MTR Corporation Limited

Shatin to Central Link –
Tai Wai to Hung Hom Section and
Mong Kok East to Hung Hom Section

Monthly EM&A Report No. 13

[Period from 1 to 30 September 2013]

(October 2013)

Verified by: Fredrick Leong

Position: Independent Environmental Checker

Date: 11 October 2013

MTR Corporation Limited

Shatin to Central Link – Tai Wai to Hung Hom Section and Mong Kok East to Hung Hom Section

Monthly EM&A Report No. 13

[Period from 1 to 30 September 2013]

(October 2013)

Certified by: Richard Kwan

Position: Environmental Team Leader

Date: 11 October 2013

AECOM

MTR Corporation Limited

Consultancy Agreements
No. C11033 & C11033B

Shatin to Central Link - Tai Wai to Hung Hom Section and Mong Kok East to Hung Hom Section

Monthly EM&A Report No. 13

[Period from 1 to 30 September 2013]

	Name	Signature
Prepared & Checked:	Joanne Tsoi	
Reviewed & Approved:	Josh Lam	

Version:	A	Date:	11 October 2013

AECOM Asia Co. Ltd.
8/F, Grand Central Plaza, Tower 2, 138 Shatin Rural Committee Road, Shatin, NT, Hong Kong
Tel: (852) 3922 9000   Fax: (852) 3922 9797   www.aecom.com

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1 INTRODUCTION

1.1 Background

1.1.1 The Shatin to Central Link (SCL) is a 17km extension of the existing Ma On Shan Line (MOL) and East Rail Line (EAL) comprising (i) The East-West Corridor which extends the MOL from Tai Wai to Hung Hom via East Kowloon to connect with the West Rail Line (WRL) at Hung Hom Station (HUH) and Stabling Sidings at Hung Hom Freight Yard (HHS); and (ii) The North-South Corridor which is an extension of the East Rail Line (EAL) at Hung Hom across the harbour to Admiralty Station (ADM).

1.1.2 Shatin to Central Link – Tai Wai to Hung Hom Section [SCL (TAW-HUH)] and Shatin to Central Link – Mong Kok East to Hung Hom Section [SCL (MKK-HUH) (hereafter referred to as "the Project") are parts of the SCL. Shatin to Central Link – Stabling Sidings at Hung Hom Freight Yard [SCL (HHS)] is a proposed stabling sidings option for SCL (TAW – HUH) at the former freight yard in Hung Hom.

1.1.3 The Environmental Impact Assessment (EIA) Reports for SCL (TAW-HUH) (Register No.: AEIAR-167/2012), SCL (MKK-HUH) (Register No.: AEIAR-165/2012) and SCL (HHS) (Register No.: AEIAR-164/2012) were approved on 17 February 2012 under the Environmental Impact Assessment Ordinance (EIAO). Following the approval of the EIA Reports, two Environmental Permits (EPs) were granted on 22 March 2012, one covers SCL (TAW-HUH) and SCL (HHS)(EP No: EP-438/2012) and the other covers SCL (MKK-HUH) and SCL (HHS) (EP No.: EP-437/2012), for their construction and operation. Variations of environmental permit (VEP) was subsequently applied for EP-438/2012 and the latest Environmental Permit (EP No: EP-438/2012/D) was issued by Director of Environmental Protection (DEP) on 13 September 2013.

1.2 Project Programme

1.2.1 Nine civil construction works contracts of the Project have been awarded since July 2012. The construction of the Project commenced in September 2012 and is expected to complete in 2018. **Table 1.1** summarises the information of the awarded Works Contracts.

Table 1.1 Summary of Awarded Works Contracts

Works Contract	Description	Construction Start Date	Contractor	Environmental Team
1101	Ma On Shan Line Modification Works[(1)]	December 2012	Sun Fook Kong Joint Venture (SFKJV)	EDMS Consulting Ltd. (EDMS)
1103	Hin Keng to Diamond Hill Tunnels	February 2013	Vinci Construction Grands Projets	Ove Arup & Partners Hong Kong Ltd.
1106	Diamond Hill Station	March 2013	Sembawang – Leader Joint Venture	Cinotech Consultants Ltd. (Cinotech)
1107	Diamond Hill to Kai Tak Tunnels	May 2013	Chun Wo - SELI Joint Venture	Cinotech Consultants Ltd. (Cinotech)
1108	Kai Tak Station and Associated Tunnels	June 2013	Kaden -Chun Wo Joint Venture	Environmental Pioneers & Solutions Ltd.
1108A	Kai Tak Barging Point Facilities	September 2012	Concentric – Hong Kong River Joint Venture (CCL-HKR JV)	Cinotech Consultants Ltd. (Cinotech)
1109	Stations and Tunnels of Kowloon City Section	September 2012	Samsung-Hsin Chong JV (SSHCJV)	ERM-Hong Kong Limited (ERM)
1111	Hung Hom North Approach Tunnels	January 2013	Gammon-Kaden SCL1111 JV	AECOM Asia Co. Ltd.

Works Contract	Description	Construction Start Date	Contractor	Environmental Team
1112	Hung Hom Station and Stabling Sidings	June 2013	Leighton Contractors (Asia) Limited	SMEC Asia Ltd., HK

Note:
(1) Only the EM&A works for works areas at Tai Wai Mei Tin Road and the offsite temporary storage areas are included in this Report.

1.3 Purpose of the Report

1.3.1 The Environmental Monitoring and Audit (EM&A) programme for the Project commenced in September 2012. This is the thirteenth EM&A Report for the Project which summarises the EM&A works undertaken by the respective Contractor's ETs during the period from 1 to 30 September 2013.

2 ENVIRONMENTAL MONITORING AND AUDIT

2.1.1 The construction of SCL has been divided into different civil construction works contracts which are covered by EP No. EP-437/2012 and/or EP-438/2012/D. As per the EP Conditions, EM&A Reports for the works contracts as shown in the table below have been prepared by the respective Contractor's ETs.

Works Contract	Contract Title	Works Covered in Environmental Permit No.
1101	Ma On Shan Modification Works	EP-438/2012/D
1103	Hin Keng to Diamond Hill Tunnels	EP-438/2012/D
1106	Diamond Hill Station	EP-438/2012/D
1107	Diamond Hill to Kai Tak Tunnels	EP-438/2012/D
1108	Kai Tak Station and Associated Tunnels	EP-438/2012/D
1108A	Kai Tak Barging Point Facilities	EP-438/2012/D
1109	Stations and Tunnels of Kowloon City Section	EP-438/2012/D
1111	Hung Hom North Approach Tunnels	EP-437/2012 & EP-438/2012/D
1112	Hung Hom Station and Stabling Sidings	EP-437/2012 & EP-438/2012/D

2.1.2 The EM&A Reports for Works Contracts 1108A, 1109, 1101, 1111, 1103, 1106, 1107, 1112 and 1108 prepared by the respective Contractor's ETs are provided in **Appendices A** to **I,** respectively. The EM&A Reports provide details of the project information, EM&A requirements, impact monitoring and audit results for the corresponding Contracts.

2.1.3 A summary of the major construction activities undertaken by the respective Contractors of various Works Contracts during the reporting period are presented in **Table 2.1**.

Table 2.1 Summary of Major Construction Activities in the Reporting Period

Works Contract	Site	Construction Activities
1101	Tai Wai Mei Tin Road	• Erection of steel structure of noise cover.
1102[(1)]	N/A	N/A
1103	Diamond Hill Area	• Diaphragm Wall Construction.
	Hin Keng Area	• Pipe Piling, • Site Setup; and • Site Formation.

Works Contract	Site	Construction Activities
	Fung Tak Area	• Utilities Diversion, • Hoarding Erection; and • Platform Construction.
	Ma Chai Hang Area	• Diaphragm Wall Construction, • Hoarding Erection; • Platform Construction; and • Site Setup.
1106	Diamond Hill Station Area	• D-wall construction; • Archaeological survey-cum-excavation; • Underpinning works of Old Pillbox; • Pre-drilling work; and • Tree transplantation.
1107	Tunnel section next to Kai Tak Station	• Site investigation works; • Investigation and removal of old foundation works; • Hoarding erection; • D-wall construction; and • Preparation works for site access and drainage.
1108	Kai Tak Station	• Installation of sheetpile cutoff wall; • Installation of dewatering well; • Installation of ground monitoring instrumentation; • Advance excavation to +3.5mPD; • Breaking of concrete pavement and material stockpile on site; • Commencement pumping test; • Additional boreholes and CPT for ground investigation works; and • Commence existing nullah decks removal works for downstream portion.
1108A	Kai Tak Barging Point Facilities	• Daily operation and maintenance of the Barging Point Facilities; and • Marine transportation of received spoil to receptor sites.
1109	Ma Tau Wai (MTW) Works Area	• TKW/MTW Road Garden – Operation of bentonite plant and pier 15 pre-drilling works; and • Along Ma Tau Wai Road - Construction of D-wall panel, predrilling for D-wall and trial pits for location of utilities.
	To Kwa Wan (TKW) Works Area	• Olympic Playground – Pre-bored H pilling; • TKW Station – Archaeological survey, construction of grout curtain, water main diversion, sheet pile, bored pile and pre-bored H pile; and • Nam Kok Road – Installation of pipe pile and construction of grout curtain.
1111	Mong Kok Freight Terminal	• Noise panel installation, Architectural Builders Works and Finishes (ABWF) & Electrical and Mechanical (E&M) works..
	Hung Hom Area	• Excavation work, demolition work, site formation, slope work; • Man hole and drainage construction,

Works Contract	Site	Construction Activities
		reinforced concrete structure construction, cross track duct construction, timber platform construction, emergency vehicular access construction, construction of excavation and lateral support structure, temporary pedestrian walkway construction, portable equipment modules construction; • Cable trough installation, overhead line portals erection, track rail installation; • Geological investigation, installation of geological instrument; • Trial pit, sheet pilling, pile pilling, pipe pilling, pre-drilling, pre-grouting; • Hoarding erection, hoarding re-alignment; • Tree felling; and • ABWF and E&M works.
1112	Hong Hom (HUH and HHS) Works Area	• Diaphragm wall construction at HUH; and • Initial excavation at HUH.

Note:
(1) Construction works under the contract have not yet commenced
N/A Not applicable

2.1.4 Impact monitoring for air quality and construction noise were conducted in accordance with the EM&A Manual in the reporting period. Under Works Contract 1109, continuous noise monitoring was also conducted according to the Continuous Noise Monitoring Plan (CNMP) in the reporting period. The air quality, construction noise and continuous noise monitoring results for this reporting month are summarised in **Tables 2.2** to **2.4**. Details of the monitoring requirements, locations, equipment, methodology and QA/QC procedures are presented in the EM&A Reports as provided in **Appendices A** to **I**.

2.1.5 The monitoring results indicated that no exceedance of the Action/Limit Levels of 24-hr TSP, construction noise and continuous noise due to the Project construction was recorded during the reporting period. Investigation of the exceedances recorded at MTW-16-1 on 6, 7, 8, 20, 21, 22, 23, 24, 26, 27, 28 August 2013 and on 29 and 30 July 2013 had been conducted. In total, exceedances were recorded in the above 13 days, of which 10 days of exceedances were considered project related and the remaining 3 days of exceedances were non-conclusive. Details of the Investigation are presented in Appendix B.

2.1.6 Water quality monitoring was not carried out during this reporting period since no dredging activity was conducted in the reporting month.

2.1.7 No environmental complaints, notification of summons and successful prosecutions were received in the reporting period. Cumulative log for environmental complaints, notification of summons and successful prosecutions is provided in **Table 2.5**.

2.1.8 Regular site inspections were conducted by the respective Contractor's ETs on a weekly basis to check the implementation of environmental pollution control and mitigation measures for the Project. No non-conformance was identified in the reporting period.

Table 2.2 Summary of 24-Hour TSP Monitoring Results in the Reporting Period

Monitoring Station ID	Location	TSP Concentration (μg/m³)	Action Level (μg/m³)	Limit Level (μg/m³)	Exceedance due to the Project Construction (Yes/No)
Works Contract 1101(6)					
Works Contract 1102(1)					
Works Contract 1103					
DMS-1	C.U.H.K.A.A. Thomas Cheung School	16.6 – 67.3	148.7	260	No
DMS-2	Price Memorial Catholic Primary School	12.8 – 65.4	167.4	260	No
Works Contracts 1103 and 1106					
DMS-3	Hong Kong S.K.H Nursing Home(2)	15.8 – 58.7	159.1	260	No
Works Contract 1106 and 1107					
DMS-4	Block 1, Rhythm Garden	22.5 – 62.6	160.4	260	No
Works Contract 1108(6)					
Works Contract 1108A(6)					
Works Contract 1109					
DMS-6	Katherine Building(3)	75 – 93	156.8	260	No
DMS-7	Parc 22(4)	78 – 100	166.7	260	No
DMS-8	SKH Good Shepherd Primary School	86 – 100	152.2	260	No
DMS-9	No. 26 Kowloon City Road(5)	83 – 97	160.9	260	No
DMS-10	Chat Ma Mansion	83 – 99	170.4	260	No
Works Contract 1111					
AM1(7)	No. 234 – 238 Chatham Road North(8)	33.9 – 103.0	183.9	260	No
Works Contract 1112					
AM2	Site Boundary of Finger Pier adjacent to Harbourfront Horizon(9)	31.1 – 70.3	182	260	No

Note:
(1) Construction works under the contract have not yet commenced
(2) Alternative monitoring location to Shek On House
(3) Alternative monitoring location to Prosperity House
(4) Alternative monitoring location to Skytower Tower 2
(5) Alternative monitoring location to Lucky Building
(6) No TSP monitoring is required under this contract
(7) AM1 named as HUH-1-3 in SCL(TAW-HUH) and SCL(HHS) EIA Reports.
(8) Alternative monitoring location to Wing Fung Building
(9) Alternative monitoring location to Harbourfront Horizon

N/A Not applicable

Table 2.3 Summary of Construction Noise Monitoring Results in the Reporting Period

Monitoring Station ID	Location	Noise Level ($L_{Aeq,30mins}$, dB(A))			Limit Level (dB(A))	Exceedance due to the Project Construction (Yes/No)
		Measured	Baseline	Corrected[8]		
Works Contract 1101[7]						
Works Contract 1102[1]						
Works Contract 1103						
NMS-CA-1	C.U.H.K.A.A. Thomas Cheung School	57.6 – 58.7	57.0	48.7 – 53.8	70 (65 during examination period)	No
NMS-CA-2	Price Memorial Catholic Primary School	67.4 – 68.9	66.0	61.8 – 65.8	70 (65 during examination period)	No
Works Contracts 1103 and 1106						
NMS-CA-3	Hong Kong S.K.H Nursing Home[2]	67.8 – 68.9	73.0	< baseline	75	No
Works Contract 1106 and 1107						
NMS-CA-4	Block 1, Rhythm Garden (north-eastern façade)	65.1 – 68.7	71.0	< baseline	75	No
NMS-CA-5	Block 1, Rhythm Garden (northern façade)[3]	65.7 – 69.6	74.0	< baseline	70 (65 during examination period)	No
Works Contract 1108[7]						
Works Contract 1108A[7]						
Works Contract 1109						
NMS-CA-6	No. 16-23 Nam Kok Road [4]	64.1 – 64.8	76.1	< baseline	75	No
NMS-CA-7	Skytower Tower 2	67.7 – 68.2	70.0	< baseline	75	No
NMS-CA-8	SKH Good Shepherd Primary School	75.1 – 77.7	75.4	< baseline – 73.8	70 (65 during examination period) (79 during the period of conducting the continuous noise monitoring) [9]	No
NMS-CA-9	Kong Yiu Mansion[5]	73.7 – 75.6	69.2	71.8 – 74.5	75	No
NMS-CA-10	Chat Ma Mansion	76.7 – 76.9	76.6	60.3 – 65.1	75	No
Works Contract 1111						
NM1	Carmel Secondary School (South Block)	67.2 – 69.2	68.0	< baseline – 63.0	70 (65 during examination period)	No

Monitoring Station ID	Location	Noise Level ($L_{Aeq,30mins}$, dB(A))			Limit Level (dB(A))	Exceedance due to the Project Construction (Yes/No)
		Measured	Baseline	Corrected[(8)]		
NM2	No. 234 – 238 Chatham Road North[(6)]	71.5 – 74.4	79.0	< baseline	75	No
Works Contract 1112[(7)]						

Note:
(1) Construction works under the contract have not yet commenced.
(2) Alternative monitoring location to Shek On House.
(3) Alternative monitoring location to Canossa Primary School (San Po Kong).
(4) Alternative monitoring location to Prosperity House.
(5) Alternative monitoring location to Lucky Building.
(6) Alternative monitoring location to Wing Fung Building.
(7) No construction noise monitoring is required under this contract.
(8) The measured noise levels are corrected against the corresponding baseline noise levels.
(9) The Limit Level of 79 dB(A) was updated on 22 Aug 2013 as per the latest Construction Noise Mitigation Measures Plan (CNMMP) and Continuous Noise Monitoring Plan (CNMP) which were approved by EPD.

Table 2.4 Summary of Continuous Noise Monitoring Results in the Reporting Period

NSR ID	NSR Description	Continuous Noise Monitoring Location	Noise Level ($L_{Aeq,30mins}$, dB(A)) Measured	Baseline	Corrected(3)	Action/Limit Level(4) dB(A)	Exceedance due to the Project Construction (Yes/No)
Works Contract 1101(2)							
Works Contract 1102(1)							
Works Contract 1103							
TAW-6-7	C.U.H.K.A.A. Thomas Cheung School	TAW-6-7 (C.U.H.K.A.A. Thomas Cheung School)	(5)	(5)	(5)	66(8)	(5)
Works Contract 1103 & 1106							
DIH-9-1(2)	Shek On Building	N/A	N/A	N/A	N/A	N/A	N/A
DIH-13-1(2)	Canossa Primary School	N/A	N/A	N/A	N/A	N/A	N/A
Works Contract 1106 & 1107							
DIH-14-1(2)	Rhythm Garden Block 2	N/A	N/A	N/A	N/A	N/A	N/A
DIH-14-5(2)	Rhythm Garden Block 1	N/A	N/A	N/A	N/A	N/A	N/A
Works Contract 1103, 1106 & 1107							
DIH-14-4(2)	Canossa Primary School (San Po Kong)	N/A	N/A	N/A	N/A	N/A	N/A
Works Contract 1108(2)							
Works Contract 1108A(2)							
Works Contract 1109							
TKW-1-1(2)	Parc 22	N/A	N/A	N/A	N/A	N/A	N/A
TKW-2-2(2)	Skytower Tower 2	N/A	N/A	N/A	N/A	N/A	N/A
TKW-3-2	Prosperity House	TKW-3-2(A) (No. 420 Prince Edward Road West)	(5)	(5)	(5)	80	(5)
MTW-12-3	Lucky Mansion	MTW-12-3 (Lucky Mansion)	(5)	(5)	(5)	80	(5)
MTW-12-4	352-354 Ma Tau Wai Rd (East Façade)	MTW-12-4 (352-354 Ma Tau Wai Rd (East Façade))	(5)	(5)	(5)	80	(5)
MTW-12-4-1	352-354 Ma Tau Wai Rd (North Facade)	MTW-12-4-1(A) (59 Maidstone Road)	(5)	(5)	(5)	82	(5)

NSR ID	NSR Description	Continuous Noise Monitoring Location	Noise Level ($L_{Aeq,30mins}$, dB(A)) Measured	Baseline	Corrected[3]	Action/Limit Level[4] dB(A)	Exceedance due to the Project Construction (Yes/No)
MTW-12-10	Lucky Building (South Facade)	MTW-12-10 Lucky Building (South Façade)	(5)	(5)	(5)	84	(5)
MTW-12-10-1	Lucky Building (East Facade)	MTW-12-10-1 Lucky Building (East Façade)	(5)	(5)	(5)	80	(5)
MTW-12-11	Jing Ming Building	MTW-12-11 Jing Ming Building	(5)	(5)	(5)	81	(5)
MTW-16-1	SKH Good Shepherd Primary School	MTW-16-1 SKH Good Shepherd Primary School	61.9 – 79.5	75.4	59.1 – 77.4	78 (79) [10]	No
MTW-18-2[9]	No. 2 Kowloon City Road	MTW-18-2(A) No. 20 Kowloon City Road	N/A	N/A	N/A	N/A	N/A
HOM-2-1--A[2]	Faerie Court (East Façade)	N/A	N/A	N/A	N/A	N/A	N/A
Works Contract 1111							
OM4a	Carmel Secondary School (South Block)	NM1 Carmel Secondary School (South Block)	(5)	(5)	(5)	69[8]	(5)
HH2[7]	Wing Fung Building	NM2 No. 234-238 Chatham Road North[6]	(5)	(5)	(5)	77	(5)
Works Contract 1112[2]							

Note:
(1) Construction works under the contract have yet to commence.
(2) No continuous noise monitoring is required under this contract.
(3) Measured noise level (above the baseline noise level) was corrected against the corresponding baseline level.
(4) Reference to the predicted maximum noise level as contained in the corresponding CNMMP.
(5) According to the CNMMP and CNMP, continuous noise monitoring is not required during this reporting month.
(6) Alternative monitoring location to Wing Fung Building.
(7) HH2 named as HUH-1-3 in SCL (TAW-HUH) and SCL(HHS) EIA Reports.
(8) Action/Limit level will only be applicable during the examination period.
(9) The building at MTW-18-2 has been demolished. During the period of residual noise impact exceeding criteria predicted in the corresponding CNMMP, there will be no NSR occupied at this location. It is therefore not necessary carry out continuous noise monitoring at this location.
(10) The Limit Level of 79 dB(A) was updated on 22 Aug 2013 as per the latest Construction Noise Mitigation Measures Plan (CNMMP) and Continuous Noise Monitoring Plan (CNMP) which were approved by EPD.

N/A Not applicable

Table 2.5 Cumulative Log for Environmental Complaints, Notification of Summons and Successful Prosecutions

Works Contract	Environmental Complaints		Notification of Summons		Successful Prosecutions	
	Reporting Month	Cumulative Number	Reporting Month	Cumulative Number	Reporting Month	Cumulative Number
1101	0	0	0	0	0	0
1102(1)	N/A	N/A	N/A	N/A	N/A	N/A
1103	0	0	0	0	0	0
1106	0	0	0	0	0	0
1107	0	0	0	0	0	0
1108	0	0	0	0	0	0
1108A	0	0	0	0	0	0
1109	0	0	0	0	0	0
1111	0	0	0	0	0	0
1112	0	0	0	0	0	0

Note:
(1) Construction works under the contract have not yet commenced
N/A Not applicable

3 IMPLEMENTATION STATUS ON THE ENVIRONMENTAL PROTECTION REQUIREMENTS

3.1.1 The respective Contractors have implemented all mitigation measures and requirements as stated in the EIA Reports, EM&A Manuals and EP (EP-438/2012/D and EP-437/2012). The status of required submissions under the EPs as of the reporting period are summarised in **Table 3.1** and **3.2**.

Table 3.1 Summary of Status of Required Submissions for EP-438/2012/D

EP Condition (EP-438/2012/D)	Submission	Submission date
Condition 1.12	Notification of Commencement Date of Construction of the Project	1 Aug 2012
Condition 2.3	Notification of Information of Community Liaison Groups	13 Jul 2012 (1st submission) 31 Aug 2012 (2nd submission) 30 Nov 2012 (3rd submission)
Condition 2.7	Management Organisation of Main Construction Companies	27 Jul 2012 (1st submission) 21 Aug 2012 (2nd submission) 19 Dec 2012 (3rd submission) 22 Jan 2013 (4th submission) 30 Apr 2013 (5th submission) 21 May 2013 (6th submission)
Condition 2.8	Construction Programme and EP Submission Schedule	27 Jul 2012
Condition 2.9	Construction Noise Mitigation Measures Plan (CNMMP)	1 Aug 2012 (1st submission) 28 Sep 2012 (2nd submission) 30 Nov 2012 (3rd submission) 11 Jan 2013 (4th submission) 8 Feb 2013 (Approved for Contracts 1109, 1111 and 1103) 8 Feb 2013 (5th submission) 26 Apr 2013 (6th submission) 11 Jun 2013 (7th submission) 12 July 2013 (Approved) 26 July 2013 (8th submission) 22 Aug 2013 (Approved) 23 Aug 2013 (9th submission) 13 Sept 2013 (Approved)
Condition 2.10	Continuous Noise Monitoring Plan (CNMP)	1 Aug 2012 (1st submission) 28 Sep 2012 (2nd submission) 30 Nov 2012 (3rd submission) 11 Jan 2013 (4th submission) 8 Feb 2013 (Approved for Contracts 1109, 1111 and 1103) 8 Feb 2013 (5th submission) 26 Apr 2013 (6th submission) 11 Jun 2013 (7th submission) 12 July 2013 (Approved) 26 July 2013 (8th submission) 22 Aug 2013 (Approved) 23 Aug 2013 (9th submission) 13 Sept 2013 (Approved)
Condition 2.11	Construction and Demolition Materials Management Plan (C&DMMP)	6 Jul 2012 (1st submission) 12 Sep 2012 (2nd submission) 10 Oct 2012 (Approved)
Condition 2.12	Sediment Management Plan	6 Jul 2012 (1st submission) 12 Sep 2012 (2nd submission) 5 Oct 2012 (3rd submission) 10 Oct 2012 (Approved) 4 Mar 2013 (4th submission) 9 May 2013 (5th submission) 24 July 2013 (6th submission) 26 July 2013 (Approved)

EP Condition (EP-438/2012/D)	Submission	Submission date
Condition 2.13	Visual, Landscape, Tree Planting & Tree Protection Plan	6 Jul 2012 (1st submission) 30 Aug 2012 (2nd submission) 3 Oct 2012 (3rd submission) 13 Nov 2013 (Approved for Contracts 1101, 1106 and 1109) 14 Nov 2012 (4th submission) 8 Feb 2013 (5th submission) 18 Mar 2013 (6th submission) 18 June 2013 (7th submission) 12 July 2013 (Approved)
Condition 2.14	Transplantation Proposal for Plant Species of Conservation Importance	22 Aug 2012 (1st submission) 5 Oct 2012 (2nd submission) 26 Nov 2012 (3rd submission) 4 Dec 2012 (Approved)
Condition 2.15	Conservation Plan	31 Jan 2013 (1st submission) 18 Mar 2013 (2nd submission) 24 Apr 2013 (Approved)
Condition 2.16	Archaeological Action Plan(s) (AAP(s)) for Works Contract 1109	10 Aug 2012 (1st submission) 3 Sep 2012 (2nd submission) 21 Sep 2012 (Approved)
Condition 2.16	Archaeological Action Plan(s) (AAP(s)) for Works Contract 1106	29 Jan 2013 (1st submission) 19 Mar 2013 (2nd submission) 8 Apr 2013 (Approved)
Condition 2.23	Supplementary Contamination Assessment Report for New Territories South Animal Centre	28 Sep 2012 25 Oct 2012 (Approved)
Condition 3.3	Baseline Monitoring Report (Works Contract 1109 - Stations and Tunnels of Kowloon City Section)	27 Jul 2012
Condition 3.3	Baseline Monitoring Report (Works Contract 1108A – Kai Tak Barging Point Facilities)	31 Jul 2012
Condition 3.3	Baseline Monitoring Report (Works Contracts 1103, 1106 and 1111 – Hin Keng to Diamond Hill Tunnels, Diamond Hill Station, and Hung Hom North Approach Tunnels)	19 Oct 2012
Condition 3.4	Monthly EM&A Report No. 1 Monthly EM&A Report No. 2 Monthly EM&A Report No. 3 Monthly EM&A Report No. 4 Monthly EM&A Report No. 5 Monthly EM&A Report No. 6 Monthly EM&A Report No. 7 Monthly EM&A Report No. 8 Monthly EM&A Report No. 9 Monthly EM&A Report No. 10 Monthly EM&A Report No. 11 Monthly EM&A Report No. 12	12 Oct 2012 14 Nov 2012 13 Dec 2012 14 Jan 2013 14 Feb 2013 14 Mar 2013 12 Apr 2013 14 May 2013 14 Jun 2013 12 Jul 2013 15 Aug 2013 13 Sept 2013

Table 3.2 Summary of Status of Required Submissions for EP-437/2012

EP Condition (EP-437/2012)	Submission	Submission date
Condition 1.11	Notification of Commencement Date of Construction of the Project	30 Nov 2012
Condition 2.3	Notification of Information of Community Liaison Groups	30 Nov 2012
Condition 2.5	Management Organisation of Main Construction Companies	19 Dec 2012 (1st submission) 30 Apr 2013 (2nd submission)
Condition 2.6	Construction Programme and EP Submission Schedule	19 Dec 2012

EP Condition (EP-437/2012)	Submission	Submission date
Condition 2.7	Construction Noise Mitigation Measures Plan (CNMMP)	30 Nov 2012 (1st submission) 8 Feb 2013 (Approved for Contract 1111) 26 Apr 2013 (2nd submission) 11 Jun 2013 (3rd submission) 27 Aug 2013 (Approved)
Condition 2.8	Continuous Noise Monitoring Plan (CNMP)	30 Nov 2012 (1st submission) 11 Jan 2013 (2nd submission) 8 Feb 2013 (Approved for Contract 1111)
Condition 2.9	Construction and Demolition Materials Management Plan (C&DMMP)	6 Jul 2012 (1st submission) 12 Sep 2012 (2nd submission) 15 Oct 2012 (Approved)
Condition 2.10	Sediment Management Plan	6 Jul 2012 (1st submission) 12 Sep 2012 (2nd submission) 5 Oct 2012 (3rd submission) 15 Oct 2012 (Approved)
Condition 2.11	Visual, Landscape, Tree Planting & Tree Protection Plan	14 Nov 2012 (1st submission) 8 Feb 2013 (2nd submission)
Condition 3.3	Baseline Monitoring Report (Works Contracts 1103, 1106 and 1111 – Hin Keng to Diamond Hill Tunnels, Diamond Hill Station, and Hung Hom North Approach Tunnels)	19 Oct 2012
Condition 3.4	Monthly EM&A Report No. 5 Monthly EM&A Report No. 6 Monthly EM&A Report No. 7 Monthly EM&A Report No. 8 Monthly EM&A Report No. 9 Monthly EM&A Report No. 10 Monthly EM&A Report No. 11 Monthly EM&A Report No. 12	14 Feb 2013 14 Mar 2013 12 Apr 2013 14 May 2013 14 Jun 2013 12 Jul 2013 15 Aug 2013 13 Sept 2013

Appendix A

13th EM&A Report for Works Contract 1108A – Kai Tak Barging Point Facilities

MTR Corporation Limited

Shatin to Central Link –
Tai Wai to Hung Hom Section

Monthly EM&A Report No.13

[Period from 1 to 30 September 2013]

Works Contract 1108A – Kai Tak Barging Point Facilities

(October 2013)

Certified by: Dr. Priscilla Choy

Position: Environmental Team Leader

Date: 10th October 2013

Concentric – Hong Kong River Joint Venture

Shatin to Central Link – Contract 1108A Kai Tak Barging Point Facilities

Monthly Environmental Monitoring and Audit Report for September 2013

(Version 2.0)

Certified By	
	(Contractor's Environmental Team Leader)

REMARKS:

The information supplied and contained within this report is, to the best of our knowledge, correct at the time of printing.

CINOTECH accepts no responsibility for changes made to this report by third parties.

CINOTECH CONSULTANTS LTD
Room 1710, Technology Park,
18 On Lai Street,
Shatin, NT, Hong Kong
Tel: (852) 2151 2083 Fax: (852) 3107 1388
Email: info@cinotech.com.hk

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EXECUTIVE SUMMARY

Introduction

1. This is the 13th monthly Environmental Monitoring and Audit (EM&A) Report prepared by Cinotech Consultants Limited for MTR Contract no. 1108A "Shatin to Central Link - Kai Tak Barging Point Facilities". This report documents the findings of EM&A Works conducted in September 2013.

Summary of Site Activities undertaken during Reporting Month

2. The major site activities undertaken in the reporting month included:
   - Daily operation and maintenance of the Barging Point Facilities; and
   - Marine transportation of received spoil to receptor sites.

Environmental Monitoring and Audit Progress

3. A summary of the monitoring activities in this reporting period is listed below:
   - Water Quality Monitoring at each monitoring station…………………………......Nil
   - Environmental Site Inspection……………………………….…………...…4 times

Water Quality

4. No water quality monitoring was carried out as no dredging activity was conducted during the reporting month.

Waste Management

5. Wastes generated from this Project include inert construction and demolition (C&D) materials and non-inert C&D materials. No inert C&D materials and non-inert C&D materials were generated during the reporting period. Non-inert C&D materials are made up of general refuse, steel materials and paper/cardboard packaging materials.

Environmental Site Inspection

6. A monthly joint environmental site inspection was carried out by the representatives of the Contractor, the IEC and the ET. Details of the audit findings and implementation status are presented in Section 6.

Ecology/Landscape and Visual

7. Details of the audit findings and implementation status on Ecology/Landscape and Visual are presented in Section 6.

Environmental Exceedance/Non-conformance/Complaint/Summons and Prosecution

8. Summary of the events and action taken and key information in the reporting month is tabulated in **Table I** and **Table II** respectively.

Table I Summary Table for Events Recorded in the Reporting Month

Parameter	No. of Exceedance		Action Taken
	Action Level	Limit Level	
Water Quality Monitoring	N/A	N/A	N/A

Table II Summary Table for Key Information in the Reporting Month

Event	Event Details		Action Taken	Status	Remark
	Number	Nature			
Complaint received	0	---	N/A	N/A	---
Changes to the assumptions and key construction / operation activities recorded	0	---	N/A	N/A	---
Notifications of any summons & prosecutions	0	---	N/A	N/A	---

Future Key Issues

9. Major site activities for the coming reporting month will include:

- Daily operation and maintenance of the Barging Point Facilities; and
- Marine transportation of received spoil to receptor sites.

1 INTRODUCTION

1.1 Cinotech Consultants Limited (Cinotech) was appointed by Concentric – Hong Kong River JV as the Environmental Team (ET) to undertake the Environmental Monitoring and Audit (EM&A) programme during construction phase of the MTR Shatin to Central Link Works Contract 1108A – Kai Tak Barging Point Facilities (hereafter referred to the Project).

Purpose of the report

1.2 This is the 13th EM&A report which summarises the impact monitoring results and audit findings for the EM&A programme during the reporting period from 1 September to 30 September 2013.

Structure of the report

1.3 The structure of the report is as follows:

Section 1: **Introduction -** details the scope and structure of the report.

Section 2: **Project Information** - summarises background and scope of the project, site description, project organization and contact details, construction programme, the construction works undertaken and the status of Environmental Permits/Licenses during the reporting period.

Section 3: **Environmental Monitoring Requirement -** summarises the monitoring parameters, monitoring programmes, monitoring methodologies, monitoring frequency, monitoring locations, Action and Limit Levels, Event / Action Plans, environmental mitigation measures as recommended in the EIA report and relevant environmental requirements.

Section 4: **Implementation Status on Environmental Mitigation Measures -** summarises the implementation of environmental protection measures during the reporting period.

Section 5: **Monitoring Results** - summarises the monitoring results obtained in the reporting period.

Section 6: **Environmental Site Inspection -** summarises the audit findings of the weekly site inspections undertaken within the reporting period.

Section 7: **Environmental Non-conformance -** summarises any monitoring exceedance, environmental complaints and environmental summons within the reporting period.

Section 8: **Future Key Issues -** summarises the impact forecast and monitoring schedule for the next three months.

Section 9: **Conclusions and Recommendations**

2 PROJECT INFORMATION

Background

2.1 The Shatin to Central Link – Tai Wai to Hung Hom Section (hereafter referred to as SCL (TAW-HUH)) is an approximately 11 km long extension of the Ma On Shan Line and links up with the West Rail Line at Hung Hom forming a strategic east-west rail corridor. It is a Designated Project under the Environmental Impact Assessment Ordinance (Cap. 499) (EIAO).

2.2 The construction of the SCL (TAW-HUH) has been divided into a series of civil construction Works Contracts. In addition to the temporary work site in the vicinity of the tunnel and station structures, there are some off-site temporary works sites/areas to facilitate the construction process. This Works Contract 1108A is one of the off-site temporary works sites covers the construction and operation of barging facilities.

General Site Description

2.3 The site layout plan is presented in **Figure 1**.

Construction Programme and Activities

2.4 A summary of the major site activities undertaken in this reporting period is shown as follows. The tentative construction programme is presented in **Appendix H**.

- Daily operation and maintenance of the Barging Point Facilities; and
- Marine transportation of received spoil to receptor sites.

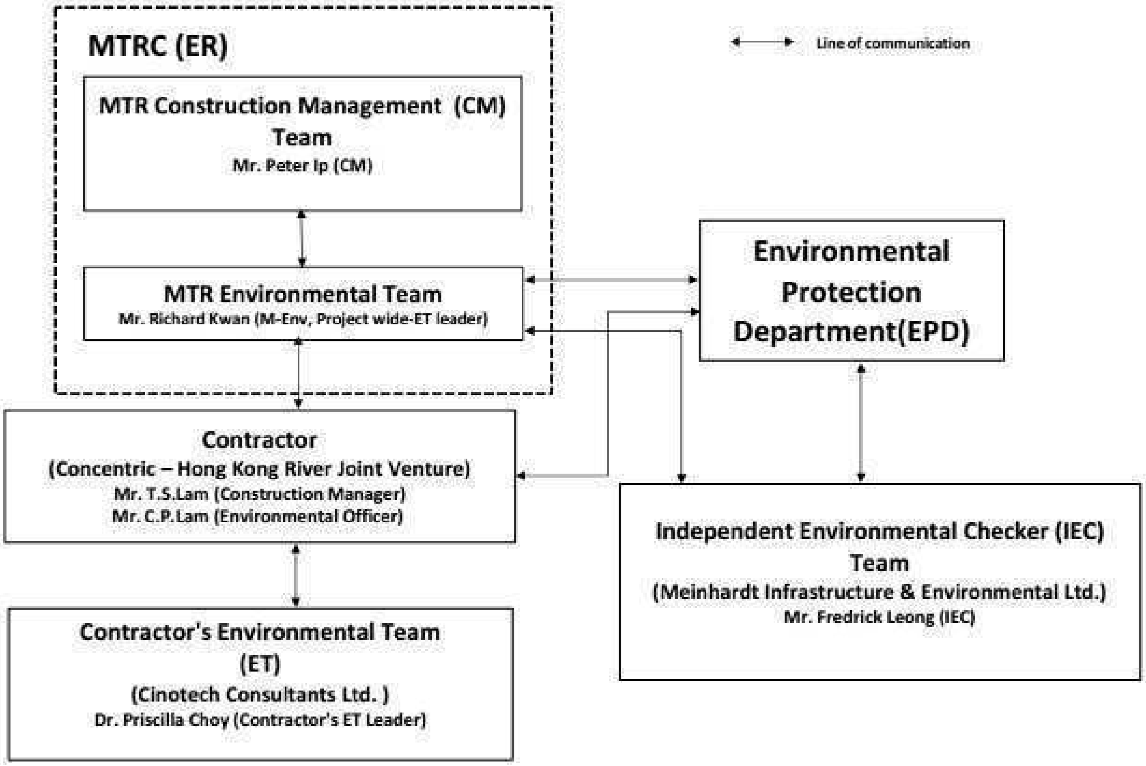
Project Organisation

2.5 Different parties with different levels of involvement in the project organization include:

- Engineer or Engineer's Representative (ER) – MTR Corporation (MTRC)
- Contractor's Environmental Team (ET) – Cinotech Consultants Ltd. (Cinotech)
- Independent Environmental Checker (IEC) – Meinhardt Infrastructure & Environment Ltd. (Meinhardt)
- Contractor – Concentric – Hong Kong River Joint Venture (CCL-HKR JV)

2.6 The responsibilities of respective parties are detailed in Section 3 of the SCL (TAW-HUH) EM&A Manual.

2.7 The project organisation chart is shown as follows:



2.8 The key contacts of the Project are shown in **Table 2.1**.

Table 2.1 Key Contacts of the Project

Party	Role	Name	Position	Phone No.	Fax No.
MTRC	ER	Mr. Peter IP	Construction Manager	3507 6889	2334 0323
	Environmental Team	Mr. Richard KWAN	SCL Project Environmental Team Leader	2688 1283	2993 7577
Cinotech	Contractor's Environmental Team	Dr. Priscilla CHOY	Contractor's ET Leader	2151 2089	3107 1388
		Ms. Ivy TAM	Project Coordinator and Audit Team Leader	2151 2090	
Meinhardt	Independent Environmental Checker	Mr. Fredrick LEONG	Independent Environmental Checker	2858 0738	2540 1580
CCL-HKR JV	Contractor	Mr. T.S. LAM	Construction Manager	9655 5486	2398 8301
		Mr. C.P. LAM	Environmental Officer	9212 9417	
		Ms. Jane ZHU	Quality Engineer	6207 3974	

Status of Environmental Licences, Notification and Permits

2.9 Application for Variation of Environmental Permit (Application No. VEP-382/2012) was submitted by the Permit Holder on 17 October 2012 for amending Conditions 2.21 and 2.22 in Part C of Environmental Permit No. EP-438/2012/A. Environmental Permit No. EP-438/2012/B was issued by EPD on 26 October 2012 based on this application. The EP was superseded by EP-438/2012/C from 30th April 2013.

2.10 An updated Environmental Permit (EP) (EP No. EP-438/2012/D) was granted on 13th September 2013. A summary of the relevant permits, licences, and/or notifications on environmental protection for this Project is presented in **Table 2.2**.

Table 2.2 Status of Environmental Licences, Notification and Permits

Permit / License No.	Valid Period		Status
	From	To	
Environmental Permit (EP)			
EP-438/2012/B	26/10/2012	29/04/2013	Superseded by EP-438/2012/C
EP-438/2012/C	30/04/2013	12/09/2013	Superseded by EP-438/2012/D
EP-438/2012/D	13/09/2013	N/A	Valid
Construction Noise Permit (CNP)			
GW-RE0754-12	24/09/2012	23/03/2013	Expired
GW-RE0272-13	26/03/2013	23/09/2013	Expired
GW-RE0969-13	24/09/2013	23/03/2014	Valid
Marine Dumping Permits			
EP/MD/13-075	10/10/2012	09/11/2012	Expired
EP/MD/13-074	26/10/2012	25/11/2012	Expired
Notification pursuant to Air Pollution Control (Construction Dust) Regulation			
EPD reference no. 348913	22/08/2012	N/A	Receipt acknowledged by EPD
Billing Account for Construction Waste Disposal			
A/C# 7015860	29/08/2012	N/A	Valid
Registration of Chemical Waste Producer			
WPN5213-286-C3752-01	17/09/2012	N/A	Valid
Effluent Discharge License under Water Pollution Control Ordinance			
WT00014328-2012	07/11/2012	30/11/2017	Valid

Summary of EM&A Requirements

2.11 The EM&A programme under 1108A require construction phase water quality monitoring as well as environmental site audits. The EM&A requirements are described in the following sections, including:

- All monitoring parameters;
- Action and Limit levels for all environmental parameters;
- Event / Action Plans;
- Environmental mitigation measures, as recommended in the project EIA study final report; and
- Environmental requirements in contract documents.

2.12 The advice on the implementation status of environmental protection and pollution control/mitigation measures is summarized in Section 6 of this report.

2.13 This report presents the monitoring results, observations, locations, equipment, period, methodology and QA/QC procedures of the required monitoring parameters, namely water quality as well as audit works for the Project in the reporting month.

3 ENVIRONMENTAL MONITORING REQUIREMENTS

Water Quality Monitoring

Monitoring Location

3.1 In accordance with the EM&A Manual, marine water quality monitoring should be carried out while dredging activities are conducting. The water quality monitoring stations and control stations of Project are shown in **Figure 2**. The co-ordinates of the proposed monitoring stations (construction phase – dredging activities) are listed in **Table 3.1**. As shown in **Figure 2**, the proposed locations are classified as Impact Station and Control Station according to their functions.

Table 3.1 Water Quality Monitoring Stations

Station	Description	East	North	Parameters to be measured
IS-1(1)	Impact Station for Dredging Activities	838499	819333	DO, Turbidity, SS
CS-1	Control Station for IS-1	838170	818903	DO, Turbidity, SS
CS-2	Control Station for IS-1	838912	818997	DO, Turbidity, SS

Note: (1) As per Baseline Monitoring Report under consultancy agreement No. NEX/2213, there was a slight adjustment for the monitoring station IS-1 due to the site constraint as the original monitoring location (Easting: 838450, Northing: 819399) has been occupied by barges/dredgers of other projects.

Monitoring Parameters, Frequency and Programme

3.2 Water quality monitoring was conducted in accordance with the requirements stipulated in the approved SCL(TAW-HUH) EM&A Manual. **Table 3.2** summarized the monitoring frequency and water quality parameters for the impact monitoring.

Table 3.2 Water Quality Impact Monitoring Programme

	Impact Monitoring
Monitoring Period	During dredging period
Monitoring Frequency	3 Days in a Week, at mid-flood and mid-ebb tides
Monitoring Locations	IS-1, CS-1, CS-2
Monitoring Parameters	DO, temperature, turbidity, pH, salinity and SS
Intervals between 2 Sets of Monitoring	Not less than 36 hours
Tide Range	Individual flood and ebb tides not less than 0.5m

Monitoring Equipment and Methodology

Dissolved Oxygen and Temperature Measuring Equipment

3.3 The instrument should be portable and weatherproof dissolved oxygen (DO) measuring instrument complete with cable and sensor, and use a DC power source. The equipment should be capable of measuring:
- DO level in the range of 0 - 20 mg/ L and 0 - 200% saturation; and
- Temperature of 0 - 45 degree Celsius.

3.4 The equipment should have a membrane electrode with automatic temperature compensation complete with a cable.

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

Turbidity Measurement Instrument

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

Water Sampler

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

Water Depth Detector

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

Salinity Measuring Equipment

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

pH Measuring Equipment

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

Sample Containers and Storage

3.11 Water samples for SS determinations should be stored in high density polythene bottles with no preservative added, packed in ice (cooled to 4°C without being frozen) and shipment to the testing laboratory. The samples shall be delivered to the laboratory within 24 hours of collection and be analysed as soon as possible after collection.

Position Equipment

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

Calibration of In-Situ Instruments

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

Back-up Equipment and Vessels

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

3.15 The water quality monitoring will involve three monitoring stations and measurements should be conducted within the prescribed tidal conditions in order to ensure the measurement/samples are representative. A multi-probe monitoring equipment set integrated with water sampler(s) is highly recommended to improve the monitoring efficiency. Depending on the actually operation, more than one field survey vessels might be required simultaneously to ensure the monitoring are conducted within the acceptable monitoring period. The ET shall also consider the use of unattended automatic sampling/monitoring devices at fixed stations where monitoring are required throughout the construction period. The use of such unattended automatic devices, however, shall be subject to the approval of the ER, IEC and EPD.

Laboratory Measurement / Analysis

3.16 At least 3 replicate samples from each independent sampling event are required for the suspended solids measurement which shall be carried in a HOKLAS or international accredited laboratory. Sufficient water samples shall be collected at the monitoring stations for carrying out the laboratory measurement and analysis. The laboratory determination work shall start within 24 hours after collection of the water samples. The analysis for SS is summarized in **Table 3.3**.

Table 3.3 Laboratory analysis for SS

Parameters	Analytical Method	Reporting Limit
Suspended Solid (SS)	APHA 2540-D	0.1 mg/L

Action and Limit Levels

3.17 The action and limit levels for water quality monitoring are presented in **Appendix A**.

Event and Action Plan

3.18 Should non-compliance of the criteria occur, action in accordance with the Event and Action Plan in **Appendix D** shall be carried out.

Cultural Heritage

3.19 According to the location of the Project and EIA report, there are no terrestrial archaeological resources and built heritage resources in vicinity of the Project. Archaeological monitoring works and the implementation of mitigation measures during the construction and operation phases of the Project is, therefore, not required.

3.20 However, the Contractor shall allow a 25m separation distance between the proposed dredging area and the Kowloon Rock as specified in the approved SCL(TAW-HUH) EIA Report.

Landscape and Visual

3.21 In accordance with the EM&A Manual, the landscape and visual mitigation measures shall be implemented and a site inspection shall be conducted once every two weeks throughout the construction period. The implementation status is summarised in **Table 6.1** of Section 6.

Ecology

3.22 In accordance with the EM&A Manual, weekly site audits should be conducted by the ET during construction phase of the Project to check the recommended mitigation measures should be properly implemented.

4 IMPLEMENTATION STATUS ON ENVIRONMENTAL PROTECTION REQUIREMENTS

4.1 The Contractor has implemented environmental mitigation measures and requirements as stated in the EIA Report, the Environmental Permit and EM&A Manual. The implementation status of the environmental mitigation measures during the reporting period is summarized in **Appendix E**. Status of required submissions under the Environmental Permit (EP) during the reporting period is presented in **Table 4.1**.

Table 4.1 Status of Required Submissions under EP

Event	Event Details		Action Taken	Status	Remark
	Number	Nature			
Status of submissions under EP	1	Monthly EM&A Report (August 2013)	Submitted to EPD on 13th September 2013 (EP Condition 3.4)	N/A	---

5 MONITORING RESULTS

Water Quality

5.1 No water quality monitoring was carried out at the monitoring stations during this reporting period as the dredging activity was completed on 11 November 2012.

5.2 Action and Limit Levels for water quality monitoring were established in the baseline water quality monitoring conducted by MTR between 16 June 2012 and 14 July 2012 under consultancy agreement no. NEX/2213. Action and Limit Levels for water quality is summarised in **Appendix A**.

Waste Management

5.3 Waste potentially generated from this Project includes inert construction and demolition (C&D) materials, non-inert C&D materials and dredging materials. Non-inert C&D materials are made up of general refuse, steel and paper/cardboard packaging materials. Steel materials generated from the project are also grouped into non-inert C&D materials as the materials were not disposed of with other inert C&D materials. With reference to relevant handling records and trip tickets of this Project, the quantities of different types of waste generated in the reporting month are summarised in **Table 5.1**. No paper/cardboard packaging, plastics and steel material were generated during the reporting period.

5.4 Detail of waste management data is presented in **Appendix F**.

Table 5.1 Quantities of Waste Generated from the Project

Reporting Month	Quantity						
	C&D Materials (inert) [(a)]	C&D Materials (non-inert)[(b)]	Dredging Quantity (in bulk volume)	Chemical Waste	Recycled materials		
					Paper/ cardboard	Plastics	Metals
September 2013	0 m^3	0 m^3	0 m^3	0 *kg*	0 *kg*	0 *kg*	0 *kg*

Notes:
(a) Inert C&D materials include bricks, concrete, building debris, rubble and excavated soil.
(b) Non-inert C&D materials include steel, paper/cardboard packaging waste, plastics and other wastes such as general refuse. Steel materials generated from the project are grouped into non-inert C&D materials as the materials were not disposed of with other inert C&D materials.

Landscape and Visual

5.5 The observations and recommendations made during the audit sessions are summarized in **Table 6.1**.

Ecology

5.6 The observations and recommendations made during the audit sessions are summarized in **Table 6.1**.

6 ENVIRONMENTAL SITE INSPECTION

Site Audits

6.1 Site audits were carried out by ET on weekly basis to monitor the timely implementation of proper environmental management practices and mitigation measures in the Project site. The summaries of site audits are attached in **Appendix C**.

6.2 Site audits were conducted on 3, 12, 18 and 24 September 2013 by ET. A joint site audit with the representative with IEC, ER, the Contractor and the ET was carried out on 12 September 2013. No site inspection was conducted by EPD during the reporting month. The details of observations during site audit can refer to **Table 6.1**.

Implementation Status of Environmental Mitigation Measures

6.3 According to the EIA Study Report, Environmental Permit and the EM&A Manual of the Project, the mitigation measures detailed in the documents are recommended to be implemented during the construction phase. An updated summary of the EMIS is provided in **Appendix E**.

6.4 During site inspections in the reporting month, no non-conformance was identified. The observations and recommendations made during the audit sessions are summarized in **Table 6.1**.

Table 6.1 Observations and Recommendations of Site Audit

Parameters	Date	Observations and Recommendations	Follow-up
Water Quality	27 August 2013	Reminder: Clear the stand water on the drip tray at the floating jetty.	The observation was observed to be improved/rectified by the Contractor during the audit session on 3 September 2013.
	3 September 2013	Reminder: Properly clear the sand and mud near the floating jetty to avoid it from entering the sea.	The observation was observed to be improved/rectified by the Contractor during the audit session on 18 September 2013.
	12 September 2013	Reminder: Sand and mud was observed to accumulate on the floating jetty. The contractor was reminded to clear the sand and mud to avoid it from entering the sea. In addition, the contractor was reminded to provide water spray on the floating jetty properly but not to over-water the deck.	The observation was observed to be improved/rectified by the Contractor during the audit session on 18 September 2013.
Noise	N/A	N/A	N/A
Ecology/ Landscape and Visual	N/A	N/A	N/A
Air Quality	27 August 2013	Reminder: Provide water spray regularly for the surface on the floating jetty and the stockpile.	The observation was observed to be improved/rectified by the Contractor during the audit session on 3 September 2013.
	18 September 2013	Reminder: Properly repair the dust enclosures for conveyer belt to avoid any hole.	The observation was observed to be improved/rectified by the Contractor during the audit session on 24 September 2013.

Parameters	Date	Observations and Recommendations	Follow-up
	18 September 2013	Reminder: Clear the sand deposited in the site area and near the floating jetty to avoid dust generation.	Follow up action will be reported in next reporting period.
	24 September 2013	Reminder: Remove the sand and mud leaked from the stockpile to avoid dust generation.	Follow up action will be reported in next reporting period.
	24 September 2013	Reminder: The automatic water spray was found to spray in wrong direction. The contractor was reminded to properly provide water spray to stockpile.	Follow up action will be reported in next reporting period.
Waste / Chemical Management	27 August 2013	Reminder: Provide a drip tray with larger capacity for the chemical container near the material storage area.	The observation was observed to be improved/rectified by the Contractor during the audit session on 3 September 2013.
	3 September 2013	Reminder: Properly clear the oil stain as chemical waste near the site entrance.	The observation was observed to be improved/rectified by the Contractor during the audit session on 12 September 2013.
	18 September 2013	Reminder: Properly clear the oil stain on the ground as chemical waste.	The observation was observed to be improved/rectified by the Contractor during the audit session on 24 September 2013.
Permits / Licenses	24 September 2013	Reminder: Properly display the EP at the site entrance.	Follow up action will be reported in next reporting period.

7 ENVIRONMENTAL NON-CONFORMANCE

Summary of Exceedances

7.1 No impact monitoring was conducted in the reporting month. The summary of exceedance is provided in **Appendix B**.

Summary of Environmental Non-Compliance

7.2 No environmental non-compliance was recorded in the reporting month.

Summary of Environmental Complaint

7.3 No environmental related complaint, prosecution or notification of summons was received in the reporting month. The Complaint Log is presented in **Appendix G**.

Summary of Environmental Summon and Successful Prosecution

7.4 There was no environmental complaint, prosecution or notification of summons received since the Project commencement.

8 FUTURE KEY ISSUES

Key Issues in the Coming Month

8.1 Key issues to be considered in the coming month include:

- Potential dust and noise impacts arising from unloading and temporary stockpiling of C&D material during full operation of the Barging Point Facilities.
- Potential water pollution problem due to the discharge of site runoff during rainfall events.
- Potential environmental impacts arising from unloading and handling of C&D material to the barge.
- Potential splashing of spoils into the surrounding seawater arising from handling/unloading of the spoil at the discharge points.

Site Activities for the Next Month

8.2 A tentative construction programme is provided in **Appendix H**. The major site activities in the coming month will include:

- Daily operation and maintenance of the Barging Point Facilities; and
- Marine transportation of received spoil to receptor sites.

9 CONCLUSIONS AND RECOMMENDATIONS

Conclusions

9.1 The Environmental Monitoring and Audit (EM&A) Report presents the EM&A works undertaken during the period from 1 September 2013 to 30 September 2013 in accordance with EM&A Manual and the requirement under EP-438/2012/D.

9.2 No impact monitoring was conducted in the reporting month.

9.3 There was no environmental complaint, prosecution or notification of summons received.

9.4 The ET will keep track on the EM&A programme to ensure compliance of environmental requirements and the proper implementation of all necessary mitigation measures.

Recommendations

9.5 According to the environmental audit performed in the reporting month, the following recommendations were made:

Water Quality

- Provide adequate measures to avoid any splashing of spoils into the surrounding seawater when handling/unloading the spoil at the discharge points.

Air Quality

- Flexible dust curtains should be properly installed at the discharge point for dust suppression when in operation.
- Dust enclosures for the loading ramp should be properly installed and maintained in good condition to prevent fugitive dust emissions at barging point.
- Provide water spray on the floating jetty regularly to avoid the generation of dust from vehicles.

Waste / Chemical Management

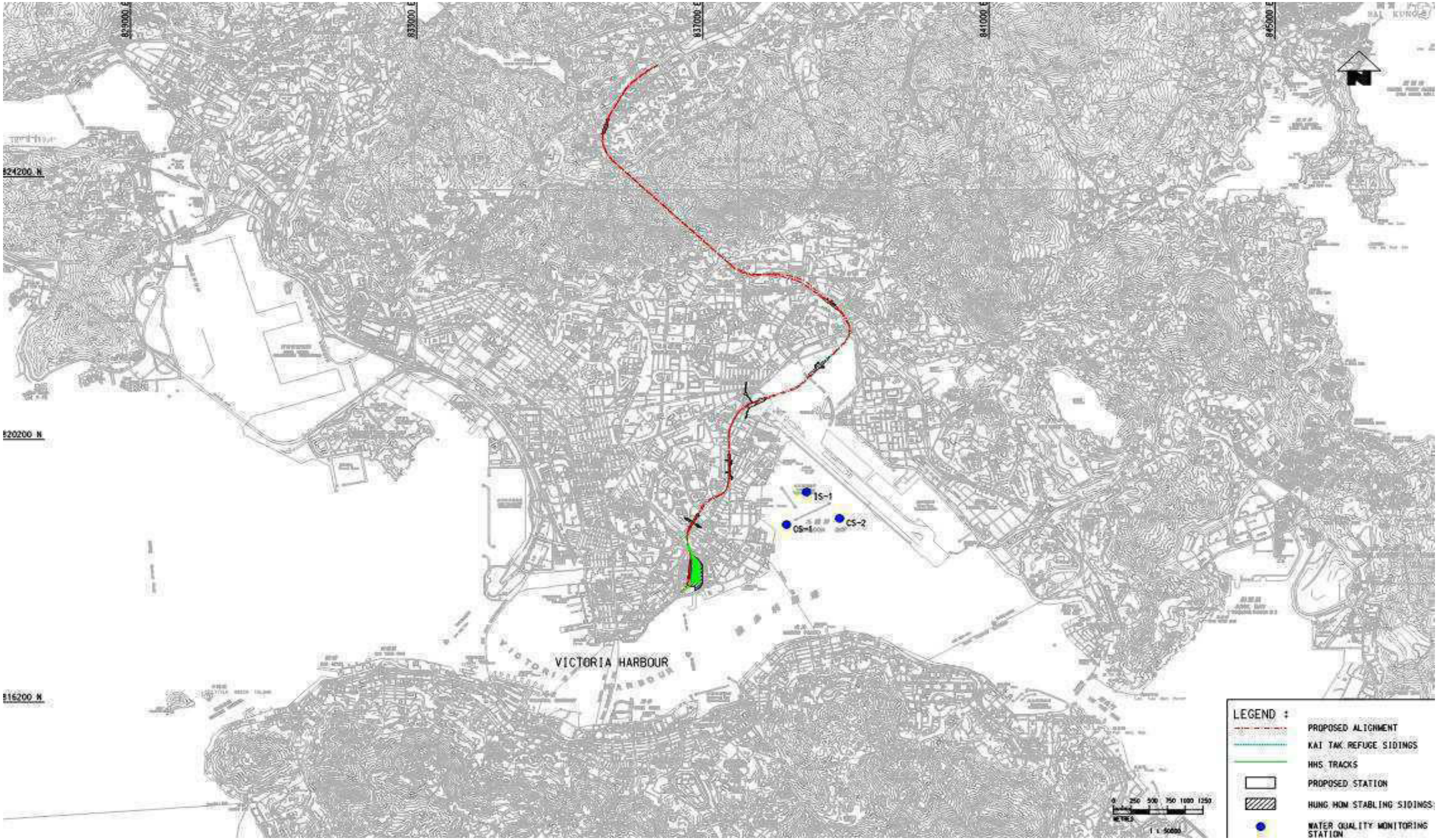
- Provide and properly maintain drip trays with adequate capacity for equipment or temporary use of chemicals.
- Chemical wastes should be placed and labeled properly at designated area.

Permits / Licenses

- Environmental Permit should be displayed conspicuously at the site entrance and make available for checking.

FIGURES

Title		Scale	Proposal No.	
	SCL Contract 1108A The Shatin to Central Link - Kai Tak Barging Point Facilities Site Layout Plan	N.T.S	MA12028	CINOTECH
		Date Oct-12	Figure 1	



Title		Scale	Proposal No.	
SCL Contract 1108A The Shatin to Central Link - Kai Tak Barging Point Facilities Location of Water Monitoring Station and Control Stations		N.T.S	MA12028	CINOTECH
		Date: Oct-12	Figure: 2	

APPENDIX A
ACTION AND LIMIT LEVELS

APPENDIX A – Action and Limit Levels

Action and Limit Levels for Water Quality

Parameter	Action	Limit
DO in mg/L	Surface & Middle: 4.6 (5 percentile of baseline data) Bottom: 3.9 (5 percentile of baseline data)	Surface & Middle: 4 Bottom: 2
SS in mg/L	6.1 (95 percentile of baseline data) or 120% of upstream control station's SS at the same tide of the same day	6.3 (99 percentile of baseline data) or 130% of upstream control station's SS at the same tide of the same day
Turbidity in NTU	4.8 (95 percentile of baseline data) or 120% of upstream control station's Turbidity at the same tide of the same day	5.0 (99 percentile of baseline data) or 130% of upstream control station's Turbidity at the same tide of the same day

APPENDIX B
SUMMARY OF EXCEEDANCE

APPENIDX B – SUMMARY OF EXCEEDANCE

Reporting Month: September 2013

a) Exceedance Report for Water Quality Monitoring (NIL)

APPENDIX C
SITE AUDIT SUMMARY

Record Summary of Environmental Site Inspection

Inspection Information

Checklist Reference Number	130903
Date	3 September 2013 (Tuesday)
Time	14:00-15:00

Ref. No.	Non-Compliance	Related Item No.
-	None identified.	-

Ref. No.	Remarks/Observations	Related Item No.
130903-R01	***Part B - Water Quality*** • Properly clear the sand and mud near the floating jetty to avoid it from entering the sea.	B 25
	Part C - Ecology/Others • No environmental deficiency was identified during the site inspection.	
	Part D – Air Quality • No environmental deficiency was identified during the site inspection.	
	Part E – Construction Noise Impact • No environmental deficiency was identified during the site inspection.	
130903-R02	***Part F – Waste/Chemical Management*** • Properly clear the oil stain as chemical waste near the site entrance.	F 6
	Part G - Permit / Licenses • No environmental deficiency was identified during the site inspection.	
	Others • Follow-up on previous audit section (Ref. No.:130827), all environmental deficiencies were observed to be improved/rectified by the Contractor.	

	Name	Signature	Date
Recorded by	Kevin Lam	Kevin	3 September 2013
Checked by	Dr. Priscilla Choy		3 September 2013

Record Summary of Environmental Site Inspection

Inspection Information

Checklist Reference Number	130912
Date	12 September 2013 (Thursday)
Time	15:00-16:00

Ref. No.	Non-Compliance	Related Item No.
-	None identified	-

Ref. No.	Remarks/Observations	Related Item No.
130912-R01	*Part B - Water Quality* • Sand and mud was observed to accumulate on the floating jetty. The contractor was reminded to clear the sand and mud to avoid it from entering the sea. In addition, the contractor was reminded to provide water spray on the floating jetty properly but not to over-water the deck. *Part C - Ecology/Others* • No environmental deficiency was identified during the site inspection. *Part D – Air Quality* • No environmental deficiency was identified during the site inspection. *Part E – Construction Noise Impact* • No environmental deficiency was identified during the site inspection. *Part F – Waste/Chemical Management* • No environmental deficiency was identified during the site inspection. *Part G - Permit / Licenses* • No environmental deficiency was identified during the site inspection. *Others* • Follow-up on previous audit section (Ref. No.:130903), item 130903-R01 was found outstanding and was remarked as 130912-R01. Review will be needed in the next site inspection.	B 25

	Name	Signature	Date
Recorded by	Kevin Lam	Kevin	12 September 2013
Checked by	Dr. Priscilla Choy		12 September 2013

Record Summary of Environmental Site Inspection

Inspection Information

Checklist Reference Number	130918
Date	18 September 2013 (Wednesday)
Time	14:00-15:00

Ref. No.	Non-Compliance	Related Item No.
-	None identified	-

Ref. No.	Remarks/Observations	Related Item No.
	Part B - Water Quality	
	• No environmental deficiency was identified during the site inspection.	
	Part C - Ecology/Others	
	• No environmental deficiency was identified during the site inspection.	
	Part D – Air Quality	
130918-R02	• Properly repair the dust enclosures for conveyer belt to avoid any hole.	D 12
130918-R03	• Clear the sand deposited in the site area and near the floating jetty to avoid dust generation.	D 4
	Part E – Construction Noise Impact	
	• No environmental deficiency was identified during the site inspection.	
	Part F – Waste/Chemical Management	
130918-R01	• Properly clear the oil stain on the ground as chemical waste.	F 8
	Part G - Permit / Licenses	
	• No environmental deficiency was identified during the site inspection.	
	Others	
	• Follow-up on previous audit section (Ref. No.:130912), all environmental deficiencies were observed to be improved/rectified by the Contractor.	

	Name	Signature	Date
Recorded by	Johnny Fung		18 September 2013
Checked by	Dr. Priscilla Choy		18 September 2013

Record Summary of Environmental Site Inspection

Inspection Information

Checklist Reference Number	130924
Date	24 September 2013 (Tuesday)
Time	14:00-15:00

Ref. No.	Non-Compliance	Related Item No.
-	None identified	-

Ref. No.	Remarks/Observations	Related Item No.
	Part B - Water Quality	
	• No environmental deficiency was identified during the site inspection.	
	Part C - Ecology/Others	
	• No environmental deficiency was identified during the site inspection.	
	Part D – Air Quality	
130924-R01	• Remove the sand and mud leaked from the stockpile to avoid dust generation.	D 4
130924-R02	• The automatic water spray was found to spray in wrong direction. The contractor was reminded to properly provide water spray to stockpile.	D 6
	Part E – Construction Noise Impact	
	• No environmental deficiency was identified during the site inspection.	
	Part F – Waste/Chemical Management	
	• No environmental deficiency was identified during the site inspection.	
	Part G - Permit / Licenses	
130924-R03	• Properly display the EP at the site entrance.	G 5
	Others	
	• Follow-up on previous audit section (Ref. No.:130918), item 130918-R03 was found outstanding and was remarked as 130924-R01. Review will be needed in the next site inspection.	

	Name	Signature	Date
Recorded by	Kevin Lam		24 September 2013
Checked by	Dr. Priscilla Choy		24 September 2013

APPENDIX D
EVENT AND ACTION PLANS

Event and Action Plan for Water Quality

Event	ET	IEC	ER	Contractor
Action level being exceeded by one sampling day	1. Inform IEC, contractor and ER; 2. Check monitoring data, all plant, equipment and Contractor's working methods; and 3. Discuss remedial measures with IEC and Contractor and ER	1. Discuss with ET, ER and Contractor on the implemented mitigation measures; 2. Review proposals on remedial measures submitted by Contractor and advise the ER accordingly; and 3. Review and advise the ET and ER on the effectiveness of the implemented mitigation measures.	1. Discuss with IEC, ET and Contractor on the implemented mitigation measures; and 2. Make agreement on the remedial measures to be implemented. 3. Supervise the implementation of agreed remedial measures	1. Identify source(s) of impact; 2. Inform the ER and confirm notification of the non-compliance in writing; 3. Rectify unacceptable practice; 4. Check all plant and equipment; 5. Consider changes of working methods; 6. Discuss with ER, ET and IEC and propose remedial measures to IEC and ER; and 7. Implement the agreed mitigation measures.
Action level being exceeded by more than one consecutive sampling days	1. Repeat in-situ measurement on next day of exceedance to confirm findings; 2. Inform IEC, contractor and ER; 3. Check monitoring data, all plant, equipment and Contractor's working methods; 4. Discuss remedial measures with IEC, contractor and ER 5. Ensure remedial measures are implemented	1. Discuss with ET Contractor and ER on the implemented mitigation measures; 2. Review the proposed remedial measures submitted by Contractor and advise the ER accordingly; and 3. Review and advise the ET and ER on the effectiveness of the implemented mitigation measures.	1. Discuss with ET, IEC and Contractor on the proposed mitigation measures; 2. Make agreement on the remedial measures to be implemented; and 3. Discuss with ET IEC and Contractor on the effectiveness of the implemented remedial measures.	1. Identify source(s) of impact; 2. Inform the ER and confirm notification of the non-compliance in writing; 3. Rectify unacceptable practice; 4. Check all plant and equipment and consider changes of working methods; 5. Discuss with ET, IEC and ER and submit proposal of remedial measures to ER and IEC within 3 working days of notification; and 6. Implement the agreed mitigation measures.
Limit level being	1. Repeat measurement on next day	1. Discuss with ET , Contractor and	1. Discuss with IEC, ET and	1. Identify source(s) of impact;

Event	ET	IEC	ER	Contractor
exceeded by one sampling day	of exceedance to confirm findings; 2. Inform IEC, contractor and ER; 3. Rectify unacceptable practice; 4. Check monitoring data, all plant, equipment and Contractor's working methods; 5. Consider changes of working methods 6. Discuss mitigation measures with IEC, ER and Contractor; and 7. Ensure the agreed remedial measures are implemented;	ER on possible remedial actions; 2. Review the proposed remedial measures submitted by Contractor and advise the ER accordingly; and 3. Review and advise the ET and ER on the effectiveness of the implemented mitigation measures.	Contractor on the implemented remedial measures; 2. Request Contractor to critically review the working methods; 3. Make agreement on the remedial measures to be implemented; and 4. Discuss with ET, IEC and Contractor on the effectiveness of the implemented remedial measures.	2. Inform the ER and confirm notification of the non-compliance in writing; 3. Rectify unacceptable practice; 4. Check all plant and equipment and consider changes of working methods; 5. Discuss with ET, IEC and ER and submit proposal of additional mitigation measures to ER within 3 working days of notification; and 6. Implement the agreed remedial measures.
Limit level being exceeded by more than one consecutive sampling days	1. Inform IEC, contractor, ER and EPD 2. Check monitoring data, all plant, equipment and Contractor's working methods; 3. Discuss mitigation measures with IEC, ER and Contractor; and 4. Ensure mitigation measures are implemented; and 5. Increase the monitoring frequency to daily until no exceedance of Limit Level for two consecutive days.	1. Discuss with ET, ER and Contractor on possible remedial actions; 2. Review the proposed mitigation measures submitted by Contractor and advise the ER accordingly; and 3. Review and advise the ET and ER on the effectiveness of the implemented mitigation measures.	1. Discuss with IEC, ET and Contractor on the implemented mitigation measures; 2. Request Contractor to critically review the working methods; 3. Make agreement on the remedial measures to be implemented; 4. Discuss with ET and IEC on the effectiveness of the implemented mitigation measures; and 5. Consider and instruct, if necessary, the Contractor to slow down or to stop all or part of the dredging activities until no exceedance of Limit level.	1. Identify source(s) of impact; 2. Inform the ER and confirm notification of the non-compliance in writing; 3. Rectify unacceptable practice; 4. Check all plant and equipment and consider changes of working methods; 5. Discuss with ET, IEC and ER and submit proposal of additional mitigation measures to ER and IEC within 3 working days of notification; 6. Implement the agreed mitigation measures. 7. As directed by the ER, to slow down or to stop all or part of the dredging activities until no exceedance of Limit level.

Event and Action Plan for Landscape and Visual during Construction Stage

Event	ET	IEC	ER	Contractor
Non-conformity on one occasion	1. Inform the Contractor, the IEC and the ER 2. Discuss remedial actions with the IEC, the ER and the Contractor 3. Monitor remedial actions until rectification has been completed	1. Check inspection report 2. Check the Contractor's working method 3. Discuss with the ET, ER and the Contractor on possible remedial measures 4. Advise the ER on effectiveness of proposedremedial measures.	1. Confirm receipt of notification of non-conformity in writing 2. Review and agree on the remedial measures proposed by the Contractor 3. Supervise implementation of remedial measures	1. Identify Source and investigate the non-conformity 2. Implement remedial measures 3. Amend working methods agreed with the ER as appropriate 4. Rectify damage and undertake any necessary replacement
Repeated Non-conformity	1. Identify Source 2. Inform the Contractor, the IEC and the ER 3. Increase inspection frequency 4. Discuss remedial actions with the IEC, the ER and the Contractor 5. Monitor remedial actions until rectification has been completed 6. If non-conformity stops, cease additional monitoring	1. Check inspection report 2. Check the Contractor's working method 3. Discuss with the ET and the Contractor on possible remedial measures 4. Advise the ER on effectiveness of proposed remedial measures	1. Notify the Contractor 2. In consultation with the ET and IEC, agree with the Contractor on the remedialmeasures to be implemented 3. Supervise implementation of remedial measures.	1. Identify Source and investigate the non-conformity implement remedial measures 2. Amend working methods agreed with the ER as appropriate 3. Rectify damage and undertake any necessary replacement. 4. Stop relevant portion of works as determined by the ER until the non-conformity is abated.

Note:

ET – Environmental Team

IEC – Independent Environmental Checker

ER – Engineer/Engineer's Representative

APPENDIX E
UPDATED ENVIRONMENTAL MITIGATION IMPLEMENTATION SCHEDULE

EIA Ref.	EM&A Log Ref	Recommended Mitigation Measures	Objectives of the recommended Measures & Main Concerns to address	Who to implement the measures?	Location of the measures	When to Implement the measures?	What requirements or standards for the measures to achieve?	Status
Ecology (Pre-Construction Phase)								
S5.7	E3	Tree felling and vegetation removal Precautionary checks of the vegetation for the presence of nesting bird species of conservation interest should be carried out before vegetation clearance by an ecologist.	Minimize ecological impacts to breeding bird species of conservation interest	Contractor	Works sites Kai Tak Barging Point	Prior to site clearance	• AFCD's requirements	^
Ecology (Construction Phase)								
S5.7	E5	Good Site Practices Impact to any habitats or local fauna should be avoided by implementing good site practices, including the containment of silt runoff within the site boundary, the containment of contaminated soils for removal from the site, appropriate storage of chemicals and chemical waste away from sites of ecological value and the provision of sanitary facilities for on-site workers. Adoption of such measures should permit waste to be suitably contained within the site for subsequent removal and appropriate disposal. The following good site practices should also be implemented: • Erection of temporary geotextile silt or sediment fences/oil traps around any earth-moving works to trap any sediments and prevent them from entering watercourses in particular the Tei Lung Hau stream;	Minimise ecological impacts	Contractor	All construction sites	During Construction	• ProPECC PN 1/94	^

EIA Ref.	EM&A Log Ref	Recommended Mitigation Measures	Objectives of the recommended Measures & Main Concerns to address	Who to implement the measures?	Location of the measures	When to Implement the measures?	What requirements or standards for the measures to achieve?	Status
		• Avoidance of soil storage against trees or close to waterbodies in particular the Tei Lung Hau stream; • Delineation of works site by erecting hoardings to prevent encroachment onto adjacent habitats and fence off areas which have some ecological value. • No on-site burning of waste; • Waste and refuse in appropriate receptacles.						^ ^ ^ ^
S5.7	E6	Sediment Removal • Use closed grab in dredging works. • Install silt curtain during the dredging.	• Reduce indirect impacts of suspended solids on sessile benthic and intertidal fauna • Minimize marine water quality impacts	Contractor	Dredging Area	During Dredging	•TM-Water	N/A(2) N/A(2)
Landscape & Visual (Construction Phase)								
S6.9.3	LV1	The following good site practices and measures for minimisation and avoidance of potential impacts are recommended: Re-use of Existing Soil • For soil conservation, existing topsoil shall be re-used where	Minimize visual & landscape impact	Contractor	Within Project Site	Construction stage	•TM-EIAO	N/A(2)

EIA Ref.	EM&A Log Ref	Recommended Mitigation Measures	Objectives of the recommended Measures & Main Concerns to address	Who to implement the measures?	Location of the measures	When to Implement the measures?	What requirements or standards for the measures to achieve?	Status
		possible for new planting areas within the project. The construction program shall consider using the soil removed from one phase for backfilling another. Suitable storage ground, gathering ground and mixing ground may be set up on-site as necessary.						
		<u>No-intrusion Zone</u>						
		• To maximize protection to existing trees, ground vegetation and the associated under storey habitats, construction contracts may designate "No-intrusion Zone" to various areas within the site boundary with rigid and durable fencing for each individual no-intrusion zone. The contractor should closely monitor and restrict the site working staff from entering the "no-intrusion zone", even for indirect construction activities and storage of equipment.						^
		<u>Protection of Retained Trees</u>						
		• All retained trees should be recorded photographically at the commencement of the Contract, and carefully protected during the construction period. Detailed tree protection specification shall be allowed and included in the Contract Specification, which specifying the tree protection requirement, submission and approval system, and the tree monitoring system.						^

EIA Ref.	EM&A Log Ref	Recommended Mitigation Measures	Objectives of the recommended Measures & Main Concerns to address	Who to implement the measures?	Location of the measures	When to Implement the measures?	What requirements or standards for the measures to achieve?	Status
		• The Contractor shall be required to submit, for approval, a detailed working method statement for the protection of trees prior to undertaking any works adjacent to all retained trees, including trees in contractor's works sites.						^
S6.12	LV2	Decorative Hoarding • Erection of decorative screen during construction stage to screen off undesirable views of the construction site for visual and landscape sensitive areas. Hoarding should be designed to be compatible with the existing urban context. Management of facilities on work sites • To provide proper management of the facilities on the sites, give control on the height and disposition/ arrangement of all facilities on the works site to minimize visual impact to adjacent VSRs.	Minimize visual & landscape impact	Contractor	Within Project Site	Detailed design and construction stage	• EIAO – TM •ETWB TCW 2/2004 • ETWB TCW 3/2006	^ N/A(1)
Construction Dust Impact								
S7.6.5	D1	The contractor shall follow the procedures and requirements given in the Air Pollution Control (Construction Dust) Regulation	Minimize dust impact at the nearby sensitive receivers	Contractor	All Construction Sites	Construction stage	• APCO • To control the dust impact to meet HKAQO and TM-EIA criteria	^

EIA Ref.	EM&A Log Ref	Recommended Mitigation Measures	Objectives of the recommended Measures & Main Concerns to address	Who to implement the measures?	Location of the measures	When to Implement the measures?	What requirements or standards for the measures to achieve?	Status
S7.6.5	D2	Mitigation measures in form of regular watering under a good site practice should be adopted. Watering once per hour on exposed worksites and haul road in the Kowloon area should be conducted to achieve dust removal efficiencies of 91.7%. While the above watering frequencies are to be followed, the extent of watering may vary depending on actual site conditions but should be sufficient to maintain an equivalent intensity of no less than 1.8 L/m^2 to achieve the dust removal efficiency	Minimize dust impact at the nearby sensitive receivers	Contractor	All Construction Sites	Construction stage	• APCO • To control the dust impact to meet HKAQO and TM-EIA criteria	^
S7.6.5	D3	• Proper watering of exposed spoil should be undertaken throughout the construction phase; • Any excavated or stockpile of dusty material should be covered entirely by impervious sheeting or sprayed with water to maintain the entire surface wet and then removed or backfilled or reinstated where practicable within 24 hours of the excavation or unloading; • Any dusty materials remaining after a stockpile is removed should be wetted with water and cleared from the surface of roads; • A stockpile of dusty material should not be extend beyond the pedestrian barriers, fencing or traffic cones; • The load of dusty materials on a vehicle leaving a construction site	Minimize dust impact at the nearby sensitive receivers	Contractor	All Construction Sites	Construction stage	• APCO • To control the dust impact to meet HKAQO and TM-EIA criteria	* * ^ ^ ^

EIA Ref.	EM&A Log Ref	Recommended Mitigation Measures	Objectives of the recommended Measures & Main Concerns to address	Who to implement the measures?	Location of the measures	When to Implement the measures?	What requirements or standards for the measures to achieve?	Status
		should be covered entirely by impervious sheeting to ensure that the dusty materials do not leak from the vehicle;						
		• Where practicable, vehicle washing facilities with high pressure water jet should be provided at every discernible or designated vehicle exit point. The area where vehicle washing takes place and the road section between the washing facilities and the exit point should be paved with concrete, bituminous materials or hardcores;						^
		• When there are open excavation and reinstatement works, hoarding of not less than 2.4m high should be provided and properly maintained as far as practicable along the site boundary with provision for public crossing; Good site practice shall also be adopted by the Contractor to ensure the conditions of the hoardings are properly maintained throughout the construction period;						^
		• The portion of any road leading only to construction site that is within 30m of a vehicle entrance or exit should be kept clear of dusty materials;						^
		• Surfaces where any pneumatic or power-driven drilling, cutting, polishing or other mechanical breaking operation takes place						^

EIA Ref.	EM&A Log Ref	Recommended Mitigation Measures	Objectives of the recommended Measures & Main Concerns to address	Who to implement the measures?	Location of the measures	When to Implement the measures?	What requirements or standards for the measures to achieve?	Status
		should be sprayed with water or a dust suppression chemical continuously;						
		• Any area that involves demolition activities should be sprayed with water or a dust suppression chemical immediately prior to, during and immediately after the activities so as to maintain the entire surface wet;						N/A(2)
		• Where a scaffolding is erected around the perimeter of a building under construction, effective dust screens, sheeting or netting should be provided to enclose the scaffolding from the ground floor level of the building, or a canopy should be provided from the first floor level up to the highest level of the scaffolding;						N/A(2)
		• Any skip hoist for material transport should be totally enclosed by impervious sheeting;						N/A(2)
		• Every stock of more than 20 bags of cement or dry pulverized fuel ash (PFA) should be covered entirely by impervious sheeting or placed in an area sheltered on the top and the 3 sides;						N/A(2)
		• Cement or dry PFA delivered in bulk should be stored in a closed silo fitted with an audible high level alarm which is interlocked with the material filling line and no overfilling is allowed;						N/A(2)
		• Loading, unloading, transfer, handling or storage of bulk cement or						N/A(2)

EIA Ref.	EM&A Log Ref	Recommended Mitigation Measures	Objectives of the recommended Measures & Main Concerns to address	Who to implement the measures?	Location of the measures	When to Implement the measures?	What requirements or standards for the measures to achieve?	Status
		dry PFA should be carried out in a totally enclosed system or facility, and any vent or exhaust should be fitted with an effective fabric filter or equivalent air pollution control system; and • Exposed earth should be properly treated by compaction, turfing, hydroseeding, vegetation planting or sealing with latex, vinyl, bitumen, shotcrete or other suitable surface stabiliser within six months after the last construction activity on the construction site or part of the construction site where the exposed earth lies.						N/A(2)
S7.6.5	D4	The following mitigation measures should be adopted to prevent fugitive dust emissions at barging point: • All road surface within the barging facilities will be paved; • Dust enclosures will be provided for the loading ramp; • Vehicles will be required to pass through designated wheels wash facilities; and • Continuous water spray at the loading points	Control construction dust	Contractor	Kai Tak Barging Point	Construction stage	• Air Pollution Control (Construction Dust) Regulation	^ * ^ ^
S7.6.5	D5	• For the unloading of spoil from trucks at barging point, installation of 3-sided screen with top tipping hall and operating water spraying and flexible dust curtains at the discharge point for dust suppression	Minimize dust impact at the nearby sensitive receivers	Contractor	Barging Points	Construction stage	• APCO • To control the dust impact to meet HKAQO	^

EIA Ref.	EM&A Log Ref	Recommended Mitigation Measures	Objectives of the recommended Measures & Main Concerns to address	Who to implement the measures?	Location of the measures	When to Implement the measures?	What requirements or standards for the measures to achieve?	Status
							and TM-EIA criteria •EP Condition 2.18 (c)	
S7.6.5	D6	Implement regular dust monitoring under EM&A programme during the construction stage.	Monitoring of dust impact	Contractor	Selected representative dust monitoring station	Construction stage	• TM-EIA	N/A(1)
Construction Noise (Airborne)								
S8.3.6	N1	Implement the following good site practices: • Only well-maintained plant should be operated on-site and plant should be serviced regularly during the construction programme; • Machines and plant (such as trucks, cranes) that may be in intermittent use should be shut down between work periods or should be throttled down to a minimum; • Plant known to emit noise strongly in one direction, where possible, be orientated so that the noise is directed away from nearby NSRs; • Silencers or mufflers on construction equipment should be properly fitted and maintained during the construction works;	Control construction airborne noise	Contractor	All Construction Sites	Construction stage	• Annex 5, TM-EIA	^ ^ ^ N/A(2)

EIA Ref.	EM&A Log Ref	Recommended Mitigation Measures	Objectives of the recommended Measures & Main Concerns to address	Who to implement the measures?	Location of the measures	When to Implement the measures?	What requirements or standards for the measures to achieve?	Status
		• Mobile plant should be sited as far away from NSRs as possible and practicable; • Material stockpiles, mobile container site office and other structures should be effectively utilized, where practicable, to screen noise from on-site construction activities.						^ N/A(2)
S8.3.6	N2	Install temporary hoarding located on the site boundaries between noisy construction activities and NSRs. The conditions of the hoardings shall be properly maintained throughout the construction period.	Reduce the construction noise levels at low-level zone of NSRs through partial screening.	Contractor	All Construction Sites	Construction stage	• Annex 5, TM-EIA	^
S8.3.6	N3	Install movable noise barriers (typical design is wooden framed barrier with a small-cantilevered on a skid footing with 25mm thick internal sound absorptive lining), acoustic mat or full enclosure, screen the noisy plants including air compressor, generators and saw.	Screen the noisy plant items to be used at all construction sites	Contractor	All Construction Sites	Construction stage	• Annex 5, TM-EIA	N/A(1)
S8.3.6	N4	Use "Quiet plants"	Reduce the noise levels of plant items	Contractor	All Construction Sites where practicable	Construction stage	• Annex 5, TM-EIA	^

EIA Ref.	EM&A Log Ref	Recommended Mitigation Measures	Objectives of the recommended Measures & Main Concerns to address	Who to implement the measures?	Location of the measures	When to Implement the measures?	What requirements or standards for the measures to achieve?	Status
S8.3.6	N5	Sequencing operation of construction plants where practicable.	Operate sequentially within the same work site to reduce the construction airborne noise	Contractor	All Construction Sites where practicable	Construction stage	• Annex 5, TM-EIA	N/A(1)
S8.3.6	N6	Implement a noise monitoring under EM&A programme.	Monitor the construction noise levels at the selected representative locations	Contractor	Selected representative noise monitoring station	Construction stage	•TM-EIA	N/A(1)
Water Quality (Construction Phase)								
S10.7.1	W1	In accordance with the Practice Noise for Professional Persons on Construction Site Drainage, Environmental Protection Department, 1994 (ProPECC PN1/94), construction phase mitigation measures shall include the following: <u>Construction Runoff and Site Drainage</u> • At the start of site establishment (including the barging facilities), perimeter cut-off drains to direct off-site water around the site should be constructed with internal drainage works and erosion	To minimize water quality impact from construction site runoff and general construction activities	Contractor	All construction sites where practicable	Construction stage	• Water Pollution Control Ordinance • ProPECC PN1/94 • TM-EIAO • TM-Water	^

EIA Ref.	EM&A Log Ref	Recommended Mitigation Measures	Objectives of the recommended Measures & Main Concerns to address	Who to implement the measures?	Location of the measures	When to Implement the measures?	What requirements or standards for the measures to achieve?	Status
		and sedimentation control facilities implemented. Channels (both temporary and permanent drainage pipes and culverts), earth bunds or sand bag barriers should be provided on site to direct stormwater to silt removal facilities. The design of the temporary on-site drainage system will be undertaken by the contractor prior to the commencement of construction.						
		• The dikes or embankments for flood protection should be implemented around the boundaries of earthwork areas. Temporary ditches should be provided to facilitate the runoff discharge into an appropriate watercourse, through a site/sediment trap. The sediment/silt traps should be incorporated in the permanent drainage channels to enhance deposition rates. The design of efficient silt removal facilities should be based on the guidelines in Appendix A1 of ProPECC PN 1/94, which states that the retention time for silt/sand traps should be 5 minutes under maximum flow conditions. Sizes may vary depending upon the flow rate, but for a flow rate of 0.1 m^3/s a sedimentation basin of $30m^3$ would be required and for a flow rate of 0.5 m^3/s the basin would be 150 m^3. The detailed design of the sand/silt traps shall be undertaken by the contractor prior to the						^

EIA Ref.	EM&A Log Ref	Recommended Mitigation Measures	Objectives of the recommended Measures & Main Concerns to address	Who to implement the measures?	Location of the measures	When to Implement the measures?	What requirements or standards for the measures to achieve?	Status
		commencement of construction.						
		• All exposed earth areas should be completed and vegetated as soon as possible after earthworks have been completed, or alternatively, within 14 days of the cessation of earthworks where practicable. Exposed slope surfaces should be covered by tarpaulin or other means.						^
		• The overall slope of the site should be kept to a minimum to reduce the erosive potential of surface water flows, and all traffic areas and access roads protected by coarse stone ballast. An additional advantage accruing from the use of crushed stone is the positive traction gained during prolonged periods of inclement weather and the reduction of surface sheet flows.						^
		• All drainage facilities and erosion and sediment control structures should be regularly inspected and maintained to ensure proper and efficient operation at all times and particularly following rainstorms. Deposited silt and grit should be removed regularly and disposed of by spreading evenly over stable, vegetated areas.						^
		• Measures should be taken to minimize the ingress of site drainage into excavations. If the excavation of trenches in wet periods is necessary, they should be dug and backfilled in short sections						^

EIA Ref.	EM&A Log Ref	Recommended Mitigation Measures	Objectives of the recommended Measures & Main Concerns to address	Who to implement the measures?	Location of the measures	When to Implement the measures?	What requirements or standards for the measures to achieve?	Status
		wherever practicable. Water pumped out from trenches or foundation excavations should be discharged into storm drains via silt removal facilities.						
		• Open stockpiles of construction materials (for example, aggregates, sand and fill material) of more than $50m^3$ should be covered with tarpaulin or similar fabric during rainstorms.						^
		• Measures should be taken to prevent the washing away of construction materials, soil, silt or debris into any drainage system. Manholes (including newly constructed ones) should always be adequately covered and temporarily sealed so as to prevent silt, construction materials or debris being washed into the drainage system and storm runoff being directed into foul sewers						^
		• Precautions be taken at any time of year when rainstorms are likely, actions to be taken when a rainstorm is imminent or forecasted, and actions to be taken during or after rainstorms are summarised in Appendix A2 of ProPECC PN 1/94. Particular attention should be paid to the control of silty surface runoff during storm events, especially for areas located near steep slopes						^
		• All vehicles and plant should be cleaned before leaving a construction site to ensure no earth, mud, debris and the like is						^

EIA Ref.	EM&A Log Ref	Recommended Mitigation Measures	Objectives of the recommended Measures & Main Concerns to address	Who to implement the measures?	Location of the measures	When to Implement the measures?	What requirements or standards for the measures to achieve?	Status
		deposited by them on roads. An adequately designed and sited wheel washing facilities should be provided at every construction site exit where practicable. Wash-water should have sand and silt settled out and removed at least on a weekly basis to ensure the continued efficiency of the process. The section of access road leading to, and exiting from, the wheel-wash bay to the public road should be paved with sufficient backfall toward the wheel-wash bay to prevent vehicle tracking of soil and silty water to public roads and drains.						
		• Oil interceptors should be provided in the drainage system downstream of any oil/fuel pollution sources. The oil interceptors should be emptied and cleaned regularly to prevent the release of oil and grease into the storm water drainage system after accidental spillage. A bypass should be provided for the oil interceptors to prevent flushing during heavy rain.						^
		• Construction solid waste, debris and rubbish on site should be collected, handled and disposed of properly to avoid water quality impacts.						^
		• All fuel tanks and storage areas should be provided with locks and sited on sealed areas, within bunds of a capacity equal to 110% of						^

EIA Ref.	EM&A Log Ref	Recommended Mitigation Measures	Objectives of the recommended Measures & Main Concerns to address	Who to implement the measures?	Location of the measures	When to Implement the measures?	What requirements or standards for the measures to achieve?	Status
		the storage capacity of the largest tank to prevent spilled fuel oils from reaching water sensitive receivers nearby • All the earth works involving should be conducted sequentially to limit the amount of construction runoff generated from exposed areas during the wet season (April to September) as far as practicable. • Adopt best management practices.						N/A(2) *
S10.7.1	W3	Sewage Effluent • Portable chemical toilets and sewage holding tanks are recommended for handling the construction sewage generated by the workforce. A licensed contractor should be employed to provide appropriate and adequate portable toilets and be responsible for appropriate disposal and maintenance.	To minimize water quality from sewage effluent	Contractor	All construction sites where practicable	Construction stage	• Water Pollution Control Ordinance • TM-water	^
S10.7.1	W4	Groundwater from Contaminated Area: • No direct discharge of groundwater from contaminated areas should be adopted. Prior to the excavation works within these potentially contaminated areas, the groundwater quality should be reviewed with reference to the site investigation data in this EIA report for compliance to the Technical Memorandum on Standards for Effluents Discharged into Drainage on Sewerage Systems,	To minimize groundwater quality impact from contaminated area	Contractor	Excavation areas where contamination is found.	Construction stage	• Water Pollution Control Ordinance • TM-water • TM-EIAO	N/A(1)

EIA Ref.	EM&A Log Ref	Recommended Mitigation Measures	Objectives of the recommended Measures & Main Concerns to address	Who to implement the measures?	Location of the measures	When to Implement the measures?	What requirements or standards for the measures to achieve?	Status
		Inland and Coastal Waters (TM-Water) and the existence of prohibited substance should be confirmed. The review results should be submitted to EPD for examination If the review results indicated that the groundwater to be generated from the excavation works would be contaminated, the contaminated groundwater should be either properly treated in compliance with the requirements of the TM-Water or properly recharged into the ground.						
		• If wastewater treatment is deployed, the wastewater treatment unit shall deploy suitable treatment process (e.g. oil interceptor / activated carbon) to reduce the pollution level to an acceptable standard and remove any prohibited substances (e.g. TPH) to undetectable range. All treated effluent from wastewater treatment plant shall meet the requirements as stated in TM-Water and should be discharged into the foul sewers						N/A[(1)]
		• If groundwater recharging wells are deployed, recharging wells should be installed as appropriate for recharging the contaminated groundwater back into the ground. The recharging wells should be selected at places where the groundwater quality will not be affected by the recharge operation as indicated in the Section 2.3						N/A[(1)]

EIA Ref.	EM&A Log Ref	Recommended Mitigation Measures	Objectives of the recommended Measures & Main Concerns to address	Who to implement the measures?	Location of the measures	When to Implement the measures?	What requirements or standards for the measures to achieve?	Status
		of TM-Water. The baseline groundwater quality shall be determined prior to the selection of the recharge wells, and submit a working plan (including the laboratory analytical results showing the quality of groundwater at the proposed recharge location(s) as well as the pollutant levels of groundwater to be recharged) to EPD for agreement. Pollution levels of groundwater to be recharged shall not be higher than pollutant levels of ambient groundwater at the recharge well. Prior to recharge, any prohibited substances such as TPH products should be removed as necessary by installing the petrol interceptor. The Contractor should apply for a discharge licence under the WPCO through the Regional Office of EPD for groundwater recharge operation or discharge of treated groundwater.						
S10.7.1	W5	<u>Dredging Works</u> The following good practice shall apply for the dredging works: • Install efficient silt curtains at the point of seawall dredging to control the dispersion of SS; • Implement water quality monitoring to ensure effective control of water pollution and recommend additional mitigation measures required;	To minimize sediment suspension during dredging	Contractor	Kai Tak Barging Point during dredging works	Dredging period	• Water Pollution Control Ordinance • TM-EIAO	N/A(2) N/A(2)

EIA Ref.	EM&A Log Ref	Recommended Mitigation Measures	Objectives of the recommended Measures & Main Concerns to address	Who to implement the measures?	Location of the measures	When to Implement the measures?	What requirements or standards for the measures to achieve?	Status
		• The decent speed of grabs should be controlled to minimize the seabed impact and to reduce the volume of over-dredging; and • All vessels should be sized so that adequate clearance is maintained between vessels and the seabed in all tide conditions, to ensure that undue turbidity is not generated by turbulence from vessel movement or propeller wash.						N/A(2) N/A(2)
S10.7.1	W6	Operation of Barging Facilities The following good practice shall apply for the barging facilities operations: • All barges should be fitted with tight bottom seals to prevent leakage of materials during transport; • Barges or hoppers should not be filled to a level that will cause overflow of materials or polluted water during loading or transportation; • All vessels should be sized so that adequate clearance is maintained between vessels and the seabed in all tide conditions, to ensure that undue turbidity is not generated by turbulence from vessel movement or propeller wash; • Loading of barges and hoppers should be controlled to prevent splashing of material into the surrounding water; and	To minimize water quality impact from operation of barging facility	Contractor	All barging facilities	Construction stage	• Water Pollution Control Ordinance • TM-EIA	^ ^ ^ ^

EIA Ref.	EM&A Log Ref	Recommended Mitigation Measures	Objectives of the recommended Measures & Main Concerns to address	Who to implement the measures?	Location of the measures	When to Implement the measures?	What requirements or standards for the measures to achieve?	Status
		• Mitigation measures as outlined in W1 should be applied to minimise water quality impacts from site runoff and open stockpile spoils at the proposed barging facilities where appropriate.						*
S10.7.1	W7	In order to prevent accidental spillage of chemicals, the following is recommended: • All the tanks, containers, storage area should be bunded and the locations should be locked as far as possible from the sensitive watercourse and stormwater drains. • The Contractor should register as a chemical waste producer if chemical wastes would be generated. Storage of chemical waste arising from the construction activities should be stored with suitable labels and warnings. • Disposal of chemical wastes should be conducted in compliance with the requirements as stated in the Waste disposal (Chemical Waste) (General) Regulation.	To minimize water quality impact from accidental spillage	Contractor	All construction sites where practicable	Construction stage	• Water Pollution Control Ordinance • ProPECC PN1/94 • TM-EIAO • TM-Water	^ ^ ^
S10.7.1	W8	Implement a marine water quality monitoring programme	Monitor marine water quality prior to and during dredging period	Contractor	At identified monitoring location	Prior to and during dredging period	• Water Pollution Control Ordinance • TM-water • EIA-TM	^

EIA Ref.	EM&A Log Ref	Recommended Mitigation Measures	Objectives of the recommended Measures & Main Concerns to address	Who to implement the measures?	Location of the measures	When to Implement the measures?	What requirements or standards for the measures to achieve?	Status
Waste Management (Construction Waste)								
S11.4.1.1	WM1	On-site sorting of C&D material • Geological assessment should be carried out by competent persons on site during excavation to identify materials which are not suitable to use as aggregate in structural concrete (e.g. volcanic rock, Aplite dyke rock, etc). Volcanic rock and Aplite dyke rock should be separated at the source sites as far as practicable and stored at designated stockpile areas preventing them from delivering to crushing facilities. The crushing plant operator should also be reminded to set up measures to prevent unsuitable rock from ended up at concrete batching plants and be turned into concrete for structural use. Details regarding control measures at source site and crushing facilities should be submitted by the Contractors for the Engineer to review and agree. In addition, site records should also be kept for the types of rock materials excavated and the traceability of delivery will be ensured with the implementation of Trip Ticket System and enforced by site supervisory staff as stipulated under DEVB TC(W) No. 6/2010 for tracking of the correct delivery to the rock crushing facilities for processing into aggregates. Alternative disposal option for the reuse of volcanic rock and Aplite Dyke rock, etc should also be explored.	Separation of unsuitable rock from ending up at concrete batching plants and be turned into concrete for structural use	Contractor	All construction sites	Construction stage	• DEVB TC(W) No. 6/2010	N/A[(2)]

EIA Ref.	EM&A Log Ref	Recommended Mitigation Measures	Objectives of the recommended Measures & Main Concerns to address	Who to implement the measures?	Location of the measures	When to Implement the measures?	What requirements or standards for the measures to achieve?	Status
S11.5.1	WM2	Construction and Demolition Material • Maintain temporary stockpiles and reuse excavated fill material for backfilling and reinstatement; • Carry out on-site sorting; • Make provisions in the Contract documents to allow and promote the use of recycled aggregates where appropriate; • Adopt 'Selective Demolition' technique to demolish the existing structures and facilities with a view to recovering broken concrete effectively for recycling purpose, where possible; • Implement a trip-ticket system for each works contract to ensure that the disposal of C&D materials are properly documented and verified; and • Implement an enhanced Waste Management Plan similar to ETWBTC (Works) No. 19/2005 – "Environmental Management on Construction Sites" to encourage on-site sorting of C&D materials and to minimize their generation during the course of construction. • In addition, disposal of the C&D materials onto any sensitive locations such as agricultural lands, etc. should be avoided. The Contractor shall propose the final disposal sites to the Project Proponent and get its approval before implementation	Good site practice to minimize the waste generation and recycle the C&D materials as far as practicable so as to reduce the amount for final disposal	Contractor	All construction sites	Construction stage	• Land (Miscellaneous Provisions) Ordinance • Waste Disposal Ordinance • ETWB TCW No. 19/2005	N/A(2) N/A(2) N/A(2) N/A(2) ^ ^ ^

EIA Ref.	EM&A Log Ref	Recommended Mitigation Measures	Objectives of the recommended Measures & Main Concerns to address	Who to implement the measures?	Location of the measures	When to Implement the measures?	What requirements or standards for the measures to achieve?	Status
S11.5.1	WM3	C&D Waste • Standard formwork or pre-fabrication should be used as far as practicable in order to minimize the arising of C&D materials. The use of more durable formwork or plastic facing for the construction works should be considered. Use of wooden hoardings should not be used, as in other projects. Metal hoarding should be used to enhance the possibility of recycling. The purchasing of construction materials will be carefully planned in order to avoid over ordering and wastage. • The Contractor should recycle as much of the C&D materials as possible on-site. Public fill and C&D waste should be segregated and stored in different containers or skips to enhance reuse or recycling of materials and their proper disposal. Where practicable, concrete and masonry can be crushed and used as fill. Steel reinforcement bar can be used by scrap steel mills. Different areas of the sites should be considered for such segregation and storage.	Good site practice to minimize the waste generation and recycle the C&D materials as far as practicable so as to reduce the amount for final disposal	Contractor	All construction sites	Construction stage	• Land (Miscellaneous Provisions) Ordinance • Waste Disposal Ordinance • ETWB TCW No.19/2005	^ N/A(2)
S11.5.1	WM4	General Refuse • General refuse generated on-site should be stored in enclosed bins or compaction units separately from construction and	Minimize production of the general refuse and avoid odour, pest and litter impacts	Contractor	All construction sites	Construction stage	• Waste Disposal Ordinance	^

EIA Ref.	EM&A Log Ref	Recommended Mitigation Measures	Objectives of the recommended Measures & Main Concerns to address	Who to implement the measures?	Location of the measures	When to Implement the measures?	What requirements or standards for the measures to achieve?	Status
		chemical wastes.						
		• A reputable waste collector should be employed by the Contractor to remove general refuse from the site, separately from construction and chemical wastes, on a daily basis to minimize odour, pest and litter impacts. Burning of refuse on construction sites is prohibited by law.						^
		• Aluminium cans are often recovered from the waste stream by individual collectors if they are segregated and made easily accessible. Separate labelled bins for their deposit should be provided if feasible.						^
		• Office wastes can be reduced through the recycling of paper if volumes are large enough to warrant collection. Participation in a local collection scheme should be considered by the Contractor.						^
S11.5.1	WM6	Land-based and Marine-based Sediment	To control pollution due to marine sediment	Contractor	Within Project Site Area	Construction Stage	• ETWB TCW No. 34/2002	
		• All construction plant and equipment shall be designed and maintained to minimize the risk of silt, sediments, contaminants or other pollutants being released into the water column or deposited in the locations other than designated location;						N/A(1)
		• All vessels shall be sized such that adequate draft is maintained between vessels and the sea bed at all states of the tide to ensure						N/A(1)

EIA Ref.	EM&A Log Ref	Recommended Mitigation Measures	Objectives of the recommended Measures & Main Concerns to address	Who to implement the measures?	Location of the measures	When to Implement the measures?	What requirements or standards for the measures to achieve?	Status
		that undue turbidity is not generated by turbulence from vessel movement or propeller wash;						
		• Before moving the vessels which are used for transporting dredged material, excess material shall be cleaned from the decks and exposed fittings of vessels and the excess materials shall never be dumped into the sea except at the approved locations;						N/A(1)
		• Adequate freeboard shall be maintained on barges to ensure that decks are not washed by wave action.						N/A(1)
		• The Contractors shall monitor all vessels transporting material to ensure that no dumping outside the approved location takes place. The Contractor shall keep and produce logs and other records to demonstrate compliance and that journeys are consistent with designated locations and copies of such records shall be submitted to the engineers;						N/A(1)
		• The Contractors shall comply with the conditions in the dumping licence.						N/A(1)
		• All bottom dumping vessels (Hopper barges) shall be fitted with tight fittings seals to their bottom openings to prevent leakage of material;						N/A(1)
		• The material shall be placed into the disposal pit by bottom						N/A(1)

EIA Ref.	EM&A Log Ref	Recommended Mitigation Measures	Objectives of the recommended Measures & Main Concerns to address	Who to implement the measures?	Location of the measures	When to Implement the measures?	What requirements or standards for the measures to achieve?	Status
		dumping;						
		• Contaminated marine mud shall be transported by spit barge of not less than 750m^3 capacity and capable of rapid opening and discharge at the disposal site;						N/A(1)
		• Discharge shall be undertaken rapidly and the hoppers shall be closed immediately. Material adhering to the sides of the hopper shall not be washed out of the hopper and the hopper shall remain closed until the barge returns to the disposal site.						N/A(1)
		• For Type 3 special disposal treatment, sealing of contaminant with geosynthetic containment before dropping into designated mud pit would be a possible arrangement. A geosynthetic containment method is a method whereby the sediments are sealed in geosynthetic containers and, the containers would be dropped into the designated contaminated mud pit where they would be covered by further mud disposal and later by the mud pit capping at the disposal site, thereby fulfilling the requirements for fully confined mud disposal.						N/A(1)
S11.5.1	WM7	<u>Chemical Waste</u> • Chemical waste that is produced, as defined by Schedule 1 of the Waste Disposal (Chemical Waste) (General) Regulation, should	Control the chemical waste and ensure proper storage, handling and disposal.	Contractor	All Construction Sites	Construction Stage	• Waste Disposal (Chemical Waste)	*

EIA Ref.	EM&A Log Ref	Recommended Mitigation Measures	Objectives of the recommended Measures & Main Concerns to address	Who to implement the measures?	Location of the measures	When to Implement the measures?	What requirements or standards for the measures to achieve?	Status
		be handled in accordance with the Code of Practice on the Packaging, Labelling and Storage of Chemical Wastes.					(General) Regulation	
		• Containers used for the storage of chemical wastes should be suitable for the substance they are holding, resistant to corrosion, maintained in a good condition, and securely closed; have a capacity of less than 450 liters unless the specification has been approved by the EPD; and display a label in English and Chinese in accordance with instructions prescribed in Schedule 2 of the regulation.					• Code of Practice on the Packaging, Labelling and Storage of Chemical Waste	^
		• The storage area for chemical wastes should be clearly labeled and used solely for the storage of chemical waste; enclosed on at least 3 sides; have an impermeable floor and bunding of sufficient capacity to accommodate 110% of the volume of the largest container or 20 % of the total volume of waste stored in that area, whichever is the greatest; have adequate ventilation; covered to prevent rainfall entering; and arranged so that incompatible materials are adequately separated.						^
		• Disposal of chemical waste should be via a licensed waste collector; be to a facility licensed to receive chemical waste, such as the Chemical Waste Treatment Centre which also offers a						^

EIA Ref.	EM&A Log Ref	Recommended Mitigation Measures	Objectives of the recommended Measures & Main Concerns to address	Who to implement the measures?	Location of the measures	When to Implement the measures?	What requirements or standards for the measures to achieve?	Status
		chemical waste collection service and can supply the necessary storage containers; or be to a reuser of the waste, under approval from the EPD.						

Remarks: ^ Compliance of mitigation measure X Non-compliance of mitigation measure

• Non-compliance but rectified by the contractor

* Recommendation was made during site audit but improved/rectified by the contractor.

N/A(1) Not Applicable N/A(2) Not Applicable at this stage

APPENDIX F
WASTE GENERATION IN THE REPORTING MONTH

Concentric – Hong Kong River Joint Venture

MTR SCL Contract 1108A
Kai Tak Barging Point Facilities

Monthly Summary Waste Flow Table for 2013 (year)

Month	Actual Quantities of Inert C&D Materials Generated Monthly						Actual Quantities of C&D Wastes Generated Monthly				
	Total Quantity Generated	Hard Rock and Large Broken Concrete	Reused in the Contract	Reused in other Projects	Disposed as Public Fill	Imported Fill	Metals	Paper/ cardboard packaging	Plastics	Chemical Waste	Others, e.g. general refuse
	(in '000m^3)	(in '000m^3)	(in '000m^3)	(in '000m^3)	(in '000m^3)	(in '000m^3)	(in '000 kg)	(in '000kg)	(in '000kg)	(in '000kg)	(in '000m^3)
January	**0.005**	**0.000**	**0.000**	**0.000**	**0.005**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.005**
Feb	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.005**
Mar	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**
Apr	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**
May	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**
June	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.010**
Sub-total	**0.005**	**0.000**	**0.000**	**0.000**	**0.005**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.020**
July	**0.010**	**0.000**	**0.000**	**0.000**	**0.010**	**0.000**	**0.000**	**0.000**	**0.000**	**0.010**	**0.005**
Aug	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.015**
Sept	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**
Oct	-	-	-	-	-	-	-	-	-	-	-
Nov	-	-	-	-	-	-	-	-	-	-	-
Dec	-	-	-	-	-	-	-	-	-	-	-
G.Total	**0.015**	**0.000**	**0.000**	**0.000**	**0.015**	**0.000**	**0.000**	**0.000**	**0.000**	**0.010**	**0.040**

APPENDIX G
COMPLAINT LOG

Appendix G - Complaint Log

Log Ref.	Date/Location	Complainant/ Date of Contact	Details of Complaint	Investigation/ Mitigation Action	File Closed
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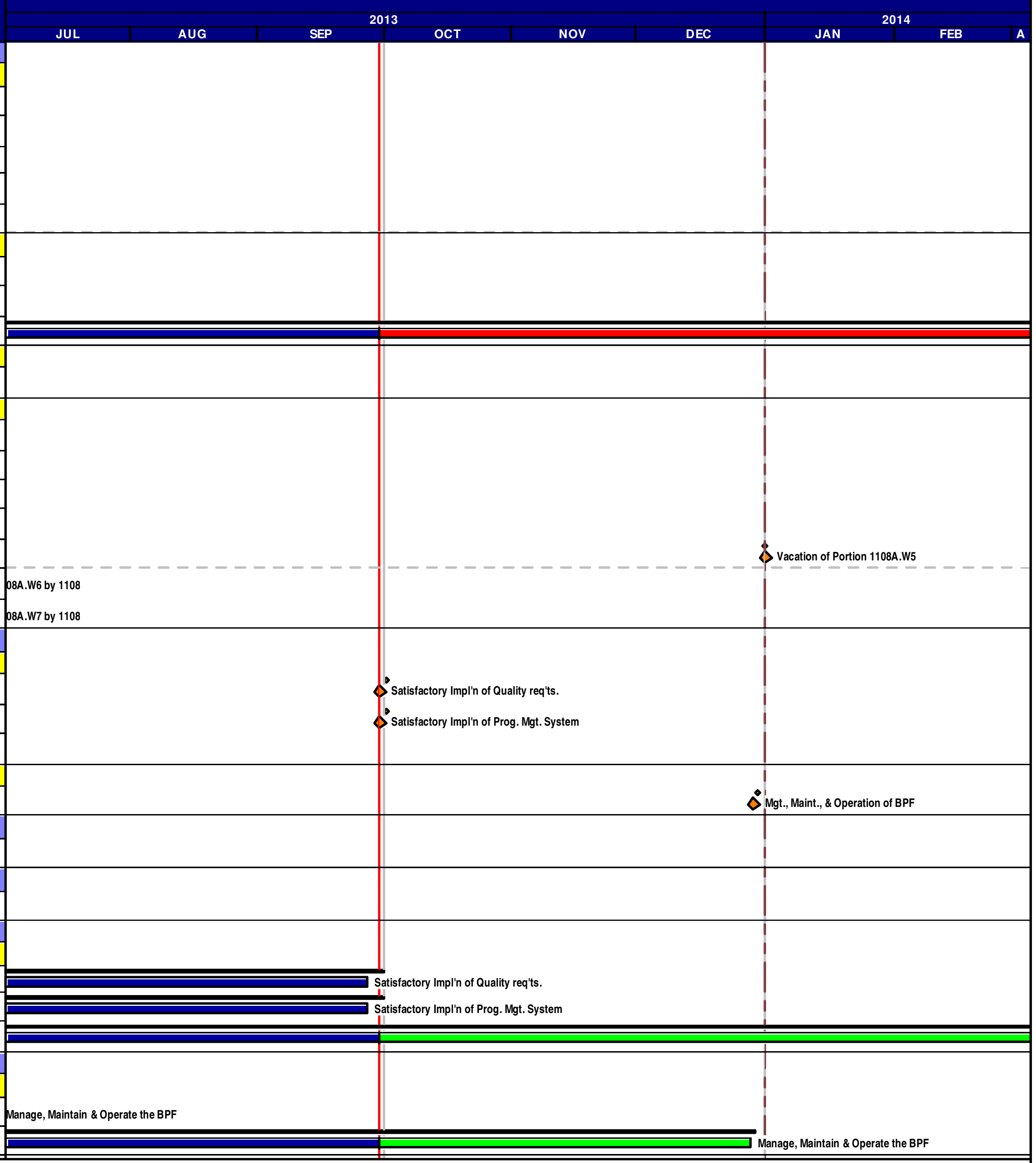
APPENDIX H
TENTATIVE CONSTRUCTION PROGRAMME

MTR

MTR SCL 1108A
KAI TAK BARGING POINT FACILITIES
3 Month Rolling Programme (Rev.02)

Act ID	Description	Orig Dur	Early Start	Early Finish	%
COMMENCEMENT & COMPLETION					
Completion of the Works					
1108ACD01	Letter of Acceptance	0	10AUG12 A		100
1108ACD02	Commencement of Contract	0	13AUG12 A		100
1108ACD03A	Completion of Specified Parts of the Works	0		10FEB13 A	100
1108ACD03C	Completion of Contract	0		28AUG16	0
1108ACD04B	Completion of 1st BPF for Operation	0		10DEC12 A	100
Time for Completion					
1108ACD04A	Completion of Specified Parts of the Works	187	13AUG12 A	15FEB13 A	100
1108ADC04B	Completion of 1st BPF for Operation	122	13AUG12 A	10DEC12 A	100
1108ADC04C	Completion of The Whole of the Works	1477	13AUG12 A	28AUG16	28
+Time for Possession of Works Area					
		52	13AUG12 A	03OCT12 A	100
Vacation of Works Area					
1108ACD11V	Vacation of Portion 1108A.W1	0		28AUG16 *	0
1108ACD12V	Vacation of Portion 1108A.W2	0		28AUG16 *	0
1108ACD13V	Vacation of Portion 1108A.W3	0		31DEC15 *	0
1108ACD14V	Vacation of Portion 1108A.W4 (Access Only)	0		28AUG16 *	0
1108ACD15V	Vacation of Portion 1108A.W5	0		31DEC13 *	0
1108ACD16V	Taking over of Portion 1108A.W6 by 1108	0		31MAY13 A	100
1108ACD17V	Taking over of Portion 1108A.W7 by 1108	0		31MAY13 A	100
MILESTONES SCHEDULE					
Milestones for Cost Centre A					
1108AMSA41	Satisfactory Impl'n of Quality req'ts.	0		29SEP13 A	100
1108AMSA42	Satisfactory Impl'n of Prog. Mgt. System	0		29SEP13 A	100
1108AMSA50	Satisfactory Impl'n of Safety & Env. req'ts.	0		30MAY14	0
Milestones for Cost Centre B					
1108AMSB40	Mgt., Maint., & Operation of BPF	0		28DEC13	0
+EXECUTION OF OPTIONS					
		43	13AUG12 A	10OCT12 A	100
+Value Engineering Proposals					
		27	10SEP12 A	06OCT12 A	100
Cost Centre A					
Preliminaries					
1108AA4010	Satisfactory Impl'n of Quality req'ts.	415	13AUG12 A	27SEP13 A	100
1108AA4020	Satisfactory Impl'n of Prog. Mgt. System	415	13AUG12 A	27SEP13 A	100
1108AA5010	Satisfactory Impl'n of Safety & Env. req'ts.	598	13AUG12 A	30MAY14	59
Cost Centre B					
Kai Tak BPF - Mgt., Maintenance & Operation					
1108AB3010	Manage, Maintain & Operate the BPF	152	10DEC12 A	30JUN13 A	100
1108AB4010	Manage, Maintain & Operate the BPF	182	30JUN13 A	28DEC13	51



Start date	10AUG12
Finish date	28AUG16
Data date	30SEP13
Run date	01OCT13
Page number	1A

c Primavera Systems, Inc.

MTR

MTR SCL 1108A

KAI TAK BARGING POINT FACILITIES

Concentric - Hong Kong River Joint Venture

Early bar
Target bar
Progress bar
Critical bar
Summary bar
Start milestone point
Finish milestone point

Date	Revision	Checked	Approved
13AUG12	1st Submission		
11SEP12	comments(SContE)		
21SEP12	comments(SContE)		

Appendix B

13th EM&A Report for Works Contract 1109 – Stations and Tunnels of Kowloon City Section

MTR Corporation Limited

Shatin to Central Link –
Tai Wai to Hung Hom Section

Monthly EM&A Report No. 13

[Period from 1 to 30 September 2013]

Works Contract 1109 - Stations and Tunnels of Kowloon City Section

(October 2013)

Certified by: Winnie Ko

Position: Environmental Team Leader

Date: 11 October 2013

Samsung-Hsin Chong JV

Shatin to Central Link (SCL) - Tai Wai to Hung Hom Section: Works Contract 1109 – Stations and Tunnels of Kowloon City Section

Monthly EM&A Report No.13

October 2013

Environmental Resources Management
16/F DCH Commercial Centre
25 Westlands Road
Quarry Bay, Hong Kong
Telephone: (852) 2271 3000
Facsimile: (852) 2723 5660
E-mail: post.hk@erm.com
http://www.erm.com

Samsung-Hsin Chong JV

Shatin to Central Link (SCL) - Tai Wai to Hung Hom Section: Works Contract 1109 – Stations and Tunnels of Kowloon City Section

Monthly EM&A Report No.13

October 2013

Reference 0171181

For and on behalf of
ERM-Hong Kong, Limited

Approved by: Frank Wan

Signed:

Position: Partner

Date: 11 October2013

CONTENTS

LIST OF ANNEXES

EXECUTIVE SUMMARY

The construction works of **MTR Shatin to Central Link Works Contract 1109 – Stations and Tunnels of Kowloon City Section** commenced on 1 September 2012. This is the thirteenth monthly Environmental Monitoring and Audit (EM&A) report presenting the EM&A works carried out during the period from 1 September to 30 September 2013 in accordance with the EM&A Manual.

Summary of the Construction Works undertaken during the Reporting Month

The major construction works undertaken during the reporting month include:

Construction Activities undertaken
Works in Ma Tau Wai (MTW)
• TKW/MTW Road Garden – Operation of bentonite plant and pier 15 pre-drilling works; • Along Ma Tau Wai Road - Construction of D-wall panel, predrilling for D-wall and trial pits for location of utilities.
Works in To Kwa Wan (TKW)
• Olympic Playground – Pre-bored H pilling; • TKW Station – Archaeological survey, construction of grout curtain, water main diversion, sheet pile, bored pile and pre-bored H pile; • Nam Kok Road – Installation of pipe pile and construction of grout curtain.

Regular Construction Noise and Construction Dust Monitoring

A summary of the monitoring activities in this reporting period is listed below:

- Regular construction noise monitoring during normal working hours
  - *NMS-CA-6* *4 times*
  - *NMS-CA-7* *4 times*
  - *NMS-CA-8* *4 times*
  - *NMS-CA-9* *4 times*
  - *NMS-CA-10* *4 times*
- Construction dust (24-hour TSP) monitoring
  - *DMS-6* *5 times*
  - *DMS-7* *5 times*
  - *DMS-8* *5 times*
  - *DMS-9* *5 times*
  - *DMS-10* *5 times*

Continuous Noise Monitoring

During the reporting period, continuous noise monitoring is only required at MTW-16-1 according to the schedule presented in CNMP.

Cultural Heritage

A Licence to Excavate and Search for Antiquities under Antiquities and Monuments Ordinance has been obtained from Antiquities and Monuments Office (AMO) on 29 October 2012. The archaeological survey-cum-excavation at the Sacred Hill (North) commenced on 1 November 2012 and is being conducted in accordance with the Licence and the approved Archaeological Action Plan (AAP).

Vibration monitoring was conducted at Hong Kong Aviation Club during the reporting period, no non-compliance was recorded.

Waste Management

Wastes generated from this Project include inert construction and demolition (C&D) materials and non-inert C&D materials. About 4,641 m^3 of inert C&D materials were generated from the Project, which were sent to 1108A Kai Tai Barging Facilities during the reporting month. 522 kg of plastics was generated and sent to recyclers for recycling during the reporting period. About 110 m^3 of non-recyclable non-inert C&D materials, such as general refuse, were disposed of at NENT Landfill. No chemical waste or metal was generated during this reporting month. 27 kg of paper/cardboard packaging was generated and sent to recyclers for recycling during the reporting period.

Landscape and Visual

Bi-weekly inspection of the implementation of landscape and visual mitigation measures was conducted on 2 and 16 September 2013. No audit findings were observed during the reporting month. The implementation status is presented in *Section 5*.

Environmental Site Inspection

Joint weekly site inspections were conducted by representatives of the Contractor, Engineer and Contractor's ET on 2, 9, 16, 23 and 30 September 2013. The representative of the IEC joined the site inspection on 9 September 2013. Details of the audit findings and implementation status are presented in *Section 6*.

Environmental Exceedance/Non-conformance/Compliant/Summons and Prosecution

No exceedance of the Action and Limit Levels of regular construction noise monitoring and 24-hour TSP monitoring was recorded during the reporting period.

No exceedance of the Action and Limit Levels of the continuous noise at MTW-16-1 was recorded during the reporting month. No non-compliance event was recorded during the reporting period. Investigation of the exceedances recorded at MTW-16-1 on 6, 7, 8, 20, 21, 22, 23, 24, 26, 27, 28 August 2013 and on 29 and 30 July 2013 had been conducted. In total, exceedances were recorded in the above 13 days, of which 10 days of exceedances were considered project related and the remaining 3 days of exceedances were non-conclusive.

No environmental complaint and summons/prosecutions was received in this reporting period.

Future Key Issues

The major construction works to be undertaken in the next reporting month include:

Construction Activities to be undertaken
Work in Ma Tau Wai (MTW)
● Along Ma Tau Wai Road - Construction of D-wall panel, pre-drilling for D Wall and trial pits for location of utilities; ● TKW/MTW Road Garden – Operation of bentonite plant and pier 15 pre-drilling works.
Work in To Kwa Wan (TKW)
● Olympic Playground – Pre-bored H piling; ● Nam Kok Road – Installation of pipe pile and grout curtain; ● TKW Station – Archaeological survey, construction of ground curtain, bored pile and sheet pile and water main diversion, and pre-bored H pilling.

1 INTRODUCTION

ERM-Hong Kong, Limited (ERM) was appointed by Samsung-Hsin Chong JV (SSHCJV) as the Environmental Team (Contractor's ET) to undertake the Environmental Monitoring and Audit (EM&A) programme during the construction phase of the **MTR Shatin to Central Link (SCL) Works Contract 1109 – Stations and Tunnels of Kowloon City Section** (the Project).

1.1 PURPOSE OF THE REPORT

This is the thirteenth EM&A report which summarises the monitoring results and audit findings during the reporting period from 1 September to 30 September 2013.

1.2 STRUCTURE OF THE REPORT

Section 1 : **Introduction**
It details the purpose and structure of the report.

Section 2 : **Project Information**
It summarises the background and scope of the project, site description, project organization and contact details, construction programme, construction works undertaken and status of the Environmental Permits/Licenses during the reporting period.

Section 3 : **Environmental Monitoring Requirement**
It summarises the monitoring parameters, programmes, methodologies, frequency, locations, Action and Limit Levels, Event /Action Plans.

Section 4 : **Implementation Status of Environmental Mitigation Measures**
It summarises the implementation of environmental protection measures during the reporting period.

Section 5 : **Monitoring Results**
It summarises the monitoring results obtained in the reporting period.

Section 6 : **Environmental Site Inspection**
It summarises the audit findings of the weekly site inspections undertaken within the reporting period.

Section 7 : **Environmental Non-conformance**
It summarises any monitoring exceedance, environmental complaints and summons within the reporting period.

Section 8 : **Future Key Issues**

It summarises the forecast of environmental impact and monitoring schedule for the next three months.

Section 9 : **Conclusions**

2 PROJECT INFORMATION

2.1 BACKGROUND

The Shatin to Central Link – Tai Wai to Hung Hom Section (hereafter referred to as SCL (TAW-HUH)) is an extension of the Ma On Shan Line and is approximately 11 km long. It links up with the West Rail Line at Hung Hom forming a strategic east-west rail corridor. It is a Designated Project under the *Environmental Impact Assessment Ordinance* (Cap. 499) (EIAO).

The construction of the SCL (TAW-HUH) has been divided into a series of civil construction Works Contracts and this Works Contract 1109 covers the construction of stations in To Kwa Wan (TKW) and Ma Tau Wai (MTW), and the tunnels between the TKW station and Ho Man Tin station (HOM).

2.2 GENERAL SITE DESCRIPTION

For the Works Contract 1109, the alignment runs from TKW station below Ma Tau Chung Road/Ma Tau Wai Road towards the west, reaching the MTW station. After leaving MTW station, the alignment passes Ko Shan Road and joins the HOM station at the intersection of Fat Kwong Street and Shun Yung Street. The underground sections of the alignment between TKW and HOM stations will be constructed by bored tunneling. Both the TKW and MTW stations will be constructed by cut-and-cover method.

The alignment and works area for the Works Contract 1109 are shown in ***Annex A***.

2.3 CONSTRUCTION PROGRAMME AND ACTIVITIES

A summary of the major construction activities undertaken in this reporting period is shown in ***Table 2.1***. The construction programme is presented in ***Annex B***.

Table 2.1 Summary of the Construction Activities Undertaken during the Reporting Month

Construction Activities undertaken
Works in Ma Tau Wai (MTW)
• TKW/MTW Road Garden – Operation of bentonite plant and pier 15 pre-drilling works; • Along Ma Tau Wai Road - Construction of D-wall panel, predrilling for D-wall and trial pits for location of utilities.
Works in To Kwa Wan (TKW)
• Olympic Playground – Pre-bored H pilling; • TKW Station – Archaeological survey, construction of grout curtain, water main diversion, sheet pile, bored pile, and pre-bored H pile; • Nam Kok Road – Installation of pipe pile and construction of grout curtain

2.4 *PROJECT ORGANISATION*

The project organizational chart and contact details are shown in ***Annex C***.

2.5 *STATUS OF ENVIRONMENTAL LICENCES, NOTIFICATION AND PERMITS*

A summary of the relevant permits, licences, and/or notifications on environmental protection for this Project since the commencement of the construction works in September 2012 is presented in ***Table 2.2***.

Table 2.2 Summary of the Status of Environmental Licence, Notification, Permit and Documentations

Permit/ Licences/ Notification	Reference	Validity Period	Remarks
Environmental Permit	EP-438/2012	-	Superseded by EP-438/2012/A on 12 July 2012
	EP-438/2012/A	-	Superseded by EP-438/2012/B on 26 October 2012
	EP-438/2012/B	-	Superseded by EP-438/2012/C on 30 April 2013
	EP-438/2012/C	-	Superseded by EP-438/2012/D on 13 September 2013
	EP-438/2012/D	Throughout the Contract	Permit granted on 13 September 2013
Notification of Construction Works under the Air Pollution Control (Construction Dust) Regulation (Form NA)	348516	13 Aug 2012 – 30 Apr 2017	-
Notification of Construction Works under Air Pollution Control (Construction Dust) Regulation (Form NB)	351125	16 Oct 2012 – 30 Apr 2017	-
Wastewater Discharge Licence			
Site at TKW	*WT00014390-2012*	*30-Sep-2017*	-
Site at MTW	*WT00016348-2013*	*30-Sep-2017*	-
Chemical Waste Producer Registration			
Site at TKW	*5213-286-S3682-01*	*Throughout the Contract*	-
Site at MTW	*5213-242-S3682-02*	*Throughout the Contract*	-
Construction Noise Permit			
- *Grout Pump and Generator at TKW/ MTW Garden*	*GW-RE0855-13*	*21 Aug 2013 - 20 Feb 2014*	-
- *Powered Mechanical Equipment at TKW.*	*GW-RE0614-13*	*19 Jun 2013 - 12 Dec 2013*	-
- *Powered Mechanical Equipment at MTW*	*GW-RE0960-13*	*15 Sept 2013 - 22 Sept 2013*	-

Permit/ Licences/ Notification	Reference	Validity Period	Remarks
Works Area			
- *Powered Mechanical Equipment at MTW Works Area*	*GW-RE1017-13*	*6 Oct 2013 - 13 Oct 2013*	-
Licence to Excavate and Search for Antiquities	342	Till 29 Oct 2013	-
Billing Account for Disposal of Construction Waste	7015758	Throughout the Contract	-

3 ENVIRONMENTAL MONITORING REQUIREMENTS

3.1 REGULAR CONSTRUCTION NOISE MONITORING

3.1.1 Monitoring Location

In accordance with the EM&A Manual, monitoring of construction noise impact should be conducted at the designated monitoring stations. Since access to some of the proposed monitoring locations stated in the EM&A Manual was rejected or not available; alternative locations were proposed and agreed by the ER (Engineer's Representative), IEC (Independent Environmental Checker) and EPD (Environmental Protection Department). The construction noise monitoring locations are listed in ***Table 3.1*** and shown in ***Annex D***. The noise sensitive receivers (NSRs) related to this Works Contract are also shown in ***Annex D***.

Table 3.1 Regular Construction Noise Monitoring Location

Proposed Regular Construction Noise Monitoring Location	Description	Type of Measurement
NMS–CA-6 (a)	No.16-23 Nam Kok Road	Façade
NMS–CA-7	Skytower Tower 2	Façade
NMS–CA-8	SKH Good Shepherd Primary School	Façade
NMS–CA-9 (b)	Kong Yiu Mansion	Façade
NMS–CA-10	Chat Ma Mansion	Façade

Notes:

(a) Access to the monitoring location at Prosperity House (originally proposed in the approved EM&A Manual) was denied during the baseline monitoring. Furthermore, the alternative location, No. 420 Prince Edward Road West, used in the baseline monitoring was also not available as access permission was rejected by the owner of the building. An alternative location (No.16-23 Nam Kok Road) was proposed and approved by the ER and agreed by the IEC and EPD.

(b) As the Incorporated Owners Association of the monitoring location at Lucky Building (originally proposed in the approved EM&A Manual) did not reply to our request for access to their premise, an alternative location, Kong Yiu Mansion, was proposed and approved by the ER and agreed by the IEC and EPD.

3.1.2 Monitoring Parameter and Frequency

Weekly construction noise monitoring was conducted in accordance with the requirements stipulated in the EM&A Manual. If works are to be carried out during restricted hours, the conditions stipulated in the construction noise permit issued by the Noise Control Authority have to be followed. The monitoring schedule for this reporting period is shown in ***Annex E***.

The construction noise levels were measured in terms of the A-weighted equivalent continuous sound pressure level (L_{Aeq}) in decibels dB(A). $L_{Aeq\,(30min)}$ was used as the monitoring metric for the time period between 0700 – 1900 hours on normal weekdays. The measured noise levels were logged every 5 minutes throughout the monitoring period.

3.1.3 Monitoring Equipment and Methodology

Construction noise measurements were conducted in accordance with the calibration and measurement procedures as stated in *Annex – General Calibration and Measurement Procedures* of *Technical Memorandum on Noise from Construction Work other than Percussive Piling* (*GW-TM*) issued under the *Noise Control Ordinance* (*NCO*) (Cap 400).

The sound level meters and calibrator used for the noise measurement, as listed in ***Table 3.2***, compile with the IEC 651: 1979 and 804:1985 (Type 1) specification. The calibration certificates of the sound level meters are included in ***Annex F***.

Table 3.2 Noise Monitoring Equipment

Monitoring Stations	Monitoring Equipment (Sound Level Meter and Calibrator)
NMS–CA-6, NMS–CA-7, NMS–CA-9 and NMS–CA-10	Calibrator: NC 73 (Serial No. 10997142) Sound Level Meter: NL 18 (Serial No. 00360030)
NMS–CA-8	Calibrator: NC-73 (Serial No. 10997142) Sound Level Meter: NL-31 (Serial No. 00983400)

Immedi1ately prior to and following the noise measurements, the accuracy of the measurement equipment was checked using an acoustic calibrator generating a known sound pressure level at a known frequency.

Measurements were accepted when the calibration level from before and after the noise measurement agreed to be within 1.0 dB(A).

3.1.4 Action and Limit Levels

The Action and Limit Levels are presented in ***Table 3.3*** and the Event / Action Plan (EAP) for noise monitoring is presented in ***Annex G.***

Table 3.3 Action and Limit Levels for Noise Monitoring

Time Period	Regular Noise Monitoring Location	Action Level	Limit Level
0700 - 1900 hours on normal weekdays	NMS– CA-6	When one documented valid complaint is received	75 dB(A)
	NMS– CA-7	When one documented valid complaint is received	75 dB(A)
	NMS– CA-8	When one documented valid complaint is received	70 dB(A) 65 dB(A) during examination periods 79 dB(A) (b) during the period of conducting the continuous noise monitoring
	NMS– CA-9	When one documented valid complaint is received	75 dB(A)
	NMS– CA-10	When one documented valid complaint is received	75 dB(A)

Note:

(a) If works are to be carried out during restricted hours (ie, outside 0700 – 1900 on Monday to Saturday), the conditions stipulated in the construction noise permit issued by the Noise Control Authority have to be followed.

(b) The Limit Level of 79 dB(A) was updated on 22 Aug 2013 as per the latest Construction Noise Mitigation Measures Plan (CNMMP) and Continuous Noise Monitoring Plan (CNMP) which were approved by EPD.

3.2 CONTINUOUS NOISE MONITORING

3.2.1 Monitoring Location

With reference to the Continuous Noise Monitoring Plan (CNMP) and EP Condition 2.10, continuous noise monitoring should be conducted during the construction of the SCL (TAW-HUH) under Works Contract 1109 at eight noise sensitive receivers (NSRs), where the predicted residual air-borne construction noise impacts exceed the relevant noise criteria. The proposed continuous noise monitoring locations are presented in ***Table 3.4*** and shown in ***Annex D***.

Table 3.4 Proposed Continuous Noise Monitoring Locations

Continuous Noise Monitoring Location[a]	Description
TKW-3-2(A)	No. 420 Prince Edward Road West
MTW-12-3	Lucky Mansion
MTW-12-4	352-354 Ma Tau Wai Rd (East Façade)
MTW-12-4-1(A)	59 Maidstone Road
MTW-12-10	Lucky Building (South Façade)
MTW-12-10-1	Lucky Building (East Façade)
MTW-12-11	Jing Ming Building
MTW-16-1	SKH Good Shepherd Primary School

Note:

(a) The final monitoring locations will be subject to the latest Continuous Noise Monitoring

Plan (CNMP).

3.2.2 *Monitoring Parameter and Frequency*

Continuous monitoring of $L_{Aeq(30min)}$ noise levels are required to be carried out at the eight proposed continuous noise monitoring locations identified in ***Table 3.4*** during the normal construction working hours (0700 – 1900 Monday to Saturday) in the period that presented in the CNMP. The recommended measurement period for the continuous noise monitoring programme in the CNMP are presented in ***Table 3.6***. If works are to be carried out during restricted hours (ie, outside 0700 – 1900 on Monday to Saturday), the conditions stipulated in the construction noise permit issued by the Noise Control Authority have to be followed.

3.2.3 *Monitoring Equipment and Methodology*

In accordance to the Technical Memorandum (TM) issued under the *Noise Control Ordinance* (NCO), sound level meters in compliance with the *International Electrotechnical Commission Publications 651:1979 (Type 1) and 804:1985 (Type 1)* specifications will be used for carrying out the noise monitoring.

Table 3.5 Noise Monitoring Equipment

Monitoring Stations	Monitoring Equipment (Sound Level Meter and Calibrator)
MTW-16-1	Calibrator: NC-73 (Serial No. 10997142) Sound Level Meter: NL-31 (Serial No. 00983400)

Note:
(a) During the reporting period, continuous noise monitoring is only required at MTW-16-1 according to the schedule presented in CNMP.

Immediately prior to the noise measurement, the accuracy of the sound level meter will be checked using an acoustic calibrator, which generated a known sound pressure level at a known frequency. The accuracy of the sound level meter will also be checked on an annual-basis. Measurements will be accepted as valid only if the calibration level before and after the noise measurement agrees to be within 1.0 dB(A). Noise measurements will be made in accordance with standard acoustical principles and practices in relation to weather conditions.

3.2.4 *Action and Limit Levels*

The Action/Limit Levels for the continuous noise monitoring programme recommended in the latest CNMP are presented in ***Table 3.6.***

Table 3.6 Action/Limit Levels for Continuous Noise Monitoring [a]

Proposed Continuous Noise Monitoring Stations	Description	Action / Limit Level [a]	Measurement Period [a]
TKW-3-2(A)	No. 420 Prince Edward Road West	80	Sept 2014 – Dec 2014

Proposed Continuous Noise Monitoring Stations	Description	Action / Limit Level (a)	Measurement Period (a)
MTW-12-3	Lucky Mansion	80	Aug 2014 – Jan 2015, Mar 2015 – Jun 2015
MTW-12-4	352-354 Ma Tau Wai Rd (East Façade)	80	Aug 2014 – Jun 2015
MTW-12-4-1(A)	59 Maidstone Road	82	Oct 2014, Dec 2014 – Jun 2015
MTW-12-10	Lucky Building (South Façade)	84	Mar 2015 – Apr 2015, Sept 2015 – Jan 2016
MTW-12-10-1	Lucky Building (East Façade)	80	Dec 2014 – May 2015, Sept 2015 – Jan 2016
MTW-12-11	Jing Ming Building	81	Sept 2014 – Jun 2015
MTW-16-1	SKH Good Shepherd Primary School	78 79 (b)	Apr 2013 – 21 Aug2013, 22 Aug 2013 – Dec 2013 May 2014, Aug 2014 – Mar 2016

Notes:

(a) The A/L Levels and Measurement Periods will be subject to the latest Construction Noise Mitigation Measures Plan (CNMMP) and Continuous Noise Monitoring Plan (CNMP).

(b) The A/L Level of 79 dB(A) was updated on 22 Aug 2013 as per the latest Construction Noise Mitigation Measures Plan (CNMMP) and Continuous Noise Monitoring Plan (CNMP) which were approved by EPD.

The Event/Action Plan (EAP) of the latest CNMP for continuous noise monitoring is presented in ***Annex G***.

3.3 *CONSTRUCTION DUST MONITORING*

3.3.1 *Monitoring Location*

The proposed dust monitoring stations for the construction phase of the Project, as recommended in the approved EM&A Manual, are listed in ***Table 3.7*** and shown in ***Annex D***. The proposed locations have been agreed with the ER, EPD and IEC.

Table 3.7 Construction Dust Monitoring Location

Proposed Construction Dust Monitoring Location	Description
DMS-6 (a)	Katherine Building
DMS-7	Parc 22
DMS-8	SKH Good Shepherd Primary School
DMS-9 (b)	No. 26 Kowloon City Road
DMS-10	Chat Ma Mansion

Proposed Construction Dust Monitoring Location	Description

Notes:

(a) Access to the monitoring location at. Prosperity House (originally proposed in the approved EM&A Manual) was denied during the baseline monitoring. Furthermore, the alternative location at No. 420 Prince Edward Road West, which was used in the baseline monitoring, was also not available as access permission was not granted by the owner of the building. An alternative location, Katherine Building, was proposed and had been approved by the ER and agreed by the IEC and EPD.

(b) As the Incorporated Owners Association of the originally proposed monitoring location at Lucky Building did not reply to our request for access to their premise, an alternative location, No. 26 Kowloon City Road, was proposed and had been approved by the ER and agreed by the IEC and EPD.

3.3.2 *Monitoring Parameter and Frequency*

The construction dust monitoring (in terms of Total Suspended Particulates (TSP)) was conducted at the designated monitoring stations in accordance with the requirements stipulated in the EM&A Manual. The 24-hour TSP levels were monitored at the frequency and duration stated in ***Table 3.8***. The TSP monitoring was conducted as per the schedule presented in ***Annex E***.

Table 3.8 Construction Dust Monitoring Parameters and Frequency

Monitoring Period	Duration	Parameter	Frequency
Dust Monitoring	Throughout the construction period of the Project	24-hour TSP	Once per 6 days

3.3.3 *Monitoring Equipment*

24-hour averaged TSP monitoring was performed at the designated monitoring stations using High Volume Samplers (HVS) with the appropriate sampling inlets installed. The performance specification of HVS complied with the standard method "*Determination of Suspended Particulate Matter in the Atmosphere (High Volume Method)*" as stipulated in *US EPA Standard Title 40, Code of Federation Regulations Chapter 1 (Part 50 Appendix B)*. ***Table 3.9*** summarises the equipment that was deployed for the 24-hour averaged monitoring.

Table 3.9 Construction Dust Monitoring Equipment

Monitoring Location	Monitoring Equipment (HVS and Calibrator)
DMS-6	TE-5170 (Serial No. 0107), CM-AIR-43 (Orifice ID 2323)
DMS-7	TE-5170 (Serial No. 3574), CM-AIR-43 (Orifice ID 2323)
DMS-8	TE-5170 (Serial No. 3572), CM-AIR-43 (Orifice ID 2323)
DMS-9	TE-5170 (Serial No. 0814), CM-AIR-43 (Orifice ID 2323)
DMS-10	TE-5170 (Serial No. 3573), CM-AIR-43 (Orifice ID 2323)

3.3.4 *Monitoring Methodology*

All HVSs were free-standing with no obstruction.

The following criteria were considered in the installation of the HVSs:

- appropriate support to secure the samplers against gusty wind needed to be provided at the monitoring stations;

- a minimum of 2m separation from walls, parapets and penthouses was required for rooftop samplers;

- no furnace or incinerator flues was nearby;

- airflow around the sampler was unrestricted; and

- permission could be obtained to set up the samplers and gain access to the monitoring stations.

Preparation of Filter Papers

- glass fibre filters were labelled and sufficient filters that were clean and without pinholes were selected;

- all filters were equilibrated in the conditioning environment for 24 hours before weighing. The conditioning environment temperature was around 25°C and not varied by more than ± 3°C; the relative humidity (RH) was 40%; and

- SGS Hong Kong Ltd, a HOKLAS accredited laboratory, implemented comprehensive quality assurance and quality control programmes on the filters.

Field Monitoring

- the power supply was checked to ensure that the HVSs were working properly;

- the filter holder and area surrounding the filter were cleaned;

- the filter holder was removed by loosening the foul bolts and a new filter, with stamped number upward, on a supporting screen was aligned carefully;

- the filter was properly aligned on the screen so that the gasket formed an airtight seal on the outer edges of the filter;

- the swing bolts were fastened to hold the filter holder down to the frame. The pressure applied should be sufficient to avoid air leakage at the edges;

- the shelter lid was closed and secured with an aluminium strip;

- the HVS was warmed-up for about 5 minutes to establish run-temperature conditions;

- a new flow rate record sheet was inserted into the flow recorder;

- the flow rates of the HVSs were checked and adjusted to between 1.22 - 1.37 m^3min^{-1} , which was within the range specified in the EM&A Manual (i.e. 0.6 – 1.7 m^3min^{-1});
- the programmable timer was set for a sampling period of 24 hours ± 1 hour, and the starting time, weather condition and filter number were recorded;
- the initial elapsed time was recorded;
- at the end of sampling, the sampled filter was removed carefully and folded in half so that only surfaces with collected particulate matter were in contact;
- the filter paper was placed in a clean plastic envelope and sealed;
- all monitoring information was recorded on a standard data sheet; and
- the filters were sent to SGS Hong Kong Ltd for analysis.

Maintenance and Calibration

- the HVSs and their accessories were maintained in a good working condition. For example, motor brushes were replaced routinely and electrical wiring was checked to ensure a continuous power supply; and
- the flow rate of each HVS with mass flow controller was calibrated using an orifice calibrator. Initial calibrations of the dust monitoring equipment were conducted upon installation and prior to commissioning. Five-point calibration was carried out for HVSs using CM-AIR-43 Calibration Kit. HVSs are calibrated every six-month. The calibration records for the HVSs are given in ***Annex F***.

Wind Data Monitoring

- Average wind data (wind speed and direction) at the Kai Tak meteorological station during the monitoring period were obtained from the Hong Kong Observatory (HKO) and presented in ***Annex J***.

3.3.5 Action and Limit Levels

The Action and Limit levels have been established and are presented in ***Table 3.10***.

Table 3.10 Action and Limit Levels for Dust Monitoring

Parameters	Dust Monitoring Station	Action Level (μg m^{-3}) [(a)]	Limit Level (μg m^{-3}) [(a)]
24-hour TSP	DMS-6	156.8	260
	DMS-7	166.7	260
	DMS-8	152.2	260
	DMS-9	160.9	260
	DMS-10	170.4	260

Parameters	Dust Monitoring Station	Action Level (μg m^{-3}) [(a)]	Limit Level (μg m^{-3}) [(a)]
1-hour TSP [(b)]	DMS-6	288.8	500
	DMS-7	289.7	500
	DMS-8	300.0	500
	DMS-9	303.0	500
	DMS-10	294.7	500

Notes:

(a) Reference to the Baseline Monitoring Report submitted in July 2012.

(b) Action and Limit Levels for 1-hour TSP will only be used when 1-hour TSP is required to be monitored when a valid complaint is received.

The Event/Action Plan (EAP) for dust monitoring is presented in ***Annex G***.

3.4 *CULTURAL HERITAGE*

The Licence to Excavate and Search for Antiquities under Antiquities and Monuments Ordinance was obtained from the Antiquities and Monuments Office (AMO) on 29 October 2012. The archaeological survey-cum-excavation and additional investigation at the Sacred Hill (North) commenced on 1 November 2012 and has been conducted in accordance with the Licence and the approved Archaeological Action Plan (AAP).

In accordance with the EM&A Manual, appropriate vibration monitoring on the identified built heritage will be agreed with the Building Department (BD)/Geotechnical Engineering Office (GEO) under the requirement of Buildings Ordinance and/or Blasting Permit as appropriate. Vibration levels will be controlled to appropriate levels. Vibration monitoring will be carried out by the Contractor. The structures requiring vibration monitoring during the relevant tunneling work for this Works Contract include S.K.H. Holy Trinity Church and Old Fast East Flying Training School.

3.5 *LANDSCAPE AND VISUAL MITIGATION MEASURES*

In accordance with the EM&A Manual, the landscape and visual mitigation measures shall be implemented and a site inspection shall be conducted once every two weeks throughout the construction period. The implementation status is given in ***Annex H***.

4 IMPLEMENTATION STATUS OF THE ENVIRONMENTAL PROTECTION REQUIREMENTS

The Contractor has implemented all the environmental mitigation measures and requirements as stated in the EIA Report, Environmental Permit and EM&A Manual. The implementation status of the environmental mitigation measures for this Works Contract during the reporting period is summarized in ***Annex H***. The status of the required submissions under the EP for this Works Contract during this reporting month is presented in ***Table 4.1***.

Table 4.1 Status of Required Submission under Works Contract 1109

EP Condition	Submission	Submission Date
Condition 3.4	Twelfth Monthly EM&A Report	13 September 2013

5 MONITORING RESULTS

5.1 REGULAR CONSTRUCTION NOISE MONITORING

A total of 20 sets of 30-minute construction noise measurements were carried out at the monitoring stations during normal weekdays of the reporting period. No exceedance of the limit level was recorded on 4, 10 and 27 September at NMS-CA-9 and during the whole reporting period at NMS–CA-6, NMS–CA-7 and NMS–CA-8.

The noise monitoring results of the measurements carried out at NMS-CA-9 on 16 September and at NMS-CA-10 on 4, 10, 16 and 27 September are higher than the daytime construction noise criterion. However, the results are not considered as exceedance because they are either below the baseline level or below the limit level after deducting the baseline noise level.

The monitoring results together with their graphical presentations are presented in ***Annex I-1.***

5.2 CONTINUOUS NOISE MONITORING

According to the prediction in the CNMP, continuous noise monitoring was only conducted at MTW-16-1 during the reporting month. No exceedance of the Action and Limit Levels of the continuous noise monitoring was recorded at MTW-16-1 during the reporting period. The monitoring results are presented in ***Annex I-2***.

5.3 CONSTRUCTION DUST MONITORING

A total of 25 sets of 24-hr TSP monitorings were carried out at the designated monitoring stations during normal weekdays of the reporting period. The monitoring results together with their graphical presentations are presented in ***Annex J*** and a summary of the dust monitoring results in this reporting month is given in ***Table 5.1***.

Table 5.1 Summary of the Dust Monitoring Results in this Reporting Month

Monitoring Station	24-hour TSP Monitoring Results measured, μgm^{-3} [(a)]		Action Level, μgm^{-3}	Limit Level, μgm^{-3}
	Average	Range		
DMS-6	86	75 - 93	156.8	260
DMS-7	89	78 - 100	166.7	260
DMS-8	92	86 - 100	152.2	260
DMS-9	88	83 - 97	160.9	260
DMS-10	89	83 - 99	170.4	260

No exceedance of the Action and Limit Levels of the 24-hr TSP was recorded during the reporting period.

5.4 *CULTURAL HERITAGE*

A Licence to Excavate and Search for Antiquities under Antiquities and Monuments Ordinance was obtained from Antiquities and Monuments Office (AMO) on 29 October 2012. The archaeological survey-cum-excavation at the Sacred Hill (North) commenced on 1 November 2012 and is being conducted in accordance with the Licence and the approved Archaeological Action Plan (AAP).

Vibration monitoring was conducted at Hong Kong Aviation Club during the reporting period, no non-compliance was recorded.

5.5 *WASTE MANAGEMENT*

The waste generated from this Project includes inert construction and demolition (C&D) materials, and non-inert C&D materials. Non-inert C&D materials are made up of general refuse, vegetative wastes and recyclable wastes such as plastics and paper/cardboard packaging waste. Steel materials generated from the project are also grouped into non-inert C&D materials as the materials were not disposed of with other inert C&D materials. With reference to relevant handling records and trip tickets of this Project, the quantities of different types of waste generated in the reporting month are summarised in ***Table 5.2***. Details of waste management data are presented in ***Annex K.***

Table 5.2 Quantities of Waste Generated from the Project

Reporting Month	Quantity					
	Inert C&D Materials [(a)] [(b)]	Chemical Waste	Non-inert C&D Materials			
			General Refuse/Vegetative Waste	Recycled materials		
				Paper/cardboard	Plastics	Metals
September 2013	4,641 m^3	0 kg	110 m^3	27 kg	522 kg	0 kg

Notes:

(a) Inert C&D materials include bricks, concrete, building debris, rubble and excavated spoil.

(b) About 4,641 m^3 of inert C&D materials were generated from the Project, and sent to 1108A Kai Tai Barging Facilities during the reporting month.

(c) Chemical waste includes waste oil. It is assumed density of waste oil to be 0.8 kg/L.

5.6 *LANDSCAPE AND VISUAL MITIGATION MEASURES*

Bi-weekly inspection of the implementation of landscape and visual mitigation measures was conducted on 2 and 16 September 2013. Most of the mitigation measures given in ***Annex H*** have been implemented. Required Actions that were found are listed below:

2 September 2013

- No observation was reported during the site inspection.

16 September 2013

- No observation was reported during the site inspection.

6 ENVIRONMENTAL SITE INSPECTION

Joint weekly site inspections were conducted by representatives of the Contractor, Engineer and Contractor's ET on 2, 9, 16, 23 and 30 September 2013. The representative of the IEC joined the site inspection on 9 September 2013. No non-compliance was recorded during the site inspections.

Follow up actions for the observations on 26 August 2013 had been taken. Drip tray with sufficient capacity had been provided to accommodate the chemical containers at MTW works area as observed during the site audit on 2 September 2013. The empty chemical container had been removed at MTW works area during the site audit on 2 September 2013.

Findings and recommendations for the site inspection in this reporting month are summarized as follows:

2 September 2013

- A patch of oil stain was observed at TKW works area. The Contractor was reminded to remove the oil stain. Oil stains had been removed in Olympic playground at TKW works area as observed during the site inspection on 9 September 2013.
- The drip tray holding the air compressor was not in good shape at the bottom. The Contractor was reminded to replace the impaired drip tray. The impaired drip tray had been replaced for the air compressor in TKW works area as observed during the site inspection on 9 September 2013.

9 September 2013

- The Contractor was reminder to remove the oil stains observed at Pier 15 of MTW works area. Oil stains had been removed in MTW works area as observed during the site inspection on 16 September 2013.
- An oil drum was observed without a drip tray at TKW works area. The Contractor was reminded to provide sufficient drip trays for oil drums. A drip tray was provided for the chemical container in TKW works area as observed during the site inspection on 16 September 2013.

16 September 2013

- The Contractor was reminded to provide sufficient drip trays for chemical containers to prevent leakage in TKW works area. Sufficient drip trays had been provided for the chemical containers in TKW works area as observed during the site inspection on 23 September 2013.
- Oil stains were observed at Olympic Garden of TKW works area. The Contractor was reminded to remove the oil stains and dispose of them properly as chemical waste. Oil stains had been removed from Olympic

Garden of TKW works area as observed during the site inspection on 23 September 2013.

23 September 2013

- The Contractor was reminded to provide sufficient noise mitigation measures during the operation of the breaker in MTW works area. Noise mitigation measures had been implemented by the Contractor to reduce the noise nuisance in MTW works area as observed during the site inspection on 30 September 2013.

30 September 2013

- Chemical containers were found without drip trays in TKW works area. The contractor was reminded to provide chemical containers with drip trays to prevent leakage. The follow-up action will be reported in the next reporting period.

- Earthy and muddy materials had been discovered in the vehicles which had been loaded onto the carrying lorry and such constituted a potential of spillage of earthly / muddy materials onto the public area. The Contractor was reminded to clean the site vehicles before they are loaded onto the carrying lorries and to keep a good housekeeping practice in TKW works area. The follow-up action will be reported in the next reporting period.

All the follow-up actions requested by Contractor's ET and IEC during the site inspection were undertaken as reported by the Contractor and confirmed in the following weekly site inspection conducted during the reporting period.

7 ENVIRONMENTAL NON-CONFORMANCE

7.1 SUMMARY OF MONITORING EXCEEDANCE

No exceedance of the Action and Limit Levels of the regular construction noise and 24-hour TSP monitoring was recorded during the reporting month.

No exceedance of the Action and Limit Levels of the continuous noise monitoring at MTW-16-1 was recorded during the reporting month. Investigation of the exceedances recorded at MTW-16-1 on 6, 7, 8, 20, 21, 22, 23, 24, 26, 27, 28 August 2013 and on 29 and 30 July 2013 had been conducted. In total, exceedances were recorded in the above 13 days, of which 10 days of exceedances were considered project related and the remaining 3 days of exceedances were non-conclusive. Investigation reports are attached in *Annex L.*

7.2 SUMMARY OF ENVIRONMENTAL NON-COMPLIANCE

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

7.3 SUMMARY OF ENVIRONMENTAL COMPLAINT

No complaint was reported during the reporting month. The cumulative environmental complaint log is shown in ***Annex M**.*

7.4 SUMMARY OF ENVIRONMENTAL SUMMON AND SUCCESSFUL PROSECUTION

No summon was received during the reporting month. The cumulative summons/prosecution log is shown in ***Annex M.***

8 FUTURE KEY ISSUES

8.1 KEY ISSUES FOR THE COMING MONTH

Works to be undertaken in the next reporting month are summarized in ***Table 8.1***.

Table 8.1 Construction Works to be undertaken in the Next Reporting Month

Construction Activities to be undertaken
Work in Ma Tau Wai (MTW)
• Along Ma Tau Wai Road - Construction of D-wall panel, pre-drilling for D Wall and trial pits for location of utilities; • TKW/MTW Road Garden – Operation of bentonite plant and pier 15 pre-drilling works.
Work in To Kwa Wan (TKW)
• Olympic Playground – Pre-bored H piling; • Nam Kok Road –Installation of pipe pile and grout curtain; • TKW Station – Archaeological survey, construction of ground curtain, bored pile and sheet pile and water main diversion, and pre-bored H pilling.

Potential environmental impacts arising from the above construction activities are mainly associated with dust, construction noise and waste management.

8.2 MONITORING SCHEDULE FOR THE NEXT MONTH

The tentative schedule of regular construction noise monitoring and 24-hour TSP monitoring in the next reporting period is presented in ***Annex E***. The regular construction noise monitoring and 24-hour TSP monitoring will be conducted at the same monitoring locations in the next reporting period. According to the schedule presented in the CNMP, continuous noise monitoring will be conducted in the next reporting period.

8.3 CONSTRUCTION PROGRAMME FOR THE NEXT MONTH

The construction programme for the Project for the next reporting month is presented in ***Annex B.***

9 CONCLUSIONS

This 13th monthly Environmental Monitoring and Audit (EM&A) Report presents the EM&A works undertaken during the period from 1 September 2013 to 30 September 2013 in accordance with the EM&A Manual and the requirement under EP-438/2012/D.

No exceedance of the Action and Limit Levels of the regular construction noise and 24-hour TSP monitoring was recorded at the designated monitoring stations during the reporting period.

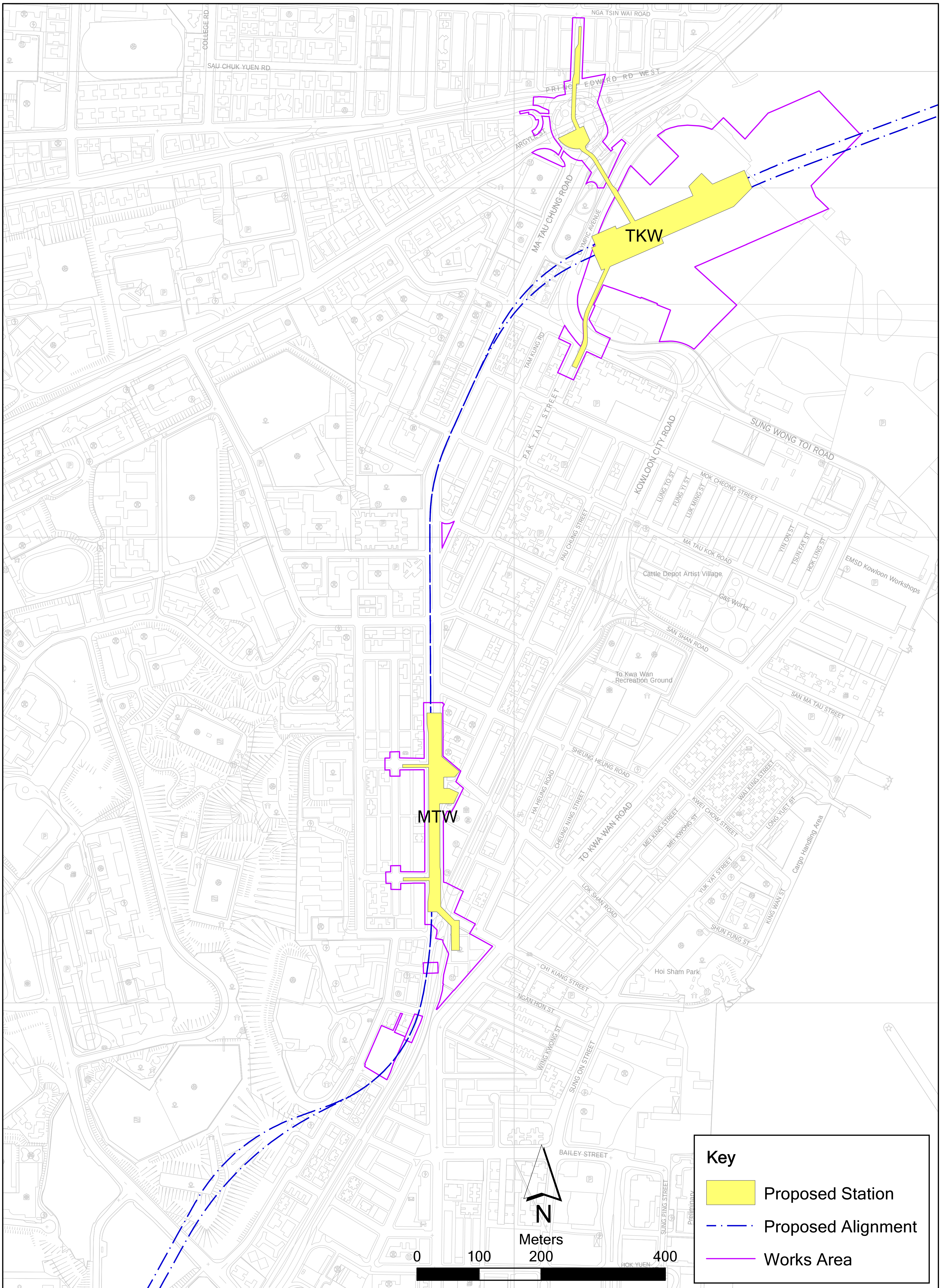
No exceedance of the Action and Limit Levels of the continuous noise at MTW-16-1 was recorded during the reporting month. Investigation of the exceedances recorded at MTW-16-1 on 6, 7, 8, 20, 21, 22, 23, 24, 26, 27, 28 August 2013 and on 29 and 30 July 2013 had been conducted. In total, exceedances were recorded in the above 13 days, of which 10 days of exceedances were considered project related and the remaining 3 days of exceedances were non-conclusive.

No complaint and summons/prosecution was received during the reporting period.

The Contractor has implemented possible and feasible mitigation measures to mitigate the potential environmental impacts during construction. The Contractor's ET will continue to keep track of the EM&A programme to ensure compliance of environmental requirements and the effectiveness and efficiency of the mitigation measures implemented. If necessary, the Contractor will provide more mitigation measures to further alleviate the impacts.

Annex A

The Alignment and Works Area for Works Contract



Annex A

Alignment, Stations and Works Area of SCL Works Contract 1109

Name: 0171181_Works_Area_Annex.mxd
Date: 10-Oct-12

Environmental
Resources
Management
ERM

Annex B

Construction Programme for the Reporting Month and the Coming Month [1]

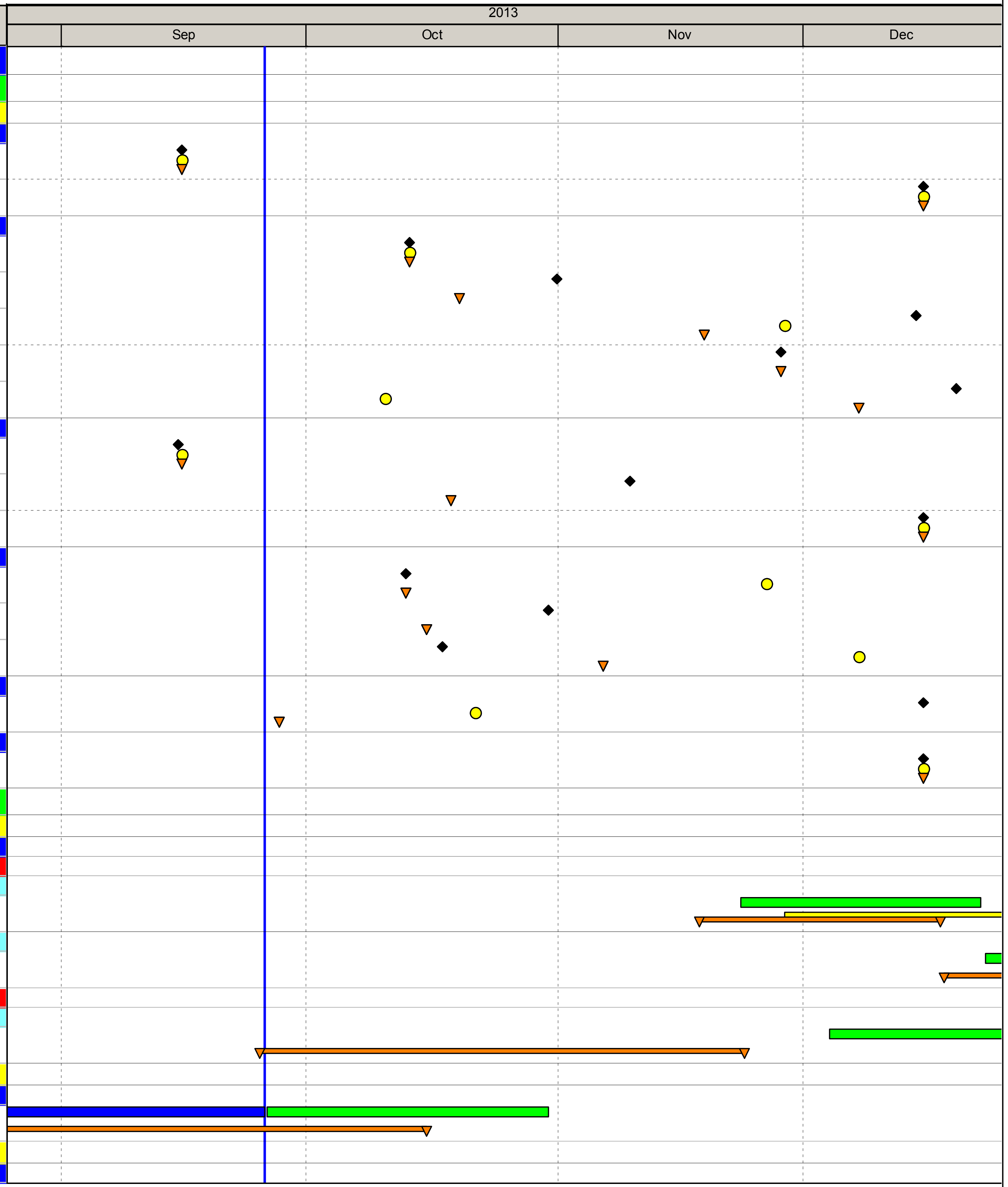
(1) Sung Wong Toi and To Kwa Wan Stations in the programme mean To Kwa Wan and Ma Tau Wai Stations in the Monthly EM&A Report respectively.

Data Date: 25-Sep-13

SAMSUNG - HSIN CHONG JOINT VENTURE

THREE MONTH ROLLING PROGRAMME - SEPTEMBER 2013

Activity ID	Activity Name	Physical % Complete	Start	Finish
1109 - SUW & TKW Stations and Tunnels SEP13 (UWP R5)				
PROJECT DATES				
Specified Milestone Dates				
CC-A Milestones				
01109.MSA1i	A5 - Engr's confirmation of satisfac implementation of Programming Mangmt Sys (1).(Wk37/13;15Sep13)	100%		15-Sep-13 A
01109.MSA3ii	A6(ii) Engr's confirmation of satisfac implementation of quality reqmtsas per approved spec. Plans (1).(Wk50/13;15Dec13)	0%		15-Dec-13*
CC-B Milestones				
01109.MSB04iv	B4(iv)-All Perm Works Material Control Schedules (as per GS Cl G4.16.1) approved by the Eng.(Wk41/13;13Oct13)	0%		13-Oct-13*
01109.MSB03i	B3(i) - Archaeological survey-cum-excavation complete.(Wk24/13;16Jun13)	0%		31-Oct-13*
01109.MSB04iii	B4(iii)-Temp bored pile wall,grout curtain,pump test complete& ready for excavation@TBM launch shaft.(Wk41/13;13Oct13)	0%		14-Dec-13
01109.MSB04ii	B4(ii) - 60% of total numbers of pre-bored H piles complete.(Wk41/13;13Oct13)	0%		28-Nov-13*
01109.MSB04i	B4(i)-Existing DSD twin cell box culvert temporarily diverted to north of SUW.(Wk41/13;13Oct13)	0%		19-Dec-13
CC-C Milestones				
01109.MSC04iii	C4(iii)-Cont dwg submission sch. approved for blkwork,glazed&metal	100%		15-Sep-13 A
01109.MSC02	C2-30% by plan length of permanent diaphragm wall complete.(25 Jun 13)	0%		09-Nov-13
01109.MSC05ii	C5(ii)-All Permanent Works Material Control Schs (as per GS Clause G4.16.1)approved by the Engineer.(Wk50/13;15Dec13)	0%		15-Dec-13*
CC-D Milestones				
01109.MSD03	D3-Submission of des.&manufact.data comp; obtain Engr Notice of no objection" for segments (Wk41/13;13Oct13)	0%		13-Oct-13*
01109.MSD02ii	D2(ii)- Investig.to confirm no exist. piles/obstructions to proposed TBM tunnels comp.&accepted by	0%		30-Oct-13
01109.MSD04iii	D4(iii)-4 pre-bored H-Piles for underpinning at EKW Pier 15 complete.(Wk07/14;16Feb14)	0%		17-Oct-13*
CC-E Milestones				
01109.MSE01i	E1(i) - Contractor's drawing sub, schedules App for hard & soft landscaping wkr, ext drain, svc & E&M (50/13;15Dec13)	0%		15-Dec-13*
CC-F Milestones				
01109.MSF01	F1 - Contr dwg submission sch. & perm works mat. Control Sch (as per GS G4.16.1)approved by Eng.(Wk50/13;15Dec13)	0%		15-Dec-13*
CC-A - PRELIMINARIES AND GENERAL REQUIREMENTS				
Design and Approvals				
Temporary Traffic Arrangements				
TKW Station, Entrances and Adits				
TTMS Design & Approval				
01109.PDA1170	TKW - Stage 2A - TTM Design & Approval by SLG	0%	23-Nov-13	22-Dec-13
TTMS Signal Modification by EMSD				
01109.PDA1300	TKW - Stage 2A - EMSD Signal Preparation	0%	23-Dec-13	16-Feb-14
SUW Station, Entrances and Adits				
TTMS Design & Approval				
01109.PDA1340	SUW - Sung Wong Toi & Pak Tai St - TTM Stage 1 - Design & Approval by SLG	0%	04-Dec-13	01-Feb-14
Management Systems				
Existing Buildings and Structures (EBS) - Submission				
01109.PDA3120	EBS Condition Survey - Investigation to confirm no exist piles/obstructions to proposed TBM tunnels	30%	15-May-13 A	30-Oct-13
Procurement				
Initial Subcontracts				



MTR Corporation Limited

Shatin to Central Link Contract 1109

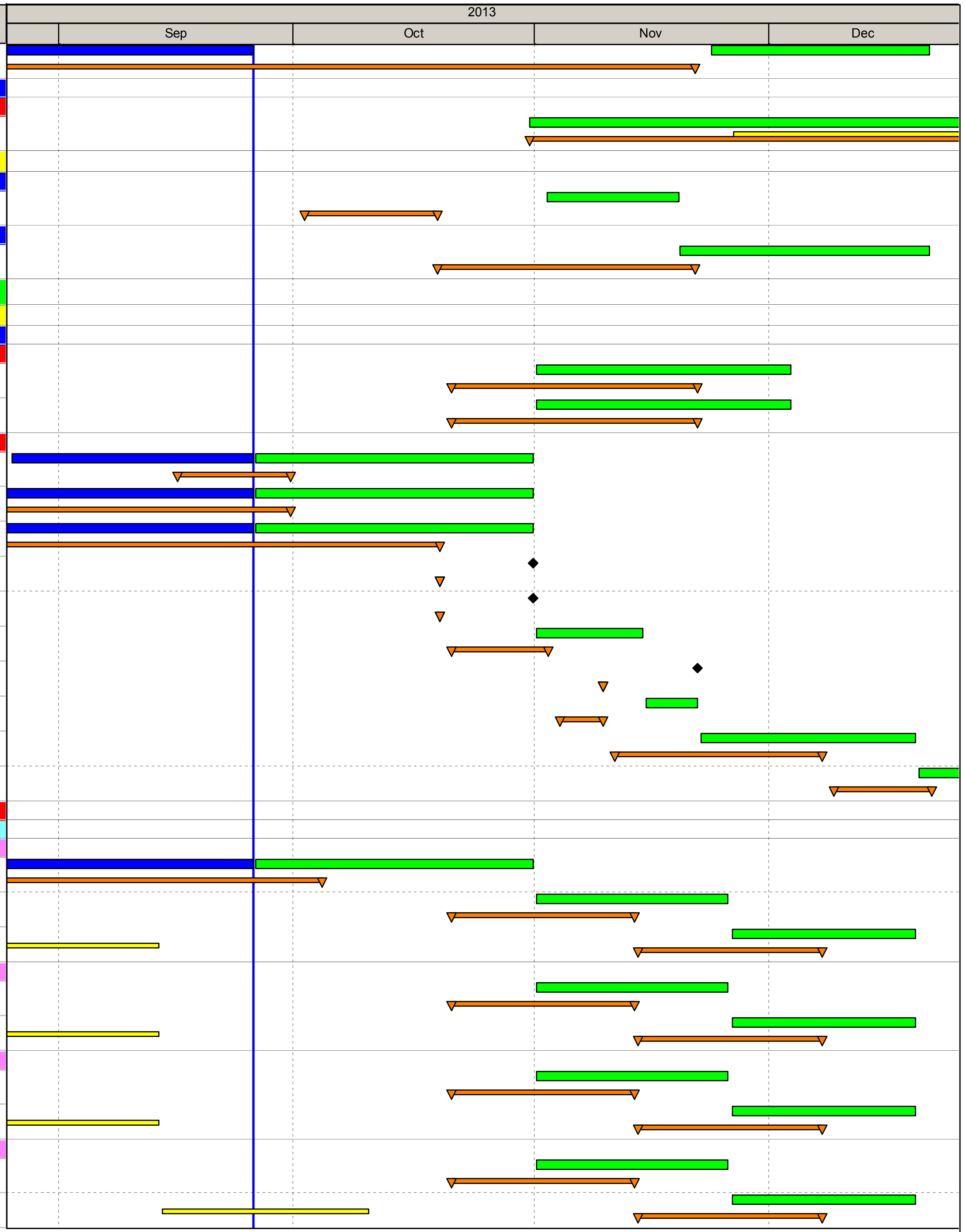
Samsung - Hsin Chong Joint Venture

THREE MONTH ROLLING PROGRAMME - SEP 13 TASK filters: 3MRP Dates, MTRC 1109 - 3MRP.

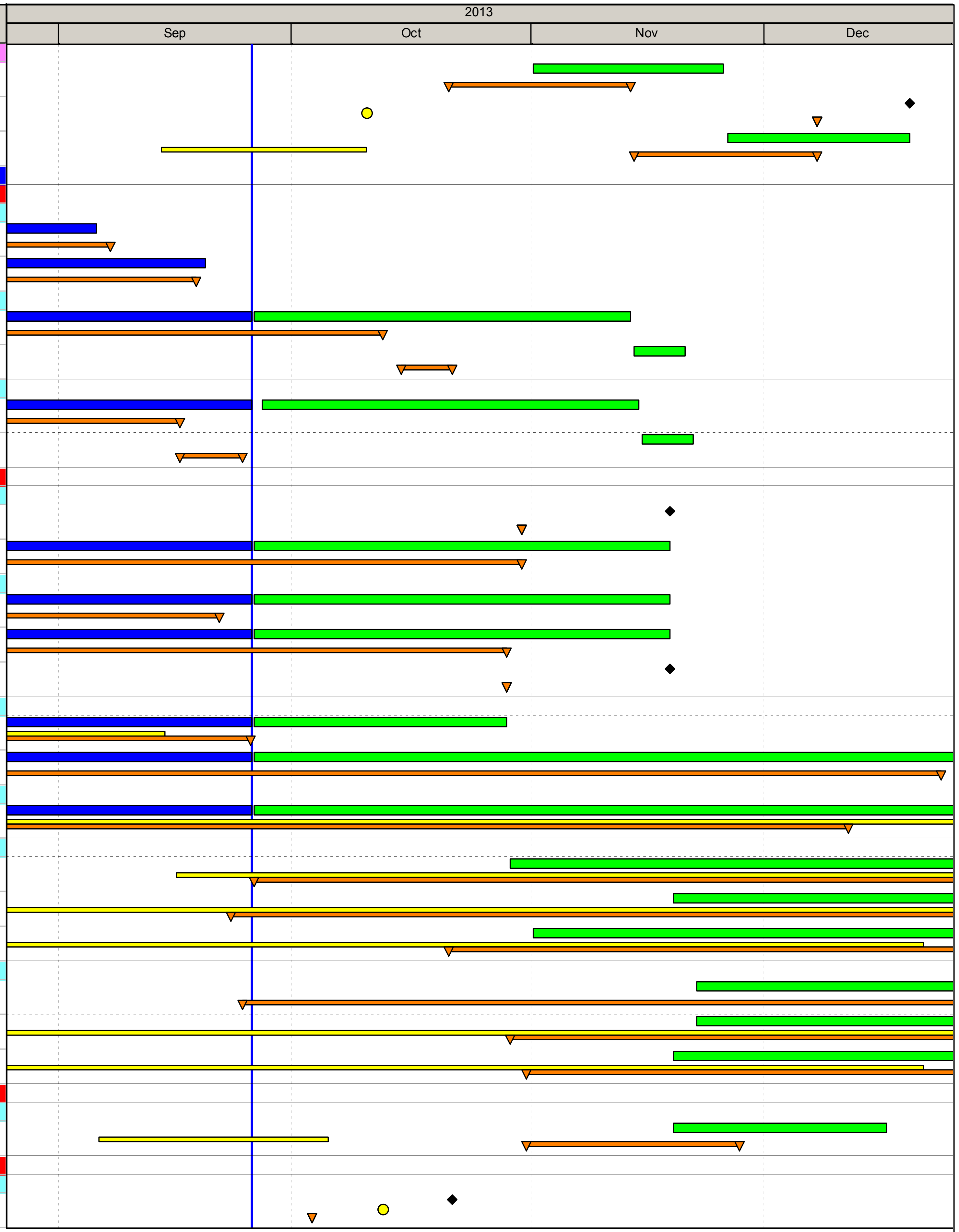
Printed:07-Oct-13

Actual Work
Remaining Work
Master Programme Rev.1
Last Month Update (Aug 2013)
Milestone
MP Rev.1 Milestone
Aug 2013 Milestone

Activity ID	Activity Name	Physical % Complete	Start	Finish
01109.PDA35100	Procure and mobilize observation wells plant & equipment	90%	17-Oct-12 A	21-Dec-13
Concrete Construction Materials				
Precast supplies				
01109.PDA4000	Precast concrete segment manufacture (1st batch) 5%	0%	31-Oct-13*	29-Dec-13
Method Statements				
SUW - Method statements Submission				
01109.PDA34900	SUW - Prepare and submit Observation Wells & Pumping Test method statement	0%	02-Nov-13	19-Nov-13
SUW - Method Statements Approval				
01109.PDA35000	Review & Approval of Observation Wells & Pumping Test method statement	0%	19-Nov-13	21-Dec-13
CC-B - SUW STATION, ENTRANCES AND ADITS				
SUW Station Construction Works				
Site Preparation				
Install Monitoring Instruments/Take Initial Readings				
01109.PDB14710	SUW - Install monitoring instruments/take initial readings; Part 3- GL 12 to 19	0%	01-Nov-13	03-Dec-13
01109.PDB14720	SUW - Install monitoring instruments/take initial readings; Part 4- GL 19 to 24	0%	01-Nov-13	03-Dec-13
Archaeological Survey				
01109.PDB14210	Additional Investigation (in "Green Areas")	0%	26-Aug-13 A	31-Oct-13
01109.PDB14220	Archaeological Survey-cum-Excavation (Stages 2 and 3 Excavation)	96%	13-Nov-12 A	31-Oct-13
01109.PDB1590	Prepare ASE Report	80%	01-Mar-13 A	31-Oct-13
01109.PDB14230	Archaeological Physical Survey Complete - Site Handover	0%		31-Oct-13
01109.PDB1600	Submit Draft ASE report to MTRC	0%		31-Oct-13
01109.PDB14240	MTRC Comment on Draft ASE report	0%	01-Nov-13	14-Nov-13
01109.PDB14260	Submit Draft ASE Report to AMO	0%		21-Nov-13
01109.PDB14250	Revise the Draft ASE Report (following MTR comments)	0%	15-Nov-13	21-Nov-13
01109.PDB14270	Review Draft ASE Report by AMO	0%	22-Nov-13	19-Dec-13
01109.PDB14280	Revise Draft ASE Report (following AMO comments)	0%	20-Dec-13	06-Jan-14
Utilities and Services Diversion				
Utility Diversion Works				
DSD Box Culvert Stormwater drain diversion				
01109.PDB1660A	Prebored H Pile (20nr) work for Box Culvert Diversion	35%	20-Jun-13 A	31-Oct-13
01109.PDB1670	Stormwater drain diversions (Part 3- GL 12 to 19)	0%	01-Nov-13	25-Nov-13
01109.PDB1690	Stormwater drain diversions all other areas	0%	26-Nov-13	19-Dec-13
Fresh water main diversion				
01109.PDB1730	Fresh water mains diversions (Part 3- GL 12 to 19)	0%	01-Nov-13	25-Nov-13
01109.PDB1750	Fresh water mains diversions all other areas	0%	26-Nov-13	19-Dec-13
Salt water main diversion				
01109.PDB1790	Salt water mains diversions (Part 3- GL 12 to 19)	0%	01-Nov-13	25-Nov-13
01109.PDB1810	Salt water mains diversions all other areas	0%	26-Nov-13	19-Dec-13
Electric Cable diversion				
01109.PDB1850	Electric cable diversions (Part 3- GL 12 to 19)	0%	01-Nov-13	25-Nov-13
01109.PDB1870	Electric cable diversions all other areas	0%	26-Nov-13	19-Dec-13

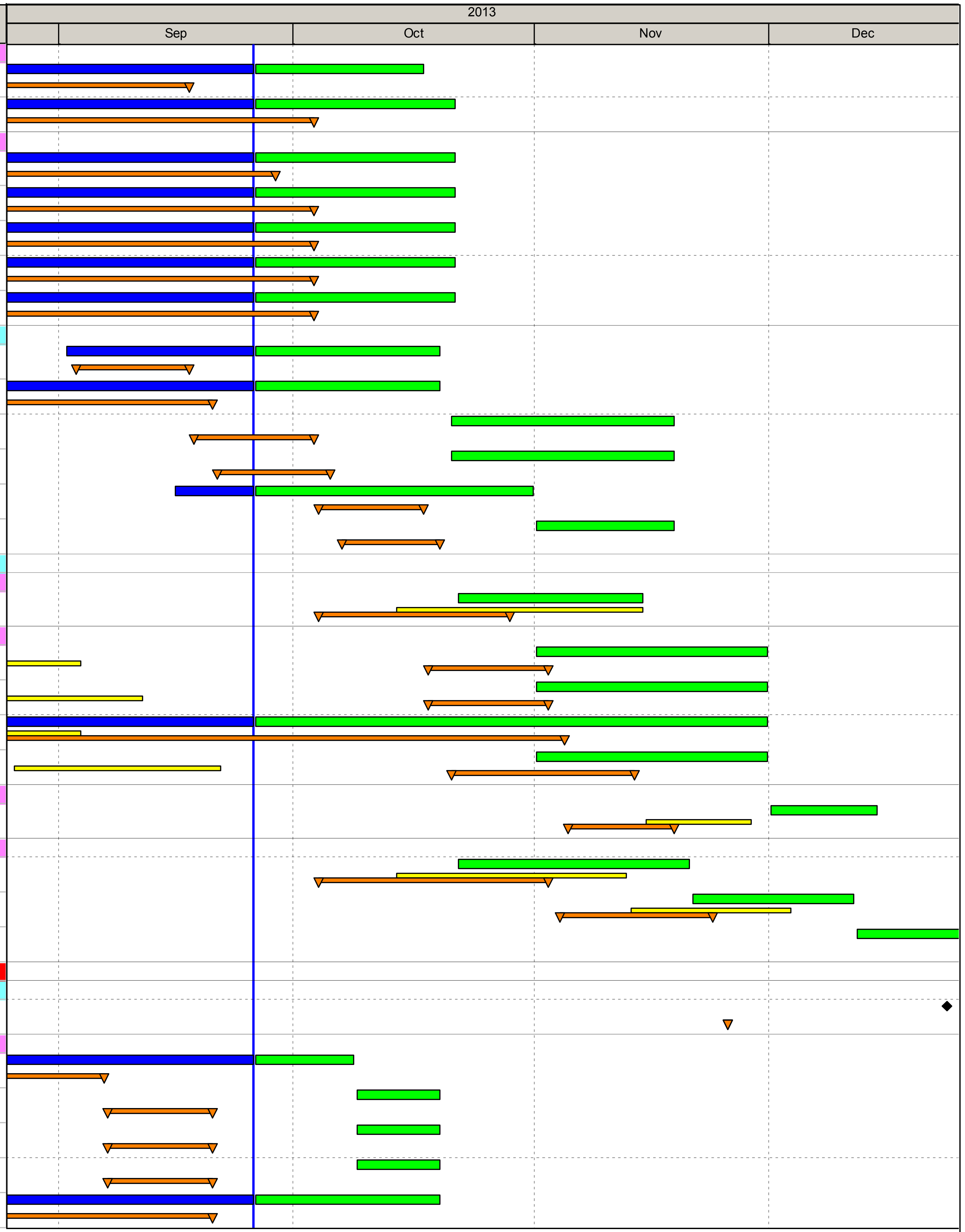


Activity ID	Activity Name	Physical % Complete	Start	Finish
Telecom cable diversions				
01109.PDB1910	Telecom cable diversions (Part 3- GL 12 to 19)	0%	01-Nov-13	25-Nov-13
01109.PDB1940	All utility diversion in Main Station Area complete	0%		19-Dec-13
01109.PDB1930	Telecom cable diversions all other areas	0%	26-Nov-13	19-Dec-13
Station - Excavation and Foundation				
Pre-drilling Works				
Part 1				
01109.PDB1960	Pre-drilling for station foundation piles (Part 1- GL 1 to 4)	100%	23-Nov-12 A	06-Sep-13 A
01109.PDB1970	SI Report & Confirmation of Founding Levels (Part 1 - Gl 1 to 4)	100%	02-Jan-13 A	20-Sep-13 A
Part 3				
01109.PDB2030	Pre-drilling for station foundation piles (Part 3- GL 12 to 19)	60%	07-Jun-13 A	13-Nov-13
01109.PDB14350	SI Report & Confirmation of Founding Levels (Part 3 - Gl 12 to 19)	0%	14-Nov-13	20-Nov-13
Part 4				
01109.PDB2060	Pre-drilling for station foundation piles (Part 4- GL 19 to 24)	75%	07-Jun-13 A	14-Nov-13
01109.PDB14360	SI Report & Confirmation of Founding Levels (Part 4 - Gl 19 to 24)	0%	15-Nov-13	21-Nov-13
Pre-bored H- Piling for Permanent Works				
Part 1 (GL 1 to 4)				
01109.PDB2390	H- Piling; (GL 1 to 4) - Complete	0%		18-Nov-13
01109.PDB2230A	Rig 2 - H- Piling - 75 Nr - (BD approved drawings 07 Mar 13)	80%	22-Jan-13 A	18-Nov-13
Part 2A (GL 4 - 7.5)				
01109.PDB2260A	Rig 3 - H-Piling - 55 Nr - (BD approved drawings 07 Mar 13)	90%	10-Jan-13 A	18-Nov-13
01109.PDB2100A	Rig 4 - H-Piling - 65 Nr - (BD approved drawings 07 Mar 13)	80%	30-Jan-13 A	18-Nov-13
01109.PDB2101A	H-Piling; (GL 4 - 7.5) - Complete	0%		18-Nov-13
Part 2B (GL 7.5 - 12)				
01109.PDB2370A10	Rig 6 - H- Piling - 37Nr - (BD approved drawings 07 Mar 13)	80%	09-Apr-13 A	28-Oct-13
01109.PDB2350	Rig 7 - H- Piling - 71Nr - (BD approved drawings 07 Mar 13)	60%	19-Apr-13 A	25-Jan-14
Other Areas (GL 23 - 24+)				
01109.PDB2250	Rig 5 - H- Piling - 37Nr - 2.5d/pile (BD approved drawings 06 Feb 13)	55%	13-May-13 A	14-Jan-14
Part 3 (GL 12 - 18)				
01109.PDB2180	Rig 6 - H- Piling - 60Nr - (BD approved drawings 07 Mar 13)	0%	29-Oct-13	03-May-14
01109.PDB2270	Rig 3 - H-Piling - 65 Nr - (BD approved drawings 07 Mar 13)	0%	19-Nov-13	30-May-14
01109.PDB2210	Rig 1 - H- Piling - 60Nr - (BD approved drawings 07 Mar 13)	0%	01-Nov-13	08-May-14
Part 4 (GL 18 - 23)				
01109.PDB2370A	Rig 5 - H- Piling - 35Nr - (BD approved drawings 07 Mar 13)	0%	22-Nov-13	11-Mar-14
01109.PDB2330	Rig 4 - H-Piling - 32 Nr - (BD approved drawings 07 Mar 13)	0%	22-Nov-13	01-Mar-14
01109.PDB2360	Rig 2 - H- Piling - 32Nr - (BD approved drawings 07 Mar 13)	0%	19-Nov-13	26-Feb-14
Pile Load Tests				
Part 1				
01109.PDB2400	Pile Load tests; Part 1 - GL 1 to GL 4	0%	19-Nov-13	16-Dec-13
TBM Launch Shaft Works				
Bored Piling for TBM Shaft				
01109.PDB19010	Bored Piling Works Complete	0%		21-Oct-13



Actual Work
Remaining Work
Master Programme Rev.1
Last Month Update (Aug 2013)
Milestone
MP Rev.1 Milestone
Aug 2013 Milestone

Activity ID	Activity Name	Physical % Complete	Start	Finish
Bored Pile P1 - P23				
01109.PDB18970B	TBM Launch shaft - Bored Piling P1-P23 (13nr) - Rig 6A	90%	22-Feb-13 A	17-Oct-13
01109.PDB18870B	TBM Launch shaft - Bored Piling P1-P23 (10nr) - Rig 7A	85%	08-Mar-13 A	21-Oct-13
Bored Pile P50 - P100				
01109.PDB18920B	TBM Launch shaft - Bored Piling P50-P100 (10nr) - Rig 3A	85%	01-Apr-13 A	21-Oct-13
01109.PDB18890B	TBM Launch shaft - Bored Piling P50-P100 (10nr) - Rig 1A	80%	08-Mar-13 A	21-Oct-13
01109.PDB18910B	TBM Launch shaft - Bored Piling P50-P100 (10nr) - Rig 2A	80%	08-Mar-13 A	21-Oct-13
01109.PDB18930B	TBM Launch shaft - Bored Piling P50-P100 (11nr) - Rig 4A	80%	01-Mar-13 A	21-Oct-13
01109.PDB18940B	TBM Launch shaft - Bored Piling P50-P100 (10nr) - Rig 5A	80%	01-Mar-13 A	21-Oct-13
Pipe piling for TBM Shaft Area				
01109.PDB19030	TBM Launch shaft - Gang A - Pipe Piles Zone C - P25 to 47 (23nr) 2d/pile	60%	02-Sep-13 A	19-Oct-13
01109.PDB19040	TBM Launch shaft - Gang A - Pipe Piles Zone C - P48 to 70 (23nr) 2d/pile	70%	05-Aug-13 A	19-Oct-13
01109.PDB19020	TBM Launch shaft - Gang A - Pipe Piles Zone B1 - P1 to 24 (24nr) 2d/pile	0%	21-Oct-13	18-Nov-13
01109.PDB19050	TBM Launch shaft - Gang B - Pipe Piles Zone C - P71 to 93 (23nr) 2d/pile	0%	21-Oct-13	18-Nov-13
01109.PDB19070	TBM Launch shaft - Gang B - Pipe Piles Zone D - P118 to 140 (23nr) 2d/pile	50%	16-Sep-13 A	31-Oct-13
01109.PDB19060	TBM Launch shaft - Gang B - Pipe Piles Zone C - P94 to 117 (24nr) 2d/pile	0%	01-Nov-13	18-Nov-13
Excavation TBM Shaft Area				
Install observation Wells- TBM Shaft				
01109.PDB3010	TBM Launch shaft - Install observation wells	0%	22-Oct-13	14-Nov-13
Curtain Grouting- TBM Shaft				
01109.PDB3050	SUW GL 1-7 - Station shaft zone A & B - Grout curtain	0%	01-Nov-13	30-Nov-13
01109.PDB3030	SUW GL 1-7 - Station shaft zone B1& D - Grout curtain	0%	01-Nov-13	30-Nov-13
01109.PDB3040	TBM GL 1-7 - Launch shaft - Grout curtain	5%	20-Aug-13 A	30-Nov-13
01109.PDB3020	SUW GL 1-7 - Station shaft zone C - Grout curtain	0%	01-Nov-13	30-Nov-13
Pumping Tests - TBM Shaft				
01109.PDB3060	TBM Launch shaft - Pumping test	0%	01-Dec-13	14-Dec-13
Excavation and lateral Support - TBM Shaft				
01109.PDB3070	TBM Launch shaft - Pile testing	0%	22-Oct-13	20-Nov-13
01109.PDB3080	TBM Launch shaft - Install capping beam	0%	21-Nov-13	11-Dec-13
01109.PDB3210B	TBM Launch shaft - Excavate EGL to +5mPD	0%	12-Dec-13	31-Dec-13
Earthworks				
Curtain Grout Works				
01109.PDB3480	Grout Curtain complete	0%		23-Dec-13
North of SUW				
01109.PDB3360A	Grout Curtain; Part 4- GL 21 to 22	75%	19-Jul-13 A	08-Oct-13
01109.PDB3390A	Grout Curtain; Part 4- GL 22 to 23	0%	09-Oct-13	19-Oct-13
01109.PDB3210A	Grout Curtain; Part 2- GL 4 to 5	0%	09-Oct-13	19-Oct-13
01109.PDB3240A	Grout Curtain; Part 3- GL 10 to 11	0%	09-Oct-13	19-Oct-13
01109.PDB3280A	Grout Curtain; Part 4- GL 19 to 20	50%	04-Aug-13 A	19-Oct-13



Samsung - Hsin Chong Joint Venture

MTR Corporation Limited

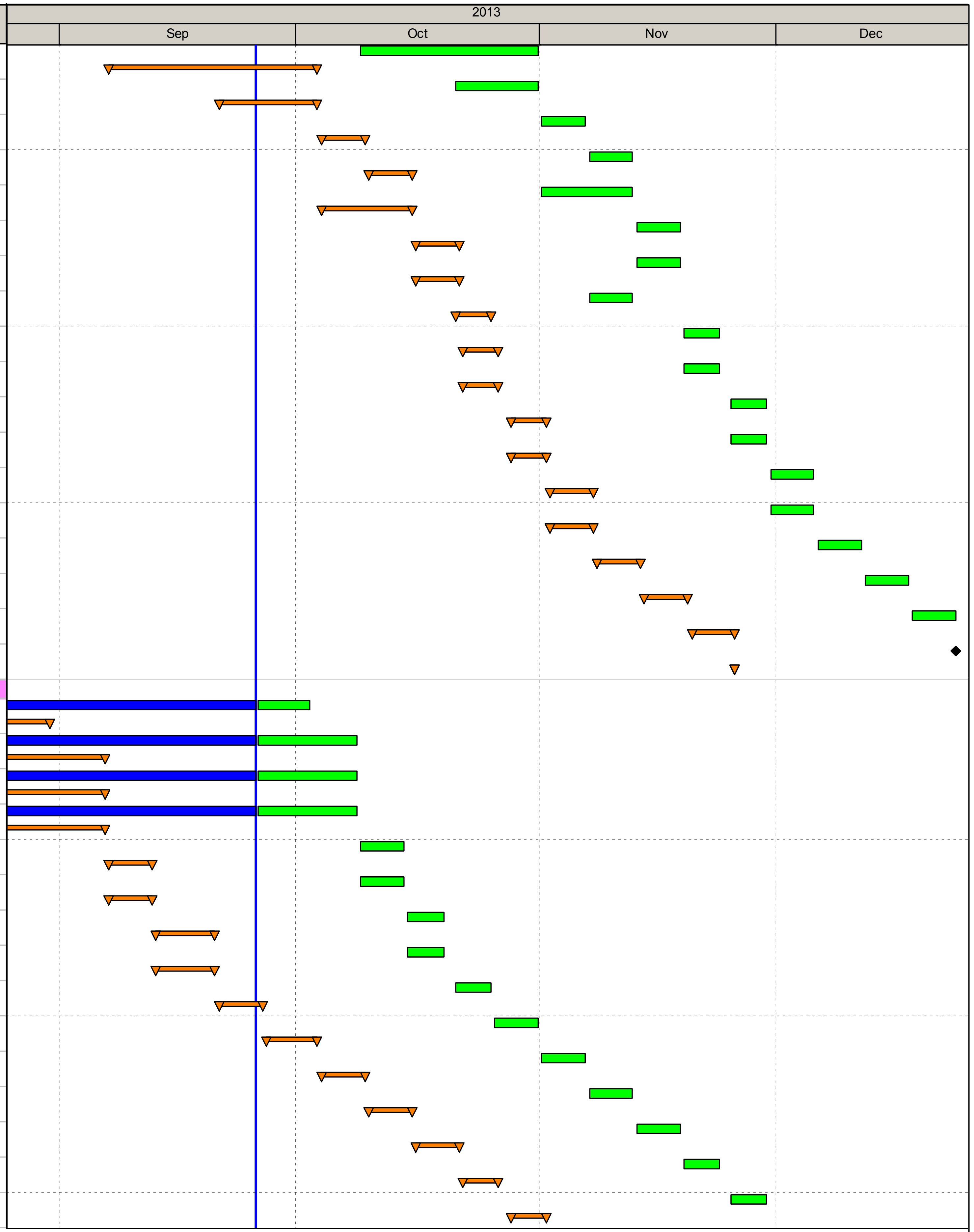
Shatin to Central Link Contract 1109

THREE MONTH ROLLING PROGRAMME - SEP 13 TASK filters: 3MRP Dates, MTRC 1109 - 3MRP.

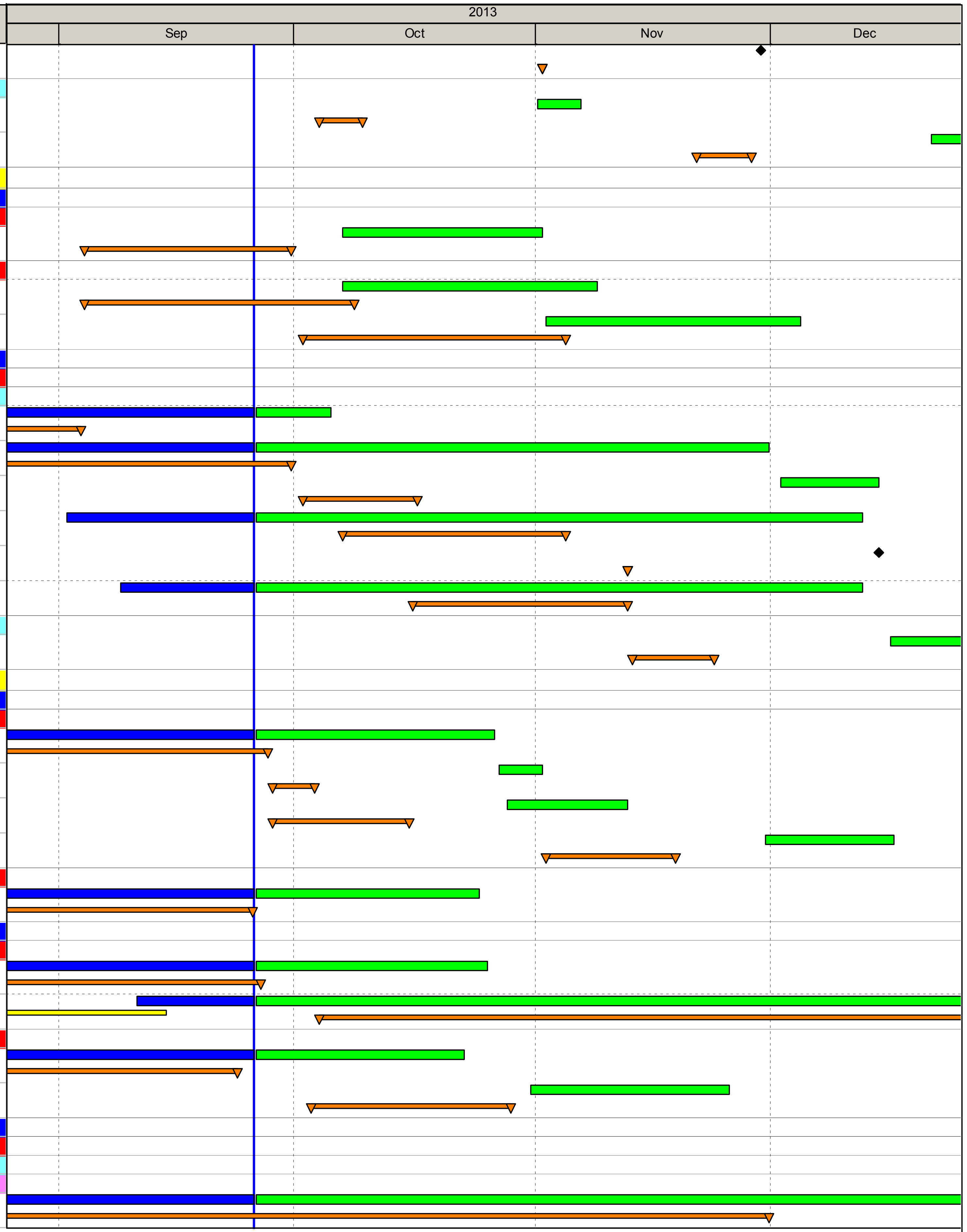
Printed:07-Oct-13

Actual Work
Remaining Work
Master Programme Rev.1
Last Month Update (Aug 2013)
Milestone
MP Rev.1 Milestone
Aug 2013 Milestone

Activity ID	Activity Name	Physical % Complete	Start	Finish
01109.PDB3420A	Grout Curtain; Part 4- GL 23 to 24	0%	09-Oct-13	31-Oct-13
01109.PDB3450A	Grout Curtain; Part 5- areas beyond GL 24	0%	21-Oct-13	31-Oct-13
01109.PDB3300A	Grout Curtain; Part 3- GL 11 to 12	0%	01-Nov-13	06-Nov-13
01109.PDB3380A	Grout Curtain; Part 3- GL 13 to 14	0%	07-Nov-13	12-Nov-13
01109.PDB3250A	Grout Curtain; Part 1- GL 1 to GL 2	0%	01-Nov-13	12-Nov-13
01109.PDB3290A	Grout Curtain; Part 2- GL 5 to 6	0%	13-Nov-13	18-Nov-13
01109.PDB3410A	Grout Curtain; Part 3- GL 14 to 15	0%	13-Nov-13	18-Nov-13
01109.PDB3340A	Grout Curtain; Part 3- GL 12 to 13	0%	07-Nov-13	12-Nov-13
01109.PDB3310A	Grout Curtain; Part 1- GL 2 to GL 3	0%	19-Nov-13	23-Nov-13
01109.PDB3440A	Grout Curtain; Part 3- GL 15 to 16	0%	19-Nov-13	23-Nov-13
01109.PDB3330A	Grout Curtain; Part 2- GL 6 to 7	0%	25-Nov-13	29-Nov-13
01109.PDB3460A	Grout Curtain; Part 3- GL 16 to 17	0%	25-Nov-13	29-Nov-13
01109.PDB3350A	Grout Curtain; Part 1- GL 3 to GL 4	0%	30-Nov-13	05-Dec-13
01109.PDB3470A	Grout Curtain; Part 3- GL 17 to 18	0%	30-Nov-13	05-Dec-13
01109.PDB3370A	Grout Curtain; Part 2- GL 7 to 8	0%	06-Dec-13	11-Dec-13
01109.PDB3400A	Grout Curtain; Part 2- GL 8 to 9	0%	12-Dec-13	17-Dec-13
01109.PDB3430A	Grout Curtain; Part 2- GL 9 to 10	0%	18-Dec-13	23-Dec-13
01109.PDB19360B	Grout Curtain completed on North of Station	0%		23-Dec-13
South of SUW				
01109.PDB19340B	Grout Curtain; Part 3- GL 12 to 13	0%	15-Jul-13 A	02-Oct-13
01109.PDB19170B	Grout Curtain; Part 3- GL 14 to 15	80%	15-Jul-13 A	08-Oct-13
01109.PDB19180B	Grout Curtain; Part 3- GL 15 to 16	80%	15-Jul-13 A	08-Oct-13
01109.PDB19220B	Grout Curtain; Part 5- areas beyond GL 24	0%	15-Jul-13 A	08-Oct-13
01109.PDB19200B	Grout Curtain; Part 2- GL 4 to 5	0%	09-Oct-13	14-Oct-13
01109.PDB19210B	Grout Curtain; Part 3- GL 10 to 11	0%	09-Oct-13	14-Oct-13
01109.PDB19280B	Grout Curtain; Part 3- GL 11 to 12	0%	15-Oct-13	19-Oct-13
01109.PDB19240B	Grout Curtain; Part 1- GL 1 to GL 2	0%	15-Oct-13	19-Oct-13
01109.PDB19260B	Grout Curtain; Part 2- GL 5 to 6	0%	21-Oct-13	25-Oct-13
01109.PDB19270B	Grout Curtain; Part 1- GL 2 to GL 3	0%	26-Oct-13	31-Oct-13
01109.PDB19290B	Grout Curtain; Part 2- GL 6 to 7	0%	01-Nov-13	06-Nov-13
01109.PDB19300B	Grout Curtain; Part 1- GL 3 to GL 4	0%	07-Nov-13	12-Nov-13
01109.PDB19310B	Grout Curtain; Part 2- GL 7 to 8	0%	13-Nov-13	18-Nov-13
01109.PDB19320B	Grout Curtain; Part 2- GL 8 to 9	0%	19-Nov-13	23-Nov-13
01109.PDB19330B	Grout Curtain; Part 2- GL 9 to 10	0%	25-Nov-13	29-Nov-13

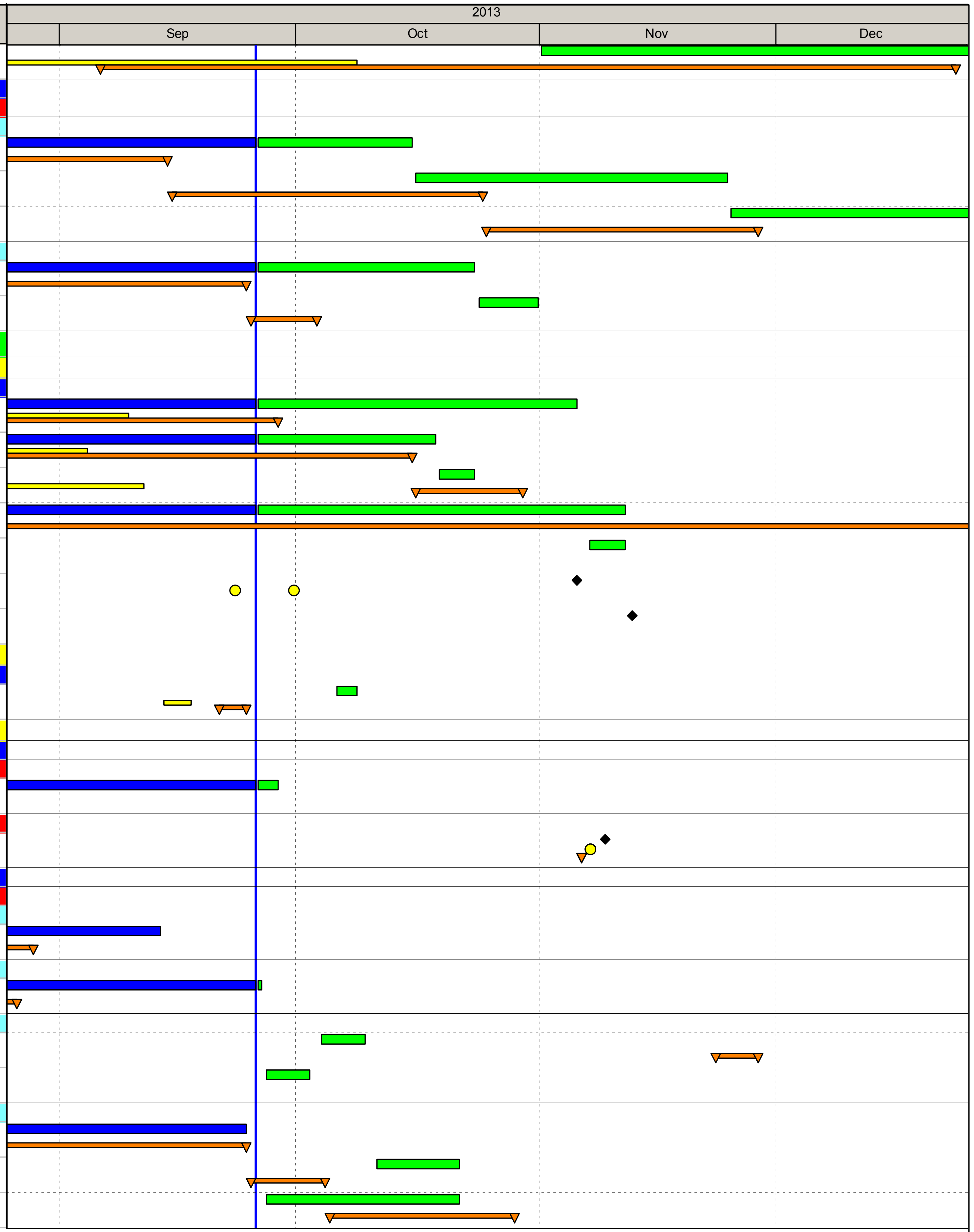


Activity ID	Activity Name	Physical % Complete	Start	Finish
01109.PDB19350B	Grout Curtain completed on South of Station	0%		29-Nov-13
Install Observation Wells				
01109.PDB3750	Observation Wells; Part 4- areas beyond GL 24	0%	01-Nov-13	06-Nov-13
01109.PDB3520	Observation Wells; Part 1- GL 1 to 2	0%	21-Dec-13	31-Dec-13
Entrance C and Associated Adits				
Entrance C - Site Preparation				
Entrance C - Record Survey and Site set-up Works				
01109.PDB10270	CCTV Record Survey of Public drains	0%	07-Oct-13	01-Nov-13
Entrance C - Utilities and Services Diversion				
01109.PDB10330	Initial survey of dump concentrations in Ent C & Adits related areas	0%	07-Oct-13	08-Nov-13
01109.PDB10310	Visual joint survey of Highways structures in Ent C & Adits areas	0%	02-Nov-13	04-Dec-13
Entrance C - Part 1- GL 7 to GL 14				
Entrance C- Part 1- ELS Works				
Entrance C - Part 1- Piling & Toe Grouting Works				
01109.PDB10380	Sheet Piling Works; GL C7 to C14	90%	05-Apr-13 A	05-Oct-13
01109.PDB14400	Pre Bored H Pile works (24nr) 1PR	70%	05-Jul-13 A	30-Nov-13
01109.PDB14410	Pre Bored H pile testing	0%	02-Dec-13	14-Dec-13
01109.PDB10390	Toe grouting Works; GL C7 to C14; East Side	15%	02-Sep-13 A	12-Dec-13
01109.PDB10410	All Piling Works for Ent C & Adits complete	0%		14-Dec-13
01109.PDB10400	Toe grouting Works; GL C14 to C7; West Side	15%	09-Sep-13 A	12-Dec-13
Entrance C - Part 1-Excavation Works				
01109.PDB14420	Pump Test	0%	16-Dec-13	28-Dec-13
Entrance B and Associated Adits				
Entrance B - Site Preparation				
Entrance B - Record Survey and Site set-up Works				
01109.PDB2040	Pre-drilling for Adit B works (GL 11 to 20)	85%	15-Mar-13 A	26-Oct-13
01109.PDB2070	SI Report & Confirmation of Founding Levels	0%	27-Oct-13	01-Nov-13
01109.PDB11690	Initial survey of Structures to be retained in Adit B areas	0%	28-Oct-13	12-Nov-13
01109.PDB11700	Initial survey of dump concentrations in Adit B related areas	0%	30-Nov-13	16-Dec-13
Entrance B - Utilities and Services Diversion				
01109.PDB11710	Traffic Diversion for site clearance, utility relocation/diversion in Adit B Area	80%	21-Jan-13 A	24-Oct-13
Entrance B - Olympic Avenue and SUW playground Works				
Stage 1				
01109.PDB11770	Divert / protect Temporary utilities	80%	26-Mar-13 A	25-Oct-13
01109.PDB11780	Pre-Bored H-Piles foundation works (16nr 1PR) (4d/pile)	0%	11-Sep-13 A	10-Jan-14
Stage 2				
01109.PDB11950	Sheet piling & Toe grouting Works; GL B9 to B11(2x36m sheetpiles)	45%	12-Jul-13 A	22-Oct-13
01109.PDB11960	Sheet piling & Toe grouting Works; GL B7 to B9 (North bound lane areas)(2x18m sheetpiles)	0%	31-Oct-13	25-Nov-13
Entrance B - Nam Kok Road Works - (Detailed Programme)				
Entrance B - Nam Kok Road Works (Portion 3)				
Nam Kok Road - TTMS - Stage 1 and 2				
TTMS - Stage 1 (Phase 1)				
01109.PDB14650A	Install 410mm dia pipe pile wall. 90nr (assume 3 piles/2 days). 1PR	20%	02-Aug-13 A	03-Jan-14



Actual Work
Remaining Work
Master Programme Rev.1
Last Month Update (Aug 2013)
Milestone
MP Rev.1 Milestone
Aug 2013 Milestone

Activity ID	Activity Name	Physical % Complete	Start	Finish
01109.PDB19200A	Install grout curtain	0%	01-Nov-13	24-Jan-14
Entrance B - Kowloon City Interchange				
Entrance B - Underpinning of KNEC Piers				
Pier P75				
01109.PDB14380A	Additional Trial Pit Excavation for Unchartered Ground Condition	50%	05-Aug-13 A	15-Oct-13
01109.PDB14390A	WSD to procure and connect existing watermain	0%	16-Oct-13	24-Nov-13
01109.PDB12980	P75 - Pre-bored socket H- Piles 609 Dia;4Nos 40m depth;1 PR of low headroom	0%	25-Nov-13*	31-Dec-13
Pier P46				
01109.PDB12640	General Clearance	70%	14-May-13 A	23-Oct-13
01109.PDB12650	Site investigation Trial Trench & predrilling	0%	24-Oct-13	31-Oct-13
CC-C - TKW STATION, ENTRANCES AND ADITS				
Engineers Instructions (EI)				
EI 29 - Provision of Watermain along Kowloon City Road and Sheung Heung Road				
01109.PDC21610A	Install Watermain at Zone 2	88%	10-May-13 A	05-Nov-13
01109.PDC21630A	Install Watermain at Zone 4	92%	29-Jan-13 A	18-Oct-13
01109.PDC21640A	Carry out Swabbing and pressure test (zone 3 and 4)	0%	19-Oct-13	23-Oct-13
01109.PDC21600A	Install Watermain at Zone 1	76%	29-Jan-13 A	11-Nov-13
01109.PDC21640B	Carry out Swabbing and pressure test (zone 1 and 2)	0%	07-Nov-13	11-Nov-13
01109.PDC21660A	Connection with existing watermain B	0%		05-Nov-13
01109.PDC21660B	Connection with existing watermain A	0%		12-Nov-13
Implementation of TTA at TKW				
Revised TTMS Schemes				
01109.PDC28940	Stage 1 - Phase 3 - Wks Area in East; Bus Stop at E3	0%	06-Oct-13	08-Oct-13
TKW Station				
Existing Utility Diversion Works				
Water Supply				
01109.PDC1720	TKW-SW101/101P - P89 - Relocate exist 200dia Salt Watermain	98%	25-Jul-13 A	28-Sep-13
Gas Supply				
01109.PDC1940	TKW-GAS602 - Proposed MP315PE Gas Main - Subject to discussion (MTR & Town Gas)	0%	09-Nov-13*	
Diaphragm Wall EAST side STAGE 1 PHASE 2 TTMS				
Area E1 (MTW Road)				
Area E1 (MTW Rd) - Advance Works				
01109.PDC2020A	E1 (MTW Rd) - Batch 1 - Excavation & Construction of Guide walls (P132-P133)	100%	31-May-13 A	13-Sep-13 A
Area E1 (MTW Rd) - Founding Level Predrill				
01109.PDC2180	E1 (MTW Rd) - Batch 2 - P:11,12,13,128,134,159 - SI Report & Confirmation of Founding Levels	83%	19-Feb-13 A	26-Sep-13
Area E1 (MTW Rd) - BC Cutter Nr 1				
01109.PDC28900A	E4 - Crosswall E1-1	0%	04-Oct-13	09-Oct-13
01109.PDC23440	E1 (MTW Rd) - Crosswall D4-1	0%	27-Sep-13	02-Oct-13
Area E1 (MTW Rd) - BC Cutter Nr 2 (Low Headroom cutter)				
01109.PDC23350	E1 (MTW Rd) - Dwall works P159 (under TKW Flyover)	100%	19-Aug-13 A	24-Sep-13 A
01109.PDC23390a	E1 (MTW Rd) - Dwall works P13a	0%	11-Oct-13	21-Oct-13
01109.PDC23380	E1 (MTW Rd) - Dwall works P132 (under TKW Flyover)	0%	27-Sep-13	21-Oct-13



Samsung - Hsin Chong Joint Venture

MTR Corporation Limited

Shatin to Central Link Contract 1109

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THREE MONTH ROLLING PROGRAMME - SEP 13 TASK filters: 3MRP Dates, MTRC 1109 - 3MRP.

Printed:07-Oct-13

Actual Work
Remaining Work
Master Programme Rev.1
Last Month Update (Aug 2013)
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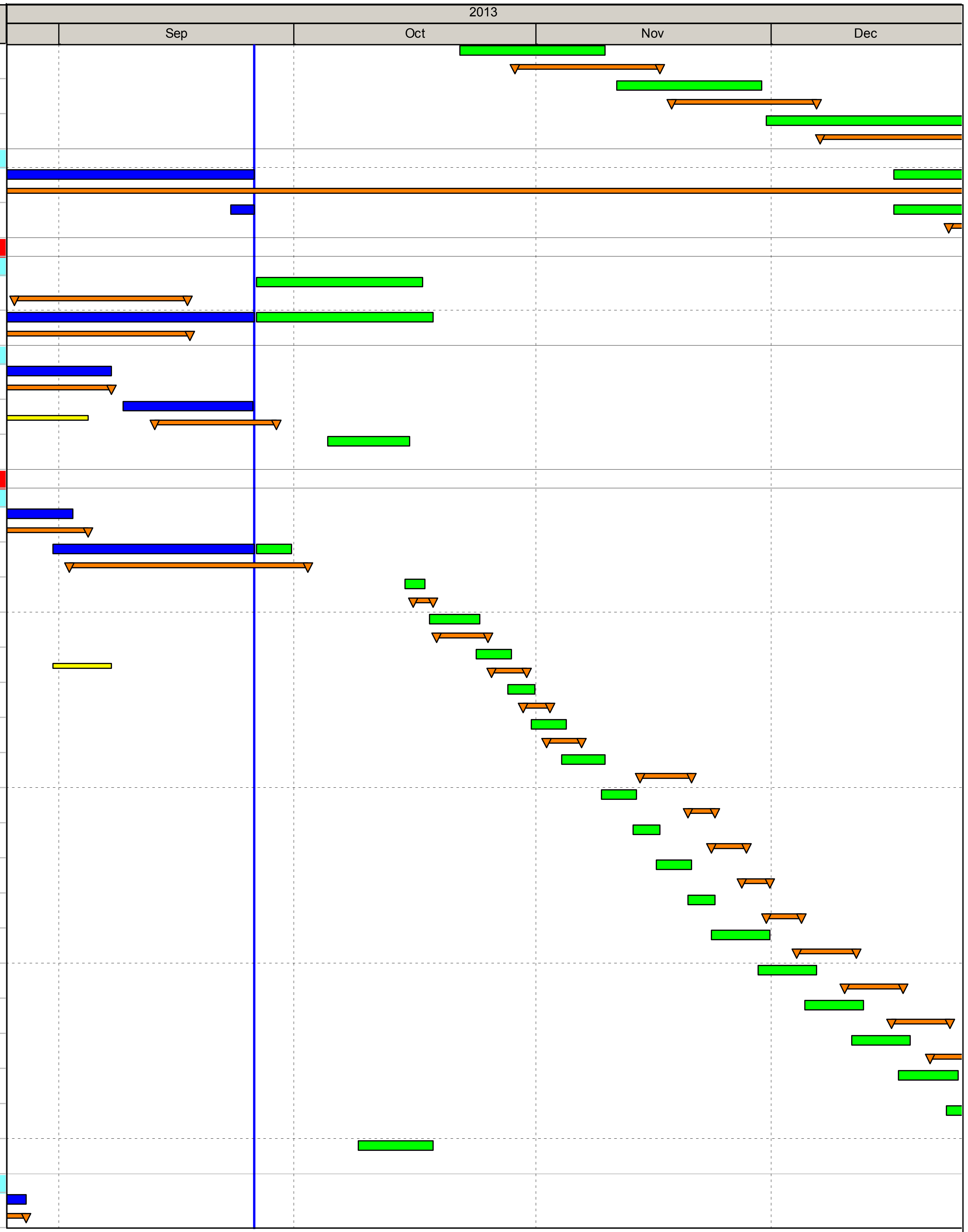
Aug 2013 Milestone

Activity ID	Activity Name	Physical % Complete	Start	Finish
01109.PDC23350a	E1 (MTW Rd) - Dwall works P159a (under TKW Flyover)	0%	22-Oct-13	09-Nov-13
01109.PDC23330	E1 (MTW Rd) - Dwall works P133 (under TKW Flyover)	0%	11-Nov-13	29-Nov-13
01109.PDC23370	E1 (MTW Rd) - Dwall works P12 (under TKW Flyover)	0%	30-Nov-13	27-Dec-13
Area E1 (MTW Rd) - Post Concrete Works				
01109.PDC3210	E1 (MTW Rd) - Dwall testing	19%	03-Jun-13 A	04-Jan-14
01109.PDC3180	E1 (MTW Rd) - Dwall Toe grouting	1%	23-Sep-13 A	09-Jan-14
Area E1 (Ent D)				
Area E1 (Ent D) - Founding Level Pedrill				
01109.PDC3270A	E1 (Ent D) - Batch 2 - P9 Trial pit and Founding Level Predrill	0%	26-Sep-13	17-Oct-13
01109.PDC3380	E1 (Ent D) - Batch 2 - P:5,6,10,9,7,8 - GI Report & Confirmation of Founding Levels	60%	10-Apr-13 A	18-Oct-13
Area E1 (Ent D) - BC Cutter Nr 2 (Low Headroom cutter)				
01109.PDC23870	E1 (Ent D) - Dwall works P6	100%	27-Jul-13 A	07-Sep-13 A
01109.PDC23860	E1 (Ent D) - Dwall works P142 (cutter excav)	100%	09-Sep-13 A	25-Sep-13 A
01109.PDC23860A	E1 (Ent D) - Dwall works P142 (cutter excav, rebar, conc)	0%	05-Oct-13	15-Oct-13
Area E2/E4/E5				
Area E2/E4/E5 - BC Cutter Nr 1				
01109.PDC23680	E2 - Dwall works P119A	100%	16-Aug-13 A	02-Sep-13 A
01109.PDC23630A	E2 - Dwall works P122	60%	31-Aug-13 A	30-Sep-13
01109.PDC24995a10	BC Cutter #1 - Modify Cutter 1.2 to 0.8	0%	15-Oct-13	17-Oct-13
01109.PDC23750	E2 - Crosswall F6-1	0%	18-Oct-13	24-Oct-13
01109.PDC23730	E2 - Crosswall F7-1	0%	24-Oct-13	28-Oct-13
01109.PDC24060	E3 - Crosswall F13-2	0%	28-Oct-13	31-Oct-13
01109.PDC23810a	E2 - Crosswall F7-3	0%	31-Oct-13	04-Nov-13
01109.PDC23710	E2 - Crosswall F8-1	0%	04-Nov-13	09-Nov-13
01109.PDC24810	E5 - Crosswall F12-2	0%	09-Nov-13	13-Nov-13
01109.PDC23780	E2 - Crosswall F8-2	0%	13-Nov-13	16-Nov-13
01109.PDC23600a	E2 - Crosswall F6-3	0%	16-Nov-13	20-Nov-13
01109.PDC24800	E5 - Crosswall F9-2	0%	20-Nov-13	23-Nov-13
01109.PDC23850a	E2 - Crosswall F4-3	0%	23-Nov-13	30-Nov-13
01109.PDC23760	E2 - Crosswall F3-1	0%	29-Nov-13	06-Dec-13
01109.PDC23820a	E2 - Crosswall F2-3	0%	05-Dec-13	12-Dec-13
01109.PDC23830	E2 - Crosswall F3-2	0%	11-Dec-13	18-Dec-13
01109.PDC23740	E2 - Crosswall F2-1	0%	17-Dec-13	24-Dec-13
01109.PDC23850	E2 - Crosswall F4-2	0%	23-Dec-13	02-Jan-14
01109.PDC23680B10	E2 - Dwall works P119B (part 2)	0%	09-Oct-13	18-Oct-13
Area E2/E4/E5 - BC Cutter Nr 3				
01109.PDC24130	E3 - Crosswall F16-1	100%	23-Aug-13 A	27-Aug-13 A



Samsung - Hsin Chong Joint Venture

MTR Corporation Limited

Shatin to Central Link Contract 1109

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THREE MONTH ROLLING PROGRAMME - SEP 13 TASK filters: 3MRP Dates, MTRC 1109 - 3MRP.

Printed:07-Oct-13

- Actual Work
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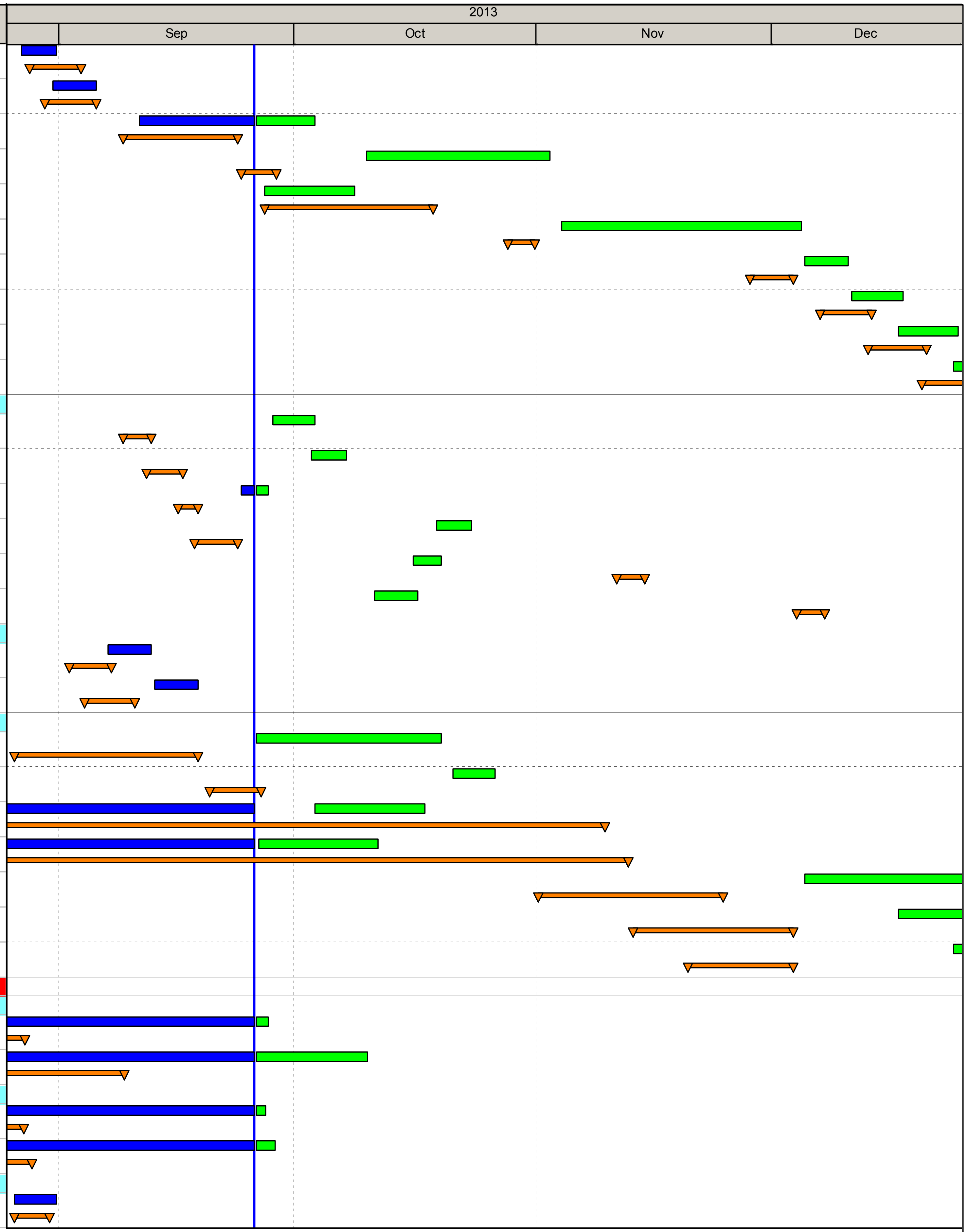
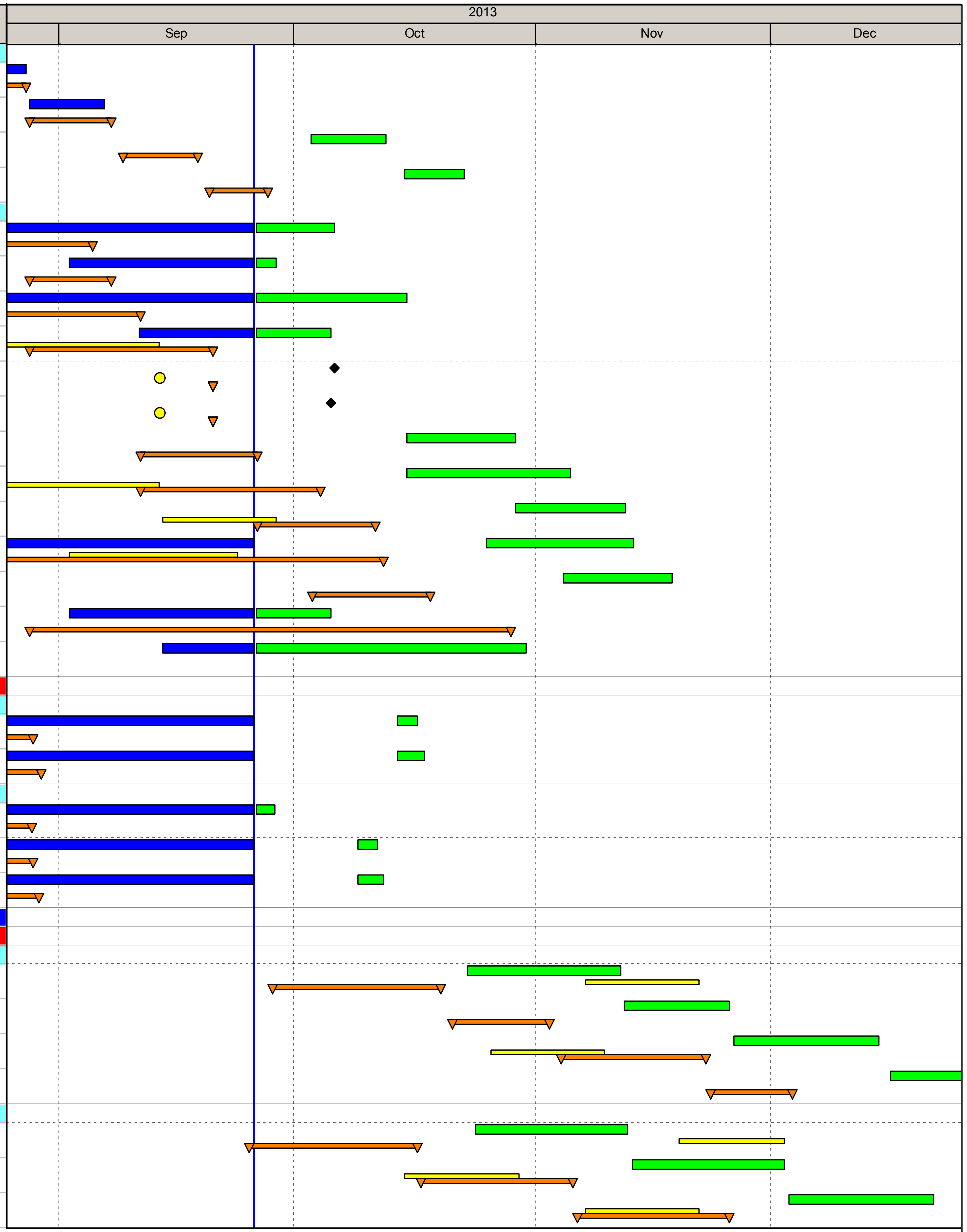
Activity ID	Activity Name	Physical % Complete	Start	Finish
01109.PDC24770	E5 - Crosswall F12-1	100%	27-Aug-13 A	31-Aug-13 A
01109.PDC24110	E3 - Crosswall F15-1	100%	31-Aug-13 A	05-Sep-13 A
01109.PDC23620	E2 - Dwall works P115	0%	11-Sep-13 A	03-Oct-13
01109.PDC23640	E2 - Dwall works P116	0%	10-Oct-13	02-Nov-13
01109.PDC23680B	E2 - Dwall works P119B (part1)	0%	27-Sep-13*	08-Oct-13
01109.PDC23660	E2 - Dwall works P118	0%	04-Nov-13	04-Dec-13
01109.PDC24995a	Modify Cutter 1.2 to 0.8	0%	05-Dec-13	10-Dec-13
01109.PDC23770	E2 - Crosswall F5-1	0%	11-Dec-13	17-Dec-13
01109.PDC23720	E2 - Crosswall F1-1	0%	17-Dec-13	24-Dec-13
01109.PDC23840	E2 - Crosswall F5-2	0%	24-Dec-13	03-Jan-14
Area E2/E4/E5 - BC Cutter Nr 4				
01109.PDC24100	E3 - Crosswall F15-2	0%	28-Sep-13	03-Oct-13
01109.PDC24080	E3 - Crosswall F14-2	0%	03-Oct-13	07-Oct-13
01109.PDC24120	E3 - Crosswall F16-2	33%	24-Sep-13 A	27-Sep-13
01109.PDC23810	E2 - Crosswall F7-2	0%	19-Oct-13	23-Oct-13
01109.PDC24830	E5 - Crosswall F11-2	0%	16-Oct-13	19-Oct-13
01109.PDC24820	E5 - Crosswall F10-2	0%	11-Oct-13	16-Oct-13
Area E2/E4/E5 - BC Cutter Nr 5				
01109.PDC24090	E3 - Crosswall F14-1	100%	07-Sep-13 A	12-Sep-13 A
01109.PDC24070	E3 - Crosswall F13-1	100%	13-Sep-13 A	18-Sep-13 A
Area E2/E4/E5 - Post Concrete Works				
01109.PDC23090	E4 - Dwall testing	0%	26-Sep-13	19-Oct-13
01109.PDC23100	E4 - Dwall Toe grouting	0%	21-Oct-13	26-Oct-13
01109.PDC23120	E5 - Dwall Toe grouting	8%	20-Aug-13 A	17-Oct-13
01109.PDC8860	E5 - Dwall testing	38%	07-Aug-13 A	11-Oct-13
01109.PDC5110	E2 - Dwall testing	0%	05-Dec-13	28-Dec-13
01109.PDC5080	E2 - Dwall Toe grouting	0%	17-Dec-13	09-Jan-14
01109.PDC5220	E2 - Dwall Shear pin installation	0%	24-Dec-13	09-Jan-14
Area E3				
Area E3 - Advance Works				
01109.PDC6760A	E3-3 - Trial Pits (Batch 2)	75%	23-Mar-13 A	27-Sep-13
01109.PDC6750A	E3-3 - Excavation and Construction of Guide Walls (P88a,88b,89,90,91,92,93)	29%	27-Mar-13 A	10-Oct-13
Area E3 - Founding Level Predrill				
01109.PDC6770	E3-3 - Batch 2 - Founding Level Predrill P88a,88b(89),92,90,93,91(8nr) 2.5PR	75%	05-Apr-13 A	27-Sep-13
01109.PDC6830	E3-3 - Batch 2 - P: 88a,88b(89),92,90,93,91 - GI Report & Confirmation of Founding Levels	57%	26-Apr-13 A	28-Sep-13
Area E3 - BC Cutter Nr 4				
01109.PDC24440	E3 - Crosswall G8-2	100%	26-Aug-13 A	31-Aug-13 A



Activity ID	Activity Name	Physical % Complete	Start	Finish
Area E3 - BC Cutter Nr 5				
01109.PDC24330	E3 - Crosswall G3-2	100%	21-Aug-13 A	27-Aug-13 A
01109.PDC29175a	Change cutter 0.8m to 1.2m and 4th desander re-location	100%	28-Aug-13 A	06-Sep-13 A
01109.PDC24570	E3 - Dwall works P91	0%	03-Oct-13	12-Oct-13
01109.PDC24500	E3 - Crosswall G11-1	0%	15-Oct-13	22-Oct-13
Area E3 - Post Concrete Works				
01109.PDC5940	E3-1 - Dwall testing	58%	23-Jul-13 A	06-Oct-13
01109.PDC29175	Trench excavation and lay bentonite pipes	70%	02-Sep-13 A	28-Sep-13
01109.PDC6650	E3-2 - Dwall Toe grouting	20%	06-Aug-13 A	15-Oct-13
01109.PDC28950A	E3-2 & E3-3 - Construct Bus Stop in Area E3 (on Temp Decking)	60%	11-Sep-13 A	05-Oct-13
01109.PDC28975A	E3-2 & E3-3 - Bus Stop relocated - Ready for TTMS Stage 1 Phase 3	0%	06-Oct-13	
01109.PDC28960A	E3-2 & E3-3 - Relocate Bus Stop from E6 to E3-2 & E3-3	0%		05-Oct-13
01109.PDC6850	E3-2 - Dwall Shear pin installation	0%	15-Oct-13	29-Oct-13
01109.PDC6820	E3-1 - Dwall Toe grouting	0%	15-Oct-13	05-Nov-13
01109.PDC6840	E3-1 - Dwall Shear pin installation	0%	29-Oct-13	12-Nov-13
01109.PDC8990	E3-3 - Dwall Toe grouting	13%	24-Jul-13 A	13-Nov-13
01109.PDC8090	E3-3 - Dwall Shear pin installation	0%	04-Nov-13	18-Nov-13
01109.PDC29165	Trench excavation and installation of sheet piles before TTA Stage 1 Phase 3 (36 lm)	78%	02-Sep-13 A	05-Oct-13
01109.PDC29165A	Trench excavation and installation of sheet piles (129 lm)	9%	14-Sep-13 A	30-Oct-13
Area E6				
Area E6 - Advance Works				
01109.PDC8960	E6 - Batch 2 - Excavation and construction of Guide walls	75%	20-Apr-13 A	16-Oct-13
01109.PDC8980	E6 - Batch 1 - Excavation and construction of Guide walls	67%	01-Jun-13 A	17-Oct-13
Area E6 - Founding Level Predrill				
01109.PDC9070	E6 - Batch 2 - E6 - P: 83,87,84,82,86,81,85,80 - GI Report & Confirmation of Founding Levels	63%	09-Jul-13 A	28-Sep-13
01109.PDC9130	E6 - Batch 1 - Founding Level Predrill - P74a,75,76,77,78,79 (8nr) 2PR	63%	19-Jun-13 A	11-Oct-13
01109.PDC9140	E6 - Batch 1 - P: 75,79,76,78,77,74a - GI Report & Confirmation of Founding Levels	50%	30-Jul-13 A	12-Oct-13
Diaphragm Wall W1 to 9 + E6 STAGE 2A TTMS				
Area E6				
Area E6 - BC Cutter Nr 5				
01109.PDC24880	E6 - Dwall works P86	0%	23-Oct-13	11-Nov-13
01109.PDC24850	E6 - Dwall works P87	0%	12-Nov-13	25-Nov-13
01109.PDC24900	E6 - Dwall works P85	0%	26-Nov-13	14-Dec-13
01109.PDC24350	E6 - Dwall works P88A	0%	16-Dec-13	27-Dec-13
Area E6 - BC Cutter Nr 4				
01109.PDC24950	E6 - Dwall works P78	0%	24-Oct-13	12-Nov-13
01109.PDC24960	E6 - Dwall works P77	0%	13-Nov-13	02-Dec-13
01109.PDC24930	E6 - Dwall works P79	0%	03-Dec-13	21-Dec-13



Samsung - Hsin Chong Joint Venture

MTR Corporation Limited

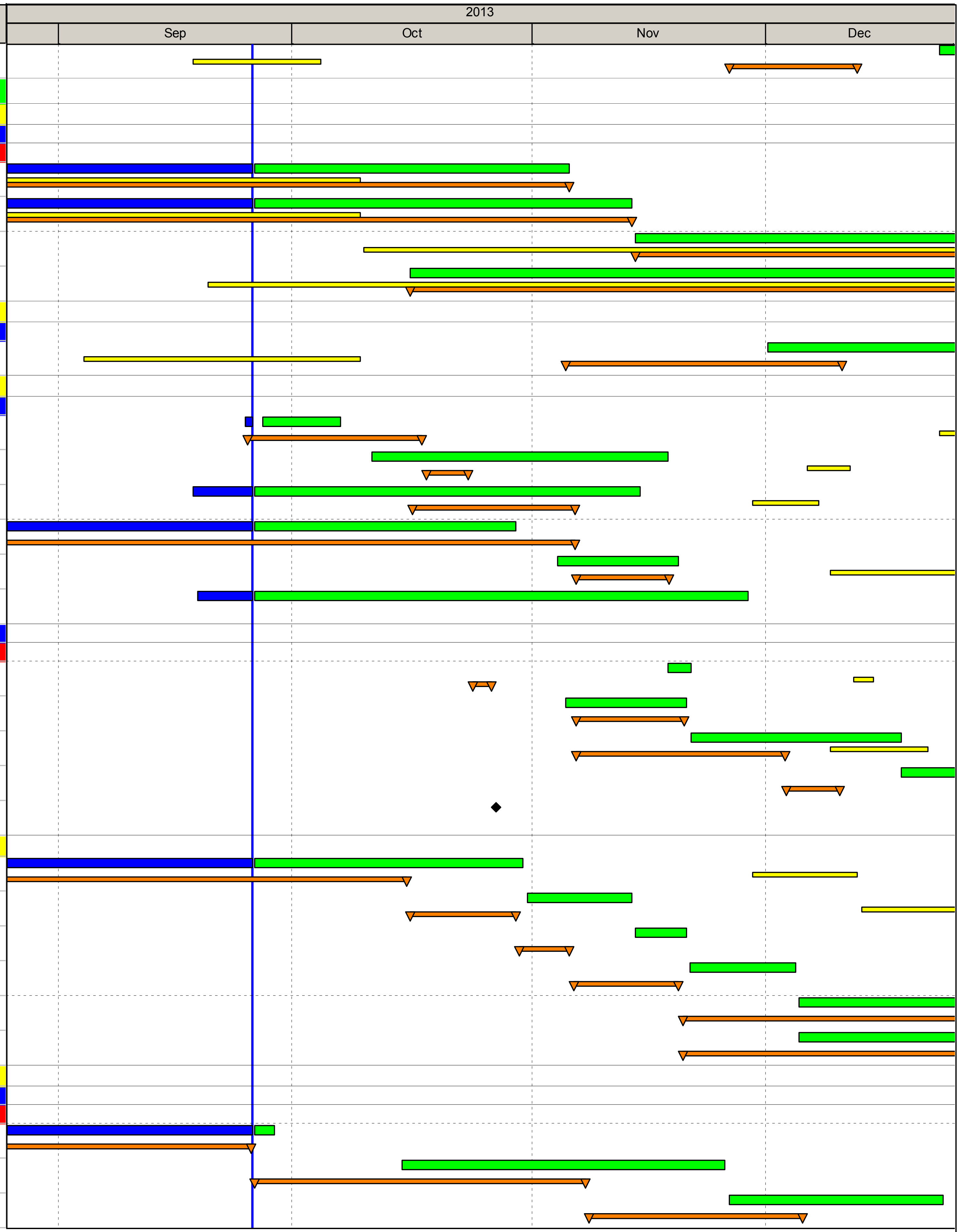
Shatin to Central Link Contract 1109

THREE MONTH ROLLING PROGRAMME - SEP 13 TASK filters: 3MRP Dates, MTRC 1109 - 3MRP.

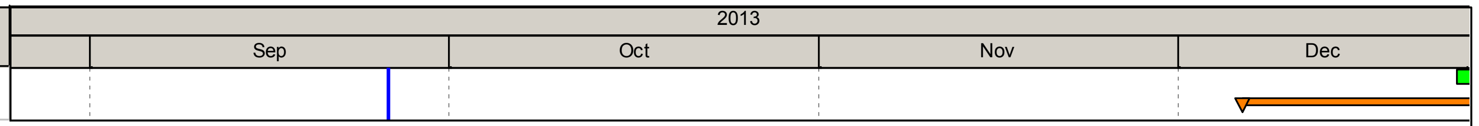
Printed:07-Oct-13

Actual Work
Remaining Work
Master Programme Rev.1
Last Month Update (Aug 2013)
Milestone
MP Rev.1 Milestone
Aug 2013 Milestone

Activity ID	Activity Name	Physical % Complete	Start	Finish
01109.PDC24940	E6 - Dwall works P76	0%	23-Dec-13	11-Jan-14
CC-D - BORED TUNNELS FROM SUW STATION TO HOM STATION				
Procurement of Specialised Construction Machinery				
Procurement of Specialised Construction Machinery				
Off-site				
01109.PDD1040	TBM Down track SUW to HOM - TBM Manufacture	86%	09-Jan-13 A	05-Nov-13
01109.PDD1030	STP (Manufacture)	83%	17-Jan-13 A	13-Nov-13
01109.PDD1060	STP (Deliver)	0%	14-Nov-13	11-Feb-14
01109.PDD1050	TBM Up track SUW to HOM - TBM Manufacture	0%	16-Oct-13	11-Aug-14
Specialised Construction Machinery Site Assembly and Related Establishment				
Specialised Construction Machinery Site Assembly and Related Establishment				
01109.PDD1140	SUW - Grout behind Bored Pile Wall	0%	01-Dec-13	05-Jan-14
Underpining of EKW Pier 15 and Foundation Removal				
Site Preparation (in exist central reservation)				
01109.PDD2350	Fresh Water Diversion	10%	25-Sep-13 A	07-Oct-13
01109.PDD2310	Salt Water DIversion	0%	11-Oct-13	18-Nov-13
01109.PDD2300	Pre-Bored H-Pile Work (4nr - P1,P2,P5,P6)	14%	18-Sep-13 A	14-Nov-13
01109.PDD2268A	Pre-Bored H-Pile Work (5nr - P3,P4,P7,P8,AP1)	54%	13-Aug-13 A	29-Oct-13
01109.PDD2330	Pile testing (incl. point load test)	0%	04-Nov-13	19-Nov-13
01109.PDD3950	Storm Drain Diversion including Manholes	10%	19-Sep-13 A	28-Nov-13
TTA Stage 1: Phase 3				
Preparation Works				
01109.PDD2390	Abandon existing 15" Salt Water Main TKW-SW504	0%	18-Nov-13	21-Nov-13
01109.PDD2400	Trench Excavation for sheet pile works	0%	05-Nov-13	20-Nov-13
01109.PDD2340	Install eastern part of sheet pile cofferdam wall (stage 2)	0%	21-Nov-13	18-Dec-13
01109.PDD2410	Toe grouting to cofferdam wall	0%	18-Dec-13	27-Dec-13
01109.PDD2300A	Stage 1 - Phase 3 - Pier 15	0%	27-Oct-13*	
Ground Treatment between TKW and Shansi Street				
01109.PDD2810	Investigate & confirm clearance of existing piles and other obstructions	25%	08-Jul-13 A	30-Oct-13
01109.PDD2820	Engineer's Approval for Ground Treatment Works	0%	31-Oct-13	13-Nov-13
01109.PDD2830	Carry out grout trials	0%	14-Nov-13	20-Nov-13
01109.PDD2840	Approve grout trials	0%	21-Nov-13	04-Dec-13
01109.PDD2850	Jet grouting columns RIG 1	0%	05-Dec-13	12-Mar-14
01109.PDD2860	Jet Grouting columns RIG 2	0%	05-Dec-13	12-Mar-14
To Kwa Wan Ancillary Building				
Site Preparation				
Demolition & Site Clearance				
01109.PDD2880A	TKA - Trench Excavation, Sheet Pile & Waling	60%	19-Jun-13 A	28-Sep-13
01109.PDD2920	TKA - Install & commission new IPB 600 Gas Main - TKA-GAS101	0%	15-Oct-13	25-Nov-13
01109.PDD2890	TKA - Install new Salt Water main - TKA-SW101P	0%	26-Nov-13	23-Dec-13



Activity ID	Activity Name	Physical % Complete	Start	Finish
01109.PDD2900	TKA - CLP Power supply line Permanent diversion (TKA-CLP101,102,103)	0%	24-Dec-13	23-Jan-14

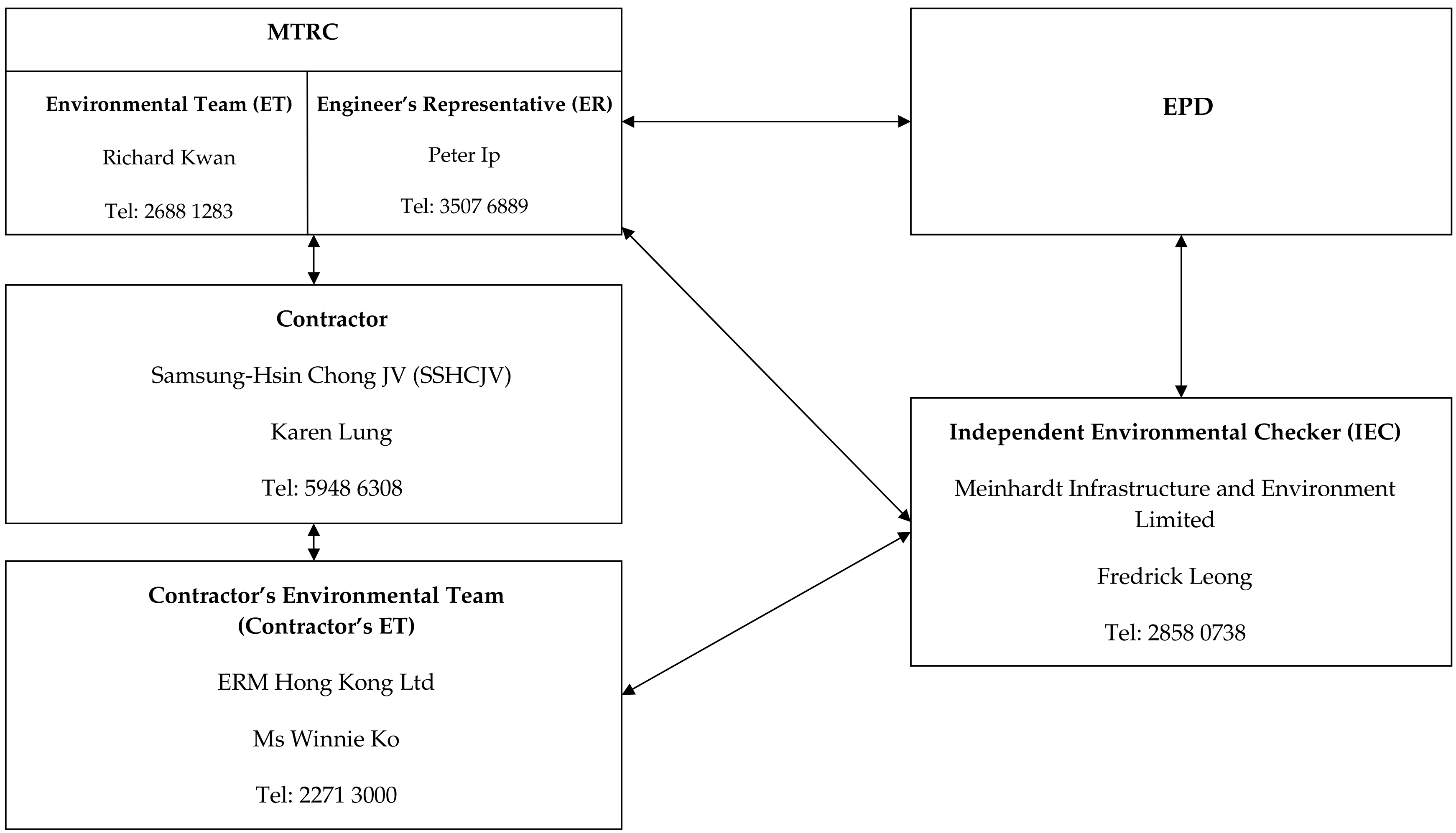


Actual Work
Remaining Work
Master Programme Rev.1
Last Month Update (Aug 2013)
Milestone
MP Rev.1 Milestone
Aug 2013 Milestone

Annex C

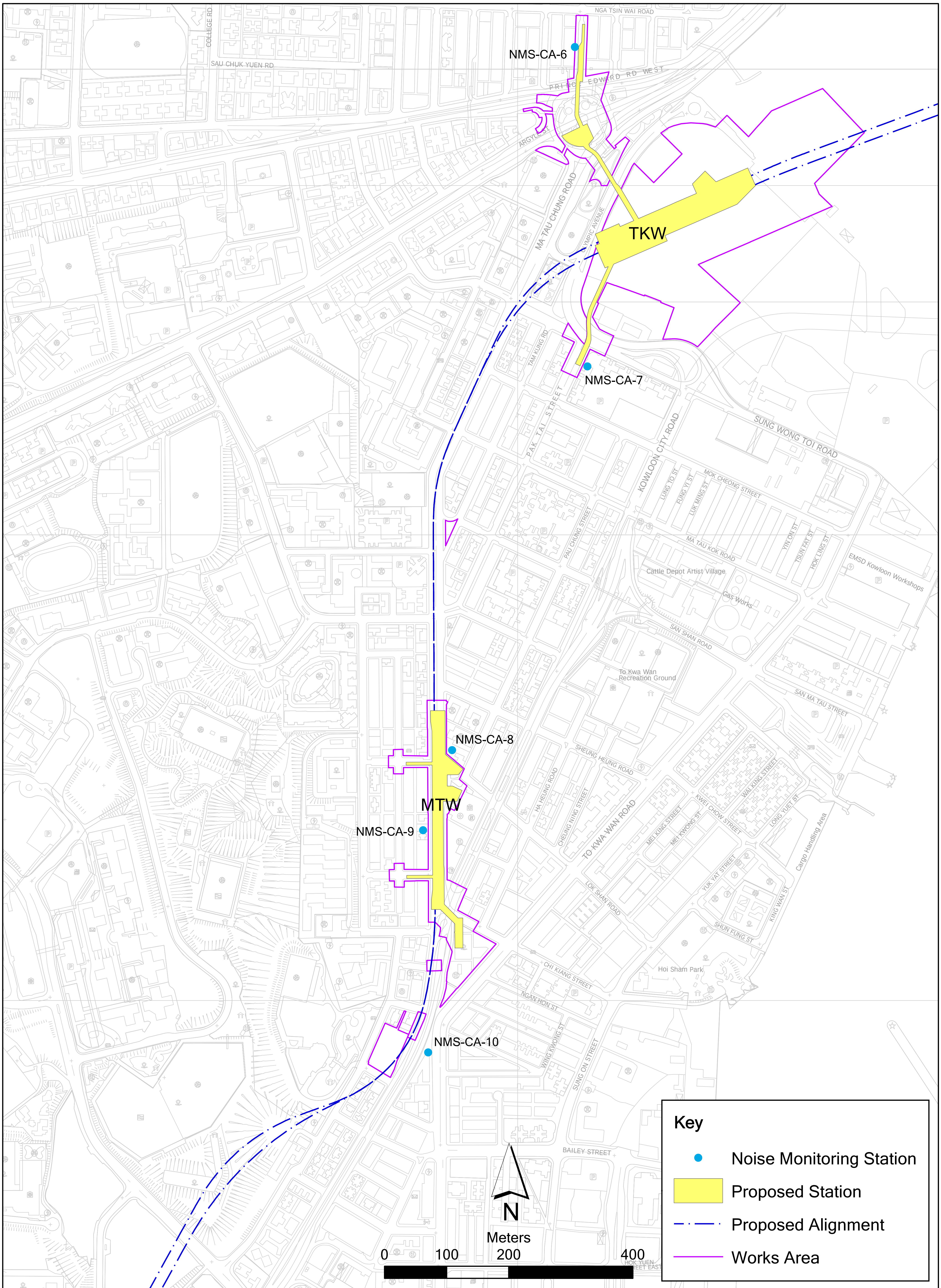
Project Organization Chart and Contact Detail

Annex C *Project Organization of SCL Works Contract 1109*



Annex D

Locations of Noise and Dust Monitoring Stations



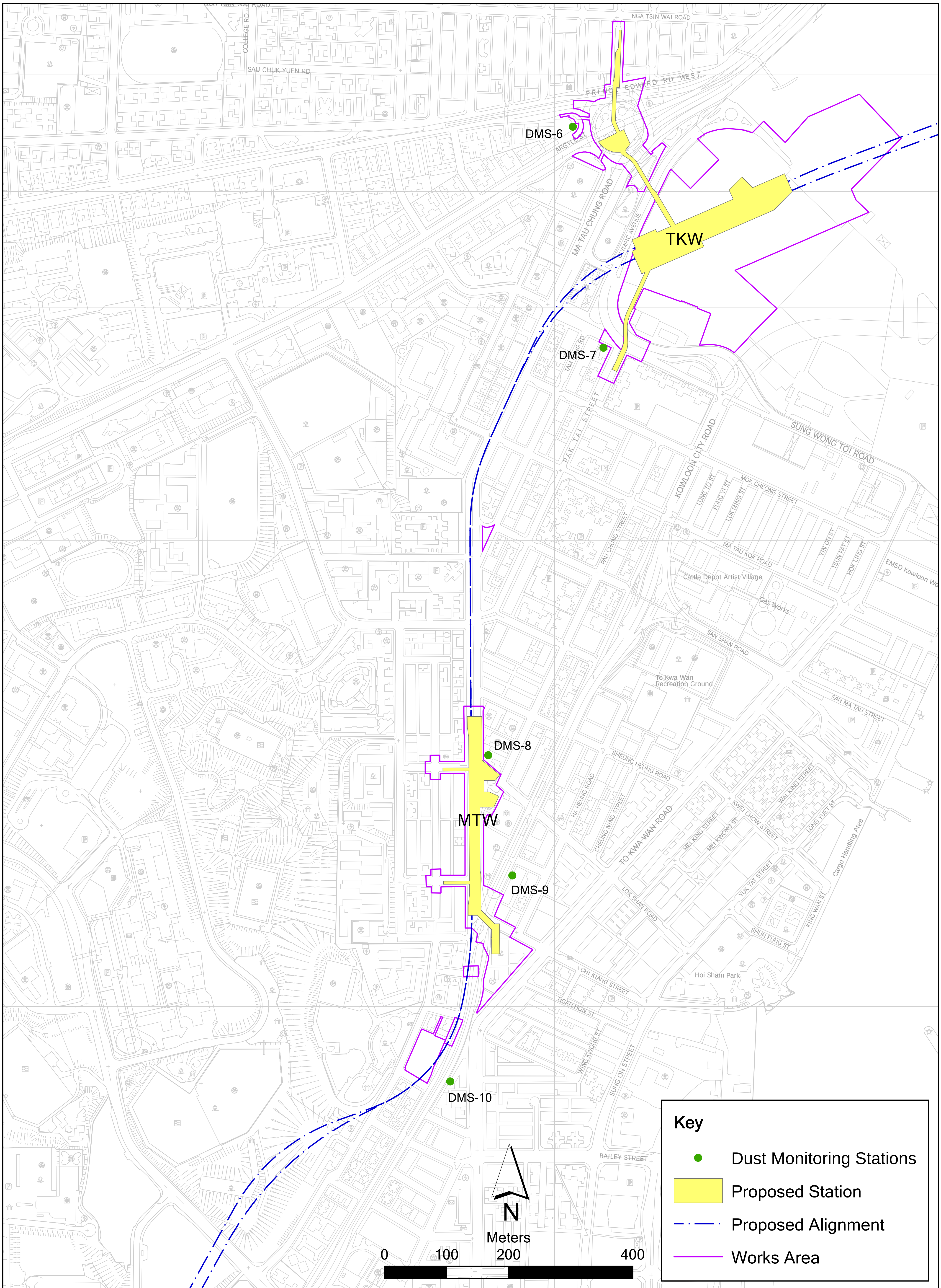
Annex D1

Location of Regular Construction Noise Monitoring Stations

File: T:\GIS\CONTRACT\0171181\Mxd\0171181_Airborne_Noise_Monitoring_Stations_Annex.mxd
Date: 07-Nov-2012

Environmental Resources Management

ERM



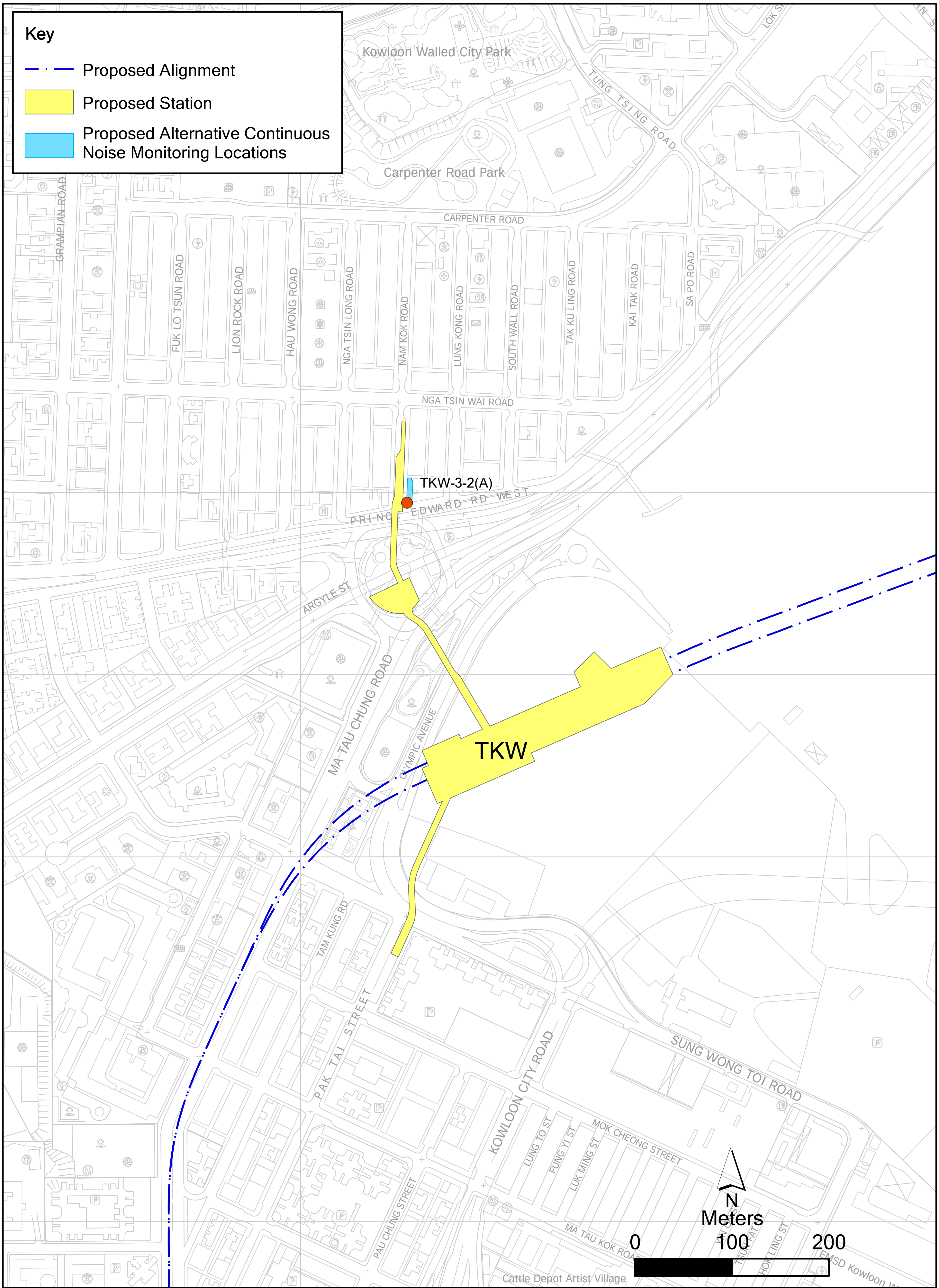
Annex D2

Location of Dust Monitoring Stations

File: T:\GIS\CONTRACT\0171181\Mxd\0171181_Dust_Monitoring_Station_Annex.mxd
Date: 07-Nov-2012

Environmental Resources Management

ERM



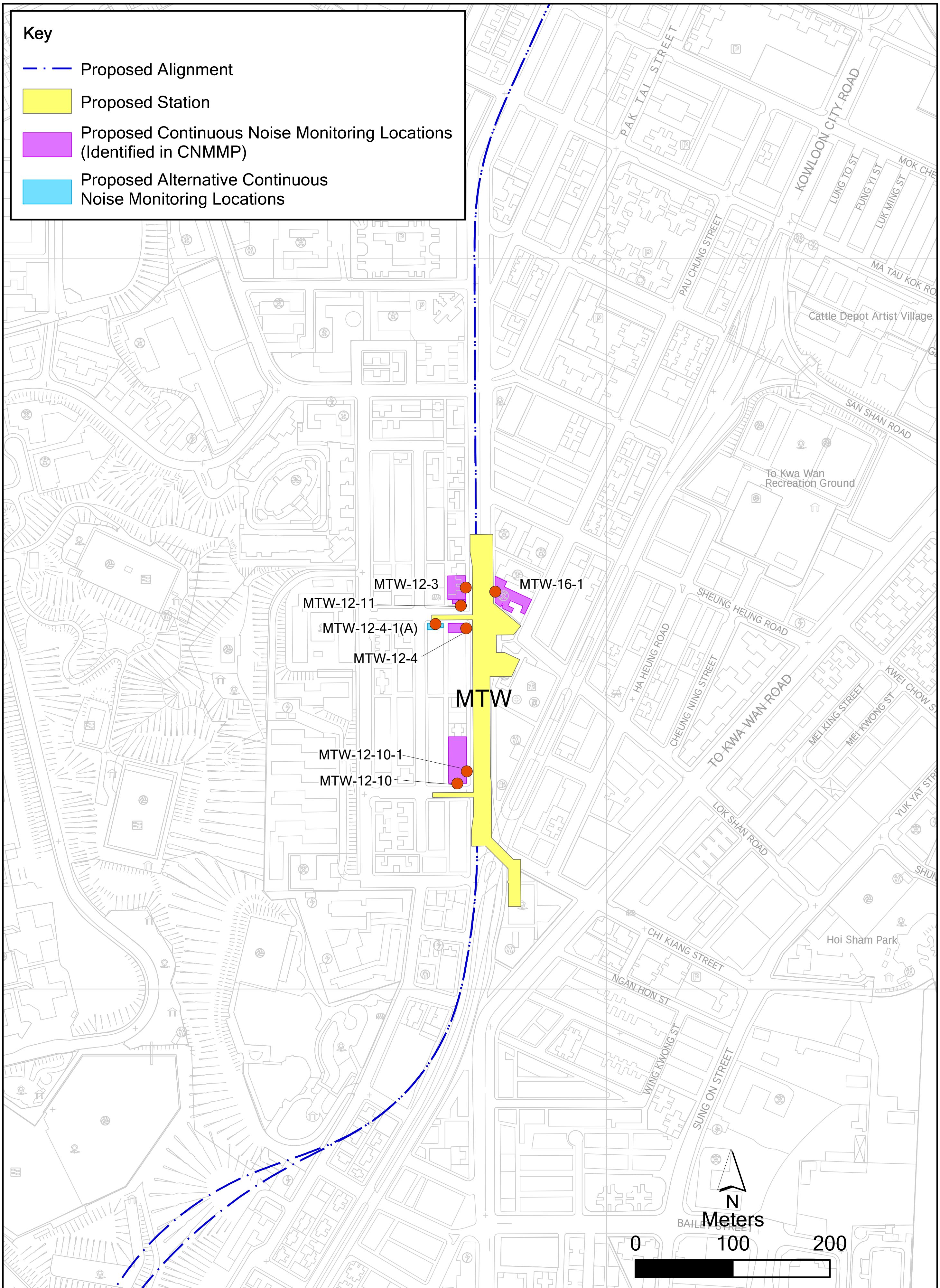
Annex D3

Proposed Continuous Noise Monitoring Locations

Name: 171181_Annex_Continuous_Noise_Monitoring_Locations_TKW.mxd
Date: 10-Oct-12

Environmental Resources Management

ERM



Annex D4

Proposed Continuous Noise Monitoring Locations

Environmental Resources Management

ERM

File: T:\GIS\CONTRACT\0171181\Mxd\0171181_Continuous_Noise_Monitoring_Locations_MTW_v2.mxd
Date: 31/1/2013

Annex E

Monitoring Schedule of the Reporting Period and the Next Month

Shatin to Central Link
Works Contract 1109
Stations and Tunnels of Kowloon City Section
Construction Air Quality and Regular Noise Monitoring Schedule

DMS-6 & NMS-CA-6
Monitoring Month : September 2013

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
01-Sep	02-Sep	03-Sep	04-Sep	05-Sep	06-Sep	07-Sep
			24-hr TSP Monitoring Noise Monitoring			
08-Sep	09-Sep	10-Sep	11-Sep	12-Sep	13-Sep	14-Sep
		24-hr TSP Monitoring Noise Monitoring				
15-Sep	16-Sep	17-Sep	18-Sep	19-Sep	20-Sep	21-Sep
	24-hr TSP Monitoring Noise Monitoring				Public Holiday	24-hr TSP Monitoring
22-Sep	23-Sep	24-Sep	25-Sep	26-Sep	27-Sep	28-Sep
					24-hr TSP Monitoring Noise Monitoring	
29-Sep	30-Sep	01-Oct	02-Oct	03-Oct	04-Oct	05-Oct

Shatin to Central Link
Works Contract 1109
Stations and Tunnels of Kowloon City Section
Construction Air Quality and Regular Noise Monitoring Schedule

DMS-7 & NMS-CA-7
Monitoring Month : September 2013

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
01-Sep	02-Sep	03-Sep	04-Sep	05-Sep	06-Sep	07-Sep
			24-hr TSP Monitoring Noise Monitoring			
08-Sep	09-Sep	10-Sep	11-Sep	12-Sep	13-Sep	14-Sep
		24-hr TSP Monitoring Noise Monitoring				
15-Sep	16-Sep	17-Sep	18-Sep	19-Sep	20-Sep	21-Sep
	24-hr TSP Monitoring Noise Monitoring				Public Holiday	24-hr TSP Monitoring
22-Sep	23-Sep	24-Sep	25-Sep	26-Sep	27-Sep	28-Sep
					24-hr TSP Monitoring Noise Monitoring	
29-Sep	30-Sep	01-Oct	02-Oct	03-Oct	04-Oct	05-Oct

Shatin to Central Link
Works Contract 1109
Stations and Tunnels of Kowloon City Section
Construction Air Quality and Regular Noise Monitoring Schedule

DMS-8 & NMS-CA-8
Monitoring Month : September 2013

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
01-Sep	02-Sep	03-Sep	04-Sep	05-Sep	06-Sep	07-Sep
			24-hr TSP Monitoring Noise Monitoring			
08-Sep	09-Sep	10-Sep	11-Sep	12-Sep	13-Sep	14-Sep
		24-hr TSP Monitoring Noise Monitoring				
15-Sep	16-Sep	17-Sep	18-Sep	19-Sep	20-Sep	21-Sep
	24-hr TSP Monitoring Noise Monitoring				Public Holiday	24-hr TSP Monitoring
22-Sep	23-Sep	24-Sep	25-Sep	26-Sep	27-Sep	28-Sep
					24-hr TSP Monitoring Noise Monitoring	
29-Sep	30-Sep	01-Oct	02-Oct	03-Oct	04-Oct	05-Oct

Shatin to Central Link
Works Contract 1109
Stations and Tunnels of Kowloon City Section
Construction Air Quality and Regular Noise Monitoring Schedule

DMS-9 & NMS-CA-9
Monitoring Month : September 2013

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
01-Sep	02-Sep	03-Sep	04-Sep	05-Sep	06-Sep	07-Sep
			24-hr TSP Monitoring Noise Monitoring			
08-Sep	09-Sep	10-Sep	11-Sep	12-Sep	13-Sep	14-Sep
		24-hr TSP Monitoring Noise Monitoring				
15-Sep	16-Sep	17-Sep	18-Sep	19-Sep	20-Sep	21-Sep
	24-hr TSP Monitoring Noise Monitoring				Public Holiday	24-hr TSP Monitoring
22-Sep	23-Sep	24-Sep	25-Sep	26-Sep	27-Sep	28-Sep
					24-hr TSP Monitoring Noise Monitoring	
29-Sep	30-Sep	01-Oct	02-Oct	03-Oct	04-Oct	05-Oct

Shatin to Central Link
Works Contract 1109
Stations and Tunnels of Kowloon City Section
Construction Air Quality and Regular Noise Monitoring Schedule

DMS-10 & NMS-CA-10
Monitoring Month : September 2013

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
01-Sep	02-Sep	03-Sep	04-Sep	05-Sep	06-Sep	07-Sep
			24-hr TSP Monitoring Noise Monitoring			
08-Sep	09-Sep	10-Sep	11-Sep	12-Sep	13-Sep	14-Sep
		24-hr TSP Monitoring Noise Monitoring				
15-Sep	16-Sep	17-Sep	18-Sep	19-Sep	20-Sep	21-Sep
	24-hr TSP Monitoring Noise Monitoring				Public Holiday	24-hr TSP Monitoring
22-Sep	23-Sep	24-Sep	25-Sep	26-Sep	27-Sep	28-Sep
					24-hr TSP Monitoring Noise Monitoring	
29-Sep	30-Sep	01-Oct	02-Oct	03-Oct	04-Oct	05-Oct

Shatin to Central Link
Works Contract 1109
Stations and Tunnels of Kowloon City Section
Construction Air Quality and Regular Noise Monitoring Schedule

DMS-6 & NMS-CA-6
Monitoring Month : October 2013

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
		01-Oct	02-Oct	03-Oct	04-Oct	05-Oct
		Public Holiday		24-hr TSP Monitoring Noise Monitoring		
06-Oct	07-Oct	08-Oct	09-Oct	10-Oct	11-Oct	12-Oct
		.	24-hr TSP Monitoring Noise Monitoring			
13-Oct	14-Oct	15-Oct	16-Oct	17-Oct	18-Oct	19-Oct
	Public Holiday	24-hr TSP Monitoring Noise Monitoring				
20-Oct	21-Oct	22-Oct	23-Oct	24-Oct	25-Oct	26-Oct
	24-hr TSP Monitoring Noise Monitoring					24-hr TSP Monitoring
27-Oct	28-Oct	29-Oct	30-Oct	31-Oct		

Shatin to Central Link
Works Contract 1109
Stations and Tunnels of Kowloon City Section
Construction Air Quality and Regular Noise Monitoring Schedule

DMS-7 & NMS-CA-7
Monitoring Month : October 2013

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
		01-Oct	02-Oct	03-Oct	04-Oct	05-Oct
		Public Holiday		24-hr TSP Monitoring Noise Monitoring		
06-Oct	07-Oct	08-Oct	09-Oct	10-Oct	11-Oct	12-Oct
			24-hr TSP Monitoring Noise Monitoring			
13-Oct	14-Oct	15-Oct	16-Oct	17-Oct	18-Oct	19-Oct
	Public Holiday	24-hr TSP Monitoring Noise Monitoring				
20-Oct	21-Oct	22-Oct	23-Oct	24-Oct	25-Oct	26-Oct
	24-hr TSP Monitoring Noise Monitoring					24-hr TSP Monitoring
27-Oct	28-Oct	29-Oct	30-Oct	31-Oct		

Shatin to Central Link
Works Contract 1109
Stations and Tunnels of Kowloon City Section
Construction Air Quality and Regular Noise Monitoring Schedule

DMS-8 & NMS-CA-8
Monitoring Month : October 2013

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
		01-Oct	02-Oct	03-Oct	04-Oct	05-Oct
		Public Holiday		24-hr TSP Monitoring Noise Monitoring		
06-Oct	07-Oct	08-Oct	09-Oct	10-Oct	11-Oct	12-Oct
		.	24-hr TSP Monitoring Noise Monitoring			
13-Oct	14-Oct	15-Oct	16-Oct	17-Oct	18-Oct	19-Oct
	Public Holiday	24-hr TSP Monitoring Noise Monitoring				
20-Oct	21-Oct	22-Oct	23-Oct	24-Oct	25-Oct	26-Oct
	24-hr TSP Monitoring Noise Monitoring					24-hr TSP Monitoring
27-Oct	28-Oct	29-Oct	30-Oct	31-Oct		

Shatin to Central Link
Works Contract 1109
Stations and Tunnels of Kowloon City Section
Construction Air Quality and Regular Noise Monitoring Schedule

DMS-9 & NMS-CA-9
Monitoring Month : October 2013

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
		01-Oct	02-Oct	03-Oct	04-Oct	05-Oct
		Public Holiday		24-hr TSP Monitoring Noise Monitoring		
06-Oct	07-Oct	08-Oct	09-Oct	10-Oct	11-Oct	12-Oct
		.	24-hr TSP Monitoring Noise Monitoring			
13-Oct	14-Oct	15-Oct	16-Oct	17-Oct	18-Oct	19-Oct
	Public Holiday	24-hr TSP Monitoring Noise Monitoring				
20-Oct	21-Oct	22-Oct	23-Oct	24-Oct	25-Oct	26-Oct
	24-hr TSP Monitoring Noise Monitoring					24-hr TSP Monitoring
27-Oct	28-Oct	29-Oct	30-Oct	31-Oct		

Shatin to Central Link
Works Contract 1109
Stations and Tunnels of Kowloon City Section
Construction Air Quality and Regular Noise Monitoring Schedule

DMS-10 & NMS-CA-10
Monitoring Month : October 2013

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
		01-Oct	02-Oct	03-Oct	04-Oct	05-Oct
		Public Holiday		24-hr TSP Monitoring Noise Monitoring		
06-Oct	07-Oct	08-Oct	09-Oct	10-Oct	11-Oct	12-Oct
		.	24-hr TSP Monitoring Noise Monitoring			
13-Oct	14-Oct	15-Oct	16-Oct	17-Oct	18-Oct	19-Oct
	Public Holiday	24-hr TSP Monitoring Noise Monitoring				
20-Oct	21-Oct	22-Oct	23-Oct	24-Oct	25-Oct	26-Oct
	24-hr TSP Monitoring Noise Monitoring					24-hr TSP Monitoring
27-Oct	28-Oct	29-Oct	30-Oct	31-Oct		

Annex F

Calibration Reports

Annex F Calibration Reports

Dust Monitoring Equipment

Monitoring Station ID	Location	Monitoring Equipment		Last Calibration Date	Next Calibration Date
24-hr TSP		**HVS**	**Calibrator**		
DMS-6	Katherine Building	TE-5170 (S/N 0107)	CM-AIR-43 (Orifice I.D. 2323)	8 March 2013	8 September 2013
		TE-5170 (S/N 0107)	CM-AIR-43 (Orifice I.D. 2323)	6 September 2013	8 March 2014
DMS-7	Parc 22	TE-5170 (S/N 3574)	CM-AIR-43 (Orifice I.D. 2323)	8 March 2013	8 September 2013
		TE-5170 (S/N 3574)	CM-AIR-43 (Orifice I.D. 2323)	6 September 2013	8 March 2014
DMS-8	SHK Good Shepherd Primary School	TE-5170 (S/N 3572)	CM-AIR-43 (Orifice I.D. 2323)	8 March 2013	8 September 2013
		TE-5170 (S/N 3572)	CM-AIR-43 (Orifice I.D. 2323)	6 September 2013	8 March 2014
DMS-9	No. 26 Kowloon City Road	TE-5170 (S/N 0814)	CM-AIR-43 (Orifice I.D. 2323)	8 March 2013	8 September 2013
		TE-5170 (S/N 0814)	CM-AIR-43 (Orifice I.D. 2323)	6 September 2013	8 March 2014
DMS-10	Chat Ma Mansion	TE-5170 (S/N 3573)	CM-AIR-43 (Orifice I.D. 2323)	8 March 2013	8 September 2013
		TE-5170 (S/N 3573)	CM-AIR-43 (Orifice I.D. 2323)	6 September 2013	8 March 2014

Noise Monitoring Equipment

Monitoring Station ID	Monitoring Equipment	Model & Serial No.	Last Calibration Date	Next Calibration Date
NMS-CA-6, NMS-CA-7, NMS-CA-9 and NMS-CA-10	Calibrator	Rion NC-73 (S/N 10997142)	12 July 2013	12 July 2014
	Sound Level Meter	Rion NL-18 (S/N 00360030)	12 July 2013	12 July 2014
NMS-CA-8, MTW-16-1	Calibrator	Rion NC-73 (S/N 10997142)	12 July 2013	12 July 2014
	Sound Level Meter	Rion NL-31 (S/N 00983400)	30 January 2013	30 January 2014

ENVIROTECH SERVICES CO.

High-Volume TSP Sampler
5-Point Calibration Record

Location : DMS-6(Katherine Building)
Calibrated by : K.T.Ho
Date : 08/03/2013

Sampler
Model : TE-5170
Serial Number : S/N 0107

Calibration Orfice and Standard Calibration Relationship
Serial Number : 2323
Service Date : 26 Dec 2012
Slope (m) : 2.09107
Intercept (b) : -0.02838
Correlation Coefficient(r) : 0.99996

Standard Condition
Pstd (hpa) : 1013
Tstd (K) : 298.18

Calibration Condition
Pa (hpa) : 1012
Ta(K) : 298

Resistance Plate		dH [green liquid] (inch water)	Z	X=Qstd (cubic meter/min)	IC	Y
1	18 holes	12.7	3.599	1.735	54	54.5
2	13 holes	9.7	3.146	1.518	47	47.5
3	10 holes	7.5	2.766	1.336	40	40.4
4	7 holes	4.6	2.166	1.050	30	30.3
5	5 holes	2.9	1.720	0.836	22	22.2

Sampler Calibration Relationship

Slope(m): 36.090 Intercept(b): -7.760 Correlation Coefficient(r): 0.9996

Checked by: Magnum Fan Date: 11/03/2013

High-Volume TSP Sampler
5-Point Calibration Record

Location	:	DMS-7(Parc 22)
Calibrated by	:	P.F.Yeung
Date	:	08/03/2013

Sampler

Model	:	TE-5170
Serial Number	:	S/N 3574

Calibration Orfice and Standard Calibration Relationship

Serial Number	:	2323
Service Date	:	26 Dec 2012
Slope (m)	:	2.09107
Intercept (b)	:	-0.02838
Correlation Coefficient(r)	:	0.99996

Standard Condition

Pstd (hpa)	:	1013
Tstd (K)	:	298.18

Calibration Condition

Pa (hpa)	:	1023
Ta(K)	:	295

Resistance Plate		dH [green liquid] (inch water)	Z	X=Qstd (cubic meter/min)	IC	Y
1	18 holes	12.5	3.571	1.721	62	62.6
2	13 holes	9.7	3.146	1.518	55	55.6
3	10 holes	7.7	2.803	1.354	48	48.5
4	7 holes	4.8	2.213	1.072	38	38.4
5	5 holes	3.0	1.749	0.850	28	28.3

Sampler Calibration Relationship

Slope(m): 39.220 Intercept(b): -4.449 Correlation Coefficient(r): 0.9991

Checked by: Magnum Fan Date: 11/03/2013

High-Volume TSP Sampler
5-Point Calibration Record

Location : DMS-8(SHK Good Shepherd Primary School)
Calibrated by : P.F.Yeung
Date : 08/03/2013

Sampler
Model : TE-5170
Serial Number : S/N 3572

Calibration Orfice and Standard Calibration Relationship
Serial Number : 2323
Service Date : 26 Dec 2012
Slope (m) : 2.09107
Intercept (b) : -0.02838
Correlation Coefficient(r) : 0.99996

Standard Condition
Pstd (hpa) : 1013
Tstd (K) : 298.18

Calibration Condition
Pa (hpa) : 1023
Ta(K) : 295

Resistance Plate		dH [green liquid] (inch water)	Z	X=Qstd (cubic meter/min)	IC	Y
1	18 holes	12.4	3.557	1.714	62	62.6
2	13 holes	9.7	3.146	1.518	55	55.6
3	10 holes	7.6	2.784	1.345	48	48.5
4	7 holes	5.0	2.258	1.094	38	38.4
5	5 holes	3.0	1.749	0.850	28	28.3

Sampler Calibration Relationship

Slope(m): 39.920 Intercept(b): -5.411 Correlation Coefficient(r): 0.9997

Checked by: Magnum Fan Date: 11/03/2013

High-Volume TSP Sampler
5-Point Calibration Record

Location : DMS-9(No. 26 Kowloon City Road)
Calibrated by : P.F.Yeung
Date : 08/03/2013

Sampler
Model : TE-5170
Serial Number : S/N 0814

Calibration Orfice and Standard Calibration Relationship
Serial Number : 2323
Service Date : 26 Dec 2012
Slope (m) : 2.09107
Intercept (b) : -0.02838
Correlation Coefficient(r) : 0.99996

Standard Condition
Pstd (hpa) : 1013
Tstd (K) : 298.18

Calibration Condition
Pa (hpa) : 1023
Ta(K) : 295

Resistance Plate		dH [green liquid] (inch water)	Z	X=Qstd (cubic meter/min)	IC	Y
1	18 holes	12.7	3.599	1.735	66	66.7
2	13 holes	9.9	3.178	1.533	59	59.6
3	10 holes	7.7	2.803	1.354	52	52.5
4	7 holes	4.8	2.213	1.072	40	40.4
5	5 holes	2.7	1.660	0.807	30	30.3

Sampler Calibration Relationship

Slope(m): 39.740 Intercept(b): -1.784 Correlation Coefficient(r): 0.9995

Checked by: Magnum Fan Date: 11/03/2013

High-Volume TSP Sampler
5-Point Calibration Record

Location	:	DMS-10(Chat Ma Mansion)
Calibrated by	:	P.F.Yeung
Date	:	08/03/2013

Sampler

Model	:	TE-5170
Serial Number	:	S/N 3573

Calibration Orfice and Standard Calibration Relationship

Serial Number	:	2323
Service Date	:	26 Dec 2012
Slope (m)	:	2.09107
Intercept (b)	:	-0.02838
Correlation Coefficient(r)	:	0.99996

Standard Condition

Pstd (hpa)	:	1013
Tstd (K)	:	298.18

Calibration Condition

Pa (hpa)	:	1023
Ta(K)	:	295

Resistance Plate		dH [green liquid] (inch water)	Z	X=Qstd (cubic meter/min)	IC	Y
1	18 holes	11.8	3.470	1.673	61	61.6
2	13 holes	9.6	3.129	1.510	54	54.5
3	10 holes	7.5	2.766	1.336	48	48.5
4	7 holes	4.9	2.236	1.083	37	37.4
5	5 holes	2.1	1.464	0.714	21	21.2

Sampler Calibration Relationship

Slope(m): 41.960 Intercept(b): 8.359 Correlation Coefficient(r): 0.9995

Checked by: Magnum Fan Date: 10/03/2013

ENVIROTECH SERVICES CO.

High-Volume TSP Sampler
5-Point Calibration Record

Location : DMS-6(Katherine Building)
Calibrated by : K.T.Ho
Date : 06/09/2013

Sampler
Model : TE-5170
Serial Number : S/N 0107

Calibration Orfice and Standard Calibration Relationship
Serial Number : 2323
Service Date : 26 Dec 2012
Slope (m) : 2.09107
Intercept (b) : -0.02838
Correlation Coefficient(r) : 0.99996

Standard Condition
Pstd (hpa) : 1013
Tstd (K) : 298.18

Calibration Condition
Pa (hpa) : 1013
Ta(K) : 299

Resistance Plate		dH [green liquid] (inch water)	Z	X=Qstd (cubic meter/min)	IC	Y
1	18 holes	12.6	3.554	1.713	53	53.1
2	13 holes	9.6	3.102	1.497	46	46.1
3	10 holes	7.3	2.705	1.307	39	39.0
4	7 holes	4.5	2.124	1.029	30	30.0
5	5 holes	3.0	1.734	0.843	24	24.0

Sampler Calibration Relationship

Slope(m): 33.432 Intercept(b): -4.393 Correlation Coefficient(r): 0.9997

Checked by: Magnum Fan Date: 09/09/2013

<u>High-Volume TSP Sampler</u>
<u>5-Point Calibration Record</u>

Location	:	DMS-7(Parc 22)
Calibrated by	:	P.F.Yeung
Date	:	06/09/2013

<u>Sampler</u>

Model	:	TE-5170
Serial Number	:	S/N 3574

<u>Calibration Orfice and Standard Calibration Relationship</u>

Serial Number	:	2323
Service Date	:	26 Dec 2012
Slope (m)	:	2.09107
Intercept (b)	:	-0.02838
Correlation Coefficient(r)	:	0.99996

<u>Standard Condition</u>

Pstd (hpa)	:	1013
Tstd (K)	:	298.18

<u>Calibration Condition</u>

Pa (hpa)	:	1013
Ta(K)	:	299

Resistance Plate		dH [green liquid] (inch water)	Z	X=Qstd (cubic meter/min)	IC	Y
1	18 holes	12.0	3.458	1.667	62	61.9
2	13 holes	9.2	3.028	1.462	54	53.9
3	10 holes	6.9	2.622	1.268	48	47.9
4	7 holes	4.2	2.046	0.992	39	38.9
5	5 holes	2.1	1.447	0.705	30	29.9

<u>Sampler Calibration Relationship</u>

Slope(m): 32.873 Intercept(b): 6.455 Correlation Coefficient(r): 0.9993

Checked by: Magnum Fan Date: 09/09/2013

High-Volume TSP Sampler
5-Point Calibration Record

Location : DMS-8(SHK Good Shepherd Primary School)
Calibrated by : P.F.Yeung
Date : 06/09/2013

Sampler
Model : TE-5170
Serial Number : S/N 3572

Calibration Orfice and Standard Calibration Relationship
Serial Number : 2323
Service Date : 26 Dec 2012
Slope (m) : 2.09107
Intercept (b) : -0.02838
Correlation Coefficient(r) : 0.99996

Standard Condition
Pstd (hpa) : 1013
Tstd (K) : 298.18

Calibration Condition
Pa (hpa) : 1013
Ta(K) : 299

Resistance Plate		dH [green liquid] (inch water)	Z	X=Qstd (cubic meter/min)	IC	Y
1	18 holes	11.8	3.429	1.654	60	59.9
2	13 holes	9.4	3.061	1.477	53	52.9
3	10 holes	7.1	2.660	1.2887	46	45.9
4	7 holes	4.5	2.118	1.026	37	36.9
5	5 holes	2.8	1.671	0.812	28	27.9

Sampler Calibration Relationship

Slope(m): 37.412 Intercept(b): -2.079 Correlation Coefficient(r): 0.9997

Checked by: Magnum Fan Date: 09/09/2013

High-Volume TSP Sampler
5-Point Calibration Record

Location	:	DMS-9(No. 26 Kowloon City Road)
Calibrated by	:	P.F.Yeung
Date	:	06/09/2013

Sampler

Model	:	TE-5170
Serial Number	:	S/N 0814

Calibration Orfice and Standard Calibration Relationship

Serial Number	:	2323
Service Date	:	26 Dec 2012
Slope (m)	:	2.09107
Intercept (b)	:	-0.02838
Correlation Coefficient(r)	:	0.99996

Standard Condition

Pstd (hpa)	:	1013
Tstd (K)	:	298.18

Calibration Condition

Pa (hpa)	:	1013
Ta(K)	:	299

Resistance Plate		dH [green liquid] (inch water)	Z	X=Qstd (cubic meter/min)	IC	Y
1	18 holes	12.3	3.501	1.688	66	65.9
2	13 holes	9.5	3.077	1.485	56	55.9
3	10 holes	7.0	2.641	1.277	47	46.9
4	7 holes	4.2	2.046	0.992	36	35.9
5	5 holes	2.7	1.640	0.798	27	26.9

Sampler Calibration Relationship

Slope(m): 42.945 Intercept(b): -7.271 Correlation Coefficient(r): 0.9991

Checked by: Magnum Fan Date: 09/09/2013

High-Volume TSP Sampler
5-Point Calibration Record

Location : DMS-10(Chat Ma Mansion)
Calibrated by : P.F.Yeung
Date : 06/09/2013

Sampler
Model : TE-5170
Serial Number : S/N 3573

Calibration Orfice and Standard Calibration Relationship
Serial Number : 2323
Service Date : 26 Dec 2012
Slope (m) : 2.09107
Intercept (b) : -0.02838
Correlation Coefficient(r) : 0.99996

Standard Condition
Pstd (hpa) : 1013
Tstd (K) : 298.18

Calibration Condition
Pa (hpa) : 1013
Ta(K) : 299

Resistance Plate		dH [green liquid] (inch water)	Z	X=Qstd (cubic meter/min)	IC	Y
1	18 holes	11.2	3.341	1.611	58	57.9
2	13 holes	9.0	2.995	1.446	52	51.9
3	10 holes	7.0	2.641	1.277	46	45.9
4	7 holes	4.5	2.118	1.026	37	36.9
5	5 holes	2.8	1.671	0.812	28	27.9

Sampler Calibration Relationship

Slope(m): 37.167 Intercept(b): -1.759 Correlation Coefficient(r): 0.9994

Checked by: Magnum Fan Date: 09/09/2013

TISCH ENVIROMENTAL, INC.
145 SOUTH MIAMI AVE.
VILLAGE OF CLEVES, OH 45002
513.467.9000
877.263.7610 TOLL FREE
513.467.9009 FAX
WWW.TISCH-ENV.COM

AIR POLLUTION MONITORING EQUIPMENT

ORIFICE TRANSFER STANDARD CERTIFICATION WORKSHEET TE-5025A

Date - Dec 26, 2012 Rootsmeter S/N 0438320 Ta (K) - 295
Operator Tisch Orifice I.D. - 2323 Pa (mm) - 753.11

PLATE OR Run #	VOLUME START (m3)	VOLUME STOP (m3)	DIFF VOLUME (m3)	DIFF TIME (min)	METER DIFF Hg (mm)	ORFICE DIFF H2O (in.)
1	NA	NA	1.00	1.4440	3.2	2.00
2	NA	NA	1.00	1.0240	6.4	4.00
3	NA	NA	1.00	0.9120	8.0	5.00
4	NA	NA	1.00	0.8720	8.8	5.50
5	NA	NA	1.00	0.7200	12.8	8.00

DATA TABULATION

Vstd	(x axis) Qstd	(y axis)		Va	(x axis) Qa	(y axis)
0.9967	0.6902	1.4149		0.9957	0.6896	0.8851
0.9925	0.9693	2.0010		0.9915	0.9683	1.2517
0.9903	1.0858	2.2372		0.9893	1.0847	1.3995
0.9893	1.1345	2.3464		0.9883	1.1334	1.4678
0.9840	1.3666	2.8299		0.9830	1.3652	1.7702
Qstd slope (m) =		2.09107		Qa slope (m) =		1.30939
intercept (b) =		-0.02838		intercept (b) =		-0.01775
coefficient (r) =		0.99996		coefficient (r) =		0.99996

y axis = SQRT[H2O(Pa/760)(298/Ta)]   y axis = SQRT[H2O(Ta/Pa)]

CALCULATIONS

Vstd = Diff. Vol[(Pa-Diff. Hg)/760](298/Ta)
Qstd = Vstd/Time

Va = Diff Vol [(Pa-Diff Hg)/Pa]
Qa = Va/Time

For subsequent flow rate calculations:

Qstd = 1/m{[SQRT(H2O(Pa/760)(298/Ta))]- b}
Qa = 1/m{[SQRT H2O(Ta/Pa)]- b}

輝創工程有限公司
Sun Creation Engineering Limited
Calibration and Testing Laboratory

Certificate of Calibration
校正證書

Certificate No. : C134307
證書編號

ITEM TESTED / 送檢項目 (Job No. / 序引編號 : IC13-1709)

Description / 儀器名稱	:	Sound Level Calibrator
Manufacturer / 製造商	:	Rion
Model No. / 型號	:	NC-73
Serial No. / 編號	:	10997142
Supplied By / 委託者	:	Envirotech Services Co. Shop 6, G/F., Casio Mansion, 209 Shaukeiwan Road, Hong Kong

TEST CONDITIONS / 測試條件

Temperature / 溫度 : (23 ± 2)°C

Relative Humidity / 相對濕度 : (55 ± 20)%

Line Voltage / 電壓 : ---

TEST SPECIFICATIONS / 測試規範

Calibration check

DATE OF TEST / 測試日期 : 12 July 2013

TEST RESULTS / 測試結果

The results apply to the particular unit-under-test only.
All results are within manufacturer's specification.
The results are detailed in the subsequent page(s).

The test equipment used for calibration are traceable to National Standards via :
- The Government of The Hong Kong Special Administrative Region Standard & Calibration Laboratory
- Rohde & Schwarz Laboratory, Germany
- Fluke Everett Service Center, USA
- Agilent Technologies, USA

Tested By 測試 : K C Lee

Certified By 核證 : K M Wu

Date of Issue 簽發日期 : 15 July 2013

Sun Creation Engineering Limited – Calibration & Testing Laboratory
c/o 4/F, Tsing Shan Wan Exchange Building, 1 Hing On Lane, Tuen Mun, New Territories, Hong Kong
輝創工程有限公司 – 校正及檢測實驗所
c/o 香港新界屯門興安里一號青山灣機樓四樓
Tel/電話: 2927 2606 Fax/傳真: 2744 8986 E-mail/電郵: callab@suncreation.com Website/網址: www.suncreation.com

Certificate of Calibration
校正證書

Certificate No. : C134307
證書編號

1. The unit-under-test (UUT) was allowed to stabilize in the laboratory for over 12 hours before the commencement of the test.

2. The results presented are the mean of 3 measurements at each calibration point.

3. Test equipment :

Equipment ID	Description	Certificate No.
CL130	Universal Counter	C133632
CL281	Multifunction Acoustic Calibrator	DC130171
TST150A	Measuring Amplifier	C120886

4. Test procedure : MA100N.

5. Results :

5.1 Sound Level Accuracy

UUT Nominal Value	Measured Value (dB)	Mfr's Spec. (dB)	Uncertainty of Measured Value (dB)
94 dB, 1 kHz	93.7	± 0.5	± 0.2

5.2 Frequency Accuracy

UUT Nominal Value (kHz)	Measured Value (kHz)	Mfr's Spec.	Uncertainty of Measured Value (Hz)
1	0.988	1 kHz ± 2 %	± 1

Remark : The uncertainties are for a confidence probability of not less than 95 %.

Note :
The values given in this Certificate only relate to the values measured at the time of the test and any uncertainties quoted will not include allowance for the equipment long term drift, variations with environment changes, vibration and shock during transportation, overloading, mis-handling, or the capability of any other laboratory to repeat the measurement. Sun Creation Engineering Limited shall not be liable for any loss or damage resulting from the use of the equipment.

Sun Creation Engineering Limited – Calibration & Testing Laboratory
c/o 4/F, Tsing Shan Wan Exchange Building, 1 Hing On Lane, Tuen Mun, New Territories, Hong Kong
輝創工程有限公司 – 校正及檢測實驗所
c/o 香港新界屯門興安里一號青山灣機樓四樓
Tel/電話: 2927 2606 Fax/傳真: 2744 8986 E-mail/電郵: callab@suncreation.com Website/網址: www.suncreation.com

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Certificate of Calibration
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Certificate No. : C134309
證書編號

ITEM TESTED / 送檢項目 (Job No. / 序引編號 : IC13-1709)

Description / 儀器名稱 : Precision Integrating Sound Level Meter
Manufacturer / 製造商 : Rion
Model No. / 型號 : NL-18
Serial No. / 編號 : 00360030
Supplied By / 委託者 : Envirotech Services Co.
Shop 6, G/F., Casio Mansion, 209 Shaukeiwan Road,
Hong Kong

TEST CONDITIONS / 測試條件

Temperature / 溫度 : (23 ± 2)°C
Relative Humidity / 相對濕度 : (55 ± 20)%
Line Voltage / 電壓 : ---

TEST SPECIFICATIONS / 測試規範

Calibration

DATE OF TEST / 測試日期 : 12 July 2013

TEST RESULTS / 測試結果

The results apply to the particular unit-under-test only.
All results are within manufacturer's specification. (after adjustment)
The results are detailed in the subsequent page(s).

The test equipment used for calibration are traceable to National Standards via :
- The Government of The Hong Kong Special Administrative Region Standard & Calibration Laboratory
- Rohde & Schwarz Laboratory, Germany
- Fluke Everett Service Center, USA
- Agilent Technologies, USA

Tested By 測試 : K C Lee

Certified By 核證 : K M Wu

Date of Issue 簽發日期 : 15 July 2013

Sun Creation Engineering Limited – Calibration & Testing Laboratory
c/o 4/F, Tsing Shan Wan Exchange Building, 1 Hing On Lane, Tuen Mun, New Territories, Hong Kong
輝創工程有限公司 – 校正及檢測實驗所
c/o 香港新界屯門興安里一號青山灣機樓四樓
Tel/電話: 2927 2606 Fax/傳真: 2744 8986 E-mail/電郵: callab@suncreation.com Website/網址: www.suncreation.com

Certificate of Calibration
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Certificate No. : C134309
證書編號

1. The unit-under-test (UUT) was allowed to stabilize in the laboratory for over 12 hours, and switched on to warm up for over 10 minutes before the commencement of the test.

2. Self-calibration using the internal standard (After Adjustment) was performed before the test from 6.1.2 to 6.4.

3. The results presented are the mean of 3 measurements at each calibration point.

4. Test equipment :

Equipment ID	Description	Certificate No.
CL280	40 MHz Arbitrary Waveform Generator	C130019
CL281	Multifunction Acoustic Calibrator	DC130171

5. Test procedure : MA101N.

6. Results :

6.1 Sound Pressure Level

6.1.1 Reference Sound Pressure Level

6.1.1.1 Before Adjustment

UUT Setting				Applied Value		UUT	IEC 60651 Type 1
Range (dB)	Mode	Frequency Weighting	Time Weighting	Level (dB)	Freq. (kHz)	Reading (dB)	Spec. (dB)
50 - 110	LA	A	Fast	94.00	1	* 93.1	± 0.7

* Out of Mfr's Spec.

6.1.1.2 After Adjustment

UUT Setting				Applied Value		UUT	IEC 60651 Type 1
Range (dB)	Mode	Frequency Weighting	Time Weighting	Level (dB)	Freq. (kHz)	Reading (dB)	Spec. (dB)
50 - 110	LA	A	Fast	94.00	1	94.1	± 0.7

6.1.2 Linearity

UUT Setting				Applied Value		UUT
Range (dB)	Mode	Frequency Weighting	Time Weighting	Level (dB)	Freq. (kHz)	Reading (dB)
60 - 120	LA	A	Fast	94.00	1	94.2 (Ref.)
				104.00		104.2
				114.00		114.2

IEC 60651 Type 1 Spec. : ± 0.4 dB per 10 dB step and ± 0.7 dB for overall different.

Sun Creation Engineering Limited – Calibration & Testing Laboratory
c/o 4/F, Tsing Shan Wan Exchange Building, 1 Hing On Lane, Tuen Mun, New Territories, Hong Kong
輝創工程有限公司 – 校正及檢測實驗所
c/o 香港新界屯門興安里一號青山灣機樓四樓
Tel/電話: 2927 2606 Fax/傳真: 2744 8986 E-mail/電郵: callab@suncreation.com Website/網址: www.suncreation.com

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6.2 Time Weighting

6.2.1 Continuous Signal

UUT Setting				Applied Value		UUT Reading (dB)	IEC 60651 Type 1 Spec. (dB)
Range (dB)	Mode	Frequency Weighting	Time Weighting	Level (dB)	Freq. (kHz)		
50 - 110	LA	A	Fast	94.00	1	94.1	Ref.
			Slow			94.1	± 0.1

6.2.2 Tone Burst Signal (2 kHz)

UUT Setting				Applied Value		UUT Reading (dB)	IEC 60651 Type 1 Spec. (dB)
Range (dB)	Mode	Frequency Weighting	Time Weighting	Level (dB)	Burst Duration		
50 -110	LA	A	Fast	106.00	Continuous	106.0	Ref.
	LAmx				200 ms	105.1	-1.0 ± 1.0
	LA		Slow		Continuous	106.0	Ref.
	LAmx				500 ms	102.4	-4.1 ± 1.0

6.3 Frequency Weighting

6.3.1 A-Weighting

UUT Setting				Applied Value		UUT Reading (dB)	IEC 60651 Type 1 Spec. (dB)
Range (dB)	Mode	Frequency Weighting	Time Weighting	Level (dB)	Freq.		
50 - 110	LA	A	Fast	94.00	31.5 Hz	54.4	-39.4 ± 1.5
					63 Hz	67.7	-26.2 ± 1.5
					125 Hz	77.7	-16.1 ± 1.0
					250 Hz	85.3	-8.6 ± 1.0
					500 Hz	90.7	-3.2 ± 1.0
					1 kHz	94.1	Ref.
					2 kHz	95.3	+1.2 ± 1.0
					4 kHz	95.1	+1.0 ± 1.0
					8 kHz	93.0	-1.1 (+1.5 ; -3.0)
					12.5 kHz	89.8	-4.3 (+3.0 ; -6.0)

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c/o 4/F, Tsing Shan Wan Exchange Building, 1 Hing On Lane, Tuen Mun, New Territories, Hong Kong
輝創工程有限公司 – 校正及檢測實驗所
c/o 香港新界屯門興安里一號青山灣機樓四樓
Tel 電話: 2927 2606 Fax 傳真: 2744 8986 E-mail/電郵: callab@suncreation.com Website/網址: www.suncreation.com

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Certificate No. : C134309
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6.3.2 C-Weighting

UUT Setting				Applied Value		UUT Reading (dB)	IEC 60651 Type 1 Spec. (dB)
Range (dB)	Mode	Frequency Weighting	Time Weighting	Level (dB)	Freq.		
50 - 110	LC	C	Fast	94.00	31.5 Hz	91.0	-3.0 ± 1.5
					63 Hz	93.2	-0.8 ± 1.5
					125 Hz	93.9	-0.2 ± 1.0
					250 Hz	94.1	0.0 ± 1.0
					500 Hz	94.1	0.0 ± 1.0
					1 kHz	94.1	Ref.
					2 kHz	93.9	-0.2 ± 1.0
					4 kHz	93.3	-0.8 ± 1.0
					8 kHz	91.0	-3.0 (+1.5 ; -3.0)
					12.5 kHz	87.8	-6.2 (+3.0 ; -6.0)

6.4 Time Averaging

UUT Setting				Applied Value					UUT Reading (dB)	IEC 60804 Type 1 Spec. (dB)
Range (dB)	Mode	Frequency Weighting	Integrating Time	Freq. (kHz)	Burst Duration (ms)	Burst Duty Factor	Burst Level (dB)	Equivalent Level (dB)		
50 - 110	LAeq	A	10 sec.	4	1	1/10	110	100	100.0	± 0.5
						$1/10^2$		90	90.0	± 0.5
			60 sec.			$1/10^3$		80	79.5	± 1.0
			5 min.			$1/10^4$		70	69.7	± 1.0

Remarks : - UUT Microphone Model No. : UC-53A & S/N : 307435

- Mfr's Spec. : IEC 60651 Type 1 & IEC 60804 Type 1

- Uncertainties of Applied Value : 94 dB : 31.5 Hz - 125 Hz : ± 0.35 dB
  250 Hz - 500 Hz : ± 0.30 dB
  1 kHz : ± 0.20 dB
  2 kHz - 4 kHz : ± 0.35 dB
  8 kHz : ± 0.45 dB
  12.5 kHz : ± 0.70 dB
  104 dB : 1 kHz : ± 0.10 dB (Ref. 94 dB)
  114 dB : 1 kHz : ± 0.10 dB (Ref. 94 dB)
  Burst equivalent level : ± 0.2 dB (Ref. 110 dB continuous sound level)

- The uncertainties are for a confidence probability of not less than 95 %.

Note :
The values given in this Certificate only relate to the values measured at the time of the test and any uncertainties quoted will not include allowance for the equipment long term drift, variations with environment changes, vibration and shock during transportation, overloading, mis-handling, or the capability of any other laboratory to repeat the measurement. Sun Creation Engineering Limited shall not be liable for any loss or damage resulting from the use of the equipment.

Sun Creation Engineering Limited – Calibration & Testing Laboratory
c/o 4/F, Tsing Shan Wan Exchange Building, 1 Hing On Lane, Tuen Mun, New Territories, Hong Kong
輝創工程有限公司 – 校正及檢測實驗所
c/o 香港新界屯門興安里一號青山灣機樓四樓
Tel/電話: 2927 2606 Fax/傳真: 2744 8986 E-mail/電郵: callab@suncreation.com Website/網址: www.suncreation.com

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Certificate of Calibration
校正證書

Certificate No. 證書編號 : C130686

ITEM TESTED / 送檢項目 (Job No. / 序引編號 : IC13-0285)

Description / 儀器名稱	:	Sound Level Meter
Manufacturer / 製造商	:	Rion
Model No. / 型號	:	NL-31
Serial No. / 編號	:	00983400
Supplied By / 委託者	:	Envirotech Services Co. Shop 6, G/F., Casio Mansion, 209 Shaukeiwan Road, Hong Kong

TEST CONDITIONS / 測試條件

Temperature / 溫度 : (23 ± 2)°C   Relative Humidity / 相對濕度 : (55 ± 20)%

Line Voltage / 電壓 : ---

TEST SPECIFICATIONS / 測試規範

Calibration check

DATE OF TEST / 測試日期 : 30 January 2013

TEST RESULTS / 測試結果

The results apply to the particular unit-under-test only.
All results are within manufacturer's specification.
The results are detailed in the subsequent page(s).

The test equipment used for calibration are traceable to National Standards via :
- The Government of The Hong Kong Special Administrative Region Standard & Calibration Laboratory
- Rohde & Schwarz Laboratory, Germany
- Fluke Everett Service Center, USA
- Agilent Technologies, USA

Tested By 測試 : K C Lee

Certified By 核證 : C C Cheung

Date of Issue 簽發日期 : 30 January 2013

Sun Creation Engineering Limited – Calibration & Testing Laboratory
c/o 4/F, Tsing Shan Wan Exchange Building, 1 Hing On Lane, Tuen Mun, New Territories, Hong Kong
輝創工程有限公司 – 校正及檢測實驗所
c/o 香港新界屯門興安里一號青山灣機樓四樓
Tel/電話: 2927 2606 Fax/傳真: 2744 8986 E-mail/電郵: callab@suncreation.com Website/網址: www.suncreation.com

Certificate of Calibration
校正證書

Certificate No. : C130686
證書編號

1. The unit-under-test (UUT) was allowed to stabilize in the laboratory for over 12 hours, and switched on to warm up for over 10 minutes before the commencement of the test.

2. Self-calibration was performed before the test.

3. The results presented are the mean of 3 measurements at each calibration point.

4. Test equipment :

Equipment ID	Description	Certificate No.
CL280	40 MHz Arbitrary Waveform Generator	C130019
CL281	Multifunction Acoustic Calibrator	DC110233

5. Test procedure : MA101N.

6. Results :

6.1 Sound Pressure Level

6.1.1 Reference Sound Pressure Level

UUT Setting				Applied Value		UUT	IEC 61672 Class 1
Range (dB)	Mode	Frequency Weighting	Time Weighting	Level (dB)	Freq. (kHz)	Reading (dB)	Spec. (dB)
30 - 120	L_A	A	Fast	94.00	1	93.8	± 1.1

6.1.2 Linearity

UUT Setting				Applied Value		UUT
Range (dB)	Mode	Frequency Weighting	Time Weighting	Level (dB)	Freq. (kHz)	Reading (dB)
30 - 120	L_A	A	Fast	94.00	1	93.8 (Ref.)
				104.00		103.8
				114.00		113.9

IEC 61672 Class 1 Spec. : ± 0.6 dB per 10 dB step and ± 1.1 dB for overall different.

6.2 Time Weighting

UUT Setting				Applied Value		UUT	IEC 61672 Class 1
Range (dB)	Mode	Frequency Weighting	Time Weighting	Level (dB)	Freq. (kHz)	Reading (dB)	Spec. (dB)
30 - 120	L_A	A	Fast	94.00	1	93.8	Ref.
			Slow			93.7	± 0.3

Certificate of Calibration
校正證書

Certificate No. : C130686
證書編號

6.3 Frequency Weighting

6.3.1 A-Weighting

UUT Setting				Applied Value		UUT Reading (dB)	IEC 61672 Class 1 Spec. (dB)
Range (dB)	Mode	Frequency Weighting	Time Weighting	Level (dB)	Freq.		
30 - 120	L_A	A	Fast	94.00	63 Hz	67.5	-26.2 ± 1.5
					125 Hz	77.5	-16.1 ± 1.5
					250 Hz	85.1	-8.6 ± 1.4
					500 Hz	90.5	-3.2 ± 1.4
					1 kHz	93.8	Ref.
					2 kHz	95.1	+1.2 ± 1.6
					4 kHz	95.0	+1.0 ± 1.6
					8 kHz	92.8	-1.1 (+2.1 ; -3.1)
					12.5 kHz	89.9	-4.3 (+3.0 ; -6.0)

6.3.2 C-Weighting

UUT Setting				Applied Value		UUT Reading (dB)	IEC 61672 Class 1 Spec. (dB)
Range (dB)	Mode	Frequency Weighting	Time Weighting	Level (dB)	Freq.		
30 - 120	L_C	C	Fast	94.00	63 Hz	92.9	-0.8 ± 1.5
					125 Hz	93.6	-0.2 ± 1.5
					250 Hz	93.8	0.0 ± 1.4
					500 Hz	93.9	0.0 ± 1.4
					1 kHz	93.9	Ref.
					2 kHz	93.7	-0.2 ± 1.6
					4 kHz	93.2	-0.8 ± 1.6
					8 kHz	90.9	-3.0 (+2.1 ; -3.1)
					12.5 kHz	88.1	-6.2 (+3.0 ; -6.0)

Remarks : - UUT Microphone Model No. : UC-53A & S/N : 315241

- Mfr's Spec. : IEC 61672 Class 1

- Uncertainties of Applied Value :

94 dB	: 63 Hz - 125 Hz	:	± 0.35 dB
	250 Hz - 500 Hz	:	± 0.30 dB
	1 kHz	:	± 0.20 dB
	2 kHz - 4 kHz	:	± 0.35 dB
	8 kHz	:	± 0.45 dB
	12.5 kHz	:	± 0.70 dB
104 dB	: 1 kHz	:	± 0.10 dB (Ref. 94 dB)
114 dB	: 1 kHz	:	± 0.10 dB (Ref. 94 dB)

- The uncertainties are for a confidence probability of not less than 95 %.

Note :
The values given in this Certificate only relate to the values measured at the time of the test and any uncertainties quoted will not include allowance for the equipment long term drift, variations with environment changes, vibration and shock during transportation, overloading, mis-handling, or the capability of any other laboratory to repeat the measurement. Sun Creation Engineering Limited shall not be liable for any loss or damage resulting from the use of the equipment.

Sun Creation Engineering Limited – Calibration & Testing Laboratory
c/o 4/F, Tsing Shan Wan Exchange Building, 1 Hing On Lane, Tuen Mun, New Territories, Hong Kong
輝創工程有限公司 – 校正及檢測實驗所
c/o 香港新界屯門興安里一號青山灣機樓四樓
Tel/電話: 2927 2606 Fax/傳真: 2744 8986 E-mail/電郵: callab@suncreation.com Website/網址: www.suncreation.com

Annex G

Summary of Event/ Action Plans

Annex G1 Event and Action Plan for Regular Construction Noise Monitoring

EVENT	Action			
	Contractor's Environmental Team (Contractor's ET)	**Independent Environmental Checker (IEC)**	**Engineer Representative (ER)**	**The Contractor**
Exceeding Action Level	1. Notify the IEC, Contractor and ER; 2. Discuss with the ER, IEC and Contractor on the remedial measures required; 3. Increase the monitoring frequency to check mitigation effectiveness.	1. Review the investigation results submitted by the contractor; 2. Review and advise the ET and ER on the effectiveness of the remedial measures proposed by the Contractor.	1. Confirm receipt of notification of complaint in writing ; 2. Notify the Contractor, IEC and ET; 3. Review and agree on the remedial measures proposed by the Contractor; 4. Supervise the implementation of remedial measures.	1. Investigate the complaint and propose remedial measures; 2. Report the results of investigation to the IEC, ET and ER; 3. Submit noise mitigation proposals to the ER with copy to the IEC and ET within 3 working days of notification; 4. Implement noise mitigation proposals.
Exceeding Limit Level	1. Notify the IEC, Contractor and EPD; 2. Repeat measurement to confirm findings; 3. Increase the monitoring frequency; 4. Carry out analysis of the Contractor's working procedures to determine possible mitigation to be implemented; 5. Arrange meeting with the IEC, Contractor and ER to discuss the remedial measures to be taken; 6. Inform the IEC, ER and EPD the causes and actions taken for the exceedances 7. Assess the effectiveness of the Contractor's remedial measures and keep the IEC, ER and EPD informed of the results	1. Check the monitoring data submitted by the ET; 2. Check the Contractor's working method; 3. Discuss with the ET, ER, and Contractor on the potential remedial measures; 4. Review and advise the ET and ER on the effectiveness of the remedial measures proposed by the Contractor	1. Confirm receipt of notification of exceedance in writing; 2. Notify the Contractor, IEC and ET; 3. In consultation with the ET and IEC, agree with the Contractor on the remedial measures to be implemented; 4. Supervise the implementation of remedial measures; 5. If exceedance continues, consider what portion of the work is responsible and instruct the Contractor to stop that portion of work until the exceedance is abated.	1. Identify reason(s) and investigate the causes of exceedance; 2. Take immediate action to avoid further exceedance; 3. Submit proposals for remedial measures to the ER with a copy to the IEC and ET within three working days of notification; 4. Implement the agreed proposals; 5. Revise and resubmit proposals if problem is still not under control; 6. Stop the relevant portion of works as determined by the ER until the exceedance is abated.

Annex G2 Event and Action Plan for Continuous Noise Monitoring

Event	Action			
	Works Contract 1109 ET	**IEC**	**ER**	**Contractor**
Exceeding Action/Limit Level	1. Identify source 2. Repeat measurement. If two consecutive measurements exceed Action/Limit Level, the exceedance is then confirmed 3. If exceedance is confirmed, notify IEC, ER and Contractor 4. Investigate the cause of exceedance and check Contractor's working procedures to determine possible mitigation to be implemented 5. Discuss jointly with the IEC, ER and Contractor and formulate remedial measures 6. Assess effectiveness of Contractor's remedial actions and keep IEC and ER informed of the results	1. Check monitoring data submitted by the Works Contract 1109 ET 2. Check the Contractor's working method 3. Discuss with the ER, Works Contract 1109 ET and Contractor on the potential remedial measures 4. Review and advise the Works Contract 1109 ET and ER on the effectiveness of the remedial measures proposed by the Contractor	1. Confirm receipt of notification of exceedance in writing 2. Notify the Contractor and IEC 3. In consultation with the Works Contract 1109 ET and IEC, agree with the Contractor on the remedial measures to be implemented 4. Ensure the proper implementation of remedial measures 5. If exceedance continues, consider what portion of the work is responsible and instruct the Contractor to stop that portion of work until the exceedance is abated	1. Identify source with Works Contract 1109 ET 2. If exceedance is confirmed, investigate the cause of exceedance and take immediate action to avoid further exceedance 3. Submit proposals for remedial measures to the ER with copy to the IEC and ET of notification 4. Implement the agreed proposals 5. Liaise with ER to optimize the effectiveness of the agreed mitigation 6. Revise and resubmit proposals if problem still not under control 7. Stop the relevant portion of works as determined by the ER until the exceedance is abated

Annex G3 Event and Action Plan for Construction Dust Monitoring

Event	Action			
	Contractor's Environmental Team (Contractor's ET)	**Independent Environmental Checker (IEC)**	**Engineer Representative (ER)**	**The Contractor**
Action Level				
Exceedance for one sample	1. Inform the IEC, Contractor and ER; 2. Discuss with the Contractor, IEC and ER on the remedial measures required; 3. Repeat measurement to confirm findings; 4. Increase the monitoring frequency	1. Check the monitoring data submitted by the ET; 2. Check the Contractor's working method; 3. Review and advise the ET and ER on the effectiveness of the proposed remedial measures.	1. Confirm receipt of notifications of exceedance in writing;	1. Identify reason(s), investigate the causes of exceedance and propose remedial measures; 2. Implement remedial measures; 3. Amend working methods and agree them with the ER as appropriate.
Exceedance for two or more consecutive samples	1. Inform the IEC, Contractor and ER; 2. Discuss with the ER, IEC and Contractor on the remedial measures required; 3. Repeat measurements to confirm findings; 4. Increase the monitoring frequency to daily; 5. If exceedance continues, arrange meeting with the IEC, ER and Contractor; 6. If exceedance stops, the monitoring frequency will resume normal.	1. Check the monitoring data submitted by the ET; 2. Check the Contractor's working method; 3. Review and advise the ET and ER on the effectiveness of the proposed remedial measures.	1. Confirm receipt of notification of exceedance in writing; 2. Notify the Contractor, IEC and ET; 3. Review and agree on the remedial measures proposed by the Contractor; 4. Supervise the Implementation of remedial measures.	1. Identify reasons and investigate the causes of exceedance; 2. Submit proposals of remedial measures to the ER with a copy to the ET and IEC within three working days of notification; 3. Implement the agreed proposals; 4. Amend the proposal as appropriate.

Event	Action			
	Contractor's Environmental Team (Contractor's ET)	**Independent Environmental Checker (IEC)**	**Engineer Representative (ER)**	**The Contractor**
Limit Level				
Exceedance for one sample	1. Inform the IEC, Contractor and ER; 2. Repeat measurement to confirm findings; 3. Increase the monitoring frequency to daily; 4. Discuss with the ER, IEC and contractor on the remedial measures and assess the effectiveness.	1. Check the monitoring data submitted by the ET; 2. Check the Contractor's working method; 3. Discuss with the ET, ER and Contractor on possible remedial measures; 4. Review and advise the ER and ET on the effectiveness of Contractor's remedial measures.	1. Confirm receipt of notification of exceedance in writing; 2. Notify the Contractor, IEC and ET; 3. Review and agree on the remedial measures proposed by the Contractor; 4. Supervise the implementation of remedial measures.	1. Identify reason(s) and investigate the causes of exceedance; 2. Take immediate action to avoid further exceedance; 3. Submit proposals of remedial measures to ER with a copy to the ET and IEC within three working days of notification; 4. Implement the agreed proposals; 5. Amend proposal if appropriate.
Exceedance for two or more consecutive samples	1. Notify the IEC, Contractor and EPD; 2. Repeat measurement to confirm findings; 3. Increase the monitoring frequency to daily; 4. Carry out analysis of the Contractor's working procedures with the ER to determine possible mitigation to be implemented; 5. Arrange meeting with the IEC, Contractor and ER to discuss the remedial measures to be taken; 6. Review the effectiveness of the Contractor's remedial measures and keep the IEC, EPD and ER informed of the results; 7. If exceedance stops, the monitoring frequency will return to normal.	1. Check the monitoring data submitted by the ET; 2. Check the Contractor's working method; 3. Discuss with the ET, ER, and Contractor on the potential remedial measures; 4. Review and advise the ER and ET on the effectiveness of Contractor's remedial measures.	1. Confirm receipt of notification of exceedance in writing; 2. Notify the Contractor, IEC and ET; 3. In consultation with the ET and IEC, agree with the Contractor on the remedial measures to be implemented; 4. Supervise the implementation of remedial measures; 5. If exceedance continues, consider what portion of the work is responsible and instruct the Contractor to stop that portion of work until the exceedance is abated.	1. Identify reason(s) and investigate the causes of exceedance; 2. Take immediate actions to avoid further exceedance; 3. Submit proposals of remedial measures to the ER with a copy to the IEC and ET within three working days of notification; 4. Implement the agreed proposals; 5. Revise and resubmit proposals if problem still not under control; 6. Stop the relevant portion of works as determined by the ER until the exceedance is abated.

Annex G4 Event and Action Plan for Landscape and Visual Impacts during the Construction Phase

Event	Action			
	Contractor's Environmental Team (Contractor's ET)	**Independent Environmental Checker (IEC)**	**Engineer Representative (ER)**	**The Contractor**
Non-conformity on one occasion	1. Inform the Contractor, the IEC and the ER. 2. Discuss remedial actions with the IEC, ER and Contractor. 3. Monitor remedial actions until rectification has been completed.	1. Check the inspection report. 2. Check the Contractor's working method. 3. Discuss with the ET, ER and Contractor on possible remedial measures. 4. Advise the ER on the effectiveness of proposed remedial measures.	1. Confirm receipt of notifications of nonconformity in writing. 2. Review and agree on the remedial measures proposed by the Contractor. 3. Supervise the implementation of remedial measures.	1. Identify reasons and investigate the non-conformity. 2. Implement remedial measures 3. Amend working methods and agree them with the ER as appropriate. 4. Rectify the damage and undertake any necessary replacement.
Repeated Nonconformity	1. Identify Reasons. 2. Inform the Contractor, IEC and ER. 3. Increase the inspection frequency. 4. Discuss remedial actions with the IEC, ER and Contractor. 5. Monitor remedial actions until rectification has been completed. 6. If non-conformity stops, the inspection frequency return to normal (ie,. Once every two weeks)	1. Check the inspection report. 2. Check the Contractor's working method. 3. Discuss with the ET and Contractor on possible remedial measures. 4. Advise the ER on the effectiveness of proposed remedial measures.	1. Notify the Contractor. 2. In consultation with the ET and IEC, agree with the Contractor on the remedial measures to be implemented. 3. Supervise the implementation of remedial measures.	1. Identify Reasons and investigate the non-conformity. 2. Implement remedial measures. 3. Amend working methods and agree them with the ER as appropriate. 4. Rectify the damage and undertake any necessary replacement. 5. Stop relevant works as determined by the ER until the non-conformity is abated.

Annex H

Summary of Implementation Status

Annex H *Environmental Mitigation Implementation Status – SCL Works Contract 1109 (Stations and Tunnels of Kowloon City Section)*

Note:

*	Reference has been made to the approved SCL (TAW-HUH) EM&A Manual.
√	Compliance of Mitigation Measures
<>	Compliance of Mitigation but need improvement
x	Non-compliance of Mitigation Measures
▲	Non-compliance of Mitigation Measures but rectified by Samsung-Hsin Chong JV
Δ	Deficiency of Mitigation Measures but rectified by Samsung-Hsin Chong JV
N/A	Not Applicable in Reporting Period

EIA Ref.	EM&A Log Ref*	Recommended Mitigation Measures	Objectives of the Recommended Measures & Main Concerns to address	Who to implement the measures?	Location of the implementation of measures	When to implement the measures?	Implementation Status
Cultural Heritage Impact							
S4.9	CH3	Submit an Archaeological Action Plan Conduct survey-cum-excavation and additional boreholes/trenches investigation at the Sacred Hill (North) Study Area prior to construction.	Salvage cultural remains at the Sacred Hill (North) Study Area	Contractor	Sacred Hill (North) Area	Prior to the Construction Phase of TKW and associated tunnels	√
Ecology (Construction Phase)							
S5.7	E5	Good Site Practices Impact on any habitats or local fauna should be avoided by implementing good site practices, including the containment of silt runoff within the site boundary, containment of contaminated soils for removal from the site, appropriate storage of chemicals and chemical waste away from sites of ecological value and the provision of sanitary facilities for on-site workers. Adoption of such measures should permit waste to be suitably contained within the site for subsequent removal and appropriate disposal.	Minimise ecological impacts	Contractor	All construction sites	Construction Stage	√

EIA Ref.	EM&A Log Ref*	Recommended Mitigation Measures	Objectives of the Recommended Measures & Main Concerns to address	Who to implement the measures?	Location of the implementation of measures	When to implement the measures?	Implementation Status
		The following good site practices should also be implemented: • Erection of temporary geotextile silt or sediment fences/oil traps around earth-moving works to trap sediments and prevent them from entering watercourses; • Avoidance of soil storage against trees or close to water bodies; • Delineation of works site by erecting hoardings to prevent encroachment onto adjacent habitats and fence off areas which have some ecological value e.g. tunnel on hill at top of slope stabilisation works; • No on-site burning of waste; • Store waste and refuse in appropriate receptacles.					
Landscape & Visual (Construction Phase)							
S6.9.3	LV1	The following good site practices and measures for minimisation and avoidance of potential impacts are recommended: <u>Re-use of Existing Soil</u> • For soil conservation, existing topsoil shall be re-used where possible for new planting areas within the project. The construction program shall consider using the soil removed from one phase for backfilling another. Suitable storage ground, gathering ground and mixing	Minimize visual & landscape impact	Contractor	Within Project Site	Construction Stage	√

EIA Ref.	EM&A Log Ref*	Recommended Mitigation Measures	Objectives of the Recommended Measures & Main Concerns to address	Who to implement the measures?	Location of the implementation of measures	When to implement the measures?	Implementation Status
		ground may be set up on-site as necessary. No-intrusion Zone • To maximize protection to existing trees, ground vegetation and associated under storey habitats, construction contracts may designate "No-intrusion Zone" to various areas within the site boundary with rigid and durable fencing . The contractor should closely monitor and restrict the site working staff from entering the "no-intrusion zone", even for indirect construction activities and storage of equipment. Protection of Retained Trees • All retained trees including trees in contractor's works sites should be recorded and photographed at the commencement of the Contract, and carefully protected during the construction period. Detailed tree protection specification shall be allowed and included in the Contract Specification, which specifies the tree protection requirement, submission and approval system, and the tree monitoring system. • The Contractor shall be required to submit, for approval, a detailed working method statement for the protection of trees prior to undertaking any works adjacent to all retained trees, including					

EIA Ref.	EM&A Log Ref*	Recommended Mitigation Measures	Objectives of the Recommended Measures & Main Concerns to address	Who to implement the measures?	Location of the implementation of measures	When to implement the measures?	Implementation Status
		trees in Contractor's works sites.					
S6.12	LV2	Decorative Hoarding • Erection of decorative screen in visual and landscape sensitive areas during the construction stage to screen off undesirable views of the construction site . Hoarding should be designed to be compatible with the existing urban context. Management of facilities on work sites • To provide proper management of the on-site facilities, control the height and disposition/ arrangement of all facilities on the works site to minimize visual impact to adjacent Visual Sensitive Receivers (VSRs). Tree Transplanting • Trees of high to medium survival rates that would be affected by the works shall be transplanted where possible and practicable. Tree transplanting proposal including the final locations for the transplanted trees shall be submitted separately to seek relevant government department's approval, in accordance with ETWB TCW No 3/2006.	Minimize visual & landscape impact	Contractor	Within Project Site	Construction Stage	√
Construction Dust							
S7.6.5	D1	The contractor shall follow the procedures and requirements given in the Air Pollution Control (Construction Dust) Regulation.	Minimize dust impact at the nearby sensitive receivers	Contractor	All construction sites	Construction stage	√

EIA Ref.	EM&A Log Ref*	Recommended Mitigation Measures	Objectives of the Recommended Measures & Main Concerns to address	Who to implement the measures?	Location of the implementation of measures	When to implement the measures?	Implementation Status
S7.6.5	D2	Mitigation measures in form of regular watering under a good site practice should be adopted. Watering once per hour on exposed worksites and haul roads in the Kowloon area should be conducted to achieve dust removal efficiencies of 91.7%. While the above watering frequencies are to be followed, the extent of watering may vary depending on actual site conditions but should be sufficient to maintain an equivalent intensity of no less than 1.8 l/m^2 to achieve the dust removal efficiency	Minimize dust impact at the nearby sensitive receivers	Contractor	All construction sites	Construction stage	√
S7.6.5	D3	• Proper watering of exposed spoil should be undertaken throughout the construction phase; • Any excavated or stockpile of dusty material should be covered entirely by an impervious sheeting or sprayed with water to maintain an entirely wet surface and then removed or backfilled or reinstated where practicable within 24 hours of the excavation or unloading; • Any dusty materials remaining after a stockpile has been removed should be wetted with water and cleared from the surface of roads; • A stockpile of dusty materials should not be extended beyond the pedestrian barriers, fencing or traffic cones. • The load of dusty materials on a vehicle leaving a construction site should be covered entirely by an impervious	Minimize dust impact at the nearby sensitive receivers	Contractor	All construction sites	Construction stage	<>

EIA Ref.	EM&A Log Ref*	Recommended Mitigation Measures	Objectives of the Recommended Measures & Main Concerns to address	Who to implement the measures?	Location of the implementation of measures	When to implement the measures?	Implementation Status
		sheeting to ensure that the dusty materials do not leak from the vehicle; • Where practicable, vehicle washing facilities with high pressure water jet should be provided at every discernible or designated vehicle exit point. The area where vehicle washing takes place and the road section between the washing facilities and the exit point should be paved with concrete, bituminous materials or hardcores; • When there are open excavation and reinstatement works, hoarding of not less than 2.4m high should be provided and properly maintained as far as practicable along the site boundary with provision for public crossing. Good site practice shall also be adopted by the Contractor to ensure the conditions of the hoardings are properly maintained throughout the construction period; • The portion of any road which leads only to construction site and is within 30m of a vehicle entrance or exit should be kept clear of dusty materials; • Surfaces where any pneumatic or power-driven drilling, cutting, polishing or other mechanical breaking operations take place should be sprayed with water or a dust suppression chemical continuously; • Any area that involves demolition activities should be sprayed with water or					

EIA Ref.	EM&A Log Ref*	Recommended Mitigation Measures	Objectives of the Recommended Measures & Main Concerns to address	Who to implement the measures?	Location of the implementation of measures	When to implement the measures?	Implementation Status
		a dust suppression chemical immediately prior to, during and immediately after the activities so as to maintain an entirely wet surface • Where a scaffolding is erected around the perimeter of a building under construction, effective dust screens, sheeting or netting should be provided to enclose the scaffolding from the ground floor level of the building upward, or a canopy should be provided from the first floor level up to the highest level of the scaffolding; • Any skip hoist for material transport should be totally enclosed by an impervious sheeting; • Every stock of more than 20 bags of cement or dry pulverised fuel ash (PFA) should be covered entirely by an impervious sheeting or placed in an area sheltered on the top and 3 sides; • Cement or dry PFA delivered in bulk should be stored in a closed silo fitted with an audible high level alarm which is interlocked with the material filling line and no overfilling is allowed; • Loading, unloading, transfer, handling or storage of bulk cement or dry PFA should be carried out in a totally enclosed system or facility, and any vent or exhaust should be fitted with an effective fabric filter or equivalent air pollution control system;					

EIA Ref.	EM&A Log Ref*	Recommended Mitigation Measures	Objectives of the Recommended Measures & Main Concerns to address	Who to implement the measures?	Location of the implementation of measures	When to implement the measures?	Implementation Status
		and • Exposed earth should be properly treated by compaction, turfing, hydroseeding, vegetation planting or sealing with latex, vinyl, bitumen, shotcrete or other suitable surface stabiliser within six months after the last construction activity on the construction site or part of the construction site where the exposed earth lies.					
S7.6.5	D6	Implement regular dust monitoring under EM&A programme during the construction stage.	Monitoring of dust impact	Contractor	Selected representative dust monitoring station	Construction stage	√
EP Condition 2.18(a)	D7	Watering once every working hour for active works areas, exposed areas and paved haul roads shall be provided in Kowloon area to keep these active works areas, exposed areas and paved haul roads wet.	Minimize construction dust impact	Contractor	All construction sites	Construction stage	√
EP Condition 2.19	D8	All diesel fuelled construction plant, including marine vessels if possible, used by the contractors within the works areas of the Project shall be powered by ultra low sulphur diesel fuel.	Minimize aerial emissions of sulphur dioxide from construction plant	Contractor	All construction sites	Construction stage	√
Construction Noise (Airborne)							
S8.3.6	N1	Implement the following good site practices: • only well-maintained plant should be operated on-site and plant should be serviced regularly during the construction programme; • machines and plant (such as trucks, cranes) that may be in intermittent use should be shut down between work	Control construction airborne noise	Contractor	All construction sites	Construction stage	√

EIA Ref.	EM&A Log Ref*	Recommended Mitigation Measures	Objectives of the Recommended Measures & Main Concerns to address	Who to implement the measures?	Location of the implementation of measures	When to implement the measures?	Implementation Status
		periods or should be throttled down to a minimum; • plant known to emit noise strongly in one direction, where possible, should be orientated so that the noise is directed away from nearby NSRs; • silencers or mufflers on construction equipment should be properly fitted and maintained during the period of construction works; • mobile plant should be sited as far away from NSRs as possible and practicable; • material stockpiles, mobile container site office and other structures should be effectively utilised, where practicable, to screen noise from on-site construction activities.					
S8.3.6	N2	Install temporary hoarding located on the site boundaries between noisy construction activities and NSRs. The conditions of the hoardings shall be properly maintained throughout the construction period.	Reduce the construction noise levels at low-level zone of NSRs through partial screening.	Contractor	All construction sites	Construction stage	<>
S8.3.6	N3	Install movable noise barriers (typical design is wooden framed barrier with a small-cantilevered on a skid footing with 25mm thick internal sound absorptive lining), acoustic mat or full enclosure, screen the noisy plants including air compressor, generators and saw.	Screen the noisy plant items to be used at all construction sites	Contractor	All construction sites where practicable	Construction stage	√
S8.3.6	N4	Use "Quiet plants"	Reduce the noise levels of plant items	Contractor	All construction sites where practicable	Construction stage	√
S8.3.6	N5	Sequencing operation of construction plants	Operate sequentially within	Contractor	Contractor All	Construction stage	√

EIA Ref.	EM&A Log Ref*	Recommended Mitigation Measures	Objectives of the Recommended Measures & Main Concerns to address	Who to implement the measures?	Location of the implementation of measures	When to implement the measures?	Implementation Status
		where practicable.	the same work site to reduce the construction airborne noise		construction sites where practicable		
S8.3.6	N6	Implement noise monitoring under EM&A programme.	Monitor the construction noise levels at the selected representative locations	Contractor	Selected representative noise monitoring station	Construction stage	√
Water Quality							
S10.7.1	W1	In accordance with the Practice Noise for Professional Persons on Construction Site Drainage, Environmental Protection Department, 1994 (ProPECC PN1/94), construction phase mitigation measures shall include the following: <u>Construction Runoffs and Site Drainage</u> • At the start of the site establishment, perimeter cut-off drains to direct off-site water around the site should be constructed with internal drainage works and erosion and sedimentation control facilities implemented. Channels (both temporary and permanent drainage pipes and culverts), earth bunds or sand bag barriers should be provided on site to direct stormwater to silt removal facilities. The design of the temporary on-site drainage system will be undertaken by the Contractor prior to the commencement of construction. • The dikes or embankments for flood protection should be implemented around the boundaries of earthwork areas. Temporary ditches should be provided to	To minimize water quality impact from construction site runoffs and general construction activities	Contractor	All construction sites where practicable	Construction stage	√

EIA Ref.	EM&A Log Ref*	Recommended Mitigation Measures	Objectives of the Recommended Measures & Main Concerns to address	Who to implement the measures?	Location of the implementation of measures	When to implement the measures?	Implementation Status
		facilitate the runoff discharge into an appropriate watercourse, through a site/sediment trap. The sediment/silt traps should be incorporated in the permanent drainage channels to enhance deposition rates. • The design of efficient silt removal facilities should be based on the guidelines in Appendix A1 of ProPECC PN 1/94, which states that the retention time for silt/sand traps should be 5 minutes under maximum flow conditions. Sizes may vary depending upon the flow rate, but for a flow rate of 0.1 m^3/s, a sedimentation basin of $30m^3$ would be required and for a flow rate of 0.5 m^3/s the basin would be 150 m^3. The detailed design of the sand/silt traps shall be undertaken by the Contractor prior to the commencement of construction. • All exposed earth areas should be completed and vegetated as soon as possible after earthworks have been completed, and definitely, within 14 days of the cessation of earthworks where practicable. Exposed slope surfaces should be covered by tarpaulin or other means. • The overall slope of the site should be kept to a minimum to reduce the erosive potential of surface water flows, and all traffic areas and access roads protected by					

EIA Ref.	EM&A Log Ref*	Recommended Mitigation Measures	Objectives of the Recommended Measures & Main Concerns to address	Who to implement the measures?	Location of the implementation of measures	When to implement the measures?	Implementation Status
		coarse stone ballast. An additional advantage from the use of crushed stone is the positive traction gained during prolonged periods of inclement weather and the reduction of surface sheet flows. • All drainage facilities and erosion and sediment control structures should be regularly inspected and maintained to ensure proper and efficient operations at all times and particularly following rainstorms. Deposited silts and grits should be removed regularly and disposed of by spreading them evenly over stable, vegetated areas. • Measures should be taken to minimise the ingress of site drainage into excavations. If the excavation of trenches in wet periods is necessary, trenches should be dug and backfilled in short sections wherever practicable. Water pumped out from trenches or foundation excavations should be discharged into storm drains via silt removal facilities. • Open stockpiles of construction materials (for example, aggregates, sand and fill material) of more than 50m^3 should be covered with tarpaulin or similar fabric during rainstorms. Measures should be taken to prevent the washing away of construction materials, soil, silt or debris into any drainage system. • Manholes (including newly constructed					

EIA Ref.	EM&A Log Ref*	Recommended Mitigation Measures	Objectives of the Recommended Measures & Main Concerns to address	Who to implement the measures?	Location of the implementation of measures	When to implement the measures?	Implementation Status
		ones) should always be adequately covered and temporarily sealed so as to prevent silt, construction materials or debris being washed into the drainage system and storm runoff being directed into foul sewers. • Precautions should be taken at any time of year when rainstorms are likely. Actions to be taken when a rainstorm is imminent or forecasted, and actions to be taken during or after rainstorms are summarised in Appendix A2 of ProPECC PN 1/94. Particular attention should be paid to the control of silty surface runoffs during storm events, especially for areas located near steep slopes. • All vehicles and plant should be cleaned before leaving a construction site to ensure that no earth, mud, debris and the like is deposited by them on roads. An adequately designed and sited wheel washing facilities should be provided at every construction site exit where practicable. Wash-water should have sand and silt settled out and removed at least on a weekly basis to ensure the continued efficiency of the process. The section of access road leading to, and exiting from, the wheel-wash bay to the public road should be paved with sufficient backfall toward the wheel-wash bay to prevent vehicle tracking of soil and					

EIA Ref.	EM&A Log Ref*	Recommended Mitigation Measures	Objectives of the Recommended Measures & Main Concerns to address	Who to implement the measures?	Location of the implementation of measures	When to implement the measures?	Implementation Status
		silty water to public roads and drains. • Oil interceptors should be provided in the drainage system downstream of any oil/fuel pollution sources. The oil interceptors should be emptied and cleaned regularly to prevent the release of oil and grease into the storm water drainage system after accidental spillage. A bypass should be provided for the oil interceptors to prevent flushing during heavy rain. • Construction solid waste, debris and rubbish on site should be collected, handled and disposed of properly to avoid water quality impacts. • All fuel tanks and storage areas should be provided with locks and sited in sealed areas, within bunds of a capacity equal to 110% of the storage capacity of the largest tank to prevent spilled fuel oils from reaching nearby water sensitive receivers. • All the earth works should be conducted sequentially to limit the amount of construction runoffs generated from exposed areas during the wet season (April to September) as far as practicable. • Adopt best management practices					
S10.7.1	W2	<u>Tunnelling Works</u> • Uncontaminated discharge should pass through sedimentation tanks prior to off-site discharge. • The wastewater with a high concentration	To minimize construction water quality impact from tunnelling works	Contractor	All tunnelling portion	Construction stage	N/A

EIA Ref.	EM&A Log Ref*	Recommended Mitigation Measures	Objectives of the Recommended Measures & Main Concerns to address	Who to implement the measures?	Location of the implementation of measures	When to implement the measures?	Implementation Status
		of suspended solids should be treated (e.g. by sedimentation tanks with sufficient retention time) before discharge. Oil interceptors would also be required to remove oil, lubricants and grease from the wastewater. • Direct discharge of the bentonite slurry (as a result of D-wall and bored tunnelling construction) is not allowed. The slurry should be reconditioned and reused wherever practicable. Temporary storage locations (typically a properly closed warehouse) should be provided on site for any unused bentonite that needs to be transported away after all the related construction activities have been completed. The requirements in ProPECC PN 1/94 should be adhered to in the handling and disposal of bentonite slurries.					
S10.7.1	W3	<u>Sewage Effluent</u> Portable chemical toilets and sewage holding tanks are recommended for handling the construction sewage generated by the workforce. A licensed contractor should be employed to provide appropriate and adequate portable toilets and be responsible for their appropriate disposal and maintenance.	To minimize water quality from sewage effluent	Contractor	All construction sites where practicable	Construction stage	√
S10.7.1	W4	<u>Groundwater from Contaminated Area in case contamination is found:</u> • No direct discharge of groundwater from	To minimize groundwater quality impact from contaminated area	Contractor	Excavation areas where contamination is found.	Construction stage	N/A

EIA Ref.	EM&A Log Ref*	Recommended Mitigation Measures	Objectives of the Recommended Measures & Main Concerns to address	Who to implement the measures?	Location of the implementation of measures	When to implement the measures?	Implementation Status
		contaminated areas is allowed. Prior to the excavation works within potentially contaminated areas, the groundwater quality should be reviewed with reference to the site investigation data in the EIA report for compliance and the Technical Memorandum on Standards for Effluents Discharged into Drainage on Sewerage Systems, Inland and Coastal Waters (TM-Water). The existence of prohibited substance should be confirmed. The review results should be submitted to EPD for examination if the review results indicate that the groundwater to be generated from the excavation works would be contaminated. The contaminated groundwater should be either properly treated in compliance with the requirements of the TM-Water or properly recharged into the ground. • If wastewater treatment is deployed, the wastewater treatment unit shall deploy suitable treatment process (e.g. oil interceptor / activated carbon) to reduce the pollution level to an acceptable standard and remove any prohibited substances (e.g. total petroleum hydrocarbon (TPH)) to undetectable range. All treated effluent from the wastewater treatment plant shall meet the requirements as stated in TM Water and should be discharged into the foul sewers.					

EIA Ref.	EM&A Log Ref*	Recommended Mitigation Measures	Objectives of the Recommended Measures & Main Concerns to address	Who to implement the measures?	Location of the implementation of measures	When to implement the measures?	Implementation Status
		• If groundwater recharging wells are deployed, recharging wells should be installed as appropriate for recharging the contaminated groundwater back into the ground. The recharging wells should be selected at places where the groundwater quality will not be affected by the recharge operation as indicated in the Section 2.3 of TM-Water. The baseline groundwater quality shall be determined prior to the selection of the recharge wells. It is necessary to submit a working plan (including the laboratory analytical results showing the quality of groundwater at the proposed recharge location(s) as well as the pollutant levels of groundwater to be recharged) to EPD for agreement. Pollution levels of groundwater to be recharged shall not be higher than the pollutant levels of ambient groundwater at the recharge well. Prior to recharge, any prohibited substances such as TPH products should be removed as necessary by installing the petrol interceptor. The Contractor should apply for a discharge licence under the Water Pollution Control Ordinance (WPCO) through the Regional Office of EPD for groundwater recharge operation or discharge of treated groundwater.					
S10.7.1	W7	In order to prevent accidental spillage of chemicals, the following is recommended:	To minimize water quality impact from accidental	Contractor	All construction sites where practicable	Construction stage	<>

EIA Ref.	EM&A Log Ref*	Recommended Mitigation Measures	Objectives of the Recommended Measures & Main Concerns to address	Who to implement the measures?	Location of the implementation of measures	When to implement the measures?	Implementation Status
		• All the tanks, containers, storage area should be bunded and the locations should be locked as far as possible from the sensitive watercourse and stormwater drains. • The Contractor should register as a chemical waste producer if chemical wastes would be generated. Storage of chemical waste arising from the construction activities should be stored with suitable labels and warnings. • Disposal of chemical wastes should be conducted in compliance with the requirements as stated in the Waste disposal (Chemical Waste) (General) Regulation.	spillage				
Waste Management (Construction Waste)							
S11.4.1.1	WM1	<u>On-site sorting of C&D (Construction and Demolition) material</u> • Geological assessment should be carried out by competent persons on site during excavation to identify materials which are not suitable to use as aggregate in structural concrete (e.g. volcanic rock, Aplite dyke rock, etc). Volcanic rock and Aplite dyke rock should be separated at the source sites as far as practicable and stored in the designated stockpile areas avoiding delivering them to crushing facilities. The crushing plant operator should also be reminded to set up measures to prevent unsuitable rock from	Separation of unsuitable rock from ending up at Concrete batching plants and be turned into concrete for structural use	Contractor	All construction sites	Construction stage	√

EIA Ref.	EM&A Log Ref*	Recommended Mitigation Measures	Objectives of the Recommended Measures & Main Concerns to address	Who to implement the measures?	Location of the implementation of measures	When to implement the measures?	Implementation Status
		being ended up at concrete batching plants and turned into concrete for structural use. Details regarding control measures at source sites and crushing facilities should be submitted by the Contractors for the Engineer to review and agree. In addition, site records should also be kept for the types of rock materials excavated. The traceability of delivery will be ensured via the implementation of Trip Ticket System and enforcement by site supervisory staff as stipulated under DEVB TC(W) No. 6/2010 for tracking of the correct delivery to the rock crushing facilities for processing into aggregates. Alternative disposal option for the reuse of volcanic rock and Aplite Dyke rock, etc should also be explored.					
S11.5.1	WM2	<u>Construction and Demolition (C&D) Material</u> • Maintain temporary stockpiles and reuse excavated fill material for backfilling and reinstatement; • Carry out on-site sorting; • Make provisions in the Contract documents to allow and promote the use of recycled aggregates where appropriate; • Adopt 'Selective Demolition' technique to demolish the existing structures and facilities with a view to recovering broken concrete effectively for recycling purpose, where possible;	Good site practice to minimize waste generation and recycle C&D materials as far as practicable so as to reduce the amount for final disposal	Contractor	All construction sites	Construction stage	√

EIA Ref.	EM&A Log Ref*	Recommended Mitigation Measures	Objectives of the Recommended Measures & Main Concerns to address	Who to implement the measures?	Location of the implementation of measures	When to implement the measures?	Implementation Status
		• Implement a trip-ticket system for each works contract to ensure that the disposal of C&D materials are properly documented and verified; • Implement an enhanced Waste management Plan similar to ETWBTC (Works) No. 19/2005 – "Environmental Management on Construction Sites" to encourage on-site sorting of C&D materials and minimize waste generation during the course of construction. • Disposal of the C&D materials to any sensitive locations such as agricultural lands, etc. should be avoided. The Contractor shall propose the final disposal sites to the Project Proponent and get his approval before implementation					
S11.5.1	WM3	<u>C&D Waste</u> • Standard formwork or pre-fabrication should be used as far as practicable in order to minimise the arising of C&D materials. The use of more durable formwork or plastic facing for the construction works should be considered. Use of wooden hoardings should not be used. Metal hoarding should be used to enhance the possibility of recycling. The purchase of construction materials will be carefully planned in order to avoid over ordering and wastage. • The Contractor should recycle as much of the C&D materials as possible on-site.	Good site practice to minimize waste generation and recycle C&D materials as far as practicable so as to reduce the amount for final disposal	Contractor	All construction sites	Construction stage	√

EIA Ref.	EM&A Log Ref*	Recommended Mitigation Measures	Objectives of the Recommended Measures & Main Concerns to address	Who to implement the measures?	Location of the implementation of measures	When to implement the measures?	Implementation Status
		Public fill and C&D waste should be segregated and stored in different containers or skips to enhance reuse or recycling of materials and their proper disposal. Where practicable, concrete and masonry can be crushed and used as fill. Steel reinforcement bar can be used by scrap steel mills. Different areas of the sites should be considered for such segregation and storage.					
S11.5.1	WM4	<u>General Refuse</u> • General refuse generated on-site should be stored in enclosed bins or compaction units separately from construction and chemical wastes. • A reputable waste collector should be employed by the Contractor to remove general refuse from the site, separately from construction and chemical wastes, on a daily basis to minimize odour, pest and litter impacts. Burning of refuse on construction sites is prohibited by law. • Aluminium cans are often recovered from the waste stream by individual collectors if they are segregated and made easily accessible. Separate labelled bins for their deposit should be provided if feasible. • Office wastes can be reduced through the recycling of paper if volumes are large enough to warrant collection. Participation in a local collection scheme	Minimize the production of general refuse and minimise odour, pest and litter impacts	Contractor	All construction sites	Construction stage	√

EIA Ref.	EM&A Log Ref*	Recommended Mitigation Measures	Objectives of the Recommended Measures & Main Concerns to address	Who to implement the measures?	Location of the implementation of measures	When to implement the measures?	Implementation Status
		should be considered by the Contractor.					
S11.5.1	WM7	Chemical Waste • Chemical waste as defined by Schedule 1 of the Waste Disposal (Chemical Waste) (General) Regulation, that is produced should be handled in accordance with the Code of Practice on the Packaging, Labelling and Storage of Chemical Wastes. • Containers used for the storage of chemical wastes should be suitable for the substance they are holding, resistant to corrosion, maintained in a good condition, and securely closed. They should have a capacity of less than 450 litres unless the specification has been approved by the EPD. A label in English and Chinese should be displayed in accordance with instructions prescribed in Schedule 2 of the regulation. • The storage area for chemical wastes should be clearly labelled and used solely for the storage of chemical waste; enclosed on at least 3 sides. It should also have an impermeable floor and bunding of sufficient capacity to accommodate 110% of the volume of the largest container or 20 % of the total volume of waste stored in that area, whichever is the greatest. It should have adequate ventilation and be covered to prevent rainfall entering; and arranged so that incompatible materials are adequately separated.	Control the chemical waste and ensure proper storage, handling and disposal.	Contractor	All construction sites	Construction stage	<>

EIA Ref.	EM&A Log Ref*	Recommended Mitigation Measures	Objectives of the Recommended Measures & Main Concerns to address	Who to implement the measures?	Location of the implementation of measures	When to implement the measures?	Implementation Status
		• Disposal of chemical waste should be via a licensed waste collector; to a facility licensed to receive chemical waste, such as the Chemical Waste Treatment Centre (which also offers a chemical waste collection service and can supply the necessary storage containers); or to a reuser of the waste, under the approval from the EPD.					

Annex I - 1

Regular Noise Monitoring Results

Annex I-1 Regular Noise Monitoring Results

Station NMS-CA-6 No. 16-23 Nam Kok Road

Date	Start Time	End Time	Weather	Measured Noise level (dB(A)), L_{Aeq}(30 min)	Baseline (dB(A)), L_{Aeq}(30 min)	Corrected LAeq(dBA) [(a)]	Major Construction Noise Source(s) Observed	Other Noise Source(s) Observed	Temp. (°C)	Wind Speed (m/s)	Noise Meter Model / ID	Calibrator Model / ID
4-Sep-13	14:40	15:10	Cloudy	64.1	76.1	-(b)	-	Traffic noise	23.0	0.5	NL-18 00360030	NC-73 10997142
10-Sep-13	11:00	11:30	Fine	64.8	76.1	-(b)	-	Traffic noise	28.0	0.5	NL-18 00360030	NC-73 10997142
16-Sep-13	10:55	11:25	Fine	64.5	76.1	-(b)	-	Traffic noise	28.0	1.5	NL-18 00360030	NC-73 10997142
27-Sep-13	10:50	11:20	Sunny	64.1	76.1	-(b)	-	Traffic noise	26.0	0.5	NL-18 00360030	NC-73 10997142

Station NMS-CA-7 Skytower Tower 2

Date	Start Time	End Time	Weather	Measured Noise level (dB(A)), L_{Aeq}(30 min)	Baseline (dB(A)), L_{Aeq}(30 min)	Corrected LAeq(dBA) [(a)]	Major Construction Noise Source(s) Observed	Other Noise Source(s) Observed	Temp. (°C)	Wind Speed (m/s)	Noise Meter Model / ID	Calibrator Model / ID
4-Sep-13	13:50	14:20	Cloudy	68.0	70.0	-(b)	-	Traffic noise	23.0	0.5	NL-18 00360030	NC-73 10997142
10-Sep-13	10:00	10:30	Fine	68.2	70.0	-(b)	-	Traffic noise	28.0	0.5	NL-18 00360030	NC-73 10997142
16-Sep-13	9:55	10:25	Fine	67.7	70.0	-(b)	-	Traffic noise	28.0	1.8	NL-18 00360030	NC-73 10997142
27-Sep-13	9:47	10:17	Sunny	67.7	70.0	-(b)	-	Traffic noise	26.0	0.5	NL-18 00360030	NC-73 10997142

Station NMS-CA-8 SKH Good Shepherd Primary School

Date	Start Time	End Time	Weather	Measured Noise level (dB(A)), L_{Aeq}(30 min)	Baseline (dB(A)), L_{Aeq}(30 min)	Corrected LAeq(dBA) [(a)]	Major Construction Noise Source(s) Observed	Other Noise Source(s) Observed	Temp. (°C)	Wind Speed (m/s)	Noise Meter Model / ID	Calibrator Model / ID
4-Sep-13	15:42	16:12	Cloudy	76.3	75.4	69.0	Crane Operation,	Traffic noise	23.0	0.5	NL-31 00983400	NC-73 10997142
10-Sep-13	9:14	9:44	Fine	77.7	75.4	73.8	Crane Operation,	Traffic noise	28.0	0.5	NL-31 00983400	NC-73 10997142
16-Sep-13	8:25	8:55	Fine	75.1	75.4	-(b)	Backhole, crane operation, hand held	Traffic noise	28.0	0.5	NL-31 00983400	NC-73 10997142
27-Sep-13	11:39	12:09	Sunny	75.4	75.4	-(b)	Backhole, crane operation, hand held	Traffic noise	26.0	0.5	NL-31 00983400	NC-73 10997142

Station NMS-CA-9 Kong Yiu Mansion

Date	Start Time	End Time	Weather	Measured Noise level (dB(A)), L_{Aeq}(30 min)	Baseline (dB(A)), L_{Aeq}(30 min)	Corrected LAeq(dBA) [a]	Major Construction Noise Source(s) Observed	Other Noise Source(s) Observed	Temp. (℃)	Wind Speed (m/s)	Noise Meter Model / ID	Calibrator Model / ID
4-Sep-13	11:00	11:30	Rainy	75.0	69.2	73.7	Crane Operation and backhole	Traffic noise	23.0	0.5	NL-18 00360030	NC-73 10997142
10-Sep-13	7:55	8:25	Sunny	73.7	69.2	71.8	Crane Operation	Traffic noise	28.0	0.5	NL-18 00360030	NC-73 10997142
16-Sep-13	8:00	8:30	Fine	75.6	69.2	74.5	Crane Operation	Traffic noise	28.0	0.5	NL-18 00360030	NC-73 10997142
27-Sep-13	8:00	8:30	Sunny	74.8	69.2	73.4	Crane Operation	Traffic noise	26.0	0.8	NL-18 00360030	NC-73 10997142

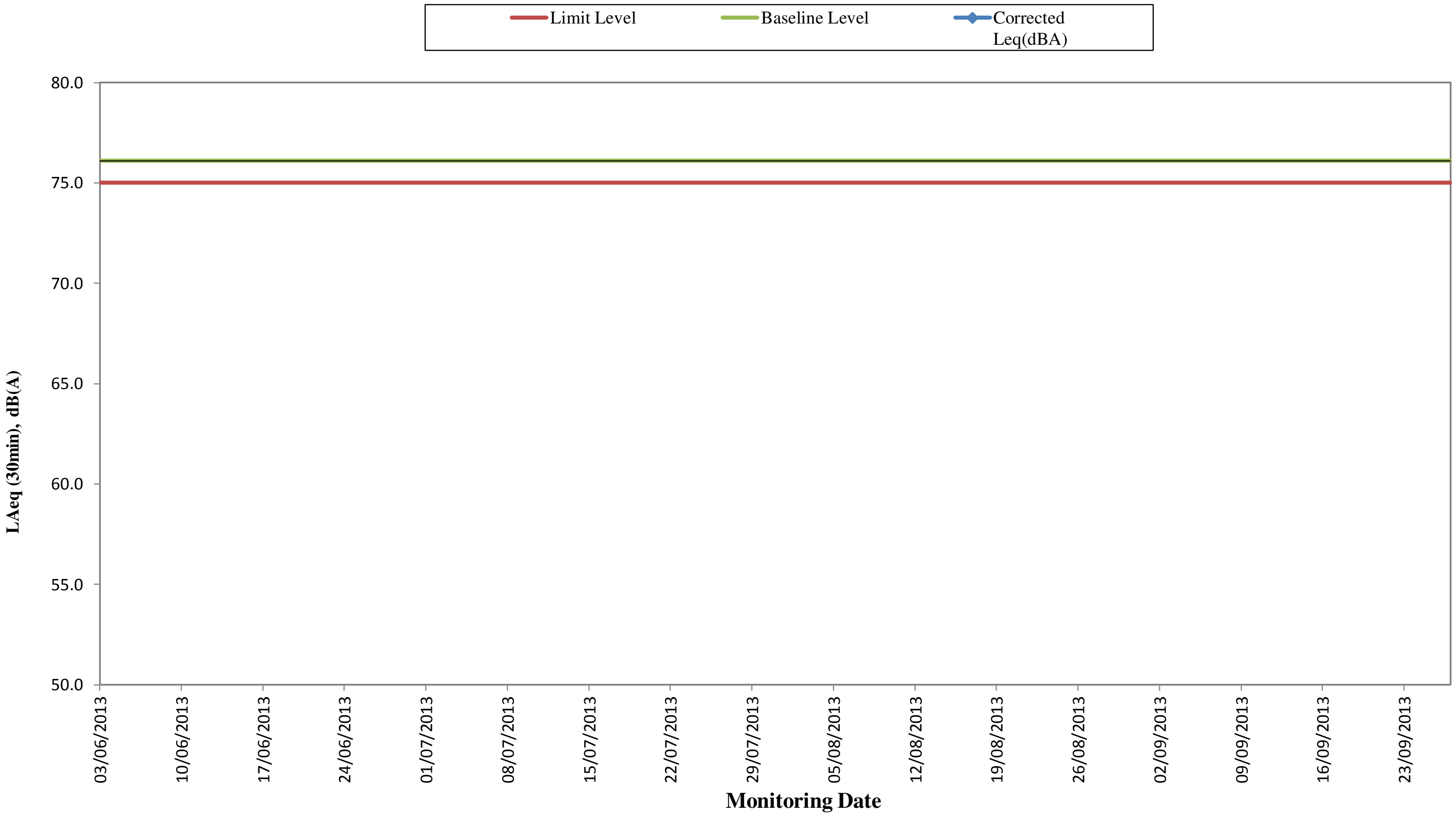
Station NMS-CA-10 Chat Ma Mansion

Date	Start Time	End Time	Weather	Measured Noise level (dB(A)), L_{Aeq}(30 min)[c]	Baseline (dB(A)), L_{Aeq}(30 min)	Corrected LAeq(dBA) [a]	Major Construction Noise Source(s) Observed	Other Noise Source(s) Observed	Temp. (℃)	Wind Speed (m/s)	Noise Meter Model / ID	Calibrator Model / ID
4-Sep-13	13:30	14:00	Rainy	76.7	76.6	60.3	Backhole	Traffic noise	23.0	0.5	NL-18 00360030	NC-73 10997142
10-Sep-13	8:39	9:09	Fine	76.9	76.6	65.1	Backhole	Traffic noise	28.0	0.5	NL-18 00360030	NC-73 10997142
16-Sep-13	8:40	9:10	Fine	76.9	76.6	65.1	Backhole	Traffic noise	28.0	1.5	NL-18 00360030	NC-73 10997142
27-Sep-13	8:42	9:12	Sunny	76.7	76.6	60.3	Backhole	Traffic noise	26.0	0.5	NL-18 00360030	NC-73 10997142

Remarks:

(a) The Measured LAeq is corrected against the corresponding Baseline Level.
(b) No correction was made as the measured noise levels were equal to or below the baseline noise levels.
(c) The noise monitoring results of the measurements carried out at NMS-CA-9 on 16 September, at NMS-CA-10 on 4, 10, 16 and 27 September are higher than the daytime construction noise criterion. However, the results are not considered as exceedance as they are below the limit level after deducting the baseline noise level.

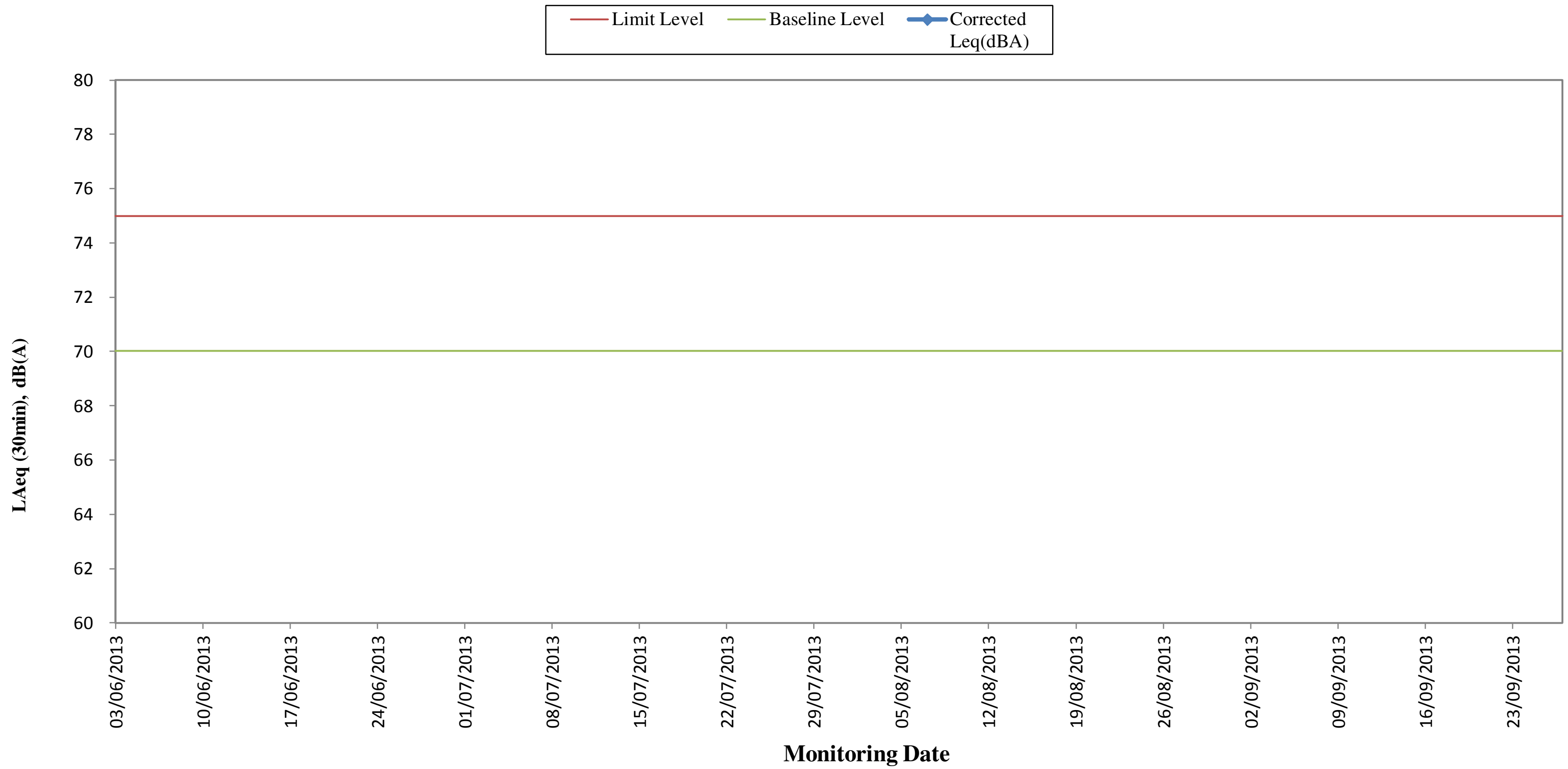
Regular Noise Monitoring Results at NMS-CA-6 (No. 16-23 Nam Kok Road) (LAeq, 30min) for the Past 4 Months



Remarks:

- For those corrected noise levels that are not shown in this graph, the measured noise level s are below baseline level.

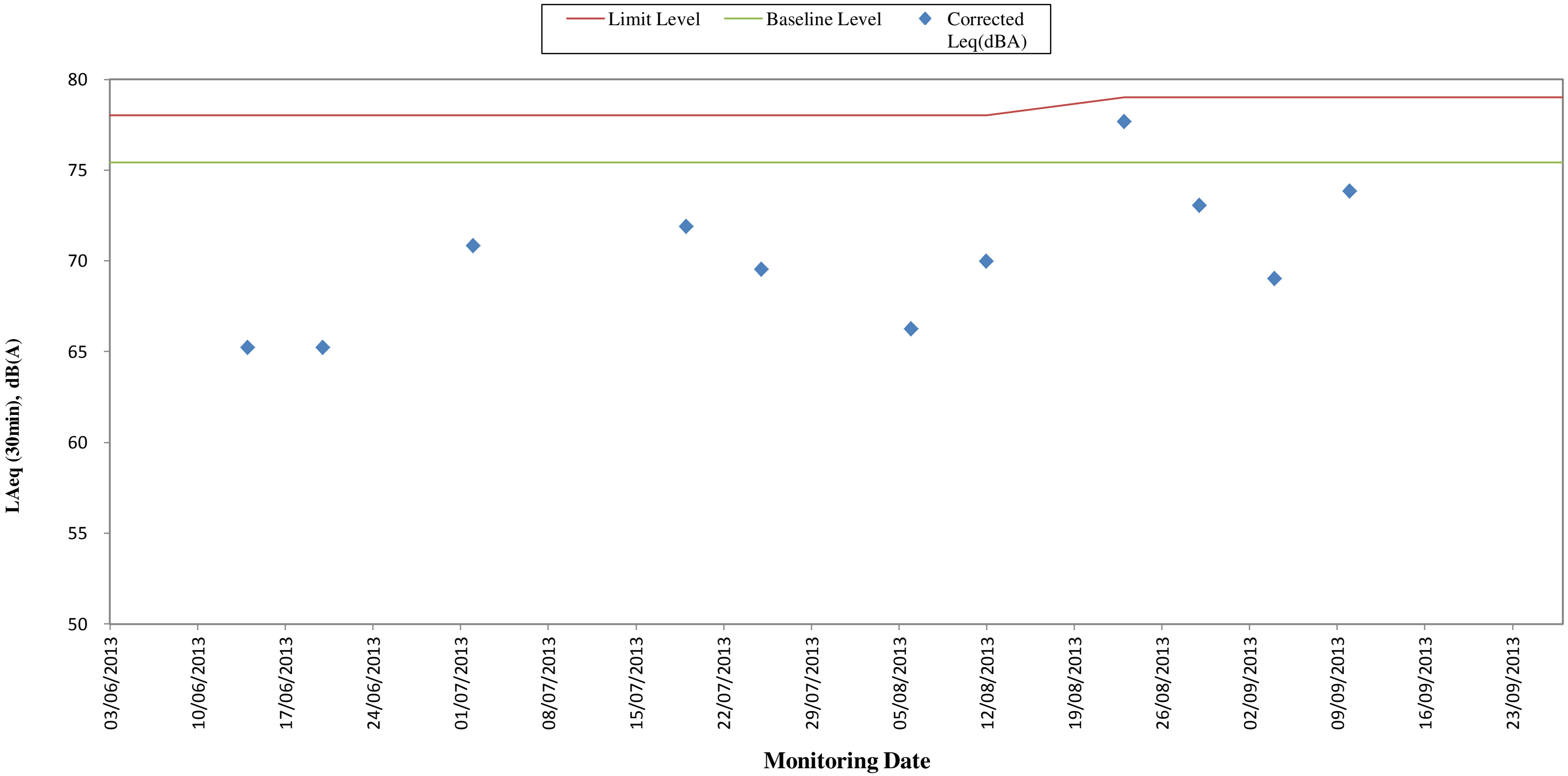
Regular Noise Monitoring Results at NMS-CA-7 (Skytower Tower 2) (LAeq, 30min) for the Past 4 Months



Remarks:

- For those corrected noise levels that are not shown in this graph, the measured noise level s are below baseline level.

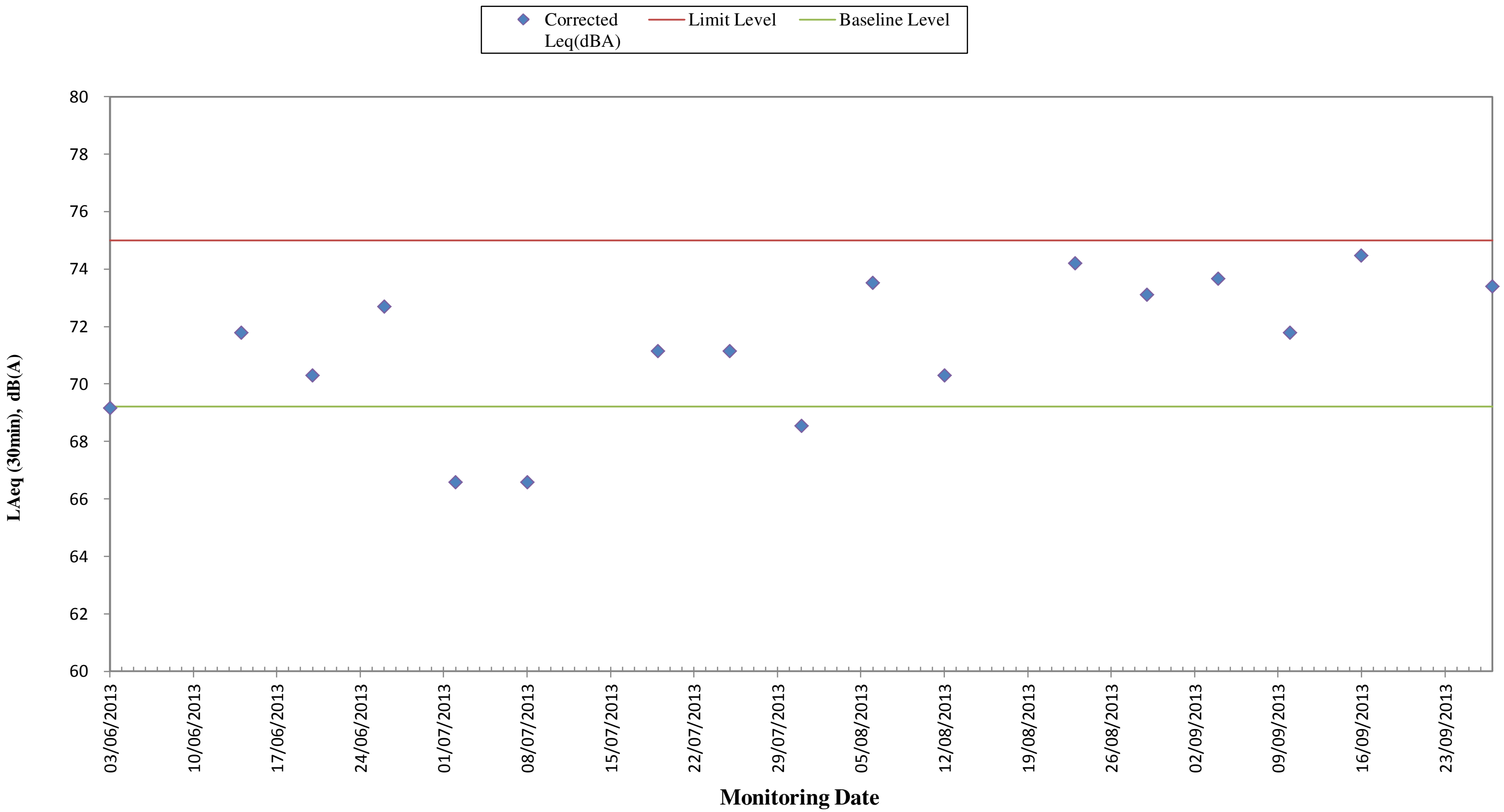
Regular Noise Monitoring Results at NMS-CA- 8 (SKH Good Shepherd Primary School) (LAeq, 30min) for the Past 4 Months



Remarks:

- For those corrected noise levels that are not shown in this graph, the measured noise level s are below baseline level.
- The limit level was updated from78dB(A) to 79 dB(A) on 22 Aug 2013 as per the latest CNMP and CNMMP.

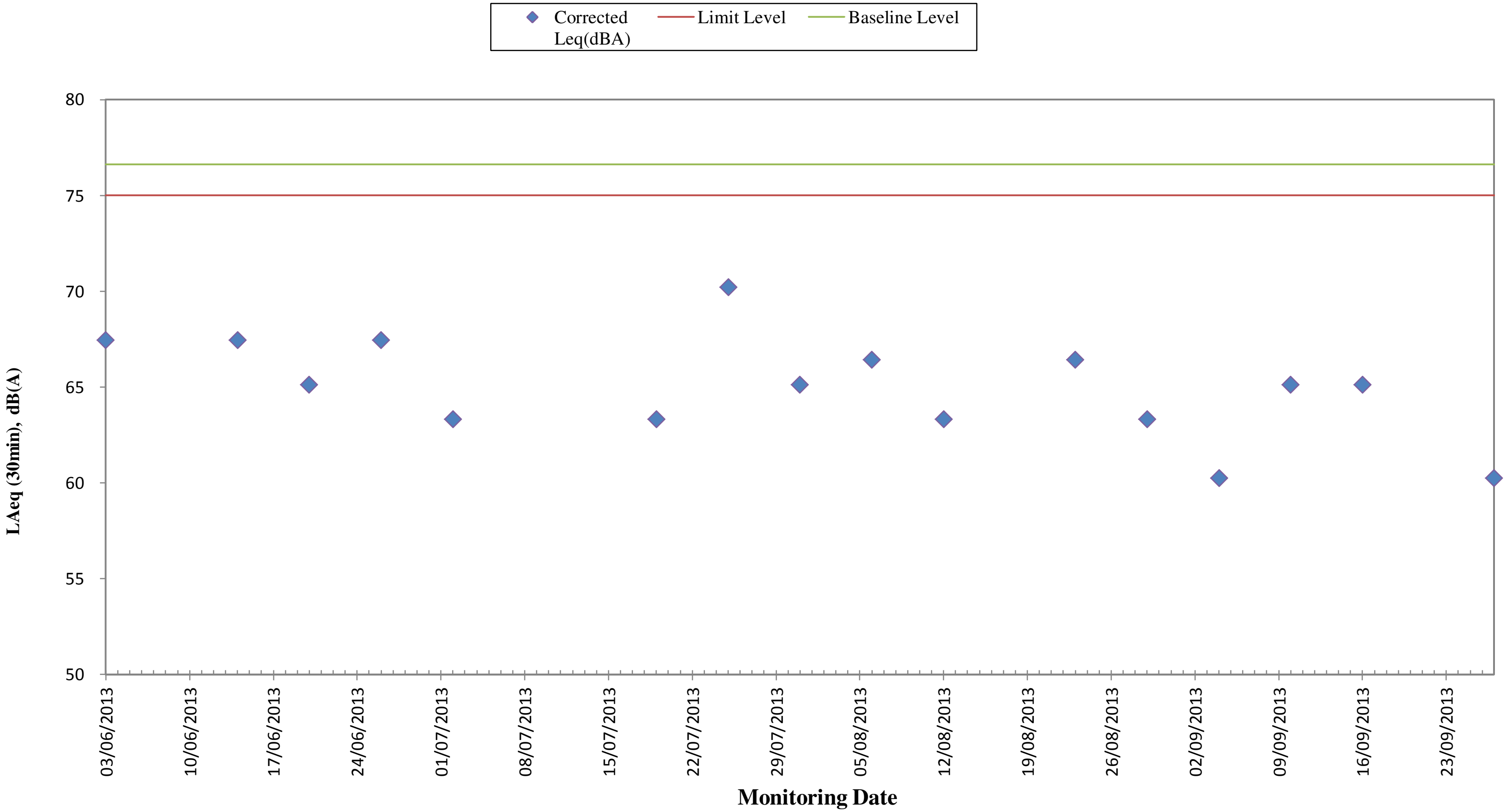
Regular Noise Monitoring Results at NMS-CA-9 (Kong Yiu Mansion) (LAeq, 30min)) for the Past 4 Months



Remarks:

- For those corrected noise levels that are not shown in this graph, the measured noise level s are below baseline level.

Regular Noise Monitoring Results at NMS-CA-10 (Chat Ma Mansion) (LAeq, 30min) for the Past 4 Months



Remarks:
- For those corrected noise levels that are not shown in this graph, the measured noise level s are below baseline level.

Annex I - 2

Continuous Noise Monitoring Results

Location ID	Name	Year (YYYY)	Month (MM)	Date (DD)	Hour (HH)	Minutes (MM)	Measured LAeq,30mins	Baseline Level (LAeq, 30mins)	Corrected Results (dB(A)) (LAeq, 30mins)	Action/Limit Level (as in CNMP)	Exceedance
MTW-16-1	SKH Good Shepherd Primary School	2013	9	2	7	0	74.2	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	2	7	30	74	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	2	8	0	75	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	2	8	30	75.1	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	2	9	0	75.1	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	2	9	30	75.1	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	2	10	0	74.8	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	2	16	12	75.1	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	2	16	42	74.5	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	2	17	12	75	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	2	17	42	76.7	75.4	70.8	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	2	18	12	74.2	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	2	18	42	73.1	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	2	19	12	73.7	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	3	6	42	74.1	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	3	7	12	74.8	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	3	7	42	75.2	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	3	8	12	75.9	75.4	66.3	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	3	8	42	76.5	75.4	70.0	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	3	9	12	75.2	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	3	9	42	75	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	3	10	12	75.1	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	3	10	42	74.7	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	3	11	12	74.8	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	3	11	42	74.3	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	3	12	12	73.4	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	3	12	42	73.5	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	3	13	12	74.8	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	3	13	42	75.4	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	3	14	12	76.1	75.4	67.8	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	3	14	42	76.8	75.4	71.2	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	3	15	12	78.3	75.4	75.2	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	3	15	42	78.7	75.4	76.0	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	3	16	12	78.6	75.4	75.8	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	3	16	42	77	75.4	71.9	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	3	17	12	76.2	75.4	68.5	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	3	17	42	75.1	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	3	18	12	75.5	75.4	59.1	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	3	18	42	74.1	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	3	19	12	74	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	4	6	42	74.4	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	4	7	12	77.3	75.4	72.8	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	4	7	42	74.2	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	4	8	12	76.3	75.4	69.0	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	4	8	42	78.1	75.4	74.8	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	4	9	12	77.3	75.4	72.8	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	4	9	42	77.9	75.4	74.3	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	4	10	12	77	75.4	71.9	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	4	10	42	76.4	75.4	69.5	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	4	11	12	75.9	75.4	66.3	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	4	11	42	76.2	75.4	68.5	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	4	12	12	73.3	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	4	12	42	74.2	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	4	13	12	77.2	75.4	72.5	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	4	13	42	76.9	75.4	71.6	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	4	14	12	76.2	75.4	68.5	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	4	14	42	75	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	4	15	12	77.2	75.4	72.5	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	4	15	42	76.3	75.4	69.0	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	4	16	12	74.2	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	4	16	42	73.9	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	4	17	12	77.1	75.4	72.2	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	4	17	42	74.1	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	4	18	12	73.3	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	4	18	42	73.7	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	4	19	12	73.7	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	5	6	42	73.8	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	5	7	12	74.2	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	5	7	42	74.7	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	5	8	12	77.2	75.4	72.5	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	5	8	42	77.7	75.4	73.8	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	5	9	12	77.2	75.4	72.5	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	5	9	42	77.1	75.4	72.2	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	5	10	12	76.3	75.4	69.0	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	5	10	42	76.3	75.4	69.0	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	5	11	12	76.9	75.4	71.6	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	5	11	42	76	75.4	67.1	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	5	12	12	74.1	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	5	12	42	73.7	75.4	<Baseline Level	79	N

Location ID	Name	Year (YYYY)	Month (MM)	Date (DD)	Hour (HH)	Minutes (MM)	Measured LAeq,30mins	Baseline Level (LAeq, 30mins)	Corrected Results (dB(A)) (LAeq, 30mins)	Action/Limit Level (as in CNMP)	Exceedance
MTW-16-1	SKH Good Shepherd Primary School	2013	9	5	13	12	78.1	75.4	74.8	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	5	13	42	78.1	75.4	74.8	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	5	14	12	75.8	75.4	65.2	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	5	14	42	77.9	75.4	74.3	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	5	15	16	76.1	75.4	67.8	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	5	15	46	75.9	75.4	66.3	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	5	16	16	76.6	75.4	70.4	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	5	16	46	76	75.4	67.1	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	5	17	16	75.6	75.4	62.1	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	5	17	46	73.3	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	5	18	16	73.6	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	5	18	46	74	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	5	19	16	74	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	6	6	46	74	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	6	7	16	74.3	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	6	7	46	74.8	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	6	8	16	75.9	75.4	66.3	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	6	8	46	75.5	75.4	59.1	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	6	9	16	75.6	75.4	62.1	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	6	9	46	75	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	6	10	16	75.3	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	6	10	46	75.4	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	6	11	16	75.3	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	6	11	46	76.2	75.4	68.5	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	6	12	16	74.7	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	6	12	46	73.2	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	6	13	16	74.7	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	6	13	46	75.3	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	6	14	16	75	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	6	14	46	75.6	75.4	62.1	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	6	15	16	74.1	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	6	15	46	73.3	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	6	16	16	74.5	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	6	16	46	75.8	75.4	65.2	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	6	17	16	73.8	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	6	17	46	73.4	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	6	18	16	73.2	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	6	18	46	74	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	6	19	16	73.5	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	7	6	46	73.5	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	7	7	16	74.7	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	7	7	46	75	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	7	8	16	75.4	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	7	8	46	78	75.4	74.5	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	7	9	16	77.4	75.4	73.1	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	7	9	46	75.7	75.4	63.9	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	7	10	16	77.3	75.4	72.8	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	7	10	46	79.1	75.4	76.7	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	7	11	16	74.7	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	7	11	46	72.8	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	7	12	16	73.7	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	7	12	46	74.5	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	7	13	16	76.2	75.4	68.5	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	7	13	46	76.9	75.4	71.6	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	7	14	16	77.8	75.4	74.1	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	7	14	46	75.3	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	7	15	16	76.6	75.4	70.4	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	7	15	46	76.1	75.4	67.8	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	7	16	16	75.4	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	7	16	46	74.8	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	7	17	16	75.2	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	7	17	46	75.1	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	7	18	16	74.1	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	7	18	46	73.6	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	7	19	16	73.1	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	9	6	46	73.8	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	9	7	16	74.3	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	9	7	46	76.1	75.4	67.8	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	9	8	16	77.2	75.4	72.5	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	9	8	46	77.2	75.4	72.5	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	9	9	16	76.3	75.4	69.0	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	9	9	46	76.9	75.4	71.6	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	9	10	16	76.5	75.4	70.0	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	9	10	46	79.5	75.4	77.4	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	9	11	14	76.3	75.4	69.0	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	9	11	44	76.3	75.4	69.0	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	9	12	14	73.1	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	9	12	44	74.1	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	9	13	14	77.9	75.4	74.3	79	N

Location ID	Name	Year (YYYY)	Month (MM)	Date (DD)	Hour (HH)	Minutes (MM)	Measured LAeq,30mins	Baseline Level (LAeq, 30mins)	Corrected Results (dB(A)) (LAeq, 30mins)	Action/Limit Level (as in CNMP)	Exceedance
MTW-16-1	SKH Good Shepherd Primary School	2013	9	9	13	44	77.9	75.4	74.3	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	9	14	14	75.8	75.4	65.2	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	9	14	44	75.2	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	9	15	14	76.2	75.4	68.5	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	9	15	44	77.5	75.4	73.3	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	9	16	14	76.6	75.4	70.4	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	9	16	44	77.5	75.4	73.3	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	9	17	14	75.2	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	9	17	44	73.8	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	9	18	14	73.8	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	9	18	44	73.8	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	9	19	14	73.6	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	9	19	44	73.6	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	9	20	14	73.1	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	10	6	44	73.7	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	10	7	14	73.9	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	10	7	44	74.3	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	10	8	14	76.8	75.4	71.2	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	10	8	44	78.1	75.4	74.8	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	10	9	14	77.7	75.4	73.8	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	10	9	44	77.6	75.4	73.6	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	10	10	14	77.5	75.4	73.3	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	10	10	44	74.8	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	10	11	14	75.8	75.4	65.2	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	10	11	44	73.7	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	10	12	14	72.5	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	10	12	44	74.5	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	10	13	14	76.2	75.4	68.5	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	10	13	44	76.5	75.4	70.0	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	10	14	14	76.5	75.4	70.0	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	10	14	44	77.3	75.4	72.8	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	10	15	14	76.6	75.4	70.4	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	10	15	44	77.6	75.4	73.6	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	10	16	14	77.4	75.4	73.1	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	10	16	44	76.3	75.4	69.0	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	10	17	14	74.8	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	10	17	44	72.8	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	10	18	14	72.9	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	10	18	44	73.2	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	10	19	14	74	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	10	19	44	73.1	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	10	20	14	73.1	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	11	6	44	61.9	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	11	7	14	62.5	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	11	7	44	65.5	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	11	8	14	71.6	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	11	8	44	77.2	75.4	72.5	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	11	9	14	79.1	75.4	76.7	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	11	9	44	76.8	75.4	71.2	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	11	10	14	77	75.4	71.9	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	11	10	44	75	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	11	11	14	74.4	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	11	11	44	72.3	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	11	12	14	69.5	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	11	12	44	73.5	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	11	13	14	76.9	75.4	71.6	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	11	13	44	77.7	75.4	73.8	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	11	14	14	75.2	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	11	14	44	75.3	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	11	15	14	78.3	75.4	75.2	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	11	15	44	76.4	75.4	69.5	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	11	16	14	74.5	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	11	16	44	74.9	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	11	17	14	74.4	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	11	17	44	72.6	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	11	18	14	71.8	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	11	18	44	74.7	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	11	19	14	73.1	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	11	19	44	73.3	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	11	20	14	73.4	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	12	6	44	73.7	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	12	7	14	73.4	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	12	7	44	73.8	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	12	8	14	75.3	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	12	8	44	74.5	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	12	9	14	74.4	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	12	9	44	74.4	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	12	10	14	74.5	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	12	10	44	74.5	75.4	<Baseline Level	79	N

Location ID	Name	Year (YYYY)	Month (MM)	Date (DD)	Hour (HH)	Minutes (MM)	Measured LAeq,30mins	Baseline Level (LAeq, 30mins)	Corrected Results (dB(A)) (LAeq, 30mins)	Action/Limit Level (as in CNMP)	Exceedance
MTW-16-1	SKH Good Shepherd Primary School	2013	9	12	11	14	75.8	75.4	65.2	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	12	11	55	73.6	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	12	12	25	72.2	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	12	12	55	75.4	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	12	13	25	76.8	75.4	71.2	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	12	13	55	76.3	75.4	69.0	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	12	14	25	74.8	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	12	14	55	76.4	75.4	69.5	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	12	15	25	76.3	75.4	69.0	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	12	15	55	75.4	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	12	16	25	76.9	75.4	71.6	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	12	16	55	74.9	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	12	17	25	74.5	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	12	17	55	72.8	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	12	18	25	73.5	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	12	18	55	73.7	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	12	19	25	73.3	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	13	6	55	73.5	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	13	7	25	73.6	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	13	7	55	74	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	13	8	25	73.2	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	13	8	55	73.7	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	13	9	25	74.1	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	13	9	55	74.4	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	13	10	25	75.6	75.4	62.1	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	13	10	55	75.6	75.4	62.1	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	13	11	25	74.5	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	13	11	55	72.6	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	13	12	25	72.5	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	13	12	55	76.2	75.4	68.5	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	13	13	25	77	75.4	71.9	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	13	13	55	77.8	75.4	74.1	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	13	14	25	78.2	75.4	75.0	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	13	14	55	76.4	75.4	69.5	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	13	15	25	76.3	75.4	69.0	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	13	15	55	77	75.4	71.9	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	13	16	25	75.6	75.4	62.1	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	13	16	55	75.9	75.4	66.3	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	13	17	25	73.1	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	13	17	55	72.2	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	13	18	25	72.8	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	13	18	55	73.8	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	13	19	25	73.5	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	14	6	55	73.7	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	14	7	25	74.2	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	14	7	55	76.3	75.4	69.0	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	14	8	25	77.6	75.4	73.6	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	14	8	55	77.8	75.4	74.1	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	14	9	25	76.6	75.4	70.4	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	14	9	55	76.6	75.4	70.4	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	14	10	25	75.8	75.4	65.2	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	14	10	55	75.4	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	14	11	25	73.3	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	14	11	55	72.5	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	14	12	25	72.3	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	14	12	55	75.1	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	14	13	25	75.7	75.4	63.9	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	14	13	55	75.7	75.4	63.9	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	14	14	25	75.2	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	14	14	55	75.3	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	14	15	25	73.4	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	14	15	55	76	75.4	67.1	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	14	16	25	75.2	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	14	16	55	73.8	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	14	17	25	72.8	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	14	17	55	73.5	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	14	18	25	72.4	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	14	18	55	73.5	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	14	19	25	73.8	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	16	6	55	73.8	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	16	7	25	73.2	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	16	7	55	74.6	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	16	8	25	75.1	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	16	8	55	76.1	75.4	67.8	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	16	9	25	76.2	75.4	68.5	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	16	9	55	77.5	75.4	73.3	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	16	10	25	76.4	75.4	69.5	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	16	10	55	77.5	75.4	73.3	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	16	11	31	75.2	75.4	<Baseline Level	79	N

Location ID	Name	Year (YYYY)	Month (MM)	Date (DD)	Hour (HH)	Minutes (MM)	Measured LAeq,30mins	Baseline Level (LAeq, 30mins)	Corrected Results (dB(A)) (LAeq, 30mins)	Action/Limit Level (as in CNMP)	Exceedance
MTW-16-1	SKH Good Shepherd Primary School	2013	9	16	12	1	73.5	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	16	12	31	73.3	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	16	13	1	76.8	75.4	71.2	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	16	13	31	75.6	75.4	62.1	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	16	14	1	75.4	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	16	14	31	77.6	75.4	73.6	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	16	15	1	77.5	75.4	73.3	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	16	15	31	76.7	75.4	70.8	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	16	16	1	77.2	75.4	72.5	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	16	16	31	76.8	75.4	71.2	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	16	17	1	75.6	75.4	62.1	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	16	17	31	73.6	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	16	18	1	73.1	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	16	18	31	73.6	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	17	7	1	74	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	17	7	31	73.8	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	17	8	1	75.7	75.4	63.9	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	17	8	31	76.5	75.4	70.0	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	17	9	1	76.1	75.4	67.8	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	17	9	31	76	75.4	67.1	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	17	10	1	73.6	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	17	10	31	74.7	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	17	11	1	75.5	75.4	59.1	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	17	11	31	72.9	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	17	12	1	73.6	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	17	12	31	73	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	17	13	1	73.9	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	17	13	31	75.6	75.4	62.1	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	17	14	1	76.4	75.4	69.5	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	17	14	31	76.7	75.4	70.8	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	17	15	1	73.5	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	17	15	31	75.6	75.4	62.1	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	17	16	1	76.3	75.4	69.0	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	17	16	31	73.7	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	17	17	1	73.4	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	17	17	31	73	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	17	18	1	72.7	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	17	18	31	73	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	18	7	1	73.8	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	18	7	31	73.5	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	18	8	1	75.3	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	18	8	31	76.5	75.4	70.0	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	18	9	1	75.9	75.4	66.3	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	18	9	31	76.2	75.4	68.5	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	18	10	1	76.1	75.4	67.8	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	18	10	31	76.2	75.4	68.5	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	18	11	1	76	75.4	67.1	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	18	11	31	76.1	75.4	67.8	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	18	12	1	75.8	75.4	65.2	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	18	12	31	72.4	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	18	13	1	75.5	75.4	59.1	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	18	13	31	75.4	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	18	14	1	75	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	18	14	31	74.9	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	18	15	1	74.9	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	18	15	31	75.2	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	18	16	1	75.7	75.4	63.9	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	18	16	31	75.2	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	18	17	1	75.4	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	18	17	31	72.5	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	18	18	1	72.8	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	18	18	31	73.9	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	19	7	1	73.7	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	19	7	31	73.3	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	19	8	1	75.9	75.4	66.3	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	19	8	31	77.2	75.4	72.5	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	19	9	1	77.5	75.4	73.3	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	19	9	31	79	75.4	76.5	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	19	10	1	77.5	75.4	73.3	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	19	10	31	76.8	75.4	71.2	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	19	11	1	75.3	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	19	11	31	76	75.4	67.1	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	19	12	1	75.8	75.4	65.2	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	19	12	43	73	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	19	13	13	77.3	75.4	72.8	79	N
MTW-16-1	SKH Good Shepherd Primary School	**2013**	9	19	13	43	**74.4**	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	19	14	13	73.5	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	19	14	43	77.3	75.4	72.8	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	19	15	13	75.2	75.4	<Baseline Level	79	N

Location ID	Name	Year (YYYY)	Month (MM)	Date (DD)	Hour (HH)	Minutes (MM)	Measured LAeq,30mins	Baseline Level (LAeq, 30mins)	Corrected Results (dB(A)) (LAeq, 30mins)	Action/Limit Level (as in CNMP)	Exceedance
MTW-16-1	SKH Good Shepherd Primary School	2013	9	19	15	43	75.8	75.4	65.2	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	19	16	13	72.9	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	19	16	43	74.3	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	19	17	13	73.8	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	19	17	43	73.5	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	19	18	13	76.9	75.4	71.6	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	19	18	43	73.1	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	21	7	13	74.1	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	21	7	43	74	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	21	8	13	76.4	75.4	69.5	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	21	8	43	77.5	75.4	73.3	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	21	9	13	77.9	75.4	74.3	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	21	9	43	79	75.4	76.5	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	21	10	13	77.1	75.4	72.2	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	21	10	43	76.6	75.4	70.4	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	21	11	13	75.1	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	23	13	12	75.3	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	23	13	42	75.2	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	23	14	12	75.5	75.4	59.1	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	23	14	42	74.9	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	23	15	12	74.9	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	23	15	42	73.8	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	23	16	12	74.2	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	23	16	42	74.1	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	23	17	12	74.5	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	23	17	42	73.2	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	23	18	12	73.6	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	23	18	42	73.6	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	23	19	12	74.2	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	24	6	42	74	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	24	7	12	74.4	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	24	7	42	74.3	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	24	8	12	75.5	75.4	59.1	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	24	8	42	75.9	75.4	66.3	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	24	9	12	76.4	75.4	69.5	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	24	9	42	75.9	75.4	66.3	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	24	10	12	75.5	75.4	59.1	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	24	10	42	75.9	75.4	66.3	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	24	11	12	75.4	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	24	11	42	75.1	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	24	12	12	72.6	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	24	12	42	73.5	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	24	13	12	75.6	75.4	62.1	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	24	13	42	75.3	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	24	14	12	74.5	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	24	14	42	74.7	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	24	15	12	75.1	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	24	15	42	76.1	75.4	67.8	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	24	16	12	76.4	75.4	69.5	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	24	16	42	75.4	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	24	17	12	74.2	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	24	17	42	73.2	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	24	18	12	72.3	75.4	<Baseline Level	79	N

Location ID	Name	Year (YYYY)	Month (MM)	Date (DD)	Hour (HH)	Minutes (MM)	Measured LAeq,30mins	Baseline Level (LAeq, 30mins)	Corrected Results (dB(A)) (LAeq, 30mins)	Action/Limit Level (as in CNMP)	Exceedance
MTW-16-1	SKH Good Shepherd Primary School	2013	9	24	18	42	73.2	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	24	19	12	73.5	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	25	6	42	74.1	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	25	7	12	73.3	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	25	7	42	74.3	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	25	8	12	76.2	75.4	68.5	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	25	8	42	76.7	75.4	70.8	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	25	9	12	76.8	75.4	71.2	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	25	9	42	77.1	75.4	72.2	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	25	10	12	76.3	75.4	69.0	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	25	10	42	73.8	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	25	11	12	73.8	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	25	11	42	73.4	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	25	12	12	73.1	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	25	12	42	74.4	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	25	13	12	75.3	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	25	13	42	78.4	75.4	75.4	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	25	14	12	75.4	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	25	14	42	75.5	75.4	59.1	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	25	15	12	77.4	75.4	73.1	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	25	15	42	76.8	75.4	71.2	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	25	16	12	77.1	75.4	72.2	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	25	16	42	76.7	75.4	70.8	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	25	17	12	74.4	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	25	17	42	73.6	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	25	18	12	74.3	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	25	18	42	74.1	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	25	19	12	73.8	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	26	6	42	74.1	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	26	7	12	74.4	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	26	7	42	74.8	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	26	8	12	76.6	75.4	70.4	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	26	8	42	76.5	75.4	70.0	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	26	9	12	76.4	75.4	69.5	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	26	9	42	73.5	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	26	10	12	73.8	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	26	10	42	73.8	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	26	11	9	74.7	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	26	11	39	74.9	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	26	12	9	73.1	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	26	12	39	74.3	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	26	13	9	76	75.4	67.1	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	26	13	39	76.5	75.4	70.0	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	26	14	9	77	75.4	71.9	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	26	14	39	79.5	75.4	77.4	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	26	15	9	76.7	75.4	70.8	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	26	15	39	76.9	75.4	71.6	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	26	16	9	76.7	75.4	70.8	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	26	16	39	76.3	75.4	69.0	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	26	17	9	74.5	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	26	17	39	73.7	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	26	18	9	72.9	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	26	18	39	74.3	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	26	19	9	74.1	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	27	6	39	73.8	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	27	7	9	74.1	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	27	7	39	73.8	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	27	8	9	73.9	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	27	8	39	74.9	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	27	9	9	74.9	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	27	9	39	75.6	75.4	62.1	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	27	10	9	76	75.4	67.1	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	27	10	39	76.2	75.4	68.5	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	27	11	9	75.8	75.4	65.2	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	27	11	39	75.4	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	27	12	9	73.5	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	27	12	39	73.3	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	27	13	9	74.6	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	27	13	39	75.2	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	27	14	9	74.7	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	27	14	39	73.3	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	27	15	9	73.7	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	27	15	39	73.5	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	27	16	9	78.9	75.4	76.3	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	27	16	39	76.2	75.4	68.5	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	27	17	9	76.3	75.4	69.0	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	27	17	39	76.4	75.4	69.5	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	27	18	9	76	75.4	67.1	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	27	18	39	73.4	75.4	<Baseline Level	79	N

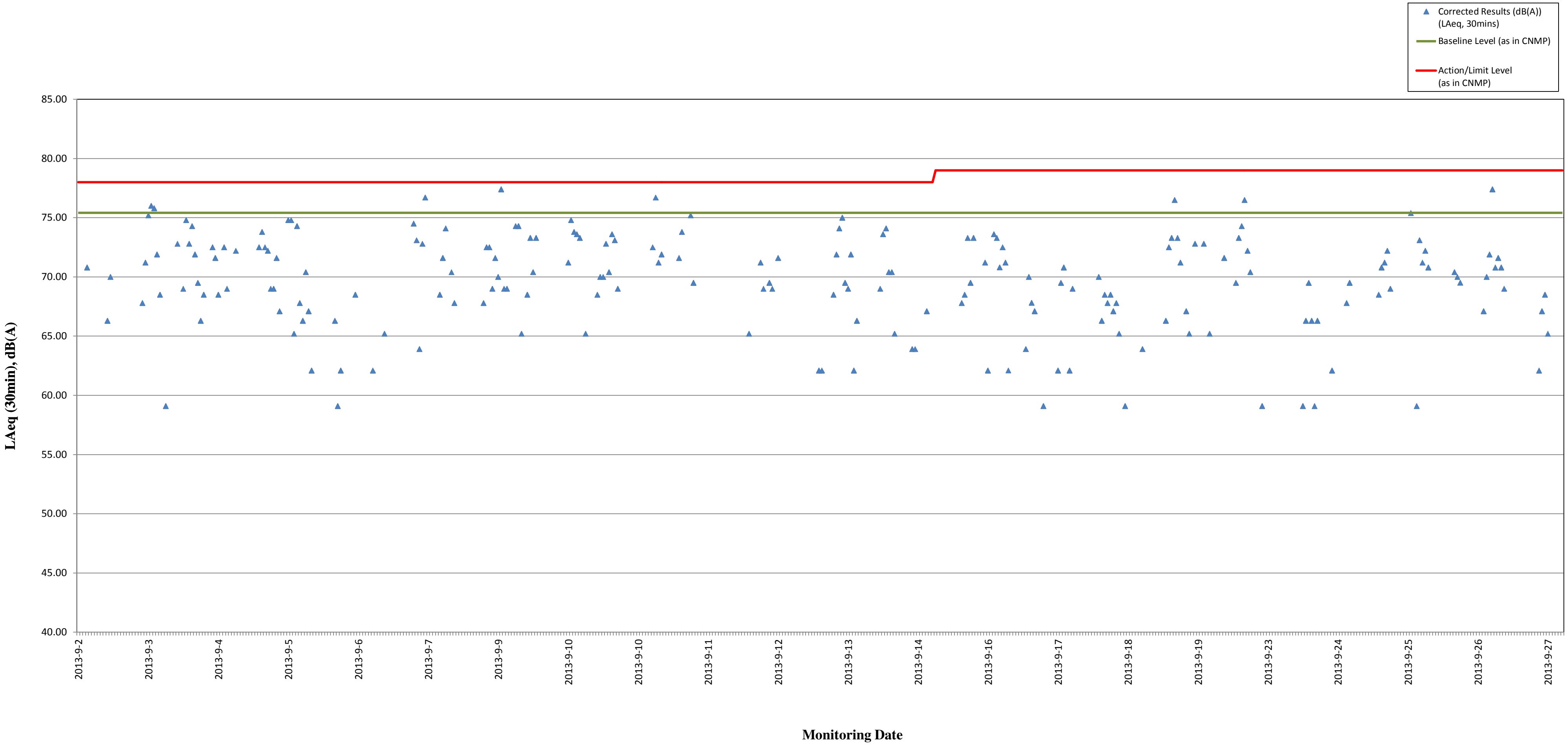
Location ID	Name	Year (YYYY)	Month (MM)	Date (DD)	Hour (HH)	Minutes (MM)	Measured LAeq,30mins	Baseline Level (LAeq, 30mins)	Corrected Results (dB(A)) (LAeq, 30mins)	Action/Limit Level (as in CNMP)	Exceedance
MTW-16-1	SKH Good Shepherd Primary School	2013	9	27	19	9	73.6	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	28	6	39	73.7	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	28	7	9	74.5	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	28	7	39	73.7	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	28	8	9	74.5	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	28	8	39	75	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	28	9	9	75.8	75.4	65.2	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	28	9	39	75.6	75.4	62.1	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	28	10	9	75.4	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	28	10	39	77.5	75.4	73.3	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	28	11	9	75.3	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	28	11	39	74.2	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	28	12	9	73.1	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	28	12	39	73.3	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	28	13	9	73.9	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	28	13	39	74.1	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	28	14	9	74.4	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	28	14	39	74.3	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	28	15	9	75.8	75.4	65.2	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	28	15	39	76.7	75.4	70.8	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	28	16	9	76.2	75.4	68.5	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	28	16	39	77.3	75.4	72.8	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	28	17	9	75.9	75.4	66.3	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	28	17	39	75.8	75.4	65.2	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	28	18	9	73.7	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	28	18	39	75.5	75.4	59.1	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	28	19	9	73.3	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	30	6	39	73.7	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	30	7	9	73.8	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	30	7	39	74	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	30	8	9	76	75.4	67.1	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	30	8	39	76	75.4	67.1	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	30	9	9	76.2	75.4	68.5	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	30	9	39	76	75.4	67.1	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	30	10	9	75.2	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	30	10	39	74.3	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	30	11	9	73.7	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	30	11	39	73	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	30	12	9	72.7	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	30	12	39	73.1	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	30	13	9	74.7	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	30	13	39	74.4	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	30	14	9	75.7	75.4	63.9	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	30	14	39	78	75.4	74.5	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	30	15	9	75.9	75.4	66.3	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	30	15	39	78.2	75.4	75.0	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	30	16	16	77.3	75.4	72.8	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	30	16	46	76.5	75.4	70.0	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	30	17	16	76	75.4	67.1	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	30	17	46	74.2	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	30	18	16	74.2	75.4	<Baseline Level	79	N
MTW-16-1	SKH Good Shepherd Primary School	2013	9	30	18	46	73.4	75.4	<Baseline Level	79	N

Remarks:

(a): Continuous noise data from 10am to 16pm on 2 September is unavailable due to technical problems.

(b): No data were recorded after 11:43 am on 21 September and before 13:12 pm on 23 September as the monitoring station was removed due to typhoon issue.

Continuous Noise Monitoring at MTW-16-1 (SKH Good Shepherd Primary School) in September 2013- (LAeq, 30min)



Remarks:
- For those corrected noise levels that are not shown the in this graph, the measured noise levels are below baseline level.

Annex J

Construction Dust Monitoring Results and Wind Data Monitoring Results

Annex J Construction Dust Monitoring Results

Station DMS-6 Katherine Building

Start Date	Time	Finish Date	Time	Weather	Filter Weight (g) Initial	Final	Elapsed Time Reading Initial	Final	Sampling Time (hrs)	Flow Rate (m^3/min) Initial	Final	Average	TSP Conc. (µg/m^3)	Action Level (µg/m^3)	Limit Level (µg/m^3)	Observations / Remarks	Sampler ID	Filter ID
04-Sep-13	9:00	05-Sep-13	9:00	Rainy	2.7927	2.9621	11600.30	11624.30	24.00	1.26	1.26	1.26	93	156.8	260	Construction work in progress	0107	8129
10-Sep-13	10:45	11-Sep-13	10:45	Fine	2.7927	2.9448	11624.30	11648.30	24.00	1.23	1.23	1.23	86	156.8	260	Construction work in progress	0107	8152
16-Sep-13	10:40	17-Sep-13	10:40	Fine	2.8192	2.9744	11648.30	11672.30	24.00	1.23	1.23	1.23	88	156.8	260	Construction work in progress	0107	8175
21-Sep-13	9:25	22-Sep-13	9:25	Sunny	2.7924	2.9511	11672.30	11696.30	24.00	1.23	1.23	1.23	90	156.8	260	Construction work in progress	0107	8202
27-Sep-13	10:35	28-Sep-13	10:35	Sunny	2.7942	2.9311	11696.30	11720.30	24.00	1.26	1.26	1.26	75	156.8	260	Construction work in progress	0107	8225
												Minimum	75					
												Average	86					
												Maximum	93					

Station DMS-7 Parc 22

Start Date	Time	Finish Date	Time	Weather	Filter Weight (g) Initial	Final	Elapsed Time Reading Initial	Final	Sampling Time (hrs)	Flow Rate (m^3/min) Initial	Final	Average	TSP Conc. (µg/m^3)	Action Level (µg/m^3)	Limit Level (µg/m^3)	Observations / Remarks	Sampler ID	Filter ID
04-Sep-13	8:45	05-Sep-13	8:45	Rainy	2.8006	2.9779	01777.17	01801.17	24.00	1.23	1.23	1.23	100	156.8	260	Construction work in progress	3574	8128
10-Sep-13	9:45	11-Sep-13	9:45	Fine	2.7887	2.9403	01801.17	01825.17	24.00	1.20	1.20	1.20	88	166.7	260	Construction work in progress	3574	8151
16-Sep-13	9:45	17-Sep-13	9:45	Fine	2.8121	2.9700	0182.17	01849.17	24.00	1.20	1.20	1.20	91	166.7	260	Construction work in progress	3574	8174
21-Sep-13	9:10	22-Sep-13	9:10	Sunny	2.7887	2.9408	01849.17	01873.17	24.00	1.20	1.20	1.20	88	166.7	260	Construction work in progress	3574	8201
27-Sep-13	10:25	28-Sep-13	10:25	Sunny	2.7820	2.9166	01873.17	01897.17	24.00	1.20	1.20	1.20	78	166.7	260	Construction work in progress	3574	8224
												Minimum	78					
												Average	89					
												Maximum	100					

Station DMS-8 SKH Good Shepherd Primary School

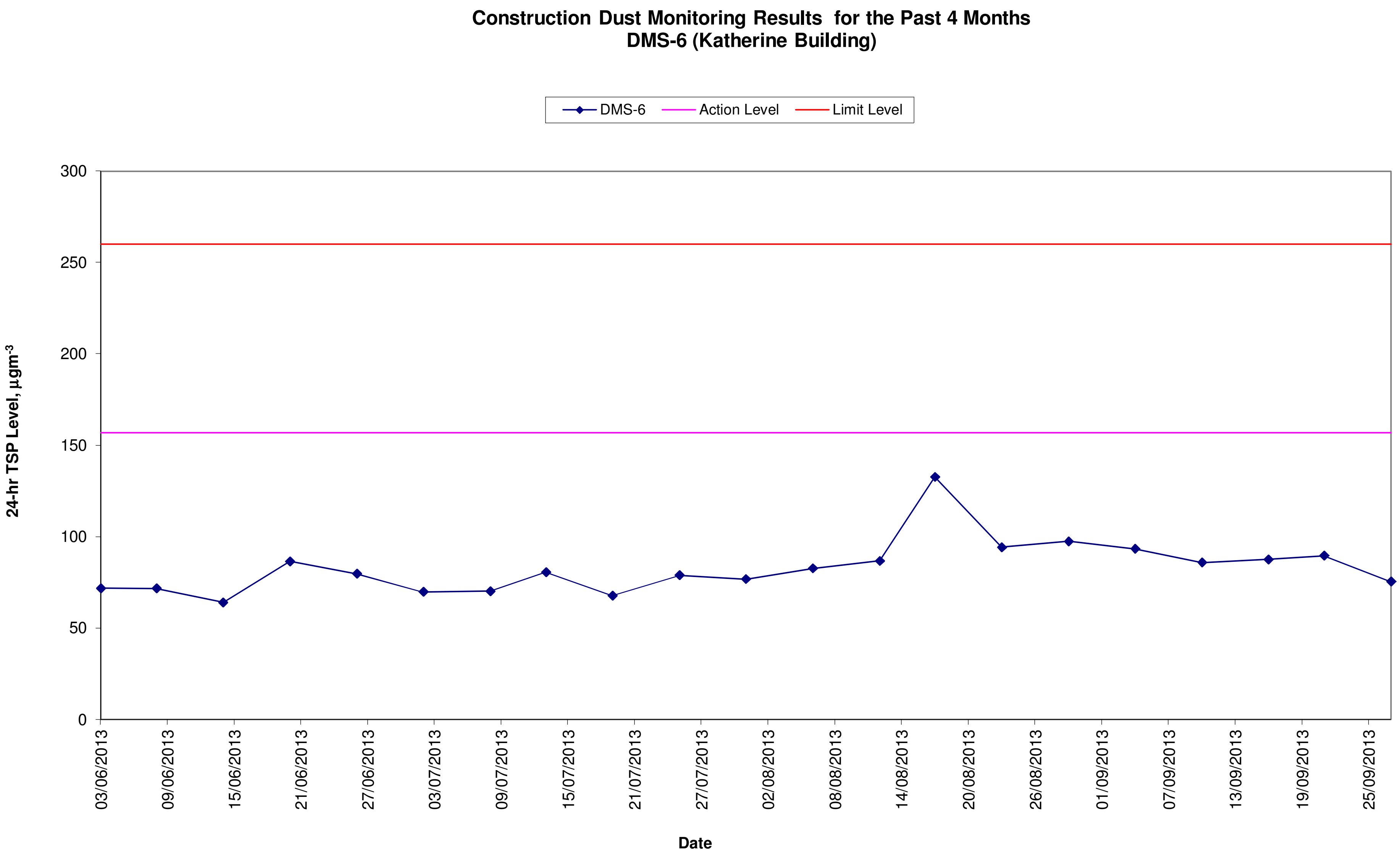
Start		Finish		Weather	Filter Weight (g)		Elapsed Time Reading		Sampling Time	Flow Rate (m^3/min)			TSP Conc.	Action Level	Limit Level	Observations / Remarks	Sampler	Filter
Date	Time	Date	Time		Initial	Final	Initial	Final	(hrs)	Initial	Final	Average	(μg/m^3)	(μg/m^3)	(μg/m^3)		ID	ID
04-Sep-13	8:28	05-Sep-13	8:28	Rainy	2.7945	2.9711	01747.11	01771.11	24.00	1.23	1.23	1.23	100	152.2	260	Construction work in progress	3572	8127
10-Sep-13	9:30	11-Sep-13	9:30	Fine	2.7912	2.9621	01771.11	01795.11	24.00	1.23	1.23	1.23	96	152.2	260	Construction work in progress	3572	8150
16-Sep-13	9:30	17-Sep-13	9:30	Fine	2.7979	2.9494	01795.11	01819.11	24.00	1.23	1.23	1.23	86	152.2	260	Construction work in progress	3572	8173
21-Sep-13	8:55	22-Sep-13	8:55	Sunny	2.7996	2.9600	01819.11	01843.11	24.00	1.23	1.23	1.23	91	152.2	260	Construction work in progress	3572	8196
27-Sep-13	9:32	28-Sep-13	9:32	Sunny	2.7861	2.9441	01843.11	01867.11	24.00	1.23	1.23	1.23	89	152.2	260	Construction work in progress	3572	8223
												Minimum	86					
												Average	92					
												Maximum	100					

Station DMS-9 No. 26 Kowloon City Road

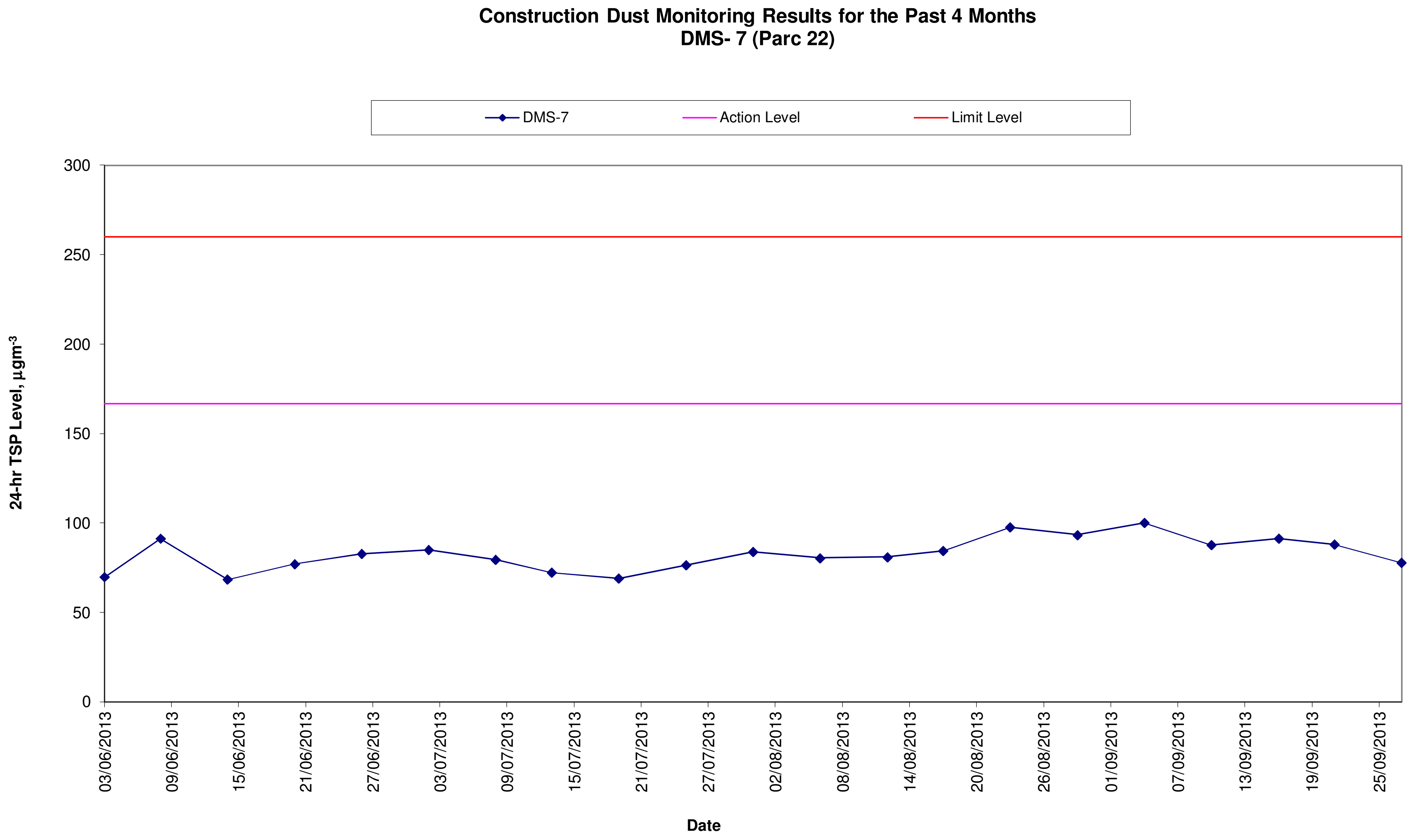
Start		Finish		Weather	Filter Weight (g)		Elapsed Time Reading		Sampling Time	Flow Rate (m^3/min)			TSP Conc.	Action Level	Limit Level	Observations / Remarks	Sampler	Filter
Date	Time	Date	Time		Initial	Final	Initial	Final	(hrs)	Initial	Final	Average	(μg/m^3)	(μg/m^3)	(μg/m^3)		ID	ID
04-Sep-13	8:17	05-Sep-13	8:17	Rainy	2.7912	2.9642	12465.40	12489.40	24.00	1.24	1.24	1.24	97	160.9	260	Construction work in progress	0814	8126
10-Sep-13	9:21	11-Sep-13	9:21	Fine	2.7868	2.9511	12489.40	12513.40	24.00	1.24	1.24	1.24	92	160.9	260	Construction work in progress	0814	8149
16-Sep-13	9:22	17-Sep-13	9:22	Fine	2.8004	2.9511	12513.40	12537.40	24.00	1.24	1.24	1.24	84	160.9	260	Construction work in progress	0814	8172
21-Sep-13	8:42	22-Sep-13	8:42	Sunny	2.8211	2.9707	12537.40	12561.40	24.00	1.24	1.24	1.24	84	160.9	260	Construction work in progress	0814	8195
27-Sep-13	9:24	28-Sep-13	9:24	Sunny	2.7890	2.9366	12561.40	12585.40	24.00	1.24	1.24	1.24	83	160.9	260	Construction work in progress	0814	8222
												Minimum	83					
												Average	88					
												Maximum	97					

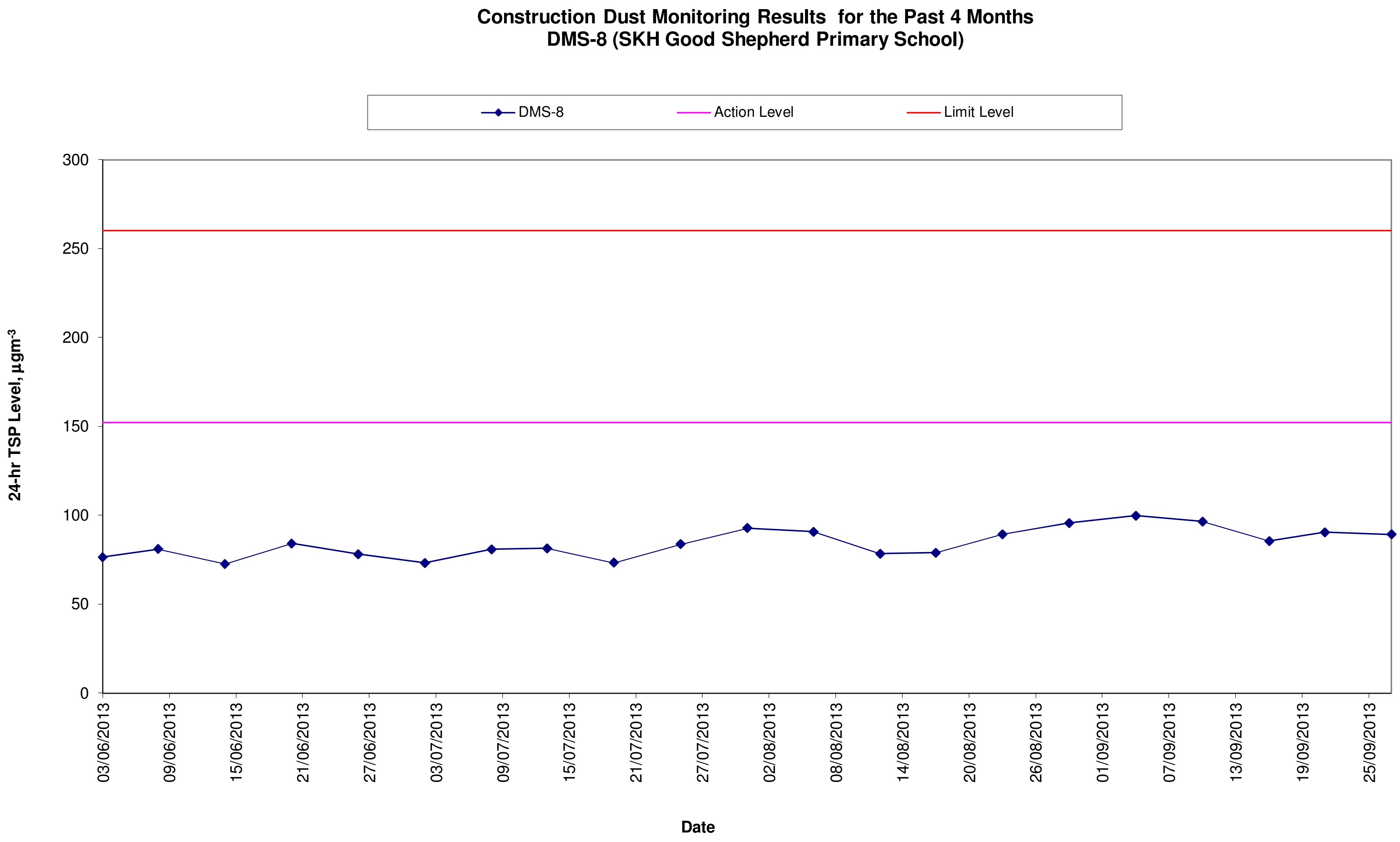
Station DMS-10 Chat Ma Mansion

Start		Finish		Weather	Filter Weight (g)		Elapsed Time Reading		Sampling Time	Flow Rate (m^3/min)			TSP Conc.	Action Level	Limit Level	Observations / Remarks	Sampler	Filter
Date	Time	Date	Time		Initial	Final	Initial	Final	(hrs)	Initial	Final	Average	(μg/m^3)	(μg/m^3)	(μg/m^3)		ID	ID
04-Sep-13	8:05	05-Sep-13	8:05	Rainy	2.7869	2.9600	01765.20	01789.20	24.00	1.22	1.22	1.22	99	170.4	260	Construction work in progress	3573	8125
10-Sep-13	8:44	11-Sep-13	8:44	Fine	2.8210	2.9680	01789.20	01813.20	24.00	1.23	1.23	1.23	83	170.4	260	Construction work in progress	3573	8148
16-Sep-13	8:43	17-Sep-13	8:43	Sunny	2.7869	2.9521	01813.20	01837.20	24.00	1.23	1.23	1.23	93	170.4	260	Construction work in progress	3573	8171
21-Sep-13	8:30	22-Sep-13	8:30	Sunny	2.8122	2.9655	01837.20	01861.20	24.00	1.23	1.23	1.23	87	170.4	260	Construction work in progress	3573	8194
27-Sep-13	8:45	28-Sep-13	8:45	Sunny	2.7988	2.9501	01861.20	01885.20	24.00	1.23	1.23	1.23	85	170.4	260	Construction work in progress	3573	8221
												Minimum	83					
												Average	89					
												Maximum	99					



Construction Dust Monitoring Results for the Past 4 Months
DMS-6 (Katherine Building)
DMS-6
Action Level
Limit Level
24-hr TSP Level, µgm-3
300
250
200
150
100
50
0
03/06/2013
09/06/2013
15/06/2013
21/06/2013
27/06/2013
03/07/2013
09/07/2013
15/07/2013
21/07/2013
27/07/2013
02/08/2013
08/08/2013
14/08/2013
20/08/2013
26/08/2013
01/09/2013
07/09/2013
13/09/2013
19/09/2013
25/09/2013
Date


Construction Dust Monitoring Results for the Past 4 Months
DMS- 7 (Parc 22)
DMS-7
Action Level
Limit Level
24-hr TSP Level, µgm-3
300
250
200
150
100
50
0
03/06/2013
09/06/2013
15/06/2013
21/06/2013
27/06/2013
03/07/2013
09/07/2013
15/07/2013
21/07/2013
27/07/2013
02/08/2013
08/08/2013
14/08/2013
20/08/2013
26/08/2013
01/09/2013
07/09/2013
13/09/2013
19/09/2013
25/09/2013
Date


Construction Dust Monitoring Results for the Past 4 Months
DMS-8 (SKH Good Shepherd Primary School)
DMS-8
Action Level
Limit Level
24-hr TSP Level, µgm-3
300
250
200
150
100
50
0
03/06/2013
09/06/2013
15/06/2013
21/06/2013
27/06/2013
03/07/2013
09/07/2013
15/07/2013
21/07/2013
27/07/2013
02/08/2013
08/08/2013
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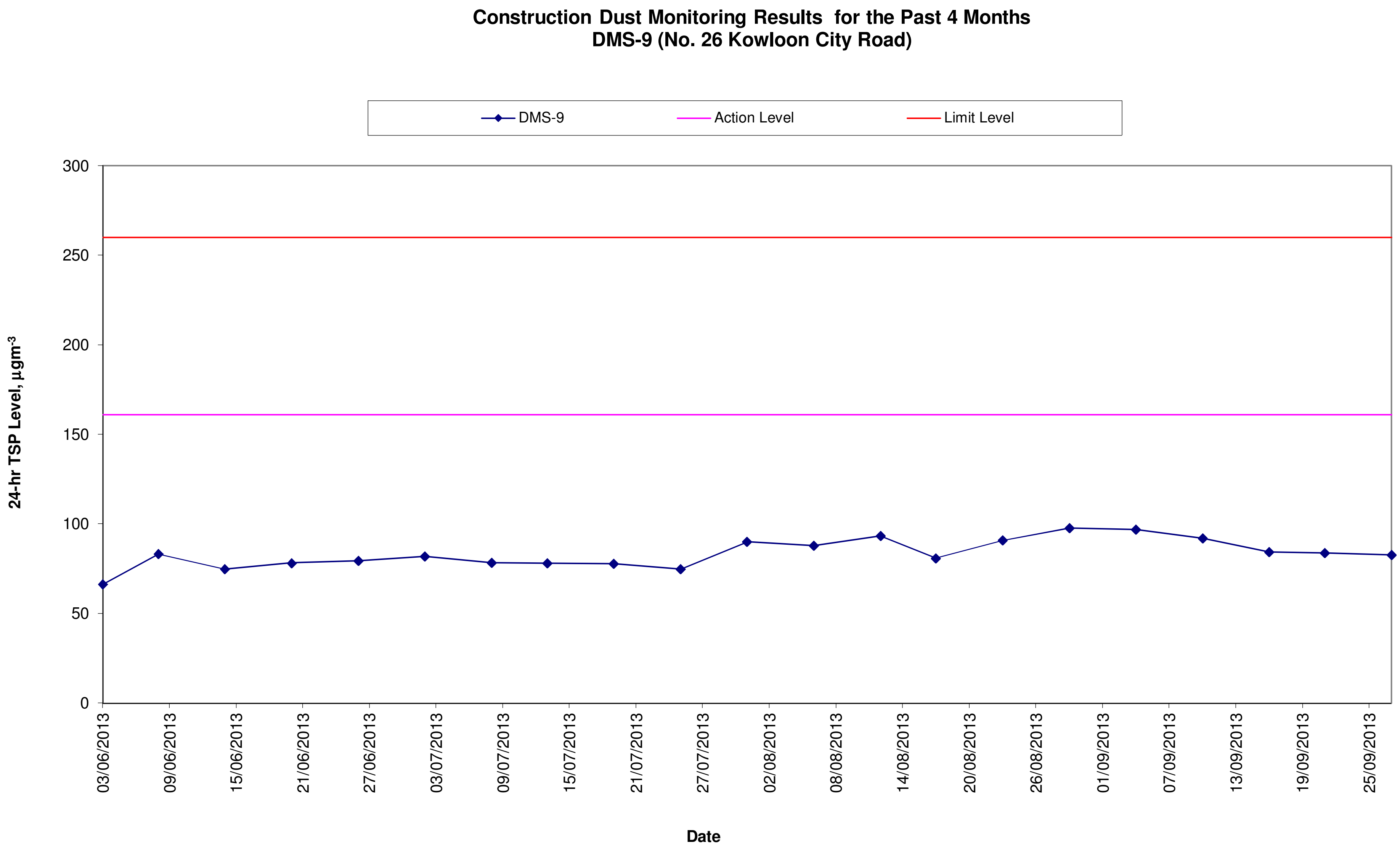
01/09/2013
07/09/2013
13/09/2013
19/09/2013
25/09/2013
Date



Construction Dust Monitoring Results for the Past 4 Months
DMS-9 (No. 26 Kowloon City Road)
DMS-9
Action Level
Limit Level
24-hr TSP Level, µgm-3
300
250
200
150
100
50
0
03/06/2013
09/06/2013
15/06/2013
21/06/2013
27/06/2013
03/07/2013
09/07/2013
15/07/2013
21/07/2013
27/07/2013
02/08/2013
08/08/2013
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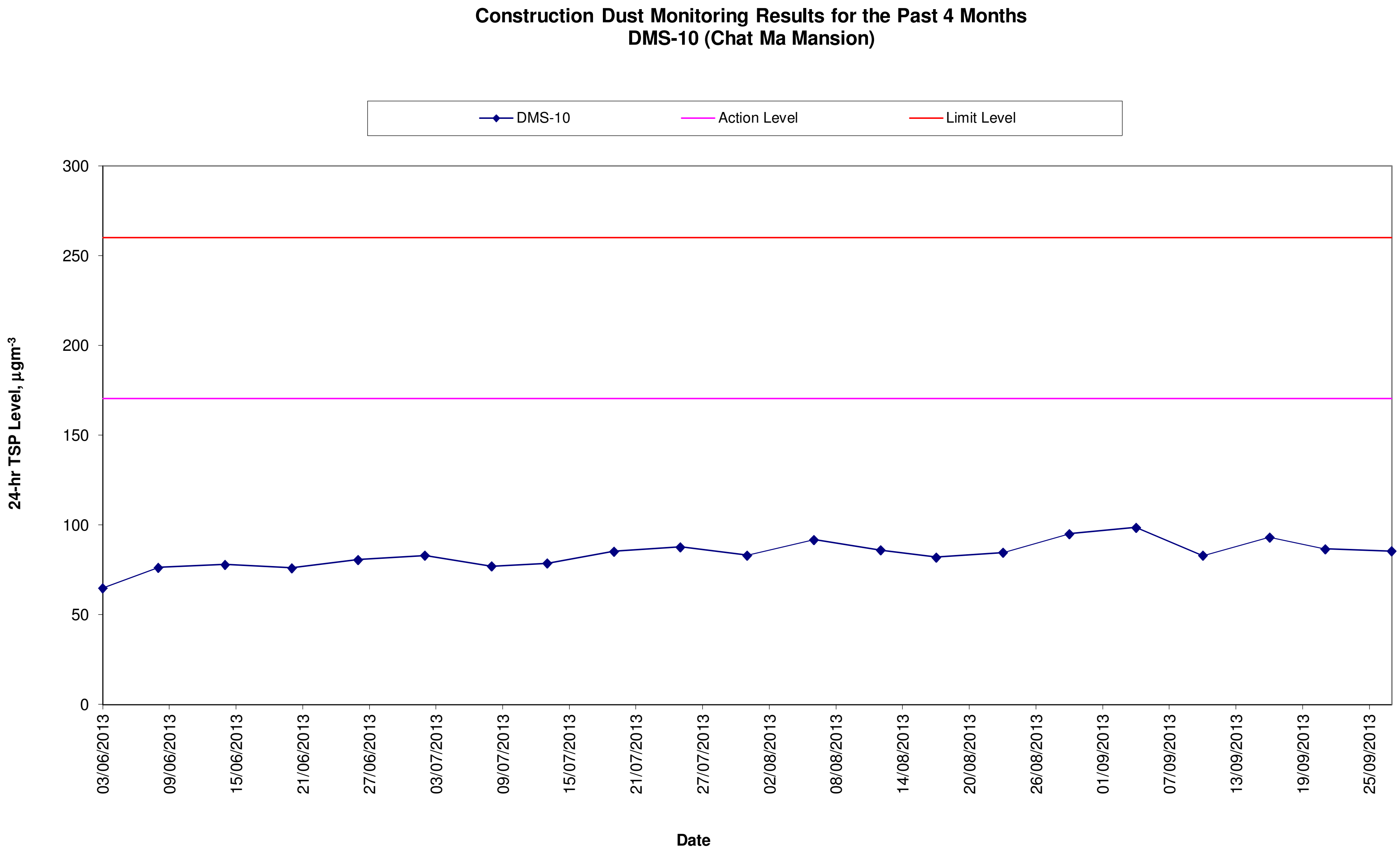
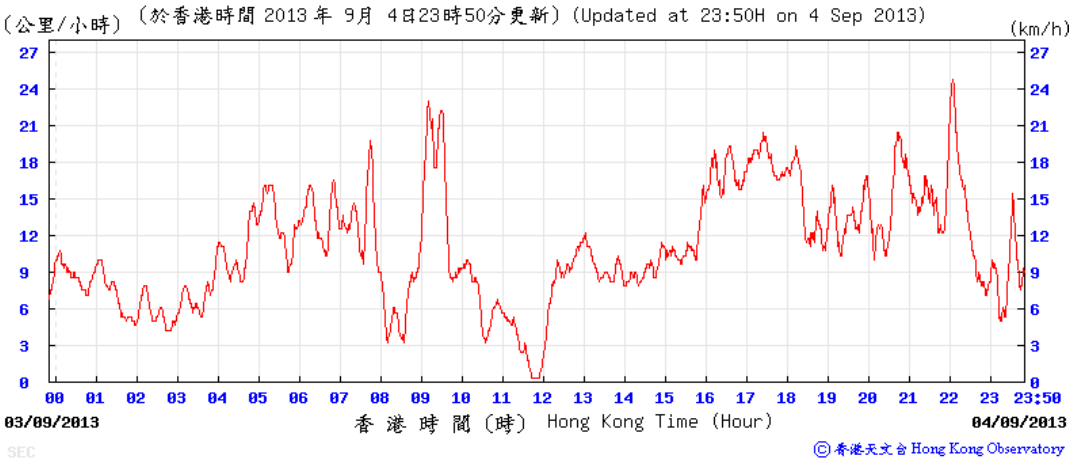
19/09/2013
25/09/2013
Date

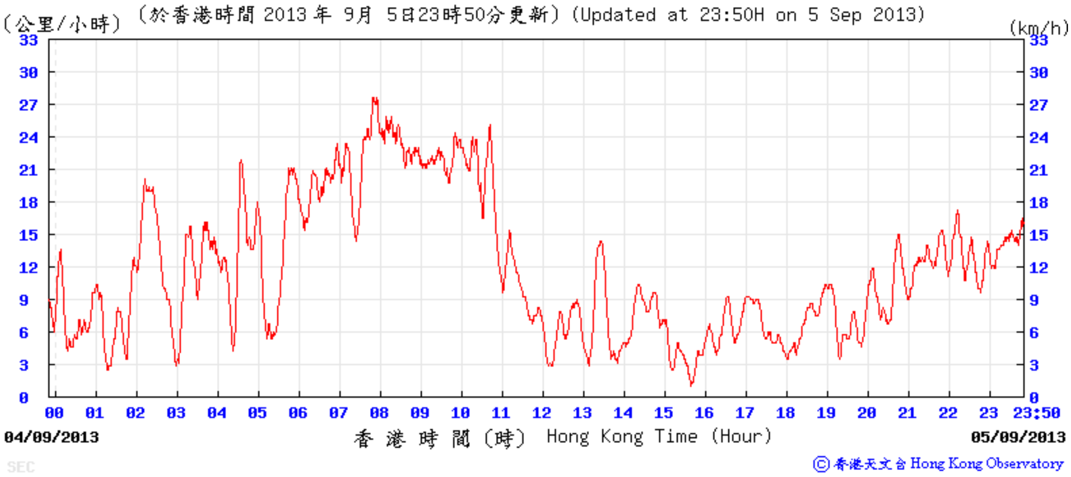


Construction Dust Monitoring Results for the Past 4 Months
DMS-10 (Chat Ma Mansion)
DMS-10
Action Level
Limit Level
24-hr TSP Level, µgm-3
300
250
200
150
100
50
0
03/06/2013
09/06/2013
15/06/2013
21/06/2013
27/06/2013
03/07/2013
09/07/2013
15/07/2013
21/07/2013
27/07/2013
02/08/2013
08/08/2013
14/08/2013
20/08/2013
26/08/2013
01/09/2013
07/09/2013
13/09/2013
19/09/2013
25/09/2013
Date

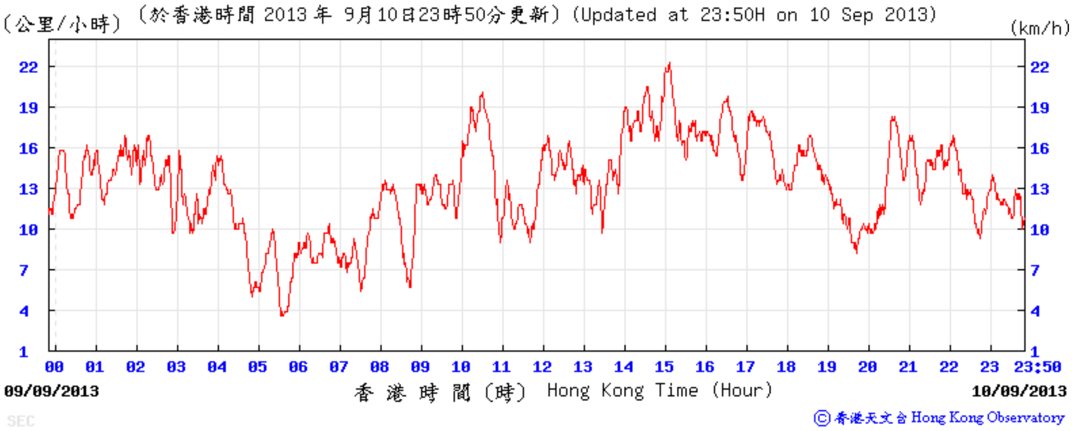
Average wind speed obtained from the meteorological station at Kai Tak from the Hong Kong Observatory (HKO)

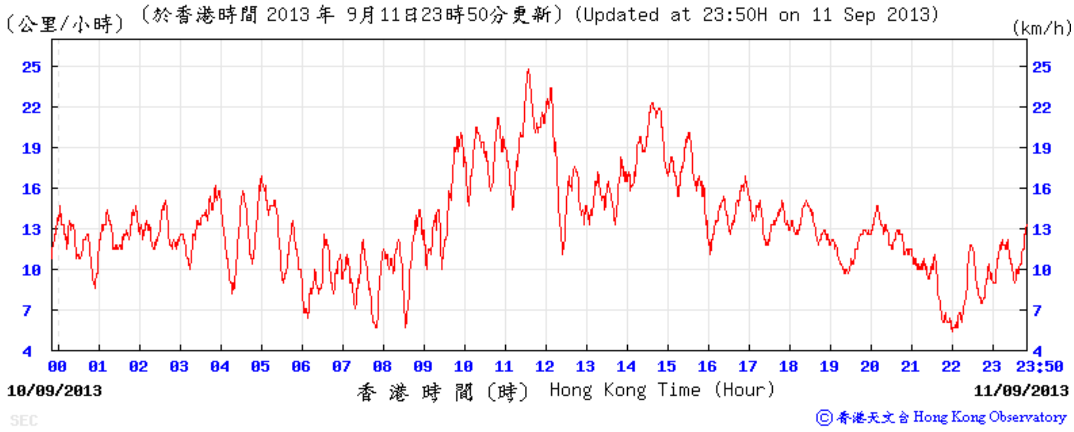
4 – 5 September 2013



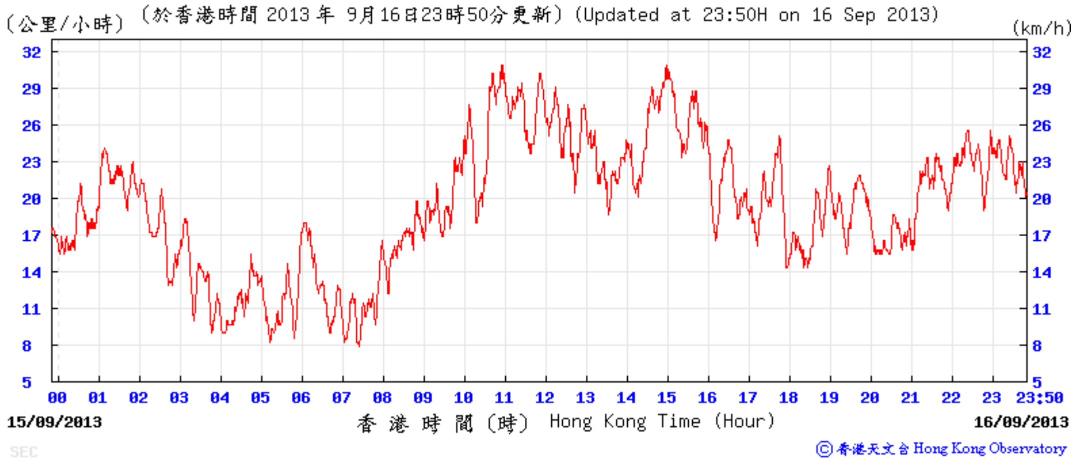


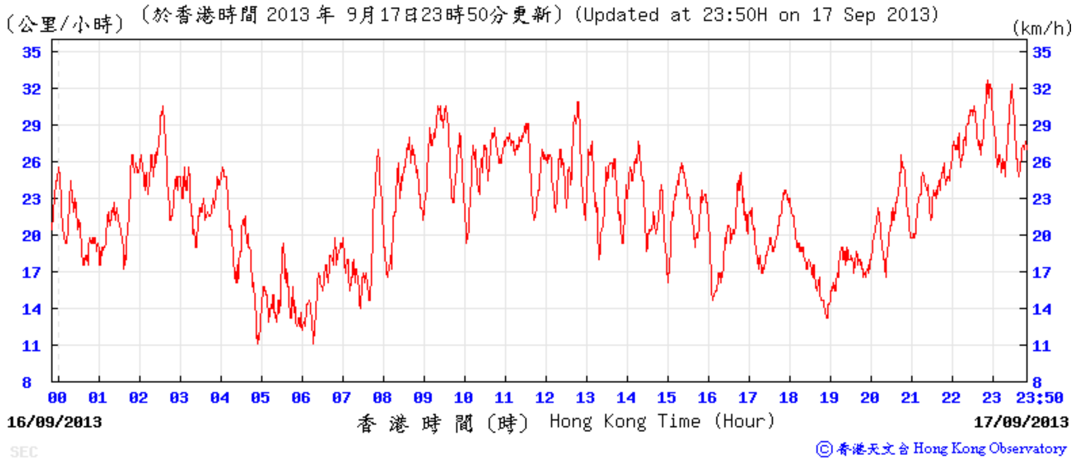
10 – 11 September 2013



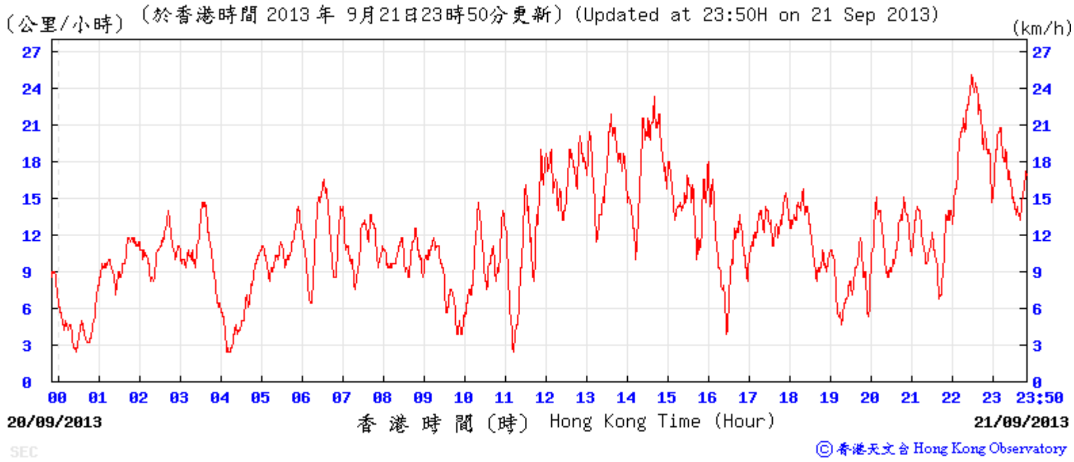


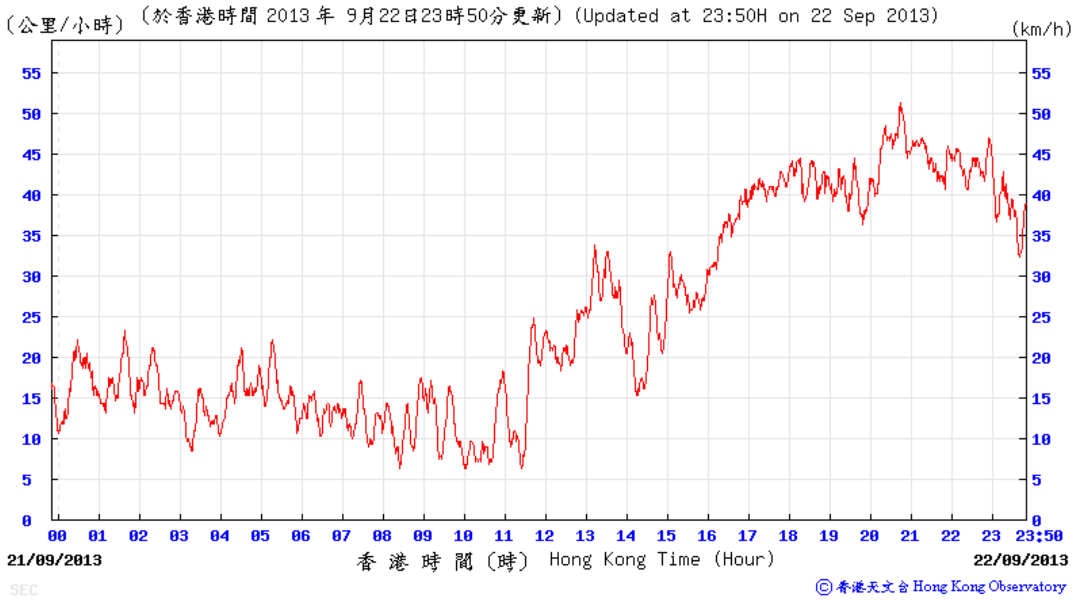
16 – 17 September 2013



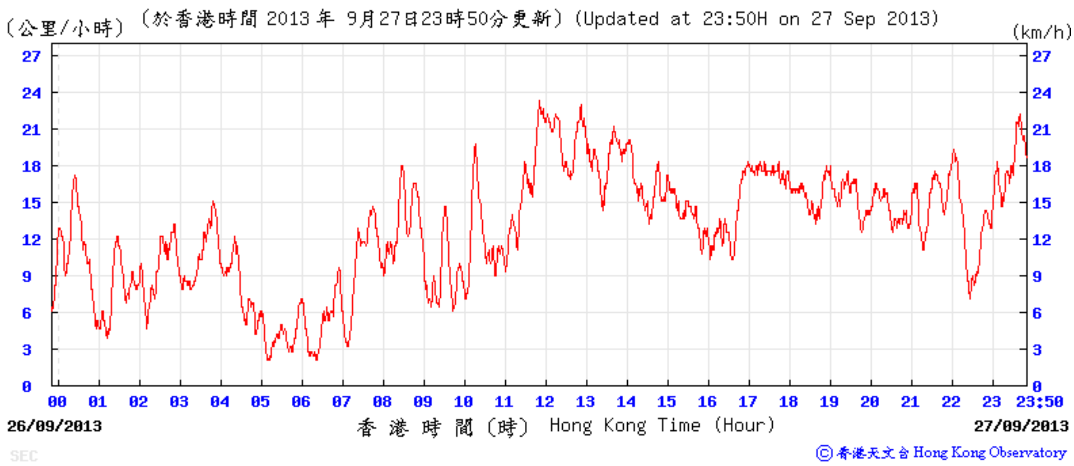


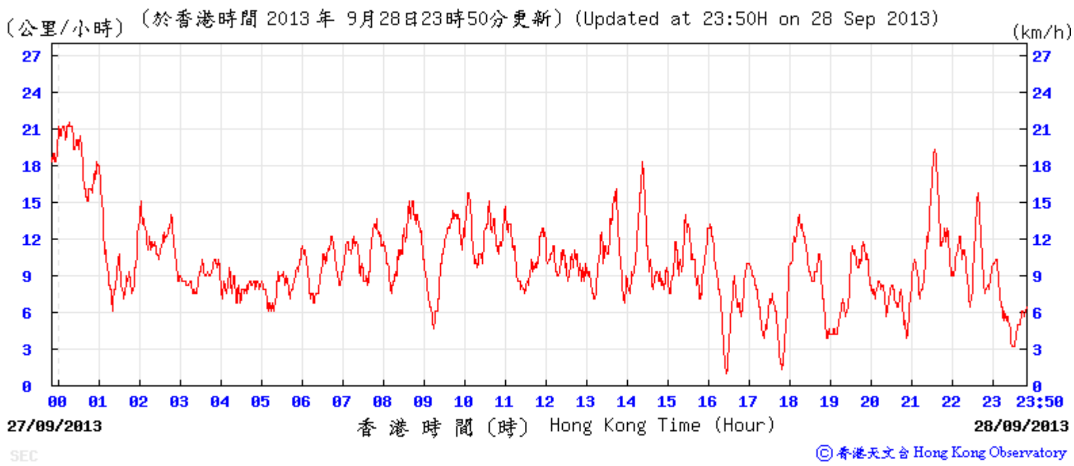
21 – 22 September 2013





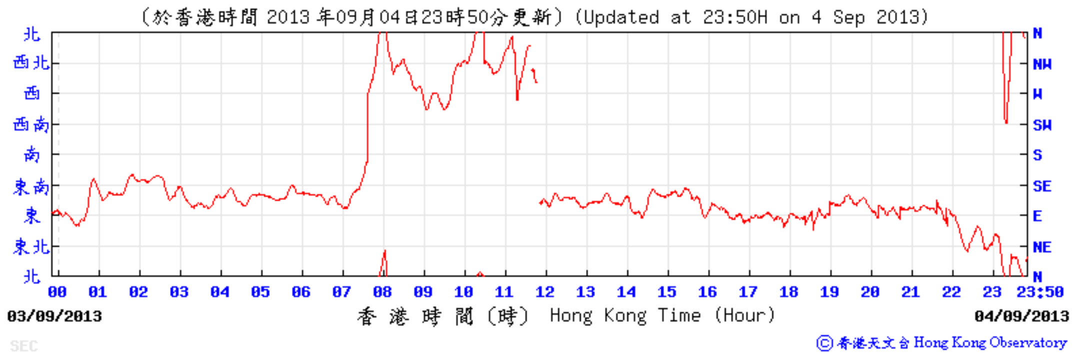
27 – 28 September 2013

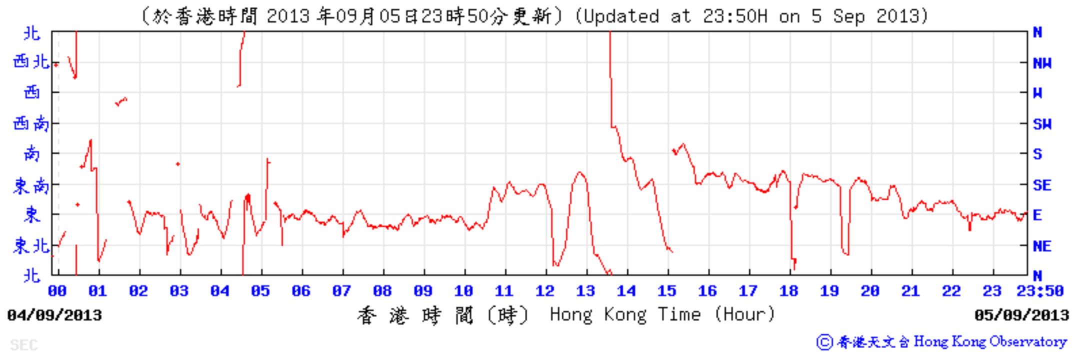




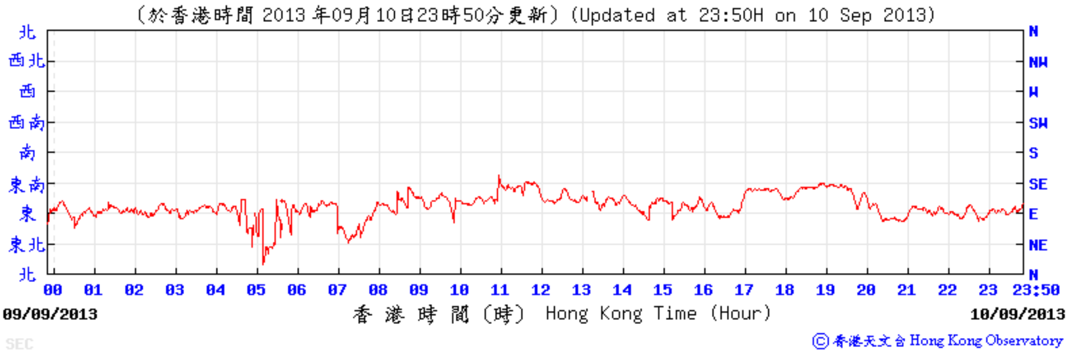
Average wind direction obtained from the meteorological station at Kai Tak from the Hong Kong Observatory (HKO)

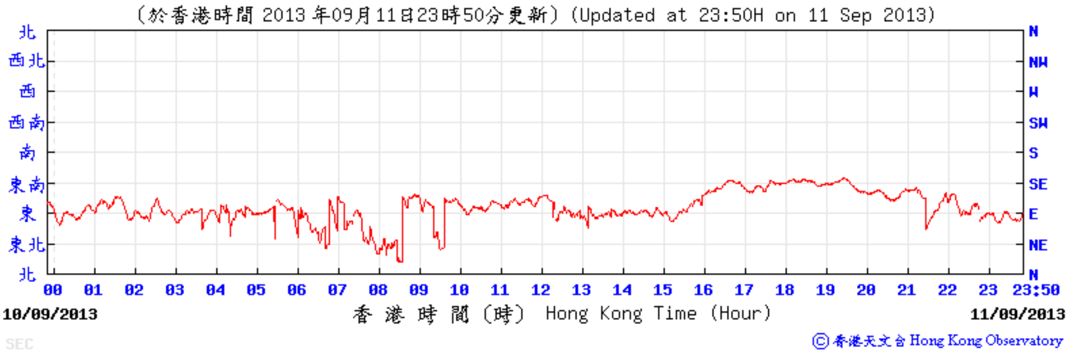
<u>4 – 5 September 2013</u>



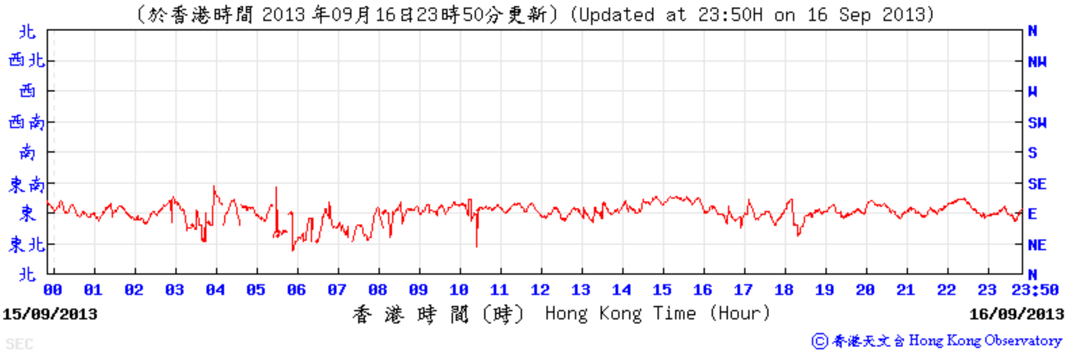


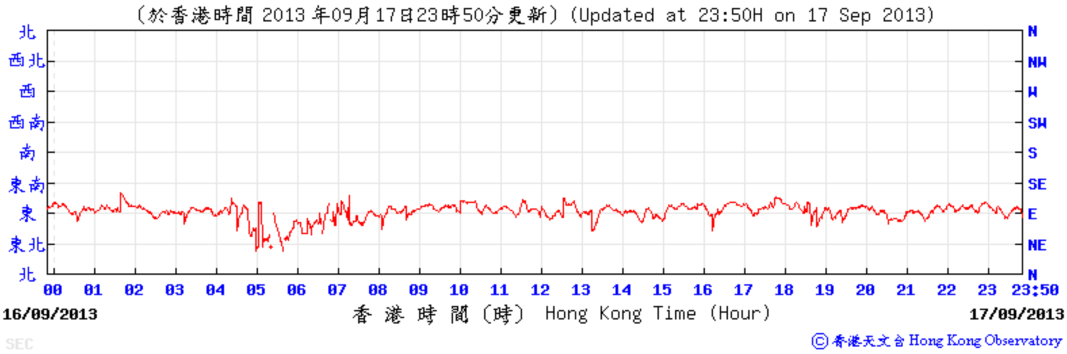
10 – 11 September 2013



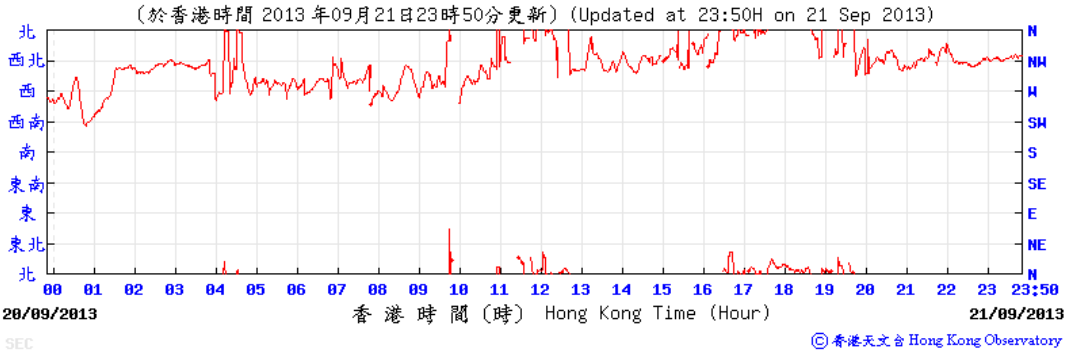


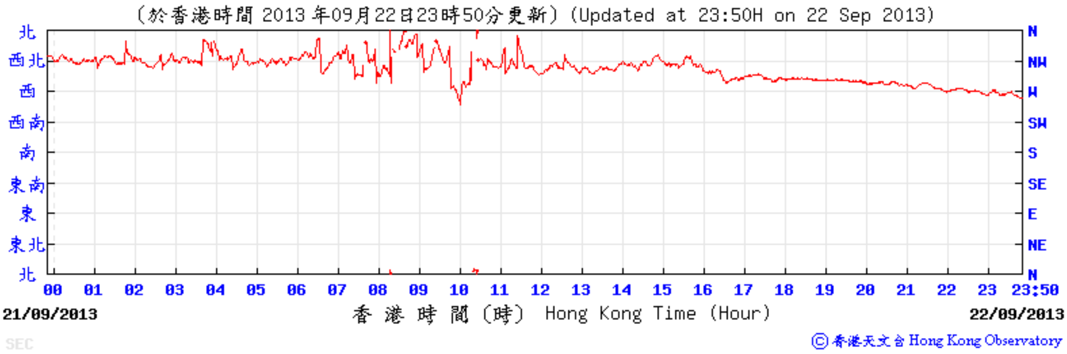
16 – 17 September 2013



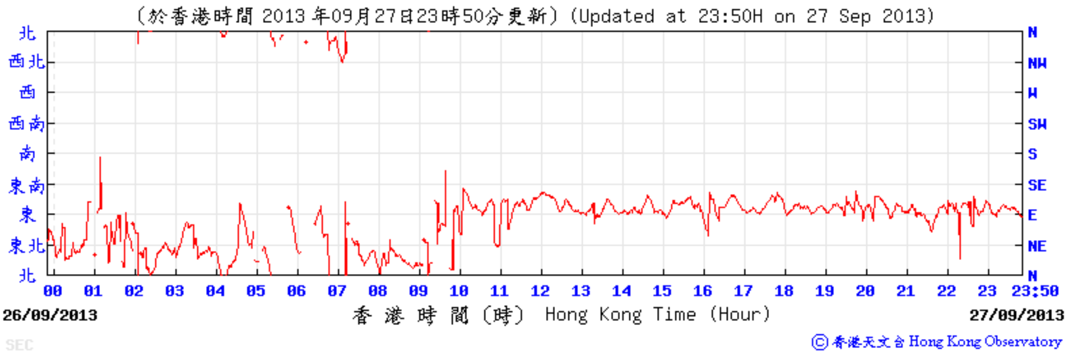


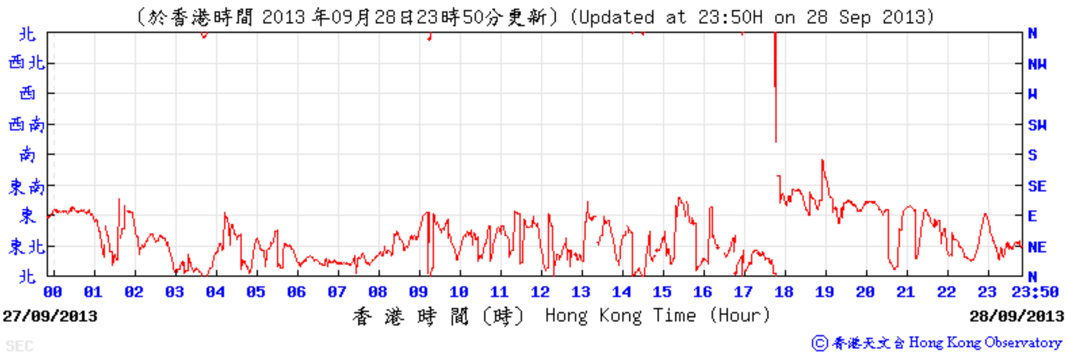
<u>21 – 22 September 2013</u>





<u>27 – 28 September 2013</u>





Annex K

Waste Flow Table

Annex K – Waste Flow Table

Monthly Summary Waste Flow Table for the year 2012-2013

Month	Actual Quantities of Inert C&D Materials Generated Monthly						Actual Quantities of Non-inert C&D Wastes Generated Monthly					Imported Fill
	Total Quantity Generated	Hard Rocks and Large Broken Concrete (See Note 3)	Reused in the Contract	Reused in other Projects	Disposed as Public Fill (See Note 5)	Inert C&D Materials Delivered to 1108A Kai Tai Barging Facilities (See Note 6)	Metals	Paper/ cardboard packaging	Plastics (See Note 2)	Chemical Waste (See Note 10)	Others, e.g. general refuse (See Note 5)	
	(in '000m^3)	(in '000m^3)	(in '000m^3)	(in '000m^3)	(in '000m^3)	(in '000m^3)	(in '000kg)	(in '000kg)	(in '000kg)	(in'000kg)	(in '000m^3)	(in '000m^3)
Jan	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
Feb	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
Mar	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
Apr	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
May	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
June	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
July	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
Aug	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
Sub-total												
Sept	0.004	0.000	0.000	0.000	0.004	-	0.000	0.000	5.300	0.000	0.144	0.000
Oct	0.000	0.000	0.000	0.000	0.000	-	12.800	0.242	0.013	0.000	0.514	0.000
Nov	0.624	0.000	0.605	0.000	0.019	-	0.000	0.154	0.002	0.000	0.172	6.804
Dec	16.844	0.000	0.000	0.000	0.005	16.839	0.000	0.000	0.000	0.000	0.057	0.000
Jan	19.828	0.000	0.000	0.000	0.006	19.822	0.000	0.036 (See Note 7)	0.416	0.000	0.081 (See Note 8)	0.000
Feb	8.372	0.000	0.000	0.000	0.005	8.366	0.000	0.036	0.443	0.000	0.021	0.000
March	14.673	0.000	0.000	0.000	0.000	14.673	0.000	0.036	0.463	0.000	0.064 (See Note 9)	0.000
April	13.557	0.000	0.000	0.000	0.025	13.533	0.000	0.036	0.148	0.000	0.086	0.000
May	9.969	0.000	0.000	0.000	0.000	9.969	0.000	0.000	0.481	0.000	0.065	0.000
June	5.538	0.000	0.000	0.000	0.000	5.538	0.000	0.045	0.784	0.32 (See Note 11)	0.065	0.000
July	6.116	0.000	0.000	0.000	0.000	6.116	0.000	0.063	0.868	0.400	0.058	0.000
August	11.537	0.000	0.000	0.000	0.000	11.537	0.000	0.068	0.464	0.000	0.071	0.000
September	4.641	0.000	0.000	0.000	0.000	4.641	0.000	0.027	0.522	0.000	0.110	0.000
Total	111.704	0.000	0.605	0.000	0.064	111.034	12.800	0.707	9.904	0.720	1.363	6.804

Notes:

-1 The performance targets are given below:

- All excavated materials to be sorted for recovering the inert portion of C&D materials, e.g. hard rocks, soil and broken concrete, for reuse on the Site or disposal to designated outlets;
- All metallic waste to be recovered for collection by recycling contractors;
- All cardboard and paper packaging (for plant, equipment and materials) to be recovered, properly stockpiled in dry and covered condition to prevent cross contamination;
- All chemical wastes to be collected and properly disposed of by specialist contractors; and
- All demolition debris to be stored to recover broken concrete, reinforcement bars, mechanical and electrical fittings, hardware as well as other fitting / materials that have established recycling outlets.

-2 Plastics refer to plastic bottles/containers, plastic sheets/foam from packaging material.

-3 Broken concrete for recycling into aggregates.

-4 The waste flow table shall also include C&D materials that are specified in the Contract to be imported for use at the Site.

-5 Density Assumption: 1.6(kg/l) for Public Fill and 0.9(kg/l) for General Refuse

-6 Inert C&D Material was delivered to contract 1108A from 10-Dec-2012.

-7 The quantity of paper/ cardboard packaging generated in January 2013 was updated by the Contractor in March 2013.

-8 The quantity of general refuse generated in January 2013 was updated by the Contractor in March 2013.

-9 The quantity of general refuse generated in March 2013 was updated by the Contractor in April 2013.

-10 Chemical waste includes waste oil. It is assumed density of waste oil to be 0.8 kg/L.

-11 The quantity of chemical waste generated in June 2013 was updated by the Contractor in August 2013.

Annex L

Investigation reports

Investigation Report of Environmental Quality Limit Exceedance

Date	29 July 2013
Time	09:31 – 10:01; 10:01 – 10:31; 10:31 – 11:01
Monitoring Location	MTW-16-1 SKH Good Shepherd Primary School
Parameter	Noise, $L_{Aeq\ (30mins)}$
Action / Limit Levels	78 dB(A) (according to the latest Continuous Noise Monitoring Plan, CNMP)
Measured Level (With baseline level adjustment)	83.4 dB(A) (9:31 – 10:01) 83.1 dB(A) (10:01– 10:31) 83.0 dB(A) (10:31-11:01)
Possible reason	Based on site record on 29 July 2013, the potential noise sources from the Project works were identified, including mobilizing and setting up drill rig; trench cutter maintenance works; trench excavation works; and toe grouting work at Area E3. The above-mentioned construction works were continuously operating on 29 July (before and after the exceedance period). However, the noise levels were all below the Action/Limit Levels before and after the exceedance period. Besides, concurrent works including trenching works using breaker at CLP construction works at Lok Shan Road; drilling and concrete floor breaking works at ELCHK Hung Hom Lutheran Primary School; and renovation works within SKH Good Shepard Primary School were also identified as potential noise sources contributing the measured noise levels during the exceedance period. In addition, due to the construction works, bus stop has been relocated to outside SKH Good Shepherd Primary School. There is significant traffic noise due to the increase of bus frequency and bus engine on and off during the exceedance period for background noise. It is noted that high background noise was recorded and this might contribute to general high noise levels recorded of the day. Having considered the above, the exceedances recorded are potentially project-related.
Action Taken / Action to be Taken	The following actions/noise mitigation measures/good site practice had been undertaken: 1. According to SCL EIA Section 8.4.6, the Contractor

	had considered and implemented a good site practice of scheduling the construction works to minimize the potential noise impact to the normal school class periods. 2. The mini breaker tip had been covered with acoustic fabric to mitigate the noise. Movable noise fabrics as barrier had been erected on the site hoarding. 3. The Contractor has conducted site inspections twice a day since the issue of this NOE, to collect details regarding the site activities in vicinity to the concerned works area and to check if any further mitigation measures is needed. All proposed noise mitigation measures proposed in the latest Construction Noise Mitigation Measure Plan (CNMMP) have been implemented as far as practicable. However, the Contractor will continue to review and provide sufficient and necessary mitigation measures to mitigation the noise to avoid any exceedance of the Action/Limit Level and keep reminding frontline workers to implement the noise mitigation measures accordingly. The Contractor will continue to adhere strictly to the CNMMP and to implement all relevant noise mitigation measures recommended or specified in the EIA, EM&A Manual, EMP, Method Statements, General and Particular Specifications of this Project to minimize the noise generation as far as possible and avoid exceedance of the Action/Limit Level or causing noise nuisance where practicable.
Remarks	-

Prepared by:	Winnie Ko, 1109 ET Leader
Date	11-Oct-13

Investigation Report of Environmental Quality Limit Exceedance

Date	30 July 2013
Time	8:33 – 9:03; 9:03 – 9:33;
Monitoring Location	MTW-16-1 SKH Good Shepherd Primary School
Parameter	Noise, $L_{Aeq\ (30mins)}$
Action / Limit Levels	Limit level 78 dB(A) (according to the latest Continuous Noise Monitoring Plan, CNMP)
Measured Level (With baseline level adjustment)	83.1 dB(A) (8:33 – 9:03) 82.7 dB(A) (9:03– 9:33)
Possible reason	Based on site record on 30 July 2013, the potential noise sources from the Project works were identified, including drill rig mobilization and setup; trench cutter maintenance and excavation works; and toe grouting work at Area E3. The above-mentioned construction works were continuously operating on 30 July (before and after the exceedance period). However, the noise levels were all below the Action/Limit Levels before and after the exceedance period. Besides, concurrent works including drilling and concrete floor breaking works at ELCHK Hung Hom Lutheran Primary School; was identified as potential noise sources contributing the measured noise levels during the exceedance period. In addition, due to the construction works, bus stop has been relocated to outside SKH Good Shepherd Primary School. There is significant traffic noise due to the increase of bus frequency and bus engine on and off during the exceedance period for background noise. It is noted that high background noise was recorded and this might contribute to general high noise levels recorded of the day. Having considered the above, the exceedances recorded are potentially project-related.
Action Taken / Action to be Taken	The following actions/noise mitigation measures/good site practice had been undertaken: 1. According to SCL EIA Section 8.4.6, the Contractor had considered and implemented a good site practice of scheduling the construction works to minimize the potential noise impact to the normal school class periods.

	2. The mini breaker tip had been covered with acoustic fabric to mitigate the noise. Movable noise fabrics as barrier had been erected on the site hoarding. 3. The Contractor had conducted site inspections twice a day since the issue of this NOE, to collect details regarding the site activities in vicinity to the concerned works area and to check if any further mitigation measures is needed. 4. Daily briefing on environmental issues before works had been provided to frontline workers and always keeps reminding the workers to implement noise mitigation measures. All proposed noise mitigation measures proposed in the latest Construction Noise Mitigation Measure Plan (CNMMP) have been implemented as far as practicable. However, the Contractor will continue to review and provide sufficient and necessary mitigation measures to mitigation the noise to avoid any exceedance of the Action/Limit Level and keep reminding frontline workers to implement the noise mitigation measures accordingly. The Contractor will continue to adhere strictly to the CNMMP and to implement all relevant noise mitigation measures recommended or specified in the EIA, EM&A Manual, EMP, Method Statements, General and Particular Specifications of this Project to minimize the noise generation as far as possible and avoid exceedance of the Action/Limit Level or causing noise nuisance where practicable.
Remarks	-

Prepared by: Winnie Ko, 1109 ET Leader
Date 11-Oct-13

Investigation Report of Environmental Quality Limit Exceedance

Date	06 August 2013
Time	14:08 – 14:38; 14:38 – 15:08; 15:08 – 15:38
Monitoring Location	MTW-16-1 SKH Good Shepherd Primary School
Parameter	Noise, $L_{Aeq\ (30mins)}$
Action / Limit Levels	Limit level 78 dB(A) (according to the latest Continuous Noise Monitoring Plan, CNMP)
Measured Level (With baseline level adjustment)	79.9 dB(A) (14:08 – 14:38) 82.7 dB(A) (14:38 – 15:08) 79.2 dB(A) (15:08 – 15:38)
Possible reason	Based on site record on 6 August 2013, the potential noise sources from the Project works were identified, including trench cutter excavation; concreting works; mobilization of the cutters; toe grouting works; and pipe diversion at E3 and along Ma Tau Wai Road. Pipe laying works was carried out at Lok Shan Road Site. The above-mentioned construction works were continuously operating on 6 August (before and after the exceedance period). However, the noise levels were all below the Action/Limit Levels before and after the exceedance period. Besides, concurrent works including drilling and concrete floor breaking works at ELCHK Hung Hom Lutheran Primary School; was also identified as potential noise sources contributing the measured noise levels during the exceedance period. In addition, due to the construction works, bus stop has been relocated to outside SKH Good Shepherd Primary School. There is significant traffic noise due to the increase of bus frequency and bus engine on and off during the exceedance period for background noise. It is noted that high background noise was recorded and this might contribute to general high noise levels recorded of the day. Having considered the above, the exceedance recorded during 14:38 – 15:08 is potentially project-related.
Action Taken / Action to be Taken	The following actions/noise mitigation measures/good site practice had been undertaken: 1. According to SCL EIA Section 8.4.6, the Contractor

	had considered and implemented a good site practice of scheduling the construction works to minimize the potential noise impact to the normal school class periods. 2. Noise fabrics as barrier had been erected on the site hoarding. 3. Noise fabrics had been provided for trench cutters. 4. The Contractor had conducted site inspections twice a day since the issue of this NOE, to collect details regarding the site activities in vicinity to the concerned works area and to check if any further mitigation measures is needed. 5. Daily briefing on environmental issues before works had been provided to frontline workers and always keeps reminding the workers to implement noise mitigation measures. All proposed noise mitigation measures proposed in the latest Construction Noise Mitigation Measure Plan (CNMMP) have been implemented as far as practicable. However, the Contractor will continue to review and provide sufficient and necessary mitigation measures to mitigation the noise to avoid any exceedance of the Action/Limit Level and keep reminding frontline workers to implement the noise mitigation measures accordingly. The Contractor will continue to adhere strictly to the CNMMP and to implement all relevant noise mitigation measures recommended or specified in the EIA, EM&A Manual, EMP, Method Statements, General and Particular Specifications of this Project to minimize the noise generation as far as possible and avoid exceedance of the Action/Limit Level or causing noise nuisance where practicable.
Remarks	-

Prepared by: Winnie Ko, 1109 ET Leader
Date 11-Oct-2013

Investigation Report of Environmental Quality Limit Exceedance

Date	07 August 2013
Time	13:08 – 13:38; 13:38 – 14:08;
Monitoring Location	MTW-16-1 SKH Good Shepherd Primary School
Parameter	Noise, $L_{Aeq\ (30mins)}$
Action / Limit Levels	Limit level 78 dB(A) (according to the latest Continuous Noise Monitoring Plan, CNMP)
Measured Level (With baseline level adjustment)	80.0 dB(A) (13:08 – 13:38) 79.2 dB(A) (13:38 – 14:08)
Possible reason	Based on site record on 7 August 2013, the potential noise sources from the Project works were identified, including trench cutter excavation; concreting works; mobilization of the cutters; toe grouting works; and pipe diversion at E3 and along Ma Tau Wai Road. Pipe laying works was carried out at Lok Shan Road Site. The above-mentioned construction works were continuously operating on 7 August (before and after the exceedance period). However, the noise levels were all below the Action/Limit Levels before and after the exceedance period. Besides, concurrent works including drilling and concrete floor breaking works at ELCHK Hung Hom Lutheran Primary School; was also identified as potential noise sources contributing the measured noise levels during the exceedance period. In addition, due to the construction works, bus stop has been relocated to outside SKH Good Shepherd Primary School. There is significant traffic noise due to the increase of bus frequency and bus engine on and off during the exceedance period for background noise. It is noted that high background noise was recorded and this might contribute to general high noise levels recorded of the day. Having considered the above, the exceedance recorded during 13:08 – 13:38 is potentially project-related.
Action Taken / Action to be Taken	The following actions/noise mitigation measures/good site practice had been undertaken: 1. According to SCL EIA Section 8.4.6, the Contractor had considered and implemented a good site practice of scheduling the construction works to

	minimize the potential noise impact to the normal school class periods. 2. Noise fabrics as barrier had been erected on the site hoarding. 3. Noise fabrics had been provided for trench cutters. 4. The Contractor has conducted site inspections twice a day since the issue of this NOE, to collect details regarding the site activities in vicinity to the concerned works area and to check if any further mitigation measures is needed. 5. Daily briefing on environmental issues before works had been provided to frontline workers and always keeps reminding the workers to implement noise mitigation measures. All proposed noise mitigation measures proposed in the latest Construction Noise Mitigation Measure Plan (CNMMP) have been implemented as far as practicable. However, the Contractor will continue to review and provide sufficient and necessary mitigation measures to mitigation the noise to avoid any exceedance of the Action/Limit Level and keep reminding frontline workers to implement the noise mitigation measures accordingly. The Contractor will continue to adhere strictly to the CNMMP and to implement all relevant noise mitigation measures recommended or specified in the EIA, EM&A Manual, EMP, Method Statements, General and Particular Specifications of this Project to minimize the noise generation as far as possible and avoid exceedance of the Action/Limit Level or causing noise nuisance where practicable.
Remarks	-

Prepared by: Winnie Ko, 1109 ET Leader
Date 11-Oct-13

Investigation Report of Environmental Quality Limit Exceedance

Date	08 August 2013
Time	09:08 – 09:38; 09:38 – 10:08;
Monitoring Location	MTW-16-1 SKH Good Shepherd Primary School
Parameter	Noise, $L_{Aeq\ (30mins)}$
Action / Limit Levels	Limit level 78 dB(A) (according to the latest Continuous Noise Monitoring Plan, CNMP)
Measured Level (With baseline level adjustment)	80.5 dB(A) (09:08 – 09:38) 79.9 dB(A) (09:38 – 10:08)
Possible reason	Based on site record on 8 August 2013, the potential noise sources from the Project works were identified, including trench cutter excavation; concreting works; mobilization of the cutters; toe grouting works; and pipe diversion at E3 and along Ma Tau Wai Road. Pipe laying works was carried out at Lok Shan Road Site. The above-mentioned construction works were continuously operating on 8 August (before and after the exceedance period). However, the noise levels were all below the Action/Limit Levels before and after the exceedance period. Besides, concurrent works including drilling and concrete floor breaking works at ELCHK Hung Hom Lutheran Primary School; was identified as potential noise sources contributing the measured noise levels during the exceedance period. In addition, due to the construction works, bus stop has been relocated to outside SKH Good Shepherd Primary School. There is significant traffic noise due to the increase of bus frequency and bus engine on and off during the exceedance period for background noise. It is noted that high background noise was recorded and this might contribute to general high noise levels recorded of the day. Having considered the above, the exceedances recorded are potentially project-related.
Action Taken / Action to be Taken	The following actions/noise mitigation measures/good site practice had been undertaken: 1. According to SCL EIA Section 8.4.6, the Contractor had considered and implemented a good site practice of scheduling the construction works to minimize the potential noise impact to the normal

	school class periods. 2. Noise fabrics as barrier had been erected on the site hoarding. 3. Noise fabrics had been provided for trench cutters. 4. The Contractor has conducted site inspections twice a day since the issue of this NOE, to collect details regarding the site activities in vicinity to the concerned works area and to check if any further mitigation measures is needed. 5. Daily briefing on environmental issues before works had been provided to frontline workers and always keeps reminding the workers to implement noise mitigation measures. All proposed noise mitigation measures proposed in the latest Construction Noise Mitigation Measure Plan (CNMMP) have been implemented as far as practicable. However, the Contractor will continue to review and provide sufficient and necessary mitigation measures to mitigation the noise to avoid any exceedance of the Action/Limit Level and keep reminding frontline workers to implement the noise mitigation measures accordingly. The Contractor will continue to adhere strictly to the CNMMP and to implement all relevant noise mitigation measures recommended or specified in the EIA, EM&A Manual, EMP, Method Statements, General and Particular Specifications of this Project to minimize the noise generation as far as possible and avoid exceedance of the Action/Limit Level or causing noise nuisance where practicable.
Remarks	-

Prepared by: Winnie Ko, 1109 ET Leader
Date 11-Oct-13

Investigation Report of Environmental Quality Limit Exceedance

Date	20 August 2013
Time	10:07 – 10:37; 10:37 – 11:07;
Monitoring Location	MTW-16-1 SKH Good Shepherd Primary School
Parameter	Noise, $L_{Aeq\ (30mins)}$
Action / Limit Levels	Limit level 78 dB(A) (according to the latest Continuous Noise Monitoring Plan, CNMP)
Measured Level (With baseline level adjustment)	78.5 dB(A) (10:07 – 10:37) 80.5 dB(A) (10:37 – 11:07)
Possible reason	Based on site record on 20 August 2013, the potential noise sources from the Project works were identified, including trench excavation, excavation for pipe diversion at E3 and drilling works at E6. Installation of shoring was carried out at Lok Shan Road Site. The above-mentioned construction works were continuously operating on 20 August (before and after the exceedance period). However, the noise levels were all below the Action/Limit Levels before and after the exceedance period. In addition, due to the construction works, bus stop has been relocated to outside SKH Good Shepherd Primary School. There is significant traffic noise due to the increase of bus frequency and bus engine on and off during the exceedance period for background noise. It is noted that high background noise was recorded and this might contribute to general high noise levels recorded of the day. Having considered the above, the exceedance recorded during 10:37 - 11:07 is potentially project-related.
Action Taken / Action to be Taken	The following actions/noise mitigation measures/good site practice had been undertaken: 1. According to SCL EIA Section 8.4.6, the Contractor had considered and implemented a good site practice of scheduling the construction works to minimize the potential noise impact to the normal school class periods. 2. Noise fabrics as barrier had been erected on the site hoarding. 3. Noise fabrics had been provided for trench cutters.

	4. The Contractor has conducted site inspections twice a day since the issue of this NOE, to collect details regarding the site activities in vicinity to the concerned works area and to check if any further mitigation measures is needed. 5. Daily briefing on environmental issues before works had been provided to frontline workers and always keeps reminding the workers to implement noise mitigation measures. All proposed noise mitigation measures proposed in the latest Construction Noise Mitigation Measure Plan (CNMMP) have been implemented as far as practicable. However, the Contractor will continue to review and provide sufficient and necessary mitigation measures to mitigation the noise to avoid any exceedance of the Action/Limit Level and keep reminding frontline workers to implement the noise mitigation measures accordingly. The Contractor will continue to adhere strictly to the CNMMP and to implement all relevant noise mitigation measures recommended or specified in the EIA, EM&A Manual, EMP, Method Statements, General and Particular Specifications of this Project to minimize the noise generation as far as possible and avoid exceedance of the Action/Limit Level or causing noise nuisance where practicable.
Remarks	-

Prepared by: Winnie Ko, 1109 ET Leader
Date 11-Oct-13

Investigation Report of Environmental Quality Limit Exceedance

Date	21 August 2013
Time	07:57 – 08:27; 08:27 – 08:57; 08:57 – 09:27; 13:57 – 14:27; 14:27 – 14:57; 14:57 – 15:27; 16:27 – 16:57; 16:57 – 17:27;
Monitoring Location	MTW-16-1 SKH Good Shepherd Primary School
Parameter	Noise, $L_{Aeq\ (30mins)}$
Action / Limit Levels	Limit level 78 dB(A) (according to the latest Continuous Noise Monitoring Plan, CNMP)
Measured Level (With baseline level adjustment)	80.7 dB(A) (07:57 – 08:27) 78.7 dB(A) (08:27 – 08:57) 78.5 dB(A) (08:57 – 09:27) 78.7 dB(A) (13:57 – 14:27) 81.6 dB(A) (14:27 – 14:57) 81.6 dB(A) (14:57 – 15:27) 78.7 dB(A) (16:27 – 16:57) 79.0 dB(A) (16:57 – 17:27)
Possible reason	Based on site record on 21 August 2013, the potential noise sources from the Project works were identified, including concreting works, BC cutter mobilization, trench excavation and excavation for pipe diversion at E3; drilling works at E6. Laying of gas pipe by gas company and pipe installation was carried out on MTW Road and Lok Shan Road, respectively. The above-mentioned construction works were continuously operating on 21 August (before and after the exceedance period). However, the noise levels were all below the Action/Limit Levels before and after the exceedance period. In addition, due to the construction works, bus stop has been relocated to outside SKH Good Shepherd Primary School. There is significant traffic noise due to the increase of bus frequency and bus engine on and off during the exceedance period for background noise. It is noted that high background noise was recorded and this might contribute to general high noise levels recorded of the day. Having considered the above, the exceedances recorded during the following time periods are potentially project-related: 07:57 - 08:27, 14:27 - 14:57 and 14:57 - 15:27.
Action Taken / Action to be Taken	The following actions/noise mitigation measures/good site practice had been undertaken: 1. According to SCL EIA Section 8.4.6, the Contractor

	had considered and implemented a good site practice of scheduling the construction works to minimize the potential noise impact to the normal school class periods. 2. Noise fabrics as barrier had been erected on the site hoarding. 3. Noise fabrics had been provided for trench cutters. 4. The Contractor has conducted site inspections twice a day since the issue of this NOE, to collect details regarding the site activities in vicinity to the concerned works area and to check if any further mitigation measures is needed. 5. Daily briefing on environmental issues before works had been provided to frontline workers and always keeps reminding the workers to implement noise mitigation measures. All proposed noise mitigation measures proposed in the latest Construction Noise Mitigation Measure Plan (CNMMP) have been implemented as far as practicable. However, the Contractor will continue to review and provide sufficient and necessary mitigation measures to mitigation the noise to avoid any exceedance of the Action/Limit Level and keep reminding frontline workers to implement the noise mitigation measures accordingly. The Contractor will continue to adhere strictly to the CNMMP and to implement all relevant noise mitigation measures recommended or specified in the EIA, EM&A Manual, EMP, Method Statements, General and Particular Specifications of this Project to minimize the noise generation as far as possible and avoid exceedance of the Action/Limit Level or causing noise nuisance where practicable.
Remarks	

Prepared by: Winnie Ko, 1109 ET Leader
Date 11-Oct-13

Investigation Report of Environmental Quality Limit Exceedance

Date	22 August 2013
Time	10:07 – 10:37; 10:37 – 11:07; 11:07 – 11:37;
Monitoring Location	MTW-16-1 SKH Good Shepherd Primary School
Parameter	Noise, $L_{Aeq\ (30mins)}$
Action / Limit Levels	Limit level - 79 dB(A) (according to the latest Continuous Noise Monitoring Plan, CNMP)
Measured Level (With baseline level adjustment)	79.5 dB(A) (10:07 – 10:37) 80.5 dB(A) (10:37 – 11:07) 90.1 dB(A) (11:07 – 11:37)
Possible reason	Based on site record on 22 August 2013, the potential noise sources from the Project works were identified, including concreting works, BC cutter mobilization, trench excavation and excavation for pipe diversion at E3; drill rig mobilization at E6. Installation of shoring was carried out at the worksite at Lok Shan Road. Based on Hong Kong Observatory weather report on 22 August 2013, the weather is cloudy with a few showers and 20.1mm rainfall was recorded. According to the international practice for noise measurement, noise measured during rain and high wind speed should not be counted. Considering the relationship between the works and the measured noise level, it is believed that the works and rain noise would contribute to the measured noise levels but it is uncertain whether the works or rain noise would be dominant noise source, so the exceedance were considered as non-conclusive.
Action Taken / Action to be Taken	The following actions/noise mitigation measures/site practice had been undertaken: 1. According to SCL EIA Section 8.4.6, the Contractor had considered and implemented a good site practice of scheduling the construction works to minimize the potential noise impact to the normal school class periods. 2. Noise fabrics as barrier had been erected on the site hoarding. 3. Noise fabrics had been provided for trench cutters. 4. The Contractor has conducted site inspections twice a day since the issue of this NOE, to collect details regarding the site activities in vicinity to

	the concerned works area and to check if any further mitigation measures is needed. All proposed noise mitigation measures proposed in the latest Construction Noise Mitigation Measure Plan (CNMMP) have been implemented as far as practicable. However, the Contractor will continue to review and provide sufficient and necessary mitigation measures to mitigation the noise to avoid any exceedance of the Action/Limit Level and keep reminding frontline workers to implement the noise mitigation measures accordingly. The Contractor will continue to adhere strictly to the CNMMP and to implement all relevant noise mitigation measures recommended or specified in the EIA, EM&A Manual, EMP, Method Statements, General and Particular Specifications of this Project to minimize the noise generation as far as possible and avoid exceedance of the Action/Limit Level or causing noise nuisance where practicable.
Remarks	-

Prepared by: Winnie Ko, 1109 ET Leader
Date 11-Oct-13

Investigation Report of Environmental Quality Limit Exceedance

Date	23 August 2013
Time	09:04 – 09:34; 09:34 – 10:04; 10:04 – 10:34; 10:34 – 11:04; 11:04 – 11:34; 11:34 – 12:04; 15:34 – 16:04; 16:04 – 16:34; 16:34 – 17:04; 17:04 – 17:34; 17:34 – 18:04.
Monitoring Location	MTW-16-1 SKH Good Shepherd Primary School
Parameter	Noise, $L_{Aeq\ (30mins)}$
Action / Limit Levels	Limit level - 79 dB(A) (according to the latest Continuous Noise Monitoring Plan, CNMP)
Measured Level (With baseline level adjustment)	89.6 dB(A) (09:04 – 09:34); 84.4 dB(A) (09:34 – 10:04); 80.7 dB(A) (10:04 – 10:34); 82.7 dB(A) (10:34 – 11:04); 84.6 dB(A) (11:04 – 11:34); 79.7 dB(A) (11:34 – 12:04); 80.5 dB(A) (15:34 – 16:04); 84.4 dB(A) (16:04 – 16:34); 84.6 dB(A) (16:34 – 17:04); 83.1 dB(A) (17:04 – 17:34); 80.9 dB(A) (17:34 – 18:04).
Possible reason	Based on site record on 23 August 2013, the potential noise sources from the Project works were identified, including concreting works, trench excavation and excavation for pipe diversion at E3; drilling works at E6. Concreting work for storm pipe at the Lok Shan Road worksite. Based on Hong Kong Observatory weather report on 23 August 2013, the weather is cloudy with a few showers and 26 mm rainfall was recorded. According to the international practice for noise measurement, noise measured during rain and high wind speed should not be counted. Considering the relationship between the works and the measured noise level, it is believed that the works and rain noise would contribute to the measured noise levels but it is uncertain whether the works or rain noise would be dominant noise source, so the exceedance were considered as non-conclusive.
Action Taken / Action to be Taken	The following actions/noise mitigation measures had been undertaken: 1. According to SCL EIA Section 8.4.6, the Contractor had considered and implemented a good site practice of scheduling the construction works to minimize the potential noise impact to the normal school class periods. 2. Noise fabrics as barrier had been erected on the site hoarding.

	3. Noise fabrics had been provided for trench cutters. 4. The Contractor has conducted site inspections twice a day since the issue of this NOE, to collect details regarding the site activities in vicinity to the concerned works area and to check if any further mitigation measures is needed. All proposed noise mitigation measures proposed in the latest Construction Noise Mitigation Measure Plan (CNMMP) have been implemented as far as practicable. However, the Contractor will continue to review and provide sufficient and necessary mitigation measures to mitigation the noise to avoid any exceedance of the Action/Limit Level and keep reminding frontline workers to implement the noise mitigation measures accordingly. The Contractor will continue to adhere strictly to the CNMMP and to implement all relevant noise mitigation measures recommended or specified in the EIA, EM&A Manual, EMP, Method Statements, General and Particular Specifications of this Project to minimize the noise generation as far as possible and avoid exceedance of the Action/Limit Level or causing noise nuisance where practicable.
Remarks	-

Prepared by: Winnie Ko, 1109 ET Leader
Date 11-Oct-13

Investigation Report of Environmental Quality Limit Exceedance

Date	24 August 2013
Time	08:04 – 08:34; 08:34 – 09:04; 09:04 – 09:34; 09:34 – 10:04; 10:04 – 10:34; 10:34 – 11:04; 11:04 – 11:34; 11:34 – 12:04; 12:34 – 13:04; 13:04 – 13:34; 13:34 – 14:04; 14:04 – 14:34; 14:34 – 15:04; 15:04 – 15:34; 15:34 – 16:04; 16:04 – 16:34; 16:34 – 17:04; 17:04 – 17:34.
Monitoring Location	MTW-16-1 SKH Good Shepherd Primary School
Parameter	Noise, $L_{Aeq\ (30mins)}$
Action / Limit Levels	Limit level - 79 dB(A) (according to the latest Continuous Noise Monitoring Plan, CNMP)
Measured Level (With baseline level adjustment)	82.5 dB(A) (08:04 – 08:34); 82.7 dB(A) (08:34 – 09:04); 83.8 dB(A) (09:04 – 09:34); 84.7 dB(A) (09:34 – 10:04); 83.0 dB(A) (10:04 – 10:34); 82.3 dB(A) (10:34 – 11:04); 82.8 dB(A) (11:04 – 11:34); 80.9 dB(A) (11:34 – 12:04); 79.7 dB(A) (12:34 – 13:04); 82.8 dB(A) (13:04 – 13:34); 83.7 dB(A) (13:34 – 14:04); 83.0 dB(A) (14:04 – 14:34); 83.9 dB(A) (14:34 – 15:04); 83.2 dB(A) (15:04 – 15:34); 83.0 dB(A) (15:34 – 16:04); 82.3 dB(A) (16:04 – 16:34); 82.9 dB(A) (16:34 – 17:04); 80.3 dB(A) (17:04 – 17:34).
Possible reason	Based on site record on 24 August 2013, the potential noise sources from the Project works were identified, including concreting works, trench excavation and excavation for pipe diversion at E3; drilling works at E6. Excavation and shoring installation works at the Lok Shan Road worksite. Based on Hong Kong Observatory weather report on 24 August 2013, the weather is cloudy with a few showers and 51.6 mm rainfall was recorded. According to the international practice for noise measurement, noise measured during rain and high wind speed should not be counted. Considering the relationship between the works and the measured noise level, it is believed that the works and rain noise would contribute to the measured noise levels but it is uncertain whether the works or rain noise would be dominant noise source, so the exceedance were considered as non-conclusive.
Action Taken / Action to be Taken	The following actions/noise mitigation measures/site practice had been undertaken: 1. According to SCL EIA Section 8.4.6, the Contractor had considered and implemented a good site practice of scheduling the construction works to minimize the potential noise impact to the normal

	school class periods. 2. Noise fabrics as barrier had been erected on the site hoarding. 3. Noise fabrics had been provided for trench cutters. 4. The Contractor had conducted site inspections twice a day since the issue of this NOE, to collect details regarding the site activities in vicinity to the concerned works area and to check if any further mitigation measures is needed. All proposed noise mitigation measures proposed in the latest Construction Noise Mitigation Measure Plan (CNMMP) have been implemented as far as practicable. However, the Contractor will continue to review and provide sufficient and necessary mitigation measures to mitigation the noise to avoid any exceedance of the Action/Limit Level and keep reminding frontline workers to implement the noise mitigation measures accordingly. The Contractor will continue to adhere strictly to the CNMMP and to implement all relevant noise mitigation measures recommended or specified in the EIA, EM&A Manual, EMP, Method Statements, General and Particular Specifications of this Project to minimize the noise generation as far as possible and avoid exceedance of the Action/Limit Level or causing noise nuisance where practicable.
Remarks	-

Prepared by: Winnie Ko, 1109 ET Leader
Date 11-Oct-13

Investigation Report of Environmental Quality Limit Exceedance

Date	26 August 2013
Time	07:39 – 08:09; 08:09 – 08:39; 08:39 – 09:09; 09:09 – 09:39; 09:39 – 10:09; 10:09 – 10:39; 10:39 – 11:09; 11:09 – 11:39; 12:39 – 13:09; 13:09 – 13:39; 13:39 – 14:09; 14:09 – 14:39; 14:39 – 15:09; 15:09 – 15:39; 15:39 – 16:09.
Monitoring Location	MTW-16-1 SKH Good Shepherd Primary School
Parameter	Noise, $L_{Aeq\ (30mins)}$
Action / Limit Levels	Limit level - 79 dB(A) (according to the latest Continuous Noise Monitoring Plan, CNMP)
Measured Level (With baseline level adjustment)	79.6 dB(A) (07:39 – 08:09); 83.2 dB(A) (08:09 – 08:39); 83.4 dB(A) (08:39 – 09:09); 82.2 dB(A) (09:09 – 09:39); 82.7 dB(A) (09:39 – 10:09); 81.2 dB(A) (10:09 – 10:39); 80.9 dB(A) (10:39 – 11:09); 81.4 dB(A) (11:09 – 11:39); 81.1 dB(A) (12:39 – 13:09); 80.5 dB(A) (13:09 – 13:39); 80.8 dB(A) (13:39 – 14:09); 81.7 dB(A) (14:09 – 14:39); 83.0 dB(A) (14:39 – 15:09); 83.1 dB(A) (15:09 – 15:39); 83.0 dB(A) (15:39 – 16:09).
Possible reason	Based on site record on 26 August 2013, the potential noise sources from the Project works were identified, including concreting works, excavation and installation of water pipe for diversion at E3; drilling works at E6 and excavation and shoring installation at the worksite at Lok Shan Road; gas pipe laying work and backfilling by gas company at Ma Tau Wai road. In addition, due to the construction works, bus stop has been relocated to outside SKH Good Shepherd Primary School. There is significant traffic noise due to the increase of bus frequency and bus engine on and off during the exceedance period for background noise. It is noted that high background noise was recorded and this might contribute to general high noise levels recorded of the day. Having considered the above, the exceedances recorded during the following time periods are potentially project-related: 08:09-08:39, 08:39-09:09, 09:39-10:09, 14:39-15:09 , 15:09-15:39, 15:39-16:09.
Action Taken / Action to be Taken	The following actions/noise mitigation measures/good site practice had been undertaken: 1. According to SCL EIA Section 8.4.6, the Contractor had considered and implemented a good site practice of scheduling the construction works to minimize the potential noise impact to the normal school class periods.

	2. Noise fabrics as barrier had been erected on the site hoarding at worksites E3, E6 and at Lok Shan Road; 3. The Contractor had conducted site inspections twice a day to remind workers to implement necessary noise mitigation measures, such as erection of movable noise barrier at the excavation area, to collect details regarding the site activities in vicinity to the concerned works area and to check if any further mitigation measures is needed; 4. Daily briefing on environmental issues before works had been provided to frontline workers and always keeps reminding the workers to implement noise mitigation measures. All proposed noise mitigation measures proposed in the latest Construction Noise Mitigation Measure Plan (CNMMP) have been implemented as far as practicable. However, the Contractor will continue to review and provide sufficient and necessary mitigation measures to mitigation the noise to avoid any exceedance of the Action/Limit Level and keep reminding frontline workers to implement the noise mitigation measures accordingly. The Contractor will continue to adhere strictly to the CNMMP and to implement all relevant noise mitigation measures recommended or specified in the EIA, EM&A Manual, EMP, Method Statements, General and Particular Specifications of this Project to minimize the noise generation as far as possible and avoid exceedance of the Action/Limit Level or causing noise nuisance where practicable.
Remarks	-

Prepared by:	Winnie Ko, 1109 ET Leader
Date	11-Oct-13

Investigation Report of Environmental Quality Limit Exceedance

Date	27 August 2013
Time	13:31 – 14:01; 14:01 – 14:31; 14:31 – 15:01; 15:01 – 15:31; 15:31 – 16:01; 16:01 – 16:31; 16:31 – 17:01.
Monitoring Location	MTW-16-1 SKH Good Shepherd Primary School
Parameter	Noise, $L_{Aeq\ (30mins)}$
Action / Limit Levels	Limit level - 79 dB(A) (according to the latest Continuous Noise Monitoring Plan, CNMP)
Measured Level (With baseline level adjustment)	79.9 dB(A) (13:31 – 14:01); 80.1 dB(A) (14:01 – 14:31); 80.4 dB(A) (14:31 – 15:01); 81.3 dB(A) (15:01 – 15:31); 80.0 dB(A) (15:31 – 16:01); 80.7 dB(A) (16:01 – 16:31); 80.0 dB(A) (16:31 – 17:01).
Possible reason	Based on site record on 27 August 2013, the potential noise sources from the Project works were identified, including concreting works, trench excavation by cutter, maintenance of BC cutter and Idling, pipe diversion and drilling works at E3; drilling works at E6 and excavation; Trench backfilling for new gas main at Ma Tau Wai road and manhole construction at Lok Shan Road. In addition, due to the construction works, bus stop has been relocated to outside SKH Good Shepherd Primary School. There is significant traffic noise due to the increase of bus frequency and bus engine on and off during the exceedance period for background noise. It is noted that high background noise was recorded and this might contribute to general high noise levels recorded of the day. Having considered the above, the exceedances recorded during the following time periods are potentially project-related: 15:01 - 15:31 and 16:01 - 16:31.
Action Taken / Action to be Taken	The following actions/noise mitigation measures/good site practice had been undertaken: 1. According to SCL EIA Section 8.4.6, the Contractor had considered and implemented a good site practice of scheduling the construction works to minimize the potential noise impact to the normal school class periods; 2. Noise fabrics had been provided for trench cutters. 3. The Contractor had conducted site inspections

	twice a day, to remind workers to implement necessary noise mitigation measures, such as erection of movable noise barrier at the excavation area, to collect details regarding the site activities in vicinity to the concerned works area, to check if any further mitigation measures is needed; 4. Daily briefing on environmental issues before works has been provided to frontline workers and keeps reminding the workers to implement noise mitigation measures. All proposed noise mitigation measures proposed in the latest Construction Noise Mitigation Measure Plan (CNMMP) have been implemented as far as practicable. However, the Contractor will continue to review and provide sufficient and necessary mitigation measures to mitigation the noise to avoid any exceedance of the Action/Limit Level and keep reminding frontline workers to implement the noise mitigation measures accordingly. The Contractor will continue to adhere strictly to the CNMMP and to implement all relevant noise mitigation measures recommended or specified in the EIA, EM&A Manual, EMP, Method Statements, General and Particular Specifications of this Project to minimize the noise generation as far as possible and avoid exceedance of the Action/Limit Level or causing noise nuisance where practicable.
Remarks	-

Prepared by: Winnie Ko, 1109 ET Leader
Date 11-Oct-13

Investigation Report of Environmental Quality Limit Exceedance

Date	28 August 2013
Time	09:01 – 09:31; 09:31 – 10:01; 10:01 – 10:31; 10:31 – 11:01; 11:01 – 11:31; 11:31 – 12:01; 16:01 – 16:31; 16:31 – 17:01.
Monitoring Location	MTW-16-1 SKH Good Shepherd Primary School
Parameter	Noise, $L_{Aeq\ (30mins)}$
Action / Limit Levels	Limit level - 79 dB(A) (according to the latest Continuous Noise Monitoring Plan, CNMP)
Measured Level (With baseline level adjustment)	80.3 dB(A) (09:01 – 09:31); 81.6 dB(A) (09:31 – 10:01); 80.0 dB(A) (10:01 – 10:31); 79.9 dB(A) (10:31 – 11:01); 80.0 dB(A) (11:01 – 11:31); 79.7 dB(A) (11:31 – 12:01); 80.4 dB(A) (16:01 –16:31); 81.7 dB(A) (16:31 – 17:01).
Possible reason	Based on site record on 28 August 2013, the potential noise sources from the Project works were identified, including plant mobilization, trench excavation by cutter, maintenance of BC cutter and Idling, pipe diversion at E3; drilling works at E6; Trench backfilling for new gas main at Ma Tau Wai road and concreting for manhole at Lok Shan Road. In addition, due to the construction works, bus stop has been relocated to outside SKH Good Shepherd Primary School. There is significant traffic noise due to the increase of bus frequency and bus engine on and off during the exceedance period for background noise. It is noted that high background noise was recorded and this might contribute to general high noise levels recorded of the day. Having considered the above, the exceedances recorded during the following time periods are potentially project-related: 09:31 - 10:01 and 16:31 - 17:01
Action Taken / Action to be Taken	The following actions/noise mitigation measures/good site practice had been undertaken: 1. According to SCL EIA Section 8.4.6, the Contractor had considered and implemented a good site practice of scheduling the construction works to minimize the potential noise impact to the normal school class periods. 2. Noise fabrics as barrier have been erected on the site hoarding at worksites E3, E6 and at Lok Shan Road; 3. Noise fabrics had been provided for trench

	cutters. 4. The Contractor has conducted site inspections twice a day, to remind workers to implement necessary noise mitigation measures, such as erection of movable noise barrier at the excavation area, to collect details regarding the site activities in vicinity to the concerned works area, to check if any further mitigation measures is needed; 5. Daily briefing on environmental issues before works has been provided to frontline workers and keeps reminding the workers to implement noise mitigation measures. All proposed noise mitigation measures proposed in the latest Construction Noise Mitigation Measure Plan (CNMMP) have been implemented as far as practicable. However, the Contractor will continue to review and provide sufficient and necessary mitigation measures to mitigation the noise to avoid any exceedance of the Action/Limit Level and keep reminding frontline workers to implement the noise mitigation measures accordingly. The Contractor will continue to adhere strictly to the CNMMP and to implement all relevant noise mitigation measures recommended or specified in the EIA, EM&A Manual, EMP, Method Statements, General and Particular Specifications of this Project to minimize the noise generation as far as possible and avoid exceedance of the Action/Limit Level or causing noise nuisance where practicable.
Remarks	-

Prepared by: Winnie Ko, 1109 ET Leader
Date 11-Oct-13

Annex M

Environmental Complaint, Environmental Summon and Prosecution

Annex M Environmental Complaint, Environmental Summon and Prosecution Log

Reporting Month	Number of Complaints in Reporting Month	Number of Summons/Prosecutions in Reporting Month
September 2012	0	0
October 2012	0	0
November 2012	0	0
December 2012	0	0
January 2013	0	0
February 2013	0	0
March 2013	0	0
April 2013	0	0
May 2013	0	0
June 2013	0	0
July 2013	0	0
August 2013	0	0
September 2013	0	0
Overall Total	0	0

Appendix C

10th EM&A Report for Works Contract 1101 –
Ma On Shan Line Modification Works

MTR Corporation Limited

Shatin to Central Link –
Tai Wai to Hung Hom Section

Monthly EM&A Report

[Period from 1 to 30 September 2013]

Works Contract 1101

Ma On Shan Modification Works

(October 2013)

Certified by: James Choi

Position: Environmental Team Leader

Date: 11 October 2013

EDMS Consulting Limited

edms

SCL Contract No. 1101

Ma On Shan Line Modification Works

Monthly EM&A Report (SCL) (September 2013)

for

Sun Fook Kong Joint Venture

Prepared By		Checked By		Approved for Issue
E Yue		A Lee		J Choi
Version	0		**Date**	3 October 2013

The information contained in this report is, to the best of our knowledge, correct at the time of printing. The interpretation and recommendations in the report are based on our experience, using reasonable professional skill and judgment, and based upon the information that was available to us. These interpretations and recommendations are not necessarily relevant to any aspect outside the restricted requirements of the brief. This report has been prepared for the sole and specific use of our client and EDMS Consulting Limited accepts no responsibility for its use by others.

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EXECUTIVE SUMMARY

Sun Fook Kong Join Venture (SFKJV) was awarded the Shatin to Central Link (SCL) Contract No. 1101 Ma On Shan Line (MOL) Modification Works (this Project). EDMS Consulting Limited (EDMS) was commissioned by SFKJV as the Environmental Team (ET) for undertaking the Environmental Monitoring and Audit (EM&A) works during the construction period. The works areas under this Project covered by Environmental Permit (EP-438/2012/C and EP-438/2012/D) for the SCL Tai Wai to Hung Hom Section (TAW-HUH) included works sites at Tai Wai Mei Tin Road, To Shek Storage Yard and Shek Mun Storage Yard of which EM&A programme according to the EM&A Manual of SCL (TAW-HUH) should be implemented.

Construction Activities

During the reporting month, major construction activities undertaken by the Contractor includes erection of steel structure of noise cover at Tai Wai Mei Tin Road.

Air Quality and Noise Monitoring

According to the EM&A Manual of SCL (TAW-HUH), there is no designated monitoring stations for work sites at Tai Wai Mei Tin Road, To Shek Storage Yard and Shek Mun Storage Yard.

Environmental Auditing

Weekly site inspections were carried out by ET to ensure proper implementation of environmental mitigation measures and compliance with environmental legislation. During the reporting month, a total of 4 site inspections were conducted and the joint site inspection with IEC was conducted on 24 September 2013. All observations, which were recorded in inspection checklist and together with the ET's recommendations, were passed to the Contractor and ER for necessary corrective action.

Waste Disposal

No C&D materials and chemical wastes were disposed off in the reporting month and no general refuse were disposed of to NENT Landfill in the reporting month.

Complaint Log

No environmental complaint was received during the reporting month.

Notification of Summon and Successful Prosecution

No Notification of Summons or successful prosecution was received during the reporting month.

Future Key Issues

No construction activity is scheduled in the upcoming months.

Reporting Changes

No reporting change was observed during the reporting month.

1. INTRODUCTION

1.1 Background

The Shatin to Central Link - Tai Wai to Hung Hom Section (hereafter referred to as SCL (TAW-HUH)) is an extension of the Ma On Shan Line (MOL) and is approximately 11 km long. It links up with the West Rail Line at Hung Hom forming a strategic east-west rail corridor. It is a Designated Project under the Environmental Impact Assessment Ordinance (Cap. 499) (EIAO).

The construction of the SCL (TAW-HUH) has been divided into a series of civil construction Works Contracts and this Works Contract 1101 covers the works sites at Tai Wai Mei Tin Road, To Shek Storage Yard and Shek Mun Storage Yard of which EM&A programme according to the EM&A Manual of SCL (TAW-HUH) should be implemented.

EDMS Consulting Limited (EDMS) was commissioned by Sun Fook Kong Joint Venture (SFKJV), the main contractor as the Environmental Team (ET) during the construction phase of SCL(TAW-HUH) for Contract No. 1101.

1.2 Description of the Construction Works

The major activities of the Construction Works include:

- Construction of noise cover over the viaduct at Tai Wai Mei Tin Road

The works areas including works sites at Tai Wai Mei Tin Road, To Shek Storage Yard and Shek Mun Storage Yard are shown in ***Appendix A*** and the updated construction programme of the construction works is shown in ***Appendix B***.

1.3 Purpose of this Report

This is the 10th monthly EM&A report summarising audit findings of the EM&A program carried out according to EM&A Manual for SCL (TAW-HUH) by ET during the reporting month in September 2013.

As there is no designated air quality, noise and water quality monitoring stations for works sites at Tai Wai Mei Tin Road, To Shek Storage Yard and Shek Mun Storage Yard, this report mainly summarises the waste management details, site inspections findings, environmental complaint records and investigations, and any notification of summons, prosecutions and corrective actions in the reporting month. This monthly EM&A Report is organised as follows:

- Section 1 Introduction
- Section 2 Project Information
- Section 3 Waste Management
- Section 4 Site Inspection
- Section 5 Environmental Complaint
- Section 6 Summary of Notification of Summons, Successful Prosecutions and Corrective Actions
- Section 7 Future Key Issues

2. PROJECT INFORMATION

2.1 Project Organization and Management Structure

The organization chart, contact detail and lines of communication with respect to the environmental management are shown in ***Appendix C***.

2.2 Construction Activities

In the reporting month, major site construction activities undertaken by the Contractor include:

Tai Wai Mei Tin Road:

- Erection of steel structure of noise cover

Offsite works areas at To Shek Storage Yard and Shek Mun Storage Yard were only used for storage of construction materials and no construction activities were carried out.

2.3 Status of License, Permit and Submissions under Environmental Protection Requirements

A summary of relevant permits and licences related to environmental protection for the Construction Works and submission under EP-438/2012/C and EP-438/2012/D for contract no. 1101 is given in *Table 1* and *Table 2* in ***Appendix D***.

3. WASTE MANAGEMENT

The status of waste management in the reporting month is summarized in the following table. Details of the quantities of waste materials generated during the reporting month are shown in the waste flow table given in ***Appendix E***.

Table 3.1 Waste Generated in the Reporting Month

Waste Type	**Quantity this month m^3**	**Cumulative-to-Date m^3**
Inert C&D materials disposed	0	13.00
Inert C&D materials recycled	0	0
Non-inert C&D materials disposed	0	0
Non-inert C&D materials recycled	0	3.00
General waste disposed of to NENT Landfill	0	117.25
Chemical waste disposed off to Chemical Waste Treatment Centre at Tsing Yi	0	0

4. SITE INSPECTION

Weekly site inspections were carried out at the sites on 6, 10, 18, 24 September 2013. The joint site inspection with IEC was carried out on 24 September 2013. All observations together with the appropriate recommended mitigation measures where necessary were recorded in the site inspection checklists that were passed to the Contractor. Major environmental deficiencies observed during the site inspection and recommendations made by the ET are given in ***Table 4.1***.

Table 4.1 Summary of Major Environmental Deficiencies in the Reporting Month

Date	Item	ET's Observations and Recommendations	Follow-up Action
6 Sep 2013	1	At Shek Mun Storage Yard – Muddy water was observed. The Contractor was advised to perform mitigation measure. i.e. place sandbags or proper measures to prevent muddy water run outside to the adjacent site area. The mitigation measures, i.e. sandbags, should be ready in next week. (Remark was raised on 20.8.2013)	Please see the remark on Item 1 of the environmental site walk on 10.9.2013.
10 Sep 2013	1	At Shek Mun Storage Yard – Muddy water was observed. The Contractor was advised to perform mitigation measure. i.e. place sandbags or proper measures to prevent muddy water run outside to the adjacent site area. The mitigation measures, i.e. sandbags, should be ready at the end of that week. (Remark was raised on 20.8.2013)	At Shek Mun Storage Yard – Proper measure to prevent muddy water run outside to adjacent site area was observed on 18.9.2013. Last observation raised since 20.8.2013 closed.
18 Sep 2013	--	No site observation	NA
24 Sep 2013	1	At Shek Mun Storage Yard – construction waste were observed. The Contractor was advised to remove the construction wastes more frequently. Sorting of the construction materials and wastes should be properly performed. Good housekeeping practices should be performed throughout the whole construction period. (Remark was raised on 24.9.2013)	The follow-up action will be reviewed in the next environmental site walk in October 2013.

Remark:
No construction activity had been carried out at To Shek Storage Yard and Shek Mun Storage Yard.

During site inspections in the reporting month, no non-conformance of implementation of environmental mitigation measures was identified. All relevant environmental mitigation measures for construction stages as stated in the EM&A Manual of SCL (TAW-HUH) was carried out properly in the reporting month. The mitigation measures implementation schedule is shown in ***Appendix F***.

5. ENVIRONMENTAL COMPLAINT

No complaint was received during the reporting month.

A log of environmental complaints is shown in ***Appendix G.*** Cumulative statistic of environmental complaints is shown in ***Table 5.1***.

Table 5.1 Cumulative Statistic of Environmental Complaint

Compliant Received in the Reporting Month	Cumulative Number of Compliant
0	0

6. SUMMARY OF NOTIFICATION OF SUMMONS, SUCCESSFUL PROSECUTIONS AND CORRECTIVE ACTIONS

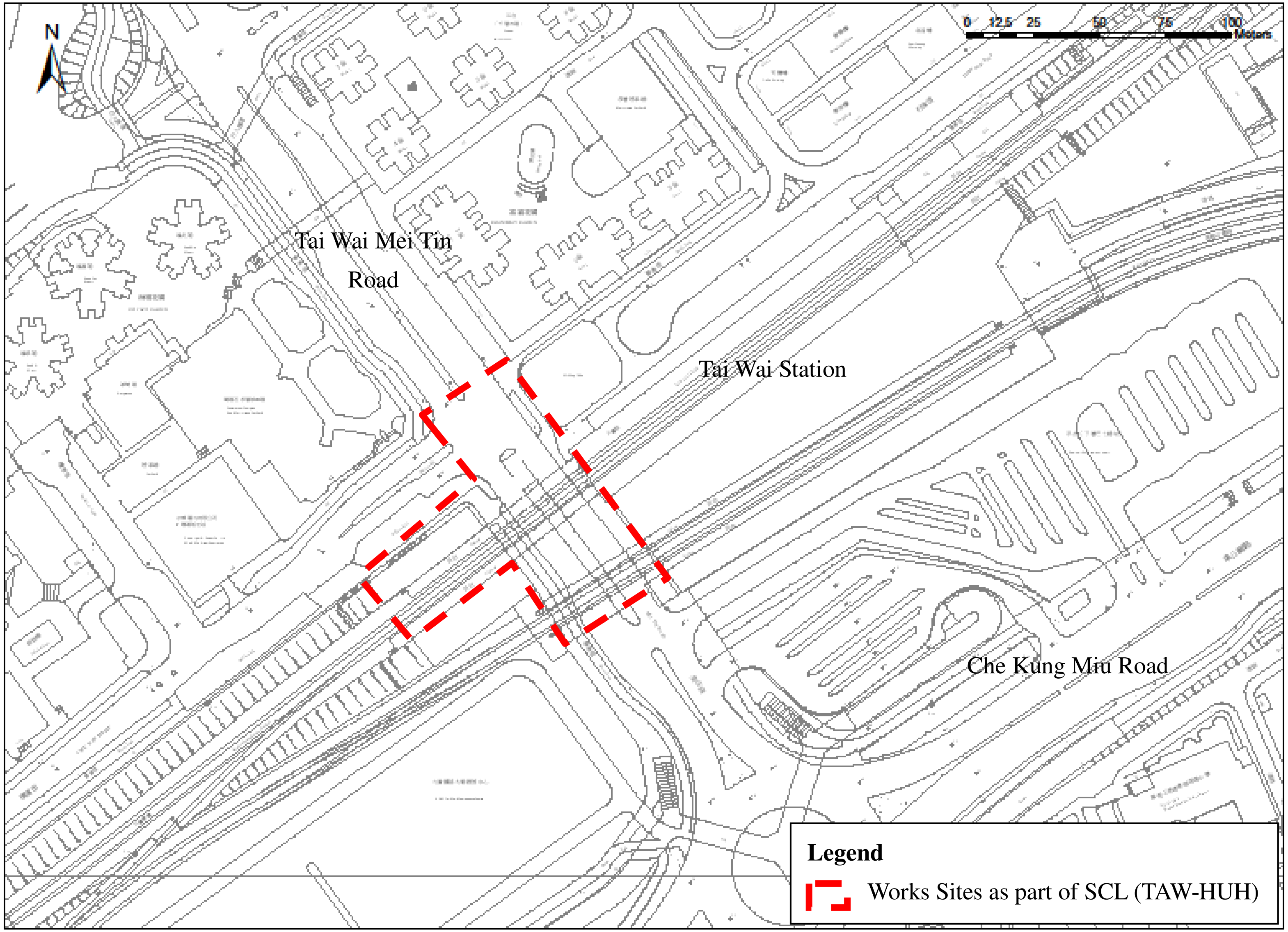
Neither Notification of Summon nor successful prosecution was received by the Contractor during the reporting month.

7. FUTURE KEY ISSUES

No construction activity is scheduled in the upcoming months.

APPENDIX A

LOCATION PLAN OF WORKS AREA AND STORAGE YARD



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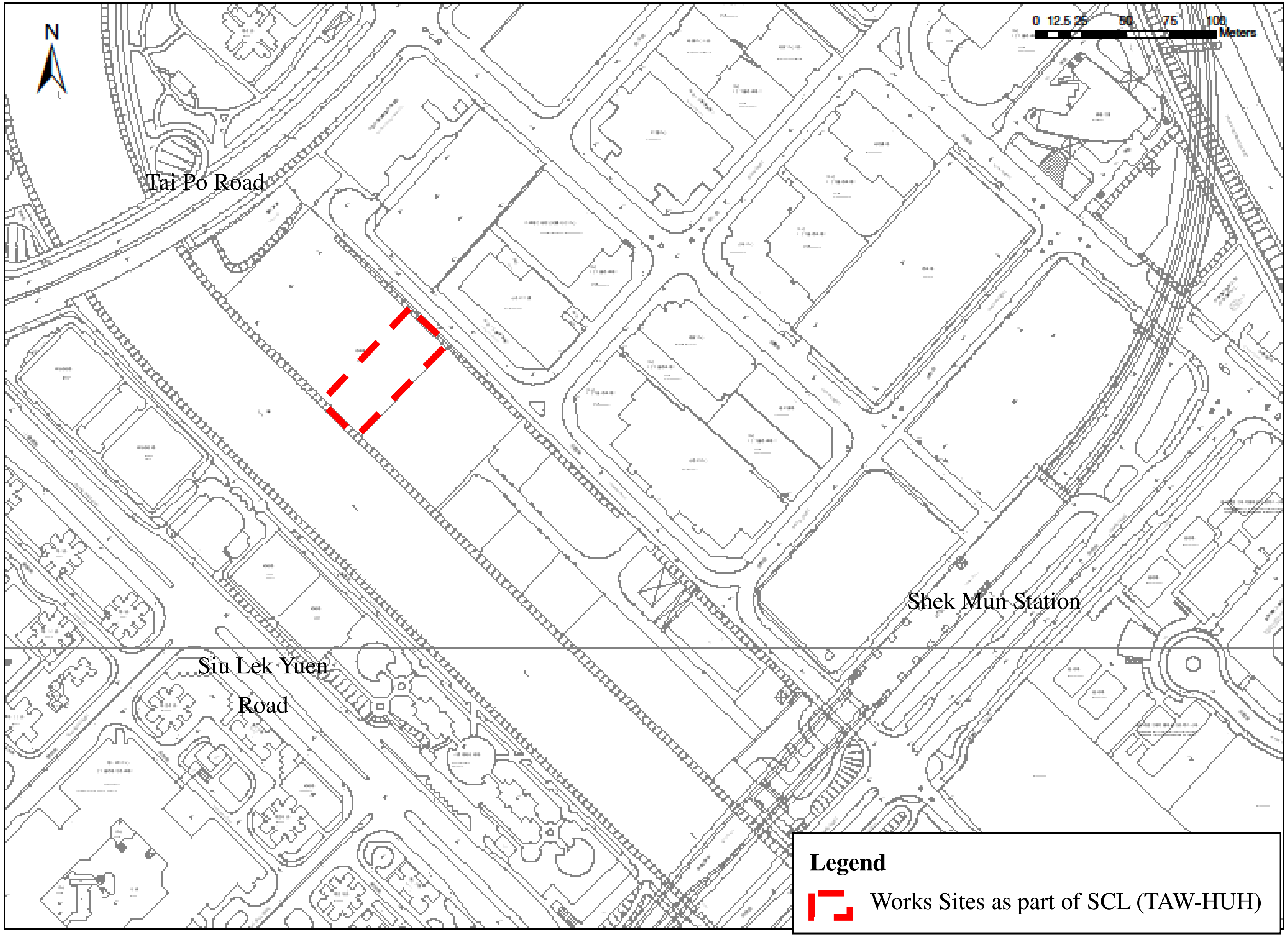
Location Plan of Works Area and Storage Yard
Tai Wai Mei Tin Road

SCALE	N.T.S.	DATE	4 June 2013	
CHECK	LYMA	DRAWN	YSWE	
Ref. SCL Contract No.1101		FIGURE NO. App A (Sheet 1 of 3)		REV 1



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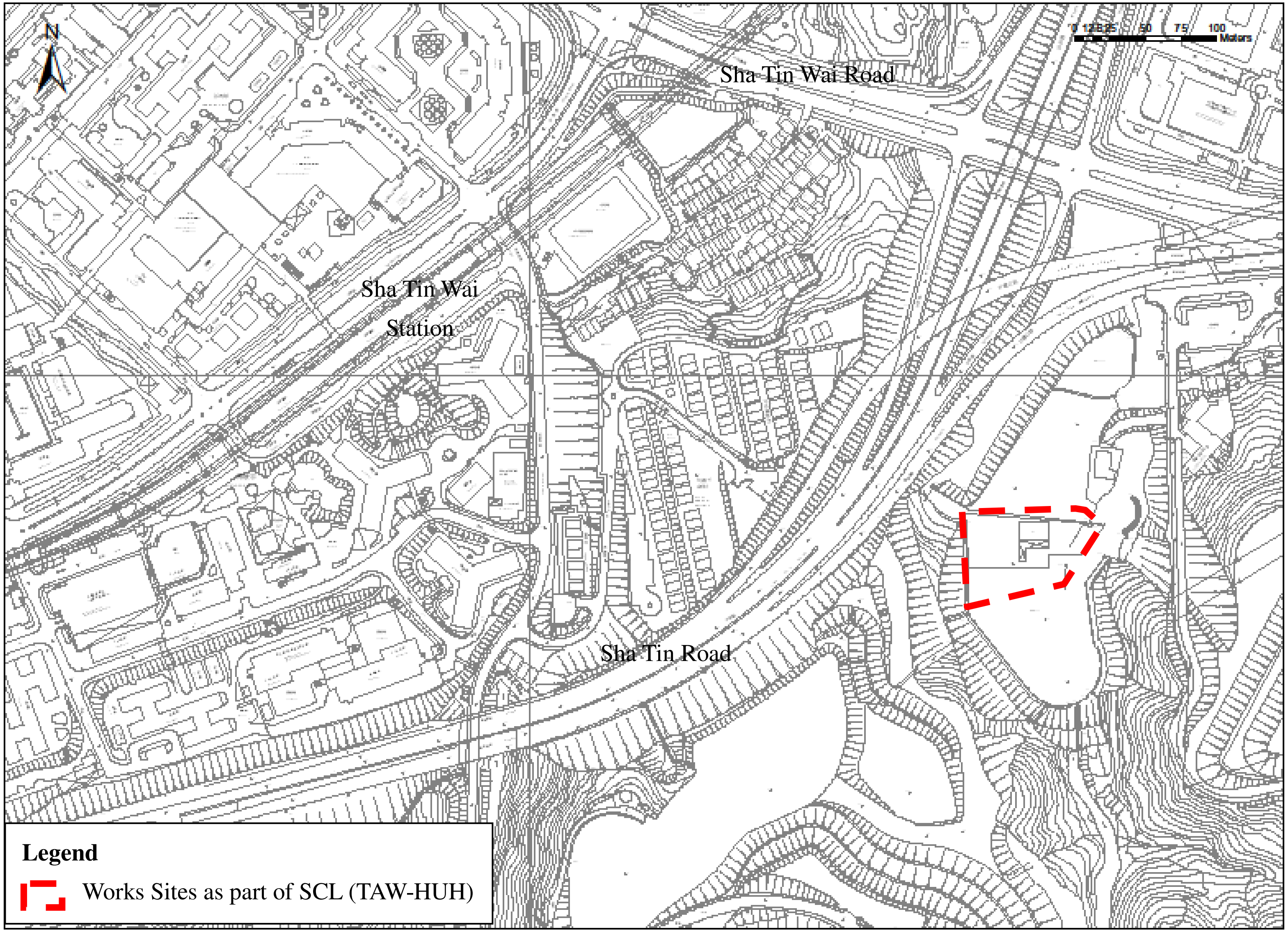
Location Plan of Works Area and Storage Yard
Shek Mun Storage Yard

SCALE	N.T.S.	DATE	4 June 2013
CHECK	LYMA	DRAWN	YSWE
Ref. SCL Contract No.1101		FIGURE NO. App A (Sheet 2 of 3)	REV 1



edms

Location Plan of Works Area and Storage Yard
To Shek Storage Yard

SCALE	N.T.S.	DATE	4 June 2013
CHECK	LYMA	DRAWN	YSWE
Ref. SCL Contract No.1101		FIGURE NO. App A (Sheet 3 of 3)	REV 1

APPENDIX B

UPDATED CONSTRUCTION PROGRAMME

Construction Programme (SCL)

		2012				2013												2014												2015												2016						
Work site	Activities	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul
Tai Wai Mei Tin Road	Noise Barrier Installation Work			I	I	I	I	I	I	I	I	I	I	I																																		

Note:
1. Abbreviation:

I	Engineering Possession (2:00 to 4:00)

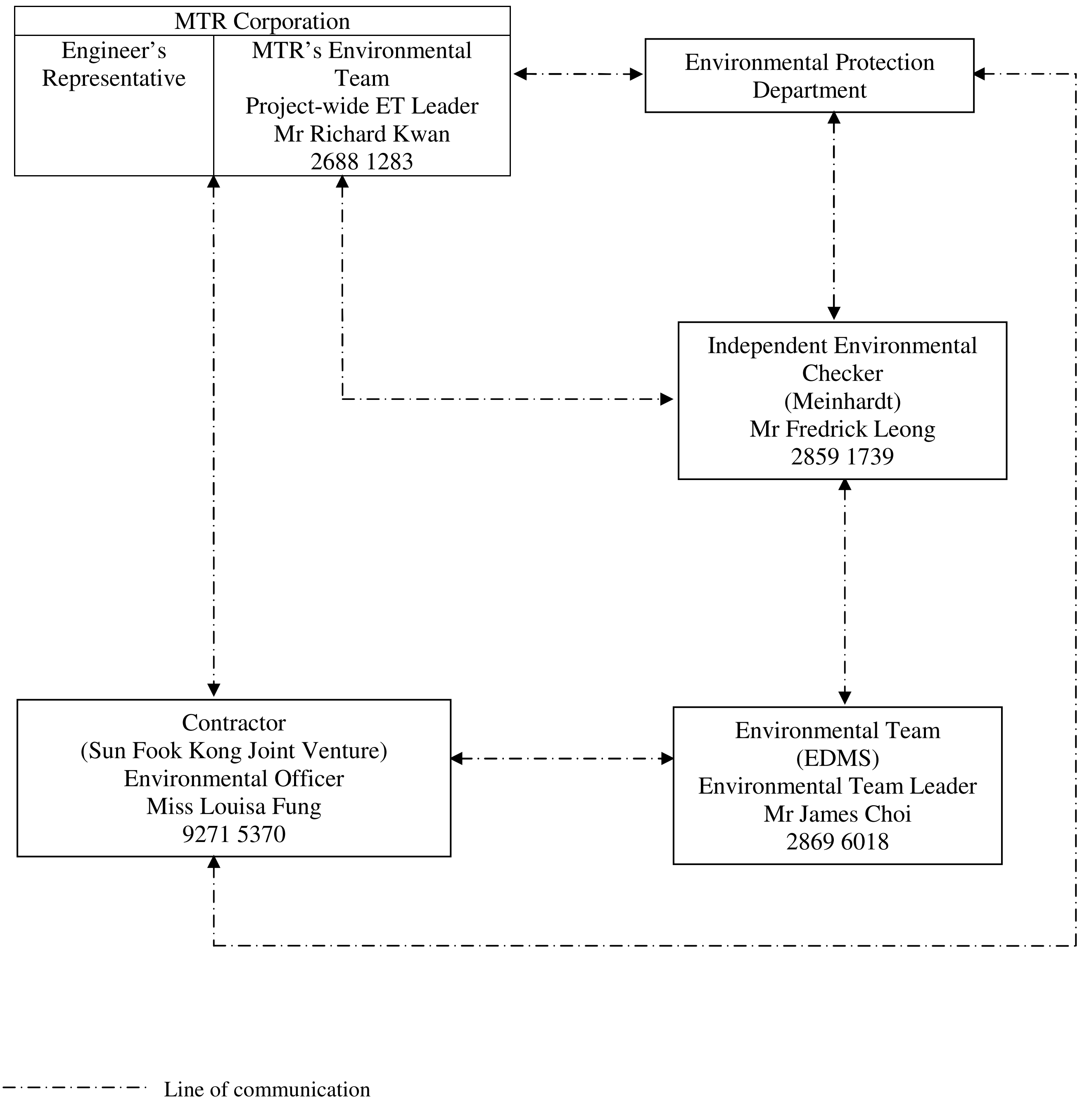
2 No construction activity had been carried out at To Shek Storage Yard and Shek Mun Storage Yard.

APPENDIX C

ORGANISATION CHART OF ENVIRONMENTAL MANAGEMENT

Appendix C Organisation Chart of Environmental Management

Project Organization Chart



APPENDIX D

STATUS OF LICENSE, PERMIT AND SUBMISSIONS UNDER ENVIRONMENTAL PROTECTION REQUIREMENTS

Appendix D Status of License, Permits and Submission under Environmental Protection Requirements

Table 1 Environmental Management Related Licenses and Permits

Subject	Reference No.	Application Date	Issued Date	Effective Date	Expired Date
Environmental Permit					
Shatin to Central Link (SCL) - Tai Wai to Hung Hom Section	EP-438/2012/C	15 April 2013	30 April 2013	30 April 2013	N/A
Shatin to Central Link (SCL) - Tai Wai to Hung Hom Section	EP-438/2012/D	30 August 2013	13 September 2013	13 September 2013	N/A
Construction Noise Permit					
Tai Wai Station (At Tai Wai Mei Tin Road)	GW-RN0433-13	19 July 2013	6 August 2013	18 August 2013	17 February 2014
Chemical Waste Producer					
Tai Wai Station (At Tai Wai Mei Tin Road)	5213-757-S3683-02	6 September 2012	8 October 2012	8 October 2012	N/A
To Shek Storage Yard	5213-759-S3683-08	10 January 2013	14 February 2013	14 February 2013	N/A
Wastewater Discharge Licence					
Tai Wai Station (At Tai Wai Mei Tin Road)	WT00014550-2012	5 November 2012	19 November 2012	19 November 2012	30 November 2017
To Shek Storage Yard	WT00014628-2012	12 November 2012	12 December 2012	12 December 2012	31 December 2017

Note: Only include those valid or under application; “N/A” for non-applicable item(s).

Table 2 Summary of Submission Status under EP-438/2012/C and EP-438/2012/D

EP Condition	Submission	Date of Submission
Condition 3.4	Monthly EM&A Report (August 2013)	13 September 2013

APPENDIX E

WASTE FLOW TABLE

Waste Flow Table for _2012_ (year) (in cu. meter) for SCL

Month	Actual Quantities of Inert C&D Materials Generated Monthly				Actual Quantities of Other C&D Wastes Generated Monthly		
	Total Quantity Generated	Reused in the Contract	Reused in Other Projects	Disposed as Public Fill	Recyclable Metals	Non-inert Waste / General Refuse	Chemical Waste
January							
February							
March							
April							
May							
June							
Sub-total							
July							
August							
September	**0.00**	0.00	0.00	0.00	0.00	0.00	0.00
October	**0.00**	0.00	0.00	0.00	0.00	0.00	0.00
November	**13.00**	0.00	0.00	13.00	0.00	26.00	0.00
December	**0.00**	0.00	0.00	0.00	0.00	0.00	0.00
Cumulative Total	**13.00**	**0.00**	**0.00**	**13.00**	**0.00**	**26.00**	**0.00**

Remark: Waste Generated from site at Tai Wai Mei Tin Road, Shek Mun Storage Yard, To Shek Storage Yard and Tai Shui Hang Storage Yard.
1 full loaded dumping truck is assumed equivalent to 6.5 m^3 by volume from Archsd D/OL03/09.002

Waste Flow Table for _2013_ (year) (in cu. meter) for SCL

Month	Actual Quantities of Inert C&D Materials Generated Monthly				Actual Quantities of Other C&D Wastes Generated Monthly		
	Total Quantity Generated	Reused in the Contract	Reused in Other Projects	Disposed as Public Fill	Recyclable Metals	Non-inert Waste / General Refuse	Chemical Waste
January	**0.00**	0.00	0.00	0.00	0.00	0.00	0.00
February	**0.00**	0.00	0.00	0.00	0.00	3.50	0.00
March	**0.00**	0.00	0.00	0.00	0.00	3.25	0.00
April	**0.00**	0.00	0.00	0.00	3.00	16.25	0.00
May	**0.00**	0.00	0.00	0.00	0.00	35.75	0.00
June	**0.00**	0.00	0.00	0.00	0.00	22.75	0.00
Sub-total	**13.00**	**0.00**	**0.00**	**13.00**	**3.00**	**107.50**	**0.00**
July	**0.00**	0.00	0.00	0.00	0.00	6.50	0.00
August	**0.00**	0.00	0.00	0.00	0.00	3.25	0.00
September	**0.00**	0.00	0.00	0.00	0.00	0.00	0.00
October							
November							
December							
Cumulative Total	**13.00**	**0.00**	**0.00**	**13.00**	**3.00**	**117.25**	**0.00**

Remark: **Waste generated from site at Tai Wai Mei Tin Road, Shek Mun Storage Yard, To Shek Storage Yard and Tai Shui Hang Storage Yard from January 2013 – April 2013.**

Waste generated from site at Tai Wai Mei Tin Road, Shek Mun Storage Yard and To Shek Storage Yard only from May 2013 onwards

Tai Shui Hang Storage Yard has been handed back to land owner on 15/04/2013

1 full loaded dumping truck is assumed equivalent to 6.5 m^3 by volume from Archsd D/OL03/09.002

APPENDIX F

MITIGATION MEASURES IMPLEMENTATION SCHEDULE FOR CONSTRUCTION STAGE

EIA Ref.	EM&A Log Ref.	Recommended Mitigation Measures	Objectives of the Recommended Measures & Main Concerns to address	Who to implement the measures?	Location of the measures	When to implement the measures?	What requirements or standards for the measures to achieve?	Status
Ecology (Construction Phase)								
S5.7	E5	Good Site Practices Impact to any habitats or local fauna should be avoided by implementing good site practices, including the containment of silt runoff within the site boundary, the containment of contaminated soils for removal from the site, appropriate storage of chemicals and chemical waste away from sites of ecological value and the provision of sanitary facilities for on-site workers. Adoption of such measures should permit waste to be suitably contained within the site for subsequent removal and appropriate disposal. The following good site practices should also be implemented: • Erection of temporary geotextile silt or sediment fences/oil traps around any earth-moving works to trap any sediments and prevent them from entering watercourses in particular the Tei Lung Hau stream; • Avoidance of soil storage against trees or close to waterbodies in particular the Tei Lung Hau stream; • Delineation of works site by erecting hoardings to prevent encroachment onto adjacent habitats and fence off areas which have some ecological value e.g. Tei Lung Hau Stream and the adjoining secondary woodland, tunnel on hill at top of slope stabilization works;	Minimise ecological impacts	Contractor	All construction sites	During construction	• ProPECC PN 1/94	^

Remarks:
^ Implement mitigation measure in the reporting month
N/A Not Applicable in the reporting month
x Non-compliance of mitigation measure
* Not satisfactory but rectified by the contractor

EIA Ref.	EM&A Log Ref.	Recommended Mitigation Measures	Objectives of the Recommended Measures & Main Concerns to address	Who to implement the measures?	Location of the measures	When to implement the measures?	What requirements or standards for the measures to achieve?	Status
		• No on-site burning of waste; • Waste and refuse in appropriate receptacles.						
Landscape & Visual (Construction Phase)								
S6.9.3	LV1	The following good site practices and measures for minimization and avoidance of potential impacts are recommended: <u>Re-use of Existing Soil</u> • For soil conservation, existing topsoil shall be re-used where possible for new planting areas within the project. The construction program shall consider using the soil removed from one phase for backfilling another. Suitable storage ground, gathering ground and mixing ground may be set up on-site as necessary. <u>No-intrusion Zone</u> • To maximize protection to existing trees, ground vegetation and the associated under storey habitats, construction contracts may designate "No-intrusion Zone" to various areas within the site boundary with rigid and durable fencing for each individual no-intrusion zone. The contractor should closely monitor and restrict the site working staff from entering the "no-intrusion zone", even for indirect construction activities and storage of equipment. <u>Protection of Retained Trees</u>	Minimize visual & landscape impact	Contractor	Within Project Site	Contraction stage	TM-EIAO	^

Remarks:

^	Implement mitigation measure in the reporting month	x	Non-compliance of mitigation measure
N/A	Not Applicable in the reporting month	*	Not satisfactory but rectified by the contractor

EIA Ref.	**EM&A Log Ref.**	**Recommended Mitigation Measures**	**Objectives of the Recommended Measures & Main Concerns to address**	**Who to implement the measures?**	**Location of the measures**	**When to implement the measures?**	**What requirements or standards for the measures to achieve?**	**Status**
		• All retained trees should be recorded photographically at the commencement of the Contract, and carefully protected during the construction period. Detailed tree protection specification shall be allowed and included in the Contract Specification, which specifying the tree protection requirement, submission and approval system, and the tree monitoring system. • The Contractor shall be required to submit, for approval, a detailed working method statement for the protection of trees prior to undertaking any works adjacent to all retained trees, including trees in contractor's works sites.						
S6.12	LV2	• <u>Decorative Hoarding</u> Erection of decorative screen during construction stage to screen off undesirable views of the construction site for visual and landscape sensitive areas. Hoarding should be designed to be compatible with the existing urban context. • <u>Management of facilities on work sites</u> To provide proper management of the facilities on the sites, give control on the height and disposition/arrangement of all facilities on the works site to minimize visual impact to adjacent VSRs. • <u>Tree Transplanting</u>	Minimize visual & landscape impact	Contractor	Within Project Site	Detailed design and construction stage	EIAO-TM ETWB TCW 2/2004 ETWB TCW 3/2006	^

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		Trees of high to medium survival rate would be affected by the works shall be transplanted where possible and practicable. Tree transplanting proposal including final location for transplanted trees shall be submitted separately to seek relevant government department's approval, in accordance with ETWB TCW No 3/2006.						
Construction Dust Impact								
S7.6.5	D1	The contractor shall follow the procedures and requirements given in the Air Pollution Control (Construction Dust) Regulation	Minimize dust impact at the nearby sensitive receivers	Contractor	All construction sites	Construction stage	• APCO • To control the dust impact to meet HKAQO and TM-EIA criteria	^
S7.6.5	D2	• Mitigation measures in form of regular watering under a good site practice should be adopted. Watering once per hour on exposed worksites and haul road in the Kowloon area and once per 1.5 hour at those in the Tai Wai area should be conducted to achieve dust removal efficiencies of 91.7%. While the above watering frequencies are to be followed, the extent of watering may vary depending on actual site conditions but should be sufficient to maintain an equivalent intensity of no less than 1.8 L/m2 to achieve the dust removal efficiency	Minimize dust impact at the nearby sensitive receivers	Contractor	All construction sites	Construction stage	• APCO • To control the dust impact to meet HKAQO and TM-EIA criteria	^

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N/A Not Applicable in the reporting month
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EIA Ref.	EM&A Log Ref.	Recommended Mitigation Measures	Objectives of the Recommended Measures & Main Concerns to address	Who to implement the measures?	Location of the measures	When to implement the measures?	What requirements or standards for the measures to achieve?	Status
S7.6.5	D3	• Proper watering of exposed spoil should be undertaken throughout the construction phase: • Any excavated or stockpile of dusty material should be covered entirely by impervious sheeting or sprayed with water to maintain the entire surface wet and then removed or backfilled or reinstated where practicable within 24 hours of the excavation or unloading; • Any dusty materials remaining after a stockpile is removed should be wetted with water and cleared from the surface of roads; • A stockpile of dusty material should not be extend beyond the pedestrian barriers, fencing or traffic cones. • The load of dusty materials on a vehicle leaving a construction site should be covered entirely by impervious sheeting to ensure that the dusty materials do not leak from the vehicle; • Where practices, vehicle washing facilities with high pressure water jet should be provided at every discernible or designated vehicle exit point. The area where vehicle washing takes place and the road section between the washing facilities and the exit point should be paved with concrete, bituminous materials or hardcores;	Minimize dust impact at the nearby sensitive receivers	Contractor	All construction sites	Construction stage	• APCO • To control the dust impact to meet HKAQO and TM-EIA criteria	^

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EIA Ref.	EM&A Log Ref.	Recommended Mitigation Measures	Objectives of the Recommended Measures & Main Concerns to address	Who to implement the measures?	Location of the measures	When to implement the measures?	What requirements or standards for the measures to achieve?	Status
		• When there are open excavation and reinstatement works, hoarding of not less than 2.4m high should be provided and properly maintained as far as practicable along the site boundary with provision for public crossing; Good site practice shall also be adopted by the Contractor to ensure the conditions of the hoardings are properly maintained throughout the construction period; • The portion of any road leading only to construction site that is within 30m of a vehicle entrance or exit should be kept clear of dusty materials; • Surface where any pneumatic or power-driven drilling, cutting, polishing or other mechanical breaking operation takes place should be sprayed with water or a dust suppression chemical continuously; • Any area that involves demolition activities should be sprayed with water or a dust suppression chemical immediately prior to, during and immediately after the activities so as to maintain the entire surface wet; • Where a scaffolding is erected around the perimeter of a building under construction, effective dust screens, sheeting or netting should be provided to enclose the scaffolding from the ground floor level of the building, or a canopy should be provided from the first floor level up to the highest level of the scaffolding; • Any skip hoist for material transport should be totally enclosed by impervious sheeting;						

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		• Every stock of more than 20 bags of cement or by pulverized fuel ash (PFA) should be covered entirely by impervious sheeting or placed in an area sheltered on the top and the 3 sides; • Cement or dry PFA delivered in bulk should be stored in a closed silo fitted with an audible high level alarm which is interlocked with the material filling line and no overfilling is allowed; • Loading, unloading, transfer, handling or storage of bulk cement or dry PFA should be carried out in a totally enclosed system or facility, and any vent or exhaust should be fitted with an effective fabric filter or equivalent air pollution control system; and • Exposed earth should be properly treated by compaction, turfing, hydroseeding, vegetation planting or sealing with latex, vinyl, bitumen, shotcrete or other suitable surface stabilizer within six months after the last construction activity on the construction site or part of the construction site where the exposed earth lies.						
Construction Noise (Airborne)								
S8.3.6	N1	Implement the following good site practices: • Only well-maintained plant should be operated on-site and plant should be serviced regularly during the construction programme;	Control construction airborne noise	Contractor	All construction sites	Construction stage	• Annex 5, TM-EIA	^

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		• Machines and plant (such as trucks, cranes) that may be in intermittent use should be shut down between work periods or should be throttled down to a minimum; • Plant down to emit noise strongly in one direction, where possible, be orientated so that the noise is directed away from nearby NSRs; • Silencers or mufflers on construction equipment should be properly fitted and maintained during the construction works; • Mobile plant should be sited as far away from NSRs as possible and practicable; • Material stockpiles, mobile container site office and other structures should be effectively utilized, where practicable, to screen noise from on-site construction activities.						
S8.3.6	N2	Install temporary hoarding located on the site boundaries between noisy construction activities and NSRs. The conditions of the hoarding shall be properly maintained throughout the construction period.	Reduce the construction noise level at low-level zone of NSRs through partial screening	Contractor	All construction sites	Construction stage	• Annex 5, TM-EIA	^
S8.3.6	N3	Install movable noise barriers (typical design is wooden framed barrier with a small-cantilevered on a skid footing with 25mm thick internal sound absorptive lining), acoustic mat or full enclosure, screen the noisy plants including air compressor, generators and saw.	Screen the noisy plant items to be used at all construction sites	Contractor	All construction sites where practicable	Construction stage	• Annex 5, TM-EIA	^

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S8.3.6	N4	Use “Quiet plants”	Reduce the noise levels of plant items	Contractor	All construction sites where practicable	Construction stage	• Annex 5, TM-EIA	^
S8.3.6	N5	Sequencing operation of construction plants where practicable	Operate sequentially within the same work site to reduce the construction airborne noise	Contractor	All construction sites where practicable	Construction stage	• Annex 5, TM-EIA	^
Water Quality (Construction Phase)								
S10.7.1	W1	In accordance with the Practice Noise for Professional Persons on Construction Site Drainage, Environmental Protection Department, 1994 (ProPECC PN1/94), construction phase mitigation measures shall include the following: Construction Runoff and Site Drainage • At the start of site establishment (including the barging facilities), perimeter cut-off drains to direct off-site water around the site should be constructed with internal drainage works and erosion and sedimentation control facilities implemented. Channels (both temporary and permanent drainage pipes and culverts), earth bunds or sand bag barriers should be provided on site to direct stormwater to silt removal facilities. The design of the temporary on-site drainage system will be undertaken by	To minimize water quality impact from construction site runoff and general construction activities	Contractor	All construction sites where practicable	Construction stage	• Water Pollution Control Ordinance • ProPECC PN1/94 • TM-EIAO • TM-Water	*

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		the contractor prior to the commencement of construction. • The dikes or embankments for flood protection should be implemented around the boundaries of earthwork areas. Temporary ditches should be provided to facilities the runoff discharge into an appropriate watercourse, through a site/sediment trap. The sediments/silt traps should be incorporated in the permanent drainage channels to enhance deposition rates. • The design of efficient silt removal facilities should be based on the guidelines in Appendix A1 of ProPECC PN 1/94, which states that the retention time for silt/sand traps should be 5 minutes under maximum flow conditions. Sizes may vary depending upon the flow rate, but for a flow rate of $0.1m^3/s$ a sedimentation basin of $30m^3$ would be required and for a flow rate of $0.5m^3/s$ the basin would be $150m^3$. The detailed design of the sand/silt traps shall be undertaken by the constructor prior to the commencement of construction. • All exposed earth areas should be completed and vegetated as soon as possible after earthworks have been completed, or alternatively, within 14 days of the cessation of earthworks where practicable. Exposed slope surface should be covered by tarpaulin or other means.						

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		• The overall slope of the site should be kept to a minimum to reduce the erosive potential of surface water flows, and all traffic areas and access roads protected by coarse stone ballast. An additional advantage accruing from the use of crushed stone is the positive traction gained during prolonged periods of inclement weather and the reduction of surface sheet flows. • All drainage facilities and erosion and sediment control structures should be regularly inspected and maintained to ensure proper and efficient operation at all times and particularly following rainstorms. Deposited silt and grit should be removed regularly and disposed of by spreading evenly over stable, vegetated areas. • Measures should be taken to minimize the ingress of site drainage into excavations. If the excavation of trenches in wet periods is necessary, they should be dug and backfilled in short sections wherever practicable. Water pumped out from trenches or foundation excavations should be discharged into storm drains via silt removal facilities. • Open stockpiles of construction materials (for example, aggregates, sand and fill material) of more than $50m^3$ should be covered with tarpaulin or similar fabric during rainstorms. Measures should be taken to prevent the washing away of construction materials, soil, silt or						

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		debris into any drainage system. • Manholes (including newly constructed ones) should always be adequately covered and temporarily sealed so as to prevent silt, construction materials or debris being washed into the drainage system and storm runoff being directed into foul sewers. • Precautions be taken at any time of year when rainstorms are likely, actions to be taken when a rainstorm in imminent or forecasted, and actions to be taken during or after rainstorms are summarized in Appendix A2 or ProPECC PN 1/94. Particular attention should be paid to the control of silt surface runoff during storm events, especially for areas located near steep slopes. • All vehicles and plant should be cleaned before leaving a construction site to ensure no earth, mud, debris and the like is deposited by them on roads. An adequately designed and sited wheel washing facilities should be provided at every construction site exit where practicable. Wash-water should have sand and silt settled out and removed at least on a weekly basis to ensure the continued efficiency of the process. The section of access road leading to, and exiting from, the wheel-wash bay to the public road should be paved with sufficient backfall toward the wheel-wash bay to prevent vehicle tracking of soil and silty water to public roads						

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		and drains. • Oil interceptors should be provided in the drainage system downstream of any oil/fuel pollution sources. The oil interceptors should be emptied and cleaned regularly to prevent the release of oil and grease into the storm water drainage system after accidental spillage. A bypass should be provided for the oil interceptors to prevent flushing during heavy rain. • Construction solid waste, debris and rubbish on site should be collected, handled and disposed of properly to avoid water quality impacts. • All fuel tanks and storage areas should be provided with locks and sited on sealed areas, within bunds of a capacity equal to 110% of the storage capacity of the largest tank to prevent spilled fuel oils from reaching water sensitive receivers nearby. • All the earth works involving should be conducted sequentially to limit the amount of construction runoff generated from exposed areas during the wet season (April to September) as far as practicable. • Adopt best management practices.						
S10.7.1	W3	<u>Sewage Effluent</u> • Portable chemical toilets and sewage holding tanks are recommended for handling the construction sewage generated by the workforce. A licensed contractor	To minimize water quality from sewage effluent	Contractor	All construction sites where practicable	Construction stage	• Water Pollution Control Ordinance • TM-water	^

Remarks:
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		should be employed to provide appropriate and adequate portable toilets and be responsible for appropriate disposal and maintenance.						
S10.7.1	W7	In order to prevent accidental spillage of chemicals, the following is recommended: • All the tanks, containers, storage area should be bunded and the location should be locked as far as possible from the sensitive watercourse and stormwater drains. • The Contractor should register as a chemical waste produce if chemical wastes would be generated. Storage of chemical waste arising from the construction activities should be stored with suitable labels and warnings. • Disposal of chemical waste should be conducted in compliance with the requirements as stated in the Waste disposal (Chemical Waste) (General) Regulation.	To minimize water quality impact from accidental spillage	Contractor	All construction sites where practicable	Construction stage	• Water Pollution Control Ordinance • ProPECC PN1/94 • TM-EIAO • TM-Water	^
Waste Management (Construction Waste)								
S11.4.1.1	WM1	<u>On-site sorting of C&D material</u> • Geological assessment should be carried out by competent persons on site during excavation to identity materials which are not suitable to use as aggregate in structural concrete (e.g. volcanic rock, Aplite dyke rock, etc). Volcanic rock and Aplite dyke roke should be separated at the source sites as far as practicable and stored at designated stockpile areas preventing them	Separation of unsuitable rock from ending up at concrete batching plants and be turned into concrete for structural use	Contractor	All construction sites	Construction stage	• DEVB TC(W) No.6/2010	^

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		from delivering to crushing facilities. The crushing plant operator should also be reminded to set up measures to prevent unsuitable rock from ended up at concrete batching plants and be turned into concrete for structural use. Details regarding control measures at source site and crushing facilities should be submitted by the Contractors for the Engineer to review and agree. In addition, site records should also be kept for the types of rock materials excavated and the traceability of delivery will be ensured with the implementation of Trip Ticket System and enforced by site supervisory staff as stipulated under DEVB TC(W) No. 6/2010 for tracking of the correct delivery to the rock crushing facilities for processing into aggregates. Alternative disposal option for the reuse of volcanic rock and Apilte Dyke rock, etc should also be explored.						
S11.5.1	WM2	<u>Construction and Demolition Material</u> • Maintain temporary stockpiles and reuse excavated fill material for backfilling and reinstatement; • Carry out on-site sorting; • Make provisions in the Contract documents to allow and promote the use of recycled aggregates where appropriate; • Adopt "Selective Demolition" technique to demolish the existing structures and facilities with a view to recovering broken concrete effectively for recycling	Good site practice to minimize the waste generation and recycle the C&D materials as far as practicable so as to reduce the amount for final disposal	Contractor	All construction sites	Construction stage	• Land (Miscellaneous Provisions) Ordinance • Waste Disposal Ordinance • ETWB TCW No.19/2005	*

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		purpose, where possible; • Implement a trip-ticket system for each works contract to ensure that the disposal of C&D materials are properly documents and verified; and • Implement an enhanced Waste Management Plan similar to ETWBTC (Works) No. 19/2005 – "Environmental Management on Construction Sites" to encourage on-site sorting of C&D materials and to minimize their generation during the course of construction; • In addition, disposal of the C&D materials onto ant sensitive locations such as agricultural lands, etc. should be avoided. The Contractor shall propose the final disposal sites to the Project Proponent and get its approval before implementation.						
S11.5.1	WM3	<u>C&D Waste</u> • Standard formwork or pre-fabrication should be used as far as practicable in order to minimise the arising of C&D materials. The use of more durable formwork or plastic facing for the construction works should be considered. Use of wooden hoardings should not be used, as in other projects. Metal hoarding should be used to enhance the possibility of recycling. The purchasing of construction materials will be carefully planned in order to avoid over ordering and wastage.	Good site practice to minimize the waste generation and recycle the C&D materials as far as practicable so as to reduce the amount for final disposal	Contractor	All construction sites	Construction stage	• Land (Miscellaneous Provisions) Ordinance • Waste Disposal Ordinance • ETWB TCW No.19/2005	^

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EIA Ref.	EM&A Log Ref.	Recommended Mitigation Measures	Objectives of the Recommended Measures & Main Concerns to address	Who to implement the measures?	Location of the measures	When to implement the measures?	What requirements or standards for the measures to achieve?	Status
		• The Contractor should recycle as much of the C&D materials as possible on-site. Public fill and C&D waste should be segregated and stored in different containers or skips to enhance reuse or recycling of materials and their proper disposal. Where practicable, concrete and masonry can be crushed and used as fill. Steel reinforcement bar can be used by scrap steel mills. Different areas of the sites should be considered for such segregation and storage.						
S11.5.1	WM4	General Refuse • General refuse generated on-site should be stored in enclosed bins or compaction units separately from construction and chemical wastes. • A reputable waste collector should be employed by the Contractor to remove general refuse from the site, separately from construction and chemical wastes, on a daily basis to minimize odour, pest and litter impacts. Burning of refuse on construction sites is prohibited by law. • Aluminium cans are often recovered from the waste stream by individual collectors if they are segregated and made easily accessible. Separate labeled bins for their deposit should be provided if feasible.	Minimize production of the general refuse and avoid odour, pest and litter impacts	Contractor	All construction sites	Construction stage	• Waste Disposal Ordinance	^

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		• Office wastes can be reduced through the recycling of paper if volumes are large enough to warrant collection. Participation in a local collection scheme should be considered by the Contractor.						
S11.5.1	WM7	<u>Chemical Waste</u> • Chemical waste that is produced, as defined by Schedule 1 of the Waste Disposal (Chemical Waste) (General) Regulation, should be handled in accordance with the Code of Practice on the Packaging, Labelling and Storage of Chemical Wastes. • Containers used for the storage of chemical wastes should be suitable for the substance they are holding, resistant to corrosion, maintained in a good condition, and securely closed; have a capacity of less than 450 liters unless the specification has been approved by the EPD; and display a label in English and Chinese in accordance with instructions prescribed in Schedule 2 of the regulation. • The storage area for chemical wastes should be clearly labelled and used solely for the storage of chemical waste; enclosed on at least 3 sides; have an impermeable floor and bunding of sufficient capacity to accommodate 110% of the volume of the largest container or 20% of the total volume of waste stored in that area, whichever is the greatest; have adequate ventilation; covered to prevent rainfall entering; and arranged so that	Control the chemical waste and ensure proper storage, handling and disposal.	Contractor	All construction sites	Construction stage	• Waste Disposal (Chemical Waste General) Regulation • Code of Practice on the Packaging, Labelling and Storage of Chemical Waste	^

Remarks:

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N/A	Not Applicable in the reporting month	*	Not satisfactory but rectified by the contractor

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		incompatible materials are adequately separated; • Disposal of chemical waste should be via a licensed waste collector, be to a facility licensed to receive chemical waste, such as the Chemical Waste Treatment Centre which also offers a chemical waste collection service and can supply the necessary storage containers; or be to a reuser of the waste, under approval from the EPD.						
EM&A Project								
S14.2	EM1	An Independent Environmental Checker needs to be employed as per the EM&A Manual.	Control EM&A Performance	MTR Corporation	All construction sites	Construction Stage	• EIAO Guidance Note No.4/2010 • TM-EIAO	^
S14.2-14.4	EM2	1) An Environmental Team needs to be employed as per the EM&A Manual. 2) Prepare a systematic Environmental Management Plan to ensure effective implementation of the mitigation measures. 3) An environmental impact monitoring needs to be implementing by the Environmental Team to ensure all the requirements given in the EM&A Manual are fully complied with.	Perform environmental monitoring & auditing	MTR Corporation/ Contractor	All construction sites	Construction stage	• EIAO Guidance Note No. 4/2010 • TM-EIAO	^

Remarks:

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APPENDIX G

ENVIRONMENTAL COMPLAINT LOG

Appendix G Environmental Complaint Log

Complaint Log No.	Name of Complainant	Date Complaint Received	Complaint Date	Complaint Location	Details of Complaint	Date Complaint Received by ET	ET's Investigation Date	Investigation/ Mitigation Measures	Validity To Project
Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil

Appendix D

9th EM&A Report for Works Contract 1111 – Hung Hom North Approach Tunnel

AECOM

Gammon- Kaden SCL 1111 Joint Venture

Shatin to Central Link - Tai Wai to Hung Hom Section and Mong Kok East to Hung Hom Section

Works Contract 1111 - Hung Hom North Approach Tunnels

Monthly EM&A Report for September 2013

October 2013

	Name	Signature
Prepared & Checked:	Isabella Yeung	
Reviewed, Approved & Certified:	Y T Tang (Contractor's Environmental Team Leader)	

Version: 0 Date: 11 October 2013

Disclaimer

AECOM Asia Co. Ltd.
15/F, Grand Central Plaza, Tower 1, 138 Shatin Rural Committee Road, Shatin, NT, Hong Kong
Tel: (852) 3922 9000 Fax: (852) 2317 7609 www.aecom.com

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EXECUTIVE SUMMARY

Shatin to Central Link Contract 1111 – Hung Hom North Approach Tunnels (hereafter called "the Project") covers part of the construction of the Shatin to Central Link (SCL) which aimed to convey a total of 17km extension of the existing Ma On Shan Line (MOL) through east Kowloon to West Rail Line and also East Rail Line (EAL) through Hung Hom across the harbour to Admiralty Station (ADM). The Project covers construction activities at Mong Kok Freight Terminal and part of the construction activities located at Hung Hom Area for SCL (TAW-HUH), SCL (MKK-HUH) and SCL (HHS).

The EM&A programme commenced in January 2013.The impact EM&A for the Project includes air quality and noise monitoring.

This report documents the findings of EM&A works conducted in the period between 1 and 30 September 2013. As informed by the Contractor, major activities in the reporting period were:-

Hung Hom Area

- Excavation work, demolition work, site formation, slope work,
- Man hole and drainage construction, reinforced concrete structure construction, cross track duct construction, timber platform construction, emergency vehicular access construction, construction of excavation and lateral support structure, temporary pedestrian walkway construction, portable equipment modules construction,
- Cable trough installation, overhead line portals erection,
- Geological investigation, installation of geological instrument,
- Trial pit, sheet pilling, pile pilling, piling platform, pre-drilling, pre-grouting,
- Hoarding erection, hoarding re-alignment,
- Architectural Builders Works and Finishes (ABWF) & Electrical and Mechanical (E&M) works.

Mong Kok Freight Terminal

- Noise panel installation, ABWF and E&M works.

Breaches of Action and Limit Levels for Air Quality

No exceedance of Action and Limit Level of 24-hour TSP monitoring was recorded at the monitoring location in the reporting month.

Breaches of Action and Limit Levels for Noise

Regular Noise Monitoring

No Action Level exceedance was recorded since no noise related complaint was received in the reporting month.

No exceedance of Limit Level of noise was recorded in the reporting month.

Continuous Noise Monitoring

As the construction works identified by the Construction Noise Mitigation Measures Plan (CNMMP) to be potentially causing exceedance of noise criteria have not commenced during this reporting month, no continuous noise monitoring was carried out.

Complaint, Notification of Summons and Successful Prosecution

No environmental complaint and no notification of summons and successful prosecution were received in the reporting month.

Future Key Issues

Key issues to be considered in the coming month included:-

Hung Hom Area

- Excavation work, demolition work, site formation, slope work,
- Man hole and drainage construction, reinforced concrete structure construction, cross track duct construction, timber platform construction, emergency vehicular access construction, construction of excavation and lateral support structure, temporary pedestrian walkway construction, portable equipment modules construction,
- Cable trough installation, overhead line portals erection, track rail installation,
- Geological investigation, installation of geological instrument,
- Trial pit, sheet pilling, pile pilling, pipe pilling, pilling platform, pre-drilling, pre-grouting, grounting
- Hoarding erection, hoarding re-alignment,
- Tree felling,
- Architectural Builders Works and Finishes (ABWF) & Electrical and Mechanical (E&M) works.

Mong Kok Freight Terminal

- Noise panel installation, ABWF and E&M works.

Potential environmental impacts arising from the above construction activities are mainly associated with construction dust, construction noise and waste management.

1 INTRODUCTION

Gammon-Kaden SCL1111 Joint Venture (GKSCLJV) was commissioned by MTR as the Civil Contractor for Works Contract 1111. AECOM Asia Company Limited (AECOM) was appointed by GKSCLJV as the Environmental Team (ET) to undertake the Environmental Monitoring and Audit (EM&A) programme during construction phase of the Project.

1.1 Purpose of the Report

1.1.1 This is the ninth monthly EM&A Report which summaries the impact monitoring results and audit findings for the Project during the reporting period from 1 to 30 September 2013.

1.2 Report Structure

1.2.1 This monthly EM&A Report is orgainised as follows:

- Section 1: Introduction
- Section 2: Project Information
- Section 3: Environmental Monitoring Requirement
- Section 4: Implementation Status of Environmental Mitigation Measures
- Section 5: Monitoring Results
- Section 6: Environmental Site Inspection
- Section 7: Environmental Non-conformance
- Section 8: Future Key Issues
- Section 9: Conclusions and Recommendation

2 PROJECT INFORMATION

2.1 Background

2.1.1 The Shatin to Central Link (SCL) is a 17km extension of the existing Ma On Shan Line (MOL) and East Rail Line (EAL) comprising (i) The East-West Corridor which extends the MOL from Tai Wai via East Kowloon to connect with the West Rail Line (WRL) at Hung Hom Station (HUH); and (ii) The North-South Corridor which is an extension of the East Rail Line (EAL) at Hung Hom across the harbour to Admiralty Station (ADM).

2.1.2 The Environmental Impact Assessment (EIA) Reports for SCL – Tai Wai to Hung Hom Section [SCL (TAW-HUH)] (Register No.: AEIAR-167/2012), SCL – Mong Kok East to Hung Hom Section [SCL (MKK-HUH)] (Register No.: AEIAR-165/2012) and SCL - Stabling Sidings at Hung Hom Freight Yard [SCL (HHS)] (Register No.: AEIAR-164/2012) were approved on 17 February 2012 under the Environmental Impact Assessment Ordinance (EIAO). Following the approval of the EIA Reports, two Environmental Permits (EPs) were granted on 22 March 2012, one covers SCL (TAW-HUH) and SCL (HHS)(EP No: EP-438/2012) and the other covers SCL (MKK-HUH) and SCL (HHS) (EP No.: EP-437/2012), for their construction and operation. Variations of environmental permit (VEP) was subsequently applied for EP-438/2012 and the latest Environmental Permit (EP No: EP-438/2012/D) was issued by Director of Environmental Protection (DEP) on 13 September 2013.

2.1.3 The construction of the SCL is divided into different civil construction works contracts and Works Contract 1111 – Hung Hom North Approach Tunnels (hereafter referred to as “the Project”) covers construction activities at Mong Kok Freight Terminal and part of the construction activities located at Hung Hom under the two EPs.

2.2 Site Description

2.2.1 The major construction activities under Works Contract 1111 include:

- SCL (MKK-HUH) – (i) Construction of an realigned and modified railway from Portal 1A near Oi Man Estate to Hung Hom Station; (ii) Construction of Noise Enclosure at Portal 1A; (iii) modification works on the existing Homantin Siding; and (iv) new EVA near Hung Hom Station.
- SCL (TAW–HUH) – Part of the railway tunnel from Ho Man Tin Station to Hung Hom.
- SCL (HHS) – Construction of tracks and noise barrier of Hung Hom Stabling Sidings.

2.2.2 **Figure 1.1** shows the works areas for the Works Contract 1111.

2.3 Construction Programme and Activities

2.3.1 The major construction activities undertaken in the reporting month are summarised below:-

Hung Hom Area

- Excavation work, demolition work, site formation, slope work,
- Man hole and drainage construction, reinforced concrete structure construction, cross track duct construction, timber platform construction, emergency vehicular access construction, construction of excavation and lateral support structure, temporary pedestrian walkway construction, portable equipment modules construction,
- Cable trough installation, overhead line portals erection,
- Geological investigation, installation of geological instrument,
- Trial pit, sheet pilling, pile pilling, piling platform, pre-drilling, pre-grouting,
- Hoarding erection, hoarding re-alignment,
- Architectural Builders Works and Finishes (ABWF) & Electrical and Mechanical (E&M) works.

Mong Kok Freight Terminal

- Noise panel installation, ABWF and E&M works.

2.3.2 The construction programme is presented in **Appendix A**.

2.4 Project Organisation

2.4.1 The project organization structure is shown in **Appendix B**. The key personnel contact names and numbers for the Project are summarised in **Table 1.1.**

Table 1.1 Contact Information of Key Personnel

Party	Role	Position	Name	Telephone	Fax
MTR	Residential Engineer (ER)	Construction Manager	Mr. Michael Fu	3127 6201	3124 6422
		SCL Project Environmental Team Leader	Mr. Richard Kwan	2688 1283	2993 7577
Meinhardt	Independent Environmental Checker	Independent Environmental Checker	Mr. Fredrick Leong	2859 1739	2540 1580
GKSCKJV	Contractor	Project Manager	Mr. Alan Yan	9855 0361	3904 9630
		Environmental Manager	Mr. Brian Kam	9456 9541	
AECOM	Contractor's Environmental Team (ET)	ET Leader	Mr. Y T Tang	3922 9393	2317 7609

2.5 Status of Environmental Licences, Notification and Permits

2.5.1 Relevant environmental licenses, permits and/or notifications on environmental protection for this Project and valid in the reporting month are summarized in **Table 2.1**.

Table 2.1 Status of Environmental Licenses, Notifications and Permits

Permit / License No. / Notification/ Reference No.	Valid Period		Status	Remarks
	From	To		
Environmental Permit				
EP-437/2012	22 Mar 2012	-	Valid	-
EP-438/2012/C	30 Apr 2013	13 Sep 2013	Valid until 13 Sep 2013	Superseded by EP-438/2012/D
EP-438/2012/D	13 Sep 2013	-	Valid	-
Construction Noise Permit				
GW-RE0670-13	03 Jul 2013	28 Dec 2013	Valid	For Cross Track Duct Installation at Oi Sen Path near Workfronts No. 5 & 6
GW-RE0732-13	14 Jul 2013	15 Nov 2013	Valid	For Cross-track Duct Installation and Hoarding Erection at Workfronts No. 1, 2 & 3
GW-RE0741-13	18 Jul 2013	31 Dec 2013	Valid	For ADMS Installation Works near Hung Hom Station
GW-RE0782-13	01 Aug 2013	31 Jan 2014	Valid	E&M Works at Mong Kok East Station Concourse
GW-RE0794-13	31 Jul 2013	26 Jan 2014	Valid	For General Works at Mong Kok Freight Terminal
GW-RE0825-13	09 Aug 2013	29 Sep 2013	Valid until cancellation on 07 Sep 2013	For Tree Felling Works and Mobilization Works at Oi Sen Path near Workfronts No.5&6
GW-RE0838-13	08 Aug 2013	29 Jan 2014	Valid	For General and Reprovisioning Works at Hung Hom Station
GW-RE0858-13	16 Aug 2013	30 Sep 2013	Valid	For Noise Panel Installation at Mong Kok East Station
GW-RE0892-13	27 Aug 2013	05 Oct 2013	Valid until cancellation on 24 Sep 2013	For Erection of OHL Footing and Mast at Chatham Road North
GW-RE0894-13	04 Sep 2013	28 Sep 2013	Valid	For 6m Hoarding Works at Oi Sen Path Rest Area
GW-RE0908-13	30 Aug 2013	12 Oct 2013	Valid	For Scaffolding Erection during Night Time adjacent to Workfront No. 7
GW-RE0941-13	07 Sep 2013	31 Oct 2013	Valid	For Tree Felling Works and Mobilization Works at Oi Sen Path near Workfronts No. 5&6
GW-RE1018-13	24 Sep 2013	08 Nov 2013	Valid until cancellation on 30 Sep 2013	For Working Platform for Inspection at Existing Bridge OB2 and OB2A
GW-RE1030-13	25 Sep 2013	28 Nov 2013	Valid	For Tree Felling and Transplant at Slip Road adjoining Hong Chong Road and Chatham Road North
GW-RE1054-13	27 Sep 2013	15 Oct 2013	Valid	For Tree Felling Works of Cut & Cover Tunnel at Chatham Road North (Westbound)

Permit / License No. / Notification/ Reference No.	Valid Period		Status	Remarks
	From	To		
GW-RE1061-13	30 Sep 2013	31 Oct 2013	Valid	For Working Platform for Inspection at Existing Bridge OB2 and OB2A
Wastewater Discharge License				
WT00015148-2013	20 Feb 2013	28 Feb 2018	Valid	For Winslow Street Works
WT00015644-2013	16 Apr 2013	30 Apr 2018	Valid	For Homantin Sidings Works
WT00015606-2013	25 Apr 2013	30 Apr 2018	Valid	For Mong Kok Freight Terminal Works
WT00016090-2013	14 Jun 2013	30 Jun 2018	Valid	For Hung Hom Station Works
WT00016108-2013	14 Jun 2013	30 Jun 2018	Valid	For Slip Road Works from Chatham Road North and underneath Princess Margaret Road Link (Discharge Point near Hong Chong Road)
WT00015859-2013	14 May 2013	31 May 2018	Valid	For Works in EWL8 and Oi Sen Path Garden
WT00016447-2013	24 Jul 2013	31 Jul 2018	Valid	For Winslow Street Slope Works Between Chatham Road North and Wai Fung Street
WT00016435-2013	23 Jul 2013	31 Jul 2018	Valid	For Slip Road Works from Chatham Road North and underneath Princess Margaret Road Link (Discharge Point near Oi Sen Path)
Chemical Waste Producer Registration				
5213-213-G2618-01	22 Mar 2013	-	Valid	For Winslow Street Works
5213-213-G2618-03	8 Apr 2013	-	Valid	For Hung Hom Station Reprovisioning Works
5213-222-G2618-05	25 Apr 2013	-	Valid	For Mong Kok Freight Terminal Works
5213-213-G2618-06	16 Apr 2013	-	Valid	For Homantin Sidings Works
5213-236-G2618-10	14 Jun 2013	-	Valid	For Slip Road Works from Chatham Road North and underneath Princess Margaret Road Link
5213-236-G2618-11	27 May 2013	-	Valid	For Works near Chatham Road North
Billing Account for Construction Waste Disposal				
7016658	24 Jan 2013	-	Account Active	-
Notification Under Air Pollution Control (Construction Dust) Regulation				
353991	02 Jan 2013	18 Apr 2018	Notified	-

3 ENVIRONMENTAL MONITORING REQUIREMENTS

3.1 Construction Dust Monitoring

Monitoring Requirements

3.1.1 In accordance with the approved EM&A Manuals, 24-hour Total Suspended Particulates (TSP) level at the designated air quality monitoring station is required. Impact 24-hour TSP monitoring should be carried out for at least once every 6 days. The Action and Limit level of the air quality monitoring is provided in **Appendix D**.

Monitoring Equipment

3.1.2 24-hour TSP air quality monitoring was performed using High Volume Sampler (HVS) located at each designated monitoring station. The HVS meets all the requirements of the EM&A Manual. Brand and model of the equipment is given in **Table 3.1**.

Table 3.1 Air Quality Monitoring Equipment

Equipment	Brand and Model
High Volume Sampler (24-hour TSP)	Andersen Total Suspended Particulate Mass Flow Controlled High Volume Air Sampler (Model No. GS 2310 (S/N:894-0835))
Calibration Kit	TISCH Environmental Orifice (Model TE-5025A (Orifice I.D.: 0843))

Monitoring Locations

3.1.3 One monitoring station was set up at the proposed location in accordance with the approved EM&A Manuals for SCL (TAW-HUH), SCL (MKK-HUH) and SCL (HHS) as well as the works areas of the Project. The location of the construction dust monitoring station is summarised in **Table 3.2** and shown in **Figure 2.1.**

Table 3.2 Locations of Construction Dust Monitoring Stations

ID	Location	Monitoring Station
AM1	No. 234 – 238 Chatham Road North	Roof top of the premises facing Chatham Road North

Note:
(1) Permission of access could not be obtained from Wing Fung Building (originally proposed in the approved EM&A Manuals) and hence the monitoring location was relocated to No. 234-248 Chatham Road North. The alternative monitoring location has been approved by IEC and EPD.

Monitoring Methodology

3.1.4 24-hour TSP Monitoring

(a) The HVS was installed in the vicinity of the air sensitive receivers. The following criteria were considered in the installation of the HVS as far as practicable:-

(i) A horizontal platform with appropriate support to secure the sampler against gusty wind was provided.
(ii) The distance between the HVS and any obstacles, such as buildings, was at least twice the height that the obstacle protrudes above the HVS.
(iii) A minimum of 2 meters separation from walls, parapets and penthouse for rooftop sampler.
(iv) A minimum of 2 meters separation from any supporting structure, measured horizontally is required.
(v) No furnace or incinerator flues nearby.
(vi) Airflow around the sampler was unrestricted.
(vii) Permission was obtained to set up the samplers and access to the monitoring stations.
(viii) A secured supply of electricity was obtained to operate the samplers.
(ix) The sampler was located more than 20 meters from any dripline.
(x) Any wire fence and gate, required to protect the sampler, did not obstruct the monitoring process.
(xi) Flow control accuracy was kept within ±2.5% deviation over 24-hour sampling period.

(b) Preparation of Filter Papers

(i) Glass fibre filters, G810 were labelled and sufficient filters that were clean and without pinholes were selected.
(ii) All filters were equilibrated in the conditioning environment for 24 hours before weighing. The conditioning environment temperature was around 25 °C and not variable by more than ±3 °C; the relative humidity (RH) was < 50% and not variable by more than ±5%. A convenient working RH was 40%.
(iii) All filter papers were prepared and analysed by ALS Technichem (HK) Pty Ltd., which is a HOKLAS accredited laboratory and has comprehensive quality assurance and quality control programmes.

(c) Field Monitoring

(i) The power supply was checked to ensure the HVS works properly.
(ii) The filter holder and the area surrounding the filter were cleaned.
(iii) The filter holder was removed by loosening the four bolts and a new filter, with stamped number upward, on a supporting screen was aligned carefully.
(iv) The filter was properly aligned on the screen so that the gasket formed an airtight seal on the outer edges of the filter.
(v) The swing bolts were fastened to hold the filter holder down to the frame. The pressure applied was sufficient to avoid air leakage at the edges.
(vi) Then the shelter lid was closed and was secured with the aluminium strip.
(vii) The HVS was warmed-up for about 5 minutes to establish run-temperature conditions.
(viii) A new flow rate record sheet was set into the flow recorder.
(ix) On site temperature and atmospheric pressure readings were taken and the flow rate of the HVS was checked and adjusted at around 1.3 m^3/min, and complied with the range specified in the EM&A Manual (i.e. 0.6-1.7 m^3/min).
(x) The programmable digital timer was set for a sampling period of 24 hrs, and the starting time, weather condition and the filter number were recorded.
(xi) The initial elapsed time was recorded.
(xii) At the end of sampling, on site temperature and atmospheric pressure readings were taken and the final flow rate of the HVS was checked and recorded.
(xiii) The final elapsed time was recorded.
(xiv) The sampled filter was removed carefully and folded in half length so that only surfaces with collected particulate matter were in contact.
(xv) It was then placed in a clean plastic envelope and sealed.
(xvi) All monitoring information was recorded on a standard data sheet.
(xvii) Filters were then sent to ALS Technichem (HK) Pty Ltd. for analysis.

(d) Maintenance and Calibration

(i) The HVS and its accessories were maintained in good working condition, such as replacing motor brushes routinely and checking electrical wiring to ensure a continuous power supply.
(ii) HVSs were calibrated using TE-5025A Calibration Kit upon installation and thereafter at bi-monthly intervals.
(iii) Calibration certificate of the TE-5025A Calibration Kit and the HVSs are provided in **Appendix E**.

Monitoring Schedule for the Reporting Month

3.1.5 The schedule for environmental monitoring in September 2013 is provided in **Appendix F**.

3.2 Regular Construction Noise Monitoring

Monitoring Requirements

3.2.1 In accordance with the EM&A Manuals, impact noise monitoring should be conducted for at least once a week during the construction phase of the Project. **Table 3.4** summarises the monitoring parameters, frequency and duration of impact noise monitoring. The Action and Limit level of the noise monitoring is provided in **Appendix D**.

Table 3.4 Noise Monitoring Parameters, Frequency and Duration

Parameter and Duration	Frequency
30-mins measurement at each monitoring station between 0700 and 1900 on normal weekdays. Leq, L10 and L90 would be recorded.	At least once per week

Monitoring Equipment

3.2.2 Noise monitoring was performed using sound level meter at each designated monitoring station. The sound level meters deployed comply with the International Electrotechnical Commission Publications (IEC) 651:1979 (Type 1) and 804:1985 (Type 1) specifications. Acoustic calibrator was deployed to check the sound level meters at a known sound pressure level. Brand and model of the equipment is given in **Table 3.5**.

Table 3.5 Noise Monitoring Equipment for Regular Noise Monitoring

Equipment	Brand and Model
Integrated Sound Level Meter	Rion (Model No. NL-31 (S/N: 00320528)), B&K (Model No. 2238 (S/N: 2800927) & (S/N: 2800930))
Acoustic Calibrator	Rion (Model No. NC-73 (S/N: 10307216) & (S/N: 10186482))

Monitoring Locations

3.2.3 Two monitoring stations were set up at the proposed locations in accordance with the approved EM&A Manuals for SCL (TAW-HUH), SCL (MKK-HUH) and SCL (HHS) as well as the works areas of the Project. Locations of the noise monitoring stations are summarised in **Table 3.6** and shown in **Figure 3.1**.

Table 3.6 Locations of Regular Construction Noise Monitoring Stations

ID	Location	Monitoring Station	Type of Measurement
NM1	Carmel Secondary School (South Block)	1m from the exterior of the roof top façade of the premises facing Oi Sen Path	Façade
NM2	No. 234 – 238 Chatham Road North(1)	Free-field on the rooftop of the premise	Free Field

Note:
(1) Permission of access could not be obtained from Wing Fung Building (originally proposed in the approved EM&A Manuals) and hence the monitoring location was relocated to No. 234-248 Chatham Road North. The alternative monitoring location has been approved by IEC and EPD.

Monitoring Methodology

3.2.4 Monitoring Procedure

(a) The sound level meter was set on a tripod at a height of 1.2 m above the ground for free-field measurements at NM2. A correction of +3 dB(A) shall be made to the free field measurements.

(b) Façade measurements were made at NM1.

(c) The battery condition was checked to ensure the correct functioning of the meter.

(d) Parameters such as frequency weighting, the time weighting and the measurement time were set as follows:

(i) frequency weighting: A
(ii) time weighting: Fast
(iii) time measurement: $L_{eq(30\text{-minutes})}$ during non-restricted hours i.e. 0700 – 1900 on normal weekdays.

(e) Prior to and after each noise measurement, the meter was calibrated using the acoustic calibrator for 94 dB(A) at 1000 Hz. If the difference in the calibration level before and after measurement was more than 1 dB(A), the measurement would be considered invalid and repeat of noise measurement would be required after re-calibration or repair of the equipment.

(f) During the monitoring period, the L_{eq}, L_{10} and L_{90} were recorded. In addition, site conditions and noise sources were recorded on a standard record sheet.

(g) Noise measurement was paused during periods of high intrusive noise (e.g. dog barking, helicopter noise) if possible. Observations were recorded when intrusive noise was unavoidable.

(h) Noise monitoring was cancelled in the presence of fog, rain, wind with a steady speed exceeding 5m/s, or wind with gusts exceeding 10m/s.

3.2.5 Maintenance and Calibration

(a) The microphone head of the sound level meter was cleaned with soft cloth at regular intervals.

(b) The meter and calibrator were sent to the supplier or HOKLAS laboratory to check and calibrate at yearly intervals.

(c) Calibration certificates of the sound level meters and acoustic calibrators are provided in **Appendix E**.

Monitoring Schedule for the Reporting Month

3.2.6 The schedule for environmental monitoring in September 2013 is provided in **Appendix F**.

3.3 Continuous noise monitoring

Monitoring Requirements

3.3.1 According to EP conditions under EP-437/2012 (Condition 2.8) and EP-438/2012/D (Condition 2.10), continuous noise monitoring should be conducted at the NSRs as identified by the Construction Noise Mitigation Measures Plan (CNMMP) to have residual air-borne noise impacts. A Continuous Noise Monitoring Plan (CNMP) was prepared and submitted to EPD before the commencement of the construction of the Project.

Monitoring Locations

3.3.2 With reference to the CNMP, continuous noise monitoring should be conducted during period at which the predicted airborne construction noise levels exceed the relevant noise criteria at the respective NSRs. The proposed continuous noise monitoring locations are presented in **Table 3.7** and shown in **Figure 2.1**.

Table 3.7 Summary of Proposed Continuous Noise Monitoring Location

NSR ID	NSR Description	Uses	Proposed Continuous Noise Monitoring Location	Alternative Noise Monitoring Location
OM4a	Carmel Secondary School (South Block)	Educational	NM1	-
HH2	Wing Fung Building	Residential	NM2	No. 234-238 Chatham Road North(1)

Note:
(1) Permission of access could not be obtained from Wing Fung Building (originally proposed in the approved EM&A Manuals) and hence the monitoring location was relocated to No. 234-248 Chatham Road North. The alternative monitoring location is considered as an appropriate alternative noise monitoring station in the CNMP.

Monitoring Equipment

3.3.3 Continuous noise monitoring will be performed using sound level meter at each designated monitoring station. The sound level meters deployed comply with the International Electrotechnical Commission Publications (IEC) 651:1979 (Type 1) and 804:1985 (Type 1) specifications. Acoustic calibrator will be deployed to check the sound level meters at a known sound pressure level. Brand and model of the equipment is given in **Table 3.8.**

Table 3.8 Noise Monitoring Equipment for Continuous Noise Monitoring

Equipment	Brand and Model
Integrated Sound Level Meter	Rion (Model No. NL-31)
Acoustic Calibrator	Rion (Model No. NC-73)

Monitoring Parameters, Frequency and Duration

3.3.4 Continuous noise level will be measured in terms of the A-weighted equivalent continuous sound pressure level for 30 minutes ($L_{eq,\ 30\ min}$) for time period between 0700 and 1900 hours on normal working hours (i.e. Mondays to Saturdays) during the construction period that the predicted noise levels exceed the relevant noise criteria at the identified NSRs. The recommended measurement period for the continuous noise monitoring programme in the CNMP is summarised in **Table 3.9**.

Monitoring Methodology

3.3.5 Immediately prior to the noise measurement, the accuracy of the sound level meter will be checked using an acoustic calibrator, which generated a known sound pressure level at a known frequency. The accuracy of the sound level meter will also be checked on an annual-basis. Measurement will be accepted as valid only if the calibration level before and after the noise measurement agrees to within 1.0dB. Noise measurement will be made in accordance with standard acoustical principles and practices in relation to weather conditions.

Event and Action Plan

3.3.6 Summary of the proposed continuous noise monitoring programme are presented in **Table 3.9**. The Event and Action Plan for the continuous noise monitoring programme recommended in the CNMP is presented in **Appendix I**.

Table 3.9 Summary of Proposed Continuous Noise Monitoring Plan

Monitoring Location	NSR Description	Action/Limit Level, dB(A)	Measurement Period
NM1	Carmel Secondary School (South Block)	69(1)	Dec of 2014 Mar of 2015 Mar of 2017
NM2	No. 234-238 Chatham Road North(2)	77	Sep to Dec of 2014 Jan / Mar to May 2015

Note:
(1) Action/Limit level will only be applicable during the examination period.
(2) Permission of access could not be obtained from Wing Fung Building (originally proposed in the approved EM&A Manuals) and hence the monitoring location was relocated to No. 234-248 Chatham Road North. The alternative monitoring location is considered as an appropriate alternative noise monitoring station in the CNMP.

3.4 Landscape and Visual

3.4.1 As per the EM&A Manuals, the landscape and visual mitigation measures should be implemented and site inspections should be undertaken once every two weeks during the construction period. A summary of the implementation status is presented in **Section 6.**

4 IMPLEMENTATION STATUS OF ENVIRONMENTAL MITIGATION MEASURES

The Contractor has implemented environmental mitigation measures and requirements as stated in the EIA Reports, the EPs and EM&A Manuals. The implementation status of the environmental mitigation measures during the reporting period is summarized in **Appendix C**. Status of required submissions under the EPs during the reporting period is summarised in **Table 4.1**.

Table 4.1 Status of Required Submission under Environmental Permit

EP Condition	Submission	Submission Date
Condition 3.4 (EP-437/2012) & Condition 3.4 (EP-438/2012/D)	Monthly EM&A Report for August 2013	13 September 2013

5 MONITORING RESULTS

5.1 Construction Dust Monitoring

5.1.1 The monitoring results for 24-hour TSP are summarised in **Table 5.1**. Detailed air quality monitoring results and wind monitoring data extracted from the nearest Automatic Weather Station are presented in **Appendix G**.

Table 5.1 Summary of 24-hour TSP Monitoring Results in the Reporting Period

ID	Average ($\mu g/m^3$)	Range ($\mu g/m^3$)	Action Level ($\mu g/m^3$)	Limit Level ($\mu g/m^3$)
AM1	65.0	33.9 – 103.0	183.9	260

5.1.2 No Action and Limit Level exceedance was recorded for 24-hour TSP monitoring at the monitoring location in the reporting month.

5.1.3 The event action plan is annexed in **Appendix I**.

5.1.4 Major dust sources during the monitoring included construction dust from the Project site and other nearby construction sites and also nearby traffic emission.

5.2 Regular Construction Noise Monitoring

5.2.1 The monitoring results for noise are summarized in **Table 5.2** and the monitoring data is provided in **Appendix H**.

Table 5.2 Summary of Impact Noise Monitoring Results in the Reporting Period

ID	Range, dB(A), $L_{eq\ (30\ mins)}$	Limit Level, dB(A), $L_{eq\ (30\ mins)}$
NM 1[(2)]	<Baseline – 63.0	70 (65)[(1)]
NM 2[(2)]	<Baseline	75

Note:

(1) Daytime noise Limit Level of 70dB(A) applies to education institutions while 65dB(A) applies during school examination period.

(2) Baseline correction will be made to the measured L_{eq} when the measured noise level exceeded the corresponding baseline noise level and presented in the table. No correction was made to NM2 as all measured noise levels were below the baseline noise level.

5.2.2 No noise complaint was received in the reporting month; hence, no Action Level exceedance was recorded.

5.2.3 No Limit Level exceedance of noise was recorded at all monitoring stations in the reporting month.

5.2.4 The event action plan is annexed in **Appendix I**.

5.2.5 Major noise sources during the monitoring included construction noise from the Project site and other nearby construction sites, nearby traffic noise and noise from school activities and the community.

5.3 Continuous Noise Monitoring

5.3.1 As the construction works that have been identified by the CNMMP to be potentially causing exceedance of noise criteria have not commenced during this reporting month, no continuous noise monitoring was carried out.

5.4 Waste Management

5.4.1 C&D materials and wastes sorting were carried out on site. Receptacles were available for C&D wastes and general refuse collection.

5.4.2 As advised by the Contractor, 1,359m^3 of inert C&D material was generated and disposed as public fills at TKO 137 and TM38 while 113,560kg of general refuse was disposed at NENT landfill in the reporting month. 282kg of paper/cardboard packaging, 1kg of plastics and 12kg of metals were collected by recycling contractor in the reporting month. No inert C&D materials were reused on site. No chemical waste was collected by licensed contractor in the reporting period. The waste flow table is annexed in **Appendix K.**

5.4.3 The Contractor is advised to properly maintain on site C&D materials and wastes collection, sorting and recording system and maximize reuse / recycle of C&D materials and wastes. The Contractor is reminded to properly maintain the site tidiness and dispose of the wastes accumulated on site regularly and properly.

5.4.4 The Contractor is reminded that chemical waste containers should be properly treated and stored temporarily in designated chemical waste storage area on site in accordance with the Code of Practise on the Packaging, Labelling and Storage of Chemical Wastes.

5.5 Landscape and Visual

5.5.1 Inspection of the implementation of landscape and visual mitigation measures were conducted bi-weekly. A summary of the site inspection is provided in **Appendix C**. The observations and recommendations made during the site inspections are presented in **Table 6.1**.

5.5.2 The event action plan is annexed in **Appendix I**.

6 ENVIRONMENTAL SITE INSPECTION AND AUDIT

6.1.1 Site inspections were carried out on a weekly basis to monitor the implementation of proper environmental pollution control and mitigation measures for the Project. A summary of the site inspection is provided in **Appendix C**.

6.1.2 In the reporting month, 4 site inspections were carried out on 5, 12, 19 and 26 September 2013. The one held on 19 September 2013 was a joint inspection with the IEC, ER, the Contractor and the ET. No site inspection was conducted by EPD during the reporting month. No non-compliance was recorded during the site inspections. Details of observations recorded during the site inspections are presented in **Table 6.1**.

Table 6.1 Observations and Recommendations of Site Audit

Parameters	Date	Observations and Recommendations	Follow-up
Water Quality	12 Sep 2013	• Public drainage in NSL8 was observed to be exposed to effluent. The Contractor should provide proper arrangement to the discharge outlet and review the effectiveness of the effluent treating facility.	The item was rectified by the Contractor on 18 Sep 2013.
		• Inadequate sand bags were provided at works area in Winslow Street, EWL8 and Homantin Siding. The Contractor should provide sand bags to prevent any potential exposure of effluent to the drainage system.	
	19 Sep 2013	• Perimeter channel was found missing at the vehicle entrance of Hong Chong Road. The Contractor should provide perimeter channel at the periphery of the works area to intercept effluent generated within works area.	The item was observed to be rectified by the Contractor on 26 Sep 2013.
		• The wheel washing mechanism in Homantin Siding and Hong Chong Road were found to be ineffective. The Contractor should review the mechanism to ensure vehicles are washed to remove dusty materials from their wheels before leaving the construction site.	
	26 Sep 2013	• Deposited slit was observed along the haul road and near the manhole in Homantin Siding. The Contractor should clear the deposit slit regularly to avoid any dust or effluent related nuisance occur.	The item was rectified by the Contractor on 2 Oct 2013.
		• Over-flowing of effluent at drainage was observed in Homantin Siding. The Contractor should provide sand bunding and effective pumping facilities to avoid effluent seepage.	

Parameters	Date	Observations and Recommendations	Follow-up
Air Quality	12 Sep 2013	• Stockpiles and works associated with dusty materials were observed to be partially covered in Winslow Street, NSL8, EWL8, Hong Chong Road and Homantin Siding. The Contractor should cover the stockpile with tarpaulin sheet and/or provide regular spraying of water as dust suppression mechanism.	The item was rectified by the Contractor on 18 Sep 2013.
	19 Sep 2013	• 3-sided shelter was provided to the soil nailing activity. However, dust suppression measure should be enhanced to dusty construction activities in Hoamantin Siding. The Contractor should provide effective dust suppression measures to these activities as well as to exposed works area.	The item was observed to be rectified by the Contractor on 26 Sep 2013.
Noise	N/A	N/A	N/A
Waste/ Chemical Management	N/A	N/A	N/A
Landscape & Visual	N/A	N/A	N/A
Permits/ Licenses	N/A	N/A	N/A

6.1.3 All the follow-up actions requested by Contractor's ET and IEC during the site inspection were undertaken as reported by the Contractor and confirmed into the following weekly site inspection conducted during the reporting period.

6.1.4 The items of which their inspection for follow-up actions were outstanding as recorded in the last reporting month have already been rectified by the Contractor as confirmed by the ET during the reporting period.

7 ENVIRONMENTAL NON-CONFORMANCE

7.1 Summary of Monitoring Exceedances

7.1.1 All 24-hour TSP results were below the Action and Limit level at all monitoring locations in the reporting month.

7.1.2 No noise complaint was received in the reporting month; hence, no Action Level exceedance was recorded.

7.1.3 No Limit Level exceedance for noise was recorded at all monitoring stations in the reporting month.

7.2 Summary of Environmental Non-Compliance

7.2.1 No environmental non-compliance was recorded in the reporting month.

7.3 Summary of Environmental Complaints

7.3.1 No environmental related complaint was received in the reporting month. Cumulative statistics on environmental complaints is provided in **Appendix J**.

7.4 Summary of Environmental Summon and Successful Prosecutions

7.4.1 No environmental related prosecution or notification of summons was received in the reporting month. Cumulative statistics on notification of summons and successful prosecutions is provided in **Appendix J**.

8 FUTURE KEY ISSUES

8.1 Construction Programme for the Next Month

8.1.1 The major construction works in October and November 2013 will be:-

Hung Hom Area

- Excavation work, demolition work, site formation, slope work,
- Man hole and drainage construction, reinforced concrete structure construction, cross track duct construction, timber platform construction, emergency vehicular access construction, construction of excavation and lateral support structure, temporary pedestrian walkway construction, portable equipment modules construction,
- Cable trough installation, overhead line portals erection, track rail installation,
- Geological investigation, installation of geological instrument,
- Trial pit, sheet pilling, pile pilling, pipe pilling, pilling platform, pre-drilling, pre-grouting, grouting,
- Hoarding erection, hoarding re-alignment,
- Tree felling,
- Architectural Builders Works and Finishes (ABWF) & Electrical and Mechanical (E&M) works.

Mong Kok Freight Terminal

- Noise panel installation, ABWF and E&M works.

8.2 Key Issues for the Coming Month

8.2.1 Potential environmental impacts arising from the above construction activities are mainly associated with construction dust, construction noise and waste management.

8.3 Monitoring Schedule for the Next Month

8.3.1 The tentative schedule for environmental monitoring in October 2013 is provided in **Appendix F**.

9 CONCLUSIONS AND RECOMMENDATIONS

9.1 Conclusions

9.1.1 24-hour TSP and noise monitoring were carried out in the reporting month.

9.1.2 All 24-hour TSP monitoring results complied with the Action / Limit Level at in the reporting month.

9.1.3 No noise complaint was received in the reporting month. Hence, no Action Level exceedance was recorded.

9.1.4 No Limit Level exceedance for noise was recorded at all monitoring stations in the reporting month.

9.1.5 As the construction works that have been identified by the CNMMP to be potentially causing exceedance of noise criteria have not commenced during this reporting month, no continuous noise monitoring was carried out.

9.1.6 4 nos. of environmental site inspections were carried out in September 2013. Recommendations on remedial actions were given to the Contractor for the deficiencies identified during the site audit.

9.1.7 Referring to the Contractor’s information, no environmental complaint, notification of summons and successful prosecution was received in the reporting month.

9.2 Recommendations

9.2.1 According to the environmental site inspections performed in the reporting month, the following recommendations were provided:-

Air Quality Impact

- Implement effective measures to avoid dust impact.

Construction Noise Impact

- No specific observation was identified in the reporting month.

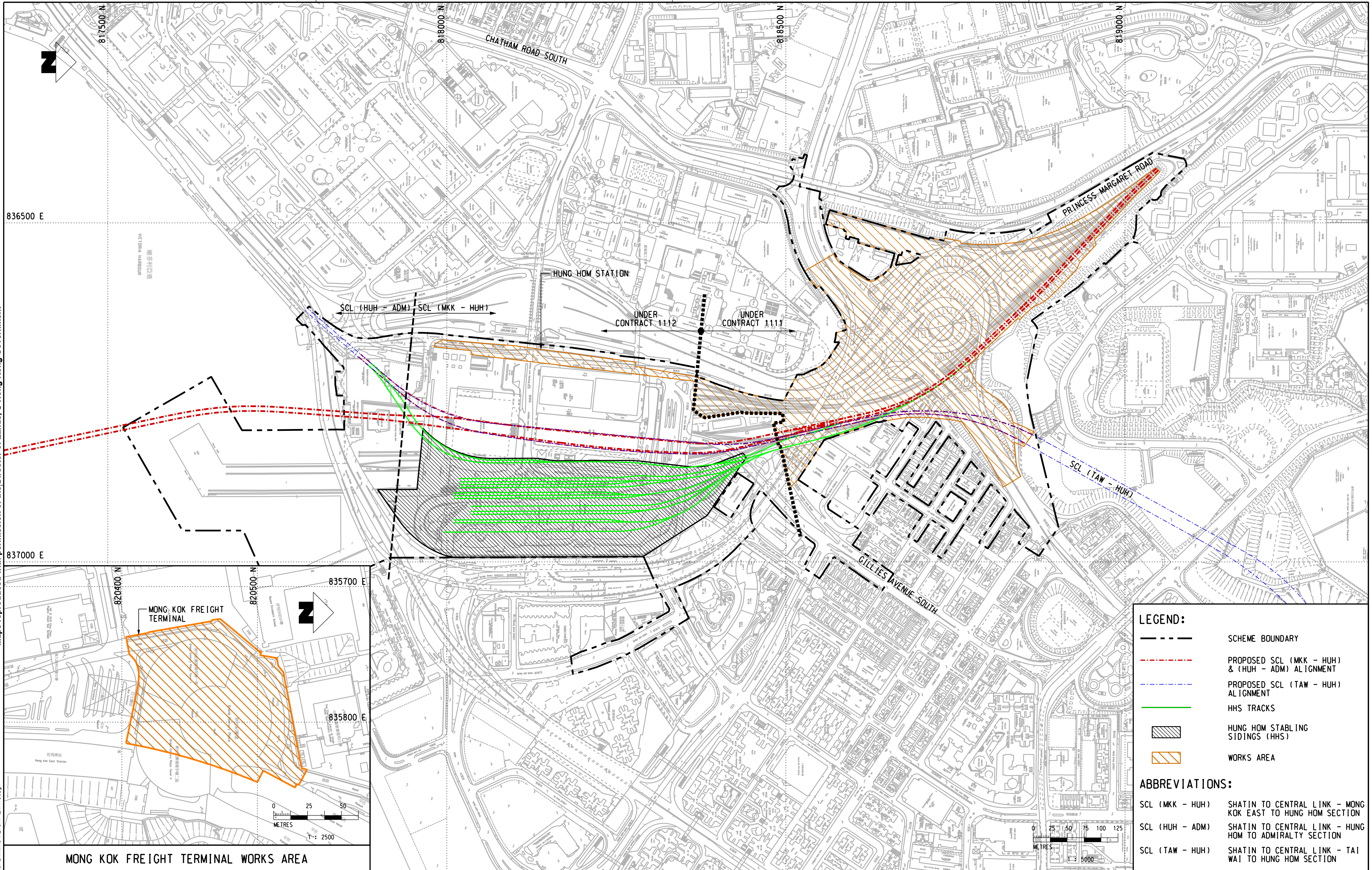
Water Quality Impact

- Implement effective measures to avoid surface runoff into the drainage system.
- Provide effective wheel washing facility.

Chemical and Waste Management

- No specific observation was identified in the reporting month.

FIGURES



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APPROVED	IMW
DATE	08/FEB/2013

MTR
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CONTRACTOR: Gammon – Kaden SCL 1111 Joint Venture
ORIGINATOR: AECOM

TITLE
CONTRACT 1111
HUNG HOM NORTH APPROACH TUNNELS
WORKS AREAS OF THE PROJECT

CADD REF. 701.dgn
SCALE A3 AS SHOWN
FIGURE NO. FIGURE 1.1
REV. -

REV	DESCRIPTION	BY	DATE	APPROVED	REV	DESCRIPTION	BY	DATE	APPROVED

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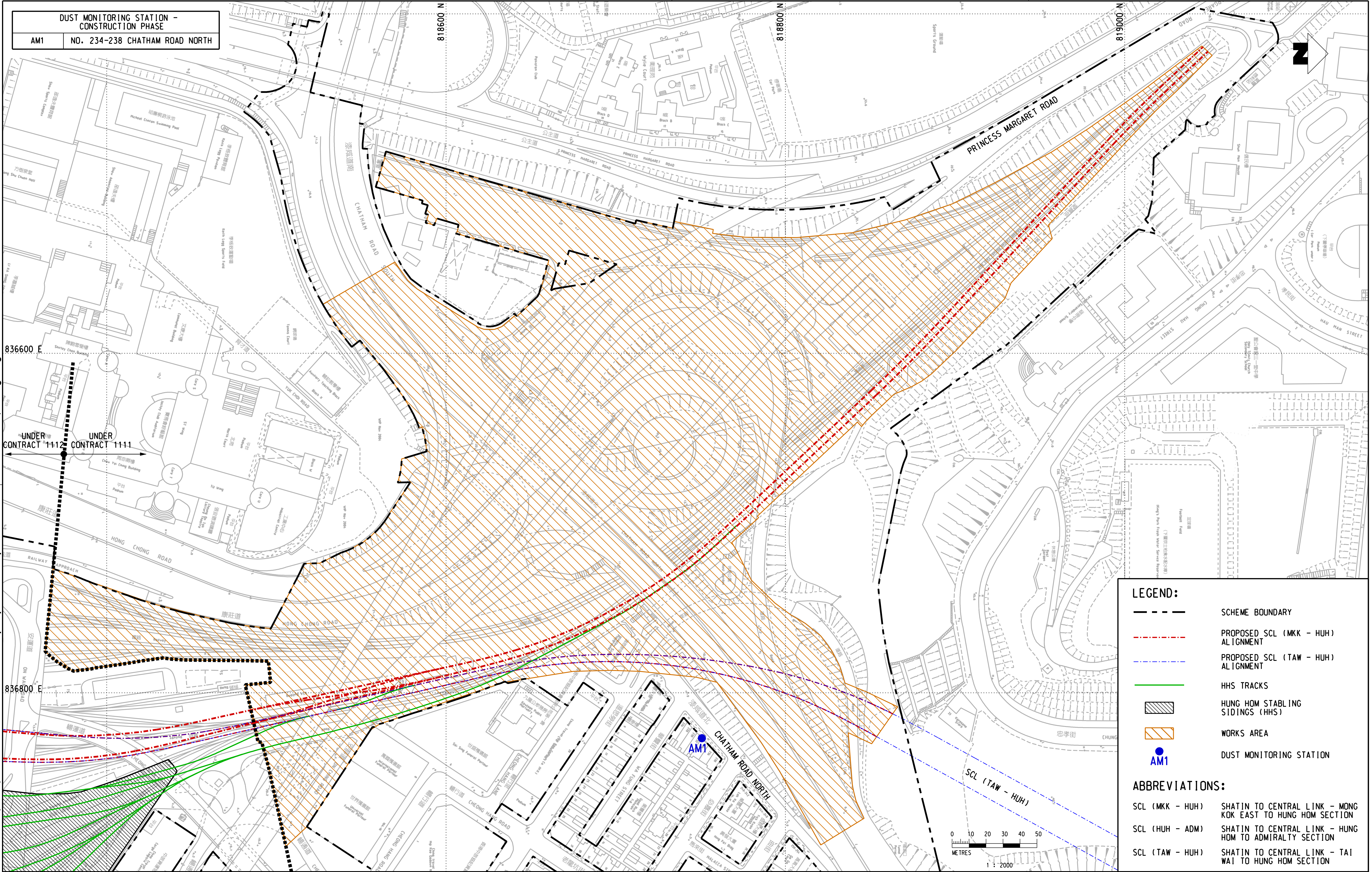

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APPROVED	IMW
DATE	08/JAN/2013

MTR

SHATIN TO CENTRAL LINK

CONTRACTOR: Gammon Kaden — Gammon – Kaden SCL 1111 Joint Venture

ORIGINATOR: AECOM

TITLE

CONTRACT 1111
HUNG HOM NORTH APPROACH TUNNELS
LOCATION OF AIR QUALITY MONITORING STATION

REV	DESCRIPTION	BY	DATE	APPROVED	REV	DESCRIPTION	BY	DATE	APPROVED

CADD REF. Figure 2.1.dgn

SCALE 1 : 2000 (A3)

FIGURE NO. FIGURE 2.1

REV. -

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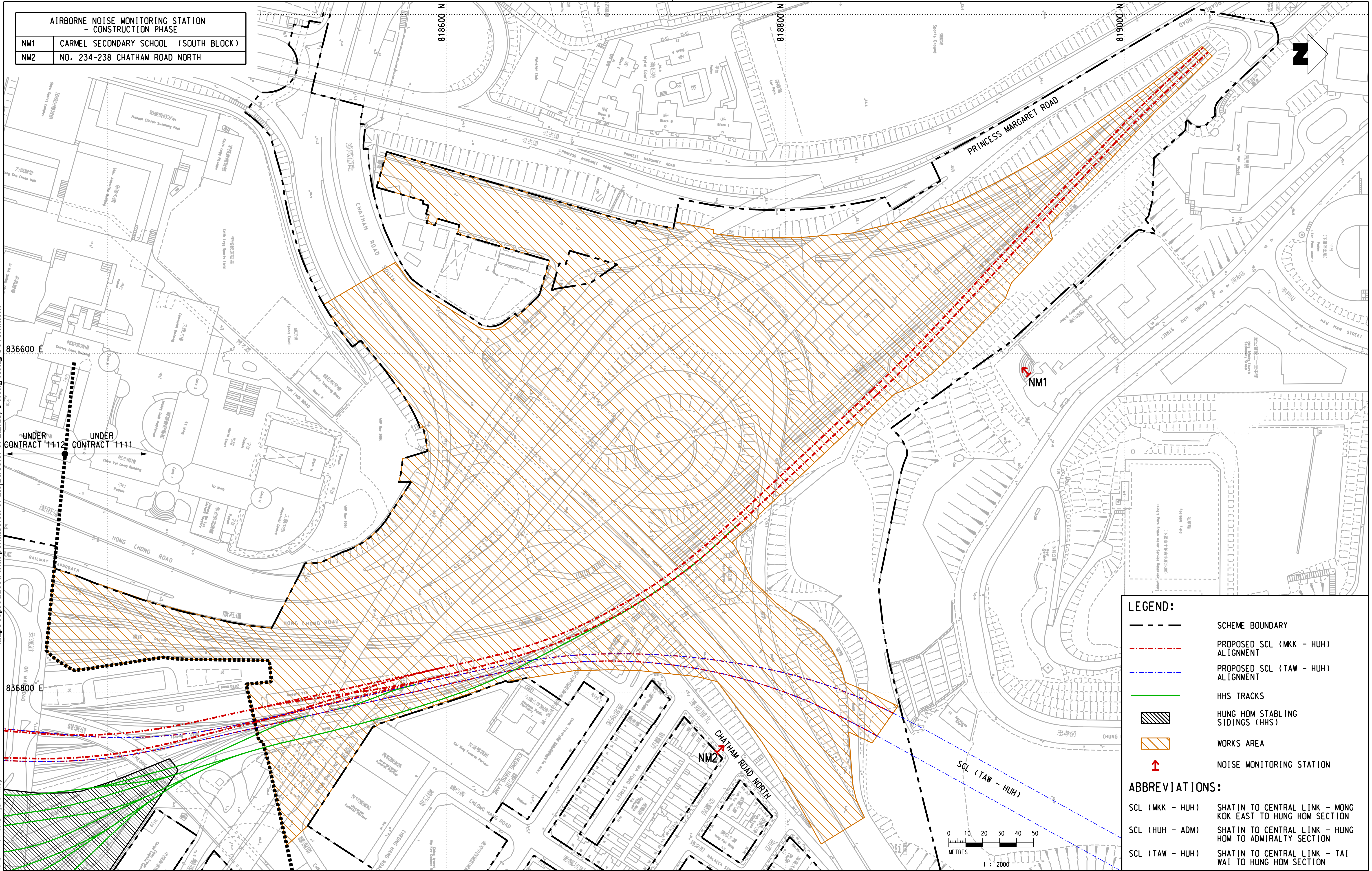

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APPROVED	IMW
DATE	08/JAN/2013

MTR

SHATIN TO CENTRAL LINK

CONTRACTOR: Gammon Kaden — Gammon – Kaden SCL 1111 Joint Venture

ORIGINATOR: AECOM

TITLE

CONTRACT 1111
HUNG HOM NORTH APPROACH TUNNELS
LOCATION OF NOISE MONITORING STATION (CONSTRUCTION PHASE)

REV	DESCRIPTION	BY	DATE	APPROVED	REV	DESCRIPTION	BY	DATE	APPROVED

CADD REF. Figure 3.1.dgn

SCALE 1 : 2000 (A3)

FIGURE NO. FIGURE 3.1

REV. -

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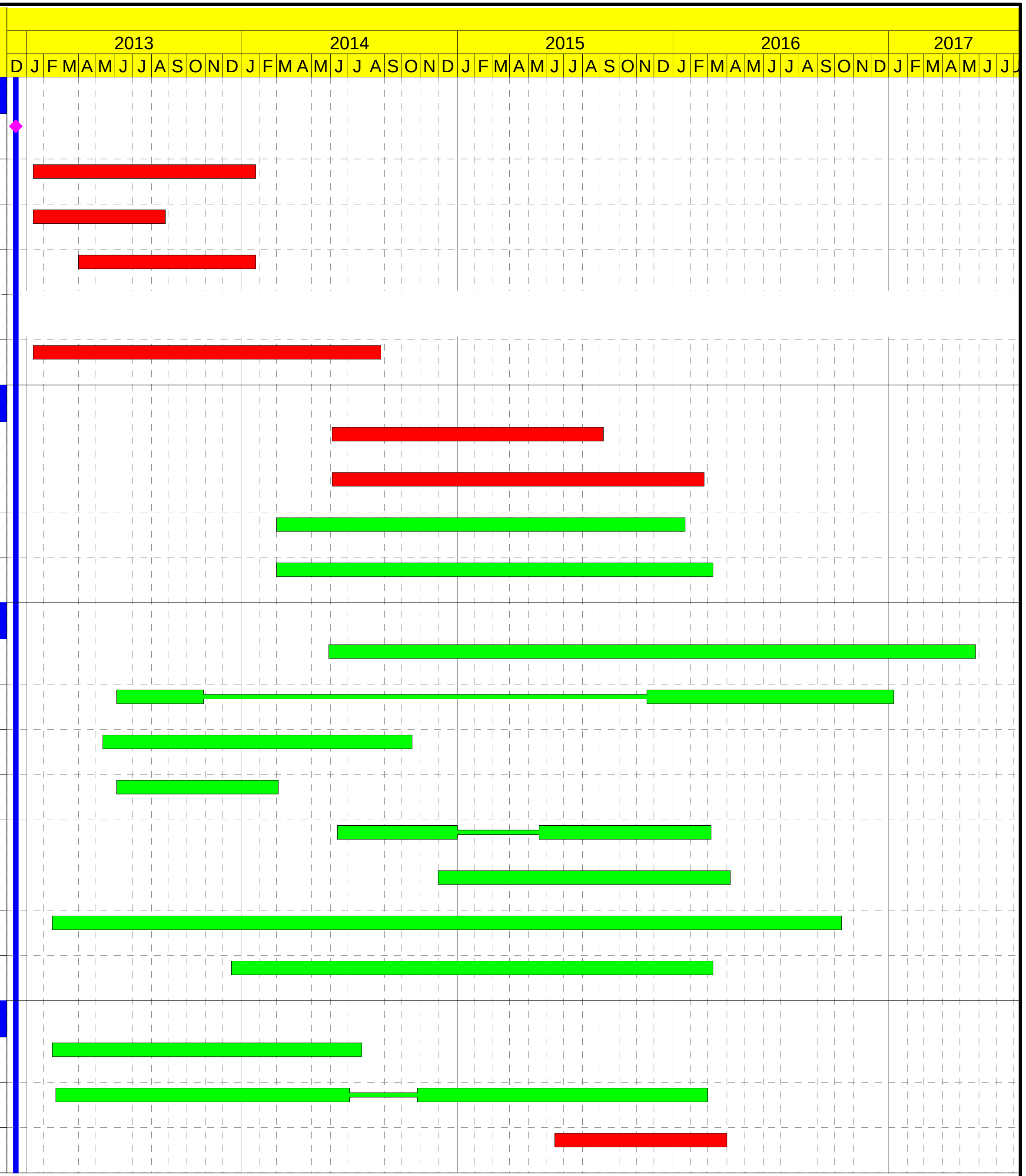
APPENDIX A

Construction Programme

Activity Description	Start	Finish
REPROVISIONING WORKS		
Commencement of Works	17/12/12	
Existing HUH Station Platform Level Works	14/01/13	26/01/14
Mong Kok Freight Terminal Podium Level	14/01/13	25/08/13
Poly U Railway Reserve & New Maintenance Sidings	01/04/13	26/01/14
Inter City Crew Accomodation on HUH EWL Platform	14/01/13	24/08/14
NSL/EWL TUNNEL		
NSL/EWL Area 3 Tunnel (early handover)	03/06/14*	04/09/15
NSL/EWL Area 4 Tunnel	03/06/14*	22/02/16
NSL/EWL Area 5 Tunnel	03/03/14*	20/01/16
NSL/EWL Area 6 Tunnel	03/03/14*	07/03/16
NSL TUNNEL		
NSL Area 7 Tunnel (inc CRN1 & Traffic Diversion)	30/05/14*	26/05/17
NSL Area 8A Tunnel	04/06/13*	07/01/17
TB1	13/05/13*	17/10/14
TB2	04/06/13*	05/03/14
NSL Area 8B Tunnel	13/06/14*	05/03/16
NSL Area 9 Tunnel	01/12/14*	06/04/16
Oi Sen Path Slope Works and Tunnel	14/02/13*	13/10/16
Oi Sen Path Noise Enclosure	14/12/13*	09/03/16
EWL TUNNEL		
EWL Area 6A Tunnel	15/02/13*	22/07/14
EWL Areas 7&8 Tunnel	22/02/13*	27/02/16
EWL Area 9 Tunnel (late possession)	15/06/15*	02/04/16



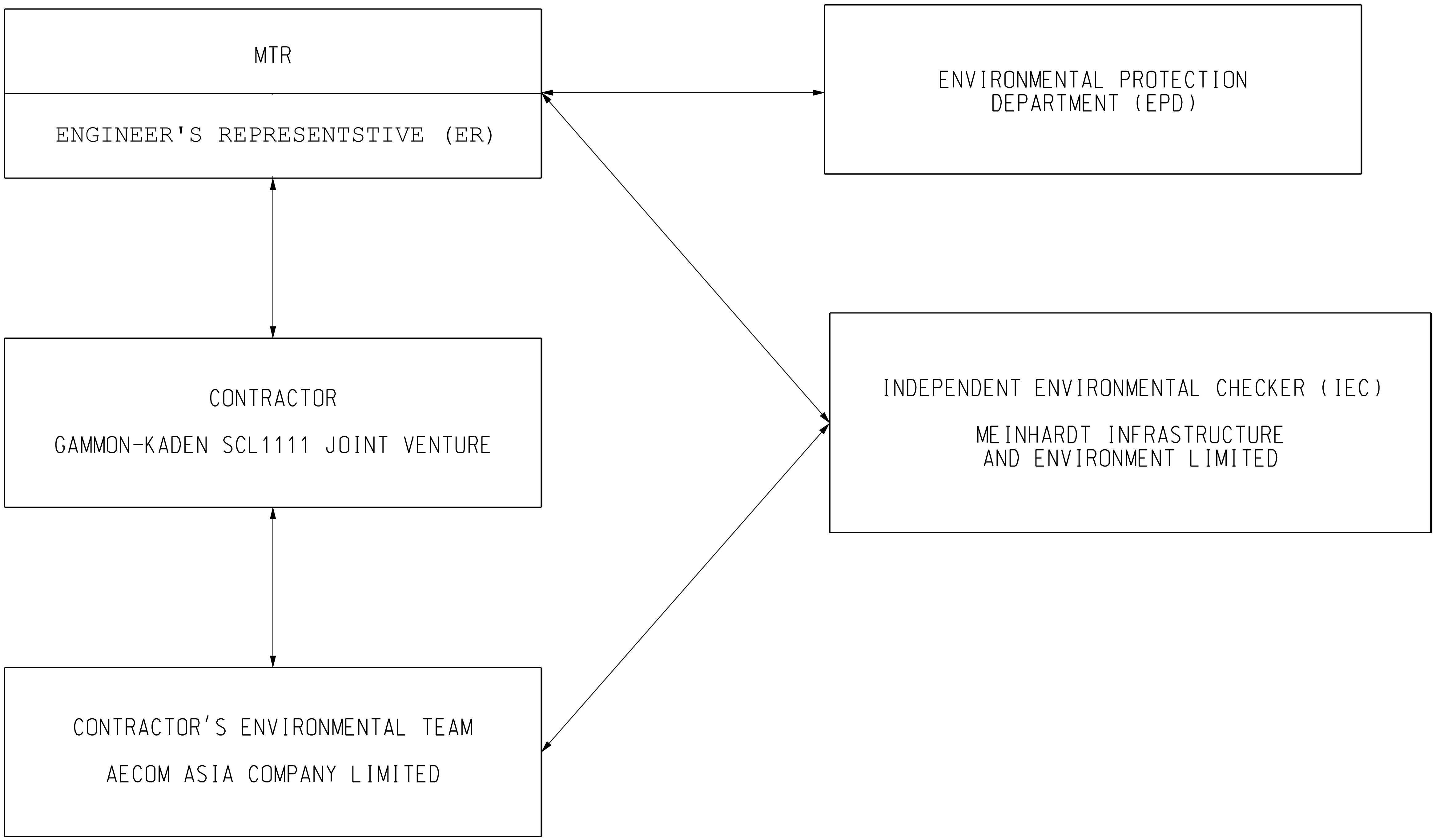
Early Bar
Progress Bar
Critical Activity

SCL 1111
SUMMARY PROGRAMME

Date	Revision	Checked	Approved
19/09/12			

APPENDIX B

Project Organization Structure



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APPROVED	IMW
DATE	08/JAN/2013

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MTR

SHATIN TO CENTRAL LINK

CONTRACTOR: Gammon Kaden — Gammon – Kaden SCL 1111 Joint Venture

ORIGINATOR: AECOM

CADD REF. Appendix B

TITLE

CONTRACT 1111
HUNG HOM NORTH APPROACH TUNNELS
PROJECT ORGANISATION

SCALE N.T.S.

FIGURE NO. Appendix B

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APPENDIX C

Implementation Schedule of Environmental Mitigation Measures

Appendix C - Implementation Schedule of Environmental Mitigation Measures

EIA Ref.	Environmental Mitigation Measures		Location	Implementation Status
Landscape and Visual Impact				
S6.9.3 (TAW-HUH) , S6.12 (HHS), S6.12 (TAW-HUH), Table 6.9 (HHS) & Table 4.9 (MKK-HUH)	Minimize visual & landscape impact	Existing topsoil shall be re-used where possible for new planting areas within the Project.	All construction sites	N/A
		Ground vegetation and the associated under storey habitats, construction contracts may designate “No-intrusion Zone” to various areas within the site boundary with rigid and durable fencing for each individual no-intrusion zone.	All construction sites	N/A
		All retained trees should be recorded photographically at the commencement of the Contract, and carefully protected during the construction period.	All construction sites	V
		Erection of decorative screen during construction stage to screen off undesirable views of the construction site for visual and landscape sensitive areas.	All construction sites	V
		Giving control on the height and disposition/ arrangement of all facilities on the works site to minimize visual impact to adjacent VSRs.	All construction sites	V
		Trees of medium to high survival rate that would be affected by the works shall be transplanted where possible and practicable.	All construction sites	N/A

		Compensatory tree & shrub planting shall be provided to compensate for the loss of shrub planting in amenity areas.	All construction sites	N/A
		Control of night-time lighting glare	All construction sites	N/A
		All hard and soft landscape areas disturbed temporarily during construction shall be reinstated to equal or better quality, to the satisfaction of the relevant Government Departments.	All construction sites	N/A

Construction Noise Impact				
8.3.6 (TAW-HUH) , S8.5.6 (HHS) & S6 (MKK-HUH)	To control construction airborne noise	Only well-maintained plant should be operated on-site and plant should be serviced regularly during the construction programme.	All construction sites	V
		Machines and plant (such as trucks, cranes) that may be in intermittent use should be shut down between work periods or should be throttled down to a minimum	All construction sites	V
		Plant known to emit noise strongly in one direction, where possible, be orientated so that the noise is directed away from nearby NSRs	All construction sites	V
		Silencers or mufflers on construction equipment should be properly fitted and maintained during the construction works	All construction sites	V
		Mobile plant should be sited as far away from NSRs as possible and practicable;	All construction sites	V
		Material stockpiles, mobile container site office and other structures should be effectively utilised, where practicable, to screen noise from on-site construction activities	All construction sites	V
		The following quiet PME should be used: • Asphalt Paver (SWL=101dB(A)) • Backhoe (SWL=106dB(A)) • Backhoe with Hydraulic Breaker (SWL=110dB(A)) • Concrete lorry mixer (SWL=96dB(A)) • Concrete mixer truck (SWL=96dB(A)) • Concrete Pump (SWL=106dB(A))	Works areas where required	N/A

		• Concrete Pump Truck (SWL=106dB(A)) • Crane, mobile (SWL=94dB(A)) • Crawler Crane (SWL=102dB(A)) • Drill, hand-held (SWL=98dB(A)) • Dump truck (SWL=104dB(A)) • Excavator (SWL=106dB(A)) • Flat Bed Lorry (SWL=102dB(A)) • Generator (SWL=95dB(A)) • Giken Piler and Power-pack (SWL=94dB(A)) • Hydraulic breaker (SWL=110dB(A)) • Hydraulic excavator (SWL=106dB(A)) • Lorry (SWL=102dB(A)) • Lorry with crane/ grab (SWL=94dB(A)) • Mini Piling Rig (SWL=112dB(A)) • Piling Rig (SWL=112dB(A)) • Poker, vibrator, hand-held (SWL=98dB(A)) • Road Roller (SWL=101dB(A)) • Rock Drill (SWL = 108dB(A) • Roller (SWL = 101dB(A) • Truck (SWL=103dB(A)) • Vibratory Hammer (SWL=118dB(A))		
		Install temporary hoarding located on the site boundaries between noisy construction activities and NSRs.	All construction sites	V

		Install movable noise barriers, acoustic mat or full enclosure, screen the noisy plants	All construction sites	V
		Sequencing operation of construction plants where practicable.	All construction sites	V
		Particularly noisy construction activities will be scheduled to avoid school examination period as far as practicable.	Works areas near the Carmel Secondary School	V
Construction Air Quality Impact				
S7.6.5 (TAW-HUH) , S7.6.6 (HHS), S5.50, 5.51 &5.57 (MKK-HUH)	Minimize dust impact at nearby sensitive receivers	Watering once per hour on exposed worksites and haul road should be conducted to achieve dust removal efficiencies of 91.7%.	All construction sites	@
		Any excavated or stockpile of dusty material should be covered entirely by impervious sheeting or sprayed with water to maintain the entire surface wet.	All construction sites	@
		Any dusty materials remaining after a stockpile is removed should be wetted with water and cleared from the surface of roads	All construction sites	N/A
		A stockpile of dusty material should not be extended beyond the pedestrian barriers, fencing or traffic cones.	All construction sites	V
		The load of dusty materials on a vehicle leaving a construction site should be covered entirely by impervious sheeting to ensure that the dusty materials do not leak from the vehicle	All construction sites	N/A
		Vehicle washing facilities with high pressure water jet should be provided at every discernible or designated vehicle exit point.	All construction sites	@

		The area where vehicle washing takes place and the road section between the washing facilities and the exit point should be paved with concrete, bituminous materials or hardcores.	All construction sites	V
		When there are open excavation and reinstatement works, hoarding of not less than 2.4m high should be provided.	All construction sites	V
		The portion of any road leading only to construction site that is within 30m of a vehicle entrance or exit should be kept clear of dusty materials.	All construction sites	N/A
		Surfaces where any pneumatic or power-driven drilling, cutting, polishing or other mechanical breaking operation takes place should be sprayed with water or a dust suppression chemical continuously.	All construction sites	V
		Any area that involves demolition activities should be sprayed with water or a dust suppression chemical immediately prior to, during and immediately after the activities so as to maintain the entire surface wet.	All construction sites	N/A
		Where a scaffolding is erected around the perimeter of a building under construction, effective dust screens, sheeting or netting should be provided to enclose the scaffolding from the ground floor level of the building.	All construction sites	V
		Any skip hoist for material transport should be totally enclosed by impervious sheeting.	All construction sites	N/A
		Where possible, routing of vehicles and positioning of construction plant should be at the maximum possible distance from ASRs.	All construction sites	N/A

		Every stock of more than 20 bags of cement or dry pulverized fuel ash (PFA) should be covered entirely by impervious sheeting or placed in an area sheltered on the top and the 3 sides.	All construction sites	N/A
		Cement or dry PFA delivered in bulk should be stored in a closed silo fitted with an audible high level alarm which is interlocked with the material filling line and no overfilling is allowed.	All construction sites	N/A
		Loading, unloading, transfer, handling or storage of bulk cement or dry PFA should be carried out in a totally enclosed system or facility, and any vent or exhaust should be fitted with an effective fabric filter or equivalent air pollution control system.	All construction sites	N/A
		Exposed earth should be properly treated by compaction, turfing, hydroseeding, vegetation planting or sealing with latex, vinyl, bitumen, shotcrete or other suitable surface stabiliser within six months after the last construction activity on the construction site.	All construction sites	N/A
		Imposition of speed controls for vehicles on site haul roads.	All construction sites	N/A

Construction Water Quality Impact				
S10.7.1 (TAW-HUH) , S10.7.1 (HHS) & S8 (MKK-HUH)	To minimize construction water quality impactt	Construction Site Drainage should be implemented to control site run-off and drainage as well as any site effluents generated from the works areas, and to prevent run-off and construction wastes from entering nearby water environment.	Site drainage system	V
		Surface run-off from construction sites should be discharged into storm drains via adequately designed sand/silt removal facilities such as sand traps, silt traps and sedimentation basins.	Site drainage system	@
		Channels or earth bunds or sand bag barriers should be provided on site to properly direct stormwater to such silt removal facilities.	All works area	@
		Perimeter channels at site boundaries should be provided on site boundaries where necessary to intercept storm run-off from outside the site so that it will not wash across the site.	All works area	V
		Silt removal facilities, channels and manholes should be maintained and the deposited silt and grit should be removed regularly.	All construction sites	@
		Construction works should be programmed to minimize soil excavation works in rainy seasons.	All construction sites	N/A
		Temporary exposed slope surfaces should be covered e.g. by tarpaulin, and temporary access roads should be protected by crushed stone or gravel, as excavation proceeds.	All construction sites	V
		Earthworks final surfaces should be well compacted and the subsequent permanent work or surface protection should be carried	All construction sites	N/A

		out immediately after the final surfaces are formed to prevent erosion caused by rainstorms.		
		Open stockpiles of construction materials (e.g. aggregates, sand and fill material) on sites should be covered with tarpaulin or similar fabric during rainstorms.	All construction sites	@
		Measures should be taken to minimize the ingress of rainwater into trenches. If excavation of trenches in wet seasons is necessary, they should be dug and backfilled in short sections. Rainwater pumped out from trenches or foundation excavations should be discharged into storm drains via silt removal facilities	All construction sites	V
		Manholes (including newly constructed ones) should always be adequately covered and temporarily sealed so as to prevent silt, construction materials or debris from getting into the drainage system, and to prevent storm run-off from getting into foul sewers.	All construction sites	V
		Good site practices should be adopted to remove rubbish and litter from construction sites so as to prevent the rubbish and litter from spreading from the site area.	All construction sites	V
		All vehicles and plant should be cleaned before they leave a construction site to minimize the deposition of earth, mud, debris on roads.	All construction sites	@
		Bentonite slurries used in diaphragm wall construction should be reconditioned and used again wherever practicable. If the disposal of a certain residual quantity cannot be avoided, the used slurry should	All construction sites	V

		either be dewatered or mixed with inert fill material for disposal to a public filling area.		
		A cofferdam wall should be built as necessary to limit groundwater inflow to the excavation works areas.	Excavation works areas	N/A
		Wastewater generated should not be discharged into the stormwater drainage system.	All construction sites	V
		Acidic wastewater generated from acid cleaning, etching, pickling and similar activities should be neutralized to within the pH range of 6 to 10 before discharging into foul sewers.	All construction sites	N/A
		Appropriate numbers of portable toilets shall be provided by a licensed contractor to serve the construction workers over the construction site	All construction sites	V
		The Contractor should apply for a discharge license under the WPCO through the Regional Office of EPD for groundwater recharge operation or discharge of treated groundwater.	All construction sites where practicable	N/A
		Appropriate measures will be deployed to minimize the intrusion of groundwater into excavation works areas.	All construction sites	N/A
		Measures should be put in place in order to mitigate any drawdown effects to the groundwater table during the operation of the temporary dewatering works	All construction sites	N/A

Waste Management				
S11.5.1(TAW-HUH), S11.5.1(HHS) & S9 (MKK-HUH)	Good site practice to minimize the generation and impact of the waste.	Maintain temporary stockpiles and reuse excavated fill material for backfilling and reinstatement;	All construction sites	N/A
		Sorting of demolition debris and excavated materials from demolition works to recover reusable/ recyclable portions.	All construction sites	V
		Segregation and storage of different types of waste in different containers, skips or stockpiles to enhance reuse or recycling of materials and their proper disposal.	All construction sites	V
		Proper storage and site practices to minimize the potential for damage or contamination of construction materials.	All construction sites	V
		Plan and stock construction materials carefully to minimize amount of waste generated and avoid unnecessary generation of waste.	All construction sites	N/A
		Waste, such as soil, should be handled and stored well to ensure secure containment, thus minimizing the potential of pollution.	All construction sites	V
		Maintain and clean storage areas routinely.	All construction sites	V
		Stockpiling area should be provided with covers and water spraying system to prevent materials from wind-blown or being washed away.	All construction sites	@
		Waste should be removed in timely manner	All construction sites	V
		Waste collectors should only collect wastes prescribed by their permits.	All construction sites	V

		Waste should be disposed of at licensed waste disposal facilities.	All construction sites	V
		Implement a trip-ticket system for each works contract to ensure that the disposal of C&D materials are properly documented and verified.	All construction sites	V
		Containers used for the storage of chemical wastes should be suitable for the substance they are holding, resistant to corrosion, maintained in a good condition, and securely closed.	All construction sites	V
		The storage area for chemical wastes should be clearly labelled and used solely for the storage of chemical waste; enclosed on at least 3 sides.	All construction sites	V
		The Contractor should register as a chemical waste producer if chemical wastes would be generated.	All construction sites	V
		Disposal of chemical waste should be via a licensed waste collector.	All construction sites	V
		Stockpiling of contaminated sediments should be avoided as far as possible.	All construction sites	N/A
		All storage of asbestos waste should be carried out properly in a secure place isolated from other substances so as to prevent any possible release of asbestos fibres into the atmosphere and contamination of other substances.	All construction sites	N/A

Contaminated Land				
S10.24– 10.34 (MKK-HUH)	To act as a general precautionary measure to screen soils for the presence contamination during construction.	Precautionary measures such as visual inspection are recommended to be undertaken during construction activities that disturb soil.	Within Project Boundary where signs of contamination is identified	N/A
		If soil discolouration or the presence of oil/unnatural odour is noted during visual inspection, sampling and testing should also be undertaken to verify the presence of contamination.		N/A
	To remediate contaminated soil	If land contamination is identified, CAR and RAP detailing the proposed remediation works should be prepared. RR should then be prepared and submitted to EPD to demonstrate that the decontamination work is adequate and has been carried out in accordance with the endorsed CAR and RAP.		N/A

Legend: V = implemented;
x = not implemented;
@ = partially implemented;
N/A = not applicable

APPENDIX D

Summary of Action and Limit Levels

Appendix D – Summary of Action and Limit Levels

Table 1 Action and Limit Levels for 24-hour TSP

ID	Location	Action Level	Limit Level
AM1	No. 234 – 238 Chatham Road North	183.9 $\mu g/m^3$	260.0 $\mu g/m^3$

Table 2 Action and Limit Levels for Regular Construction Noise (0700 – 1900 hrs of normal weekdays)

<table>
<tr><th>ID</th><th>Location</th><th>Action Level</th><th>Limit Level</th></tr>
<tr><td>NM1</td><td>Carmel Secondary School (South Block)</td><td rowspan="2">When one documented complaint, related to 0700 – 1900 hours on normal weekdays, is received from any one of the sensitive receivers.</td><td>65 / 70 dB(A)(1)</td></tr>
<tr><td>NM2</td><td>No. 234 – 238 Chatham Road North</td><td>75 dB(A)</td></tr>
</table>

Note:
(1) Daytime noise Limit Level of 70 dB(A) applies to education institutions, while 65dB(A) applies during school examination period.

Table 3 Action and Limit Levels for Continuous Noise

ID	Location	Action/Limit Level
NM1	Carmel Secondary School (South Block)	69 dB(A)(1)
NM2	No. 234-238 Chatham Road North	77 dB(A)

Note:
(1) Action/Limit level will only be applicable during the examination period.

APPENDIX E

Calibration Certificates of Equipments

AECOM Asia Company Limited
TSP High Volume Sampler
Field Calibration Report

Station	234 - 238 Chatham Road North; SCL - DMS - 11	Operator:	Shum Kam Yuen
Cal. Date:	12-Jul-13	Next Due Date:	12-Sep-13
Equipment No.:	---	Serial No.	894-0835

Ambient Condition			
Temperature, Ta (K)	303	Pressure, Pa (mmHg)	752.7

Orifice Transfer Standard Information					
Serial No:	843	Slope, mc	1.99238	Intercept, bc	-0.00351
Last Calibration Date:	6-Dec-12	**mc x Qstd + bc = [DH x (Pa/760) x (298/Ta)]$^{1/2}$**			
Next Calibration Date:	6-Dec-13	**Qstd = {[DH x (Pa/760) x (298/Ta)]$^{1/2}$ -bc} / mc**			

Calibration of TSP Sampler

Resistance Plate No.	Orfice			HVS Flow Recorder	
	DH (orifice), in. of water	[DH x (Pa/760) x (298/Ta)]$^{1/2}$	Qstd (m^3/min) **X - axis**	Flow Recorder Reading (CFM)	Continuous Flow Recorder Reading IC (CFM) **Y-axis**
18	8.8	2.93	1.47	50.0	49.35
13	7.0	2.61	1.31	42.0	41.45
10	5.8	2.38	1.19	35.0	34.54
7	4.2	2.02	1.02	28.0	27.63
5	3.2	1.77	0.89	21.0	20.73

By Linear Regression of Y on X

Slope , mw = 48.4665 **Intercept, bw = -22.2868**

Correlation Coefficient* = 0.9967

*If Correlation Coefficient < 0.990, check and recalibrate.

Set Point Calculation

From the TSP Field Calibration Curve, take Qstd = 1.30m^3/min

From the Regression Equation, the "Y" value according to

mw x Qstd + bw = IC x [(Pa/760) x (298/Ta)]$^{1/2}$

Therefore, Set Point; IC = (mw x Qstd + bw) x [(760 / Pa) x (Ta / 298)]$^{1/2}$= **41.26**

Remarks:

QC Reviewer: WS CHAN Signature: Date: 15/7/13

D:\HVS Calibration Certificate (Existing)\60284101 -

AECOM Asia Company Limited
TSP High Volume Sampler
Field Calibration Report

Station	234 - 238 Chatham Road North; SCL - DMS - 11	Operator:	Shum Kam Yuen
Cal. Date:	11-Sep-13	Next Due Date:	11-Nov-13
Equipment No.:	---	Serial No.	894-0835

Ambient Condition			
Temperature, Ta (K)	302	Pressure, Pa (mmHg)	757.1

Orifice Transfer Standard Information					
Serial No:	843	Slope, mc	1.99238	Intercept, bc	-0.00351
Last Calibration Date:	6-Dec-12	$mc \times Qstd + bc = [DH \times (Pa/760) \times (298/Ta)]^{1/2}$			
Next Calibration Date:	6-Dec-13	$Qstd = \{[DH \times (Pa/760) \times (298/Ta)]^{1/2} - bc\} / mc$			

Calibration of TSP Sampler

Resistance Plate No.	Orfice			HVS Flow Recorder	
	DH (orifice), in. of water	$[DH \times (Pa/760) \times (298/Ta)]^{1/2}$	Qstd (m^3/min) **X - axis**	Flow Recorder Reading (CFM)	Continuous Flow Recorder Reading IC (CFM) **Y-axis**
18	9.0	2.97	1.49	48.0	47.59
13	7.0	2.62	1.32	41.0	40.65
10	5.9	2.41	1.21	36.0	35.69
7	4.4	2.08	1.05	29.0	28.75
5	3.1	1.75	0.88	20.0	19.83

By Linear Regression of Y on X

Slope , mw = 44.7916 **Intercept, bw = -18.7723**

Correlation Coefficient* = 0.9966

*If Correlation Coefficient < 0.990, check and recalibrate.

Set Point Calculation

From the TSP Field Calibration Curve, take Qstd = 1.30m^3/min

From the Regression Equation, the "Y" value according to

$$mw \times Qstd + bw = IC \times [(Pa/760) \times (298/Ta)]^{1/2}$$

Therefore, Set Point; $IC = (mw \times Qstd + bw) \times [(760 / Pa) \times (Ta / 298)]^{1/2}$ = **39.80**

Remarks:

QC Reviewer: WS CHAN Signature: Date: 12/09/13

TISCH ENVIRONMENTAL

TISCH ENVIROMENTAL, INC.
145 SOUTH MIAMI AVE.
VILLAGE OF CLEVES, OH 45002
513.467.9000
877.263.7610 TOLL FREE
513.467.9009 FAX
WWW.TISCH-ENV.COM

AIR POLLUTION MONITORING EQUIPMENT

ORIFICE TRANSFER STANDARD CERTIFICATION WORKSHEET TE-5025A

Date - Dec 06, 2012	Rootsmeter S/N 0438320	Ta (K) -	293
Operator Tisch	Orifice I.D. - 0843	Pa (mm) -	751.84

PLATE OR Run #	VOLUME START (m3)	VOLUME STOP (m3)	DIFF VOLUME (m3)	DIFF TIME (min)	METER DIFF Hg (mm)	ORFICE DIFF H2O (in.)
1	NA	NA	1.00	1.4040	3.2	2.00
2	NA	NA	1.00	0.9860	6.4	4.00
3	NA	NA	1.00	0.8850	8.0	5.00
4	NA	NA	1.00	0.8420	8.8	5.50
5	NA	NA	1.00	0.6930	12.9	8.00

DATA TABULATION

Vstd	(x axis) Qstd	(y axis)		Va	(x axis) Qa	(y axis)
1.0018	0.7136	1.4186		0.9957	0.7092	0.8828
0.9976	1.0118	2.0061		0.9915	1.0056	1.2485
0.9953	1.1247	2.2429		0.9893	1.1178	1.3959
0.9943	1.1809	2.3524		0.9883	1.1737	1.4640
0.9888	1.4269	2.8371		0.9828	1.4182	1.7657

Qstd slope (m) =	1.99238	Qa slope (m) =	1.24760
intercept (b) =	-0.00351	intercept (b) =	-0.00219
coefficient (r) =	0.99992	coefficient (r) =	0.99992
y axis = SQRT[H2O(Pa/760)(298/Ta)]		y axis = SQRT[H2O(Ta/Pa)]	

CALCULATIONS

Vstd = Diff. Vol[(Pa-Diff. Hg)/760](298/Ta)
Qstd = Vstd/Time

Va = Diff Vol [(Pa-Diff Hg)/Pa]
Qa = Va/Time

For subsequent flow rate calculations:

Qstd = 1/m{[SQRT(H2O(Pa/760)(298/Ta))]- b}
Qa = 1/m{[SQRT H2O(Ta/Pa)]- b}

綜合試驗有限公司
SOILS & MATERIALS ENGINEERING CO., LTD.
G/F., 9/F., 12/F., 13/F. & 20/F., Leader Centre, 37 Wong Chuk Hang Road, Aberdeen, Hong Kong.
香港黃竹坑道37號利達中心地下，9樓，12樓，13樓及20樓
E-mail: smec@cigismec.com Website: www.cigismec.com
Tel : (852) 2873 6860
Fax : (852) 2555 7533

HOKLAS 028 CAL

CERTIFICATE OF CALIBRATION

Certificate No.: 13CA0617 01-01

Item tested

Description:	Sound Level Meter (Type 1)	,	Microphone
Manufacturer:	B & K	,	B & K
Type/Model No.:	2238	,	4188
Serial/Equipment No.:	2800927 / N.009.06	,	2791211
Adaptors used:	-	,	-

Item submitted by

Customer Name:	AECOM ASIA CO. LTD.
Address of Customer:	-
Request No.:	-
Date of receipt:	17-Jun-2013

Date of test: 18-Jun-2013

Reference equipment used in the calibration

Description:	Model:	Serial No.	Expiry Date:	Traceable to:
Multi function sound calibrator	B&K 4226	2288444	22-Jun-2013	CIGISMEC
Signal generator	DS 360	33873	15-Apr-2014	CEPREI
Signal generator	DS 360	61227	15-Apr-2014	CEPREI

Ambient conditions

Temperature:	22 ± 1 °C
Relative humidity:	60 ± 10 %
Air pressure:	1000 ± 10 hPa

Test specifications

1, The Sound Level Meter has been calibrated in accordance with the requirements as specified in BS 7580: Part 1: 1997 and the lab calibration procedure SMTP004-CA-152.

2, The electrical tests were performed using an electrical signal substituted for the microphone which was removed and replaced by an equivalent capacitance within a tolerance of ±20%.

3, The acoustic calibration was performed using an B&K 4226 sound calibrator and corrections was applied for the difference between the free-field and pressure responsess of the Sound Level Meter.

Test results

This is to certify that the Sound Level Meter conforms to BS 7580: Part 1: 1997 for the conditions under which the test was performed.

Details of the performed measurements are presented on page 2 of this certificate.

Actual Measurement data are documented on worksheets.

Approved Signatory: ~~Huang Jian Min~~/Feng Jun Qi **Date:** 18-Jun-2013 **Company Chop:** SOILS AND MATERIALS ENGINEERING COMPANY LTD. 綜合試驗有限公司

Comments: The results reported in this certificate refer to the condition of the instrument on the date of calibration and carry no implication regarding the long-term stability of the instrument.

Form No.CARP152-1/Issue 1/Rev.C/01/02/2007

綜合試驗有限公司
SOILS & MATERIALS ENGINEERING CO., LTD.
G/F., 9/F., 12/F., 13/F. & 20/F., Leader Centre, 37 Wong Chuk Hang Road, Aberdeen, Hong Kong.
香港黃竹坑道37號利達中心地下，9樓，12樓，13樓及20樓
E-mail: smec@cigismec.com Website: www.cigismec.com
Tel : (852) 2873 6860
Fax : (852) 2555 7533

HOKLAS 028 CAL

CERTIFICATE OF CALIBRATION

Certificate No.: 13CA0617 01-02 **Page** 1 **of** 2

Item tested

Description:	Sound Level Meter (Type 1)	,	Microphone
Manufacturer:	B & K	,	B & K
Type/Model No.:	2238	,	4188
Serial/Equipment No.:	2800930 / N.009.07	,	2791214
Adaptors used:	-	,	-

Item submitted by

Customer Name:	AECOM ASIA CO. LTD.
Address of Customer:	-
Request No.:	-
Date of receipt:	17-Jun-2013

Date of test: 18-Jun-2013

Reference equipment used in the calibration

Description:	Model:	Serial No.	Expiry Date:	Traceable to:
Multi function sound calibrator	B&K 4226	2288444	22-Jun-2013	CIGISMEC
Signal generator	DS 360	33873	15-Apr-2014	CEPREI
Signal generator	DS 360	61227	15-Apr-2014	CEPREI

Ambient conditions

Temperature:	22 ± 1 °C
Relative humidity:	60 ± 10 %
Air pressure:	1000 ± 10 hPa

Test specifications

1, The Sound Level Meter has been calibrated in accordance with the requirements as specified in BS 7580: Part 1: 1997 and the lab calibration procedure SMTP004-CA-152.

2, The electrical tests were performed using an electrical signal substituted for the microphone which was removed and replaced by an equivalent capacitance within a tolerance of ±20%.

3, The acoustic calibration was performed using an B&K 4226 sound calibrator and corrections was applied for the difference between the free-field and pressure responsess of the Sound Level Meter.

Test results

This is to certify that the Sound Level Meter conforms to BS 7580: Part 1: 1997 for the conditions under which the test was performed.

Details of the performed measurements are presented on page 2 of this certificate.

Actual Measurement data are documented on worksheets.

Approved Signatory: Huang Jian Min/Feng Jun Qi **Date:** 18-Jun-2013 **Company Chop:** SOILS AND MATERIALS ENGINEERING COMPANY LTD. 綜合試驗有限公司

Comments: The results reported in this certificate refer to the condition of the instrument on the date of calibration and carry no implication regarding the long-term stability of the instrument.

綜合試驗有限公司
SOILS & MATERIALS ENGINEERING CO., LTD.
G/F., 9/F., 12/F., 13/F. & 20/F., Leader Centre, 37 Wong Chuk Hang Road, Aberdeen, Hong Kong.
香港黃竹坑道37號利達中心地下，9樓，12樓，13樓及20樓
E-mail: smec@cigismec.com Website: www.cigismec.com
Tel : (852) 2873 6860
Fax : (852) 2555 7533

HOKLAS 028 CAL

CERTIFICATE OF CALIBRATION

Certificate No.: 12CA1008 02

Item tested

Description:	Sound Level Meter (Type 1)	,	Microphone	Preamp
Manufacturer:	Rion Co., Ltd.	,	Rion Co., Ltd.	Rion Co., Ltd.
Type/Model No.:	NL-31	,	UC-53A	NH-19
Serial/Equipment No.:	00320528 / N.007.03A	,	90565	75883
Adaptors used:	-	,	-	-

Item submitted by

Customer Name: AECOM ASIA CO., LTD.
Address of Customer: -
Request No.: -
Date of receipt: 08-Oct-2012

Date of test: 08-Oct-2012

Reference equipment used in the calibration

Description:	Model:	Serial No.	Expiry Date:	Traceable to:
Multi function sound calibrator	B&K 4226	2288444	22-Jun-2013	CIGISMEC
Signal generator	DS 360	33873	29-May-2013	CEPREI
Signal generator	DS 360	61227	29-May-2013	CEPREI

Ambient conditions

Temperature: (22 ± 1) °C
Relative humidity: (60 ± 10) %
Air pressure: (1000 ± 5) hPa

Test specifications

1, The Sound Level Meter has been calibrated in accordance with the requirements as specified in BS 7580: Part 1: 1997 and the lab calibration procedure SMTP004-CA-152.
2, The electrical tests were performed using an electrical signal substituted for the microphone which was removed and replaced by an equivalent capacitance within a tolerance of ±20%.
3, The acoustic calibration was performed using an B&K 4226 sound calibrator and corrections was applied for the difference between the free-field and pressure responsess of the Sound Level Meter.

Test results

This is to certify that the Sound Level Meter conforms to BS 7580: Part 1: 1997 for the conditions under which the test was performed.

Details of the performed measurements are presented on page 2 of this certificate.

Actual Measurement data are documented on worksheets.

Approved Signatory: Huang Jian Min/Feng Jun Qi **Date:** 08-Oct-2012 **Company Chop:** SOILS AND MATERIALS ENGINEERING COMPANY LTD. 綜合試驗有限公司

Comments: The results reported in this certificate refer to the condition of the instrument on the date of calibration and carry no implication regarding the long-term stability of the instrument.

 Form No.CARP152-1/Issue 1/Rev.C/01/02/2007

綜合試驗有限公司
SOILS & MATERIALS ENGINEERING CO., LTD.
G/F., 9/F., 12/F., 13/F. & 20/F., Leader Centre, 37 Wong Chuk Hang Road, Aberdeen, Hong Kong.
香港黃竹坑道37號利達中心地下，9樓，12樓，13樓及20樓
E-mail: smec@cigismec.com Website: www.cigismec.com
Tel : (852) 2873 6860
Fax : (852) 2555 7533

HOKLAS 028
CAL

CERTIFICATE OF CALIBRATION

Certificate No.: 13CA0313 02

Item tested

Description:	Acoustical Calibrator (Class 1)
Manufacturer:	Rion Co., Ltd.
Type/Model No.:	NC-73
Serial/Equipment No.:	10307216 / N.004.06
Adaptors used:	-

Item submitted by

Curstomer:	AECOM ASIA CO. LTD
Address of Customer:	-
Request No.:	-
Date of receipt:	13-Mar-2013

Date of test: 14-Mar-2013

Reference equipment used in the calibration

Description:	Model:	Serial No.	Expiry Date:	Traceable to:
Lab standard microphone	B&K 4180	2412857	29-May-2013	SCL
Preamplifier	B&K 2673	2239857	17-Dec-2013	CEPREI
Measuring amplifier	B&K 2610	2346941	17-Dec-2013	CEPREI
Signal generator	DS 360	61227	29-May-2013	CEPREI
Digital multi-meter	34401A	US36087050	10-Dec-2013	CEPREI
Audio analyzer	8903B	GB41300350	29-May-2013	CEPREI
Universal counter	53132A	MY40003662	29-May-2013	CEPREI

Ambient conditions

Temperature:	22 ± 1 °C
Relative humidity:	60 ± 10 %
Air pressure:	1000 ± 10 hPa

Test specifications

1, The Sound Calibrator has been calibrated in accordance with the requirements as specified in IEC 60942 1997 Annex B and the lab calibration procedure SMTP004-CA-156.

2, The calibrator was tested with its axis vertical facing downwards at the specific frequency using insert voltage technique.

3, The results are rounded to the nearest 0.01 dB and 0.1 Hz and have not been corrected for variations from a reference pressure of 1013.25 hectoPascals as the maker's information indicates that the instrument is insensitive to pressure changes.

Test results

This is to certify that the sound calibrator conforms to the requirements of annex B of IEC 60942: 1997 for the conditions under which the test was performed. This does not imply that the sound calibrator meets IEC 60942 under any other conditions.

Details of the performed measurements are presented on **page 2** of this certificate.

Approved Signatory: Huang Jian Min/Feng Jun Qi **Date:** 14-Mar-2013 **Company Chop:** SOILS AND MATERIALS ENGINEERING COMPANY LTD. 綜合試驗有限公司

Comments: The results reported in this certificate refer to the conditon of the instrument on the date of calibration and carry no implication regarding the long-term stability of the instrument.

Form No.CARP156-1/Issue 1/Rev.D/01/03/2007

綜合試驗有限公司
SOILS & MATERIALS ENGINEERING CO., LTD.
G/F., 9/F., 12/F., 13/F. & 20/F., Leader Centre, 37 Wong Chuk Hang Road, Aberdeen, Hong Kong.
香港黃竹坑道37號利達中心地下，9樓，12樓，13樓及20樓
E-mail: smec@cigismec.com Website: www.cigismec.com
Tel : (852) 2873 6860
Fax : (852) 2555 7533

HOKLAS 028
CAL

CERTIFICATE OF CALIBRATION

Certificate No.: 13CA0325 01-03

Item tested

Description:	Acoustical Calibrator (Class 1)
Manufacturer:	Rion Co., Ltd.
Type/Model No.:	NC-73
Serial/Equipment No.:	10186482 / N.004.09
Adaptors used:	-

Item submitted by

Curstomer:	AECOM ASIA CO., LTD.
Address of Customer:	-
Request No.:	-
Date of receipt:	25-Mar-2013

Date of test: 26-Mar-2013

Reference equipment used in the calibration

Description:	Model:	Serial No.	Expiry Date:	Traceable to:
Lab standard microphone	B&K 4180	2412857	29-May-2013	SCL
Preamplifier	B&K 2673	2239857	17-Dec-2013	CEPREI
Measuring amplifier	B&K 2610	2346941	17-Dec-2013	CEPREI
Signal generator	DS 360	61227	29-May-2013	CEPREI
Digital multi-meter	34401A	US36087050	10-Dec-2013	CEPREI
Audio analyzer	8903B	GB41300350	29-May-2013	CEPREI
Universal counter	53132A	MY40003662	29-May-2013	CEPREI

Ambient conditions

Temperature:	22 ± 1 °C
Relative humidity:	60 ± 10 %
Air pressure:	1000 ± 10 hPa

Test specifications

1, The Sound Calibrator has been calibrated in accordance with the requirements as specified in IEC 60942 1997 Annex B and the lab calibration procedure SMTP004-CA-156.

2, The calibrator was tested with its axis vertical facing downwards at the specific frequency using insert voltage technique.

3, The results are rounded to the nearest 0.01 dB and 0.1 Hz and have not been corrected for variations from a reference pressure of 1013.25 hectoPascals as the maker's information indicates that the instrument is insensitive to pressure changes.

Test results

This is to certify that the sound calibrator conforms to the requirements of annex B of IEC 60942: 1997 for the conditions under which the test was performed. This does not imply that the sound calibrator meets IEC 60942 under any other conditions.

Details of the performed measurements are presented on **page 2** of this certificate.

Approved Signatory: ~~Huang Jian Min~~/Feng Jun Qi **Date:** 26-Mar-2013 **Company Chop:** SOILS AND MATERIALS ENGINEERING COMPANY LTD. 綜合試驗有限公司

Comments: The results reported in this certificate refer to the conditon of the instrument on the date of calibration and carry no implication regarding the long-term stability of the instrument.

APPENDIX F

EM&A Monitoring Schedules

Shatin to Central Link Contract 1111 - Hung Hom North Approach Tunnels
Impact Monitoring Schedule for September 2013

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
01-Sep	02-Sep	03-Sep	04-Sep	05-Sep	06-Sep	07-Sep
			24-hour TSP (AM1)	Noise (NM1, NM2)		
08-Sep	09-Sep	10-Sep	11-Sep	12-Sep	13-Sep	14-Sep
		24-hour TSP (AM1)	Noise (NM1, NM2)			
15-Sep	16-Sep	17-Sep	18-Sep	19-Sep	20-Sep	21-Sep
	24-hour TSP (AM1)	Noise (NM1, NM2)				24-hour TSP (AM1)
22-Sep	23-Sep	24-Sep	25-Sep	26-Sep	27-Sep	28-Sep
		Noise (NM1, NM2)			24-hour TSP (AM1)	
29-Sep	30-Sep					

APPENDIX G

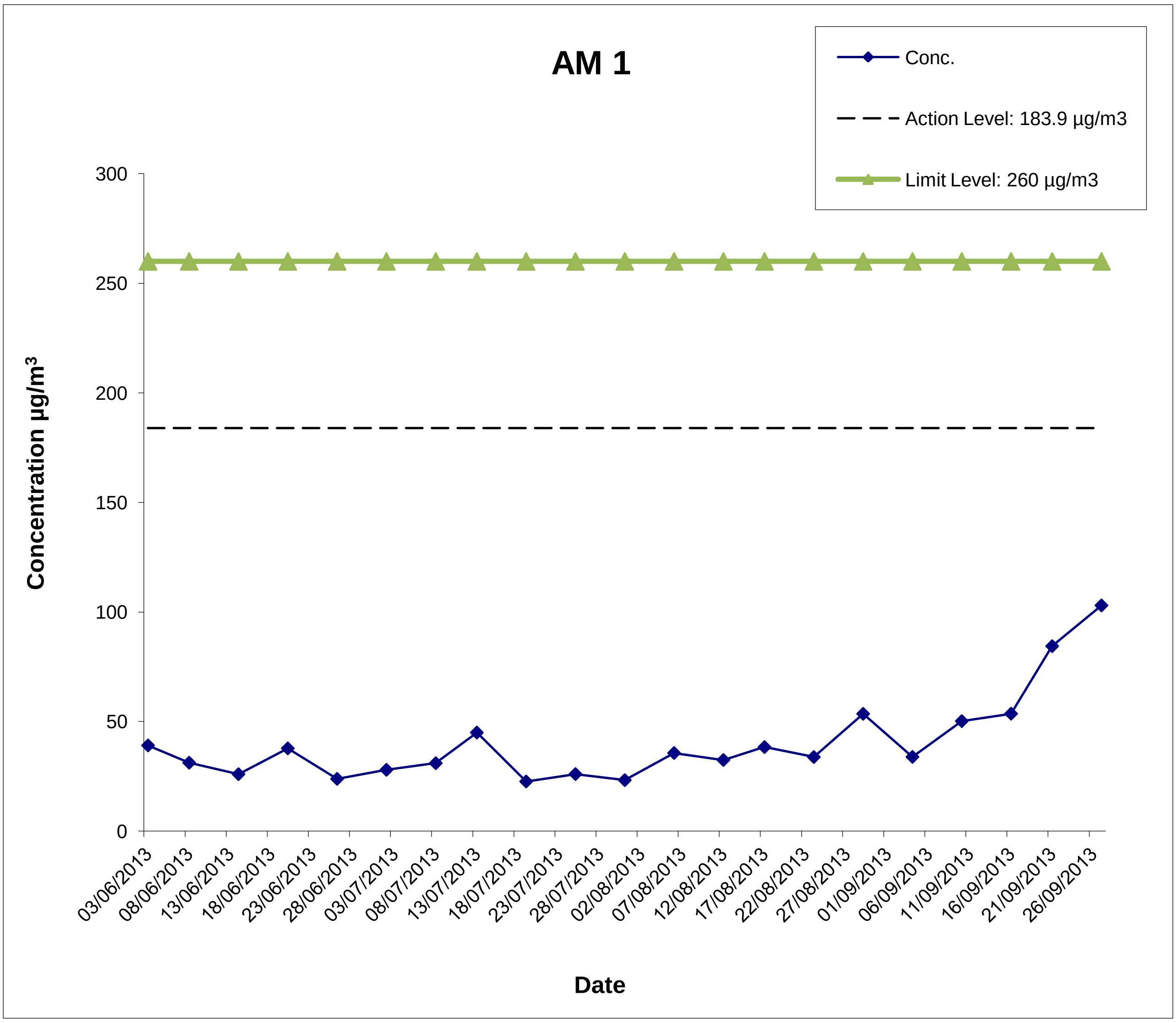
Air Quality Monitoring Results and their Graphical Presentations

Appendix G
Air Quality Monitoring Results

24-hour TSP Monitoring Results at Station AM1 (No. 234 – 238 Chatham Road North)

Start		End		Weather	Air	Atmospheric	Flow Rate (m^3/min.)		Av. flow	Total vol.	Filter Weight (g)		Particulate	Elapse Time		Sampling	Conc.
Date	Time	Date	Time	Condition	Temp. (^oC)	Pressure (hPa)	Initial	Final	(m^3/min)	(m^3)	Initial	Final	weight(g)	Initial	Final	Time(hrs.)	($\mu g/m^3$)
04-Sep-13	0:00	05-Sep-13	0:00	Rainy	25.0	1009.2	1.33	1.33	1.33	1916.6	2.9777	3.0426	0.0649	13057.87	13081.87	24.00	33.9
10-Sep-13	0:00	11-Sep-13	0:00	Sunny	28.6	1010.6	1.33	1.33	1.33	1916.6	2.9596	3.0558	0.0962	13081.87	13105.87	24.00	50.2
16-Sep-13	0:00	17-Sep-13	0:00	Sunny	28.1	1007.5	1.33	1.33	1.33	1916.6	2.9643	3.0670	0.1027	13105.87	13129.87	24.00	53.6
21-Sep-13	0:00	22-Sep-13	0:00	Sunny	31.2	999.9	1.33	1.33	1.33	1916.6	3.6188	3.7806	0.1618	13129.87	13153.87	24.00	84.4
27-Sep-13	0:00	28-Sep-13	0:00	Fine	26.5	1011.7	1.33	1.33	1.33	1916.6	2.9329	3.1303	0.1974	13153.87	13177.87	24.00	103.0
																Average	**65.0**
																Minimum	**33.9**
																Maximum	**103.0**

Appendix G Air Quality Monitoring Results



AECOM	**Shatin to Central Link Works Contract 1111- Hung Hom North Approach Tunnels**	SCALE	N.T.S.	DATE	Oct-13	
		CHECK	TYUT	DRAWN	IYYS	
	Graphical Presentations of Impact 24-hour TSP Monitoring Results	JOB NO.	60284101	**APPENDIX No.** G		**Rev.** -

Appendix G Extract of Meteorological Observations for King's Park* Automatic Weather Station, September 2013

Date	Total Rainfall (mm)	Prevailing Wind Direction (degrees)	Mean Wind Speed (km/h)
Sep-01	0.5	290	4.8
Sep-02	87.5	290	4.6
Sep-03	5.5	120	3.8
Sep-04	86.5	120	7.6
Sep-05	148	110	7.0
Sep-06	0.0	120	10.0
Sep-07	0.0	120	8.5
Sep-08	0.0	120	10.1
Sep-09	0.0	120	10.9
Sep-10	0.0	120	8.9
Sep-11	0.0	120#	10.2#
Sep-12	0.0	120	10.0
Sep-13	0.0	120	8.6
Sep-14	0.0	130	7.2
Sep-15	20.0	290	4.9
Sep-16	1.0	120#	12.8#
Sep-17	0.0	110#	14.7#
Sep-18	0.0	120	14.0
Sep-19	0.0	120#	11.2#
Sep-20	0.0	280	5.9
Sep-21	0.0	10	10.1
Sep-22	33.0	350	17.0
Sep-23	51.0	200#	15.7#
Sep-24	1.5	130	13.7
Sep-25	0.0	120	12.0
Sep-26	0.5	50	9.3
Sep-27	0.5	120	9.8
Sep-28	5.0	60	8.3
Sep-29	3.0	50	9.7
Sep-30	8.0	90	12.1
Mean	-----	120#	9.8#
Total	451.5	---	-----
Maximum	148	---	17.0#
Minimum	0.0	---	3.8#

*Meterological data of the nearest Automatic Weather Station is presented.
missing (less than 24 hourly observations a day)
Rainfall measured in increment of 0.5 mm. Amount of < 0.5 mm cannot be detected

APPENDIX H

Noise Monitoring Results and their Graphical Presentations

Appendix H   Regular Construction Noise Monitoring Results

Daytime Noise Monitoring Results at Station NM 1 (Carmel Secondary School (South Block))

Date	Weather Condition	Noise Level for 30-min, dB(A)+				Baseline Corrected Level, dB(A)	Baseline Noise Level, dB(A)	Limit Level***, dB(A)	Exceedance (Y/N)
		Time	L90	L10	Leq				
05-Sep-13	Rainy	10:28	65.1	69.0	67.2	67.2	68.0	70	N
11-Sep-13	Sunny	10:05	65.2	68.9	67.6	67.6	68.0	70	N
17-Sep-13	Sunny	10:48	67.3	70.0	68.7	60.4#	68.0	70	N
24-Sep-13	Fine	10:08	67.5	71.0	69.2	63.0#	68.0	70	N

Daytime Noise Monitoring Results at Station NM 2 (No. 234 – 238 Chatham Road North)

Date	Weather Condition	Noise Level for 30-min, dB(A)++				Baseline Corrected Level, dB(A)	Baseline Noise Level, dB(A)	Limit Level***, dB(A)	Exceedance (Y/N)
		Time	L90	L10	Leq				
05-Sep-13	Rainy	13:50	69.3	74.9	73.2	73.2	79.0	75	N
11-Sep-13	Sunny	14:22	72.8	75.5	74.4	74.4	79.0	75	N
17-Sep-13	Sunny	11:26	69.5	73.1	71.5	71.5	79.0	75	N
24-Sep-13	Fine	14:30	71.5	76.0	74.3	74.3	79.0	75	N

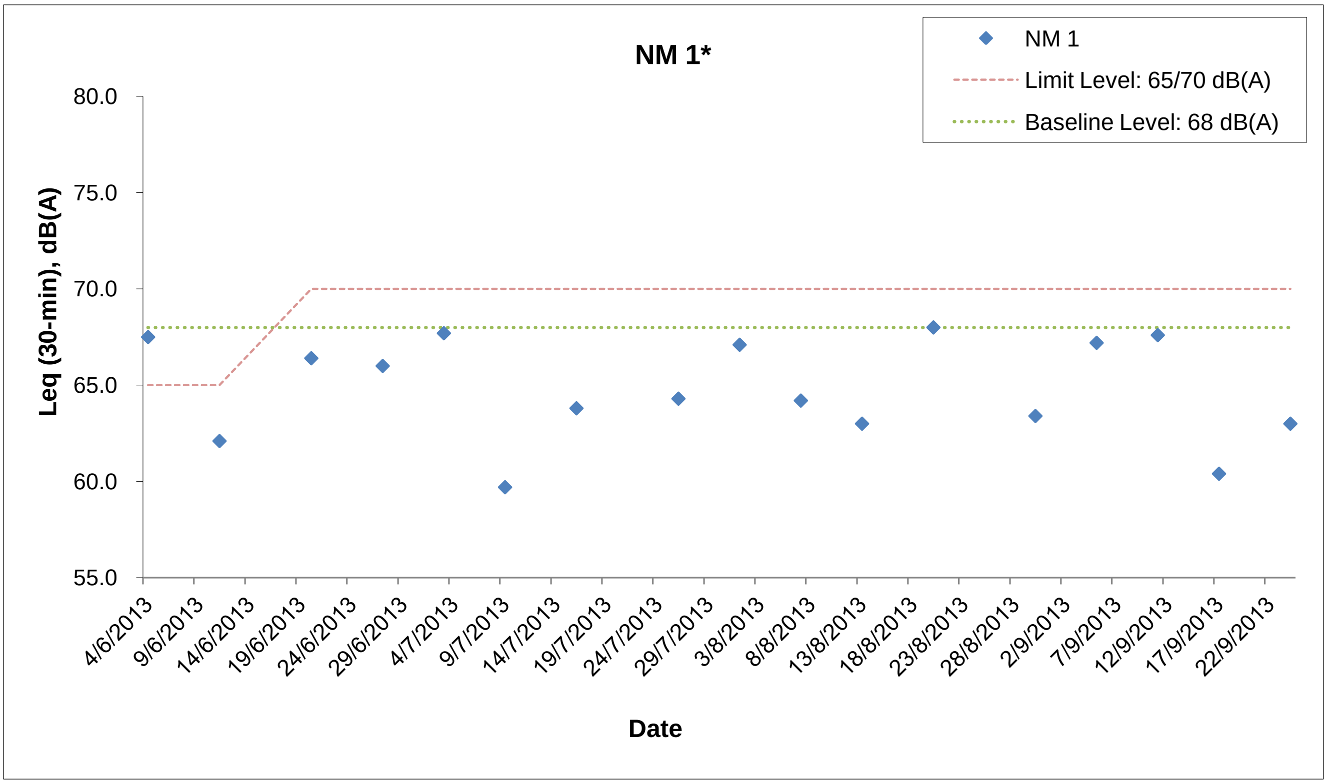
+ - Façade measurement

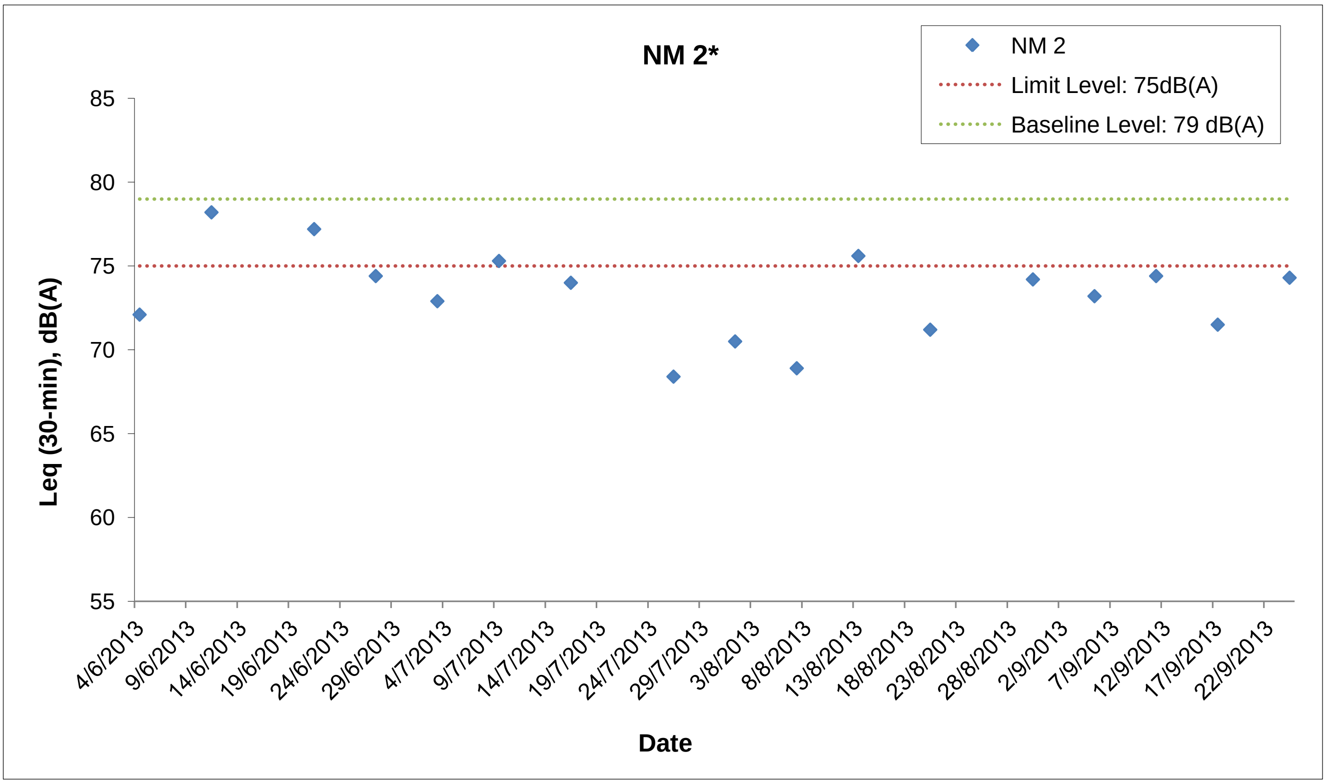
++ - Free field measurement

*** - Limit Level of 70dB(A) applies to education institutes while 65dB(A) applies during school examination period.

- The noise monitoring results of the measurements are higher than the daytime construction noise criterion. However, the results are not considered as exceedance if they are either below the baseline level or below the limit level after deducting the baseline noise level.

Appendix H   Regular Construction Noise Monitoring Results





* - The noise monitoring results of the measurements are higher than the daytime construction noise criterion. However, the results are not considered as exceedance if they are either below the baseline level or below the limit level after deducting the baseline noise level.

AECOM	**Shatin to Central Link Works Contract 1111- Hung Hom North Approach Tunnels**	SCALE	N.T.S.	DATE	Oct-13	
		CHECK	TYUT	DRAWN	IYYS	
	Graphical Presentations of Noise Monitoring Results	JOB NO.	60284101	APPENDIX	H	Rev -

APPENDIX I

Event Action Plan

Appendix I – Event and Action Plan

Event / Action Plan for Construction Dust

EVENT	ACTION			
	ET	**IEC**	**ER**	**Contractor**
ACTION LEVEL				
1. Exceedance for one sample	1. Inform the Contractor, IEC and ER; 2. Discuss with the Contractor and IEC on the remedial measures required; 3. Repeat measurement to confirm findings; 4. Increase monitoring frequency	1. Check monitoring data submitted by the ET; 2. Check Contractor's working method; 3. Review and advise the ET and ER on the effectiveness of the proposed remedial measures.	1. Confirm receipt of notification of exceedance in writing.	1. Identify source(s), investigate the causes of exceedance and propose remedial measures; 2. Implement remedial measures; 3. Amend working methods agreed with the ER as appropriate.

EVENT	ACTION			
	ET	IEC	ER	Contractor
2. Exceedance for two or more consecutive samples	1. Inform the Contractor, IEC and ER; 2. Discuss with the ER, IEC and Contractor on the remedial measures required; 3. Repeat measurements to confirm findings; 4. Increase monitoring frequency to daily; 5. If exceedance continues, arrange meeting with the IEC, ER and Contractor; 6. If exceedance stops, cease additional monitoring.	1. Check monitoring data submitted by the ET; 2. Check Contractor's working method; 3. Review and advise the ET and ER on the effectiveness of the proposed remedial measures.	1. Confirm receipt of notification of exceedance in writing; 2. Review and agree on the remedial measures proposed by the Contractor; 3. Supervise Implementation of remedial measures.	1. Identify source and investigate the causes of exceedance; 2. Submit proposals for remedial measures to the ER with a copy to ET and IEC within three working days of notification; 3. Implement the agreed proposals; 4. Amend proposal as appropriate.

<table>
<tr><th rowspan="2">EVENT</th><th colspan="4">ACTION</th></tr>
<tr><th>ET</th><th>IEC</th><th>ER</th><th>Contractor</th></tr>
<tr><td colspan="5">LIMIT LEVEL</td></tr>
<tr><td>1. Exceedance for one sample</td><td>1. Inform the Contractor, IEC, EPD and ER;
2. Repeat measurement to confirm findings;
3. Increase monitoring frequency to daily;
4. Discuss with the ER, IEC and contractor on the remedial measures and assess the effectiveness.</td><td>1. Check monitoring data submitted by the ET;
2. Check the Contractor's working method;
3. Discuss with the ET, ER and Contractor on possible remedial measures;
4. Review and advise the ER and ET on the effectiveness of Contractor's remedial measures.</td><td>1. Confirm receipt of notification of exceedance in writing;
2. Review and agree on the remedial measures proposed by the Contractor;
3. Supervise implementation of remedial measures.</td><td>1. Identify source(s) and investigate the causes of exceedance;
2. Take immediate action to avoid further exceedance;
3. Submit proposals for remedial measures to ER with a copy to ET and IEC within three working days of notification;
4. Implement the agreed proposals;
5. Amend proposal if appropriate.</td></tr>
</table>

EVENT	ACTION			
	ET	**IEC**	**ER**	**Contractor**
2. Exceedance for two or more consecutive samples	1. Notify Contractor, IEC, EPD and ER ; 2. Repeat measurement to confirm findings; 3. Increase monitoring frequency to daily; 4. Carry out analysis of the Contractor's working procedures with the ER to determine possible mitigation to be implemented; 5. Arrange meeting with the IEC and ER to discuss the remedial measures to be taken; 6. Review the effectiveness of the Contractor's remedial measures and keep IEC, EPD and ER informed of the results; 7. If exceedance stops, cease additional monitoring.	1. Check monitoring data submitted by the ET; 2. Check the Contractor's working method; 3. Discuss with ET, ER, and Contractor on the potential remedial measures; 4. Review and advise the ER and ET on the effectiveness of Contractor's remedial measures.	1. Confirm receipt of notification of exceedance in writing; 2. In consultation with the ET and IEC, agree with the Contractor on the remedial measures to be implemented; 3. Supervise the implementation of remedial measures; 4. If exceedance continues, consider what portion of the work is responsible and instruct the Contractor to stop that portion of work until the exceedance is abated.	1. Identify source(s) and investigate the causes of exceedance; 2. Take immediate action to avoid further exceedance; 3. Submit proposals for remedial measures to the ER with a copy to the IEC and ET within three working days of notification; 4. Implement the agreed proposals; 5. Revise and resubmit proposals if problem still not under control; 6. Stop the relevant portion of works as determined by the ER until the exceedance is abated.

Event / Action Plan for Regular Construction Noise

EVENT	ACTION			
	ET	IEC	ER	Contractor
Exceedance of Action Level	1. Notify the Contractor, IEC and ER; 2. Discuss with the ER, IEC and Contractor on the remedial measures required; and 3. Increase monitoring frequency to check mitigation effectiveness.	1. Review the investigation results submitted by the contractor; and 2. Review and advise the ET and ER on the effectiveness of the remedial measures proposed by the Contractor.	1. Confirm receipt of notification of complaint in writing; 2. Review and agree on the remedial measures proposed by the Contractor; and 3. Supervise implementation of remedial measures.	1. Investigate the complaint and propose remedial measures; 2. Report the results of investigation to the IEC, ET and ER; 3. Submit noise mitigation proposals to the ER with copy to the IEC and ET within 3 working days of notification; and 4. Implement noise mitigation proposals.

EVENT	ACTION			
	ET	IEC	ER	Contractor
Exceedance of Limit Level	1. Notify the Contractor, IEC, EPD and ER ; 2. Repeat measurement to confirm findings; 3. Increase monitoring frequency; 4. Carry out analysis of Contractor's working procedures to determine possible mitigation to be implemented; 5. Arrange meeting with the IEC and ER to discuss the remedial measures to be taken; 6. Inform IEC, ER and EPD the causes and actions taken for the exceedances 7. Review the effectiveness of Contractor's remedial measures and keep IEC, EPD and ER informed of the results; and 8. If exceedance stops, cease additional monitoring.	1. Check monitoring data submitted by the ET; 2. Check the Contractor's working method; 3. Discuss with the ER, ET and Contractor on the potential remedial measures; and 4. Review and advise the ET and ER on the effectiveness of the remedial measures proposed by the Contractor.	1. Confirm receipt of notification of failure in writing; 2. In consultation with the ET and IEC, agree with the Contractor on the remedial measures to be implemented; 3. Supervise the implementation of remedial measures; and 4. If exceedance continues, consider what portion of the work is responsible and instruct the Contractor to stop that portion of work until the exceedance is abated.	1. Identify source and investigate the causes of exceedance; 2. Take immediate action to avoid further exceedance; 3. Submit proposals for remedial measures to the ER with copy to the IEC and ET within 3 working days of notification; 4. Implement the agreed proposals; 5. Revise and resubmit proposals if problem still not under control; and 6. Stop the relevant portion of works as determined by the ER until the exceedance is abated.

Event / Action Plan for Continuous Construction Noise

EVENT	ACTION			
	ET	**IEC**	**ER**	**CONTRACTOR**
Action/Limit Level	1. Identify source ; 2. Repeat measurement. If two consecutive measurements exceed Action/Limit Level, the exceedance is then confirmed; 3. If exceedance is confirmed, notify IEC, ER and Contractor; 4. Investigate the cause of exceedance and ckeck Contractor's working procedures to determine possible mitigation to be implemented; 5. Discuss jointly with the IEC, ER and Contractor and formulate remedial measures; and 6. Assess effectiveness of Contractor's remedial actions and keep IEC and ER informed of the results.	1. Check monitoring data submitted by the Works Contract 1111 ET; 2. Check the Contractor's working method; 3. Discuss with the ER, Works Contract 1111 ET and Contractor on the potential remedial measures; and 4. Review and advise the Works Contract 1111 ET and ER on the effectiveness of the remedial measures proposed by the Contractor.	1. Confirm receipt of notification of exceedance in writing; 2. In consultation with the Works Contract 1111 ET and IEC, agree with the Contractor on the remedial measures to be implemented; 3. Ensure the proper implementation of remedial measures; and 4. If exceedance continues, consider what portion of the work is responsible and instruct the Contractor to stop that portion of work until the exceedance is abated.	1. Identify source with the Works Contract 1111 ET; 2. If exceedance is confirmed, investigation the cause of exceedance and take immediate action to avoid further exceedance; 3. Submit proposals for remedial measures to the ER with copy to the IEC and ET of notification; 4. Implement the agreed proposals; 5. Liaise with ER to optimize the effectiveness of the agreed mitigation; 6. Revise and resubmit proposals if problem still not under control; and 7. Stop the relevant portion of works as determined by the ER until the exceedance is abated.

Event / Action Plan for Landscape and Visual during Construction Stage

EVENT	ET	IEC	ER	Contractor
ACTION LEVEL				
Non-conformity on one occasion	1. Inform the Contractor, the IEC and the ER 2. Discuss remedial actions with the IEC, the ER and the Contractor 3. Monitor remedial actions until rectification has been completed	1. Check inspection report 2.Check the Contractor's working method 3. Discuss with the ET, ER and the Contractor on possible remedial measures 4.Advise the ER on effectiveness of proposed remedial measures.	1. Confirm receipt of notification of non-conformity in writing 2.Review and agree on the remedial measures proposed by the Contractor 3. Supervise implementation of remedial measures	1. Identify Source and investigate the non-conformity 2. Implement remedial measures 3.Amend working methods agreed with the ER as appropriate 4. Rectify damage and undertake any necessary replacement
Repeated Non-conformity	1. Identify source 2. Inform the Contractor, the IEC and the ER 3. Increase inspection frequency 4. Discuss remedial actions with the IEC, the ER and the Contractor 5. Monitor remedial actions until rectification has been completed 6. If non-conformity stops, cease additional monitoring	1. Check inspection report 2.Check the Contractor's working method 3. Discuss with the ET and the Contractor on possible remedial measures 4.Advise the ER on effectiveness of proposed remedial measures	1. Notify the Contractor 2. In consultation with the ET and IEC, agree with the Contractor on the remedial measures to be implemented 3. Supervise implementation of remedial measures.	1. Identify Source and investigate the non-conformity 2. Implement remedial measures 3. Amend working methods agreed with the ER as appropriate 4. Rectify damage and undertake any necessary replacement. Stop relevant portion of works as determined by the ER until the non-conformity is abated.

APPENDIX J

Cumulative Statistics of Complaints, Notification of Summons and Successful Prosecutions

Appendix J
Cumulative Statistics on Complaints, Notifications of Summons and Successful Prosecutions

	Date Received	Subject	Status	Total no. received in this month	Total no. received since project commencement
Environmental complaints	-	-	-	0	0
Notification of summons	-	-	-	0	0
Successful Prosecutions	-	-	-	0	0

APPENDIX K

Waste Flow Table

Appendix K Monthly Summary Waste Flow Table

Month	Actual Quantities of Inert C&D Materials Generated Monthly (Note 1)										Actual Quantities of non-inert C&D Materials (i.e. C&D Wastes) Generated Monthly				
	Generated				Disposed						Recycled			Disposed	
	Fill Material	Artificial Material		Total Quatity Generated	Reused in the Contract	Reused in other Projects	Disposed as Public Fills at HH Barging Point	Disposed as Public Fills at TKO137	Disposed as Public Fills at TM38	Total Quatity Disposal	Metals	Paper/ cardboard packaging (Note 3)	Plastics	Chemical Waste	General Refuse (Note 2)
	Soil and Rock	Broken Concrete	Asphalt												
Unit	('000m^3)	('000m^3)	('000m$^{3)}$	('000m^3)	('000m^3)	('000m^3)	('000m^3)	('000m^3)	('000m^3)	('000m^3)	('000Kg)	('000Kg)	('000Kg)	('000Kg)	('000Kg)
Jan	0.043	0.000	0.021	0.065	0.000	0.000	0.000	0.065	0.000	0.065	0.000	0.000	0.000	0.000	17.110
Feb	0.172	0.004	0.019	0.195	0.026	0.000	0.000	0.165	0.004	0.195	0.000	0.000	0.000	0.000	29.440
Mar	0.280	0.010	0.094	0.384	0.000	0.000	0.001	0.347	0.036	0.384	7.490	0.000	0.000	0.000	112.240
Apr	0.726	0.041	0.073	0.840	0.000	0.000	0.000	0.777	0.062	0.840	0.000	0.000	0.000	0.000	213.390
May	2.032	0.087	0.064	2.183	0.000	0.000	0.000	1.695	0.488	2.183	0.000	0.077	0.000	0.000	112.700
Jun	3.920	0.035	0.065	4.020	0.000	0.000	0.000	1.088	2.932	4.020	0.000	0.189	0.000	0.000	213.570
SUB-TOTAL	7.173	0.177	0.337	7.687	0.026	0.000	0.001	4.137	3.522	7.687	7.490	0.266	0.000	0.000	698.450
Jul	4.204	0.032	0.055	4.291	0.000	0.000	0.000	0.045	4.246	4.291	0.000	0.287	0.000	0.000	127.540
Aug	2.124	0.023	0.034	2.180	0.000	0.000	0.000	0.006	2.174	2.180	0.000	0.336	0.000	0.000	121.170
Sep	1.344	0.012	0.004	1.359	0.000	0.000	0.000	0.000	1.359	1.359	0.012	0.282	0.001	0.000	113.560
Oct															
Nov															
Dec															
TOTAL	14.844	0.243	0.430	15.516	0.026	0.000	0.001	4.188	11.301	15.516	7.502	1.171	0.001	0.000	1060.720

Note:
1. Assume the density of fill is 2 ton/m^3.
2. Refuses disposed of at NENT landfill.
3. Assume the weight of recycled papers is 7 kg/bag.

Appendix E

8th EM&A Report for Works Contract 1103 – Hin Keng to Diamond Hill

MTR Corporation Limited

Shatin to Central Link – Tai Wai to Hung Hom Section

Monthly EM&A Report No. 8

[Period from 1 to 30 September 2013]

Works Contract 1103 – Hin Keng to Diamond Hill Tunnels

(October 2013)

Certified by: Coleman Ng

Position: Environmental Team Leader

Date: 10/10/2013

MTR Corporation Limited

SCL1103 Hin Keng to Diamond Hill Tunnels Construction Stage - Environmental Services

Monthly Environmental Monitoring and Audit Report – September 2013

228105-27

October 2013

Job number 228105-27

Ove Arup & Partners Hong Kong Ltd
Level 5 Festival Walk
80 Tat Chee Avenue
Kowloon Tong
Kowloon
Hong Kong
www.arup.com

ARUP

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Executive Summary

This is the eighth monthly Environmental Monitoring and Audit (EM&A) report prepared by Ove Arup & Partners Hong Kong Limited (Arup), the designated Environmental Team (ET), for the Project “SCL1103 Hin Keng to Diamond Hill Tunnels”. Construction works of this works contract commenced on 14 February 2013 and this report presents the results of EM&A works conducted in the month of September 2013 (1 to 30 September 2013).

In the reporting month, the following activities took place for the Project:

- Diaphragm Wall Construction at Diamond Hill;
- Pipe Piling, Site Setup and Site Formation at Hin Keng;
- Utilities Diversion, Hoarding Erection and Platform Construction at Fung Tak; and
- Diaphragm Wall Construction, Hoarding Erection and Platform Construction and Site Setup at Ma Chai Hang.

Air Quality and noise monitoring were performed and the results were checked and reviewed. Site audits were conducted on weekly basis. The implementation of the environmental mitigation measures, Event and Action Plans and environmental complaint handling procedures were checked.

Impact monitoring was carried out at 3 air quality and 3 noise monitoring stations during the reporting month.

Environmental Monitoring Works – Breaches of Action and Limit Levels

Air Quality

All measured 24-hour TSP concentrations in the reporting month were below the Action and Limit Levels.

Noise

No Action Level exceedance was recorded since no noise related complaint was received in the reporting month.

No exceedance of Limit Level of regular construction noise was recorded during the reporting month.

Landscape and Visual Audit

Landscape and visual site audits in accordance with the requirements stipulated in the EM&A manual were conducted in the reporting month. Based on the site inspections, no substantial change of Landscape Resources, Landscape Character Areas and Visual Sensitive Receivers was noted.

Waste Disposal

Inert C&D Materials with an actual amount of 2355m^3 were generated and disposed of at public fill in TKO137FB and Kai Tak Barging Point Facility (Contract 1108A). 440m^3 of general refuse was generated and disposed of at NENT landfill.

Environmental Auditing

A total of 4 environmental site audits were conducted on a weekly basis in the reporting month. The first site inspection was on 4 September 2013 and the final, an IEC joint site audit, was undertaken on 25 September 2013. No non-conformance to the environmental requirements was identified during the reporting period.

Complaint Log

No complaint in relation to the environmental issues was made against the Project in the reporting period.

Notifications of Summons and Successful Prosecutions

No summons or prosecution related to the environmental issues were made against the Project in the reporting period.

Reporting Changes

To address the recent changes in the planned blasting activities, in accordance with the latest engineering information and construction optimisation, a QRA study (**Appendix M**) has therefore been conducted.

The study concluded that the risk associated with the proposed changes will be within the risk envelope of 'Worst Case Scenario' indicated in the approved SCL (TAW-HUH) EIA and no unacceptable impacts will be anticipated.

Future Key Issues

Construction noise is one of the key environmental issues. The implemented construction noise mitigation measures should also be maintained and improved as necessary. Especially in restricted hours, the conditions stipulated in the CNPs should be strictly followed when the construction works were carried out during restricted hours.

Water Quality impact is also a key environmental issue. The drainage system should be well maintained. All wastewater generated within the site shall be collected and treated prior to discharge. The solid and liquid waste management should be strictly followed in accordance with the requirements stipulated in the EIA report.

1 Environmental Status

1.1 Project Background

The Shatin to Central Link – Tai Wai to Hung Hom Section (hereafter referred to as SCL (TAW-HUH)) is an extension of the Ma On Shan Line and is approximately 11 km long. It links up with the West Rail Line at Hung Hom forming a strategic east-west rail corridor. It is a Designated Project under the Environmental Impact Assessment Ordinance (Cap. 499) (EIAO).

The construction of the SCL (TAW-HUH) has been divided into a series of civil construction Works Contracts and this Works Contract 1103 covers the construction of the tunnels between Diamond Hill (DIH) and Hin Keng (HIK).

1.2 Construction Programme

An up-to-date rolling construction programme is attached in **Appendix A**.

1.3 Work Undertaken During the Reporting Month

The major construction activities carried out by the Contractor in the reporting month are summarized in **Table 1.1**. Location of the works area is indicated in **Figures 1.1** to **1.6**. The structure of the project organisation in relation to the environmental management is shown in **Figure 1.7**. Contacts of key environmental staff of the Project are shown in **Table 1.2**.

Table 1.1 Construction Activities in the Reporting Month

Locations	Major Works Undertaken
Diamond Hill	Diaphragm Wall Construction.
Hin Keng	Pipe Piling, Site Setup and Site Formation.
Fung Tak	Utilities Diversion, Hoarding Erection and Platform Construction.
Ma Chai Hang	Diaphragm Wall Construction, Hoarding Erection and Platform Construction and Site Setup.

1.4 Project Organization

Contacts of key environmental staff of the Project and are shown in **Table 1.2**.

Table 1.2 Contacts of Key Environmental Staff

Organisation	Name	Telephone
Project Proponent: MTRC Engineer's Representative SCL Project-wide Environmental Team Leader	 Thomas Barrett Richard Kwan	 2163 6181 2688 1283
Independent Environmental Checker: Meinhardt Infrastructure & Environment Ltd. Independent Environmental Checker	 Fredrick Leong	 2859 1739
Contractor: VINCI Constructions Grand Projects Project Director IMS Manager	 Francois Dudouit L K Mak	 3765 5610 3765 5635
Contractor's Environmental Team: Ove Arup & Partners Hong Kong Ltd. Designated Environmental Team Leader for Works Contract 1103	 Coleman Ng	 2268 3097

1.5 Project Area and Environmental Monitoring locations

The Project area is shown in **Figures 1.1** to **1.6**, while **Table 1.3** and **Figures 1.8** to **1.13** show the names and locations of the monitoring stations.

Table 1.3 Summary of Air Quality and Noise Monitoring Stations

ID	Premise
Air Quality	
DMS-1	C.U.H.K.A.A. Thomas Cheung School
DMS-2	Price Memorial Catholic Primary School
DMS-3 (Note 2) / DMS-4 (Note 3)	Hong Kong Sheng Kung Hui Nursing Home (Note 1)
Noise	
NMS-CA-1	C.U.H.K.A.A. Thomas Cheung School
NMS-CA-2	Price Memorial Catholic Primary School
NMS-CA-3 (Note 2) / NMS-CA-4 (Note 3)	Hong Kong Sheng Kung Hui Nursing Home

Note:

Note 1: Hong Kong Sheng Kung Hui Nursing Home was selected as an alternative monitoring location to Shek On House.

Note 2: Station ID as identified in approved EM&A Manual / EIA Report for SCL (TAW - HUH).

Note 3: Station ID as identified in approved EM&A Manual / EIA Report for SCL (HHS).

1.6 Impact Monitoring Schedule

Environmental monitoring and audit was carried out in accordance with the requirements stipulated in the EM&A Manual. Air quality and noise monitoring as well as weekly site audit schedule for the reporting month with respect to the construction programme is shown in **Appendix B**.

1.7 Status of Environmental Licensing and Permitting

All permits/licences for the reporting month are summarised in **Table 1.4**. They are all properly kept by the contactor at their site office.

Table 1.4 Summary of Environmental Licensing Status

Types of Permits / Licenses	Reference No.	Site	Valid from	Valid to
Environmental Permit	EP-438/2012	All	22 Mar 2012	Superseded
	EP-438/2012A	All	12 July 2012	Superseded
	EP-438/2012/B	All	26 Oct 2012	Superseded
	EP-438/2012/C	All	30 Apr 2013	Superseded
	EP-438/2012/D	All	13 Sept 2013	Throughout the contract
Discharge License under WPCO	WT00014697-2012	Diamond Hill	30 Nov 2012	30 Nov 2017
	WT00014650-2012	Hin Keng	10 Dec 2012	31 Dec 2017
	WT00014648-2012	Hin Keng	10 Dec 2012	31 Dec 2017
	WT00015145-2013	Shui Chuen O	21 Feb 2013	28 Feb 2018
	WT00015513-2013	Ma Chai Hang	2 Apr 2013	30 Apr 2018
	WT00015430-2013	Fung Tak	18 Mar 2013	31 Mar 2018
Notification of Construction Works under the Air Pollution Control (Construction Dust) Regulation	351345	All	22 Oct 2012	15 Apr 2018
Construction Noise Permit	GW-RE0118-13	Diamond Hill	14 Feb 2013	13 Aug 2013
	GW-RE0130-13	Diamond Hill	14 Feb 2013	Expired
	GW-RE0145-13	Diamond Hill	20 Feb 2013	10 Aug 2013
	GW-RE0411-13	Diamond Hill	3 May 2013	Expired
	GW-RE0295-13	Ma Chai Hang	28 Mar 2013	Expired
	GW-RE0366-13	Hin Keng	17 July 2013	16 Jan 2014
	GW-RE0441-13	Hin Keng	2 Aug 2013	19 Feb 2014
	GW-RE0816-13	Diamond Hill	14 Aug 2013	12 Feb 2014
	GW-RE0879-13	Diamond Hill	1 Sep 2013	29 Sep 2013
	GW-RE0988-13	Diamond Hill	15 Sep 2013	29 Sep 2013

Types of Permits / Licenses	Reference No.	Site	Valid from	Valid to
Chemical Waste Producer Registration	5213-759-V2179-01	Hin Keng	13 Dec 2012	Throughout the Contract
	5213-281-V2180-01	Diamond Hill	12 Dec 2012	Throughout the Contract
	5213-281-V2179-03	Fung Tak	5 Mar 2013	Throughout the Contract
	5213-282-V2180-02	Ma Chai Hang	18 Mar 2013	Throughout the Contract
Billing Account for Disposal of Construction Waste	7016250	All	2 Nov 2012	Throughout the Contract

1.8 Purpose of the Report

The purpose of this monthly EM&A report is to provide the information on monitoring methodology, monitoring results, environmental permit status, site audit findings, recommendations and conclusions during the construction of this works contract for the EM&A conducted during the construction period. This is the eighth monthly EM&A report summarising the monitoring methodology, locations, periods, frequencies, results and any observation from the air quality, noise, ecology, waste management, landscape and visual monitoring and environmental site audit from 1 to 30 September 2013.

2 Implementation Status

2.1 Implementation Status of Mitigation Measures

During weekly site inspections, the environmental protection, and pollution control/mitigation measures in accordance with the requirements stipulated in the EIA were observed. The key observations and ET's corresponding recommendations while the Contractor's response and follow-up status are described in **Section 7.1**.

2.2 Updated Implementation Schedule

According to the Environmental Permit, the mitigation measures detailed in the permits are required to be implemented. The Implementation Schedule of Mitigation Measures was inspected during the weekly site inspections in reporting month. The details of the findings/observations are described in **Section 7.1**. An updated summary of the Implementation Schedule of Mitigation Measures is presented in **Appendix C**. The status of the required submissions under the Environmental Permit (EP) of the reporting period is presented in **Table 2.1**.

Table 2.1 Status of Required Submissions under the EP

EP Condition	Submission	Submission Date
Condition 3.4	Monthly EM&A Report (August 2013)	13th September 2013

To address the recent changes in the planned blasting activities, in accordance with the latest engineering information and construction optimisation, a QRA study (**Appendix M**) has therefore been conducted. The study concluded that the risk associated with the proposed changes will be with the risk envelope of 'Worst Case Scenario' indicated in the approved SCL (TAW-HUH) EIA and no unacceptable impacts will be anticipated.

3 Air Quality Monitoring

3.1 Air Quality Monitoring Requirements

Monitoring Parameters

Regular 24-hour TSP levels shall be monitored during the construction stage while 1-hour TSP levels shall be required to monitor in case of complaints received.

Monitoring Frequency

The monitoring frequency is summarised in **Table 3.1**.

Table 3.1 Air quality monitoring parameters and frequency

Parameters	Monitoring Frequency
24-hour TSP	Once every 6 days
1-hour TSP	3 times every 6 days (as required in case of complaints)

Monitoring Locations

In accordance with the EM&A Manual and the subsequent Baseline Monitoring Report, three air quality monitoring locations during construction stage are required. The locations of the three air quality monitoring stations are shown below in **Table 3.2**:

Table 3.2 Air Quality Monitoring Locations

ID	Premise
DMS -1	C.U.H.K.A.A. Thomas Cheung School
DMS -2	Price Memorial Catholic Primary School
DMS-3 (Note 2) / DMS-4 (Note 3)	Hong Kong Sheng Kung Hui Nursing Home (Note 1)

Note:

Note 1: Hong Kong Sheng Kung Hui Nursing Home was selected as an alternative monitoring location to Shek On House.

Note 2: Station ID as identified in approved EM&A Manual / EIA Report for SCL (TAW - HUH).

Note 3: Station ID as identified in approved EM&A Manual / EIA Report for SCL (HHS).

Wind Monitoring

Wind monitoring data including wind speed and wind directions shall be collected from Hong Kong Observatory – Kai Tak and Sha Tin Meteorological Stations and shown in **Appendix F**.

Environmental /Quality Performance Limits

The monitoring results will be checked against the Action and Limit levels described in the Baseline Monitoring Report, of which they are excerpted and summarised in **Tables 3.3** and **3.4.**

Table 3.3 Action and Limit Level for Air Quality Monitoring of 24-hour TSP level

Level	Air Monitoring Stations		
	DMS-1	DMS-2	DMS-3 / DMS-4
Action Level, µg/m^3	148.7	167.4	159.1
Limit Level, µg/m^3	260		

Table 3.4 Action and Limit Level for Air Quality Monitoring of 1-hour TSP level

Level	Air Monitoring Stations		
	DMS-1	DMS-2	DMS-3 / DMS-4
Action Level, µg/m^3	283.9	276.2	278.4
Limit Level, µg/m^3	500		

Note:
Note 1: 1-hr TSP monitoring would be required in case of receiving complaints.

3.2 Air Quality Monitoring Methodology

3.2.1 Monitoring Equipment

High Volume Sampler (HVS) was used to monitor the 24-hour TSP. **Table 3.5** shows the equipment used for the air quality monitoring.

Table 3.5 Air Quality Equipment List for Impact Air Quality Monitoring

Equipment	Manufacturer & Model No	Measurement Parameter	Serial No.
High Volume Sampler	TE-5170	24-hour TSP	3761, 3762, 3763
Fibreglass Filter	G810		-
HVS Calibration Kit	GMW-2535		2421

3.2.2 Maintenance and Calibration

The HVSs and their accessories were frequently checked and maintained in accordance with the manufacturer's operation and maintenance manual. The maintenance included checking of supporting screen and gasket, as well as routine replacement of motor carbon brushes for the blower motor. The power cords and power supply were checked each time before sampling to ensure proper operation.

The HVSs were calibrated at 2-month intervals using GMW-2535 calibration kit which is re-calibrated by the manufacturer after one year of use. The calibration spreadsheets of the HVSs and calibration certificate of the calibration kit are provided in **Appendix D**.

3.2.3 Monitoring Procedures

Specifications of the HVS are as follows:

- 0.6 – 1.7 m^3/min (20 – 60SCFM);
- Equipped with a timing/control device with +/- 5 minutes accuracy for 24 hour operation;

- Installed with elapsed time meter with +/- 2 minutes accuracy for 24 hour operation;
- Capable of providing a minimum exposed area of 406 cm^2 ($63in^2$);
- Flow control accuracy: +/-2.5% deviation over 24-hour sampling period;
- Equipped with a shelter to protect the filter and sampler;
- Incorporated with an electronic mass flow rate controller or other equivalent devices;
- Equipped with a flow recorder for continuous monitoring;
- Provided with a peaked roof inlet;
- Incorporated with a manometer;
- Able to hold and seal the filter paper to the sampler housing at horizontal position;
- Easy to change the filter; and
- Capable of operating continuously for 24-hour period.

The HVSs were equipped with an electronic mass flow controller and calibrated against a traceable standard at regular intervals. All equipment, calibration kit and filter papers were clearly labelled.

The relevant data including temperature, pressure, weather conditions, elapsed-time meter reading for the start and stop of the sampler, identification and weight of the filter paper, and other special phenomena observed and work progress of the concerned site were recorded.

A HOKLAS accredited laboratory (ALS Technichem (HK) Pty Ltd (HOKLAS no.: 066)), in accordance with their standard QA/QC procedures, with constant temperature and humidity control as well as equipped with necessary measuring and conditioning instruments to handle the 24-hour TSP samples was employed for sample analysis, and equipment calibration and maintenance. Filter papers of size 8"x10" were labelled before sampling. They were inspected clean with no pin holes and conditioned in a humidity controlled chamber for over 24-hour and be pre-weighed before use for the sampling.

The 24-hour TSP levels were measured by following the standard High Volume Method for Total Suspended Particulates as set out in the Title 40 of the United States Code of Federal Regulations, Chapter 1 (Part 50), Appendix B. TSP was sampled by drawing air through a conditioned, pre-weighted filter paper inside the HVS at a controlled air flow rate. After 24-hour sampling, the filter papers loaded with dust were kept in a clean and tightly sealed plastic bag, and then returned to the laboratory for reconditioning in the humidity controlled chamber followed by accurate weighing by an electronic balance with a readout down to 0.1 mg. All the collected samples shall be kept in a good condition for 6 months before disposal.

3.3 Monitoring Results and Observations

3.3.1 Weather Condition

No adverse weather conditions were recorded during the monitoring dates.

3.3.2 Air Quality Monitoring Results

Monitoring of 24-hour TSP was conducted on 5, 11, 17, 23, 28 September 2013. All monitoring data and graphical presentation of the monitoring results are provided in **Appendix E** and are summarised in **Table 3.6**. The graphical presentations of the monitoring results are provided in **Appendix E**. Wind data obtained from the Hong Kong Observatory – Kai Tak and Sha Tin stations during the reporting period are presented in **Appendix F**.

Table 3.6 Summary of Impact Air Quality Monitoring Results

Monitoring Station	24- hour TSP Monitoring Results (μg/m^{3})		Action Level	Limit Level
	Average	Range		
DMS-1	37.8	50.7	148.7	260
DMS-2	40.6	52.6	167.4	260
DMS-3 / DMS-4	35.7	42.9	159.1	260

All 24-hour TSP measurements during the reporting month were below the Action/Limit Level. No exceedance of action and limit level was found.

The event and action plan is provided in **Appendix I**.

3.3.3 General Observations

Major construction works including site formation, ground investigation, diaphragm wall construction, hoarding erection, pipe piling, and utilities detection and diversion. No abnormal condition was recorded during the monitoring period.

4 Noise Monitoring

4.1 Noise Monitoring Requirements

4.1.1 Impact Monitoring

Monitoring Parameters

Construction noise shall be measured in terms of the A-weighted equivalent continuous sound pressure level (L_{eq}). L_{10} and L_{90} shall also be recorded as supplementary reference information for data auditing.

Monitoring Frequency

Noise measurements shall be conducted on a weekly basis. The monitoring time periods, monitoring parameters and frequency are summarised in **Table 4.1.**

Table 4.1 Construction Noise Monitoring Parameters and Frequency

Time Period (when construction activity is found)	Parameters	Monitoring Frequency
Between 0700-1900 hours on normal weekdays	$L_{eq(30\ min)}$	Once per week

Monitoring Location

In accordance with the EM&A Manual and the subsequent Baseline Monitoring Report, three noise monitoring locations during the construction stage are required, namely:

Table 4.2 Noise Monitoring Locations

ID	Premise
NMS-CA-1	C.U.H.K.A.A. Thomas Cheung School
NMS-CA-2	Price Memorial Catholic Primary School
NMS-CA-3 (Note 2) / NMS-CA-4 (Note 3)	Hong Kong Sheng Kung Hui Nursing Home (Note 1)

Notes:

Note 1: Hong Kong Sheng Kung Hui Nursing Home was selected as an alternative monitoring location to Shek On house.

Note 2: Station ID as identified in approved EM&A Manual / EIA Report for SCL (TAW - HUH).

Note 3: Station ID as identified in approved EM&A Manual / EIA Report for SCL (HHS).

Environmental /Quality Performance Limits

The monitoring results will be checked against the Action and Limit levels described in the Baseline Monitoring Report, of which they are excerpted and summarised in **Tables 4.3**.

Table 4.3 Action and Limit Levels of construction noise

Location (Note 1)	Time Period (note 3)	Action Level	Limit Level dB(A)
NMS-CA-1 & NMS-CA-2	0700 - 1900 hours on normal weekdays	When one documented complaint is received	70/65 (Note 2)
NMS-CA-3 / NMS-CA-4			75

Notes:

1. The detail of monitoring locations was presented in Table 1.3.
2. For normal day-time working hours, the noise criteria is 70 dB(A) and 65 dB(A) for normal teaching periods and examination periods respectively.
3. If works are to be carried out during restricted hours, the conditions stipulated in the Construction Noise Permit (CNP) issued by the Noise Control Authority have to be followed.

4.2 Noise Monitoring Methodology

4.2.1 Monitoring Equipment

Noise level was measured by a Sound Level Meter (SLM) in terms of A-weighted equivalent continuous sound pressure level. Leq, L_{10} and L_{90} were recorded as supplementary information for data auditing. **Table 4.4** shows the equipment list of the noise monitoring.

Table 4.4 Noise Equipment List for Impact Noise Monitoring

Equipment	Manufacturer & Model No.	Serial No.	Precision Grade
Integrated SLM	Brüel & Kjær 2238	2562763	IEC 651 Type 1 IEC 804 Type 1
Sound level calibrator	Brüel & Kjær 4231	2713427	IEC 942 Type 1

4.2.2 Maintenance and Calibration

The SLM and calibrator in compliance with the International Electrotechnical Commission (IEC) Publication 651:1979 (Type 1) and 804:1985 (Type 1) specifications according to the EM&A manual.

SLM complying with the standards of IEC 651 (Fast, Slow, Impulse rms detector tests) and IEC 804 (L_{eq} functions) and acoustical calibrator complying with IEC 942 were adopted for the noise measurement. All equipments are calibrated externally. The calibration certificates for the noise equipment are given in **Appendix G**.

4.2.3 Monitoring Procedures

- The SLM and battery were checked to ensure that they are in proper condition. The SLM was set on a tripod at 1.2m above ground and at least 1m from the exterior of the building façade;
- Before conducting the measurement, the SLM was calibrated by an acoustical calibrator;

- Measurement parameter was set to A-weighted sound pressure level. The time weighting was set in fast response and the time period of measurement at 30 minutes;
- Wind speed was checked during noise monitoring to ensure the steady wind speed does not exceed 5m/s, or wind with gusts does not exceed 10m/s;
- Any abnormal conditions that generated intrusive noise during the measurement was recorded on the field record sheet;
- After each measurement, the equivalent continuous sound pressure level (L_{eq}), L_{10} and L_{90} were recorded on the field record sheet;
- After conducting the measurement, the SLM was calibrated by an sound level calibrator; and
- The SLM was re-calibrated by the sound level calibrator to confirm that there is no significant drift of reading. Measurements shall be accepted as valid only if the calibration levels before and after the noise measurement agrees to within 1.0 dB.

4.3 Monitoring Results and Observations

4.3.1 Weather Condition

The weather condition was mainly overcast with periods of rain during the noise monitoring period in the reporting month.

4.3.2 Noise Monitoring Results

Impact Monitoring

Monitoring of the construction noise level was conducted on 6, 12, 18, and 24 September 2013. All monitoring data and graphical presentation of the monitoring results are provided in **Appendix H** and are summarised in **Tables 4.5 - 4.7**. The graphical presentations of the monitoring results are provided in **Appendix H**.

Table 4.5 Summary of Impact Noise Monitoring at Location NMS-CA-1

Date	Time	Measured Noise Level, dB(A)	Baseline Noise Level, dB(A)	Construction Noise Level(Note1), dB(A)	Limit Level (Note 2)
		Leq (30min)	Leq (30min)	Leq (30min)	dB(A)
6 Sept 13	14:00-14:30	58.7	57.0	53.8	70/65
12 Sept 13	14:20-14:50	57.6		48.7	
18 Sept 13	14:25-14:55	58.2		52.0	
24 Sept 13	14:50-15:20	57.6		48.7	

Notes:

1. Construction Noise Level = Measured Noise Level – Baseline Noise Level.
2. For normal day-time working hours, the noise criteria is 70 dB(A) and 65 dB(A) for normal teaching periods and examination periods respectively.

Table 4.6 Summary of Impact Noise Monitoring at Location NMS-CA-2

Date	Time	Measured Noise Level, dB(A)	Baseline Noise Level, dB(A)	Construction Noise Level(Note1), dB(A)	Limit Level (Note 2)
		Leq (30min)	Leq (30min)	Leq (30min)	dB(A)
6 Sept 13	09:20-09:50	67.4	66.0	61.8	70/65
12 Sept 13	09:10-09:40	67.7		62.8	
18 Sept 13	09:25-09:55	68.6		65.1	
24 Sept 13	10:00-10:30	68.9		65.8	

Notes:

1. Construction Noise Level = Measured Noise Level – Baseline Noise Level.
2. For normal day-time working hours, the noise criteria is 70 dB(A) and 65 dB(A) for normal teaching periods and examination periods respectively.

Table 4.7 Summary of Impact Noise Monitoring at Location NMS-CA-3/NMS-CA-4

Date	Time	Measured Noise Level, dB(A)	Baseline Noise Level, dB(A)	Construction Noise Level(Note1), dB(A)	Limit Level
		Leq (30min)	Leq (30min)	Leq (30min)	dB(A)
6 Sept 13	11:10-11:40	68.9	73.0	< Baseline Level	75
12 Sept 13	11:05-11:35	68.4		< Baseline Level	
18 Sept 13	11:20-11:50	68.6		< Baseline Level	
24 Sept 13	11:35-12:05	67.8		< Baseline Level	

Note:

1. Construction Noise Level = Measured Noise Level – Baseline Noise Level.

4.3.3 Exceedance of Limit and Action Levels for Construction Noise

No Action Level exceedance was recorded since no noise related complaint was received in the reporting month.

No exceedance of Limit Level of regular construction noise was recorded during the reporting month.

The event and action plan is provided in **Appendix I**.

4.3.4 General Observations

The construction site has been under normal operation during the noise monitoring period and no unusual operation was observed.

5 Landscape and Visual Monitoring

5.1 Introduction

In accordance with the EM&A Manual, the landscape and visual mitigation measures shall be implemented and a site inspection shall be conducted once every two weeks throughout the construction period. The event and action plan is provided in **Appendix I**.

5.2 Mitigation Measures

Bi-weekly inspection of the implementation of landscape and visual mitigation measures were conducted during the reporting month on 11 and 25 September 2013. During the site inspections the following actions were found to be required:

11 September 2013

- The Contractor was reminded to improve the provision of tree protection zones and ensure that they are properly implemented.

6 Waste Disposal

The actual amounts of different types of waste generated by the activities of the Project during the reporting month are shown in **Table 6.1**. The monthly waste summary flow table is provided in **Appendix J.**

Table 6.1 Amount of Waste Generated

Waste Type	Amount	Disposal Locations
Inert C&D Materials	2355m^3	TKO137FB and Kai Tak Barging Point Facility (1108A)
Chemical Waste	0	Disposed of by a licensed collector
Paper / cardboard packaging	0	-
Plastic	0	
Metal	0	
General Refuse	440m^3	NENT Landfill

7 Environmental Performance

7.1 Environmental Site Inspection

Environmental site inspections were carried out on a weekly basis, with the IEC joint site inspection being carried out on 25 September 2013, to monitor environmental issues on the construction sites to ensure that all mitigation measures were implemented timely and properly. A summary of the site inspections in the reporting month is presented in **Table 7.1**.

Table 7.1 Key Findings of Weekly Environmental Site Audit

Inspection Date	Works Area	Key Observations and Recommendations	Contractor's Response / Environmental Outcome	Closed Date / Follow up Status
		Water Quality		
4 Sept 2013	Diamond Hill, Fung Tak, Ma Chai Hang and Hin Keng	The contractor was reminded to ensure that water seepage is prevented during heavy rain. Once the rain event had subsided, the contractor should ensure that standing water is removed.	Agreed with ET's Advice	The contractor rectified the situation and provided sandbags. Closed 11 Sept 2013.
4 Sept 2013	Diamond Hill	An overflowing WWTP was observed. The contractor should ensure that the seepage and discharge of muddy water from site is prevented.	Agreed with ET's Advice	The contractor rectified the situation and provided adequate drainage and ensured the situation was closely monitored in the future. Closed 11 Sept 2013.
4 Sept 2013	Hin Keng	The contractor was reminded to closely monitor and record the condition of the nearby stream in order to ensure the water quality of the stream is not affected by any works.	Agreed with ET's Advice	The contractor rectified the situation and provided a worker to monitor the stream condition during the working day. Closed 11 Sept 2013.
11 Sept 2013	Hin Keng	A short pulse of abnormal discharge was observed which may affect the discharge quality	Agreed with ET's Advice	The contractor rectified the situation and

Inspection Date	Works Area	Key Observations and Recommendations	Contractor's Response / Environmental Outcome	Closed Date / Follow up Status
		of the WWTP. The contractor was reminded to optimize WWTP and keep vigilant on the discharge condition.		will closely monitor the discharge point in future. Closed 18 Sept 2013.
Noise				
11 Sept 2013	Diamond Hill	The Contractor was reminded to position the water pumps to make use of the screening effects and mitigate noise impacts. .	Agreed with ET's Advice	The contractor rectified the situation and properly positioned the water pumps Closed 18 Sept 2013.
11 Sept 2013	Ma Chai Hang	The Contractor was reminded to set up noise screen or barrier for the generator located near the footbridge.	Agreed with ET's Advice.	The contractor has rectified the issue and provided a noise barrier. Closed 18 Sept 2013.
18 Sept 2013	Hin Keng	The Contractor was reminded to properly position noise barriers in the vicinity of air compressors in order to maximize the screening effect.	Agreed with ET's Advice.	The contractor rectified the situation and positioned the compressors closer to the noise barrier to enhance the screening effect. Closed 25 Sept 2013.
25 Sept 2013	Ma Chai Hang	The Contractor was reminded to set up noise barrier for the power pack of the plant upon the commencement of construction activities for diaphragm wall.	Agreed with ET's Advice.	The contractor will follow up. The status will be reported by the ET in the next reporting month.
Air				
11 Sept 2013	Ma Chai Hang	The contractor should ensure that all stockpiles of dusty materials are covered with tarpaulin sheets	Agreed with ET's Advice.	The contractor has rectified the issue and ensured that tarpaulin sheets were

Inspection Date	Works Area	Key Observations and Recommendations	Contractor's Response / Environmental Outcome	Closed Date / Follow up Status
				used to cover stockpiles. Closed 18 Sept 2013.
Landscape and Visual				
28 August 2013	Ma Chai Hang	The contractor is reminded to ensure that tree protection zones are properly implemented for trees next to the site office.	Agreed with ET's Advice	The contractor rectified the issues and ensured that tree protection zones were adequately implemented. Closed 4 Sept 2013.
11 Sept 2013	Ma Chai Hang	The Contractor was reminded to improve the provision of tree protection zone s and ensure that they are properly implemented.	Agreed with ET's Advice	The contractor has rectified the issue and provided proper tree protection zones. Closed 18 Sept 2013.

7.2 Summary of Environmental Complaint

No environmental complaints regarding environmental issue were recorded in the reporting month. The updated statistical summary of complaint is presented in **Table 7.2**. The updated complaint logs, if any, of the Project in the reporting month is shown in **Appendix L**.

Table 7.2 Summary of Complaints

Reporting Period	Complaint Statistics		Area of Concern	Validity to the Project	Status
	Number	Cumulative			
01/09/13–30/09/13	0	0	N/A	N/A	N/A

7.3 Summary of Environmental Non-Compliance

There was no non-compliance identified during the reporting month so review of the non-compliance was not required.

7.4 Summary of Environmental Summon and Successful Prosecution

No summons of prosecutions related to environmental issues were received or made against the project in the reporting month. Please refer to **Appendix L** for a Cumulative Log for Complaints, Notifications of Summons and Successful Prosecutions.

8 Future Key Issues

8.1 Key Issues for the Coming Month

Works to be undertaken in the coming reporting month are summarised in **Table 8.1** below.

Table 8.1 Tentative Programme of Construction Works for the Coming Month

Locations	Major Works Undertaken
Diamond Hill	Diaphragm Wall Construction.
Hin Keng	Pipe Piling Work and Site Setup.
Fung Tak	Utilities Diversion, Hoarding Erection and Platform Construction.
Ma Chai Hang	Diaphragm Wall Construction, Platform Construction and Site Setup and Preparation.

8.2 Environmental Monitoring Program for the Coming Month

Environmental monitoring and audit will be carried out in accordance with the requirements stipulated in the EM&A manual. Tentative air and noise monitoring as well as weekly site audit schedule for the coming month with respect to the construction programme is shown in **Appendix K**.

8.3 Construction Program for the Coming Month

The construction programme for the coming month is shown in **Appendix A.**

9 Conclusions and Recommendations

9.1 Conclusions

The construction phase of the project commenced on 14 February 2013. The EM&A programme has since been implemented, including air quality, noise and environmental site audits. Four environmental site audits were conducted in the reporting month.

No exceedance of the Action and Limit Levels of regular construction noise was recorded at the designated monitoring stations during the reporting period.

No exceedance of the Action and Limit Levels of 24-hour TSP monitoring was recorded at the designated monitoring stations during the reporting period.

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

No complaint and summons/prosecution was received during the reporting period.

The Contractor’s ET will keep track on the EM&A programme to ensure compliance of environmental requirements and the proper implementation of all necessary mitigation measures.

9.2 Recommendations

Impact monitoring will continue to be carried out in the following month and will follow the requirements stipulated in the EM&A manual. Attention will be paid to the environmental issues identified in the EIA report and weekly site audit. Mitigation measures recommended in EIA report and Implementation Schedule of Mitigation Measure will be fully implemented.

Construction noise is one of the key environmental issues. The implemented construction noise mitigation measures should also be maintained and improved as necessary. Especially in restricted hours, the conditions stipulated in the CNPs should be strictly followed when the construction works were carried out during restricted hours.

Water Quality impact is also a key environmental issue. The drainage system should be well maintained. All wastewater generated within the site shall be collected and treated prior to discharge. The solid and liquid waste management should be strictly followed in accordance with the requirements stipulated in the EIA report.

Landscape and Visual is another key environmental issue. The implemented landscape and visual mitigation measures such as the provision of tree protection zones should be maintained and improved as necessary.

10 Reference

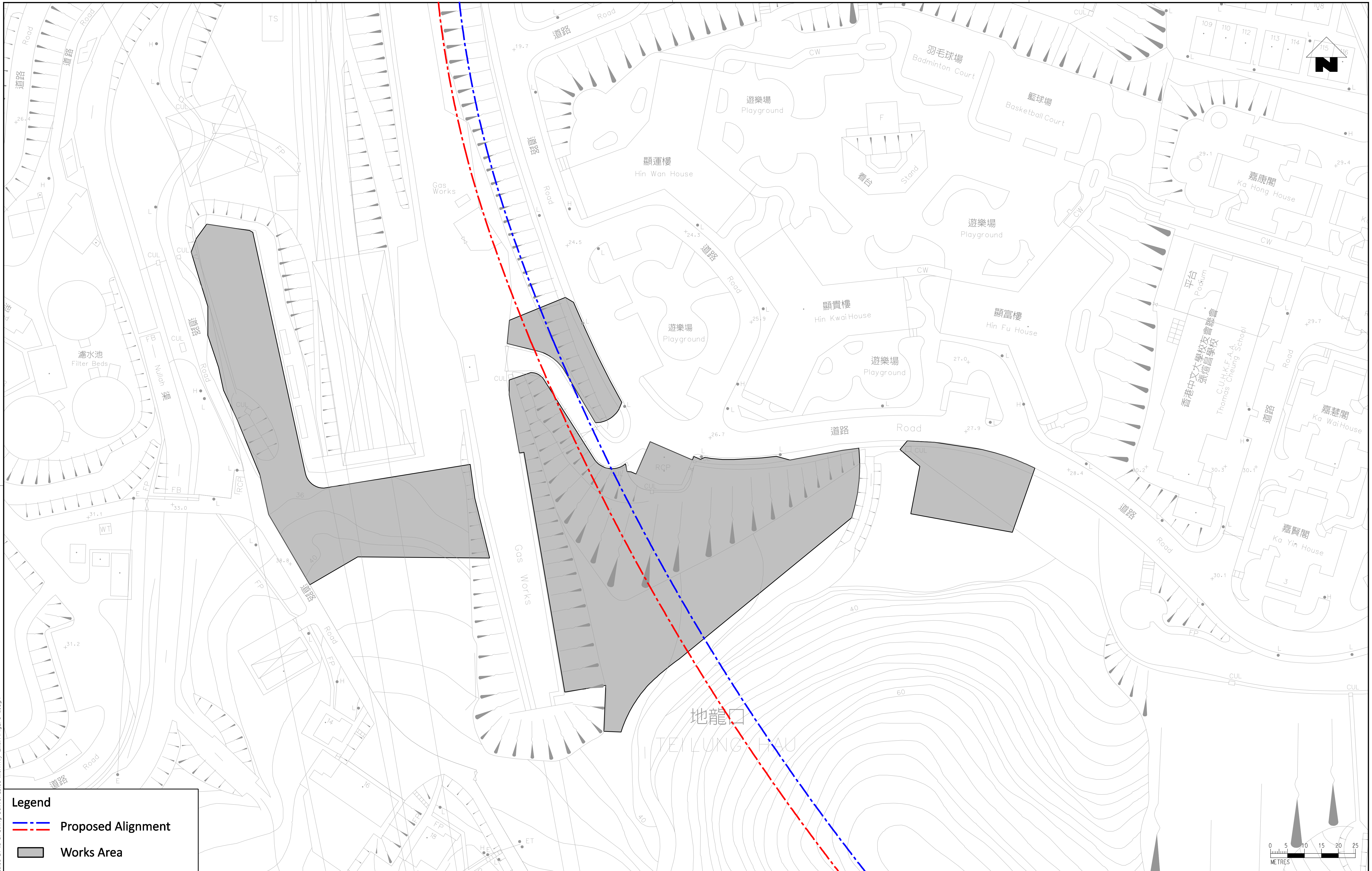
(1) MTR Corporation Limited. SCL – NEX/2206 EIA Study for Tai Wai to Hung Hom Section. Final Environmental Impact Assessment Report. October 2011.

(2) MTR Corporation Limited. SCL – NEX/2206 EIA Study for Tai Wai to Hung Hom Section. Environmental Monitoring and Audit Manual. October 2011.

(3) MTR Corporation Limited. SCL – NEX/2206 EIA Study for Stabling Sidings at Hung Hom Freight Yard. Final Environmental Impact Assessment Report. October 2011.

(4) MTR Corporation Limited. SCL - NEX/2206 EIA Study for Stabling Sidings at Hung Hom Freight Yard. Environmental Monitoring and Audit Manual. October 2011.

Figures



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TITLE

CONTRACT 1103
HIN KENG TO DIAMOND HILL TUNNELS
Locations of Project Works Areas
– General Site Layout of Hin Keng Works Area
(Sheet 1 of 6)

SCALE	DRAWING NO.	REV.
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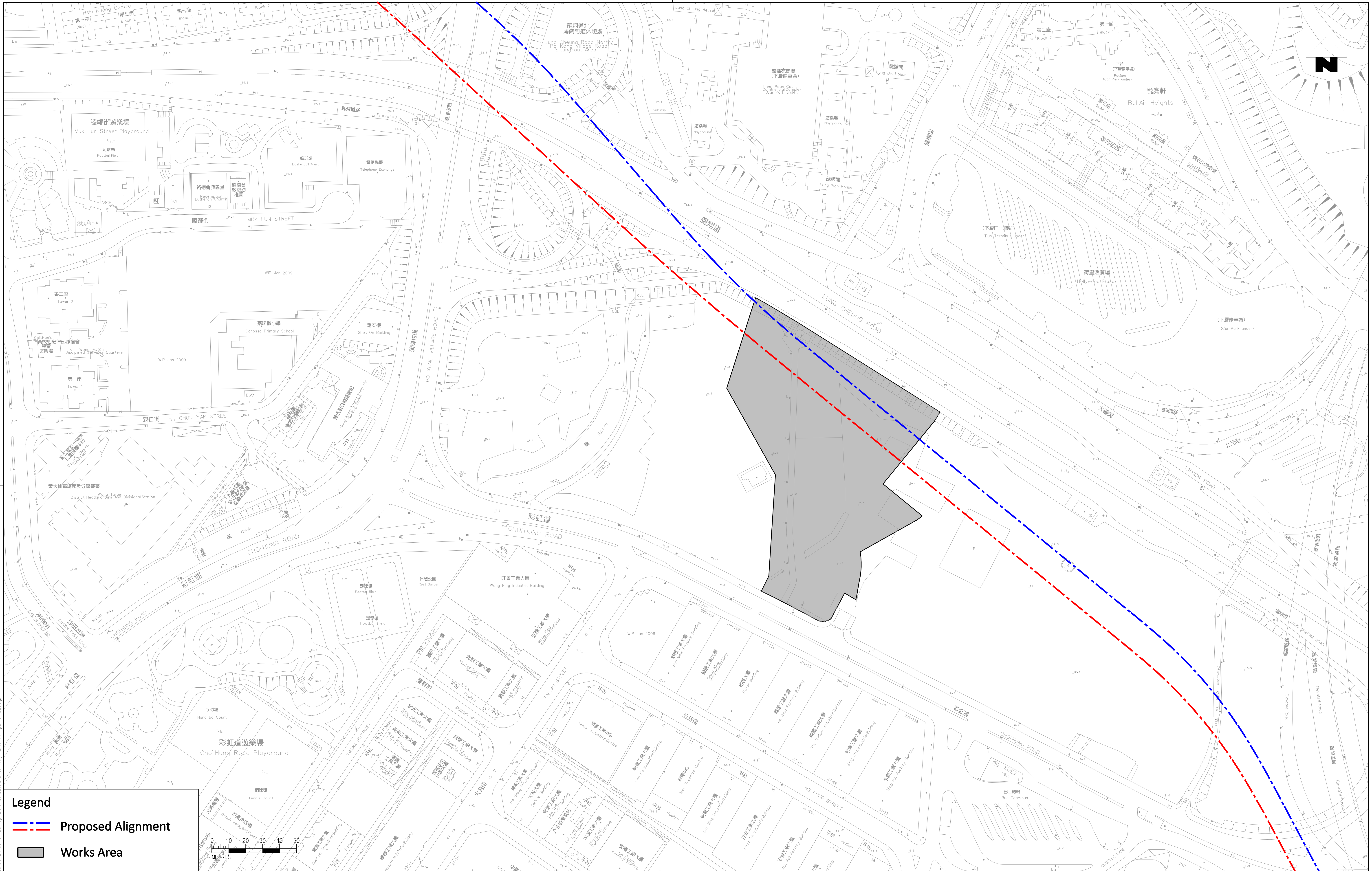

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CONTRACT 1103

HIN KENG TO DIAMOND HILL TUNNELS

Locations of Project Works Areas
- General Site Layout of Diamond Hill Works Area
(Sheet 2 of 6)

SCALE	DRAWING NO.	REV.
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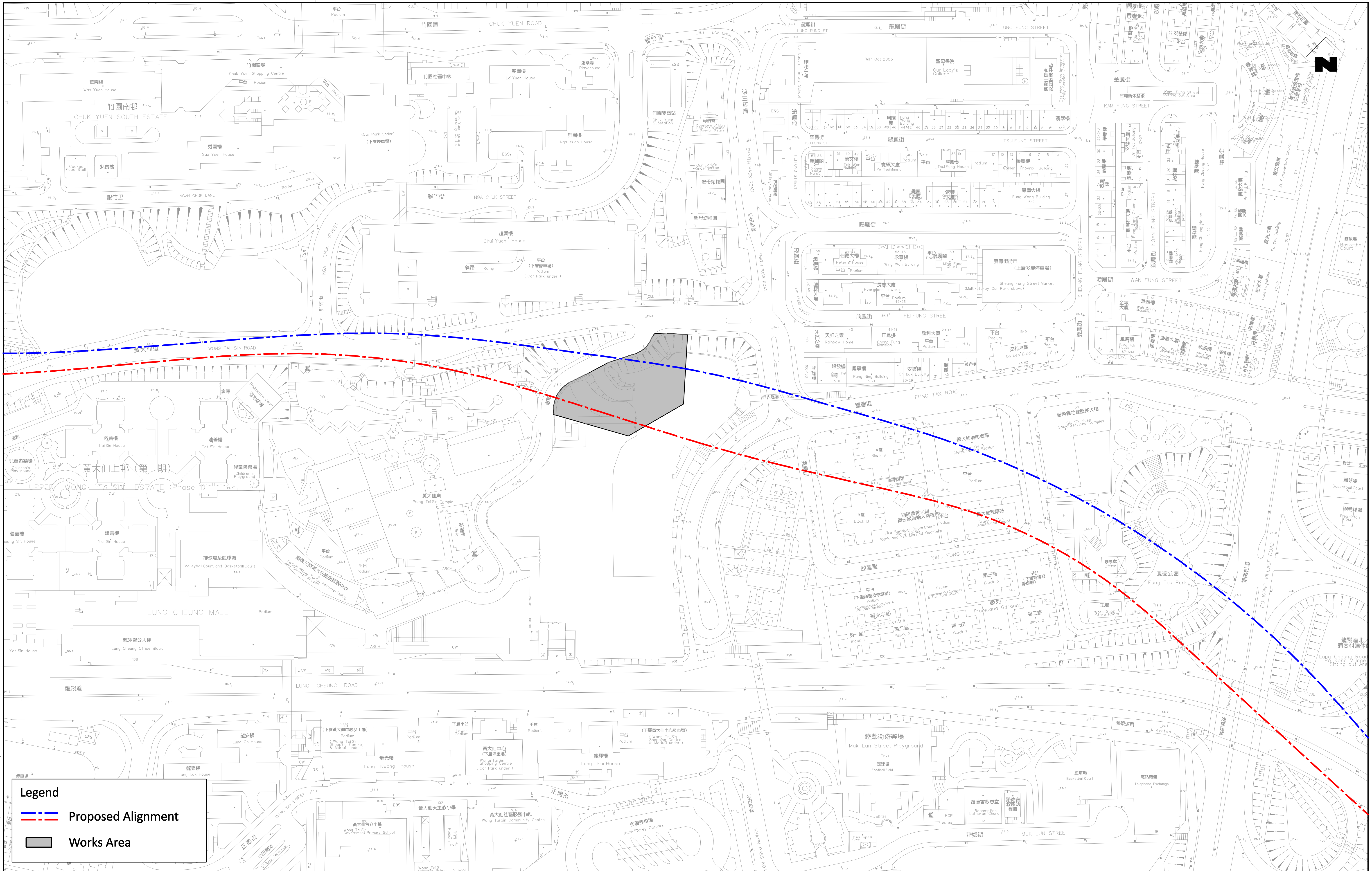

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TITLE

CONTRACT 1103
HIN KENG TO DIAMOND HILL TUNNELS
Locations of Project Works Areas - Site Layout Plan of Fung Tak EAP/EEP Building
(Sheet 3 of 6)

SCALE 1:2000 (A3)

DRAWING NO. Figure 1.3

REV. A

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TITLE
CONTRACT 1103
HIN KENG TO DIAMOND HILL TUNNELS
Locations of Project Works Areas
- Site Layout Plan of Ma Chai Hang Shaft
(Sheet 4 of 6)

SCALE 1:2000 (A3)
DRAWING NO. Figure 1.4
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TITLE
CONTRACT 1103
HIK KENG TO DIAMOND HILL TUNNELS
Locations of Project Works Area
General Site Layout of Shui Chuen O Works Area
(Sheet 5 of 6)

SCALE	DRAWING NO.	REV.
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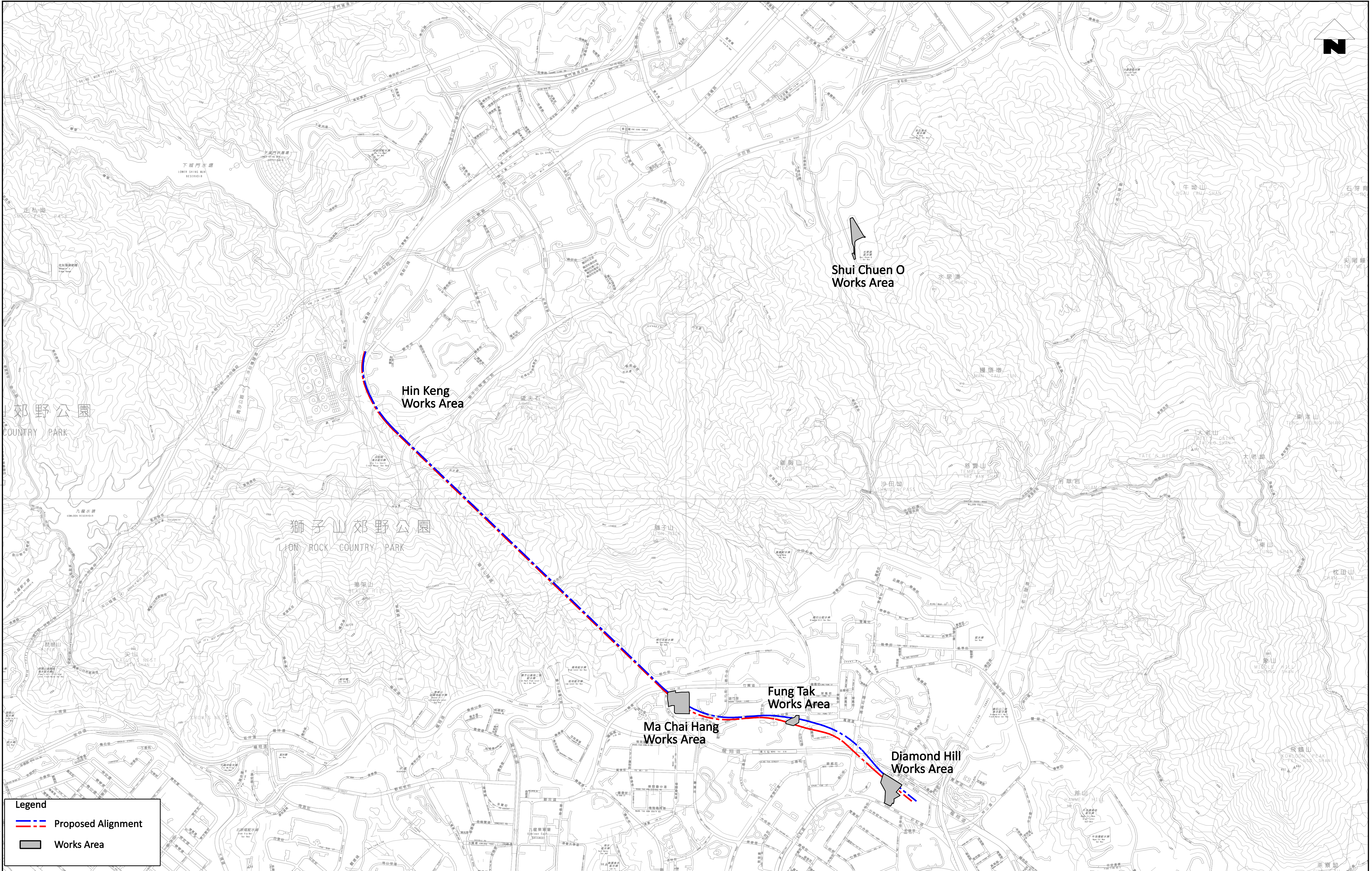

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A	FIRST ISSUE	GL	12/12	ST

DRAWN	GL
DESIGNED	GL
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APPROVED	ST
DATE	03/13

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SHATIN TO CENTRAL LINK

ORIGINATOR

ARUP Ove Arup & Partners Hong Kong Limited

CADD REF.

TITLE

CONTRACT 1103

HIN KENG TO DIAMOND HILL TUNNELS

Locations of Project Works Areas
- General Alignment of Contract 1103
(Sheet 6 of 6)

SCALE	DRAWING NO.	REV.
1:20000 (A3)	Figure 1.6	B

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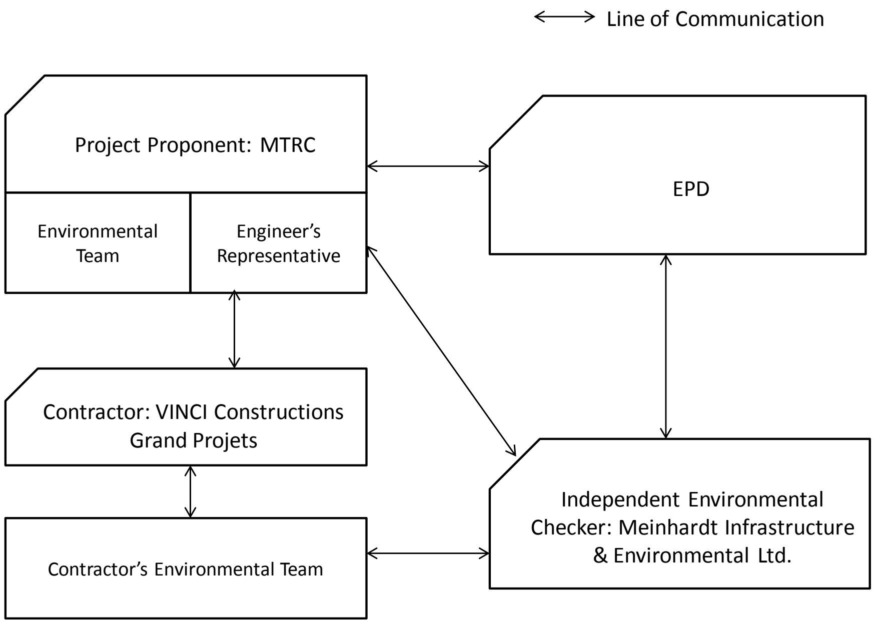
Figure 1.7 - Project Organisation for Environmental Works



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TITLE

CONTRACT 1103

HIN KENG TO DIAMOND HILL TUNNELS

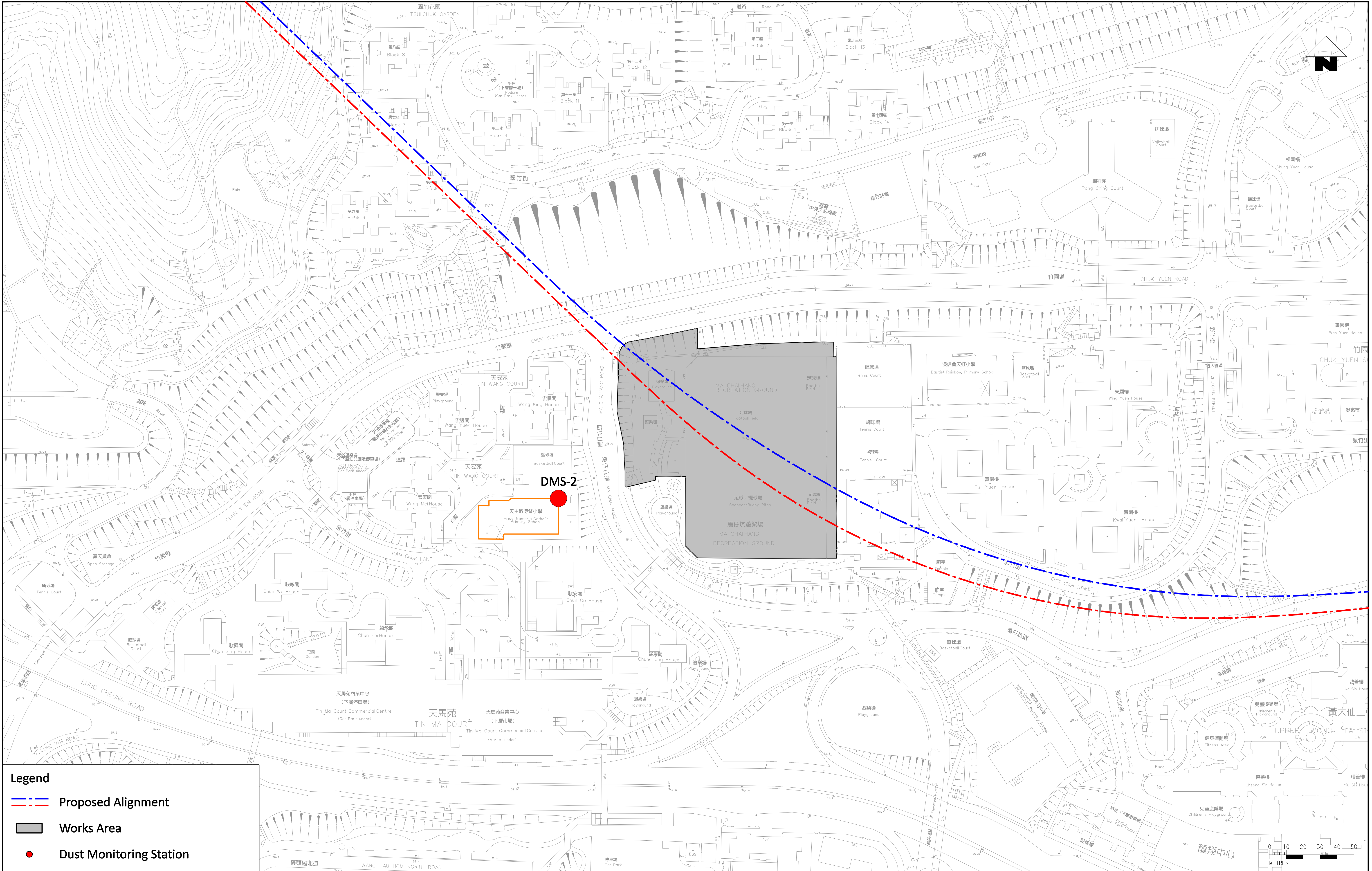
Locations of Proposed Dust Monitoring Stations

(Sheet 1 of 3)

SCALE 1:1000 (A3)

DRAWING NO. Figure 1.8

REV. A



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DATE	12/12

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TITLE

CONTRACT 1103
HIN KENG TO DIAMOND HILL TUNNELS
Locations of Proposed Dust Monitoring Stations
(Sheet 2 of 3)

SCALE	DRAWING NO.	REV.
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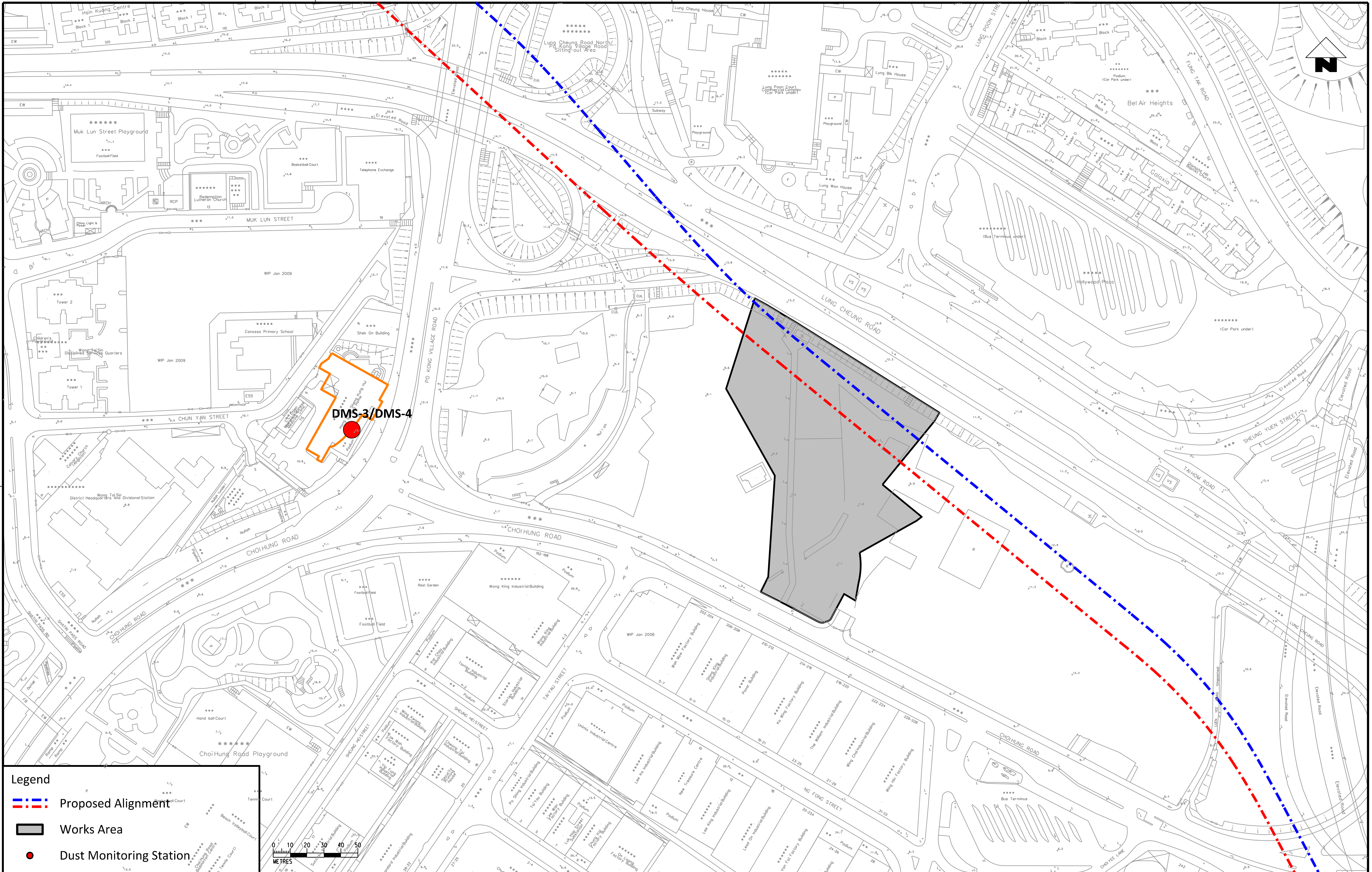

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TITLE
CONTRACT 1103
HIN KENG TO DIAMOND HILL TUNNELS
Locations of Proposed Dust Monitoring Stations
(Sheet 3 of 3)

SCALE 1:2000 (A3)
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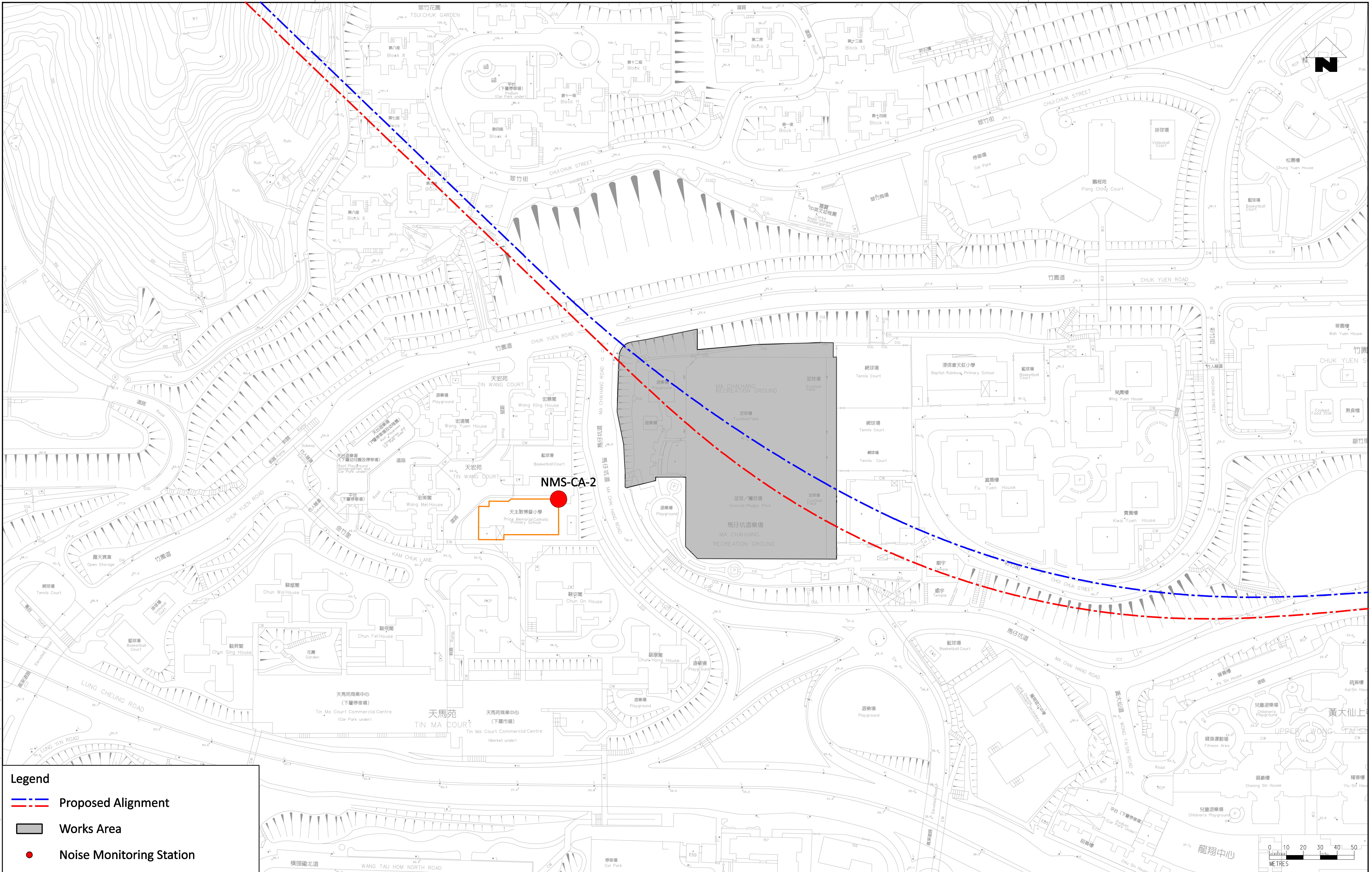
CADD REF.

TITLE
CONTRACT 1103
HIN KENG TO DIAMOND HILL TUNNELS
Locations of Noise Monitoring Stations
(Construction Airborne Noise)
(Sheet 1 of 3)

SCALE 1:1000 (A3)
DRAWING NO. Figure 1.11
REV. A



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CADD REF.

TITLE

CONTRACT 1103

HIN KENG TO DIAMOND HILL TUNNELS

Locations of Noise Monitoring Stations

(Construction Airborne Noise)

(Sheet 2 of 3)

SCALE 1:2000 (A3)

DRAWING NO. Figure 1.12

REV. A

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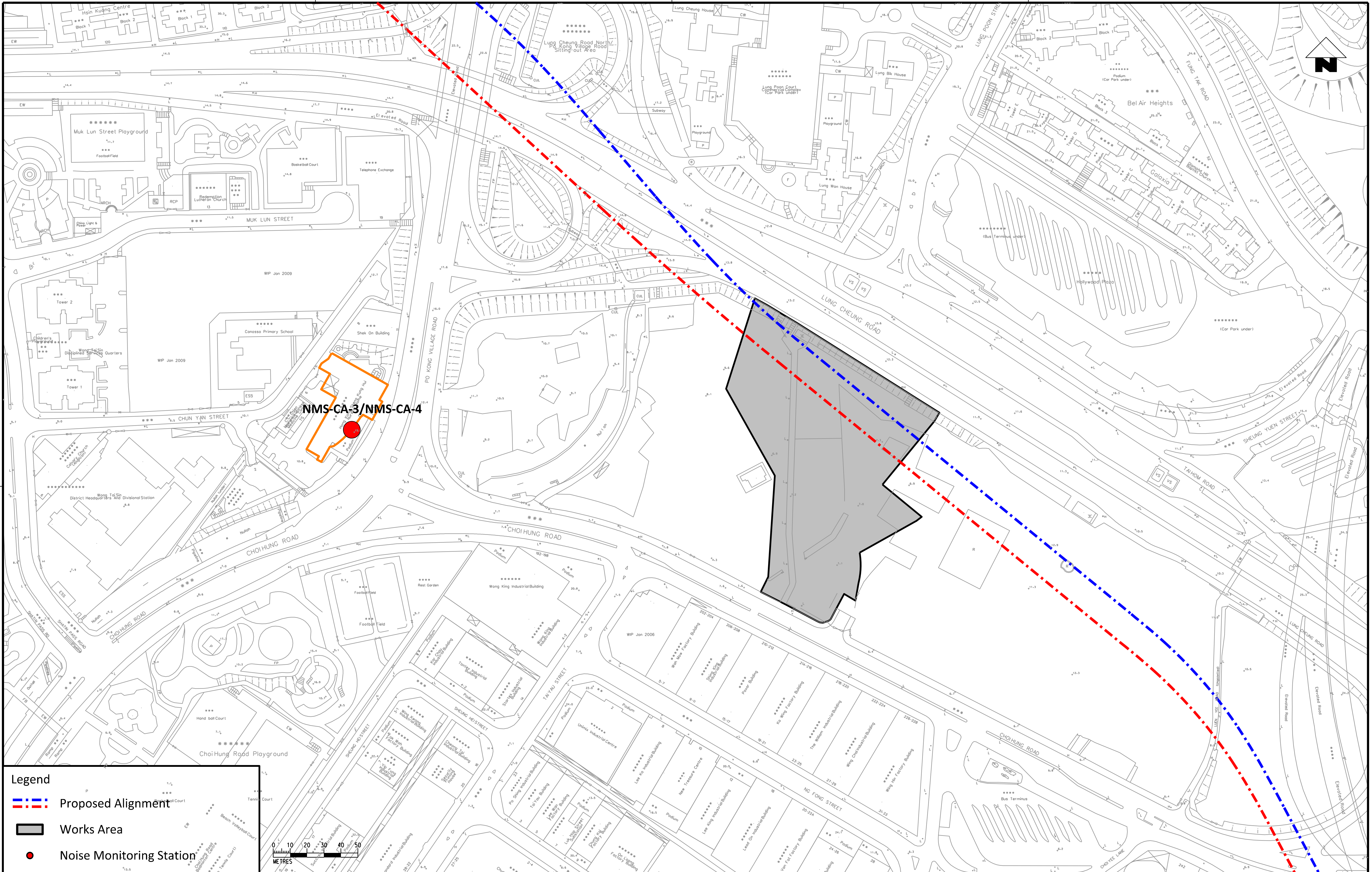

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CADD REF.

TITLE
CONTRACT 1103
HIN KENG TO DIAMOND HILL TUNNELS
Locations of Noise Monitoring Stations
(Construction Airborne Noise)
(Sheet 3 of 3)

SCALE 1:2000 (A3)
DRAWING NO. Figure 1.13
REV. A

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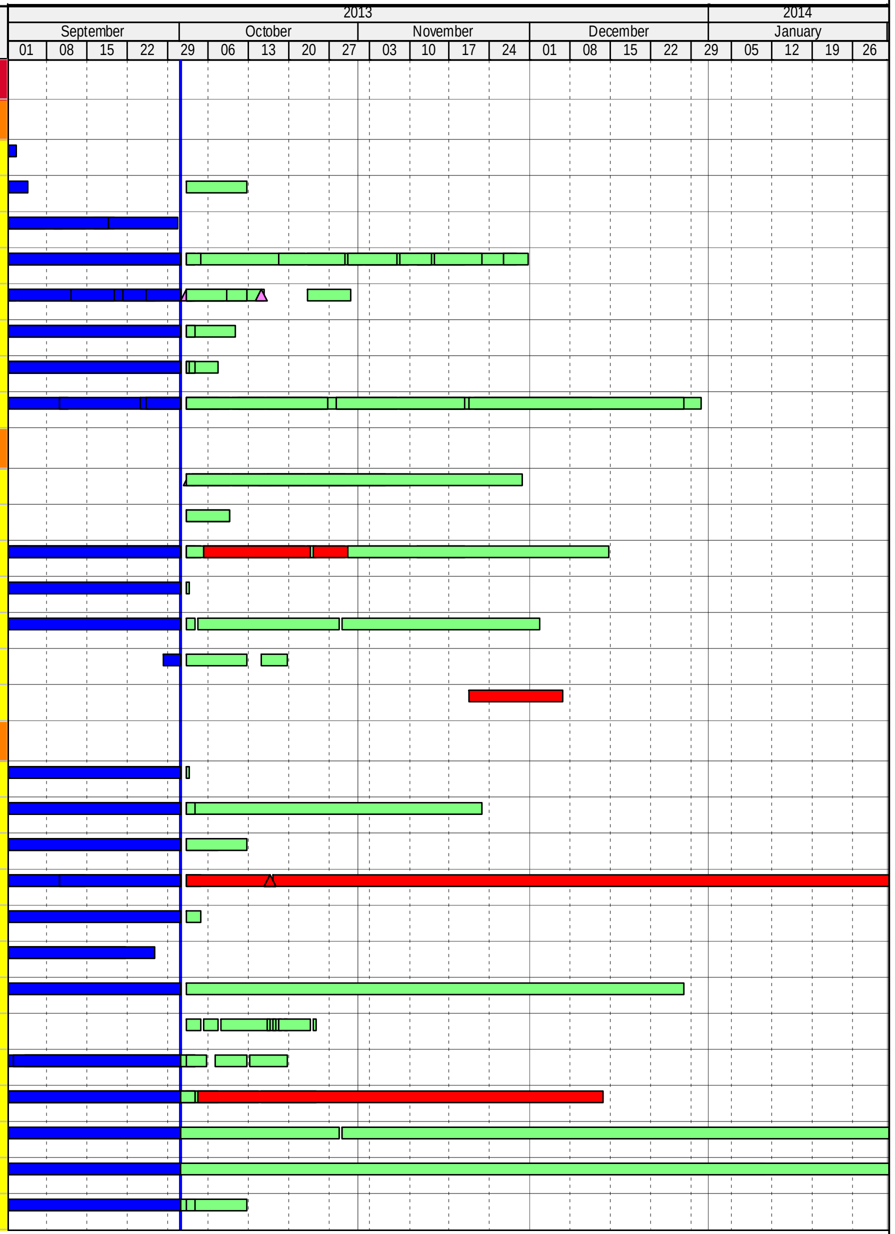
Appendix A

Construction Programme

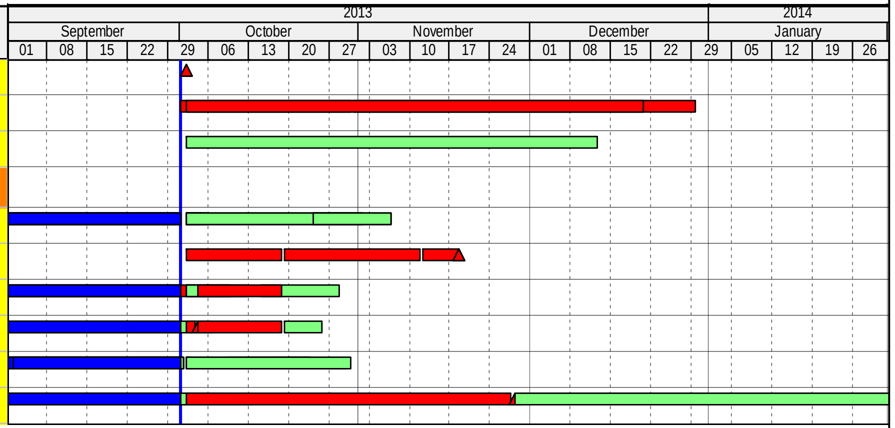
Activity ID	Activity Name	Original Duration	Start	Finish	Physical % Complete
	CONTRACT 1103:- HIN KENG TO DIAMOND HILL TUNNELS (Option 6)				
	COST CENTER F - MA CHAI HANG VENTILATION BUILDING (MCV)				
	MCH - TTM Works				
	MCH - Hoarding Erection				
	MCH - Pedestrian Steel Bridge Diversion				
	MCH - Dn 900mm DSD Drainage Diversion Works				
	MCH - Site Setup and Preparation				
	MCH - D-Wall Platform Erection				
	MCH - D-Wall Mobilization				
	MCH - D-Wall Construction				
	COST CENTER G - FUNG TAK EAP/EEP BUILDING (FTA)				
	FTA - Hoarding Erection				
	FTA - TTMs Works				
	FTA - Dn 600mm DSD Drainage Diversion Works				
	FTA - Site Setup and Preparation				
	FTA - PTT D-Wall Platform Erection (into 2 Stages)				
	FTA - FTA Shaft D-Wall Platform Erection				
	FTA - D-Wall Mobilization				
	COST CENTER H - HIN KENG WORKING SHAFT				
	HIK - Site Clearance, Tree Felling/Transplant				
	HIK - Site Setup				
	HIK - Site Formation				
	HIK - Stage 2 Pipe Pile (At W6b)				
	HIK - Pipe Pile (For Cut and Cover)				
	HIK - Stage 1a Curtain Grout (For Shaft)				
	HIK - CLP Room				
	HIK - Capping Beam				
	HIK Stage 1 Pumping Test				
	HIK - ELS in Stages				
	HIK - Muckling Out Arragement				
	HIK - Conveyor System				
	HIK - Tower Crane				



Three Month Rolling Programme
As of 30-9-2013

Date	Revision	Checked	Approved
05-10-13	Submission for MTR Information	QT	Robert N.D.

Activity ID	Activity Name	Original Duration	Start	Finish	Physical % Complete
HIK - Mined Tunnel					
HIK - 1102 Access Deck (TBC)					
HIK - RCP (TBC)					
COST CENTER S - DIAMOND HILL					
DIH - D-Wall Construction					
DIH - Ground Treatment for TBM at Works Areas W21c					
DIH - Capping Beams					
DIH - Pumping Test					
DIH - KTL DIH Strengthening Works					
DIH - Shaft Excavation and Strutting					



Appendix B

Environmental
Monitoring
Programme in
Reporting Month

SCL Works Contract 1103 - Hin Keng to Diamond Hill Tunnels
Impact Monitoring Schedule - September 2013

Date		Air Quality	Noise	Site Inspection
		24-hours TSP	L_{Aeq}, 30 min	
01-Sep-13	Sun			
02-Sep-13	Mon			
03-Sep-13	Tue			
04-Sep-13	Wed			
05-Sep-13	Thu			
06-Sep-13	Fri			
07-Sep-13	Sat			
08-Sep-13	Sun			
09-Sep-13	Mon			
10-Sep-13	Tue			
11-Sep-13	Wed			
12-Sep-13	Thu			
13-Sep-13	Fri			
14-Sep-13	Sat			
15-Sep-13	Sun			
16-Sep-13	Mon			
17-Sep-13	Tue			
18-Sep-13	Wed			
19-Sep-13	Thu			
20-Sep-13	Fri			
21-Sep-13	Sat			
22-Sep-13	Sun			
23-Sep-13	Mon			
24-Sep-13	Tue			
25-Sep-13	Wed			
26-Sep-13	Thu			
27-Sep-13	Fri			
28-Sep-13	Sat			
29-Sep-13	Sun			
30-Sep-13	Mon			

	Public Holiday
	Monitoring Day

Monitoring Details

Monitoring	Locations	Parameters
Air Quality	DMS-1 - C.U.H.K.A.A Thomas Cheung School, DMS-2 - Price Memorial Catholic Primary School and DMS-3 / DMS-4 - Hong Kong Sheng Kung Hui Nursing Home	24-hour TSP
Noise	NMS-CA-1 - C.U.H.K.A.A Thomas Cheung School, NMS-CA-2 - Price Memorial Catholic Primary School and NMS-CA-3 /NMS-CA-4 - Hong Kong Sheng Kung Hui Nursing	$L_{Aeq(30\ min)}$, L_{10}, L_{90}

Appendix C

Environmental Mitigation Implementation Schedule (EMIS)

Environmental Mitigation Implementation Schedule – Works Contract 1103

Note: Chapters 1 to 3 of the EIA report present the background information of the Project, identified concurrent projects, objectives and scope for various environmental aspects, and description on alternative options and construction description. Chapters 4 to 14 of the EIA report present the EIA findings and mitigation measures are described below with cross-reference to the EIA report for the reporting month. Chapters 15 & 16 describe the environmental monitoring requirements and conclusion.

EIA Ref.	EM&A Log Ref	Recommended Mitigation Measures	Objectives of the Recommended Measures & Main Concerns to address	Location of the measures	When to implement the measures?	What requirements or standards for the measures to achieve?	Implementation Status
Ecology (Pre-Construction Phase)							
S5.4	E1	Engineering works should not encroach into country park boundary, Tei Lung Hau Stream and secondary woodland near the portal at Hin Keng	Minimize ecological impacts	Lion Rock Country Park, Tei Lung Hau Stream	Detailed design and construction stage	• AFCD's requirements • EIAO • Country Parks Ordinance	✓
	E2	Habitat Loss A detailed vegetation survey should be conducted in the Hin Keng Portal area to locate and enumerate individuals of *Aquilaria sinensis* which will potentially be affected by construction and operation of the Portal. A suitable site for transplanting all affected individuals within the footprint area should be identified and assessed for its suitability. A transplantation plan should then be drawn up and details of the transplantation methodologies and programme along with post-transplantation monitoring should be included.	Minimize ecological impacts on important species	Hin Keng Portal areas	Prior to site clearance	• AFCD's requirements	✓
S5.7	E3	Tree felling and vegetation removal Precautionary checks of the vegetation for the presence of nesting bird species of conservation interest should be carried out before vegetation clearance by an ecologist.	Minimize ecological impacts to breeding bird species of conservation interest	Works sites for DIH	Prior to site clearance	• AFCD's requirements	N/A

Notes (*): ✓ - Compliance; N/A – Not Applicable; N/O – Not Observed; Rdr – Reminder; Obs – Observation; N/C – Non Compliance

Environmental Mitigation Implementation Schedule – Works Contract 1103

EIA Ref.	EM&A Log Ref	Recommended Mitigation Measures	Objectives of the Recommended Measures & Main Concerns to address	Location of the measures	When to implement the measures?	What requirements or standards for the measures to achieve?	Implementation Status
Ecology (Construction Phase)							
S5.7	E5	Good Site Practices Impact to any habitats or local fauna should be avoided by implementing good site practices, including the containment of silt runoff within the site boundary, the containment of contaminated soils for removal from the site, appropriate storage of chemicals and chemical waste away from sites of ecological value and the provision of sanitary facilities for on-site workers. Adoption of such measures should permit waste to be suitably contained within the site for subsequent removal and appropriate disposal. The following good site practices should also be implemented: • Erection of temporary geotextile silt or sediment fences/oil traps around any earth-moving works to trap any sediments and prevent them from entering watercourses in particular the Tei Lung Hau stream; • Avoidance of soil storage against trees or close to waterbodies in particular the Tei Lung Hau stream; • Delineation of works site by erecting hoardings to prevent encroachment onto adjacent habitats and fence off areas which have some ecological value e.g. Tei Lung Hau Stream and the adjoining secondary woodland, tunnel on hill at top of slope stabilisation works; • No on-site burning of waste; • Waste and refuse in appropriate receptacles.	Minimize ecological impacts	All construction sites	Construction stage		✓ ✓ ✓ ✓ ✓

Environmental Mitigation Implementation Schedule – Works Contract 1103

EIA Ref.	EM&A Log Ref	Recommended Mitigation Measures	Objectives of the Recommended Measures & Main Concerns to address	Location of the measures	When to implement the measures?	What requirements or standards for the measures to achieve?	Implementation Status
S5.7	E7	Water Quality and Hydrology • Implement water control measures (ETWB TCW No. 5/2005, Protection of natural streams/ rivers from adverse impacts arising from construction works to avoid direct or indirect impacts on the Tei Lung Hau Stream) and good site practices. • Canopy tubes should be installed from the shaft structure and extend the full width of the stream. These canopy tubes with sieves along its length should be grouted and form a stable and low permeable 'umbrella' for further mining works to be carried out in stages. The canopy tubes beneath the stream area are within Completely Decomposed Granite (CDG) stratum.	• Avoid indirect water impact to any wetland habitats or wetland fauna • Minimize the drawdown of water table	Works area in Hin Keng	Construction stage	• TCW No. 5/2005	✓ N/A

EIA Ref.	EM&A Log Ref	Recommended Mitigation Measures	Objectives of the Recommended Measures & Main Concerns to address	Location of the measures	When to implement the measures?	What requirements or standards for the measures to achieve?	Implementation Status
Landscape and Visual (Construction Phase)							
S6.9.3	LV1	The following good site practices and measures for minimisation and avoidance of potential impacts are recommended: Re-use of Existing Soil • For soil conservation, existing topsoil shall be re-used where possible for new planting areas within the project. The construction program shall consider using the soil removed from one phase for backfilling another. Suitable storage ground, gathering ground and mixing ground may be set up on-site as necessary.	Minimize visual & landscape impact	Within Project Site	Construction stage	TM-EIAO	✓
		No-intrusion Zone • To maximize protection to existing trees, ground vegetation and the associated under storey habitats, construction contracts may designate "No-intrusion Zone" to various areas within the site boundary with rigid and durable fencing for each individual no-intrusion zone. The contractor should closely monitor and restrict the site working staff from entering the "no-intrusion zone", even for indirect construction activities and storage of equipment.					Rdr
		Protection of Retained Trees • All retained trees should be recorded photographically at the commencement of the Contract, and carefully protected during the construction period. Detailed tree protection specification shall be allowed and included in the Contract Specification, which specifying the tree protection requirement, submission and approval system, and the tree monitoring system. • The Contractor shall be required to submit, for approval, a detailed working method statement for the protection of trees					✓

Environmental Mitigation Implementation Schedule – Works Contract 1103

EIA Ref.	EM&A Log Ref	Recommended Mitigation Measures	Objectives of the Recommended Measures & Main Concerns to address	Location of the measures	When to implement the measures?	What requirements or standards for the measures to achieve?	Implementation Status
		prior to undertaking any works adjacent to all retained trees, including trees in contractor's works sites.					✓
S6.12	LV2	• Decorative Hoarding Erection of decorative screen during construction stage to screen off undesirable views of the construction site for visual and landscape sensitive areas. Hoarding should be designed to be compatible with the existing urban context. • Management of facilities on work sites To provide proper management of the facilities on the sites, give control on the height and disposition/ arrangement of all facilities on the works site to minimize visual impact to adjacent VSRs. • Tree Transplanting Trees of high to medium survival rate would be affected by the works shall be transplanted where possible and practicable. Tree transplanting proposal including final location for transplanted trees shall be submitted separately to seek relevant government department's approval, in accordance with ETWB TCW No 3/2006.	Minimize visual & landscape impact	Within Project Site	Detailed design and construction stage	EIAO – TM ETWB TCW 2/2004 ETWB TCW 3/2006	✓ ✓ ✓

Environmental Mitigation Implementation Schedule – Works Contract 1103

EIA Ref.	EM&A Log Ref	Recommended Mitigation Measures	Objectives of the Recommended Measures & Main Concerns to address	Location of the measures	When to implement the measures?	What requirements or standards for the measures to achieve?	Implementation Status
Construction Dust Impact							
S7.6.5	D1	The contractor shall follow the procedures and requirements given in the Air Pollution Control (Construction Dust) Regulation	Minimize dust impact at the nearby sensitive receivers	All construction sites	Construction stage	• APCO • To control the dust impact to meet HKAQO and TM-EIA criteria	✓
S7.6.5	D2	• Mitigation measures in form of regular watering under a good site practice should be adopted. Watering once per hour on exposed worksites and haul road in the Kowloon area and once per 1.5 hour at those in the Tai Wai area should be conducted to achieve dust removal efficiencies of 91.7%. While the above watering frequencies are to be followed, the extent of watering may vary depending on actual site conditions but should be sufficient to maintain an equivalent intensity of no less than 1.8 L/m2 to achieve the dust removal efficiency	Minimize dust impact at the nearby sensitive receivers	All construction sites	Construction stage	• APCO • To control the dust impact to meet HKAQO and TM-EIA criteria	✓
S7.6.5	D3	• Proper watering of exposed spoil should be undertaken throughout the construction phase: • Any excavated or stockpile of dusty material should be covered entirely by impervious sheeting or sprayed with water to maintain the entire surface wet and then removed or backfilled or reinstated where practicable within 24 hours of the excavation or unloading; • Any dusty materials remaining after a stockpile is removed should be wetted with water and cleared from the surface of roads; • A stockpile of dusty material should not be extend beyond the	Minimize dust impact at the nearby sensitive receivers	All construction sites	Construction stage	• APCO • To control the dust impact to meet HKAQO and TM-EIA criteria	✓ ✓ ✓ ✓

Environmental Mitigation Implementation Schedule – Works Contract 1103

EIA Ref.	EM&A Log Ref	Recommended Mitigation Measures	Objectives of the Recommended Measures & Main Concerns to address	Location of the measures	When to implement the measures?	What requirements or standards for the measures to achieve?	Implementation Status
		pedestrian barriers, fencing or traffic cones.					
		• The load of dusty materials on a vehicle leaving a construction site should be covered entirely by impervious sheeting to ensure that the dusty materials do not leak from the vehicle;					✓
		• Where practicable, vehicle washing facilities with high pressure water jet should be provided at every discernible or designated vehicle exit point. The area where vehicle washing takes place and the road section between the washing facilities and the exit point should be paved with concrete, bituminous materials or hardcores;					✓
		• When there are open excavation and reinstatement works, hoarding of not less than 2.4m high should be provided and properly maintained as far as practicable along the site boundary with provision for public crossing; Good site practice shall also be adopted by the Contractor to ensure the conditions of the hoardings are properly maintained throughout the construction period;					✓
		• The portion of any road leading only to construction site that is within 30m of a vehicle entrance or exit should be kept clear of dusty materials;					✓
		• Surfaces where any pneumatic or power-driven drilling, cutting, polishing or other mechanical breaking operation takes place should be sprayed with water or a dust suppression chemical continuously;					✓
		• Any area that involves demolition activities should be sprayed with water or a dust suppression chemical immediately prior to, during and immediately after the activities so as to maintain the entire surface wet;					N/A
		• Where a scaffolding is erected around the perimeter of a building under construction, effective dust screens, sheeting or netting					✓

Notes (*): ✓ - Compliance; N/A – Not Applicable; N/O – Not Observed; Rdr – Reminder; Obs – Observation; N/C – Non Compliance

Environmental Mitigation Implementation Schedule – Works Contract 1103

EIA Ref.	EM&A Log Ref	Recommended Mitigation Measures	Objectives of the Recommended Measures & Main Concerns to address	Location of the measures	When to implement the measures?	What requirements or standards for the measures to achieve?	Implementation Status
		should be provided to enclose the scaffolding from the ground floor level of the building, or a canopy should be provided from the first floor level up to the highest level of the scaffolding; • Any skip hoist for material transport should be totally enclosed by impervious sheeting; • Every stock of more than 20 bags of cement or dry pulverised fuel ash (PFA) should be covered entirely by impervious sheeting or placed in an area sheltered on the top and the 3 sides;					✓ ✓
		• Cement or dry PFA delivered in bulk should be stored in a closed silo fitted with an audible high level alarm which is interlocked with the material filling line and no overfilling is allowed; • Loading, unloading, transfer, handling or storage of bulk cement or dry PFA should be carried out in a totally enclosed system or facility, and any vent or exhaust should be fitted with an effective fabric filter or equivalent air pollution control system; and • Exposed earth should be properly treated by compaction, turfing, hydroseeding, vegetation planting or sealing with latex, vinyl, bitumen, shotcrete or other suitable surface stabiliser within six months after the last construction activity on the construction site or part of the construction site where the exposed earth lies.					✓ ✓ N/A
S7.6.5	D6	Implement regular dust monitoring under EM&A programme during the construction stage.	Monitoring of dust impact	Selected representative dust monitoring station	Construction stage	• TM-EIA	✓

Notes (*): ✓ - Compliance; N/A – Not Applicable; N/O – Not Observed; Rdr – Reminder; Obs – Observation; N/C – Non Compliance

EIA Ref.	EM&A Log Ref	Recommended Mitigation Measures	Objectives of the Recommended Measures & Main Concerns to address	Location of the measures	When to implement the measures?	What requirements or standards for the measures to achieve?	Implementation Status
Construction Noise (Airborne)							
S8.3.6	N1	Implement the following good site practices: • only well-maintained plant should be operated on-site and plant should be serviced regularly during the construction programme; • machines and plant (such as trucks, cranes) that may be in intermittent use should be shut down between work periods or should be throttled down to a minimum; • plant known to emit noise strongly in one direction, where possible, be orientated so that the noise is directed away from nearby NSRs; • silencers or mufflers on construction equipment should be properly fitted and maintained during the construction works; • mobile plant should be sited as far away from NSRs as possible and practicable; • material stockpiles, mobile container site office and other structures should be effectively utilised, where practicable, to screen noise from on-site construction activities.	Control construction airborne noise	All construction sites	Construction stage	• Annex 5, TM-EIA	 ✓ ✓ ✓ ✓ ✓ Rdr
S8.3.6	N2	Install temporary hoarding located on the site boundaries between noisy construction activities and NSRs. The conditions of the hoardings shall be properly maintained throughout the construction period.	Reduce the construction noise levels at low-level zone of NSRs through partial screening.	All construction sites	Construction stage	• Annex 5, TM-EIA	✓
S8.3.6	N3	Install movable noise barriers (typical design is wooden framed barrier with a small-cantilevered on a skid footing with 25mm thick internal sound absorptive lining), acoustic mat or full enclosure, screen the noisy plants including air compressor, generators and	Screen the noisy plant items to be used at all construction sites	All construction sites where practicable	Construction stage	• Annex 5, TM-EIA	Rdr

Notes (*): ✓ - Compliance; N/A – Not Applicable; N/O – Not Observed; Rdr – Reminder; Obs – Observation; N/C – Non Compliance

Environmental Mitigation Implementation Schedule – Works Contract 1103

EIA Ref.	EM&A Log Ref	Recommended Mitigation Measures	Objectives of the Recommended Measures & Main Concerns to address	Location of the measures	When to implement the measures?	What requirements or standards for the measures to achieve?	Implementation Status
		saw.					
S8.3.6	N4	Use "Quiet plants"	Reduce the noise levels of plant items	All construction sites where practicable	Construction stage	• Annex 5, TM-EIA	✓
S8.3.6	N5	Sequencing operation of construction plants where practicable.	Operate sequentially within the same work site to reduce the construction airborne noise	All construction sites where practicable	Construction stage	• Annex 5, TM-EIA	✓
S8.3.6	N6	Implement a noise monitoring under EM&A programme.	Monitor the construction noise levels at the selected representative locations	Selected representative noise monitoring station	Construction stage	• TM-EIA	✓

Notes (*): ✓ - Compliance; N/A – Not Applicable; N/O – Not Observed; Rdr – Reminder; Obs – Observation; N/C – Non Compliance

Environmental Mitigation Implementation Schedule – Works Contract 1103

EIA Ref.	EM&A Log Ref	Recommended Mitigation Measures	Objectives of the Recommended Measures & Main Concerns to address	Location of the measures	When to implement the measures?	What requirements or standards for the measures to achieve?	Implementation Status
Water Quality (Construction Phase)							
S10.7.1	W1	In accordance with the Practice Noise for Professional Persons on Construction Site Drainage, Environmental Protection Department, 1994 (ProPECC PN1/94), construction phase mitigation measures shall include the following: *<u>Construction Runoff and Site Drainage</u>* • At the start of site establishment (including the barging facilities), perimeter cut-off drains to direct off-site water around the site should be constructed with internal drainage works and erosion and sedimentation control facilities implemented. Channels (both temporary and permanent drainage pipes and culverts), earth bunds or sand bag barriers should be provided on site to direct stormwater to silt removal facilities. The design of the temporary on-site drainage system will be undertaken by the contractor prior to the commencement of construction. • The dikes or embankments for flood protection should be implemented around the boundaries of earthwork areas. Temporary ditches should be provided to facilitate the runoff discharge into an appropriate watercourse, through a site/sediment trap. The sediment/silt traps should be incorporated in the permanent drainage channels to enhance deposition rates. • The design of efficient silt removal facilities should be based on the guidelines in Appendix A1 of ProPECC PN 1/94, which states that the retention time for silt/sand traps should be 5 minutes under maximum flow conditions. Sizes may vary depending upon the flow rate, but for a flow rate of 0.1 m^3/s a sedimentation basin of $30m^3$ would be required and for a flow rate of 0.5 m^3/s the basin would be 150 m^3. The detailed design of the sand/silt traps shall be undertaken by the contractor prior to the	To minimize water quality impact from construction site runoff and general construction activities	All construction sites where practicable	Construction stage	• Water Pollution Control Ordinance • ProPECC PN1/94 • TM-EIAO • TM-Water	 Rdr ✓ ✓

EIA Ref.	EM&A Log Ref	Recommended Mitigation Measures	Objectives of the Recommended Measures & Main Concerns to address	Location of the measures	When to implement the measures?	What requirements or standards for the measures to achieve?	Implementation Status
		commencement of construction.					
		• All exposed earth areas should be completed and vegetated as soon as possible after earthworks have been completed, or alternatively, within 14 days of the cessation of earthworks where practicable. Exposed slope surfaces should be covered by tarpaulin or other means.					✓
		• The overall slope of the site should be kept to a minimum to reduce the erosive potential of surface water flows, and all traffic areas and access roads protected by coarse stone ballast. An additional advantage accruing from the use of crushed stone is the positive traction gained during prolonged periods of inclement weather and the reduction of surface sheet flows.					✓
		• All drainage facilities and erosion and sediment control structures should be regularly inspected and maintained to ensure proper and efficient operation at all times and particularly following rainstorms. Deposited silt and grit should be removed regularly and disposed of by spreading evenly over stable, vegetated areas.					Obs
		• Measures should be taken to minimise the ingress of site drainage into excavations. If the excavation of trenches in wet periods is necessary, they should be dug and backfilled in short sections wherever practicable. Water pumped out from trenches or foundation excavations should be discharged into storm drains via silt removal facilities.					✓
		• Open stockpiles of construction materials (for example, aggregates, sand and fill material) of more than 50m³ should be covered with tarpaulin or similar fabric during rainstorms. Measures should be taken to prevent the washing away of construction materials, soil, silt or debris into any drainage system.					✓
		• Manholes (including newly constructed ones) should always be					

Notes (*): ✓ - Compliance; N/A – Not Applicable; N/O – Not Observed; Rdr – Reminder; Obs – Observation; N/C – Non Compliance

Environmental Mitigation Implementation Schedule – Works Contract 1103

EIA Ref.	EM&A Log Ref	Recommended Mitigation Measures	Objectives of the Recommended Measures & Main Concerns to address	Location of the measures	When to implement the measures?	What requirements or standards for the measures to achieve?	Implementation Status
		adequately covered and temporarily sealed so as to prevent silt, construction materials or debris being washed into the drainage system and storm runoff being directed into foul sewers.					✓
		• Precautions be taken at any time of year when rainstorms are likely, actions to be taken when a rainstorm is imminent or forecasted, and actions to be taken during or after rainstorms are summarised in Appendix A2 of ProPECC PN 1/94. Particular attention should be paid to the control of silty surface runoff during storm events, especially for areas located near steep slopes.					Rdr
		• All vehicles and plant should be cleaned before leaving a construction site to ensure no earth, mud, debris and the like is deposited by them on roads. An adequately designed and sited wheel washing facilities should be provided at every construction site exit where practicable. Wash-water should have sand and silt settled out and removed at least on a weekly basis to ensure the continued efficiency of the process. The section of access road leading to, and exiting from, the wheel-wash bay to the public road should be paved with sufficient backfall toward the wheel-wash bay to prevent vehicle tracking of soil and silty water to public roads and drains.					✓
		• Oil interceptors should be provided in the drainage system downstream of any oil/fuel pollution sources. The oil interceptors should be emptied and cleaned regularly to prevent the release of oil and grease into the storm water drainage system after accidental spillage. A bypass should be provided for the oil interceptors to prevent flushing during heavy rain.					✓
		• Construction solid waste, debris and rubbish on site should be collected, handled and disposed of properly to avoid water quality impacts.					✓
		• All fuel tanks and storage areas should be provided with locks					

Notes (*): ✓ - Compliance; N/A – Not Applicable; N/O – Not Observed; Rdr – Reminder; Obs – Observation; N/C – Non Compliance

Environmental Mitigation Implementation Schedule – Works Contract 1103

EIA Ref.	EM&A Log Ref	Recommended Mitigation Measures	Objectives of the Recommended Measures & Main Concerns to address	Location of the measures	When to implement the measures?	What requirements or standards for the measures to achieve?	Implementation Status
		and sited on sealed areas, within bunds of a capacity equal to 110% of the storage capacity of the largest tank to prevent spilled fuel oils from reaching water sensitive receivers nearby. • All the earth works involving should be conducted sequentially to limit the amount of construction runoff generated from exposed areas during the wet season (April to September) as far as practicable. • Adopt best management practices					✓ ✓ ✓
S10.7.1	W2	*Tunnelling Works* • Cut-&-cover/ open cut tunnelling work should be conducted sequentially to limit the amount of construction runoff generated from exposed areas during the wet season (April to September) as far as practicable. • Uncontaminated discharge should pass through sedimentation tanks prior to off-site discharge • The wastewater with a high concentration of SS should be treated (e.g. by sedimentation tanks with sufficient retention time) before discharge. Oil interceptors would also be required to remove the oil, lubricants and grease from the wastewater. • Direct discharge of the bentonite slurry (as a result of D-wall and bored tunnelling construction) is not allowed. It should be reconditioned and reused wherever practicable. Temporary storage locations (typically a properly closed warehouse) should be provided on site for any unused bentonite that needs to be transported away after all the related construction activities are completed. The requirements in ProPECC PN 1/94 should be adhered to in the handling and disposal of bentonite slurries.	To minimize construction water quality impact from tunneling works	All tunneling portion	Construction stage	• Water Pollution Control Ordinance • ProPECC PN 1/94 • TM-water • TM-EIAO	N/A N/A N/A N/A
S10.7.1	W3	*Sewage Effluent*	To minimize water quality	All construction sites	Construction	• Water Pollution	

Notes (*): ✓ - Compliance; N/A – Not Applicable; N/O – Not Observed; Rdr – Reminder; Obs – Observation; N/C – Non Compliance

EIA Ref.	EM&A Log Ref	Recommended Mitigation Measures	Objectives of the Recommended Measures & Main Concerns to address	Location of the measures	When to implement the measures?	What requirements or standards for the measures to achieve?	Implementation Status
		• Portable chemical toilets and sewage holding tanks are recommended for handling the construction sewage generated by the workforce. A licensed contractor should be employed to provide appropriate and adequate portable toilets and be responsible for appropriate disposal and maintenance.	from sewage effluent	where practicable	stage	Control Ordinance • TM-water	✓
S10.7.1	W4	*Groundwater from Contaminated Area:* • No direct discharge of groundwater from contaminated areas should be adopted. Prior to the excavation works within these potentially contaminated areas, the groundwater quality should be reviewed with reference to the site investigation data in this EIA report for compliance to the Technical Memorandum on Standards for Effluents Discharged into Drainage on Sewerage Systems, Inland and Coastal Waters (TM-Water) and the existence of prohibited substance should be confirmed. The review results should be submitted to EPD for examination If the review results indicated that the groundwater to be generated from the excavation works would be contaminated, the contaminated groundwater should be either properly treated in compliance with the requirements of the TM-Water or properly recharged into the ground. • If wastewater treatment is deployed, the wastewater treatment unit shall deploy suitable treatment process (e.g. oil interceptor / activated carbon) to reduce the pollution level to an acceptable standard and remove any prohibited substances (e.g. TPH) to undetectable range. All treated effluent from wastewater treatment plant shall meet the requirements as stated in TM-Water and should be discharged into the foul sewers. • If groundwater recharging wells are deployed, recharging wells should be installed as appropriate for recharging the contaminated groundwater back into the ground. The recharging wells should be selected at places where the groundwater quality	To minimize groundwater quality impact from contaminated area	Excavation areas where contamination is found.	Construction stage	• Water Pollution Control Ordinance • TM-water • TM-EIAO	N/A N/A N/A

EIA Ref.	EM&A Log Ref	Recommended Mitigation Measures	Objectives of the Recommended Measures & Main Concerns to address	Location of the measures	When to implement the measures?	What requirements or standards for the measures to achieve?	Implementation Status
		will not be affected by the recharge operation as indicated in the Section 2.3 of TM-Water. The baseline groundwater quality shall be determined prior to the selection of the recharge wells, and submit a working plan (including the laboratory analytical results showing the quality of groundwater at the proposed recharge location(s) as well as the pollutant levels of groundwater to be recharged) to EPD for agreement. Pollution levels of groundwater to be recharged shall not be higher than pollutant levels of ambient groundwater at the recharge well. Prior to recharge, any prohibited substances such as TPH products should be removed as necessary by installing the petrol interceptor. The Contractor should apply for a discharge licence under the WPCO through the Regional Office of EPD for groundwater recharge operation or discharge of treated groundwater.					
S10.7.1	W7	In order to prevent accidental spillage of chemicals, the following is recommended: • All the tanks, containers, storage area should be bunded and the locations should be locked as far as possible from the sensitive watercourse and stormwater drains. • The Contractor should register as a chemical waste producer if chemical wastes would be generated. Storage of chemical waste arising from the construction activities should be stored with suitable labels and warnings. • Disposal of chemical wastes should be conducted in compliance with the requirements as stated in the Waste disposal (Chemical Waste) (General) Regulation.	To minimize water quality impact from accidental spillage	All construction sites where practicable	Construction stage	• Water Pollution Control Ordinance • ProPECC PN1/94 • TM-EIAO • TM-Water	✓ ✓ ✓

Environmental Mitigation Implementation Schedule – Works Contract 1103

EIA Ref.	EM&A Log Ref	Recommended Mitigation Measures	Objectives of the Recommended Measures & Main Concerns to address	Location of the measures	When to implement the measures?	What requirements or standards for the measures to achieve?	Implementation Status
Waste Management (Construction Phase)							
S11.4.1.1	WM1	*On-site sorting of C&D material* • Geological assessment should be carried out by competent persons on site during excavation to identify materials which are not suitable to use as aggregate in structural concrete (e.g. volcanic rock, Aplite dyke rock, etc). Volcanic rock and Aplite dyke rock should be separated at the source sites as far as practicable and stored at designated stockpile areas preventing them from delivering to crushing facilities. The crushing plant operator should also be reminded to set up measures to prevent unsuitable rock from ended up at concrete batching plants and be turned into concrete for structural use. Details regarding control measures at source site and crushing facilities should be submitted by the Contractors for the Engineer to review and agree. In addition, site records should also be kept for the types of rock materials excavated and the traceability of delivery will be ensured with the implementation of Trip Ticket System and enforced by site supervisory staff as stipulated under DEVB TC(W) No. 6/2010 for tracking of the correct delivery to the rock crushing facilities for processing into aggregates. Alternative disposal option for the reuse of volcanic rock and Aplite Dyke rock, etc should also be explored.	Separation of unsuitable rock from ending up at concrete batching plants and be turned into concrete for structural use	All construction sites	Construction stage	• DEVB TC(W) No. 6/2010	✓
S11.5.1	WM2	*Construction and Demolition Material* • Maintain temporary stockpiles and reuse excavated fill material for backfilling and reinstatement; • Carry out on-site sorting; • Make provisions in the Contract documents to allow and	Good site practice to minimize the waste generation and recycle the C&D materials as far as practicable so as to reduce the amount for final disposal	All construction sites	Construction stage	• Land (Miscellaneous Provisions) Ordinance • Waste Disposal Ordinance	✓ ✓

Environmental Mitigation Implementation Schedule – Works Contract 1103

EIA Ref.	EM&A Log Ref	Recommended Mitigation Measures	Objectives of the Recommended Measures & Main Concerns to address	Location of the measures	When to implement the measures?	What requirements or standards for the measures to achieve?	Implementation Status
		promote the use of recycled aggregates where appropriate; • Adopt 'Selective Demolition' technique to demolish the existing structures and facilities with a view to recovering broken concrete effectively for recycling purpose, where possible; • Implement a trip-ticket system for each works contract to ensure that the disposal of C&D materials are properly documented and verified; and • Implement an enhanced Waste Management Plan similar to ETWBTC (Works) No. 19/2005 – "Environmental Management on Construction Sites" to encourage on-site sorting of C&D materials and to minimize their generation during the course of construction. • In addition, disposal of the C&D materials onto any sensitive locations such as agricultural lands, etc. should be avoided. The Contractor shall propose the final disposal sites to the Project Proponent and get its approval before implementation				• ETWB TCW No. 19/2005	✓ ✓ ✓ ✓ ✓
S11.5.1	WM3	*C&D Waste* • Standard formwork or pre-fabrication should be used as far as practicable in order to minimise the arising of C&D materials. The use of more durable formwork or plastic facing for the construction works should be considered. Use of wooden hoardings should not be used, as in other projects. Metal hoarding should be used to enhance the possibility of recycling. The purchasing of construction materials will be carefully planned in order to avoid over ordering and wastage. • The Contractor should recycle as much of the C&D materials as possible on-site. Public fill and C&D waste should be segregated and stored in different containers or skips to enhance reuse or recycling of materials and their proper disposal. Where practicable, concrete and masonry can be	Good site practice to minimize the waste generation and recycle the C&D materials as far as practicable so as to reduce the amount for final disposal	All construction sites	Construction stage	• Land (Miscellaneous Provisions) Ordinance • Waste Disposal Ordinance • ETWB TCW No. 19/2005	✓ N/A

Notes (*): ✓ - Compliance; N/A – Not Applicable; N/O – Not Observed; Rdr – Reminder; Obs – Observation; N/C – Non Compliance

Environmental Mitigation Implementation Schedule – Works Contract 1103

EIA Ref.	EM&A Log Ref	Recommended Mitigation Measures	Objectives of the Recommended Measures & Main Concerns to address	Location of the measures	When to implement the measures?	What requirements or standards for the measures to achieve?	Implementation Status
		crushed and used as fill. Steel reinforcement bar can be used by scrap steel mills. Different areas of the sites should be considered for such segregation and storage.					
S11.5.1	WM4	*General Refuse* • General refuse generated on-site should be stored in enclosed bins or compaction units separately from construction and chemical wastes. • A reputable waste collector should be employed by the Contractor to remove general refuse from the site, separately from construction and chemical wastes, on a daily basis to minimize odour, pest and litter impacts. Burning of refuse on construction sites is prohibited by law. • Aluminium cans are often recovered from the waste stream by individual collectors if they are segregated and made easily accessible. Separate labelled bins for their deposit should be provided if feasible. • Office wastes can be reduced through the recycling of paper if volumes are large enough to warrant collection. Participation in a local collection scheme should be considered by the Contractor.	Minimize production of the general refuse and avoid odour, pest and litter impacts	All construction sites	Construction stage	• Waste Disposal Ordinance	✓ ✓ ✓ ✓
S11.5.1	WM5	Excavated Contaminated Soils Details of the mitigation measures on handling of the contaminated soil shall be referred to Section on Land Contamination below.	To remediate contaminated soil	Site L4 (Former Tai Hom Village)	Site remediation	• Guidance Notes for Investigation and Remediation of Contaminated Sites of Petrol Filling Stations, Boat yards and Car Repair/Dismantling Workshop.	

Notes (*): ✓ - Compliance; N/A – Not Applicable; N/O – Not Observed; Rdr – Reminder; Obs – Observation; N/C – Non Compliance

Environmental Mitigation Implementation Schedule – Works Contract 1103

EIA Ref.	EM&A Log Ref	Recommended Mitigation Measures	Objectives of the Recommended Measures & Main Concerns to address	Location of the measures	When to implement the measures?	What requirements or standards for the measures to achieve?	Implementation Status
S11.5.1	WM7	*Chemical Waste* • Chemical waste that is produced, as defined by Schedule 1 of the Waste Disposal (Chemical Waste) (General) Regulation, should be handled in accordance with the Code of Practice on the Packaging, Labelling and Storage of Chemical Wastes. • Containers used for the storage of chemical wastes should be suitable for the substance they are holding, resistant to corrosion, maintained in a good condition, and securely closed; have a capacity of less than 450 liters unless the specification has been approved by the EPD; and display a label in English and Chinese in accordance with instructions prescribed in Schedule 2 of the regulation. • The storage area for chemical wastes should be clearly labelled and used solely for the storage of chemical waste; enclosed on at least 3 sides; have an impermeable floor and bunding of sufficient capacity to accommodate 110% of the volume of the largest container or 20 % of the total volume of waste stored in that area, whichever is the greatest; have adequate ventilation; covered to prevent rainfall entering; and arranged so that incompatible materials are adequately separated. • Disposal of chemical waste should be via a licensed waste collector; be to a facility licensed to receive chemical waste, such as the Chemical Waste Treatment Centre which also offers a chemical waste collection service and can supply the necessary storage containers; or be to a reuser of the waste, under approval from the EPD.	Control the chemical waste and ensure proper storage, handling and disposal.	All construction sites	Construction stage	• Waste Disposal (Chemical Waste) General) Regulation • Code of Practice on the Packaging, Labelling and Storage of Chemical Waste	✓ ✓ ✓ ✓

Environmental Mitigation Implementation Schedule – Works Contract 1103

EIA Ref.	EM&A Log Ref	Recommended Mitigation Measures	Objectives of the Recommended Measures & Main Concerns to address	Location of the measures	When to implement the measures?	What requirements or standards for the measures to achieve?	Implementation Status
S14.2	EM1	An Independent Environmental Checker needs to be employed as per the EM&A Manual.	Control EM&A Performance	All construction sites	Construction stage	• EIAO Guidance Note No.4/2010 • TM-EIAO	✓
S14.2 – 14.4	EM2	1) An Environmental Team needs to be employed as per the EM&A Manual.	Perform environmental monitoring & auditing	All construction sites	Construction stage	• EIAO Guidance Note No.4/2010 • TM-EIAO	✓
		2) Prepare a systematic Environmental Management Plan to ensure effective implementation of the mitigation measures.					✓
		3) An environmental impact monitoring needs to be implementing by the Environmental Team to ensure all the requirements given in the EM&A Manual are fully complied with.					✓

Notes (*): ✓ - Compliance; N/A – Not Applicable; N/O – Not Observed; Rdr – Reminder; Obs – Observation; N/C – Non Compliance

Appendix D

Calibration Certficates for Air Monitoring Equipment

Ove Arup Partners (Hong Kong) Limited

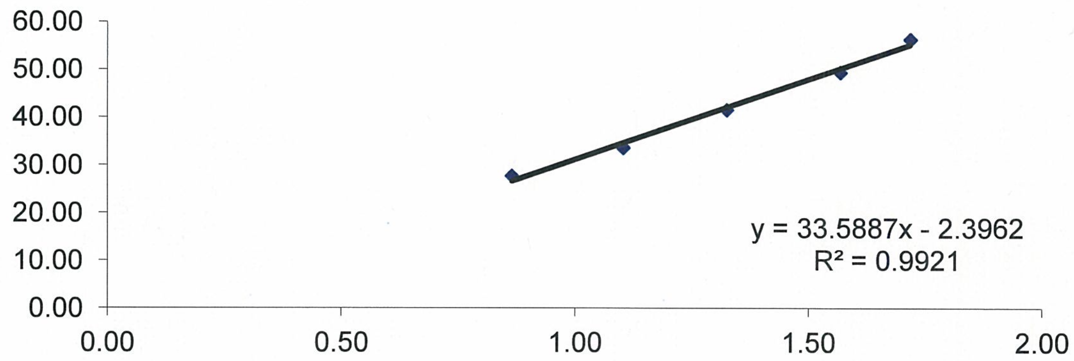
High Volume Air Sampler Calibration Worksheet

Calibration date	29-Jul-13	**Barometric pressure**	753 mm Hg
Next Calibration date	27-Sep-13	**Tempature (°C)**	28 °C
Sampler location	DMS1 - Thomas Cheung School	**Tempature (K)**	301 K
Sampler model	TE-5170	**P_{std}**	760 mm Hg
Sampler serial number	3763	**T_{std}**	298 K

Calibrator model	GMW-2535
Calibrator serial number	2421
Slope of the standard curve, m_s	2.0458
Intercept of the standard curve, b_s	0.0019

Resistance Plate No.	Manometer Reading (inch H_2O)	Flow Recorder Reading (CFM)	Calculated Q_{std} (m^3/min)	Continuous Flow Recorder Reading IC (CFM)
5	3.20	28.00	0.87	27.73
7	5.20	34.00	1.10	33.67
10	7.50	42.00	1.32	41.60
13	10.50	50.00	1.57	49.52
18	12.60	57.00	1.72	56.45

Calibration Curve



Linear Regression

Sampler slope (m) : **33.5887**

Sampler intercept (b) : **-2.3962**

Correlation coefficient (R^2) : **0.9921**

Correlation coefficient is greater than 0.9900 and the calibration result is accepted.

Performed by: ____________ Date: 29.7.13

Checked by: ____________ Date: 29-7-13

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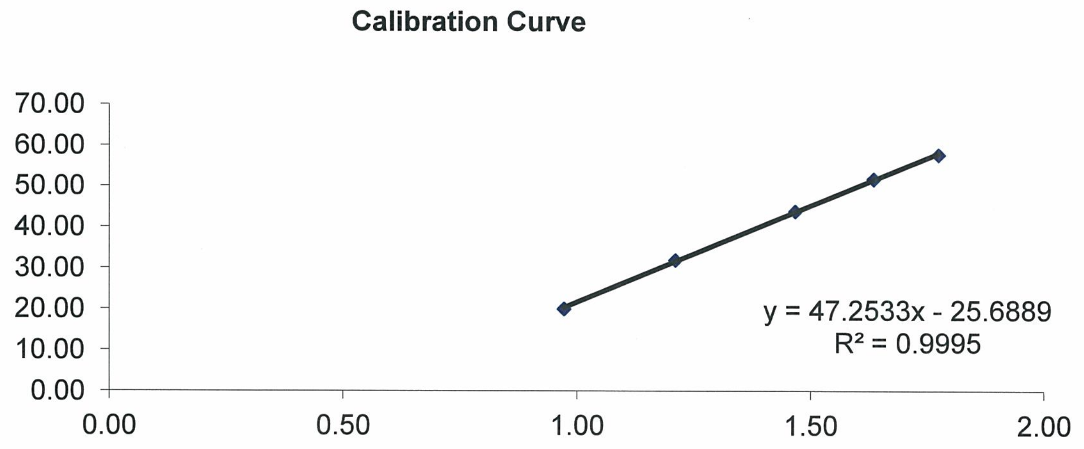
Ove Arup Partners (Hong Kong) Limited

High Volume Air Sampler Calibration Worksheet

Calibration date	24-Sep-13	**Barometric pressure**	758 mm Hg
Next Calibration date	23-Nov-13	**Tempature (°C)**	27 °C
Sampler location	DMS1 - Thomas Cheung School	**Tempature (K)**	300 K
Sampler model	TE-5170	**P_{std}**	760 mm Hg
Sampler serial number	3763	**T_{std}**	298 K

Calibrator model	GMW-2535
Calibrator serial number	2421
Slope of the standard curve, m_s	2.0458
Intercept of the standard curve, b_s	0.0019

Resistance Plate No.	Manometer Reading (inch H_2O)	Flow Recorder Reading (CFM)	Calculated Q_{std} (m^3/min)	Continuous Flow Recorder Reading IC (CFM)
5	4.00	20.00	0.97	19.91
7	6.20	32.00	1.21	31.85
10	9.10	44.00	1.47	43.80
13	11.30	52.00	1.63	51.76
18	13.30	58.00	1.77	57.73



Linear Regression

Sampler slope (m) : **47.2533**

Sampler intercept (b) : **-25.6889**

Correlation coefficient (R^2) : **0.9995**

Correlation coefficient is greater than 0.9900 and the calibration result is accepted.

Performed by: ________ Date: 24.9.13

Checked by: D Rollinson Date: 25-9-13

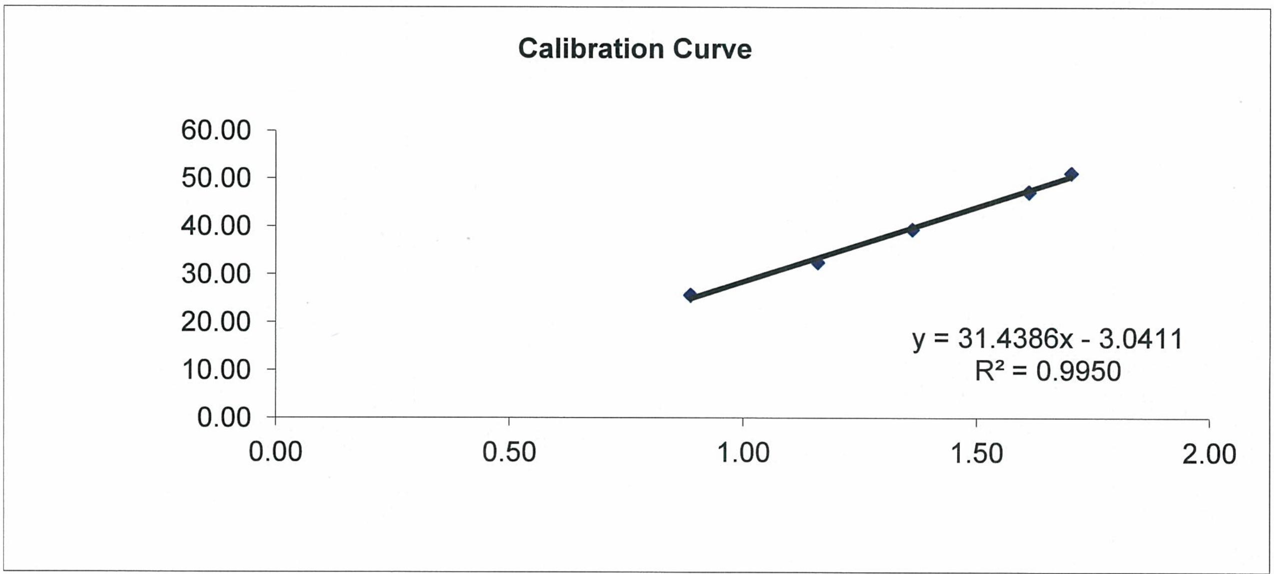
Ove Arup Partners (Hong Kong) Limited

High Volume Air Sampler Calibration Worksheet

Calibration date	26-Aug-13	**Barometric pressure**	751 mm Hg
Next Calibration date	25-Oct-13	**Tempature (°C)**	30 °C
Sampler location	DMS2 - Price Memorial Catholic Pri	**Tempature (K)**	303 K
Sampler model	TE-5170	**P_{std}**	760 mm Hg
Sampler serial number	3761	**T_{std}**	298 K

Calibrator model	GMW-2535
Calibrator serial number	2421
Slope of the standard curve, m_s	2.0458
Intercept of the standard curve, b_s	0.0019

Resistance Plate No.	Manometer Reading (inch H_2O)	Flow Recorder Reading (CFM)	Calculated Q_{std} (m^3/min)	Continuous Flow Recorder Reading IC (CFM)
5	3.40	26.00	0.89	25.63
7	5.80	33.00	1.16	32.53
10	8.00	40.00	1.36	39.43
13	11.20	48.00	1.61	47.32
18	12.50	52.00	1.70	51.26



Linear Regression

Sampler slope (m) : **31.4386**

Sampler intercept (b) : **-3.0411**

Correlation coefficient (R^2) : **0.9950**

Correlation coefficient is greater than 0.9900 and the calibration result is accepted.

Performed by: ______ Date: 26.8.13

Checked by: D Rollinson Date: 26.8.13

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Ove Arup Partners (Hong Kong) Limited

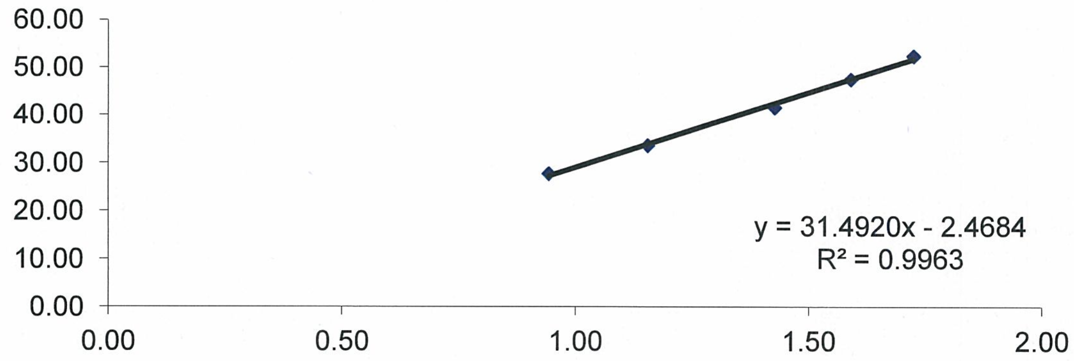
High Volume Air Sampler Calibration Worksheet

Calibration date	29-Jul-13	**Barometric pressure**	753 mm Hg
Next Calibration date	27-Sep-13	**Tempature (°C)**	28 °C
Sampler location	DMS3 - Sheng Kung Hui Nursing H	**Tempature (K)**	301 K
Sampler model	TE-5170	P_{std}	760 mm Hg
Sampler serial number	3762	T_{std}	298 K

Calibrator model	GMW-2535
Calibrator serial number	2421
Slope of the standard curve, m_s	2.0458
Intercept of the standard curve, b_s	0.0019

Resistance Plate No.	Manometer Reading (inch H_2O)	Flow Recorder Reading (CFM)	Calculated Q_{std} (m^3/min)	Continuous Flow Recorder Reading IC (CFM)
5	3.80	28.00	0.94	27.73
7	5.70	34.00	1.15	33.67
10	8.70	42.00	1.43	41.60
13	10.80	48.00	1.59	47.54
18	12.70	53.00	1.72	52.49

Calibration Curve



Linear Regression

Sampler slope (m) : **31.4920**

Sampler intercept (b) : **-2.4684**

Correlation coefficient (R^2) : **0.9963**

Correlation coefficient is greater than 0.9900 and the calibration result is accepted.

Performed by: ______ Date: 29.7.13

Checked by: ______ Date: 29-7-13

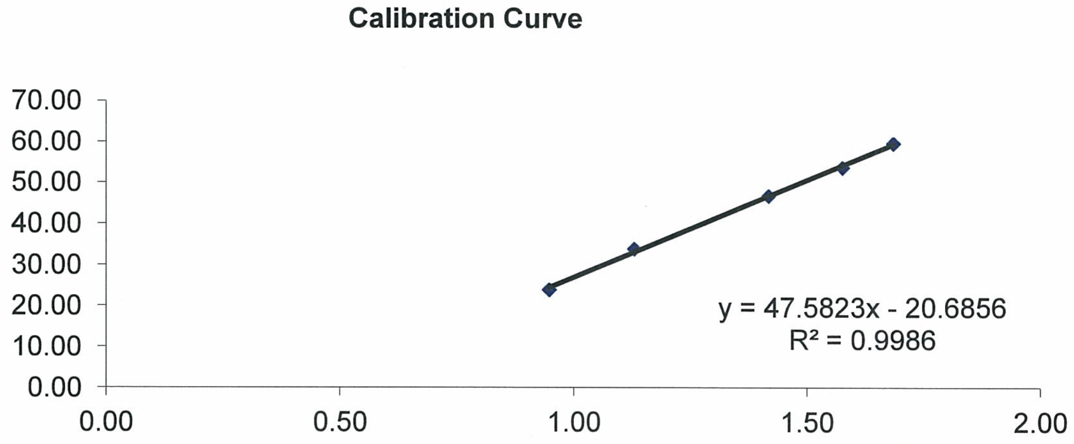
Ove Arup Partners (Hong Kong) Limited

High Volume Air Sampler Calibration Worksheet

Calibration date	24-Sep-13	**Barometric pressure**	758 mm Hg
Next Calibration date	23-Nov-13	**Tempature (°C)**	27 °C
Sampler location	DMS3 - Sheng Kung Hui Nursing H	**Tempature (K)**	300 K
Sampler model	TE-5170	P_{std}	760 mm Hg
Sampler serial number	3762	T_{std}	298 K

Calibrator model	GMW-2535
Calibrator serial number	2421
Slope of the standard curve, m_s	2.0458
Intercept of the standard curve, b_s	0.0019

Resistance Plate No.	Manometer Reading (inch H_2O)	Flow Recorder Reading (CFM)	Calculated Q_{std} (m^3/min)	Continuous Flow Recorder Reading IC (CFM)
5	3.80	24.00	0.95	23.89
7	5.40	34.00	1.13	33.84
10	8.50	47.00	1.42	46.78
13	10.50	54.00	1.58	53.75
18	12.00	60.00	1.68	59.72



Linear Regression

Sampler slope (m) : **47.5823**

Sampler intercept (b) : **-20.6856**

Correlation coefficient (R^2) : **0.9986**

Correlation coefficient is greater than 0.9900 and the calibration result is accepted.

Performed by: ________ Date: 24.9.13

Checked by: A Rollinson Date: 25-9-13

TISCH ENVIROMENTAL, INC.
145 SOUTH MIAMI AVE.
VILLAGE OF CLEVES, OH 45002
513.467.9000
877.263.7610 TOLL FREE
513.467.9009 FAX
WWW.TISCH-ENV.COM

AIR POLLUTION MONITORING EQUIPMENT

ORIFICE TRANSFER STANDARD CERTIFICATION WORKSHEET TE-5025A

Date - Jan 21, 2013 Rootsmeter S/N 0438320 Ta (K) - 293
Operator Tisch Orifice I.D. - 2421 Pa (mm) - 759.46

PLATE OR Run #	VOLUME START (m3)	VOLUME STOP (m3)	DIFF VOLUME (m3)	DIFF TIME (min)	METER DIFF Hg (mm)	ORFICE DIFF H2O (in.)
1	NA	NA	1.00	1.4550	3.2	2.00
2	NA	NA	1.00	1.0240	6.4	4.00
3	NA	NA	1.00	0.9140	7.9	5.00
4	NA	NA	1.00	0.8680	8.8	5.50
5	NA	NA	1.00	0.7180	12.8	8.00

DATA TABULATION

Vstd	(x axis) Qstd	(y axis)		Va	(x axis) Qa	(y axis)
1.0120	0.6955	1.4257		0.9958	0.6844	0.8784
1.0078	0.9842	2.0163		0.9916	0.9683	1.2423
1.0057	1.1003	2.2543		0.9895	1.0826	1.3889
1.0045	1.1573	2.3643		0.9884	1.1387	1.4567
0.9992	1.3916	2.8514		0.9831	1.3692	1.7568

Qstd slope (m) = 2.04580
intercept (b) = 0.00190
coefficient (r) = 0.99997

y axis = SQRT[H2O(Pa/760)(298/Ta)]

Qa slope (m) = 1.28105
intercept (b) = 0.00117
coefficient (r) = 0.99997

y axis = SQRT[H2O(Ta/Pa)]

CALCULATIONS

Vstd = Diff. Vol[(Pa-Diff. Hg)/760](298/Ta)
Qstd = Vstd/Time

Va = Diff Vol [(Pa-Diff Hg)/Pa]
Qa = Va/Time

For subsequent flow rate calculations:

Qstd = 1/m{[SQRT(H2O(Pa/760)(298/Ta))]- b}
Qa = 1/m{[SQRT H2O(Ta/Pa)]- b}

Appendix E

Dust Results

Location: DMS-1 - C.U.H.K.A.A. Thomas Cheung School

Details of 24-Hour TSP Monitoring

Filter No.	Month	Date	Time periods		Receptor No.	Weather condition	Site condition	Pressure (mmHg)		Temperature (oC)		Flow Recorder Reading (CFM)		Filter Weight (g)		TSP weight (g)	Flow Rate (m^3/min)		Average Flow Rate (m^3/min)	Elapse Time		Sampling Time (mins.)	Total vol. (m^3)	24-hour TSP Level (mg/m^3)	Action Level ($\mu g/m^3$)	Limit Level ($\mu g/m^3$)
			Start	Finish				Initial	Final	Initial	Final	Initial	Final	Initial	Final		Initial	Final		Start	Finish					
102754	Sep-13	5-Sep-13	00:00	00:00	DMS1	Rainy	Normal Operation	755.0	754.0	25.0	27.0	44.0	44.0	3.5487	3.6819	0.1332	1.3770	1.3717	1.3744	936.29	960.29	1440.00	1979.06	67.3	148.7	260.0
102757	Sep-13	11-Sep-13	00:00	00:00	DMS1	Fine	Normal Operation	755.0	755.0	28.0	28.0	42.0	41.0	3.5369	3.5679	0.0310	1.3114	1.2819	1.2967	960.29	984.29	1440.00	1867.18	16.6	148.7	260.0
102760	Sep-13	17-Sep-13	00:00	00:00	DMS1	Fine	Normal Operation	754.0	756.0	28.0	28.0	41.0	41.0	3.5490	3.5916	0.0420	1.2811	1.2826	1.2819	984.29	1008.29	1440.00	1845.86	23.1	148.7	260.0
102763	Sep-13	23-Sep-13	00:00	00:00	DMS1	Cloudy	Normal Operation	758.0	755.0	26.0	28.0	41.0	42.0	3.5499	3.6054	0.0555	1.2884	1.3114	1.2999	1008.29	1032.29	1440.00	1871.86	29.6	148.7	260.0
102766	Sep-13	28-Sep-13	00:00	00:00	DMS1	Fine	Normal Operation	754.0	754.0	27.0	27.0	41.0	41.0	3.5392	3.6450	0.1058	1.4050	1.4050	1.4050	1032.29	1056.29	1440.00	2023.20	52.3	148.7	260.0

Average (µg/m3)	37.8
Max (µg/m3)	67.3
Min (µg/m3)	16.6

Location: DMS-2 Price Memorial Catholic Primary School

Details of 24-Hour TSP Monitoring

Filter No.	Month	Date	Time periods		Receptor No.	Weather condition	Site condition	Pressure (mmHg)		Temperature (oC)		Flow Recorder Reading (CFM)		Filter Weight (g)		TSP weight (g)	Flow Rate (m^3/min)		Average Flow Rate (m^3/min)	Elapse Time		Sampling Time (mins.)	Total vol. (m^3)	24-hour TSP Level (mg/m^3)	Action Level ($\mu g/m^3$)	Limit Level ($\mu g/m^3$)
			Start	Finish				Initial	Final	Initial	Final	Initial	Final	Initial	Final		Initial	Final		Start	Finish					
102755	Sep-13	5-Sep-13	00:00	00:00	DMS2	Rainy	Normal Operation	755.0	754.0	25.0	27.0	43.0	44.0	3.5570	3.5841	0.0271	1.4600	1.4861	1.4731	792.39	816.39	1440.00	2121.19	12.8	167.4	260.0
102758	Sep-13	11-Sep-13	00:00	00:00	DMS2	Fine	Normal Operation	755.0	755.0	28.0	28.0	41.0	42.0	3.5411	3.6288	0.0877	1.3900	1.4216	1.4058	816.39	840.39	1440.00	2024.35	43.3	167.4	260.0
102761	Sep-13	17-Sep-13	00:00	00:00	DMS2	Fine	Normal Operation	754.0	756.0	28.0	28.0	40.0	41.0	3.5494	3.5811	0.0317	1.3577	1.3909	1.3743	840.39	864.39	1440.00	1978.99	16.0	167.4	260.0
102764	Sep-13	23-Sep-13	00:00	00:00	DMS2	Cloudy	Normal Operation	758.0	755.0	26.0	28.0	40.0	40.0	3.5374	3.6655	0.1281	1.3653	1.3585	1.3619	864.39	888.39	1440.00	1961.14	65.3	167.4	260.0
102767	Sep-13	28-Sep-13	00:00	00:00	DMS2	Fine	Normal Operation	754.0	754.0	27.0	27.0	40.0	40.0	3.5446	3.6726	0.1280	1.3598	1.3598	1.3598	888.39	912.39	1440.00	1958.11	65.4	167.4	260.0

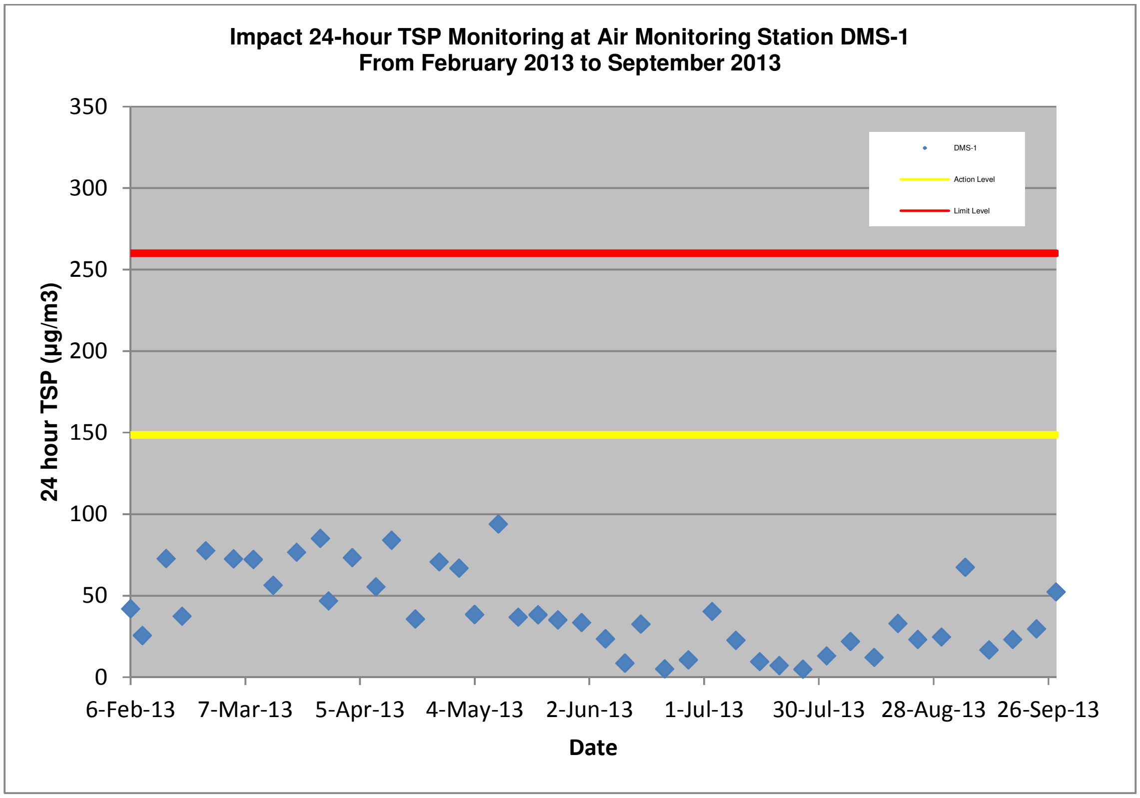
Average (µg/m3)	40.6
Max (µg/m3)	65.4
Min (µg/m3)	12.8

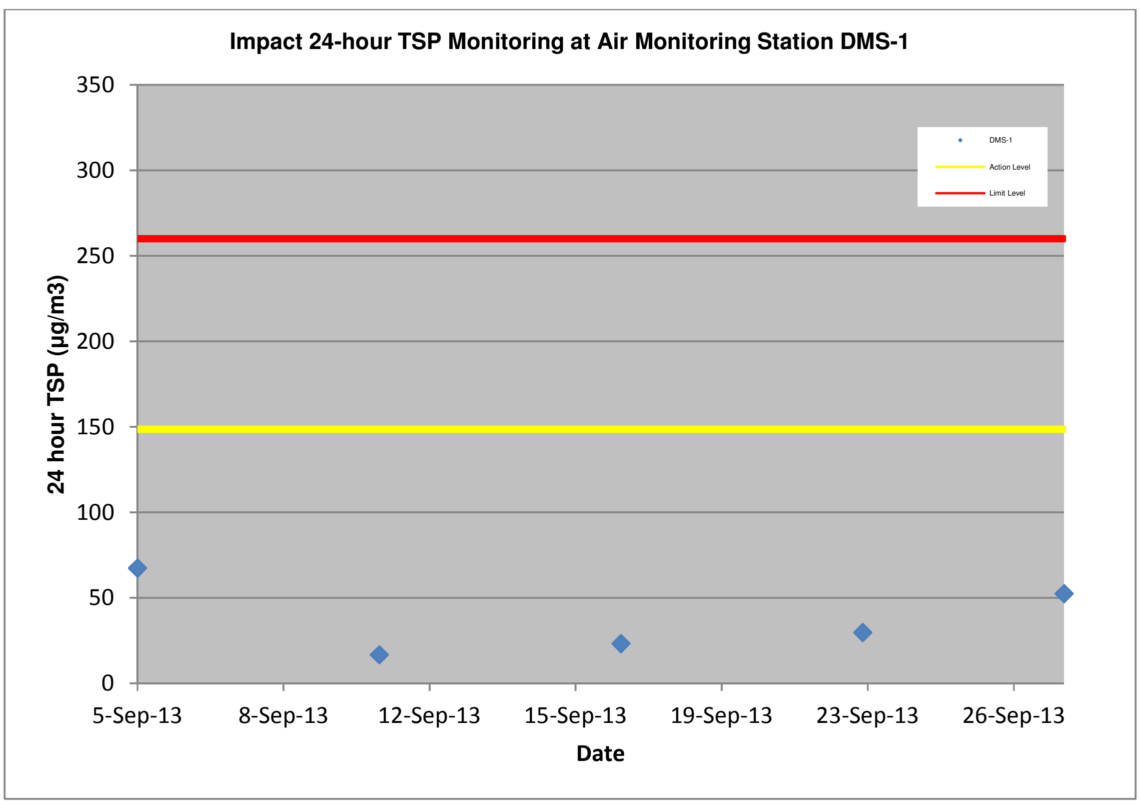
Location: DMS-3/DMS-4 - Hong Kong Sheng Kung Hui Nursing Home

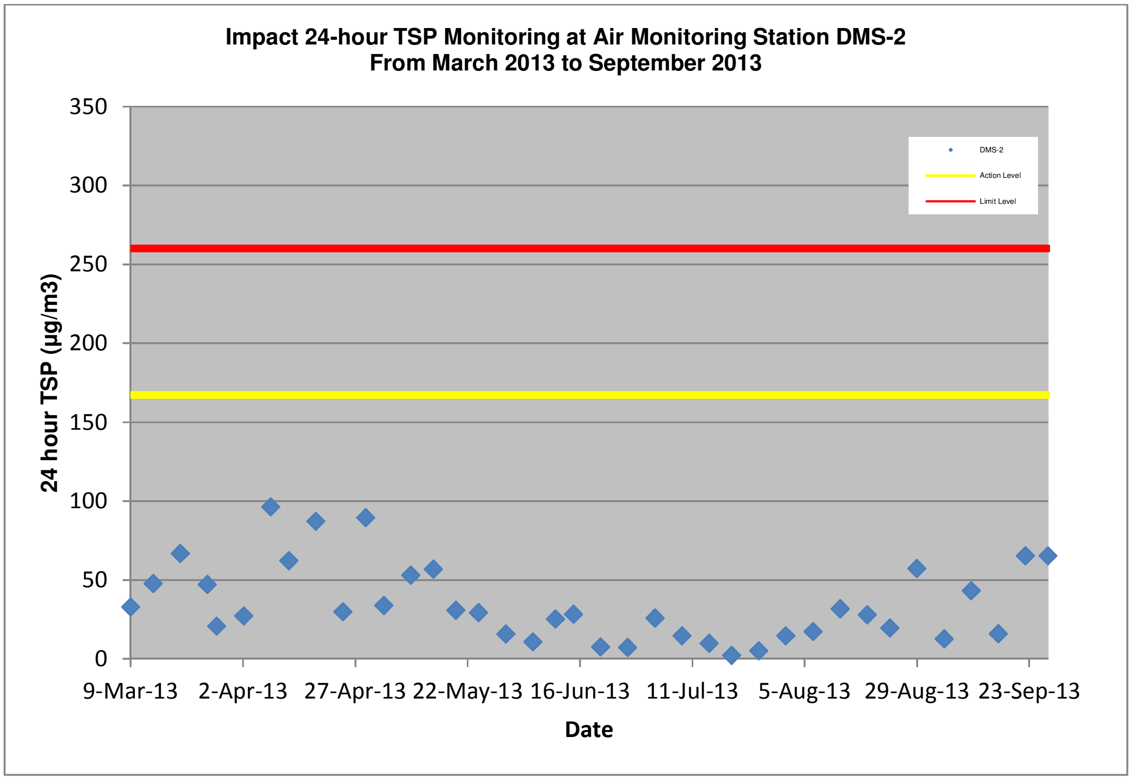
Details of 24-Hour TSP Monitoring

Filter No.	Month	Date	Time periods		Receptor No.	Weather condition	Site condition	Pressure (mmHg)		Temperature (oC)		Flow Recorder Reading (CFM)		Filter Weight (g)		TSP weight (g)	Flow Rate (m^3/min)		Average Flow Rate (m^3/min)	Elapse Time		Sampling Time (mins.)	Total vol. (m^3)	24-hour TSP Level ($\mu g/m^3$)	Action Level ($\mu g/m^3$)	Limit Level ($\mu g/m^3$)
			Start	Finish				Initial	Final	Initial	Final	Initial	Final	Initial	Final		Initial	Final		Start	Finish					
102756	Sep-13	5-Sep-13	00:00	00:00	DMS3	Rainy	Normal Operation	755.0	754.0	25.0	27.0	42.0	44.0	3.5458	3.5903	0.0445	1.4076	1.4654	1.4365	936.40	960.40	1440.00	2068.56	21.5	159.1	260.0
102759	Sep-13	11-Sep-13	00:00	00:00	DMS3	Fine	Normal Operation	755.0	755.0	28.0	28.0	42.0	42.0	3.5446	3.6031	0.0585	1.4010	1.4010	1.4010	960.40	984.40	1440.00	2017.44	29.0	159.1	260.0
102762	Sep-13	17-Sep-13	00:00	00:00	DMS3	Fine	Normal Operation	754.0	756.0	28.0	28.0	42.0	41.0	3.5434	3.5779	0.0345	1.4001	1.3703	1.3852	984.40	1008.40	1440.00	1994.69	15.8	159.1	260.0
102765	Sep-13	23-Sep-13	00:00	00:00	DMS3	Cloudy	Normal Operation	758.0	755.0	26.0	28.0	42.0	41.0	3.5367	3.6434	0.1067	1.4081	1.3695	1.3888	1008.40	1032.40	1440.00	1999.87	53.4	159.1	260.0
102768	Sep-13	28-Sep-13	00:00	00:00	DMS3	Fine	Normal Operation	754.0	754.0	27.0	27.0	42.0	42.0	3.5317	3.6426	0.1109	1.3110	1.3110	1.3110	1032.40	1056.40	1440.00	1887.84	58.7	159.1	260.0

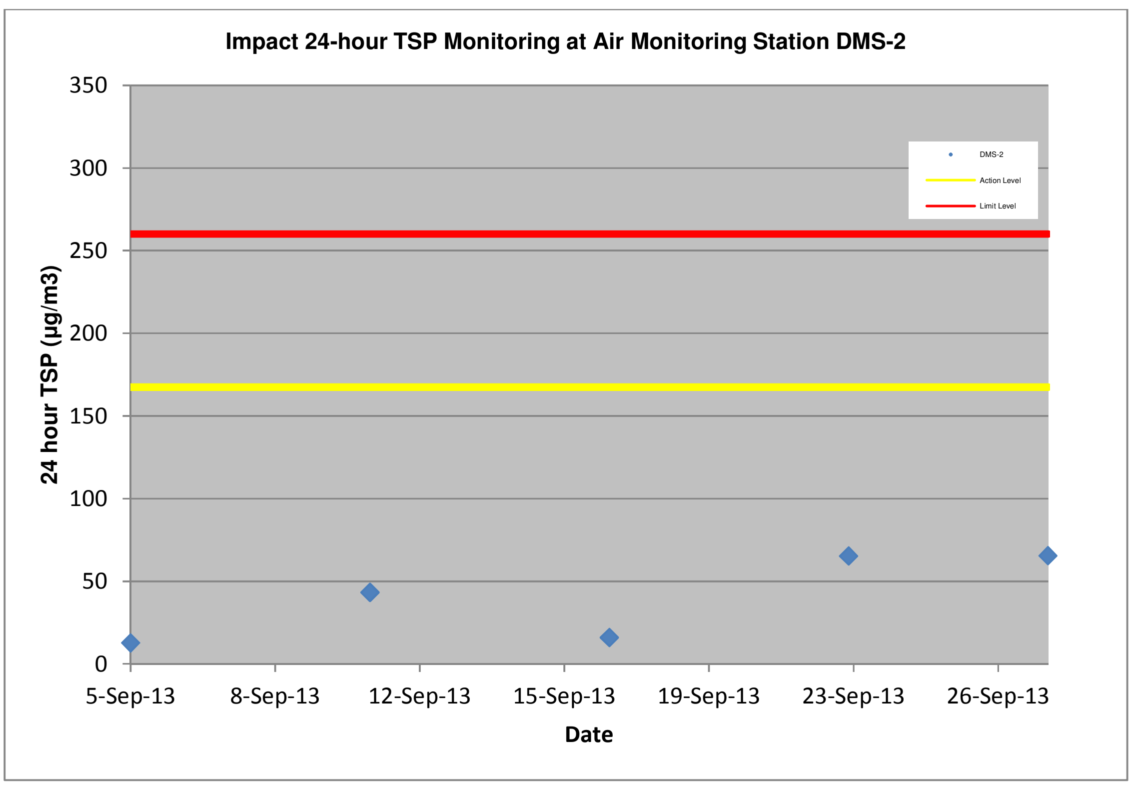
Average (µg/m3)	35.7
Max (µg/m3)	58.7
Min (µg/m3)	15.8


Impact 24-hour TSP Monitoring at Air Monitoring Station DMS-1
From February 2013 to September 2013
24 hour TSP (µg/m3)
350
300
250
200
150
100
50
0
6-Feb-13
7-Mar-13
5-Apr-13
4-May-13
2-Jun-13
1-Jul-13
30-Jul-13
28-Aug-13
26-Sep-13
Date
DMS-1
Action Level
Limit Level

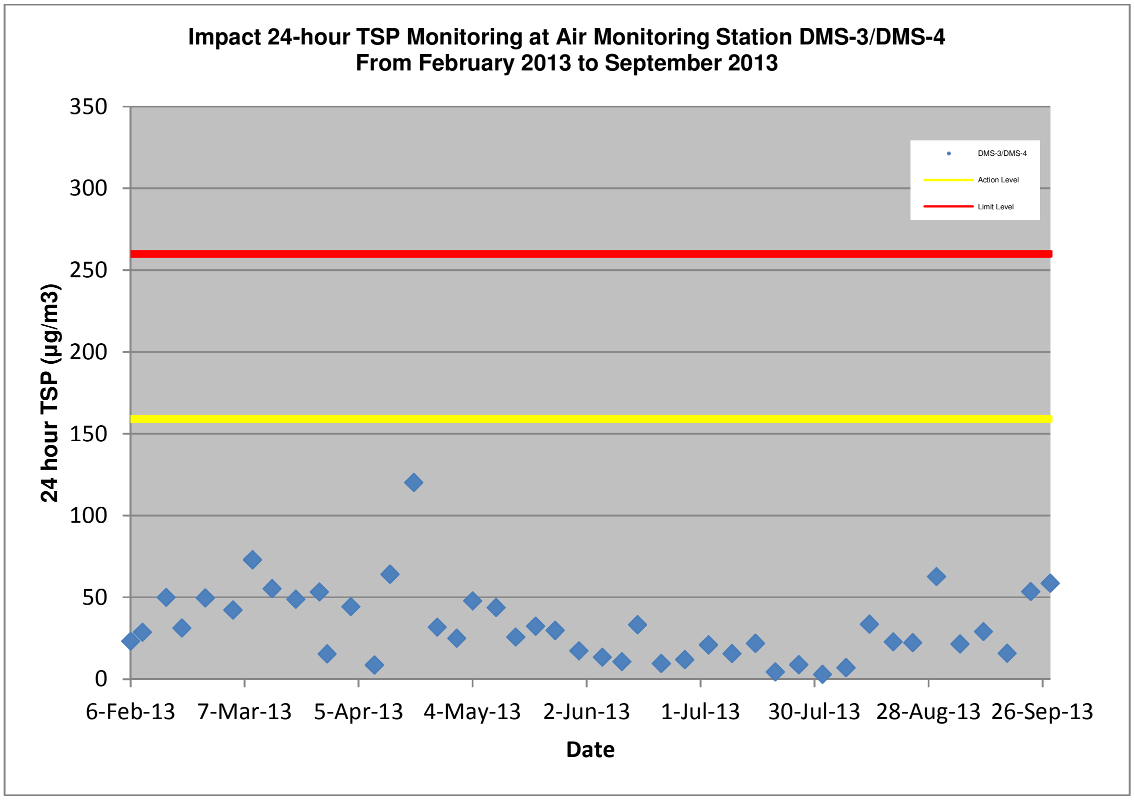

Impact 24-hour TSP Monitoring at Air Monitoring Station DMS-1
24 hour TSP (µg/m3)
350
300
250
200
150
100
50
0
5-Sep-13
8-Sep-13
12-Sep-13
15-Sep-13
19-Sep-13
23-Sep-13
26-Sep-13
Date
DMS-1
Action Level
Limit Level

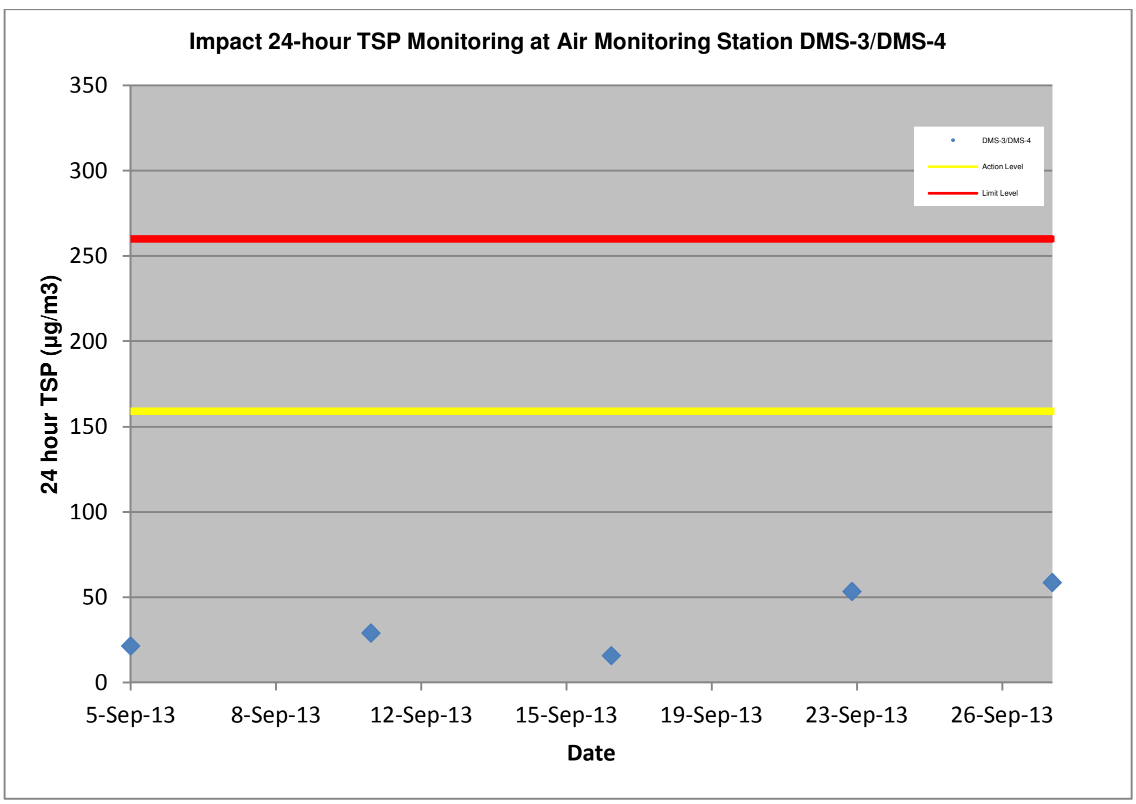


Impact 24-hour TSP Monitoring at Air Monitoring Station DMS-2
From March 2013 to September 2013
350
300
250
200
150
100
50
0
24 hour TSP (µg/m3)
DMS-2
Action Level
Limit Level
9-Mar-13
2-Apr-13
27-Apr-13
22-May-13
16-Jun-13
11-Jul-13
5-Aug-13
29-Aug-13
23-Sep-13
Date



Impact 24-hour TSP Monitoring at Air Monitoring Station DMS-2
350
300
250
200
150
100
50
0
24 hour TSP (µg/m3)
DMS-2
Action Level
Limit Level
5-Sep-13
8-Sep-13
12-Sep-13
15-Sep-13
19-Sep-13
23-Sep-13
26-Sep-13
Date


Impact 24-hour TSP Monitoring at Air Monitoring Station DMS-3/DMS-4
From February 2013 to September 2013
DMS-3/DMS-4
Action Level
Limit Level
24 hour TSP (µg/m3)
350
300
250
200
150
100
50
0
6-Feb-13
7-Mar-13
5-Apr-13
4-May-13
2-Jun-13
1-Jul-13
30-Jul-13
28-Aug-13
26-Sep-13
Date

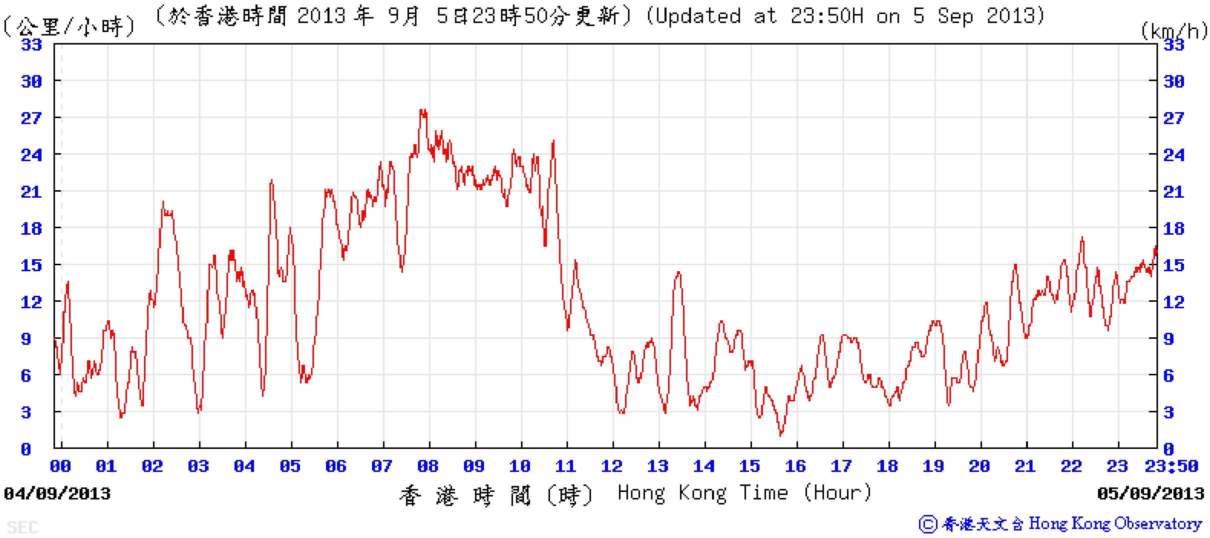

Impact 24-hour TSP Monitoring at Air Monitoring Station DMS-3/DMS-4
DMS-3/DMS-4
Action Level
Limit Level
24 hour TSP (µg/m3)
350
300
250
200
150
100
50
0
5-Sep-13
8-Sep-13
12-Sep-13
15-Sep-13
19-Sep-13
23-Sep-13
26-Sep-13
Date

Appendix F

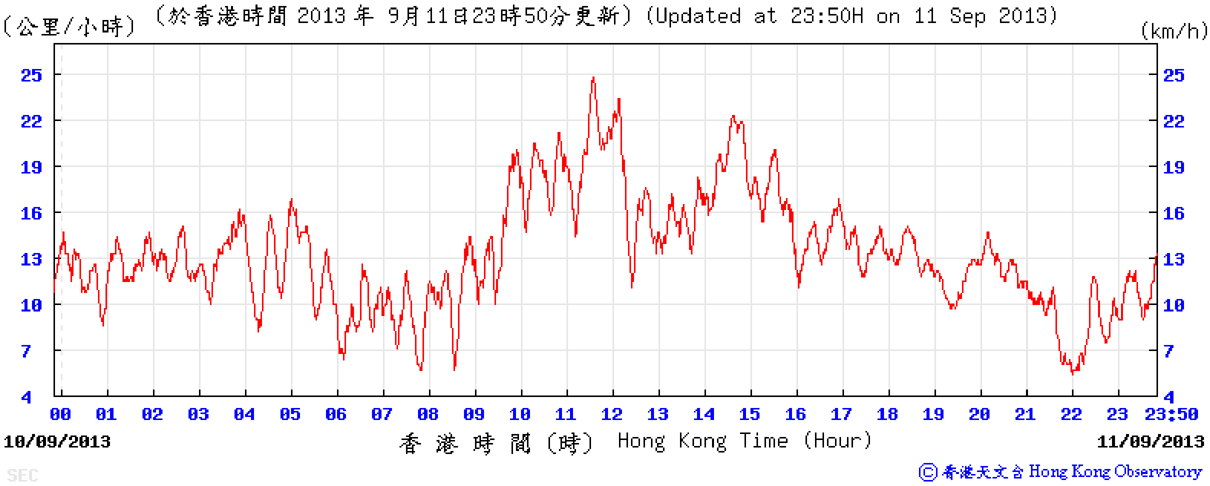
Wind data

Average wind speed obtained from the meteorological station at Kai Tak from the Hong Kong Observatory (HKO)

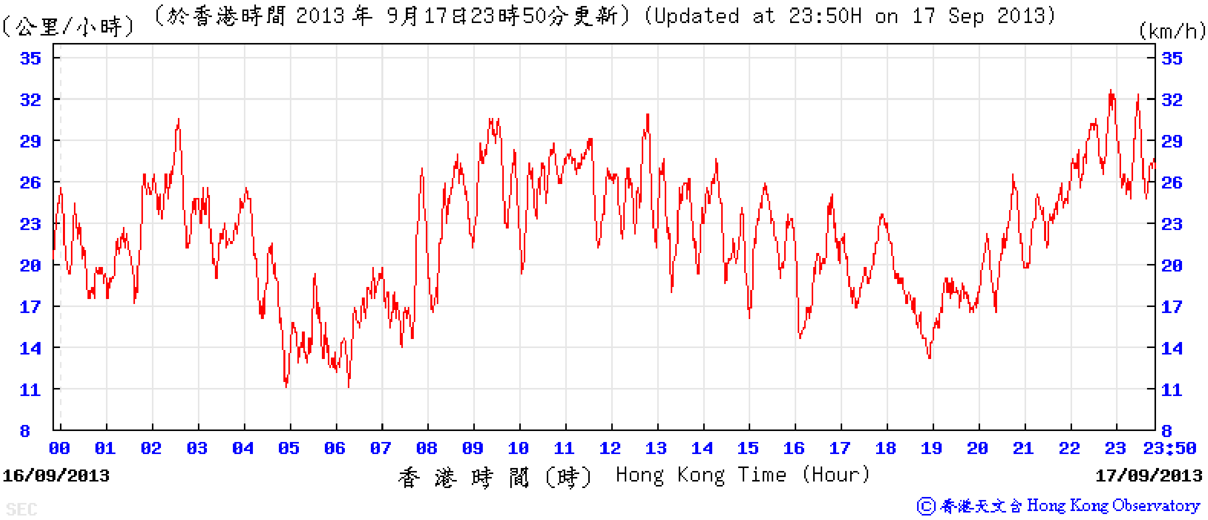
5 September 2013



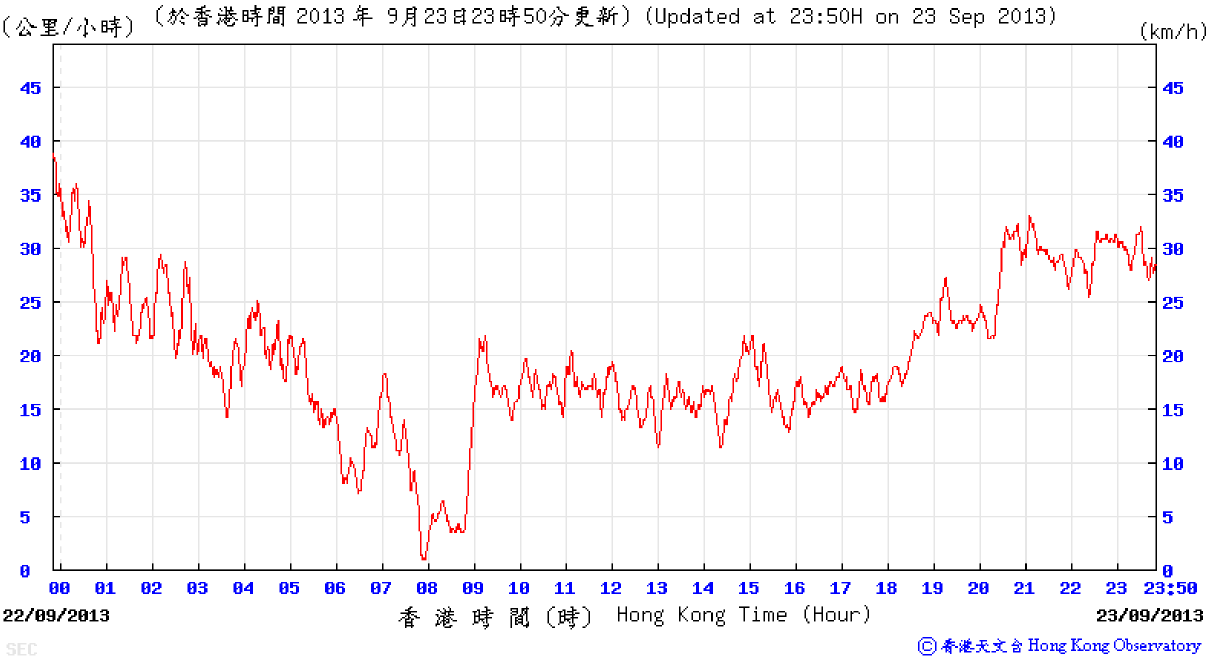
11 September 2013



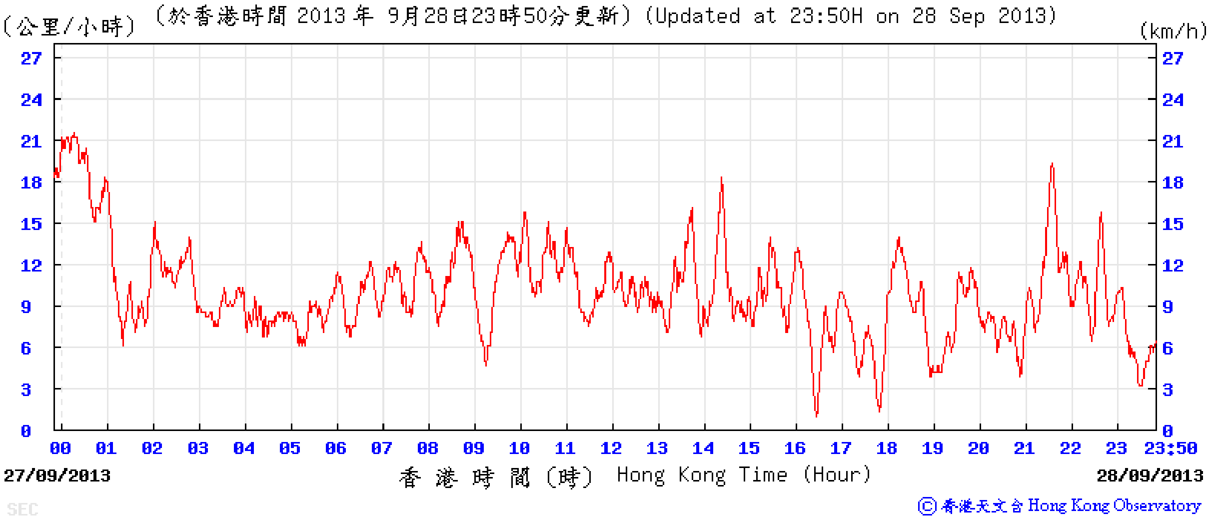
17 September 2013



23 September 2013

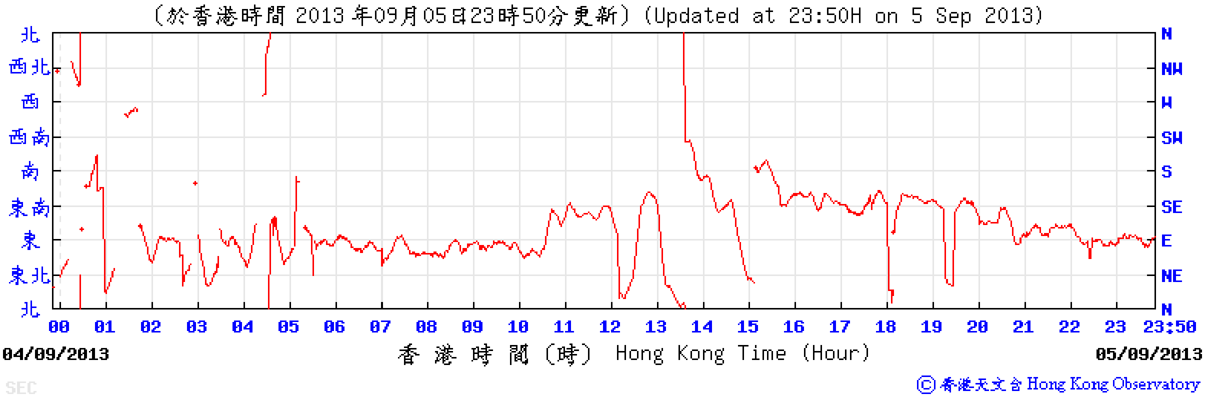


28 September 2013

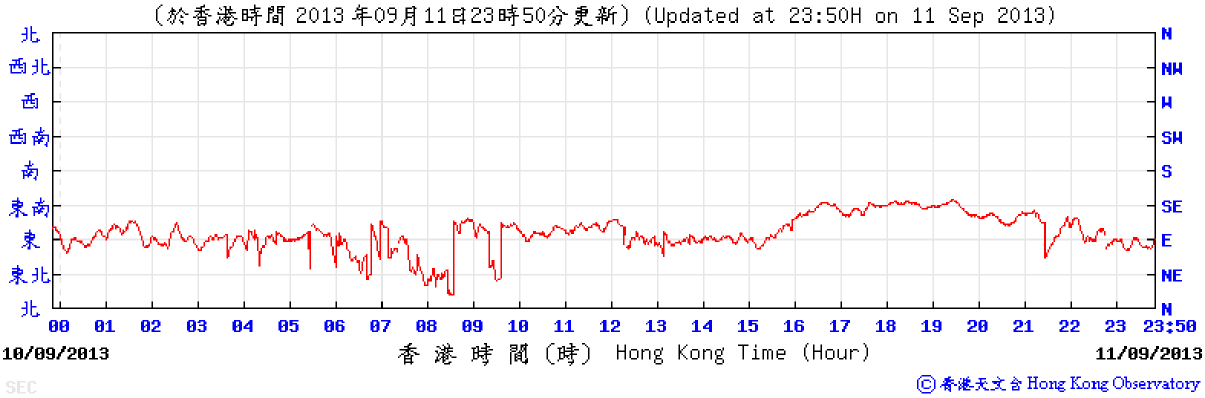


Average wind direction obtained from the meteorological station at Kai Tak from the Hong Kong Observatory (HKO)

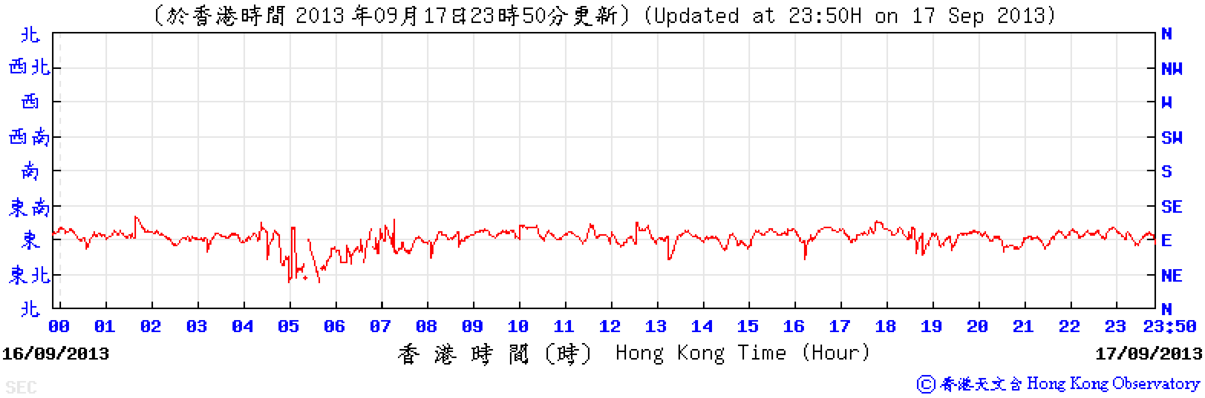
5 September 2013



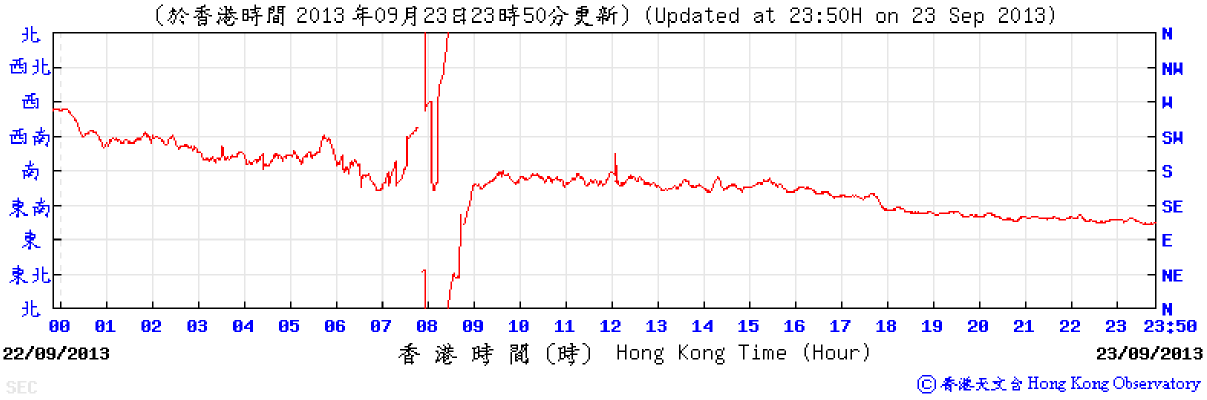
11 September 2013



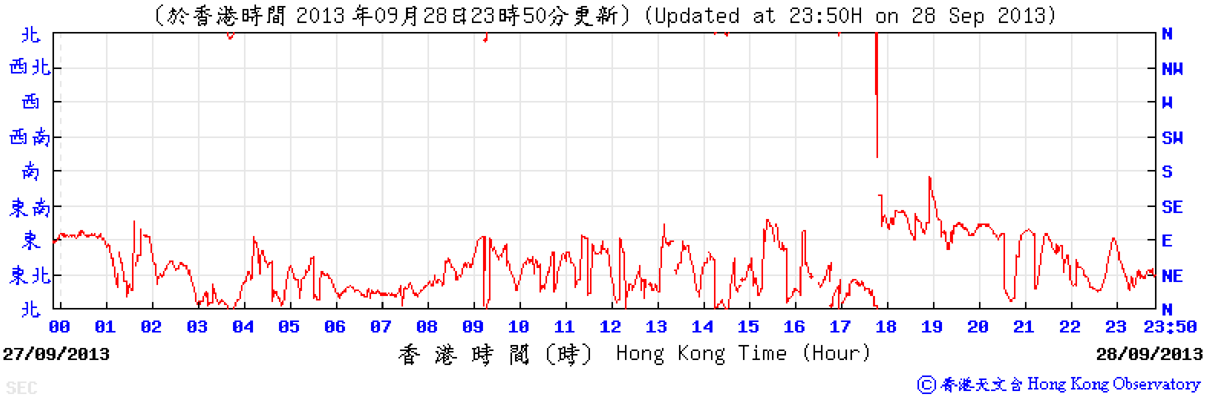
17 September 2013



23 September 2013

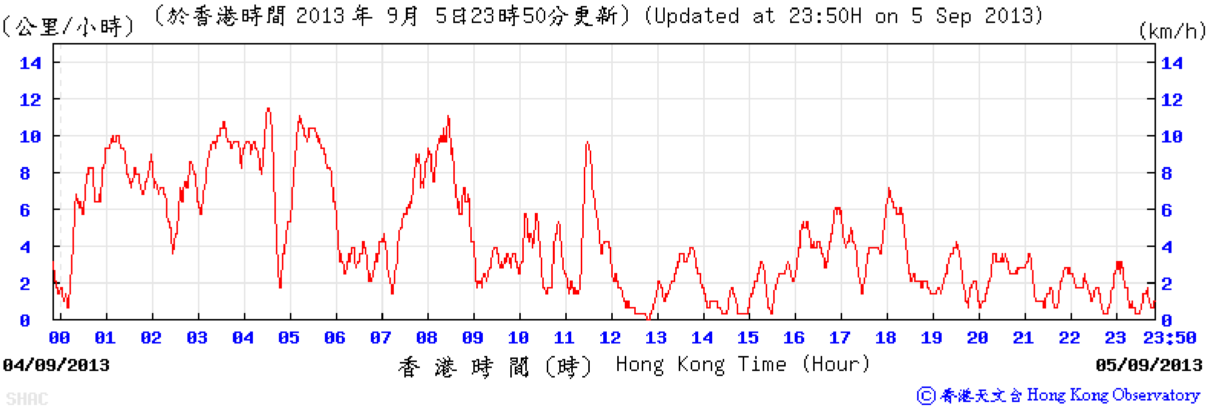


28 September 2013

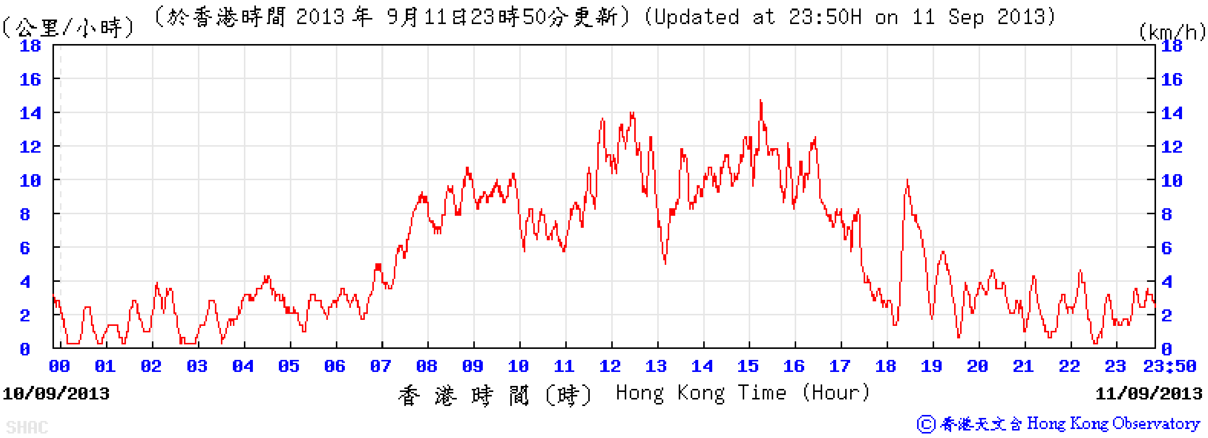


Average wind speed obtained from the meteorological station at Sha Tin from the Hong Kong Observatory (HKO)

5 September 2013



11 September 2013



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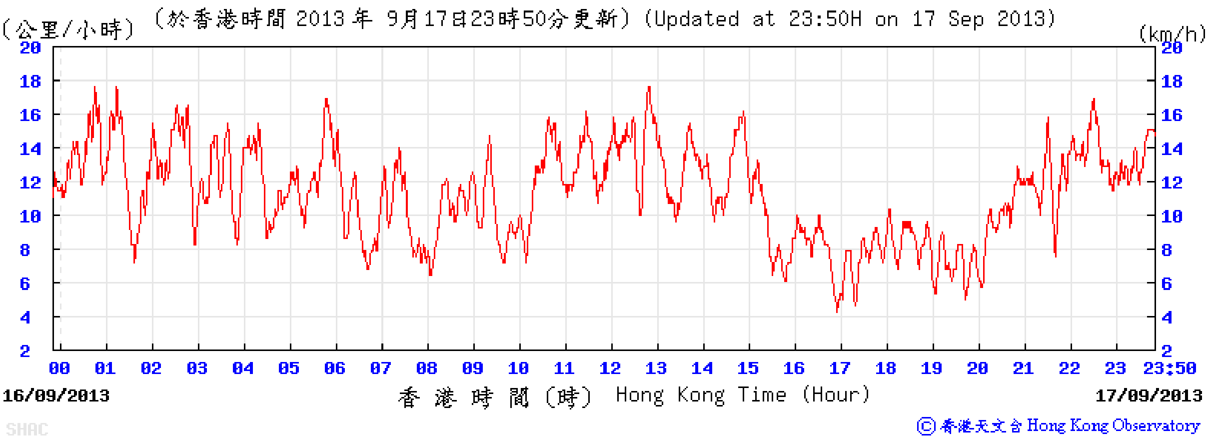
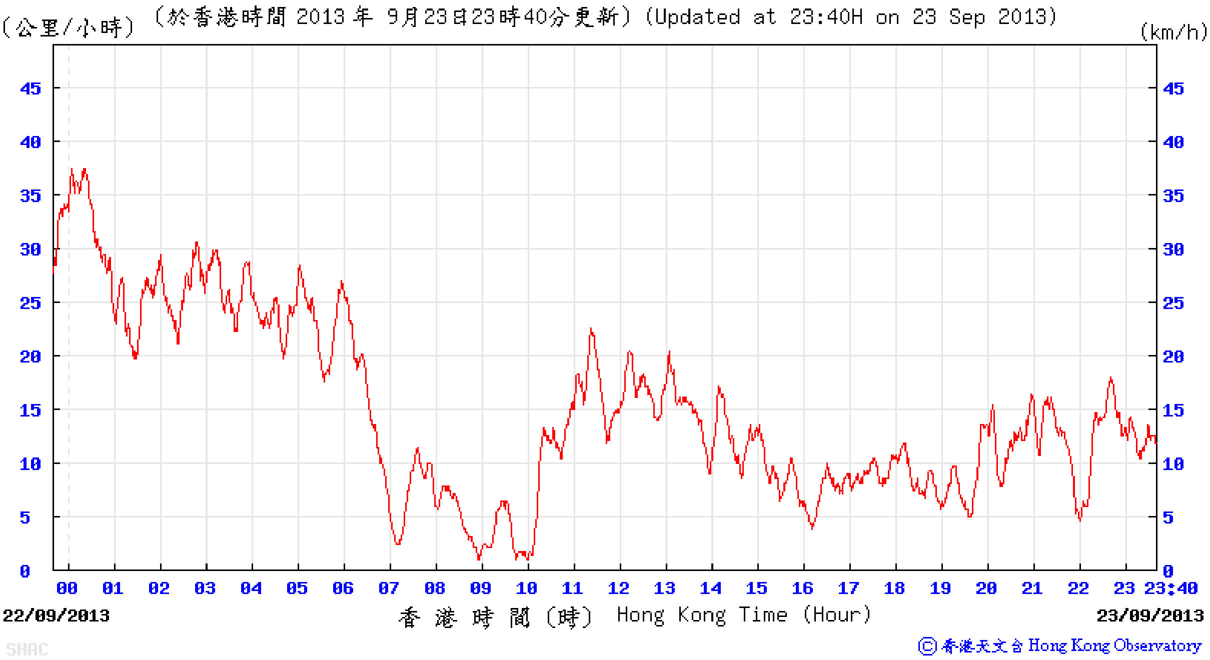
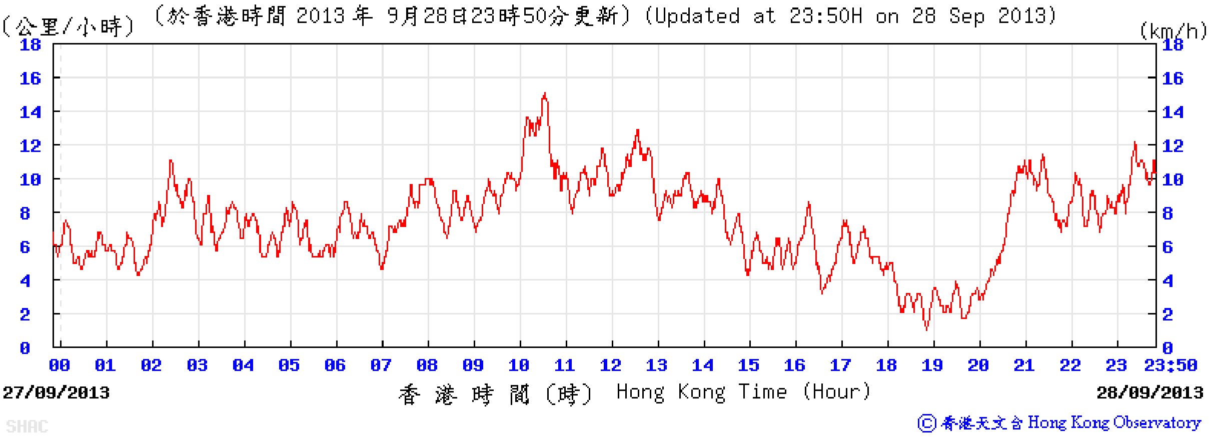


23 September 2013

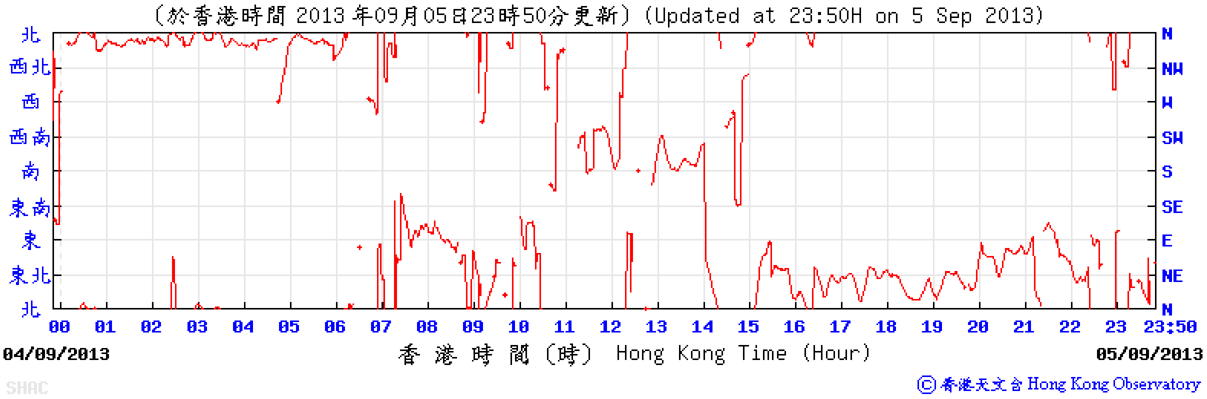


28 September 2013

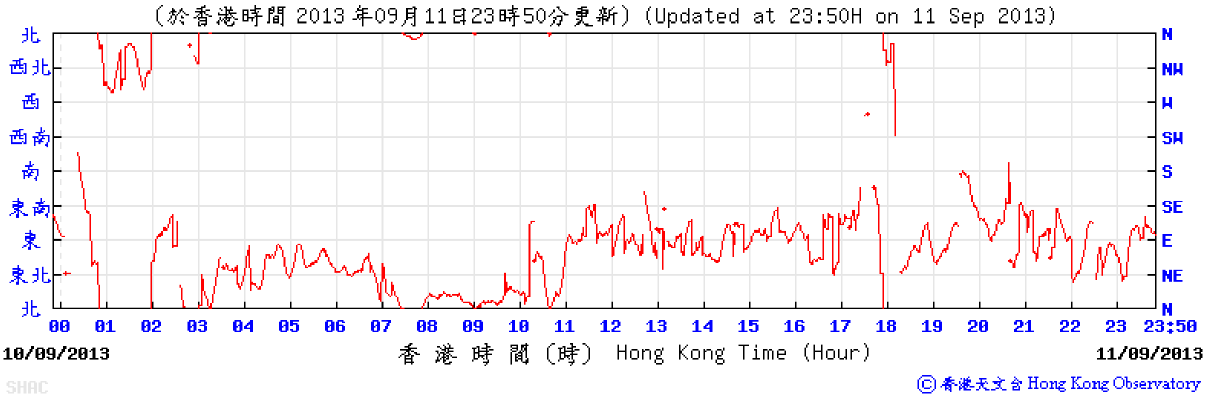


Average wind direction obtained from the meteorological station at Sha Tin from the Hong Kong Observatory (HKO)

5 September 2013



11 September 2013



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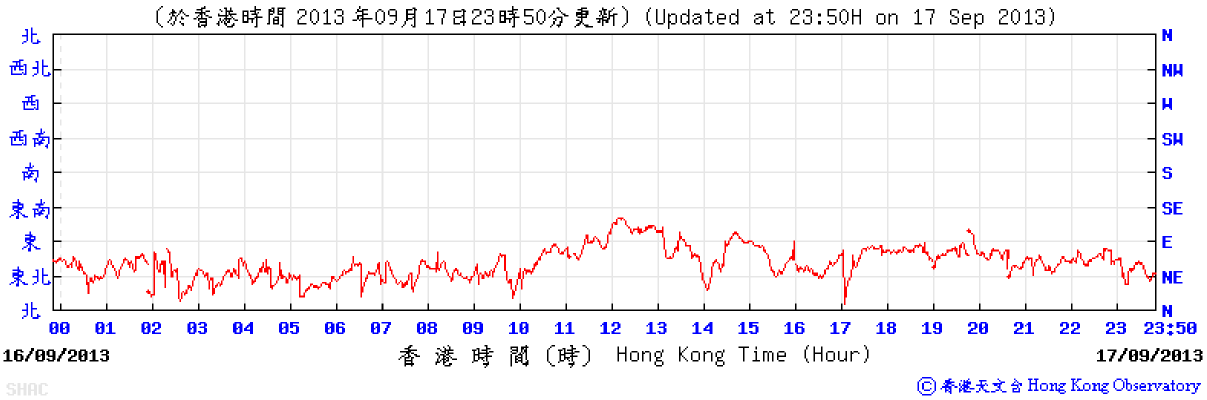
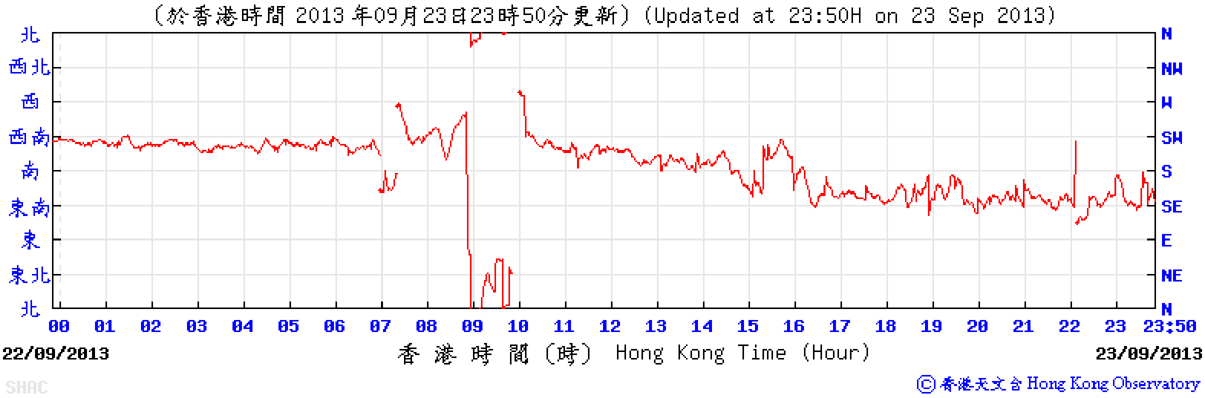
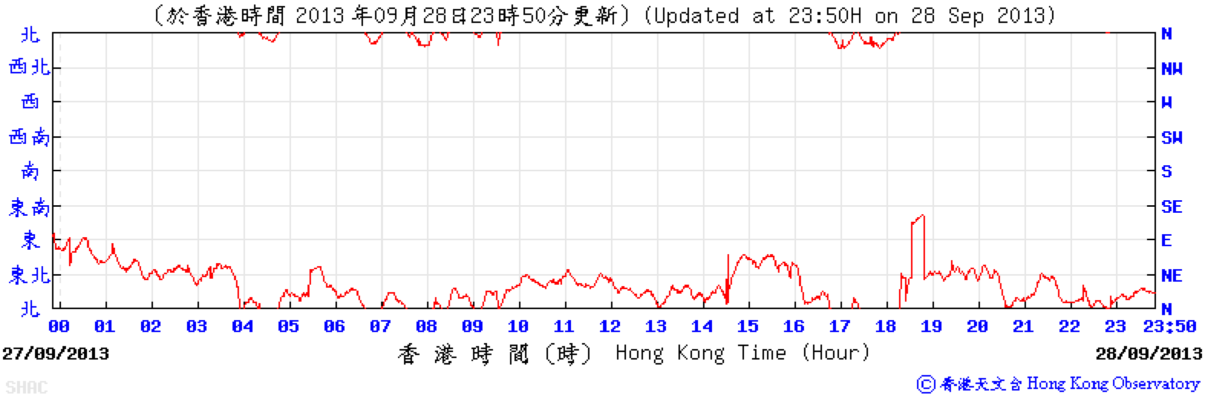


23 September 2013



28 September 2013



Appendix G

Calibration Certificates of Noise Monitoring Equipment

輝創工程有限公司
Sun Creation Engineering Limited
Calibration and Testing Laboratory

Certificate of Calibration
校正證書

Certificate No. : C134619
證書編號

ITEM TESTED / 送檢項目 (Job No. / 序引編號 : IC13-1856)

Description / 儀器名稱	:	Integrating Sound Level Meter
Manufacturer / 製造商	:	Brüel & Kjær
Model No. / 型號	:	2238
Serial No. / 編號	:	2562763
Supplied By / 委託者	:	Ove Arup & Partners Hong Kong Co., Ltd. Level 5, Festival Walk, 80 Tat Chee Avenue, Kowloon Tong, Kowloon

TEST CONDITIONS / 測試條件

Temperature / 溫度 : (23 ± 2)°C   Relative Humidity / 相對濕度 : (55 ± 20)%
Line Voltage / 電壓 : ---

TEST SPECIFICATIONS / 測試規範

Calibration check

DATE OF TEST / 測試日期 : 23 July 2013

TEST RESULTS / 測試結果

The results apply to the particular unit-under-test only.
All results are within manufacturer's specification.
The results are detailed in the subsequent page(s).

The test equipment used for calibration are traceable to National Standards via :
- The Government of The Hong Kong Special Administrative Region Standard & Calibration Laboratory
- Rohde & Schwarz Laboratory, Germany
- Fluke Everett Service Center, USA
- Agilent Technologies, USA

Tested By
測試 : K C Lee

Certified By
核證 : K M Wu

Date of Issue
簽發日期 : 24 July 2013

Sun Creation Engineering Limited – Calibration & Testing Laboratory
c/o 4/F, Tsing Shan Wan Exchange Building, 1 Hing On Lane, Tuen Mun, New Territories, Hong Kong
輝創工程有限公司 – 校正及檢測實驗所
c/o 香港新界屯門興安里一號青山灣機樓四樓
Tel/電話: 2927 2606 Fax/傳真: 2744 8986 E-mail/電郵: callab@suncreation.com Website/網址: www.suncreation.com

Certificate of Calibration
校正證書

Certificate No. : C134619
證書編號

1. The unit-under-test (UUT) was allowed to stabilize in the laboratory for over 12 hours, and switched on to warm up for over 10 minutes before the commencement of the test.

2. Self-calibration using laboratory acoustic calibrator was performed before the test from 6.1.1.2 to 6.4.

3. The results presented are the mean of 3 measurements at each calibration point.

4. Test equipment :

Equipment ID	Description	Certificate No.
CL280	40 MHz Arbitrary Waveform Generator	C130019
CL281	Multifunction Acoustic Calibrator	DC130171

5. Test procedure : MA101N.

6. Results :

6.1 Sound Pressure Level

6.1.1 Reference Sound Pressure Level

6.1.1.1 Before Self-calibration

UUT Setting				Applied Value		UUT
Range (dB)	Parameter	Frequency Weighting	Time Weighting	Level (dB)	Freq. (kHz)	Reading (dB)
50 - 130	L_{AFP}	A	F	94.00	1	94.4

6.1.1.2 After Self-calibration

UUT Setting				Applied Value		UUT	IEC 60651
Range (dB)	Parameter	Frequency Weighting	Time Weighting	Level (dB)	Freq. (kHz)	Reading (dB)	Type 1 Spec. (dB)
50 - 130	L_{AFP}	A	F	94.00	1	94.1	± 0.7

6.1.2 Linearity

UUT Setting				Applied Value		UUT
Range (dB)	Parameter	Frequency Weighting	Time Weighting	Level (dB)	Freq. (kHz)	Reading (dB)
50 - 130	L_{AFP}	A	F	94.00	1	94.1 (Ref.)
				104.00		104.1
				114.00		114.1

IEC 60651 Type 1 Spec. : ± 0.4 dB per 10 dB step and ± 0.7 dB for overall different.

Sun Creation Engineering Limited – Calibration & Testing Laboratory
c/o 4/F, Tsing Shan Wan Exchange Building, 1 Hing On Lane, Tuen Mun, New Territories, Hong Kong
輝創工程有限公司 – 校正及檢測實驗所
c/o 香港新界屯門興安里一號青山灣機樓四樓
Tel/電話: 2927 2606 Fax/傳真: 2744 8986 E-mail/電郵: callab@suncreation.com Website/網址: www.suncreation.com

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校正證書

Certificate No. : C134619
證書編號

6.2 Time Weighting

6.2.1 Continuous Signal

UUT Setting				Applied Value		UUT	IEC 60651
Range (dB)	Parameter	Frequency Weighting	Time Weighting	Level (dB)	Freq. (kHz)	Reading (dB)	Type 1 Spec. (dB)
50 - 130	L_{AFP}	A	F	94.00	1	94.1	Ref.
	L_{ASP}		S			94.1	± 0.1
	L_{AIP}		I			94.1	± 0.1

6.2.2 Tone Burst Signal (2 kHz)

UUT Setting				Applied Value		UUT	IEC 60651
Range (dB)	Parameter	Frequency Weighting	Time Weighting	Level (dB)	Burst Duration	Reading (dB)	Type 1 Spec. (dB)
30 - 110	L_{AFP}	A	F	106.0	Continuous	106.0	Ref.
	L_{AFMax}				200 ms	105.0	-1.0 ± 1.0
	L_{ASP}		S		Continuous	106.0	Ref.
	L_{ASMax}				500 ms	102.0	-4.1 ± 1.0

6.3 Frequency Weighting

6.3.1 A-Weighting

UUT Setting				Applied Value		UUT	IEC 60651
Range (dB)	Parameter	Frequency Weighting	Time Weighting	Level (dB)	Freq.	Reading (dB)	Type 1 Spec. (dB)
50 - 130	L_{AFP}	A	F	94.00	31.5 Hz	54.9	-39.4 ± 1.5
					63 Hz	68.0	-26.2 ± 1.5
					125 Hz	77.9	-16.1 ± 1.0
					250 Hz	85.4	-8.6 ± 1.0
					500 Hz	90.8	-3.2 ± 1.0
					1 kHz	94.1	Ref.
					2 kHz	95.3	+1.2 ± 1.0
					4 kHz	95.0	+1.0 ± 1.0
					8 kHz	92.9	-1.1 (+1.5 ; -3.0)
					12.5 kHz	89.9	-4.3 (+3.0 ; -6.0)

Sun Creation Engineering Limited – Calibration & Testing Laboratory
c/o 4/F, Tsing Shan Wan Exchange Building, 1 Hing On Lane, Tuen Mun, New Territories, Hong Kong
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c/o 香港新界屯門興安里一號青山灣機樓四樓
Tel/電話: 2927 2606 Fax/傳真: 2744 8986 E-mail/電郵: callab@suncreation.com Website/網址: www.suncreation.com

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6.3.2 C-Weighting

UUT Setting				Applied Value		UUT	IEC 60651
Range (dB)	Parameter	Frequency Weighting	Time Weighting	Level (dB)	Freq.	Reading (dB)	Type 1 Spec. (dB)
50 - 130	L_{CFP}	C	F	94.00	31.5 Hz	91.2	-3.0 ± 1.5
					63 Hz	93.3	-0.8 ± 1.5
					125 Hz	93.9	-0.2 ± 1.0
					250 Hz	94.0	0.0 ± 1.0
					500 Hz	94.1	0.0 ± 1.0
					1 kHz	94.0	Ref.
					2 kHz	93.9	-0.2 ± 1.0
					4 kHz	93.2	-0.8 ± 1.0
					8 kHz	91.0	-3.0 (+1.5 ; -3.0)
					12.5 kHz	87.9	-6.2 (+3.0 ; -6.0)

6.4 Time Averaging

UUT Setting				Applied Value					UUT	IEC 60804
Range (dB)	Parameter	Frequency Weighting	Integrating Time	Frequency (kHz)	Burst Duration (ms)	Burst Duty Factor	Burst Level (dB)	Equivalent Level (dB)	Reading (dB)	Type 1 Spec. (dB)
30 - 110	L_{Aeq}	A	10 sec.	4	1	1/10	110.0	100	100.0	± 0.5
						$1/10^2$		90	90.1	± 0.5
			60 sec.			$1/10^3$		80	79.8	± 1.0
			5 min.			$1/10^4$		70	69.8	± 1.0

Remarks : - UUT Microphone Model No. : 4188 & S/N : 2658559

- Mfr's Spec. : IEC 60651 Type 1 & IEC 60804 Type 1

- Uncertainties of Applied Value :

94 dB :	31.5 Hz - 125 Hz	: ± 0.35 dB
	250 Hz - 500 Hz	: ± 0.30 dB
	1 kHz	: ± 0.20 dB
	2 kHz - 4 kHz	: ± 0.35 dB
	8 kHz	: ± 0.45 dB
	12.5 kHz	: ± 0.70 dB
104 dB :	1 kHz	: ± 0.10 dB (Ref. 94 dB)
114 dB :	1 kHz	: ± 0.10 dB (Ref. 94 dB)
Burst equivalent level		: ± 0.2 dB (Ref. 110 dB continuous sound level)

- The uncertainties are for a confidence probability of not less than 95 %.

Note :
The values given in this Certificate only relate to the values measured at the time of the test and any uncertainties quoted will not include allowance for the equipment long term drift, variations with environment changes, vibration and shock during transportation, overloading, mis-handling, or the capability of any other laboratory to repeat the measurement. Sun Creation Engineering Limited shall not be liable for any loss or damage resulting from the use of the equipment.

Sun Creation Engineering Limited – Calibration & Testing Laboratory
c/o 4/F, Tsing Shan Wan Exchange Building, 1 Hing On Lane, Tuen Mun, New Territories, Hong Kong
輝創工程有限公司 – 校正及檢測實驗所
c/o 香港新界屯門興安里一號青山灣機樓四樓
Tel/電話: 2927 2606 Fax/傳真: 2744 8986 E-mail/電郵: callab@suncreation.com Website/網址: www.suncreation.com

輝創工程

Sun Creation Engineering

輝創工程有限公司

Sun Creation Engineering Limited

Calibration and Testing Laboratory

Certificate of Calibration
校正證書

Certificate No. : C134617
證書編號

ITEM TESTED / 送檢項目 (Job No. / 序引編號 : IC13-1856)

Description / 儀器名稱 : Acoustical Calibrator
Manufacturer / 製造商 : Brüel & Kjær
Model No. / 型號 : 4231
Serial No. / 編號 : 2713427
Supplied By / 委託者 : Ove Arup & Partners Hong Kong Co., Ltd.
Level 5, Festival Walk, 80 Tat Chee Avenue, Kowloon Tong,
Kowloon

TEST CONDITIONS / 測試條件

Temperature / 溫度 : (23 ± 2)°C
Relative Humidity / 相對濕度 : (55 ± 20)%
Line Voltage / 電壓 : ---

TEST SPECIFICATIONS / 測試規範

Calibration check

DATE OF TEST / 測試日期 : 23 July 2013

TEST RESULTS / 測試結果

The results apply to the particular unit-under-test only.
All results are within manufacturer's specification.
The results are detailed in the subsequent page(s).

The test equipment used for calibration are traceable to National Standards via :
- The Government of The Hong Kong Special Administrative Region Standard & Calibration Laboratory
- Rohde & Schwarz Laboratory, Germany
- Fluke Everett Service Center, USA
- Agilent Technologies, USA

Tested By 測試 : K C Lee

Certified By 核證 : K M Wu

Date of Issue 簽發日期 : 24 July 2013

Sun Creation Engineering Limited – Calibration & Testing Laboratory
c/o 4/F, Tsing Shan Wan Exchange Building, 1 Hing On Lane, Tuen Mun, New Territories, Hong Kong
輝創工程有限公司 – 校正及檢測實驗所
c/o 香港新界屯門興安里一號青山灣機樓四樓
Tel/電話: 2927 2606 Fax/傳真: 2744 8986 E-mail/電郵: callab@suncreation.com Website/網址: www.suncreation.com

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1. The unit-under-test (UUT) was allowed to stabilize in the laboratory for over 12 hours before the commencement of the test.

2. The results presented are the mean of 3 measurements at each calibration point.

3. Test equipment :

Equipment ID	Description	Certificate No.
CL130	Universal Counter	C133632
CL281	Multifunction Acoustic Calibrator	DC130171
TST150A	Measuring Amplifier	C120886

4. Test procedure : MA100N.

5. Results :

5.1 Sound Level Accuracy

UUT Nominal Value	Measured Value (dB)	Mfr's Spec. (dB)	Uncertainty of Measured Value (dB)
94 dB, 1 kHz	94.0	± 0.2	± 0.2
114 dB, 1 kHz	114.1		

5.2 Frequency Accuracy

UUT Nominal Value (kHz)	Measured Value (kHz)	Mfr's Spec.	Uncertainty of Measured Value (Hz)
1	1.000 0	1 kHz ± 0.1 %	± 0.1

Remark : The uncertainties are for a confidence probability of not less than 95 %.

Note :
The values given in this Certificate only relate to the values measured at the time of the test and any uncertainties quoted will not include allowance for the equipment long term drift, variations with environment changes, vibration and shock during transportation, overloading, mis-handling, or the capability of any other laboratory to repeat the measurement. Sun Creation Engineering Limited shall not be liable for any loss or damage resulting from the use of the equipment.

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輝創工程有限公司 – 校正及檢測實驗所
c/o 香港新界屯門興安里一號青山灣機樓四樓
Tel/電話: 2927 2606 Fax/傳真: 2744 8986 E-mail/電郵: callab@suncreation.com Website/網址: www.suncreation.com

Appendix H

Noise Results

Location: NMS-CA-1 - C.U.H.K.A.A Thomas Cheung School

Daytime Noise Monitoring Results

Date	Time	Measured Noise Level, dB(A)				Baseline Noise Level, dB(A)	Baseline Corrected Level
		L_{Aeq},30min	Limit	L_{10},30min	L_{90},30min	L_{Aeq},30min	L_{Aeq},30min
06-Sep-13	14:00 - 14:30	58.7	70.0	60.5	52.5	57.0	53.8
12-Sep-13	14:20 - 14:50	57.6	70.0	60.0	51.5	57.0	48.7
18-Sep-13	14:25 - 14:55	58.2	70.0	61.0	53.0	57.0	52.0
24-Sep-13	14:50 - 15:20	57.6	70.0	59.5	50.5	57.0	48.7

Notes: (*): Façade correction is included
(#): Baseline Corrected Level = Measured Noise Level - Baseline Noise Level

Average	**L_{Aeq},30min**	58.0
Max	**L_{Aeq},30min**	58.7
Min	**L_{Aeq},30min**	57.6

Location: NMS-CA-2 - Price Memorial Catholic Primary School

Date	Time	Measured Noise Level, dB(A)				Baseline Noise Level, dB(A)	Baseline Corrected Level
		L_{Aeq},30min	Limit	L_{10},30min	L_{90},30min	L_{Aeq},30min	L_{Aeq},30min
06-Sep-13	09:20 - 09:50	67.4	70.0	69.5	60.5	66.0	61.8
12-Sep-13	09:10 - 09:40	67.7	70.0	69.5	61.0	66.0	62.8
18-Sep-13	09:25 - 09:55	68.6	70.0	70.5	63.5	66.0	65.1
24-Sep-13	10:00 - 10:30	68.9	70.0	71.0	64.0	66.0	65.8

Notes: (*): Façade correction is included
(#): Baseline Corrected Level = Measured Noise Level - Baseline Noise Level

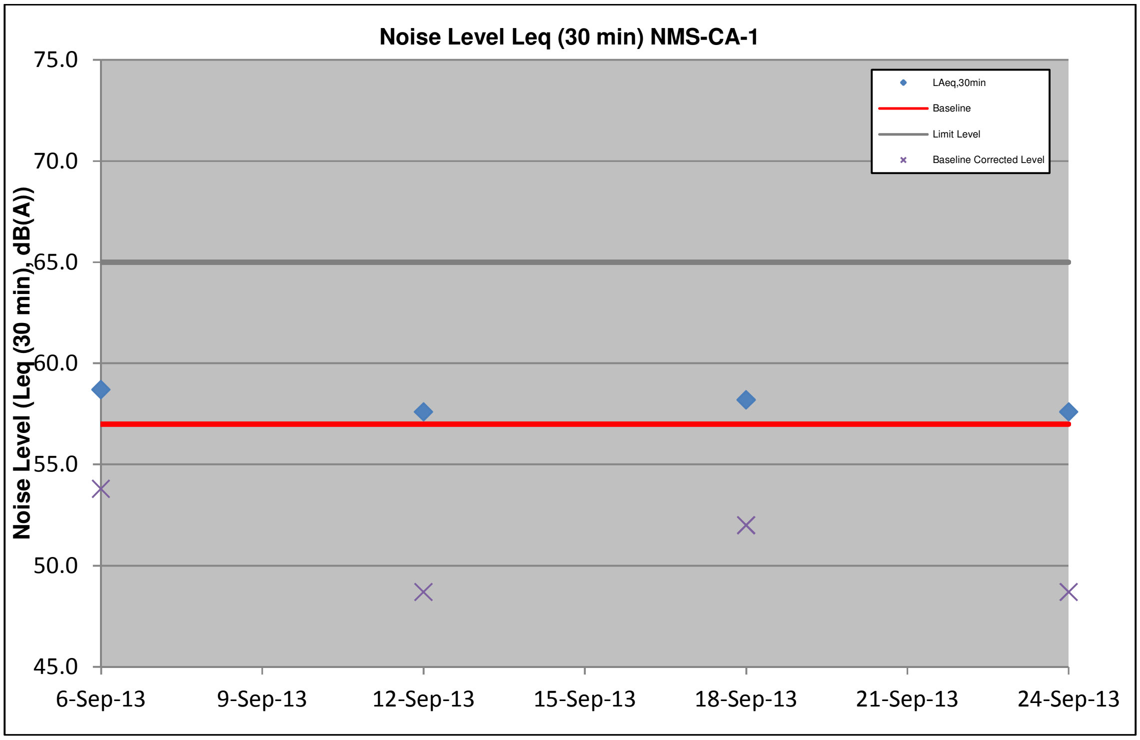
Average	**L_{Aeq},30min**	68.2
Max	**L_{Aeq},30min**	68.9
Min	**L_{Aeq},30min**	67.4

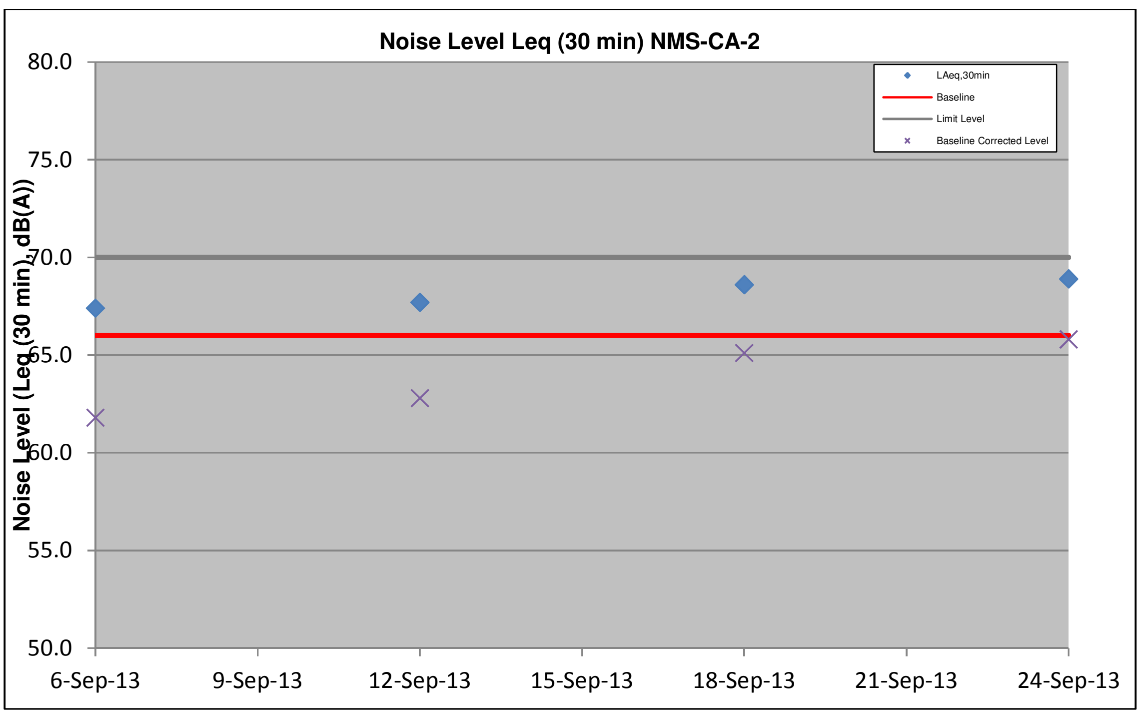
Location: NMS-CA-3 / NMS-CA-4 - Hong Kong Sheng Kung Hui Nursing Home

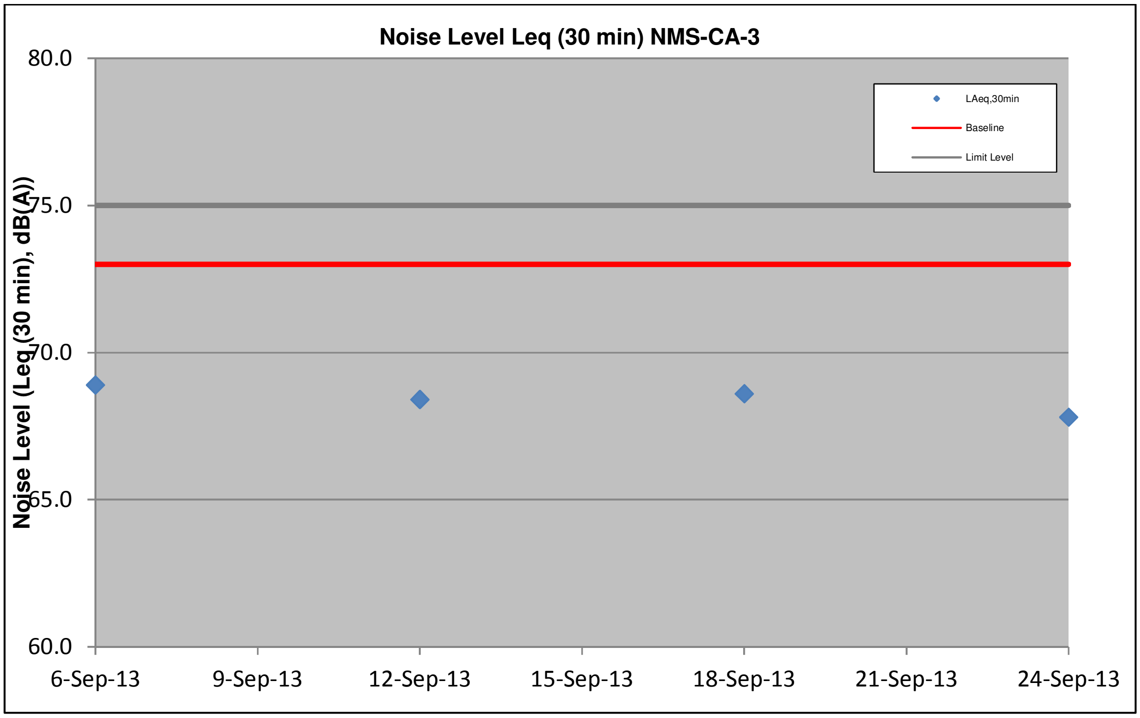
Date	Time	Measured Noise Level, dB(A)				Baseline Noise Level, dB(A)	Baseline Corrected Level
		L_{Aeq},30min	Limit	L_{10},30min	L_{90},30min	L_{Aeq},30min	L_{Aeq},30min
06-Sep-13	11:10 - 11:40	68.9	75.0	68.9	70.5	73.0	< Baseline Level
12-Sep-13	11:05 - 11:35	68.4	75.0	70.5	61.5	73.0	< Baseline Level
18-Sep-13	11:20 - 11:50	68.6	75.0	71.0	63.5	73.0	< Baseline Level
24-Sep-13	11:35 - 12:05	67.8	75.0	70.5	60.5	73.0	< Baseline Level

Notes: (*): Façade correction is included
(#): Baseline Corrected Level = Measured Noise Level - Baseline Noise Level

Average	**L_{Aeq},30min**	68.4
Max	**L_{Aeq},30min**	68.9
Min	**L_{Aeq},30min**	67.8


Noise Level Leq (30 min) NMS-CA-1
Noise Level (Leq (30 min), dB(A))
75.0
70.0
65.0
60.0
55.0
50.0
45.0
6-Sep-13
9-Sep-13
12-Sep-13
15-Sep-13
18-Sep-13
21-Sep-13
24-Sep-13
LAeq,30min
Baseline
Limit Level
Baseline Corrected Level


Noise Level Leq (30 min) NMS-CA-2
Noise Level (Leq (30 min), dB(A))
80.0
75.0
70.0
65.0
60.0
55.0
50.0
6-Sep-13
9-Sep-13
12-Sep-13
15-Sep-13
18-Sep-13
21-Sep-13
24-Sep-13
LAeq,30min
Baseline
Limit Level
Baseline Corrected Level



Noise Level Leq (30 min) NMS-CA-3
80.0
75.0
70.0
65.0
60.0
Noise Level (Leq (30 min), dB(A))
6-Sep-13
9-Sep-13
12-Sep-13
15-Sep-13
18-Sep-13
21-Sep-13
24-Sep-13
LAeq,30min
Baseline
Limit Level

Appendix I

Event/Action Plan for Air Quality, Airborne Noise and Landscape and Visual

Event and Action Plan for Air Quality

Event	Action			
	ET	**IEC**	**ER**	**Contractor**
Action Level				
1. Exceedance for one sample	1. Inform the IEC, Contractor and ER; 2. Discuss with the Contractor, IEC and ER on the remedial measures required; 3. Repeat measurement to confirm findings; 4. Increase monitoring frequency	1. Check monitoring data submitted by the ET; 2. Check Contractor's working method; 3. Review and advise the ET and ER on the effectiveness of the proposed remedial measures.	1. Confirm receipt of notification of exceedance in writing;	1. Identify source(s), investigate the causes of exceedance and propose remedial measures; 2. Implement remedial measures; 3. Amend working methods agreed with the ER as appropriate.
2. Exceedance for two or more consecutive samples	1. Inform the IEC, Contractor and ER; 2. Discuss with the ER, IEC and Contractor on the remedial measures required; 3. Repeat measurements to confirm findings; 4. Increase monitoring frequency to daily; 5. If exceedance continues, arrange meeting with the IEC, ER and Contractor; 6. If exceedance stops, cease additional monitoring.	1. Check monitoring data submitted by the ET; 2. Check Contractor's working method; 3. Review and advise the ET and ER on the effectiveness of the proposed remedial measures.	1. Confirm receipt of notification of exceedance in writing; 2. Notify the Contractor, IEC and ET; 3. Review and agree on the remedial measures proposed by the Contractor; 4. Supervise Implementation of remedial measures.	1. Identify source and investigate the causes of exceedance; 2. Submit proposals for remedial measures to the ER with a copy to ET and IEC within three working days of notification; 3. Implement the agreed proposals; 4. Amend proposal as appropriate.

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

Event and Action Plan for Airborne Noise

Event	Action			
	ET	IEC	ER	Contractor
Action Level	1. Notify the IEC, Contractor and ER 2. Discuss with the ER, IEC and Contractor on the remedial measures required 3. Increase monitoring frequency to check mitigation effectiveness	1. Review the investigation results submitted by the contractor; 2. Review and advise the ET and ER on the effectiveness of the remedial measures proposed by the Contractor.	1. Confirm receipt of notification of complaint in writing 2. Notify the Contractor, IEC and ET 3. Review and agree on the remedial measures proposed by the Contractor; 4. Supervise implementation of remedial measures	1. Investigate the complaint and propose remedial measures 2. Report the results of investigation to the IEC, ET and ER 3. Submit noise mitigation proposals to the ER with copy to the IEC and ET within 3 working days of notification. 4. Implement noise mitigation proposals
Limit Level	1. Notify the IEC, Contractor and EPD 2. Repeat measurement to confirm findings 3. Increase monitoring frequency 4. Carry out analysis of Contractor's working procedures to determine possible mitigation to be implemented 5. Arrange meeting with the IEC, Contractor and ER to discuss the remedial measures to be taken; 6. Inform IEC, ER and EPD the causes and actions taken for the exceedances 7. Assess effectiveness of the Contractor's remedial measures and keep IEC, ER and EPD informed of the results	1. Check monitoring data submitted by the ET; 2. Check the Contractor's working method; 3. Discuss with the ER, ET and Contractor on the potential remedial measures 4. Review and advise the ET and ER on the effectiveness of the remedial measures proposed by the Contractor.	1. Confirm receipt of notification of exceedance in writing 2. Notify the Contractor, IEC and ET 3. In consultation with the ET and IEC, agree with the Contractor on the remedial measures to be implemented 4. Supervise the implementation of remedial measures 5. If exceedance continues, consider what portion of the work is responsible and instruct the Contractor to stop that portion of work until the exceedance is abated	1. Identify source and investigate the causes of exceedance 2. Take immediate action to avoid further exceedance 3. Submit proposals for remedial measures to the ER with copy to the IEC and ET within 3 working days of notification. 4. Implement the agreed proposals 5. Revise and resubmit proposals if problem still not under control 6. Stop the relevant portion of works as determined by the ER until the exceedance is abated

Event / Action Plan for Landscape and Visual

Action Level	ET	IEC	ER	Contractor
Non-conformity on one occasion	1. Inform the Contractor, the IEC and the ER 2. Discuss remedial actions with the IEC, the ER and the Contractor 3. Monitor remedial actions until rectification has been completed	1. Check inspection report 2. Check the Contractor's working method 3. Discuss with the ET, ER and the Contractor on possible remedial measures 4. Advise the ER on effectiveness of proposed remedial measures.	1. Confirm receipt of notification of non-conformity in writing 2. Review and agree on the remedial measures proposed by the Contractor 3. Supervise implementation of remedial measures	1. Identify Source and investigate the non-conformity 2. Implement remedial measures 3. Amend working methods agreed with the ER as appropriate 4. Rectify damage and undertake any necessary replacement
Repeated Non-conformity	1. Identify Source 2. Inform the Contractor, the IEC and the ER 3. Increase inspection frequency 4. Discuss remedial actions with the IEC, the ER and the Contractor 5. Monitor remedial actions until rectification has been completed 6. If non-conformity stops, cease additional monitoring	1. Check inspection report 2. Check the Contractor's working method 3. Discuss with the ET and the Contractor on possible remedial measures 4. Advise the ER on effectiveness of proposed remedial measures	1. Notify the Contractor 2. In consultation with the ET and IEC, agree with the Contractor on the remedial measures to be implemented 3. Supervise implementation of remedial measures.	1. Identify Source and investigate the non-conformity 2. Implement remedial measures 3. Amend working methods agreed with the ER as appropriate 4. Rectify damage and undertake any necessary replacement. Stop relevant portion of works as determined by the ER until the non-conformity is abated.

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

Appendix J

Waste Flow Table

MONTHLY SUMMARY WASTE FLOW TABLE

Name of Department: ENV

Contract No.:MTR-SCL1103

Monthly Summary Waste Flow Table for 2013

Month	Actual Quantities of Inert C&D Materials Generated Monthly						Actual Quantities of C&D Wastes Generated Monthly				
	Total Quantity Generated	Hard Rock and Large Broken Concrete	Reused in the Contract	Reused in Other Projects	Disposed as Public Fill	Imported Fill	Metals	Paper / Cardboard Packaging	Plastics (see Note 3)	Chemical Waste	Others, e.g. general refuse
	(in '000m^3)	(in '000m^3)	(in '000m^3)	(in '000m^3)	(in '000m^3)	(in '000m^3)	(in '000kg)	(in '000kg)	(in '000kg)	(in '000kg)	(in '000m^3)
Jan	1.694	0.000	0.000	0.000	1.694	0.000	0.000	0.000	0.000	0.000	0.087
Feb	1.962	0.000	0.000	0.526	1.436	1.339	0.000	0.000	0.000	0.000	0.014
Mar	3.171	0.000	0.440	1.537	1.194	2.199	0.000	0.000	0.000	0.000	0.025
Apr	3.319	0.000	0.000	2.621	0.698	0.000	0.000	0.000	0.000	0.000	0.045
May	4.776	0.000	0.000	3.848	0.928	0.000	0.000	0.000	0.000	0.600	0.044
Jun	4.128	0.000	0.000	3.130	0.998	0.000	0.000	0.000	0.000	1.200	0.037
Sub-total	19.050	0.000	0.440	11.662	6.948	3.538	0.000	0.000	0.000	1.800	0.253
Jul	4.422	0.000	0.110	2.881	1.431	0.000	0.000	0.000	0.000	0.000	0.045
Aug	3.818	0.000	0.000	2.362	1.456	0.000	0.000	0.000	0.000	1.000	0.362
Sep	2.355	0.000	0.000	0.935	1.057	0.363	0.000	0.000	0.000	0.000	0.440
Oct											
Nov											
Dec											
Total	29.645	0.000	0.550	17.840	10.892	3.902	0.000	0.000	0.000	2.800	1.099

Comment:

1) Assumption: The densities of Rock, Soil, Mix Rock and Soil, and Regular Spoil are 2.0 ton/m3; the density of general refuse is 1.0 ton/m3; the density of waste oil is 1.0 ton/m3.

2) The cut-off date of waste amount in Sep is 26/9/2013 for TKO137FB/TM38FB, NENT landfill, and 30/9/2013 for Kai Tak 1108A.

3) The amounts of waste in Sep are 439.55tons for NENT Landfill, 2114.03 tonnes for TKO137FB/TM38 FB, 1869.46ton for Kai Tak (Contract 1108A).

4) The amount of chemcial waste in Sep is 0L for cut-off date as 26/9/2013.

5) The amount of imported fill is 726.68ton for cut-off date as 24/9/2013.

Appendix K

Environmental Monitoring Programme for Coming Month

SCL Works Contract 1103 - Hin Keng to Diamond Hill Tunnels
Tentative Impact Monitoring Schedule - October 2013

Date		Air Quality	Noise	Site Inspection
		24-hours TSP	L_{Aeq}, 30 min	
01-Oct-13	Tue			
02-Oct-13	Wed			
03-Oct-13	Thu			
04-Oct-13	Fri			
05-Oct-13	Sat			
06-Oct-13	Sun			
07-Oct-13	Mon			
08-Oct-13	Tue			
09-Oct-13	Wed			
10-Oct-13	Thu			
11-Oct-13	Fri			
12-Oct-13	Sat			
13-Oct-13	Sun			
14-Oct-13	Mon			
15-Oct-13	Tue			
16-Oct-13	Wed			
17-Oct-13	Thu			
18-Oct-13	Fri			
19-Oct-13	Sat			
20-Oct-13	Sun			
21-Oct-13	Mon			
22-Oct-13	Tue			
23-Oct-13	Wed			
24-Oct-13	Thu			
25-Oct-13	Fri			
26-Oct-13	Sat			
27-Oct-13	Sun			
28-Oct-13	Mon			
29-Oct-13	Tue			
30-Oct-13	Wed			
31-Oct-13	Thu			

	Public Holiday
	Monitoring Day

Monitoring Details

Monitoring	Locations	Parameters
Air Quality	DMS-1 - C.U.H.K.A.A Thomas Cheung School, DMS-2 - Price Memorial Catholic Primary School and DMS-3 / DMS-4 - Hong Kong Sheng Kung Hui Nursing Home	24-hour TSP
Noise	NMS-CA-1 - C.U.H.K.A.A Thomas Cheung School, NMS-CA-2 - Price Memorial Catholic Primary School and NMS-CA-3 /NMS-CA-4 - Hong Kong Sheng Kung Hui Nursing	$L_{Aeq(30\ min)}$, L_{10}, L_{90}

Appendix L

Cumulative Log for Complaints, Notifications of Summons and Successful Prosecutions

Ove Arup and Partners HK Ltd.

SCL 1103 Hin Keng to Diamond Hill Tunnels Construction Stage
Environmental Complaint Log (September 2013)

ET's Complaint Log Ref. no.	Incoming Complaint Ref no.	Name of Complainant	Date Complaint Received	Complaint Date/ Period	Complaint Location	Area of Concern	Details of Complaint	Date Complaint Received by ET	ET's Investigation Date	Investigation/Mitigation Measures	Validity to Project	Status
-	-	-	-	-	-	-	-	-	-	-	-	-

SCL 1103 Hin Keng to Diamond Hill Tunnels Construction Stage
Environmental Complaint Log (Cumulative)

Reporting Month	Number of Complaints in Reporting Month	Number of Summons in Reporting Month	Number of Prosecutions in Reporting Month
February 2013	0	0	0
March 2013	0	0	0
April 2013	0	0	0
May 2013	0	0	0
June 2013	0	0	0
July 2013	0	0	0
August 2013	0	0	0
September 2013	0	0	0
Total	0	0	0

Appendix M

Quantitative Risk Assessment Revision for Transport Storage and Use of Explosives

FINAL REPORT

MTR Corporation Limited

MTR Shatin to Central Link (SCL) Contract 1103 – Hin Keng to Diamond Hill Tunnels:
Quantitative Risk Assessment Revision for Transport, Storage and Use of Explosives

August 2013

Environmental Resources Management
16/F DCH Commercial Centre
25 Westlands Road
Quarry Bay, Hong Kong
Telephone: (852) 2271 3000
Facsimile: (852) 2723 5660
E-mail: post.hk@erm.com
http://www.erm.com

FINAL REPORT

MTR Corporation Limited

MTR Shatin to Central Link (SCL) Contract 1103 – Hin Keng to Diamond Hill Tunnels:
Quantitative Risk Assessment Revision for Transport, Storage and Use of Explosives

August 2013

Reference 0196852

For and on behalf of ERM-Hong Kong, Limited	
Approved by:	Herve Bonnel
Signed:	Bonnel
Position:	Partner
Date:	19th August 2013

CONTENTS

1 INTRODUCTION

1.1 BACKGROUND

Following the approval of the Shatin to Central Link - Tai Wai to Hung Hom Section Environmental Impact Assessment Report (SCL EIA) [1] by the Environmental Protection Department (EPD) on 17 February 2012 (Register No.: AEIAR-167/2012), an Environmental Permit (EP- 438/2012) was granted on 22 March 2012 for the Shatin to Central Link - Tai Wai to Hung Hom Section (SCL (TAW-HUH)) and variations to the EP were subsequently applied and approved in July, October 2012 and April 2013 respectively. The construction of the SCL (TAW-HUH) is now progressing under various works contracts led by the MTR Corporation Limited (MTR).

VINCI Construction Grands Projets (VCGP) has been awarded by MTR Corporation Limited (MTR) the Contract 1103 – which involves the construction of Hin Keng to Diamond Hill tunnels for the SCL Project (Contract 1103). The contract comprises the construction of a Hin Keng Portal, the Lion Rock Tunnel (drill and blast and mined sections), Tunnel Boring Machine (TBM) tunnels between Ma Chai Hang and the new Diamond Hill Station, Ma Chai Hang Ventilation Building and Fung Tak Emergency Access and Emergency Escape Access.

In the approved SCL EIA, a Quantitative Risk Assessment (QRA) study was performed to assess the risk arising from transport, storage and use of explosives from the SCL (TAW-HUH) project to the delivery points in Hin Keng (HIK) Portal and Ma Chai Hang Ventilation Building (MCV) for the construction of Lion Rock Tunnel (LRT). In view of the latest engineering information and construction optimization, with potential benefits to reduce nuisance to the public, some changes have been identified and proposed for the blasting activity by MTR and VCGP including i) reduction of explosive quantity as a result of the reduction of LRT cross section and MCV tunnel design change , ii) use of electronic detonators in some specific sections and iii) changes in blasting period, number of delivery trips and maximum instantaneous charge (MIC). More detailed descriptions of the proposed changes are given in *Section 1.3*.

ERM Risk was subsequently commissioned by VCGP to re-examine the QRA study of the approved SCL EIA, taking into account the reduced explosives quantities and the revised delivery frequency related to explosives transportation.

1.2 OBJECTIVES

In 2011, ERM was commissioned by MTR Corporation Ltd. (MTR) to conduct a Hazard to Life (HtL) Assessment of the Transport, Storage and Use of Explosives for the SCL (TAW-HUH) project as part of the SCL (TAW-HUH) EIA (MTR, 2012) study.

This QRA Report is to assess the risk posed by the transport, storage and use of explosives associated with the proposed changes in blasting activity under SCL Contract 1103[1], using the approved SCL EIA (2012) methodology. The societal and individual risk levels are compared against the Hong Kong Risk Guidelines (HKRG). The purpose of this document is to demonstrate that the risks associated with the proposed change are within the envelope of the risks approved in SCL EIA and no unacceptable impacts will be anticipated in accordance with the Environmental Impact Assessment Ordinance Technical Memorandum (EIAO-TM) requirements.

This QRA Report presents:

- The basis for the assessment;
- The results for the QRA; and
- The assessment of the risk against the EIAO-TM Risk Criteria.

[1] It should be noted that the drill & blast section of the Ho Man Tin Tunnel (HMT) as stated in the approved SCL EIA has been changed to bored tunnelling and the associated VEP has been applied and approved in July 2012, details refer to VEP-370/2013. As the HMT is not under the construction of Contract 1103, therefore the transport, storage and use of the explosives assessment for HMT will not be required and included in this study.

1.3 *OVERVIEW OF THE PROPOSED CHANGES*

Under SCL Contract 1103, the excavation works for the tunnels from Hin Keng Portal to Ma Chai Hang Ventilation Building (MCV) will now be undertaken from January 2014 to October 2015 using the Drill and Blast Method in the areas stated in SCL EIA (MTR, 2012). Based on the latest engineering information and construction optimisation, the tunnel construction design has been updated as follows:

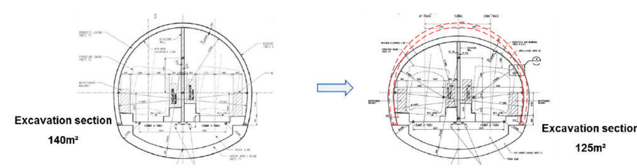
- As in the SCL EIA, a short section of mined tunnel will be constructed at Hin Keng Portal, followed by a twin track tunnel to MCV by drill & blast method. However, the drill & blast at certain sections would be at reduced rates due to vibration restrictions (sensitive receivers).
- The tunnel design for a short section (~250m) from MCV towards Hin Keng Portal has been changed from one large tunnel by drill & blast as assumed in the SCL EIA to three separate smaller tunnels to be constructed by both drill & blast and Tunnel Boring Machine (TBM) methods.

Consequently, the following blasting activity changes are envisaged:

Reduction in Explosives Volume

It is assumed in the SCL QRA that the LRT will require an average full face excavation area of ~140 m^2. It is now proposed to adopt an alternative tunnel profile with reduced tunnel size and lining thickness resulting a smaller excavation area (~125 m^2) without incurring any negative impacts on the functional requirements of the tunnels (*Figure 1.1*). This proposed change will reduce cross section of Lion Rock Tunnel from ~140 m^2 to ~125 m^2 for a length of about 2.4km. As a result, there would be some reduction in excavation volume and reduction in explosives volume is anticipated.

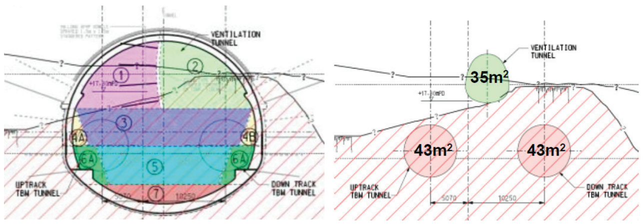
Figure 1.1 Proposed reduction of Lion Rock Tunnel Cross Section



Original Design Proposed Change

In addition, a short tunnel section (~250m) connecting between MCV and LTR will be changed from a single large tunnel to three (3) separate smaller tunnels: two (2) TBM rail tunnels and one (1) ventilation tunnel by drill and blast for 250m (*Figure 1.2*). This could reduce excavated material at MCV and reduce in the volume of explosives required.

Figure 1.2 Proposed Change in Tunnel Arrangement from MCV to LRT (Section)



<u>Original Design</u> <u>Proposed Change</u>

Use of electronic detonators

To provide precise delay timings in mined tunnel section near Hin Keng Portal (chainages 93180 to 93300) and the tunnel section near Water Services Department (WSD) water tunnel (chainages 93590 to 93640), electronic detonators (e-dets) are proposed to be used in these tunnel chainages.[2] The use of e-dets in place of conventional shock tube non-electric (nonel) detonators, with potential to reduce the environmental nuisance to the surroundings, was examined.

Change in number of delivery trips

The proposed changes in blasting activities would reduce the quantity of explosives required per delivery and changes the explosives delivery schedule. Based on the latest explosives delivery arrangement, less number of trips to MCV and more number of trips to HIK are proposed. The detailed assessment on transport of explosives is provided.

Change in blasting period

In the approved SCL EIA, the delivery schedule was from October 2013 to March 2015, however with the proposed changes the revised delivery schedule is proposed to be from January 2014 to October 2015. This extension is to fit with the start and end dates for the use of the magazine.

[2] Subject to project development, electronic detonators (e-dets) would also be used in the tunnel chainages (95370-95607) for part of the ventilation tunnel (~240m) as shown in *Figure 1.2*. In addition, referring to *section 2.2*, it is noted that the failure frequencies for e-dets are generally lower than conventional shock tube non-electric (nonel) detonators. Hence, in this study, tunnel chainages (95370-95607) is assessed by using nonel detonators as conservative approach.

The magazine handover date is October 2015 and the latest explosive delivery date is December 2015[3]. Moreover, at this construction stage, there has been site access constraint at MCV and the blasting schedule was therefore delayed. The detailed assessment on transport of explosives is provided in this report.

Change in maximum instantaneous charge (MIC)

Referencing the approved SCL EIA, at certain LRT sections, maximum instantaneous charges are at reduced rates due to vibration restrictions (sensitive receivers). This approach has been applied to Contract 1103 in the same way. In the vicinity of sensitive receivers, maximum instantaneous charges are reduced and controlled to meet vibration restrictions. In some areas far away from the sensitive receivers, maximum instantaneous charges are proposed to increase up to 8.55kg (as compared to 7kg as assumed in the SCL EIA) provided that vibration restrictions are met. The detailed assessment on use of explosives is provided.

Other assumptions made for the transport and use of explosives in the SCL EIA (MTR, 2012) remain valid. Regarding the storage of explosives, all assumptions made in the SCL EIA (MTR, 2012) remain valid.

1.4 STUDY BASIS

This assessment revisited the transport and the use of explosives aspects of the SCL project pertaining to Contract 1103's scope of works and the proposed changes for the construction of Lion Rock Tunnels from Ma Chai Hang Ventilation Building (MCV) to Hin Keng (HIK) Portal.

For the transport of explosives, the proposed delivery points and explosives delivery route are shown in *Figure 1.3*, which are entirely the same as the approved SCL EIA. The works areas requiring explosives delivery by contractors are shown in *Table 1.1* below.

[3] After the magazine is handover, the transport of explosives will be carried out by Mines Division of Civil Engineering Development Department (CEDD), subject to approval by CEDD. Besides, in case unforeseen delay of blasting programme, the period of explosive delivery and magazine operation by Contractor may be extended to December 2015 subject to project development, hence, it is not considered further in this study.

Table 1.1 SCL Contract 1103 Works Areas Requiring Delivery by Contractor

Magazine Storage Requirement per contract	Works Areas	Blast Faces	Delivery Point
500 kg (250 kg x 2 stores)	Ma Chai Hang Ventilation Building (MCV)	- One vent tunnel towards Hin Keng for 250m, Twin track tunnel towards Hin Keng (Lion Rock Tunnel)	Ma Chai Hang Road
	Hin Keng (HIK) Portal	- Twin track tunnel towards Ma Chai Hang (Lion Rock Tunnel)	Hin Keng Estate Access Road

Initiating (cast boosters, cartridged emulsion explosives, detonating cord and detonators) and blasting explosives (bulk emulsion explosives) are used for the construction of LRT.

Detonators are used in relatively small quantities and transported separately. Bulk emulsion will be used in this project as the blasting explosive. Cartridged emulsion explosives or cast boosters will be used to initiate the blasting explosive.

Bulk emulsion (unsensitised) is not classified as an explosive substance (i.e. Category 1 Dangerous Good) in Hong Kong (it is classified as Category 7 Dangerous Good, i.e. a strong supporter of combustion) until sensitised within the blast holes at the excavation face, and hence is out of the scope of this review.

Further description of the properties, safety measures and requirements for both transport and storage of these explosives is given in the SCL EIA (MTR, 2012) and remain valid for Contract 1103.

The use of the explosives assessment is in principle the same as the approved SCL EIA (MTR, 2012) [1], except for frequency of accidental blasting using e-dets and changes in blast design. The methodology for assessing the use of explosives with e-dets in this assessment is the same as that assessed in WIL Environmental Review Report [2]. The frequency and consequence assessment have been revised based on the latest available blasting activity information.

A detailed Blast Assessment Report (CBAR) [3], which is outside the scope of EIAO, has been prepared to describe the blasting mechanism, vibration monitoring, and safety measures to minimize any potential impact to the sensitive receivers for the proposed LRT. The CBAR report will be submitted to Mines for approval. Supplementary Report on Blasting Assessment for QRA (PBAR) [4] cited in the SCL EIA (MTR, 2012) is also reviewed in this study. Data in the CBAR and PBAR has been used as a reference in this QRA section.

Figure 1.3 SCL Proposed Lion Rock Tunnel Alignment and Works Areas

1.4.1 *REVISED DRILL AND BLAST INITIATING EXPLOSIVE REQUIREMENTS*

Based on the SCL (LRT) explosives delivery route, the travel distance from magazine site to each delivery point is provided in *Table 1.2*. The same methodology is adopted to derive the total number of trips and the total initiating explosives to be transported per trip as described in the SCL EIA (MTR, 2012). The corresponding explosive deliveries in the peak 12- month period is shown in *Table 1.3* for each work area. The corresponding explosive load transported in the peak 12- month delivery period is shown in *Table 1.4* for each work area.

Table 1.2 Travel Distance from TKO Temporary Magazine Site to Each Delivery Point

Delivery Points	Ma Chai Hang Ventilation Building	Hin Keng Portal
Travel distance (km) from temporary Magazine Site to Delivery Point	20.71	31.42

Table 1.3 Explosive Deliveries for Every 12-Month Period during Construction for Each Work Area

12-Month Delivery Period	Total Explosive Delivery Trips within the 12-Month Period		Total No. of Trips	Total Distance Travelled (km)
	Hin Keng	Ma Chai Hang Ventilation Building		
Jan 2014 – Dec 2014	665	75	740	22448
Feb 2014 – Jan 2015	642	101	743	22263
Mar 2014 – Feb 2015	618	122	740	21944
Apr 2014 – Mar 2015	592	148	740	21666
May 2014 – Apr 2015	594	171	765	22205
Jun 2014 – May 2015(1)	592	195	787	22639
Jul 2014 - Jun 2015	569	220	789	22434
Aug 2014 - Jul 2015	543	246	789	22156
Sep 2014 - Aug 2015	517	272	789	21877
Oct 2014 - Sep 2015	492	297	789	21610
Nov 2014 - Oct 2015	467	297	764	20824

Note: (1) Peak delivery period selected for the Revised Case based on total travel distance within the 12-Month Period

Table 1.4 Explosives Load Transported in the Peak 12-Month Delivery Period

Works Areas	Explosive Load Transported (kg/trip)
MCV	162
HIK Portal	200

Based on the envisaged construction programme and sequence of works, the annual travel distance by explosives vehicles, carrying cartridged emulsion and detonating cord, will reach a peak in the period between June 2014 and May 2015 as shown in *Table 1.3* (i.e. the same assessment year adopted in SCL

EIA (MTR, 2012), refer to section 4.2.4 of Appendix 13A). This period is referred as the peak explosives delivery period which is taken to represent the Revised Case scenario for this assessment.

Within this period, the annual number of deliveries is 787 while the explosives trucks travel distance is around 22,639 km. The delivery frequency has been estimated on the basis that, for a given delivery point, each delivery will be made to each blast face independently of the other blast faces even if the load could be transported on the same truck. This approach, although slightly conservative, accounts for envisaged delivery variations during the peak delivery period, within which, separate deliveries will be generally undertaken.

To reflect the envisaged construction programme, a Revised Case, which accounts for the new explosives delivery schedule to the delivery points at HIK and MCV, has been considered for this QRA review. The same methodology in the SCL EIA (MTR, 2012) is adopted for this assessment. In addition, the Revised Case is then assessed against the Worst Case scenario as described in the SCL EIA (MTR, 2012), which was approved by EPD in 2012. This re-assessment is conducted to ensure the risk levels of the Revised Case are within the envelope of the Worst Case scenario approved in the previous study (MTR, 2012).

It is assumed that the types of explosives used in LRT construction have not been changed, except using smaller explosive charges such as cast boosters instead of cartridged emulsion as primers for bulk emulsion. This is an option detailed in the ALARP assessment section 9.6 of the SCL EIA (MTR, 2012) of Appendix 13A, which could reduce the quantity of explosives required for transportation for the sections where bulk emulsion will be used. Under Contract 1103, cast boosters are proposed to be used as far as practicable.

Table 1.5 SCL (LRT) Drill and Blast – Initiating Explosive Types

Explosive	Quantity per Production/Perimeter Hole
Cartridged emulsion	0.125 kg (125 g per cartridged emulsion) [1]
Cast Booster	0.02 kg (20 g per mini cast booster)
Detonating Cord	0.080 kg/m based on density of 0.040 kg/m (40 g/m)
Detonator	0.001 kg (0.9 g each)

Note 1: For blast where MIC is lower than 2 kg and bulk emulsion cannot be used; 0.208 kg cartridged types explosives may be used.

The physical properties for the explosives are shown in *Table 1.6*.

Table 1.6 Explosive Types and Properties

Explosive Type	TNT Equivalency	Melting Point (°C) @ 1 atm	Bullet Test Sensitivity	Auto-ignition Point (°C) @ 1 atm	UN Hazard Division
Emulsion (packaged in cartridges)	0.96	170 *	>500 m/s	230-265**	1.1D
PETN (as provided for detonating cord)	1.4	135-145	> 450 m/s	190	1.1D
PETN (as provided within detonators)	1.4	120	> 450 m/s	190	1.4B 1.4S
Cast Boosters (75% PETN)	1.3	80	> 450 m/s	299	1.1D

* This refers to the melting point of Ammonium Nitrate: Ammonium Nitrate undergoes phase changes at 32-83 °C and starts to melt at 170° C.

** Depends on type of oil used

1.4.2 REVISED BLASTING METHOD FOR LION ROCK TUNNEL

The risk assessment methodology associated with e-dets has been detailed in the WIL Environmental Review Report for King George V Memorial Park (KGV) shaft [2]. The same assessment methodology has been repeated in this study, taking into account impact on sensitive receivers for LRT section.

The proposed blasting process includes the use of both conventional shock tube non-electric (nonel) detonators and electronic detonators. The use of nonel detonators has been discussed in detail in the approved SCL EIA, while the use of electronic detonators, which was not previously assessed, is described in *Annex A1*. A short description of the two types of detonators is presented below.

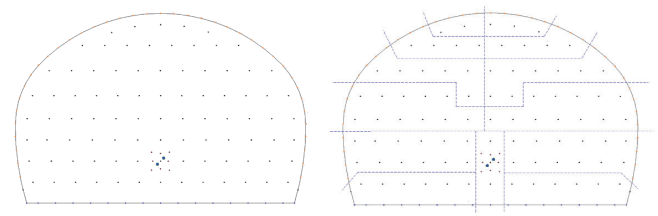
For both types of detonators, the design is such that each MIC is detonated at a fixed time delay from any other MIC.

In the case of nonel detonators, the shotfirer selects detonators with their delay set at manufacture. The shotfirer then place the detonators with the preset delay in the blast holes. The detonators are arranged in sectors and each sector is set to blast at a different time using surface connector devices. In the case of electronic detonators, the delay for each detonator is set directly at the blast face. The detonators are linked in a daisy chain arrangement and the shotfirer, using a Tagger device, will typically programme strings of detonators (typically 5 to 6) in semi-automatic mode, i.e. by setting the initial delay on the first detonator in the string then specifying a delay increment. On special cases, he may also enter a fixed delay manually using a Tagger for specific detonators. For both types of detonators, the blasting process is subject to a robust checking and verification process.

In general, electronic detonators allow a greater control of the blast and vibrations. The blast accuracy for each MIC is in the order of ±1 ms when compared to ±2% for non-electric detonators. Such accuracy allows a reduction in PPV reducing the additive effects of seismic waves generated from the blast. This has been demonstrated as part of the KGV shaft blasting activities for WIL Project.

Figure 1.4 shows the typical electronic (in 1 sector) and non-electric (in 13 sectors) blast patterns for the LRT section for the SCL (TAW-HUH).

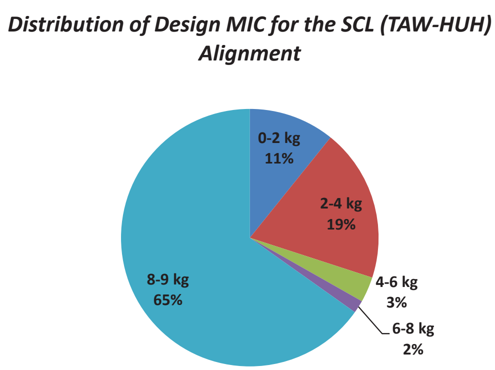
Figure 1.4 ***Proposed Typical Blast Patterns for LRT section of SCL (TAW-HUH)***



1 Sector   13 Sectors

The distribution of MIC for the construction of Lion Rock Tunnel of the SCL (TAW-HUH) alignment is shown in *Figure 1.5*.

Figure 1.5 ***Distribution of Design MIC for the SCL (TAW-HUH) Alignment***



1.4.3 STUDY APPROACH

The assessment methodology for the transport, storage and use of explosives has followed the methodology detailed in the approved SCL EIA (MTR, 2012). The frequency and consequence assessment has been updated to account for the proposed options for blasting activities.

1.4.4 DELIVERY ROUTES AND POPULATION

The explosives will be delivered from the temporary Magazine store (i.e. Tseung Kwan O (TKO) Area 137) to the two works areas (i.e. HIK Portal and MCV) using the public roads as shown in *Figure 1.3*. The explosives delivery routes are listed in *Table 1.7*. It has been noted that the same delivery routes as in the SCL EIA are adopted in the revised explosives delivery programme. The study is based on the Blasting Schedule provided by VCGP in June 2013 [11].

Based on the envisaged explosives delivery schedule as shown in *Table 1.3*, a peak period will be between June 2014 and May 2015, so assessment year 2015 is taken (i.e. the same assessment year adopted in SCL EIA (MTR, 2012), refer to section 4.2.4 of Appendix 13A). Population data in this period is taken to represent the Revised Case scenario for this assessment. All assumptions as described in detail in the SCL EIA (MTR, 2012) apply. Three types of population have been considered:

- Pedestrian population on footpaths and pavements next to the delivery routes;
- Road population; and
- Building population.

Table 1.7 ***Delivery Routes from TKO Area 137 Magazine***

Section ID	Description
Route 1d (TKO Area 137 – Ma Chai Hang Ventilation Building)	
Road 1d1	TKO Area 137 Magazine Site Track
Road 1d2	Wan Po Road (Chun Yat St- Chiu Shun Rd)
Road 1d3a	Chiu Shun Road (Wan Po Rd - Ngan O Rd)
Road 1d3b	Chiu Shun Road (Ngan O Rd - Po Ning Rd)
Road 1d4	Hang Hau Road
Road 1d5	Clear Water Bay Road (Hang Hau - Hiram's Highway)
Road 1d6a	Clear Water Bay Road (Hiram's Highway - Anderson Road)
Road 1d6b	Clear Water Bay Road (Anderson Road - New Clear Water Bay Rd Eastern Junction)
Road 1d7	New Clear Water Bay Road (Eastern Junction - Shun Lee Street)
Road 1d8	New Clear Water Bay Road (Shun Lee Street - Western Junction)
Road 1d9	Clear Water Bay Road (New Clear Water Bay Rd Western Junction - Lung Cheung Rd)
Road 1d10a	Lung Cheung Rd (Clear Water Bay Rd - Wong Kuk Ave)
Road 1d10b	Lung Cheung Rd (Wong Kuk Ave - Hammer Hill Rd)
Road 1d10c	Lung Cheung Rd (Hammer Hill Rd - Po Kong Village Rd)
Road 1d11	Po Kong Village Rd (Lung Cheung Rd - Fung Tak Rd)
Road 1d12	Fung Tak Rd (Po Kong Village Rd - Sheung Fung St)

Section ID	Description
Road 1d13	Wong Tai Sin Rd + Fung Tak Rd (Sheung Fung St - Ma Chai Hang Rd)
Road 1d14	Nga Chuk St
Road 1d15	Chuk Yuen Rd (Nga Chuk St - Ma Chai Hang Rd)
Road 1d16	Ma Chai Hang Rd (Chuk Yuen St - Ma Chai Hang Rd Ra)
Route 1v (TKO Area 137 – Hin Keng Portal)	
Road 1v1	TKO Area 137 Magazine Site Track
Road 1v2	Wan Po Road (Chun Yat St- Chiu Shun Rd)
Road 1v3a	Chiu Shun Road (Wan Po Rd - Ngan O Rd)
Road 1v3b	Chiu Shun Road (Ngan O Rd - Po Ning Rd)
Road 1v4	Hang Hau Road
Road 1v5	Clear Water Bay Road (Hang Hau - Hiram's Highway)
Road 1v6a	Clear Water Bay Road (Hiram's Highway - Anderson Road)
Road 1v6b	Clear Water Bay Road (Anderson Road - New Clear Water Bay Rd Eastern Junction)
Road 1v7	New Clear Water Bay Road (Eastern Junction - Shun Lee Street)
Road 1v8	New Clear Water Bay Road (Shun Lee Street - Western Junction)
Road 1v9	Clear Water Bay Road (New Clear Water Bay Rd Western Junction - Lung Cheung Rd)
Road 1v10a	Lung Cheung Rd (Clear Water Bay Rd - Wong Kuk Ave)
Road 1v10b	Lung Cheung Rd (Wong Kuk Ave - Hammer Hill Rd)
Road 1v10c	Lung Cheung Rd (Hammer Hill Rd - Po Kong Village Rd)
Road 1v11a	Lung Cheung Rd (Po Kong Village Rd - Fung Mo St)
Road 1v11b	Lung Cheung Rd (Fung Mo St - Waterloo Rd)
Road 1v11c	Lung Cheung Rd (Lion Rock Tunnel Rd - Nam Cheong St)
Road 1v11d	Lung Cheung Rd / Cornwall St (Nam Cheong St - Tai Po Rd)
Road 1v12a	Tai Po Rd (Lung Cheung Rd - Tai Po Rd Int)
Road 1v12b	Tai Po Rd (Tai Po Rd Int - Caldecott Rd)
Road 1v12c	Tai Po Rd - Shatin Heights (Caldecott Rd - Keng Hau Rd)
Road 1v12d	Tai Po Rd - Shatin Heights (Keng Hau Rd - Shing Ho Rd)
Road 1v13a	Mei Tin Rd (Tai Po Rd (Tai Wai) - Tsuen Nam Rd)
Road 1v13b	Mei Tin Rd (Tsuen Nam Rd - Che Kung Miu Rd)
Road 1v14a	Che Kung Miu Rd (Mei Tin Rd - Tin Sam St)
Road 1v14b	Che Kung Miu Rd (Tin Sam St – Hin Keng St)
Road 1v15	Hin Keng Estate Access Rd

2 FREQUENCY ASSESSMENT

2.1 FREQUENCY ANALYSIS FOR TRANSPORT AND STORAGE OF EXPLOSIVES

A Revised Case was considered in the risk assessment, as shown in *Table 2.1*. The Revised Case is assessed against the Worst Case scenario, which was approved in the SCL EIA (MTR, 2012). The Worst Case is shown in *Table 2.2* for reference.

Table 2.1 Scenarios Considered in the Revised Case Assessment

Tag	Scenario	Explosives Load (TNT eqv. kg)	No. of Trips per year	Remarks
	Storage of Explosives			
01	Detonation of full load of explosives in one store in the TKO Area 137 magazine site	301	-	Store capacity is 250kg
02	Detonation of full load of explosives in one contractor truck on the access road within TKO Area 137 magazine site boundary	194	787	
	Transport of Explosives			
03	Detonation of full load of explosives in one contractor truck on public roads – from TKO Area 137 site to Ma Chai Hang Ventilation Building delivery point	156	195	
04	Detonation of full load of explosives in one contractor truck on public roads – from TKO Area 137 site to Hin Keng Portal delivery point	194	592	

Table 2.2 Scenarios Considered in the Worst Case Assessment of the approved SCL EIA (without Shansi Street)

Tag	Scenario	Explosives Load (TNT eqv. kg)	No. of Trips per year	Remarks
	Storage of Explosives			
01	Detonation of full load of explosives in one store in TKO Area 137 magazine site	301	-	Store capacity is 250kg
02	Detonation of full load of explosives in one contractor truck on the access road within TKO Area 137 magazine site boundary	194	952	
	Transport of Explosives			
03	Detonation of full load of explosives in one contractor truck on public roads – from TKO Area 137 site to Ma Chai Hang Ventilation Building delivery point	156	616	

Tag	Scenario	Explosives Load (TNT eqv. kg)	No. of Trips per year	Remarks
04	Detonation of full load of explosives in one contractor truck on public roads – from TKO Area 137 site to Hin Keng Portal delivery point	194	336	

The base frequency for accidental explosion during transport was assessed at 7.69×10^{-10}/km for normal roads as applicable for the transport of explosives for the SCL (TAW- HUH) project (MTR, 2012). As the numbers of trips are changed based on revised delivery schedule along the same approved delivery route to the works areas, the frequency assessment is updated following the same methodology in the SCL EIA (MTR, 2012).

2.2 *FREQUENCY ANALYSIS FOR USE OF EXPLOSIVES*

A set of failure probabilities for concerned e-det system was derived in the WIL Environmental Review for the King George V Memorial Park (KGV) shaft which forms the basis of this analysis. *Table 2.3* and *Table 2.4* present the failure probabilities for e-dets with bulk and cartridged emulsion respectively. The approved SCL EIA (MTR, 2012, details refer to Section 4 of Appendix 13B) presented the failure frequencies for conventional non-electric (nonel) detonators. As a comparison, it may be noted that the failure frequencies for e-dets are generally lower.

Table 2.3 Probability of Occurrence per Face for E-dets with Bulk Emulsion

Scenarios	Probability of Occurrence Per Face
Higher vibration due to 2 MIC detonated at the same time	1.21×10^{-5}
Higher vibration due to 3 MIC detonated at the same time	1.45×10^{-8}
Higher vibration due to 4 MIC detonated at the same time	2.25×10^{-10}
Higher vibration due to 5 MIC detonated at the same time	2.25×10^{-10}
Higher vibration due to 6 MIC detonated at the same time	2.25×10^{-10}

Table 2.4 Probability of Occurrence per Face for E-dets with Cartridged Emulsion

Scenarios	Probability of Occurrence Per Face
Higher vibration due to 2 MIC detonated at the same time	1.41×10^{-5}
Higher vibration due to 3 MIC detonated at the same time	1.46×10^{-8}
Higher vibration due to 4 MIC detonated at the same time	2.47×10^{-10}
Higher vibration due to 5 MIC detonated at the same time	2.47×10^{-10}
Higher vibration due to 6 MIC detonated at the same time	2.47×10^{-10}

Annex A2 to *A5* presents the Fault Tree Analysis (FTA) and Human Error Assessment & Reduction Technique (HEART) for the use of electronic detonators with bulk and cartridged emulsion.

The failure probabilities for nonel detonators with bulk and cartridged emulsion were also revised based on changes in the blasting activity. *Table 2.5* and *Table 2.6* show the overall frequencies for failure scenarios leading to higher than expected vibration for the Lion Rock Tunnel (LRT) section taking into account the aforementioned proposed blasting activities options.

Table 2.5 Overall Frequencies for Failure Scenarios leading to Higher than Expected Vibration for the LRT section of Contract 1103

Sections	Blast Linear Length	Occurrence Frequency for multiple MIC detonated at the same time (Occurrence per Project)				
		2MIC	3MIC	4MIC	5MIC	6MIC
Lion Rock Tunnel section	2.4 km	8.70E-02	1.38E-04	9.49E-07	9.49E-07	9.49E-07

Table 2.6 Overall Frequencies for Failure Scenarios leading to Higher than Expected Vibration per 10 m Section and per 5 m Section of Contract 1103

Sections	Occurrence Frequency for multiple MIC detonated at the same time for 10 m advance (Occurrence per 5m and 10m section)				
	2MIC	3MIC	4MIC	5MIC	6MIC
Lion Rock Tunnel (10 m)	3.76E-04	5.97E-07	4.11E-09	4.11E-09	4.11E-09
Lion Rock Tunnel (5 m)	1.88E-04	2.98E-07	2.05E-09	2.05E-09	2.05E-09

The above frequencies for this revised reassessment case can be compared with the overall frequencies for the SCL (TAW-HUH) project in the previously approved SCL EIA shown in *Table 2.7* and *Table 2.8*.

Table 2.7 ***Overall Frequencies for Failure Scenarios leading to Higher than Expected Vibration for the SCL (TAW-HUH) Project (MTR, 2012)***

Sections	Blast Linear Length	Occurrence Frequency for multiple MIC detonated at the same time (Occurrence per Project)				
		2MIC	3MIC	4MIC	5MIC	6MIC
SCL (TAW-HUH) Alignment	3.2 km	1.32E-01	3.81E-04	2.19E-06	2.19E-06	2.19E-06

Table 2.8 ***Overall Frequencies for Failure Scenarios leading to Higher than Expected Vibration per 10 m Section and per 5 m Section for the SCL (TAW-HUH) Project (MTR, 2012)***

Sections	Occurrence Frequency for multiple MIC detonated at the same time for 10 m advance (Occurrence per 5m and 10m section)				
	2MIC	3MIC	4MIC	5MIC	6MIC
SCL (TAW-HUH) (10 m)	4.13E-04	1.19E-06	6.84E-09	6.84E-09	6.84E-09
SCL (TAW-HUH) (5 m)	2.07E-04	5.95E-07	3.42E-09	3.42E-09	3.42E-09

Since the transport length within the tunnel will vary as the blasting proceeds, the average transport length was assumed as half the tunnel length for all deliveries in accordance with the SCL EIA (MTR, 2012) and WIL study (ERM, 2008). The overall transport length thus comprises the length of the access path combined with half of the tunnel length. The revised frequency for accidental explosion due to detonation of full load during delivery to the blast site is presented in *Table 2.9*.

Table 2.9 ***Frequency of Accidental Explosion due to Detonation of Full Load during Delivery to Blast Site***

Scenario	Description	Initiation Freq (/yr)	No. of Trips (1)	Road Length (km)	Frequency (/yr)
D01	Initiation of explosives during explosives delivery from delivery point at Hin Tin Street to Hin Keng Portal.	7.69E-10	665	0.04	1.02E-08
D02	Initiation of explosives during explosives delivery from Hin Keng Portal to Lion Rock Tunnel blast site.	7.69E-10	665	2.2	5.63E-07
D03	Initiation of explosives during explosives delivery from Ma Chai Hang Ventilation Building to Lion Rock Tunnel blast site.	7.69E-10	297	0.2	2.28E-08

Note: (1) The greatest number of trips shown in *Table 1.3* is taken.

Table 2.10 shows the frequency presented in the SCL EIA for accidental explosion due to detonation of full load.

Table 2.10 ***Frequency of Accidental Explosion due to Detonation of Full Load during Delivery to Blast Site in approved SCL EIA (MTR, 2012)***

Scenario	Description	Initiation Freq (/yr)	No. of Trips	Road Length (km)	Frequency (/yr)
D01	Initiation of explosives during explosives delivery from delivery point at Hin Tin Street to Hin Keng Portal.	7.69E-10	384	0.04	5.91E-09
D02	Initiation of explosives during explosives delivery from Hin Keng Portal to Lion Rock Tunnel blast site.	7.69E-10	384	0.51	7.53E-08
D03	Initiation of explosives during explosives delivery from Ma Chai Hang Ventilation Building to Lion Rock Tunnel blast site.	7.69E-10	598	1.88	4.33E-07

2.3 CONSEQUENCE ANALYSIS FOR TRANSPORT OF EXPLOSIVES

To be consistent with the approach adopted in SCL EIA (MTR, 2012) [1], the consequence models used for assessment of the probability of fatality due to blast and pressure waves are based on the most recent UK Explosive Storage and Transport Committee (ESTC) model defined in the HSC publication (ESTC, 2000).

The distance to probabilities of fatality of 1%, 50% and 90% was estimated. The criteria adopted in this study are consistent with the SCL EIA (MTR, 2012). The consequence results for the blasting using cartridged emulsion are replicated in *Table 2.11* below for reference.

Table 2.11 Summary of Results for Worst Case Consequence Scenarios of the approved SCL EIA

No.	Scenario	TNT (eqv. kg)	Fatality Prob.	*Indoor* Impact distance (m)	*Outdoor* Impact distance (m)
	Storage of Explosives				
01	Detonation of full load of explosives in one store of TKO Area 137 site	301	90%	20.6	16.5
			50%	23.9	17.2
			10%	35.4	19.0
			3%	47.3	20.4
			1%	61.1	21.5
02	Detonation of full load of explosives in one contractor truck on the access road within the TKO Area 137 magazine site boundary	194	90%	17.9	14.3
			50%	20.7	14.9
			10%	30.6	16.5
			3%	40.9	17.6
			1%	52.7	18.7
	Transport of Explosives				
03	Detonation of full load of explosives in one contractor truck on public roads – from TKO Area 137 to Ma Chai Hang delivery point	156	90%	16.6	13.3
			50%	19.2	13.9
			10%	28.5	15.3
			3%	38.1	16.4
			1%	49.5	17.4
04	Detonation of full load of explosives in one contractor truck on public roads – from TKO Area 137 site to Hin Keng Portal delivery point	194	90%	17.9	14.3
			50%	20.7	14.9
			10%	30.6	16.5
			3%	40.9	17.6
			1%	52.7	18.7

Referring to the SCL EIA (MTR, 2012), the consequence results for the blasting using bulk emulsion with cast boosters as primers are shown in *Table 2.12* below.

Table 2.12 Summary of Consequence Results for Bulk Emulsion with Cast Boosters (Option Case 2) Scenarios of the approved SCL EIA

No.	Scenario	TNT (eqv. kg)	*Indoor* Fatality Prob.	*Indoor* Impact distance (m)	*Outdoor* Fatality Prob.	*Outdoor* Impact distance (m)
	Storage of Explosives					
01	Detonation of full load of explosives in one store in TKO Area 137 site	301	90%	20.6	90%	16.5
			50%	23.9	50%	17.2
			10%	35.4	10%	19.0
			3%	47.3	3%	20.4
			1%	61.1	1%	21.5
02	Detonation of full load of explosives in one contractor truck on the access road within TKO Area 137 magazine site boundary	25	90%	9.1	90%	7.3
			50%	10.5	50%	7.6
			10%	15.6	10%	8.4
			3%	20.8	3%	9.0
			1%	27.0	1%	9.6
	Transport of Explosives					
03	Detonation of full load of explosives in one contractor truck on public roads – from TKO Area 137 site to Ma Chai Hang delivery point	21	90%	8.6	90%	6.9
			50%	9.9	50%	7.2
			10%	14.7	10%	7.9
			3%	19.6	3%	8.5
			1%	25.7	1%	9.0
04	Detonation of full load of explosives in one contractor truck on public roads – from TKO Area 137 to Hin Keng Portal delivery point	21	90%	8.6	90%	6.9
			50%	9.9	50%	7.2
			10%	14.7	10%	7.9
			3%	19.6	3%	8.5
			1%	25.7	1%	9.0

It is noted that consequence results for using bulk emulsion with cast boosters as primers shown in *Table 2.12* is less than the consequence results for using cartridged emulsion shown in *Table 2.11*. On a conservative approach, the consequence results of cartridged emulsion to be stored and transported were assessed instead of taking the consequence results of bulk emulsion with cast boosters; therefore, the consequence result of explosives deliveries used in the model will be more conservative, which accounts for envisaged delivery variations during the peak delivery period under Contract 1103.

2.4 CONSEQUENCE ANALYSIS FOR USE OF EXPLOSIVES

The prediction of the Peak Particle Velocity (PPV) follows a propagation law which has the form (CEDD, 1998) [5]:

$V = K Q^{d} R^{-b}$

Where V is the Peak Particle Velocity, mm/sec

R is the distance (m) between the blasting source and the measuring point

Q is the explosive charge weight (kg) in TNT equivalence per delay

K, d and b are site specific constants, termed the rock constant, charge exponent, and attenuation factor respectively. Both theoretical and empirical methods have been used to estimate values for K, d, and b.

The above equation with values of K = 644 based on the 84% confidence limit, d = 0.5 and b = 1.22 have been used for the blast design of the SCL (TAW-HUH) project, in accordance with the general practice in Hong Kong and as per the guidelines developed by the Mines Division. A limit on PPV of 25 mm/s (for buildings) and similar values (for other receptors) is used as the criteria for the blast design as discussed in the SCL EIA (MTR, 2012) and Blasting Assessment Report (MTR, 2010).

From a risk perspective, if an 84% confidence level is used for calculation of PPV, there would be a 16% probability that the PPV will exceed the acceptable PPV. Hence, it is necessary to determine a value for the rock constant, K that is appropriate for the hazard assessment.

The value for the rock constant, K, is largely related to the rock type, structure and the confinement of the blast, i.e. K will be larger for an explosive charge placed in a tight fitting blasthole than for explosives stored in a chamber or tunnel. The values of K for granitic and volcanic rocks in Hong Kong are in the range of 1,000 to 1,200 for rock blasting (CEDD, 1998) [5]. Geoguide 4 states that the values for the charge and attenuation exponents are from 0.6 to 0.8 and from 1.2 to 1.6 respectively.

The specific constants and criteria adopted for this QRA study remains the same as the SCL EIA (MTR, 2012).

2.4.1 *Consequence Assessment results for the Construction of Lion Rock Tunnel for SCL (TAW-HUH) Alignment*

<u>*Ground Vibration Effect on Slopes due to Errors in Blasting Face*</u>

One slope feature (for full load detonation) was identified for further assessment based on the screening criteria of PPV = 90 mm/s during construction of Lion Rock Tunnel due to accidental initiation of 5MIC. The data of the affected slopes are summarized in *Table 2.13*.

No Slopes were found to exceed a PPV of 90mm/s due to full load detonation during the construction of the Lion Rock Tunnel.

Table 2.13 Analysis of Slopes Exceeding Peak Particle Velocity of 90 mm/s due to accidental initiation during the Construction of Lion Rock Tunnel

Mapsheet	Type (1)	No.	Static F.O.S	Slope length (m) (2)	Slope depth (m) (3)	Slope Material	PPVc (mm/s)	Slip Volume (m3) (4)	PPV correspond to 100% slope failure (mm/s)	PPV correspond to 50% slope failure (mm/s)	PPV correspond to 10% slope failure (mm/s)	PPV correspond to 0.01% slope failure (mm/s)
11NE-A	C	333	1.361	270	15.2	Soil	111.5	112815	989 (5)	719 (5)	549 (5)	408(5)

Notes:

(1) C-Cut Slope, F-Fill Slope, CR/FR – Slope & Retaining Wall, R-Retaining Wall

(2) Slope length along its own slope

(3) Slope depth measured as a perpendicular distance below the slope surface

(4) It is assumed that the slope failure width is equal to the length and that the volume = π * length^2 * depth / 6.

(5) PPV > 400 mm/s which is unachievable based on the assessment

Ground Vibration Effect on Buildings due to Errors in Blasting Face

It was found that the building structural element collapse threshold (PPV = 229 mm/s) considering accidental explosion up to 6MIC is not applicable.

Nevertheless, some features along the alignment would reach the object falling threshold (PPV = 100 mm/s, 1% fatality threshold), the results are summarized below.

Table 2.14 Features Affected by Higher than Expected Vibrations Generated by the Construction of LRT

Scenario/ Chainage	Features Affected	Observed PPV (mm/s)
4MIC detonated at the same time		
93610	High Island Water Tunnel	103
93620	High Island Water Tunnel	106
5MIC detonated at the same time		
93600	High Island Water Tunnel	103
93610	High Island Water Tunnel	118
93620	High Island Water Tunnel	121
93630	High Island Water Tunnel	104
6MIC detonated at the same time		
93600	High Island Water Tunnel	115
93610	High Island Water Tunnel	132
93620	High Island Water Tunnel	135
93630	High Island Water Tunnel	117
93640	High Island Water Tunnel	100

Ground Vibration Effects on the Old Beacon Hill Tunnel due to Errors in Blast Face

The following failure scenarios were found to occur based on the maximum allowable PPV of 13 mm/s.

Table 2.15 Features (Old Beacon Hill Tunnel) Affected by Higher than Expected Vibrations Generated by Accidental Initiation during the Construction of Lion Rock Tunnel

Scenario/ Chainage	Features Affected	Observed PPV (mm/s)
2MIC detonated at the same time		
93340	Gas Main Tunnel Nearest to proposed tunnel	21
93350	Gas Main Tunnel Nearest to proposed tunnel	20
93360	Gas Main Tunnel Nearest to proposed tunnel	18
93370	Gas Main Tunnel Nearest to proposed tunnel	17
93380	Gas Main Tunnel Nearest to proposed tunnel	16

Scenario/ Chainage	Features Affected	Observed PPV (mm/s)
93390	Gas Main Tunnel Nearest to proposed tunnel	15
93400	Gas Main Tunnel Nearest to proposed tunnel	14
3MIC detonated at the same time		
93200	Gas Main Tunnel Portal	17
93210	Gas Main Tunnel Portal	17
93220	Gas Main Tunnel Portal	17
93230	Gas Main Tunnel Portal	17
93240	Gas Main Tunnel Portal	17
93250	Gas Main Tunnel Portal	17
93260	Gas Main Tunnel Portal	16
93270	Gas Main Tunnel Portal	14
93340	Gas Main Tunnel Portal	16
93350	Gas Main Tunnel Portal	15
93360	Gas Main Tunnel Portal	14
93370	Gas Main Tunnel Portal	13
93250	Gas Main Tunnel Nearest to proposed tunnel	15
93260	Gas Main Tunnel Nearest to proposed tunnel	17
93270	Gas Main Tunnel Nearest to proposed tunnel	17
93280	Gas Main Tunnel Nearest to proposed tunnel	17
93290	Gas Main Tunnel Nearest to proposed tunnel	17
93300	Gas Main Tunnel Nearest to proposed tunnel	17
93310	Gas Main Tunnel Nearest to proposed tunnel	17
93320	Gas Main Tunnel Nearest to proposed tunnel	17
93330	Gas Main Tunnel Nearest to proposed tunnel	17
93340	Gas Main Tunnel Nearest to proposed tunnel	27
93350	Gas Main Tunnel Nearest to proposed tunnel	25
93360	Gas Main Tunnel Nearest to proposed tunnel	23
93370	Gas Main Tunnel Nearest to proposed tunnel	22
93380	Gas Main Tunnel Nearest to proposed tunnel	20
93390	Gas Main Tunnel Nearest to proposed tunnel	19
93400	Gas Main Tunnel Nearest to proposed tunnel	17
93410	Gas Main Tunnel Nearest to proposed tunnel	15
4MIC detonated at the same time		
93190	Gas Main Tunnel Portal	14
93200	Gas Main Tunnel Portal	20
93210	Gas Main Tunnel Portal	20
93220	Gas Main Tunnel Portal	20
93230	Gas Main Tunnel Portal	20
93240	Gas Main Tunnel Portal	20

Scenario/ Chainage	Features Affected	Observed PPV (mm/s)
93250	Gas Main Tunnel Portal	20
93260	Gas Main Tunnel Portal	19
93270	Gas Main Tunnel Portal	17
93280	Gas Main Tunnel Portal	15
93290	Gas Main Tunnel Portal	14
93300	Gas Main Tunnel Portal	13
93340	Gas Main Tunnel Portal	19
93350	Gas Main Tunnel Portal	18
93360	Gas Main Tunnel Portal	17
93370	Gas Main Tunnel Portal	16
93380	Gas Main Tunnel Portal	15
93390	Gas Main Tunnel Portal	14
93240	Gas Main Tunnel Nearest to proposed tunnel	15
93250	Gas Main Tunnel Nearest to proposed tunnel	17
93260	Gas Main Tunnel Nearest to proposed tunnel	20
93270	Gas Main Tunnel Nearest to proposed tunnel	20
93280	Gas Main Tunnel Nearest to proposed tunnel	20
93290	Gas Main Tunnel Nearest to proposed tunnel	20
93300	Gas Main Tunnel Nearest to proposed tunnel	20
93310	Gas Main Tunnel Nearest to proposed tunnel	20
93320	Gas Main Tunnel Nearest to proposed tunnel	20
93330	Gas Main Tunnel Nearest to proposed tunnel	20
93340	Gas Main Tunnel Nearest to proposed tunnel	32
93350	Gas Main Tunnel Nearest to proposed tunnel	30
93360	Gas Main Tunnel Nearest to proposed tunnel	28
93370	Gas Main Tunnel Nearest to proposed tunnel	26
93380	Gas Main Tunnel Nearest to proposed tunnel	24
93390	Gas Main Tunnel Nearest to proposed tunnel	23
93400	Gas Main Tunnel Nearest to proposed tunnel	21
93410	Gas Main Tunnel Nearest to proposed tunnel	18
93420	Gas Main Tunnel Nearest to proposed tunnel	15
5MIC detonated at the same time		
93180	Gas Main Tunnel Portal	13
93190	Gas Main Tunnel Portal	16
93200	Gas Main Tunnel Portal	23
93210	Gas Main Tunnel Portal	23
93220	Gas Main Tunnel Portal	23
93230	Gas Main Tunnel Portal	23
93240	Gas Main Tunnel Portal	23

Scenario/ Chainage	Features Affected	Observed PPV (mm/s)
93250	Gas Main Tunnel Portal	23
93260	Gas Main Tunnel Portal	22
93270	Gas Main Tunnel Portal	19
93280	Gas Main Tunnel Portal	18
93290	Gas Main Tunnel Portal	16
93300	Gas Main Tunnel Portal	15
93310	Gas Main Tunnel Portal	14
93320	Gas Main Tunnel Portal	14
93330	Gas Main Tunnel Portal	14
93340	Gas Main Tunnel Portal	22
93350	Gas Main Tunnel Portal	20
93360	Gas Main Tunnel Portal	19
93370	Gas Main Tunnel Portal	18
93380	Gas Main Tunnel Portal	17
93390	Gas Main Tunnel Portal	16
93400	Gas Main Tunnel Portal	15
93230	Gas Main Tunnel Nearest to proposed tunnel	14
93240	Gas Main Tunnel Nearest to proposed tunnel	17
93250	Gas Main Tunnel Nearest to proposed tunnel	20
93260	Gas Main Tunnel Nearest to proposed tunnel	23
93270	Gas Main Tunnel Nearest to proposed tunnel	23
93280	Gas Main Tunnel Nearest to proposed tunnel	23
93290	Gas Main Tunnel Nearest to proposed tunnel	23
93300	Gas Main Tunnel Nearest to proposed tunnel	23
93310	Gas Main Tunnel Nearest to proposed tunnel	23
93320	Gas Main Tunnel Nearest to proposed tunnel	23
93330	Gas Main Tunnel Nearest to proposed tunnel	23
93340	Gas Main Tunnel Nearest to proposed tunnel	36
93350	Gas Main Tunnel Nearest to proposed tunnel	34
93360	Gas Main Tunnel Nearest to proposed tunnel	32
93370	Gas Main Tunnel Nearest to proposed tunnel	30
93380	Gas Main Tunnel Nearest to proposed tunnel	28
93390	Gas Main Tunnel Nearest to proposed tunnel	26
93400	Gas Main Tunnel Nearest to proposed tunnel	24
93410	Gas Main Tunnel Nearest to proposed tunnel	20
93420	Gas Main Tunnel Nearest to proposed tunnel	17
93430	Gas Main Tunnel Nearest to proposed tunnel	14

Scenario/ Chainage	Features Affected	Observed PPV (mm/s)
6MIC detonated at the same time		
93180	Gas Main Tunnel Portal	15
93190	Gas Main Tunnel Portal	17
93200	Gas Main Tunnel Portal	25
93210	Gas Main Tunnel Portal	25
93220	Gas Main Tunnel Portal	25
93230	Gas Main Tunnel Portal	25
93240	Gas Main Tunnel Portal	25
93250	Gas Main Tunnel Portal	25
93260	Gas Main Tunnel Portal	25
93270	Gas Main Tunnel Portal	22
93280	Gas Main Tunnel Portal	20
93290	Gas Main Tunnel Portal	18
93300	Gas Main Tunnel Portal	17
93310	Gas Main Tunnel Portal	16
93320	Gas Main Tunnel Portal	16
93330	Gas Main Tunnel Portal	15
93340	Gas Main Tunnel Portal	24
93350	Gas Main Tunnel Portal	23
93360	Gas Main Tunnel Portal	21
93370	Gas Main Tunnel Portal	20
93380	Gas Main Tunnel Portal	19
93390	Gas Main Tunnel Portal	18
93400	Gas Main Tunnel Portal	17
93410	Gas Main Tunnel Portal	14
93220	Gas Main Tunnel Nearest to proposed tunnel	13
93230	Gas Main Tunnel Nearest to proposed tunnel	16
93240	Gas Main Tunnel Nearest to proposed tunnel	19
93250	Gas Main Tunnel Nearest to proposed tunnel	22
93260	Gas Main Tunnel Nearest to proposed tunnel	25
93270	Gas Main Tunnel Nearest to proposed tunnel	25
93280	Gas Main Tunnel Nearest to proposed tunnel	25
93290	Gas Main Tunnel Nearest to proposed tunnel	25
93300	Gas Main Tunnel Nearest to proposed tunnel	25
93310	Gas Main Tunnel Nearest to proposed tunnel	25
93320	Gas Main Tunnel Nearest to proposed tunnel	25
93330	Gas Main Tunnel Nearest to proposed tunnel	25
93340	Gas Main Tunnel Nearest to proposed tunnel	41
93350	Gas Main Tunnel Nearest to proposed tunnel	38
93360	Gas Main Tunnel Nearest to proposed tunnel	36
93370	Gas Main Tunnel Nearest to	33

Scenario/ Chainage	Features Affected	Observed PPV (mm/s)
	proposed tunnel	
93380	Gas Main Tunnel Nearest to proposed tunnel	31
93390	Gas Main Tunnel Nearest to proposed tunnel	29
93400	Gas Main Tunnel Nearest to proposed tunnel	27
93410	Gas Main Tunnel Nearest to proposed tunnel	23
93420	Gas Main Tunnel Nearest to proposed tunnel	19
93430	Gas Main Tunnel Nearest to proposed tunnel	16
93440	Gas Main Tunnel Nearest to proposed tunnel	14

<u>*Ground Vibration Effects on the LPG Gas Station due to Errors in Blast Face*</u>

The following failure scenarios were found to occur based on the maximum allowable PPV of 13 mm/s.

Table 2.16 Features (LPG Gas Station) Affected by Higher than Expected Vibrations Generated by Accidental Initiation during the Construction of Lion Rock Tunnel

Scenario/ Chainage	Features Affected	Observed PPV (mm/s)
3MIC detonated at the same time		
95450	LPG Gas Station	13
95460	LPG Gas Station	15
95470	LPG Gas Station	16
95480	LPG Gas Station	16
95490	LPG Gas Station	16
95500	LPG Gas Station	16
95510	LPG Gas Station	16
95520	LPG Gas Station	16
95530	LPG Gas Station	16
95540	LPG Gas Station	16
95550	LPG Gas Station	15
95560	LPG Gas Station	13
4MIC detonated at the same time		
95430	LPG Gas Station	13
95440	LPG Gas Station	15
95450	LPG Gas Station	16
95460	LPG Gas Station	18
95470	LPG Gas Station	19
95480	LPG Gas Station	19
95490	LPG Gas Station	19
95500	LPG Gas Station	19
95510	LPG Gas Station	19
95520	LPG Gas Station	19
95530	LPG Gas Station	19
95540	LPG Gas Station	19
95550	LPG Gas Station	18

Scenario/ Chainage	Features Affected	Observed PPV (mm/s)
95560	LPG Gas Station	16
95570	LPG Gas Station	15
95580	LPG Gas Station	14
95600	LPG Gas Station	14
95601	LPG Gas Station	13
95602	LPG Gas Station	14
95603	LPG Gas Station	14
95604	LPG Gas Station	14
95605	LPG Gas Station	14
95606	LPG Gas Station	14
95607	LPG Gas Station	14
5MIC detonated at the same time		
95410	LPG Gas Station	13
95420	LPG Gas Station	14
95430	LPG Gas Station	15
95440	LPG Gas Station	17
95450	LPG Gas Station	18
95460	LPG Gas Station	20
95470	LPG Gas Station	21
95480	LPG Gas Station	21
95490	LPG Gas Station	21
95500	LPG Gas Station	21
95510	LPG Gas Station	21
95520	LPG Gas Station	21
95530	LPG Gas Station	21
95540	LPG Gas Station	21
95550	LPG Gas Station	21
95560	LPG Gas Station	18
95570	LPG Gas Station	17
95580	LPG Gas Station	16
95590	LPG Gas Station	15
95600	LPG Gas Station	15
95601	LPG Gas Station	15
95602	LPG Gas Station	16
95603	LPG Gas Station	16
95604	LPG Gas Station	16
95605	LPG Gas Station	16
95606	LPG Gas Station	16
95607	LPG Gas Station	16
6MIC detonated at the same time		
95220	LPG Gas Station	13
95230	LPG Gas Station	14
95240	LPG Gas Station	13
95250	LPG Gas Station	13
95390	LPG Gas Station	13
95400	LPG Gas Station	14
95410	LPG Gas Station	15
95420	LPG Gas Station	16
95430	LPG Gas Station	17
95440	LPG Gas Station	19
95450	LPG Gas Station	20
95460	LPG Gas Station	23
95470	LPG Gas Station	24
95480	LPG Gas Station	24

Scenario/ Chainage	Features Affected	Observed PPV (mm/s)
95490	LPG Gas Station	24
95500	LPG Gas Station	24
95510	LPG Gas Station	24
95520	LPG Gas Station	24
95530	LPG Gas Station	24
95540	LPG Gas Station	24
95550	LPG Gas Station	23
95560	LPG Gas Station	20
95570	LPG Gas Station	19
95580	LPG Gas Station	17
95590	LPG Gas Station	17
95600	LPG Gas Station	17
95601	LPG Gas Station	17
95602	LPG Gas Station	17
95603	LPG Gas Station	18
95604	LPG Gas Station	18
95605	LPG Gas Station	18
95606	LPG Gas Station	18
95607	LPG Gas Station	18

Further consequence analysis was carried out on the LPG Gas Station to assess the risks on population due to gas leak hazards; see *Section 3.1.6*.

Ground Vibration Effect on Towngas Pipelines due to Errors in Blast Face

Ground vibration effect on the Towngas Pipeline is shown in the following table.

Table 2.17 Features (Towngas Pipelines) Affected by Higher than Expected Vibrations Generated by Accidental Initiation during the Construction of Lion Rock Tunnel

Scenario/ Chainage	Features Affected	Observed PPV (mm/s)
3MIC detonated at the same time		
93200	Towngas Pipeline (15)	26
93200	Towngas Pipeline (16)	25
4MIC detonated at the same time		
93200	Towngas Pipeline (14)	29
93210	Towngas Pipeline (14)	26
93180	Towngas Pipeline (15)	29
93190	Towngas Pipeline (15)	26
93200	Towngas Pipeline (15)	31
93210	Towngas Pipeline (15)	27
93180	Towngas Pipeline (16)	27
93200	Towngas Pipeline (16)	30
93210	Towngas Pipeline (16)	26
93200	Towngas Pipeline (17)	25
5MIC detonated at the same time		
93180	Towngas Pipeline (14)	27
93190	Towngas Pipeline (14)	26

Scenario/ Chainage	Features Affected	Observed PPV (mm/s)
93200	Towngas Pipeline (14)	33
93210	Towngas Pipeline (14)	30
93220	Towngas Pipeline (14)	28
93230	Towngas Pipeline (14)	26
93240	Towngas Pipeline (14)	25
93180	Towngas Pipeline (15)	33
93190	Towngas Pipeline (15)	30
93200	Towngas Pipeline (15)	36
93210	Towngas Pipeline (15)	31
93220	Towngas Pipeline (15)	28
93230	Towngas Pipeline (15)	27
93240	Towngas Pipeline (15)	26
93180	Towngas Pipeline (16)	31
93190	Towngas Pipeline (16)	28
93200	Towngas Pipeline (16)	34
93210	Towngas Pipeline (16)	30
93220	Towngas Pipeline (16)	28
93230	Towngas Pipeline (16)	26
93240	Towngas Pipeline (16)	25
93200	Towngas Pipeline (17)	29
93210	Towngas Pipeline (17)	26
6MIC detonated at the same time		
93200	Towngas Pipeline (13)	26
93210	Towngas Pipeline (13)	25
93220	Towngas Pipeline (13)	25
93230	Towngas Pipeline (13)	25
93240	Towngas Pipeline (13)	25
93250	Towngas Pipeline (13)	25
93340	Towngas Pipeline (13)	25
93180	Towngas Pipeline (14)	30
93190	Towngas Pipeline (14)	29
93200	Towngas Pipeline (14)	37
93210	Towngas Pipeline (14)	33
93220	Towngas Pipeline (14)	31
93230	Towngas Pipeline (14)	29
93240	Towngas Pipeline (14)	28
93250	Towngas Pipeline (14)	28
93260	Towngas Pipeline (14)	27
93340	Towngas Pipeline (14)	26
93180	Towngas Pipeline (15)	37
93190	Towngas Pipeline (15)	34
93200	Towngas Pipeline (15)	40
93210	Towngas Pipeline (15)	35
93220	Towngas Pipeline (15)	32
93230	Towngas Pipeline (15)	30
93240	Towngas Pipeline (15)	29
93250	Towngas Pipeline (15)	28
93260	Towngas Pipeline (15)	27
93340	Towngas Pipeline (15)	25
93180	Towngas Pipeline (16)	35
93190	Towngas Pipeline (16)	32
93200	Towngas Pipeline (16)	38
93210	Towngas Pipeline (16)	34
93220	Towngas Pipeline (16)	31

Scenario/ Chainage	Features Affected	Observed PPV (mm/s)
93230	Towngas Pipeline (16)	29
93240	Towngas Pipeline (16)	28
93250	Towngas Pipeline (16)	27
93260	Towngas Pipeline (16)	26
93180	Towngas Pipeline (17)	28
93190	Towngas Pipeline (17)	26
93200	Towngas Pipeline (17)	33
93210	Towngas Pipeline (17)	29
93220	Towngas Pipeline (17)	28
93230	Towngas Pipeline (17)	26
93240	Towngas Pipeline (17)	26
93250	Towngas Pipeline (17)	25

Ground Vibration Effect on Features due to Detonation of Full Load during the Transfer of Explosives from Delivery Point to Blast Site

The calculation for ground vibrations follows the equation given in *Section 1.4.3* with a value of K = 200. The effect from ground vibrations caused by the denotation of 156 TNT eqv.kg and 194 TNT eqv.kg of explosives within the tunnel whilst transferring explosives to the appropriate blast site was found not causing any damage to any of the sensitive receivers.

Blast Effects on Features due to Detonation of Full Load during the Transfer of Explosives from Delivery Point to Blast Site

Blast effects due to the detonation of a full load during the transfer of explosives are summarised in *Table 2.18.*

Table 2.18 ***Summary of Blast Effect Associated with Transport of Explosives from Delivery Point to Blast Site at Lion Rock Tunnel***

Scenario	Description	TNT eqv. (kg)	Freq. (/yr)	*Indoor* Fatality Prob.	*Indoor* Impact distance (m)	*Outdoor* Fatality Prob.	*Outdoor* Impact distance (m)
D01	Initiation of explosives during explosives delivery from delivery point at Hin Tin Street to Hin Keng Portal	194	1.02E-08	90%	18	90%	14
				50%	21	50%	15
				10%	31	10%	17
				3%	41	3%	18
				1%	54	1%	19
D02	Initiation of explosives during explosives delivery from Hin Keng Portal to blast site	194	5.63E-07	90%	18	90%	14
				50%	21	50%	15
				10%	31	10%	17
				3%	41	3%	18
				1%	54	1%	19
D03	Initiation of explosives during explosives	156	2.28E-08	90%	17	90%	13
				50%	19	50%	14

delivery from Ma Chai Hang Ventilation Building to blast site	10%	29	10%	15
	3%	38	3%	16
	1%	50	1%	17

Ground Vibration Effect on Towngas Installations due to Detonation of Full Load during the Transfer of Explosives from Delivery Point to Blast Site

Beacon Hill North Gas Offtake Station

The highest probability of damage to the Beacon Hill North Gas Offtake Station is 1%. This probability of damage was determined based on the calculated vibration level (PPV) on the offtake station from full load detonation (i.e. 200 kg explosives) compared to the conservative criteria as developed in *Section 5.3.3* of the approved SCL EIA. It was found that a length of 20 m along the delivery route could cause the vibration (with 13 mm/s ≤ PPV level < 32.5 mm/s) on the gas offtake station up to a 1% probability of damage of its pipeworks, valves and flanges at the station. *Table 2.19* summarizes the results for effect of ground vibration on the offtake station.

Table 2.19 Consequence of Ground Vibration Effect on Beacon Hill North Gas Offtake Station from Full Load Detonation during Construction of Lion Rock Tunnel

Scenario	Frequency (/yr)	Travel Distance along Delivery Route (m)
Full load detonation along delivery route causing 1% damage to the offtake station by vibration effect	5.22E-10	30

Towngas Pipelines

A 2-D analysis was carried out for risk assessment of Towngas pipelines since this gives a conservative result compared to when elevation is considered in the assessment. The probabilities of damage to the pipelines were determined based on the calculated vibration level (PPV) on the pipes from full load detonation (i.e. 200 kg explosives) compared to the conservative criteria as developed in Section 5.3.5 of the approved SCL EIA Appendix 13B. *Table 2.20* summarizes the results. Note that in all cases the pipes were modelled as a 7 barg 600 mm gas main for conservatism.

Table 2.20 Consequence of Ground Vibration Effect on Towngas Pipelines from Full Load Detonation during Construction of Lion Rock Tunnel

Scenario	Frequency (/yr)	Travel Distance along Delivery Route (m)
Full load detonation along delivery route causing 1% damage to towngas pipelines around Hin Keng Portal by vibration effect	7.66E-08	70

Blast Effects on Towngas Installations due to Detonation of Full Load during the Transfer of Explosives Along Access Path

Based on the 39 m hazard distance described in Section 5.3.3 of the approved SCL EIA Appendix 13B, there is no risk of full pipe rupture at Beacon Hill North Gas Offtake Station caused by blast effects when 200 kg of explosives is detonated along the access path to Hin Keng Portal since the nearest point of the delivery route is 52 m away from the station.

For the aboveground gas mains, the blast effects resulting from a full load detonation is shown in *Table 2.21*.

Table 2.21 Consequence of Blast Effects on Towngas Pipelines from Full Load Detonation during Construction of Lion Rock Tunnel

Scenario	Frequency (/ yr)	Travel Distance along Access Path (m)
Full load detonation along delivery route causing 1% damage to towngas pipelines around Hin Keng Portal by blast effect	9.90E-09	39

Further consequence analysis was carried out on the pipelines to assess the risks on population due to gas leak hazards; see *Section 3*.

3 RISK RESULTS

3.1 OVERVIEW

The risks (societal and individual) arising from the proposed change in delivery schedule under Contact 1103 has been assessed following the methodology of the SCL EIA (MTR, 2012). The study is based on a number of assumptions and these uncertainties are given in the SCL EIA (MTR, 2012).

The ERM's in-house software has been used for risk calculation and summation in accordance with the SCL EIA (MTR, 2012) methodology. This integrates the risks associated with the transport, storage and use of explosives to the works areas, including the risks to other road users, nearby buildings, sensitive receivers and outdoor population.

Although the blasting operation of the whole SCL (TAW-HUH) project will be carried out in a period longer than 12 months, it was conservatively assumed that all the scenarios leading to failure would occur in the same year (12 months).

The two types of risk measures considered are societal and individual risks.

3.1.1 *Societal Risk*

Societal risk is defined as the risk to a group of people due to all hazards arising from a hazardous installation or activity. The simplest measure of societal risk is the Rate of Death or Potential Loss of Life (PLL), which represents the predicted equivalent fatalities per year:

$$PLL = f_1N_1 + f_2N_2 + f_3N_3 + \ldots + f_nN_n$$

where f_i is the frequency and N_i the number of fatalities for each hazardous outcome event.

Societal risk can also be expressed in the form of an F-N curve, which represents the cumulative frequency (F) of all event outcomes leading to N or more fatalities. This representation of societal risk highlights the potential for accidents involving large numbers of fatalities.

3.1.2 POTENTIAL LOSS OF LIFE

Table 3.1 and *Table 3.2* below show the PLL values for the Revised Case and the approved Worst Case for the LRT respectively due to the blasting activities in terms of transport, storage and use of explosives. It can be seen that the risk level of the Revised Case (PLL = 4.18E-4/year) is below that of the approved Worst Case (PLL = 4.55E-4/year).

The proposed temporary magazine storage site (TKO 137) has negligible contribution to the overall risks since it is located in a remote area with very

low population density nearby. The delivery to Hin Keng Portal (HIK) accounts for approximately 82% of the overall risk, with the remaining 16% attributed to the delivery to Ma Chai Hang Ventilation Building. This can be explained by longer transport distances, more number of trips and higher explosive loads to the HIK comparing to MCV. The use of explosives accounts for about 1.36% in overall.

Table 3.1 PLL for Revised Case

Case: Revised Case	PLL (per year)	Contribution (%)
Transport of Explosives		
TKO Area 137 Magazine to Hin Keng Portal	3.44E-04	82.21%
TKO Area 137 Magazine to Ma Chai Hang Ventilation Building	6.78E-05	16.20%
Storage of Explosives		
Tseung Kwan O (TKO) Area 137 Magazine	9.17E-07	0.22%
Use of Explosives		
Construction of Lion Rock Tunnel (Ground shock from blast face)	5.44E-06	1.30%
Full load detonation of explosives during transport to blast faces for Lion Rock Tunnel (Blast effect)	1.56E-07	0.04%
Full load detonation of explosives during transport to blast faces for Lion Rock Tunnel (Ground shock)	2.06E-08	0.00%
Gas piping rupture due to Ground shock and Blast effect (Tertiary Effect)	1.04E-07	0.02%
LPG Gas Station Failure (Tertiary Effect)	4.58E-09	0.00%
Total	4.18E-04	100%

Table 3.2 PLL for Worst Case in the approved SCL EIA (MTR, 2012)

Case: Worst Case in the approved SCL EIA (MTR, 2012)	PLL (per year)	Contribution (%)
Transport of Explosives		
TKO Area 137 Magazine to Hin Keng Portal	2.32E-04	50.95%
TKO Area 137 Magazine to Ma Chai Hang Ventilation Building	2.16E-04	47.44%
Storage of Explosives		
Tseung Kwan O (TKO) Area 137 Magazine	9.17E-07	0.20%
Use of Explosives		
Construction of Lion Rock Tunnel (Ground shock from blast face)	5.68E-06	1.25%
Full load detonation of explosives during transport to blast faces for Lion Rock Tunnel (Blast effect)	4.09E-07	0.09%
Full load detonation of explosives during transport to blast faces for Lion Rock Tunnel (Ground shock)	1.03E-08	0.00%
Gas piping rupture due to Ground shock and Blast effect (Tertiary Effect)	1.90E-07	0.04%
LPG Gas Station Failure (Tertiary Effect)	1.28E-07	0.03%
Total	4.55E-04	100%

Notes: The PLL in this table takes into account the risk associated with blasting activity for Lion Rock Tunnel only, Ho Man Tin tunnel is excluded as discussed in *section 1.2*.

3.1.3 *F-N CURVES*

Figure 3.1 shows a comparison of the F-N curves for the overall risk of LRT construction due to the storage, transport and use of explosives. The red line represents the Worst Case in the approved SCL EIA (MTR, 2012), and the blue line represents the Revised Case for Contract 1103. It can be seen that the Revised Case F-N curve lies within the envelope of the approved Worst Case F-N curve.

The Revised Case represents the risks associated with the proposed blasting activity options, whereas the approved Worst Case has considered the combination of a 20% increase in the number of deliveries of the Base Case scenario (MTR, 2012). It can be seen that for both cases the risks lie in the lower ALARP region.

Figure 3.1 F-N Curves for Transport, Storage and Use of Explosives for Lion Rock Tunnel construction

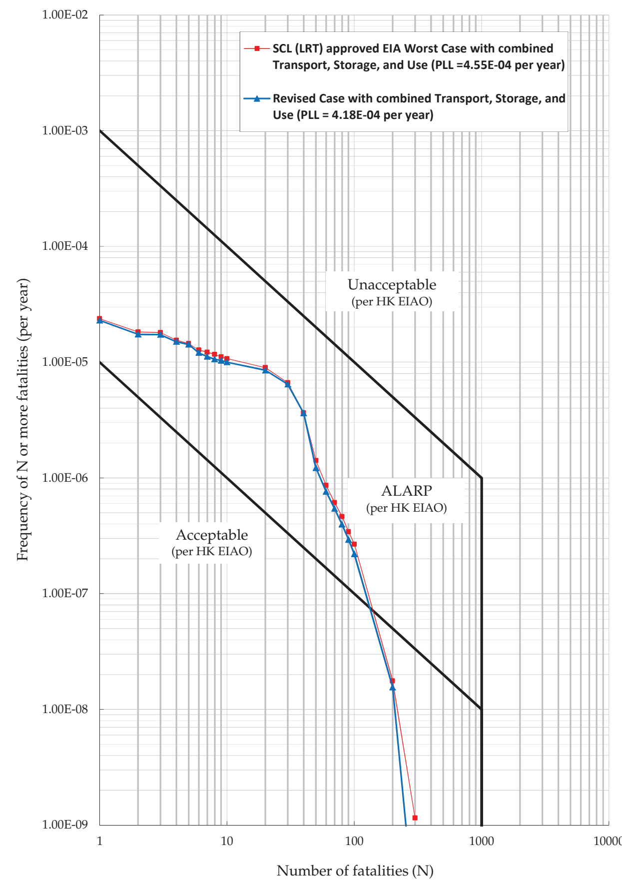


Figure 3.2 shows the contribution of storage, transport and use of explosives to the overall risk to the Contract 1103 taken into account the proposed blasting activity options.

The Revised Case includes the TKO Area 137 Magazine stores and the associated transport routes to the two works areas. It can be seen that risks from the temporary magazine are negligible compared to transport risks. This is consistent with the comments made in relation to the PLL. Population in the vicinity of the magazine sites is very low and hence the societal risks are small. The risk associated with the use of explosives lies in the acceptable region, whereas the risk associated with the transport of explosives lie in the lower ALARP region.

Figure 3.2 ***F-N Curves Incorporating the Proposed Changes - Contribution of Storage, Transport and Use of Explosives to the Overall Risk***

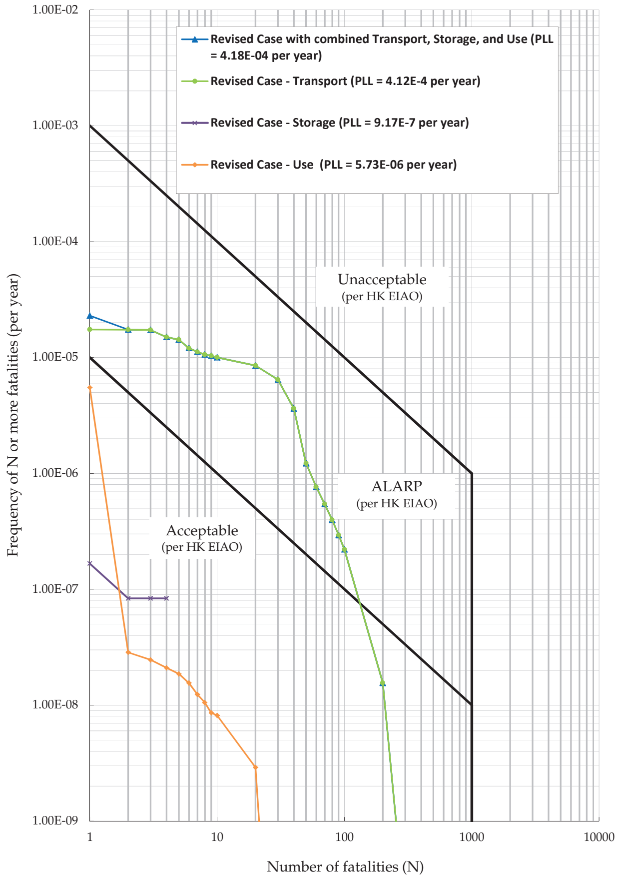


Figure 3.3 provides a breakdown by population type for the Revised Case. As expected, the highest risks are associated with other road users and this dominates the overall F-N curve, particularly for the low *N* scenarios. 79.1% of the PLL (3.26×10^{-4} per year compared to the total of 4.12×10^{-4} per year) is

related to population in vehicles. This is to be expected since the hazard effects from explosions diminish quickly with distance from the explosives truck. Scenarios involving high numbers of fatalities are related to fatalities in buildings close to the road.

The F-N curves show risks in the ALARP region and mitigation measures need to be considered to reduce the risks. These have been adequately considered in the approved SCL EIA (MTR, 2012, details refer to Section 10 of Appendix 13A) and remain valid for Contract 1103.

Figure 3.3 F-N Curve for the Revised Case with Breakdown by Population Type

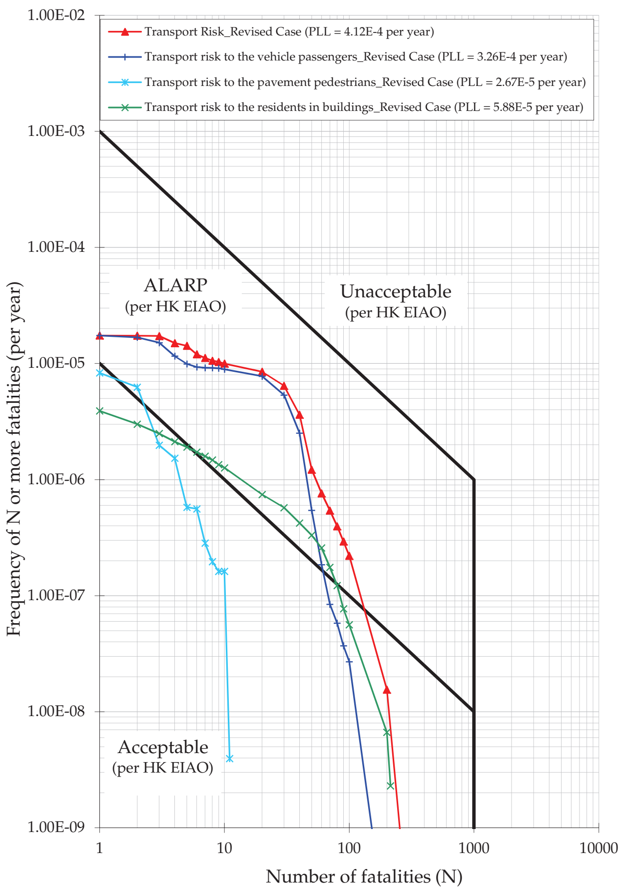
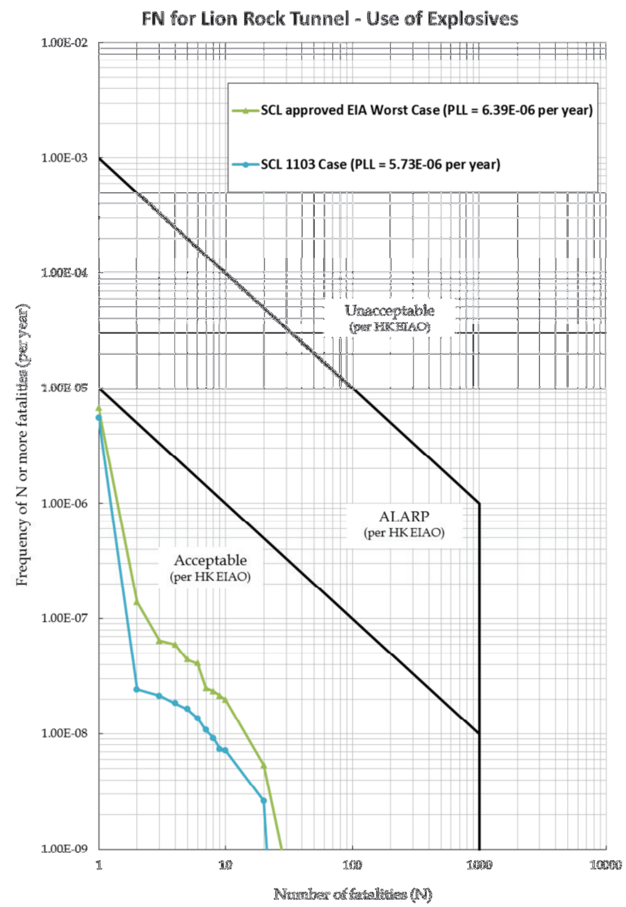


Figure 3.4 compares the F-N curves for the use of explosives of this reassessment with the worst case in the previously approved SCL EIA (TAW-HUH) Project. It can be seen that the risk with the proposed changes lies in the acceptable region within the envelope of the worst case of the approved SCL EIA (MTR, 2012).

Figure 3.4 F-N Curve for Use of Explosives



3.1.4 *INDIVIDUAL RISK FOR TRANSPORT OF EXPLOSIVES*

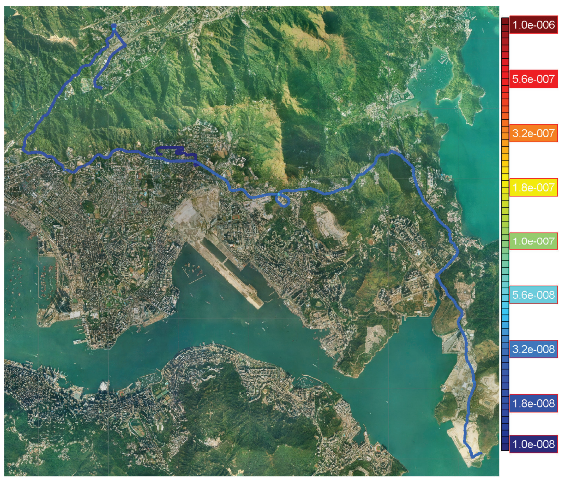
The individual risk (IR) for each section of the transport route is listed in *Table 3.3*. The same data is shown graphically in *Figure 3.5*. These data take into account that some road sections are common to several transport routes; the IR is roughly proportional to the frequency of explosives trucks travelling along the road. The IR data represent the maximum individual risk, occurring on the road in the same lane as the explosives delivery truck. It can be seen that the maximum IR is about 5.47×10^{-8} per year. This is a low risk when compared to Hong Kong Risk Guidelines which require the offsite IR from a fixed installation to be below 10^{-5} per year. The low values of IR are due to the fact that the risk at any given fixed location along the route is transitory.

Table 3.3 Maximum Individual Risk for Each Section of the Transport Routes from Tseung Kwan O Area 137 Magazine (Revised Case)

Section ID	Description	Maximum IR (per year)
Route 1d (TKO Area 137 Magazine – Ma Chai Hang Ventilation Building)		
road 1d1	TKO Area 137 Magazine Site Track	2.98E-08
road 1d2	Wan Po Road (Chun Yat St- Chiu Shun Rd)	3.3E-08
road 1d3a	Wan Po Road (Chun Yat St- Chiu Shun Rd)	2.83E-08
road 1d3b	Chiu Shun Road (Wan Po Rd - Ngan O Rd)	2.81E-08
road 1d4	Chiu Shun Road (Ngan O Rd - Po Ning Rd)	2.85E-08
road 1d5	Hang Hau Road	2.88E-08
road 1d6a	Clear Water Bay Road (Hang Hau - Hiram's Highway)	2.84E-08
road 1d6b	Clear Water Bay Road (Hiram's Highway - Anderson Road)	5.47E-08
road 1d7	Clear Water Bay Road (Anderson Road - New Clear Water Bay Rd Eastern Junction)	5.18E-08
road 1d8	New Clear Water Bay Road (Eastern Junction - Shun Lee Street)	2.77E-08
road 1d9	New Clear Water Bay Road (Shun Lee Street - Western Junction)	2.8E-08
road 1d10a	Clear Water Bay Road (New Clear Water Bay Rd Western Junction - Lung Cheung Rd)	2.82E-08
road 1d10b	Lung Cheung Rd (Clear Water Bay Rd - Wong Kuk Ave)	2.81E-08
road 1d10c	Lung Cheung Rd (Wong Kuk Ave - Hammer Hill Rd)	2.81E-08
road 1d11	Lung Cheung Rd (Hammer Hill Rd - Po Kong Village Rd)	2.61E-08
road 1d12	Po Kong Village Rd (Lung Cheung Rd - Fung Tak Rd)	6.94E-09
road 1d13	Fung Tak Rd (Po Kong Village Rd - Sheung Fung St)	7.65E-09
road 1d14	Wong Tai Sin Rd + Fung Tak Rd (Sheung Fung St - Ma Chai Hang Rd)	7.27E-09
road 1d15	Nga Chuk St	6.89E-09
road 1d16	Chuk Yuen Rd (Nga Chuk St - Ma Chai Hang Rd)	6.79E-09
Route 1v (TKO Area 137 Magazine – Hin Keng Portal)		
road 1v1	TKO Area 137 Magazine Site Track	2.98E-08
road 1v2	Wan Po Road (Chun Yat St- Chiu Shun Rd)	3.3E-08
road 1v3a	Chiu Shun Road (Wan Po Rd - Ngan O Rd)	2.83E-08
road 1v3b	Chiu Shun Road (Ngan O Rd - Po Ning Rd)	2.81E-08
road 1v4	Hang Hau Road	2.85E-08
road 1v5	Clear Water Bay Road (Hang Hau - Hiram's Highway)	2.88E-08
road 1v6a	Clear Water Bay Road (Hiram's Highway - Anderson Road)	2.84E-08
road 1v6b	Clear Water Bay Road (Anderson Road - New Clear Water Bay Rd Eastern Junction)	5.47E-08

Section ID	Description	Maximum IR (per year)
road 1v7	New Clear Water Bay Road (Eastern Junction - Shun Lee Street)	5.18E-08
road 1v8	New Clear Water Bay Road (Shun Lee Street - Western Junction)	2.77E-08
road 1v9	Clear Water Bay Road (New Clear Water Bay Rd Western Junction - Lung Cheung Rd)	2.8E-08
road 1v10a	Lung Cheung Rd (Clear Water Bay Rd - Wong Kuk Ave)	2.82E-08
road 1v10b	Lung Cheung Rd (Wong Kuk Ave - Hammer Hill Rd)	2.81E-08
road 1v10c	Lung Cheung Rd (Hammer Hill Rd - Po Kong Village Rd)	2.76E-08
road 1v11a	Lung Cheung Rd (Po Kong Village Rd - Fung Mo St)	2.25E-08
road 1v11b	Lung Cheung Rd (Fung Mo St - Waterloo Rd)	2.17E-08
road 1v11c	Lung Cheung Rd (Lion Rock Tunnel Rd - Nam Cheong St)	2.21E-08
road 1v11d	Lung Cheung Rd / Cornwall St (Nam Cheong St - Tai Po Rd)	3.08E-08
road 1v12a	Tai Po Rd (Lung Cheung Rd - Tai Po Rd Int)	2.12E-08
road 1v12b	Tai Po Rd (Tai Po Rd Int - Caldecott Rd)	2.22E-08
road 1v12c	Tai Po Rd - Shatin Heights (Caldecott Rd - Keng Hau Rd)	2.23E-08
road 1v12d	Tai Po Rd - Shatin Heights (Keng Hau Rd - Shing Ho Rd)	4.06E-08
road 1v13a	Mei Tin Rd (Tai Po Rd (Tai Wai) - Tsuen Nam Rd)	4.21E-08
road 1v13b	Mei Tin Rd (Tsuen Nam Rd - Che Kung Miu Rd)	2.21E-08
road 1v14a	Che Kung Miu Rd (Mei Tin Rd - Tin Sam St)	2.16E-08
road 1v14b	Che Kung Miu Rd (Tin Sam St - Hin Keng St)	2.16E-08
road 1v15	Hin Keng Estate Access Rd	2.17E-08

Figure 3.5 ***Maximum IR for the Delivery Routes from Tseung Kwan O Area 137 Magazine (Revised Case)***

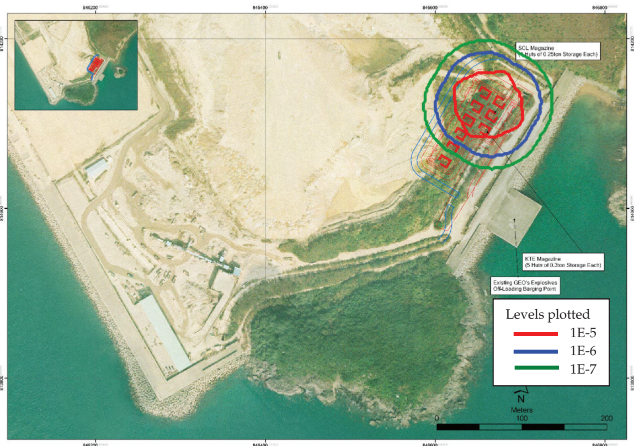


3.1.5 *INDIVIDUAL RISK FOR STORAGE OF EXPLOSIVES*

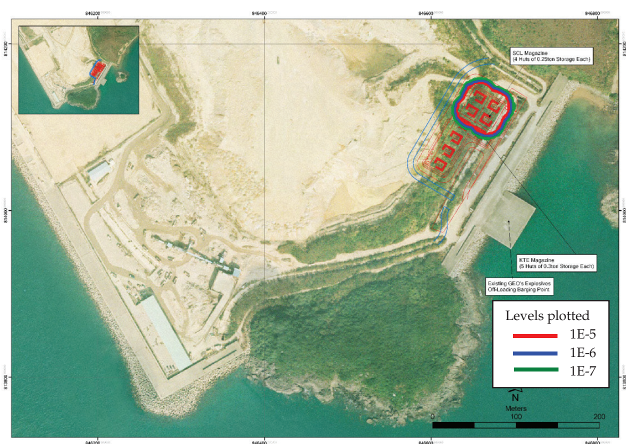
For the temporary Magazine store, individual risk contours have been plotted and overlaid on plot layouts for TKO Area 137 site (*Figure 3.6*). IR contours (assuming a risk exposure factor of 100%) have been presented for both outdoor and indoor populations, with the 10-5 per year contour extending offsite in both cases. It is concluded that the IR is similar to the SCL EIA (MTR, 2012) and the actual risk to any individual satisfies the 10-5 per year criterion and is deemed to be acceptable.

Figure 3.6 *IR of the Tseung Kwan O Area 137 Magazine*

Indoor Population



Outdoor Population



3.1.6 *RISK RESULTS FOR USE OF EXPLOSIVES*

The frequency of occurrence of more than 3 to 6 MIC detonated at the same time has been derived on a per 10-m and a per 5-m basis (see *Table 2.6*). The relevant length of the chainage that impact the feature as identified in the

consequence assessment was then used to obtain the frequency of the hazard footprints.

The hazard footprints at each interval of the relevant chainage were then overlaid on each particular feature to estimate the number of fatalities due to falling objects in buildings, or failure of slopes/ boulders.

The resulting risk for every interval of the relevant chainage is summed to determine the overall risk to a particular feature and the risks of all relevant features are summed to give the overall risk due to the proposed changes in blasting operation for the LRT section of the SCL (TAW-HUH) project.

Ground Vibration Effect on Slopes due to Errors in Blasting Face

No slopes were found to exceed a PPV of 90mm/s due to accidental initiation of up to 6MIC during the construction of the Lion Rock Tunnel.

Ground Vibration Effect on Buildings due to Errors in the Blasting Face

The results of the scenario frequencies and expected fatalities for the affected building features arising from an accidental initiation of explosives in the blasting face are summarized in *Table 3.7* below.

Table 3.4 ***Buildings Affected by Higher than Expected Vibrations Generated by Accidental Initiation during the Construction of Lion Rock Tunnel***

Scenario/ Chainage	Features Affected	Scenario Frequency (/yr)(1)	Expected Fatality (N)(2)	Remarks
4MIC detonated at the same time				
93610	High Island Water Tunnel	4.11E-09	1	-
93620	High Island Water Tunnel	4.11E-09	1	-
5MIC detonated at the same time				
93600	High Island Water Tunnel	4.11E-09	1	-
93610	High Island Water Tunnel	4.11E-09	1	-
93620	High Island Water Tunnel	4.11E-09	1	-
93630	High Island Water Tunnel	4.11E-09	1	-
6MIC detonated at the same time				
93600	High Island Water Tunnel	4.11E-09	1	-
93610	High Island Water Tunnel	4.11E-09	1	-
93620	High Island Water Tunnel	4.11E-09	1	-
93630	High Island Water Tunnel	4.11E-09	1	-
93640	High Island Water Tunnel	4.11E-09	1	-

Note:

(1) This value is obtained from *Table 2.6*. For the concern section which is less than 10 m, the frequency will be adjusted accordingly.

(2) Expected fatality = Population x Fatality rate. The Fatality rate is interpolated (between 1% and 100%) for PPV between 100 mm/s and 229 mm/s.

Ground Vibration Effect on Old Beacon Hill Tunnel due to Errors in Blast Face

The results of the scenario frequencies and probability of damage to then Old Beacon Hill Tunnel due to ground shocks generated because of errors in the blasting faces are summarized in the following table.

Table 3.5 ***Features (Old Beacon Hill Tunnel) Affected by Higher than Expected Vibrations Generated by Accidental Initiation during the Construction of Lion Rock Tunnel***

Scenario/ Chainage	Features Affected	Scenario Frequency (/yr)	Probability of Damage
2MIC detonated at the same time			
93340	Gas Main Tunnel Nearest to proposed tunnel	3.76E-04	5%
93350	Gas Main Tunnel Nearest to proposed tunnel	3.76E-04	4%
93360	Gas Main Tunnel Nearest to proposed tunnel	3.76E-04	3%
93370	Gas Main Tunnel Nearest to proposed tunnel	3.76E-04	3%
93380	Gas Main Tunnel Nearest to proposed tunnel	3.76E-04	2%
93390	Gas Main Tunnel Nearest to proposed tunnel	3.76E-04	2%
93400	Gas Main Tunnel Nearest to proposed tunnel	3.76E-04	1%
3MIC detonated at the same time			
93200	Gas Main Tunnel Portal	5.97E-07	3%
93210	Gas Main Tunnel Portal	5.97E-07	3%
93220	Gas Main Tunnel Portal	5.97E-07	3%
93230	Gas Main Tunnel Portal	5.97E-07	3%
93240	Gas Main Tunnel Portal	5.97E-07	3%
93250	Gas Main Tunnel Portal	5.97E-07	3%
93260	Gas Main Tunnel Portal	5.97E-07	2%
93270	Gas Main Tunnel Portal	5.97E-07	2%
93340	Gas Main Tunnel Portal	5.97E-07	2%
93350	Gas Main Tunnel Portal	5.97E-07	2%
93360	Gas Main Tunnel Portal	5.97E-07	1%
93370	Gas Main Tunnel Portal	5.97E-07	1%
93250	Gas Main Tunnel Nearest to proposed tunnel	5.97E-07	2%
93260	Gas Main Tunnel Nearest to proposed tunnel	5.97E-07	3%
93270	Gas Main Tunnel Nearest to proposed tunnel	5.97E-07	3%
93280	Gas Main Tunnel Nearest to proposed tunnel	5.97E-07	3%
93290	Gas Main Tunnel Nearest to proposed tunnel	5.97E-07	3%
93300	Gas Main Tunnel Nearest to proposed tunnel	5.97E-07	3%
93310	Gas Main Tunnel Nearest to proposed tunnel	5.97E-07	3%
93320	Gas Main Tunnel Nearest to proposed tunnel	5.97E-07	3%

Scenario/ Chainage	Features Affected	Scenario Frequency (/yr)	Probability of Damage
93330	Gas Main Tunnel Nearest to proposed tunnel	5.97E-07	3%
93340	Gas Main Tunnel Nearest to proposed tunnel	5.97E-07	7%
93350	Gas Main Tunnel Nearest to proposed tunnel	5.97E-07	7%
93360	Gas Main Tunnel Nearest to proposed tunnel	5.97E-07	6%
93370	Gas Main Tunnel Nearest to proposed tunnel	5.97E-07	5%
93380	Gas Main Tunnel Nearest to proposed tunnel	5.97E-07	4%
93390	Gas Main Tunnel Nearest to proposed tunnel	5.97E-07	4%
93400	Gas Main Tunnel Nearest to proposed tunnel	5.97E-07	3%
93410	Gas Main Tunnel Nearest to proposed tunnel	5.97E-07	2%
4MIC detonated at the same time			
93190	Gas Main Tunnel Portal	4.11E-09	1%
93200	Gas Main Tunnel Portal	4.11E-09	4%
93210	Gas Main Tunnel Portal	4.11E-09	4%
93220	Gas Main Tunnel Portal	4.11E-09	4%
93230	Gas Main Tunnel Portal	4.11E-09	4%
93240	Gas Main Tunnel Portal	4.11E-09	4%
93250	Gas Main Tunnel Portal	4.11E-09	4%
93260	Gas Main Tunnel Portal	4.11E-09	4%
93270	Gas Main Tunnel Portal	4.11E-09	3%
93280	Gas Main Tunnel Portal	4.11E-09	2%
93290	Gas Main Tunnel Portal	4.11E-09	1%
93300	Gas Main Tunnel Portal	4.11E-09	1%
93340	Gas Main Tunnel Portal	4.11E-09	4%
93350	Gas Main Tunnel Portal	4.11E-09	3%
93360	Gas Main Tunnel Portal	4.11E-09	3%
93370	Gas Main Tunnel Portal	4.11E-09	2%
93380	Gas Main Tunnel Portal	4.11E-09	2%
93390	Gas Main Tunnel Portal	4.11E-09	1%
93240	Gas Main Tunnel Nearest to proposed tunnel	4.11E-09	2%
93250	Gas Main Tunnel Nearest to proposed tunnel	4.11E-09	3%
93260	Gas Main Tunnel Nearest to proposed tunnel	4.11E-09	4%
93270	Gas Main Tunnel Nearest to proposed tunnel	4.11E-09	4%
93280	Gas Main Tunnel Nearest to proposed tunnel	4.11E-09	4%
93290	Gas Main Tunnel Nearest to proposed tunnel	4.11E-09	4%
93300	Gas Main Tunnel Nearest to proposed tunnel	4.11E-09	4%
93310	Gas Main Tunnel Nearest to proposed tunnel	4.11E-09	4%
93320	Gas Main Tunnel Nearest to proposed tunnel	4.11E-09	4%
93330	Gas Main Tunnel Nearest to	4.11E-09	4%

Scenario/ Chainage	Features Affected	Scenario Frequency (/yr)	Probability of Damage
	proposed tunnel		
93340	Gas Main Tunnel Nearest to proposed tunnel	4.11E-09	10%
93350	Gas Main Tunnel Nearest to proposed tunnel	4.11E-09	9%
93360	Gas Main Tunnel Nearest to proposed tunnel	4.11E-09	8%
93370	Gas Main Tunnel Nearest to proposed tunnel	4.11E-09	7%
93380	Gas Main Tunnel Nearest to proposed tunnel	4.11E-09	6%
93390	Gas Main Tunnel Nearest to proposed tunnel	4.11E-09	6%
93400	Gas Main Tunnel Nearest to proposed tunnel	4.11E-09	5%
93410	Gas Main Tunnel Nearest to proposed tunnel	4.11E-09	3%
93420	Gas Main Tunnel Nearest to proposed tunnel	4.11E-09	2%
5MIC detonated at the same time			
93180	Gas Main Tunnel Portal	4.11E-09	1%
93190	Gas Main Tunnel Portal	4.11E-09	2%
93200	Gas Main Tunnel Portal	4.11E-09	5%
93210	Gas Main Tunnel Portal	4.11E-09	5%
93220	Gas Main Tunnel Portal	4.11E-09	5%
93230	Gas Main Tunnel Portal	4.11E-09	5%
93240	Gas Main Tunnel Portal	4.11E-09	5%
93250	Gas Main Tunnel Portal	4.11E-09	5%
93260	Gas Main Tunnel Portal	4.11E-09	5%
93270	Gas Main Tunnel Portal	4.11E-09	4%
93280	Gas Main Tunnel Portal	4.11E-09	3%
93290	Gas Main Tunnel Portal	4.11E-09	2%
93300	Gas Main Tunnel Portal	4.11E-09	2%
93310	Gas Main Tunnel Portal	4.11E-09	2%
93320	Gas Main Tunnel Portal	4.11E-09	1%
93330	Gas Main Tunnel Portal	4.11E-09	1%
93340	Gas Main Tunnel Portal	4.11E-09	5%
93350	Gas Main Tunnel Portal	4.11E-09	4%
93360	Gas Main Tunnel Portal	4.11E-09	4%
93370	Gas Main Tunnel Portal	4.11E-09	3%
93380	Gas Main Tunnel Portal	4.11E-09	3%
93390	Gas Main Tunnel Portal	4.11E-09	2%
93400	Gas Main Tunnel Portal	4.11E-09	2%
93230	Gas Main Tunnel Nearest to proposed tunnel	4.11E-09	2%
93240	Gas Main Tunnel Nearest to proposed tunnel	4.11E-09	3%
93250	Gas Main Tunnel Nearest to proposed tunnel	4.11E-09	4%
93260	Gas Main Tunnel Nearest to proposed tunnel	4.11E-09	5%
93270	Gas Main Tunnel Nearest to proposed tunnel	4.11E-09	5%
93280	Gas Main Tunnel Nearest to proposed tunnel	4.11E-09	5%

Scenario/ Chainage	Features Affected	Scenario Frequency (/yr)	Probability of Damage
93290	Gas Main Tunnel Nearest to proposed tunnel	4.11E-09	5%
93300	Gas Main Tunnel Nearest to proposed tunnel	4.11E-09	5%
93310	Gas Main Tunnel Nearest to proposed tunnel	4.11E-09	5%
93320	Gas Main Tunnel Nearest to proposed tunnel	4.11E-09	5%
93330	Gas Main Tunnel Nearest to proposed tunnel	4.11E-09	5%
93340	Gas Main Tunnel Nearest to proposed tunnel	4.11E-09	15%
93350	Gas Main Tunnel Nearest to proposed tunnel	4.11E-09	12%
93360	Gas Main Tunnel Nearest to proposed tunnel	4.11E-09	10%
93370	Gas Main Tunnel Nearest to proposed tunnel	4.11E-09	9%
93380	Gas Main Tunnel Nearest to proposed tunnel	4.11E-09	8%
93390	Gas Main Tunnel Nearest to proposed tunnel	4.11E-09	7%
93400	Gas Main Tunnel Nearest to proposed tunnel	4.11E-09	6%
93410	Gas Main Tunnel Nearest to proposed tunnel	4.11E-09	4%
93420	Gas Main Tunnel Nearest to proposed tunnel	4.11E-09	3%
93430	Gas Main Tunnel Nearest to proposed tunnel	4.11E-09	2%
6MIC detonated at the same time			
93180	Gas Main Tunnel Portal	4.11E-09	2%
93190	Gas Main Tunnel Portal	4.11E-09	3%
93200	Gas Main Tunnel Portal	4.11E-09	7%
93210	Gas Main Tunnel Portal	4.11E-09	7%
93220	Gas Main Tunnel Portal	4.11E-09	7%
93230	Gas Main Tunnel Portal	4.11E-09	7%
93240	Gas Main Tunnel Portal	4.11E-09	7%
93250	Gas Main Tunnel Portal	4.11E-09	7%
93260	Gas Main Tunnel Portal	4.11E-09	6%
93270	Gas Main Tunnel Portal	4.11E-09	5%
93280	Gas Main Tunnel Portal	4.11E-09	4%
93290	Gas Main Tunnel Portal	4.11E-09	3%
93300	Gas Main Tunnel Portal	4.11E-09	3%
93310	Gas Main Tunnel Portal	4.11E-09	2%
93320	Gas Main Tunnel Portal	4.11E-09	2%
93330	Gas Main Tunnel Portal	4.11E-09	2%
93340	Gas Main Tunnel Portal	4.11E-09	6%
93350	Gas Main Tunnel Portal	4.11E-09	6%
93360	Gas Main Tunnel Portal	4.11E-09	5%
93370	Gas Main Tunnel Portal	4.11E-09	4%
93380	Gas Main Tunnel Portal	4.11E-09	4%
93390	Gas Main Tunnel Portal	4.11E-09	3%
93400	Gas Main Tunnel Portal	4.11E-09	3%
93410	Gas Main Tunnel Portal	4.11E-09	2%

Scenario/ Chainage	Features Affected	Scenario Frequency (/yr)	Probability of Damage
93220	Gas Main Tunnel Nearest to proposed tunnel	4.11E-09	1%
93230	Gas Main Tunnel Nearest to proposed tunnel	4.11E-09	2%
93240	Gas Main Tunnel Nearest to proposed tunnel	4.11E-09	4%
93250	Gas Main Tunnel Nearest to proposed tunnel	4.11E-09	5%
93260	Gas Main Tunnel Nearest to proposed tunnel	4.11E-09	7%
93270	Gas Main Tunnel Nearest to proposed tunnel	4.11E-09	7%
93280	Gas Main Tunnel Nearest to proposed tunnel	4.11E-09	7%
93290	Gas Main Tunnel Nearest to proposed tunnel	4.11E-09	7%
93300	Gas Main Tunnel Nearest to proposed tunnel	4.11E-09	7%
93310	Gas Main Tunnel Nearest to proposed tunnel	4.11E-09	7%
93320	Gas Main Tunnel Nearest to proposed tunnel	4.11E-09	7%
93330	Gas Main Tunnel Nearest to proposed tunnel	4.11E-09	7%
93340	Gas Main Tunnel Nearest to proposed tunnel	4.11E-09	20%
93350	Gas Main Tunnel Nearest to proposed tunnel	4.11E-09	17%
93360	Gas Main Tunnel Nearest to proposed tunnel	4.11E-09	14%
93370	Gas Main Tunnel Nearest to proposed tunnel	4.11E-09	11%
93380	Gas Main Tunnel Nearest to proposed tunnel	4.11E-09	9%
93390	Gas Main Tunnel Nearest to proposed tunnel	4.11E-09	9%
93400	Gas Main Tunnel Nearest to proposed tunnel	4.11E-09	7%
93410	Gas Main Tunnel Nearest to proposed tunnel	4.11E-09	5%
93420	Gas Main Tunnel Nearest to proposed tunnel	4.11E-09	4%
93430	Gas Main Tunnel Nearest to proposed tunnel	4.11E-09	2%
93440	Gas Main Tunnel Nearest to proposed tunnel	4.11E-09	1%

The associated overall scenario frequency corresponding to the pipe damage probabilities are presented in *Table 3.6*.

Table 3.6 Scenario frequencies for Damage of Gas Mains inside the Old Beacon Hill Tunnel

Gas Main	Probability of Damage	Overall Scenario Frequency (per year) (1)
Gas Main Tunnel	1 – 17%	7.77E-05

(1) This value takes into account the corresponding probability of damage for each Scenario

Taking into account the ignition probability of towngas of 0.07 for major releases (Lees, 1996), which is considered to be an conservative approach, the occurrence frequency for a towngas explosion event for the gas main will be 5.44E-06 per year. A single fatality was conservatively assumed for each of these scenarios based on the consequence modelling.

Ground Vibration Effect on the LPG Gas Station due to Errors in Blast Face

The results of the scenario frequencies and probability of damage to the LPG Gas Station due to ground shocks generated because of errors in the blasting faces are summarized in the following table.

Table 3.7 Features (LPG Gas Station) Affected by Higher than Expected Vibrations Generated by Accidental Initiation during the Construction of Lion Rock Tunnel

Scenario/ Chainage	Features Affected	Scenario Frequency (/yr)(1)	Probability of Damage
3MIC detonated at the same time			
95450	LPG Gas Station	5.97E-07	1%
95460	LPG Gas Station	5.97E-07	2%
95470	LPG Gas Station	5.97E-07	2%
95480	LPG Gas Station	5.97E-07	2%
95490	LPG Gas Station	5.97E-07	2%
95500	LPG Gas Station	5.97E-07	2%
95510	LPG Gas Station	5.97E-07	2%
95520	LPG Gas Station	5.97E-07	2%
95530	LPG Gas Station	5.97E-07	2%
95540	LPG Gas Station	5.97E-07	2%
95550	LPG Gas Station	5.97E-07	2%
95560	LPG Gas Station	5.97E-07	1%
4MIC detonated at the same time			
95430	LPG Gas Station	4.11E-09	1%
95440	LPG Gas Station	4.11E-09	2%
95450	LPG Gas Station	4.11E-09	2%
95460	LPG Gas Station	4.11E-09	3%
95470	LPG Gas Station	4.11E-09	4%
95480	LPG Gas Station	4.11E-09	4%
95490	LPG Gas Station	4.11E-09	4%
95500	LPG Gas Station	4.11E-09	4%
95510	LPG Gas Station	4.11E-09	4%
95520	LPG Gas Station	4.11E-09	4%
95530	LPG Gas Station	4.11E-09	4%
95540	LPG Gas Station	4.11E-09	4%
95550	LPG Gas Station	4.11E-09	3%
95560	LPG Gas Station	4.11E-09	2%
95570	LPG Gas Station	4.11E-09	2%
95580	LPG Gas Station	4.11E-09	1%
95600	LPG Gas Station	4.11E-09	1%
95601	LPG Gas Station	4.11E-09	1%
95602	LPG Gas Station	4.11E-09	1%
95603	LPG Gas Station	4.11E-09	1%

Scenario/ Chainage	Features Affected	Scenario Frequency (/yr)[1]	Probability of Damage
95604	LPG Gas Station	4.11E-09	1%
95605	LPG Gas Station	4.11E-09	1%
95606	LPG Gas Station	4.11E-09	2%
95607	LPG Gas Station	4.11E-09	2%
5MIC detonated at the same time			
95410	LPG Gas Station	4.11E-09	1%
95420	LPG Gas Station	4.11E-09	2%
95430	LPG Gas Station	4.11E-09	2%
95440	LPG Gas Station	4.11E-09	3%
95450	LPG Gas Station	4.11E-09	3%
95460	LPG Gas Station	4.11E-09	4%
95470	LPG Gas Station	4.11E-09	5%
95480	LPG Gas Station	4.11E-09	5%
95490	LPG Gas Station	4.11E-09	5%
95500	LPG Gas Station	4.11E-09	5%
95510	LPG Gas Station	4.11E-09	5%
95520	LPG Gas Station	4.11E-09	5%
95530	LPG Gas Station	4.11E-09	5%
95540	LPG Gas Station	4.11E-09	5%
95550	LPG Gas Station	4.11E-09	5%
95560	LPG Gas Station	4.11E-09	3%
95570	LPG Gas Station	4.11E-09	3%
95580	LPG Gas Station	4.11E-09	2%
95590	LPG Gas Station	4.11E-09	2%
95600	LPG Gas Station	4.11E-09	2%
95601	LPG Gas Station	4.11E-09	2%
95602	LPG Gas Station	4.11E-09	2%
95603	LPG Gas Station	4.11E-09	2%
95604	LPG Gas Station	4.11E-09	2%
95605	LPG Gas Station	4.11E-09	2%
95606	LPG Gas Station	4.11E-09	2%
95607	LPG Gas Station	4.11E-09	3%
6MIC detonated at the same time			
95220	LPG Gas Station	4.11E-09	1%
95230	LPG Gas Station	4.11E-09	1%
95240	LPG Gas Station	4.11E-09	1%
95250	LPG Gas Station	4.11E-09	1%
95390	LPG Gas Station	4.11E-09	1%
95400	LPG Gas Station	4.11E-09	2%
95410	LPG Gas Station	4.11E-09	2%
95420	LPG Gas Station	4.11E-09	2%
95430	LPG Gas Station	4.11E-09	3%
95440	LPG Gas Station	4.11E-09	4%
95450	LPG Gas Station	4.11E-09	4%
95460	LPG Gas Station	4.11E-09	5%
95470	LPG Gas Station	4.11E-09	6%
95480	LPG Gas Station	4.11E-09	6%
95490	LPG Gas Station	4.11E-09	6%
95500	LPG Gas Station	4.11E-09	6%
95510	LPG Gas Station	4.11E-09	6%
95520	LPG Gas Station	4.11E-09	6%
95530	LPG Gas Station	4.11E-09	6%

Scenario/ Chainage	Features Affected	Scenario Frequency (/yr)[1]	Probability of Damage
95540	LPG Gas Station	4.11E-09	6%
95550	LPG Gas Station	4.11E-09	6%
95560	LPG Gas Station	4.11E-09	4%
95570	LPG Gas Station	4.11E-09	4%
95580	LPG Gas Station	4.11E-09	3%
95590	LPG Gas Station	4.11E-09	3%
95600	LPG Gas Station	4.11E-09	3%
95601	LPG Gas Station	4.11E-09	3%
95602	LPG Gas Station	4.11E-09	3%
95603	LPG Gas Station	4.11E-09	3%
95604	LPG Gas Station	4.11E-09	3%
95605	LPG Gas Station	4.11E-09	3%
95606	LPG Gas Station	4.11E-09	3%
95607	LPG Gas Station	4.11E-09	3%

Note:

(1) This value is obtained from *Table 2.6*. For the concern section which is less than 10 m, the frequency will be adjusted accordingly.

<u>*Ground Vibration Effect on Towngas Pipelines due to Errors in Blast Face*</u>

Ground vibration effect on the Towngas Pipeline is shown in the following table.

Table 3.8 Features (Towngas Pipelines) Affected by Higher than Expected Vibrations Generated by Accidental Initiation during the Construction of Lion Rock Tunnel

Scenario/ Chainage	Features Affected	Scenario Frequency (/yr)	Probability of Damage
3MIC detonated at the same time			
93200	Towngas Pipeline (15)	5.97E-07	1%
93200	Towngas Pipeline (16)	5.97E-07	1%
4MIC detonated at the same time			
93200	Towngas Pipeline (14)	4.11E-09	2%
93210	Towngas Pipeline (14)	4.11E-09	1%
93180	Towngas Pipeline (15)	4.11E-09	2%
93190	Towngas Pipeline (15)	4.11E-09	1%
93200	Towngas Pipeline (15)	4.11E-09	2%
93210	Towngas Pipeline (15)	4.11E-09	2%
93180	Towngas Pipeline (16)	4.11E-09	2%
93200	Towngas Pipeline (16)	4.11E-09	2%
93210	Towngas Pipeline (16)	4.11E-09	1%
93200	Towngas Pipeline (17)	4.11E-09	1%
5MIC detonated at the same time			
93180	Towngas Pipeline (14)	4.11E-09	1%
93190	Towngas Pipeline (14)	4.11E-09	1%
93200	Towngas Pipeline (14)	4.11E-09	3%
93210	Towngas Pipeline (14)	4.11E-09	2%
93220	Towngas Pipeline (14)	4.11E-09	2%

Scenario/ Chainage	Features Affected	Scenario Frequency (/yr)	Probability of Damage
93230	Towngas Pipeline (14)	4.11E-09	1%
93240	Towngas Pipeline (14)	4.11E-09	1%
93180	Towngas Pipeline (15)	4.11E-09	3%
93190	Towngas Pipeline (15)	4.11E-09	2%
93200	Towngas Pipeline (15)	4.11E-09	4%
93210	Towngas Pipeline (15)	4.11E-09	2%
93220	Towngas Pipeline (15)	4.11E-09	2%
93230	Towngas Pipeline (15)	4.11E-09	1%
93240	Towngas Pipeline (15)	4.11E-09	1%
93180	Towngas Pipeline (16)	4.11E-09	2%
93190	Towngas Pipeline (16)	4.11E-09	2%
93200	Towngas Pipeline (16)	4.11E-09	3%
93210	Towngas Pipeline (16)	4.11E-09	2%
93220	Towngas Pipeline (16)	4.11E-09	2%
93230	Towngas Pipeline (16)	4.11E-09	1%
93240	Towngas Pipeline (16)	4.11E-09	1%
93200	Towngas Pipeline (17)	4.11E-09	2%
93210	Towngas Pipeline (17)	4.11E-09	1%
6MIC detonated at the same time			
93200	Towngas Pipeline (13)	4.11E-09	1%
93210	Towngas Pipeline (13)	4.11E-09	1%
93220	Towngas Pipeline (13)	4.11E-09	1%
93230	Towngas Pipeline (13)	4.11E-09	1%
93240	Towngas Pipeline (13)	4.11E-09	1%
93250	Towngas Pipeline (13)	4.11E-09	1%
93340	Towngas Pipeline (13)	4.11E-09	1%
93180	Towngas Pipeline (14)	4.11E-09	2%
93190	Towngas Pipeline (14)	4.11E-09	2%
93200	Towngas Pipeline (14)	4.11E-09	4%
93210	Towngas Pipeline (14)	4.11E-09	3%
93220	Towngas Pipeline (14)	4.11E-09	2%
93230	Towngas Pipeline (14)	4.11E-09	2%
93240	Towngas Pipeline (14)	4.11E-09	2%
93250	Towngas Pipeline (14)	4.11E-09	2%
93260	Towngas Pipeline (14)	4.11E-09	1%
93340	Towngas Pipeline (14)	4.11E-09	1%
93180	Towngas Pipeline (15)	4.11E-09	4%
93190	Towngas Pipeline (15)	4.11E-09	3%
93200	Towngas Pipeline (15)	4.11E-09	5%
93210	Towngas Pipeline (15)	4.11E-09	3%
93220	Towngas Pipeline (15)	4.11E-09	3%
93230	Towngas Pipeline (15)	4.11E-09	2%
93240	Towngas Pipeline (15)	4.11E-09	2%
93250	Towngas Pipeline (15)	4.11E-09	2%
93260	Towngas Pipeline (15)	4.11E-09	1%
93340	Towngas Pipeline (15)	4.11E-09	1%
93180	Towngas Pipeline (16)	4.11E-09	3%
93190	Towngas Pipeline (16)	4.11E-09	3%
93200	Towngas Pipeline (16)	4.11E-09	4%
93210	Towngas Pipeline (16)	4.11E-09	3%
93220	Towngas Pipeline (16)	4.11E-09	2%
93230	Towngas Pipeline (16)	4.11E-09	2%

Scenario/ Chainage	Features Affected	Scenario Frequency (/yr)	Probability of Damage
93240	Towngas Pipeline (16)	4.11E-09	2%
93250	Towngas Pipeline (16)	4.11E-09	2%
93260	Towngas Pipeline (16)	4.11E-09	1%
93180	Towngas Pipeline (17)	4.11E-09	2%
93190	Towngas Pipeline (17)	4.11E-09	1%
93200	Towngas Pipeline (17)	4.11E-09	3%
93210	Towngas Pipeline (17)	4.11E-09	2%
93220	Towngas Pipeline (17)	4.11E-09	2%
93230	Towngas Pipeline (17)	4.11E-09	1%
93240	Towngas Pipeline (17)	4.11E-09	1%
93250	Towngas Pipeline (17)	4.11E-09	1%

Ground Vibration Effect on Features due to Detonation of Full Load during the Transfer of Explosives from Delivery Point to Blast Site

No features were found to be affected by the detonation of a full load during transfer from the delivery point to the blast site.

Effect of Damage to Beacon Hill North Gas Offtake Station on Population

The frequency of a full piping rupture at Beacon Hill Gas Offtake Station is 5.22E-10 which is much less that 1E-09, therefore was not considered further. The results are presented in *Table 3.9*.

Table 3.9 Maximum Fatality Caused by Rupture of Piping at Beacon Hill North Gas Offtake Station

Scenario	Frequency (/yr)	Max. Fatality (N)
Rupture of piping at Beacon Hill North Gas Offtake Station	5.22E-10	-

Effect of Damage to Towngas Pipeline on Population

The effect of a full towngas pipeline rupture on the population was modelled using RISKPLOT™ and the following table shows the results.

Table 3.10 Maximum Fatality Caused by Rupture of Towngas Pipeline at Hin Keng Portal

Scenario	Frequency (/yr)	Max. Fatality (N)
Rupture of Towngas pipeline near Hin Keng Portal	2.97E-08	39

3.1.7 INDIVIDUAL RISK FOR USE OF EXPLOSIVES

For rock excavation using explosives, features at risk due to ground shock were identified and the maximum risk of fatality to any individual is estimated as 5.44E-06 per year (see *Table 3.11*). This is lower than the Individual Risk Criterion of 10^{-5} per year from the EIAO-TM Annex 4.

Table 3.11 Individual Risk for Ground Vibrations Generated by Rock Excavation Using Explosives

Features	Individual Risk (per year)
High Island Water Tunnel	5.32E-09
Old Beacon Hill Gas Main Tunnel	5.44E-06
LPG Gas Station	1.42E-07

For detonation of full load, no features were found to be at risk due to ground shock.

For detonation of full load, the IR of transport route from delivery point to the blast site is shown in *Table 3.12*. The maximum IR for the transport route is 2.03E-08 per year. This is much lower than the Individual Risk Criterion of 10^{-5} per year from the EIAO-TM Annex 4.

Table 3.12 Individual Risk for Blast Effects due to Full Load Detonation during Delivery to Blast Site

Transport Route	Individual Risk (per year)
Lion Rock Tunnel - Hin Keng Portal	2.03E-08

For gas pipe rupture scenario due to ground vibration, the IR values are shown in *Table 3.13*. The maximum IR is 8.80E-09 per year, which is much lower than the Individual Risk Criterion of 10^{-5} per year from the EIAO-TM Annex 4.

Table 3.13 Individual Risk for Gas Pipe Rupture Scenario

Scenario	Individual Risk (per year)
Pipe Rupture at Beacon Hill Offtake Station	3.65E-10
Towngas Pipe Rupture at Hin Keng Portal	8.80E-09

4 CONCLUSIONS

A QRA has been carried out to assess the hazard to life issues arising from the proposed changes in the transport, storage and use of explosives during construction of the Hin Keng to Diamond Hill tunnels under Contract 1103 for the SCL Project.

The Individual Risk of transport, storage and use of explosives is found acceptable and met the 10^{-5} per year criterion of the EIAO-TM. For societal risk, the assessment results show that the transport of explosives in the Revised Case lies within the envelope of the Worst Case scenario assessed in the approved SCL EIA (MTR, 2012). In addition, the societal risk for the Revised Case lies within the ALARP region when compared to the criteria stipulated in the EIAO-TM. The societal risk for the storage of explosives is found acceptable.

The assessment results show that the societal risk of the use of explosives lies within the acceptable region when compared to the criteria stipulated in the EIAO-TM. Moreover, the societal risk for the Revised Case also lies within the envelope of the Worst Case scenario assessed in the approved SCL EIA (MTR, 2012).

A detailed ALARP assessment as part of the SCL EIA (MTR, 2012) has been undertaken for the worst case scenario considering a wide range of mitigation measures and the results show compliance with the ALARP principles provided that the recommendations suggested in SCL EIA (MTR, 2012) are followed. The analyses and recommendations from the ALARP assessment also applies for the Revised Case in this QRA Report since its risk levels remain in the envelope of the Worst Case scenario approved in the SCL EIA (MTR, 2012).

Therefore, the proposed changes will not constitute a material change to the Shatin to Central Link - Tai Wai to Hung Hom Section Project related to Hazard to Life in the context of EIAO.

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Annex A1

Blasting Process

CONTENTS

1 OVERVIEW OF BLASTING PROCESS WITH ELECTRONIC DETONATORS

1.1 BLASTING FUNCTION

The objective of underground blasting is to excavate a void by fragmenting and ejecting rock. The size of the fragmentation is an important factor and impacts on efficient removal of the blasted material, the smaller the rock fragments, the faster the material can be handled by excavation equipment and the faster it can be removed enabling the drill and blast cycle to progress.

To blast rock a pre-determined quantity of explosives are placed in holes which have been drilled on a pre-determined pattern. The explosives are initiated by either a detonator for cartridged emulsion or a small booster attached to a detonator for bulk emulsion.

The following elements are important functions within the blasting process.

1.2 SENSITIVE VIBRATION RECEIVERS AND MAXIMUM INSTANTANEOUS CHARGE (MIC)

Each and every blast is directly influenced by a controlling sensitive receiver which can be a building, slope or utilities. This controlling sensitive receiver will have a pre-determined maximum allowable critical peak particle velocity (PPVc), otherwise known as a maximum allowable ground vibration expressed in mm/second. This maximum PPV value dictates the amount of explosives that can be detonated at once i.e. per delay detonator, and is known as the maximum instantaneous charge (MIC).

1.3 DETONATION SEQUENCE

The order in which the detonators are initiated is a key component of the blasting process. Blasts are designed so that no more than one detonators will initiate at the same instant in time resulting in a doubling of the MIC. To achieve this sequential initiation, in the case of non-electric (Nonel) detonators, detonators are selected with different delay periods (eg. 300, 350,400, 450 milliseconds etc) and are typically grouped in sectors. Surface connectors are used to delay the blast between sectors and their operation is similar to Nonel detonators. In the case of electronic detonators (e-dets), the time delay for each e-det is programmed using an electronic detonator system. For both cases, a series of checks is performed to ensure that the blast will be in accordance with the blast design. The factors concerning the use of electronic detonators are described in the remainder of this document.

All blasts start with a 'cut' area which is usually positioned at the centre portion of the face to be blasted. This area is characterised by 1 or more large diameter drill holes which are not loaded with explosives. The purpose of these 'relief' holes is to provide a void area which allows the ejection of the blasted rock, creating a larger void. This provides the space for the rocks from outer sectors of the blast face to collapse into following detonation of the explosives within the production holes.

The blast is typically designed such that the blast starts from the ‘ cut ‘ area and the detonator delays increase radially outwards towards the tunnel perimeter allowing the face to be blasted in ring like sections.

With electronic detonators, the whole face is blasted using detonators connected in one or more daisy chains (strings). The multiple detonator strings (if more than one) are connected in sequence. As for Nonel detonators, the design will ensure that no more than 1 MIC will detonate at the same time, however, there will be a single sector for the whole face. For practical reasons, the string may be broken down into manageable string segments consisting of typically 5 to 6 normal (ie untagged) electronic detonators delimited by a starter device, a series of markers (software tags on detonators) and an end plug device.

Delays are set by programming the detonator chip on each individual detonator at the blast face by means of a Tagger. The shorfirer will typically programme each string segment in sequence entering an initial delay to the first detonator or to the detonator tagged as a “marker” and then input time delay increment (which could either be positive or negative). This will programme the string segment up to the next marker or end plug. The order of input does not necessarily match the blast sequence. After all detonators have been programmed with the correct delay, there is a rigorous check of the detonator delays, devices positions and software tags to verify that they match the blast design. A correct blast should not have more than 1 MIC detonating at the same time.

1.4 *EXPLOSIVES TYPES AND CHARGING OF BLASTHOLES*

Blastholes may be charged (loaded) with the following explosives types:

- Cartridged emulsion explosives (UN Category 1.1D)
- Bulk emulsion explosives (UN Cat egory1.5D)

1.4.1 *Cartridged Emulsion Explosives*

Cartridged Emulsion explosives typically contain:

- 78-81% ammonium/sodium nitrate solution (oxidizer)
- 6-8% fuel or mineral oil (fuel)
- 0.7 – 1.0% surfactant (also a fuel)
- 15.3-10.0% water

- The percentage of fuels can be varied if aluminium powder is added; the aluminium being used to raise the explosion temperature.

Cartridged Emulsion explosives are packaged in either plastic film (valeron) or paper wrapped. They have a semi-soft consistency, the softness being controlled by their water content. Cartridged Emulsions have the appearance of slightly yellow viscous cream or silver when aluminium is added to the formulation.

Cartridged Emulsions do not completely fill the blasthole and result in various degrees of ‘decoupling’ depending on the diameter of the cartridge stick and the blast hole into which it is placed. This ‘decoupling’ reduces the overall effectiveness of the explosive as the explosive cartridge is not in total contact with the blasthole wall, being separated by an air annulus.

Cartridged Emulsion explosives usually have the following technical parameters:

- Density 1.20 – 1.25 gms/cc
- Velocity of Detonation 4,300-4,500 m/sec
- Detonation Pressure 55.7 – 63.5 kBar
- Sensitivity No. 8 detonator

1.4.2 *Bulk Emulsion Precursor*

Bulk Emulsion Precursor has a similar composition to Cartridged Emulsion, however, these are usually manufactured using mineral oil as the fuel phase and do not contain aluminium. The bulk emulsion precursor has a density of 1.38-1.40 gms/cc and is an oxidising agent. It is not considered an explosive and is classified as UN 5.1 and DG Category 7 Strong Supporters of Combustion.

Bulk Emulsion explosives have the appearance of viscous cream and are frequently slightly yellow in colour.

1.4.3 *Bulk Emulsion*

Bulk Emulsion precursor is sensitised at the blast face where a gassing solution (usually Acetic/Citric acid) is added to the charging hose downstream from the delivery pump. This gassing solution mixes with the emulsion precursor, aided by a ‘static mixer’ positioned near the outlet end of the delivery hose and produces nitrogen bubbles, which in turn results in a final product density of 0.80-1.10 gms/cc. At this density the Bulk Emulsion precursor becomes a booster sensitive explosive. Bulk Emulsion will not reliably detonate if primed only with a No. 8 detonator.

Bulk Emulsion explosives which are pumped into blastholes completely fill the blasthole and thus are ‘fully coupled’ to the blasthole. This results in improved explosive performance and enables Bulk Emulsion explosives of lower power (cf. Cartridged Emulsions) to be utilized, resulting in equal or better performance over Cartridged Emulsions.

Bulk Emulsion explosives usually have the following technical parameters:

- Density 0.80 – 1.10 gms/cc
- Velocity of Detonation 4,500-4,800 m/sec
- Detonation Pressure 40.7 – 63.6 kBar
- Sensitivity 12 gram cast booster

1.5 *ELECTRONIC DETONATORS*

The ignition of electronic detonators is achieved by the utilisation of stored electrical energy inside the detonators as a means of providing the timing delay and initiation. An electronic detonator typically consists of a logic core, a communication interface, storage capacitor(s), capacitor discharge resistors and the ignition element. The system usually undergoes a sequence of power-up, verification, arming (charging and calibration) and finally firing. Capacitor discharge resistors discharge the capacitor within the detonator (make safe) if a blast is cancelled or terminated (not fired) within a predetermined period of time, usually 90 seconds after the 'clear to fire' signal has been received from the initiating equipment.

1.6 *CAST BOOSTERS*

These devices are only required if bulk emulsion is to be used instead of cartridged emulsion. They are small devices, usually containing 12 grams in weight of high explosive into which a detonator is inserted and the whole assembly is then placed in the end of the blasthole, and once assembled is called a primer.

Cast Boosters are usually manufactured from a 50/50% mixture of TNT and PETN, termed Pentolite. Cast Boosters detonate at speeds of 6,000 m/sec and provide sufficient 'shock' energy to reliably detonate the Bulk Emulsion, after firstly being initiated by the delay detonator.

1.7 *DETONATING CORD – PERIMETER BLASTHOLES*

The perimeter blastholes are drilled at typically 600-700 mm intervals around the circumference of the tunnel profile. These blastholes are not loaded with the equivalent MIC for the blast as this would lead to a substantial amount of 'overbreak' of the tunnel profile.

Perimeter blast holes are instead loaded with 80 gms/m of detonating cord (2 x 40 gms/m), and a single stick of cartridged emulsion is placed in the 'toe' (bottom) of the blasthole. When these blastholes are initiated the high Velocity of Detonation (VOD) of the detonating cord (about 7,000 m/sec), and the gas

produced by the single cartridge of emulsion is sufficient to crack the rock between adjoining blastholes resulting in a smooth tunnel profile. It is not unusual to see half blastholes around the tunnel perimeter after a blast indicating a perfect pre-split.

1.8 *PERSONNEL – ROLES & RESPONSIBILITIES*

Under current Hong Kong Law a Shotfirer is legally responsible for collecting the explosives, loading the blast holes, ensuring a blast site has been evacuated, detonating the blast and for the consequential outcome of that blast.

The legislation states that the Shotfirer is the only individual that can make up primer charges and load blastholes and as such, is in control of the physical blast preparation at the working face.

The Blasting Engineer is responsible for the blast design and for obtaining endorsements/approvals from the Competent Blasting Supervisor (CBS) and Mines Division (MD) for all blasts. The blasting engineer's duties include calculating the required volume of explosives and initiating systems for the blast, maintaining safety, ensuring that the monitoring plan is implemented and for supervising the work of the Shotfirer(s).

2 BLASTING CYCLE

The following sections describe the complete blasting cycle and the responsible person(s) for each step.

2.1 BLAST PLANNING & DOCUMENTATION

Blasts are planned two days in advance. This allows sufficient time for the Contractors' Blasting Engineer to submit blast documentation to the CBS and Mines Division for endorsement. Blast documentation should be submitted to the CBS and Mines two days before the intended blast. The CBS and Mines should confirm their endorsement one day before the planned blast.

The required blast documentation comprises the following information, which is signed by both the Blasting Engineer and the Registered Shotfirer:

- Plan view of the blast face detailing the diameter and position of all blastholes, and the delay time of the detonators to be used within each blasthole with the face;
- The total required number of detonators;
- The quantity of cartridged or bulk emulsion explosives to be used within the blast;
- The quantity of mini cast boosters or cartridged emulsion boosters required;
- The quantity of detonating cord to be used in perimeter blast holes;
- The MIC for the blast;
- The predicted Peak Particle Velocity (PPV) (vibration) and Air Overpressure (AOP) at the nominated sensitive receivers; and
- Date and estimated time of the subject blast.

2.2 ORDERING OF EXPLOSIVES & INITIATION SYSTEMS

The detailed blast documentation also forms the explosives and initiating systems order from the explosives magazine.

When the explosives are required they will be delivered by Mines Division or the Registered Shotfirer along with nominated representatives from the Contractor and the CBS or Registered Explosives Supervisor (RES) will go to the on-site explosives magazine with the endorsed blast documentation which is presented to the security chief.

For the case of SCL (TAW-HUH), explosives will be delivered in licenced trucks (licenced by Mines Division) operated by the Contractor.

The security chief will check the identity of all personnel against a photo ID list held at the magazine before allowing the individuals access to the magazine complex.

The Registered Shotfirer, the representative from the Contractor, and the CBS or RES will then proceed to, and unlock the niche(s), to withdraw the endorsed quantity of explosives and initiating systems for the blast.

After securing the various niches of the magazine, the party will return to the security office and update and sign the Explosives Register.

The Registered Shotfirer the representative from the Contractor, the CBS or RES and an armed security guard will then transport the explosives and initiating systems (separately), to the nominated delivery/access point. Upon arrival, the explosives and initiating systems will be transported down the tunnel in separate lots to a diesel powered vehicle for transportation to the working blast face.

2.3 BLASTHOLE CLEANING

While the Registered Shotfirer is awaiting the delivery by Mines Division or collecting the explosives and initiating systems from the explosives magazine, the Assistant Shotfirer will supervise the blast crew workers while they clean all blastholes to remove rock chips that may cause a blockage during loading of the blastholes.

Any blastholes which cannot be cleaned due to severe blockages will be deleted from the blast and marked with a spray painted red cross.

2.4 BLASTHOLE MARKING

After the blastholes have been cleaned the Registered and Assistant Shotfirer will consult the blasting plan and mark each blasthole (using spray paint) with the required delay detonator number. Every blasthole delay mark is unique to a particular delay.

2.5 DETONATOR HOOK-UP

Detonator hook-up is carried out in a logical sequence (row by row, or ring by ring, or if another pattern ID utilized, it should be mapped). The detonators are connected in sequence (e.g. detonator 1 to detonator 2, detonator 2 to detonator 3 etc.). String Starter device is used to mark the beginning of the string and an End Plug device is used to mark the end. Detonators can be marked with software tags (Markers) which can be positioned anywhere within a string to enable a change in the time delay or time-delay increment ("change row" or "change pattern"). As part of the hook-up sequence, integrity checks will be performed by the bench box system for each device and the communication system.

2.6 *DETONATOR DELAY ASSIGNMENT*

The Registered Shotfirer and the Assistant Shotfirer will then study the blast plan and insert the electronic detonators into the blast holes. They will perform a diagnostic check on the detonators to ensure that they are communicable for the subsequent programming step, where the delay times are assigned to each detonator.

Following the blast plan, the Registered Shotfirer will place the detonator system devices in their designated location and proceed with the tagging of detonators. For practical reasons, the string may be broken down in manageable string segments consisting of typically 5 to 6 normal (ie untagged) electronic detonators delimited by a starter device, a series of markers (software tags on detonators) and an end plug device.

Delays are set by programming the detonator chip on each individual detonator at the blast face by means of a Tagger. The shorfirer will typically programme each string segment in sequence entering an initial delay to the first detonator or to detonator tagged as a "marker" and then input time delay increment (which could either be positive or negative). This will programme the string segment up to the next marker or end plug. The order of input does not necessarily match the blast sequence. The tagger will have basic diagnostic checks and will generate a warning screen at input stage if a 0 ms increment is entered.

There in an option to programme individual detonators manually (manual input mode). For such a case, these manual delay tagged detonators, although physically connected to the daisy chain, will not be ignored in the case of delay increment assignment (semi-automatic input mode). The detonator input modes are further described in next section.

The final setup will be checked by the Blasting Engineer and/or a Second Registered Shotfirer. During those checks, a different Tagger than the one used to programme the detonators will be used.

Amongst other checks, specific checks will be performed by the Shotfirer and independently by the Blasting Engineer to ensure that:

- The e-det system devices (starter, detonators and end plugs) are located at the correct locations (visual checks);
- Each starter has been assigned with the correct ID and has been positioned at the designated location from the Blast Plan (using the Tagger);
- Each marker will be checked to ensure the markers are correct and on the correct devices (using the Tagger); and

- At the time of time delay input, the time delays and/or time delay sequence match the one from the blast design. This will be achieved by checking the time delay of each individual detonator. The tagger device itself will provide feedback of the time delay keyed in for each detonator. A warning prompt will be issued in case of a 0 ms increment input.

The Blasting Engineer will independently check, using a different tagger, that the programmed delays match the ones from the blast design. This will be achieved by checking the time delay of each individual detonator.

Final checks will be performed at a later stage from the Bench Box as described in the following sections.

2.7 *DETONATOR DELAY INPUT MODES*

There are potentially 3 ways to input delay times: manually, in semi-auto mode, or downloaded from a computer. The later option is not available from the proposed system. In the case of the tunnel either the manual or semi-automatic method will be used. Programming the delays is done at the location of the string starter, and can be done sitting down (comfortable environment).

For the manual input: each detonator can be assigned during the detonator integrity check or after the hook-up the detonators can be scrolled through and delay times assigned individually. This can be done in a 2-man team with one man responsible for the Tagger input and the second man responsible for reading the blast design hard copy.

For the semi-automatic programming it is standard practice to use a 2-man team, one man responsible for the Tagger input and the second man responsible for reading the blast design hard copy.

- Row and Change Markers are inputted during the detonator integrity check
- After the hook-up the programming can be done in a sitting down position
- The delay times are read from the blast design and inputted into the Tagger, using the Markers as guides

The Markers are interruptions to the circuit which begins at the string starter. At each Marker there is a prompt for the delay time input and the incremental increase to the next Marker. This is repeated until the End Plug is reached.

2.8 *PRIMING CUT, LIFTER & PRODUCTION BLASTHOLES*

If bulk emulsion is to be used, then the detonator will be inserted into the mini cast booster or the cartridged emulsion primer and the assembly gently pushed to the back of the cut, lifter and production blastholes. The primer is always positioned so that the detonator is pointing towards the blasthole collar (i.e. the face of the blast).

2.9 *LOADING CARTRIDGED EMULSION EXPLOSIVES*

After priming all the cut, lifter and production blastholes the Registered Shotfirer and the Assistant Shotfirer will load the blastholes with the required MIC of cartridged emulsion sticks.

In the case of cartridged emulsion explosives, this will be a pre-calculated number of 'sticks' of the explosive; eg. if the MIC is 1.0 kg and 32 mm x 200 mm cartridged emulsion (0.208 kg / stick) is being used, then 5 x cartridges will be inserted into each blasthole. (0.208kg is correct). Depending on blast requirements the contractor may use cartridged emulsion of 0.125g/stick.

2.10 *LOADING BULK EMULSION EXPLOSIVES*

When bulk emulsion explosives are utilized, the blast plan will have determined the required emulsion density. This will be communicated to the bulk emulsion pump / truck operator. The operator will consult calibration charts and set the flow rate of the gassing solution chemicals to provide the correct final bulk emulsion density.

Before pumping bulk emulsion into the blastholes, the pump truck operator will pump the gassed bulk emulsion into a beaker of known size and weight (usually 1 litre capacity). The operator will wait for about 10 minutes to allow the gassing phase to be completed and using a spatula, will wipe the top of the beaker to remove any excess material. The beaker and its gassed bulk emulsion contents are then weighed on calibrated laboratory scales to confirm the final product density.

Should the density require further adjustment, the above process is repeated until such time as the final product density is achieved.

Once the density is correct the Registered Shotfirer and his Assistant Shotfirer shall instruct the pump truck operator to provide the required MIC in each blasthole.

As an added checking method the Blasting Engineer knowing the final bulk emulsion density and the blasthole diameter, will calculate the length of the blasthole that will be filled with the MIC. For example, an MIC of 1.43 kg in a 45 mm blasthole at 0.90 gms/cc explosive density, the explosive column will be 1.0 m long). Typically, the Registered and Assistant Shotfirer will place a highly visible mark at the required distance from the end of the bulk emulsion loading hose. When the bulk emulsion is being pumped into the blasthole and the loading hose slowly withdrawn, the visible mark will appear at the blast hole collar indicating that the MIC has been loaded. The bulk emulsion pump will automatically shut down once it has delivered the pre-determined quantity.

When all blastholes have been loaded the pump truck operator will check the 'totalizer' and print out two copies of a certificate detailing the total volume of bulk emulsion used/loaded for the particular blast. The Blasting Engineer will sign both copies and will return one copy to the pump truck operator.

2.11 *LOADING PERIMETER BLASTHOLES*

The detonating cord and cartridged emulsion booster for the perimeter blastholes are usually made up along a length of split bamboo, the explosive components being taped to the bamboo.

After preparation the lengths of bamboo are pushed to the back of the blastholes. Depending on the MIC for the blast groups of perimeter blastholes are linked together by 2 x 5 gms/m detonating cord and the 'group' of blastholes are fired by a single delay detonator; eg. for blastholes of 4.2 m in length with 2 x 40 gms/m detonating cords and a 0.208 kg cartridge emulsion toe charge, the charge per blasthole would be 0.544 kg ((4.2 x 40 x 2) + 0.208 kg = 0.544 kg). If the MIC for the blast was 1.7 kg, then three perimeter blastholes can be detonated at the same time instant (0.544 x 3 = 1.632 kg).

2.12 *MONITORING PLAN*

About 1 hour before the blast is to be initiated the Blasting Engineer will instruct the Instrument Engineer to commence deploying the monitoring equipment to record vibration (PPV) and air overpressure (AOP) at the designated monitoring locations for the subject blast.

Once completed the Instrument Engineer will confirm that all instruments have been deployed and are active.

2.13 *BLAST SITE EVACUATION AND FINAL CHECKS*

At this time the Blasting Engineer will instruct all the Shotfirers' helpers to evacuate the blast site and to proceed to their predetermined sentry positions and to await further instructions.

The Blasting Engineer, the Registered and Assistant Shotfirer will then retreat to the nominated 'firing point' which would normally be at least 200 m from the blast face where a 'safe haven' is located. (At this location the final diagnostic checks are performed via the bench box, flag, key, charging capacitors etc)

The CBS will independently check from the bench box system that the programmed delays match the ones from the blast design and no detonator has been assigned with the same time delay. This will be achieved by checking the time delay of each individual detonator.

At this time the Blasting Engineer will give instructions for the blast door(s) to be closed.

2.14 *BLAST INITIATION*

In the case of e-dets, the Registered Shotfirer will then follow the procedures to arm and fire the blast by way of the Blasting Machine (which is the bench box) (and SmartKey). From a master clock, the blast signal will be sent simultaneously to all the strings connected to the system. In case of any communication error or device malfunction, the blasting initiation process will abort automatically.

2.15 *POST BLAST INSPECTION*

After the blast has been initiated, the ventilation fans activated and after the post blast dust and fumes have diminished, the Registered and Assistant Shotfirer, along with the Blasting Engineer will inspect the blast site for any 'misfired' blastholes.

If no misfires are detected the Blasting Engineer shall give the 'all clear' and the sentries will leave their designated locations and other site personnel will return to their place of work.

Should a misfire be detected, the Registered Shotfirer will make sure the misfire is made safe. The standard evacuation procedure will again been completed and the misfire shall be initiated and a further post blast inspection made.

2.16 *VENTILATION AND RETURN TO WORKING FACE*

Once the all clear has been given the ventilation fans will continue to operate and the broken rock from the blast will be watered down to reduce dust emissions.

Once the area is safe to resume work the following activities are sequentially commenced:

- Scaling down the walls, backs and face (removing loose rock)
- Removal of the broken rock from the blast site
- Inspection by a geologist to determine the required rock stabilization/support
- Installation of the recommended rock support mechanisms (rock bolts, wire mesh and/or shotcrete)
- Drilling of a horizontal forward probe hole to determine rock quality in advance of the blast face (usually up to 20 m in length)
- Drilling of the blastholes for the next blast

The 'ideal' cycle time for blasting is about 12 hours allowing 2 blasts per 24 hour period however, this is dependent on several factors such as the time taken to stabilize the excavation, equipment breakdown and the availability of an on-site explosives magazine.

2.17 *POST BLAST SENSITIVE RECEIVER INSPECTION & MONITORING REPORT*

After the all clear has been given, the Instrument Engineer will inspect the sensitive receivers (particularly slopes) for any sign of distress/damage.

He will then recover all the monitoring instruments used for the blast and return them to the site office for the downloading of their recordings.

Initially the Instrument Engineer will check to ensure that none of the Alert-Alarm-Action (A-A-A) levels have been exceeded and advise the Blasting Engineer and the RE accordingly.

Thereafter the Instrument Engineer will download the recordings from each monitoring device and produce a Monitoring Report detailing the following information:

- The sensitive receivers for the subject blast
- Their radial distance from the blast
- The MIC for the blast
- Their A-A-A levels
- The predicted PPV and AOP levels, and
- The actual PPV and AOP (recorded) levels.

This report is copied to the RE and Mines, and sometimes to the project owner/sponsor if requested.

Annex A2

Electronic Detonator System Devices and their Functions

CONTENTS

1 ELECTRONIC DETONATOR SYSTEM DEVICES AND THEIR FUNCTIONS

The SmartShot™ Electronic Detonator System manufactured by DetNet and supplied by Brandrill Engineering (HK) Limited has been selected by MTRCL and its contractor for use of tunnel blasting in the SCL project. The present assessment has been conducted on the basis of the SmartShot™ system or an equivalent electronic detonator system in terms of functions, failure modes and failure probabilities.

1.2 ELECTRONIC DETONATOR

The SmartShot™ Electronic Detonator System comprises the following key components:

- SmartShot™ Detonator Assembly (detonator, male and female connector and downline wire)
- String Starter
- Tagger
- End Plug
- Bench Box
- Connection Block
- Smart Key

1.2.1 *Detonator Assembly*

The detonator assembly consists of a SmartShot™ Detonator which is connected to the next detonator in the timing sequence through the 4-wire downlines and a set of connecters (male and female connector). Each detonator has a detonator Printed Circuit Board (PCB) where the delay time information for the detonator is saved. The detonator PCB also contains the fuse head which is an incendiary explosive device that acts as the interface between the electronics and the explosives base charge of the detonator. The detonator is protected against external influences including over-voltage, over-current, electrostatic discharge and electromagnetic pulse.

1.2.2 *String Starter*

The string starter connects a string of detonator and converts the 4-wire detonator system to a 2-wire communicating system. Each string starter can accommodate a maximum of 200 detonators.

1.2.3 *Tagger*

The tagger is a hand-held unit used for on-bench operations such as assigning detonator locations, testing communications, assigning delay detonator times and testing the detonator. With the tagger, the delays to the detonators can be assigned using either manual bench mode or semi-automated bench mode. In the manual bench mode, delay times to detonators are assigned on an individual basis by entering each delay individually, ie. absolute delay assigned to each detonator. Alternatively, in the semi-automated bench mode,

a string of detonator is defined with the string starter and the following string starter or an end plug, and the delays are input in the form of a fixed time increment or decrement from the start of a string.

In addition to assigning delay to detonators, the tagger has the following functions:

- Test individual detonators or test strings of detonators that have been connected using the daisy-chain method;
- View assigned timing in a list format;
- Mark detonator to identify a change in timing or specific location; and
- Tag String Starter.

In terms of safety, the tagger is intrinsically safe; the maximum battery voltage is below the blasting voltage and the tagger cannot issue the encrypted blasting command. Also, the tagger is interchangeable and has no memory, once assigned the delays is stored on the detonator PCB such that the risk of tagger malfunction leading to erroneous detonation sequence is minimised if a separated tagger is used to monitor and check the delays assigned onto the detonators.

1.2.4 *End Plug*

End plug is plugged to the last detonator in the daisy chain to indicate the end of the final string.

1.2.5 *Bench Box*

The bench box is the power unit that is used in conjunction with the connection blocks, a smart key and string starters to initiate a blast. The bench box is also used to test all detonators and string starters on the bench (the whole installation). Detonators' delay information can be viewed with the bench box for checking.

1.2.6 *Connection Box*

The connection block connects the string starters with the bench box through 2-wire connections. Each pair of connections is called a channel, which is not polarity sensitive. The connection block also houses a mechanical flag, which has to be locked in position for the system to be able to initiate the detonators. The flag therefore acts as a mechanical safety device.

1.2.7 *Smart Key*

The smart key contains a physical link without which blast voltage cannot be routed to the detonators. The key also house the electronic devices required to generate blasting signals as well as to enable communications between devices.

1.3 *Blasting Process using the SmartShot System*

The operational procedures to be followed are also unchanged for the stages in preparing the blastholes up to the point that electronic detonators are introduced and have to be programmed. The procedures for assigning delays to detonators, connecting, and firing the blast are dependent on the type of system that will be used, and there are a number of options which operate differently (systems and equipment are not interchangeable). A typical blasting cycle is described below using the SmartShot™ system, considering the sample tunnel blasting pattern provided.

1.3.1 *Procedures for the Blasting Cycle:*

1 Blastholes are drilled, cleaned and marked with the delay according to the blasting plan (same as for pyrotechnic detonators).

2 Detonator placement in blasthole with diagnostic check using a Tagger (to check if the each individual detonator chip is responsive, delay can also be inputted at this stage to individual detonators).

3 *Optional for incremental delay input:* Markers can be inputted at any time before programming the string, and normally during the detonator integrity check (usually indicated using spray paint). Incremental delay is inputted during 4-wire programming of the completed string.

4 Explosives loading of cartridged emulsion or bulk emulsion explosives (same as for pyrotechnic detonators).

5 Detonator hookup in a logical sequence (row by row, or ring by ring, or if another pattern is utilized it should be mapped).

6 Attach End Plug (electronic device that sends a signal that it is the end of the circuit). If the end plug is missing it should be detected by the diagnostic check. The system can still be operated (e.g. in case there is a faulty end plug), without any effect on the delay inputs but with a possible misfire situation undetected.

7 Attach Tagger to circuit and assign delay to detonators (if not already done so in Step 2). The input can be done for individual detonators or the Taggers enable programmable input of incremental delays for an entire string of detonators (up to 200 detonators per String Starter).

8 Check the delay input

9 Attach the wiring to the "Starter" (String-Starter). The function of the starter is merely a wire converter from the 4-wire detonator/s to the two wire blasting cable which is then rolled out to the bench box (blasting machine).

10 Evacuate the site, ensuring all protection measures are in place, and the Registered Shotfirer(s) and Blasting Engineer retreat to the nominated safe haven firing position.

11 Attach the "Starter" (String Starter) to the "Blasting Machine" (Bench-box) and run the mandatory diagnostics check which tests the circuit for shorted, missing, faulty firing lines or any other causes of potential misfires. It does not detect errors in the assigned delays, irregular patterns, etc., however, delays can be visually checked from the bench box screen. The blast cannot proceed without a successful diagnostic check.

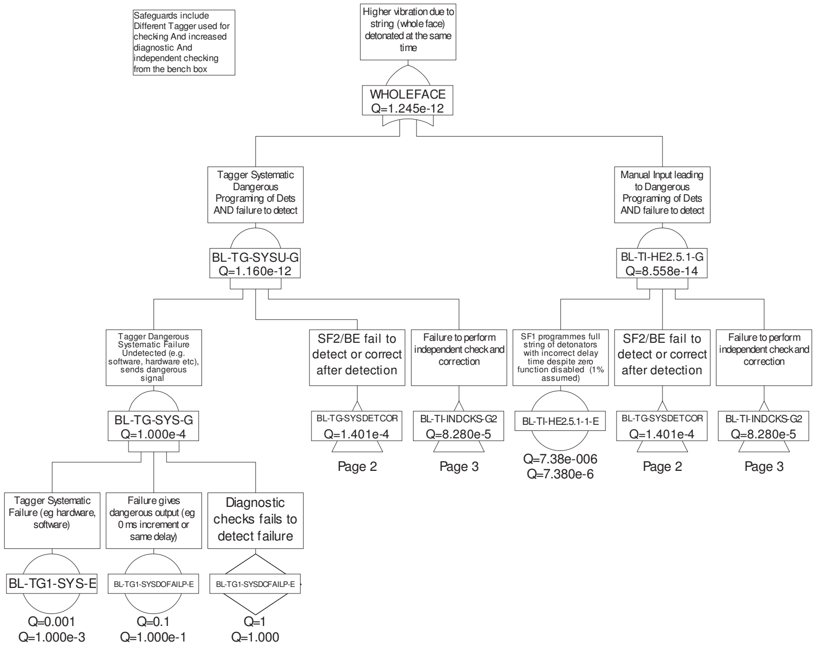
12 Insert the Red "Smart Key" and password when prompted , if key is inserted at any other time, the box will automatically switch off. This enables the internal transformers in the blasting machine to energise the capacitors in the detonators (takes 2 minutes). The blast is now armed and ready to be fired.

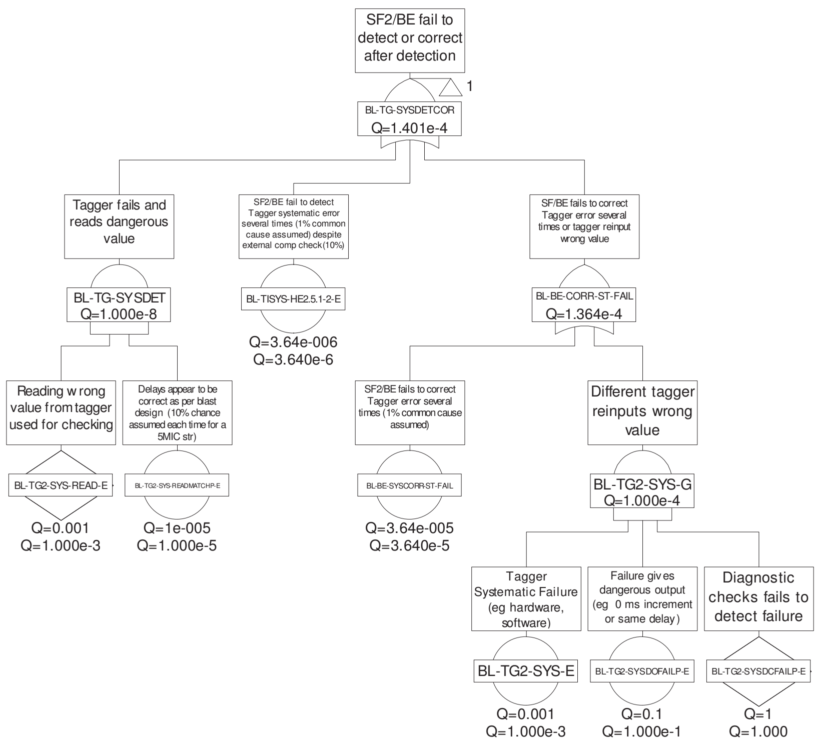
13 Fire the blast by pressing two (soft key) fire buttons simultaneously. Has to be fired within 90 seconds whereafter the "fire" buttons will disappear. A safety feature of the system if the blast is not fired within these 90 seconds the blast is aborted automatically and the capacitors are discharged via resistors on the PCB, but normally the blast should be fired within 10 seconds.

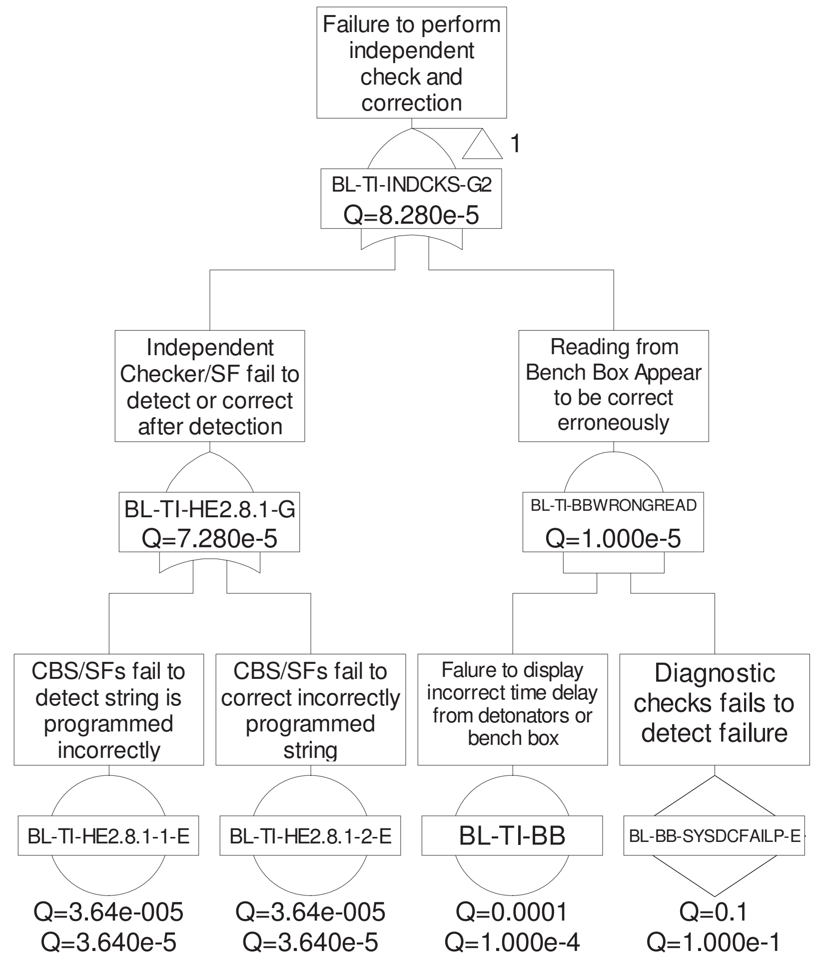
14 Post-blast inspection.

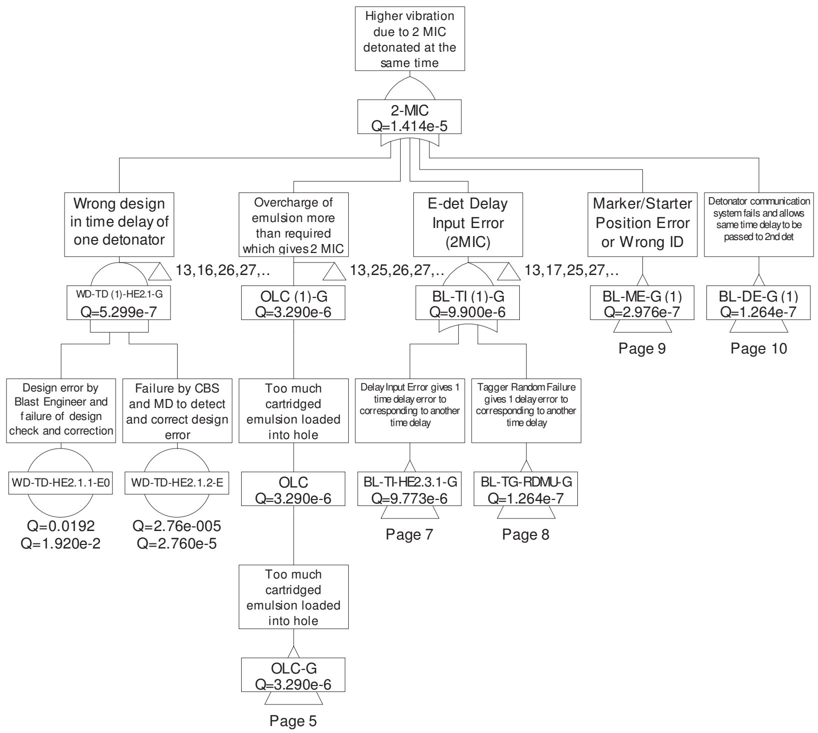
Annex A3

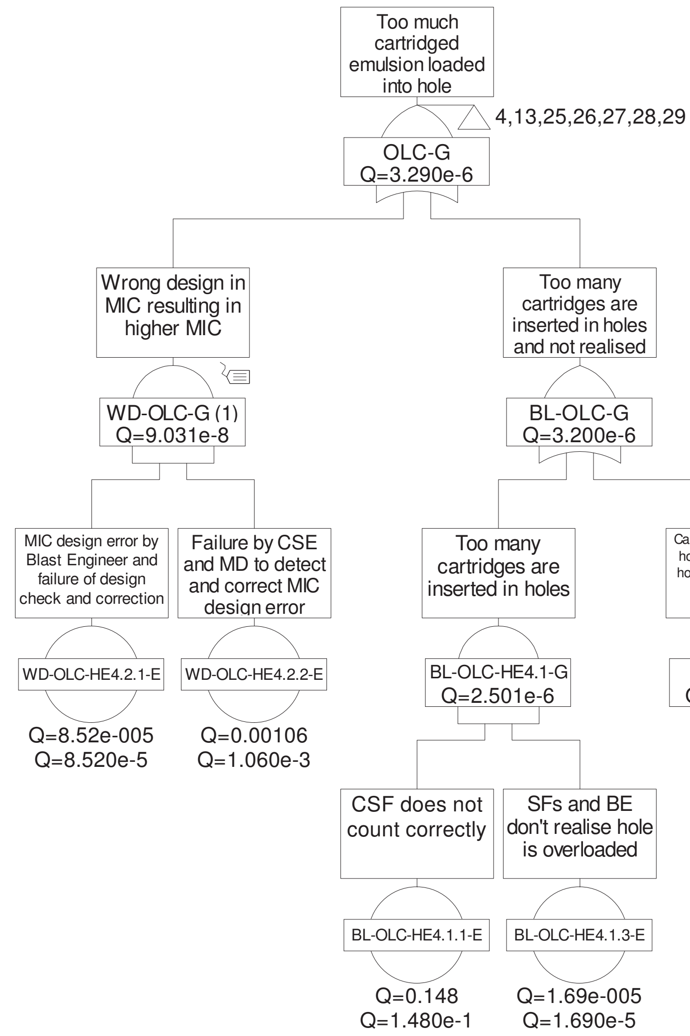
Fault Tree Analysis

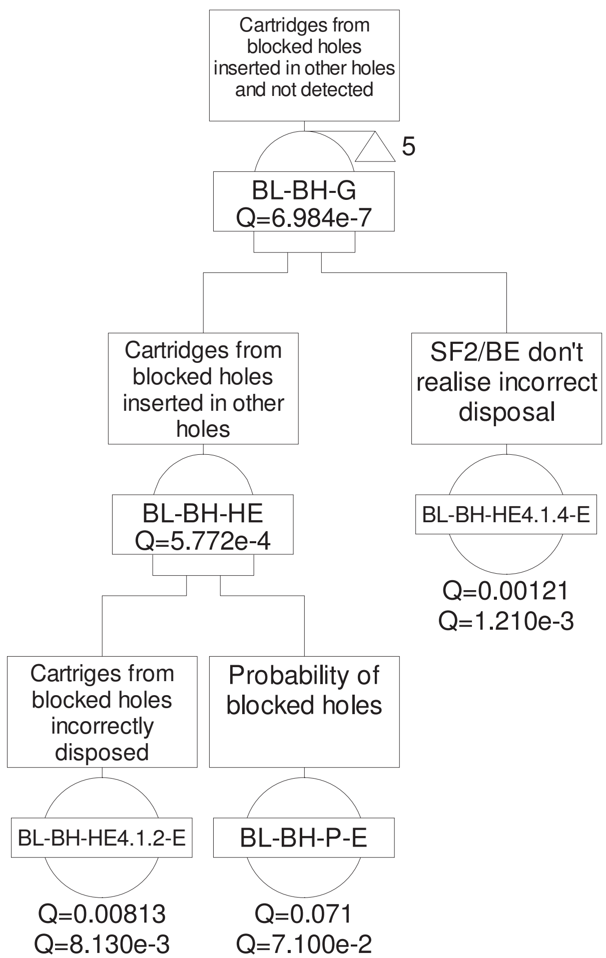


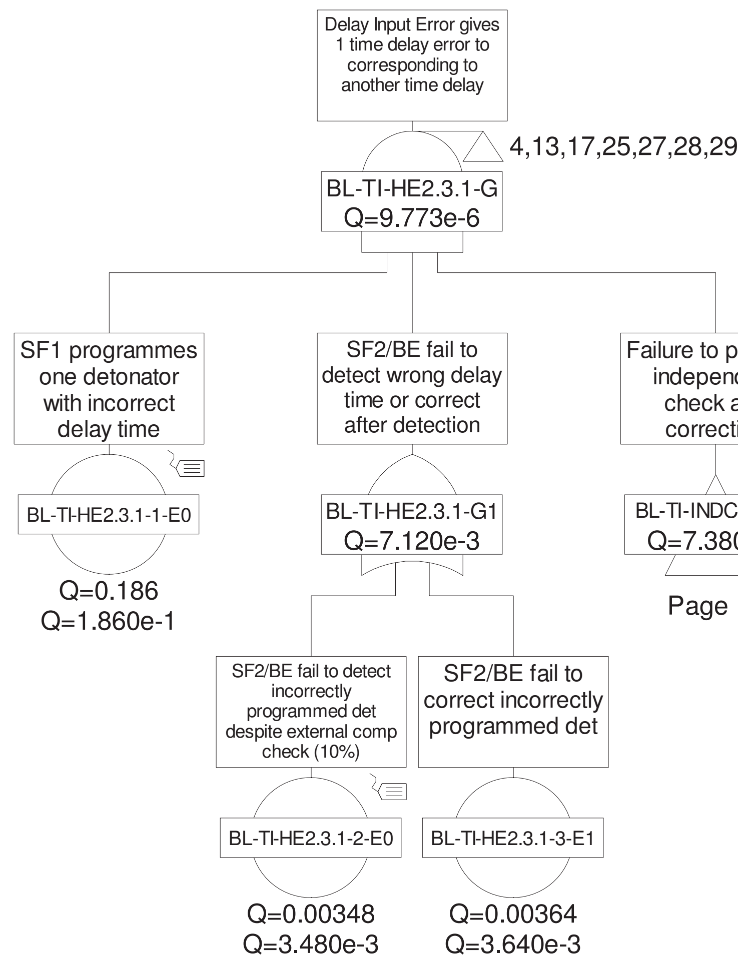

SF2/BE fail to detect or correct after detection
1
BL-TG-SYSDETCOR
Q=1.401e-4
Tagger fails and reads dangerous value
BL-TG-SYSDET
Q=1.000e-8
SF2/BE fail to detect Tagger systematic error several times (1% common cause assumed) despite external comp check(10%)
BL-TISYS-HE2.5.1-2-E
Q=3.64e-006
Q=3.640e-6
SF/BE fails to correct Tagger error several times or tagger reinput wrong value
BL-BE-CORR-ST-FAIL
Q=1.364e-4
Reading wrong value from tagger used for checking
BL-TG2-SYS-READ-E
Q=0.001
Q=1.000e-3
Delays appear to be correct as per blast design (10% chance assumed each time for a 5MIC str)
BL-TG2-SYS-READMATCHP-E
Q=1e-005
Q=1.000e-5
SF2/BE fails to correct Tagger error several times (1% common cause assumed)
BL-BE-SYSCORR-ST-FAIL
Q=3.64e-005
Q=3.640e-5
Different tagger reinputs wrong value
BL-TG2-SYS-G
Q=1.000e-4
Tagger Systematic Failure (eg hardware, software)
BL-TG2-SYS-E
Q=0.001
Q=1.000e-3
Failure gives dangerous output (eg 0 ms increment or same delay)
BL-TG2-SYSDOFAILP-E
Q=0.1
Q=1.000e-1
Diagnostic checks fails to detect failure
BL-TG2-SYSDCFAILP-E
Q=1
Q=1.000

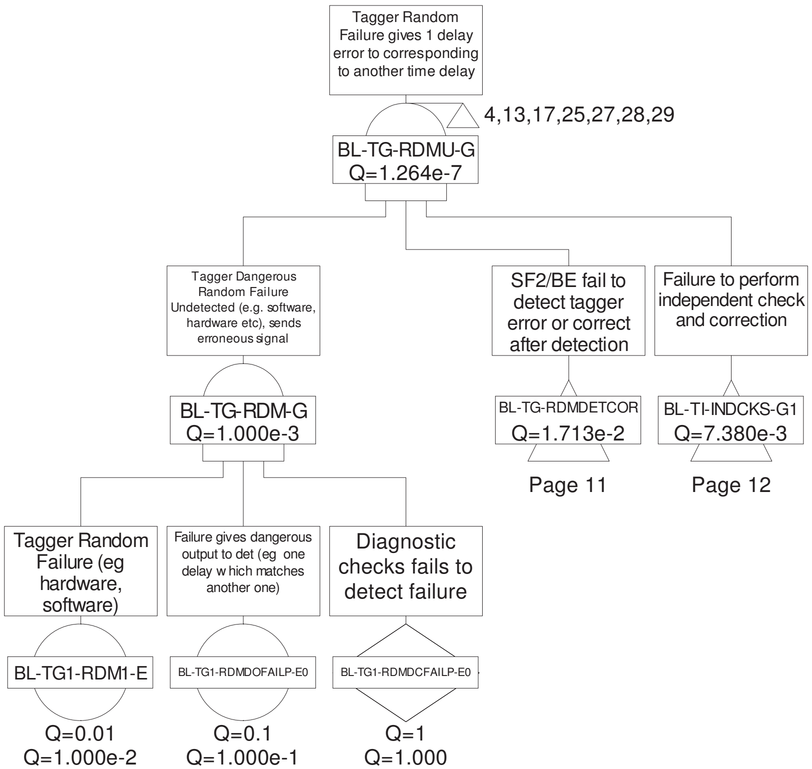

Failure to perform independent check and correction
1
BL-TI-INDCKS-G2
Q=8.280e-5
Independent Checker/SF fail to detect or correct after detection
BL-TI-HE2.8.1-G
Q=7.280e-5
Reading from Bench Box Appear to be correct erroneously
BL-TI-BBWRONGREAD
Q=1.000e-5
CBS/SFs fail to detect string is programmed incorrectly
BL-TI-HE2.8.1-1-E
Q=3.64e-005
Q=3.640e-5
CBS/SFs fail to correct incorrectly programmed string
BL-TI-HE2.8.1-2-E
Q=3.64e-005
Q=3.640e-5
Falure to display incorrect time delay from detonators or bench box
BL-TI-BB
Q=0.0001
Q=1.000e-4
Diagnostic checks fails to detect failure
BL-BB-SYSDCFAILP-E
Q=0.1
Q=1.000e-1

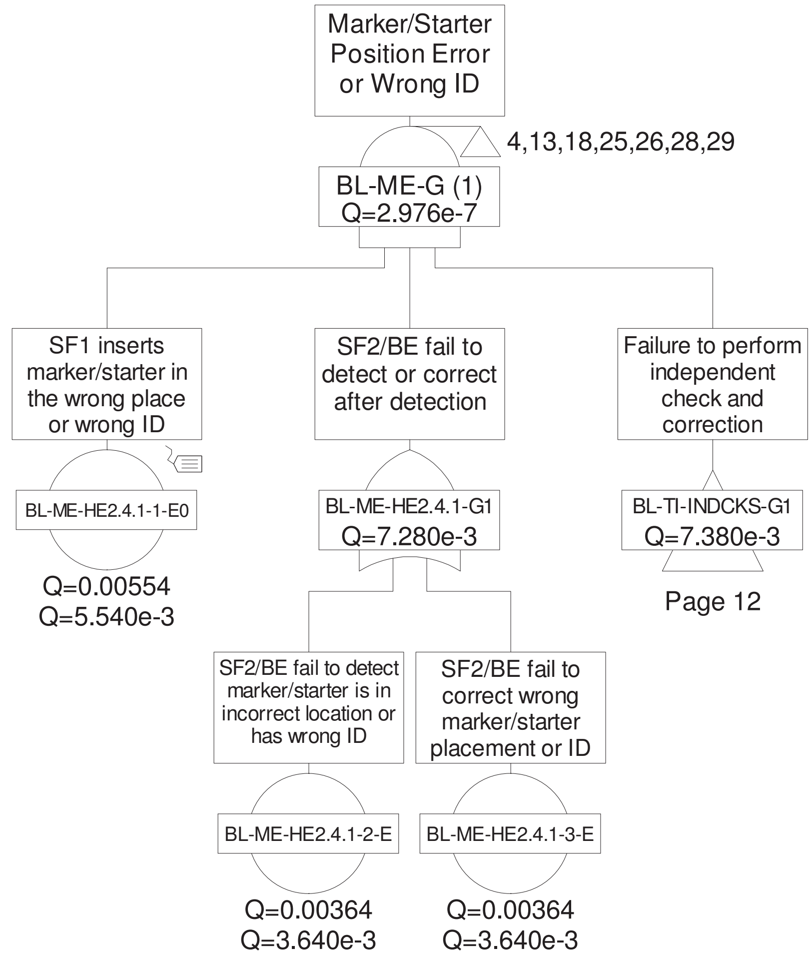

Higher vibration due to 2 MIC detonated at the same time
2-MIC
Q=1.414e-5
Wrong design in time delay of one detonator
13,16,26,27,..
WD-TD (1)-HE2.1-G
Q=5.299e-7
Overcharge of emulsion more than required which gives 2 MIC
13,25,26,27,..
OLC (1)-G
Q=3.290e-6
E-det Delay Input Error (2MIC)
13,17,25,27,..
BL-TI (1)-G
Q=9.900e-6
Marker/Starter Position Error or Wrong ID
BL-ME-G (1)
Q=2.976e-7
Page 9
Detonator communication system fails and allows same time delay to be passed to 2nd det
BL-DE-G (1)
Q=1.264e-7
Page 10
Design error by Blast Engineer and failure of design check and correction
WD-TD-HE2.1.1-E0
Q=0.0192
Q=1.920e-2
Failure by CBS and MD to detect and correct design error
WD-TD-HE2.1.2-E
Q=2.76e-005
Q=2.760e-5
Too much cartridged emulsion loaded into hole
OLC
Q=3.290e-6
Too much cartridged emulsion loaded into hole
OLC-G
Q=3.290e-6
Page 5
Delay Input Error gives 1 time delay error to corresponding to another time delay
BL-TI-HE2.3.1-G
Q=9.773e-6
Page 7
Tagger Random Failure gives 1 delay error to corresponding to another time delay
BL-TG-RDMU-G
Q=1.264e-7
Page 8

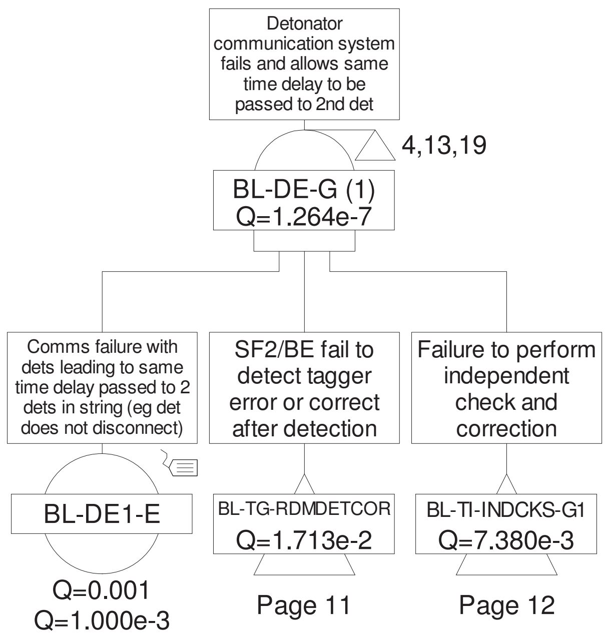

Too much cartridged emulsion loaded into hole
4,13,25,26,27,28,29
OLC-G
Q=3.290e-6
Wrong design in MIC resulting in higher MIC
WD-OLC-G (1)
Q=9.031e-8
Too many cartridges are inserted in holes and not realised
BL-OLC-G
Q=3.200e-6
MIC design error by Blast Engineer and failure of design check and correction
WD-OLC-HE4.2.1-E
Q=8.52e-005
Q=8.520e-5
Failure by CSE and MD to detect and correct MIC design error
WD-OLC-HE4.2.2-E
Q=0.00106
Q=1.060e-3
Too many cartridges are inserted in holes
BL-OLC-HE4.1-G
Q=2.501e-6
Cartridges from blocked holes inserted in other holes and not detected
BL-BH-G
Q=6.984e-7
Page 6
CSF does not count correctly
BL-OLC-HE4.1.1-E
Q=0.148
Q=1.480e-1
SFs and BE don't realise hole is overloaded
BL-OLC-HE4.1.3-E
Q=1.69e-005
Q=1.690e-5

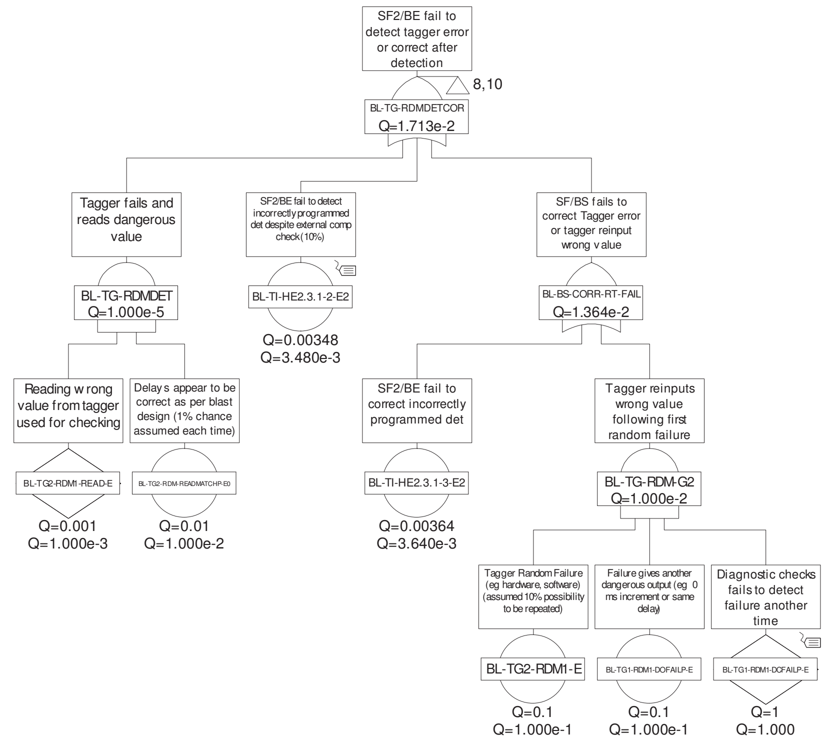

Cartridges from blocked holes inserted in other holes and not detected
5
BL-BH-G
Q=6.984e-7
Cartridges from blocked holes inserted in other holes
SF2/BE don't realise incorrect disposal
BL-BH-HE
Q=5.772e-4
BL-BH-HE4.1.4-E
Q=0.00121
Q=1.210e-3
Cartriges from blocked holes incorrectly disposed
Probability of blocked holes
BL-BH-HE4.1.2-E
BL-BH-P-E
Q=0.00813
Q=8.130e-3
Q=0.071
Q=7.100e-2

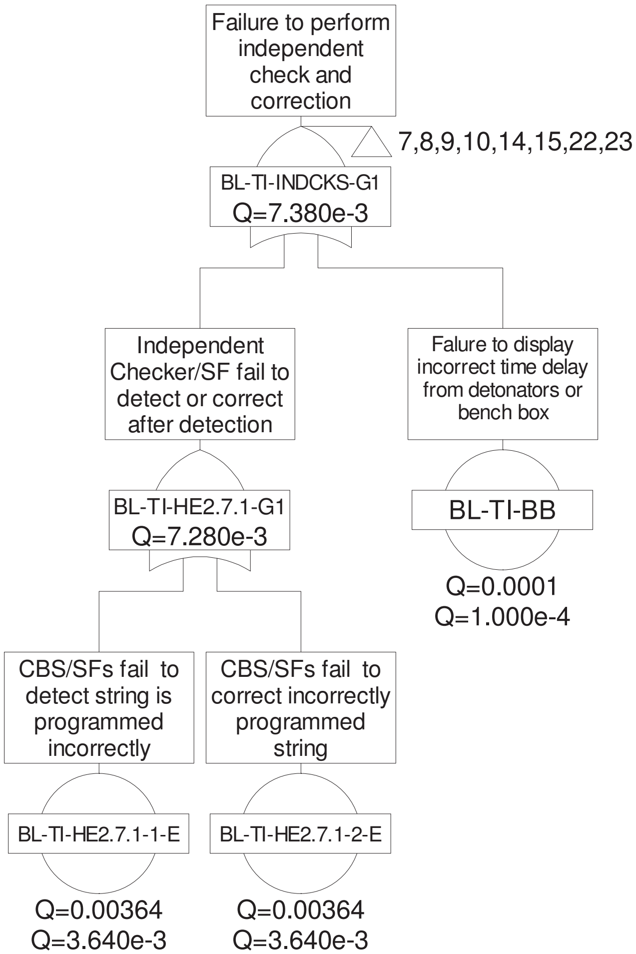

Delay Input Error gives 1 time delay error to corresponding to another time delay
4,13,17,25,27,28,29
BL-TI-HE2.3.1-G
Q=9.773e-6
SF1 programmes one detonator with incorrect delay time
SF2/BE fail to detect wrong delay time or correct after detection
Failure to perform independent check and correction
BL-TI-HE2.3.1-1-E0
Q=0.186
Q=1.860e-1
BL-TI-HE2.3.1-G1
Q=7.120e-3
BL-TI-INDCKS-G1
Q=7.380e-3
Page 12
SF2/BE fail to detect incorrectly programmed det despite external comp check (10%)
SF2/BE fail to correct incorrectly programmed det
BL-TI-HE2.3.1-2-E0
BL-TI-HE2.3.1-3-E1
Q=0.00348
Q=3.480e-3
Q=0.00364
Q=3.640e-3

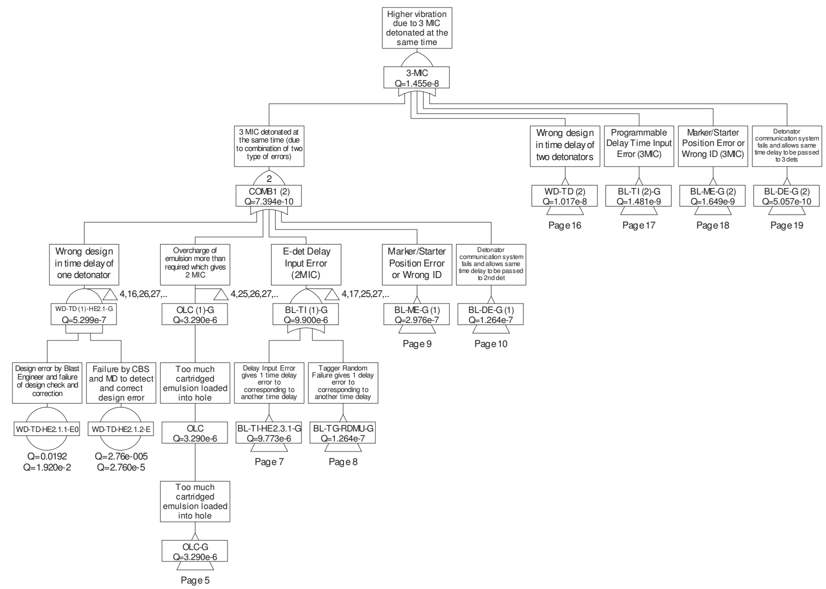

Tagger Random Failure gives 1 delay error to corresponding to another time delay
4,13,17,25,27,28,29
BL-TG-RDMU-G
Q=1.264e-7
Tagger Dangerous Random Failure Undetected (e.g. software, hardware etc), sends erroneous signal
BL-TG-RDM-G
Q=1.000e-3
SF2/BE fail to detect tagger error or correct after detection
BL-TG-RDMDETCOR
Q=1.713e-2
Page 11
Failure to perform independent check and correction
BL-TI-INDCKS-G1
Q=7.380e-3
Page 12
Tagger Random Failure (eg hardware, software)
BL-TG1-RDM1-E
Q=0.01
Q=1.000e-2
Failure gives dangerous output to det (eg one delay w hich matches another one)
BL-TG1-RDMDOFAILP-E0
Q=0.1
Q=1.000e-1
Diagnostic checks fails to detect failure
BL-TG1-RDMDCFAILP-E0
Q=1
Q=1.000

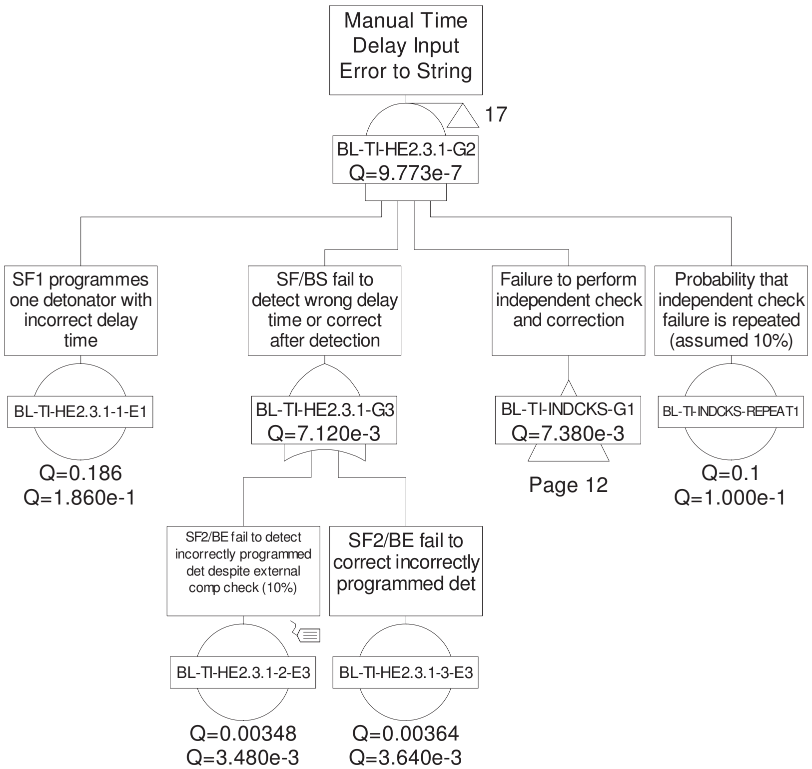

Marker/Starter Position Error or Wrong ID
4,13,18,25,26,28,29
BL-ME-G (1)
Q=2.976e-7
SF1 inserts marker/starter in the wrong place or wrong ID
BL-ME-HE2.4.1-1-E0
Q=0.00554
Q=5.540e-3
SF2/BE fail to detect or correct after detection
BL-ME-HE2.4.1-G1
Q=7.280e-3
Failure to perform independent check and correction
BL-TI-INDCKS-G1
Q=7.380e-3
Page 12
SF2/BE fail to detect marker/starter is in incorrect location or has wrong ID
BL-ME-HE2.4.1-2-E
Q=0.00364
Q=3.640e-3
SF2/BE fail to correct wrong marker/starter placement or ID
BL-ME-HE2.4.1-3-E
Q=0.00364
Q=3.640e-3

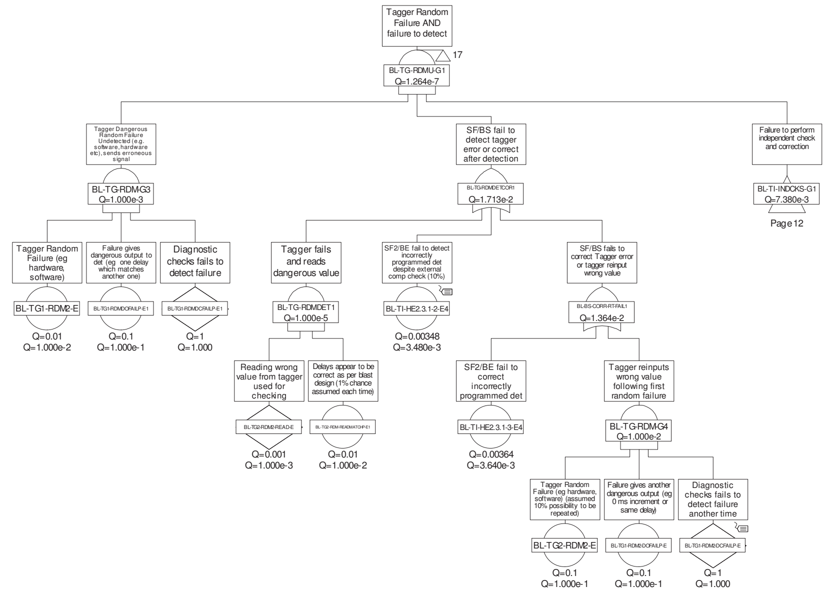

Detonator communication system fails and allows same time delay to be passed to 2nd det
4,13,19
BL-DE-G (1)
Q=1.264e-7
Comms failure with dets leading to same time delay passed to 2 dets in string (eg det does not disconnect)
BL-DE1-E
Q=0.001
Q=1.000e-3
SF2/BE fail to detect tagger error or correct after detection
BL-TG-RDMDETCOR
Q=1.713e-2
Page 11
Failure to perform independent check and correction
BL-TI-INDCKS-G1
Q=7.380e-3
Page 12

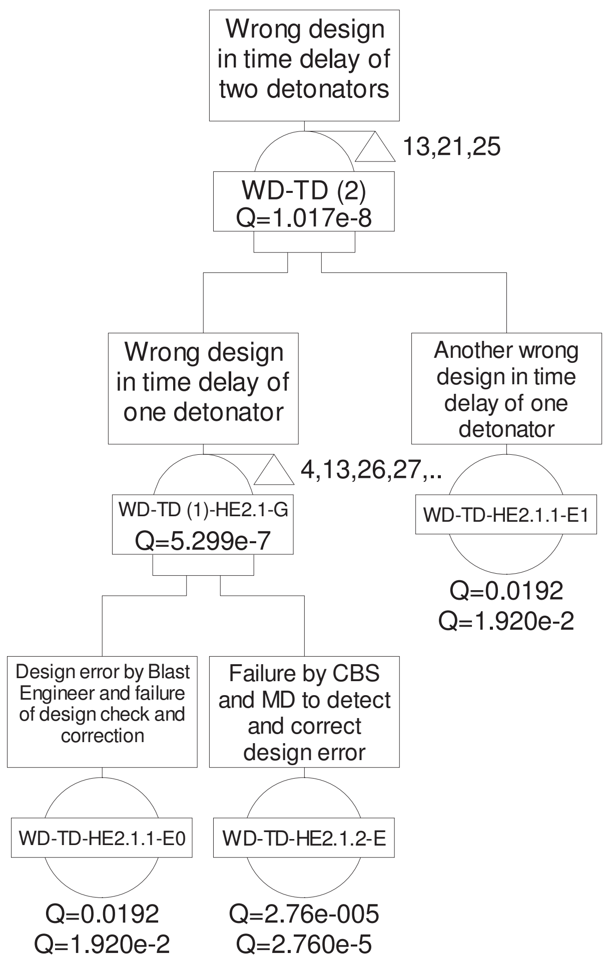

SF2/BE fail to detect tagger error or correct after detection
8,10
BL-TG-RDMDETCOR
Q=1.713e-2
Tagger fails and reads dangerous value
BL-TG-RDMDET
Q=1.000e-5
Reading wrong value from tagger used for checking
BL-TG2-RDM1-READ-E
Q=0.001
Q=1.000e-3
Delays appear to be correct as per blast design (1% chance assumed each time)
BL-TG2-RDM-READMATCHP-E0
Q=0.01
Q=1.000e-2
SF2/BE fail to detect incorrectly programmed det despite external comp check(10%)
BL-TI-HE2.3.1-2-E2
Q=0.00348
Q=3.480e-3
SF/BS fails to correct Tagger error or tagger reinput wrong value
BL-BS-CORR-RT-FAIL
Q=1.364e-2
SF2/BE fail to correct incorrectly programmed det
BL-TI-HE2.3.1-3-E2
Q=0.00364
Q=3.640e-3
Tagger reinputs wrong value following first random failure
BL-TG-RDM-G2
Q=1.000e-2
Tagger Random Failure (eg hardware, software) (assumed 10% possibility to be repeated)
BL-TG2-RDM1-E
Q=0.1
Q=1.000e-1
Failure gives another dangerous output (eg 0 ms increment or same delay)
BL-TG1-RDM1-DOFAILP-E
Q=0.1
Q=1.000e-1
Diagnostic checks fails to detect failure another time
BL-TG1-RDM1-DCFAILP-E
Q=1
Q=1.000

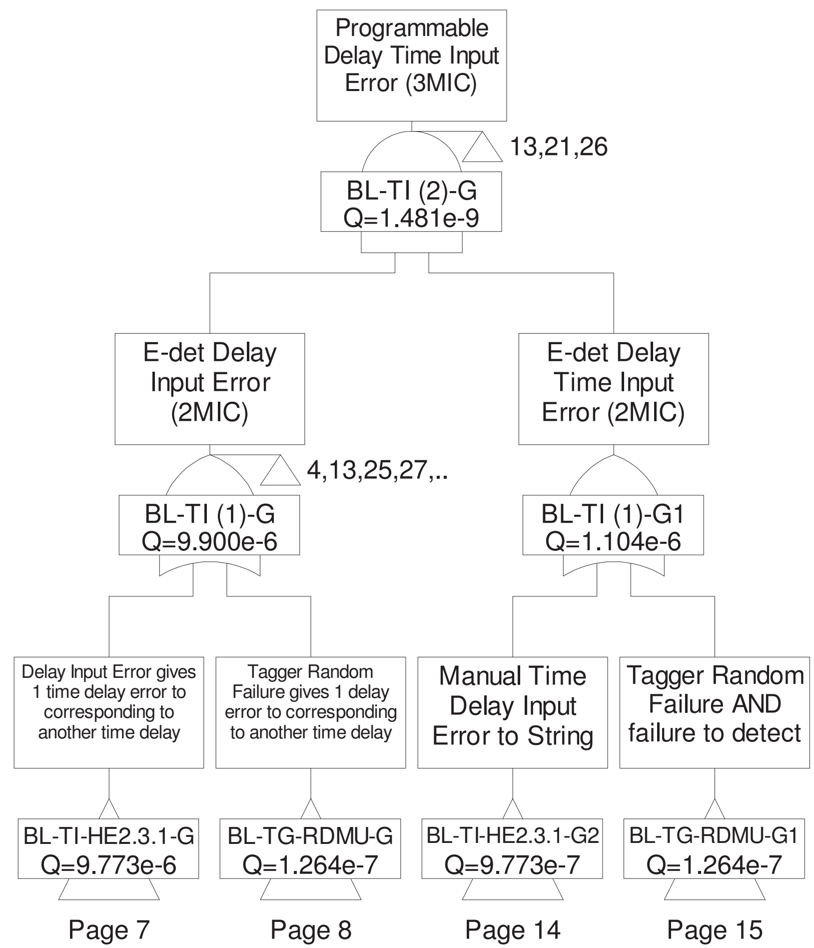

Failure to perform independent check and correction
7,8,9,10,14,15,22,23
BL-TI-INDCKS-G1
Q=7.380e-3
Independent Checker/SF fail to detect or correct after detection
Falure to display incorrect time delay from detonators or bench box
BL-TI-HE2.7.1-G1
Q=7.280e-3
BL-TI-BB
Q=0.0001
Q=1.000e-4
CBS/SFs fail to detect string is programmed incorrectly
CBS/SFs fail to correct incorrectly programmed string
BL-TI-HE2.7.1-1-E
BL-TI-HE2.7.1-2-E
Q=0.00364
Q=3.640e-3
Q=0.00364
Q=3.640e-3

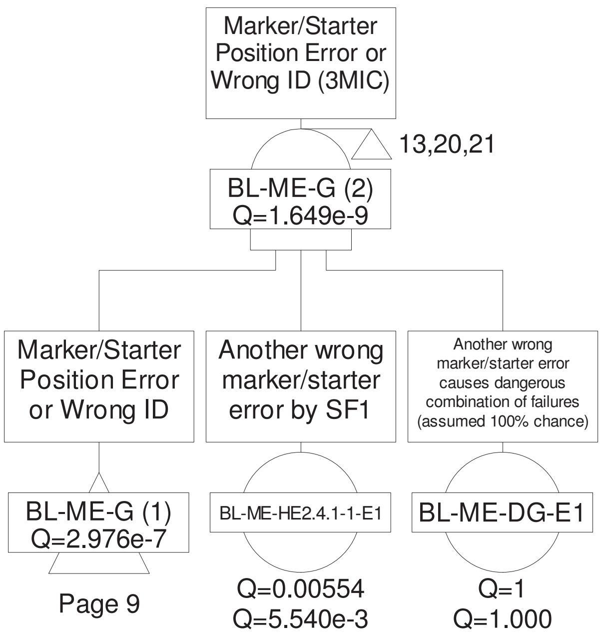

Higher vibration due to 3 MIC detonated at the same time
3-MIC
Q=1.455e-8
3 MIC detonated at the same time (due to combination of two type of errors)
2
COMB1 (2)
Q=7.394e-10
Wrong design in time delay of two detonators
WD-TD (2)
Q=1.017e-8
Page 16
Programmable Delay Time Input Error (3MIC)
BL-TI (2)-G
Q=1.481e-9
Page 17
Marker/Starter Position Error or Wrong ID (3MIC)
BL-ME-G (2)
Q=1.649e-9
Page 18
Detonator communication system fails and allows same time delay to be passed to 3 dets
BL-DE-G (2)
Q=5.057e-10
Page 19
Wrong design in time delay of one detonator
4,16,26,27,..
WD-TD (1)-HE2.1-G
Q=5.299e-7
Overcharge of emulsion more than required which gives 2 MIC
4,25,26,27,..
OLC (1)-G
Q=3.290e-6
E-det Delay Input Error (2MIC)
4,17,25,27,..
BL-TI (1)-G
Q=9.900e-6
Marker/Starter Position Error or Wrong ID
BL-ME-G (1)
Q=2.976e-7
Page 9
Detonator communication system fails and allows same time delay to be passed to 2nd det
BL-DE-G (1)
Q=1.264e-7
Page 10
Design error by Blast Engineer and failure of design check and correction
WD-TD-HE2.1.1-E0
Q=0.0192
Q=1.920e-2
Failure by CBS and MD to detect and correct design error
WD-TD-HE2.1.2-E
Q=2.76e-005
Q=2.760e-5
Too much cartridged emulsion loaded into hole
OLC
Q=3.290e-6
Too much cartridged emulsion loaded into hole
OLC-G
Q=3.290e-6
Page 5
Delay Input Error gives 1 time delay error to corresponding to another time delay
BL-TI-HE2.3.1-G
Q=9.773e-6
Page 7
Tagger Random Failure gives 1 delay error to corresponding to another time delay
BL-TG-RDMU-G
Q=1.264e-7
Page 8

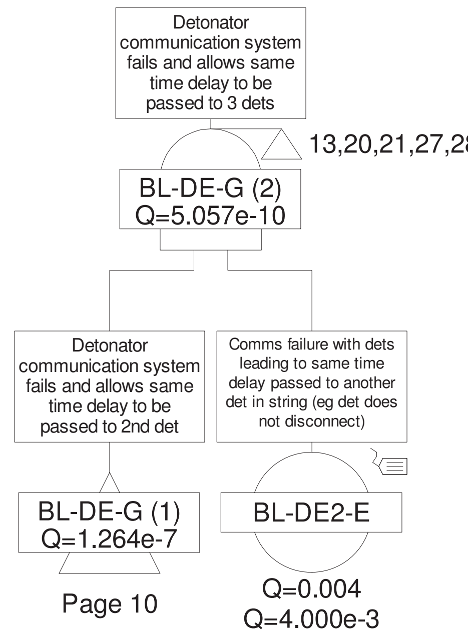

Manual Time Delay Input Error to String
17
BL-TI-HE2.3.1-G2
Q=9.773e-7
SF1 programmes one detonator with incorrect delay time
BL-TI-HE2.3.1-1-E1
Q=0.186
Q=1.860e-1
SF/BS fail to detect wrong delay time or correct after detection
BL-TI-HE2.3.1-G3
Q=7.120e-3
Failure to perform independent check and correction
BL-TI-INDCKS-G1
Q=7.380e-3
Page 12
Probability that independent check failure is repeated (assumed 10%)
BL-TI-INDCKS-REPEAT1
Q=0.1
Q=1.000e-1
SF2/BE fail to detect incorrectly programmed det despite external comp check (10%)
BL-TI-HE2.3.1-2-E3
Q=0.00348
Q=3.480e-3
SF2/BE fail to correct incorrectly programmed det
BL-TI-HE2.3.1-3-E3
Q=0.00364
Q=3.640e-3

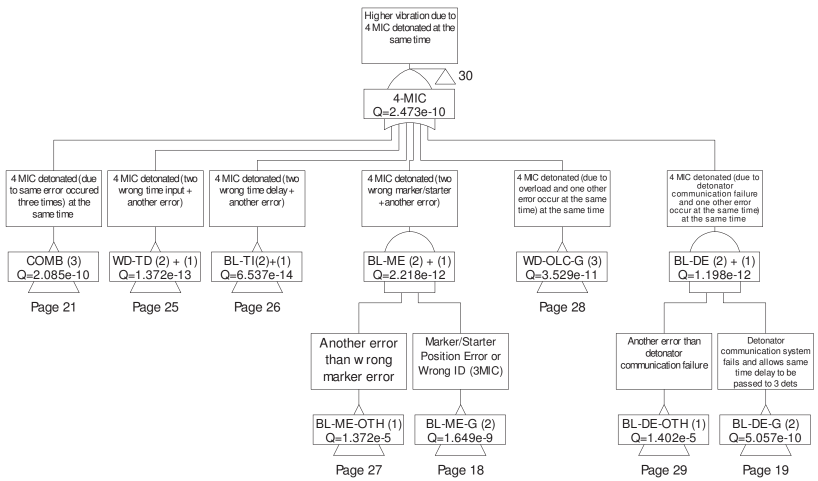

Tagger Random Failure AND failure to detect
17
BL-TG-RDMU-G1
Q=1.264e-7
Tagger Dangerous Random Failure Undetected (e.g. software, hardware etc), sends erroneous signal
BL-TG-RDM-G3
Q=1.000e-3
Tagger Random Failure (eg hardware, software)
BL-TG1-RDM2-E
Q=0.01
Q=1.000e-2
Failure gives dangerous output to det (eg one delay which matches another one)
BL-TG1-RDMDOFAILP-E1
Q=0.1
Q=1.000e-1
Diagnostic checks fails to detect failure
BL-TG1-RDMDCFAILP-E1
Q=1
Q=1.000
SF/BS fail to detect tagger error or correct after detection
BL-TG-RDMDETCOR1
Q=1.713e-2
Tagger fails and reads dangerous value
BL-TG-RDMDET1
Q=1.000e-5
Reading wrong value from tagger used for checking
BL-TG2-RDM2-READ-E
Q=0.001
Q=1.000e-3
Delays appear to be correct as per blast design (1% chance assumed each time)
BL-TG2-RDM-READMATCHP-E1
Q=0.01
Q=1.000e-2
SF2/BE fail to detect incorrectly programmed det despite external comp check (10%)
BL-TI-HE2.3.1-2-E4
Q=0.00348
Q=3.480e-3
SF/BS fails to correct Tagger error or tagger reinput wrong value
BL-BS-CORR-RT-FAIL1
Q=1.364e-2
SF2/BE fail to correct incorrectly programmed det
BL-TI-HE2.3.1-3-E4
Q=0.00364
Q=3.640e-3
Tagger reinputs wrong value following first random failure
BL-TG-RDM-G4
Q=1.000e-2
Tagger Random Failure (eg hardware, software) (assumed 10% possibility to be repeated)
BL-TG2-RDM2-E
Q=0.1
Q=1.000e-1
Failure gives another dangerous output (eg 0 ms increment or same delay)
BL-TG1-RDM2-DOFAILP-E
Q=0.1
Q=1.000e-1
Diagnostic checks fails to detect failure another time
BL-TG1-RDM2-DCFAILP-E
Q=1
Q=1.000
Failure to perform independent check and correction
BL-TI-INDCKS-G1
Q=7.380e-3
Page 12

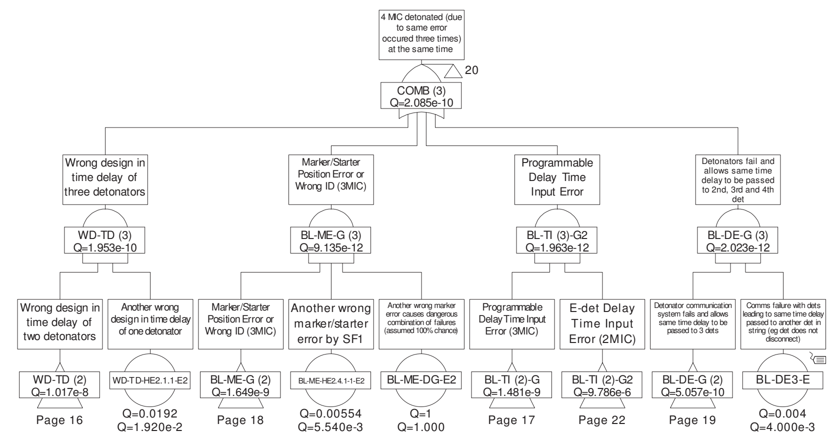

Wrong design in time delay of two detonators
13,21,25
WD-TD (2)
Q=1.017e-8
Wrong design in time delay of one detonator
4,13,26,27,..
WD-TD (1)-HE2.1-G
Q=5.299e-7
Another wrong design in time delay of one detonator
WD-TD-HE2.1.1-E1
Q=0.0192
Q=1.920e-2
Design error by Blast Engineer and failure of design check and correction
WD-TD-HE2.1.1-E0
Q=0.0192
Q=1.920e-2
Failure by CBS and MD to detect and correct design error
WD-TD-HE2.1.2-E
Q=2.76e-005
Q=2.760e-5

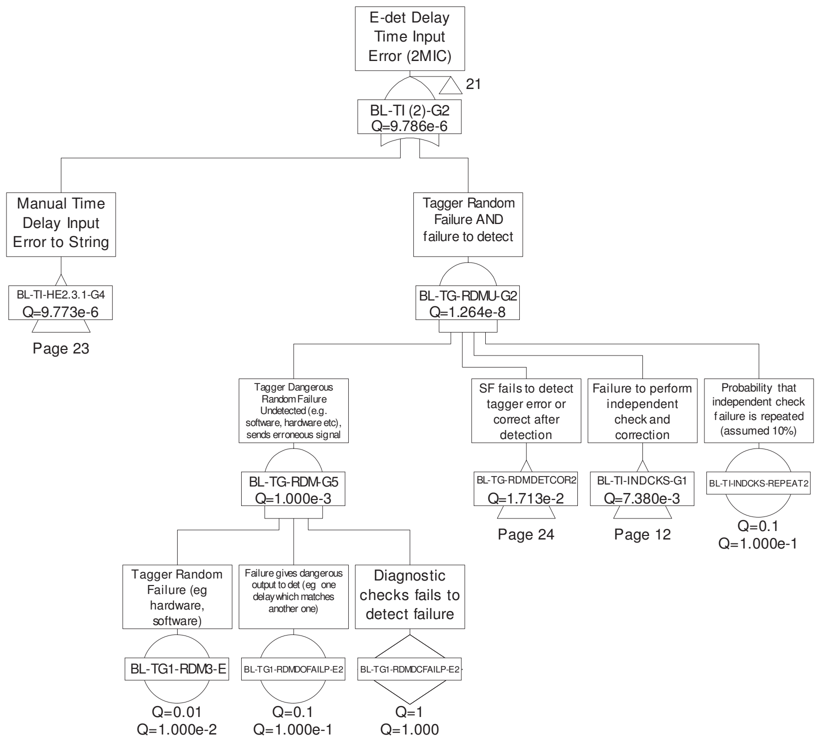

Programmable Delay Time Input Error (3MIC)
13,21,26
BL-TI (2)-G
Q=1.481e-9
E-det Delay Input Error (2MIC)
4,13,25,27,..
BL-TI (1)-G
Q=9.900e-6
E-det Delay Time Input Error (2MIC)
BL-TI (1)-G1
Q=1.104e-6
Delay Input Error gives 1 time delay error to corresponding to another time delay
BL-TI-HE2.3.1-G
Q=9.773e-6
Page 7
Tagger Random Failure gives 1 delay error to corresponding to another time delay
BL-TG-RDMU-G
Q=1.264e-7
Page 8
Manual Time Delay Input Error to String
BL-TI-HE2.3.1-G2
Q=9.773e-7
Page 14
Tagger Random Failure AND failure to detect
BL-TG-RDMU-G1
Q=1.264e-7
Page 15


Marker/Starter Position Error or Wrong ID (3MIC)
13,20,21
BL-ME-G (2)
Q=1.649e-9
Marker/Starter Position Error or Wrong ID
Another wrong marker/starter error by SF1
Another wrong marker/starter error causes dangerous combination of failures (assumed 100% chance)
BL-ME-G (1)
Q=2.976e-7
Page 9
BL-ME-HE2.4.1-1-E1
Q=0.00554
Q=5.540e-3
BL-ME-DG-E1
Q=1
Q=1.000

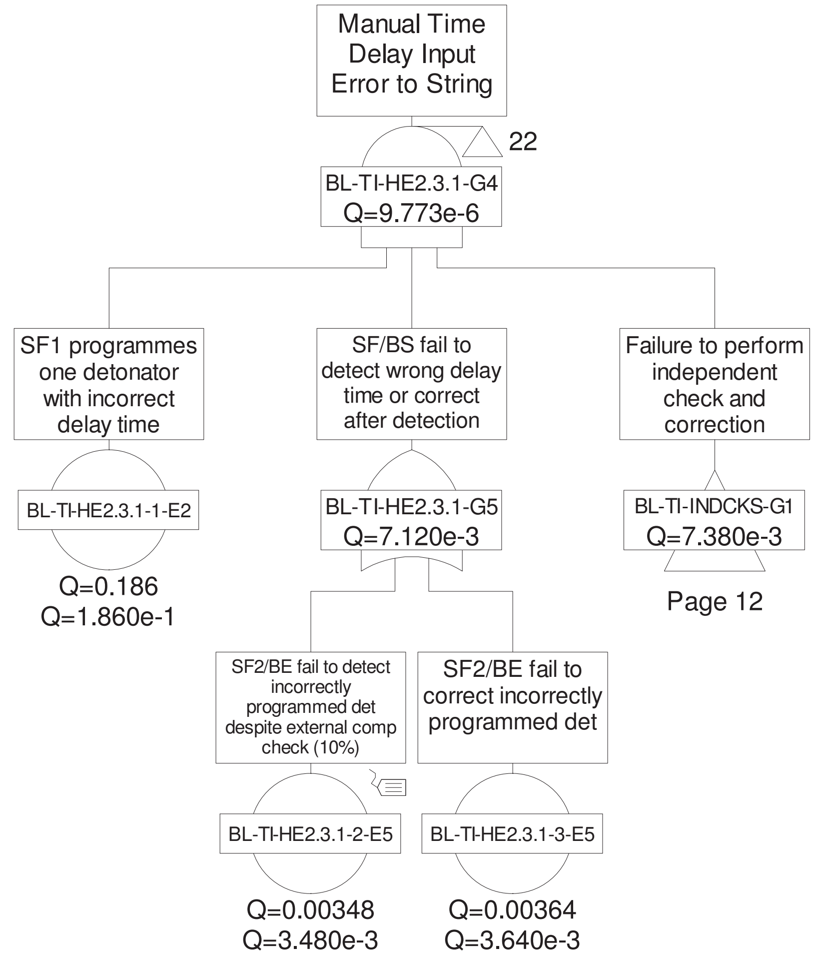

Detonator communication system fails and allows same time delay to be passed to 3 dets
13,20,21,27,28
BL-DE-G (2)
Q=5.057e-10
Detonator communication system fails and allows same time delay to be passed to 2nd det
Comms failure with dets leading to same time delay passed to another det in string (eg det does not disconnect)
BL-DE-G (1)
Q=1.264e-7
Page 10
BL-DE2-E
Q=0.004
Q=4.000e-3


Higher vibration due to 4 MIC detonated at the same time
30
4-MIC
Q=2.473e-10
4 MIC detonated (due to same error occured three times) at the same time
COMB (3)
Q=2.085e-10
Page 21
4 MIC detonated (two wrong time input + another error)
WD-TD (2) + (1)
Q=1.372e-13
Page 25
4 MIC detonated (two wrong time delay + another error)
BL-TI(2)+(1)
Q=6.537e-14
Page 26
4 MIC detonated (two wrong marker/starter +another error)
BL-ME (2) + (1)
Q=2.218e-12
Another error than w rong marker error
BL-ME-OTH (1)
Q=1.372e-5
Page 27
Marker/Starter Position Error or Wrong ID (3MIC)
BL-ME-G (2)
Q=1.649e-9
Page 18
4 MIC detonated (due to overload and one other error occur at the same time) at the same time
WD-OLC-G (3)
Q=3.529e-11
Page 28
4 MIC detonated (due to detonator communication failure and one other error occur at the same time) at the same time
BL-DE (2) + (1)
Q=1.198e-12
Another error than detonator communication failure
BL-DE-OTH (1)
Q=1.402e-5
Page 29
Detonator communication system fails and allows same time delay to be passed to 3 dets
BL-DE-G (2)
Q=5.057e-10
Page 19

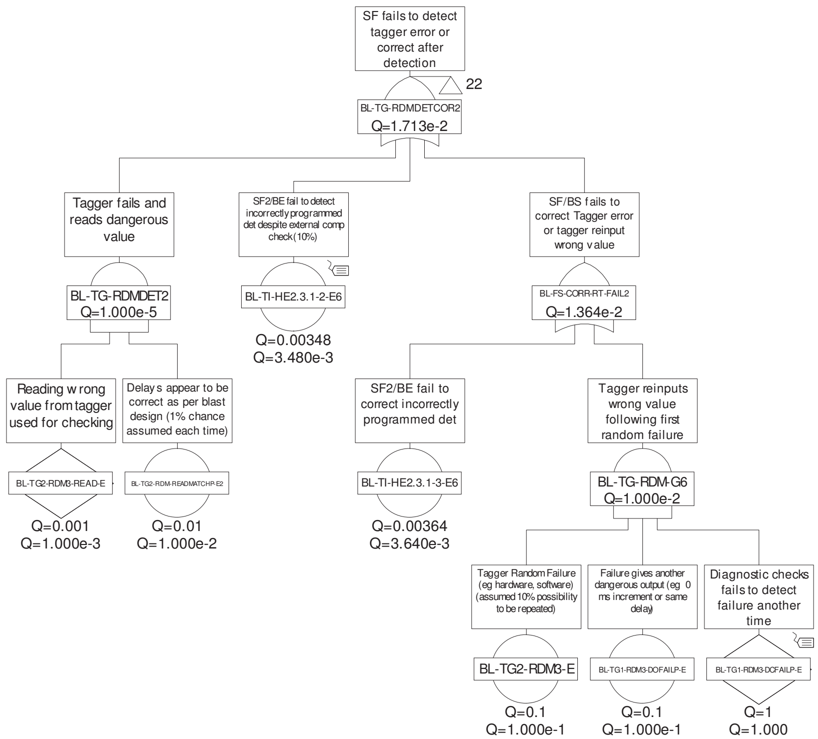

4 MIC detonated (due to same error occured three times) at the same time
20
COMB (3)
Q=2.085e-10
Wrong design in time delay of three detonators
WD-TD (3)
Q=1.953e-10
Wrong design in time delay of two detonators
WD-TD (2)
Q=1.017e-8
Page 16
Another wrong design in time delay of one detonator
WD-TD-HE2.1.1-E2
Q=0.0192
Q=1.920e-2
Marker/Starter Position Error or Wrong ID (3MIC)
BL-ME-G (3)
Q=9.135e-12
Marker/Starter Position Error or Wrong ID (3MIC)
BL-ME-G (2)
Q=1.649e-9
Page 18
Another wrong marker/starter error by SF1
BL-ME-HE2.4.1-1-E2
Q=0.00554
Q=5.540e-3
Another wrong marker error causes dangerous combination of failures (assumed 100% chance)
BL-ME-DG-E2
Q=1
Q=1.000
Programmable Delay Time Input Error
BL-TI (3)-G2
Q=1.963e-12
Programmable Delay Time Input Error (3MIC)
BL-TI (2)-G
Q=1.481e-9
Page 17
E-det Delay Time Input Error (2MIC)
BL-TI (2)-G2
Q=9.786e-6
Page 22
Detonators fail and allows same time delay to be passed to 2nd, 3rd and 4th det
BL-DE-G (3)
Q=2.023e-12
Detonator communication system fails and allows same time delay to be passed to 3 dets
BL-DE-G (2)
Q=5.057e-10
Page 19
Comms failure with dets leading to same time delay passed to another det in string (eg det does not disconnect)
BL-DE3-E
Q=0.004
Q=4.000e-3



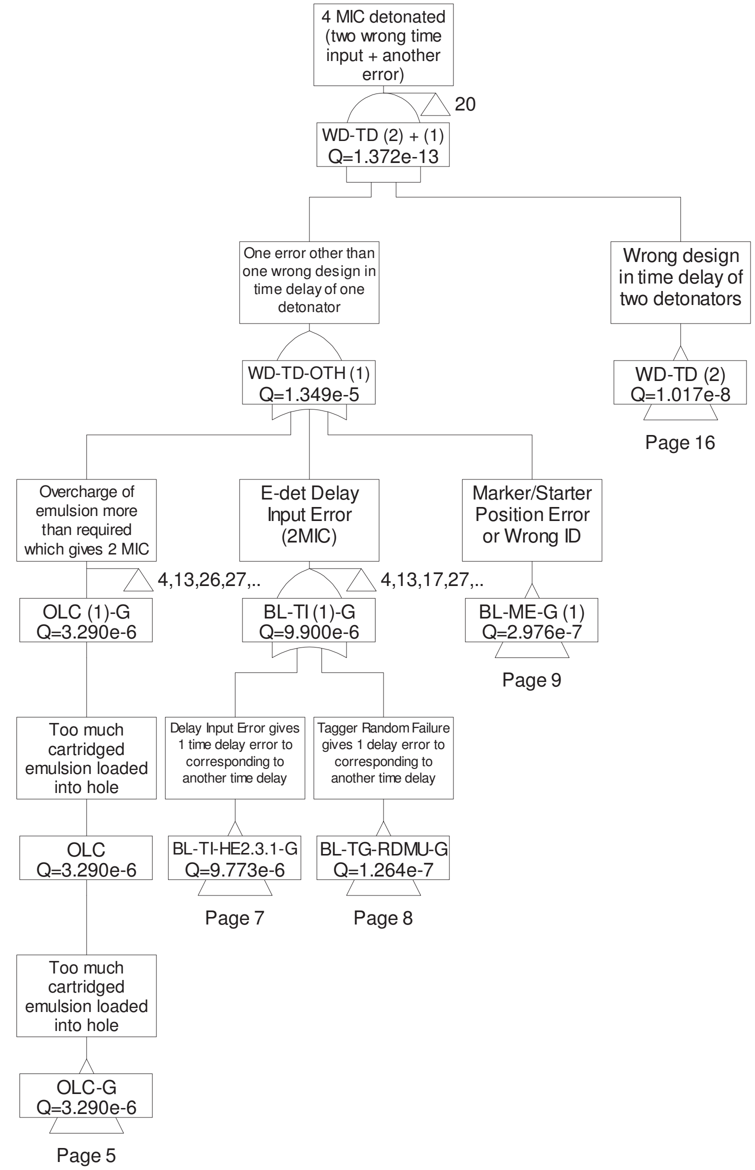
E-det Delay Time Input Error (2MIC)
21
BL-TI (2)-G2
Q=9.786e-6
Manual Time Delay Input Error to String
BL-TI-HE2.3.1-G4
Q=9.773e-6
Page 23
Tagger Random Failure AND failure to detect
BL-TG-RDMU-G2
Q=1.264e-8
Tagger Dangerous Random Failure Undetected (e.g. software, hardware etc), sends erroneous signal
BL-TG-RDM-G5
Q=1.000e-3
SF fails to detect tagger error or correct after detection
BL-TG-RDMDETCOR2
Q=1.713e-2
Page 24
Failure to perform independent check and correction
BL-TI-INDCKS-G1
Q=7.380e-3
Page 12
Probability that independent check failure is repeated (assumed 10%)
BL-TI-INDCKS-REPEAT2
Q=0.1
Q=1.000e-1
Tagger Random Failure (eg hardware, software)
BL-TG1-RDM3-E
Q=0.01
Q=1.000e-2
Failure gives dangerous output to det (eg one delay which matches another one)
BL-TG1-RDMDOFAILP-E2
Q=0.1
Q=1.000e-1
Diagnostic checks fails to detect failure
BL-TG1-RDMDCFAILP-E2
Q=1
Q=1.000



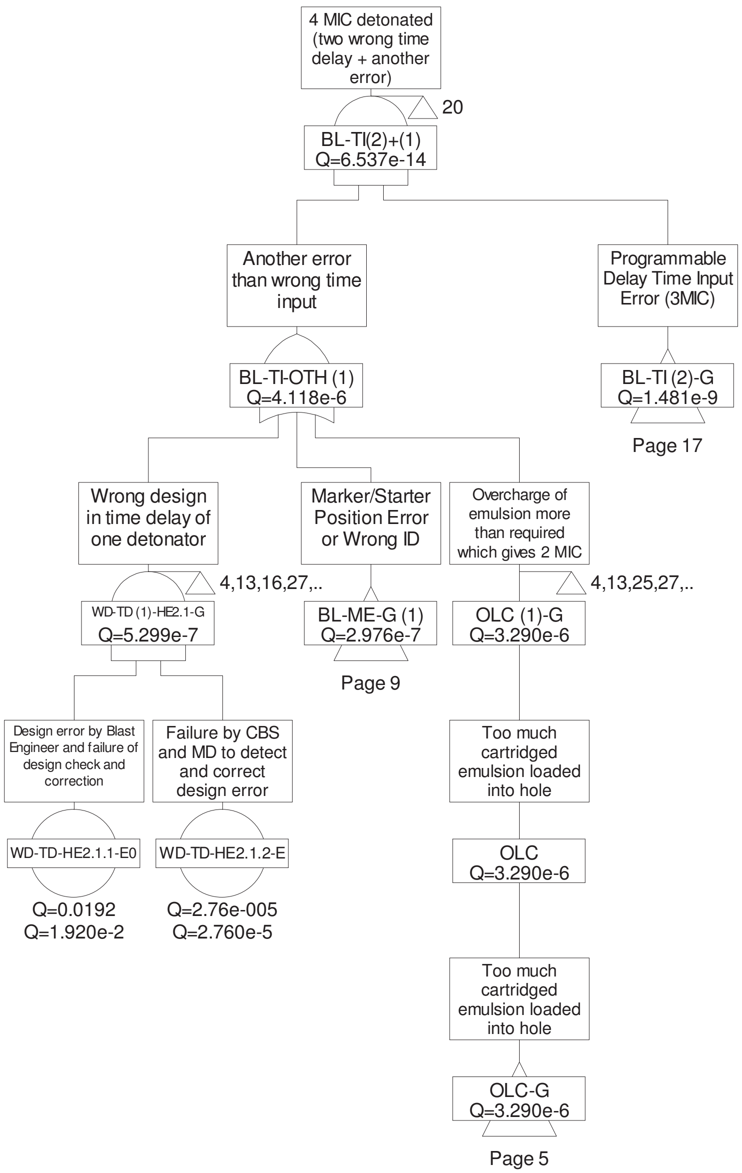
Manual Time Delay Input Error to String
22
BL-TI-HE2.3.1-G4
Q=9.773e-6
SF1 programmes one detonator with incorrect delay time
BL-TI-HE2.3.1-1-E2
Q=0.186
Q=1.860e-1
SF/BS fail to detect wrong delay time or correct after detection
BL-TI-HE2.3.1-G5
Q=7.120e-3
Failure to perform independent check and correction
BL-TI-INDCKS-G1
Q=7.380e-3
Page 12
SF2/BE fail to detect incorrectly programmed det despite external comp check (10%)
BL-TI-HE2.3.1-2-E5
Q=0.00348
Q=3.480e-3
SF2/BE fail to correct incorrectly programmed det
BL-TI-HE2.3.1-3-E5
Q=0.00364
Q=3.640e-3

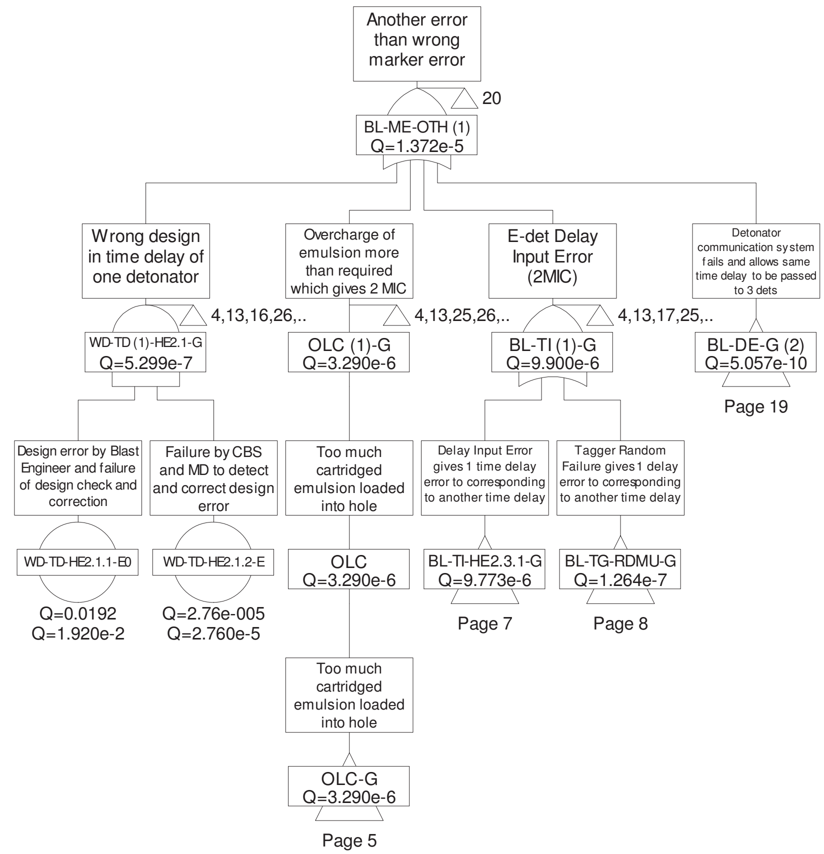


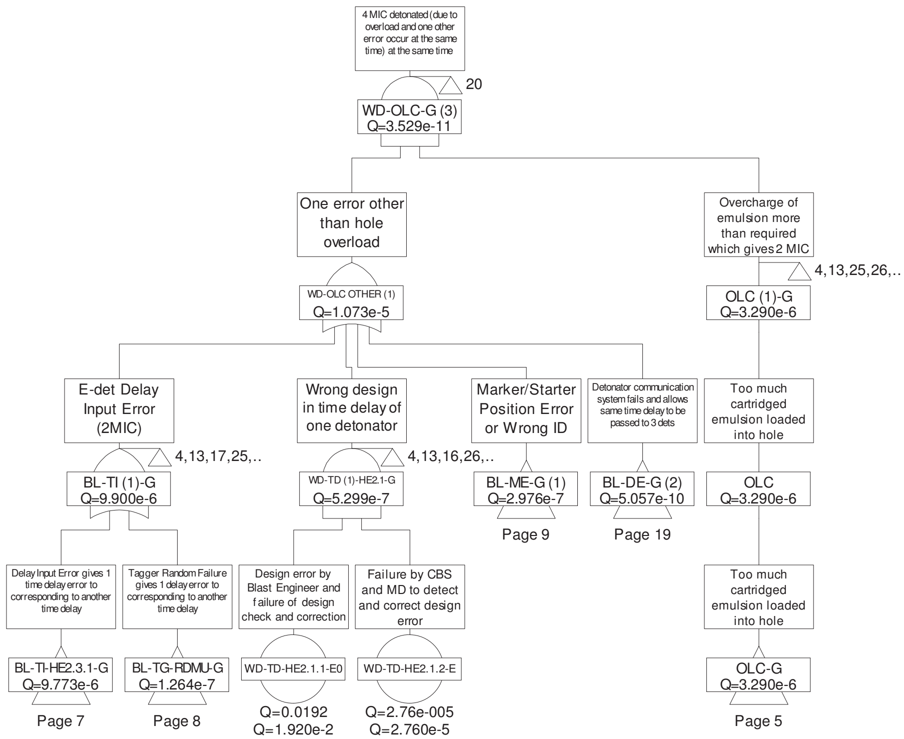
SF fails to detect tagger error or correct after detection
22
BL-TG-RDMDETCOR2
Q=1.713e-2
Tagger fails and reads dangerous value
BL-TG-RDMDET2
Q=1.000e-5
Reading wrong value from tagger used for checking
BL-TG2-RDM3-READ-E
Q=0.001
Q=1.000e-3
Delays appear to be correct as per blast design (1% chance assumed each time)
BL-TG2-RDM-READMATCHP-E2
Q=0.01
Q=1.000e-2
SF2/BE fail to detect incorrectly programmed det despite external comp check(10%)
BL-TI-HE2.3.1-2-E6
Q=0.00348
Q=3.480e-3
SF/BS fails to correct Tagger error or tagger reinput wrong value
BL-FS-CORR-RT-FAIL2
Q=1.364e-2
SF2/BE fail to correct incorrectly programmed det
BL-TI-HE2.3.1-3-E6
Q=0.00364
Q=3.640e-3
Tagger reinputs wrong value following first random failure
BL-TG-RDM-G6
Q=1.000e-2
Tagger Random Failure (eg hardware, software) (assumed 10% possibility to be repeated)
BL-TG2-RDM3-E
Q=0.1
Q=1.000e-1
Failure gives another dangerous output (eg 0 ms increment or same delay)
BL-TG1-RDM3-DOFAILP-E
Q=0.1
Q=1.000e-1
Diagnostic checks fails to detect failure another time
BL-TG1-RDM3-DCFAILP-E
Q=1
Q=1.000

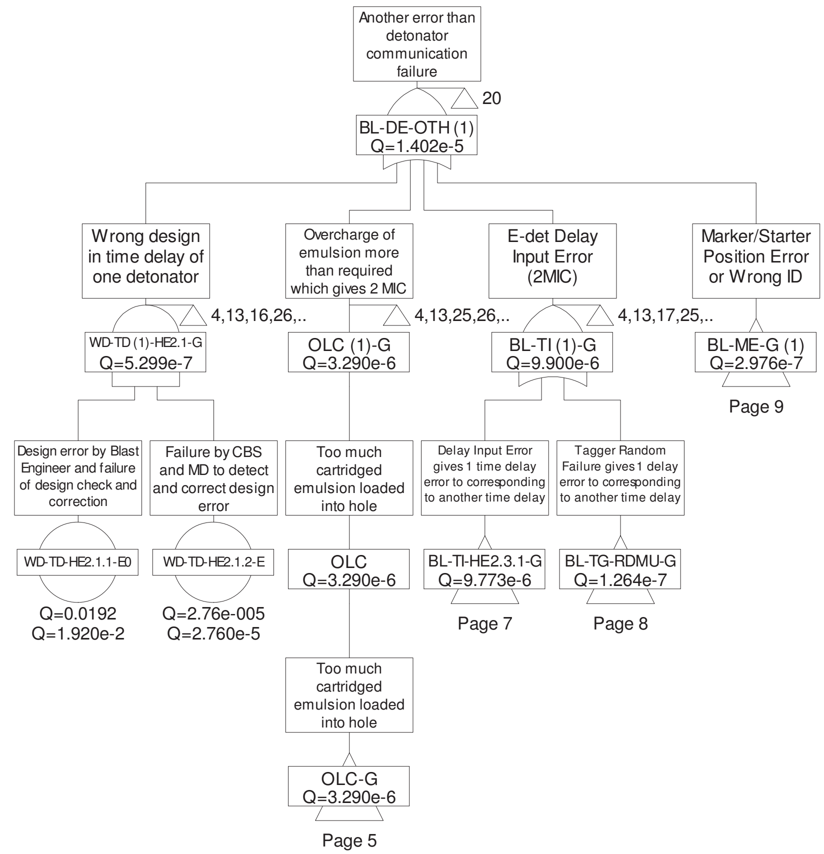


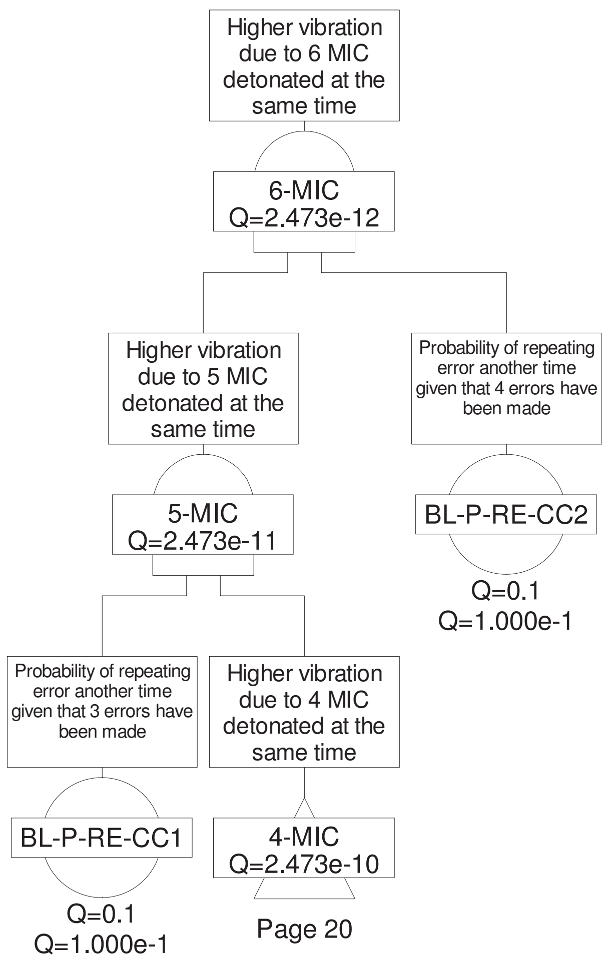
4 MIC detonated (two wrong time input + another error)
20
WD-TD (2) + (1)
Q=1.372e-13
One error other than one wrong design in time delay of one detonator
WD-TD-OTH (1)
Q=1.349e-5
Wrong design in time delay of two detonators
WD-TD (2)
Q=1.017e-8
Page 16
Overcharge of emulsion more than required which gives 2 MIC
4,13,26,27,..
OLC (1)-G
Q=3.290e-6
Too much cartridged emulsion loaded into hole
OLC
Q=3.290e-6
Too much cartridged emulsion loaded into hole
OLC-G
Q=3.290e-6
Page 5
E-det Delay Input Error (2MIC)
4,13,17,27,..
BL-TI (1)-G
Q=9.900e-6
Delay Input Error gives 1 time delay error to corresponding to another time delay
BL-TI-HE2.3.1-G
Q=9.773e-6
Page 7
Tagger Random Failure gives 1 delay error to corresponding to another time delay
BL-TG-RDMU-G
Q=1.264e-7
Page 8
Marker/Starter Position Error or Wrong ID
BL-ME-G (1)
Q=2.976e-7
Page 9

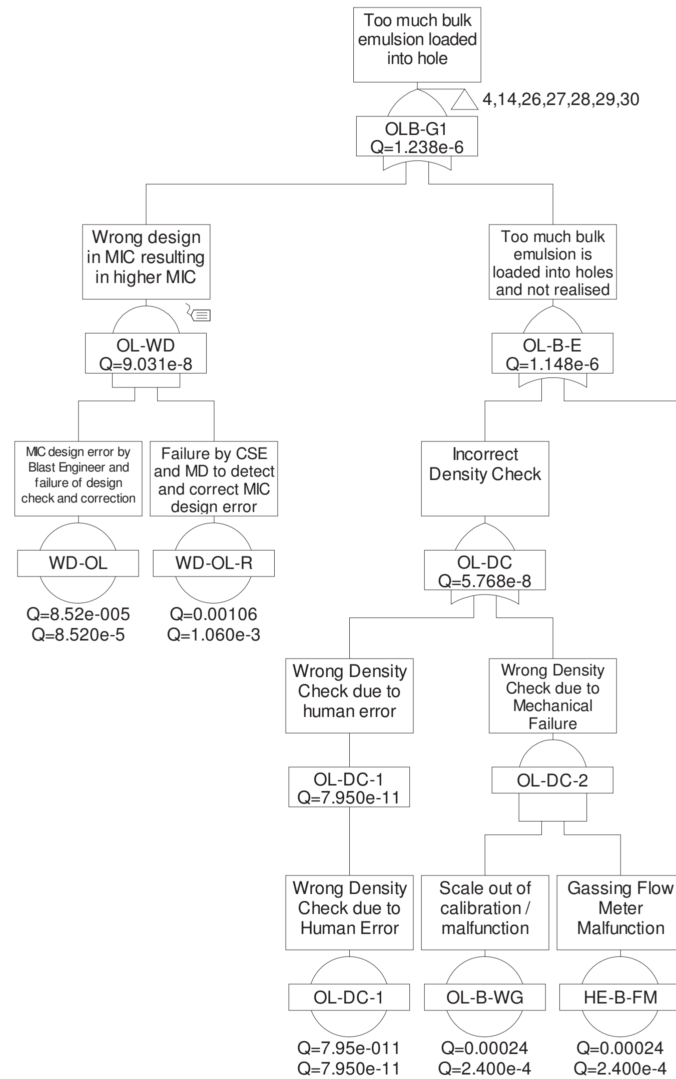

4 MIC detonated (two wrong time delay + another error)
20
BL-TI(2)+(1)
Q=6.537e-14
Another error than wrong time input
Programmable Delay Time Input Error (3MIC)
BL-TI-OTH (1)
Q=4.118e-6
BL-TI (2)-G
Q=1.481e-9
Page 17
Wrong design in time delay of one detonator
Marker/Starter Position Error or Wrong ID
Overcharge of emulsion more than required which gives 2 MIC
4,13,16,27,..
4,13,25,27,..
WD-TD (1)-HE2.1-G
Q=5.299e-7
BL-ME-G (1)
Q=2.976e-7
Page 9
OLC (1)-G
Q=3.290e-6
Design error by Blast Engineer and failure of design check and correction
Failure by CBS and MD to detect and correct design error
Too much cartridged emulsion loaded into hole
WD-TD-HE2.1.1-E0
WD-TD-HE2.1.2-E
OLC
Q=3.290e-6
Q=0.0192
Q=1.920e-2
Q=2.76e-005
Q=2.760e-5
Too much cartridged emulsion loaded into hole
OLC-G
Q=3.290e-6
Page 5


Another error than wrong marker error
20
BL-ME-OTH (1)
Q=1.372e-5
Wrong design in time delay of one detonator
Overcharge of emulsion more than required which gives 2 MIC
E-det Delay Input Error (2MIC)
Detonator communication system fails and allows same time delay to be passed to 3 dets
4,13,16,26,..
4,13,25,26,..
4,13,17,25,..
WD-TD (1)-HE2.1-G
Q=5.299e-7
OLC (1)-G
Q=3.290e-6
BL-TI (1)-G
Q=9.900e-6
BL-DE-G (2)
Q=5.057e-10
Page 19
Design error by Blast Engineer and failure of design check and correction
Failure by CBS and MD to detect and correct design error
Too much cartridged emulsion loaded into hole
Delay Input Error gives 1 time delay error to corresponding to another time delay
Tagger Random Failure gives 1 delay error to corresponding to another time delay
WD-TD-HE2.1.1-E0
WD-TD-HE2.1.2-E
OLC
Q=3.290e-6
BL-TI-HE2.3.1-G
Q=9.773e-6
BL-TG-RDMU-G
Q=1.264e-7
Q=0.0192
Q=1.920e-2
Q=2.76e-005
Q=2.760e-5
Page 7
Page 8
Too much cartridged emulsion loaded into hole
OLC-G
Q=3.290e-6
Page 5


4 MIC detonated (due to overload and one other error occur at the same time) at the same time
20
WD-OLC-G (3)
Q=3.529e-11
One error other than hole overload
WD-OLC OTHER (1)
Q=1.073e-5
Overcharge of emulsion more than required which gives 2 MIC
4,13,25,26,..
OLC (1)-G
Q=3.290e-6
E-det Delay Input Error (2MIC)
4,13,17,25,..
BL-TI (1)-G
Q=9.900e-6
Wrong design in time delay of one detonator
4,13,16,26,..
WD-TD (1)-HE2.1-G
Q=5.299e-7
Marker/Starter Position Error or Wrong ID
BL-ME-G (1)
Q=2.976e-7
Page 9
Detonator communication system fails and allows same time delay to be passed to 3 dets
BL-DE-G (2)
Q=5.057e-10
Page 19
Too much cartridged emulsion loaded into hole
OLC
Q=3.290e-6
Too much cartridged emulsion loaded into hole
OLC-G
Q=3.290e-6
Page 5
Delay Input Error gives 1 time delay error to corresponding to another time delay
BL-TI-HE2.3.1-G
Q=9.773e-6
Page 7
Tagger Random Failure gives 1 delay error to corresponding to another time delay
BL-TG-RDMU-G
Q=1.264e-7
Page 8
Design error by Blast Engineer and failure of design check and correction
WD-TD-HE2.1.1-E0
Q=0.0192
Q=1.920e-2
Failure by CBS and MD to detect and correct design error
WD-TD-HE2.1.2-E
Q=2.76e-005
Q=2.760e-5


Another error than detonator communication failure
20
BL-DE-OTH (1)
Q=1.402e-5
Wrong design in time delay of one detonator
4,13,16,26,..
WD-TD (1)-HE2.1-G
Q=5.299e-7
Overcharge of emulsion more than required which gives 2 MIC
4,13,25,26,..
OLC (1)-G
Q=3.290e-6
E-det Delay Input Error (2MIC)
4,13,17,25,..
BL-TI (1)-G
Q=9.900e-6
Marker/Starter Position Error or Wrong ID
BL-ME-G (1)
Q=2.976e-7
Page 9
Design error by Blast Engineer and failure of design check and correction
WD-TD-HE2.1.1-E0
Q=0.0192
Q=1.920e-2
Failure by CBS and MD to detect and correct design error
WD-TD-HE2.1.2-E
Q=2.76e-005
Q=2.760e-5
Too much cartridged emulsion loaded into hole
OLC
Q=3.290e-6
Too much cartridged emulsion loaded into hole
OLC-G
Q=3.290e-6
Page 5
Delay Input Error gives 1 time delay error to corresponding to another time delay
BL-TI-HE2.3.1-G
Q=9.773e-6
Page 7
Tagger Random Failure gives 1 delay error to corresponding to another time delay
BL-TG-RDMU-G
Q=1.264e-7
Page 8


Higher vibration due to 6 MIC detonated at the same time
6-MIC
Q=2.473e-12
Higher vibration due to 5 MIC detonated at the same time
Probability of repeating error another time given that 4 errors have been made
5-MIC
Q=2.473e-11
BL-P-RE-CC2
Q=0.1
Q=1.000e-1
Probability of repeating error another time given that 3 errors have been made
Higher vibration due to 4 MIC detonated at the same time
BL-P-RE-CC1
4-MIC
Q=2.473e-10
Q=0.1
Q=1.000e-1
Page 20


Too much bulk emulsion loaded into hole
4,14,26,27,28,29,30
OLB-G1
Q=1.238e-6
Wrong design in MIC resulting in higher MIC
Too much bulk emulsion is loaded into holes and not realised
OL-WD
Q=9.031e-8
OL-B-E
Q=1.148e-6
MIC design error by Blast Engineer and failure of design check and correction
Failure by CSE and MD to detect and correct MIC design error
Incorrect Density Check
TO, SF and BE don't realise hole is overloaded
WD-OL
WD-OL-R
OL-DC
Q=5.768e-8
OL-B-HO
Q=8.52e-005
Q=8.520e-5
Q=0.00106
Q=1.060e-3
Q=1.09e-006
Q=1.090e-6
Wrong Density Check due to human error
Wrong Density Check due to Mechanical Failure
OL-DC-1
Q=7.950e-11
OL-DC-2
Wrong Density Check due to Human Error
Scale out of calibration / malfunction
Gassing Flow Meter Malfunction
OL-DC-1
OL-B-WG
HE-B-FM
Q=7.95e-011
Q=7.950e-11
Q=0.00024
Q=2.400e-4
Q=0.00024
Q=2.400e-4

Annex A4

Human Factor Assessment for the Use of Electronic Detonators

CONTENTS

1 HUMAN ERROR ASSESSMENT & REDUCTION TECHNIQUE (HEART)

1.1 OVERVIEW

In order to assess how likely it is that a process will fail based on the potential for human error, a human reliability assessment (HRA) has been undertaken. HRA addresses the following questions:

- Which types of human error may occur (e.g. action error, information retrieval error, communication error, violation)?
- What is estimated probability of such errors being made?
- What factors may influence this probability (e.g. time pressure, stress, poor working environment, low morale)
- How can the identified human errors be prevented in the design or how can their impact be reduced by additional mitigating controls?

The Human Error Assessment and Reduction Technique (HEART) is a HRA method based on human performance literature; it has been used in this assessment to quantify human error probabilities. HEART assesses the interactions between humans, their specific tasks and performance shaping/human factors (error producing conditions).

1.2 METHODOLOGY

The blasting process is inherently complex and is composed of numerous subtasks, carried out by different individuals. It is therefore important to identify these subtasks, the roles and responsibilities associated with these tasks and to assess the risks arising from human performance failure.

In consultation with an experienced Blast Engineer/Shot-firer, fault trees were constructed to identify possible sources of human error during three critical blasting subtasks:

1) More than 1 MIC detonated at the same time (this scenario includes All MIC detonated at the same time);
2) Excessive loading of cartridge emulsion; and
3) Excessive loading of bulk emulsion.

Fault Tree Analysis examines the logical relationship between the circumstances, failures events, and human/management errors which must occur in order for these specified undesired events to occur.

A human factors specialist reviewed the assumptions made by the project team (including relevant personnel from MTRCL, the contractor and the electronic detonator supplier) and adapted the fault trees where necessary before undertaking the HEART assessment. Analyses were undertaken for each scenario to identify the base human error probability. To ensure all potential human errors were identified and taken into account in the risk

assessment, errors were quantified for the entire blasting life cycle, from the design of the blast plan to the initiation of the explosives. Manufacture errors were not taken into account in this assessment as they have been accounted in the equipment and system failure probabilities.

1.2.1 HEART methodology

The HEART technique was developed by Williams (1986) and is based on human performance literature. The human factors specialist must undertake the steps summarised in *Table 1.1* in order to estimate the probability of failure for a specific task.

Table 1.1 ***HEART methodology***

Step	Task	Output
1	Classify the task in terms of its generic human unreliability into one of the 8 generic HEART task types	Nominal human unreliability probability
2	Identify relevant error producing conditions (EPCs) which may negatively influence performance	Maximum predicted nominal amount by which unreliability may increase (multiplier)
3	Estimate the impact of each EPC on the task	Value between 0 and 1
4	Calculate the 'assessed impact' for each EPC according to the formula: (EPC multiplier -1) x Impact	Assessed impact value
5	Calculate overall probability of failure of task based on the formula: Nominal human unreliability x assessed effects 1 x assessed effects 2… etc	Overall probability of failure

Each scenario has been analysed separately in *Sections 2 to 4 of this annex* to determine the overall probability of human failure. Hence for each contributing error, the following sections present and discuss the generic HEART task type and the EPCs and their impacts, culminating in an overall probability of failure. It should be noted that the overall probabilities of failures are probabilities *per occasion the task is undertaken*.

1.2.2 General Assumptions

- Where a task is undertaken by more than one individual at a time e.g. two representatives from the Mines Division, a reduction in the *assessed proportion of* effect of 1/3 has been calculated to reflect the presence of two individuals. The value of 1/3 is thought to be appropriate due to the potential distraction introduced when more than one individual is present.
- The Shotfirers, Blast Engineers and Competent Blasting Supervisor are experienced and competent to perform their tasks.

- The working environment in the tunnel is not optimal for human performance. It is understood that it is wet, dusty (due to poor ventilation), hot, poorly lit for the tasks to be carried out and noisy. Therefore for all tasks taking place within the tunnel, the maximum weighting for the EPC *hostile environment* has been used.
- For all tasks apart from design checking and error correction, a disruption to sleep has been assumed. Shotfirers work a forward-rotating shift pattern, and the Blast Engineer must also be present. The Competent Blasting Supervisor and Mines Division will have to be present at the magazine during the early hours of the morning; therefore they too will also experience some degree of sleep disruption.

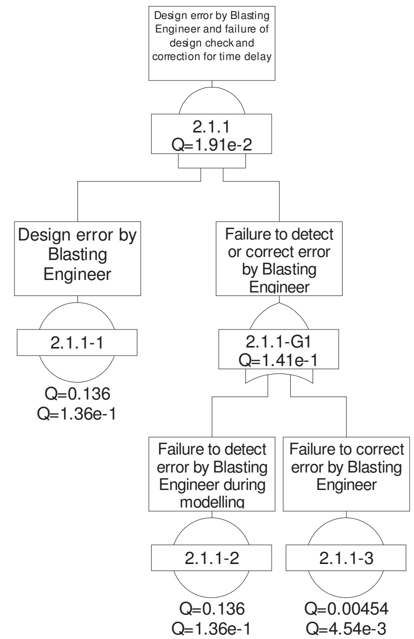
2 *SCENARIO ONE: MORE THAN 1 MIC DETONATED AT THE SAME TIME*

2.1 *EVENT 2.1: WRONG DESIGN OF TIME DELAY*

The overall probability of the wrong design being released to the project team is **5.29 E-7**, based on the failure of some or all of the tasks analysed below.

2.1.1 *Event 2.1.1: Design error by Blast Engineer and failure of design check and correction*

The overall probability of a wrong blast plan submitted to the Competent Blasting Supervisor and Mines Division for review is **1.91 E-2,** based on the failure of all of the tasks analysed below.



2.1.1-1 - Design error by Blast Engineer

As before, if an error is made by the Blast Engineer during the design process and the incorrect drawings are distributed to the blasting team, they will utilise the plans believing them to be correct when in fact they are incorrect. The generic HEART task type taken to represent this checking task, utilising a modelling system is *"Fairly simple task performed rapidly or given scant attention"* for which the nominal human unreliability is *0.09.* The EPCs and their impacts are shown in *Table 2.1*.

Table 2.1 HEART calculation

Task	Generic task unreliability	EPCs	Multiplier	Assessed Proportion of Effect	Assessed Effect	Human Error Probability
Design error by Blast Engineer	0.09	Shortage of time available for error detection & correction	11	0.01	1.1	1.36 E-1
		Disruption of normal work-sleep	1.1	0.1	1.01	

Task	Generic task unreliability	EPCs	Multiplier	Assessed Proportion of Effect	Assessed Effect	Human Error Probability
		cycles				
		High level of emotional stress	1.3	0.3	1.09	
		Channel capacity overload	6	0.05	1.25	

Based on the above estimates, the likelihood of producing an error is **1.36 E-1**.

Event 2.1.1-2/3 - Failure to detect and correct error by Blast Engineer during modelling

Following any possible calculation error, the Blast Engineer should detect the error during the checking phase, and subsequently correct the error. However, due to time pressure, stress, lack of sleep and workload, it is possible that design errors may slip through.

Event 2.1.1-2 Failure to detect the error

The Blast Engineer utilises a modelling programme which will highlight any inconsistencies or mistakes. However, it is possible that the Blast Engineer does not detect the errors highlighted by the modelling programme, or simply does not utilise the software to check the design. The generic HEART task type taken to represent this checking task, utilising a modelling system is *"Fairly simple task performed rapidly or given scant attention"* for which the nominal human unreliability is *0.09*. The EPCs and their impacts are shown in *Table 2.2*.

Table 2.2 ***HEART calculation***

Task	Generic task unreliability	EPCs	Multiplier	Assessed Proportion of Effect	Assessed Effect	Human Error Probability
Failure to detect error by Blast Engineer during modelling	0.09	Shortage of time available for error detection & correction	11	0.01	1.1	1.36 E-1
		Disruption of normal work-sleep cycles	1.1	0.1	1.01	
		Channel capacity	6	0.05	1.25	

Task	Generic task unreliability	EPCs	Multiplier	Assessed Proportion of Effect	Assessed Effect	Human Error Probability
		overload				
		High level of emotional stress	1.3	0.3	1.09	

Based on the above estimates, the likelihood of producing an error is **1.36 E-1**.

Event 2.1.1-3 Failure to correct the error

If the Blast Engineer identifies a problem with the design, there is potential that he may not act upon this information and fail to rectify the mistake. The generic HEART task type taken to represent this action task is *"Restore or shift a system to original or new state following procedures, with some checking"* for which the nominal human unreliability is *0.003*. The EPCs and their impacts are shown in *Table 2.3*.

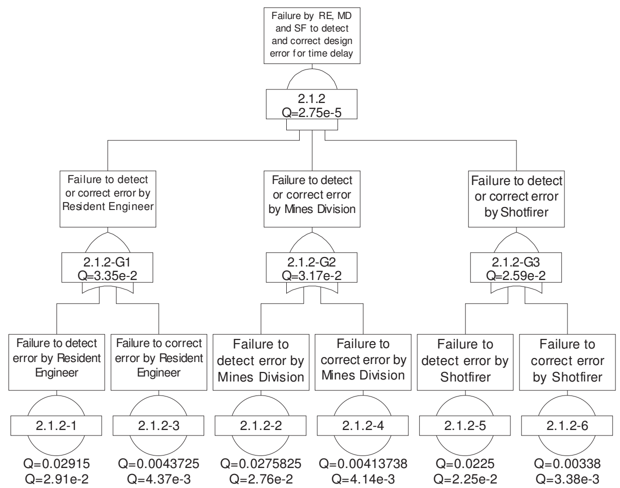
Table 2.3 ***HEART calculation***

Task	Generic task unreliability	EPCs	Multiplier	Assessed Proportion of Effect	Assessed Effect	Human Error Probability
Failure to correct error by Blast Engineer	0.003	Shortage of time available for error detection & correction	11	0.01	1.1	4.54 E-3
		Disruption of normal work-sleep cycles	1.1	0.1	1.01	
		Channel capacity overload	6	0.05	1.25	
		High level of emotional stress	1.3	0.3	1.09	

Based on the above estimates, the likelihood of producing an error is **4.54 E-3**.

2.1.2 *Event 2.1.2: Failure to detect and correct error by Competent Blasting Supervisor, Mines Division and Shotfirers*

The overall probability of Failure to detect and correct error by Competent Blasting Supervisor, Mines Division and by the Shotfirers is **2.75 E-5,** based on the failure of all of the tasks analysed below.



Event 2.1.2-1 - Failure to detect error by the Competent Blasting Supervisor

Once the Blast Engineer has finalised the design, it is passed to the Competent Blasting Supervisor and to the Mines Division. The Competent Blasting Supervisor should check the design before giving his endorsement to the Mines Division. It has been assumed that the Competent Blasting Supervisor is not as competent or experienced as the Blast Engineer as this is not his sole task within the project. The generic HEART task type taken to represent this manual checking task is *"Routine, highly practised, rapid tasks involving relatively low level of skill"* for which the nominal human unreliability is *0.02*. The EPCs and their impacts are shown in *Table 2.4*.

Table 2.4 ***HEART calculation***

Task	Generic task unreliability	EPCs	Multiplier	Assessed Proportion of Effect	Assessed Effect	Human Error Probability
Failure to detect error by Competen t Blasting Superviso	0.02	Shortage of time available for error detection & correction	11	0.01	1.1	2.92 E-2
		High level of emotional stress	1.3	0.2	1.06	

Task	Generic task unreliability	EPCs	Multiplier	Assessed Proportion of Effect	Assessed Effect	Human Error Probability
r						
		Channel capacity overload	6	0.05	1.25	

Based on the above estimates, the likelihood of producing an error is **2.92 E-2**.

Event 2.1.2.-2 - Failure to detect error by Mines Division

As specified earlier, Mines Division will also check the design for errors, although it is possible that errors may be made during the check which allows the incorrect design to go unnoticed. The generic HEART task type taken to represent this manual checking task is *"Routine, highly practised, rapid tasks involving relatively low level of skill"* for which the nominal human unreliability is *0.02*. The EPCs and their impacts are shown in *Table 2.5*.

Table 2.5 ***HEART calculation***

Task	Generic task unreliability	EPCs	Multiplier	Assessed Proportion of Effect	Assessed Effect	Human Error Probability
Failure to detect error by Mines Division	0.02	Shortage of time available for error detection & correction	11	0.01	1.1	2.76 E-2
		High level of emotional stress	1.3	0.01	1.003	
		Channel capacity overload	6	0.05	1.25	

Based on the above estimates, the likelihood of producing an error is **2.76 E-2**.

Event 2.1.2-3 - Failure to correct error by the Competent Blasting Supervisor

As above, the Competent Blasting Supervisor may detect the error, but then fail to act on this to correct the design error. The generic HEART task type taken to represent this action task is *"Restore or shift a system to original or new state following procedures, with some checking"* for which the nominal human unreliability is *0.003*. The EPCs and their impacts are shown in *Table 2.6*.

Table 2.6 ***HEART calculation***

Task	Generic task unreliability	EPCs	Multiplier	Assessed Proportion of Effect	Assessed Effect	Human Error Probability
Failure to correct error by Competent Blasting Supervisor	0.003	Shortage of time available for error detection & correction	11	0.01	1.1	4.37 E-3
		Channel capacity overload	6	0.05	1.25	
		High level of emotional stress	1.3	0.2	1.06	

Based on the above estimates, the likelihood of producing an error is **4.37 E-3**.

Event 2.1.2-4 – Failure to correct error by Mines Division

As above, the Mines Division may fail to correct the error in the design. The generic HEART task type taken to represent this action task is *"Restore or shift a system to original or new state following procedures, with some checking"* for which the nominal human unreliability is *0.003.* The EPCs and their impacts are shown in *Table 2.7*.

Table 2.7 HEART calculation

Task	Generic task unreliability	EPCs	Multiplier	Assessed Proportion of Effect	Assessed Effect	Human Error Probability
Failure to correct error by Mines Division	0.003	Shortage of time available for error detection & correction	11	0.01	1.1	4.14 E-3
		Channel capacity overload	6	0.05	1.25	
		High level of emotional stress	1.3	0.01	1.003	

Based on the above estimates, the likelihood of producing an error is **4.14 E-3**.

Event 2.1.2-5 – Failure to detect error by Shot-firer

The Shot-firer will review the blast plan before blasting commences. The generic HEART task type taken to represent this manual checking task is *"Routine, highly practised, rapid task involving relatively low level of skill"* for which the nominal human unreliability is *0.02.* The EPCs and their impacts are shown in *Table 2.8*.

Table 2.8 HEART calculation

Task	Generic task unreliability	EPCs	Multiplier	Assessed Proportion of Effect	Assessed Effect	Human Error Probability
Shot-firer fails to detect error	0.02	Shortage of time available for error detection & correction	11	0.003	1.03	2.25 E-2
		High level of emotional stress	1.3	0.015	1.075	
		Channel capacity overload	6	0.06	1.018	

Based on the above estimates, the likelihood of producing an error is **2.25 E-2**.

Event 2.1.2-6 – Failure to correct error by Shot-firer

If the Shot-firer identifies an error in the blast plan, he must act to correct the error before the blast commences. The generic HEART task type taken to represent this manual checking task is *"Routine, highly practised, rapid task involving relatively low level of skill"* for which the nominal human unreliability is *0.02.* The EPCs and their impacts are shown in *Table 2.9*.

Table 2.9 HEART calculation

Task	Generic task unreliability	EPCs	Multiplier	Assessed Proportion of Effect	Assessed Effect	Human Error Probability
Shotfirer fails to correct error	0.02	Shortage of time available for error detection & correction	11	0.003	1.03	3.38 E-3
		High level of emotional stress	1.3	0.015	1.075	
		Channel capacity overload	6	0.06	1.018	

Based on the above estimates, the likelihood of producing an error is **3.38 E-3**.

2.2 *EVENT 2.3.1 – SHOTFIRER INPUTS WRONG TIME DELAY AND FAILURE TO DETECT AND CORRECT ERROR*

To model specific human error dependencies, the overall error probability has been modelled in the main Fault Tree in *Annex A3*.

Event 2.3.1-1 Shotfirer inputs incorrect delay time using Tagger

As all detonators are supplied without any pre-entered time delay, the shotfirer must programme each individual detonator using the Tagger. Information communication errors can be made when reading from the blast plan and inputting the information into the tagger, with a simple lapse resulting in the wrong delay time being inputted. The generic HEART task type taken to represent this action task is *"Routine, highly practised, rapid task involving relatively low level of skill"* for which the nominal human unreliability is *0.02*. This assessment accounts for a typical number of production holes which is about 200 for the face. The EPCs and their impacts are shown in *Table 2.10.*

Table 2.10 HEART calculation

Task	Generic task unreliability	EPCs	Multiplier	Assessed Proportion of Effect	Assessed Effect	Human Error Probability
Shotfirer inputs incorrect delay time using Tagger	0.02	Shortage of time available for error detection & correction	11	0.01	1.1	1.86E-1
		Disruption of normal work-sleep cycles	1.1	0.1	1.01	
		High level of emotional stress	1.3	0.2	1.06	
		Poor/hostile environment	1.15	1	1.15	
		Low signal-noise ratio	10	0.5	5.5	
		Channel capacity overload	6	0.05	1.25	

Based on the above estimates, the likelihood of producing an error is **1.86E-1.**

Event 2.3.1-2 – Blasting Engineer fails to detect incorrect detonator delay time

The Blasting Engineer should check the programmed detonator delay time against a checklist to ensure it corresponds with the blast plan. However, it is possible that due to time pressure, poor lighting etc that the check is omitted due to a long list being presented, especially when there are few detonators with the same time delay in a long list. The generic HEART task type taken to represent this action task is *"Routine, highly practised, rapid task involving relatively low level of skill"* for which the nominal human unreliability is *0.02*. The EPCs and their impacts are shown in *Table 2.11.*

Table 2.11 HEART calculation

Task	Generic task unreliability	EPCs	Multiplier	Assessed Proportion of Effect	Assessed Effect	Human Error Probability
Blasting Engineer fails to detect wrong detonator delay time.	0.02	Shortage of time available for error detection & correction	11	0.01	1.1	3.48E-02
		Disruption of normal work-sleep cycles	1.1	0.1	1.01	
		High level of emotional stress	1.3	0.2	1.06	
		Poor/hostile environment	1.15	1	1.15	
		Low signal-noise ratio	10	0.003	1.027	
		Channel capacity overload	6	0.05	1.25	

Based on the above estimates, the likelihood of producing an error is **3.48E-2.**

It should be noted that a second shotfirer may perform this task instead of or in addition to the Blasting Engineer.

Event 2.3.1-3 – Blasting Engineer/Shot firer fail to correct incorrect detonator delay time

If an error is detected during the checking process, the Blasting Engineer should notify the Shotfirer and the Shotfirer should correct the error by re-entering the time delay. However, it is possible that due to time pressure, poor lighting, noise etc that either the error is not communicated effectively by the person who finds the error, or that the error is not corrected because the person forgets or mishears. The generic HEART task type taken to represent this manual checking task is *"Restore or shift a system to original or new state following procedures, with some checking"* for which the nominal human unreliability is *0.003.* The EPCs and their impacts are shown in *Table 2.12.*

Table 2.12 ***HEART calculation***

Task	Generic task unreliability	EPCs	Multiplier	Assessed Proportion of Effect	Assessed Effect	Human Error Probability
Blasting Engineer/ Shotfirer fails to correct incorrect detonator delay time	0.003	Shortage of time available for error detection & correction	11	0.003	1.03	3.64E-3
		Disruption of normal work-sleep cycles	1.1	0.03	1.01	
		High level of emotional stress	6	0.06	1.25	
		Poor/hostile environment	1.3	0.3	1.06	
		Low signal-noise ratio	10	0.003	1.09	
		Channel capacity overload	1.15	0.015	1.15	

Based on the above estimates, the likelihood of producing an error is **3.64E-3**

2.3 *EVENT 2.4.1 – SHOTFIRER WRONGLY DEFINE A STRING WITH STARTER AND MARKERS AND FAILURE TO DETECT AND CORRECT ERROR*

To model specific human error dependencies, the overall error probability has been modelled in the main Fault Tree in Annex A3.

Event 2.4.1-1 Shotfirer wrongly place or tag starter or marker

The Shot-firer may elect to programme a string of detonators by inserting starters and markers (change row or change pattern markers) which delineate the start and end of the semi-automatic programming sequence for a string. This will result in part of the string being wrongly defined.

During this task, the Shotfirer may wrongly define a string by physically placing the starter device at the wrong location or, using the Tagger, marking the starter with the wrong ID or marking the wrong detonator with the "change row" or "change pattern tag. An error may be made defining the string at the blast face resulting in the string being too long or too short compared to the blast plan. The generic HEART task type taken to represent this manual checking task is "Restore or shift a system to original or new state following procedures, with some checking" for which the nominal human unreliability is 0.003. The EPCs and their impacts are shown in *Table 2.13*.

Table 2.13 ***HEART calculation***

Task	Generic task unreliability	EPCs	Multiplier	Assessed Proportion of Effect	Assessed Effect	Human Error Probability
Shot firer fails to correct incorrect detonator delay time	0.003	Shortage of time available for error detection & correction	11	0.01	1.1	5.54E-3
		Disruption of normal work-sleep cycles	1.1	0.1	1.01	
		High level of emotional stress	1.3	0.2	1.06	
		Low signal-noise ratio	10	0.01	1.09	
		Channel capacity overload	6	0.05	1.25	
		Poor/hostile environment	1.15	1	1.15	

Based on the above estimates, the likelihood of producing an error is **5.54E-3**

Event 2.4.1-2 Blasting Engineer fails to detect starter/marker tagging and position is correct

The Blasting Engineer should check the placement of the starters and markers against the blast plan as well as the correct starter ID, highlighting any deviations. However, the check may not take place, or may be incomplete. The generic HEART task type taken to represent this manual checking task is "Restore or shift a system to original or new state following procedures, with some checking" for which the nominal human unreliability is 0.003. The EPCs and their impacts are shown in *Table 2.14*.

Table 2.14 ***HEART calculation***

Task	Generic task unreliability	EPCs	Multiplier	Assessed Proportion of Effect	Assessed Effect	Human Error Probability
Blasting Engineer fails to detect starter/marker tagging and position is correct	0.003	Shortage of time available for error detection & correction	11	0.003	1.03	3.64E-03
		Disruption of normal work-sleep cycles	1.1	0.03	1.003	
		High level of emotional stress	1.3	0.06	1.018	
		Low signal-noise ratio	10	0.003	1.027	
		Channel capacity overload	6	0.015	1.075	
		Poor/hostile environment	1.15	0.3	1.045	

Based on the above estimates, the likelihood of producing an error is **3.64E-3**

It should be noted that a second shotfirer may perform this task instead of or in addition to the Blasting Engineer.

Event 2.4.1-3 Blasting Engineer/Shotfirer fail to correct starter/marker tagging and position

If an error is detected during the checking process, the Blasting Engineer should notify the Shotfirer and the Shotfirer should correct the error by re-entering the time delay for that part of the string. However, it is possible that due to time pressure, poor lighting, noise etc that either the error is not communicated effectively by the person who finds the error, or that the error is not corrected because the person forgets or mishears. The generic HEART task type taken to represent this manual checking task is "Restore or shift a system to original or new state following procedures, with some checking" for which the nominal human unreliability is 0.003. The EPCs and their impacts are shown in *Table 2.15*.

Table 2.15 HEART calculation

Task	Generic task unreliability	EPCs	Multiplier	Assessed Proportion of Effect	Assessed Effect	Human Error Probability
Blasting Engineer/ Shotfirer fail to detect starter/marker tagging and position	0.003	Shortage of time available for error detection & correction	11	0.003	1.03	3.64E-3
		Disruption of normal work-sleep cycles	1.1	0.03	1.01	
		High level of emotional stress	6	0.06	1.25	
		Poor/hostile environment	1.3	0.3	1.06	
		Low signal-noise ratio	10	0.003	1.09	
		Channel capacity overload	1.15	0.015	1.15	

Based on the above estimates, the likelihood of producing an error is **3.64E-3**

2.4 *EVENT 2.5.1 – SHOTFIRER INPUTS SAME DELAY FOR PART OF STRING AND FAILURE TO DETECT AND CORRECT ERROR*

To model specific human error dependencies, the overall error probability has been modelled in the main Fault Tree in Annex A3.

Event 2.5.1-1 Shotfirer inputs same delay for part of string using Tagger

If semi-automatic programming of the string is utilised, there is potential for the entire string to be programmed with an incorrect time delay ie 0 ms. The generic HEART task type taken to represent this action task is *"Completely familiar, well designed, highly practised, routine task occurring several times per hour, performed to highest possible standards by highly motivated and experienced person, totally aware of the implications of failure, with time to correct potential error, but without the benefit of significant job aids"* for which the nominal human unreliability is *0.0004.* The EPCs and their impacts are shown in *Table 2.16.*

Table 2.16 HEART calculation

Task	Generic task unreliability	EPCs	Multiplier	Assessed Proportion of Effect	Assessed Effect	Human Error Probability
Shot firer input same delay to part of the	0.0004	Shortage of time available for error detection & correction	11	0.01	1.1	7.38E-04

string						
		Disruption of normal work-sleep cycles	1.1	0.1	1.01	
		High level of emotional stress	1.3	0.2	1.06	
		Channel capacity overload	6	0.05	1.25	
		Low signal-noise ratio	10	0.01	1.09	
		Poor/hostile environment	1.15	1	1.15	

Based on the above estimates, the likelihood of producing an error is **7.38E-4**

Event 2.5.1-2 – Blasting Engineer fails to detect incorrect detonator delay for part of string

The Blasting Engineer must check the string delay time against the blasting plan. There is potential for him to make an error when carrying out the check, hence not detecting part of the string has 0 ms delay increment. The generic HEART task type taken to represent this action task is *"Restore or shift a system to original or new state following procedures, with some checking"* for which the nominal human unreliability is *0.003.*

The EPCs and their impacts are shown in *Table 2.17.*

Table 2.17 HEART calculation

Task	Generic task unreliability	EPCs	Multiplier	Assessed Proportion of Effect	Assessed Effect	Human Error Probability
Blasting engineer fails to detect incorrect detonator delay for part of string	0.003	Shortage of time available for error detection & correction	11	0.003	1.03	3.64E-03
		Disruption of normal work-sleep cycles	1.1	0.03	1.003	
		High level of emotional stress	1.3	0.06	1.018	
		Channel capacity overload	6	0.015	1.075	
		Low signal-noise ratio	10	0.003	1.027	

		Poor/hostile environment	1.15	0.3	1.045	

Based on the above estimates, the likelihood of producing an error is **3.64E-3**

It should be noted that a second shotfirer may perform this task instead of or in addition to the Blasting Engineer.

It should be noted that such failure to detect is unlikely compared to 2.3.1 given the high number of detonators with wrong time delay. A possibility of common cause error of 1% has been conservatively assumed for independent checks from the check box (event 2.8.1-1) but not for independent checks from the Tagger (event 2.5.1-2) to specifically model human error dependencies.

Event 2.5.1-3 – Blasting Engineer/Shotfirer fail to correct wrong detonator delay for part of string

Upon discovering an error, the Shot Firer and/or the Blasting Engineer must correct the time delay error. The generic HEART task type taken to represent this action task is *"Restore or shift a system to original or new state following procedures, with some checking"* for which the nominal human unreliability is *0.003.* The EPCs and their impacts are shown in *Table 2.18.*

Table 2.18 HEART calculation

Task	Generic task unreliability	EPCs	Multiplier	Assessed Proportion of Effect	Assessed Effect	Human Error Probability
Blasting Engineer/ Shotfirer fail to correct wrong detonator delay for part of string	0.003	Shortage of time available for error detection & correction	11	0.003	1.03	3.64E-03
		Disruption of normal work-sleep cycles	1.1	0.03	1.003	
		High level of emotional stress	1.3	0.06	1.018	
		Channel capacity overload	6	0.015	1.075	
		Low signal-noise ratio	10	0.003	1.027	
		Poor/hostile environment	1.15	0.3	1.045	

Based on the above estimates, the likelihood of producing an error is **3.64E-3**

2.5 *EVENT 2.7.1 – FAILURE OF INDEPENDENT CHECKS PERFORMED FROM THE BENCH BOX AND FAILURE TO CORRECT*

Event 2.7.1-1 – Competent Blasting Supervisor fail to detect more than 1 MIC are set to detonate at the same time

The Competent Blasting Supervisor should check the programmed detonator delay time as displayed on the bench box against a checklist to ensure it corresponds with the blast plan and specifically that there is no MIC to detonate within the same time delay. However, the check may not take place, or may be incomplete. The generic HEART task type taken to represent this manual checking task is "Restore or shift a system to original or new state following procedures, with some checking" for which the nominal human unreliability is 0.003. The EPCs and their impacts are shown in *Table 2.19.*

Table 2.19 ***HEART calculation***

Task	Generic task unreliability	EPCs	Multiplier	Assessed Proportion of Effect	Assessed Effect	Human Error Probability
Competent Blasting Supervisor fail to detect more than 1 MIC are set to detonate at the same time	0.003	Shortage of time available for error detection & correction	11	0.003	1.03	3.64E-03
		Disruption of normal work-sleep cycles	1.1	0.03	1.003	
		High level of emotional stress	1.3	0.06	1.018	
		Low signal-noise ratio	10	0.003	1.027	
		Channel capacity overload	6	0.015	1.075	
		Poor/hostile environment	1.15	0.3	1.045	

Based on the above estimates, the likelihood of producing an error is **3.64E-3.**

Event 2.7.1-2 – Competent Blasting Supervisor /Shot firer fail to correct incorrect detonator delay time

If an error is detected during the checking process, the Competent Blasting Supervisor should notify the Shotfirer and the Shotfirer should correct the error by re-entering the time delay. However, it is possible that due to time

pressure, poor lighting, noise etc that either the error is not communicated effectively by the person who finds the error, or that the error is not corrected because the person forgets or mishears. The generic HEART task type taken to represent this manual checking task is *"Restore or shift a system to original or new state following procedures, with some checking"* for which the nominal human unreliability is *0.003.* The EPCs and their impacts are shown in *Table 2.20.*

Table 2.20 ***HEART calculation***

Task	Generic task unreliability	EPCs	Multiplier	Assessed Proportion of Effect	Assessed Effect	Human Error Probability
Competent Blasting Supervisor / Shotfirer fails to correct incorrect detonator delay time	0.003	Shortage of time available for error detection & correction	11	0.003	1.03	3.64E-3
		Disruption of normal work-sleep cycles	1.1	0.03	1.01	
		High level of emotional stress	6	0.06	1.25	
		Poor/hostile environment	1.3	0.3	1.06	
		Low signal-noise ratio	10	0.003	1.09	
		Channel capacity overload	1.15	0.015	1.15	

Based on the above estimates, the likelihood of producing an error is **3.64E-3**

2.6 *EVENT 2.8.1 – FAILURE OF INDEPENDENT CHECKS PERFORMED FROM THE BENCH BOX TO DETECT SYSTEMATIC FAILURES AND FAILURE TO CORRECT*

Event 2.8.1-1 – Competent Blasting Supervisor fails to detect all detonator in all string or string segment has more than 1 MIC set to detonate at the same time

It should be noted that such failure to detect is unlikely compared to 2.7.1 given that the failure will appear to follow a certain pattern and would require a number of detection failures to be undetected. A possibility of common cause error of 1% has been conservatively assumed for independent checks from the check box (event 2.8.1-1) when compared to event 2.7.1-1. Based on the above estimates, the likelihood of producing an error is **3.64E-5.**

Event 2.8.1-2 – Competent Blasting Supervisor /Shot firer fail to correct incorrect detonator delay time

For such a severe failure, the level of correction and subsequent checks would be equivalent to starting a new blast. However, to model human error dependency a common cause error of 1% has been conservatively assumed for independent checks from the check box (event 2.8.1-1) when compared to event 2.7.1-1.

Based on the above estimates, the likelihood of producing an error is **3.64E-5.**

3 SCENARIO TWO: MIC EXCEEDED (BULK EMULSION)

Such scenario is independent of the type of detonators used which has been modelled directly in the main Fault Tree in *Annex A3*.

4 SCENARIO THREE: MIC EXCEEDED (CARTRIDGE EMULSION)

Such scenario is independent of the type of detonators used which has been modelled directly in the main Fault Tree in *Annex A3*.

Annex A5

Use of Explosives – Frequency Assessment Details for Electronic Detonators

CONTENTS

1 FREQUENCY ASSESSMENT OF SCENARIOS LEADING TO HIGHER GROUND VIBRATION AT A BLAST FACE WITH THE USE OF ELECTRONIC DETONATORS

1.1 HIGH-LEVEL FAILURE MODE ANALYSIS FOR USE OF EXPLOSIVES

A high-level failure mode effect analysis was carried out as part of the SCL EIA to systematically identify failure scenarios associated with use of explosives for the construction of the tunnel. The analysis focused on those failure modes that could lead to potential increase in ground vibration, given consideration of human errors and other causes. A series of workshops were held with the equipment suppliers and shotfirers specialized with the use of electronic detonators to identify potentially new failure modes. The failure modes, not applicable for the use of electronic detonators, were not considered further.

The following failure scenarios were identified and further investigated in the subsequent sections.

1. Face freeze caused by cut failure

2. Two MIC detonated at the same time at a blast face

3. Multiple MIC detonated at the same time at a blast face

4. More cartridged sticks/ bulk emulsion explosives loaded into a production hole than required

5. Unforeseen ground conditions

6. Sympathetic detonation of all the MICs at the blast face.

Fault tree analysis was then carried out, to assess the causal relationship amongst the failure modes and causes, and evaluate the probability of occurrence for each failure scenario that could lead to higher ground vibration.

1.2 BASIS FOR FREQUENCY ASSESSMENT

The following forms the basis for assessing the probability of occurrence for the failure scenarios associated with the use of explosives:

- The SmartShot™ electronic detonator system or equivalent will be used to blast the Lion Rock Tunnel section of the SCL (TAW-HUH), which includes the following components: SmartShot Electronic Detonators, SmartShot Taggers, SmartShot End Plugs, SmartShot String Starters, SmartShot Bench Boxes, and SmartShot Smart keys. The various components are shown in *Figure 2.1*.

- All SmartShot detonators are the same, and arrive without any pre-programmed delay times. Even if detonators come pre-programmed for any reason, the blasting process will override the pre-programmed data. This is unlike conventional detonators which have preset delays.

- Fixed time, Row and Change pattern Markers (software tags) will be used together with the Tagger to program the detonator time delays. The process of tagging will require a direct connection in a 4-wire mode.

- No more than one detonator for production holes is allowed to be programmed with the same time delay.

- Perimeter holes will have a dedicated detonator per hole and will not detonate at the same time. They will have a minimum of 1 ms interval from each other.

- No failure modes of detonator will directly result in significant change in time delay with the exception of manufacture scatter out of tolerance.

- Perimeter holes, if used, will be designed such that each of them will be loaded with a charge less than a MIC and multiple perimeter holes may be detonated at small time delay increments.

  In case the perimeter hole are blasted out earlier than expected, due to programming errors or system failure, the effects will be negligible on vibration as the charge load is lower than a MIC. Hence, no significant effect is expected.

  Due to lower MIC for perimeter holes and since there is one detonator per hole, a minimum of two permutations is required to result in 2 MIC detonated at the same time. Perimeter hole detonators require one further level of error or permutation than production hole detonators to cause multiple MIC detonated at the same time, and therefore, perimeter holes were not considered further in the frequency assessment as the frequency is dominated by production holes. The exception is systematic human error or system failure for the whole string which is modeled separately.

It has been further assumed as further described in Annex A1, that:

- The Tagger will perform basic diagnostic checks including self checks and alarms

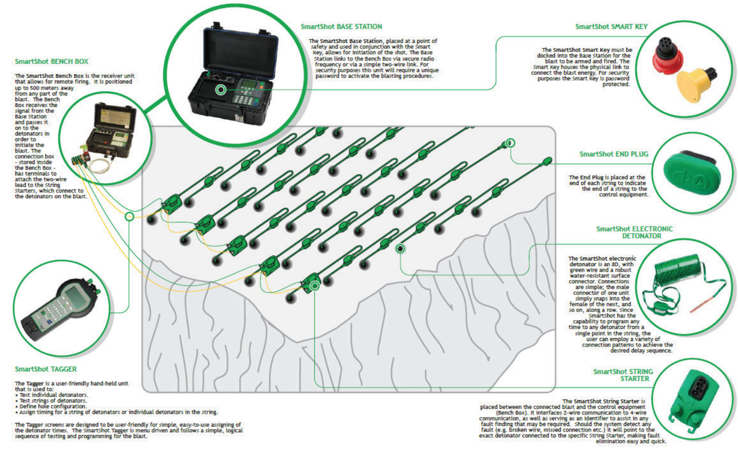
- The Tagger will be subject to functional tests before each blast. This will involve checking that inputs and outputs are the same

- During the delay input to the detonators, the Tagger will generate a warning in case the user input a 0 ms time increment

- Independent checks will be carried out by the Blasting Engineer to ensure the delay set for each detonator is matching the Blasting Plan. During these checks, the Blasting Engineer will use a different Tagger

- Third party checks will be carried out by the Competent Blasting Supervisor to ensure that no more than one MIC is set to detonate at the same time.

Figure 1.1 Electronic Detonator System



1.2.1 *Face freeze caused by cut failure due to either wrong hole diameter for relief holes at cut or wrong time delay at cut*

A cut is provided for each blast face to provide a void/ relief before other production holes are blasted, allowing the rock to be blasted out in a ring like sequence. Two (2) relief holes are provided at the centre of the cut to provide relief when the nine (9) cut holes blast out in sequence.

In case the size or location of relief holes is not correctly drilled to an extent significantly enough to hinder sufficient relief, possible freeze of blast face may result. The reason for incorrect size or location of relief holes could be either design or drilling errors.

A minimum of 4 out of 6 cut holes should be blasted out in order to achieve sufficient relief for other production holes. If more than 2 cut holes cannot be blasted out due to design error, installation error, or manufacturer defect, the cut cannot be ejected to provide a void of sufficient relief before the production holes blast out. Possible freeze of blast face will result.

In the event of a face freeze, the vibration will increase by about 30% to 40% beyond the expected vibration for a given MIC with sufficient relief. Since the PPV correlation has considered blast under confined condition, the face freeze caused by cut failure will not contribute to further increase in PPV value.

Since face freeze does not generate excessive vibration to pose a concern to the general population, it is not further considered in this assessment.

1.2.2 *Two MIC detonated at the same time at a blast face*

More than one MIC detonated at the same time in a face will result in higher vibration than the design limit. A total of 5 failure modes leading to two MIC detonated at the same time were identified in the high-level failure mode analysis. They were further analysed as described below:

a) Wrong design of time delay

This scenario is same as for conventional detonators.

The typical blast plan will contain those information that are applicable for all blast faces of the same layout and dimensions, these include layout and dimension of the blast face, number of production holes, location of cut, type and number of detonators, blast pattern information such as Starter Devices location and IDs and, Marker types and position. The typical blast plan can then be customized to accommodate face-specific details such as the co-ordinates of the holes, loading of each perimeter hole, MIC for holes, and sensitive receiver, to meet the location specific blasting constraints.

The electronic detonators arrive without any default time delay therefore for 2 detonators to initiate at the same time, the same time delay would have to be input to both of them. This could be due to an error in the design such that two detonators are unintentionally given the same time delay during the design process and such time delay are used in the blast resulting in two MIC detonated at the same time. However, as two detonators for production holes are not allowed to be programmed with the same time delay, the team undertaking the blast is likely to detect the situation.

The human error probabilities associated with the wrong design of time delay were calculated in *Annex A4* and summarized in *Table 1.1* below.

Table 1.1 Human Error Probabilities for Wrong Design of Time Delay

Event/ task no.	Description	Human Error Probability for a face
2.1	**Wrong design of time delay for a face**	
2.1.1	Design error by Blasting Engineer and failure of design check	1.92e-02
2.1.2	Failure to detect and correct error by Shotfirers, Blast Engineer, Competent Blasting Supervisor, and Mines Division	2.76e-05

b) Human Error during Input of detonator time delays

This scenario is applicable to electronic detonators only.

This can be done in a number of ways, however, it is mainly dependent on human error. The potential causes are:

- Shotfirer keys in a wrong delay with the Tagger which coincides with a delay from another detonator;
- The 2nd Shotfirer and/or Blasting Engineer fail to detect error using a different tagger and no corrective action is taken;
- The Competent Blasting Supervisor fails to detect error using the bench box system or fails to take/ensure corrective actions (which is independent from the Tagger system)

The human error probabilities associated with the Wrong input of time delay by Shotfirer were calculated *in Annex A4*. A summary is given in *Table 1.2.*

Such errors will depend on the number of detonators programmed for production holes. The assessment has been based for a typical blast plan involving typically about 200 production holes. The error probability will also depend on the input method which is either manual or semi-automatic. For the purpose of this assessment, the manual method could theoretically produce an error for each detonator and has been assumed as the worst case. In the case of human error, it has been also conservatively assumed that if the Shotfirer inputs a wrong a time delay for one detonator, such a value will match another one in the face.

Table 1.2 Human Error Probabilities for Wrong input of time delay by Shotfirer using Tagger

Event/ task no.	Description	Human Error Probability for a face
2.3	**Wrong input of time delay by Shotfirer using Tagger**	
2.3.1-1	Shot firer inputs wrong time delay using Tagger	1.86E-01
2.3.1-2	BE fails to detect wrong detonator delay time using Tagger	3.48E-02
2.3.1-3	Shot firer/BE fail to correct wrong time delay using Tagger	3.64E-03
2.7	**Independent Checking Team fails to detect and correct individual errors**	
2.7.1-1	CBS fails to detect some dets in string are programmed incorrectly	3.64E-03
2.7.1-2	SFs/CBS fail to correct incorrectly programmed string dets	3.64E-03

c) Tagger random failure leading to wrong time delay

This scenario is applicable to electronic detonators only.

This could be due to a random hardware or software failure that remains undetected and could impact on the input and checking of the detonator delay times. The main causes are:

- Tagger fails in such a way that it gives an erroneous time delay during the process and the time delay matches another one. A possible error may come from a random communication error originating from the Tagger. This could be due to hardware failure or software error giving a dangerous output and the diagnostic function fails to detect such a failure. In the case of random failure, the tagger may feedback the correct time delay as entered by the shotfirer but the diagnostic function cannot check whether the same time delay has been actually programmed to the detonators;
- The 2nd Shotfirer and/or Blasting Engineer fail to detect error using a different tagger and no corrective action is taken;
- The Competent Blasting Supervisor fails to detect error using the bench box system or fails to take/ensure corrective actions (which is independent from the Tagger system).

The Tagger system follows a robust development process and is classified as a safety related system with Safety Integrity Level 1 (SIL1) in accordance with safety standard IEC61508 [3]. This certification guarantees an average dangerous failure rate of between 10^{-6} and 10^{-5} per hour of operation. Each blast setup will last less than 2 hours, however, since the Tagger will not be used between two consecutive blasts and can be subject to dormant failure, it is conservatively assumed that it could also fail while not in operation. Since blast is roughly every 100 hour, the probability of dangerous failure for a given blast is ranging from 0.0001 to 0.001. The upper value is selected for random failure, as random failure is the most likely outcome compared to systematic failures as the detonator system has been proven in use. In the case of random failure, the probability of giving a dangerous output matching another time delay has been conservatively assumed as 10% as the values may more likely be out of range compared to time delay set in the blast plan.

It should be noted that this failure scenario may result in repeated detonations of 2 MICs.

d) Communication error/failure with detonator devices

Any communication error and failure leading to incorrect programming of the detonators will require a specific failure of the detonator communication system which may lead to the assignment of the same time delay for two detonators. Since the detonators are connected in daisy chain arrangement, it will require multiple failures to lead to more than 2 MICs.

Communication could be influenced by a number of parameters such as Radio Frequency and Induced Current [4]. However, the system has been specifically designed to mitigate such effects. Tests have also been made to check the immunity of the system to induced current. These tests indicate that

the system is not sensitive to induced current and requires a significant energy to cause an accidental initiation of the detonators.

Electronic detonator devices and communication system follow a similar design and development process as the tagger and the probability of dangerous failure has been assumed as 0.001 for a random failure. In addition, diagnostic checks are performed within the bench box which will further reduce the probability of dangerous failure to 10^{-4} per blast. However, to account for potential local string failures, this probability has been applied per string. Assuming a maximum of 10 strings, the overall probability for communication failure with detonators has been assessed as 0.001.

Detonators erroneously programmed with wrong time delay can also be independently detected. The human error failures considered for this initiating event are:

- The 2nd Shotfirer and/or Blasting Engineer fail to detect error using a different tagger and no corrective action is taken;
- The Competent Blasting Supervisor fails to detect error using the bench box system or fails to take/ensure corrective actions (which is independent from the Tagger system)

b) Human Error during Starter or Marker Tagging.

This scenario is applicable to electronic detonators only.

Wrong tagging may results in 2 MIC detonated at the same time if the following conditions occur:

- Wrong tagging could occur if a starter or marker is wrongly positioned or the started has been assigned a wrong ID;
- The 2nd Shotfirer and/or Blasting Engineer fail to detect error using a different tagger and no corrective action is taken;
- The Competent Blasting Supervisor fails to detect error using the bench box system or fail to take/ensure corrective actions(which is independent from the Tagger system)

The human error probabilities associated with Wrong Starter or Marker Tagging were calculated in *Annex A4*. A summary is given in *Table 1.3*.

Table 1.3 Human Error Probabilities for Wrong Starter or Marker Tag or Position

Event/ task no.	Description	Human Error Probability for a face
2.4	**Wrong Starter or Marker Tag or Position**	
2.4.1-1	Shot firer wrongly place or tag starter or marker	5.54E-03
2.4.1-2	BE fails to check starter/marker tagging and position is correct	3.64E-03
2.4.1-3	Shot firer/BE fail to correct starter/marker tag or ID	3.64E-03

Event/ task no.	Description	Human Error Probability for a face
2.7	**Independent Checking Team fails to detect and correct individual errors**	
2.7.1-1	CBS fails to detect some dets in string are programmed incorrectly	3.64E-03
2.7.1-2	SFs/CBS fail to correct incorrectly programmed string dets	3.64E-03

1.2.3 *Multiple MIC detonated at the same time at a blast face*

The failure mode analysis considers simply the multiple failures of the same types of failure modes identified for 2 MIC detonated at the same time above, for example, 3 detonators incorrectly programmed with the same time delay.

Common cause failures have been specifically assessed, especially when error repetition is concerned. The following conservative assumptions have been made:

- Independent Check Failure: In case several errors have been made (eg wrong time delay input to detonators) requiring the independent checker (CBS/SF2) to detect and correct errors. It has been conservatively assumed that the probability of failing to detect another mistake is 10%;

- Multiple failures beyond 4 MIC detonated at the same time: It has been conservatively assumed that once 3 errors have been made leading to 4 MIC detonating at the same time, another error is unlikely. However, due to potential common causes it has been conservatively assumed that the frequency for 5 MIC and 6 MIC detonated at the same time is assumed to be equal to the 4 MIC case.

Combinations of failure modes leading to multiple MIC detonated at the same time have been modeled using fault tree analysis which is detailed in *Annex A3*.

1.2.4 *More bulk emulsion explosives loaded into a production hole than required*

There are three causes that will lead to more bulk emulsion explosives loaded into a production hole than required:

- Wrong density check of bulk emulsion

    - Density checks will be carried out by the truck operator, with results verified by Chief Shotfirer and Blasting Engineer, prior to loading of bulk emulsion into holes, in the middle of loading and towards end of loading. In case the results read low density but the density is actually high due to human error or mechanical failure of instruments, more than required bulk emulsion will be loaded into the holes. Considering the MIC profile of SCL, the density of the bulk emulsion and pull length of blasts, the holes will be overloaded with double MIC in worst case.

The gassing flow meter and scales used for the density checks will be calibrated by certified bodies once every year. The failure rate of erratic output for flow meter is 2.78E-06 per hour based on OREDA[5]. It was assumed that the usage of the truck (which can act as proof tests of the flow meter) is at least once every week. The probability of failure of the flow meter was evaluated to be 2.4E-04 (ie 2.78E-6 x 168 hours/2). No reported failure data for scales are available in generic data source. The probability of failure of the scales was assumed to be the same as flow meter. This value is considered conservative based on the engineering judgment by the Blast Expert who did not observe such failures in his past experience (ie more than 12,000 blasts).

- Truck operator, Shotfirer, Blasting Engineer do not realise holes are overloaded

    - In case the truck operator inputs incorrect revolutions of bulk emulsion loading pump (note that each revolution of pump will deliver a certain amount of bulk emulsion) into PLC or Shotfirer puts mark on hose in the wrong place, holes overload could be possible. However, a totaliser is provided on the truck to indicate the total amount of bulk emulsion delivered for a blast and the reading will be checked by Truck operator and verified by Blasting Engineer at the end of loading.

- Wrong design of MIC

    - The MIC profile has been defined for the SCL in the Blast Assessment Reports. The MIC along the alignment varies with respect to the type and maximum design PPV of sensitive receivers and distance to the sensitive receivers from the alignment. Actual site blast trials will be carried out prior to full scale blasts for the whole alignment to obtain site specific details for refining the MIC values.

    - In case there are any errors in the MIC calculation, a higher charge load may be defined up to the maximum MIC specified for the SCL. However, the MIC profile along the alignment basically changes gradually and any sudden spike will be obviously spotted. It was therefore assumed that design error will lead to no more than double charge.

The human error probabilities associated with more bulk emulsion explosives loaded into a production hole than required were calculated in *Annex A4* and summarized in *Table 1.4* below.

Table 1.4 Human Error Probabilities for Excess Emulsion Loaded into a Hole

Event/ task no.	Description	Human Error Probability for a face
3.1	**Excess emulsion is loaded into a hole**	
3.1.1	Excess emulsion is loaded due to wrong density	7.95E-11
3.1.2	Shotfirer does not realise hole is overloaded	1.09E-06
3.2	**Wrong design of MIC**	
3.2.1	Design error by Blasting Engineer	8.52E-05
3.2.2	Failure to detect and correct design error	1.06E-03

1.2.5 More cartridged sticks loaded into a production hole than required

There are four causes that will lead to more cartridged stick loaded into a production hole than required:

- Shotfirer does not count number of cartridges he has picked up and loads too many into a hole. This will be detected towards end of the loading process as the exact amount of cartridges required for a blast will be delivered to site.

- Cartridges left over from blocked holes may be disposed of incorrectly. The Shotfirer may load additional cartridges into the lifter holes to ensure a good blast. This can be seen as a violation of procedure, although the Shotfirer will be well aware of the risks he is taking. However, the other Shotfirer and Blasting Engineer will check the cartridges leftover due to presence of blocked holes at the end of the loading process. The probability of presence of blocked holes was assumed as once every week, two blasts every day.

- The Shotfirers may not realize holes are overloaded in case there are excess amount of cartridges delivered to site, failure to check for remaining detonator bundles by Shotfirer and Blasting Engineer towards end of loading process.

  It is noted that each storage box will contain 25 kg cartridges eg 120 sticks at about 0.208 kg (for instance) per stick. Generally, several full un-open boxes as a multiple of 25 kg plus loose sticks (for the balance less than 25 kg) will be delivered to site depending on the necessary amount for a face. For example, if a blast requires say 215 kg, there would be 8 full un-open box and 72 sticks to be delivered to site. In the worst case, an additional full box delivered instead of loose sticks, the overload per hole is expected to be less than 2 MIC due to the physical limitation by the hole length and diameter, and not all holes at a face will be overloaded.

- Wrong design of MIC, as discussed in the 3rd bullet of *Section 1.2.4.*

The human error probabilities associated with more cartridged sticks loaded into a production hole than required were derived from the WIL EIA [1] and summarized in *Table 1.5* below.

Table 1.5 Human Error Probabilities for Excess Emulsion Loaded into a Hole

Event/ task no.	Description	Human Error Probability for a face
4.1	**Too many cartridges are inserted in holes**	
4.1.1	SF does not count correctly and load excess cartridges into holes	1.48E-01
4.1.2	Cartridges from blocked holes are not disposed of correctly	8.13E-03
4.1.3	Shotfirers/Blasting Engineer do not realise holes are overloaded	1.69E-05
4.1.4	Shotfirers/Blasting Engineer do not realise blocked holes are not disposed of	1.21E-03
4.2	**Wrong design of MIC**	
4.2.1	Design error by Blasting Engineer	8.52E-05
4.2.2	Failure to detect and correct design error	1.06E-03

Notes:
[1] Based on typical 200 production holes and derived following WIL EIA methodology.

1.2.6 Sympathetic Detonation of the Full Face

Only two failure modes have been identified that can theoretically cause sympathetic detonation of all the MICs of the full face. This can be due to the following systematic errors:

- The shotfirer programs the full string with 0 ms increment; or

- A systematic error from the Tagger leads to the full string programmed with 0 ms increment or with the same time delay.

Such errors would normally be detected during the various checks performed during the blast process. Combinations of failures have been modelled using Fault Tree Analysis considering specific Human Factor Assessment.

a) Human Error during Input of detonator time delays leading to full string programmed with same time delay

This scenario is applicable to electronic detonators only.

A series of failures are required to lead to this scenario outcome. The causes considered are::

- The shotfirer can erroneously program the full string of detonators with a 0 ms increment which would lead to all the detonators within the string to be programmed with the same time delay;

- First level of checks: the shot firer will receive an error message to indicate a dangerous action has been conducted. The probability of failure of this first level of checks will mainly depend on the reliability of the Tagger diagnostic function which is conservatively assumed to have a 10% chance of failure;

- Second level of checks:

- The 2nd Shotfirer and/or Blasting Engineer may fail to detect error using a different tagger and no corrective action is taken. A gross negligence would be required for failure to spot that all the time delays have been programmed with the same value;

- The second level of checks can also fail if the Tagger fails and misleads the checking team by displaying time delays which appear to match the blast design. Such Tagger error is unlikely as it requires a Tagger failure (probability of 0.001) and the failure is such the values match the Blast Plan. A 10% probability has been conservatively assumed for each time delay in a short string of 5 MIC (overall 10^{-5} probability);

- The second level of checks can also fail if the second Tagger used for checking has a systematic fault (as described in point (b) below) such that the second shortfirer and Blasting Engineer think that the correction has been made but the Second Tagger has programmed the detonators with a 0 ms increment. Such failure has been assessed with overall probability of dangerous failure per blast being 10^{-4}.

- Third level of checks:

  - The Competent Blasting Supervisor may fail to detect error using the bench box system at fail to take corrective actions (which is independent from the Tagger system). A gross negligence would be required for failure to spot that all the time delays have been programmed with the same value;

  - The bench box itself may fail and display time delays which appear to be correct. Such failure is very unlikely and assumed as 0.0001 (bottom range from the certified failure rate range). However, such failures will have to pass the various diagnostic checks performed within the Bench Box.

The human errors associated with the Input of detonator time delays leading to full string programmed with same time delay were calculated *in Annex A4*. A summary is given in *Table 1.6*.

Table 1.6 ***Human Error Probabilities for Wrong input of time delay by Shotfirer using Tagger leading to Sympathetic Detonation of all MIC within the Face***

Event/ task no.	Description	Human Error Probability for a face
2.5	**Wrong programming of string pattern by Shotfirer using Tagger**	**9.78E-09**
2.5.1-1	Shot firer programmes string of detonators with incorrect delay time	7.38E-04
2.5.1-2	BE fails to detect string is programmed incorrectly	3.64E-03
2.5.1-3	SF/BE fails to correct incorrectly programmed string	3.64E-03
2.8	**Independent Checking Team fails to detect and correct string pattern errors**	**7.28E-05**

Event/ task no.	Description	Human Error Probability for a face
2.8.1-1	CBS fails to detect all dets in string are programmed incorrectly (assumed 1% common cause as compared to 2.7.1)	3.64E-05
2.8.1-2	SFs/CBS fail to correct incorrectly programmed string for all dets (1% common cause as compared to 2.7.1)	3.64E-05

b) Tagger systematic failure leading to wrong time delay

This could be due to a systematic hardware or software failure that remains undetected and would require a series of failures to lead to this scenario outcome. The causes considered are:

- Tagger fails in such a way that it gives the same time delay systematically to all detonator within a string. A possible error may come from a systematic communication error originating from the Tagger. This could be due to hardware failure or software error giving a dangerous output. In the case of random failure, the tagger may feedback the correct time delay as entered by the shotfirer but the diagnostic function cannot check whether the same time delay has been actually programmed to the detonators;

- First level of checks:

  - The 2nd Shotfirer and/or Blasting Engineer may fail to detect error using a different tagger and no corrective action is taken. A gross negligence would be required for failure to spot that all the time delays have been programmed with the same value;

  - The second level of checks can also fail if the Tagger fail and misleads the checking team by displaying time delays which appear to match the blast design. Such Tagger error is unlikely as it requires a Tagger failure (probability of 0.001) and the failure is such that the time delays match the Blast Plan. A 10% probability has been conservatively assumed for each time delay in a short string of 5 MIC (overall 10^{-5} probability).

  - The second level of checks can also fail if the second Tagger used for checking has a systematic fault (as described in point b))such that the second shortfirer and Blasting Engineer think that the correction has been made but the Second Tagger has programmed the detonators with a 0 ms increment.

- Second level of checks:

  - The Competent Blasting Supervisor may fail to detect error using the bench box system at fail to take corrective actions (which is independent from the Tagger system). A gross negligence would be required for failure to spot that all the time delays have been programmed with the same value;

- The bench box itself may fail and display time delays which appear to be correct. Such failure is very unlikely and assumed as 0.0001 (bottom range from the certified failure rate range). However, such failures will have to pass the various diagnostic checks performed within the Bench Box.

1.2.7 *Unforeseen ground conditions*

The MIC values derived in the Blast Assessment Reports are based on site surveys carried out for sensitive receivers and will be refined using the trial blast results prior to the full scale blast process of the SCL project. A 3As (Alert-Alarm-Action) monitoring programme will also be implemented to continuously monitor any potential exceedance for every blast. All potential causes leading to increase in ground vibration level (such as deviation of geological condition from the base design) will be investigated and the root cause will be identified. It was assumed that the unforeseen ground conditions between the blast faces and the sensitive receivers will be detected by the 3As programme.

As an additional check on forward ground conditions, the geologist will drill a horizontal forward probe hole to determine rock quality in advance of the blast face (usually up to 20m in length). This will help to determine the geographical condition prior to the actual blast.

1.3 *FAULT TREE ANALYSIS*

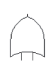
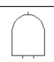
1.3.1 *Overview*

Fault Tree Analysis (FTA) was used to estimate the probability of occurrence for each failure scenario identified in *Section 1.1.*

FTA is a technique widely applied to estimate the probability of unwanted events. It is a technique by which the logical relationships between the circumstances, equipment failure and human error are examined. The software package, FaultTree+, was used to construct fault trees for the estimation of probability of occurrence. FaultTree+ calculated the probability of occurrence using cutset to model multiple levels of protections, checking and review process.

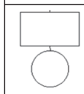
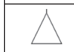
The gate symbols are listed in *Table 1.7* together with their causal relations.

Table 1.7 Gate Symbols for Fault Tree Models

Gate Symbol	Name	Causal Relation	Valid No. of Inputs
	*OR*	Output event occurs if any one of the input events occur	≥ 2
	*AND*	Output event occurs if all input events occur	≥ 2

The event symbols used in fault tree models are illustrated in *Table 1.8* together with their meanings.

Table 1.8 Event Symbols for Fault Tree Models

Event Symbol	Name	Meaning
	*BASIC*	System or component event description Basic event for which failure and repair data is available
	*TRANSFER*	Indicates that this part of the fault tree is developed in a different part of the diagram or on a different page

1.3.2 *Fault Tree Models*

The fault tree models (see *Annex A3*) were developed for each of the following failure scenarios associated with the use of explosives.

- Higher vibration due to 2 MIC detonated at the same time
- Higher vibration due to 3 MIC detonated at the same time
- Higher vibration due to 4 MIC detonated at the same time
- Higher vibration due to 5 MIC detonated at the same time
- Higher vibration due to 6 MIC detonated at the same time

Modelling of Overcharge of Emulsion more than Required

Fault tree models were also developed for the following two failure scenarios. Since either bulk or cartridged emulsion will be used for a blast face, the one with higher failure probability was considered as an integral part of the above models. The overload was considered as one of the causes leading to a maximum of 2 MIC detonated at the same time as mentioned in the previous section.

- More cartridged sticks loaded into a production hole than required
- More bulk emulsion explosives loaded into a production hole than required.

The overload could be a maximum of 1 MIC or less.

Configuration of Fault Tree Models

For the construction of the fault tree models, the number of the errors (failure modes) required and their combinations need to be considered, as shown below.

- One error leading to 2 MIC detonation at the same time
- Two errors leading to 3 MIC detonation at the same time

- Three errors leading to 4 MIC detonation at the same time
- Four errors leading to 5 MIC detonation at the same time
- Five errors leading to 6 MIC detonation at the same time

Therefore, the trees have been constructed in such a way that:

- For the 3 MIC case, the two errors could be of the same type or different types.
- For the 4 MIC case, the three errors could be 3 of same types, or 2 of same type + 1 different type, or 3 of different types. In addition, it has been assumed that "Overcharge of emulsion more than required" plus 1 error other than overcharge will lead to 4 MIC accidental detonation.

Potential Dependency of Human Errors

Human errors dependencies were specifically modeled in the Fault Trees as discussed in *Section A1-1.2.2.*

1.3.3 *Modeling Results*

The modelling results are summarised in Table 1.9.

Table 1.9 Probability of Occurrence per Face

Scenarios	Probability of Occurrence Per Face
Higher vibration due to 2 MIC detonated at the same time	1.41×10^{-5}
Higher vibration due to 3 MIC detonated at the same time	1.46×10^{-8}
Higher vibration due to 4 MIC detonated at the same time	2.47×10^{-10}
Higher vibration due to 5 MIC detonated at the same time	2.47×10^{-10}
Higher vibration due to 6 MIC detonated at the same time	2.47×10^{-10}

Table 1.9 shows that the probability of occurrence of multiple MIC being detonated at the same time will generally reduce as additional error is required to result in one more MIC going off together. The number of blasts will be a maximum of 200 for the LRT, and it has been conservatively assumed that the scenarios for 5 and 6 MIC be the same as the frequency for 4 MIC.

Appendix F

7th EM&A Report for Works Contract 1106 – Diamond Hill Station

MTR Corporation Limited

Shatin to Central Link –
Tai Wai to Hung Hom Section

Monthly EM&A Report No. 7

[Period from 1 to 30 September 2013]

Works Contract 1106 – Diamond Hill Station

(October 2013)

Certified by: Dr. Priscilla Choy

Position: Environmental Team Leader

Date: 10th October 2013

Sembawang – Leader Joint Venture

Shatin to Central Link – Contract 1106 Diamond Hill Station

Monthly Environmental Monitoring and Audit Report for September 2013

(Version 2.0)

Certified By	Dr. Priscilla Choy (Environmental Team Leader)

REMARKS:

The information supplied and contained within this report is, to the best of our knowledge, correct at the time of printing.

CINOTECH accepts no responsibility for changes made to this report by third parties.

CINOTECH CONSULTANTS LTD
Room 1710, Technology Park,
18 On Lai Street,
Shatin, NT, Hong Kong
Tel: (852) 2151 2083 Fax: (852) 3107 1388
Email: info@cinotech.com.hk

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EXECUTIVE SUMMARY

Introduction

1. This is the 7th monthly Environmental Monitoring and Audit (EM&A) Report prepared by Cinotech Consultants Limited for **MTR Shatin to Central Link (SCL) Works Contract 1106 – Diamond Hill Station**. This report documents the findings of EM&A Works conducted from 1 to 30 September 2013.

Summary of Construction Works undertaken during Reporting Month

2. The major site activities undertaken in the reporting month include:

- D-wall construction;
- Archaeological survey-cum-excavation;
- Underpinning works of Old Pillbox;
- Pre-drilling work; and
- Tree transplantation.

Environmental Monitoring and Audit Progress

3. A summary of the monitoring activities in this reporting period is listed below:

Regular Construction Noise and Construction Dust Monitoring

- Regular construction noise monitoring during normal working hours
  Noise Monitoring Station ID
  - NMS-CA-3(1)(3)/NMS-CA-4(2)(3) (H.K. Sheng Kung Hui Nursing Home) 4 times
  - NMS-CA-4(1)/NMS-CA-3(2) (Block 1, Rhythm Garden (north-eastern façade)) 4 times
  - NMS-CA-5(1)/NMS-CA-2(2) (Block 1, Rhythm Garden (northern façade)) 4 times

- Construction Dust (24-hour TSP) Monitoring
  Dust Monitoring Station ID
  - DMS-3(1) (4) /DMS-4(2) (4) (H.K. Sheng Kung Hui Nursing Home) 5 times
  - DMS-4(1)/ DMS-3(2) (Block 1, Rhythm Garden) 5 times

Remarks:
(1) Station ID as identified in approved EM&A Manual / EIA Report for SCL(TAW-HUH).
(2) Station ID as identified in approved EM&A Manual / EIA Report for SCL(HHS).
(3) Noise monitoring on NMS-CA-3(1)/ NMS-CA-4(2) (Hong Kong Sheng Kung Hui Nursing Home) is carried out by Environmental Team of SCL Works Contract 1103.
(4) Dust monitoring on DMS-3(1)/ DMS-4(2) (Hong Kong Sheng Kung Hui Nursing Home) is carried out by Environmental Team of SCL Works Contract 1103.

Cultural Heritage

4. An Archaeological Action Plan (AAP) for the survey-cum-excavation at the former Tai Hom Village site was approved by EPD on 8 April 2013. A Licence to Excavate and Search for Antiquities under Antiquities and Monuments Ordinance has been subsequently obtained from Antiquities and Monuments Office (AMO) on 19 April 2013. The archaeological survey-cum-excavation at Former Tai Hom Village commenced on 25 April 2013 and the fieldwork had been completed in September 2013 in accordance with the Licence granted and the approved AAP.

The Conservation Plans for the two historic buildings, namely Former Royal Air Force Hangar and the Old Pillbox at the former Tai Hom Village site, were approved by EPD on 24 April 2013. Dismantling works on Former Royal Air Force Hangar was carried out in accordance with the approved Conservation Plan and completed in June 2013. Preparation works to relocate the Old Pillbox was carried in September 2013 in accordance with the approved Conservation Plan.

<u>Waste Management</u>

5. Wastes generated from this Project include inert construction and demolition (C&D) materials and non-inert C&D materials. About 2,535 m^3 of inert C&D materials were generated from the Project and were sent to SCL1108A and Tuen Mun Area 38 Fill Bank during the reporting month. About 11 m^3 of non-recyclable non-inert C&D materials, such as general refuse, were disposed of at NENT Landfill. No chemical was collected by licensed collector during the reporting month. No steel material, plastics and paper/cardboard packaging was collected by the recycler during this reporting month.

<u>Landscape and Visual</u>

6. Bi-weekly inspection of the implementation of landscape and visual mitigation measures was conducted on 10 and 24 September 2013. Most of the necessary mitigation measures have been implemented and recommended follow-up actions have been discharged by the Contractor. Details of the audit findings and implementation status are presented in Section 6.

<u>Environmental Site Inspection</u>

7. Joint weekly site inspections were conducted by representatives of the Contractor, Engineer and Contractor's ET on 3, 10, 17 and 24 September 2013. The representative of the IEC joined the site inspection on 17 September 2013. Details of the audit findings and implementation status are presented in Section 6.

Environmental Exceedance/Non-conformance/Complaint/Summons and Successful Prosecution

8. No exceedance of the Action and Limit Levels of regular construction noise monitoring and 24-hour TSP monitoring was recorded during the reporting period.

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

10. No Project related environmental complaint and notification of summons/ successful prosecutions were received in this reporting period.

Future Key Issues

11. Major site activities for the coming reporting month will include:

- D-wall construction;
- Underpinning works and relocation of Old Pillbox;
- Pre-drilling works;
- Sheet piling works; and
- Tree transplantation.

1 INTRODUCTION

1.1 Cinotech Consultants Limited (Cinotech) was appointed by Sembawang – Leader Joint Venture (SLJV) as the Environmental Team (ET) to undertake the Environmental Monitoring and Audit (EM&A) programme during construction phase of the MTR Shatin to Central Link (SCL)Works Contract 1106 – Diamond Hill Station (hereafter referred to as the Project).

Purpose of the Report

1.2 This is the 7th EM&A report which summarises the impact monitoring results and audit findings for the EM&A programme during the reporting period from 1 to 30 September 2013.

Structure of the Report

1.3 The structure of the report is as follows:

Section 1: **Introduction -** details the scope and structure of the report.

Section 2: **Project Information** - summarises background and scope of the project, site description, project organization and contact details, construction programme, the construction works undertaken and the status of Environmental Permits/Licenses during the reporting period.

Section 3: **Environmental Monitoring Requirement -** summarises the monitoring parameters, monitoring programmes, monitoring methodologies, monitoring frequency, monitoring locations, Action and Limit Levels, Event / Action Plans, environmental mitigation measures as recommended in the EIA report and relevant environmental requirements.

Section 4: **Implementation Status on Environmental Mitigation Measures -** summarises the implementation of environmental protection measures during the reporting period.

Section 5: **Monitoring Results** - summarises the monitoring results obtained in the reporting period.

Section 6: **Environmental Site Inspection -** summarises the audit findings of the weekly site inspections undertaken within the reporting period.

Section 7: **Environmental Non-conformance -** summarises any monitoring exceedance, environmental complaints and environmental summons within the reporting period.

Section 8: **Future Key Issues -** summarises the impact forecast and monitoring schedule for the next three months.

Section 9: **Conclusions and Recommendations**

2 PROJECT INFORMATION

Background

2.1 The Shatin to Central Link – Tai Wai to Hung Hom Section (hereafter referred to as SCL (TAW-HUH)) is an approximately 11 km long extension of the Ma On Shan Line and links up with the West Rail Line at Hung Hom forming a strategic east-west rail corridor. It is a Designated Project under the Environmental Impact Assessment Ordinance (Cap. 499) (EIAO).

2.2 The construction of the SCL (TAW-HUH) has been divided into a series of civil construction Works Contracts. This Works Contract 1106 covers the construction of Shatin-to-Central Link (SCL) station in Diamond Hill (DIH).

General Site Description

2.3 For Works Contract 1106, the works area for the DIH station is located to the northeast of Choi Hung Road next to the existing Kwun Tong Line DIH Station. The DIH station will be constructed by cut-and-cover method. The alignment and works area for the Works Contract 1106 are shown in **Figure 1**.

Construction Programme and Activities

2.4 A summary of the major construction activities undertaken in this reporting period is shown as follows. The tentative construction programme is presented in **Appendix A**.

- D-wall construction;
- Archaeological survey-cum-excavation;
- Underpinning works of Old Pillbox;
- Pre-drilling work; and
- Tree transplantation.

Project Organisation

2.5 The project organizational chart and contact details are shown in **Figure 4.**

Status of Environmental Licences, Notification and Permits

2.6 A summary of the relevant permits, licences, and/or notifications on environmental protection for this Project since the commencement of the construction works in March 2013 is presented in **Table 2.1**.

Table 2.1 Summary of the Status of Environmental Licences, Notification and Permits

Permit / License No.	Valid Period		Status
	From	To	
Environmental Permit (EP)			
EP-438/2012/D	13/09/2013	N/A	Valid
Notification pursuant to Air Pollution Control (Construction Dust) Regulation			
No.: 353668	19/12/2012	N/A	Valid
Billing Account for Construction Waste Disposal			
Account No.: 7016601	27/12/2012	N/A	Valid
Registration of Chemical Waste Producer			
5213-281-S3711-01	11/01/2013	N/A	Valid
Effluent Discharge License under Water Pollution Control Ordinance			
WT00014959-2012	14/01/2013	31/01/2018	Valid
WT00016920-2013	06/09/2013	30/09/2018	Valid
Construction Noise Permit (CNP)			
GW-RE0340-13	12/04/2013	11/10/2013	Valid

Summary of EM&A Requirements

2.7 The EM&A programme under Works Contract 1106 requires regular dust and noise monitoring as well as environmental site audits. The EM&A requirements are described in the following sections, including:

- All monitoring parameters;
- Action and Limit levels for all environmental parameters;
- Event / Action Plans;
- Environmental mitigation measures, as recommended in the Project EIA study final report; and
- Environmental requirements in contract documents.

2.8 The advice on the implementation status of environmental protection and pollution control/mitigation measures is summarized in Section 6 of this report.

2.9 This report presents the monitoring results, observations, locations, equipment, period, methodology and QA/QC procedures of the required monitoring parameters, namely construction noise & dust monitoring as well as audit works for the Project in the reporting month.

3 ENVIRONMENTAL MONITORING REQUIREMENTS

Regular Construction Noise Monitoring

3.1 In accordance with the EM&A Manual, monitoring of construction noise impact should be conducted at the designated monitoring stations. Since access to some of the proposed monitoring locations stated in the EM&A Manual was rejected; alternative locations were proposed and agreed by the ER (Engineer's Representative), IEC (Independent Environmental Checker) and EPD (Environmental Protection Department). The construction noise monitoring locations are listed in **Table 3.1** and shown in **Figure 2**.

Table 3.1 Regular Construction Noise Monitoring Location

Regular Construction Noise Monitoring Location	Description	Type of Measurement
NMS-CA-3(1)(3)(4)/ NMS-CA-4 (2)(3)(4)	Hong Kong Sheng Kung Hui Nursing Home	Façade
NMS-CA-4(1)/ NMS-CA-3(2)	Block 1, Rhythm Garden (north-eastern façade)	Façade
NMS-CA-5 (1) (5)/ NMS-CA-2(2)(5)	Block 1, Rhythm Garden (northern façade)	Façade

Note:
(1) NSR ID as identified in approved EM&A Manual / EIA Report for SCL(TAW-HUH).
(2) NSR ID as identified in approved EM&A Manual / EIA Report for SCL(HHS).
(3) Access to the monitoring location at Shek On House (originally proposed in the approved EM&A Manual) was denied during the baseline monitoring. An alternative location (Hong Kong S.K.H Nursing Home) was proposed and approved by the ER and agreed by the IEC and EPD.
(4) Noise monitoring on NMS-CA-3(1)/ NMS-CA-4(2) (Hong Kong Sheng Kung Hui Nursing Home) is carried out by Environmental Team of SCL Works Contract 1103.
(5) Access to the monitoring location at Canossa Primary School (San Po Kong) (originally proposed in the approved EM&A Manual) was denied during the baseline monitoring. An alternative location (Block 1, Rhythm Garden (northern façade)) was proposed and approved by the ER and agreed by the IEC and EPD.

Monitoring Parameter and Frequency

3.2 Weekly construction noise monitoring was conducted in accordance with the requirements stipulated in the EM&A Manual. If works are to be carried out during restricted hours, the conditions stipulated in the construction noise permit issued by the Noise Control Authority have to be followed. The monitoring schedule for this reporting period of monitoring stations at Rhythm Garden is shown in **Appendix D**.

3.3 The construction noise levels were measured in terms of the A-weighted equivalent continuous sound pressure level (L_{Aeq}) in decibels dB(A). L_{Aeq} (30min) (as six consecutive $L_{eq,\ 5\text{-}min}$ readings) was used as the monitoring metric for the time period between 0700 – 1900 hours on normal weekdays.

Monitoring Equipment and Methodology

Field Monitoring

3.4 The monitoring procedures are as follows:

- The microphone head of the sound level meter was positioned 1m exterior of the noise sensitive facade and lowered sufficiently so that the building's external wall acts as a reflecting surface.
- The battery condition was checked to ensure good functioning of the meter.
- Parameters such as frequency weighting, the time weighting and the measurement time were set as follows:

  - frequency weighting : A
  - time weighting : Fast
  - measurement time : 5 minutes (obtaining six consecutive $L_{eq,5min}$ readings for a $L_{eq,30\ min}$ reading)

- Prior to and after noise measurement, the meter was calibrated using the calibrator for 94.0 dB at 1000 Hz. If the difference in the calibration level before and after measurement is more than 1.0 dB, the measurement was considered invalid and repeat of noise measurement was required after re-calibration or repair of the equipment.
- The wind speed at the monitoring station was checked with the portable wind meter. Noise monitoring was cancelled in the presence of fog, rain, and wind with a steady speed exceeding 5 m/s, or wind with gusts exceeding 10 m/s.
- Noise measurement was paused during periods of high intrusive noise if possible and observation was recorded when intrusive noise was not avoided.
- At the end of the monitoring period, the L_{eq}, L_{10} and L_{90} were recorded. In addition, site conditions and noise sources were recorded on a standard record sheet.
- A façade correction of +3dB(A) shall be made to the noise parameter obtained by free field measurement.

Monitoring Equipment

3.5 The sound level meters and calibrator used for the noise measurement, as listed in **Table 3.2**, compile with the IEC 651: 1979 and 804:1985 (Type 1) specification. The calibration certificates of the sound level meters are included in **Appendix C**.

Table 3.2 Noise Monitoring Equipment

Monitoring Equipment	Model (Serial no.)
Sound Level Meter	SVANTEK – SVAN 957 (Serial no.: 21459)
Calibrator	SVANTEK – SV30A (Serial no.: 10929 and 24791)

Maintenance and Calibration

3.6 Maintenance and Calibration procedures were as follows:

- The microphone head of the sound level meter and calibrator were cleaned with a soft cloth at quarterly intervals.
- The sound level meter and calibrator were checked and calibrated at yearly intervals. Copies of calibration certificates are attached in **Appendix C**.

Action & Limit Level for Construction Noise Monitoring

3.7 The Action and Limit Levels are presented in **Appendix B** and the Event / Action Plan (EAP) for noise monitoring is presented in **Appendix I.**

Continuous Noise Monitoring

3.8 With reference to the latest Continuous Noise Monitoring Plan (CNMP) and Construction Noise Mitigation Measures Plan (CNMMP) prepared and submitted under EP Condition 2.10, it is predicted that no residual air-borne construction noise impacts exceeding the relevant noise criteria will be anticipated. Therefore, no continuous noise monitoring is required during the construction of the SCL (TAW-HUH) under Works Contract 1106.

Regular Construction Dust Monitoring

3.9 The proposed dust monitoring stations for the construction phase of the Project, as recommended in the approved EM&A Manual, are listed in **Table 3.3** and shown in **Figure 3**. The proposed locations have been agreed with the ER, EPD and IEC.

Table 3.3 Dust Monitoring Location

Regular Dust Monitoring Location	Description
DMS-3(1)(3)(4)/ DMS-4(2)(3)(4)/	Hong Kong Sheng Kung Hui Nursing Home
DMS-4(1)/ DMS-3(2)	Block 1, Rhythm Garden

Note:
(1) ASR ID as identified in approved EM&A Manual / EIA Report for SCL(TAW-HUH).
(2) ASR ID as identified in approved EM&A Manual / EIA Report for SCL(HHS).
(3) Access to the monitoring location at Shek On House (originally proposed in the approved EM&A Manual) was denied during the baseline monitoring. An alternative location (Hong Kong S.K.H Nursing Home) was proposed and approved by the ER and agreed by the IEC and EPD.
(4) Dust monitoring on DMS-3(1)/DMS-4(2) (Hong Kong Sheng Kung Hui Nursing Home) is carried out by Environmental Team of SCL Works Contract 1103.

Monitoring Parameter and Frequency

3.10 The dust monitoring (in terms of Total Suspended Particulates (TSP)) was conducted at the designated monitoring stations in accordance with the requirements stipulated in the EM&A Manual. The 24-hour TSP levels were monitored at the frequency and duration stated in **Table 3.4**. The TSP monitoring at Rhythm Garden was conducted as per the schedule presented in **Appendix D**.

Table 3.4 Dust Monitoring Parameters and Frequency

Monitoring Period	Duration	Parameter	Frequency
Impact Monitoring(1)	Throughout the construction period	24-hour TSP	Once per 6 days

Note:
(1) 1- hour TSP shall be conducted when one documented valid complaint is received.

Monitoring Equipment

3.11 **Table 3.5** summarizes the equipment used for the dust monitoring.

Table 3.5 Dust Monitoring Equipment

Equipment	Model and Make	Qty.
HVS	Tisch Environmental, Inc.; Model no. TE-5170, Serial no.: 2352	1
Calibration Orifice	Tisch Environmental, Inc.; Model no. TE – 5025A Orifice ID: 2323	1

Instrumentation

3.12 High Volume Samplers (HVS) connected with appropriate sampling inlets were employed for air quality monitoring. Each sampler was composed of a motor, a filter holder, a flow controller and a sampling inlet and its performance specification complies with that required by USEPA Standard Title 40, Code of Federation Regulations Chapter 1 Appendix B (Part 50).

HVS Installation

3.13 The following guidelines were adopted during the installation of HVS:

- Sufficient support was provided to secure the samplers against gusty wind.
- No two samplers were placed less than 2 meters apart.
- The distance between the sampler and an obstacle, such as buildings, was at least twice the height that the obstacle protrudes above the sampler.
- A minimum of 2 meters of separation from walls, parapets and penthouses was required for rooftop samples.
- A minimum of 2 meters separation from any supporting structure, measured horizontally was required.
- No furnaces or incineration flues were nearby.
- Airflow around the sampler was unrestricted.
- The samplers were more than 20 meters from the drip line.
- Any wire fence and gate, to protect the sampler, should not cause any obstruction

during monitoring.

Filters Preparation

3.14 Fiberglass filters were used which have a collection efficiency of larger than 99% for particles of 0.3 μm diameter. A HOKLAS accredited laboratory, Wellab Ltd. (HOKLAS Registration No. 083), was responsible for the preparation of pre-weighed filter papers for Cinotech's monitoring team.

3.15 All filters, which were prepared by Wellab Ltd., were equilibrated in the conditioning environment for 24 hours before weighing. The conditioning environment temperature was around 25 °C and not variable by more than ±3 °C; the relative humidity (RH) was < 50% and not variable by more than ±5%. A convenient working RH was 40%.

3.16 Wellab Ltd. has a comprehensive quality assurance and quality control programmes.

Operating/Analytical Procedures

3.17 Operating/analytical procedures for the TSP monitoring were highlighted as follows:

- Prior to the commencement of the dust sampling, the flow rate of the HVS was properly set (between 1.1 and 1.4 m^3/min.) in accordance with the manufacturer's instruction to within the range recommended in USEPA Standard.
- The power supply was checked to ensure the sampler worked properly.
- The filter holding frame and the area surrounding the filter were cleaned.
- On sampling, the sampler was operated for 5 minutes to establish thermal equilibrium before placing any filter media at the air quality monitoring station.
- The filter holding frame was then removed by loosening the four nuts and carefully a weighted and conditioned filter was centered with the stamped number upwards, on a supporting screen.
- The filter was aligned on the screen so that the gasket formed an airtight seal on the outer edges of the filter. Then the filter holding frame was tightened to the filter holder with swing bolts to avoid air leakage at the edges.
- The shelter lid was closed and secured with the aluminum strip.
- A new flow rate record chart was set into the flow recorder.
- The timer was then programmed. Information was recorded on the record sheet, which included the starting time, the weather condition and the filter number (the initial weight of the filter paper can be found out by using the filter number).
- The flow rate of the HVS sampler would be verified to be constant and recorded on the data sheet before and after sampling.
- The elapsed time and other relevant information was recorded. After sampling, the sampled filter was removed carefully and folded in half length so that only surfaces with collected particulate matter were in contact.
- It was then placed in a clean plastic envelope and sealed and sent to the Wellab Ltd. for weighing.
- Before weighing, all filters were equilibrated in a conditioning environment for 24 hours. The conditioning environment should be between 25°C and 30°C and not vary by more than ±3°C; the relative humidity (RH) should be < 50% and not vary by more than ±5%. A convenient working RH is 40%. Weighing results were returned to Cinotech for further analysis of TSP concentrations.

Maintenance/Calibration

3.18 The following maintenance/calibration was required for the HVS:

- The high volume motors and their accessories were properly maintained. Appropriate maintenance such as routine motor brushes replacement and electrical wiring checking were made to ensure that the equipment and necessary power supply are in good working condition.
- Calibration of the HVS (five point calibration) using Calibration Kit was carried out every two months. Copies of calibration certificates are attached in **Appendix C**.
- The HVS calibration orifice will be calibrated annually.

Action and Limit Levels for Dust Monitoring

3.19 The Action and Limit levels have been established and are presented in **Appendix B** and the Event / Action Plan (EAP) for dust monitoring is presented in **Appendix I.**

Cultural Heritage

3.20 An Archaeological Action Plan (AAP) for the survey-cum-excavation at the former Tai Hom Village site was approved by EPD on 8 April 2013. A Licence to Excavate and Search for Antiquities under Antiquities and Monuments Ordinance has been subsequently obtained from Antiquities and Monuments Office (AMO) on 19 April 2013. The archaeological survey-cum-excavation at Former Tai Hom Village commenced on 25 April 2013 and the fieldwork had been completed in September 2013 in accordance with the Licence granted and the approved AAP.

3.21 The Conservation Plans for the two historic buildings, namely Former Royal Air Force Hangar and the Old Pillbox at the former Tai Hom Village site, were approved by EPD on 24 April 2013. Dismantling works on Former Royal Air Force Hangar was carried out in accordance with the approved Conservation Plan and completed in June 2013. Preparation works to relocate the Old Pillbox was carried in September 2013 in accordance with the approved Conservation Plan.

Landscape and Visual

3.22 In accordance with the EM&A Manual, the landscape and visual mitigation measures shall be implemented and a site inspection shall be conducted once every two weeks throughout the construction period. The implementation status is given in **Appendix J**. The Event / Action Plan (EAP) for landscape and visual are presented in **Appendix I.**

4 IMPLEMENTATION STATUS ON ENVIRONMENTAL PROTECTION REQUIREMENTS

4.1 The Contractor has implemented environmental mitigation measures and requirements as stated in the EIA Report, the Environmental Permit and EM&A Manual. The implementation status of the environmental mitigation measures of the reporting period is summarized in **Appendix J**. Status of required submissions under the Environmental Permit (EP) of the reporting period is presented in **Table 4.1**.

Table 4.1 Status of Required Submissions under EP

EP Condition	Submission	Submission Date
Condition 3.4	Monthly EM&A Report (August 2013)	13th September 2013

5 MONITORING RESULTS

Regular Construction Noise Monitoring

5.1 A total of 8 sets of 30-minute construction noise measurements were carried out at the monitoring stations during normal weekdays of the reporting period by ET of SCL Works Contract 1106. No exceedance of the limit level was recorded at designated monitoring stations.

5.2 The noise monitoring results recorded at NMS-CA-5[(1)]/NMS-CA-2[(2)] (Block 1, Rhythm Garden (northern façade)) did not exceed the daytime construction noise criterion.

5.3 Based on observation during the on-site monitoring, road traffic nearby is considered as a potential noise source other than construction works of the Project that affects the monitoring results of the reporting month.

5.4 The noise monitoring results together with their graphical presentations are presented in **Appendix F**[(3)].

5.5 No exceedance of the Action and Limit Levels of construction noise due to the Project was recorded during the reporting period.

Regular Dust Monitoring

5.6 A total of 5 sets of 24-hour TSP monitoring were carried out at the designated monitoring stations during normal weekdays of the reporting period by ET of SCL Works Contract 1106. The monitoring results together with their graphical presentations are presented in **Appendix E**[(3)] and a summary of the dust monitoring results in this reporting month is given in **Table 5.1**.

Table 5.1 Summary Table of Dust Monitoring Results during the reporting month

Parameter	Minimum μg/m^3	Maximum μg/m^3	Average μg/m^3	Action Level, μg/m^3	Limit Level, μg/m^3
24-hr TSP (DMS-3[(1)(4)]/ DMS-4[(2) (4)])	15.8	58.7	35.7	159.1	260
24-hr TSP (DMS-4[(1)]/ DMS-3[(2)])	22.5	62.6	40.3	160.4	260

Remarks:
(1) Station ID as identified in approved EM&A Manual / EIA Report for SCL(TAW-HUH).
(2) Station ID as identified in approved EM&A Manual / EIA Report for SCL(HHS).
(3) The monitoring results and graphical presentation for H.K. Sheng Kung Hui Nursing Home are presented in Monthly EM&A Report for Contract 1103.
(4) Dust monitoring on DMS-3[(1)]/DMS-4[(2)] (Hong Kong Sheng Kung Hui Nursing Home) is carried out by Environmental Team of SCL Works Contract 1103

5.7 Based on observation during the on-site monitoring, road traffic emission nearby is considered as a potential dust source other than construction works of the Project that affects the monitoring results of the reporting month.

5.8 Wind monitoring data were obtained from Kai Tak Meteorological Station of Hong Kong Observatory and shown on **Appendix E**.

5.9 No exceedance of the Action and Limit Levels of the 24-hour TSP was recorded during the reporting period.

Cultural Heritage

5.10 An Archaeological Action Plan (AAP) for the survey-cum-excavation at the former Tai Hom Village site was approved by EPD on 8 April 2013. A Licence to Excavate and Search for Antiquities under Antiquities and Monuments Ordinance has been subsequently obtained from Antiquities and Monuments Office (AMO) on 19 April 2013. The archaeological survey-cum-excavation at Former Tai Hom Village commenced on 25 April 2013 and completed in September 2013 in accordance with the Licence granted and the approved AAP.

5.11 The Conservation Plans for the two historic buildings, namely Former Royal Air Force Hangar and the Old Pillbox at the former Tai Hom Village site, were approved by EPD on 24 April 2013. Dismantling works on Former Royal Air Force Hangar was carried out in accordance with the approved Conservation Plan and completed in June 2013. Preparation works to relocate the Old Pillbox was carried in September 2013 in accordance with the approved Conservation Plan.

Waste Management

5.12 Waste generated from this Project includes inert construction and demolition (C&D) materials and non-inert C&D materials. Non-inert C&D materials are made up of general refuse, vegetative wastes and recyclable wastes like plastics and paper/cardboard packaging materials. Steel materials generated from the project are also grouped into non-inert C&D materials as the materials were not disposed of with other inert C&D materials. With reference to relevant handling records and trip tickets of this Project, the quantities of different types of waste generated in the reporting month are summarised in **Table 5.2**. No steel material, plastics and paper/cardboard packaging was collected by the recycler during this reporting month. Detail of waste management data is presented in **Appendix K**.

Table 5.2 Quantities of Waste Generated from the Project

<table>
<tr><th rowspan="4">Reporting Month</th><th colspan="6">Quantity</th></tr>
<tr><th rowspan="3">C&D Materials (inert) [(a)]</th><th colspan="5">C&D Materials (non-inert) [(b)]</th></tr>
<tr><th rowspan="2">General Refuse</th><th rowspan="2">Chemical Waste</th><th colspan="3">Recycled materials</th></tr>
<tr><th>Paper/ cardboard</th><th>Plastics</th><th>Metals</th></tr>
<tr><td>September 2013</td><td>2,535 m^3</td><td>11 m^3</td><td>0 kg</td><td>0 kg</td><td>0 kg</td><td>0 kg</td></tr>
<tr><td colspan="7">Notes:
(a) Inert C&D materials include bricks, concrete, building debris, rubble and excavated soil, which were delivered to SCL 1108A and Tuen Mun Area 38 Fill Bank during the reporting month.
(b) Non-inert C&D materials include steel, paper/cardboard packaging waste, plastics and other wastes such as general refuse and vegetative wastes. Steel materials generated from the project are grouped into non-inert C&D materials as the materials were not disposed of with other inert C&D materials. General refuse was delivered to designated landfill for disposal.</td></tr>
</table>

Landscape and Visual

5.13 Bi-weekly inspection of the implementation of landscape and visual mitigation measures was conducted on 10 and 24 September 2013. The observations and recommendations made during the audit sessions are summarized in **Table 6.1**.

6 ENVIRONMENTAL SITE INSPECTION

Site Audits

6.1 Site audits were carried out by ET on weekly basis to monitor the timely implementation of proper environmental management practices and mitigation measures in the Project site. The summaries of site audits are attached in **Appendix H**.

6.2 Site audits were conducted on 3, 10, 17 and 24 September 2013 by ET. A joint site audit with the representative with IEC, ER, the Contractor and the ET was carried out on 17 September 2013. No site inspection was conducted by EPD during the reporting month. The details of observations during site audit carried out by ET can refer to **Table 6.1**.

Implementation Status of Environmental Mitigation Measures

6.3 According to the EIA Study Report, Environmental Permit and the EM&A Manual of the Project, the mitigation measures detailed in the documents are recommended to be implemented during the construction phase. An updated summary of the Environmental Mitigation Implementation Schedule (EMIS) is provided in **Appendix J**.

6.4 During site inspections in the reporting month, no non-conformance was identified. The observations and recommendations made during the audit sessions are summarized in **Table 6.1**.

Table 6.1 Observations and Recommendations of Site Audit

Parameters	Date	Observations and Recommendations	Follow-up
Water Quality	10 Sep 2013	To clear the sediment in the U-channel (next to the site entrance) to prevent blockage.	The sediment in the U-channel was cleared by the Contractor on 17 Sep 2013.
	24 Sep 2013	Reminder: To avoid further overflowing at sedimentation tank by properly check the pumps. (Next to Area W8)	Follow up actions will be reported in next month.
Noise	17 Sep 2013	Reminder: The acoustic blanket installed at the top of hoarding next to Tai Hom Road should be extended for enhancing noise reduction.	The acoustic blanket was installed at the top of hoarding next to Tai Hom Road by the Contractor on 24 Sep 2013.
Landscape and Visual	3 Sep 2013	The operating machine was observed closed to retaining tree DT1885. The Contractor should keep away the machine from tree for better tree protection.	The identified machine was removed from the retaining tree DT1885 by the Contractor on 10 Sep 2013.
	3 Sep 2013	To erect tree protection fence for retaining tree next to Archaeological area.	Tree protection fence was erected for trees next to Archaeological area by the Contractor on 10 Sep 2013.
	24 Sep 2013	Metal plates were observed lean on tree DT 0799. The Contractor was reminded to remove them from tree protection zone.	Follow up actions will be reported in next month.
	24 Sep 2013	The operating machine should keep away from Tree DT1911 to avoid damage to retaining tree.	Follow up actions will be reported in next month.
Cultural Heritage	N/A	N/A	N/A

Parameters	Date	Observations and Recommendations	Follow-up
Air Quality	N/A	N/A	N/A
Waste / Chemical Management	27 Aug 2013	To provide or to enhance the drip tray to avoid the spillage of fuel during oil filling. (Next to desander)	An additional tray was provided to contain the potential oil spillage during oil filling by the Contractor on 3 Sep 2013.
	27 Aug 2013	To clear the leaked oil and treat oil stained soil as chemical waste. (Next to previous RAF Hanger)	The leaked oil and oil stained soil were cleared by the Contractor on 3 Sep 2013.
	27 Aug 2013	Reminder: To clear the stagnant water in the drip tray. (GI Area)	The identified equipment and drip tray were removed from site by the Contractor on 3 Sep 2013.
	27 Aug 2013	Reminder: Removed part of the equipment should be enclosed with impervious materials to prevent oil leakage to earth.(Near Archaeological Area)	The identified equipment was enclosed with tarpaulin to prevent oil leakage to earth by the Contractor on 3 Sep 2013.
	17 Sep 2013	Reminder: To clean the oily stagnant water in drip tray next to the desander to prevent leakage.	The oily stagnant water was cleared by the Contractor by 24 Sep 2013.
	24 Sep 2013	The empty plastic chemical containers, which waiting for recycling, should be removed from chemical storage area to prevent confusion. (Next to Area W8)	Follow up actions will be reported in next month.
Permits/ Licenses	N/A	N/A	N/A

7 ENVIRONMENTAL NON-CONFORMANCE

Summary of Exceedances

7.1 No exceedance of the Action and Limit Levels of the regular construction noise and 24-hour TSP monitoring was recorded during the reporting month. The summary of exceedance is provided in **Appendix G**.

Summary of Environmental Non-Compliance

7.2 No environmental non-compliance was recorded in the reporting month.

Summary of Environmental Complaint

7.3 No environmental Project-related complaint was received in the reporting month. The Cumulative Complaint Log since the commencement of the Project is presented in **Appendix L**.

Summary of Environmental Summon and Successful Prosecution

7.4 There was no successful environmental prosecution or notification of summons received since the Project commencement. The Cumulative Log for environmental summon and successful prosecution since the commencement of the Project is presented in Appendix **L**.

8 FUTURE KEY ISSUES

Construction Programme for the Next Month

8.1 A tentative construction programme is provided in **Appendix A**. The major construction activities in the coming month will include:

- D-wall construction;
- Underpinning works and relocation of Old Pillbox;
- Pre-drilling works;
- Sheet piling work; and
- Tree transplantation.

Key Issues in the Next Month

8.2 Key issues to be considered in the coming month include:

- Dust arising from loading, unloading, transfer, handling or storage of bulk cement or dry PFA and bentonite and excavated materials;
- Control of silty surface runoff;
- Preservation of Former Royal Air Force Hangar and Old Pillbox after dismantling and relocation;
- Preservation and protection of retained and transplanted trees; and
- Implementation of mitigation measures for noise nuisance from construction works.

Monitoring Schedule in the Next Month

8.3 The tentative schedule of regular construction noise monitoring and 24-hour TSP monitoring at Rhythm Garden in the next reporting period is presented in **Appendix D**. The regular construction noise monitoring and 24-hour TSP monitoring will be conducted at the same monitoring locations in the next reporting period.

9 CONCLUSIONS AND RECOMMENDATIONS

Conclusions

9.1 The Environmental Monitoring and Audit (EM&A) Report presents the EM&A works undertaken during the period from 1 to 30 September 2013 in accordance with EM&A Manual and the requirement under EP.

9.2 No exceedance of the Action and Limit Levels of regular construction noise and 24-hour TSP monitoring was recorded at the designated monitoring stations during the reporting month.

9.3 4 times of joint weekly site inspections were conducted by representatives of the Contractor, Engineer and Contractor's ET and 2 times of bi-weekly inspection of the implementation of landscape and visual mitigation measures were conducted during the reporting period.

9.4 There was no Project related environmental complaint, successful prosecution or notification of summons received during the reporting month.

9.5 The ET will keep track on the EM&A programme to ensure compliance of environmental requirements and the proper implementation of all necessary mitigation measures.

Recommendations

9.6 According to the environmental audit performed in the reporting month, the following recommendations were made:

<u>Water Quality</u>

- All drainage facilities and erosion and sediment control structures should be regularly inspected and maintained to ensure proper and efficient operation at all times and particularly following wet seasons.
- It is recommended particular attention should be paid to the control of silty surface runoff during wet season. Stockpiles of materials that are likely to generate silty surface runoff should be covered by impervious sheets whenever practicable
- Slurry on the haul road should be cleared regularly to reduce the runoff generation.

<u>Construction Noise</u>

- Regular review on the noise mitigation measures and the conditions of the implemented noise mitigation measures shall be properly maintained.

<u>Landscape and Visual</u>

- "No-intrusion zone" should be established and maintained for existing trees as far as practicible. The Contractor is reminded to closely monitor and restrict the site working staff from entering the erected "no-intrusion zone" for existing trees and avoid placing construction materials within the tree protection zone for maximizing the protection.

<u>Air Quality</u>

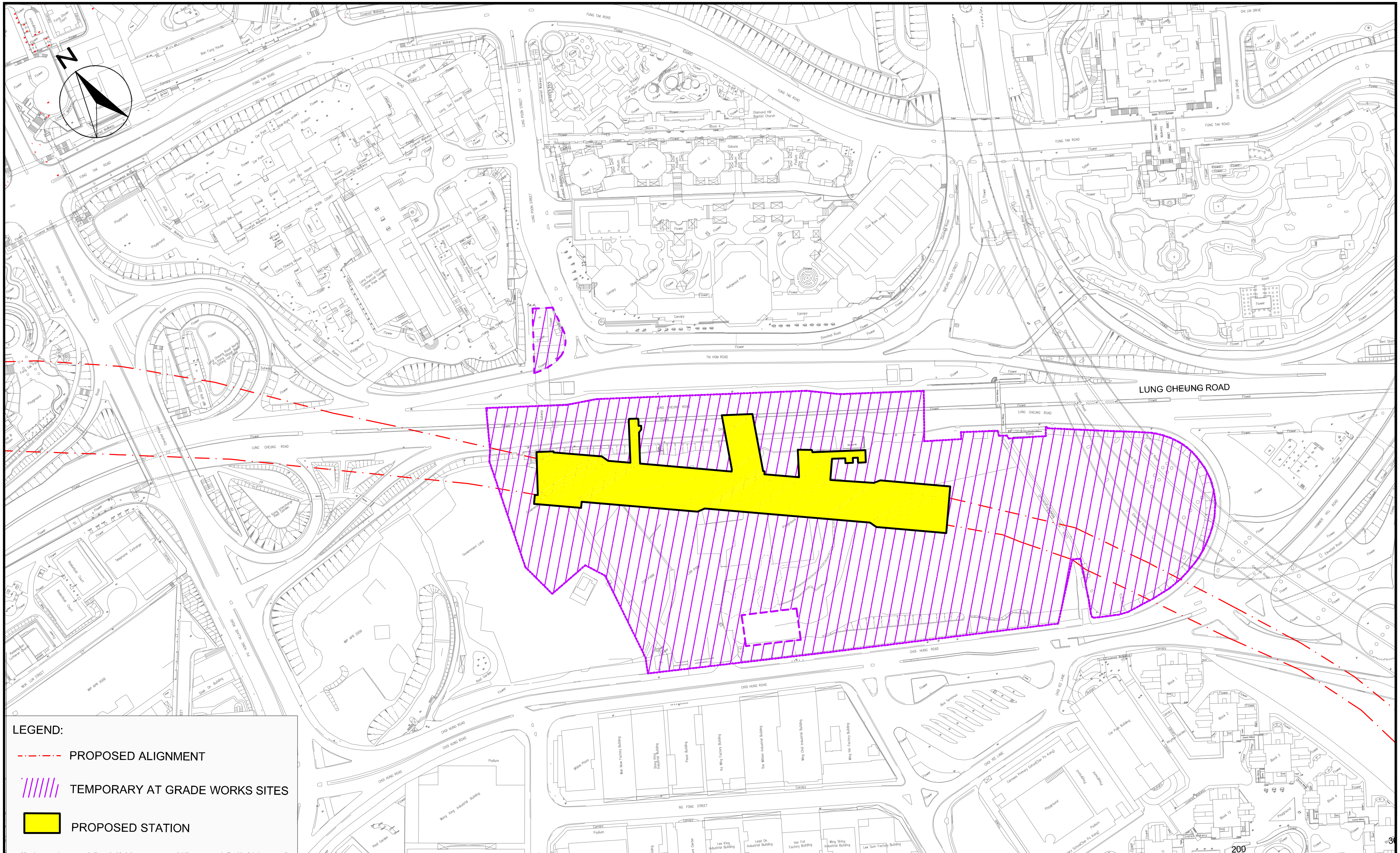
- Regular water spraying on site is reminded to be implemented as per EP requirement.
- Any excavated or stockpile of dusty material should be covered entirely by impervious sheeting or sprayed with water to maintain the entire surface wet and then

removed or backfilled or reinstated where practicable within 24 hours of the excavation or unloading.

Waste/Chemical Management

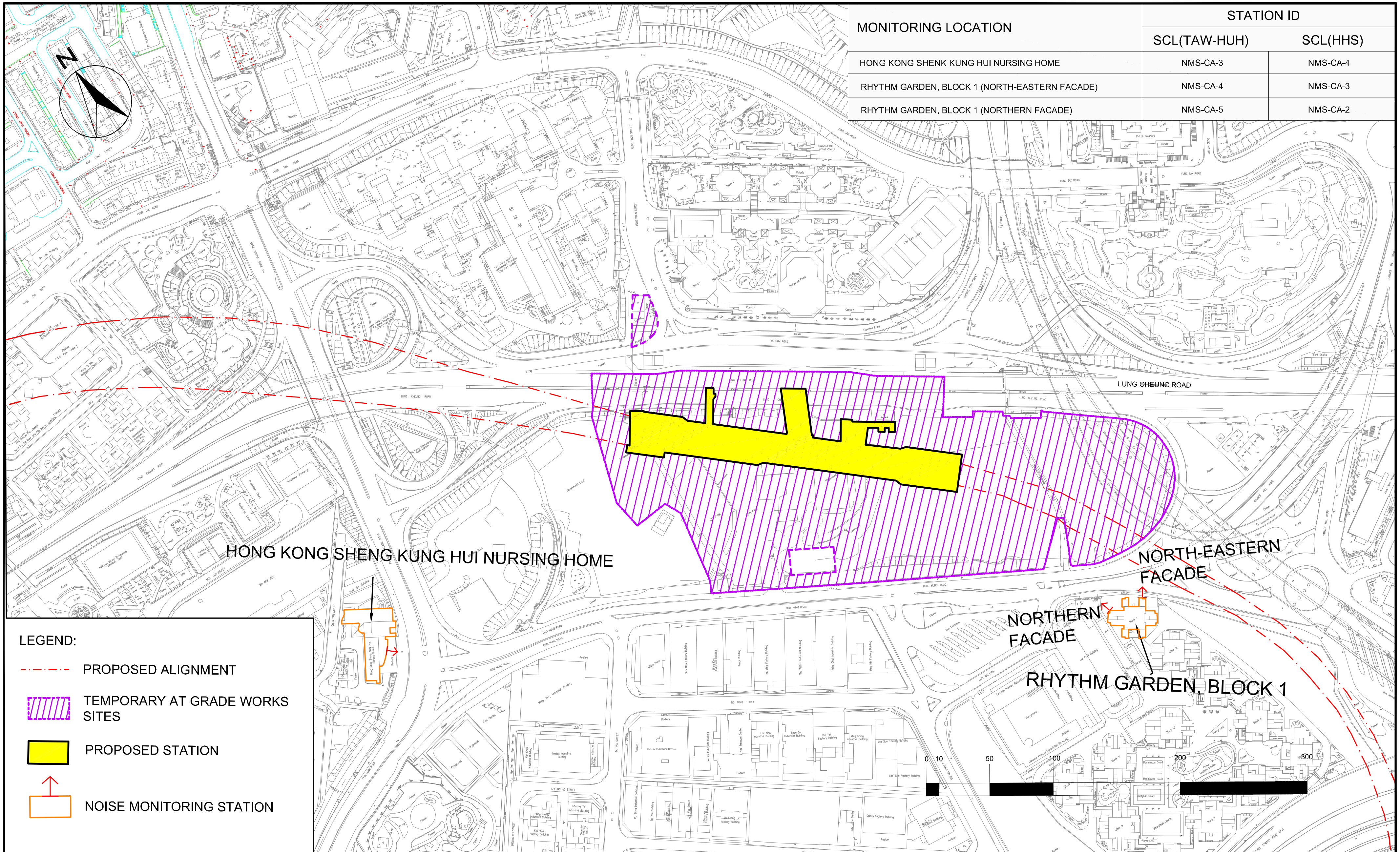
- Good site practice of providing drip trays for temporary use of chemicals shall be sustained. Drip trays should be properly maintained.
- On-site sorting of materials are advised to be segregated and stored in different containers or skips to enhance reuse or recycling of materials and their proper disposal whenever practicable.
- Provision and enhancement of the preventive mitigation measures to avoid oil leakage during oil filling works.

FIGURES



CINOTECH Cinotech Consultants Limited	SHATIN TO CENTRAL LINK CONTRACT 1106 DIAMOND HILL STATION SITE LAYOUT PLAN	SCALE	1:80	DATE	MAY 2013
		CHECK	KC	DRAWN	JW
		JOB No.	MA12051	FIGURE NO. 1	REV -

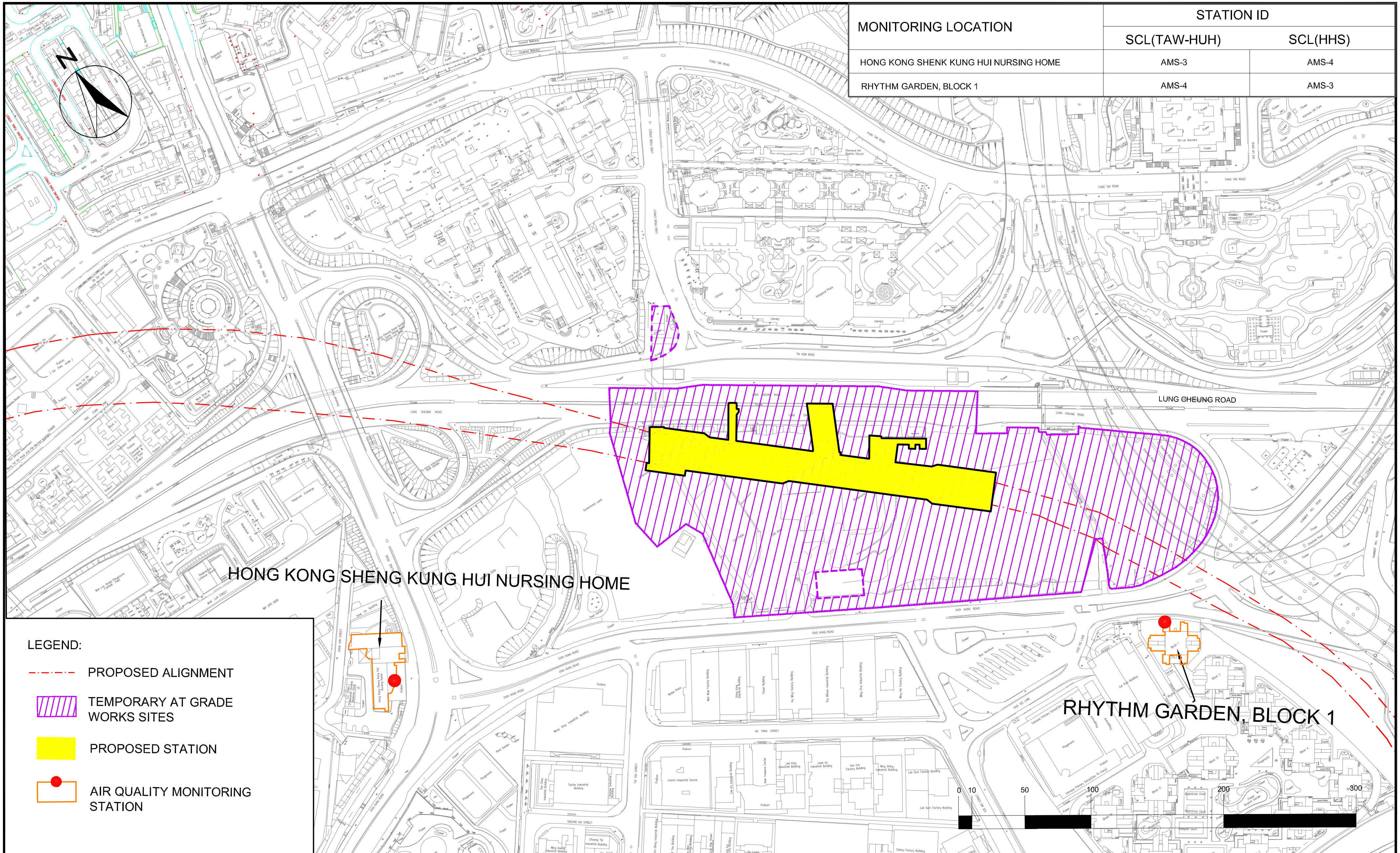
MONITORING LOCATION	STATION ID	
	SCL(TAW-HUH)	SCL(HHS)
HONG KONG SHENK KUNG HUI NURSING HOME	NMS-CA-3	NMS-CA-4
RHYTHM GARDEN, BLOCK 1 (NORTH-EASTERN FACADE)	NMS-CA-4	NMS-CA-3
RHYTHM GARDEN, BLOCK 1 (NORTHERN FACADE)	NMS-CA-5	NMS-CA-2



LEGEND:

- PROPOSED ALIGNMENT
- TEMPORARY AT GRADE WORKS SITES
- PROPOSED STATION
- NOISE MONITORING STATION

CINOTECH Cinotech Consultants Limited	SHATIN TO CENTRAL LINK CONTRACT 1106 DIAMOND HILL STATION LOCATION OF NOISE MONITORING STATIONS(CONSTRUCTION AIRBORNE NOISE)	SCALE 1:100	DATE MAY 2013		
		CHECK KC	DRAWN JW		
		JOB No. MA12051	FIGURE NO. 2	REV -	



MONITORING LOCATION	STATION ID	
	SCL(TAW-HUH)	SCL(HHS)
HONG KONG SHENK KUNG HUI NURSING HOME	AMS-3	AMS-4
RHYTHM GARDEN, BLOCK 1	AMS-4	AMS-3

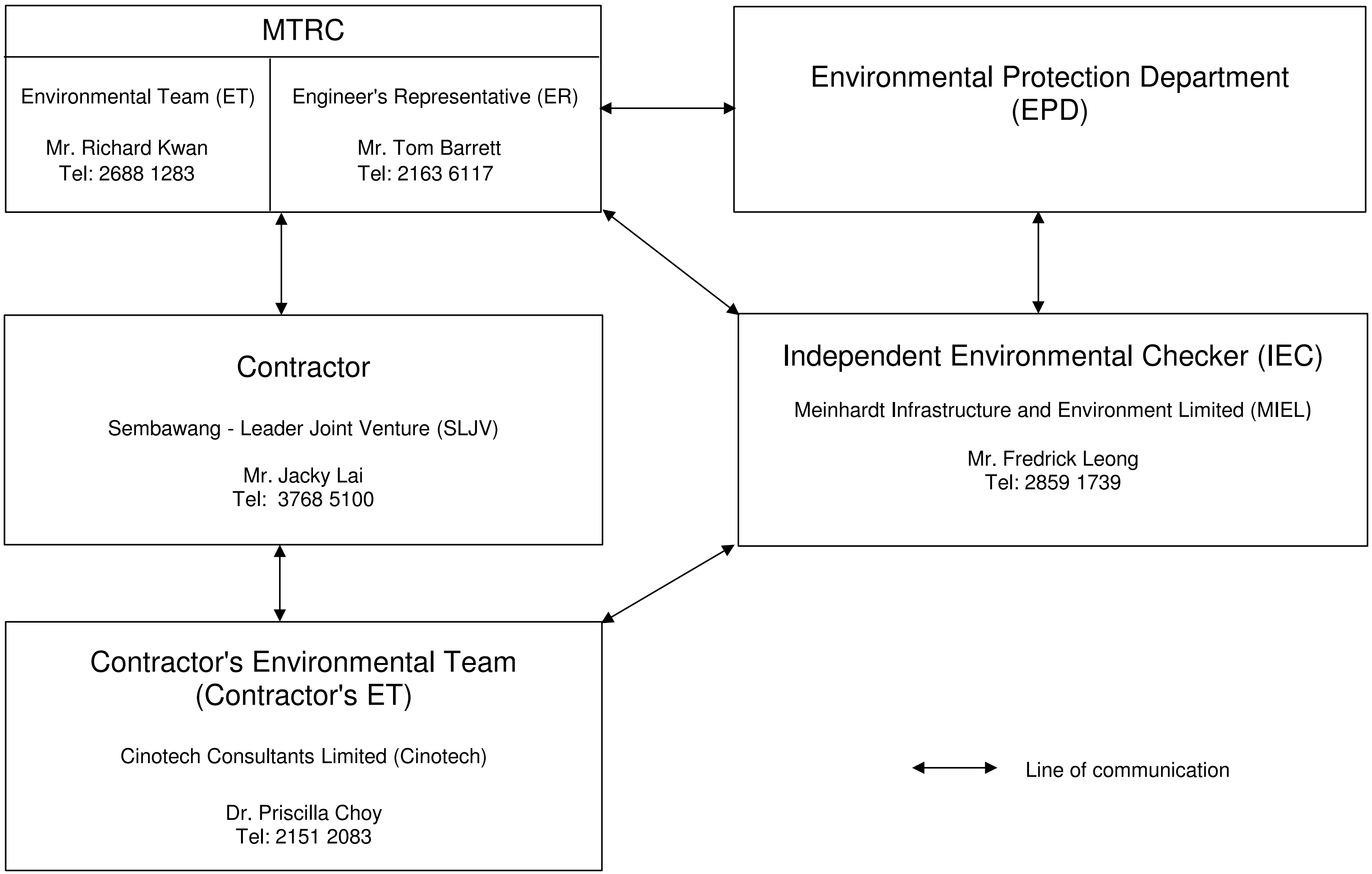
CINOTECH

Cinotech Consultants Limited

SHATIN TO CENTRAL LINK CONTRACT 1106
DIAMOND HILL STATION

LOCATION OF AIR QUALITY MONITORING STATIONS

SCALE	1:100	DATE	MAY 2013
CHECK	KC	DRAWN	JW
JOB No.	MA12051	FIGURE NO. 3	REV -



Title	Scale	Proposal	
MTR SCL Works Contract 1106 Diamond Hill Station Organisation Chart and Key Contact of the Project	N.T.S	No. MA12051	CINOTECH
	Date Jun-13	Figure 4	

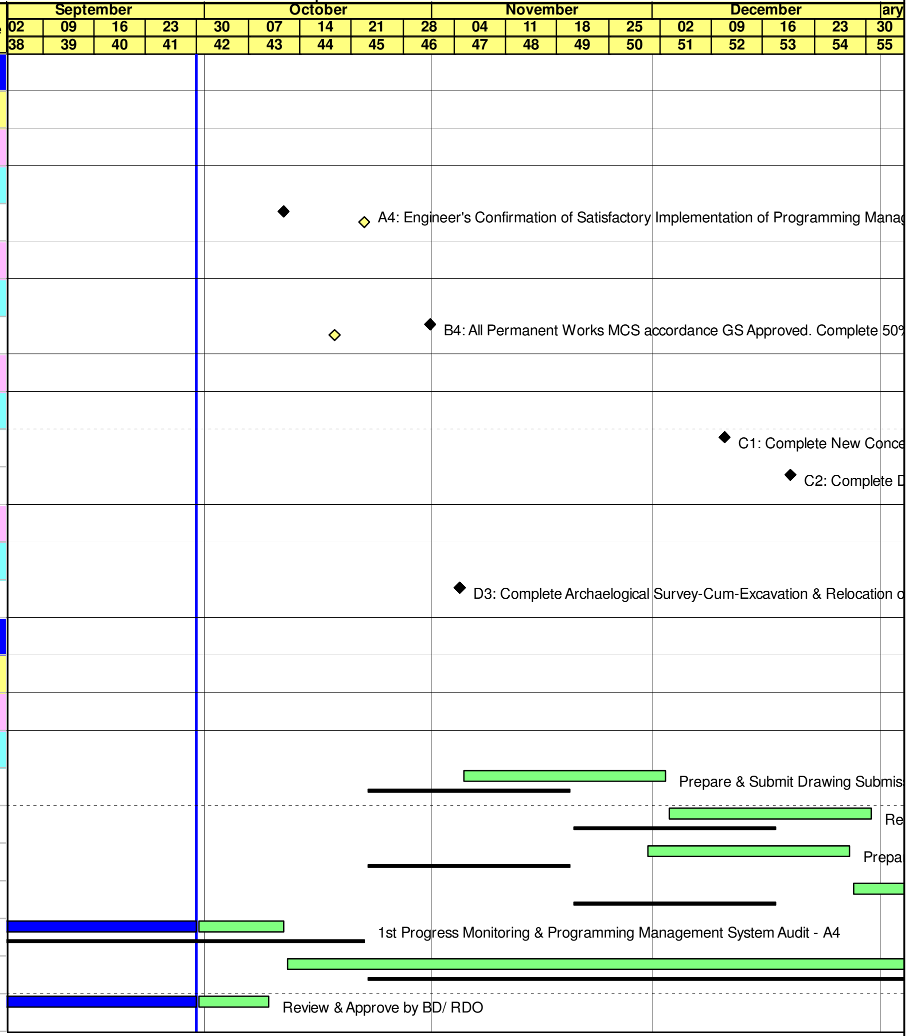
APPENDIX A
TENTATIVE CONSTRCUTION PROGRAMME

Contract 1106 - Diamond Hill Station

MTR

Sembawang - Leader Joint Venture

Activity ID	Activity Name	Orig Dur	Forecast Start	Forecast Finish	% Complete
Contract Dates					
Milestone Dates					
Cost Centre A Milestones					
Preliminaries					
C1106.MSA04	A4: Engineer's Confirmation of Satisfactory Implementation of Programming Management System	0		11-Oct-13	0%
Cost Centre B (Option 5 Tender (SCL), Entrances & Adits)					
Completion Dates					
C1106.MSB04	B4: All Permanent Works MCS accordance GS Approved. Complete 50% Dwall by nos. between GL39-49	0		31-Oct-13	0%
Cost Centre C (Option 5 (KTL) Station Modification)					
Completion Dates					
C1106.CMSC01	C1: Complete New Concession at Concourse Level GL 2-4	0		10-Dec-13	0%
C1106.CMSC02	C2: Complete Demolished Existing Concession at CC Level GL3-4 and GL13-14,Sheet Pile for lift LT-02 at Lung Poon	0		19-Dec-13	0%
Cost Centre D - Reprovisioning, Remedial and Improvement Works (RRIW)					
Completion Dates					
C1106.DMS003	D3: Complete Archaelogical Survey-Cum-Excavation & Relocation of Heritage Structure	0		04-Nov-13	0%
Cost Centre A - Preliminaries					
General Requirements					
Submissions					
General					
C1106.GS0270	Prepare & Submit Drawing Submission Schedule	28	05-Nov-13*	02-Dec-13	0%
C1106.GS0275	Review & Approve Drawing Submission Schedule	28	03-Dec-13	30-Dec-13	0%
C1106.GS0278	Prepare & Submit Preliminary ABWF Programme	28	30-Nov-13*	27-Dec-13	0%
C1106.GS0282	Review & Approve Preliminary ABWF Programme	28	28-Dec-13	24-Jan-14	0%
C1106.GS0320	1st Progress Monitoring & Programming Management System Audit - A4	90	13-Jul-13 A	11-Oct-13	90%
C1106.GS0322	1st Quality Management Audit - A5	90	12-Oct-13	09-Jan-14	0%
C1106.GS0485	Review & Approve by BD/ RDO	28	23-May-13 A	09-Oct-13	80%



Remaining Work
Baseline
Actual Work
Critical Remaining Work
Baseline Milestone
Milestone

MTR Contract 1106 - Diamond Hill Station
Three Month Rolling Programme
As of 30 September 2013

3 Month Rolling Programme			
Date	Revision	Checked	Appr...
02-Oct-13	C-1106-3MRP/ 09	RR	RB

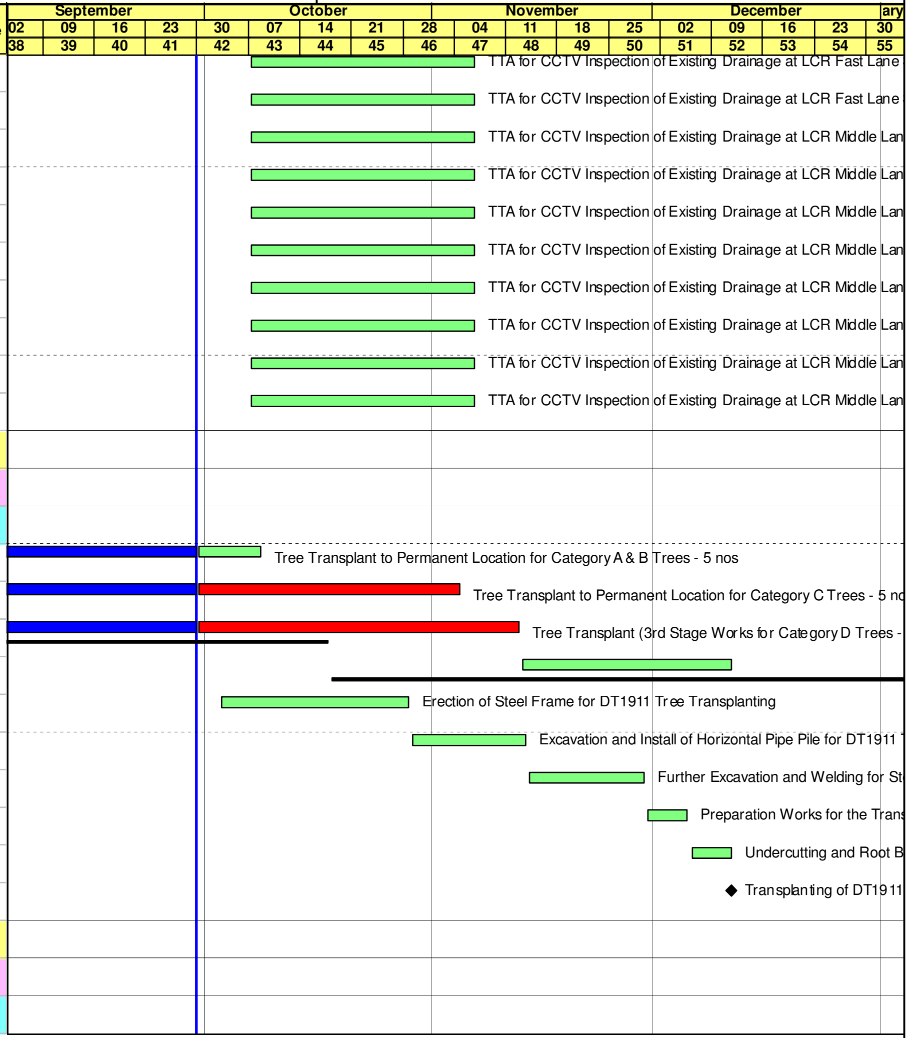
Activity ID	Activity Name	Orig Dur	Forecast Start	Forecast Finish	% Complete
C1106.GS0495	Prepare & Submitl BD BA10 Form	7	10-Oct-13	16-Oct-13	0%
C1106.GS0575	Erect and Equip Engineer's Site Office	70	17-Oct-13	09-Jan-14	0%
Cost Centre B: SCL- DIH Station, Entrances and Adits					
Design & Approval					
General					
General					
C1106.DS0585	Prepare & Submit Excavation & ELS Design, ICE Check	21	08-Aug-13 A	24-Oct-13	80%
C1106.DS0590	Review & Approve Excavation & ELS Design for the Station	40	25-Oct-13	10-Dec-13	0%
C1106.DS0595	Prepare & Submit Pumping Test Design (SCL DIH Bulk Excavation)	21	29-Nov-13	23-Dec-13	0%
C1106.DS0600	Review & Approve Pumping Test Design (SCL DIH Bulk Excavation)	25	24-Dec-13	24-Jan-14	0%
TTMS Implementation					
Submissions					
TTM Submission					
C1106.TMS0297	Review & Approve TTM Drawings for Temp. Lung Cheung Road Diversion (Stages 4)	25	23-Aug-13 A	24-Sep-13 A	100%
C1106.TMS0310	Prepare & Submit Construction Traffic Impact Assessment (CTIA) with Contingency Plan	21	09-Oct-13*	29-Oct-13	0%
C1106.TMS0320	MTR Review for Endorsement to Trabsport Department (TD)	28	30-Oct-13	26-Nov-13	0%
C1106.TMS0325	Review & Approval of TTMS at Lung Cheung Road by Transport Department	60	27-Nov-13	25-Jan-14	0%
Lung Cheung Road					
TTA Implementation					
C1106.TMS0380	TTA for Installation of Instrumentation at Lung Cheung Road (SLG/1106/006/DIH/004/001A)	12	26-Sep-13 A	07-Oct-13	20%
C1106.TMS0385	TTA for Trial Pit Excavation for Locating Existing CLP Cables at LCR Footpath (SLG/1106/013/DIH/001/001A)	11	08-Oct-13	18-Oct-13	0%
C1106.TMS0390	TTA for Trial Pit Excavation for Locating Existing Water Mains at LCR Footpath (SLG/1106/013/DIH/003/001A)	12	21-Oct-13	01-Nov-13	0%
C1106.TMS0395	TTA for CCTV Inspection of Existing Drainage at LCR Fast Lane Stage 1 (SLG/1106/014/DIH/004/001A)	31	07-Oct-13*	06-Nov-13	0%
C1106.TMS0400	TTA for CCTV Inspection of Existing Drainage at LCR Fast Lane Stage 1 (SLG/1106/014/DIH/004/002A)	31	07-Oct-13	06-Nov-13	0%
C1106.TMS0405	TTA for CCTV Inspection of Existing Drainage at LCR Fast Lane Stage 2 (SLG/1106/014/DIH/005/001A)	31	07-Oct-13	06-Nov-13	0%
C1106.TMS0410	TTA for CCTV Inspection of Existing Drainage at LCR Fast Lane Stage 2 (SLG/1106/014/DIH/005/002A)	31	07-Oct-13	06-Nov-13	0%

Remaining Work
Milestone
Baseline
Actual Work
Critical Remaining Work
Baseline Milestone

MTR Contract 1106 - Diamond Hill Station
Three Month Rolling Programme
As of 30 September 2013

3 Month Rolling Programme			
Date	Revision	Checked	Appr...
02-Oct-13	C-1106-3MRP/ 09	RR	RB

Activity ID	Activity Name	Orig Dur	Forecast Start	Forecast Finish	% Complete
C1106.TMS0415	TTA for CCTV Inspection of Existing Drainage at LCR Fast Lane Stage 3 (SLG/1106/014/DIH/006/001A)	31	07-Oct-13	06-Nov-13	0%
C1106.TMS0420	TTA for CCTV Inspection of Existing Drainage at LCR Fast Lane Stage 3 (SLG/1106/014/DIH/006/002A)	31	07-Oct-13	06-Nov-13	0%
C1106.TMS0425	TTA for CCTV Inspection of Existing Drainage at LCR Middle Lane Stage 1 (SLG/1106/014/DIH/007/001A)	31	07-Oct-13	06-Nov-13	0%
C1106.TMS0430	TTA for CCTV Inspection of Existing Drainage at LCR Middle Lane Stage 1 (SLG/1106/014/DIH/007/002A)	31	07-Oct-13	06-Nov-13	0%
C1106.TMS0435	TTA for CCTV Inspection of Existing Drainage at LCR Middle Lane Stage 2 (SLG/1106/014/DIH/008/001A)	31	07-Oct-13	06-Nov-13	0%
C1106.TMS0440	TTA for CCTV Inspection of Existing Drainage at LCR Middle Lane Stage 2 (SLG/1106/014/DIH/008/002A)	31	07-Oct-13	06-Nov-13	0%
C1106.TMS0445	TTA for CCTV Inspection of Existing Drainage at LCR Middle Lane Stage 3 (SLG/1106/014/DIH/009/001A)	31	07-Oct-13	06-Nov-13	0%
C1106.TMS0450	TTA for CCTV Inspection of Existing Drainage at LCR Middle Lane Stage 3 (SLG/1106/014/DIH/009/002A)	31	07-Oct-13	06-Nov-13	0%
C1106.TMS0455	TTA for CCTV Inspection of Existing Drainage at LCR Middle Lane Stage 4 (SLG/1106/014/DIH/010/001A)	31	07-Oct-13	06-Nov-13	0%
C1106.TMS0460	TTA for CCTV Inspection of Existing Drainage at LCR Middle Lane Stage 4 (SLG/1106/014/DIH/010/001A)	31	07-Oct-13	06-Nov-13	0%
Tree Feeling / Transplanting					
General					
Tree Transplanting					
C1106.BTP1425	Tree Transplant to Permanent Location for Category A & B Trees - 5 nos	30	04-Jun-13 A	08-Oct-13	90%
C1106.BTP1480	Tree Transplant to Permanent Location for Category C Trees - 5 nos	53	26-Jun-13 A	04-Nov-13	70%
C1106.BTP1525	Tree Transplant (3rd Stage Works for Category D Trees - 2 nos.)	70	21-Jul-13 A	12-Nov-13	60%
C1106.BTP1530	Tree Transplant to Permanent Location for Category D Trees - 2 nos	25	13-Nov-13	11-Dec-13	0%
C1106.BTP1535	Erection of Steel Frame for DT1911 Tree Transplanting	21	03-Oct-13*	28-Oct-13	0%
C1106.BTP1540	Excavation and Install of Horizontal Pipe Pile for DT1911 Tree	14	29-Oct-13	13-Nov-13	0%
C1106.BTP1545	Further Excavation and Welding for Steel Universal Beam & Structural Frame Member	14	14-Nov-13	29-Nov-13	0%
C1106.BTP1550	Preparation Works for the Transplanting of DT1911 Tree	5	30-Nov-13	05-Dec-13	0%
C1106.BTP1555	Undercutting and Root Ball Preparation for DT1911 Tree Transplanting	5	06-Dec-13	11-Dec-13	0%
C1106.BTP1560	Transplanting of DT1911 Tree to Receptor Site	0		11-Dec-13	0%
Diaphragm Wall & Foundation Works					
DIH (SCL) Gridline 39 - 49					
Station Cofferdam					



Remaining Work
Baseline
Actual Work
Critical Remaining Work
Baseline Milestone
Milestone

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Three Month Rolling Programme
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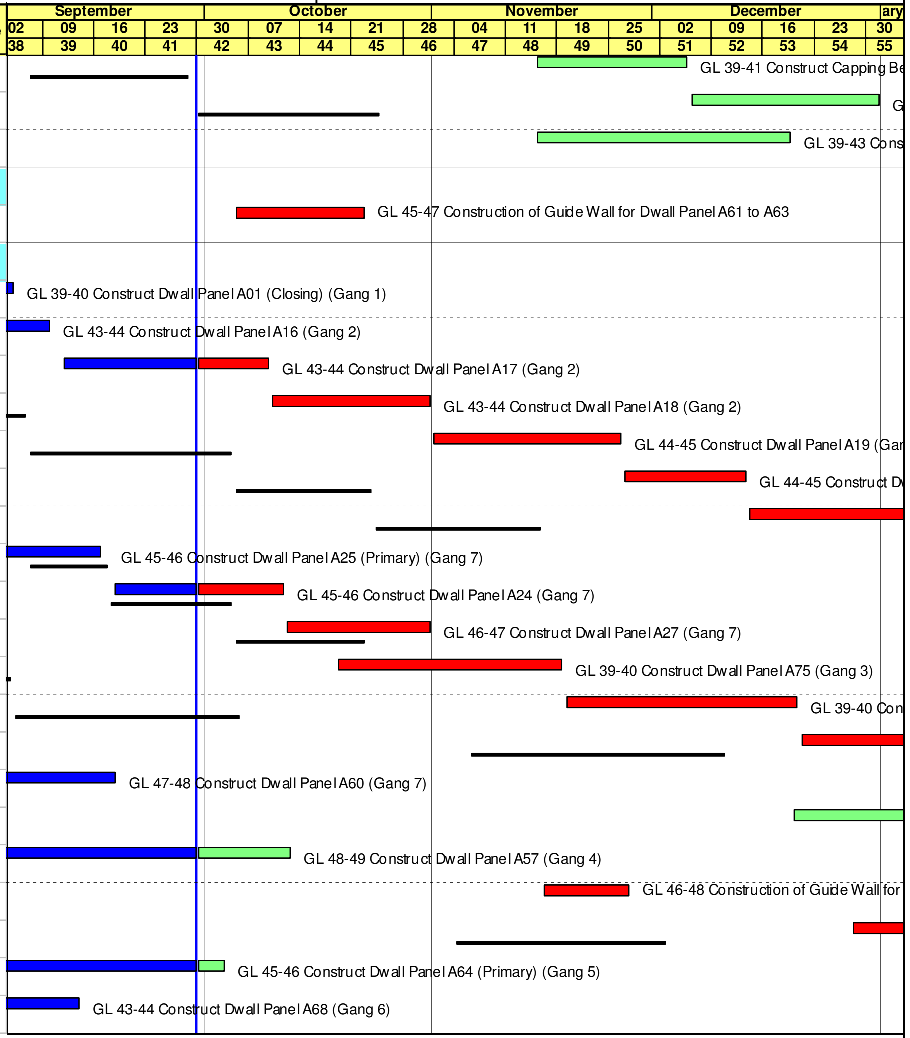
Contract 1106 - Diamond Hill Station

MTR

Sembawang - Leader Joint Venture

Activity ID	Activity Name	Orig Dur	Forecast Start	Forecast Finish	% Complete
C1106.BDW4120	GL 39-41 Construct Capping Beam (A01-A07, 24m) at +8.270mPD & Dwall Grouting	18	15-Nov-13*	05-Dec-13	0%
C1106.BDW4125	GL 41-44 Construct Capping Beam (A08-A16, 29m) at +8.27mPD & Dwall Grouting	20	06-Dec-13	31-Dec-13	0%
C1106.BDW4435	GL 39-43 Construct Capping Beam (A70-A76, 43m) at +7.70mPD & Dwall Grouting	30	15-Nov-13*	19-Dec-13	0%
Guidewall					
C1106.BDW4635	GL 45-47 Construction of Guide Wall for Dwall Panel A61 to A63	14	05-Oct-13*	22-Oct-13	0%
Dwall Construction					
C1106.BDW4027	GL 39-40 Construct Dwall Panel A01 (Closing) (Gang 1)	14	15-Aug-13 A	05-Sep-13 A	100%
C1106.BDW4060	GL 43-44 Construct Dwall Panel A16 (Gang 2)	20	08-Aug-13 A	10-Sep-13 A	100%
C1106.BDW4065	GL 43-44 Construct Dwall Panel A17 (Gang 2)	14	12-Sep-13 A	09-Oct-13	60%
C1106.BDW4070	GL 43-44 Construct Dwall Panel A18 (Gang 2)	18	10-Oct-13	31-Oct-13	0%
C1106.BDW4075	GL 44-45 Construct Dwall Panel A19 (Gang 2)	22	01-Nov-13	26-Nov-13	0%
C1106.BDW4082	GL 44-45 Construct Dwall Panel A20 (Closing (Gang 2)	15	27-Nov-13	13-Dec-13	0%
C1106.BDW4095	GL 44-45 Construct Dwall Panel A21 (Gang 2)	21	14-Dec-13	10-Jan-14	0%
C1106.BDW4110	GL 45-46 Construct Dwall Panel A25 (Primary) (Gang 7)	16	23-Aug-13 A	17-Sep-13 A	100%
C1106.BDW4112	GL 45-46 Construct Dwall Panel A24 (Gang 7)	16	19-Sep-13 A	11-Oct-13	40%
C1106.BDW4113	GL 46-47 Construct Dwall Panel A27 (Gang 7)	16	12-Oct-13	31-Oct-13	0%
C1106.BDW4470	GL 39-40 Construct Dwall Panel A75 (Gang 3)	26	19-Oct-13*	18-Nov-13	0%
C1106.BDW4480	GL 39-40 Construct Dwall Panel A76 (Interface) (Gang 3)	28	19-Nov-13	20-Dec-13	0%
C1106.BDW4640	GL 46-47 Construct Dwall Panel A61 (Gang 3)	35	21-Dec-13	06-Feb-14	0%
C1106.BDW4650	GL 47-48 Construct Dwall Panel A60 (Gang 7)	40	25-Jul-13 A	19-Sep-13 A	100%
C1106.BDW4655	GL 48-49 Construct Dwall Panel A58 (Gang 4)	35	20-Dec-13	05-Feb-14	0%
C1106.BDW4660	GL 48-49 Construct Dwall Panel A57 (Gang 4)	27	06-Aug-13 A	12-Oct-13	80%
C1106.BDW4712	GL 46-48 Construction of Guide Wall for Dwall Panel A28 to A32	10	16-Nov-13	27-Nov-13	0%
C1106.BDW4725	GL 46-47 Construct Dwall Panel A29 (Primary) (Gang 5)	18	28-Dec-13	18-Jan-14	0%
C1106.BDW4763	GL 45-46 Construct Dwall Panel A64 (Primary) (Gang 5)	31	19-Jul-13 A	03-Oct-13	95%
C1106.BDW4785	GL 43-44 Construct Dwall Panel A68 (Gang 6)	20	20-Jul-13 A	14-Sep-13 A	100%



Remaining Work

Baseline

Actual Work

Critical Remaining Work

Baseline Milestone

◆ Milestone

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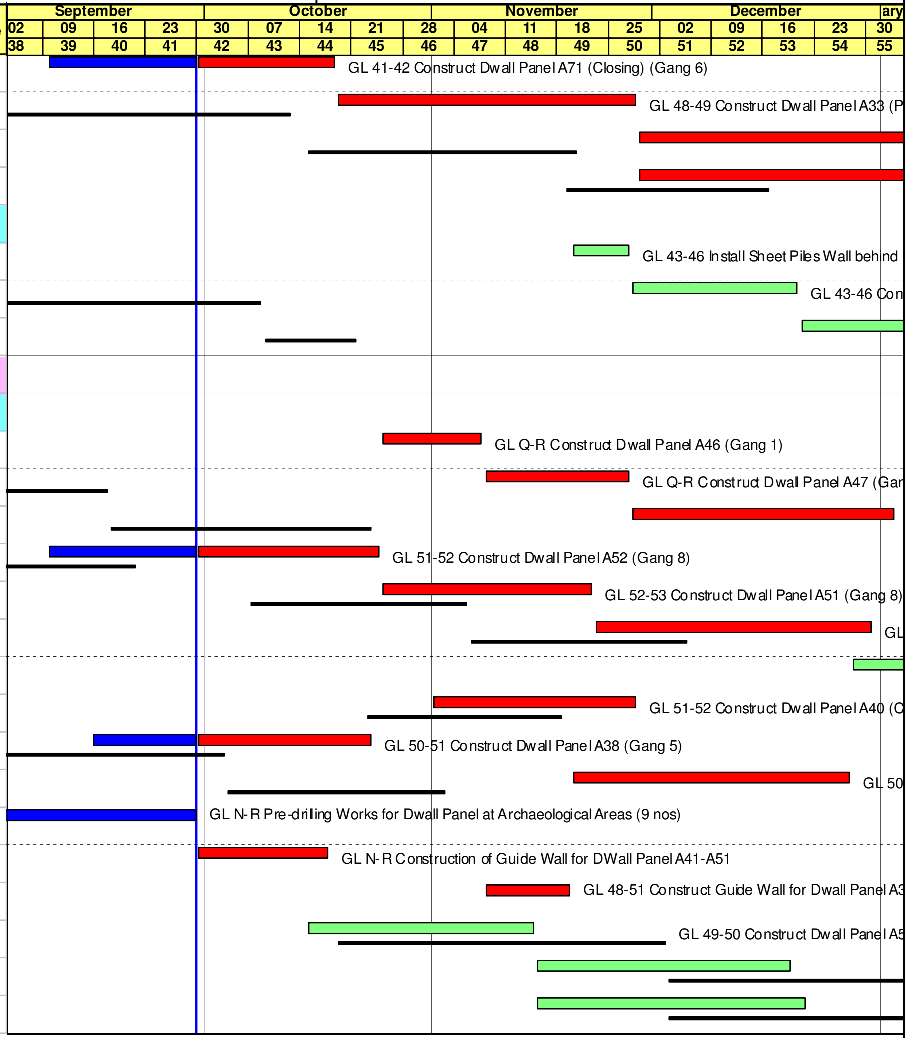
Sembawang - Leader Joint Venture

Activity ID	Activity Name	Orig Dur	Forecast Start	Forecast Finish	% Complete
C1106.BDW4790	GL 41-42 Construct Dwall Panel A71 (Closing) (Gang 6)	29	10-Sep-13 A	18-Oct-13	50%
C1106.BDW4793	GL 48-49 Construct Dwall Panel A33 (Primary) (Gang 6)	35	19-Oct-13	28-Nov-13	0%
C1106.BDW4796	GL 48-49 Construct Dwall Panel A34 (Gang 6)	35	29-Nov-13	11-Jan-14	0%
C1106.BDW4808	GL 44-46 Construct Dwall Panel A65 (Closing) (Gang 7)	31	29-Nov-13	07-Jan-14	0%
Capping Beam & Sheet Pile					
C1106.BDW4810	GL 43-46 Install Sheet Piles Wall behind Diaphragm Wall A17-28 (49m)	7	20-Nov-13*	27-Nov-13	0%
C1106.BDW4820	GL 43-46 Construct Capping Beam (A17-A28, 49m) at +10.0mPD & Dwall Grouting	20	28-Nov-13	20-Dec-13	0%
C1106.BDW4835	GL 50-47 Install Sheet Piles Wall behind Diaphragm Wall A56-65 (63m)	10	21-Dec-13	04-Jan-14	0%
DIH (SCL) Gridline 49 - 53					
Station Cofferdam					
C1106.BDW4042	GL Q-R Construct Dwall Panel A46 (Gang 1)	12	25-Oct-13	07-Nov-13	0%
C1106.BDW4047	GL Q-R Construct Dwall Panel A47 (Gang 1)	17	08-Nov-13	27-Nov-13	0%
C1106.BDW4052	GL Q-R Construct Dwall Panel A45 (Gang 1)	28	28-Nov-13	02-Jan-14	0%
C1106.BDW4483	GL 51-52 Construct Dwall Panel A52 (Gang 8)	26	10-Sep-13 A	24-Oct-13	50%
C1106.BDW4485	GL 52-53 Construct Dwall Panel A51 (Gang 8)	25	25-Oct-13	22-Nov-13	0%
C1106.BDW4490	GL 52-53 Construct Dwall Panel A50 (Gang 8)	30	23-Nov-13	30-Dec-13	0%
C1106.BDW4700	GL 51-52 Construct Dwall Panel A39 (Gang 5)	20	28-Dec-13	21-Jan-14	0%
C1106.BDW4705	GL 51-52 Construct Dwall Panel A40 (Closing) (Gang 7)	24	01-Nov-13	28-Nov-13	0%
C1106.BDW4710	GL 50-51 Construct Dwall Panel A38 (Gang 5)	25	16-Sep-13 A	23-Oct-13	30%
C1106.BDW4715	GL 50-51 Construct Dwall Panel A37 (Gang 5)	31	20-Nov-13	27-Dec-13	0%
C1106.BDW4960	GL N-R Pre-drilling Works for Dwall Panel at Archaeological Areas (9 nos)	14	28-Aug-13 A	30-Sep-13 A	100%
C1106.BDW5315	GL N-R Construction of Guide Wall for DWall Panel A41-A51	14	30-Sep-13	17-Oct-13	0%
C1106.BDW5317	GL 48-51 Construct Guide Wall for Dwall Panel A33 to A37	10	08-Nov-13*	19-Nov-13	0%
C1106.BDW5325	GL 49-50 Construct Dwall Panel A56 (Gang 4)	27	15-Oct-13	14-Nov-13	0%
C1106.BDW5340	GL 49-50 Construct Dwall Panel A55 (Gang 4)	30	15-Nov-13	19-Dec-13	0%
C1106.BDW5350	GL N-R Install Sheet Piles Wall behind Diaphragm Wall A41-A50 (53m)	32	15-Nov-13	21-Dec-13	0%



Remaining Work
Baseline
Actual Work
Critical Remaining Work
Baseline Milestone
Milestone

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Sembawang - Leader Joint Venture

Activity ID	Activity Name	Orig Dur	Forecast Start	Forecast Finish	% Complete
C1106.BDW5365	GL 48-50 Install Sheet Piles Wall behind Diaphragm Wall A32-37 (37m)	8	23-Dec-13	03-Jan-14	0%
DIH (SCL) Gridline 35-39					
Station Cofferdam					
C1106.BDW3510	GL 35-39 Possession of Areas for Capping Beam Construction	0	23-Nov-13*		0%
C1106.BDW3515	GL 35-39 Construct Capping Beam	30	23-Nov-13	30-Dec-13	0%
DIH (SCL) Gridline 35-53					
Station Cofferdam					
C1106.BDW4850	GL 35-53 Install Instrumentation & Wells	40	15-Nov-13	03-Jan-14	0%
ABWF & Miscellaneous Works					
Manufacture & Delivery					
Delivery					
C1106.BML5963	Procure, Manufacture & Delivery ABWF Finishes	120	20-Nov-13*	16-Apr-14	0%
Construction of Interchange Adit					
Submissions					
General					
C1106.BIA6019	Amend and Resubmit Cofferdam (ELS) Design, ICE Check for Interchange Adit	30	10-Aug-13 A	30-Aug-13 A	100%
C1106.BIA6021	Cofferdam (ELS) Design for Interchange Adit received Comments from MTR	14	02-Sep-13 A	13-Sep-13 A	100%
C1106.BIA6022	Prepare & Submit Pumping Test Design for Interchange Adit	25	25-Nov-13	23-Dec-13	0%
C1106.BIA6027	Review & Approve Pumping Test Design for Interchange Adit	25	24-Dec-13	24-Jan-14	0%
C1106.BIA6031	Amend & Resubmit Cofferdam (ELS) Design, ICE Check for Interchange Adit (Rev. B)	25	16-Sep-13 A	30-Oct-13	60%
C1106.BIA6036	Engineer's Approval for ELS Design Interchanged Adit (Rev. B)	21	31-Oct-13	23-Nov-13	0%
Site Preparation					
C1106.BIA6023	Mobilize, Site Preparation & Survey	14	25-Nov-13	10-Dec-13	0%
C1106.BIA6026	Erect Hoarding & Temporary Site Access/ Access Staircase	18	11-Dec-13	03-Jan-14	0%
Construction of West Unpaid Link Adit					
Submissions					

Remaining Work | Milestone
Baseline
Actual Work
Critical Remaining Work
Baseline Milestone

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Sembawang - Leader Joint Venture

Activity ID	Activity Name	Orig Dur	Forecast Start	Forecast Finish	% Complete
General					
C1106.BWA7537	Cofferdam (ELS) Design for West Unpaid Link Adit Received Comments from MTR	14	27-Aug-13 A	05-Sep-13 A	100%
C1106.BWA7538	Amend & Resubmit Cofferdam (ELS) Design, ICE Check for West Unpaid Link (Rev. B)	25	09-Sep-13 A	30-Oct-13	70%
C1106.BWA7540	Mobilise, Site Preparation & Survey	10	31-Oct-13	11-Nov-13	0%
C1106.BWA7547	Engineer's Approval for ELS Design West Unpaid Link Adit (Rev. B)	25	31-Oct-13	28-Nov-13	0%
C1106.BWA7550	Construct Temporary Site Acces/ Access Staircase	8	12-Nov-13	20-Nov-13	0%
C1106.BWA7560	Install Instrumention & Markers	7	21-Nov-13	28-Nov-13	0%
C1106.BWA7565	Demolition of Existing Concrete Boundary Wall, Stairs, Metal Fencing & Others	10	27-Nov-13	07-Dec-13	0%
C1106.BWA7570	Prepare & Submit Pumping Test Design for West Unpaid Link	21	29-Nov-13	23-Dec-13	0%
C1106.BWA7575	Review & Approve Pumping Test Design for West Unpaid Link	25	24-Dec-13	24-Jan-14	0%
West Adit Link - South Section					
Adit Cofferdam					
C1106.BWA8260	Mobilize & Set-up for Equipment and Pre-drilling Works	7	29-Nov-13	06-Dec-13	0%
C1106.BWA8270	West Unpaid Link Adit - Install Prebored Socketed H-Pile 610mm (2 nos.)	10	07-Dec-13	18-Dec-13	0%
C1106.BWA8275	Loading Test (Compresion & Tension Test Test)	6	19-Dec-13	27-Dec-13	0%
C1106.BWA8280	West Unpaid Link Adit - Construct Barrette (2 nos.)	24	19-Dec-13	18-Jan-14	0%
Cost Centre D - Reprovisioning, Remedial and Improvement Works (RRIW)					
Preservation of Old Pillbox & RAF Hanger and Archaeological Survey-Cum-Excavation					
Submissions					
General					
C1106.DRIW439	Received Comments on Method Statement for Temp. Storage Compound for RAF Hangar	14	28-Aug-13 A	02-Sep-13 A	100%
C1106.DRIW449	Amend and Submit Method Statement for Temp. Storage Compound for RAF Hangar	21	30-Sep-13	25-Oct-13	0%
C1106.DRIW479	Engineer's Approval on Method Statement for Temp. Storage Compound for RAF Hangar	14	26-Oct-13	11-Nov-13	0%
Preservation of Old Pillbox					
General					
C1106.DRIW414	Installation of Fibre-optic sensors	8	23-Aug-13 A	31-Aug-13 A	100%

Remaining Work
Milestone
Baseline
Actual Work
Critical Remaining Work
Baseline Milestone

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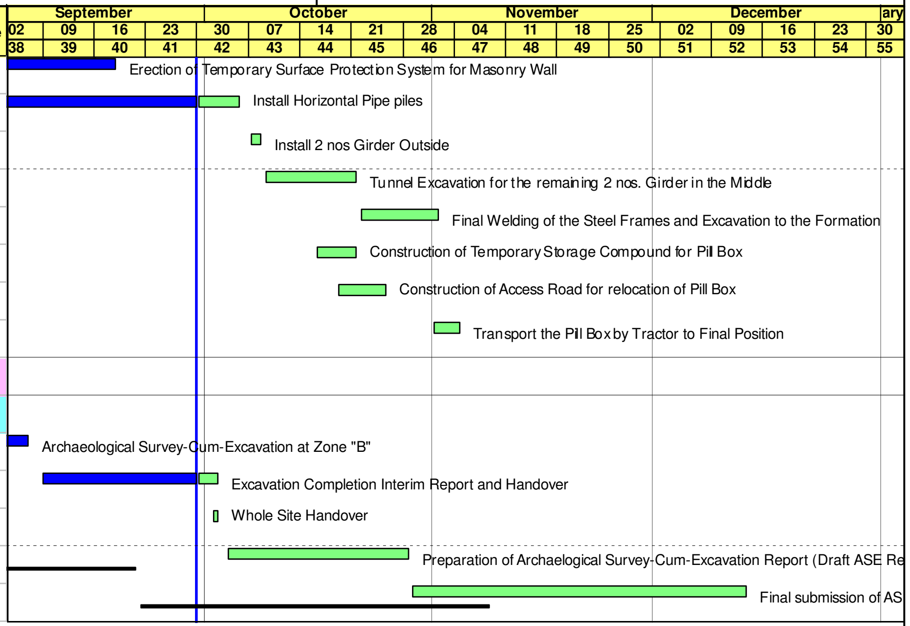
MTR

Sembawang - Leader Joint Venture

Activity ID	Activity Name	Orig Dur	Forecast Start	Forecast Finish	% Complete
C1106.DRIW416	Erection of Temporary Surface Protection System for Masonry Wall	30	20-Aug-13 A	19-Sep-13 A	100%
C1106.DRIW417	Install Horizontal Pipe piles	8	02-Sep-13 A	05-Oct-13	90%
C1106.DRIW418	Install 2 nos Girder Outside	2	07-Oct-13	08-Oct-13	0%
C1106.DRIW423	Tunnel Excavation for the remaining 2 nos. Girder in the Middle	10	09-Oct-13	21-Oct-13	0%
C1106.DRIW428	Final Welding of the Steel Frames and Excavation to the Formation	10	22-Oct-13	01-Nov-13	0%
C1106.DRIW473	Construction of Temporary Storage Compound for Pill Box	5	16-Oct-13	21-Oct-13	0%
C1106.DRIW478	Construction of Access Road for relocation of Pill Box	6	19-Oct-13	25-Oct-13	0%
C1106.DRIW480	Transport the Pill Box by Tractor to Final Position	3	01-Nov-13	04-Nov-13	0%
Archaelogical Survey					
General					
C1106.DRIW475	Archaeological Survey-Cum-Excavation at Zone "B"	21	26-Jun-13 A	07-Sep-13 A	100%
C1106.DRIW482	Excavation Completion Interim Report and Handover	7	09-Sep-13 A	02-Oct-13	90%
C1106.DRIW483	Whole Site Handover	1	02-Oct-13	02-Oct-13	0%
C1106.DRIW485	Preparation of Archaelogical Survey-Cum-Excavation Report (Draft ASE Report)	20	04-Oct-13	28-Oct-13	0%
C1106.DRIW490	Final submission of ASE Report incorporates AMO comments	46	29-Oct-13	13-Dec-13	0%



Remaining Work
Milestone
Baseline
Actual Work
Critical Remaining Work
Baseline Milestone

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APPENDIX B
ACTION AND LIMIT LEVELS

APPENDIX B – Action and Limit Levels

24-Hour TSP

Regular Dust Monitoring Location	Description	Action Level, $\mu g/m^3$	Limit Level, $\mu g/m^3$
DMS-3(1)(3)(4)/ DMS-4(2)(3)(4)/	Hong Kong Sheng Kung Hui Nursing Home	159.1	260
DMS-4(1)/ DMS-3(2)	Block 1, Rhythm Garden	160.4	

Note:
(1) ASR ID as identified in approved EM&A Manual / EIA Report for SCL(TAW-HUH).
(2) ASR ID as identified in approved EM&A Manual / EIA Report for SCL(HHS).
(3) Access to the monitoring location at Shek On House (originally proposed in the approved EM&A Manual) was denied during the baseline monitoring. An alternative location (Hong Kong S.K.H Nursing Home) was proposed and approved by the ER and agreed by the IEC and EPD.
(4) Dust monitoring on DMS-3(1)/DMS-4(2) is carried out by Environmental Team of SCL Works Contract 1103.

Construction Noise

Regular Construction Noise Monitoring Location(1)	Description	Time Period	Action Level	Limit Level
NMS-CA-3(1)(3)(4)/ NMS-CA-4(2)(3)(4)	Hong Kong Sheng Kung Hui Nursing Home	0700-1900 hrs on normal weekdays	When one documented complaint is received	75 dB(A)
NMS-CA-4(1)/ NMS-CA-3(2)	Block 1, Rhythm Garden (north-eastern façade)			75 dB(A)
NMS-CA-5 (1) (5)/ NMS-CA-2(2)(5)	Block 1, Rhythm Garden (northern façade)			65 / 70 dB(A) (6)

Note:
(1) NSR ID as identified in approved EM&A Manual / EIA Report for SCL(TAW-HUH).
(2) NSR ID as identified in approved EM&A Manual / EIA Report for SCL(HHS).
(3) Access to the monitoring location at Shek On House (originally proposed in the approved EM&A Manual) was denied during the baseline monitoring. An alternative location (Hong Kong S.K.H Nursing Home) was proposed and approved by the ER and agreed by the IEC and EPD.
(4) Noise monitoring on NMS-CA-3(1)/ NMS-CA-4(2) is carried out by Environmental Team of SCL Works Contract 1103.
(5) Access to the monitoring location at Canossa Primary School (San Po Kong) (originally proposed in the approved EM&A Manual) was denied during the baseline monitoring. An alternative location (Block 1, Rhythm Garden (northern façade)) was proposed and approved by the ER and agreed by the IEC and EPD.
(6) Daytime noise Limit Level of 70 dB(A) applies to education institutions, while 65dB(A) applies during school examination period.

APPENDIX C
CALIBRATION CERTIFICATES FOR MONITORING EQUIPEMENT

CINOTECH

High-Volume TSP Sampler
5-POINT CALIBRATION DATA SHEET

File No. MA12051/57/0003

Station: DMS-4 - Rhythm Garden, Block 1
Date: 9-Jul-13
Equipment No.: A-01-57

Operator: WK
Next Due Date: 8-Sep-13
Serial No. 2352

Ambient Condition			
Temperature, Ta (K)	301.3	Pressure, Pa (mmHg)	760.2

Orifice Transfer Standard Information					
Equipment No.:	A-04-05	Slope, mc	0.0592	Intercept, bc	-0.0283
Last Calibration Date:	26-Dec-12	$mc \times Qstd + bc = [\Delta H \times (Pa/760) \times (298/Ta)]^{1/2}$			
Next Calibration Date:	25-Dec-13	$Qstd = \{[\Delta H \times (Pa/760) \times (298/Ta)]^{1/2} - bc\} / mc$			

Calibration of TSP Sampler

Calibration Point	Orfice			HVS	
	ΔH (orifice), in. of water	$[\Delta H \times (Pa/760) \times (298/Ta)]^{1/2}$	Qstd (CFM) X - axis	ΔW (HVS), in. of	$[\Delta W \times (Pa/760) \times (298/Ta)]^{1/2}$ Y-axis
1	11.5	3.37	57.45	7.4	2.71
2	8.9	2.97	50.60	5.5	2.33
3	7.2	2.67	45.56	4.4	2.09
4	4.6	2.13	36.51	2.7	1.63
5	2.9	1.69	29.09	1.7	1.30

By Linear Regression of Y on X

Slope, mw = 0.0496 **Intercept, bw = -0.1629**

Correlation coefficient* = 0.9995

*If Correlation Coefficient < 0.990, check and recalibrate.

Set Point Calculation

From the TSP Field Calibration Curve, take Qstd = 43 CFM

From the Regression Equation, the "Y" value according to

$$mw \times Qstd + bw = [\Delta W \times (Pa/760) \times (298/Ta)]^{1/2}$$

Therefore, Set Point; $W = (mw \times Qstd + bw)^2 \times (760 / Pa) \times (Ta / 298) =$ 3.92

Remarks:

Conducted by: WK Tang Signature: Kwai Date: 9/7/13
Checked by: Ch Signature: Date: 9 July 2013

CINOTECH

High-Volume TSP Sampler
5-POINT CALIBRATION DATA SHEET

File No. MA12051/57/0004

Station: DMS-4 - Rhythm Garden, Block 1
Operator: WK
Date: 5-Sep-13
Next Due Date: 4-Nov-13
Equipment No.: A-01-57
Serial No. 2352

Ambient Condition			
Temperature, Ta (K)	297.5	Pressure, Pa (mmHg)	759.1

Orifice Transfer Standard Information					
Equipment No.:	A-04-05	Slope, mc	0.0592	Intercept, bc	-0.0283
Last Calibration Date:	26-Dec-12	$mc \times Qstd + bc = [\Delta H \times (Pa/760) \times (298/Ta)]^{1/2}$			
Next Calibration Date:	25-Dec-13	$Qstd = \{[\Delta H \times (Pa/760) \times (298/Ta)]^{1/2} - bc\} / mc$			

Calibration of TSP Sampler

Calibration Point	Orfice			HVS	
	ΔH (orifice), in. of water	$[\Delta H \times (Pa/760) \times (298/Ta)]^{1/2}$	Qstd (CFM) **X - axis**	ΔW (HVS), in. of	$[\Delta W \times (Pa/760) \times (298/Ta)]^{1/2}$ **Y-axis**
1	11.8	3.44	58.52	7.4	2.72
2	8.7	2.95	50.31	5.3	2.30
3	7.4	2.72	46.44	4.6	2.15
4	4.5	2.12	36.32	2.8	1.67
5	2.9	1.70	29.25	1.7	1.30

By Linear Regression of Y on X

Slope , mw = **0.0478** **Intercept, bw =** **-0.0820**

Correlation coefficient* = **0.9996**

*If Correlation Coefficient < 0.990, check and recalibrate.

Set Point Calculation

From the TSP Field Calibration Curve, take Qstd = 43 CFM

From the Regression Equation, the "Y" value according to

$$mw \times Qstd + bw = [\Delta W \times (Pa/760) \times (298/Ta)]^{1/2}$$

Therefore, Set Point; $W = (mw \times Qstd + bw)^2 \times (760 / Pa) \times (Ta / 298) =$ **3.89**

Remarks:

Conducted by: WK Tang Signature: Kwan Date: 5/9/13

Checked by: [illegible] Signature: [illegible] Date: 5 September 2013

TISCH ENVIROMENTAL, INC.
145 SOUTH MIAMI AVE.
VILLAGE OF CLEVES, OH 45002
513.467.9000
877.263.7610 TOLL FREE
513.467.9009 FAX
WWW.TISCH-ENV.COM

AIR POLLUTION MONITORING EQUIPMENT

ORIFICE TRANSFER STANDARD CERTIFICATION WORKSHEET TE-5025A

Date - Dec 26, 2012 Rootsmeter S/N 0438320 Ta (K) - 295
Operator Tisch Orifice I.D. - 2323 Pa (mm) - 753.11

PLATE OR Run #	VOLUME START (m3)	VOLUME STOP (m3)	DIFF VOLUME (m3)	DIFF TIME (min)	METER DIFF Hg (mm)	ORFICE DIFF H2O (in.)
1	NA	NA	1.00	1.4440	3.2	2.00
2	NA	NA	1.00	1.0240	6.4	4.00
3	NA	NA	1.00	0.9120	8.0	5.00
4	NA	NA	1.00	0.8720	8.8	5.50
5	NA	NA	1.00	0.7200	12.8	8.00

DATA TABULATION

Vstd	(x axis) Qstd	(y axis)		Va	(x axis) Qa	(y axis)
0.9967	0.6902	1.4149		0.9957	0.6896	0.8851
0.9925	0.9693	2.0010		0.9915	0.9683	1.2517
0.9903	1.0858	2.2372		0.9893	1.0847	1.3995
0.9893	1.1345	2.3464		0.9883	1.1334	1.4678
0.9840	1.3666	2.8299		0.9830	1.3652	1.7702
Qstd slope (m) =		2.09107		Qa slope (m) =		1.30939
intercept (b) =		-0.02838		intercept (b) =		-0.01775
coefficient (r) =		0.99996		coefficient (r) =		0.99996
y axis = SQRT[H2O(Pa/760)(298/Ta)]				y axis = SQRT[H2O(Ta/Pa)]		

CALCULATIONS

Vstd = Diff. Vol[(Pa-Diff. Hg)/760](298/Ta)
Qstd = Vstd/Time

Va = Diff Vol [(Pa-Diff Hg)/Pa]
Qa = Va/Time

For subsequent flow rate calculations:

Qstd = 1/m{[SQRT(H2O(Pa/760)(298/Ta))] - b}
Qa = 1/m{[SQRT H2O(Ta/Pa)] - b}

WELLAB Testing & Research 匯力

WELLAB LIMITED
Rms 816, 1516 & 1701, Technology Park,
18 On Lai Street, Shatin, N.T, Hong Kong.
Tel: 2898 7388 Fax: 2898 7076
Website: www.wellab.com.hk

TEST REPORT

APPLICANT:	**Cinotech Consultants Limited Room 1710, Technology Park, 18 On Lai Street, Shatin, NT, Hong Kong**	Test Report No.: Date of Issue: Date Received: Date Tested: Date Completed: Next Due Date:	C/N/130830/2 2013-08-31 2013-08-30 2013-08-30 2013-08-31 2014-08-30
ATTN:	**Mr. W.K. Tang**	Page:	1 of 1

Certificate of Calibration

Item for calibration:

Description	: 'SVANTEK' Integrating Sound Level Meter
Manufacturer	: SVANTEK
Model No.	: SVAN 957
Serial No.	: 21459
Microphone No.	: 43676
Equipment No.	: N-08-08

Test conditions:

Room Temperatre	: 21 degree Celsius
Relative Humidity	: 69%

Test Specifications:

Performance checking at 94 and 114 dB

Methodology:

In-house method, according to manufacturer instruction manual

Results:

Reference Set Point, dB	Instrument Readings, dB
94	94.0
114	114.0

PREPARED AND CHECKED BY:
For and On Behalf of **WELLAB Ltd.**

Patrick Tse

PATRICK TSE
Laboratory Manager

WELLAB 滙力
Testing & Research

WELLAB LIMITED
Rms 816, 1516 & 1701, Technology Park,
18 On Lai Street, Shatin, N.T, Hong Kong.
Tel: 2898 7388 Fax: 2898 7076
Website: www.wellab.com.hk

TEST REPORT

APPLICANT: **Cinotech Consultants Limited**
Room 1710, Technology Park,
18 On Lai Street,
Shatin, NT, Hong Kong

Test Report No.:	C/N/120921/1
Date of Issue:	2012-09-22
Date Received:	2012-09-21
Date Tested:	2012-09-21
Date Completed:	2012-09-22
Next Due Date:	2013-09-21

ATTN: **Mr. W.K. Tang**

Page: 1 of 1

Item for calibration:

Description	: Acoustical Calibrator
Manufacturer	: SVANTEK
Model No.	: SV30A
Serial No.	: 10929
Equipment No.	: N-09-01

Test conditions:

Room Temperatre	: 24 degree Celsius
Relative Humidity	: 56%

Methodology:

The Sound Level Calibrator has been calibrated in accordance with the documented procedures and using standard(s) and instrument(s) which are recommended by the manufacturer, or equivalent.

Results:

Sound Pressure Level (1kHz)	Measured SPL	Tolerance
At 94 dB SPL	94.0	94.0 ± 0.1 dB
At 114 dB SPL	114.0	114.0 ± 0.1 dB

PREPARED AND CHECKED BY:
For and On Behalf of **WELLAB Ltd.**

Patrick Tse

PATRICK TSE
Laboratory Manager

WELLAB 匯力
Testing & Research

WELLAB LIMITED
Rms 816, 1516 & 1701, Technology Park,
18 On Lai Street, Shatin, N.T, Hong Kong.
Tel: 2898 7388 Fax: 2898 7076
Website: www.wellab.com.hk

TEST REPORT

APPLICANT: **Cinotech Consultants Limited**
Room 1710, Technology Park,
18 On Lai Street,
Shatin, NT, Hong Kong

Test Report No.:	C/N/121005/2
Date of Issue:	2012-10-07
Date Received:	2012-10-05
Date Tested:	2012-10-05
Date Completed:	2012-10-07
Next Due Date:	2013-10-06

ATTN: **Mr. W.K. Tang**

Item for calibration:

Description : Acoustical Calibrator
Manufacturer : SVANTEK
Model No. : SV30A
Serial No. : 24791
Equipment No. : N-09-04

Test conditions:

Room Temperatre : 23 degree Celsius
Relative Humidity : 64%

Methodology:

The Sound Level Calibrator has been calibrated in accordance with the documented procedures and using standard(s) and instrument(s) which are recommended by the manufacturer, or equivalent.

Results:

Sound Pressure Level (1kHz)	Measured SPL	Tolerance
At 94 dB SPL	94.0	94.0 ± 0.1 dB
At 114 dB SPL	114.0	114.0 ± 0.1 dB

PREPARED AND CHECKED BY:
For and On Behalf of **WELLAB Ltd.**

Patrick Tse

PATRICK TSE
Laboratory Manager

APPENDIX D
IMPACT MONITORING SCHEDULE

Shatin to Central Link – Contract 1106 Diamond Hill Station
Impact Air Quality and Noise Monitoring Schedule for September 2013

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
1-Sep	2-Sep	3-Sep	4-Sep	5-Sep	6-Sep	7-Sep
			24 hr TSP	Noise		
8-Sep	9-Sep	10-Sep	11-Sep	12-Sep	13-Sep	14-Sep
		24 hr TSP	Noise			
15-Sep	16-Sep	17-Sep	18-Sep	19-Sep	**20-Sep**	21-Sep
	24 hr TSP	Noise				24 hr TSP
22-Sep	23-Sep	24-Sep	25-Sep	26-Sep	27-Sep	28-Sep
	Noise				24 hr TSP	
29-Sep	30-Sep					

Air Quality Monitoring Station

DMS-4: - Rhythm Garden, Block 1

Noise Monitoring Station

NMS-CA-4: - Block 1, Rhythm Garden (north-eastern façade)
NMS-CA-5: - Block 1, Rhythm Garden (northern façade)

Shatin to Central Link – Contract 1106 Diamond Hill Station
Tentative Impact Air Quality and Noise Monitoring Schedule for October 2013

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
		1-Oct	2-Oct	3-Oct	4-Oct	5-Oct
				24 hr TSP	Noise	
6-Oct	7-Oct	8-Oct	9-Oct	10-Oct	11-Oct	12-Oct
			24 hr TSP	Noise		
13-Oct	14-Oct	15-Oct	16-Oct	17-Oct	18-Oct	19-Oct
		24 hr TSP	Noise			
20-Oct	21-Oct	22-Oct	23-Oct	24-Oct	25-Oct	26-Oct
	24 hr TSP	Noise				24 hr TSP
27-Oct	28-Oct	29-Oct	30-Oct	31-Oct		
	Noise					

The schedule may be changed due to unforeseen circumstances (adverse weather, etc)

Air Quality Monitoring Station

DMS-4: - Rhythm Garden, Block 1

Noise Monitoring Station

NMS-CA-4: - Block 1, Rhythm Garden (north-eastern façade)
NMS-CA-5: - Block 1, Rhythm Garden (northern façade)

APPENDIX E
24-HOUR TSP MONITORING RESULTS AND GRAPHICAL PRESENTATIONIS

Appendix E - 24-hour TSP Monitoring Results

Location DMS-4(1)/DMS-3(2) - Rhythm Garden, Block 1

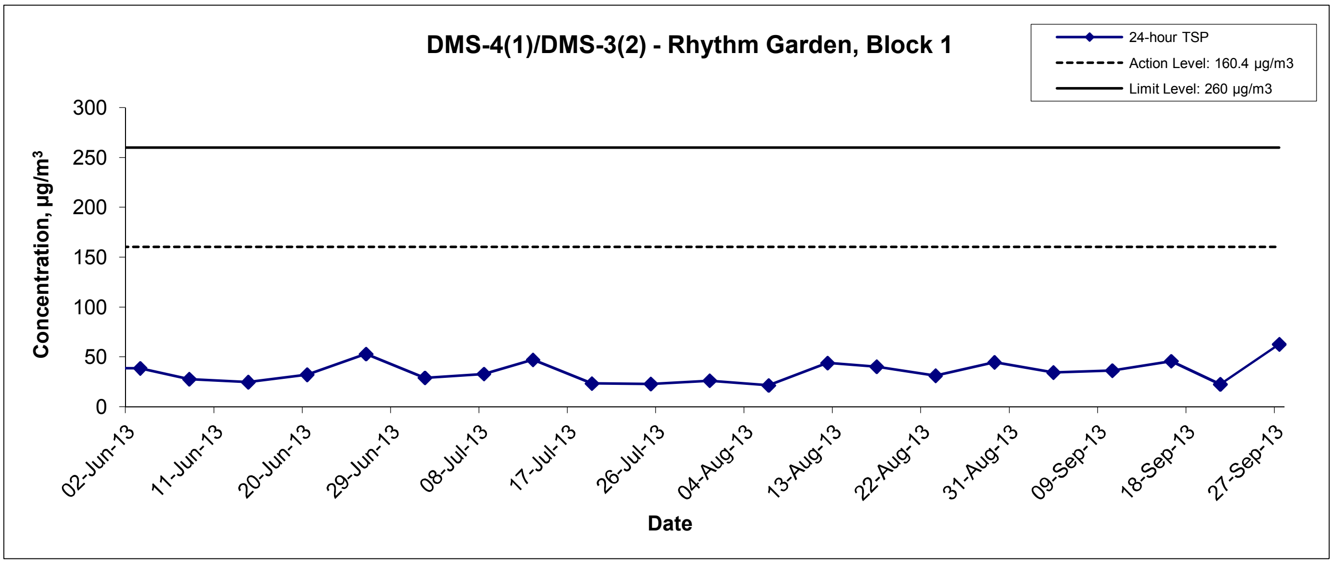
Sampling Date	Start Time	Weather Condition	Air Temp. (K)	Atmospheric Pressure, Pa (mmHg)	Filter Weight (g)		Particulate weight (g)	Elapse Time		Sampling Time(hrs.)	Flow Rate (m^3/min.)		Av. flow (m^3/min)	Total vol. (m^3)	Conc. (μg/m^3)
					Initial	Final		Initial	Final		Initial	Final			
4-Sep-13	Cloudy	Cloudy	297.7	759.2	3.8074	3.8677	0.0603	1553.9	1577.9	24.0	1.22	1.22	1.22	1756.3	34.3
10-Sep-13	Sunny	Cloudy	301.3	761.1	3.6827	3.7460	0.0633	1577.9	1601.9	24.0	1.21	1.21	1.21	1745.5	36.3
16-Sep-13	Sunny	Cloudy	301.5	758.5	3.7121	3.7918	0.0797	1601.9	1625.9	24.0	1.21	1.21	1.21	1742.1	45.7
21-Sep-13	Cloudy	Cloudy	302.9	754.2	3.7110	3.7500	0.0390	1625.9	1649.9	24.0	1.20	1.20	1.20	1733.5	22.5
27-Sep-13	Cloudy	Sunny	299.1	761.8	3.6173	3.7270	0.1097	1649.9	1673.9	24.0	1.22	1.22	1.22	1752.5	62.6
														Min	22.5
														Max	62.6
														Average	40.3

Remarks:

(1) ASR ID as identified in approved EM&A Manual / EIA Report for SCL(TAW-HUH).

(2) ASR ID as identified in approved EM&A Manual / EIA Report for SCL(HHS).

24-hour TSP Concentration Levels



Remarks:

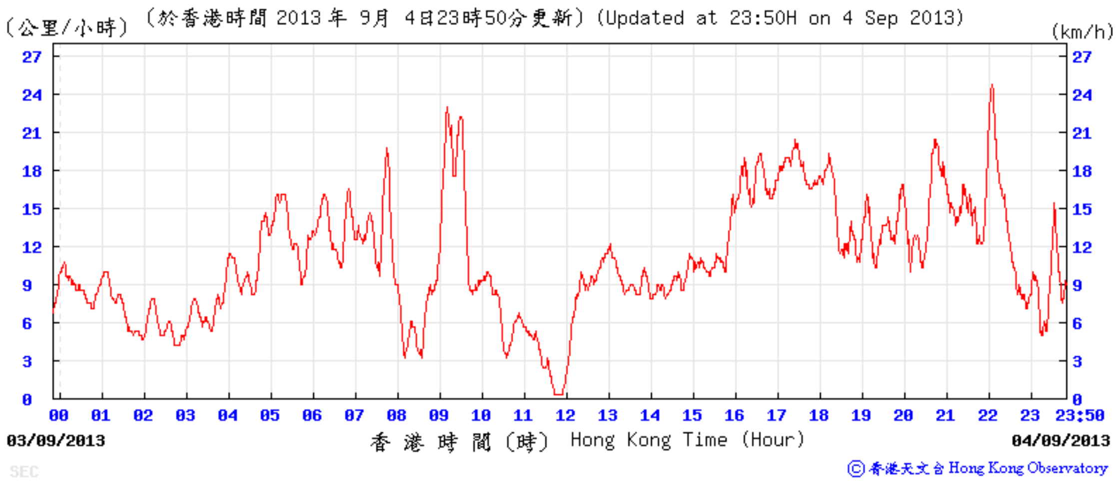
(1) ASR ID as identified in approved EM&A Manual / EIA Report for SCL(TAW-HUH).

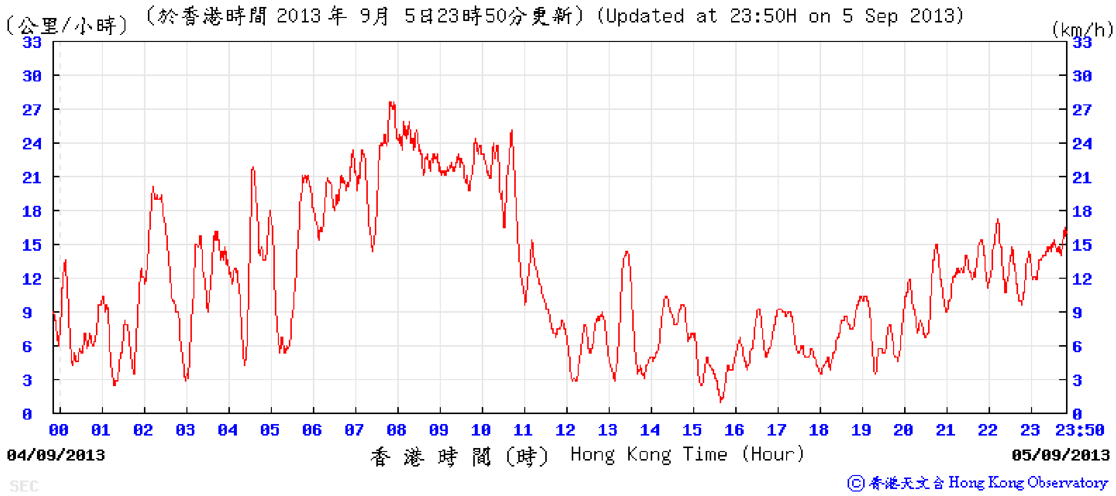
(2) ASR ID as identified in approved EM&A Manual / EIA Report for SCL(HHS).

Title	Scale	Project No.	
Shatin to Central Link – Contract 1106 Diamond Hill Station Graphical Presentation of 24-hour TSP Monitoring Results	N.T.S	MA12051	CINOTECH
	Date: Sep 13	Appendix: E	

Average wind speed obtained from the meteorological station at Kai Tak from the Hong Kong Observatory (HKO)

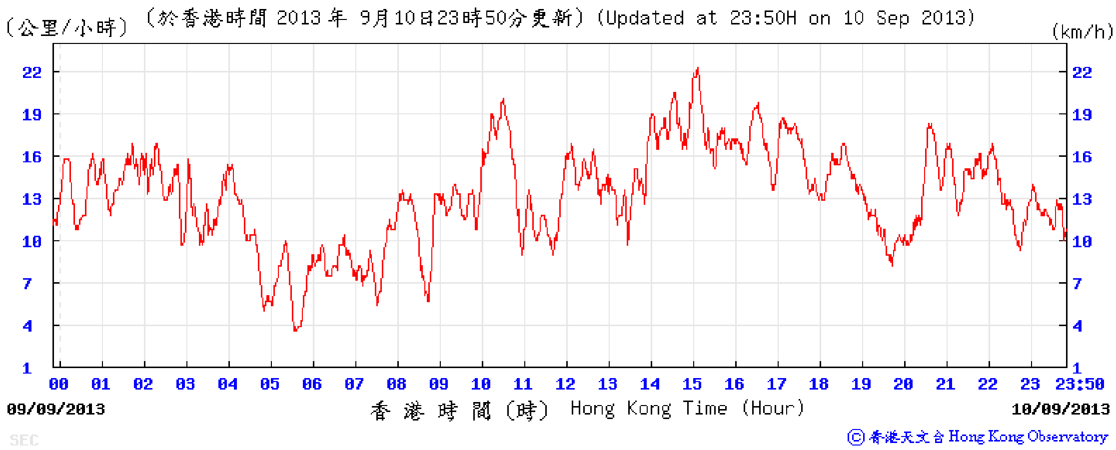
4-5 September 2013

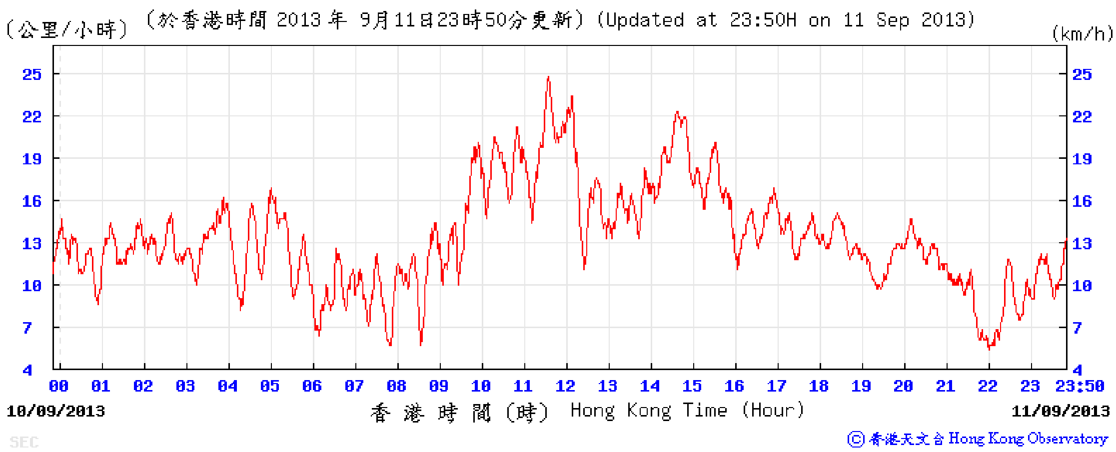




Average wind speed obtained from the meteorological station at Kai Tak from the Hong Kong Observatory (HKO)

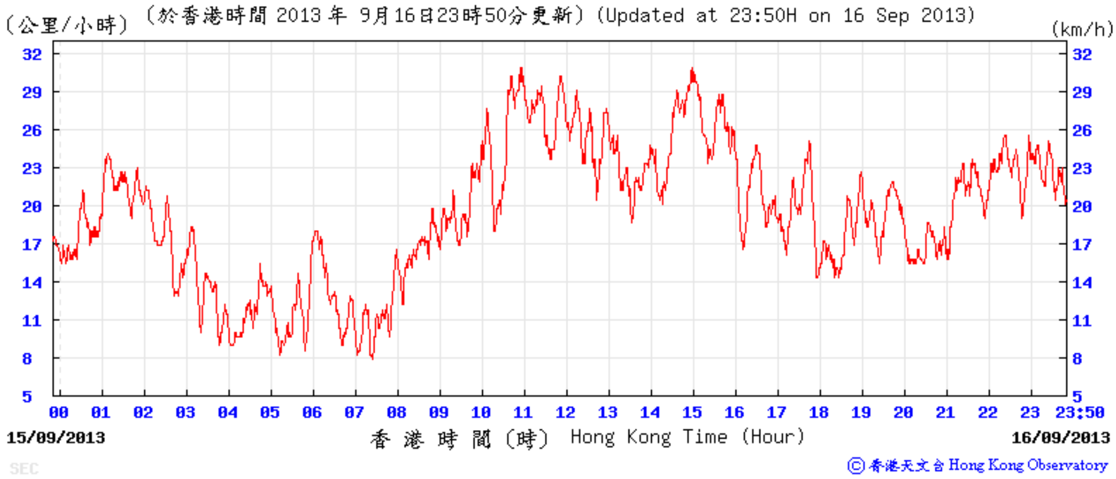
10-11 September 2013

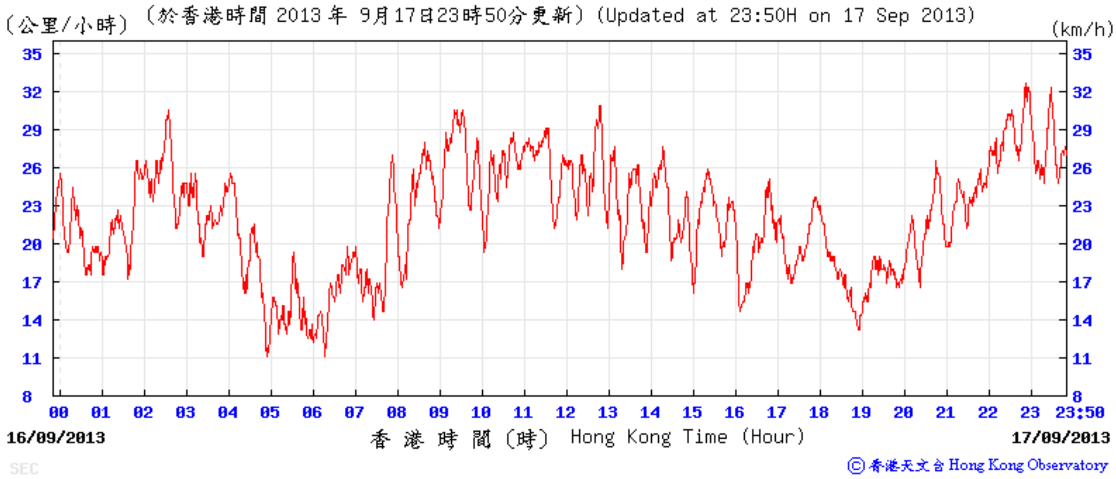




Average wind speed obtained from the meteorological station at Kai Tak from the Hong Kong Observatory (HKO)

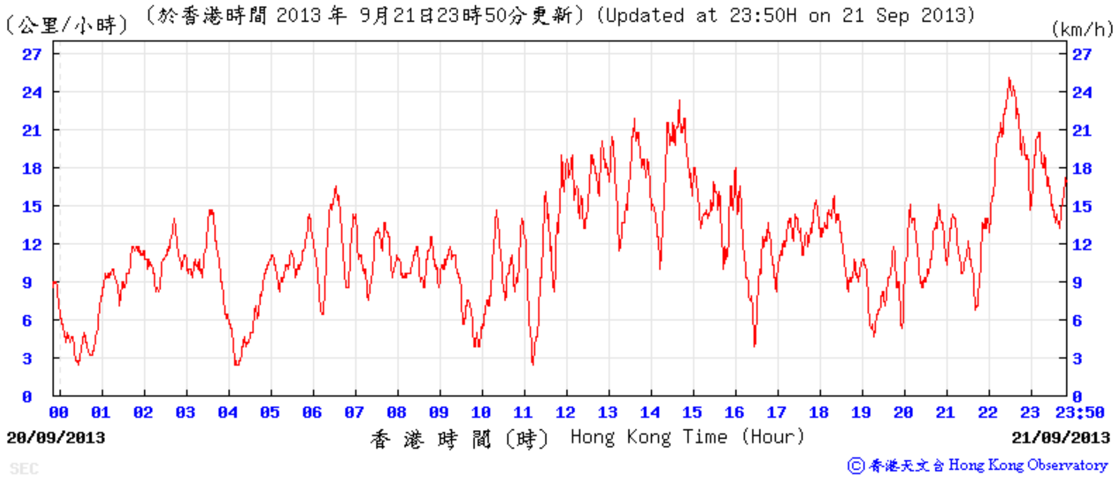
<u>16-17 September 2013</u>

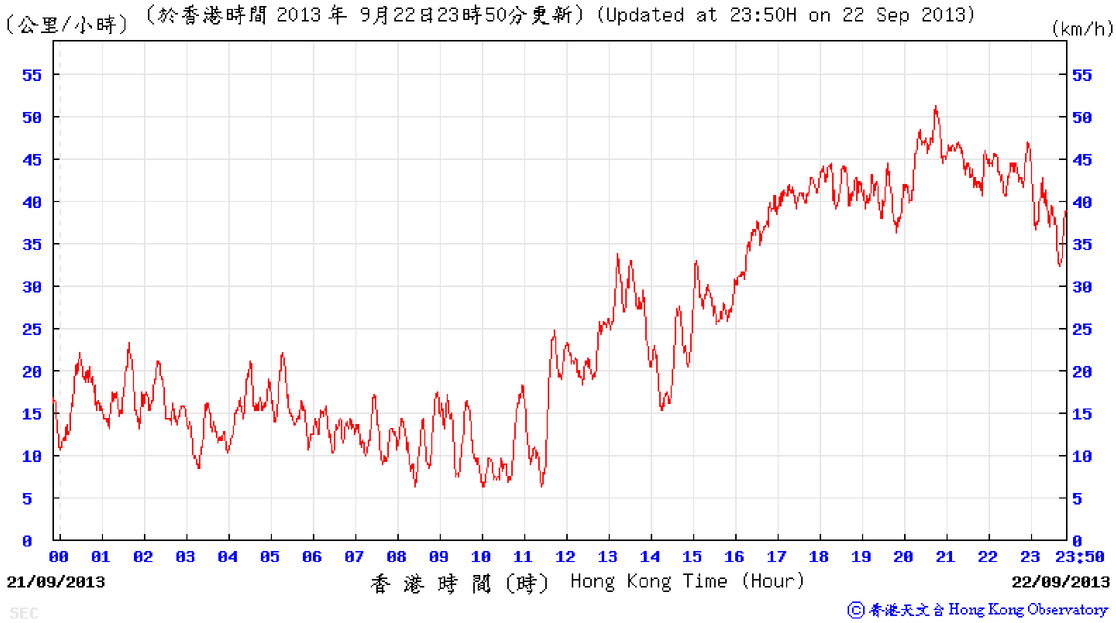




Average wind speed obtained from the meteorological station at Kai Tak from the Hong Kong Observatory (HKO)

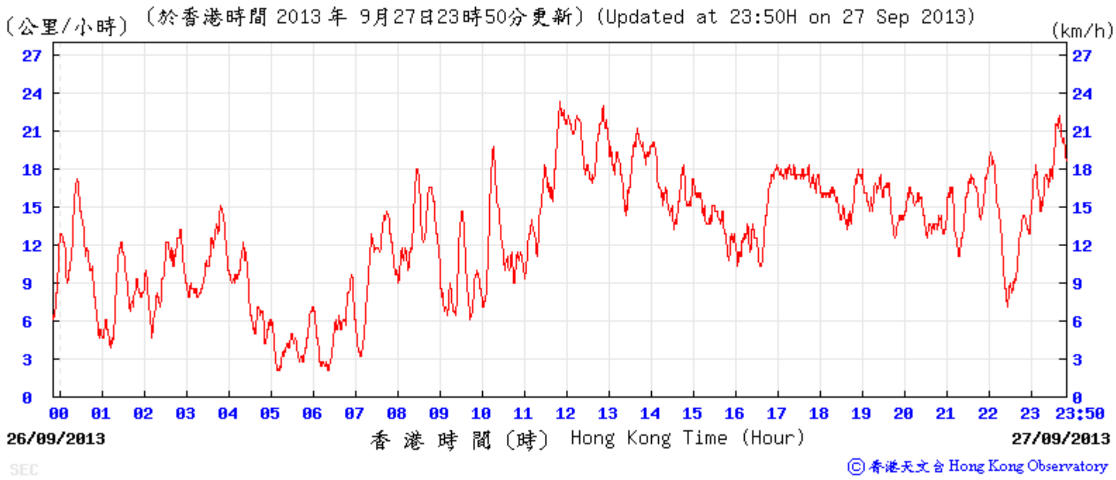
<u>21-22 September 2013</u>

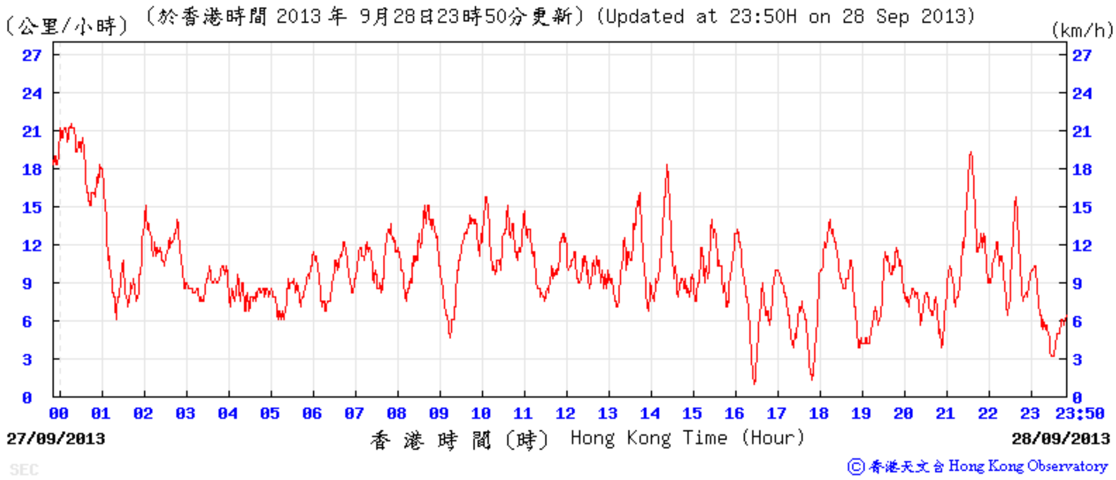




Average wind speed obtained from the meteorological station at Kai Tak from the Hong Kong Observatory (HKO)

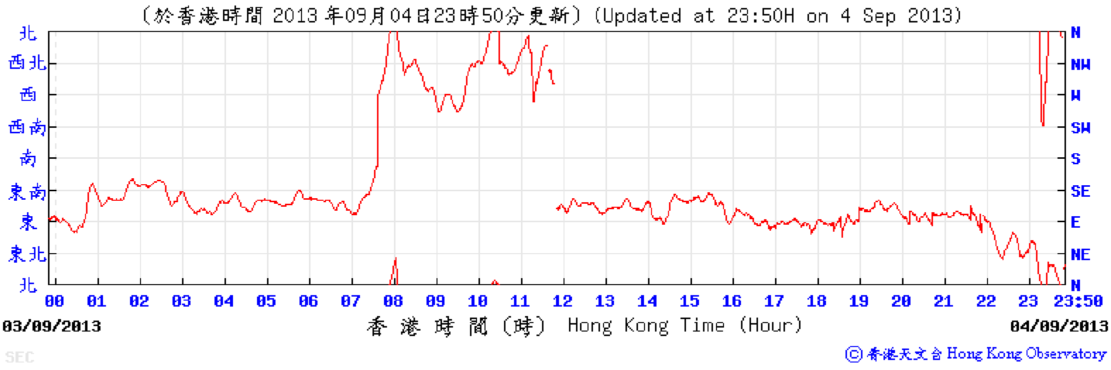
<u>27-28 September 2013</u>

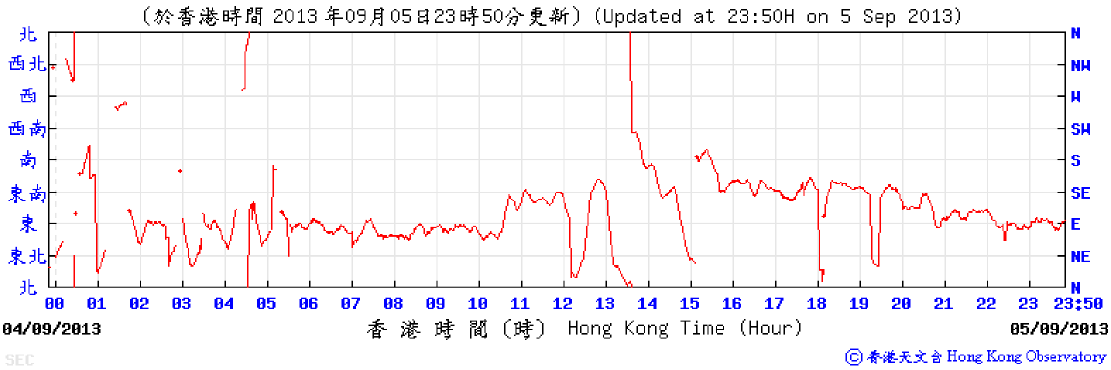




Wind direction obtained from the meteorological station at Kai Tak from the Hong Kong Observatory (HKO)

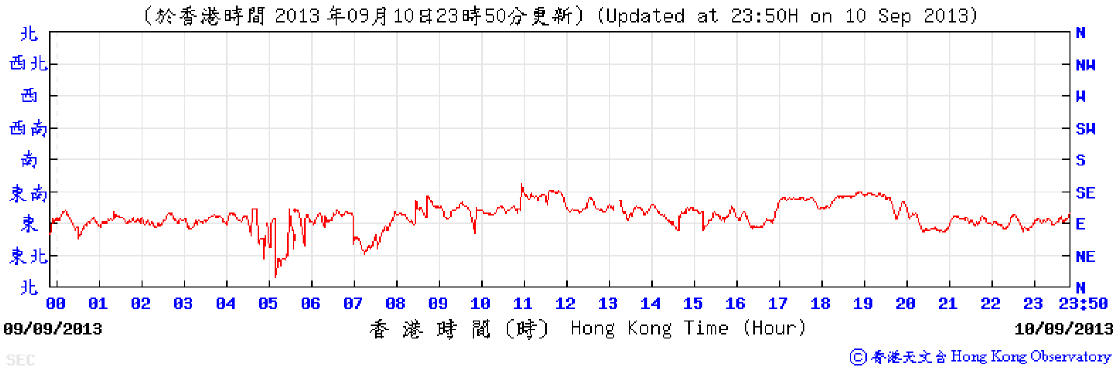
<u>4-5 September 2013</u>

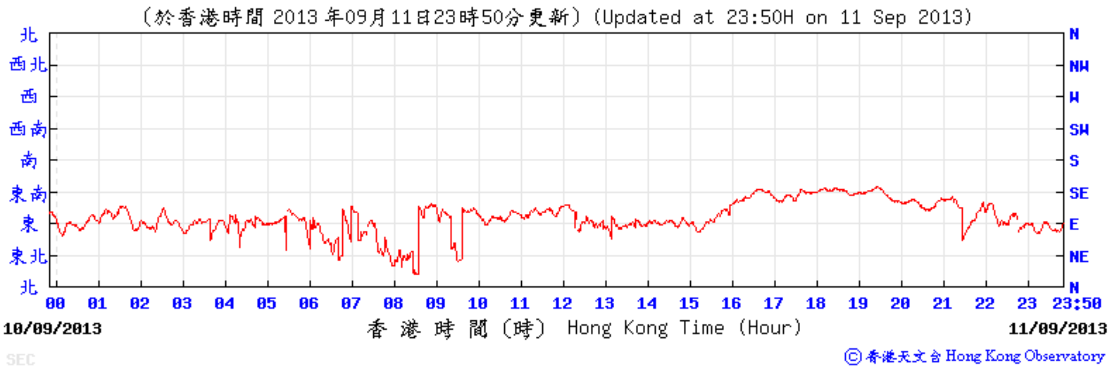




Wind direction obtained from the meteorological station at Kai Tak from the Hong Kong Observatory (HKO)

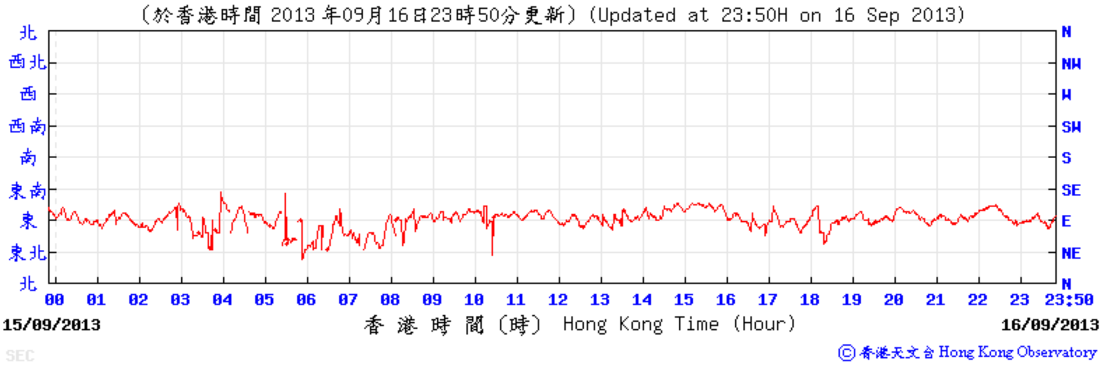
10-11 September 2013

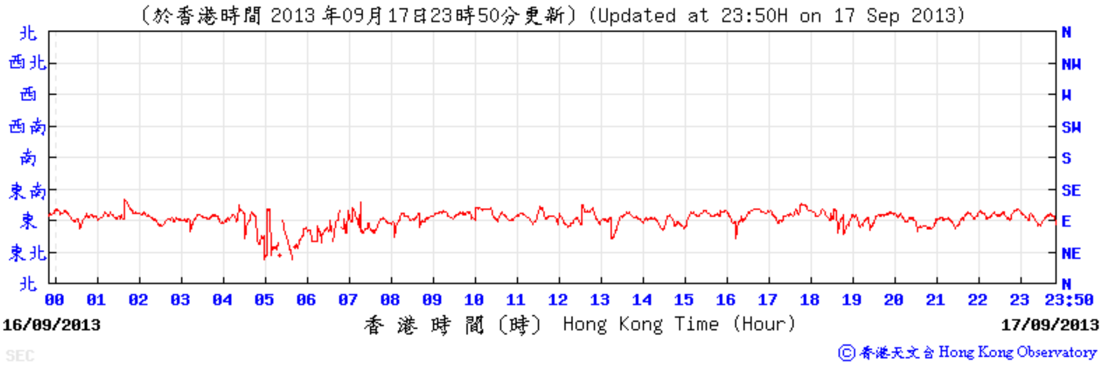




Wind direction obtained from the meteorological station at Kai Tak from the Hong Kong Observatory (HKO)

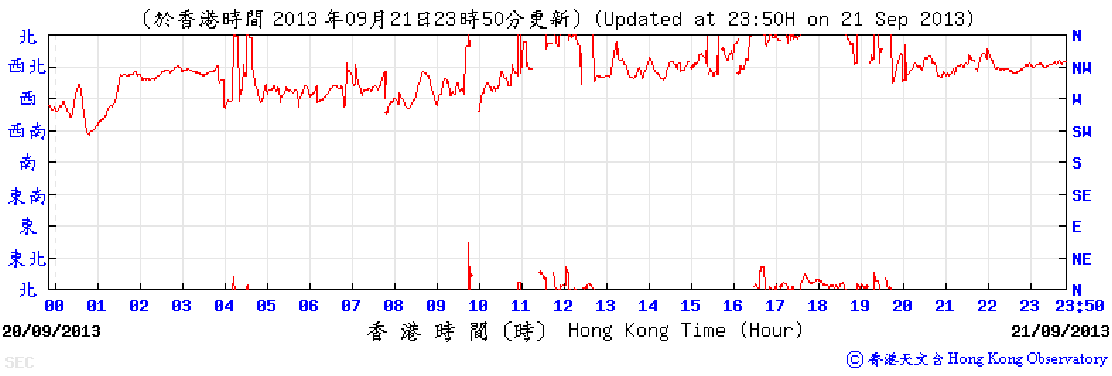
16-17 September 2013

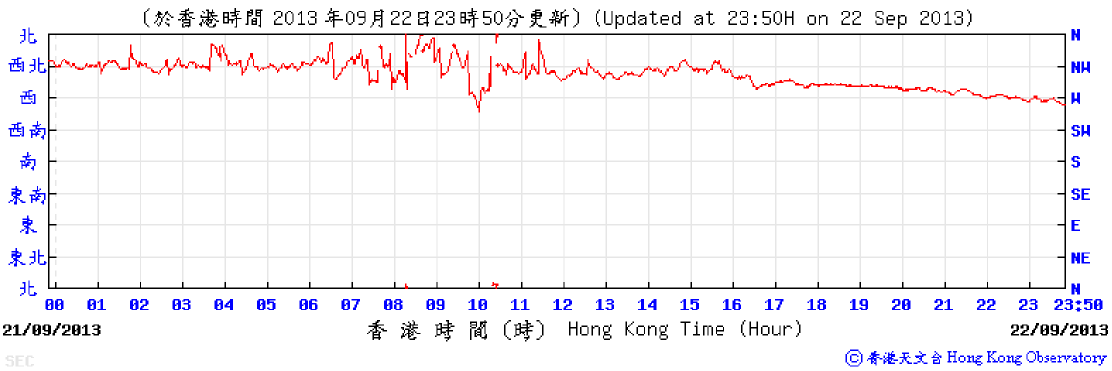




Wind direction obtained from the meteorological station at Kai Tak from the Hong Kong Observatory (HKO)

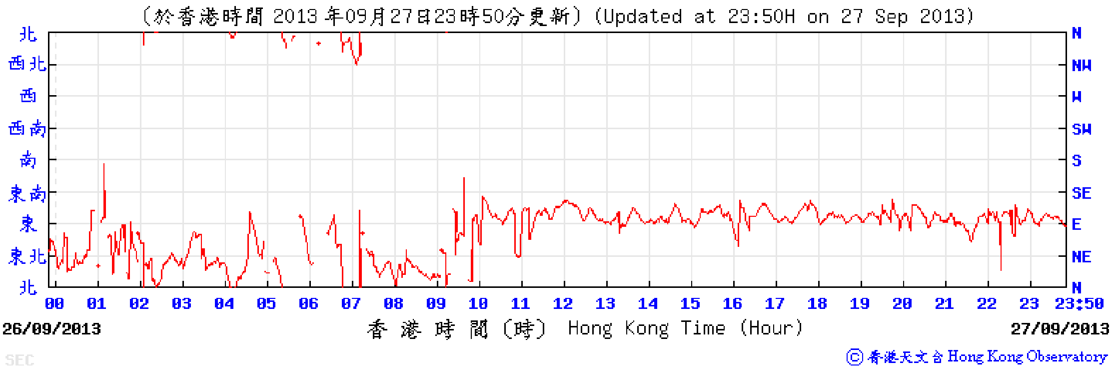
<u>21-22 September 2013</u>

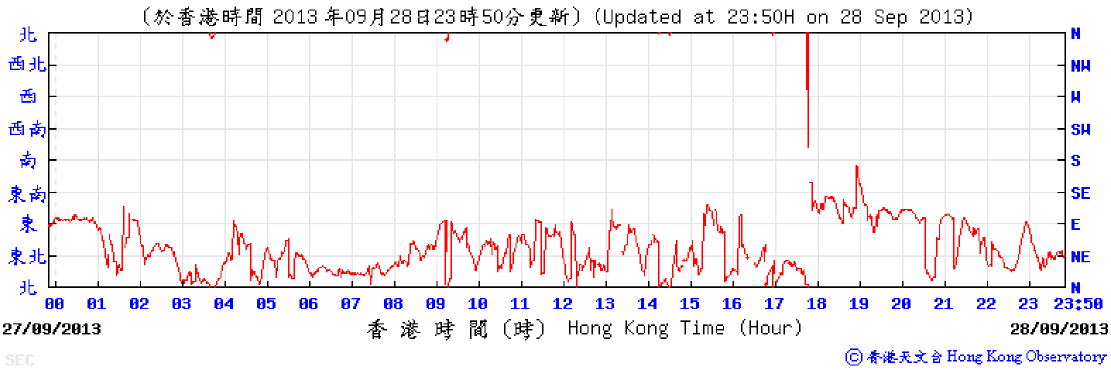




Wind direction obtained from the meteorological station at Kai Tak from the Hong Kong Observatory (HKO)

27-28 September 2013





APPENDIX F
NOISE MONITORING RESULTS AND GRAPHICAL PRESENTATIONS

Appendix F - Noise Monitoring Results

Location NMS-CA-4(1)/NMS-CA-3(2) - Block 1, Rhythm Garden (north-eastern façade)								
Date	Weather	Time	Unit: dB (A) (5-min)			Average	Baseline Level	Construction Noise Level
			L_{eq}	L_{10}	L_{90}	L_{eq}	L_{eq}	L_{eq}
5-Sep-13	Cloudy	11:30	65.1	67.8	62.6	65.1	71	65.1 Measured≦ Baseline Level
		11:35	65.0	67.8	62.7			
		11:40	65.2	67.9	62.8			
		11:45	65.2	67.8	62.9			
		11:50	65.3	68.0	63.1			
		11:55	65.0	67.8	62.7			
11-Sep-13	Sunny	13:00	66.3	67.7	64.8	65.7		65.7 Measured≦ Baseline Level
		13:05	64.9	66.2	63.4			
		13:10	65.4	66.9	63.4			
		13:15	65.6	67.2	63.1			
		13:20	66.5	67.7	63.8			
		13:25	65.1	66.5	62.0			
17-Sep-13	Sunny	14:17	68.8	69.7	67.5	68.7		68.7 Measured≦ Baseline Level
		14:22	68.8	69.8	67.5			
		14:27	68.7	69.7	67.4			
		14:32	68.7	69.7	67.4			
		14:37	68.6	69.6	67.4			
		14:42	68.6	69.7	67.5			
23-Sep-13	Cloudy	10:55	66.9	67.9	65.2	67.4		67.4 Measured≦ Baseline Level
		11:00	66.8	67.9	65.4			
		11:05	67.1	68.4	65.6			
		11:10	68.2	69.0	65.7			
		11:15	67.4	68.8	65.2			
		11:20	67.7	68.8	65.4			

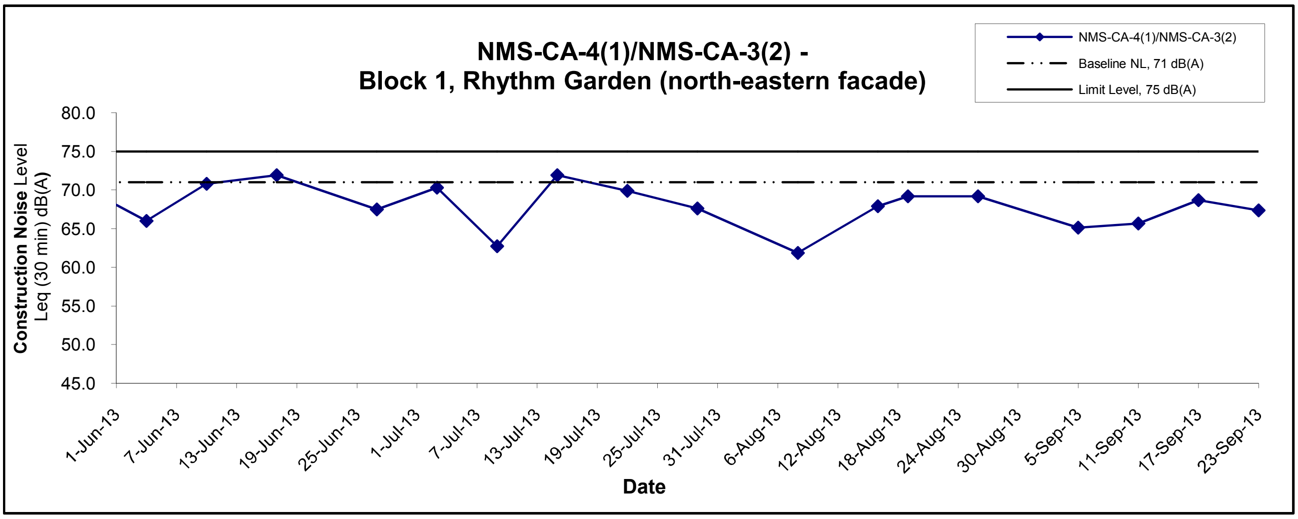
Remarks:
(1) Station ID as identified in approved EM&A Manual / EIA Report for SCL(TAW-HUH).
(2) Station ID as identified in approved EM&A Manual / EIA Report for SCL(HHS).

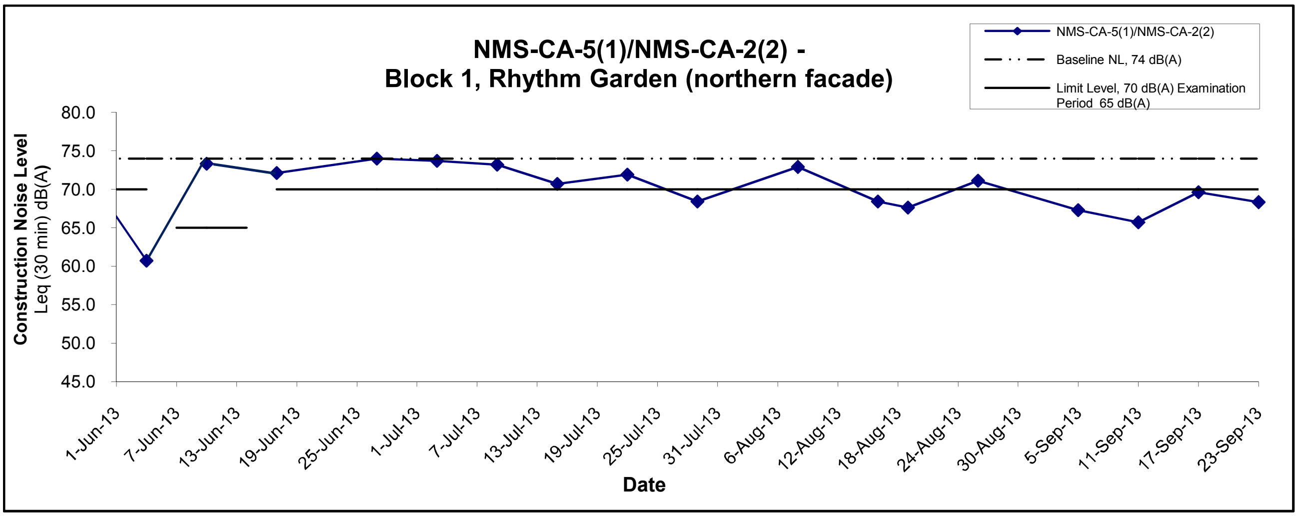
Appendix F - Noise Monitoring Results

Location NMS-CA-5(1)/NMS-CA-2(2) - Block 1, Rhythm Garden (northern façade)								
Date	Weather	Time	Unit: dB (A) (5-min)			Average	Baseline Level	Construction Noise Level
			L_{eq}	L_{10}	L_{90}	L_{eq}	L_{eq}	L_{eq}
5-Sep-13	Cloudy	11:00	67.3	68.9	65.1	67.3	74	67.3 Measured≦ Baseline Level
		11:05	67.4	69.0	65.0			
		11:10	67.3	69.1	64.9			
		11:15	67.2	68.9	65.0			
		11:20	67.1	68.9	65.1			
		11:25	67.3	68.7	64.8			
11-Sep-13	Sunny	13:35	65.2	66.5	64.0	65.7		65.7 Measured≦ Baseline Level
		13:40	65.8	66.8	64.5			
		13:45	65.9	66.9	64.1			
		13:50	65.7	66.9	64.5			
		13:55	66.0	67.1	64.8			
		14:00	65.6	66.7	64.5			
17-Sep-13	Sunny	14:50	69.8	70.8	68.6	69.6		69.6 Measured≦ Baseline Level
		14:55	69.8	70.8	68.5			
		15:00	69.5	70.2	68.4			
		15:05	69.5	70.5	68.3			
		15:10	69.5	70.6	68.3			
		15:15	69.6	70.6	68.5			
23-Sep-13	Cloudy	11:30	68.5	69.8	66.7	68.3		68.3 Measured≦ Baseline Level
		11:35	67.9	68.5	66.2			
		11:40	68.1	69.3	67.5			
		11:45	68.3	68.9	68.1			
		11:50	68.6	69.9	66.7			
		11:55	68.5	69.6	66.9			

Remarks:
(1) Station ID as identified in approved EM&A Manual / EIA Report for SCL(TAW-HUH).
(2) Station ID as identified in approved EM&A Manual / EIA Report for SCL(HHS).

Noise Levels





Remarks:
(1) Station ID as identified in approved EM&A Manual / EIA Report for SCL(TAW-HUH).
(2) Station ID as identified in approved EM&A Manual / EIA Report for SCL(HHS).
(3) In case of Measured Level ≦ Baseline Level, only Measured Level is presented on the graphical presentation.

Title	Scale	Project No.	
Shatin to Central Link - Contract 1106 - Diamond Hill Station	N.T.S	MA12051	CINOTECH
Graphical Presentation of Construction Noise Monitoring Results	Date: Sep 13	Appendix: F	

APPENDIX G
SUMMARY OF EXCEEDANCE

APPENIDX G – SUMMARY OF EXCEEDANCE

Reporting Month: September 2013

a) Exceedance Report for Dust Monitoring (NIL)

b) Exceedance Report for Noise Monitoring (NIL)

APPENDIX H
SITE AUDIT SUMMARY

Record Summary of Environmental Site Inspection

Inspection Information

Checklist Reference Number	130903
Date	3 September 2013 (Tuesday)
Time	09:00 – 11:15

Ref. No.	Non-Compliance	Related Item No.
-	None identified	-

Ref. No.	Remarks/Observations	Related Item No.
	Part B – Water Quality	
	• No environmental deficiency was identified during the site inspection.	
	Part C – Ecology	
	• No environmental deficiency was identified during the site inspection.	
	Part D – Landscape & Visual	
130903-O01	• The operating machine was observed closed to retaining tree DT1885. The Contractor should keep away the machine from tree for better tree protection.	D 3
130903-O02	• To erect tree protection fence for retaining tree next to Archaeological area.	D 2
	Part E – Air Quality	
	• No environmental deficiency was identified during the site inspection.	
	Part F – Cultural Heritage	
	• No environmental deficiency was identified during the site inspection.	
	Part G - Construction Noise Impact	
	• No environmental deficiency was identified during the site inspection.	
	Part H – Waste/Chemical Management	
	• No environmental deficiency was identified during the site inspection.	
	Part I – Permits/Licenses	
	• No environmental deficiency was identified during the site inspection.	
	Part J - Others	
	• Follow-up on previous audit section (Ref. No.:130827), all identified environmental deficiency was observed improved/rectified by the Contractor.	

	Name	Signature	Date
Recorded by	Gary Lau		3 September 2013
Checked by	Dr. Priscilla Choy		3 September 2013

Record Summary of Environmental Site Inspection

Inspection Information

Checklist Reference Number	130910
Date	10 September 2013 (Tuesday)
Time	09:00 – 11:15

Ref. No.	Non-Compliance	Related Item No.
-	None identified	-

Ref. No.	Remarks/Observations	Related Item No.
130910-O01	*Part B – Water Quality* • To clear the sediment in the U-channel (next to the site entrance) to prevent blockage. *Part C – Ecology* • No environmental deficiency was identified during the site inspection. *Part D – Landscape & Visual* • No environmental deficiency was identified during the site inspection. *Part E – Air Quality* • No environmental deficiency was identified during the site inspection. *Part F – Cultural Heritage* • No environmental deficiency was identified during the site inspection. *Part G - Construction Noise Impact* • No environmental deficiency was identified during the site inspection. *Part H – Waste/Chemical Management* • No environmental deficiency was identified during the site inspection. *Part I – Permits/Licenses* • No environmental deficiency was identified during the site inspection. *Part J - Others* • Follow-up on previous audit section (Ref. No.:130903), all identified environmental deficiency was observed improved/rectified by the Contractor.	B 7

	Name	Signature	Date
Recorded by	Gary Lau		10 September 2013
Checked by	Dr. Priscilla Choy		10 September 2013

Record Summary of Environmental Site Inspection

Inspection Information

Checklist Reference Number	130917
Date	17 September 2013 (Tuesday)
Time	09:00 – 09:50

Ref. No.	**Non-Compliance**	**Related Item No.**
-	None identified	-

Ref. No.	**Remarks/Observations**	**Related Item No.**
	Part B – Water Quality • No environmental deficiency was identified during the site inspection.	
	Part C – Ecology • No environmental deficiency was identified during the site inspection.	
	Part D – Landscape & Visual • No environmental deficiency was identified during the site inspection.	
	Part E – Air Quality • No environmental deficiency was identified during the site inspection.	
	Part F – Cultural Heritage • No environmental deficiency was identified during the site inspection.	
	Part G - Construction Noise Impact	
130917-R01	• The acoustic blanket installed at the top of hoarding next to Tai Hom Road should be extended for enhancing noise reduction.	G 7
	Part H – Waste/Chemical Management	
130917-R02	• To clean the oily stagnant water in drip tray next to the desander to prevent leakage.	H10
	Part I – Permits/Licenses • No environmental deficiency was identified during the site inspection.	
	Part J - Others • Follow-up on previous audit section (Ref. No.:130910), all identified environmental deficiency was observed improved/rectified by the Contractor.	

	Name	Signature	Date
Recorded by	Gary Lau	[signature]	17 September 2013
Checked by	Dr. Priscilla Choy	[signature]	17 September 2013

Record Summary of Environmental Site Inspection

Inspection Information

Checklist Reference Number	130924
Date	24 September 2013 (Tuesday)
Time	09:00 – 10:30

Ref. No.	Non-Compliance	Related Item No.
-	None identified	-

Ref. No.	Remarks/Observations	Related Item No.
	Part B – Water Quality	
130924-R04	• To avoid further overflowing at sedimentation tank by properly check the pumps. (Next to Area W8)	B 6ii
	Part C – Ecology	
	• No environmental deficiency was identified during the site inspection.	
	Part D – Landscape & Visual	
130924-O01	• Metal plates were observed lean on tree DT 0799. The Contractor was reminded to remove them from tree protection zone.	D 3
130924-O02	• The operating machine should keep away from Tree DT1911 to avoid damage to retaining tree.	D 3
	Part E – Air Quality	
	• No environmental deficiency was identified during the site inspection.	
	Part F – Cultural Heritage	
	• No environmental deficiency was identified during the site inspection.	
	Part G - Construction Noise Impact	
	• No environmental deficiency was identified during the site inspection.	G 7
	Part H – Waste/Chemical Management	
130924-O03	• The empty plastic chemical containers, which waiting for recycling, should be removed from chemical storage area to prevent confusion. (Next to Area W8)	H 2 ii
	Part I – Permits/Licenses	
	• No environmental deficiency was identified during the site inspection.	
	Part J - Others	
	• Follow-up on previous audit section (Ref. No.:130917), all identified environmental deficiency was observed improved/rectified by the Contractor.	

	Name	Signature	Date
Recorded by	Gary Lau		24 September 2013
Checked by	Dr. Priscilla Choy		24 September 2013

APPENDIX I
EVENT AND ACTION PLANS

Event and Action Plan for Air Quality Monitoring during Construction Phase

EVENT	ACTION			
	Works Contract 1106 ET	**IEC**	**ER**	**CONTRACTOR**
ACTION LEVEL				
1. Exceedance for one sample	1. Inform the IEC, Contractor and ER; 2. Discuss with the Contractor, IEC and ER on the remedial measures required; 3. Repeat measurement to confirm findings; 4. Increase monitoring frequency	1. Check monitoring data submitted by the ET; 2. Check Contractor's working method; 3. Review and advise the ET and ER on the effectiveness of the proposed remedial measures.	1. Confirm receipt of notification of exceedance in writing;	1. Identify source(s), investigate the causes of exceedance and propose remedial measures; 2. Implement remedial measures; 3. Amend working methods agreed with the ER as appropriate.
2.Exceedance for two or more consecutive samples	1. Inform the IEC, Contractor and ER; 2. Discuss with the ER, IEC and Contractor on the remedial measures required; 3. Repeat measurements to confirm findings; 4. Increase monitoring frequency to daily; 5. If exceedance continues, arrange meeting with the IEC, ER and Contractor; 6. If exceedance stops, cease addtional monitoring	1. Check monitoring data submitted by the ET; 2. Check Contractor's working method; 3. Review and advise the ET and ER on the effectiveness of the proposed remedial measures.	1. Confirm receipt of notification of exceedance in writing; 2. Notify the Contractor, IEC and ET; 3. Review and agree on the remedial measures proposed by the Contractor; 4. Supervise Implementation of remedial measures.	1. Identify source and investigate the causes of exceedance; 2. Submit proposals for remedial measures to the ER with a copy to ET and IEC within three working days of notification; 3. Implement the agreed proposals; 4. Amend proposal as appropriate.

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

Event and Action Plan for Noise Monitoring during Construction Phase

EVENT	ACTION			
	Works Contract 1106 ET	**IEC**	**ER**	**CONTRACTOR**
Action Level	1. Notify the IEC, Contractor and ER 2. Discuss with the ER, IEC and Contractor on the remedial measures required 3. Increase monitoring frequency to check mitigation effectiveness	1. Review the investigation results submitted by the contractor; 2. Review and advise the ET and ER on the effectiveness of the remedial measures proposed by the Contractor. .	1. Confirm receipt of notification of complaint in writing 2. Notify the Contractor, IEC and ET 3. Review and agree on the remedial measures proposed by the Contractor; 4. Supervise implementation of remedial measures	1. Investigate the complaint and propose remedial measures 2. Report the results of investigation to the IEC, ET and ER 3. Submit noise mitigation proposals to the ER with copy to the IEC and ET within 3 working days of notification. 4. Implement noise mitigation proposals
Limit Level	1. Notify the IEC, Contractor and EPD 2. Repeat measurement to confirm findings 3. Increase monitoring frequency 4. Carry out analysis of Contractor's working procedures to determine possible mitigation to be implemented 5. Arrange meeting with the IEC, Contractor and ER to discuss the remedial measures to be taken; 6. Inform IEC, ER and EPD the causes and actions taken for the exceedances 7. Assess effectiveness of the Contractor's remedial measures and keep IEC, ER and EPD informed of the results	1. Check monitoring data submitted by the ET; 2. Check the Contractor's working method; 3. Discuss with the ER, ET and Contractor on the potential remedial measures 4. Review and advise the ET and ER on the effectiveness of the remedial measures proposed by the Contractor.	1. Confirm receipt of notification of exceedance in writing 2. Notify the Contractor, IEC and ET 3. In consultation with the ET and IEC, agree with the Contractor on the remedial measures to be implemented 4. Supervise the implementation of remedial measures 5. If exceedance continues, consider what portion of the work is responsible and instruct the Contractor to stop that portion of work until the exceedance is abated	1. Identify source and investigate the causes of exceedance 2. Take immediate action to avoid further exceedance 3. Submit proposals for remedial measures to the ER with copy to the IEC and ET within 3 working days of notification. 4. Implement the agreed proposals 5. Revise and resubmit proposals if problem still not under control 6. Stop the relevant portion of works as determined by the ER until the exceedance is abated

Event and Action Plan for Landscape and Visual during Construction Phase

Action Level	Works Contract 1106 ET	IEC	ER	Contractor
Non-conformity on one occasion	1. Inform the Contractor, the IEC and the ER 2. Discuss remedial actions with the IEC, the ER and the Contractor 3. Monitor remedial actions until rectification has been completed	1. Check inspection report 2. Check the Contractor's working method 3. Discuss with the ET, ER and the Contractor on possible remedial measures 4. Advise the ER on effectiveness of proposed remedial measures.	1. Confirm receipt of notification of non-conformity in writing 2. Review and agree on the remedial measures proposed by the Contractor 3. Supervise implementation of remedial measures	1. Identify Source and investigate the non-conformity 2. Implement remedial measures 3. Amend working methods agreed with the ER as appropriate 4. Rectify damage and undertake any necessary replacement
Repeated Non-conformity	1. Identify Source 2. Inform the Contractor, the IEC and the ER 3. Increase inspection frequency 4. Discuss remedial actions with the IEC, the ER and the Contractor 5. Monitor remedial actions until rectification has been completed 6. If non-conformity stops, cease additional monitoring	1. Check inspection report 2. Check the Contractor's working method 3. Discuss with the ET and the Contractor on possible remedial measures 4. Advise the ER on effectiveness of proposed remedial measures	1. Notify the Contractor 2. In consultation with the ET and IEC, agree with the Contractor on the remedial measures to be implemented 3. Supervise implementation of remedial measures.	1. Identify Source and investigate the non-conformity 2. Implement remedial measures 3. Amend working methods agreed with the ER as appropriate 4. Rectify damage and undertake any necessary replacement. Stop relevant portion of works as determined by the ER until the non-conformity is abated.

APPENDIX J
UPDATED ENVIRONMENTAL MITIGATION IMPLEMENTATION SCHEDULE

SCL Works Contract 1106 - Environmental Mitigation Implementation Schedule

EIA Ref.	EM&A Log Ref	Recommended Mitigation Measures	Objectives of the recommended Measures & Main Concerns to address	Who to implement the measures?	Location of the measures	When to Implement the measures?	What requirements or standards for the measures to achieve?	Status
Cultural Heritage Impact (Construction Phase)								
S4.8.1	CH1	Submit an Archaeological Action Plan. Survey-cum-excavation shall be conducted prior to the construction works at the former Tai Hom Village site.	Salvage cultural remains at the Former Tai Hom Village Site	Contractor	Former Tai Hom Village Site	Prior to the Construction Phase of DIH site	• AMO's requirements	^ ^
S4.8.2	CH2	Submit a Conservation Plan for the Former Royal Air Force Hangar and the Old Pillbox to AMO for agreement.	Proposal for conservation of 2 historical buildings	Contractor	Former Tai Hom Village Site	Prior to the Construction Phase of DIH site	• AMO's requirements • Principles for the Conservation of Heritage Sites in China • Burra Charter, the Australia's ICOMOS Charter for Places of Cultural Significance	^
Ecology (Construction Phase)								
S5.7	E1	<u>Good Site Practices</u> Impact to any habitats or local fauna should be avoided by implementing good site practices, including the containment of silt runoff within the site boundary, appropriate storage of chemicals and chemical waste away from sites of ecological value and the provision of sanitary facilities for	Minimise ecological impacts	Contractor	All construction sites	During Construction	• ProPECC PN 1/94	^

EIA Ref.	EM&A Log Ref	Recommended Mitigation Measures	Objectives of the recommended Measures & Main Concerns to address	Who to implement the measures?	Location of the measures	When to Implement the measures?	What requirements or standards for the measures to achieve?	Status
		on-site workers. Adoption of such measures should permit waste to be suitably contained within the site for subsequent removal and appropriate disposal. The following good site practices should also be implemented: • No on-site burning of waste; • Waste and refuse in appropriate receptacles.						 ^ ^
Landscape & Visual (Construction Phase)								
S6.12	LV1	The following good site practices and measures for minimisation and avoidance of potential impacts are recommended: <u>Re-use of Existing Soil</u> • For soil conservation, existing topsoil shall be re-used where possible for new planting areas within the project. The construction program shall consider using the soil removed from one phase for backfilling another. Suitable storage ground, gathering ground and mixing ground may be set up on-site as necessary. <u>No-intrusion Zone</u> • To maximize protection to existing trees, ground vegetation and the associated under storey habitats, construction contracts may designate "No-intrusion Zone" to various areas within the site boundary with rigid and durable fencing for each individual	Minimize visual & landscape impact	Contractor	Within Project Site	Construction stage	•TM-EIAO	 ^ *

SCL Works Contract 1106 - Environmental Mitigation Implementation Schedule

EIA Ref.	EM&A Log Ref	Recommended Mitigation Measures	Objectives of the recommended Measures & Main Concerns to address	Who to implement the measures?	Location of the measures	When to Implement the measures?	What requirements or standards for the measures to achieve?	Status
		no-intrusion zone. The contractor should closely monitor and restrict the site working staff from entering the "no-intrusion zone", even for indirect construction activities and storage of equipment.						
		Protection of Retained Trees						
		• All retained trees should be recorded photographically at the commencement of the Contract, and carefully protected during the construction period. Detailed tree protection specification shall be allowed and included in the Contract Specification, which specifying the tree protection requirement, submission and approval system, and the tree monitoring system.						^
		• The Contractor shall be required to submit, for approval, a detailed working method statement for the protection of trees prior to undertaking any works adjacent to all retained trees, including trees in contractor's works sites.						^
Table 6.9	LV2	Decorative Hoarding	Minimize the visual and landscape impact of the Project during construction phase	Contractor	Within Project Site	Detailed design and construction stage	• EIAO – TM •ETWB TCW 2/2004 • ETWB TCW 3/2006	
		• Erection of decorative screen during construction stage to screen off undesirable views of the construction site for visual and landscape sensitive areas. Hoarding should be designed to be compatible with the existing urban context.						^
		Management of facilities on work sites						
		• To provide proper management of the facilities on the sites, give						^

EIA Ref.	EM&A Log Ref	Recommended Mitigation Measures	Objectives of the recommended Measures & Main Concerns to address	Who to implement the measures?	Location of the measures	When to Implement the measures?	What requirements or standards for the measures to achieve?	Status
		control on the height and disposition/ arrangement of all facilities on the works site to minimize visual impact to adjacent VSRs. Tree Transplanting • Trees of medium to high survival rate that would be affected by the works shall be transplanted where possible and practicable. Tree transplanting proposal including final location for transplanted trees shall be submitted separately to seek relevant government department's approval, in accordance with ETWB TCW No 3/2006.						N/A
Construction Dust Impact								
S7.6.6	D1	The contractor shall follow the procedures and requirements given in the Air Pollution Control (Construction Dust) Regulation	Minimize dust impact at the nearby sensitive receivers	Contractor	All Construction Sites	Construction stage	• APCO • To control the dust impact to meet HKAQO and TM-EIA criteria	^
S7.6.6	D2	Mitigation measures in form of regular watering under a good site practice should be adopted. Watering once per hour on exposed worksites and haul road in the Kowloon area should be conducted to achieve dust removal efficiencies of 91.7%. While the above watering frequencies are to be followed, the extent of watering may vary depending on actual site conditions but should be sufficient to maintain	Minimize dust impact at the nearby sensitive receivers	Contractor	All Construction Sites	Construction stage	• APCO • To control the dust impact to meet HKAQO and TM-EIA criteria	^

SCL Works Contract 1106 - Environmental Mitigation Implementation Schedule

EIA Ref.	EM&A Log Ref	Recommended Mitigation Measures	Objectives of the recommended Measures & Main Concerns to address	Who to implement the measures?	Location of the measures	When to Implement the measures?	What requirements or standards for the measures to achieve?	Status
		an equivalent intensity of no less than 1.8 L/m^2 to achieve the dust removal efficiency						
S7.6.6	D3	• Any excavated or stockpile of dusty material should be covered entirely by impervious sheeting or sprayed with water to maintain the entire surface wet and then removed or backfilled or reinstated where practicable within 24 hours of the excavation or unloading; • Any dusty materials remaining after a stockpile is removed should be wetted with water and cleared from the surface of roads; • A stockpile of dusty material should not be extend beyond the pedestrian barriers, fencing or traffic cones. • The load of dusty materials on a vehicle leaving a construction site should be covered entirely by impervious sheeting to ensure that the dusty materials do not leak from the vehicle; • Where practicable, vehicle washing facilities with high pressure water jet should be provided at every discernible or designated vehicle exit point. The area where vehicle washing takes place and the road section between the washing facilities and the exit point should be paved with concrete, bituminous materials or hardcores; • When there are open excavation and reinstatement works, hoarding of not less than 2.4m high should be provided and	Minimize dust impact at the nearby sensitive receivers	Contractor	All Construction Sites	Construction stage	• APCO • To control the dust impact to meet HKAQO and TM-EIA criteria	^ ^ ^ ^ ^ ^

SCL Works Contract 1106 - Environmental Mitigation Implementation Schedule

EIA Ref.	EM&A Log Ref	Recommended Mitigation Measures	Objectives of the recommended Measures & Main Concerns to address	Who to implement the measures?	Location of the measures	When to Implement the measures?	What requirements or standards for the measures to achieve?	Status
		properly maintained as far as practicable along the site boundary with provision for public crossing; Good site practice shall also be adopted by the Contractor to ensure the conditions of the hoardings are properly maintained throughout the construction period;						
		• The portion of any road leading only to construction site that is within 30m of a vehicle entrance or exit should be kept clear of dusty materials;						^
		• Surfaces where any pneumatic or power-driven drilling, cutting, polishing or other mechanical breaking operation takes place should be sprayed with water or a dust suppression chemical continuously;						^
		• Any area that involves demolition activities should be sprayed with water or a dust suppression chemical immediately prior to, during and immediately after the activities so as to maintain the entire surface wet;						^
		• Where a scaffolding is erected around the perimeter of a building under construction, effective dust screens, sheeting or netting should be provided to enclose the scaffolding from the ground floor level of the building, or a canopy should be provided from the first floor level up to the highest level of the scaffolding;						N/A

SCL Works Contract 1106 - Environmental Mitigation Implementation Schedule

EIA Ref.	EM&A Log Ref	Recommended Mitigation Measures	Objectives of the recommended Measures & Main Concerns to address	Who to implement the measures?	Location of the measures	When to Implement the measures?	What requirements or standards for the measures to achieve?	Status
		• Any skip hoist for material transport should be totally enclosed by impervious sheeting; • Every stock of more than 20 bags of cement or dry pulverised fuel ash (PFA) should be covered entirely by impervious sheeting or placed in an area sheltered on the top and the 3 sides; • Cement or dry PFA delivered in bulk should be stored in a closed silo fitted with an audible high level alarm which is interlocked with the material filling line and no overfilling is allowed; • Loading, unloading, transfer, handling or storage of bulk cement or dry PFA should be carried out in a totally enclosed system or facility, and any vent or exhaust should be fitted with an effective fabric filter or equivalent air pollution control system; and • Exposed earth should be properly treated by compaction, turfing, hydroseeding, vegetation planting or sealing with latex, vinyl, bitumen, shotcrete or other suitable surface stabiliser within six months after the last construction activity on the construction site or part of the construction site where the exposed earth lies.						^ ^ ^ ^ N/A
S7.6.6	D4	Implement regular dust monitoring under EM&A programme during the construction stage.	Monitoring of dust impact	Contractor	Selected representative dust monitoring station	Construction stage	• TM-EIA	^

SCL Works Contract 1106 - Environmental Mitigation Implementation Schedule

EIA Ref.	EM&A Log Ref	Recommended Mitigation Measures	Objectives of the recommended Measures & Main Concerns to address	Who to implement the measures?	Location of the measures	When to Implement the measures?	What requirements or standards for the measures to achieve?	Status
Construction Airborne Noise								
S8.5.6	AN1	Implement the following good site practices:	Control construction airborne noise	Contractor	All Construction Sites where practicable	Construction stage	• Annex 5, TM-EIA	
		• only well-maintained plant should be operated on-site and plant should be serviced regularly during the construction programme;						^
		• machines and plant (such as trucks, cranes) that may be in intermittent use should be shut down between work periods or should be throttled down to a minimum;						^
		• plant known to emit noise strongly in one direction, where possible, be orientated so that the noise is directed away from nearby NSRs;						^
		• silencers or mufflers on construction equipment should be properly fitted and maintained during the construction works;						N/A
		• mobile plant should be sited as far away from NSRs as possible and practicable;						^
		• material stockpiles, mobile container site office and other structures should be effectively utilised, where practicable, to screen noise from on-site construction activities.						^
S8.5.6	AN2	Install temporary hoarding located on the site boundaries between noisy construction activities and NSRs. The conditions of the hoardings shall be properly maintained throughout the construction period.	Reduce the construction noise levels at low-level zone of NSRs through partial	Contractor	All Construction Sites	Construction stage	• Annex 5, TM-EIA	^

SCL Works Contract 1106 - Environmental Mitigation Implementation Schedule

EIA Ref.	EM&A Log Ref	Recommended Mitigation Measures	Objectives of the recommended Measures & Main Concerns to address	Who to implement the measures?	Location of the measures	When to Implement the measures?	What requirements or standards for the measures to achieve?	Status
			screening.					
S8.5.6	AN3	Install movable noise barriers (typical design is wooden framed barrier with a small-cantilevered on a skid footing with 25mm thick internal sound absorptive lining), acoustic mat or full enclosure, screen the noisy plants including air compressor, generators and saw.	Screen the noisy plant items to be used at all construction sites	Contractor	All Construction Sites	Construction stage	• Annex 5, TM-EIA	*
S8.5.6	AN4	Use “Quiet” plant	Reduce the noise levels of plant items	Contractor	All Construction Sites where practicable	Construction stage	• Annex 5, TM-EIA	^
S8.5.6	AN5	Sequencing operation of construction plants where practicable.	Operate sequentially within the same work site to reduce the construction airborne noise	Contractor	All Construction Sites where practicable	Construction stage	• Annex 5, TM-EIA	^
S8.5.6	AN6	Implement a noise monitoring under EM&A programme.	Monitor the construction noise levels at the selected representative locations	Contractor	Selected representative noise monitoring station	Construction stage	•TM-EIA	^
Water Quality (Construction Phase)								
S10.7.1	W1	In accordance with the Practice Noise for Professional Persons on Construction Site Drainage, Environmental Protection Department, 1994	To minimize water quality impact from construction	Contractor	All construction sites	Construction stage	• Water Pollution Control Ordinance	

SCL Works Contract 1106 - Environmental Mitigation Implementation Schedule

EIA Ref.	EM&A Log Ref	Recommended Mitigation Measures	Objectives of the recommended Measures & Main Concerns to address	Who to implement the measures?	Location of the measures	When to Implement the measures?	What requirements or standards for the measures to achieve?	Status
		(ProPECC PN1/94), construction phase mitigation measures shall include the following: Construction Runoff and Site Drainage	site runoff and general construction activities		where practicable		• ProPECC PN1/94 • TM-EIAO • TM-Water	
		• At the start of site establishment (including the barging facilities), perimeter cut-off drains to direct off-site water around the site should be constructed with internal drainage works and erosion and sedimentation control facilities implemented. Channels (both temporary and permanent drainage pipes and culverts), earth bunds or sand bag barriers should be provided on site to direct stormwater to silt removal facilities. The design of the temporary on-site drainage system will be undertaken by the contractor prior to the commencement of construction.						^
		• The dikes or embankments for flood protection should be implemented around the boundaries of earthwork areas. Temporary ditches should be provided to facilitate the runoff discharge into an appropriate watercourse, through a site/sediment trap. The sediment/silt traps should be incorporated in the permanent drainage channels to enhance deposition rates. The design of efficient silt removal facilities should be based on the guidelines in Appendix A1 of ProPECC PN 1/94, which states that the retention time for silt/sand traps should be 5 minutes						*

SCL Works Contract 1106 - Environmental Mitigation Implementation Schedule

EIA Ref.	EM&A Log Ref	Recommended Mitigation Measures	Objectives of the recommended Measures & Main Concerns to address	Who to implement the measures?	Location of the measures	When to Implement the measures?	What requirements or standards for the measures to achieve?	Status
		under maximum flow conditions. Sizes may vary depending upon the flow rate, but for a flow rate of 0.1 m^3/s a sedimentation basin of $30m^3$ would be required and for a flow rate of 0.5 m^3/s the basin would be 150 m^3. The detailed design of the sand/silt traps shall be undertaken by the contractor prior to the commencement of construction.						
		• All exposed earth areas should be completed and vegetated as soon as possible after earthworks have been completed, or alternatively, within 14 days of the cessation of earthworks where practicable. Exposed slope surfaces should be covered by tarpaulin or other means.						^
		• The overall slope of the site should be kept to a minimum to reduce the erosive potential of surface water flows, and all traffic areas and access roads protected by coarse stone ballast. An additional advantage accruing from the use of crushed stone is the positive traction gained during prolonged periods of inclement weather and the reduction of surface sheet flows.						^
		• All drainage facilities and erosion and sediment control structures should be regularly inspected and maintained to ensure proper and efficient operation at all times and particularly following rainstorms. Deposited silt and grit should be removed regularly						*

EIA Ref.	EM&A Log Ref	Recommended Mitigation Measures	Objectives of the recommended Measures & Main Concerns to address	Who to implement the measures?	Location of the measures	When to Implement the measures?	What requirements or standards for the measures to achieve?	Status
		and disposed of by spreading evenly over stable, vegetated areas.						
		• Measures should be taken to minimise the ingress of site drainage into excavations. If the excavation of trenches in wet periods is necessary, they should be dug and backfilled in short sections wherever practicable. Water pumped out from trenches or foundation excavations should be discharged into storm drains via silt removal facilities.						N/A
		• Open stockpiles of construction materials (for example, aggregates, sand and fill material) of more than $50m^3$ should be covered with tarpaulin or similar fabric during rainstorms.						^
		• Measures should be taken to prevent the washing away of construction materials, soil, silt or debris into any drainage system. Manholes (including newly constructed ones) should always be adequately covered and temporarily sealed so as to prevent silt, construction materials or debris being washed into the drainage system and storm runoff being directed into foul sewers						^
		• Precautions be taken at any time of year when rainstorms are likely, actions to be taken when a rainstorm is imminent or forecasted, and actions to be taken during or after rainstorms are summarised in Appendix A2 of ProPECC PN 1/94. Particular						^

SCL Works Contract 1106 - Environmental Mitigation Implementation Schedule

EIA Ref.	EM&A Log Ref	Recommended Mitigation Measures	Objectives of the recommended Measures & Main Concerns to address	Who to implement the measures?	Location of the measures	When to Implement the measures?	What requirements or standards for the measures to achieve?	Status
		attention should be paid to the control of silty surface runoff during storm events, especially for areas located near steep slopes						
		• All vehicles and plant should be cleaned before leaving a construction site to ensure no earth, mud, debris and the like is deposited by them on roads. An adequately designed and sited wheel washing facilities should be provided at every construction site exit where practicable. Wash-water should have sand and silt settled out and removed at least on a weekly basis to ensure the continued efficiency of the process. The section of access road leading to, and exiting from, the wheel-wash bay to the public road should be paved with sufficient backfall toward the wheel-wash bay to prevent vehicle tracking of soil and silty water to public roads and drains.						^
		• Oil interceptors should be provided in the drainage system downstream of any oil/fuel pollution sources. The oil interceptors should be emptied and cleaned regularly to prevent the release of oil and grease into the storm water drainage system after accidental spillage. A bypass should be provided for the oil interceptors to prevent flushing during heavy rain.						N/A
		• Construction solid waste, debris and rubbish on site should be collected, handled and disposed of properly to avoid water quality						^

SCL Works Contract 1106 - Environmental Mitigation Implementation Schedule

EIA Ref.	EM&A Log Ref	Recommended Mitigation Measures	Objectives of the recommended Measures & Main Concerns to address	Who to implement the measures?	Location of the measures	When to Implement the measures?	What requirements or standards for the measures to achieve?	Status
		impacts. • All fuel tanks and storage areas should be provided with locks and sited on sealed areas, within bunds of a capacity equal to 110% of the storage capacity of the largest tank to prevent spilled fuel oils from reaching water sensitive receivers nearby • All the earth works involving should be conducted sequentially to limit the amount of construction runoff generated from exposed areas during the wet season (April to September) as far as practicable. • Adopt best management practices.						^ N/A ^
S10.7.1	W3	Sewage Effluent • Portable chemical toilets and sewage holding tanks are recommended for handling the construction sewage generated by the workforce. A licensed contractor should be employed to provide appropriate and adequate portable toilets and be responsible for appropriate disposal and maintenance.	To minimize water quality from sewage effluent	Contractor	All construction sites where practicable	Construction stage	• Water Pollution Control Ordinance • TM-water	^
S10.7.1	W5	Accidental Spillage In order to prevent accidental spillage of chemicals, the following is recommended: • Proper storage and handling facilities should be provided; • All the tanks, containers, storage area should be bunded and the	To minimize water quality impact from accidental spillage	Contractor	All construction sites where practicable	Construction stage	• Water Pollution Control Ordinance • ProPECC PN1/94 • TM-EIAO • TM-Water	* ^

EIA Ref.	EM&A Log Ref	Recommended Mitigation Measures	Objectives of the recommended Measures & Main Concerns to address	Who to implement the measures?	Location of the measures	When to Implement the measures?	What requirements or standards for the measures to achieve?	Status
		locations should be locked as far as possible from the sensitive watercourse and stormwater drains; • The Contractor should register as a chemical waste producer if chemical wastes would be generated. Storage of chemical waste arising from the construction activities should be stored with suitable labels and warnings; and • Disposal of chemical wastes should be conducted in compliance with the requirements as stated in the Waste disposal (Chemical Waste) (General) Regulation.						^ ^
Waste Management (Construction Waste)								
S11.4.1.1	WM1	On-site sorting of C&D material • Geological assessment should be carried out by competent persons on site during excavation to identify materials which are not suitable to use as aggregate in structural concrete (e.g. volcanic rock, Aplite dyke rock, etc). Volcanic rock and Aplite dyke rock should be separated at the source sites as far as practicable and stored at designated stockpile areas preventing them from delivering to crushing facilities. The crushing plant operator should also be reminded to set up measures to prevent unsuitable rock from ended up at concrete batching plants and be turned into concrete for structural use. Details regarding control measures at	Separation of unsuitable rock from ending up at concrete batching plants and be turned into concrete for structural use	Contractor	All construction sites	Construction stage	• DEVB TC(W) No. 6/2010	N/A

SCL Works Contract 1106 - Environmental Mitigation Implementation Schedule

EIA Ref.	EM&A Log Ref	Recommended Mitigation Measures	Objectives of the recommended Measures & Main Concerns to address	Who to implement the measures?	Location of the measures	When to Implement the measures?	What requirements or standards for the measures to achieve?	Status
		source site and crushing facilities should be submitted by the Contractors for the Engineer to review and agree. In addition, site records should also be kept for the types of rock materials excavated and the traceability of delivery will be ensured with the implementation of Trip Ticket System and enforced by site supervisory staff as stipulated under DEVB TC(W) No. 6/2010 for tracking of the correct delivery to the rock crushing facilities for processing into aggregates. Alternative disposal option for the reuse of volcanic rock and Aplite Dyke rock, etc should also be explored.						
S11.5.1	WM2	Construction and Demolition Material • Maintain temporary stockpiles and reuse excavated fill material for backfilling and reinstatement; • Carry out on-site sorting; • Make provisions in the Contract documents to allow and promote the use of recycled aggregates where appropriate; • Adopt 'Selective Demolition' technique to demolish the existing structures and facilities with a view to recovering broken concrete effectively for recycling purpose, where possible; • Implement a trip-ticket system for each works contract to ensure that the disposal of C&D materials are properly documented and	Good site practice to minimize the waste generation and recycle the C&D materials as far as practicable so as to reduce the amount for final disposal	Contractor	All construction sites	Construction stage	• Land (Miscellaneous Provisions) Ordinance • Waste Disposal Ordinance • ETWB TCW No. 19/2005	^ ^ ^ N/A ^

SCL Works Contract 1106 - Environmental Mitigation Implementation Schedule

EIA Ref.	EM&A Log Ref	Recommended Mitigation Measures	Objectives of the recommended Measures & Main Concerns to address	Who to implement the measures?	Location of the measures	When to Implement the measures?	What requirements or standards for the measures to achieve?	Status
		verified; and • Implement an enhanced Waste Management Plan similar to ETWBTC (Works) No. 19/2005 – "Environmental Management on Construction Sites" to encourage on-site sorting of C&D materials and to minimize their generation during the course of construction. • In addition, disposal of the C&D materials onto any sensitive locations such as agricultural lands, etc. should be avoided. The Contractor shall propose the final disposal sites to the Project Proponent and EPD and get their approval before implementation						^ ^
S11.5.1	WM3	C&D Waste • Standard formwork or pre-fabrication should be used as far as practicable in order to minimise the arising of C&D materials. The use of more durable formwork or plastic facing for the construction works should be considered. Use of wooden hoardings should not be used, as in other projects. Metal hoarding should be used to enhance the possibility of recycling. The purchasing of construction materials will be carefully planned in order to avoid over ordering and wastage. • The Contractor should recycle as much of the C&D materials as possible on-site. Public fill and C&D waste should be segregated	Good site practice to minimize the waste generation and recycle the C&D materials as far as practicable so as to reduce the amount for final disposal	Contractor	All construction sites	Construction stage	• Land (Miscellaneous Provisions) Ordinance • Waste Disposal Ordinance • ETWB TCW No.19/2005	^ ^

SCL Works Contract 1106 - Environmental Mitigation Implementation Schedule

EIA Ref.	EM&A Log Ref	Recommended Mitigation Measures	Objectives of the recommended Measures & Main Concerns to address	Who to implement the measures?	Location of the measures	When to Implement the measures?	What requirements or standards for the measures to achieve?	Status
		and stored in different containers or skips to enhance reuse or recycling of materials and their proper disposal. Where practicable, concrete and masonry can be crushed and used as fill. Steel reinforcement bar can be used by scrap steel mills. Different areas of the sites should be considered for such segregation and storage.						
S11.5.1	WM4	General Refuse • General refuse generated on-site should be stored in enclosed bins or compaction units separately from construction and chemical wastes. • A reputable waste collector should be employed by the Contractor to remove general refuse from the site, separately from construction and chemical wastes, on a daily basis to minimize odour, pest and litter impacts. Burning of refuse on construction sites is prohibited by law. • Aluminium cans are often recovered from the waste stream by individual collectors if they are segregated and made easily accessible. Separate labelled bins for their deposit should be provided if feasible. • Office wastes can be reduced through the recycling of paper if volumes are large enough to warrant collection. Participation in a	Minimize production of the general refuse and avoid odour, pest and litter impacts	Contractor	All construction sites	Construction stage	• Waste Disposal Ordinance	^ ^ N/A N/A

SCL Works Contract 1106 - Environmental Mitigation Implementation Schedule

EIA Ref.	EM&A Log Ref	Recommended Mitigation Measures	Objectives of the recommended Measures & Main Concerns to address	Who to implement the measures?	Location of the measures	When to Implement the measures?	What requirements or standards for the measures to achieve?	Status
		local collection scheme should be considered by the Contractor.						
S11.5.1	WM6	<u>Chemical Waste</u> • Chemical waste that is produced, as defined by Schedule 1 of the Waste Disposal (Chemical Waste) (General) Regulation,should be handled in accordance with the Code of Practice on the Packaging, Labelling and Storage of Chemical Wastes. • Containers used for the storage of chemical wastes should be suitable for the substance they are holding, resistant to corrosion, maintained in a good condition, and securely closed; have a capacity of less than 450L unless the specification has been approved by the EPD; and display a label in English and Chinese in accordance with instructions prescribed in Schedule 2 of the regulation. • The storage area for chemical wastes should be clearly labelled and used solely for the storage of chemical waste; be enclosed on at least 3 sides; have an impermeable floor and bunding of sufficient capacity to accommodate 110% of the volume of the largest container or 20 % of the total volume of waste stored in that area, whichever is the greatest; have adequate ventilation; be covered to prevent rainfall entering; and be arranged so that incompatible materials are adequately separated.	Control the chemical waste and ensure proper storage, handling and disposal.	Contractor	All Construction Sites	Construction Stage	• Waste Disposal (Chemical Waste) (General) Regulation • Code of Practice on the Packaging, Labelling and Storage of Chemical Waste	^ ^ *

SCL Works Contract 1106 - Environmental Mitigation Implementation Schedule

EIA Ref.	EM&A Log Ref	Recommended Mitigation Measures	Objectives of the recommended Measures & Main Concerns to address	Who to implement the measures?	Location of the measures	When to Implement the measures?	What requirements or standards for the measures to achieve?	Status
		• Disposal of chemical waste should be via a licensed waste collector; and be to a facility licensed to receive chemical waste,such as the Chemical Waste Treatment Centre which also offers a chemical waste collection service and can supply the necessary storage containers; or be to a reuser of the waste, under approval from the EPD.						^

Remarks: ^ Compliance of mitigation measure X Non-compliance of mitigation measure

• Non-compliance but rectified by the contractor

* Recommendation was made during site audit but improved/rectified by the contractor.

N/A Not Applicable

APPENDIX K
WASTE GENERATION IN THE REPORTING MONTH

Contract No: **MTR SCL 1106 - Diamond Hill Station**
Date of Report: **September, 2013**

Monthly Summary Waste Flow Table for 2013

Monthly	Actual Quantities of C&D Materials Generated Monthly						Actual Quantities of Non-inert C&D Wastes Generated Monthly					Remarks
	Total Quantity Generated	Hard Rocks and Large Broken Concrete	Reused in the Contract	Reused in other Projects (See Note 2)	Disposed as Public Fill	Imported Fill	Metals	Paper/ cardboard packaging	Plastics	Chemical Waste (See Note 3)	Others, e.g. general refuse	
	(in '000m^3)	(in '000m^3)	(in '000m^3)	(in '000m^3)	(in '000m^3)	(in '000m^3)	(in '000kg)	(in '000kg)	(in '000kg)	(in '000kg)	(in '000m^3)	
Jan	0.610	0.000	0.000	0.000	0.610	0.000	0.000	0.000	0.000	0.000	0.267	
Feb	2.171	0.000	0.000	0.272	1.899	0.000	0.000	0.000	0.000	0.000	0.203	
Mar	1.416	0.000	0.000	0.392	1.024	0.000	0.000	0.000	0.000	1.500	0.172	
Apr	1.977	0.000	0.000	0.463	1.514	0.000	0.000	0.000	0.000	0.000	1.545	
May	2.638	0.000	0.000	0.400	2.238	0.000	0.000	0.050	0.000	0.000	1.396	
Jun	2.467	0.000	0.000	0.000	2.467	0.000	0.002	0.000	0.000	0.480	0.609	
Sub-total	11.280	0.000	0.000	1.527	9.752	0.000	0.002	0.050	0.000	1.980	4.192	
Jul	2.560	0.000	0.000	1.972	0.588	0.000	0.000	0.000	0.000	0.640	0.321	
Aug	2.201	0.000	0.000	1.447	0.754	0.000	0.000	0.240	0.000	0.960	0.278	
Sept	2.535	0.000	0.000	1.594	0.941	0.000	0.000	0.000	0.000	0.000	0.011	
Oct												
Nov												
Dec												
Total	18.576	0.000	0.000	6.540	12.035	0.000	0.002	0.290	0.000	3.580	4.801	

Notes:

1) Assume the densities of Rock, Soil, Mix Rock and Soil, are Regular Spoil to be 2.0 tonnes/m^3. Assumption the densities of general refuse is 1.0 tonnes/m^3
2) Inert C&D material was delivered to Kai Tak Barging Point Facility (Contract 1108A)
3) Chemical waste includes waste diesel oil. It is assumed density of diesel oil to be 0.8kg/L.

APPENDIX L
CUMULATIVE LOG FOR COMPLAINT LOGS, NOTIFICATION OF SUMMONS AND SUCCESSFUL PROSECUTIONS

Appendix L - Cumulative Log for Complaints, Notifications of Summons and Successful Prosecutions

Cumulative Complaint Log

Log Ref.	Date/Location	Complainant/ Date of Contact	Details of Complaint	Investigation/ Mitigation Action	File Closed
--	--	--	--	--	--

Cumulative Log for Notifications of Summons

Log Ref.	Date/Location	Subject	Status	Total no. Received in this reporting month	Total no. Received since project commencement
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Cumulative Log for Successful Prosecutions

Log Ref.	Date/Location	Subject	Status	Total no. Received in this reporting month	Total no. Received since the commencement of the project
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Appendix G

5th EM&A Report for Works Contract 1107 – Diamond Hill to Kai Tak Tunnels

MTR Corporation Limited

Shatin to Central Link –
Tai Wai to Hung Hom Section

Monthly EM&A Report

[Period from 1 to 30 September 2013]

Works Contract 1107 – Diamond Hill to Kai Tak Tunnels

(September 2013)

Certified by: Dr. Priscilla Choy

Position: Environmental Team Leader

Date: 10th October 2013

Chun Wo – SELI Joint Venture

Shatin to Central Link – Contract 1107 Diamond Hill to Kai Tak Tunnels

Monthly Environmental Monitoring and Audit Report for September 2013

(Version 2.0)

Certified By	Dr. Priscilla Choy (Environmental Team Leader)

REMARKS:

The information supplied and contained within this report is, to the best of our knowledge, correct at the time of printing.

CINOTECH accepts no responsibility for changes made to this report by third parties.

CINOTECH CONSULTANTS LTD
Room 1710, Technology Park,
18 On Lai Street,
Shatin, NT, Hong Kong
Tel: (852) 2151 2083 Fax: (852) 3107 1388
Email: info@cinotech.com.hk

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EXECUTIVE SUMMARY

Introduction

1. This is the 5th monthly Environmental Monitoring and Audit (EM&A) Report prepared by Cinotech Consultants Limited for **MTR Shatin to Central Link (SCL) Works Contract 1107 – Diamond Hill to Kai Tak Tunnels**. This report documents the findings of EM&A Works conducted from 1 September to 30 September 2013.

Summary of Construction Works undertaken during Reporting Month

2. The major site activities undertaken in the reporting month include:

- Site investigation works;
- Investigation and removal of old foundation works;
- Hoarding erection;
- D-wall construction;
- Sheet piling works; and
- Preparation works for site access and drainage.

Variation in Construction Method

3. As of the reporting month, an alignment section of approximately 90m long between DIH and KAT under this Works Contract 1107 will be constructed by the cut-and-cover method, instead of bored tunnelling method as assessed in the approved Environmental Impact Assessment (EIA) Report of Shatin to Central Link - Stabling Sidings at Hung Hom Freight Yard (hereafter referred to as SCL (HHS)) [Register No.: AEIAR-164/2012] due to increased construction risk caused by potential left-in piles. Also, pile removal works would be conducted if reinforced bored piles are identified along the bored tunnelling section. Application for variation of Environmental Permit (VEP) was approved and the updated EP (EP No.: EP-438/2012/D) was issued by EPD on 13 September 2013 for the varied construction method.

Environmental Monitoring and Audit Progress

4. A summary of the monitoring activities in this reporting period is listed below:

<u>Regular Construction Noise and Construction Dust Monitoring</u>

- Regular construction noise monitoring during normal working hours

  <u>Noise Monitoring Station ID</u>
  - NMS-CA-4(1)(3)/NMS-CA-3(2)(3) (Block 1, Rhythm Garden (north-eastern façade)) 4 times
  - NMS-CA-5(1)(4)/NMS-CA-2(2)(4) (Block 1, Rhythm Garden (northern façade)) 4 times

- Construction Dust (24-hour TSP) Monitoring

  <u>Dust Monitoring Station ID</u>
  - DMS-4(1)(5)/ DMS-3(2)(5) (Block 1, Rhythm Garden) 5 times

Remarks:
(1) Station ID as identified in approved EM&A Manual / EIA Report for SCL(TAW-HUH).
(2) Station ID as identified in approved EM&A Manual / EIA Report for SCL(HHS).
(3) Noise monitoring on NMS-CA-4(1)/ NMS-CA-3(2) (Block 1, Rhythm Garden (north-eastern façade) is carried out by Environmental Team of SCL Works Contract 1106.
(4) Noise monitoring on NMS-CA-5(1)/ NMS-CA-2(2) (Block 1, Rhythm Garden (northern façade) is carried out by Environmental Team of SCL Works Contract 1106.
(5) Dust monitoring on DMS-4(1)/ DMS-3(2) (Block 1, Rhythm Garden) is carried out by Environmental Team of SCL Works Contract 1106.

Waste Management

5. Wastes generated from this Project include inert construction and demolition (C&D) materials and non-inert C&D materials. Details of waste management data is presented in Section 5 and **Appendix K**.

Landscape and Visual

6. Bi-weekly inspection of the implementation of landscape and visual mitigation measures was conducted on 6 and 19 September 2013. Most of the necessary mitigation measures have been implemented and recommended follow-up actions have been discharged by the Contractor. Details of the audit findings and implementation status are presented in Section 6.

Environmental Site Inspection

7. Joint weekly site inspections were conducted by representatives of the Contractor, Engineer and Contractor's ET on 6, 13, 19 and 27 Spetember 2013. The representative of the IEC joined the site inspection on 13 September 2013. Details of the audit findings and implementation status are presented in Section 6.

Environmental Exceedance/Non-conformance/Complaint/Summons and Successful Prosecution

8. No exceedance of the Action and Limit Levels of regular construction noise monitoring and 24-hour TSP monitoring was recorded during the reporting period.

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

10. No Project related environmental complaint and notification of summons/ successful prosecutions was received in this reporting period.

Future Key Issues

11. Major site activities for the coming reporting month will include:

- Site investigation works;
- Investigation and removal of old foundation works;
- Hoarding erection;
- D-wall construction;
- Sheet piling works;
- Tree transplantation; and
- Preparation works for site access and drainage.

1 INTRODUCTION

1.1 Cinotech Consultants Limited (Cinotech) was appointed by Chun Wo – SELI Joint Venture (CSJV) as the Environmental Team (ET) to undertake the Environmental Monitoring and Audit (EM&A) programme during construction phase of the MTR Shatin to Central Link (SCL)Works Contract 1107 – Diamond Hill to Kai Tak Tunnels (hereafter referred to as the Project).

Purpose of the Report

1.2 This is the 5th EM&A report which summarises the impact monitoring results and audit findings for the EM&A programme during the reporting period from 1 September to 30 September 2013. The major construction works for Contract 1107 commenced on 27 May 2013.

Structure of the Report

1.3 The structure of the report is as follows:

Section 1: **Introduction -** details the scope and structure of the report.

Section 2: **Project Information** - summarises background and scope of the project, site description, project organization and contact details, construction programme, the construction works undertaken and the status of Environmental Permits/Licenses during the reporting period.

Section 3: **Environmental Monitoring Requirement -** summarises the monitoring parameters, monitoring programmes, monitoring methodologies, monitoring frequency, monitoring locations, Action and Limit Levels, Event / Action Plans, environmental mitigation measures as recommended in the EIA report and relevant environmental requirements.

Section 4: **Implementation Status on Environmental Mitigation Measures -** summarises the implementation of environmental protection measures during the reporting period.

Section 5: **Monitoring Results** - summarises the monitoring results obtained in the reporting period.

Section 6: **Environmental Site Inspection -** summarises the audit findings of the weekly site inspections undertaken within the reporting period.

Section 7: **Environmental Non-conformance -** summarises any monitoring exceedance, environmental complaints and environmental summons within the reporting period.

Section 8: **Future Key Issues -** summarises the impact forecast and monitoring schedule for the next three months.

Section 9: **Conclusions and Recommendations**

2 PROJECT INFORMATION

Background

2.1 The Shatin to Central Link – Tai Wai to Hung Hom Section (hereafter referred to as SCL (TAW-HUH)) is an approximately 11 km long extension of the Ma On Shan Line and links up with the West Rail Line at Hung Hom forming a strategic east-west rail corridor. It is a Designated Project under the Environmental Impact Assessment Ordinance (Cap. 499) (EIAO).

2.2 The construction of the SCL (TAW-HUH) and SCL (HHS) have been divided into a series of civil construction works contracts. This Works Contract 1107 covers the construction of running tunnel from Kai Tak (KAT) North to SCL Diamond Hill (DIH) Station which is under the approved SCL (HHS) EIA Report. This construction contract was awarded to Chun Wo - SELI Joint Venture (CSJV) in March 2013.

General Site Description

2.3 The construction of tunnel from KAT to DIH will employ either cut-and-cover method or bored tunneling. The alignment and works area for the Works Contract 1107 are shown in **Figure 1**.

Construction Programme and Activities

2.4 A summary of the major construction activities undertaken in this reporting period is shown as follows. The tentative construction programme is presented in **Appendix A**.

- Site investigation works;
- Investigation and removal of old foundation works;
- Hoarding erection;
- D-wall construction;
- Sheet piling works; and
- Preparation works for site access and drainage.

Project Organisation

2.5 The project organizational chart and contact details are shown in **Figure 4.**

Status of Environmental Licences, Notification and Permits

2.6 A summary of the relevant permits, licences, and/or notifications on environmental protection for this Project is presented in **Table 2.1**. No new Construction Noise Permit (CNP) was granted by EPD during the reporting period.

Table 2.1 Summary of the Status of Environmental Licences, Notification and Permits

Permit / License No.	Valid Period		Status
	From	To	
Environmental Permit (EP)			
EP-438/2012/C	30/04/2013	12/09/2013	Supersed by EP-438/2012/D since 13 September 2013
EP-438/2012/D	13/09/2013	N/A	Valid
Notification pursuant to Air Pollution Control (Construction Dust) Regulation			
Ref no.: 357051	18/03/2013	N/A	Valid
Billing Account for Construction Waste Disposal			
Account No. 7017163	26/03/2013	N/A	Valid
Registration of Chemical Waste Producer			
5213-286-C3798-01	29/04/2013	N/A	Valid
Effluent Discharge License under Water Pollution Control Ordinance			
WT00015861-2013	13/05/2013	31/05/2018	Valid
WT00016009-2013	23/05/2013	31/05/2018	Valid
Construction Noise Permit (CNP)			
PP-RE0028-13	15/07/2013	14/01/2014	Valid
GW-RE0852-13	19/08/2013	31/12/2013	Valid

Summary of EM&A Requirements

2.7 The EM&A programme under Works Contract 1107 require regular dust and noise monitoring as well as environmental site audits. The EM&A requirements are described in the following sections, including:

- All monitoring parameters;
- Action and Limit levels for all environmental parameters;
- Event / Action Plans;
- Environmental mitigation measures, as recommended in the Project EIA study final report; and
- Environmental requirements in contract documents.

2.8 The advice on the implementation status of environmental protection and pollution control/mitigation measures is summarized in Section 6 of this report.

2.9 This report presents the monitoring results, observations, locations, equipment, period, methodology and QA/QC procedures of the required monitoring parameters, namely construction noise & dust monitoring as well as audit works for the Project in the reporting month.

3 ENVIRONMENTAL MONITORING REQUIREMENTS

Regular Construction Noise Monitoring

3.1 In accordance with the EM&A Manual, monitoring of construction noise impact should be conducted at the designated monitoring stations. Since access to some of the proposed monitoring locations stated in the EM&A Manual was rejected; alternative locations were proposed and agreed by the ER (Engineer's Representative), IEC (Independent Environmental Checker) and EPD (Environmental Protection Department). The construction noise monitoring locations are listed in **Table 3.1** and shown in **Figure 2**.

Table 3.1 Regular Construction Noise Monitoring Location

Regular Construction Noise Monitoring Location(4)(5)	Description	Type of Measurement
NMS-CA-4(1)/ NMS-CA-3(2)	Block 1, Rhythm Garden (north-eastern façade)	Façade
NMS-CA-5 (1) (3)/ NMS-CA-2(2)(3)	Block 1, Rhythm Garden (northern façade)	Façade

Note:
(1) NSR ID as identified in approved EM&A Manual / EIA Report for SCL(TAW-HUH).
(2) NSR ID as identified in approved EM&A Manual / EIA Report for SCL(HHS).
(3) Access to the monitoring location at Canossa Primary School (San Po Kong) (originally proposed in the approved EM&A Manual) was denied during the baseline monitoring. An alternative location (Block 1, Rhythm Garden (northern façade)) was proposed and approved by the ER and agreed by the IEC and EPD.
(4) Noise monitoring on NMS-CA-4(1)/ NMS-CA-3(2) (Block 1, Rhythm Garden (north-eastern façade) is carried out by Environmental Team of SCL Works Contract 1106.
(5) Noise monitoring on NMS-CA-5(1)/ NMS-CA-2(2) (Block 1, Rhythm Garden (northern façade) is carried out by Environmental Team of SCL Works Contract 1106.

Monitoring Parameter and Frequency

3.2 Weekly construction noise monitoring was conducted in accordance with the requirements stipulated in the EM&A Manual. If works are to be carried out during restricted hours, the conditions stipulated in the construction noise permit issued by the Noise Control Authority have to be followed. The monitoring schedule for this reporting period of monitoring stations at Rhythm Garden is shown in **Appendix D**.

3.3 The construction noise levels were measured in terms of the A-weighted equivalent continuous sound pressure level (L_{Aeq}) in decibels dB(A). L_{Aeq} (30min) (as six consecutive $L_{eq,\ 5\text{-}min}$ readings) was used as the monitoring metric for the time period between 0700 – 1900 hours on normal weekdays.

Monitoring Equipment and Methodology

Field Monitoring

3.4 The monitoring procedures are as follows:

- The microphone head of the sound level meter was positioned 1m exterior of the noise sensitive facade and lowered sufficiently so that the building's external wall acts as a reflecting surface.
- The battery condition was checked to ensure good functioning of the meter.
- Parameters such as frequency weighting, the time weighting and the measurement time were set as follows:

  - frequency weighting : A
  - time weighting : Fast
  - measurement time : 5 minutes (obtaining six consecutive $L_{eq,5min}$ readings for a $L_{eq,30\ min}$ reading)

- Prior to and after noise measurement, the meter was calibrated using the calibrator for 94.0 dB at 1000 Hz. If the difference in the calibration level before and after measurement is more than 1.0 dB, the measurement was considered invalid and repeat of noise measurement was required after re-calibration or repair of the equipment.
- The wind speed at the monitoring station was checked with the portable wind meter. Noise monitoring was cancelled in the presence of fog, rain, and wind with a steady speed exceeding 5 m/s, or wind with gusts exceeding 10 m/s.
- Noise measurement was paused during periods of high intrusive noise if possible and observation was recorded when intrusive noise was not avoided.
- At the end of the monitoring period, the L_{eq}, L_{10} and L_{90} were recorded. In addition, site conditions and noise sources were recorded on a standard record sheet.
- A façade correction of +3dB(A) shall be made to the noise parameter obtained by free field measurement.

Monitoring Equipment

3.5 The sound level meters and calibrator used for the noise measurement, as listed in **Table 3.2**, compile with the IEC 651: 1979 and 804:1985 (Type 1) specification. The calibration certificates of the sound level meters are included in **Appendix C**.

Table 3.2 Noise Monitoring Equipment

Monitoring Equipment	Model (Serial no.)
Sound Level Meter	SVAN 957 (Serial no.: 21459)
Calibrator	SVANTEK – SV30A (Serial no.: 10929, 24791)

Maintenance and Calibration

3.6 Maintenance and Calibration procedures were as follows:

- The microphone head of the sound level meter and calibrator were cleaned with a soft cloth at quarterly intervals.
- The sound level meter and calibrator were checked and calibrated at yearly intervals. Copies of calibration certificates are attached in **Appendix C**.

Action & Limit Level for Construction Noise Monitoring

3.7 The Action and Limit Levels are presented in **Appendix B** and the Event / Action Plan (EAP) for noise monitoring is presented in **Appendix I.**

Continuous Noise Monitoring

3.8 With reference to the latest Continuous Noise Monitoring Plan (CNMP) and Construction Noise Mitigation Measures Plan (CNMMP) prepared submitted under EP Condition 2.9 and Condition 2.10 respectively, it is predicted that no residual air-borne construction noise impacts exceeding the relevant noise criteria will be anticipated. Therefore, no continuous noise monitoring is required during the construction of the SCL (TAW-HUH) under Works Contract 1107.

Regular Construction Dust Monitoring

3.9 The proposed dust monitoring stations for the construction phase of the Project, as recommended in the approved EM&A Manual, are listed in **Table 3.3** and shown in **Figure 3**. The proposed locations have been agreed with the ER, EPD and IEC.

Table 3.3 Dust Monitoring Location

Regular Dust Monitoring Location	Description
DMS-4(1)(3)/ DMS-3(2)(3)	Block 1, Rhythm Garden

Note:
(1) ASR ID as identified in approved EM&A Manual / EIA Report for SCL(TAW-HUH).
(2) ASR ID as identified in approved EM&A Manual / EIA Report for SCL(HHS).
(3) Dust monitoring on DMS-4(1)/DMS-3(2) (Block 1, Rhythm Garden) is carried out by Environmental Team of SCL Works Contract 1106.

Monitoring Parameter and Frequency

3.10 The dust monitoring (in terms of Total Suspended Particulates (TSP)) was conducted at the designated monitoring stations in accordance with the requirements stipulated in the EM&A Manual. The 24-hour TSP levels were monitored at the frequency and duration stated in **Table 3.4**. The TSP monitoring at Rhythm Garden was conducted as per the schedule presented in **Appendix D**.

Table 3.4 Dust Monitoring Parameters and Frequency

Monitoring Period	Duration	Parameter	Frequency
Impact Monitoring(1)	Throughout the construction period	24-hour TSP	Once per 6 days

Note:
(1) 1- hour TSP shall be conducted when one documented valid complaint is received.

Monitoring Equipment

3.11 **Table 3.5** summarizes the equipment used for the dust monitoring.

Table 3.5 Dust Monitoring Equipment

Equipment	Model and Make	Qty.
HVS	Tisch Environmental, Inc.; Model no. TE-5170, Serial no.: 2352	1
Calibration Orifice	Tisch Environmental, Inc.; Model no. TE – 5025A Orifice ID: 2323	1

Instrumentation

3.12 High Volume Samplers (HVS) connected with appropriate sampling inlets were employed for air quality monitoring. Each sampler was composed of a motor, a filter holder, a flow controller and a sampling inlet and its performance specification complies with that required by USEPA Standard Title 40, Code of Federation Regulations Chapter 1 Appendix B (Part 50).

HVS Installation

3.13 The following guidelines were adopted during the installation of HVS:

- Sufficient support was provided to secure the samplers against gusty wind.
- No two samplers were placed less than 2 meters apart.
- The distance between the sampler and an obstacle, such as buildings, was at least twice the height that the obstacle protrudes above the sampler.
- A minimum of 2 meters of separation from walls, parapets and penthouses was required for rooftop samples.
- A minimum of 2 meters separation from any supporting structure, measured horizontally was required.
- No furnaces or incineration flues were nearby.
- Airflow around the sampler was unrestricted.
- The samplers were more than 20 meters from the drip line.
- Any wire fence and gate, to protect the sampler, should not cause any obstruction during monitoring.

Filters Preparation

3.14 Fiberglass filters were used which have a collection efficiency of larger than 99% for particles of 0.3 μm diameter. A HOKLAS accredited laboratory, Wellab Ltd. (HOKLAS Registration No. 083), was responsible for the preparation of pre-weighed filter papers for Cinotech's monitoring team.

3.15 All filters, which were prepared by Wellab Ltd., were equilibrated in the conditioning environment for 24 hours before weighing. The conditioning environment temperature was around 25 °C and not variable by more than ±3 °C; the relative humidity (RH) was < 50% and not variable by more than ±5%. A convenient working RH was 40%.

3.16 Wellab Ltd. has a comprehensive quality assurance and quality control programmes.

Operating/Analytical Procedures

3.17 Operating/analytical procedures for the TSP monitoring were highlighted as follows:

- Prior to the commencement of the dust sampling, the flow rate of the HVS was properly set (between 1.1 and 1.4 m^3/min.) in accordance with the manufacturer's instruction to within the range recommended in USEPA Standard.
- The power supply was checked to ensure the sampler worked properly.
- The filter holding frame and the area surrounding the filter were cleaned.
- On sampling, the sampler was operated for 5 minutes to establish thermal equilibrium before placing any filter media at the air quality monitoring station.
- The filter holding frame was then removed by loosening the four nuts and carefully a weighted and conditioned filter was centered with the stamped number upwards, on a supporting screen.
- The filter was aligned on the screen so that the gasket formed an airtight seal on the outer edges of the filter. Then the filter holding frame was tightened to the filter holder with swing bolts to avoid air leakage at the edges.
- The shelter lid was closed and secured with the aluminum strip.
- A new flow rate record chart was set into the flow recorder.
- The timer was then programmed. Information was recorded on the record sheet, which included the starting time, the weather condition and the filter number (the initial weight of the filter paper can be found out by using the filter number).
- The flow rate of the HVS sampler would be verified to be constant and recorded on the data sheet before and after sampling.
- The elapsed time and other relevant information was recorded. After sampling, the sampled filter was removed carefully and folded in half length so that only surfaces with collected particulate matter were in contact.
- It was then placed in a clean plastic envelope and sealed and sent to the Wellab Ltd. for weighing.
- Before weighing, all filters were equilibrated in a conditioning environment for 24 hours. The conditioning environment should be between 25°C and 30°C and not vary by more than ±3°C; the relative humidity (RH) should be < 50% and not vary by more than ±5%. A convenient working RH is 40%. Weighing results were returned to Cinotech for further analysis of TSP concentrations collected by each filter.

Maintenance/Calibration

3.18 The following maintenance/calibration was required for the HVS:

- The high volume motors and their accessories were properly maintained. Appropriate maintenance such as routine motor brushes replacement and electrical wiring checking were made to ensure that the equipment and necessary power supply are in good working condition.
- Calibration of the HVS (five point calibration) using Calibration Kit was carried out every two months. Copies of calibration certificates are attached in **Appendix C**.
- The HVS calibration orifice will be calibrated annually.

Action and Limit Levels for Dust Monitoring

3.19 The Action and Limit levels have been established and are presented in **Appendix B** and the Event / Action Plan (EAP) for dust monitoring is presented in **Appendix I.**

<u>Landscape and Visual</u>

3.20 In accordance with the EM&A Manual, the landscape and visual mitigation measures shall be implemented and a site inspection shall be conducted once every two weeks throughout the construction period. The Event / Action Plan (EAP) for landscape and visual is presented in **Appendix I**. The implementation status is given in **Appendix J**.

4 IMPLEMENTATION STATUS ON ENVIRONMENTAL PROTECTION REQUIREMENTS

4.1 The Contractor has implemented environmental mitigation measures and requirements as stated in the EIA Report, the Environmental Permit and EM&A Manual. The implementation status of the environmental mitigation measures of the reporting period is summarized in **Appendix J**. Status of required submissions under the Environmental Permit (EP) of the reporting period is presented in **Table 4.1**.

Table 4.1 Status of Required Submissions under EP

EP Condition	Submission	Submission Date
Condition 3.4	Monthly EM&A Report (August 2013)	13th September 2013

5 MONITORING RESULTS

Regular Construction Noise Monitoring

5.1 A total of 8 sets of 30-minute construction noise measurements were carried out at the monitoring stations during normal weekdays of the reporting period by ET of SCL Works Contract 1106. No exceedance of the limit level was recorded at designated monitoring stations.

5.2 Based on observation during the on-site monitoring, road traffic nearby is considered as a potential noise source other than construction works of the Project that affects the monitoring results of the reporting month.

5.3 The noise monitoring results together with their graphical presentations are presented in **Appendix F**.

5.4 No exceedance of the Action and Limit Levels of construction noise due to the Project was recorded during the reporting period.

Regular Dust Monitoring

5.5 5 sets of 24-hour TSP monitoring were carried out at the designated monitoring stations during normal weekdays of the reporting period by ET of SCL Works Contract 1106. The monitoring results together with their graphical presentations are presented in **Appendix E** and a summary of the dust monitoring results in this reporting month is given in **Table 5.1**.

Table 5.1 Summary Table of Dust Monitoring Results during the reporting month

Parameter	Minimum $\mu g/m^3$	Maximum $\mu g/m^3$	Average $\mu g/m^3$	Action Level, $\mu g/m^3$	Limit Level, $\mu g/m^3$
24-hr TSP (DMS-4(1)(3)/ DMS-3(2)(3))	22.5	62.6	40.3	160.4	260

5.6 Based on observation during the on-site monitoring, road traffic emission nearby is considered as a potential dust source other than construction works of the Project that affects the monitoring results of the reporting month.

5.7 Wind monitoring data were obtained from Kai Tak Meteorological Station of Hong Kong Observatory and shown on **Appendix E**.

5.8 No exceedance of the Action and Limit Levels of the 24-hour TSP was recorded during the reporting period.

Remarks:
(1) Station ID as identified in approved EM&A Manual / EIA Report for SCL(TAW-HUH).
(2) Station ID as identified in approved EM&A Manual / EIA Report for SCL(HHS).
(3) Dust monitoring on DMS-4(1)/DMS-3(2) (Block 1, Rhythm Garden) is carried out by Environmental Team of SCL Works Contract 1106.

Waste Management

5.9 Waste generated from this Project includes inert construction and demolition (C&D) materials and non-inert C&D materials. Non-inert C&D materials are made up of general refuse, vegetative wastes and recyclable wastes like plastics and paper/cardboard packaging materials. Steel materials generated from the project are also grouped into non-inert C&D materials as the materials were not disposed of with other inert C&D materials. With reference to relevant handling records and trip tickets of this Project, the quantities of different types of waste generated in the reporting month are summarised in **Table 5.2**. No plastics and 12,000 kg of metals were generated during this reporting month. Details of waste management data is presented in **Appendix K**.

Table 5.2 Quantities of Waste Generated from the Project

<table>
<tr><th rowspan="4">Reporting Month</th><th colspan="6">Quantity</th></tr>
<tr><th rowspan="3">C&D Materials (inert) (a)</th><th colspan="5">C&D Materials (non-inert) (b)</th></tr>
<tr><th rowspan="2">General Refuse</th><th rowspan="2">Chemical Waste</th><th colspan="3">Recycled materials</th></tr>
<tr><th>Paper/ cardboard</th><th>Plastics</th><th>Metals</th></tr>
<tr><td>September 2013</td><td>1,790 m^3</td><td>40 m^3</td><td>0 kg</td><td>0 kg</td><td>0 kg</td><td>12,000 kg</td></tr>
<tr><td colspan="7">Notes:
(a) Inert C&D materials include bricks, concrete, building debris, rubble and excavated soil,
(b) Non-inert C&D materials include steel, paper/cardboard packaging waste, plastics and other wastes such as general refuse and vegetative wastes. Steel materials generated from the project are grouped into non-inert C&D materials as the materials were not disposed of with other inert C&D materials.</td></tr>
</table>

Landscape and Visual

5.10 Bi-weekly inspection of the implementation of landscape and visual mitigation measures was conducted on 6 and 19 September 2013. The observations and recommendations made during the audit sessions are summarized in **Table 6.1**.

6 ENVIRONMENTAL SITE INSPECTION

Site Audit

6.1 Site audit was carried out by ET on weekly basis to monitor the timely implementation of proper environmental management practices and mitigation measures in the Project site. The summaries of site audit are attached in **Appendix H**.

6.2 Site audits were conducted on 6, 13, 19 and 27 September 2013 by ET. A joint site audit with the representative with IEC, ER, the Contractor and the ET was carried out on 13 September 2013. No site inspection was conducted by EPD during the reporting month. The details of observations during site audit can refer to **Table 6.1**.

Implementation Status of Environmental Mitigation Measures

6.3 According to the EIA Study Report, Environmental Permit and the EM&A Manual of the Project, the mitigation measures detailed in the documents are recommended to be implemented during the construction phase. An updated summary of the Environmental Mitigation Implementation Schedule (EMIS) is provided in **Appendix J**.

6.4 During site inspections in the reporting month, no non-conformance was identified. The observations and recommendations made during the audit sessions are summarized in **Table 6.1**.

Table 6.1 Observations and Recommendations of Site Audit

Parameters	Date	Observations and Recommendations	Follow-up
Water Quality	30 Aug 2013	The wastewater treatment plant should be well maintained and ensure the reading of pH value is correct.	The observation was observed to be improved/rectified by the Contractor during the audit session on 6 Sep 2013.
	30 Aug 2013	Reminder: Cover the stockpile with impervious sheets after rainy conditions.	The observation was observed to be improved/rectified by the Contractor during the audit session on 6 Sep 2013.
	6 Sep 2013	Reminder: To avoid surface runoff discharge without water treatment.	The observation was observed to be improved/rectified by the Contractor during the audit session on 13 Sep 2013.
	13 Sep 2013	Silty water observed discharge out of the site entrance. The Contractor is reminded to avoid surface runoff discharge and provide proper water treatment facilities.	The observation was observed to be improved/rectified by the Contractor during the audit session on 27 Sep 2013.
	13 Sep 2013	Reminder: To block the holes in the sedimentation pit to avoid leakage of muddy water.	The observation was observed to be improved/rectified by the Contractor during the audit session on 19 Sep 2013.
	19 Sep 2013	Reminder: Provide sand bags to gullies near site entrance at Kai Ching Estate.	The observation was observed to be improved/rectified by the Contractor during the audit session on 27 Sep 2013.
Noise	--	--	--
Landscape and Visual	--	--	--

Parameters	Date	Observations and Recommendations	Follow-up
Air Quality	13 Sep 2013	Reminder: Properly cover the stockpile by impervious material.	Follow up action will be reported in next reporting month.
	13 Sep 2013	Reminder: General reminder for watering to exposed work area.	The observation was observed to be improved/rectified by the Contractor during the audit session on 27 Sep 2013.
	19 Sep 2013	Reminder: Properly cover the stockpile with impervious sheets.	Follow up action will be reported in next reporting month.
	19 Sep 2013	Reminder: General reminder for providing water spray to exposed area.	The observation was observed to be improved/rectified by the Contractor during the audit session on 27 Sep 2013.
	19 Sep 2013	Reminder: To check and maintain the generator to avoid black smoke emission.	Follow up action will be reported in next reporting month.
	27 Sep 2013	Black smoke emission observed from power pack. The contractor is reminded to properly maintain the mechanical equipment.	Follow up action will be reported in next reporting month.
	27 Sep 2013	Reminder: Properly cover the dusty stockpile with impervious sheeting.	Follow up action will be reported in next reporting month.
Waste / Chemical Management	9 Aug 2013	Reminder: Properly clear the stagnant water in the drip tray.	The observation was observed to be improved/rectified by the Contractor during the audit session on 6 Sep 2013.
	16 Aug 2013	Reminder: Clear the stagnant water in the drip tray properly near site entrance at Kai Ching Estate. Provide a plug to drip tray.	The observation was observed to be improved/rectified by the Contractor during the audit session on 23 Aug 2013.
	23 Aug 2013	Reminder: Clear stagnant water in drip trays.	The observation was observed to be improved/rectified by the Contractor during the audit session on 6 Sep 2013.
	30 Aug 2013	Reminder: Clear the stagnant water in the drip tray.	The observation was observed to be improved/rectified by the Contractor during the audit session on 6 Sep 2013.
	13 Sep 2013	Reminder: Empty chemical containers should be disposed as chemical waste and separated from general C&D waste.	The observation was observed to be improved/rectified by the Contractor during the audit session on 19 Sep 2013.
Permits/ Licenses	6 Sep 2013	New Construction Noise Permit should be displayed at the site entrance near Kai Ching Estate.	The observation was observed to be improved/rectified by the Contractor during the audit session on 13 Sep 2013.
	27 Sep 2013	Construction Noise Permit should be displayed at the site entrance near Kai Ching Estate.	Follow up action will be reported in next reporting month.

7 ENVIRONMENTAL NON-CONFORMANCE

Summary of Exceedances

7.1 No exceedance of the Action and Limit Levels of regular construction noise monitoring and 24-hour TSP monitoring was recorded during the reporting period. The summary of exceedance is provided in **Appendix G**.

Summary of Environmental Non-Compliance

7.2 No environmental non-compliance was recorded in the reporting month.

Summary of Environmental Complaint

7.3 No environmental Project-related complaint was received in the reporting month. The Cumulative Complaint Log since the commencement of the Project is presented in **Appendix L**.

Summary of Environmental Summon and Successful Prosecution

7.4 There was no successful environmental prosecution or notification of summons received since the Project commencement. The Cumulative Log for environmental summon and successful prosecution since the commencement of the Project is presented in **Appendix L**.

8 FUTURE KEY ISSUES

Construction Programme for the Next Month

8.1 A tentative construction programme is provided in **Appendix A**. The major construction activities in the coming month will include:

- Site investigation works;
- Investigation and removal of old foundation works;
- Hoarding erection;
- D-wall construction;
- Sheet piling works;
- Tree transplantation; and
- Preparation works for site access and drainage.

Key Issues in the Next Month

8.2 Key issues to be considered in the coming month include:

- Dust impact from excavating works;
- Dust arising from loading, unloading, transfer, handling or storage of bulk cement or dry PFA and bentonite;
- Treatment of wastewater from D-wall construction;
- To ensure the performance of sorting of C&D materials at source (during generation); and
- To carry out inspection of dump truck at site exit to ensure inert and non-inert C&D materials are properly segregated before removing off site.

Monitoring Schedule in the Next Month

8.3 The tentative schedule of regular construction noise monitoring and 24-hour TSP monitoring at Rhythm Garden in the next reporting period is presented in **Appendix D**. The regular construction noise monitoring and 24-hour TSP monitoring will be conducted at the same monitoring locations in the next reporting period.

9 CONCLUSIONS AND RECOMMENDATIONS

Conclusions

9.1 The Environmental Monitoring and Audit (EM&A) Report presents the EM&A works undertaken during the period from 1 September to 30 September 2013 in accordance with EM&A Manual and the requirement under EP.

9.2 No exceedance of the Action and Limit Levels of regular construction noise and 24-hour TSP monitoring was recorded at the designated monitoring stations during the reporting month.

9.3 4 times of joint weekly site inspections were conducted by representatives of the Contractor, Engineer and Contractor's ET and 2 times of bi-weekly inspection of the implementation of landscape and visual mitigation measures were conducted during the reporting period.

9.4 There was no Project related environmental complaint, successful prosecution or notification of summons received during the reporting month.

9.5 The ET will keep track on the EM&A programme to ensure compliance of environmental requirements and the proper implementation of all necessary mitigation measures.

Recommendations

9.6 According to the environmental audit performed in the reporting month, the following recommendations were made:

<u>Water Quality</u>

- It is recommended an adequately designed and sited wheel washing facilities should be provided at every construction site exit where practicable. Wash-water should have sand and silt settled out and removed at least on a weekly basis to ensure the continued efficiency of the process.
- It is recommended particular attention should be paid to the control of silty surface runoff into existing drainage during storm events, especially during coming wet season.
- It is reminded to ensure that water discharge is in compliance with water discharge license.
- The Contractor is reminded to avoid surface runoff discharge and provide proper water treatment facilities.

<u>Landscape and Visual</u>

- It is recommended to set up "no-intrusion zone" for existing trees on site in order to restrict the site working staff from entering into the zone prior to any tree survey or assessment.
- It is reminded to remove the construction material from the tree.

<u>Air Quality</u>

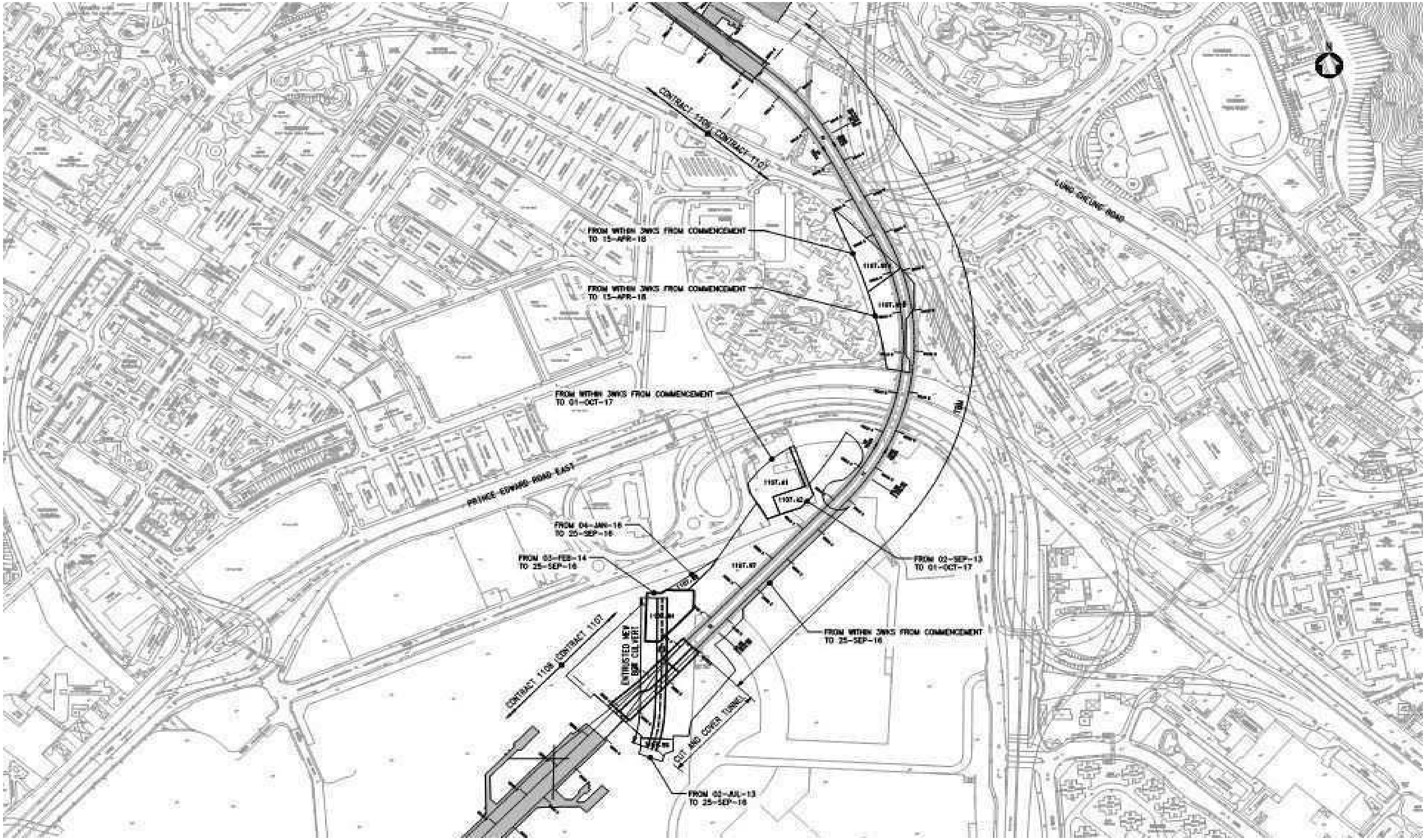
- It is reminded that any excavated or stockpile of dusty material should be covered entirely by impervious sheeting or sprayed with water to maintain the entire surface wet.

- It is reminded that a proper enclosure for the grouting plant should be provided to avoid dust generation.
- It is reminded to properly maintain the mechanical equipment to avoid black smoke emission.

Waste/Chemical Management

- It is reminded good site practice should be adopted by providing drip tray with adequate capacity for powered mechanical equipment whenever practicable. Drip tray should also be properly maintained in good condition such to prevent from accidental fuel/chemicals spillage.
- It is reminded that tarpaulin sheets should be provided for placing the breaker to avoid chemical leakage to unpaved ground.
- It is reminded to clear the oil stain properly as chemical waste.

FIGURES

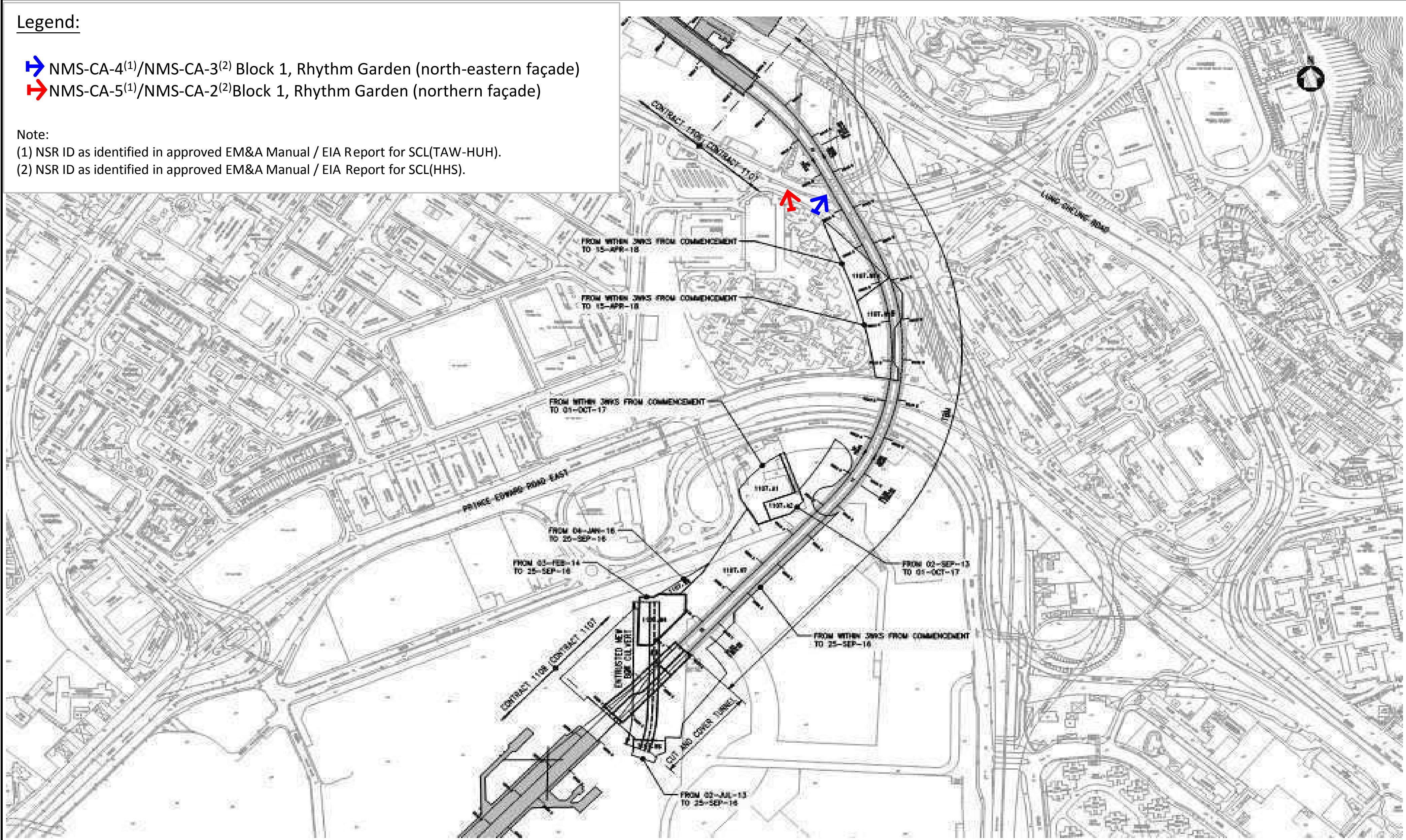


Title	Scale	Project No.	
MTR SCL Works Contract 1107 Diamond Hill to Kai Tak Tunnels Site Layout Plan	N.T.S	MA13018	CINOTECH
	Date: May-13	Figure: 1	

Legend:

- NMS-CA-4(1)/NMS-CA-3(2) Block 1, Rhythm Garden (north-eastern façade)
- NMS-CA-5(1)/NMS-CA-2(2) Block 1, Rhythm Garden (northern façade)

Note:
(1) NSR ID as identified in approved EM&A Manual / EIA Report for SCL(TAW-HUH).
(2) NSR ID as identified in approved EM&A Manual / EIA Report for SCL(HHS).

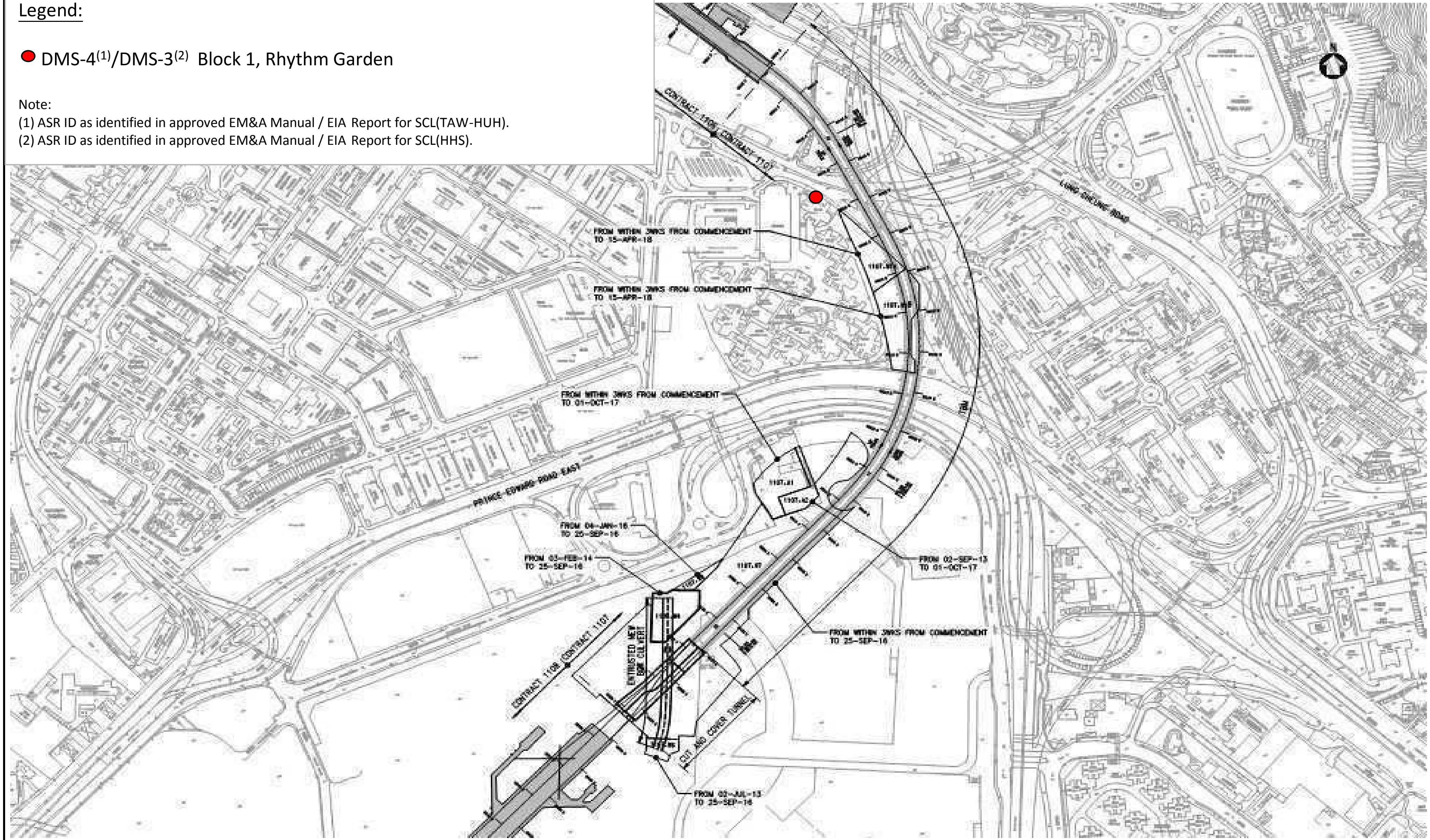


Title			
MTR SCL Works Contract 1107 Diamond Hill to Kai Tak Tunnels Locations of Construction Noise Monitoring	Scale: N.T.S	Project No.: MA13018	CINOTECH
	Date: Oct-13	Figure: 2	

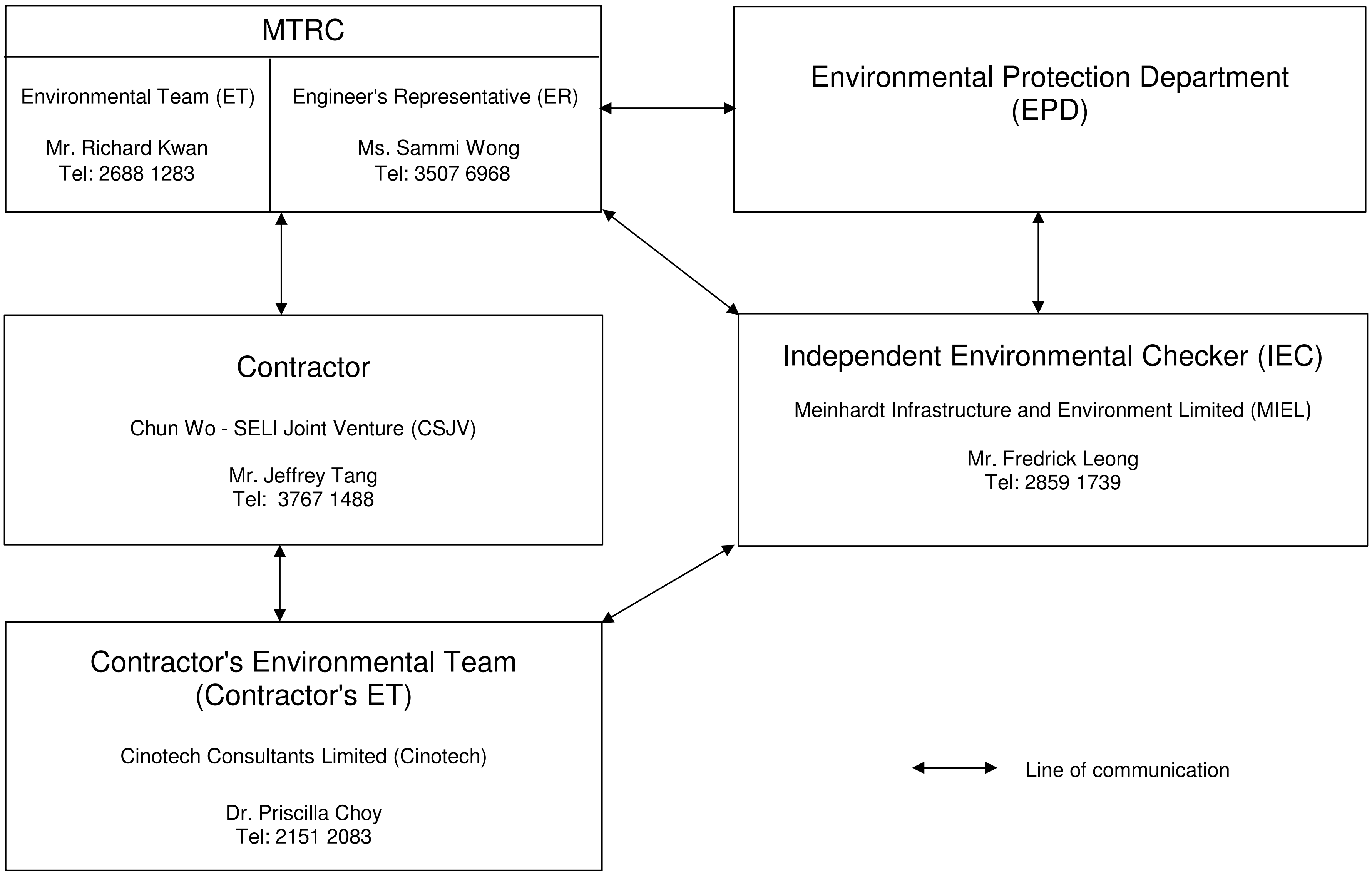
Legend:

DMS-4(1)/DMS-3(2) Block 1, Rhythm Garden

Note:
(1) ASR ID as identified in approved EM&A Manual / EIA Report for SCL(TAW-HUH).
(2) ASR ID as identified in approved EM&A Manual / EIA Report for SCL(HHS).



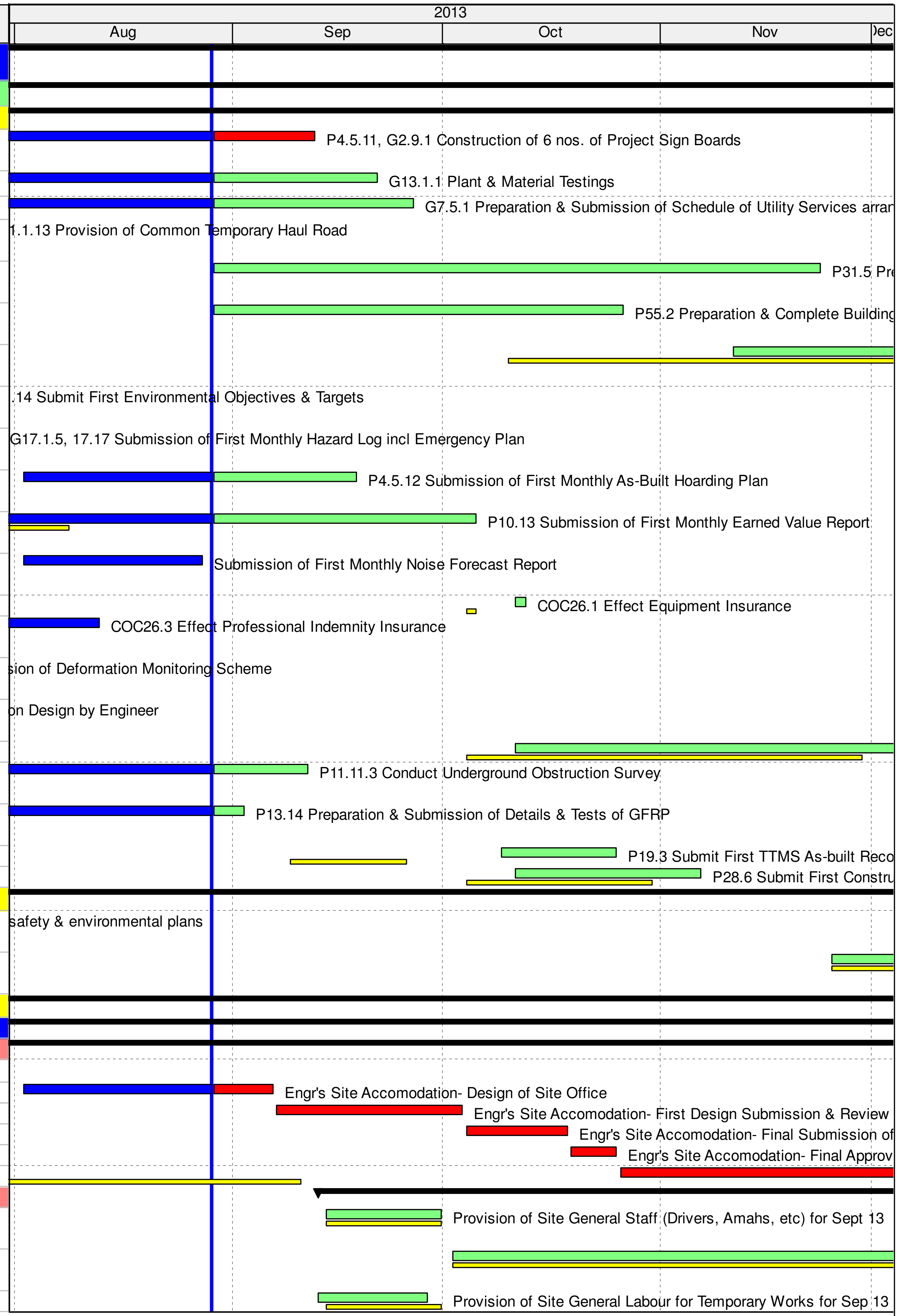
Title		Scale	Project No.	
MTR SCL Works Contract 1107 Diamond Hill to Kai Tak Tunnels Location of Dust Monitoring		N.T.S	MA13018	CINOTECH
		Date: May-13	Figure: 3	



Title	Scale	Proposal No.	
MTR SCL Works Contract 1107 Diamond Hill to Kai Tak Tunnels Organisation Chart and Key Contact of the Project	N.T.S	MA13018	CINOTECH
	Date: Jun-13	Figure: 4	

APPENDIX A
TENTATIVE CONSTRCUTION PROGRAMME

Activity ID	Activity Name	O Dur	BL Project Early Start	BL Project Early Finish	Start	Finish	CSF Reference
MTRC SCL 1107 Diamond Hill to Kai Tak Tu		286	11-Mar-13	11-Feb-14	11-Mar-13 A	25-Feb-14	
Cost Centre A - Preliminaries		277	11-Mar-13	13-Jan-14	11-Mar-13 A	14-Feb-14	
Contractor Submission Schedule		277	11-Mar-13	13-Jan-14	11-Mar-13 A	14-Feb-14	
1107.11240	P4.5.11, G2.9.1 Construction of 6 nos. of Project Sign Boards	13	11-Mar-13	25-Mar-13	11-Mar-13 A	12-Sep-13	000075
1107.11290	G13.1.1 Plant & Material Testings	20	11-Mar-13	06-Apr-13	11-Mar-13 A	21-Sep-13	
1107.11590	G7.5.1 Preparation & Submission of Schedule of Utility Services arrang	66	11-Mar-13	01-Jun-13	11-Mar-13 A	26-Sep-13	-
1107.11640	P11.1.13 Provision of Common Temporary Haul Road	72	11-Mar-13	08-Jun-13	11-Mar-13 A	27-Jul-13 A	
1107.11660	P31.5 Preparation & Submission of Contractor's Cooperative Training Scheme (CCTS)	72	11-Mar-13	08-Jun-13	29-Aug-13	23-Nov-13	
1107.11690	P55.2 Preparation & Complete Building Information Model based on Engr's Dwgs	48	11-Mar-13	08-Jun-13	29-Aug-13	26-Oct-13	
1107.11710	P12.10.1 Method statement to confirm no remains of left-in foundation or obstrucions in conflict with tunnel alignment	78	10-Oct-13	13-Jan-14	11-Nov-13	14-Feb-14	
1107.11730	G5.1.13, 5.1.14 Submit First Environmental Objectives & Targets	1	11-Mar-13	11-Mar-13	18-Jul-13 A	18-Jul-13 A	000154
1107.11790	G17.1.5, 17.17 Submission of First Monthly Hazard Log incl Emergency Plan	22	04-Jul-13	29-Jul-13	04-Jul-13 A	22-Jul-13 A	000001A-101
1107.11800	P4.5.12 Submission of First Monthly As-Built Hoarding Plan	22	11-Mar-13	09-Apr-13	02-Aug-13 A	18-Sep-13	
1107.11810	P10.13 Submission of First Monthly Earned Value Report	22	15-Jul-13	08-Aug-13	15-Jul-13 A	05-Oct-13	
1107.11840	Submission of First Monthly Noise Forecast Report	22	11-Mar-13	09-Apr-13	02-Aug-13 A	27-Aug-13 A	
1107.11890	COC26.1 Effect Equipment Insurance	2	04-Oct-13	05-Oct-13	11-Oct-13	12-Oct-13	
1107.11910	COC26.3 Effect Professional Indemnity Insurance	48	11-Mar-13	10-May-13	11-Mar-13 A	13-Aug-13 A	
1107.11940	G1.11.1, 7.5.1 Preparation & Submission of Deformation Monitoring Scheme	48	11-Mar-13	10-May-13	11-Mar-13 A	24-Jun-13 A	000133
1107.11970	G3.33.6 Submit Tunnel Ventilation Design by Engineer	48	11-Mar-13	10-May-13	11-Mar-13 A	29-Jun-13 A	000135
1107.11990	G4.10.1 Submission of ABWF & BS Programme	48	04-Oct-13	29-Nov-13	11-Oct-13	06-Dec-13	
1107.12170	P11.11.3 Conduct Underground Obstruction Survey	48	11-Mar-13	10-May-13	11-Mar-13 A	11-Sep-13	
1107.12190	P13.14 Preparation & Submission of Details & Tests of GFRP	20	11-Mar-13	06-Apr-13	11-Mar-13 A	02-Sep-13	-
1107.12260	P19.3 Submit First TTMS As-built Records	14	09-Sep-13	25-Sep-13	09-Oct-13	25-Oct-13	
1107.12300	P28.6 Submit First Construction Record	22	04-Oct-13	30-Oct-13	11-Oct-13	06-Nov-13	
Project Audit		165	07-Jun-13	21-Dec-13	15-Jul-13 A	21-Dec-13	
1107.12440	1st Audit of safety & environmental plans	24	07-Jun-13	06-Jul-13	15-Jul-13 A	18-Jul-13 A	
1107.12470	1st Audit of System Assurance & Risk Management & Design for Safety & Constructability plans	24	25-Nov-13	21-Dec-13	25-Nov-13*	21-Dec-13	
Site Enabling Works		258	11-Mar-13	31-Dec-13	11-Mar-13 A	21-Jan-14	
Site Setup		258	11-Mar-13	31-Dec-13	11-Mar-13 A	21-Jan-14	
Engineer's Site Accomodation		258	11-Mar-13	10-Sep-13	11-Mar-13 A	21-Jan-14	
1107.12600	Engr's Site Accomodation- Procure Subcontractor	18	11-Mar-13	03-Apr-13	11-Mar-13 A	03-Apr-13 A	
1107.12610	Engr's Site Accomodation- Design of Site Office	21	05-Apr-13	29-Apr-13	02-Aug-13 A	06-Sep-13	
1107.12620	Engr's Site Accomodation- First Design Submission & Review of Buildir	21	30-Apr-13	25-May-13	07-Sep-13	03-Oct-13	
1107.12630	Engr's Site Accomodation- Final Submission of Building Plans	12	27-May-13	08-Jun-13	04-Oct-13	18-Oct-13	
1107.12640	Engr's Site Accomodation- Final Approval of Building Plans	6	10-Jun-13	17-Jun-13	19-Oct-13	25-Oct-13	
1107.12650	Engr's Site Accomodation- Construction Works	72	18-Jun-13	10-Sep-13	26-Oct-13	21-Jan-14	
Misc Items		89	14-Sep-13	31-Dec-13	13-Sep-13	31-Dec-13	
1107.18969	Provision of Site General Staff (Drivers, Amahs, etc) for Sept 13	13	14-Sep-13	30-Sep-13	14-Sep-13*	30-Sep-13	
1107.18970	Provision of Site General Staff (Drivers, Amahs, etc) - Last Quarter of 2013	75	02-Oct-13	31-Dec-13	02-Oct-13	31-Dec-13	
1107.19150	Provision of Site General Labour for Temporary Works for Sep 13	13	14-Sep-13	30-Sep-13	13-Sep-13*	28-Sep-13	



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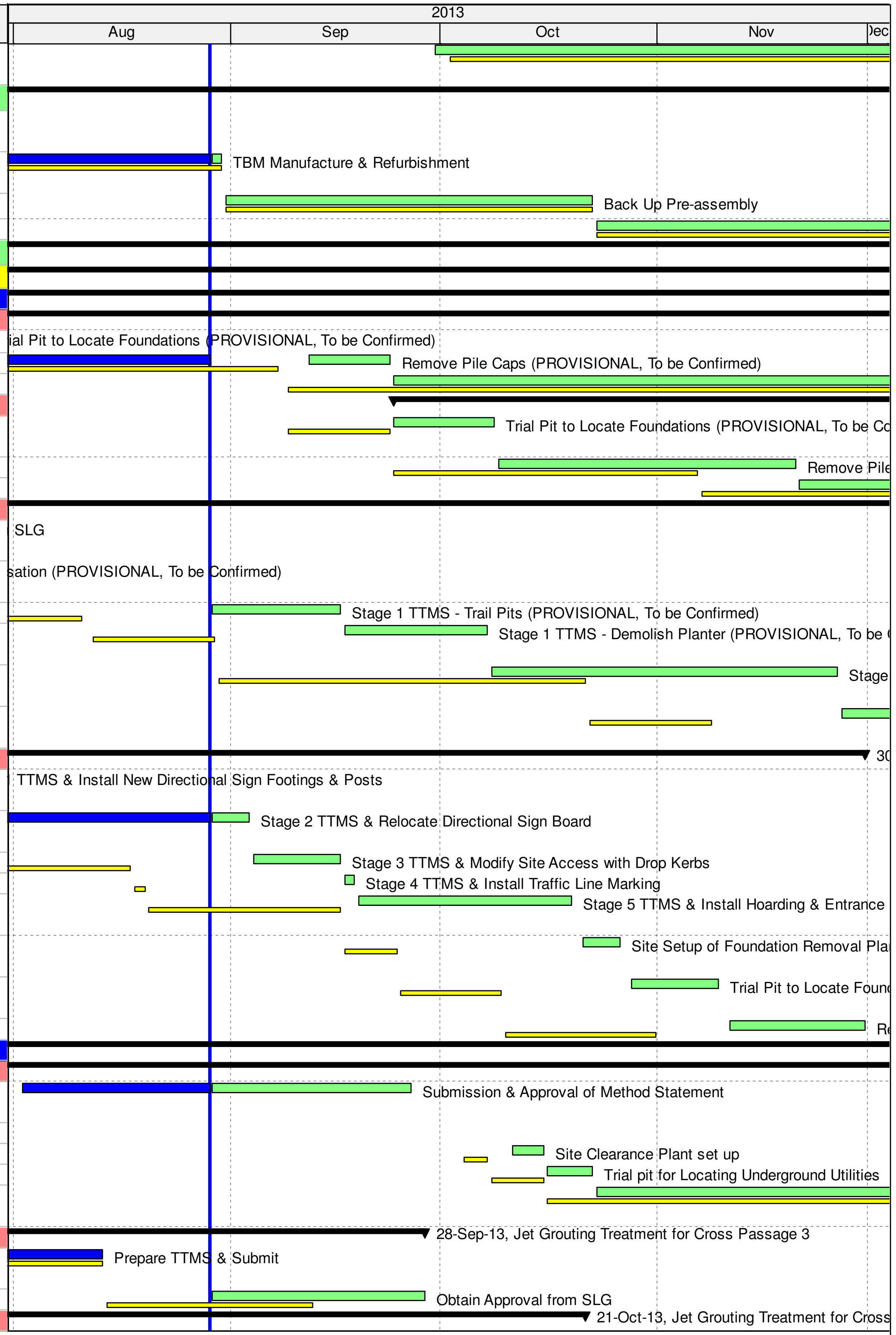
MTRC SCL 1107 Diamond Hill to Kai Tak Tunnels 3 Month Rolling Programme

No 006 DD 29AUG2013

Date	Revision	Checked	Approved
29-Aug-13	0	KCL	KCL

Activity ID	Activity Name	O Dur	BL Project Early Start	BL Project Early Finish	Start	Finish	CSF Reference
1107.19160	Provision of Site General Labour for Temporary Works - Last Quarter of 2013	75	02-Oct-13	31-Dec-13	30-Sep-13	30-Dec-13	
Cost Centre B - Procurement of TBM		172	25-May-13	17-Dec-13	25-May-13 A	17-Dec-13	
1107.12850	TBM Detailed Design	28	25-May-13	27-Jun-13	25-May-13 A	27-Jun-13 A	
1107.12851	TBM Manufacture & Refurbishment	54	28-Jun-13	30-Aug-13	28-Jun-13 A	30-Aug-13	
1107.12852	Back Up Pre-assembly	42	31-Aug-13	22-Oct-13	31-Aug-13	22-Oct-13	
1107.12860	TBM Assembly & Testing	48	23-Oct-13	17-Dec-13	23-Oct-13	17-Dec-13	
Cost Centre C - Tunnel Construction by TBM		228	11-May-13	11-Feb-14	24-May-13 A	25-Feb-14	
Site Enabling Works for TBM		228	11-May-13	11-Feb-14	24-May-13 A	25-Feb-14	
OPTION 3 - Obstruction Removal		228	24-May-13	11-Feb-14	24-May-13 A	25-Feb-14	
Removal of Abandoned Airport Admin Bldg 1 Foundations		138	15-Jul-13	11-Dec-13	15-Jul-13 A	27-Dec-13	
1107.13490	Trial Pit to Locate Foundations (PROVISIONAL, To be Confirmed)	12	15-Jul-13	27-Jul-13	15-Jul-13 A	27-Jul-13 A	
1107.13500	Remove Pile Caps (PROVISIONAL, To be Confirmed)	36	29-Jul-13	07-Sep-13	29-Jul-13 A	23-Sep-13	
1107.13510	Remove Abandoned Airport Admin. Bldg Piles (PROVISIONAL, To be C	78	09-Sep-13	11-Dec-13	24-Sep-13	27-Dec-13	
Removal of Abandoned Airport Admin Bldg 2 Foundations		126	09-Sep-13	11-Feb-14	24-Sep-13	25-Feb-14	
1107.13540	Trial Pit to Locate Foundations (PROVISIONAL, To be Confirmed)	12	09-Sep-13	23-Sep-13	24-Sep-13	08-Oct-13	
1107.13550	Remove Pile Caps (PROVISIONAL, To be Confirmed)	36	24-Sep-13	06-Nov-13	09-Oct-13	20-Nov-13	
1107.13560	Remove Abandoned Airport Admin. Bldg Piles (PROVISIONAL, To be C	78	07-Nov-13	11-Feb-14	21-Nov-13	25-Feb-14	
Removal of Abandoned Pre-existing Structure Foundations		163	03-Jun-13	08-Nov-13	03-Jun-13 A	14-Dec-13	
1107.13610	Obtain Approval from SLG	30	03-Jun-13	09-Jul-13	03-Jun-13 A	09-Jul-13 A	
1107.13620	Mobilisation (PROVISIONAL, To be Confirmed)	12	10-Jul-13	23-Jul-13	10-Jul-13 A	23-Jul-13 A	
1107.13630	Stage 1 TTMS - Trail Pits (PROVISIONAL, To be Confirmed)	16	24-Jul-13	10-Aug-13	29-Aug-13	16-Sep-13	
1107.13640	Stage 1 TTMS - Demolish Planter (PROVISIONAL, To be Confirmed)	16	12-Aug-13	29-Aug-13	17-Sep-13	07-Oct-13	
1107.13650	Stage 1 TTMS - Extract Old Foundations (PROVISIONAL, To be Confirmed)	42	30-Aug-13	21-Oct-13	08-Oct-13	26-Nov-13	
1107.13660	Stage 1 TTMS - Reinstate Area (PROVISIONAL, To be Confirmed)	16	22-Oct-13	08-Nov-13	27-Nov-13	14-Dec-13	
Removal of Abandoned Blackdown Barracks Foundations		159	24-May-13	31-Oct-13	24-May-13 A	30-Nov-13	
1107.13730	Stage 1 TTMS & Install New Directional Sign Footings & Posts	49	24-May-13	22-Jul-13	24-May-13 A	22-Jul-13 A	
1107.13740	Stage 2 TTMS & Relocate Directional Sign Board	5	23-Jul-13	27-Jul-13	23-Jul-13 A	03-Sep-13	
1107.13750	Stage 3 TTMS & Modify Site Access with Drop Kerbs	11	29-Jul-13	17-Aug-13	04-Sep-13	16-Sep-13	
1107.13760	Stage 4 TTMS & Install Traffic Line Marking	2	18-Aug-13	19-Aug-13	17-Sep-13	18-Sep-13	
1107.13770	Stage 5 TTMS & Install Hoarding & Entrance Gate, Works Area W1A, B ready for use	24	20-Aug-13	16-Sep-13	19-Sep-13	19-Oct-13	
1107.13780	Site Setup of Foundation Removal Plant (PROVISIONAL, To be Confirmed)	6	17-Sep-13	24-Sep-13	21-Oct-13	26-Oct-13	
1107.13790	Trial Pit to Locate Foundations (PROVISIONAL, To be Confirmed)	12	25-Sep-13	09-Oct-13	28-Oct-13	09-Nov-13	
1107.13800	Remove Pile Caps (PROVISIONAL, To be Confirmed)	18	10-Oct-13	31-Oct-13	11-Nov-13	30-Nov-13	
Ground Treatment		156	11-May-13	07-Jan-14	03-Jul-13 A	07-Jan-14	
Jet Grouting Treatment for KAT TBM Launch Shaft		143	11-May-13	12-Dec-13	03-Jul-13 A	19-Dec-13	
1107.12950	Submission & Approval of Method Statement	42	11-May-13	02-Jul-13	02-Aug-13 A	26-Sep-13	
1107.12960	Mobilisation	12	03-Jul-13	16-Jul-13	03-Jul-13 A	16-Jul-13 A	
1107.12970	Site Clearance Plant set up	3	04-Oct-13	07-Oct-13	11-Oct-13	15-Oct-13	
1107.12980	Trial pit for Locating Underground Utilities	6	08-Oct-13	15-Oct-13	16-Oct-13	22-Oct-13	
1107.12990	Jet Grouting (228 nos) Average 5 Columns per day with 2 machines	50	16-Oct-13	12-Dec-13	23-Oct-13	19-Dec-13	
Jet Grouting Treatment for Cross Passage 3		69	10-Jul-13	12-Sep-13	10-Jul-13 A	28-Sep-13	
1107.13030	Prepare TTMS & Submit	30	10-Jul-13	13-Aug-13	10-Jul-13 A	13-Aug-13 A	
1107.13040	Obtain Approval from SLG	26	14-Aug-13	12-Sep-13	29-Aug-13	28-Sep-13	
Jet Grouting Treatment for Cross Passage 1		82	15-Jul-13	21-Oct-13	15-Jul-13 A	21-Oct-13	



MTRC SCL 1107 Diamond Hill to Kai Tak Tunnels 3 Month Rolling Programme

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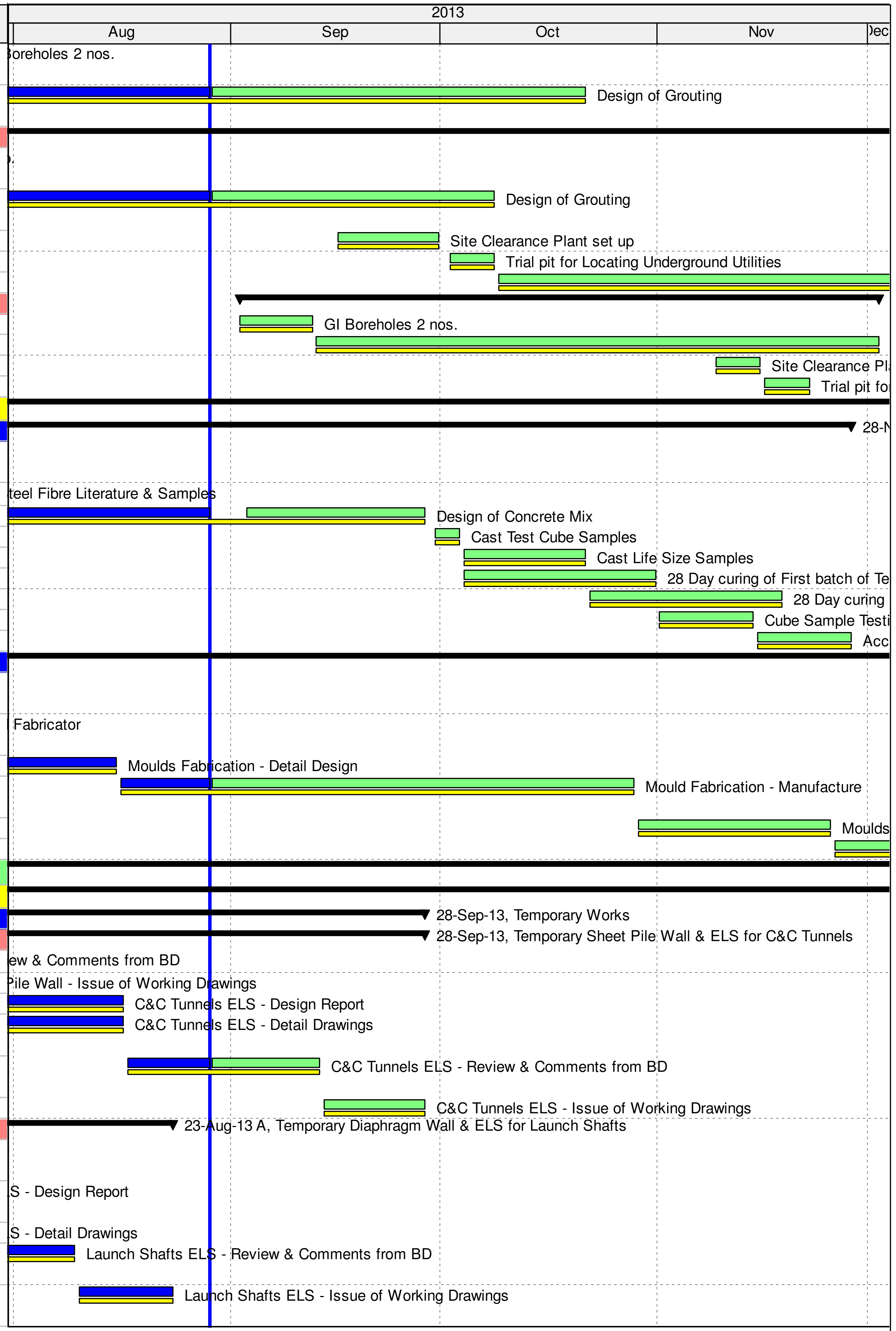
Activity ID	Activity Name	O Dur	BL Project Early Start	BL Project Early Finish	Start	Finish	CSF Reference
1107.13238	GI Boreholes 2 nos.	10	15-Jul-13	25-Jul-13	15-Jul-13 A	25-Jul-13 A	
1107.13239	Design of Grouting	72	26-Jul-13	21-Oct-13	26-Jul-13 A	21-Oct-13	
Pressure Grouting Treatment to Pier Z5 Foundation		152	08-Jul-13	07-Jan-14	08-Jul-13 A	07-Jan-14	
1107.13298	GI Borehole 1 no.	6	08-Jul-13	13-Jul-13	08-Jul-13 A	13-Jul-13 A	
1107.13299	Design of Grouting	72	15-Jul-13	08-Oct-13	15-Jul-13 A	08-Oct-13	
1107.13310	Site Clearance Plant set up	12	16-Sep-13	30-Sep-13	16-Sep-13	30-Sep-13	
1107.13320	Trial pit for Locating Underground Utilities	6	02-Oct-13	08-Oct-13	02-Oct-13	08-Oct-13	
1107.13330	Pressure Grouting (148 nos) Average 2 Points per day	74	09-Oct-13	07-Jan-14	09-Oct-13	07-Jan-14	
Pressure Grouting Treatment for DIH TBM Retrieval Shaft		76	02-Sep-13	02-Dec-13	02-Sep-13	02-Dec-13	
1107.13388	GI Boreholes 2 nos.	10	02-Sep-13	12-Sep-13	02-Sep-13	12-Sep-13	
1107.13389	Design of Grouting	66	13-Sep-13	02-Dec-13	13-Sep-13	02-Dec-13	
1107.13410	Site Clearance Plant set up	6	09-Nov-13	15-Nov-13	09-Nov-13	15-Nov-13	
1107.13420	Trial pit for Locating Underground Utilities	6	16-Nov-13	22-Nov-13	16-Nov-13	22-Nov-13	
Production of Pre - Cast Tunnel Lining		171	25-May-13	16-Dec-13	25-May-13 A	16-Dec-13	
Procurement of SFRC Fibres		156	25-May-13	28-Nov-13	25-May-13 A	28-Nov-13	
1107.18790	Sourcing of Steel Fibre Supplier	29	25-May-13	28-Jun-13	25-May-13 A	28-Jun-13 A	
1107.18795	Submission of Steel Fibre Literature & Samples	12	29-Jun-13	13-Jul-13	29-Jun-13 A	13-Jul-13 A	
1107.18800	Design of Concrete Mix	77	29-Jun-13	28-Sep-13	29-Jun-13 A	28-Sep-13	
1107.18810	Cast Test Cube Samples	3	30-Sep-13	03-Oct-13	30-Sep-13	03-Oct-13	
1107.18820	Cast Life Size Samples	14	04-Oct-13	21-Oct-13	04-Oct-13	21-Oct-13	
1107.18830	28 Day curing of First batch of Test Samples	28	04-Oct-13	31-Oct-13	04-Oct-13	31-Oct-13	
1107.18840	28 Day curing of Last batch of Test Samples	28	22-Oct-13	18-Nov-13	22-Oct-13	18-Nov-13	
1107.18850	Cube Sample Testing	12	01-Nov-13	14-Nov-13	01-Nov-13	14-Nov-13	
1107.18855	Acceptance of Concrete Mix Design by MTR	12	15-Nov-13	28-Nov-13	15-Nov-13	28-Nov-13	
Production of Segments		171	25-May-13	16-Dec-13	25-May-13 A	16-Dec-13	
1107.14660	Moulds Design	39	25-May-13	11-Jul-13	25-May-13 A	11-Jul-13 A	
1107.14680	Sourcing for Mould Fabricator	39	25-May-13	11-Jul-13	25-May-13 A	11-Jul-13 A	
1107.14681	Moulds Fabrication - Detail Design	30	12-Jul-13	15-Aug-13	12-Jul-13 A	15-Aug-13 A	
1107.14682	Mould Fabrication - Manufacture	60	16-Aug-13	28-Oct-13	16-Aug-13 A	28-Oct-13	
1107.14683	Moulds Assembly	24	29-Oct-13	25-Nov-13	29-Oct-13	25-Nov-13	
1107.14684	Moulds Inspection & Painting	18	26-Nov-13	16-Dec-13	26-Nov-13	16-Dec-13	
Cost Centre D - KAT Cut & Cover Tunnels		228	27-Apr-13	22-Jan-14	27-Apr-13 A	29-Jan-14	
Design Submissions		203	27-Apr-13	30-Dec-13	27-Apr-13 A	30-Dec-13	
Temporary Works		128	27-Apr-13	28-Sep-13	27-Apr-13 A	28-Sep-13	
Temporary Sheet Pile Wall & ELS for C&C Tunnels		100	01-Jun-13	28-Sep-13	01-Jun-13 A	28-Sep-13	
1107.14900	Temp Sheet Pile Wall - Review & Comments from BD	25	01-Jun-13	02-Jul-13	01-Jun-13 A	02-Jul-13 A	
1107.14910	Temp Sheet Pile Wall - Issue of Working Drawings	12	03-Jul-13	16-Jul-13	03-Jul-13 A	16-Jul-13 A	
1107.14920	C&C Tunnels ELS - Design Report	39	03-Jul-13	16-Aug-13	03-Jul-13 A	16-Aug-13 A	
1107.14930	C&C Tunnels ELS - Detail Drawings	27	17-Jul-13	16-Aug-13	17-Jul-13 A	16-Aug-13 A	
1107.14940	C&C Tunnels ELS - Review & Comments from BD	24	17-Aug-13	13-Sep-13	17-Aug-13 A	13-Sep-13	
1107.14950	C&C Tunnels ELS - Issue of Working Drawings	12	14-Sep-13	28-Sep-13	14-Sep-13	28-Sep-13	
Temporary Diaphragm Wall & ELS for Launch Shafts		69	03-Jun-13	23-Aug-13	03-Jun-13 A	23-Aug-13 A	
1107.15020	Temp D-Walls - Issue of Working Drawings	12	03-Jun-13	17-Jun-13	03-Jun-13 A	17-Jun-13 A	
1107.15040	Launch Shafts ELS - Design Report	33	03-Jun-13	12-Jul-13	03-Jun-13 A	12-Jul-13 A	
1107.15050	Launch Shafts ELS - Detail Drawings	21	18-Jun-13	12-Jul-13	18-Jun-13 A	12-Jul-13 A	
1107.15060	Launch Shafts ELS - Review & Comments from BD	24	13-Jul-13	09-Aug-13	13-Jul-13 A	09-Aug-13 A	
1107.15070	Launch Shafts ELS - Issue of Working Drawings	12	10-Aug-13	23-Aug-13	10-Aug-13 A	23-Aug-13 A	



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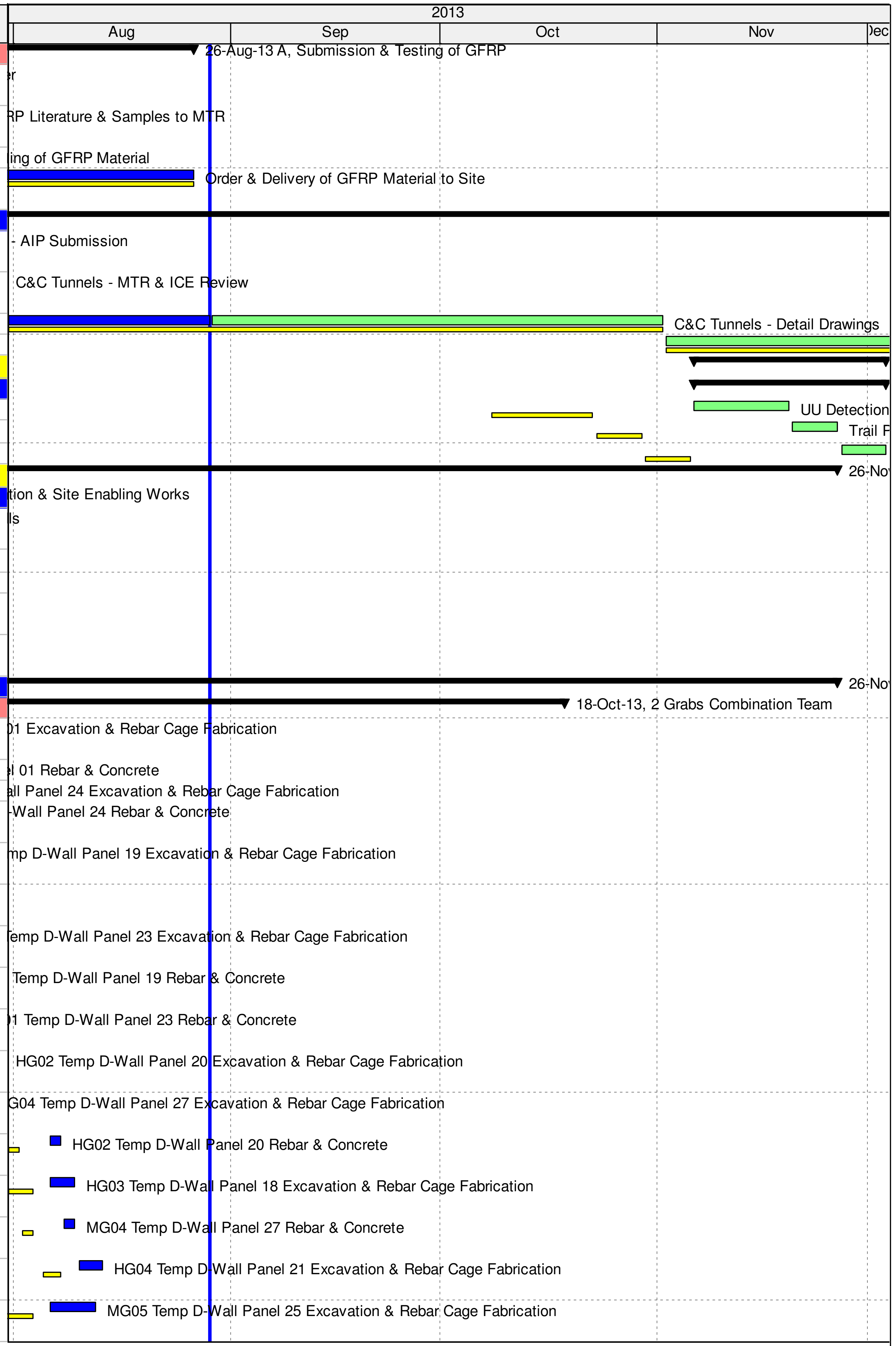
Activity ID	Activity Name	O Dur	BL Project Early Start	BL Project Early Finish	Start	Finish	CSF Reference
Submission & Testing of GFRP		100	27-Apr-13	26-Aug-13	27-Apr-13 A	26-Aug-13 A	
1107.18890	Sourcing of GFRP Supplier	55	27-Apr-13	04-Jul-13	27-Apr-13 A	04-Jul-13 A	
1107.18900	Submission of GFRP Literature & Samples to MTR	6	05-Jul-13	11-Jul-13	05-Jul-13 A	11-Jul-13 A	
1107.18910	Testing of GFRP Material	12	12-Jul-13	25-Jul-13	12-Jul-13 A	25-Jul-13 A	
1107.18920	Order & Delivery of GFRP Material to Site	45	05-Jul-13	26-Aug-13	05-Jul-13 A	26-Aug-13 A	
Cut & Tunnels Permanent Works		174	03-Jun-13	30-Dec-13	03-Jun-13 A	30-Dec-13	
1107.15080	C&C Tunnels - AIP Submission	36	03-Jun-13	16-Jul-13	03-Jun-13 A	16-Jul-13 A	
1107.15090	C&C Tunnels - MTR & ICE Review	12	17-Jul-13	30-Jul-13	17-Jul-13 A	30-Jul-13 A	
1107.15110	C&C Tunnels - Detail Drawings	78	31-Jul-13	01-Nov-13	31-Jul-13 A	01-Nov-13	
1107.15120	C&C Tunnels - Review & Comments from BD	48	02-Nov-13	30-Dec-13	02-Nov-13	30-Dec-13	
Site Enabling Works for C&C Tunnels		24	08-Oct-13	05-Nov-13	06-Nov-13	03-Dec-13	
Demolition of Abandoned Drainage		24	08-Oct-13	05-Nov-13	06-Nov-13	03-Dec-13	
1107.15140	UU Detection & CCTV Survey	12	08-Oct-13	22-Oct-13	06-Nov-13	19-Nov-13	
1107.15150	Trail Pit to Locate Drain	6	23-Oct-13	29-Oct-13	20-Nov-13	26-Nov-13	
1107.15160	Excavation to Expose Drain to be Demolished	6	30-Oct-13	05-Nov-13	27-Nov-13	03-Dec-13	
Diaphragm Walls		165	11-May-13	19-Nov-13	11-May-13 A	26-Nov-13	
Mobilisation & Site Enabling Works		48	11-May-13	09-Jul-13	11-May-13 A	09-Jul-13 A	
1107.15230	Construct Guide Walls	48	11-May-13	09-Jul-13	11-May-13 A	09-Jul-13 A	
1107.18770	Plant Setup for DWall	17	03-Jun-13	22-Jun-13	03-Jun-13 A	22-Jun-13 A	
1107.18930	Install Settlement Markers	6	11-May-13	18-May-13	11-May-13 A	18-May-13 A	
1107.18940	Install Water Level Observation wells	12	20-May-13	01-Jun-13	20-May-13 A	01-Jun-13 A	
1107.18950	Construction of Haul Road to 1108 Boundary	28	11-May-13	14-Jun-13	11-May-13 A	14-Jun-13 A	
TBM Launch Shafts		130	24-Jun-13	19-Nov-13	24-Jun-13 A	26-Nov-13	
2 Grabs Combination Team		97	24-Jun-13	10-Oct-13	24-Jun-13 A	18-Oct-13	
1107.15270	MG01 Temp D-Wall Panel 01 Excavation & Rebar Cage Fabrication	8	24-Jun-13	03-Jul-13	24-Jun-13 A	03-Jul-13 A	
1107.15280	MG01 Temp D-Wall Panel 01 Rebar & Concrete	2	04-Jul-13	05-Jul-13	04-Jul-13 A	05-Jul-13 A	
1107.15290	MG02 Temp D-Wall Panel 24 Excavation & Rebar Cage Fabrication	8	04-Jul-13	12-Jul-13	04-Jul-13 A	12-Jul-13 A	
1107.15300	MG02 Temp D-Wall Panel 24 Rebar & Concrete	2	13-Jul-13	15-Jul-13	13-Jul-13 A	15-Jul-13 A	
1107.15310	MG03 Temp D-Wall Panel 19 Excavation & Rebar Cage Fabrication	7	13-Jul-13	20-Jul-13	13-Jul-13 A	20-Jul-13 A	
1107.15319	Mobilise Hydraulic Grab	10	24-Jun-13	05-Jul-13	24-Jun-13 A	05-Jul-13 A	
1107.15320	HG01 Temp D-Wall Panel 23 Excavation & Rebar Cage Fabrication	5	17-Jul-13	22-Jul-13	17-Jul-13 A	22-Jul-13 A	
1107.15330	MG03 Temp D-Wall Panel 19 Rebar & Concrete	2	22-Jul-13	23-Jul-13	22-Jul-13 A	23-Jul-13 A	
1107.15340	HG01 Temp D-Wall Panel 23 Rebar & Concrete	2	24-Jul-13	25-Jul-13	24-Jul-13 A	25-Jul-13 A	
1107.15350	HG02 Temp D-Wall Panel 20 Excavation & Rebar Cage Fabrication	5	25-Jul-13	30-Jul-13	25-Jul-13 A	30-Jul-13 A	
1107.15360	MG04 Temp D-Wall Panel 27 Excavation & Rebar Cage Fabrication	6	22-Jul-13	27-Jul-13	22-Jul-13 A	27-Jul-13 A	
1107.15370	HG02 Temp D-Wall Panel 20 Rebar & Concrete	2	31-Jul-13	01-Aug-13	06-Aug-13 A	07-Aug-13 A	
1107.15380	HG03 Temp D-Wall Panel 18 Excavation & Rebar Cage Fabrication	4	31-Jul-13	03-Aug-13	06-Aug-13 A	09-Aug-13 A	
1107.15390	MG04 Temp D-Wall Panel 27 Rebar & Concrete	2	02-Aug-13	03-Aug-13	08-Aug-13 A	09-Aug-13 A	
1107.15400	HG04 Temp D-Wall Panel 21 Excavation & Rebar Cage Fabrication	3	05-Aug-13	07-Aug-13	10-Aug-13 A	13-Aug-13 A	
1107.15410	MG05 Temp D-Wall Panel 25 Excavation & Rebar Cage Fabrication	6	29-Jul-13	03-Aug-13	06-Aug-13 A	12-Aug-13 A	



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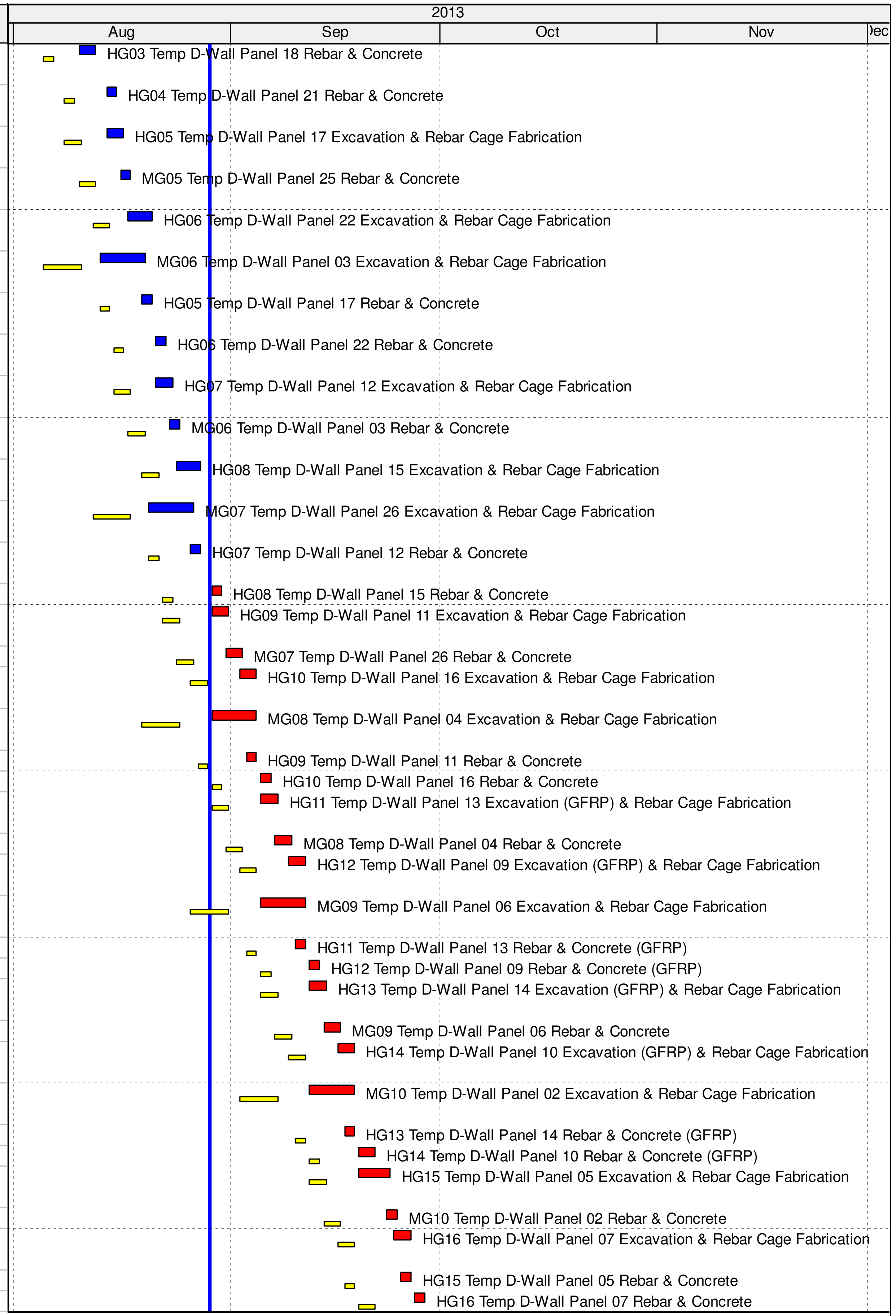
1107.15420	HG03 Temp D-Wall Panel 18 Rebar & Concrete	2	05-Aug-13	06-Aug-13	10-Aug-13 A	12-Aug-13 A	
1107.15430	HG04 Temp D-Wall Panel 21 Rebar & Concrete	2	08-Aug-13	09-Aug-13	14-Aug-13 A	15-Aug-13 A	
1107.15440	HG05 Temp D-Wall Panel 17 Excavation & Rebar Cage Fabrication	3	08-Aug-13	10-Aug-13	14-Aug-13 A	16-Aug-13 A	
1107.15450	MG05 Temp D-Wall Panel 25 Rebar & Concrete	2	10-Aug-13	12-Aug-13	16-Aug-13 A	17-Aug-13 A	
1107.15460	HG06 Temp D-Wall Panel 22 Excavation & Rebar Cage Fabrication	3	12-Aug-13	14-Aug-13	17-Aug-13 A	20-Aug-13 A	
1107.15470	MG06 Temp D-Wall Panel 03 Excavation & Rebar Cage Fabrication	6	05-Aug-13	10-Aug-13	13-Aug-13 A	19-Aug-13 A	
1107.15480	HG05 Temp D-Wall Panel 17 Rebar & Concrete	2	13-Aug-13	14-Aug-13	19-Aug-13 A	20-Aug-13 A	
1107.15490	HG06 Temp D-Wall Panel 22 Rebar & Concrete	2	15-Aug-13	16-Aug-13	21-Aug-13 A	22-Aug-13 A	
1107.15500	HG07 Temp D-Wall Panel 12 Excavation & Rebar Cage Fabrication	3	15-Aug-13	17-Aug-13	21-Aug-13 A	23-Aug-13 A	
1107.15510	MG06 Temp D-Wall Panel 03 Rebar & Concrete	2	17-Aug-13	19-Aug-13	23-Aug-13 A	24-Aug-13 A	
1107.15520	HG08 Temp D-Wall Panel 15 Excavation & Rebar Cage Fabrication	3	19-Aug-13	21-Aug-13	24-Aug-13 A	27-Aug-13 A	
1107.15530	MG07 Temp D-Wall Panel 26 Excavation & Rebar Cage Fabrication	6	12-Aug-13	17-Aug-13	20-Aug-13 A	26-Aug-13 A	
1107.15540	HG07 Temp D-Wall Panel 12 Rebar & Concrete	2	20-Aug-13	21-Aug-13	26-Aug-13 A	27-Aug-13 A	
1107.15550	HG08 Temp D-Wall Panel 15 Rebar & Concrete	2	22-Aug-13	23-Aug-13	29-Aug-13	30-Aug-13	
1107.15560	HG09 Temp D-Wall Panel 11 Excavation & Rebar Cage Fabrication	3	22-Aug-13	24-Aug-13	29-Aug-13	31-Aug-13	
1107.15570	MG07 Temp D-Wall Panel 26 Rebar & Concrete	2	24-Aug-13	26-Aug-13	31-Aug-13	02-Sep-13	
1107.15580	HG10 Temp D-Wall Panel 16 Excavation & Rebar Cage Fabrication	3	26-Aug-13	28-Aug-13	02-Sep-13	04-Sep-13	
1107.15590	MG08 Temp D-Wall Panel 04 Excavation & Rebar Cage Fabrication	6	19-Aug-13	24-Aug-13	29-Aug-13	04-Sep-13	
1107.15600	HG09 Temp D-Wall Panel 11 Rebar & Concrete	2	27-Aug-13	28-Aug-13	03-Sep-13	04-Sep-13	
1107.15610	HG10 Temp D-Wall Panel 16 Rebar & Concrete	2	29-Aug-13	30-Aug-13	05-Sep-13	06-Sep-13	
1107.15620	HG11 Temp D-Wall Panel 13 Excavation (GFRP) & Rebar Cage Fabrication	3	29-Aug-13	31-Aug-13	05-Sep-13	07-Sep-13	
1107.15630	MG08 Temp D-Wall Panel 04 Rebar & Concrete	2	31-Aug-13	02-Sep-13	07-Sep-13	09-Sep-13	
1107.15640	HG12 Temp D-Wall Panel 09 Excavation (GFRP) & Rebar Cage Fabrication	3	02-Sep-13	04-Sep-13	09-Sep-13	11-Sep-13	
1107.15650	MG09 Temp D-Wall Panel 06 Excavation & Rebar Cage Fabrication	6	26-Aug-13	31-Aug-13	05-Sep-13	11-Sep-13	
1107.15660	HG11 Temp D-Wall Panel 13 Rebar & Concrete (GFRP)	2	03-Sep-13	04-Sep-13	10-Sep-13	11-Sep-13	
1107.15670	HG12 Temp D-Wall Panel 09 Rebar & Concrete (GFRP)	2	05-Sep-13	06-Sep-13	12-Sep-13	13-Sep-13	
1107.15680	HG13 Temp D-Wall Panel 14 Excavation (GFRP) & Rebar Cage Fabrication	3	05-Sep-13	07-Sep-13	12-Sep-13	14-Sep-13	
1107.15690	MG09 Temp D-Wall Panel 06 Rebar & Concrete	2	07-Sep-13	09-Sep-13	14-Sep-13	16-Sep-13	
1107.15700	HG14 Temp D-Wall Panel 10 Excavation (GFRP) & Rebar Cage Fabrication	3	09-Sep-13	11-Sep-13	16-Sep-13	18-Sep-13	
1107.15710	MG10 Temp D-Wall Panel 02 Excavation & Rebar Cage Fabrication	6	02-Sep-13	07-Sep-13	12-Sep-13	18-Sep-13	
1107.15720	HG13 Temp D-Wall Panel 14 Rebar & Concrete (GFRP)	2	10-Sep-13	11-Sep-13	17-Sep-13	18-Sep-13	
1107.15730	HG14 Temp D-Wall Panel 10 Rebar & Concrete (GFRP)	2	12-Sep-13	13-Sep-13	19-Sep-13	21-Sep-13	
1107.15740	HG15 Temp D-Wall Panel 05 Excavation & Rebar Cage Fabrication	3	12-Sep-13	14-Sep-13	19-Sep-13	23-Sep-13	
1107.15750	MG10 Temp D-Wall Panel 02 Rebar & Concrete	2	14-Sep-13	16-Sep-13	23-Sep-13	24-Sep-13	
1107.15760	HG16 Temp D-Wall Panel 07 Excavation & Rebar Cage Fabrication	3	16-Sep-13	18-Sep-13	24-Sep-13	26-Sep-13	
1107.15770	HG15 Temp D-Wall Panel 05 Rebar & Concrete	2	17-Sep-13	18-Sep-13	25-Sep-13	26-Sep-13	
1107.15780	HG16 Temp D-Wall Panel 07 Rebar & Concrete	2	19-Sep-13	21-Sep-13	27-Sep-13	28-Sep-13	

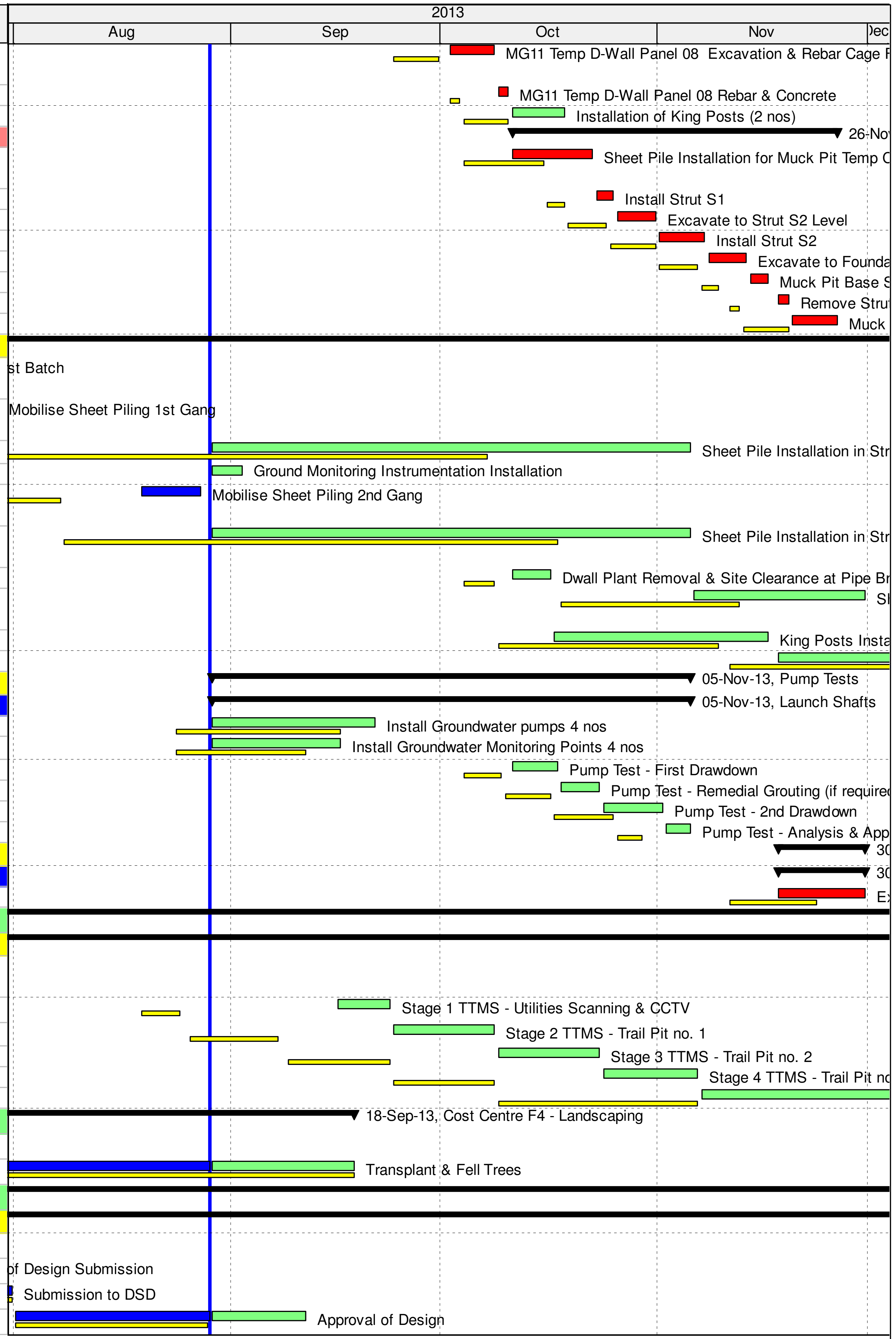


MTRC SCL 1107 Diamond Hill to Kai Tak Tunnels 3 Month Rolling Programme

No 006 DD 29AUG2013

Date	Revision	Checked	Approved
29-Aug-13	0	KCL	KCL

Activity ID	Activity Name	O Dur	BL Project Early Start	BL Project Early Finish	Start	Finish	CSF Reference
1107.15790	MG11 Temp D-Wall Panel 08 Excavation & Rebar Cage Fabrication	6	24-Sep-13	30-Sep-13	02-Oct-13	08-Oct-13	
1107.15800	MG11 Temp D-Wall Panel 08 Rebar & Concrete	2	02-Oct-13	03-Oct-13	09-Oct-13	10-Oct-13	
1107.15810	Installation of King Posts (2 nos)	6	04-Oct-13	10-Oct-13	11-Oct-13	18-Oct-13	
Temporary Muck Pit		39	04-Oct-13	19-Nov-13	11-Oct-13	26-Nov-13	
1107.19430	Sheet Pile Installation for Muck Pit Temp Cofferdam 450m2@50m2/d	9	04-Oct-13	15-Oct-13	11-Oct-13	22-Oct-13	
1107.19440	Install Strut S1	3	16-Oct-13	18-Oct-13	23-Oct-13	25-Oct-13	
1107.19450	Excavate to Strut S2 Level	5	19-Oct-13	24-Oct-13	26-Oct-13	31-Oct-13	
1107.19460	Install Strut S2	6	25-Oct-13	31-Oct-13	01-Nov-13	07-Nov-13	
1107.19470	Excavate to Foundation Level	5	01-Nov-13	06-Nov-13	08-Nov-13	13-Nov-13	
1107.19480	Muck Pit Base Slab	3	07-Nov-13	09-Nov-13	14-Nov-13	16-Nov-13	
1107.19490	Remove Strut S2	2	11-Nov-13	12-Nov-13	18-Nov-13	19-Nov-13	
1107.19500	Muck Pit Structure	6	13-Nov-13	19-Nov-13	20-Nov-13	26-Nov-13	
Sheet Piling		228	27-Apr-13	22-Jan-14	27-Apr-13 A	29-Jan-14	
1107.15840	Order sheetpiles First Batch	60	27-Apr-13	10-Jul-13	27-Apr-13 A	10-Jul-13 A	
1107.15841	Mobilise Sheet Piling 1st Gang	16	11-Jul-13	29-Jul-13	11-Jul-13 A	29-Jul-13 A	
1107.15850	Sheet Pile Installation in Streches SD & 1108INT(58m)	56	30-Jul-13	07-Oct-13	29-Aug-13	05-Nov-13	
1107.15851	Ground Monitoring Instrumentation Installation	4			29-Aug-13	02-Sep-13	
1107.15859	Mobilise Sheet Piling 2nd Gang	8	30-Jul-13	07-Aug-13	19-Aug-13 A	27-Aug-13 A	
1107.15860	Sheet Pile Installation in Strech ND & Removal of Any Left in Foundations (58m)	56	08-Aug-13	17-Oct-13	29-Aug-13	05-Nov-13	
1107.15869	Dwall Plant Removal & Site Clearance at Pipe Bridge Area	4	04-Oct-13	08-Oct-13	11-Oct-13	16-Oct-13	
1107.15870	Sheet Pile Installation in Diversion Pipe Bridge Location Streches SA & NA (44m) 2 gangs	22	18-Oct-13	12-Nov-13	06-Nov-13	30-Nov-13	
1107.15890	King Posts Installation for Diversion Bridge	27	09-Oct-13	09-Nov-13	17-Oct-13	16-Nov-13	
1107.15900	King Posts Installation for ELS	60	11-Nov-13	22-Jan-14	18-Nov-13	29-Jan-14	
Pump Tests		56	24-Aug-13	29-Oct-13	29-Aug-13	05-Nov-13	
Launch Shafts		56	24-Aug-13	29-Oct-13	29-Aug-13	05-Nov-13	
1107.15910	Install Groundwater pumps 4 nos	20	24-Aug-13	16-Sep-13	29-Aug-13	21-Sep-13	
1107.15920	Install Groundwater Monitoring Points 4 nos	16	24-Aug-13	11-Sep-13	29-Aug-13	16-Sep-13	
1107.15930	Pump Test - First Drawdown	5	04-Oct-13	09-Oct-13	11-Oct-13	17-Oct-13	
1107.15940	Pump Test - Remedial Grouting (if required)	5	10-Oct-13	16-Oct-13	18-Oct-13	23-Oct-13	
1107.15950	Pump Test - 2nd Drawdown	8	17-Oct-13	25-Oct-13	24-Oct-13	01-Nov-13	
1107.15960	Pump Test - Analysis & Approval of Report	3	26-Oct-13	29-Oct-13	02-Nov-13	05-Nov-13	
Excavation & C&C Tunnel Structure		12	11-Nov-13	23-Nov-13	18-Nov-13	30-Nov-13	
Launch Shafts - Pre- TBM Works		12	11-Nov-13	23-Nov-13	18-Nov-13	30-Nov-13	
1107.16030	Excavate to Strut S1 Level	12	11-Nov-13	23-Nov-13	18-Nov-13	30-Nov-13	
Cost Centre F3 - Utilities Protection / Diversion		208	25-Mar-13	06-Nov-13	25-Mar-13 A	04-Dec-13	
Diversion/ Replacement of WaterMains at Choi Hung Road		208	25-Mar-13	06-Nov-13	25-Mar-13 A	04-Dec-13	
1107.17530	Submission & Approval of TTMS	72	25-Mar-13	24-Jun-13	25-Mar-13 A	24-Jun-13 A	
1107.17540	Stage 1 TTMS - Utilities Scanning & CCTV	6	19-Aug-13	24-Aug-13	16-Sep-13*	23-Sep-13	
1107.17550	Stage 2 TTMS - Trail Pit no. 1	12	26-Aug-13	07-Sep-13	24-Sep-13	08-Oct-13	
1107.17560	Stage 3 TTMS - Trail Pit no. 2	12	09-Sep-13	23-Sep-13	09-Oct-13	23-Oct-13	
1107.17570	Stage 4 TTMS - Trail Pit no. 3	12	24-Sep-13	08-Oct-13	24-Oct-13	06-Nov-13	
1107.17580	Stage 5A TTMS - 1st 20m of Pipe Laying	24	09-Oct-13	06-Nov-13	07-Nov-13	04-Dec-13	
Cost Centre F4 - Landscaping		108	13-May-13	18-Sep-13	13-May-13 A	18-Sep-13	
1107.17750	Fell Trees within Cofferdam Footprint	30	13-May-13	18-Jun-13	13-May-13 A	18-Jun-13 A	
1107.17751	Transplant & Fell Trees	78	19-Jun-13	18-Sep-13	19-Jun-13 A	18-Sep-13	
Cost Centre G CEDD Entrusted Works		174	28-May-13	07-Dec-13	28-May-13 A	21-Dec-13	
Demolition & Diversion of Nullah 2		174	28-May-13	07-Dec-13	28-May-13 A	21-Dec-13	
1107.17800	Verify feasibility of Diversion Alignment	18	28-May-13	18-Jun-13	28-May-13 A	18-Jun-13 A	
1107.17810	Preparation of Design Submission	24	19-Jun-13	17-Jul-13	19-Jun-13 A	17-Jul-13 A	
1107.17820	Submission to DSD	12	18-Jul-13	31-Jul-13	18-Jul-13 A	31-Jul-13 A	
1107.19350	Approval of Design	24	01-Aug-13	28-Aug-13	01-Aug-13 A	11-Sep-13	

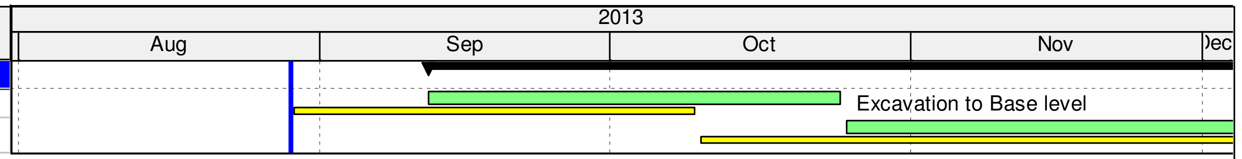


MTRC SCL 1107 Diamond Hill to Kai Tak Tunnels 3 Month Rolling Programme

No 006 DD 29AUG2013

Date	Revision	Checked	Approved
29-Aug-13	0	KCL	KCL

Activity ID	Activity Name	O Dur	BL Project Early Start	BL Project Early Finish	Start	Finish	CSF Reference
Downstream Section Pipes		84	29-Aug-13	07-Dec-13	12-Sep-13	21-Dec-13	
1107.17970	Excavation to Base level	34	29-Aug-13	09-Oct-13	12-Sep-13	24-Oct-13	
1107.17980	Install 3 nos. Conc. Drainage Pipes	50	10-Oct-13	07-Dec-13	25-Oct-13	21-Dec-13	



MTRC SCL 1107 Diamond Hill to Kai Tak Tunnels 3 Month Rolling Programme

No 006 DD 29AUG2013

Date	Revision	Checked	Approved
29-Aug-13	0	KCL	KCL

APPENDIX B
ACTION AND LIMIT LEVELS

APPENDIX B – Action and Limit Levels

24-Hour TSP

Regular Dust Monitoring Location	Description	Action Level, $\mu g/m^3$	Limit Level, $\mu g/m^3$
DMS-4(1)(3)/ DMS-3(2)(3)	Block 1, Rhythm Garden	160.4	260

Note:
(1) ASR ID as identified in approved EM&A Manual / EIA Report for SCL(TAW-HUH).
(2) ASR ID as identified in approved EM&A Manual / EIA Report for SCL(HHS).
(3) Dust monitoring on DMS-3(1)/DMS-4(2) is carried out by Environmental Team of SCL Works Contract 1106.

Construction Noise

Regular Construction Noise Monitoring Location(1)	Description	Time Period	Action Level	Limit Level
NMS-CA-4(1)(5)/ NMS-CA-3(2)(5)	Block 1, Rhythm Garden (north-eastern façade)	0700-1900 hrs on normal weekdays	When one documented complaint is received	75 dB(A)
NMS-CA-5 (1) (3)(5)/ NMS-CA-2(2)(3)(5)	Block 1, Rhythm Garden (northern façade)			65 / 70 dB(A) (4)

Note:
(1) NSR ID as identified in approved EM&A Manual / EIA Report for SCL(TAW-HUH).
(2) NSR ID as identified in approved EM&A Manual / EIA Report for SCL(HHS).
(3) Access to the monitoring location at Canossa Primary School (San Po Kong) (originally proposed in the approved EM&A Manual) was denied during the baseline monitoring. An alternative location (Block 1, Rhythm Garden (northern façade)) was proposed and approved by the ER and agreed by the IEC and EPD.
(4) Daytime noise Limit Level of 70 dB(A) applies to education institutions, while 65dB(A) applies during school examination period.
(5) Noise monitoring on Block 1, Rhythm Garden are carried out by Environmental Team of SCL Works Contract 1106.

APPENDIX C
CALIBRATION CERTIFICATES FOR MONITORING EQUIPEMENT

CINOTECH

High-Volume TSP Sampler
5-POINT CALIBRATION DATA SHEET

File No. MA12051/57/0003

Station: DMS-4 - Rhythm Garden, Block 1 — Operator: WK
Date: 9-Jul-13 — Next Due Date: 8-Sep-13
Equipment No.: A-01-57 — Serial No. 2352

Ambient Condition			
Temperature, Ta (K)	301.3	Pressure, Pa (mmHg)	760.2

Orifice Transfer Standard Information					
Equipment No.:	A-04-05	Slope, mc	0.0592	Intercept, bc	-0.0283
Last Calibration Date:	26-Dec-12	$mc \times Qstd + bc = [\Delta H \times (Pa/760) \times (298/Ta)]^{1/2}$			
Next Calibration Date:	25-Dec-13	$Qstd = \{[\Delta H \times (Pa/760) \times (298/Ta)]^{1/2} - bc\} / mc$			

Calibration of TSP Sampler

Calibration Point	Orfice			HVS	
	ΔH (orifice), in. of water	$[\Delta H \times (Pa/760) \times (298/Ta)]^{1/2}$	Qstd (CFM) X - axis	ΔW (HVS), in. of	$[\Delta W \times (Pa/760) \times (298/Ta)]^{1/2}$ Y-axis
1	11.5	3.37	57.45	7.4	2.71
2	8.9	2.97	50.60	5.5	2.33
3	7.2	2.67	45.56	4.4	2.09
4	4.6	2.13	36.51	2.7	1.63
5	2.9	1.69	29.09	1.7	1.30

By Linear Regression of Y on X

Slope , mw = 0.0496 — **Intercept, bw =** -0.1629

Correlation coefficient* = 0.9995

*If Correlation Coefficient < 0.990, check and recalibrate.

Set Point Calculation

From the TSP Field Calibration Curve, take Qstd = 43 CFM

From the Regression Equation, the "Y" value according to

$$mw \times Qstd + bw = [\Delta W \times (Pa/760) \times (298/Ta)]^{1/2}$$

Therefore, Set Point; $W = (mw \times Qstd + bw)^2 \times (760 / Pa) \times (Ta / 298) =$ 3.92

Remarks:

Conducted by: WK Tang — Signature: Kwan — Date: 9/7/13

Checked by: [illegible] — Signature: — Date: 9 July 2013

CINOTECH

High-Volume TSP Sampler
5-POINT CALIBRATION DATA SHEET

File No. MA12051/57/0004

Station: DMS-4 - Rhythm Garden, Block 1
Operator: WK
Date: 5-Sep-13
Next Due Date: 4-Nov-13
Equipment No.: A-01-57
Serial No. 2352

Ambient Condition			
Temperature, Ta (K)	297.5	Pressure, Pa (mmHg)	759.1

Orifice Transfer Standard Information					
Equipment No.:	A-04-05	Slope, mc	0.0592	Intercept, bc	-0.0283
Last Calibration Date:	26-Dec-12	$mc \times Qstd + bc = [\Delta H \times (Pa/760) \times (298/Ta)]^{1/2}$			
Next Calibration Date:	25-Dec-13	$Qstd = \{[\Delta H \times (Pa/760) \times (298/Ta)]^{1/2} - bc\} / mc$			

Calibration of TSP Sampler					
Calibration Point	Orfice			HVS	
	ΔH (orifice), in. of water	$[\Delta H \times (Pa/760) \times (298/Ta)]^{1/2}$	Qstd (CFM) X - axis	ΔW (HVS), in. of	$[\Delta W \times (Pa/760) \times (298/Ta)]^{1/2}$ Y-axis
1	11.8	3.44	58.52	7.4	2.72
2	8.7	2.95	50.31	5.3	2.30
3	7.4	2.72	46.44	4.6	2.15
4	4.5	2.12	36.32	2.8	1.67
5	2.9	1.70	29.25	1.7	1.30

By Linear Regression of Y on X

Slope , mw = 0.0478 **Intercept, bw =** -0.0820

Correlation coefficient* = 0.9996

*If Correlation Coefficient < 0.990, check and recalibrate.

Set Point Calculation

From the TSP Field Calibration Curve, take Qstd = 43 CFM

From the Regression Equation, the "Y" value according to

$$mw \times Qstd + bw = [\Delta W \times (Pa/760) \times (298/Ta)]^{1/2}$$

Therefore, Set Point; $W = (mw \times Qstd + bw)^2 \times (760 / Pa) \times (Ta / 298) =$ **3.89**

Remarks:

Conducted by: WK Tang Signature: Kwan Date: 5/9/13

Checked by: [illegible] Signature: [signature] Date: 5 September 2013

TISCH ENVIROMENTAL, INC.
145 SOUTH MIAMI AVE.
VILLAGE OF CLEVES, OH 45002
513.467.9000
877.263.7610 TOLL FREE
513.467.9009 FAX
WWW.TISCH-ENV.COM

AIR POLLUTION MONITORING EQUIPMENT

ORIFICE TRANSFER STANDARD CERTIFICATION WORKSHEET TE-5025A

Date - Dec 26, 2012 Rootsmeter S/N 0438320 Ta (K) - 295
Operator Tisch Orifice I.D. - 2323 Pa (mm) - 753.11

PLATE OR Run #	VOLUME START (m3)	VOLUME STOP (m3)	DIFF VOLUME (m3)	DIFF TIME (min)	METER DIFF Hg (mm)	ORFICE DIFF H2O (in.)
1	NA	NA	1.00	1.4440	3.2	2.00
2	NA	NA	1.00	1.0240	6.4	4.00
3	NA	NA	1.00	0.9120	8.0	5.00
4	NA	NA	1.00	0.8720	8.8	5.50
5	NA	NA	1.00	0.7200	12.8	8.00

DATA TABULATION

Vstd	(x axis) Qstd	(y axis)		Va	(x axis) Qa	(y axis)
0.9967	0.6902	1.4149		0.9957	0.6896	0.8851
0.9925	0.9693	2.0010		0.9915	0.9683	1.2517
0.9903	1.0858	2.2372		0.9893	1.0847	1.3995
0.9893	1.1345	2.3464		0.9883	1.1334	1.4678
0.9840	1.3666	2.8299		0.9830	1.3652	1.7702
Qstd slope (m) =		2.09107		Qa slope (m) =		1.30939
intercept (b) =		-0.02838		intercept (b) =		-0.01775
coefficient (r) =		0.99996		coefficient (r) =		0.99996

y axis = SQRT[H2O(Pa/760)(298/Ta)]

y axis = SQRT[H2O(Ta/Pa)]

CALCULATIONS

Vstd = Diff. Vol[(Pa-Diff. Hg)/760](298/Ta)
Qstd = Vstd/Time

Va = Diff Vol [(Pa-Diff Hg)/Pa]
Qa = Va/Time

For subsequent flow rate calculations:

Qstd = 1/m{[SQRT(H2O(Pa/760)(298/Ta))]- b}
Qa = 1/m{[SQRT H2O(Ta/Pa)]- b}

WELLAB Testing & Research 匯力

WELLAB LIMITED
Rms 816, 1516 & 1701, Technology Park,
18 On Lai Street, Shatin, N.T, Hong Kong.
Tel: 2898 7388 Fax: 2898 7076
Website: www.wellab.com.hk

TEST REPORT

APPLICANT:	**Cinotech Consultants Limited** **Room 1710, Technology Park,** **18 On Lai Street,** **Shatin, NT, Hong Kong**	Test Report No.: Date of Issue: Date Received: Date Tested: Date Completed: Next Due Date:	C/N/130830/2 2013-08-31 2013-08-30 2013-08-30 2013-08-31 2014-08-30
ATTN:	**Mr. W.K. Tang**	Page:	1 of 1

Certificate of Calibration

Item for calibration:

Description	: 'SVANTEK' Integrating Sound Level Meter
Manufacturer	: SVANTEK
Model No.	: SVAN 957
Serial No.	: 21459
Microphone No.	: 43676
Equipment No.	: N-08-08

Test conditions:

Room Temperatre	: 21 degree Celsius
Relative Humidity	: 69%

Test Specifications:

Performance checking at 94 and 114 dB

Methodology:

In-house method, according to manufacturer instruction manual

Results:

Reference Set Point, dB	Instrument Readings, dB
94	94.0
114	114.0

PREPARED AND CHECKED BY:
For and On Behalf of **WELLAB Ltd.**

Patrick Tse

PATRICK TSE
Laboratory Manager

WELLAB 滙力
Testing & Research

WELLAB LIMITED
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18 On Lai Street, Shatin, N.T, Hong Kong.
Tel: 2898 7388 Fax: 2898 7076
Website: www.wellab.com.hk

TEST REPORT

APPLICANT: **Cinotech Consultants Limited**
Room 1710, Technology Park,
18 On Lai Street,
Shatin, NT, Hong Kong

Test Report No.:	C/N/120921/1
Date of Issue:	2012-09-22
Date Received:	2012-09-21
Date Tested:	2012-09-21
Date Completed:	2012-09-22
Next Due Date:	2013-09-21

ATTN: **Mr. W.K. Tang**

Item for calibration:

Description	: Acoustical Calibrator
Manufacturer	: SVANTEK
Model No.	: SV30A
Serial No.	: 10929
Equipment No.	: N-09-01

Test conditions:

Room Temperatre	: 24 degree Celsius
Relative Humidity	: 56%

Methodology:

The Sound Level Calibrator has been calibrated in accordance with the documented procedures and using standard(s) and instrument(s) which are recommended by the manufacturer, or equivalent.

Results:

Sound Pressure Level (1kHz)	Measured SPL	Tolerance
At 94 dB SPL	94.0	94.0 ± 0.1 dB
At 114 dB SPL	114.0	114.0 ± 0.1 dB

PREPARED AND CHECKED BY:
For and On Behalf of **WELLAB Ltd.**

Patrick Tse

PATRICK TSE
Laboratory Manager

WELLAB Testing & Research 滙力

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Tel: 2898 7388 Fax: 2898 7076
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TEST REPORT

APPLICANT: **Cinotech Consultants Limited**
Room 1710, Technology Park,
18 On Lai Street,
Shatin, NT, Hong Kong

Test Report No.:	C/N/130919/3
Date of Issue:	2013-09-21
Date Received:	2013-09-19
Date Tested:	2013-09-21
Date Completed:	2013-09-21
Next Due Date:	2014-09-20

ATTN: **Mr. W.K. Tang**

Page: 1 of 1

Item for calibration:

Description : Acoustical Calibrator
Manufacturer : SVANTEK
Model No. : SV30A
Serial No. : 10929
Equipment No. : N-09-01

Test conditions:

Room Temperatre : 22 degree Celsius
Relative Humidity : 57%

Methodology:

The Sound Level Calibrator has been calibrated in accordance with the documented procedures and using standard(s) and instrument(s) which are recommended by the manufacturer, or equivalent.

Results:

Sound Pressure Level (1kHz)	Measured SPL	Tolerance
At 94 dB SPL	94.0	94.0 ± 0.1 dB
At 114 dB SPL	114.0	114.0 ± 0.1 dB

PREPARED AND CHECKED BY:
For and On Behalf of **WELLAB Ltd.**

Patrick Tse

PATRICK TSE
Laboratory Manager

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Website: www.wellab.com.hk

TEST REPORT

APPLICANT: **Cinotech Consultants Limited**
Room 1710, Technology Park,
18 On Lai Street,
Shatin, NT, Hong Kong

Test Report No.:	C/N/121005/2
Date of Issue:	2012-10-07
Date Received:	2012-10-05
Date Tested:	2012-10-05
Date Completed:	2012-10-07
Next Due Date:	2013-10-06

ATTN: **Mr. W.K. Tang**

Page: 1 of 1

Item for calibration:

Description	: Acoustical Calibrator
Manufacturer	: SVANTEK
Model No.	: SV30A
Serial No.	: 24791
Equipment No.	: N-09-04

Test conditions:

Room Temperatre	: 23 degree Celsius
Relative Humidity	: 64%

Methodology:

The Sound Level Calibrator has been calibrated in accordance with the documented procedures and using standard(s) and instrument(s) which are recommended by the manufacturer, or equivalent.

Results:

Sound Pressure Level (1kHz)	Measured SPL	Tolerance
At 94 dB SPL	94.0	94.0 ± 0.1 dB
At 114 dB SPL	114.0	114.0 ± 0.1 dB

PREPARED AND CHECKED BY:
For and On Behalf of **WELLAB Ltd.**

Patrick Tse

PATRICK TSE
Laboratory Manager

APPENDIX D
IMPACT MONITORING SCHEDULE

Shatin to Central Link – Contract 1107 Diamond Hill to Kai Tak Tunnels
Impact Air Quality and Noise Monitoring Schedule for September 2013

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
1-Sep	2-Sep	3-Sep	4-Sep	5-Sep	6-Sep	7-Sep
			24 hr TSP	Noise		
8-Sep	9-Sep	10-Sep	11-Sep	12-Sep	13-Sep	14-Sep
		24 hr TSP	Noise			
15-Sep	16-Sep	17-Sep	18-Sep	19-Sep	**20-Sep**	21-Sep
	24 hr TSP	Noise				24 hr TSP
22-Sep	23-Sep	24-Sep	25-Sep	26-Sep	27-Sep	28-Sep
	Noise				24 hr TSP	
29-Sep	30-Sep					

The schedule may be changed due to unforeseen circumstances (adverse weather, etc)

Air Quality Monitoring Station

DMS-4: - Rhythm Garden, Block 1

Noise Monitoring Station

NMS-CA-4: - Block 1, Rhythm Garden (north-eastern façade)
NMS-CA-5: - Block 1, Rhythm Garden (northern façade)

Shatin to Central Link – Contract 1107 Diamond Hill to Kai Tak Tunnels
Tentative Impact Air Quality and Noise Monitoring Schedule for October 2013

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
		1-Oct	2-Oct	3-Oct	4-Oct	5-Oct
				24 hr TSP	Noise	
6-Oct	7-Oct	8-Oct	9-Oct	10-Oct	11-Oct	12-Oct
			24 hr TSP	Noise		
13-Oct	**14-Oct**	15-Oct	16-Oct	17-Oct	18-Oct	19-Oct
		24 hr TSP	Noise			
20-Oct	21-Oct	22-Oct	23-Oct	24-Oct	25-Oct	26-Oct
	24 hr TSP	Noise				24 hr TSP
27-Oct	28-Oct	29-Oct	30-Oct	31-Oct		
	Noise					

The schedule may be changed due to unforeseen circumstances (adverse weather, etc)

Air Quality Monitoring Station

DMS-4(1)/DMS-3(2): - Rhythm Garden, Block 1

Noise Monitoring Station

NMS-CA-4(1)/NMS-CA-3(2): - Block 1, Rhythm Garden (north-eastern façade)
NMS-CA-5(1)/NMS-CA-2(2): - Block 1, Rhythm Garden (northern façade)

Remarks:

(1)Station ID as identified in approved EM&A Manual / EIA Report for SCL(TAW-HUH).

(2)Station ID as identified in approved EM&A Manual / EIA Report for SCL(HHS).

APPENDIX E
24-HOUR TSP MONITORING RESULTS AND GRAPHICAL PRESENTATIONIS

Appendix E - 24-hour TSP Monitoring Results

Location DMS-4(1)/DMS-3(2) - Rhythm Garden, Block 1

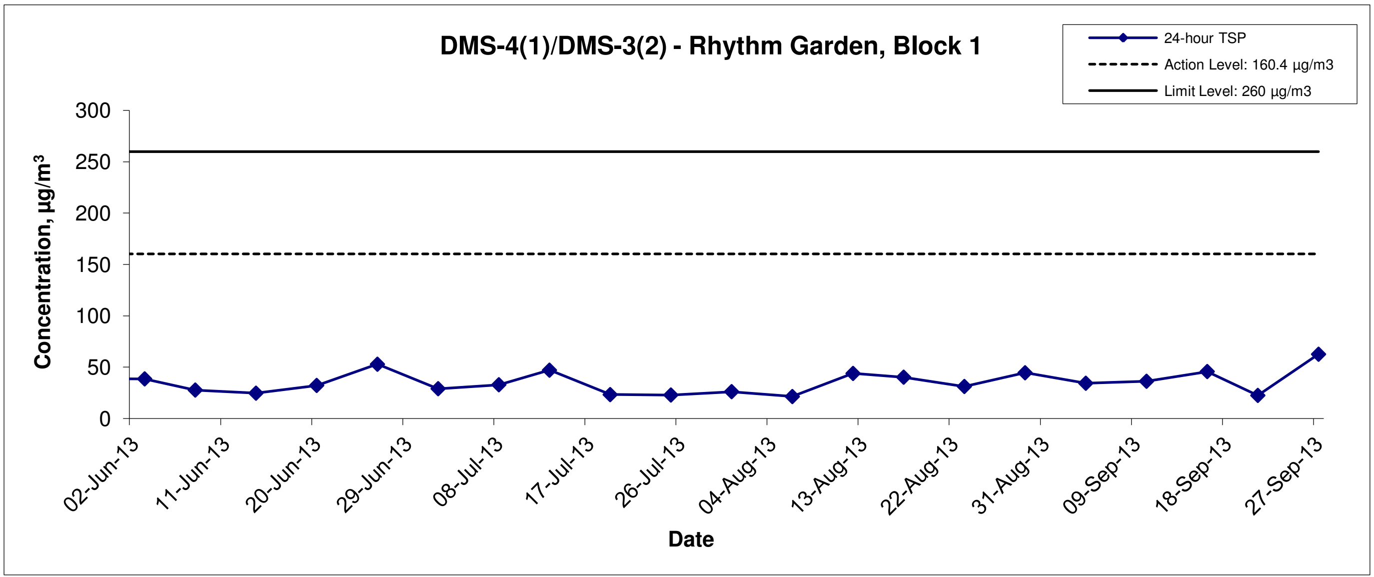
Sampling Date	Start Time	Weather Condition	Air Temp. (K)	Atmospheric Pressure, Pa (mmHg)	Filter Weight (g)		Particulate weight (g)	Elapse Time		Sampling Time(hrs.)	Flow Rate (m^3/min.)		Av. flow (m^3/min)	Total vol. (m^3)	Conc. ($\mu g/m^3$)
					Initial	Final		Initial	Final		Initial	Final			
4-Sep-13	Cloudy	Cloudy	297.7	759.2	3.8074	3.8677	0.0603	1553.9	1577.9	24.0	1.22	1.22	1.22	1756.3	34.3
10-Sep-13	Sunny	Cloudy	301.3	761.1	3.6827	3.7460	0.0633	1577.9	1601.9	24.0	1.21	1.21	1.21	1745.5	36.3
16-Sep-13	Sunny	Cloudy	301.5	758.5	3.7121	3.7918	0.0797	1601.9	1625.9	24.0	1.21	1.21	1.21	1742.1	45.7
21-Sep-13	Cloudy	Cloudy	302.9	754.2	3.7110	3.7500	0.0390	1625.9	1649.9	24.0	1.20	1.20	1.20	1733.5	22.5
27-Sep-13	Cloudy	Sunny	299.1	761.8	3.6173	3.7270	0.1097	1649.9	1673.9	24.0	1.22	1.22	1.22	1752.5	62.6
														Min	22.5
														Max	62.6
														Average	40.3

Remarks:

(1) ASR ID as identified in approved EM&A Manual / EIA Report for SCL(TAW-HUH).

(2) ASR ID as identified in approved EM&A Manual / EIA Report for SCL(HHS).

24-hour TSP Concentration Levels



Remarks:

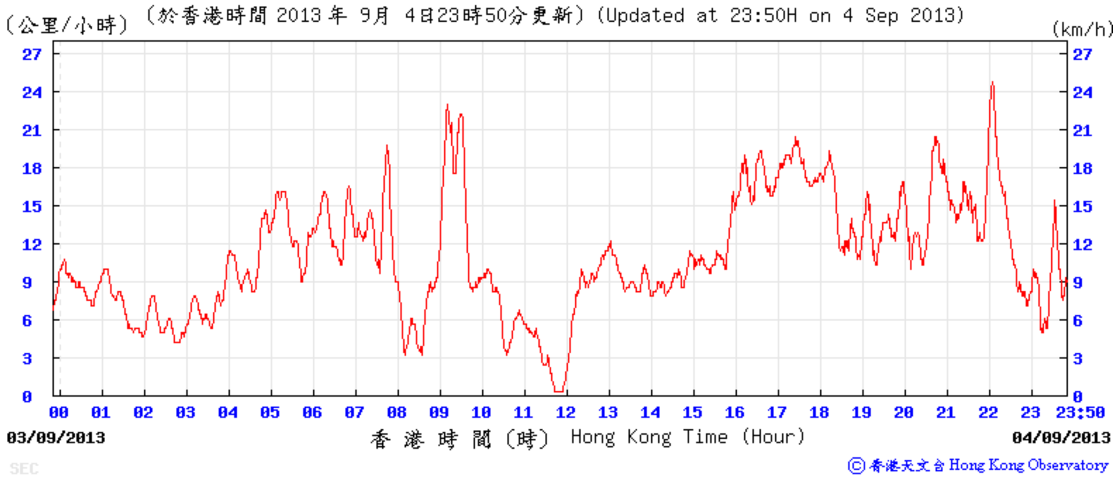
(1) ASR ID as identified in approved EM&A Manual / EIA Report for SCL(TAW-HUH).

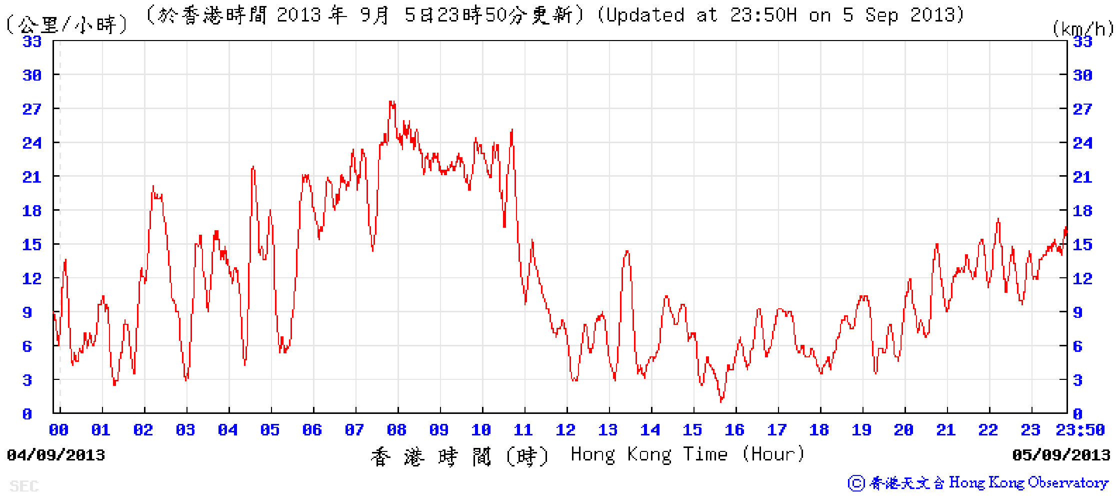
(2) ASR ID as identified in approved EM&A Manual / EIA Report for SCL(HHS).

Title	Scale	Project No.	
Shatin to Central Link - Contract 1107 - Diamond Hill to Kai Tak Tunnels Graphical Presentation of 24-hour TSP Monitoring Results	N.T.S	MA13018	CINOTECH
	Date: Sep 13	Appendix: E	

Average wind speed obtained from the meteorological station at Kai Tak from the Hong Kong Observatory (HKO)

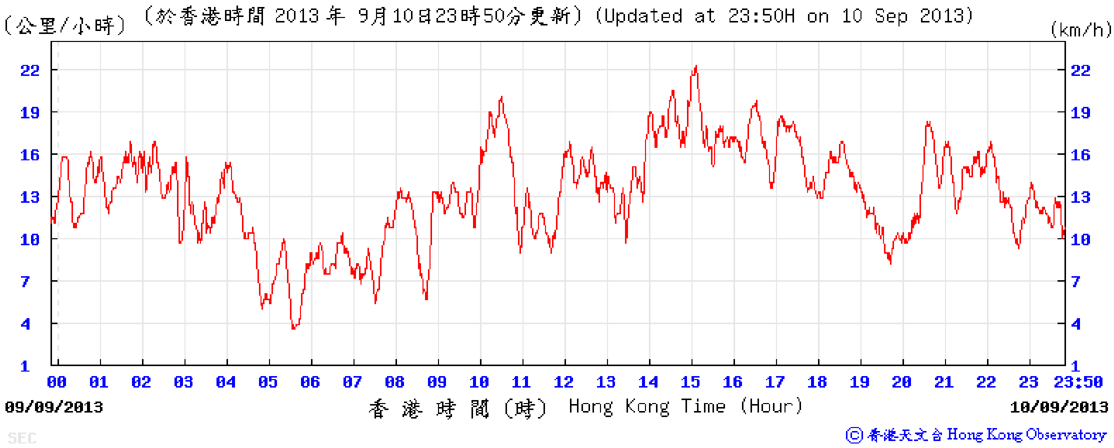
4-5 September 2013

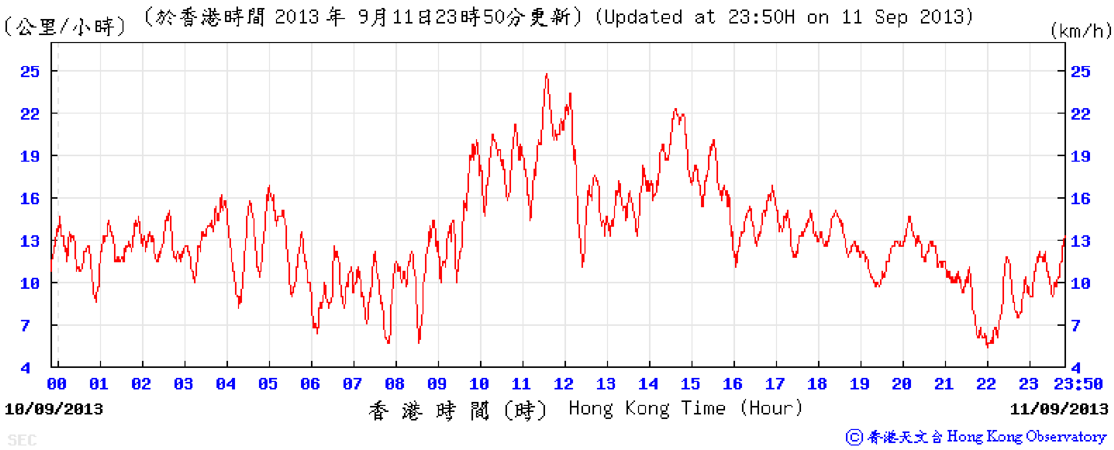




Average wind speed obtained from the meteorological station at Kai Tak from the Hong Kong Observatory (HKO)

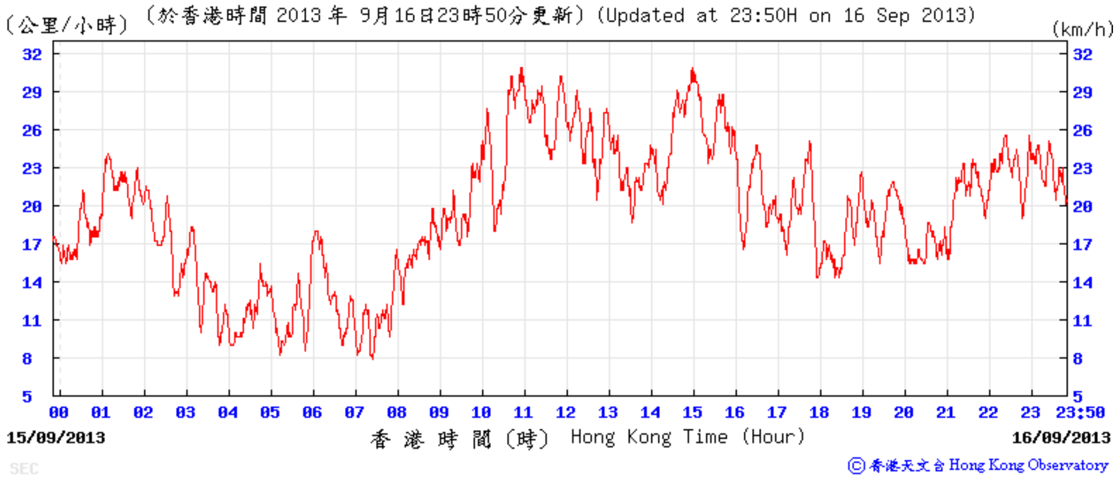
10-11 September 2013

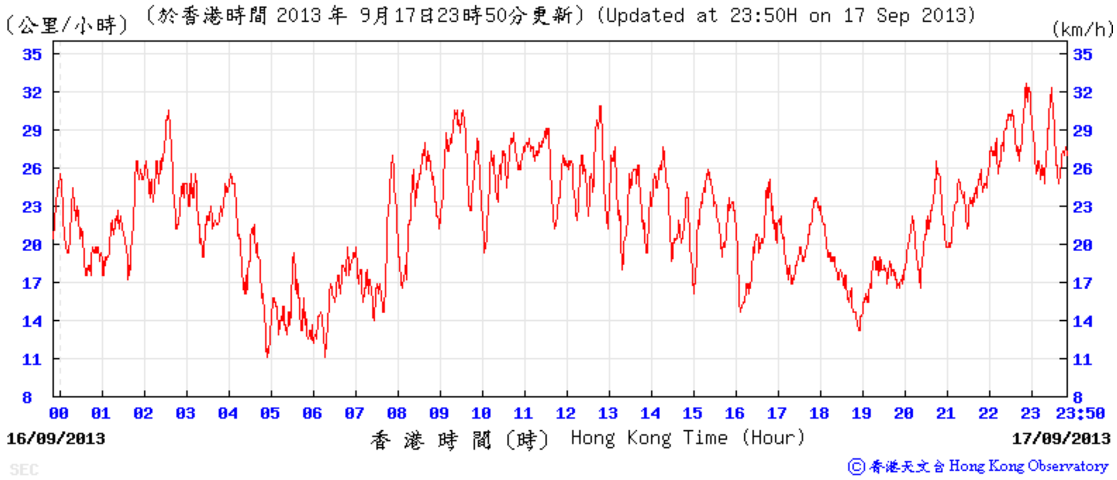




Average wind speed obtained from the meteorological station at Kai Tak from the Hong Kong Observatory (HKO)

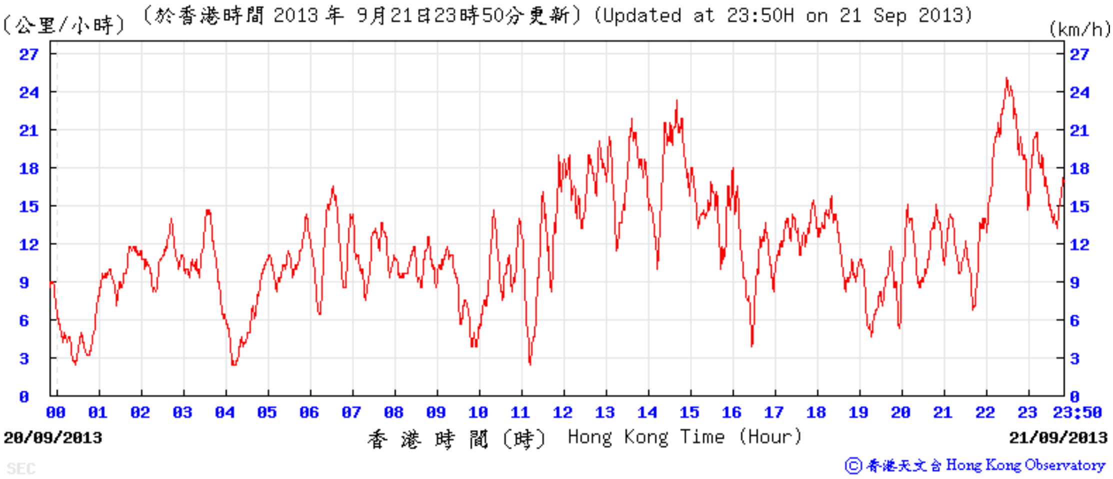
16-17 September 2013

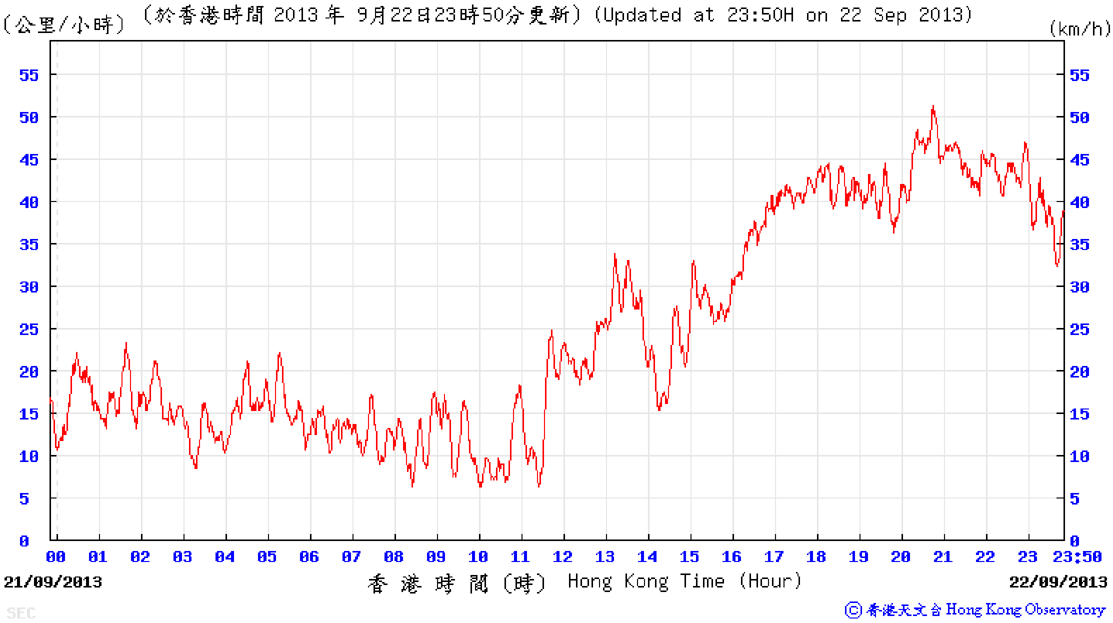




Average wind speed obtained from the meteorological station at Kai Tak from the Hong Kong Observatory (HKO)

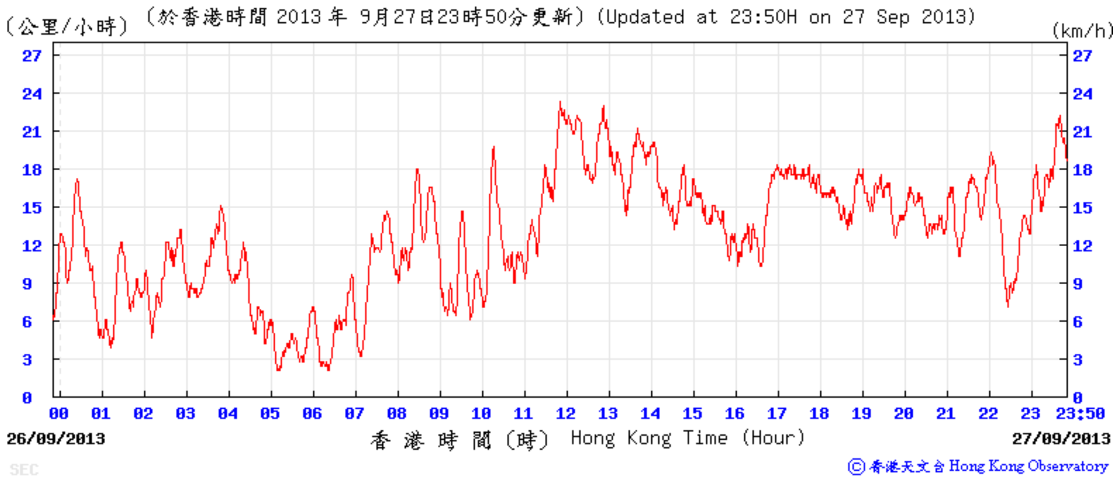
<u>21-22 September 2013</u>

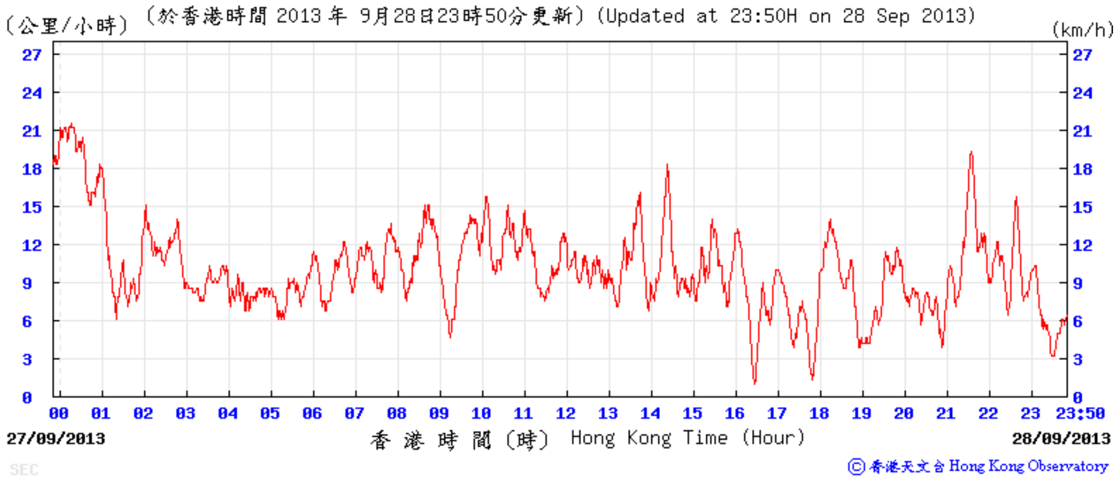




Average wind speed obtained from the meteorological station at Kai Tak from the Hong Kong Observatory (HKO)

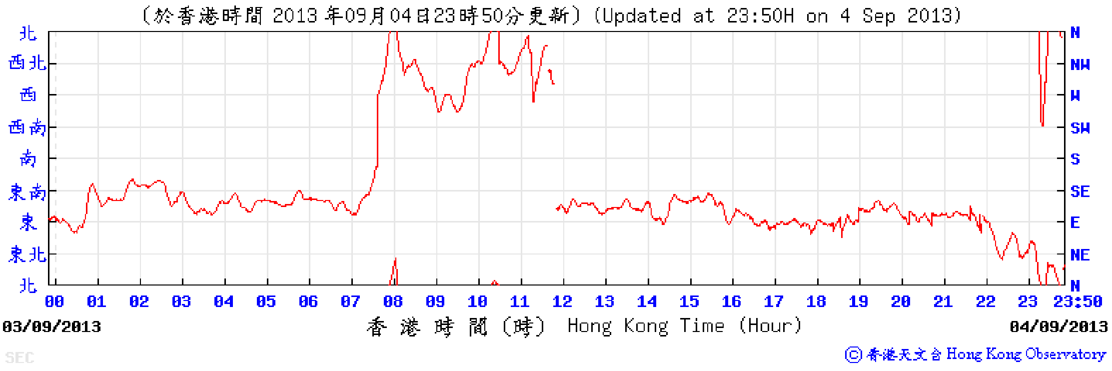
<u>27-28 September 2013</u>

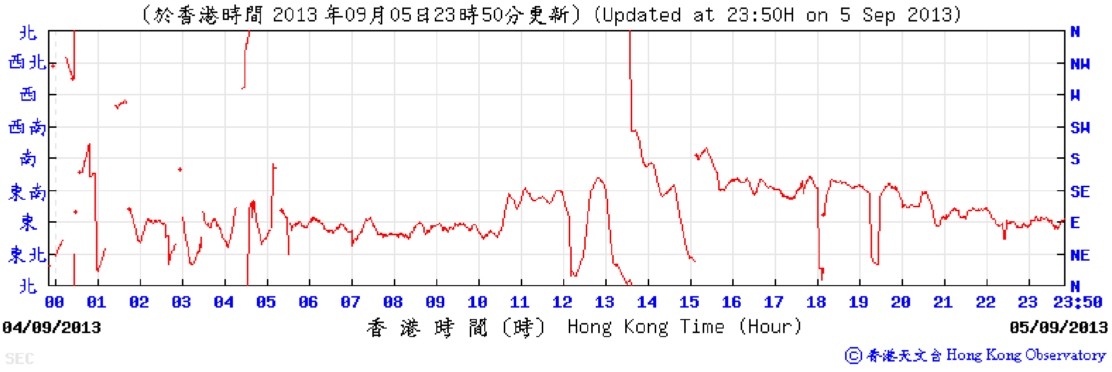




Wind direction obtained from the meteorological station at Kai Tak from the Hong Kong Observatory (HKO)

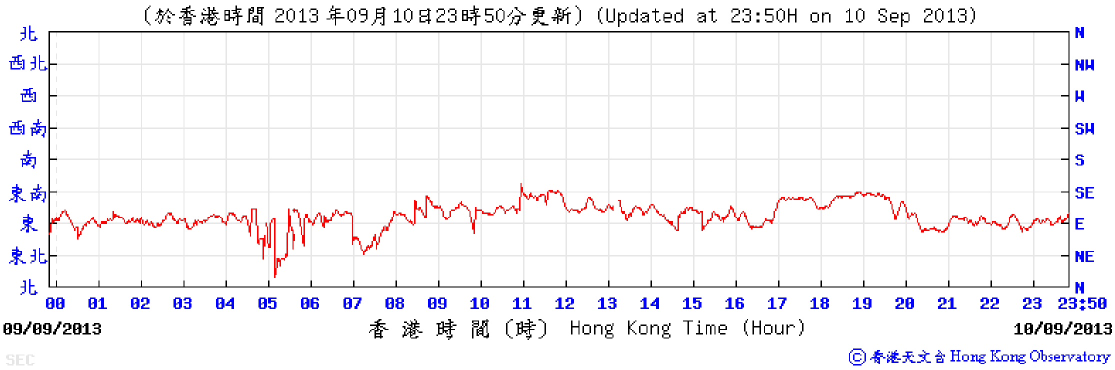
4-5 September 2013

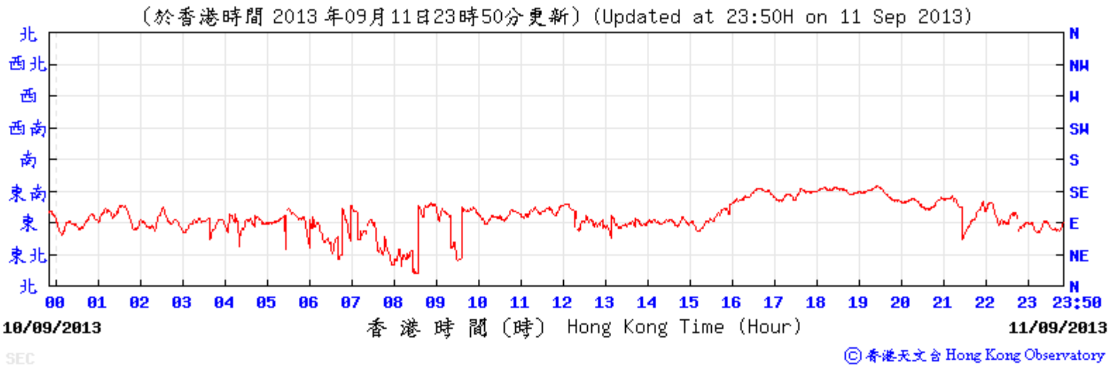




Wind direction obtained from the meteorological station at Kai Tak from the Hong Kong Observatory (HKO)

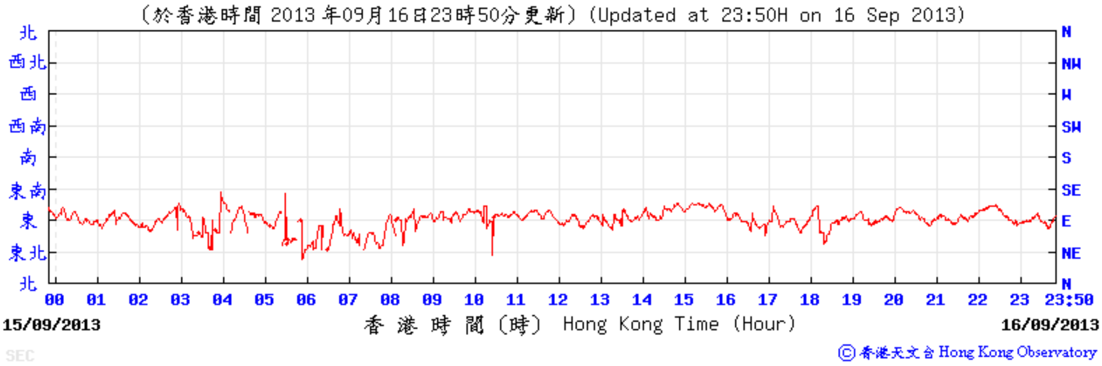
10-11 September 2013

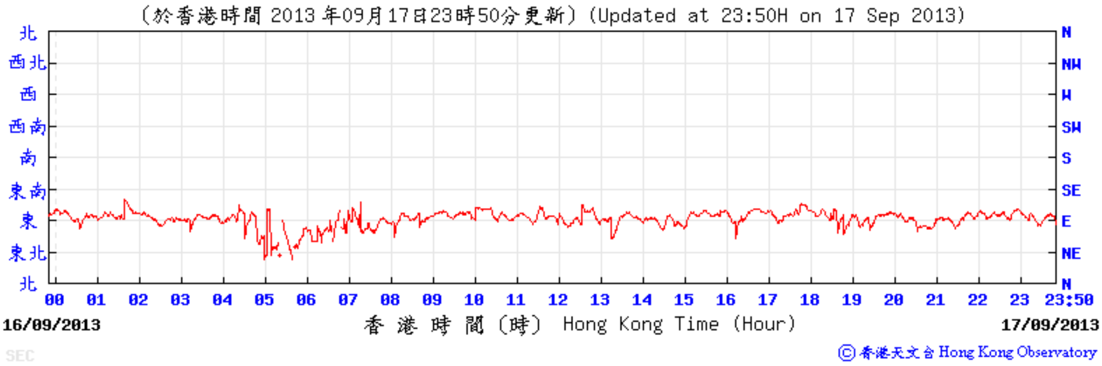




Wind direction obtained from the meteorological station at Kai Tak from the Hong Kong Observatory (HKO)

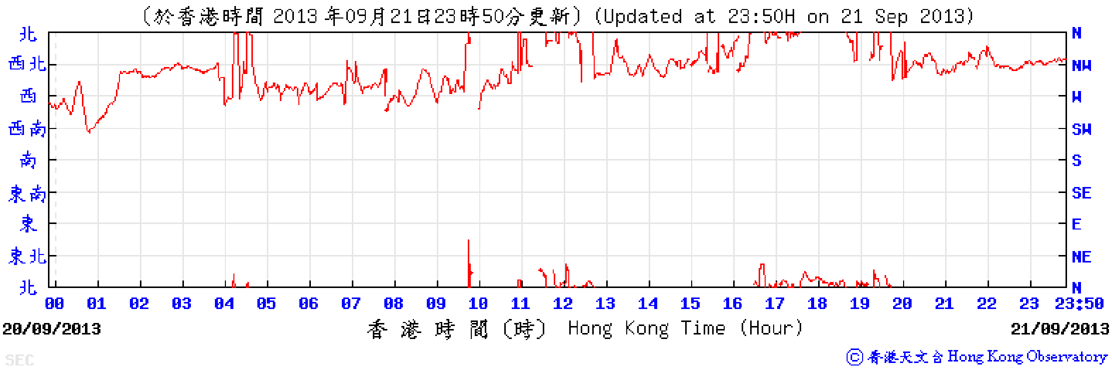
16-17 September 2013

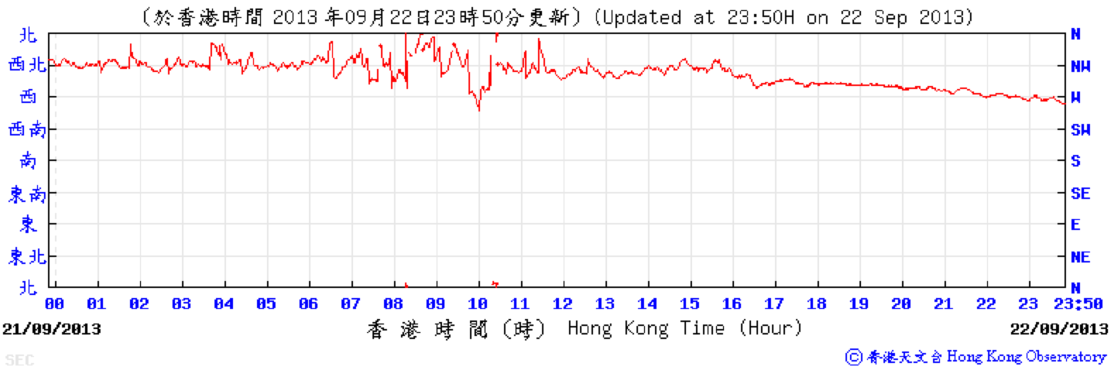




Wind direction obtained from the meteorological station at Kai Tak from the Hong Kong Observatory (HKO)

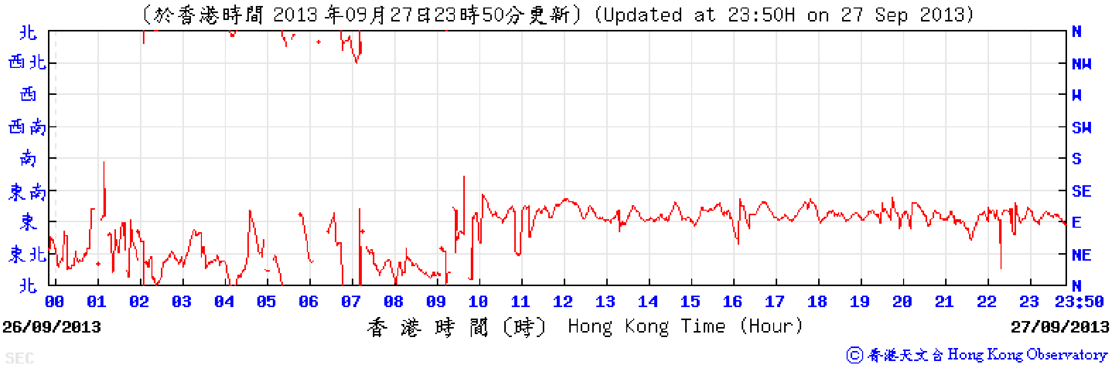
<u>21-22 September 2013</u>

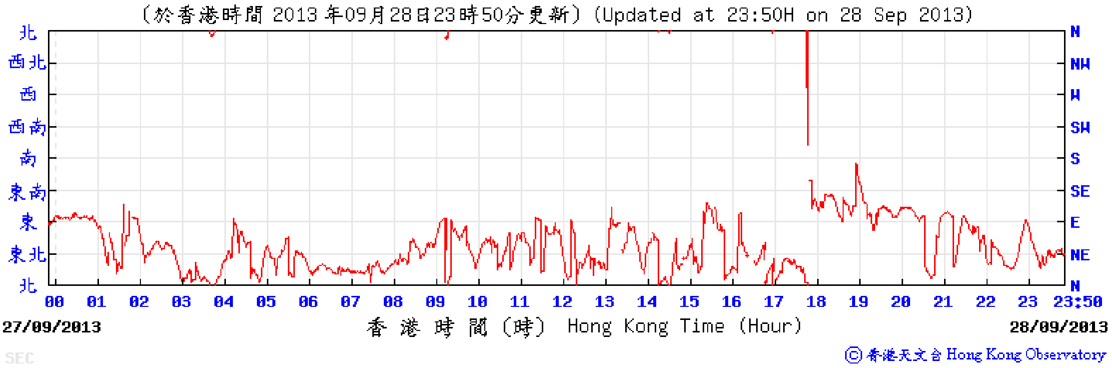




Wind direction obtained from the meteorological station at Kai Tak from the Hong Kong Observatory (HKO)

<u>27-28 September 2013</u>





APPENDIX F
NOISE MONITORING RESULTS AND GRAPHICAL PRESENTATIONS

Appendix F - Noise Monitoring Results

Location NMS-CA-4(1)/NMS-CA-3(2) - Block 1, Rhythm Garden (north-eastern façade)								
Date	Weather	Time	Unit: dB (A) (5-min)			Average	Baseline Level	Construction Noise Level
			L_{eq}	L_{10}	L_{90}	L_{eq}	L_{eq}	L_{eq}
5-Sep-13	Cloudy	11:30	65.1	67.8	62.6	65.1	71	65.1 Measured≦ Baseline Level
		11:35	65.0	67.8	62.7			
		11:40	65.2	67.9	62.8			
		11:45	65.2	67.8	62.9			
		11:50	65.3	68.0	63.1			
		11:55	65.0	67.8	62.7			
11-Sep-13	Sunny	13:00	66.3	67.7	64.8	65.7		65.7 Measured≦ Baseline Level
		13:05	64.9	66.2	63.4			
		13:10	65.4	66.9	63.4			
		13:15	65.6	67.2	63.1			
		13:20	66.5	67.7	63.8			
		13:25	65.1	66.5	62.0			
17-Sep-13	Sunny	14:17	68.8	69.7	67.5	68.7		68.7 Measured≦ Baseline Level
		14:22	68.8	69.8	67.5			
		14:27	68.7	69.7	67.4			
		14:32	68.7	69.7	67.4			
		14:37	68.6	69.6	67.4			
		14:42	68.6	69.7	67.5			
23-Sep-13	Cloudy	10:55	66.9	67.9	65.2	67.4		67.4 Measured≦ Baseline Level
		11:00	66.8	67.9	65.4			
		11:05	67.1	68.4	65.6			
		11:10	68.2	69.0	65.7			
		11:15	67.4	68.8	65.2			
		11:20	67.7	68.8	65.4			

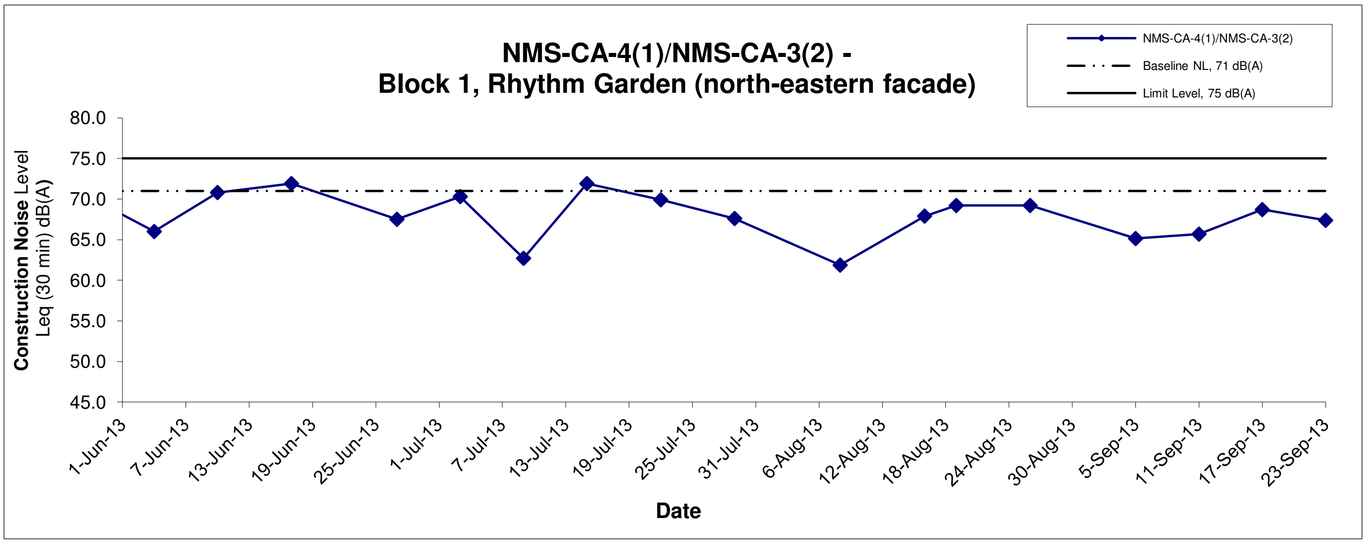
Remarks:
(1) Station ID as identified in approved EM&A Manual / EIA Report for SCL(TAW-HUH).
(2) Station ID as identified in approved EM&A Manual / EIA Report for SCL(HHS).

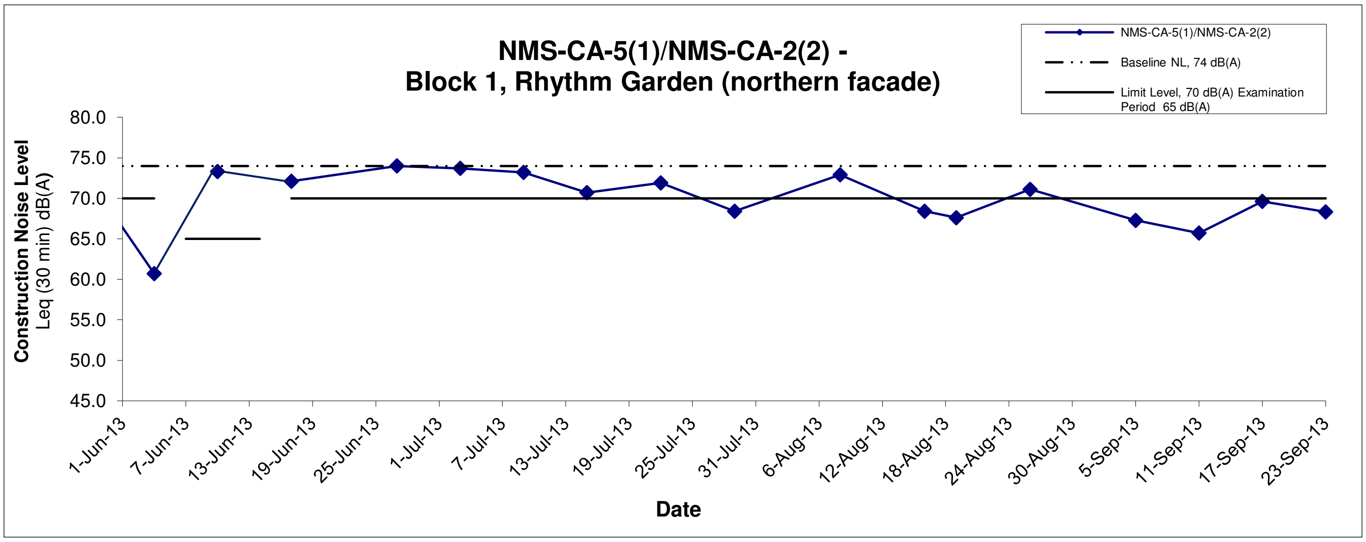
Appendix F - Noise Monitoring Results

Location NMS-CA-5(1)/NMS-CA-2(2) - Block 1, Rhythm Garden (northern façade)								
Date	Weather	Time	Unit: dB (A) (5-min)			Average	Baseline Level	Construction Noise Level
			L_{eq}	L_{10}	L_{90}	L_{eq}	L_{eq}	L_{eq}
5-Sep-13	Cloudy	11:00	67.3	68.9	65.1	67.3	74	67.3 Measured≦ Baseline Level
		11:05	67.4	69.0	65.0			
		11:10	67.3	69.1	64.9			
		11:15	67.2	68.9	65.0			
		11:20	67.1	68.9	65.1			
		11:25	67.3	68.7	64.8			
11-Sep-13	Sunny	13:35	65.2	66.5	64.0	65.7		65.7 Measured≦ Baseline Level
		13:40	65.8	66.8	64.5			
		13:45	65.9	66.9	64.1			
		13:50	65.7	66.9	64.5			
		13:55	66.0	67.1	64.8			
		14:00	65.6	66.7	64.5			
17-Sep-13	Sunny	14:50	69.8	70.8	68.6	69.6		69.6 Measured≦ Baseline Level
		14:55	69.8	70.8	68.5			
		15:00	69.5	70.2	68.4			
		15:05	69.5	70.5	68.3			
		15:10	69.5	70.6	68.3			
		15:15	69.6	70.6	68.5			
23-Sep-13	Cloudy	11:30	68.5	69.8	66.7	68.3		68.3 Measured≦ Baseline Level
		11:35	67.9	68.5	66.2			
		11:40	68.1	69.3	67.5			
		11:45	68.3	68.9	68.1			
		11:50	68.6	69.9	66.7			
		11:55	68.5	69.6	66.9			

Remarks:
(1) Station ID as identified in approved EM&A Manual / EIA Report for SCL(TAW-HUH).
(2) Station ID as identified in approved EM&A Manual / EIA Report for SCL(HHS).

Noise Levels





Remarks:
(1) Station ID as identified in approved EM&A Manual / EIA Report for SCL(TAW-HUH).
(2) Station ID as identified in approved EM&A Manual / EIA Report for SCL(HHS).
(3) In case of Measured Level ≦ Baseline Level, only Measured Level is presented on the graphical presentation.

Title	Shatin to Central Link - Contract 1107 - Diamond Hill to Kai Tak Tunnels Graphical Presentation of Construction Noise Monitoring Results	Scale N.T.S	Project No. MA13018	CINOTECH
		Date Sep 13	Appendix F	

APPENDIX G
SUMMARY OF EXCEEDANCE

APPENIDX G – SUMMARY OF EXCEEDANCE

Reporting Month: September 2013

a) Exceedance Report for Dust Monitoring (NIL)

b) Exceedance Report for Noise Monitoring (NIL)

APPENDIX H
SITE AUDIT SUMMARY

Record Summary of Environmental Site Inspection

Inspection Information

Checklist Reference Number	130906
Date	6 September 2013(Friday)
Time	9:00 – 11:00

Ref. No.	Non-Compliance	Related Item No.
-	None identified	-

Ref. No.	Remarks/Observations	Related Item No.
	Part B – Water Quality	
130906-R02	• To avoid surface runoff discharge without water treatment.	B5
	Part C – Landscape & Visual	
	• No environmental deficiency was identified during the site inspection.	
	Part D – Air Quality	
	• No environmental deficiency was identified during the site inspection.	
	Part E - Construction Noise Impact	
	• No environmental deficiency was identified during the site inspection.	
	Part F – Waste/Chemical Management	
	• No environmental deficiency was identified during the site inspection.	
	Part G – Permits/Licenses	
130906-O01	• New Construction Noise Permit should be displayed at the site entrance near Kai Ching Estate.	G1
	Part H - Others	
	• Follow-up on previous audit section (Ref. No.:130830), all environmental deficiency was observed improved/rectified by the Contractor.	

	Name	Signature	Date
Recorded by	Johnny Fung		6 September 2013
Checked by	Dr. Priscilla Choy		6 September 2013

Record Summary of Environmental Site Inspection

Inspection Information

Checklist Reference Number	130913
Date	13 September 2013(Friday)
Time	9:00 – 10:15

Ref. No.	Non-Compliance	Related Item No.
-	None identified	-

Ref. No.	Remarks/Observations	Related Item No.
	Part B – Water Quality	
130913-O01	• Silty water observed discharge our of the site entrance. The Contractor is reminded to avoid surface runoff discharge and provide proper water treatment facilities.	B3
130913-R03	• To block the holes in the sedimentation pit to avoid leakage of muddy water.	B5, 6i
	Part C – Landscape & Visual	
	• No environmental deficiency was identified during the site inspection.	
	Part D – Air Quality	
130913-R04	• Properly cover the stockpile by impervious material.	D6
130913-R05	• General reminder for watering to exposed work area.	D5
	Part E - Construction Noise Impact	
	• No environmental deficiency was identified during the site inspection.	
	Part F – Waste/Chemical Management	
130913-R02	• Empty chemical containers should be disposed as chemical waste and separated from general C&D waste.	F2iii
	Part G – Permits/Licenses	
	• No environmental deficiency was identified during the site inspection.	
	Part H - Others	
	• Follow-up on previous audit section (Ref. No.:130906), all environmental deficiency was observed improved/rectified by the Contractor.	

	Name	Signature	Date
Recorded by	Johnny Fung		13 September 2013
Checked by	Dr. Priscilla Choy		13 September 2013

Record Summary of Environmental Site Inspection

Inspection Information

Checklist Reference Number	130919
Date	19 September 2013(Thursday)
Time	9:00 – 10:30

Ref. No.	Non-Compliance	Related Item No.
-	None identified	-

Ref. No.	Remarks/Observations	Related Item No.
	Part B – Water Quality	
130919-R01	• Provide sand bags to gullies near site entrance at Kai Ching Estate.	B3
	Part C – Landscape & Visual	
	• No environmental deficiency was identified during the site inspection.	
	Part D – Air Quality	
130919-R02	• Properly cover the stockpile with impervious sheets.	D6
130919-R03	• General reminder for providing water spray to exposed area.	D5
130919-R04	• To check and maintain the generator to avoid black smoke emission.	D15
	Part E - Construction Noise Impact	
	• No environmental deficiency was identified during the site inspection.	
	Part F – Waste/Chemical Management	
	• No environmental deficiency was identified during the site inspection.	
	Part G – Permits/Licenses	
	• No environmental deficiency was identified during the site inspection.	
	Part H - Others	
130919-F05	• Follow-up on previous audit section (Ref. No.:130913), follow up actions are needed to be reviewed for items 130913-O01, 130913-R04 and 130913-R05.	

	Name	Signature	Date
Recorded by	Johnny Fung		19 September 2013
Checked by	Dr. Priscilla Choy		19 September 2013

Record Summary of Environmental Site Inspection

Inspection Information

Checklist Reference Number	130927
Date	27 September 2013(Friday)
Time	9:00 – 10:30

Ref. No.	Non-Compliance	Related Item No.
-	None identified	-

Ref. No.	Remarks/Observations	Related Item No.
	Part B – Water Quality	
	• No environmental deficiency was identified during the site inspection.	
	Part C – Landscape & Visual	
	• No environmental deficiency was identified during the site inspection.	
	Part D – Air Quality	
130927-O02	• Black smoke emission observed from power pack. The contractor is reminded to properly maintain the mechanical equipment.	D15
130927-R03	• Properly cover the dusty stockpile with impervious sheeting.	D6
	Part E - Construction Noise Impact	
	• No environmental deficiency was identified during the site inspection.	
	Part F – Waste/Chemical Management	
	• No environmental deficiency was identified during the site inspection.	
130927-O01	***Part G – Permits/Licenses***	
	• Construction Noise Permit should be displayed at the site entrance near Kai Ching Estate.	G1
	Part H - Others	
130927-F04	• Follow-up on previous audit section (Ref. No.:130919), follow up actions are needed to be reviewed for items 130919-R02 and 130919-R04.	

	Name	Signature	Date
Recorded by	Johnny Fung		27 September 2013
Checked by	Dr. Priscilla Choy		27 September 2013

APPENDIX I
EVENT AND ACTION PLANS

Appendix I - Event and Action Plan for Noise Monitoring during Construction Phase

EVENT	ACTION			
	Works Contract 1107 ET	**IEC**	**ER**	**CONTRACTOR**
Action Level	1. Notify the IEC, Contractor and ER 2. Discuss with the ER, IEC and Contractor on the remedial measures required 3. Increase monitoring frequency to check mitigation effectiveness	1. Review the investigation results submitted by the contractor; 2. Review and advise the ET and ER on effectiveness of the remedial measures proposed by the Contractor. .	1. Confirm receipt of notification of complaint in writing 2. Notify the Contractor, IEC and ET 3. Review and agree on the remedial measures proposed by the Contractor; 4. Supervise implementation of remedial measures	1. Investigate the complaint and propose remedial measures 2. Report the results of investigation to the IEC, ET and ER 3. Submit noise mitigation proposals to the ER with copy to the IEC and ET within 3 working days of notification. 4. Implement noise mitigation proposals
Limit Level	1. Notify the IEC, Contractor and EPD 2. Repeat measurement to confirm findings 3. Increase monitoring frequency 4. Carry out analysis of Contractor's working procedures to determine possible mitigation to be implemented 5. Arrange meeting with the IEC, and ER to discuss the remedial measures to be taken; 6. Inform IEC, ER and EPD the causes and actions taken for the exceedances 7. Assess effectiveness of the Contractor's remedial measures and keep IEC, ER and EPD informed of the results	1. Check monitoring data submitted by the ET; 2. Check the Contractor's working method; 3. Discuss with the ER, ET and Contractor on the potential remedial measures 4. Review and advise the ET and ER on the effectiveness of the remedial measures proposed by the Contractor.	1. Confirm receipt of notification of exceedance in writing 2. Notify the Contractor, IEC and ET 3. In consultation with the ET and IEC, agree with the Contractor on the remedial measures to be implemented 4. Supervise the implementation of remedial measures 5. If exceedance continues, consider what portion of the work is responsible and instruct the Contractor to stop that portion of work until the exceedance is abated	1. Identify source and investigate the causes of exceedance 2. Take immediate action to avoid further exceedance 3. Submit proposals for remedial measures to the ER with copy to the IEC and ET within 3 working days of notification. 4. Implement the agreed proposals 5. Revise and resubmit proposals if problem still not under control 6. Stop the relevant portion of works as determined by the ER until the exceedance is abated

Appendix I - Event and Action Plan for Air Quality Monitoring during Construction Phase

EVENT	ACTION			
	ET	IEC	ER	CONTRACTOR
ACTION LEVEL				
1. Exceedance for one sample	1. Inform the IEC, Contractor and ER; 2. Discuss with the Contractor, IEC and ER on the remedial measures required; 3. Repeat measurement to confirm findings; 4. Increase monitoring frequency	1. Check monitoring data submitted by the ET; 2. Check Contractor's working method; 3. Review and advise the ET and ER on the effectiveness of the proposed remedial measures.	1. Confirm receipt of notification of exceedance in writing;	1. Identify source(s), investigate the causes of exceedance and propose remedial measures; 2. Implement remedial measures; 3. Amend working methods agreed with the ER as appropriate.
2.Exceedance for two or more consecutive samples	1. Inform the IEC, Contractor and ER; 2. Discuss with the ER, IEC and Contractor on the remedial measures required; 3. Repeat measurements to confirm findings; 4. Increase monitoring frequency to daily; 5. If exceedance continues, arrange meeting with the IEC, ER and Contractor; 6. If exceedance stops, cease addtional monitoring	1. Check monitoring data submitted by the ET; 2. Check Contractor's working method; 3. Review and advise the ET and ER on the effectiveness of the proposed remedial measures.	1. Confirm receipt of notification of exceedance in writing; 2. Notify the Contractor, IEC and ET; 3. Review and agree on the remedial measures proposed by the Contractor; 4. Supervise Implementation of remedial measures.	1. Identify source and investigate the causes of exceedance; 2. Submit proposals for remedial measures to the ER with a copy to ET and IEC within three working days of notification; 3. Implement the agreed proposals; 4. Amend proposal as appropriate.

Appendix I - Event and Action Plan for Air Quality Monitoring during Construction Phase

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

Appendix I - Event and Action Plan for Landscape and Visual during Construction Phase

EVENT	ACTION			
	Works Contract 1107 ET	**IEC**	**ER**	**CONTRACTOR**
Non-conformity on one occasion	1. Inform the Contractor, the IEC and the ER 2. Discuss remedial actions with the IEC, the ER and the Contractor 3. Monitor remedial actions until rectification has been completed	1. Check inspection report 2. Check the Contractor's working method 3. Discuss with the ET, ER and the Contractor on possible remedial measures 4. Advise the ER on effectiveness of proposed remedial measures.	1. Confirm receipt of notification of non-conformity in writing 2. Review and agree on the remedial measures proposed by the Contractor; 3. Supervise implementation of remedial measures	1. Identify Source and investigate the non-conformity 2. Implement remedial measures 3. Amend working methods agreed with the ER as appropriate 4. Rectify damage and undertake any necessary replacement
Repeated Non-conformity	1. Identify Source 2. Inform the Contractor, the IEC and the ER 3. Increase inspection frequency 4. Discuss remedial actions with the IEC, the ER and the Contractor 5. Monitor remedial actions until rectification has been completed 6. If non-conformity stops, cease additional monitoring	1. Check inspection report 2. Check the Contractor's working method 3. Discuss with the ET and the Contractor on possible remedial measures 4. Advise the ER on effectiveness of proposed remedial measures	1. Notify the Contractor 2. In consultation with the ET and IEC, agree with the Contractor on the remedial measures to be implemented 3. Supervise implementation of remedial measures.	1. Identify Source and investigate the non-conformity 2. Implement remedial measures 3. Amend working methods agreed with the ER as appropriate 4. Rectify damage and undertake any necessary replacement. Stop relevant portion of works as determined by the ER until the non-conformity is abated.

APPENDIX J
UPDATED ENVIRONMENTAL MITIGATION IMPLEMENTATION SCHEDULE

SCL Works Contract 1107 - Environmental Mitigation Implementation Schedule

EIA Ref.	EM&A Log Ref	Recommended Mitigation Measures	Objectives of the recommended Measures & Main Concerns to address	Who to implement the measures?	Location of the measures	When to Implement the measures?	What requirements or standards for the measures to achieve?	Status
Landscape & Visual (Construction Phase)								
S6.12	LV1	The following good site practices and measures for minimisation and avoidance of potential impacts are recommended:	Minimize visual & landscape impact	Contractor	Within Project Site	Construction stage	•TM-EIAO	
		Re-use of Existing Soil						
		• For soil conservation, existing topsoil shall be re-used where possible for new planting areas within the project. The construction program shall consider using the soil removed from one phase for backfilling another. Suitable storage ground, gathering ground and mixing ground may be set up on-site as necessary.						N/A
		No-intrusion Zone						
		• To maximize protection to existing trees, ground vegetation and the associated under storey habitats, construction contracts may designate "No-intrusion Zone" to various areas within the site boundary with rigid and durable fencing for each individual no-intrusion zone. The contractor should closely monitor and restrict the site working staff from entering the "no-intrusion zone", even for indirect construction activities and storage of equipment.						^
		Protection of Retained Trees						
		• All retained trees should be recorded photographically at the commencement of the Contract, and carefully protected during the construction period. Detailed tree protection specification shall						^

SCL Works Contract 1107 - Environmental Mitigation Implementation Schedule

EIA Ref.	EM&A Log Ref	Recommended Mitigation Measures	Objectives of the recommended Measures & Main Concerns to address	Who to implement the measures?	Location of the measures	When to Implement the measures?	What requirements or standards for the measures to achieve?	Status
		be allowed and included in the Contract Specification, which specifying the tree protection requirement, submission and approval system, and the tree monitoring system. • The Contractor shall be required to submit, for approval, a detailed working method statement for the protection of trees prior to undertaking any works adjacent to all retained trees, including trees in contractor's works sites.						^
Table 6.9	LV2	Decorative Hoarding • Erection of decorative screen during construction stage to screen off undesirable views of the construction site for visual and landscape sensitive areas. Hoarding should be designed to be compatible with the existing urban context. Management of facilities on work sites • To provide proper management of the facilities on the sites, give control on the height and disposition/ arrangement of all facilities on the works site to minimize visual impact to adjacent VSRs. Tree Transplanting • Trees of medium to high survival rate that would be affected by the works shall be transplanted where possible and practicable. Tree transplanting proposal including final location for transplanted trees shall be submitted separately to seek relevant government department's approval, in accordance with ETWB	Minimize the visual and landscape impact of the Project during construction phase	Contractor	Within Project Site	Detailed design and construction stage	• EIAO – TM •ETWB TCW 2/2004 • ETWB TCW 3/2006	N/A N/A N/A

SCL Works Contract 1107 - Environmental Mitigation Implementation Schedule

EIA Ref.	EM&A Log Ref	Recommended Mitigation Measures	Objectives of the recommended Measures & Main Concerns to address	Who to implement the measures?	Location of the measures	When to Implement the measures?	What requirements or standards for the measures to achieve?	Status
		TCW No 3/2006.						
Air Quality (Construction Phase)								
/	A1	Emission from Vehicles and Plants • All vehicles shall be shut down in intermittent use. • Only well-maintained plant should be operated on-site and plant should be serviced regularly to avoid emission of black smoke. • All diesel fuelled construction plant within the works areas shall be powered by ultra low sulphur diesel fuel (ULSD)	Reduce air pollution emission from construction vehicles and plants	Contractor	All construction sites	Construction stage	• APCO	*
/	A2	Open burning shall be prohibited	Reduce air pollution emission from work site	Contractor	All construction sites	Construction stage	• APCO	^
Construction Dust Impact								
S7.6.6	D1	The contractor shall follow the procedures and requirements given in the Air Pollution Control (Construction Dust) Regulation	Minimize dust impact at the nearby sensitive receivers	Contractor	All Construction Sites	Construction stage	• APCO • To control the dust impact to meet HKAQO and TM-EIA criteria	*
S7.6.6	D2	Mitigation measures in form of regular watering under a good site practice should be adopted. Watering once per hour on exposed worksites and haul road in the Kowloon area should be conducted to achieve dust removal efficiencies of 91.7%. While the above watering frequencies are to be followed, the extent of watering may vary depending on actual site conditions but should be sufficient to maintain	Minimize dust impact at the nearby sensitive receivers	Contractor	All Construction Sites	Construction stage	• APCO • To control the dust impact to meet HKAQO and TM-EIA criteria	*

SCL Works Contract 1107 - Environmental Mitigation Implementation Schedule

EIA Ref.	EM&A Log Ref	Recommended Mitigation Measures	Objectives of the recommended Measures & Main Concerns to address	Who to implement the measures?	Location of the measures	When to Implement the measures?	What requirements or standards for the measures to achieve?	Status
		an equivalent intensity of no less than 1.8 L/m^2 to achieve the dust removal efficiency						
S7.6.6	D3	• Any excavated or stockpile of dusty material should be covered entirely by impervious sheeting or sprayed with water to maintain the entire surface wet and then removed or backfilled or reinstated where practicable within 24 hours of the excavation or unloading; • Any dusty materials remaining after a stockpile is removed should be wetted with water and cleared from the surface of roads; • A stockpile of dusty material should not be extend beyond the pedestrian barriers, fencing or traffic cones. • The load of dusty materials on a vehicle leaving a construction site should be covered entirely by impervious sheeting to ensure that the dusty materials do not leak from the vehicle; • Where practicable, vehicle washing facilities with high pressure water jet should be provided at every discernible or designated vehicle exit point. The area where vehicle washing takes place and the road section between the washing facilities and the exit point should be paved with concrete, bituminous materials or hardcores; • When there are open excavation and reinstatement works, hoarding of not less than 2.4m high should be provided and properly maintained as far as practicable along the site boundary	Minimize dust impact at the nearby sensitive receivers	Contractor	All Construction Sites	Construction stage	• APCO • To control the dust impact to meet HKAQO and TM-EIA criteria	* * ^ N/A N/A N/A

SCL Works Contract 1107 - Environmental Mitigation Implementation Schedule

EIA Ref.	EM&A Log Ref	Recommended Mitigation Measures	Objectives of the recommended Measures & Main Concerns to address	Who to implement the measures?	Location of the measures	When to Implement the measures?	What requirements or standards for the measures to achieve?	Status
		with provision for public crossing; Good site practice shall also be adopted by the Contractor to ensure the conditions of the hoardings are properly maintained throughout the construction period;						
		• The portion of any road leading only to construction site that is within 30m of a vehicle entrance or exit should be kept clear of dusty materials;						^
		• Surfaces where any pneumatic or power-driven drilling, cutting, polishing or other mechanical breaking operation takes place should be sprayed with water or a dust suppression chemical continuously;						^
		• Any area that involves demolition activities should be sprayed with water or a dust suppression chemical immediately prior to, during and immediately after the activities so as to maintain the entire surface wet;						^
		• Where a scaffolding is erected around the perimeter of a building under construction, effective dust screens, sheeting or netting should be provided to enclose the scaffolding from the ground floor level of the building, or a canopy should be provided from the first floor level up to the highest level of the scaffolding;						N/A
		• Any skip hoist for material transport should be totally enclosed by impervious sheeting;						N/A

SCL Works Contract 1107 - Environmental Mitigation Implementation Schedule

EIA Ref.	EM&A Log Ref	Recommended Mitigation Measures	Objectives of the recommended Measures & Main Concerns to address	Who to implement the measures?	Location of the measures	When to Implement the measures?	What requirements or standards for the measures to achieve?	Status
		• Every stock of more than 20 bags of cement or dry pulverised fuel ash (PFA) should be covered entirely by impervious sheeting or placed in an area sheltered on the top and the 3 sides;						^
		• Cement or dry PFA delivered in bulk should be stored in a closed silo fitted with an audible high level alarm which is interlocked with the material filling line and no overfilling is allowed;						^
		• Loading, unloading, transfer, handling or storage of bulk cement or dry PFA should be carried out in a totally enclosed system or facility, and any vent or exhaust should be fitted with an effective fabric filter or equivalent air pollution control system; and						^
		• Exposed earth should be properly treated by compaction, turfing, hydroseeding, vegetation planting or sealing with latex, vinyl, bitumen, shotcrete or other suitable surface stabiliser within six months after the last construction activity on the construction site or part of the construction site where the exposed earth lies.						N/A
S7.6.6	D4	Implement regular dust monitoring under EM&A programme during the construction stage.	Monitoring of dust impact	Contractor	Selected representative dust monitoring station	Construction stage	• TM-EIA	^
Construction Airborne Noise								
S8.5.6	AN1	Implement the following good site practices:	Control construction airborne	Contractor	All Construction Sites where	Construction stage	• Annex 5, TM-EIA	
		• only well-maintained plant should be operated on-site and plant						^

SCL Works Contract 1107 - Environmental Mitigation Implementation Schedule

EIA Ref.	EM&A Log Ref	Recommended Mitigation Measures	Objectives of the recommended Measures & Main Concerns to address	Who to implement the measures?	Location of the measures	When to Implement the measures?	What requirements or standards for the measures to achieve?	Status
		should be serviced regularly during the construction programme; • machines and plant (such as trucks, cranes) that may be in intermittent use should be shut down between work periods or should be throttled down to a minimum; • plant known to emit noise strongly in one direction, where possible, be orientated so that the noise is directed away from nearby NSRs; • silencers or mufflers on construction equipment should be properly fitted and maintained during the construction works; • mobile plant should be sited as far away from NSRs as possible and practicable; • material stockpiles, mobile container site office and other structures should be effectively utilised, where practicable, to screen noise from on-site construction activities.	noise		practicable			^ ^ N/A ^ N/A
S8.5.6	AN2	Install temporary hoarding located on the site boundaries between noisy construction activities and NSRs. The conditions of the hoardings shall be properly maintained throughout the construction period.	Reduce the construction noise levels at low-level zone of NSRs through partial screening.	Contractor	All Construction Sites	Construction stage	• Annex 5, TM-EIA	N/A
S8.5.6	AN3	Install movable noise barriers (typical design is wooden framed barrier with a small-cantilevered on a skid footing with 25mm thick internal sound absorptive lining), acoustic mat or full enclosure, screen the noisy	Screen the noisy plant items to be used at all	Contractor	All Construction Sites	Construction stage	• Annex 5, TM-EIA	^

SCL Works Contract 1107 - Environmental Mitigation Implementation Schedule

EIA Ref.	EM&A Log Ref	Recommended Mitigation Measures	Objectives of the recommended Measures & Main Concerns to address	Who to implement the measures?	Location of the measures	When to Implement the measures?	What requirements or standards for the measures to achieve?	Status
		plants including air compressor, generators and saw.	construction sites					
S8.5.6	AN4	Use “Quiet” plant	Reduce the noise levels of plant items	Contractor	All Construction Sites where practicable	Construction stage	• Annex 5, TM-EIA	N/A
S8.5.6	AN5	Sequencing operation of construction plants where practicable.	Operate sequentially within the same work site to reduce the construction airborne noise	Contractor	All Construction Sites where practicable	Construction stage	• Annex 5, TM-EIA	^
S8.5.6	AN6	Implement a noise monitoring under EM&A programme.	Monitor the construction noise levels at the selected representative locations	Contractor	Selected representative noise monitoring station	Construction stage	•TM-EIA	^
Water Quality (Construction Phase)								
S10.7.1	W1	In accordance with the Practice Noise for Professional Persons on Construction Site Drainage, Environmental Protection Department, 1994 (ProPECC PN1/94), construction phase mitigation measures shall include the following: Construction Runoff and Site Drainage • At the start of site establishment (including the barging facilities), perimeter cut-off drains to direct off-site water around the site	To minimize water quality impact from construction site runoff and general construction activities	Contractor	All construction sites where practicable	Construction stage	• Water Pollution Control Ordinance • ProPECC PN1/94 • TM-EIAO • TM-Water	^

EIA Ref.	EM&A Log Ref	Recommended Mitigation Measures	Objectives of the recommended Measures & Main Concerns to address	Who to implement the measures?	Location of the measures	When to Implement the measures?	What requirements or standards for the measures to achieve?	Status
		should be constructed with internal drainage works and erosion and sedimentation control facilities implemented. Channels (both temporary and permanent drainage pipes and culverts), earth bunds or sand bag barriers should be provided on site to direct stormwater to silt removal facilities. The design of the temporary on-site drainage system will be undertaken by the contractor prior to the commencement of construction.						
		• The dikes or embankments for flood protection should be implemented around the boundaries of earthwork areas. Temporary ditches should be provided to facilitate the runoff discharge into an appropriate watercourse, through a site/sediment trap. The sediment/silt traps should be incorporated in the permanent drainage channels to enhance deposition rates. The design of efficient silt removal facilities should be based on the guidelines in Appendix A1 of ProPECC PN 1/94, which states that the retention time for silt/sand traps should be 5 minutes under maximum flow conditions. Sizes may vary depending upon the flow rate, but for a flow rate of 0.1 m^3/s a sedimentation basin of $30m^3$ would be required and for a flow rate of 0.5 m^3/s the basin would be 150 m^3. The detailed design of the sand/silt traps shall be undertaken by the contractor prior to the commencement of construction.						*

EIA Ref.	EM&A Log Ref	Recommended Mitigation Measures	Objectives of the recommended Measures & Main Concerns to address	Who to implement the measures?	Location of the measures	When to Implement the measures?	What requirements or standards for the measures to achieve?	Status
		• All exposed earth areas should be completed and vegetated as soon as possible after earthworks have been completed, or alternatively, within 14 days of the cessation of earthworks where practicable. Exposed slope surfaces should be covered by tarpaulin or other means.						N/A
		• The overall slope of the site should be kept to a minimum to reduce the erosive potential of surface water flows, and all traffic areas and access roads protected by coarse stone ballast. An additional advantage accruing from the use of crushed stone is the positive traction gained during prolonged periods of inclement weather and the reduction of surface sheet flows.						N/A
		• All drainage facilities and erosion and sediment control structures should be regularly inspected and maintained to ensure proper and efficient operation at all times and particularly following rainstorms. Deposited silt and grit should be removed regularly and disposed of by spreading evenly over stable, vegetated areas.						*
		• Measures should be taken to minimise the ingress of site drainage into excavations. If the excavation of trenches in wet periods is necessary, they should be dug and backfilled in short sections wherever practicable. Water pumped out from trenches or foundation excavations should be discharged into storm drains via						N/A

SCL Works Contract 1107 - Environmental Mitigation Implementation Schedule

EIA Ref.	EM&A Log Ref	Recommended Mitigation Measures	Objectives of the recommended Measures & Main Concerns to address	Who to implement the measures?	Location of the measures	When to Implement the measures?	What requirements or standards for the measures to achieve?	Status
		silt removal facilities.						
		• Open stockpiles of construction materials (for example, aggregates, sand and fill material) of more than $50m^3$ should be covered with tarpaulin or similar fabric during rainstorms.						*
		• Measures should be taken to prevent the washing away of construction materials, soil, silt or debris into any drainage system. Manholes (including newly constructed ones) should always be adequately covered and temporarily sealed so as to prevent silt, construction materials or debris being washed into the drainage system and storm runoff being directed into foul sewers						*
		• Precautions be taken at any time of year when rainstorms are likely, actions to be taken when a rainstorm is imminent or forecasted, and actions to be taken during or after rainstorms are summarised in Appendix A2 of ProPECC PN 1/94. Particular attention should be paid to the control of silty surface runoff during storm events, especially for areas located near steep slopes						^
		• All vehicles and plant should be cleaned before leaving a construction site to ensure no earth, mud, debris and the like is deposited by them on roads. An adequately designed and sited wheel washing facilities should be provided at every construction site exit where practicable. Wash-water should have sand and silt settled out and removed at least on a weekly basis to ensure						^

EIA Ref.	EM&A Log Ref	Recommended Mitigation Measures	Objectives of the recommended Measures & Main Concerns to address	Who to implement the measures?	Location of the measures	When to Implement the measures?	What requirements or standards for the measures to achieve?	Status
		the continued efficiency of the process. The section of access road leading to, and exiting from, the wheel-wash bay to the public road should be paved with sufficient backfall toward the wheel-wash bay to prevent vehicle tracking of soil and silty water to public roads and drains.						
		• Oil interceptors should be provided in the drainage system downstream of any oil/fuel pollution sources. The oil interceptors should be emptied and cleaned regularly to prevent the release of oil and grease into the storm water drainage system after accidental spillage. A bypass should be provided for the oil interceptors to prevent flushing during heavy rain.						N/A
		• Construction solid waste, debris and rubbish on site should be collected, handled and disposed of properly to avoid water quality impacts.						^
		• All fuel tanks and storage areas should be provided with locks and sited on sealed areas, within bunds of a capacity equal to 110% of the storage capacity of the largest tank to prevent spilled fuel oils from reaching water sensitive receivers nearby						N/A
		• All the earth works involving should be conducted sequentially to limit the amount of construction runoff generated from exposed areas during the wet season (April to September) as far as practicable.						^

EIA Ref.	EM&A Log Ref	Recommended Mitigation Measures	Objectives of the recommended Measures & Main Concerns to address	Who to implement the measures?	Location of the measures	When to Implement the measures?	What requirements or standards for the measures to achieve?	Status
		• Adopt best management practices.						*
S10.7.1	W2	Tunneling Works • Cut-&-cover/ open cut tunnelling work should be conducted sequentially to limit the amount of construction runoff generated from exposed areas during the wet season (April to September) as far as practicable. • Uncontaminated discharge should pass through sedimentation tanks prior to off-site discharge • The wastewater with a high concentration of SS should be treated (e.g. by sedimentation tanks with sufficient retention time) before discharge. Oil interceptors would also be required to remove the oil, lubricants and grease from the wastewater. • Direct discharge of the bentonite slurry (as a result of D-wall and bored tunnelling construction) is not allowed. It should be reconditioned and reused wherever practicable. Temporary storage locations (typically a properly closed warehouse) should be provided on site for any unused bentonite that needs to be transported away after all the related construction activities are completed. The requirements in ProPECC PN 1/94 should be adhered to in the handling and disposal of bentonite slurries.	To minimize construction water quality impact from tunneling works	Contractor	All tunneling portion	Construction stage	• Water Pollution Control Ordinance • ProPECC PN 1/94 • TM-water • TM-EIAO	^ N/A N/A N/A
S10.7.1	W3	Sewage Effluent • Portable chemical toilets and sewage holding tanks are	To minimize water quality from sewage effluent	Contractor	All construction sites where	Construction stage	• Water Pollution Control Ordinance	^

EIA Ref.	EM&A Log Ref	Recommended Mitigation Measures	Objectives of the recommended Measures & Main Concerns to address	Who to implement the measures?	Location of the measures	When to Implement the measures?	What requirements or standards for the measures to achieve?	Status
		recommended for handling the construction sewage generated by the workforce. A licensed contractor should be employed to provide appropriate and adequate portable toilets and be responsible for appropriate disposal and maintenance.			practicable		• TM-water	
S10.7.1	W5	Accidental Spillage In order to prevent accidental spillage of chemicals, the following is recommended: • Proper storage and handling facilities should be provided; • All the tanks, containers, storage area should be bunded and thelocations should be locked as far as possible from the sensitive watercourse and stormwater drains; • The Contractor should register as a chemical waste producer if chemical wastes would be generated. Storage of chemical waste arising from the construction activities should be stored with suitable labels and warnings; and • Disposal of chemical wastes should be conducted in compliance with the requirements as stated in the Waste disposal (Chemical Waste) (General) Regulation.	To minimize water quality impact from accidental spillage	Contractor	All construction sites where practicable	Construction stage	• Water Pollution Control Ordinance • ProPECC PN1/94 • TM-EIAO • TM-Water	 * * ^ *
Waste Management (Construction Waste)								
S11.4.1.1	WM1	On-site sorting of C&D material • Geological assessment should be carried out by competent persons on site during excavation to identify materials which are	Separation of unsuitable rock from ending up at concrete batching plants	Contractor	All construction sites	Construction stage	• DEVB TC(W) No. 6/2010	*

EIA Ref.	EM&A Log Ref	Recommended Mitigation Measures	Objectives of the recommended Measures & Main Concerns to address	Who to implement the measures?	Location of the measures	When to Implement the measures?	What requirements or standards for the measures to achieve?	Status
		not suitable to use as aggregate in structural concrete (e.g. volcanic rock, Aplite dyke rock, etc). Volcanic rock and Aplite dyke rock should be separated at the source sites as far as practicable and stored at designated stockpile areas preventing them from delivering to crushing facilities. The crushing plant operator should also be reminded to set up measures to prevent unsuitable rock from ended up at concrete batching plants and be turned into concrete for structural use. Details regarding control measures at source site and crushing facilities should be submitted by the Contractors for the Engineer to review and agree. In addition, site records should also be kept for the types of rock materials excavated and the traceability of delivery will be ensured with the implementation of Trip Ticket System and enforced by site supervisory staff as stipulated under DEVB TC(W) No. 6/2010 for tracking of the correct delivery to the rock crushing facilities for processing into aggregates. Alternative disposal option for the reuse of volcanic rock and Aplite Dyke rock, etc should also be explored.	and be turned into concrete for structural use					
S11.5.1	WM2	Construction and Demolition Material • Maintain temporary stockpiles and reuse excavated fill material for backfilling and reinstatement; • Carry out on-site sorting;	Good site practice to minimize the waste generation and recycle the C&D materials as far as	Contractor	All construction sites	Construction stage	• Land (Miscellaneous Provisions) Ordinance	^ ^

EIA Ref.	EM&A Log Ref	Recommended Mitigation Measures	Objectives of the recommended Measures & Main Concerns to address	Who to implement the measures?	Location of the measures	When to Implement the measures?	What requirements or standards for the measures to achieve?	Status
		• Make provisions in the Contract documents to allow and promote the use of recycled aggregates where appropriate; • Adopt 'Selective Demolition' technique to demolish the existing structures and facilities with a view to recovering broken concrete effectively for recycling purpose, where possible; • Implement a trip-ticket system for each works contract to ensure that the disposal of C&D materials are properly documented and verified; and • Implement an enhanced Waste Management Plan similar to ETWBTC (Works) No. 19/2005 – "Environmental Management on Construction Sites" to encourage on-site sorting of C&D materials and to minimize their generation during the course of construction. • In addition, disposal of the C&D materials onto any sensitive locations such as agricultural lands, etc. should be avoided. The Contractor shall propose the final disposal sites to the Project Proponent and EPD and get their approval before implementation	practicable so as to reduce the amount for final disposal				• Waste Disposal Ordinance • ETWB TCW No. 19/2005	^ N/A ^ ^ ^
S11.5.1	WM3	C&D Waste • Standard formwork or pre-fabrication should be used as far as practicable in order to minimise the arising of C&D materials. The use of more durable formwork or plastic facing for the construction works should be considered. Use of wooden	Good site practice to minimize the waste generation and recycle the C&D materials as far as practicable so as to reduce	Contractor	All construction sites	Construction stage	• Land (Miscellaneous Provisions) Ordinance • Waste Disposal	^

EIA Ref.	EM&A Log Ref	Recommended Mitigation Measures	Objectives of the recommended Measures & Main Concerns to address	Who to implement the measures?	Location of the measures	When to Implement the measures?	What requirements or standards for the measures to achieve?	Status
		hoardings should not be used, as in other projects. Metal hoarding should be used to enhance the possibility of recycling. The purchasing of construction materials will be carefully planned in order to avoid over ordering and wastage. • The Contractor should recycle as much of the C&D materials as possible on-site. Public fill and C&D waste should be segregated and stored in different containers or skips to enhance reuse or recycling of materials and their proper disposal. Where practicable, concrete and masonry can be crushed and used as fill. Steel reinforcement bar can be used by scrap steel mills. Different areas of the sites should be considered for such segregation and storage.	the amount for final disposal				Ordinance • ETWB TCW No.19/2005	^
S11.5.1	WM4	General Refuse • General refuse generated on-site should be stored in enclosed bins or compaction units separately from construction and chemical wastes. • A reputable waste collector should be employed by the Contractor to remove general refuse from the site, separately from construction and chemical wastes, on a daily basis to minimize odour, pest and litter impacts. Burning of refuse on construction sites is prohibited by law. • Aluminium cans are often recovered from the waste stream by	Minimize production of the general refuse and avoid odour, pest and litter impacts	Contractor	All construction sites	Construction stage	• Waste Disposal Ordinance	^ ^ N/A

SCL Works Contract 1107 - Environmental Mitigation Implementation Schedule

EIA Ref.	EM&A Log Ref	Recommended Mitigation Measures	Objectives of the recommended Measures & Main Concerns to address	Who to implement the measures?	Location of the measures	When to Implement the measures?	What requirements or standards for the measures to achieve?	Status
		individual collectors if they are segregated and made easily accessible. Separate labelled bins for their deposit should be provided if feasible. • Office wastes can be reduced through the recycling of paper if volumes are large enough to warrant collection. Participation in a local collection scheme should be considered by the Contractor.						^
S11.5.1	WM6	<u>Chemical Waste</u> • Chemical waste that is produced, as defined by Schedule 1 of the Waste Disposal (Chemical Waste) (General) Regulation,should be handled in accordance with the Code of Practice on the Packaging, Labelling and Storage of Chemical Wastes. • Containers used for the storage of chemical wastes should be suitable for the substance they are holding, resistant to corrosion, maintained in a good condition, and securely closed; have a capacity of less than 450L unless the specification has been approved by the EPD; and display a label in English and Chinese in accordance with instructions prescribed in Schedule 2 of the regulation. • The storage area for chemical wastes should be clearly labelled and used solely for the storage of chemical waste; be enclosed on at least 3 sides; have an impermeable floor and bunding of sufficient capacity to accommodate 110% of the volume of the	Control the chemical waste and ensure proper storage, handling and disposal.	Contractor	All Construction Sites	Construction Stage	• Waste Disposal (Chemical Waste) (General) Regulation • Code of Practice on the Packaging, Labelling and Storage of Chemical Waste	* ^ *

EIA Ref.	EM&A Log Ref	Recommended Mitigation Measures	Objectives of the recommended Measures & Main Concerns to address	Who to implement the measures?	Location of the measures	When to Implement the measures?	What requirements or standards for the measures to achieve?	Status
		largest container or 20 % of the total volume of waste stored in that area, whichever is the greatest; have adequate ventilation; be covered to prevent rainfall entering; and be arranged so that incompatible materials are adequately separated.						
		• Disposal of chemical waste should be via a licensed waste collector; and be to a facility licensed to receive chemical waste,such as the Chemical Waste Treatment Centre which also offers a chemical waste collection service and can supply the necessary storage containers; or be to a reuser of the waste, under approval from the EPD.						N/A

Remarks: ^ Compliance of mitigation measure X Non-compliance of mitigation measure

• Non-compliance but rectified by the contractor

* Recommendation was made during site audit but improved/rectified by the contractor.

N/A Not Applicable

APPENDIX K
WASTE GENERATION IN THE REPORTING MONTH

CW - SELI Joint Venture

Name of Department: MTRC

Contract No.:1107

Monthly Summary Waste Flow Table for 2013

Year	Estimated Quantities of Inert C&D Materials (in '000m^3)										Estimated Quantities of C&D Wastes									
	Total Quantity Generated		Suitable for Recycled Aggregates		Reused in the Contract		Reused in other Projects		Disposed as Public Fill		Metals		Paper/cardboard packaging		Plastics (see Note 2)		Chemical Waste		Others, e.g. general refuse	
	(a)		(b)		(c)		(d)		(e=a-b-c-d)		(in '000kg)		(in '000kg)		(in '000kg)		(in '000kg)		(in '000m^3)	
	Est.	Act.	Est.	Act.	Est.	Act.	Est.	Act.	Est.	Act.	Est.	Act.	Est.	Act.	Est.	Act.	Est.	Act.	Est.	Act.
January																				
February																				
March	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
April	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
May	0.100	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.100	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.080	0.000
June	1.800	0.000	0.000	0.000	0.000	0.000	0.000	0.000	1.800	0.000	0.000	1.780	0.100	0.000	0.000	0.000	0.000	0.000	0.080	0.030
July	1.800	0.880	0.000	0.000	0.000	0.000	0.000	0.255	1.800	0.625	0.000	0.100	0.100	0.000	0.100	0.000	0.000	0.000	0.080	0.035
August	1.800	2.465	0.000	0.000	0.000	0.000	0.000	2.455	1.800	0.010	0.000	0.000	0.100	0.137	0.000	0.000	0.000	0.000	0.100	0.025
September	1.800	1.790	0.000	0.000	0.000	0.000	0.000	1.760	1.800	0.030	1.000	12.000	0.100	0.000	0.000	0.000	0.000	0.000	0.100	0.040
October	1.000		0.000		0.000		0.000		1.000		1.000		0.100		0.000		0.000		0.100	
November	5.500		0.000		0.000		0.000		5.500		0.000		0.100		0.000		0.100		0.100	
December	5.500		0.000		0.000		0.000		5.500		0.000		0.100		0.100		0.000		0.100	
Total	**19.300**	**5.135**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**4.470**	**19.300**	**0.665**	**2.000**	**13.880**	**0.700**	**0.137**	**0.200**	**0.000**	**0.100**	**0.000**	**0.740**	**0.130**

Notes:
(1) The waste flow table shall also include C&D materials that are specified in the Contract to be imported for use at the Site.
(2) Plastics refer to plastic bottles/containers, plastic sheets/foam from packaging material
(3) The quantities of C&D Materials, in m^3, was calculated by multiplying the no. of truck with the volume of truck, which is 5m^3.

APPENDIX L
CUMULATIVE LOG FOR COMPLAINT LOGS, NOTIFICATION OF SUMMONS AND SUCCESSFUL PROSECUTIONS

Appendix L - Cumulative Log for Complaints, Notifications of Summons and Successful Prosecutions

Cumulative Complaint Log

Log Ref.	Date/Location	Complainant/ Date of Contact	Details of Complaint	Investigation/ Mitigation Action	File Closed
--	--	--	--	--	--

Cumulative Log for Notifications of Summons

Log Ref.	Date/Location	Subject	Status	Total no. Received in this reporting month	Total no. Received since project commencement
--	--	--	--	--	--

Cumulative Log for Successful Prosecutions

Log Ref.	Date/Location	Subject	Status	Total no. Received in this reporting month	Total no. Received since the commencement of the project
--	--	--	--	--	--

Appendix H

4th Monthly EM&A Report for Works Contract 1112 – Hung Hom Station and Stabling Sidings

MTR Corporation Limited

Shatin to Central Link –
Tai Wai to Hung Hom Section and
Mong Kok East to Hung Hom Section

Monthly EM&A Report No.4

[Period from 1 to 30 September 2013]

Contract 1112 - Hung Hom Station and Stabling Sidings

(October 2013)

Certified by: Vivian Chan Vivian

Position: Environmental Team Leader

Date: 10th October 2013

4th Monthly EM&A Report for September 2013

Shatin to Central Link – Works Contract 1112 Hung Hom Station and Stabling Sidings

October 2013

Project/Deliverable No.	7076187 | D06/01
Project Name	Shatin to Central Link – Works Contract 1112 Hung Hom Station and Stabling Sidings
Report Name	4th Monthly EM&A Report for September 2013
Report Date	October 2013
Report for	Leighton Contractors (Asia) Limited

PREPARATION, REVIEW AND AUTHORISATION

Revision #	Date	Prepared by	Reviewed by	Approved by
1.0 (Draft)	October 2013	Winnie MA	Vivian CHAN	Alexi BHANJA
1.1 (Final)	October 2013	Winnie MA	Vivian CHAN	Alexi BHANJA

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SMEC COMPANY DETAILS

SMEC Asia Limited
27/F Ford Glory Plaza, 37-39 Wing Hong Street, Cheung Sha Wan, Kowloon, Hong Kong
T +852 3995 8100 | **F** +852 3995 8101
smecasia@smec.com | www.smec.com

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APPENDICES

TABLES

EXECUTIVE SUMMARY

Introduction

The construction works of MTRC Shatin to Central Link Works Contract 1112- Hung Hom Station and Stabling Sidings (the Project) comprise permanent works and the necessary temporary works for Hung Hom Station (HUH), Hung Hom Stabling Sidings (HHS), the South Approach Tunnels (SAT) and the North Approach Tunnels (NAT) to the new station, HHS and any reprovisioning remedial and improvement works (RRIW).

Construction works of the Project commenced on 3 June 2013. This is the 4th monthly Environmental Monitoring and Audit (EM&A) Report presenting the EM&A works carried out during the period from 1 to 30 September 2013 in accordance with the EM&A manual.

During the reporting month, the following activity took place for the Project:

- Diaphragm wall construction at HUH
- Initial excavation at HUH

Landscape and Visual Monitoring

Bi-weekly inspection of the implementation of landscape and visual mitigation measures was conducted on 3 and 18 September 2013. All necessary mitigation measures have been implemented by the Contractor.

Air Quality Monitoring

Air Quality (24-hour TSP) monitoring was carried out on 6, 12, 18, 23 and 28 September 2013. No exceedance of Action and Limit Level of 24-hour TS monitoring was recorded at the monitoring location in the reporting month.

Noise Quality Monitoring

Construction airborne noise monitoring can be referred to the Monthly EM&A Report for Contract 1111.

Waste Management

As advised by the Contractor, 16,250 kg of general refuse was generated from the Project and disposed of at NENT landfill. 22,780 kg of metals, 223 kg of paper/cardboard packaging and 460 kg plastics was recycled from the Project. A total of 3,389m^3 inert construction demolition (C&D) materials was generated from the Project, where 3,193m^3 was disposed of at TM38 Public Fill and 196m^3 was disposed of at Kwun Tong Line Extension Works Contract 1001 Barging Point. No chemical waste or was generated during the reporting month.

Environmental Auditing

A total of 4 weekly environmental site audits were conducted on 5, 12, 19 and 26 September 2013. The IEC joint site audit was undertaken on 12 September 2013.

Compliant, Notification of Summons and Successful Prosecution

No complaint in relation to the environmental issues was recorded during the reporting period.

No summons or prosecution related to the environmental issues were received in the reporting period.

Future Key Issues

Major site activities for the coming reporting month will include:

- Diaphragm wall construction at HUH
- Underpinning at HHS and HUH
- Demolition of Wagon Examination Office / Freight Document Store Room / Building Service Store Room / Amenity Building
- Bored piling for diversion of Cheong Wan Road Viaduct and South Transformer Room & Accommodation
- Set up of small scale mobile batching machinery and equipment (MBME) under the HUH podium, scheduled to be in service from October 2013

Potential environmental impacts arising from the above construction activities are mainly associated with construction dust, construction noise and waste management.

1 INTRODUCTION

1.1 Project Background

1.1.1 The Shatin to Central Link (SCL) is a designated project (DP) under the Environmental Impact Assessment Ordinance (EIAO). For the purposes of the Environmental Impact Assessment (EIA), five EIA studies have been conducted to cover different sections of the SCL. These are Tai Wai to Hung Hom Section (SCL (TAW-HUH)), Mong Kok East to Hung Hom Section (SCL (MKK-HUH)), Hung Hom to Admiralty Section (SCL (HUH-ADM)), Protection Works at Causeway Bay Typhoon Shelter and Stabling Sidings at Hung Hom Freight Yard (SCL (HHS)).

1.1.2 Three EIA reports are of relevance to Works Contract 1112 (the Project), namely EIA for SCL (TAW-HUH) (Register No. AEIAR-167/2012), EIA for SCL (MKK-HUH) (Register No. AEIAR-165/2012) and EIA for SCL (HHS) (Register No. AEIAR-164/2012). These were submitted and subsequently approved with conditions by the Environmental Protection Department (EPD) on 17 February 2012. Two Environmental Permits (EPs), Environmental Permit No. EP-437/2012 for SCL (MKK-HUH) and Environmental Permit No. EP-438/2012 for SCL (TAW-HUH) were subsequently obtained on 22 March 2012. Variation of environmental permit (VEP) was subsequently applied for Environmental Permit No. EP-438/2012/C and the latest Environmental Permit (EP No. EP-438/2012/D) was issued by Director of Environmental Protection (DEP) on 13 September 2013.

1.1.3 Construction of the SCL has been divided into a number of works contracts. This Works Contract 1112 was awarded to Leighton Contractors (Asia) Limited (the Contractor) in March 2013. Leighton has engaged SMEC Asia Limited as the Environmental Team under the EIAO for Works Contract 1112.

1.2 Purpose of the Report

1.2.1 This is the 4th EM&A report which summarizes the monitoring results and audit findings during the reporting period from 1 to 30 September 2013.

1.3 Report Structure

- Section 1: Introduction
- Section 2: Project Information
- Section 3: Environmental Monitoring Parameters
- Section 4: Implementation Status of Environmental Mitigation Measures
- Section 5: Monitoring Results
- Section 6: Environmental Site Inspection and Audit
- Section 7: Environmental Non-conformance
- Section 8: Future Key Issues
- Section 9: Conclusions and Recommendations

2 PROJECT INFORMATION

2.1 General Site Description

2.1.1 The works under Works Contract 1112 comprise permanent works and the necessary temporary works for Hung Hom Station (HUH), Hung Hom Stabling Sidings (HHS), the South Approach Tunnels (SAT) and the North Approach Tunnels (NAT) to the new station, HHS and any reprovisioning remedial and improvement works (RRIW). The major permanent works under Works Contract 1112 generally comprise the following:

- New HUH integrated with the existing HUH station, with associated entrances, ventilation facilities, plant rooms, other ancillary facilities, and ABWF works.
- Modification of the existing HUH station to allow interchange between Existing East Rail Line and SCL(TAW-HUH), and between SCL(MKK-HUH) and SCL(TAW-HUH) comprising alteration and addition works at podium level, mid-level, and platform level.
- Running tunnels of the SCL(TAW-HUH) at the south and north ends of the new HUH to the existing stub tunnel of Existing West Rail and interface with Works Contract 1111.
- Running tunnels of the SCL(MKK-HUH) at the south and north ends of the new HUH to the proposed North Ventilation Building and interface with Works Contract 1111.
- Extensive underpinning and modification of the existing podium structure of HUH and the Hong Kong Coliseum, and associated protection works.
- Diversion, modification and dismantling of existing building services associated with underpinning and modification of existing structures.
- Demolition and clearance of the majority of the existing Hung Hom Freight Terminal infrastructure.
- Protection, diversion, and modification of utilities and services.
- Launching and retrieval track connecting the SCL(TAW-HUH) to HHS from the turnout close to WRL at the south and interface with Works Contract 1111 at the north.
- CLP Transformer Building.
- Demolition of the existing International Mail Centre adjacent to Salisbury Road, the MTR Freight Operations Building within the southern end of the Hung Hom Freight Terminal, and other ancillary buildings.
- Reconstruction of Cheong Wan Road Viaduct.
- Civil, BS and ABWF provisions for designated and interfacing contracts.
- Landscape works.
- Modification to various parts of existing disused Freight Yard structure for provision of HHS, comprising alteration and addition works at underground level, ground level, mezzanine level and podium level including new

accommodation and plant areas and stablings and associated track provisions connecting to the interface with Works Contract 1111.

- Extensive underpinning of the podium structures above the existing disused Freight Yard for provision of HHS and its associated works.
- Construct part of the shunting track.
- Construct the emergency track and its associated works which connect the stabling siding to the mainline which run parallel with the northern approach of HUH.
- Construct the semi-enclosed noise enclosure and its associated works over the entire HHS north fan area.

2.1.2 The works area for the Works Contract 1112 is shown in ***Appendix A***.

2.2 Construction Programme and Activities

2.2.1 The summary of construction programme is presented in ***Appendix B***.

2.2.2 The major construction activities carried out by the Contractor in the reporting period are summarized as below:

- Diaphragm wall construction at HUH
- Initial excavation at HUH

2.3 Project Organisation

2.3.1 The project organization structure is presented in ***Appendix C***. The contact names and numbers for key personnel of the Project are summarized in ***Table 2-1***.

Table 2-1 Contact Information of Key Personnel

Company	Position	Name	Telephone	Fax
MTR	Construction Manager	Mr Patrick CHENG	3127 6203	3127 6422
	SCL Project Environmental Team Leader	Mr Richard KWAN	2688 1283	2993 7577
Meinhardt	Independent Environmental Checker	Mr Fredrick LEONG	2859 1739	2540 1580
Leighton	Environmental Manager	Mr Kevin HARMAN	3973 0270	2356 9355
SMEC	ET Leader	Ms Vivian CHAN	3995 8140	3995 8101

2.4 Status of Environmental Licences, Notification and Permits

2.4.1 A summary of the relevant permits, licences, and/or notifications on environmental protection for this Project is presented in ***Table 2-2***.

Table 2-2 Status of Environmental Licenses, Notification and Permits

Permit / Licence No. / Notification / Reference No.	Valid Period		Status	Remark
	From	To		
Environmental Permit				
EP-437/2012	22 Mar 2012	-	Valid	EP for SCL (MKK-HUH)
EP-438/2012/C	30 Apr 2013	12 Sep 2013	Valid until 12 Sep 2013	EP for SCL (TAW-HUH)
EP-438/2012/D	13 Sep 2013	-	Valid	EP for SCL (TAW-HUH)
Construction Noise Permit				
GW-RE0564-13	5 Jun 2013	30 Nov 2013	Valid	For erection or dismantling of scaffolding, and handling of scaffolding material
GW-RE0705-13	15 Jul 2013	30 Sep 2013	Valid until cancellation on 30 Sep 2013	Relocation of overhead line mast A0370
GW-RE0846-13	11 Aug 2013	03 Nov 2013	Valid	Cable inspection with CLP
GW-RE0854-13	10 Aug 2013	02 Sep 2013	Valid until cancellation on 02 Sep 2013	Concrete coring in concourse level
GW-RE0853-13	10 Aug 2013	01 Feb 2014	Valid	Bentonite recirculation for diaphragm wall
GW-RE0873-13	24 Aug 2013	15 Sep 2013	Valid until cancellation on 15 Sep 2013	Piping Installation at mid-level walkway
GW-RE0942-13	05 Sep 2013	18 Sep 2013	Valid until cancellation on 18 Sep 2013	Building services system modification work for construction of new entrances E1 & E2
GW-RE0948-13	26 Sep 2013	09 Nov 2013	Valid	Delivery of heavy

Permit / Licence No. / Notification / Reference No.	Valid Period		Status	Remark
	From	To		
				vehicles
GW-RE0966-13	12 Sep 2013	25 Sep 2013	Valid until cancellation on 25 Sep 2013	Traverser area hoarding erection
GW-RE0985-13	16 Sep 2013	15 Oct 2013	Valid	Water main modification at mid-level walkway
GW-RE1007-13	21 Sep 2013	12 Mar 2014	Valid	Bentonite recirculation for D-wall & Building Services System Modification Work
GW-RE1026-13	01 Oct 2013	30 Dec 2013	Valid	Relocation of overhead line mast A0370
GW-RE1060-13	30 Sep 2013	01 Mar 2014	Valid	Traverser area hoarding erection
Wastewater Discharge License				
WT00015983-2013	28 Jun 2013	30 Jun 2018	Valid	-
Chemical Waste Producer Registration				
5213-213-L2603-03	28 Jun 2013	-	Valid	-
Billing Account for Construction Waste Disposal				
7017179	27 Mar 2013	-	Active Account	-
Notification Under Air Pollution Control (Construction Dust) Regulation				
357078	18 Mar 2013	-	Notified	-

3 ENVIORNMENTAL MONITORTING PARAMETERS

3.1 Landscape and Visual Impact Monitoring

3.1.1 In accordance with the EM&A Manual, the landscape and visual mitigation measures shall be implemented and a site inspection shall be conducted once every two weeks throughout the construction period.

3.2 Air Quality Monitoring

Parameter, Frequency and Duration

3.2.1 In accordance with the EM&A Manual, 24-hour Total Suspended Particulates (TSP) level at the designated air quality monitoring station is required throughout the construction period. The monitoring parameters and frequency are provided in ***Table 3-1***.

Table 3-1 Air Quality Monitoring Parameters and Frequency

Parameter	Frequency
1-hour TSP	3 times in every 6 days when one documented valid complaint is received
24-hour TSP [1]	Once per 6 days

Note:
1. 24-hour TSP will be conducted when project-related construction activities are being undertaken within a radius of 500m from monitoring stations.

Monitoring Location

3.2.2 One air quality monitoring station was set up at the location in accordance with the approved EM&A Manuals. The location of the construction dust monitoring stations is summarised in ***Table 3-2 and*** shown in ***Appendix D***.

Table 3-2 Air Quality Monitoring Location

ID	Location
AM2 [1]	Harbourfront Horizon [2]

Note:
1. Different IDs were used in various EM&A Manuals for dust monitoring location at Harbourfront Horizon, DMS-12 was used in EM&A Manual for SCL(TAW-HUH), AM2 were used in EM&A Manual and EIA report for SCL(MKK-HUH), and DMS-1 Works Contract 1112were used in EM&A Manual and EIA report for HHS. For ease of future reference, AM2 will be adopted for EM&A reporting for Works Contract 1112 when referring to this monitoring location.
2. Air quality monitoring location at Harbourfront Horizon is the same as monitoring station CD6a as proposed in the EM&A Manual for "*Kwun Tong Line Extension (KTE)*". Access to Harbourfront Horizon was rejected by the owner during preparation for baseline monitoring for the KTE in early 2011. A representative monitoring location at the adjacent Finger Pier, at about 25m from Harbourfront Horizon, was adopted as an alternative monitoring location for

KTE. This monitoring location is considered the most appropriate alternative monitoring location for AM2 and have been adopted for dust monitoring for Contract 1112.

Monitoring Equipment

3.2.3 The air quality monitoring was performed using High Volume Sampler (HVS). The HVS meets all the requirements of the EM&A Manual. Detail of the HVS used in air quality monitoring is provided in ***Table 3-3***.

Table 3-3 Air Quality Monitoring Equipment

Equipment	Brand and Model	Serial Number
High Volume Sampler	GS-2310 Accu-vol	694-0665
Calibration Kit	Tisch (TE-5025A)	1941

3.2.4 The HVS were calibrated in every six months interval using calibration kit which is re-calibrated by the manufacturer after one year of use. The calibration certificate of the calibration kit and the calibration spreadsheet of the HVS is provided in ***Appendix E***.

Monitoring Procedures

3.2.5 Specifications of HVS are as follow:

i. 0.6 - 1.7m^3 per minute adjustable flow range
ii. Equipped with a timing / control device with +/- 5 minutes accuracy for 24 hours operation
iii. Installed with elapsed-time meter with +/- 2 minutes accuracy for 24 hours operation
iv. Capable of providing a minimum exposed area of 406cm2
v. Flow control accuracy: +/- 2.5% deviation over 24-hour sampling period
vi. Equipped with a shelter to protect the filter and sampler
vii. Incorporated with an electronic mass flow rate controller or other equivalent devices
viii. Equipped with a flow recorder for continuous monitoring
ix. Provided with a peaked roof inlet
x. Incorporated with a manometer
xi. Able to hold and seal the filter paper to the sampler housing at horizontal position
xii. Easily changeable filter and
xiii. Capable of operating continuously for a 24-hour period.

3.2.6 Preparation of Filter Papers

i. Glass fibre filters, G810 were labelled and sufficient filters that were clean and without pinholes were selected.
ii. All filters were equilibrated in the conditioning environment for 24 hours before weighing. The conditioning environment temperature was around 25°C and not

variable by more than ±3 °C; the relative humidity (RH) was < 50% and not variable by more than ±5%. A convenient working RH was 40%.

iii. All filter papers were prepared and analysed by ALS Technichem (HK) Pty Ltd., which is a HOKLAS accredited laboratory and has comprehensive quality assurance and quality control programmes.

3.2.7 Field Monitoring

i. The power supply was checked to ensure the HVS works properly.
ii. The filter holder and the area surrounding the filter were cleaned.
iii. The filter holder was removed by loosening the four bolts and a new filter, with stamped number upward, on a supporting screen was aligned carefully.
iv. The filter was properly aligned on the screen so that the gasket formed an airtight seal on the outer edges of the filter.
v. The swing bolts were fastened to hold the filter holder down to the frame. The pressure applied was sufficient to avoid air leakage at the edges.
vi. Then the shelter lid was closed and was secured with the aluminium strip.
vii. The HVS was warmed-up for about 5 minutes to establish run-temperature conditions.
viii. A new flow rate record sheet was set into the flow recorder.
ix. On site temperature and atmospheric pressure readings were taken and the flow rate of the HVS was checked and adjusted at around 1.3 m^3/min, and complied with the range specified in the EM&A Manual (i.e. 0.6-1.7 m^3/min).
x. The programmable digital timer was set for a sampling period of 24 hrs, and the starting time, weather condition and the filter number were recorded.
xi. The initial elapsed time was recorded.
xii. At the end of sampling, on site temperature and atmospheric pressure readings were taken and the final flow rate of the HVS was checked and recorded.
xiii. The final elapsed time was recorded.
xiv. The sampled filter was removed carefully and folded in half length so that only surfaces with collected particulate matter were in contact.
xv. It was then placed in a clean plastic envelope and sealed.
xvi. All monitoring information was recorded on a standard data sheet.
xvii. Filters were then sent to ALS Technichem (HK) Pty Ltd. for analysis.

Wind Data Monitoring

3.2.8 Average wind data (wind speed and direction) at the King's Park meteorological station during the monitoring period were obtained from the Hong Kong Observatory (HKO) and presented in ***Appendix F***.

Monitoring Schedule

3.2.9 The schedule for environmental monitoring in September 2013 is provided in ***Appendix G***.

3.3 Construction Noise Monitoring

3.3.1 In accordance with the approved EM&A Manuals for SCL (TAW-HUH), SCL (MKK-HUH) and SCL (HHS), construction noise monitoring is required at No. 234-238 Chatham Road North (originally proposed as Wing Fung Building in the approved EM&A Manuals).

3.3.2 Construction airborne noise monitoring requirement details at No. 234-238 Chatham Road North (NM2) can be referred to the Monthly EM&A Report for Contract 1111.

4 IMPLEMENTATION STATUS OF ENVIRONMENTAL MITIGATION MEASURES

4.1.1 All environmental mitigation measures and requirements as started in EIA Reports, Environmental Permit and EM&A Manual are implemented. The implementation status of the environmental mitigation measures for this Works Contract during the reporting period is summarized in ***Appendix H***.

4.1.2 Submissions to EPD during construction stage had been made in accordance with the EP requirements. A summary of EP submission requirements and their status is presented in ***Table 4-1***.

Table 4-1 Summary of Status of Required Submission under EP

Required Submission	Environmental Permit	Date of Submission	Status
EP Condition 3.4 - Monthly Environmental Monitoring & Audit (EM&A) Report	EP-437/2012	13 September 2013	Submitted
	EP-438/2012/D	13 September 2013	Submitted

5 MONITORING RESULTS

5.1 Landscape and Visual

5.1.1 Bi-weekly inspection of the implementation of landscape and visual mitigation measures was conducted on 3 and 18 September 2013. All necessary mitigation measures have been implemented by the Contractor.

5.1.2 The Event and Action Plan for Landscape and Visual Impact Monitoring is provided in ***Appendix I***.

5.2 Air Quality Monitoring

5.2.1 The monitoring results for 24-hour TSP are summarized in ***Table 5-1***. Detailed air quality monitoring results are presented in ***Appendix J***.

Table 5-1 Summary of 24-hour TSP Monitoring Results

ID	Average (μg/m^3)	Range (μg/m^3)	Action Level (μg/m^3)	Limit Level (μg/m^3)
AM2	47.1	31.1 - 70.3	182	260

5.2.2 No Action and Limit Level exceedanced was recorded in the reporting month.

5.2.3 The Event and Action Plan is provided in ***Appendix I***.

5.3 Regular Construction Noise Monitoring

5.3.1 Construction airborne noise monitoring results in the reporting month can be referred to the Monthly EM&A Report for Contract 1111.

5.4 Waste Management

5.4.1 Receptacles for collection of general refuse were provided at the site. As advised by the Contractor, 16,250 kg of general refuse was generated from the Project and disposed of at NENT landfill. A total of 3,389m^3 inert construction demolition (C&D) materials was generated from the Project, where 3,193m^3 was disposed of at TM38 Public Fill and 196m^3 was disposed of at KTE1001 Barging Point. 22,780 kg metals, 223kg paper/cardboard packaging and 460kg plastics were collected by recycling contractor in the reporting month. No chemical waste was generated and collected by licenced contractor in the reporting period. The waste flow table is presented in ***Appendix K***.

5.4.2 A billing account for construction waste disposal has been approved and a trip ticket system was implemented to record the waste generated from the Project in the reporting month.

6 ENVIRONMENTAL SITE INSPECTION AND AUDIT

6.1.1 Weekly site audits were conducted by the ET and attended by the ER and the Contractor to monitor the timely implementation of proper environmental management practices and mitigation measures at the site. 4 site audits were carried out on 5, 12, 19 and 26 September 2013 during the reporting month. Representative of the IEC joined the site inspection on 12 September 2013. A summary of the implementation schedule of environmental mitigation measures is provided in ***Appendix H***.

6.1.2 Two site inspections were conducted by EPD during the reporting month on 12 and 26 September 2013 respectively. No adverse comment was provided by EPD during the inspections in this reporting month.

6.1.3 During the weekly site inspections, no non-conformance was identified. Details of observations recorded during site inspection are summarized in ***Table 6-1***.

Table 6-1 Observations and Recommendations of Site Audits

Parameters	Description	Works Area	Observation Date	Status
Landscape and Visual	N/A	N/A	N/A	N/A
Air Quality	Debris was observed on the haul road at Gate 1. The Contractor should ensure all vehicles are washed thoroughly before exiting the construction site.	SAT	12 September 2013	The item was rectified by the Contractor on 19 September 2013.
	Stockpiles were observed not fully covered. The Contractor should provide cover at stockpile to prevent dust generation.	NAT	19, 26 September 2013	The item will be followed up in October.
		SAT	19 September 2013	The item was rectified by the Contractor on 26 September 2013.
Noise	N/A	N/A	N/A	N/A
Water Quality	N/A	N/A	N/A	N/A
Waste/ Chemicals Management	Oil stain and oil spillage was observed beside machinery. The Contractor should clear oil stain. Mitigation measures and training should be provided to prevent recurrence.	HUH	15,22, 29 August 2013	The item was rectified by the Contractor on 5 September 2013.
		HUH	12, 19 September 2013	The item was rectified by the Contractor on 26 September 2013.
		HHS	5, 12, 19 September 2013	The item was rectified by the Contractor on 26 September 2013.
		NAT	26 September 2013	The item will be follow up in October.
	Drip tray was not provided for chemical waste containers at the	HHS	15, 22, 29 August 2013	The item was rectified by the Contractor on 19 September 2013.

Parameters	Description	Works Area	Observation Date	Status
	chemical waste storage area and the dimension of the drip tray for the lighting generator was insufficient. The Contractor should provide drip tray for chemical containers and drip tray with sufficient size for generators.		5, 12 September 2013	
	General refuse was observed in various areas. Contractor should implement better housekeeping and review the numbers and location of waste receptacles provided.	HHS	29 August 2013 5 September 2013	The item was rectified by the Contractor on 12 September 2013.
	Drum for waste oil was observed located in chemical storage area. The Contractor is reminded that chemical and chemical waste should be stored in different designated area.	HHS	12 September 2013	The item was rectified by the Contractor on 19 September 2013.
	General refuse was observed in various areas. Contractor should implement better housekeeping and review the numbers and location of waste receptacles provided.	HHS	19 September 2013	The item was rectified by the Contractor on 26 September 2013.
	Chemicals and plant were observed at site without drip tray. The Contractor should provide drip tray to prevent chemicals and oil spillage.	SAT	19 September 2013	The item was rectified by the Contractor on 26 September 2013.
		HUH	19, 26 September 2013	The item will be followed up in October.
Permits/ License	N/A	N/A	N/A	N/A

Note:
1. HUH: Hung Hom Station
2. HHS: Hung Hom Stabling Sidings
3. NAT: North Approach Tunnels
4. SAT: South Approach Tunnels
5. N/A: Not Applicable

6.1.4 Follow-up actions requested by Contractor's ET and IEC during the site inspection were undertaken as reported by the Contractor and confirmed in the following weekly site inspection conducted during the reporting period. Inspection for follow-up actions that are outstanding in the reporting month will be carried out in following inspections, until the corresponding action has been undertaken by the Contractor.

7 ENVIRONMENTAL NON-CONFORMANCE

7.1 Summary of Monitoring Exceedances

7.1.1 All 24-hour TSP results were below the Action and Limit level at all monitoring locations in the reporting month.

7.2 Summary of Environmental Non-Compliance

7.2.1 No environmental non-compliance event was recorded during the reporting month.

7.3 Summary of Environmental Complaint

7.3.1 No environmental related complaint was reported during the reporting month.

7.3.2 Cumulative statistics on environmental complaints is provided in ***Appendix L***.

7.4 Summary of Environmental Summons and Successful Prosecution

7.4.1 No summon was received during the reporting month.

7.4.2 The cumulative statistics on notification of summons and successful prosecutions is provided in ***Appendix L***.

8 FUTURE KEY ISSUES

8.1 Construction Programme for Next Month

8.1.1 The construction programme for the upcoming month is provided in ***Appendix B*** and the key issues to be considered in the upcoming months include:

- Diaphragm wall construction at HUH
- Underpinning at HHS and HUH
- Demolition of Wagon Examination Office / Freight Document Store Room / Building Service Store Room / Amenity Building
- Bored piling for diversion of Cheong Wan Road Viaduct and South Transformer Room & Accommodation
- Set up of small scale mobile batching machinery and equipment (MBME) under the HUH podium, scheduled to be in service from October 2013

8.2 Key Issues for the Coming Months

8.2.1 Potential environmental impacts arising from the above construction activities are mainly associated with construction dust, construction noise and waste management.

8.3 Monitoring Schedule for Next Month

8.3.1 The tentative schedule for environmental monitoring in October 2013 is provided in ***Appendix G***.

9 CONCLUSIONS AND RECOMMENDATIONS

9.1 Conclusions

9.1.1 The construction phase of the Project was commenced on 3 June 2013. The EM&A programme has been implemented to include air quality monitoring and environmental site audits. This is the 4th monthly Environmental Monitoring and Audit (EM&A) Report presenting the EM&A works carried out during the period from 1 to 30 September 2013.

9.1.2 5 nos. of 24-hour TSP monitoring were carried out in the reporting month.

9.1.3 No exceedance of the Action and Limit Levels of air quality monitoring was recorded at the designated monitoring stations during reporting period.

9.1.4 Two landscape and visual monitoring and four environmental site audits were conducted in the reporting month. Recommendations on remedial actions were provided to the Contractor for deficiencies identified during the site audits.

9.1.5 There was no environmental complaint, prosecution or notification of summons received.

9.1.6 The ET will keep track on the EM&A programme to ensure the compliance of environmental requirements and the proper implementation of all necessary mitigation measures.

9.2 Recommendations

9.2.1 According to the environmental audit performed in the reporting month, the following recommendations were made:

Air Quality Impact

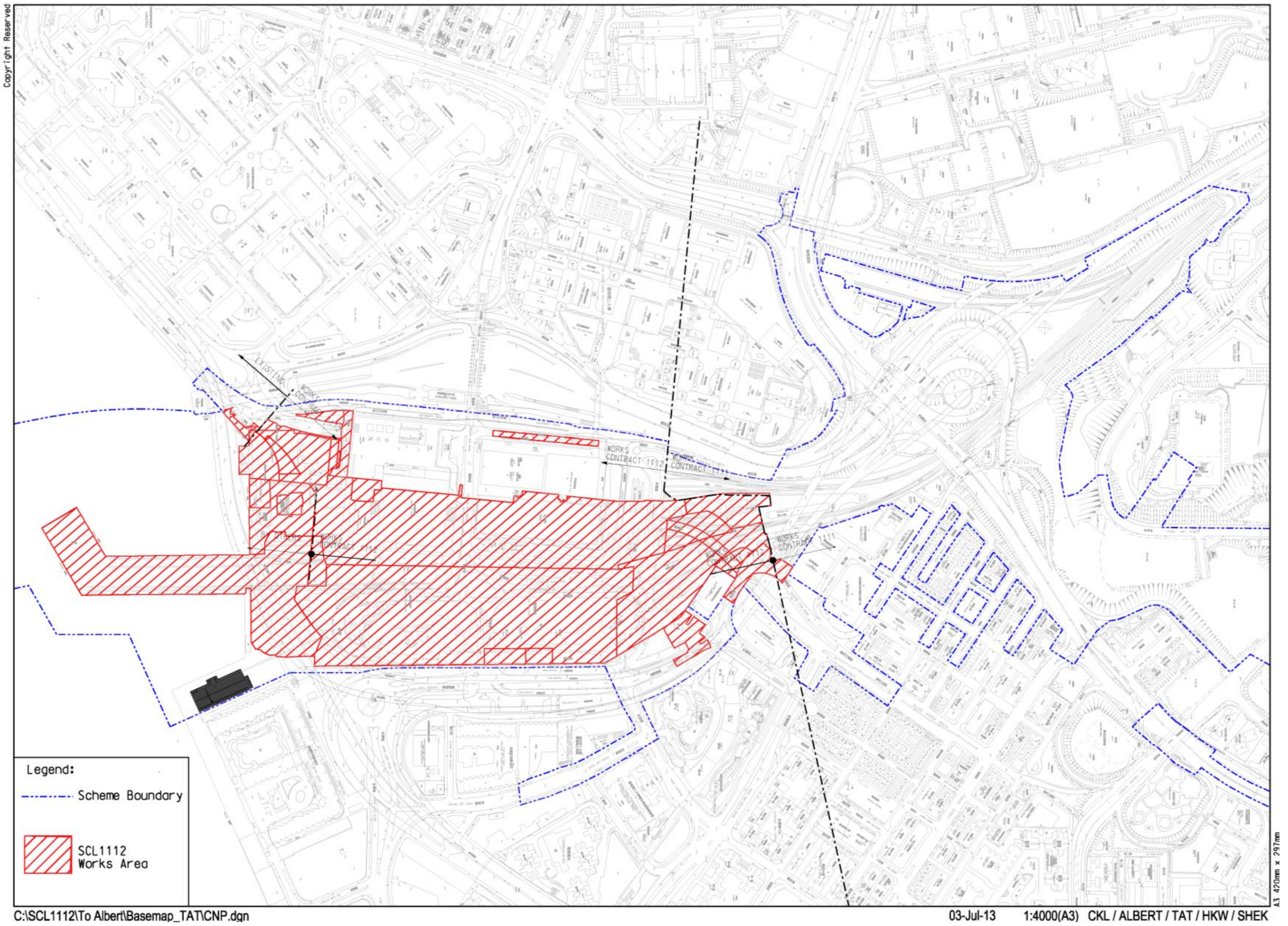
- Provide impervious sheeting for dusty stockpiles to avoid dust generation.
- Ensure all vehicles are washed thoroughly before exiting the construction site to avoid carriage of debris to public area.

Chemical and Waste Management

- Provide drip trays to chemical containers and plants to avoid potential land contamination.
- Properly maintain plant/equipment and enhance training to prevent oil spillage during oil refilling process.
- Provide proper chemical waste management.
- Provide adequate waste receptacles and implement better housekeeping to avoid general refuse from accumulating on the ground of the site.

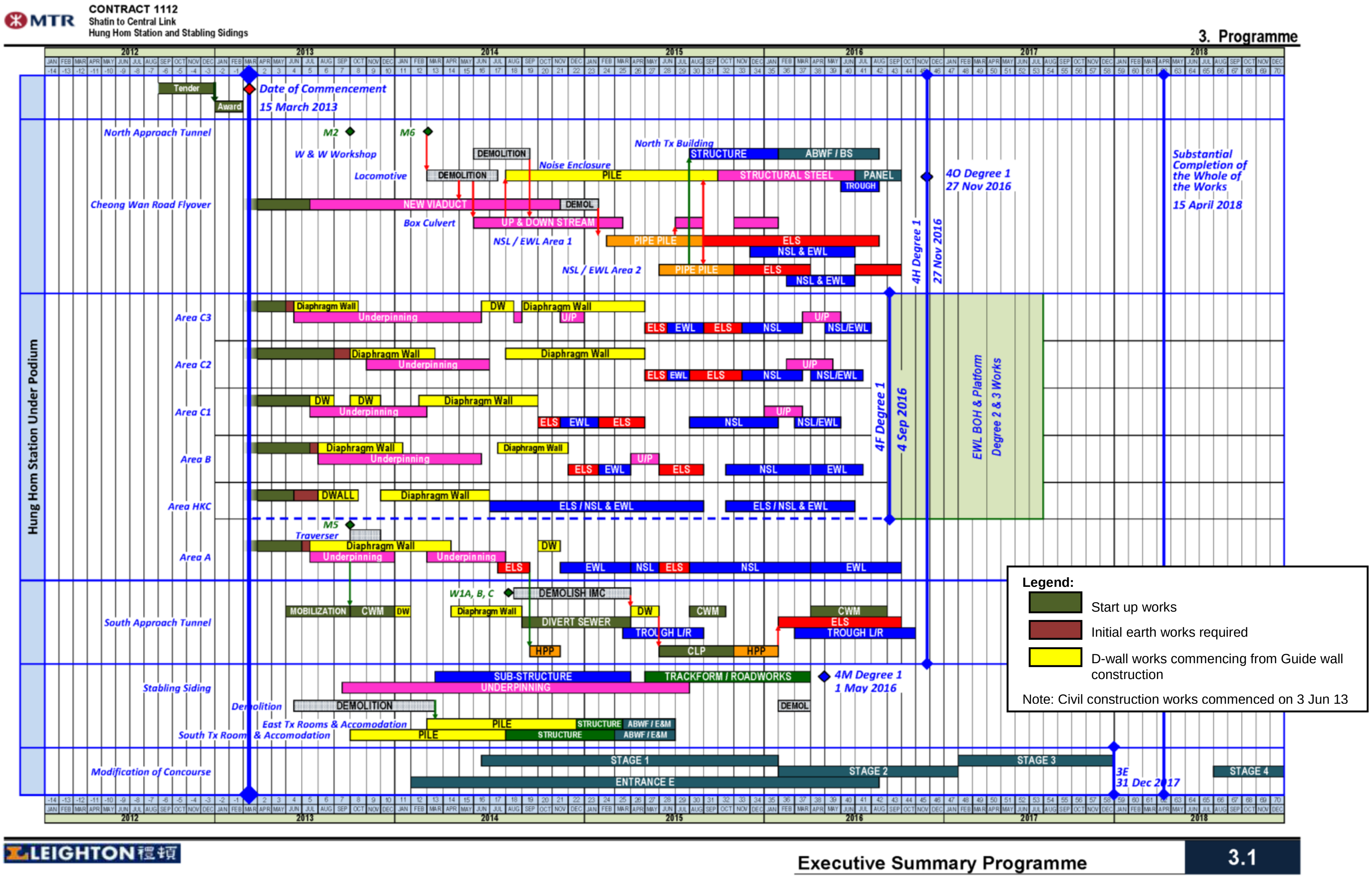
APPENDIX A

Project Works Boundary


Copyright Reserved
Legend:
Scheme Boundary
SCL1112 Works Area
WORKS CONTRACT 1112
WORKS CONTRACT 1111
C:\SCL1112\To Albert\Basemap_TAT\CNP.dgn
03-Jul-13
1:4000(A3)
CKL / ALBERT / TAT / HKW / SHEK
A3 420mm x 297mm

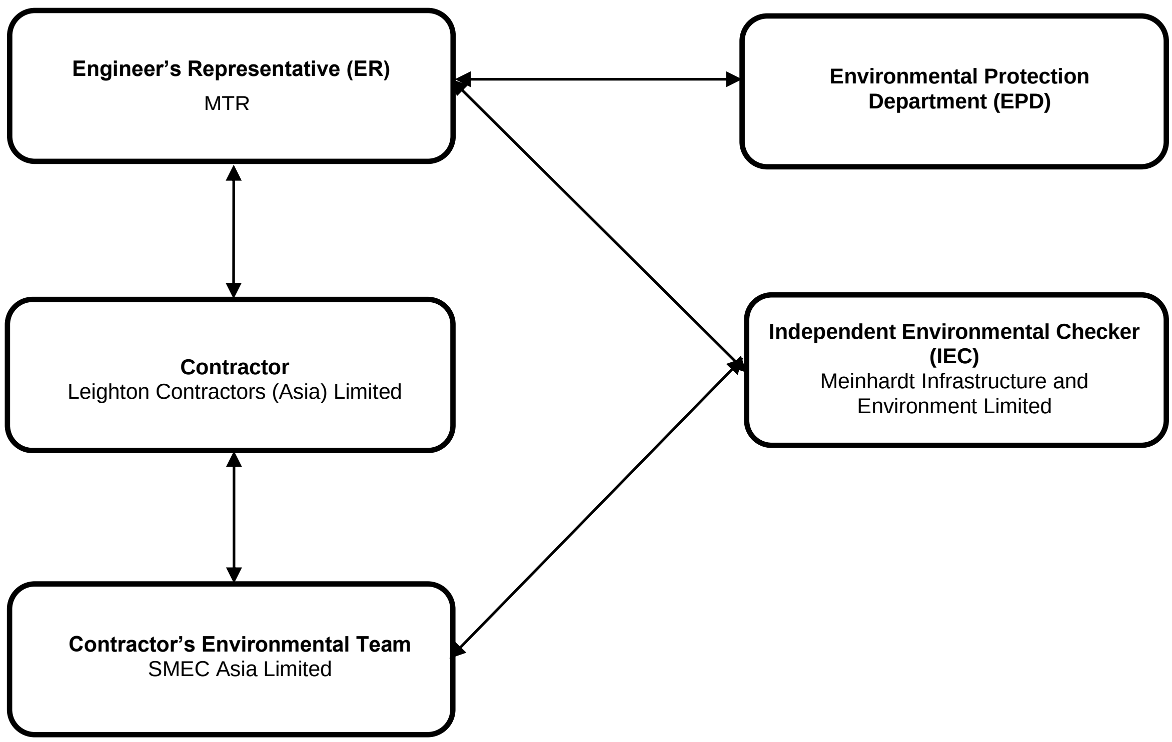
APPENDIX B

Construction Programme


MTR
CONTRACT 1112
Shatin to Central Link
Hung Hom Station and Stabling Sidings
3. Programme
Date of Commencement
15 March 2013
North Approach Tunnel
Cheong Wan Road Flyover
Hung Hom Station Under Podium
Area C3
Area C2
Area C1
Area B
Area HKC
Area A
South Approach Tunnel
Stabling Siding
Modification of Concourse
4O Degree 1
27 Nov 2016
Substantial Completion of the Whole of the Works
15 April 2018
4F Degree 1
4 Sep 2016
4M Degree 1
1 May 2016
3E
31 Dec 2017
Legend:
Start up works
Initial earth works required
D-wall works commencing from Guide wall construction
Note: Civil construction works commenced on 3 Jun 13
LEIGHTON
Executive Summary Programme
3.1

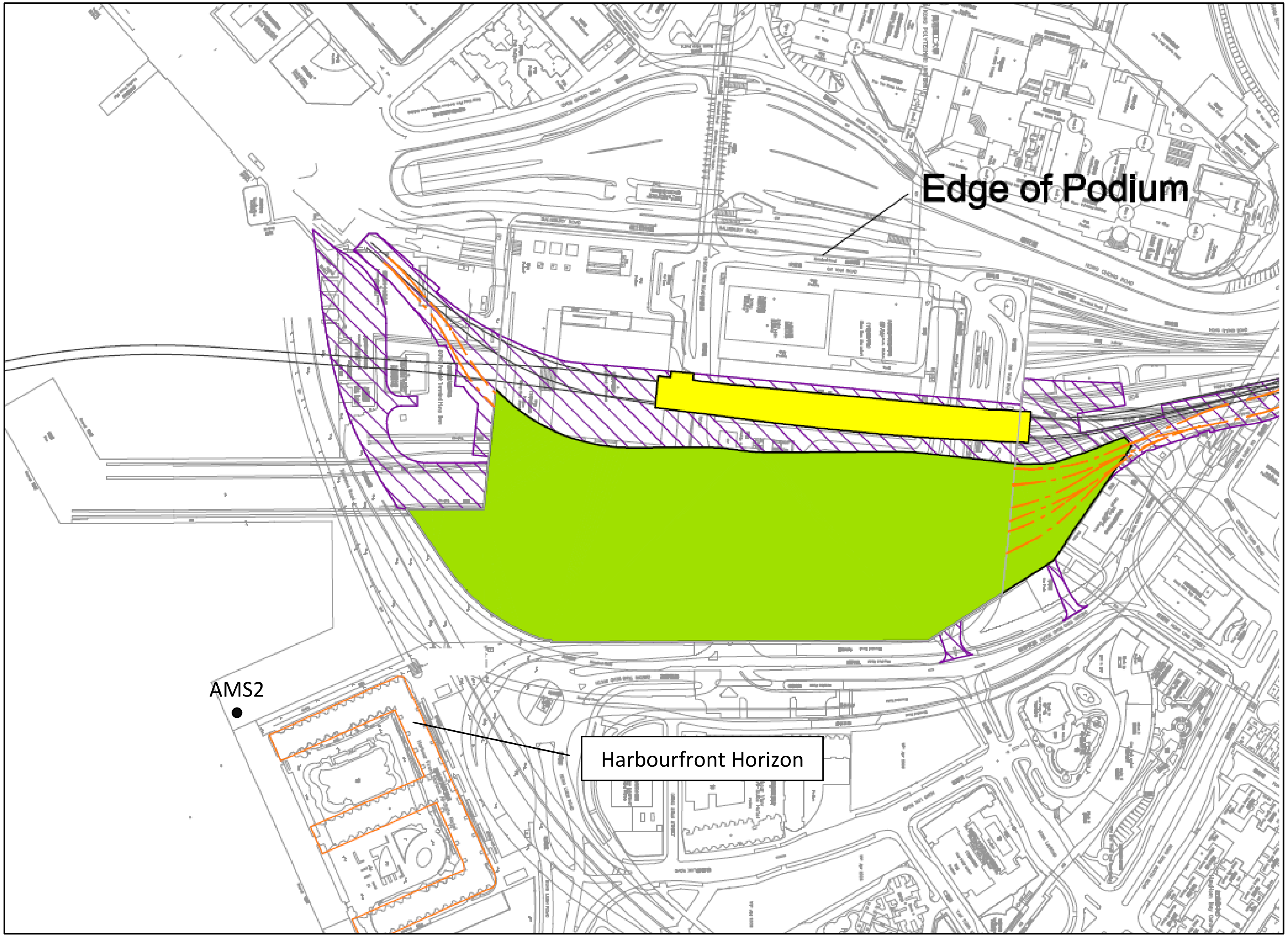
APPENDIX C

Project Organisation for Environmental Works


Engineer's Representative (ER)
MTR
Environmental Protection Department (EPD)
Contractor
Leighton Contractors (Asia) Limited
Independent Environmental Checker (IEC)
Meinhardt Infrastructure and Environment Limited
Contractor's Environmental Team
SMEC Asia Limited

APPENDIX D

Location of Air Quality Monitoring Station


Edge of Podium
AMS2
Harbourfront Horizon

APPENDIX E

Calibration Certificates for Monitoring Equipment

TSP Sampler Calibration

SITE

Location:	Hung Hom	Calibration Date:	August 5, 2013
Sampler:	Hunghom MTR TSP	Next Calibration Date:	October 5, 2013
Serial No	694-0665	Tech:	Sam Wong

CONDITIONS

Barometric Pressure (in Hg):	39.75	Corrected Pressure (mm Hg):	1010
Temperature (deg F):	85	Temperature (deg K):	302
Average Press. (in Hg):	39.75	Corrected Average (mm Hg):	1010
Average Temp. (deg F):	85	Average Temp. (deg K):	302

CALIBRATION ORIFICE

Make:	Tisch	Qstd Slope:	2.11662
Model:	TE-5025A	Qstd Intercept:	-0.01714
Serial#:	1941	Date Certified:	April 9, 2013

CALIBRATIONS

Plate or Test #	H2O (in)	Qstd (m3/min)	I (chart)	IC (corrected)	LINEAR REGRESSION	
1	11.80	1.865	58.0	66.36	Slope =	37.1259
2	10.40	1.751	54.0	61.78	Intercept =	-3.3968
3	8.00	1.537	46.0	52.63	Corr. coeff.=	0.9989
4	5.40	1.264	38.0	43.48		
5	3.40	1.005	30.0	34.32	# of Observations:	5

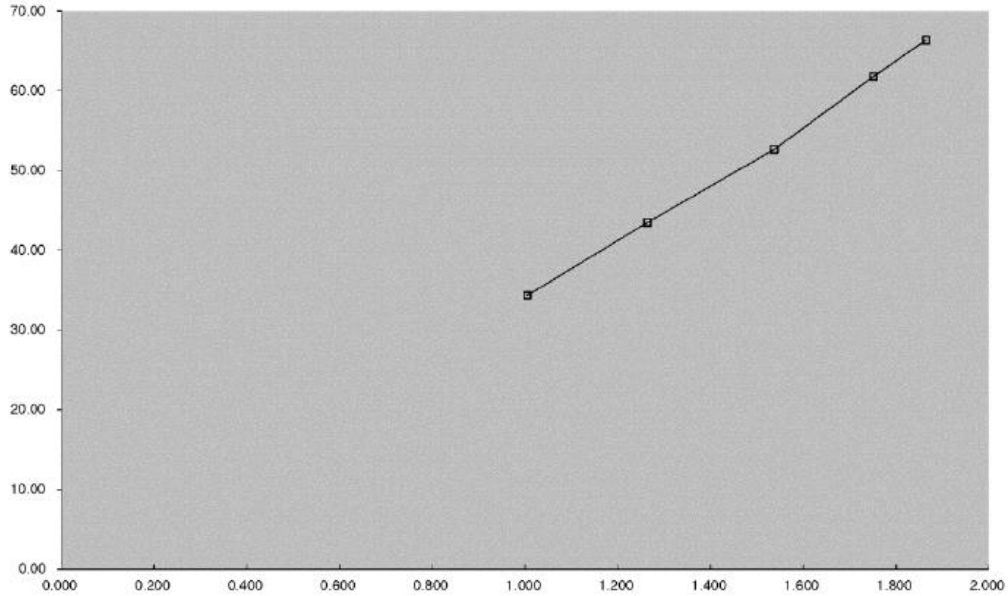
Calculations

Qstd = 1/m[Sqrt(H2O(Pa/Pstd)(Tstd/Ta))-b]
IC = I[Sqrt(Pa/Pstd)(Tstd/Ta)]

Qstd = standard flow rate
IC = corrected chart response
I = actual chart response
m = calibrator Qstd slope
b = calibrator Qstd intercept
Ta = actual temperature during calibration (deg K)
Pa = actual pressure during calibration (mm Hg)
Tstd = 298 deg K
Pstd = 760 mm Hg
For subsequent calculation of sampler flow:
1/m((I)[Sqrt(298/Tav)(Pav/760)]-b)

m = sampler slope
b = sampler intercept
I = chart response
Tav = daily average temperature
Pav = daily average pressure

Reviewer: Sam Wong Signature: ____________ Date: August 5, 2013


70.00
60.00
50.00
40.00
30.00
20.00
10.00
0.00
0.000
0.200
0.400
0.600
0.800
1.000
1.200
1.400
1.600
1.800
2.000

TISCH ENVIRONMENTAL, INC.
145 SOUTH MIAMI AVE.
VILLAGE OF CLEVES, OH 45002
513.467.9000
877.263.7610 TOLL FREE
513.467.9009 FAX
WWW.TISCH-ENV.COM

AIR POLLUTION MONITORING EQUIPMENT

ORIFICE TRANSFER STANDARD CERTIFICATION WORKSHEET TE-5025A

Date - Apr 09, 2013 Rootsmeter S/N 0438320 Ta (K) - 296
Operator Tisch Orifice I.D. - 1941 Pa (mm) - 751.84

PLATE OR Run #	VOLUME START (m3)	VOLUME STOP (m3)	DIFF VOLUME (m3)	DIFF TIME (min)	METER DIFF Hg (mm)	ORFICE DIFF H2O (in.)
1	NA	NA	1.00	1.4710	3.3	2.00
2	NA	NA	1.00	1.0370	6.4	4.00
3	NA	NA	1.00	0.9270	7.9	5.00
4	NA	NA	1.00	0.8840	8.8	5.50
5	NA	NA	1.00	0.7300	12.8	8.00

DATA TABULATION

Vstd	(x axis) Qstd	(y axis)		Va	(x axis) Qa	(y axis)
0.9916	0.6741	1.4113		0.9956	0.6768	0.8874
0.9874	0.9521	1.9959		0.9914	0.9560	1.2549
0.9854	1.0630	2.2315		0.9894	1.0673	1.4030
0.9843	1.1134	2.3405		0.9883	1.1180	1.4715
0.9790	1.3410	2.8227		0.9829	1.3465	1.7747

Qstd slope (m) = 2.11662
intercept (b) = -0.01714
coefficient (r) = 0.99999

y axis = SQRT[H2O(Pa/760)(298/Ta)]

Qa slope (m) = 1.32539
intercept (b) = -0.01078
coefficient (r) = 0.99999

y axis = SQRT[H2O(Ta/Pa)]

CALCULATIONS

Vstd = Diff. Vol[(Pa-Diff. Hg)/760](298/Ta)
Qstd = Vstd/Time

Va = Diff Vol [(Pa-Diff Hg)/Pa]
Qa = Va/Time

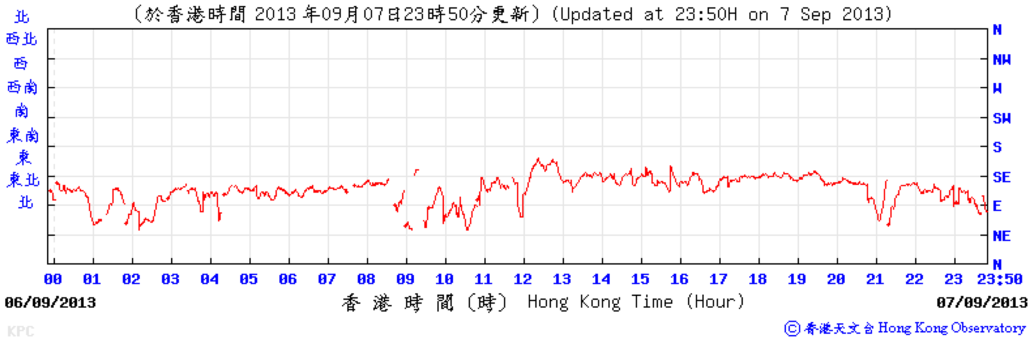
For subsequent flow rate calculations:

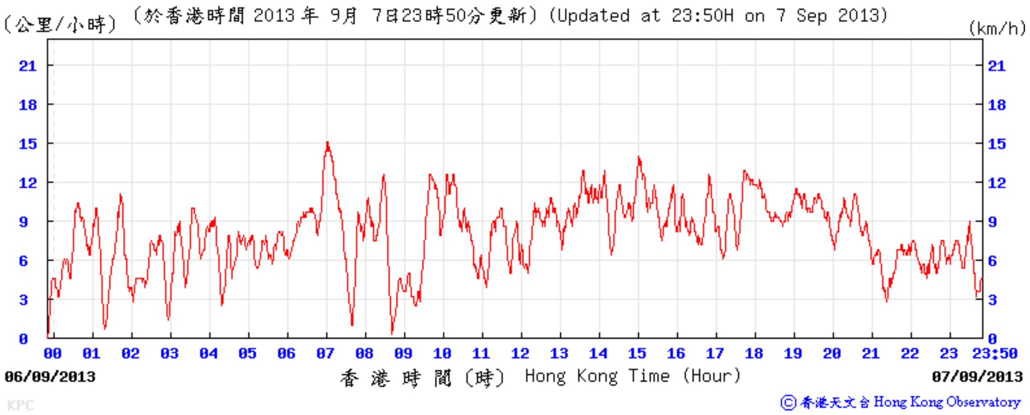
Qstd = 1/m{[SQRT(H2O(Pa/760)(298/Ta))]- b}
Qa = 1/m{[SQRT H2O(Ta/Pa)]- b}

Appendix F

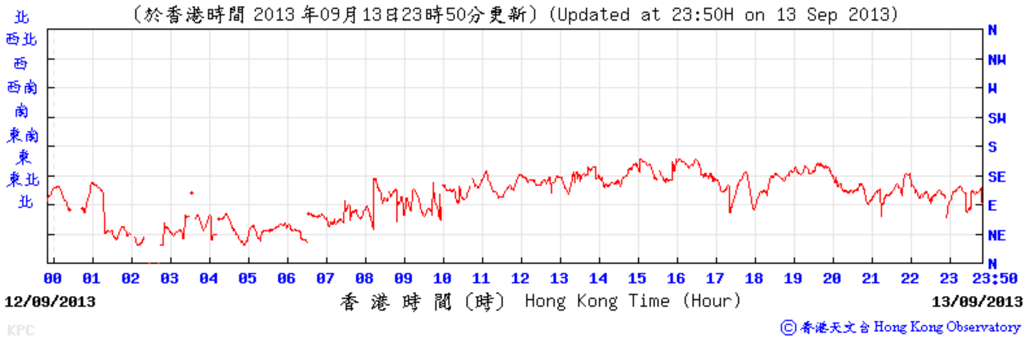
Wind Data

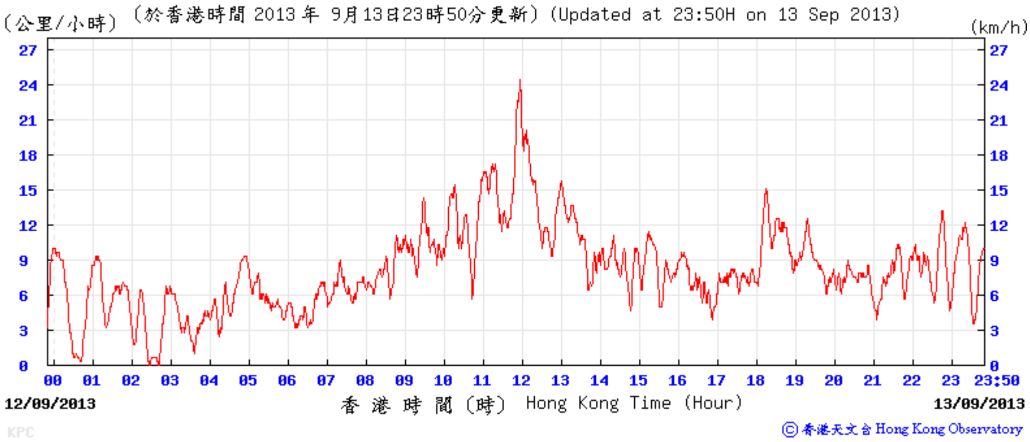
6 September 2013



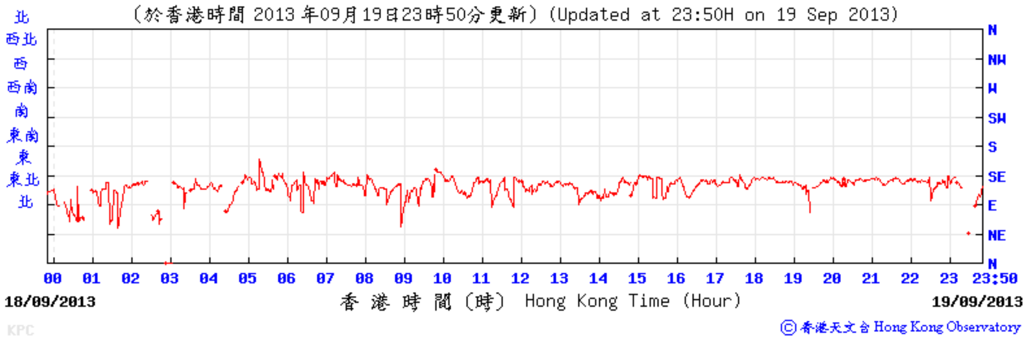


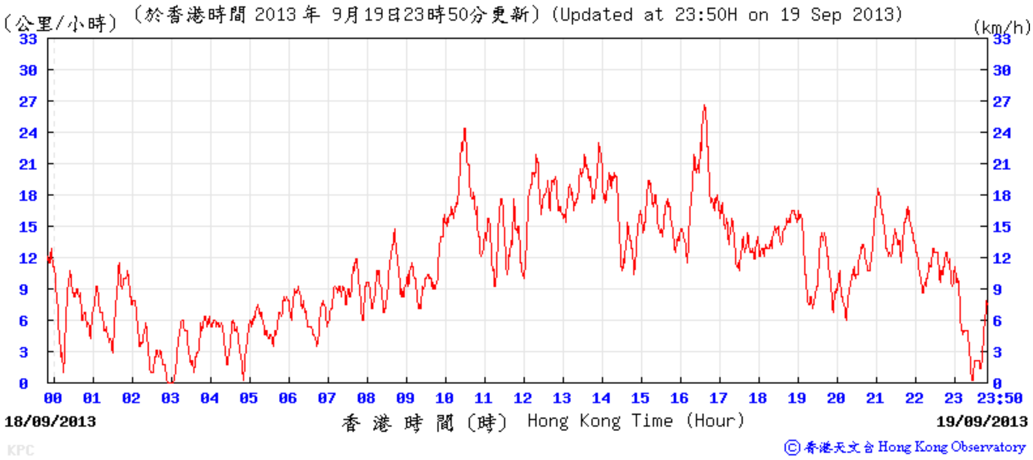
12 September 2013



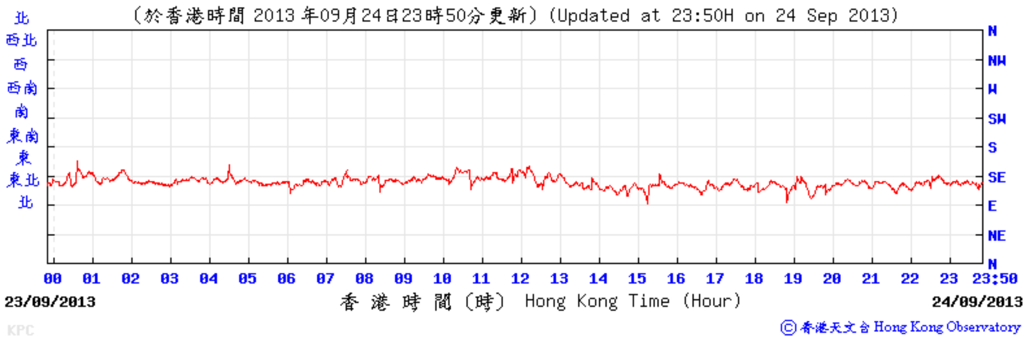


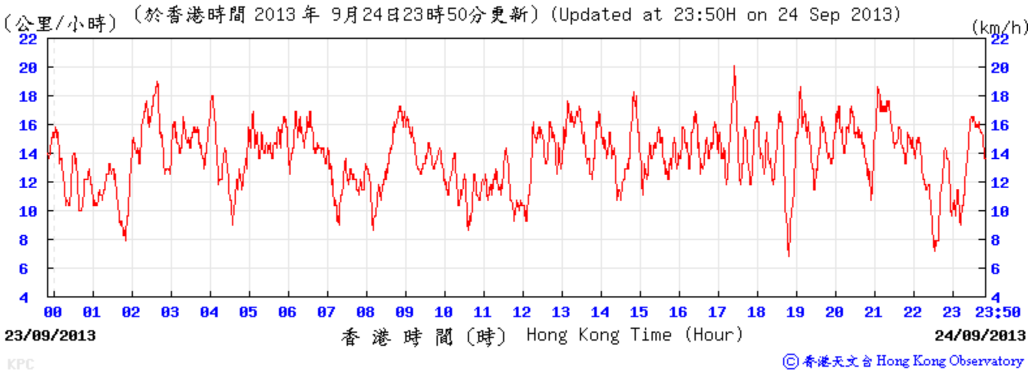
18 September 2013



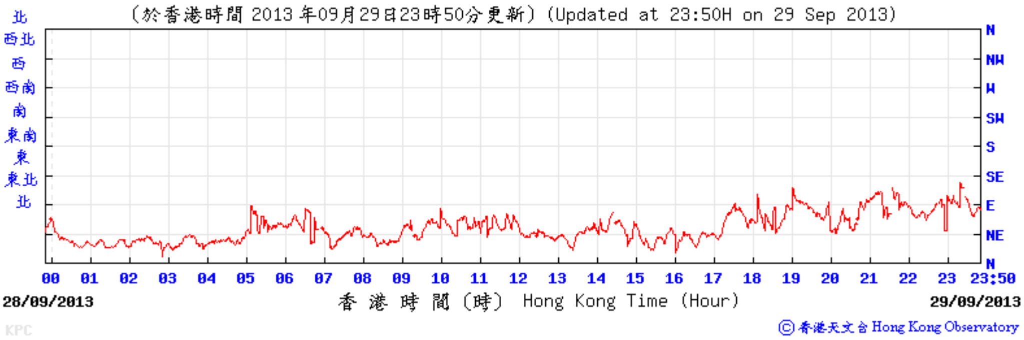


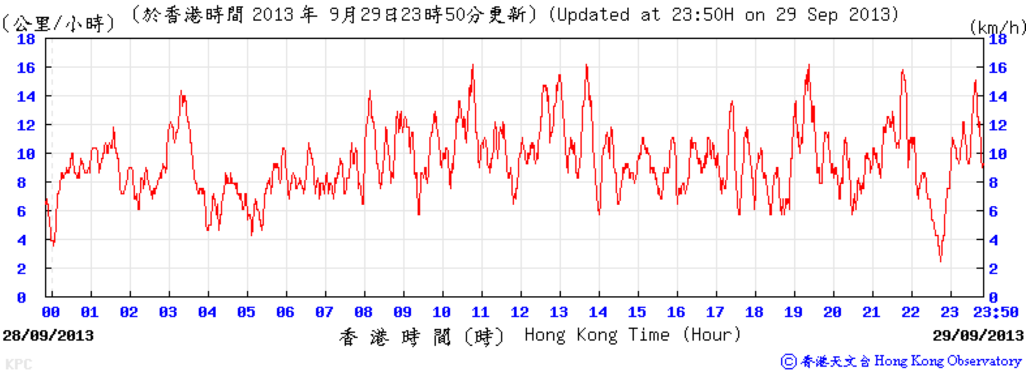
23 September 2013





28 September 2013





Appendix G

Environmental Monitoring Programme

Environmental Monitoring Schedule for SCL1112 in September 2013

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
1	2	3	4	5	6 24 hr TSP	7
8	9	10	11	12 24 hr TSP	13	14
15	16	17	18 24 hr TSP	19	20	21
22	23 24 hr TSP	24	25	26	27	28 24 hr TSP
29	30					

Environmental Monitoring Schedule for SCL1112 in October 2013

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
		1	2	3	4 24 hr TSP	5
6	7	8	9	10 24 hr TSP	11	12
13	14	15	16 24 hr TSP	17	18	19
20	21	22 24 hr TSP	23	24	25	26
27	28 24 hr TSP	29	30	31		

APPENDIX H

Implementation Schedule of Environmental Mitigation Measures

EIA Ref.	Recommended mitigation measures for Works Contract 1112	Objectives of the recommended measures & main concerns to address	Who to implement the measures?	Location of the measures	When to implement the measures?	What requirements or standards for measures to achieve?	Status
Landscape & Visual (Construction Phase)							
S6.9.3 and S6.12 of Ref.1; Table 4.9 of Ref. 2; S6.12 of Ref. 3	The following good site practices and measures for minimisation and avoidance of potential impacts are recommended: Re-use of existing soil • For soil conservation, existing topsoil will be re-used where possible for new planting areas within the project. The construction programme will consider using the soil removed from one phase for backfilling another. Suitable storage ground, gathering ground and mixing ground may be set up onsite as necessary. No-intrusion zone • To maximise protection to existing trees, ground vegetation and the associated under storey habitats, construction contracts may designate "No-intrusion Zone" to various areas within the site boundary with rigid and durable fencing for each individual no-intrusion zone. The contractor will closely monitor and restrict the site working staff from entering the "no-intrusion zone", even for indirect construction activities and storage of equipment. Protection of retained trees • All retained trees will be recorded photographically at the commencement of the contract, and carefully protected during the construction period. • The contractor will be required to submit, for approval, a detailed working method statement for the protection of trees prior to undertaking any works adjacent to all retained trees, including trees in contractor's works sites.	Minimise visual and landscape impact	Contractor	Within project site	Construction Stage	EIAO-TM	^ ^ ^ ^
S6.12 of Ref.1; Table 4.9 of Ref. 2; Table 6.9 of Ref. 3	Decorative hoarding • Erection of decorative screen during construction stage to screen off undesirable views of the construction site for visual and landscape sensitive areas. Hoarding will be designed to be compatible with the existing urban context. Management of facilities on work sites • To provide proper management of the facilities on the site, give control on the height and disposition/ arrangement of all facilities on the works site to minimise visual impact to adjacent VSRs. Tree transplanting • Trees of medium to high survival rate that would be affected by the works will be transplanted where possible and	Minimise the visual and landscape impact of the Project during construction phase	Contractor	Within project site	Detailed design and construction stage	EIAO-TM ETWB TCW 2/2004 ETWB TCW 3/2006	^ ^ ^

EIA Ref.	Recommended mitigation measures for Works Contract 1112	Objectives of the recommended measures & main concerns to address	Who to implement the measures?	Location of the measures	When to implement the measures?	What requirements or standards for measures to achieve?	Status
	practicable. Tree transplanting proposal including final location for transplanted trees will be submitted separately to seek relevant government department's approval, in accordance with ETWB TCW No 3/2006.						
Construction Dust Impact							
S7.6.5 of Ref. 1; S7.6.6 of Ref. 3	The contractor will follow the procedures and requirements given in the Air Pollution Control (Construction Dust) Regulation.	Minimise dust impact at the nearby sensitive receivers	Contractor	All construction sites	Construction stage	Air Pollution Control Ordinance (APCO) To control the dust impact to meet HKAQO and EIAO-TM criteria	^
S5.20, S5.21, S5.50 and Table 5.4 of Ref. 2	Barging Facility: • Unloading of spoils to barge – the unloading process should be undertaken within a 3-sided screen with top tipping hall. Water spraying and flexible dust curtains should be provided at the discharge point for dust suppression. • Transportation of the spoil from the construction sites to the Barging Point – watering once along all paved haul roads to reduce dust emission by 91.7%. This dust suppression efficiency is derived based on the average haul road traffic, average evaporation rate and an assumed application intensity of 1.7 L/m2 once every working hour. Any potential dust impact and watering mitigation would be subject to the actual site condition. For example, a construction activity that produces inherently wet conditions or in cases under rainy weather, the above water application intensity may not be unreservedly applied. While the above watering frequency is to be followed, the extent of watering may vary depending on actual site conditions but should be sufficient to maintain an equivalent intensity of no less than $1.7L/m^2$ to achieve the removal efficiency. The dust levels would be monitored and managed under an EM&A programme as specified in the EM&A Manual. • Vehicles leaving the barging facilities – vehicles would be required to pass through the wheel washing facilities to be provided at site exit.	To minimize the construction dust impacts to the nearby sensitive receivers	Contractor	Barging point at Hung Hom Freight Pier	Construction stage	APCO	N/A N/A N/A

EIA Ref.	Recommended mitigation measures for Works Contract 1112	Objectives of the recommended measures & main concerns to address	Who to implement the measures?	Location of the measures	When to implement the measures?	What requirements or standards for measures to achieve?	Status
S7.6.5 of Ref. 1; S5.50 of Ref. 2; S7.6.6 of Ref. 3	Mitigation measures in form of regular watering under a good site practice will be adopted. Watering once per hour on exposed worksites and haul road will be conducted to achieve dust removal efficiencies of 91.7%. While the above watering frequencies are to be followed, the extent of watering may vary depending on actual site conditions but will be sufficient to maintain an equivalent intensity of no less than 1.8 L/m^2 to achieve the dust removal efficiency.	Minimise dust impact at the nearby sensitive receivers	Contractor	Active works areas, exposed areas and paved haul roads	Construction stage	APCO To control the dust impact to meet HKAQO and EIAO-TM criteria	^
S7.6.5 of Ref. 1; S5.51 of Ref. 2; S7.6.6 of Ref. 3	• Any excavated or stockpile of dusty material will be covered entirely by impervious sheeting or sprayed with water to maintain the entire surface wet and then removed or backfilled or reinstated where practicable within 24 hours of the excavation or unloading. • Any dusty materials remaining after a stockpile is removed will be wetted and cleared from the surface of roads. • A stockpile of dusty material will not be extend beyond the pedestrian barriers, fencing or traffic cones. • The load of dusty materials on a vehicle leaving a construction site will be covered entirely by impervious sheeting to ensure that the dusty materials do not leak from the vehicle. • Where practicable, vehicle washing facilities with high pressure water jet will be provided at every discernible or designated vehicle exit point. The area where vehicle washing takes place and the road section between the washing facilities and the exit point will be paved with concrete, bituminous materials or hardcore. • When there are open excavation and reinstatement works, hoarding of not less than 2.4m high will be provided and properly maintained as far as practicable along the site boundary with provision for public crossing; Good site practice will also be adopted by the contractor to ensure the conditions of the hoardings are properly maintained in construction period. • The portion of any road leading only to construction site that is within 30m of a vehicle entrance or exit will be kept clear of dusty materials. • Surfaces where any pneumatic or power-driven drilling, cutting, polishing or other mechanical breaking operation takes place will be sprayed with water or a dust suppression chemical continuously.	Minimise dust impact at the nearby sensitive receivers	Contractor	All construction sites	Construction stage	APCO Air Pollution Control (Construction Dust) Regulation To control the dust impact to meet HKAQO and EIAO-TM criteria	# ^ ^ ^ ^ ^ * ^

EIA Ref.	Recommended mitigation measures for Works Contract 1112	Objectives of the recommended measures & main concerns to address	Who to implement the measures?	Location of the measures	When to implement the measures?	What requirements or standards for measures to achieve?	Status
	• Any area that involves demolition activities will be sprayed with water or a dust suppression chemical immediately prior to, during and immediately after the activities so as to maintain the entire surface wet. • Where scaffolding is erected around the perimeter of a building under construction, effective dust screens, sheeting or netting will be provided to enclose the scaffolding from the ground floor level of the building, or a canopy will be provided from the first floor level up to the highest level of the scaffolding. • Any skip hoist for material transport will be totally enclosed by impervious sheeting. • Every stock of more than 20 bags of cement or dry pulverised fuel ash (PFA) will be covered entirely by impervious sheeting or placed in an area sheltered on the top and the 3 sides. • Cement or dry PFA delivered in bulk will be stored in a closed silo fitted with an audible high level alarm which is interlocked with the material filling line and no overfilling is allowed. • Loading, unloading, transfer, handling or storage of bulk cement or dry PFA will be carried out in a totally enclosed system or facility, and any vent or exhaust will be fitted with an effective fabric filter or equivalent air pollution control system. • Exposed earth will be properly treated by compaction, turfing, hydroseeding, vegetation planting or sealing with latex, vinyl, bitumen, shotcrete or other suitable surface stabiliser within six months after the last construction activity on the construction site or part of the construction site where the exposed earth lies.						^ N/A ^ ^ ^ ^ ^
S7.6.5 of Ref. 1; S5.57 of Ref. 2; S7.6.6 of Ref. 3	Implement regular dust monitoring under EM&A programme during the construction stage.	Monitoring of dust impact	Contractor	Harbourfront Horizon	Construction stage	EIAO-TM APCO	^

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Construction Airborne Noise							
S8.3.6 of Ref. 1; S6.61 of Ref. 2; S8.5.6 of Ref. 3	Implement the following good site practices: • Only well-maintained plant will be operated on-site and plant will be serviced regularly during the construction programme. • Machines and plant (such as trucks, cranes) that may be in intermittent use will be shut down between work periods or will be throttled down to a minimum. • Plant known to emit noise strongly in one direction, where possible, be orientated so that the noise is directed away from nearby NSRs. • Silencers or mufflers on construction equipment will be properly fitted and maintained during the construction works. • Mobile plant will be sited as far away from NSRs as possible and practicable. • Material stockpiles, mobile container site office and other structures will be effectively utilised, where practicable, to screen noise from onsite construction activities.	Control construction airborne noise	Contractor	All construction sites where practicable	Construction stage	Annex 5, EIAO-TM	^ ^ ^ ^ ^ ^
S8.3.6 of Ref. 1; S6.68 of Ref. 2; S8.5.6 of Ref. 3	Install temporary hoarding located on the site boundaries between noisy construction activities and NSRs. The conditions of the hoardings will be properly maintained throughout the construction period.	Reduce the construction noise levels at low-level zone of NSRs through partial screening.	Contractor	All construction sites where practicable	Construction stage	Annex 5, EIAO-TM	^
S8.3.6 of Ref. 1; S6.64 – 6.67 and Table 6.20 of Ref. 2; S8.5.6 of Ref. 3	Install movable noise barriers (typical design is wooden framed barrier with a small-cantilevered on a skid footing with 25mm thick internal sound absorptive lining), acoustic mat or full enclosure, screen the noisy plants including air compressor, gene rators and saw.	Screen the noisy plant items to be used at all construction sites	Contractor	All construction sites where practicable	Construction stage	Annex 5, EIAO-TM	^
S8.3.6 of Ref. 1; S6.62 – 6.63 and Table 6.19 of Ref. 2; S8.5.6 of Ref. 3	The following quiet PME should be used: • Asphalt Paver (SWL=101dB(A)) • Backhoe (SWL=106dB(A)) • Backhoe with Hydraulic Breaker (SWL=110dB(A)) • Concrete lorry mixer (SWL=96dB(A)) • Concrete mixer truck (SWL=96dB(A)) • Concrete Pump (SWL=106dB(A)) • Concrete Pump Truck (SWL=106dB(A))	Reduce the noise levels of plant items	Contractor	All construction sites where practicable	Construction stage	Annex 5, EIAO-TM	^

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	• Crane, mobile (SWL=94dB(A)) • Crawler Crane (SWL=102dB(A)) • Drill, hand-held (SWL=98dB(A)) • Dump truck (SWL=104dB(A)) • Excavator (SWL=106dB(A)) • Flat Bed Lorry (SWL=102dB(A)) • Generator (SWL=95dB(A)) • Giken Piler and Power-pack (SWL=94dB(A)) • Hydraulic breaker (SWL=110dB(A)) • Hydraulic excavator (SWL=106dB(A)) • Lorry (SWL=102dB(A)) • Lorry with crane/ grab (SWL=94dB(A)) • Mini Piling Rig (SWL=112dB(A)) • Piling Rig (SWL=112dB(A)) • Poker, vibrator, hand-held (SWL=98dB(A)) • Road Roller (SWL=101dB(A)) • Rock Drill (SWL = 108dB(A) • Roller (SWL = 101dB(A) • Truck (SWL=103dB(A)) • Vibratory Hammer (SWL=118dB(A))						
S8.3.6 of Ref. 1; S8.5.6 of Ref. 3	Sequencing operation of construction plants where practicable.	Operate sequentially within the same work site to reduce the construction airborne noise	Contractor	All construction sites where practicable	Construction stage	Annex 5, EIAO-TM	^
S8.3.6 of Ref. 1; S8.5.6 of Ref. 3	Implement noise monitoring under EM&A programme.	Monitoring of construction noise impact	Contractor	Wing Fung Building	Construction stage as required by IEC	TM-EIA	^

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Water Quality (Construction Phase)							
S10.7.1 of Ref. 1;S8.41 – 8.39 and S8.50 of Ref. 2; S10.7.1 of Ref. 3	In accordance with the Practice Noise for Professional Persons on Construction Site Drainage, EPD, 1994 (ProPECC PN1/94), construction phase mitigation measures will include the following: Construction runoff and site drainage • At the start of site establishment, perimeter cut-off drains to direct off-site water around the site will be constructed with internal drainage works and erosion and sedimentation control facilities implemented. Channels (both temporary and permanent drainage pipes and culverts), earth bunds or sand bag barriers will be provided onsite to direct stormwater to silt removal facilities. The design of the temporary onsite drainage system will be undertaken by the contractor prior to commencement of construction. • The dikes or embankments for flood protection will be implemented around the boundaries of earthwork areas. Temporary ditches will be provided to facilitate the runoff discharge into an appropriate watercourse, through a site/sediment trap. The sediment/silt traps will be incorporated in the permanent drainage channels to enhance deposition rates. • The design of silt removal facilities will be based on the guidelines in Appendix A1 of ProPECC PN 1/94, which states that the retention time for silt/sand traps will be 5 minutes under maximum flow conditions. Sizes may vary depending upon the flow rate, but for a flow rate of $0.1m^3/s$ a sedimentation basin of $30m^3$ would be required and for a flow rate of $0.5m^3/s$ the basin would be $150m^3$. Detailed design of the sand/silt traps will be undertaken by the contractor prior to the commencement of works. • All exposed earth areas will be completed and vegetated as soon as possible after earthworks have been completed, or alternatively, within 14 days of the cessation of earthworks where practicable. Exposed slope surfaces will be covered by tarpaulin or other means. • All drainage facilities and erosion and sediment control structures will be regularly inspected and maintained to ensure proper and efficient operation at all times and particularly following rainstorms. Deposited silt and grit will be removed regularly and disposed of by spreading evenly	To minimize water quality impact from construction site runoff and general construction activities	Contractor	All construction sites where practicable	Construction stage	Water Pollution Control Ordinance (WPCO) ProPECC PN1/94 EIAO-TM TM-Water Technical Memorandum on Effluent Discharge Standard (TM-DSS)	^ ^ ^ ^ ^

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	over stable, vegetated areas.						
	• Measures will be taken to minimise the ingress of site drainage into excavations. If the excavation of trenches in wet periods is necessary, they will be dug and backfilled in short sections wherever practicable. Water pumped out from trenches or foundation excavations will be discharged into storm drains via silt removal facilities.						^
	• Open stockpiles of construction materials (for example, aggregates, sand and fill material) of more than 50m^3 will be covered with tarpaulin or similar fabric during rainstorms.						^
	• Measures will be taken to prevent the washing away of construction materials, soil, silt or debris into any drainage system.						^
	• Manholes (including newly constructed ones) will always be adequately covered and temporarily sealed so as to prevent silt, construction materials or debris being washed into the drainage system and storm runoff being directed into foul sewers.						^
	• Precautions be taken at any time of year when rainstorms are likely, actions to be taken when a rainstorm is imminent or forecasted, and actions to be taken during or after rainstorms are summarised in Appendix A2 of ProPECC PN 1/94. Particular attention will be paid to the control of silty surface runoff during storms, especially areas near steep slopes.						^
	• All vehicles and plant will be cleaned before leaving a construction site to ensure no earth, mud, debris and the like is deposited by them on roads. An adequately designed and sited wheel washing facilities will be provided at every construction site exit where practicable. Wash-water will have sand and silt settled out and removed at least on a weekly basis to ensure the continued efficiency of the process. The section of access road leading to, and exiting from, the wheel-wash bay to the public road will be paved with sufficient backfall toward the wheel-wash bay to prevent vehicle tracking of soil and silty water to public roads and drains.						^
	• Oil interceptors will be provided in the drainage system downstream of any oil/fuel pollution sources. The oil interceptors will be emptied and cleaned regularly to prevent the release of oil and grease into the storm water drainage						^

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	system after accidental spillage. A bypass will be provided for the oil interceptors to prevent flushing during heavy rain. • Construction solid waste, debris and rubbish on site will be collected, handled and disposed of properly to avoid water quality impacts. • All fuel tanks and storage areas will be provided with locks and sited on sealed areas, within bunds of a capacity equal to 110% of the storage capacity of the largest tank to prevent spilled fuel oils from reaching water sensitive receivers nearby. • All the earth works involving will be conducted sequentially to limit the amount of construction runoff generated from exposed areas during the wet season (April to September) as far as practicable. • Adopt Best Management Practices.						^ ^ ^ ^
S10.7.1 of Ref. 1; S10.7.1 of Ref. 3	Tunnelling works • Cut-and-cover/ open-cut tunnelling work will be conducted sequentially to limit the amount of construction runoff generated from exposed areas during the wet season (April to September) as far as practicable. • Uncontaminated discharge will pass through sedimentation tanks prior to off-site discharge. • The wastewater with a high concentration of SS will be treated (eg, by sedimentation tanks with sufficient retention time) before discharge. Oil interceptors would also be required to remove the oil, lubricants and grease from the wastewater. • Direct discharge of the bentonite slurry (as a result of D-wall and bored tunnelling construction) is not allowed. It will be reconditioned and reused wherever practicable. Temporary storage locations (typically a properly closed warehouse) will be provided on site for any unused bentonite that needs to be transported away after all the related construction activities are completed. The requirements in ProPECC PN 1/94 will be adhered to in the handling and disposal of bentonite slurries.	To minimize construction water quality impact from tunnelling works	Contractor	All tunnelling portion	Construction stage	WPCO ProPECC PN1/94 EIAO-TM TM-Water	^ ^ ^ ^

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S8.68 of Ref. 2; S10.7.1 of Ref. 1	Operation of Barging Facilities The following good practice shall apply for the barging facilities operations: • All barges should be fitted with tight bottom seals to prevent leakage of materials during transport; • Barges or hoppers should not be filled to a level that will cause overflow of materials or polluted water during loading or transportation; • All vessels should be sized so that adequate clearance is maintained between vessels and the seabed in all tide conditions, to ensure that undue turbidity is not generated by turbulence from vessel movement or propeller wash; and • Loading of barges and hoppers should be controlled to prevent splashing of material into the surrounding water. • Mitigation measures as outlined for control of *construction runoff and site drainage* provide above should be applied to minimise water quality impacts from site runoff and open stockpile spoils at the proposed barging facilities where appropriate.	To minimize water quality impact from operation of barging facility	Contractor	All barging facilities	Construction stage	WPCO TM-EIA	N/A N/A N/A N/A N/A
S8.51 – 8.52 of Ref. 2	Bentonite Slurries: • Bentonite slurries used in diaphragm wall construction should be reconditioned and used again wherever practicable. If the disposal of a certain residual quantity cannot be avoided, the used slurry should either be dewatered or mixed with inert fill material for disposal to a public filling area. • If the used bentonite slurry is intended to be disposed of through the public drainage system, it should be treated to the respective effluent standards applicable to foul sewer, storm drains or the receiving waters as set out in the TM-DSS.	To minimize water quality impact from bentonite slurries	Contractor	All works area	Construction stage	WPCO TM-EIA	^ ^
S8.53 – 8.54 of Ref. 2	Wastewater from Building Construction: • Before commencing any demolition works, all sewer and drainage connections should be sealed to prevent building debris, soil, sand etc. from entering public sewers/drains • Wastewater generated from building construction activities including concreting, plastering, internal decoration, cleaning of works and similar activities should not be discharged into the stormwater drainage system. If the wastewater is to be discharged into foul sewers, it should undergo the removal of	To minimize water quality impact from building construction	Contractor	All construction sites where practicable	Construction stage	WPCO EIAO-TM	^ N/A

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	settleable solids in a silt removal facility, and pH adjustment as washing and general cleaning etc., can minimise water consumption and reduce the effluent discharge volume. If monitoring of the treated effluent quality from the works areas is required during the construction phase of the Project, the monitoring should be carried out in accordance with the relevant WPCO licence which is under the ambit of regional office of EPD.						
S8.62 of Ref. 2	<u>Excavation Activities:</u> • The construction programme should be properly planned to minimise soil excavation, if any, in rainy seasons. This prevents soil erosion from exposed soil surfaces. Any exposed soil surfaces should also be properly protected to minimise the potential for dust emission, increased siltation and contamination of runoff. In areas where a large amount of exposed soils exist, earth bunds or sand bags should be provided. Exposed stockpiles should be covered with tarpaulin or impervious sheets at all times. The stockpiles of materials should be placed at locations away from water environment so as to avoid releasing materials into the water bodies. Final surfaces of earthworks should be compacted and protected by permanent work.	To minimize water quality impact from excavation activities	Contractor	All excavation works areas	Construction stage	WPCO EIAO-TM	^
S8.63 of Ref. 2	<u>Diaphragm Wall</u> • The mitigation measures as outlined in the ProPECC PN 1/94 Construction Site Drainage should be implemented to control site run-off and drainage as well as any site effluents generated from the works areas, and to prevent run-off and construction wastes from entering nearby water environment. Proper handling of bentonite slurries used in diaphragm wall construction should be adopted.	To minimize water quality impact from diaphragm walling	Contractor	All diaphragm walling works areas	Construction stage	WPCO EIAO-TM	^
S8.60 – 8.61 of Ref. 2; S10.7.1 of Ref. 3	<u>Sewage effluent</u> Portable chemical toilets are recommended for handling the construction sewage generated by the workforce. A licensed contractor will be employed to provide appropriate and adequate portable toilets and be responsible for appropriate disposal and maintenance.	To minimize water quality from sewage effluent	Contractor	All construction sites where practicable	Construction stage	WPCO TM-Water	^

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S8.64 of Ref. 2; S10.7.1 of Ref. 3	<u>Groundwater seepage</u> As some proposed works areas at Hung Hom are near Victoria Harbour, high ground water level regime due to both tidal effects and rainwater infiltration is anticipated. Appropriate measures will be deployed to minimise the intrusion of groundwater into excavation works areas. In case seepage of groundwater occurs, groundwater will be pumped out from the works areas and discharged into the storm system via silt removal facilities. Groundwater from dewatering process will also be discharged into the storm system via silt traps.	To minimize groundwater quality impact from contaminated area	Contractor	Excavation areas where contamination is found.	Construction stage	WPCO TM-Water EIAO-TM	^
S10.7.1 of Ref. 1; S8.57 – 8.59 of Ref. 2; S10.7.1 of Ref. 3	<u>Accidental spillage</u> To prevent accidental spillage of chemicals, the following is recommended: • Proper storage and handling facilities will be provided. • All the tanks, containers, storage area will be bunded and the locations will be locked as far as possible from the sensitive watercourse and stormwater drains. • The contractor will register as a chemical waste producer if chemical wastes would be generated. Storage of chemical waste arising from the construction activities will be stored with suitable labels and warnings. • Disposal of chemical wastes will be conducted in compliance with the requirements as stated in the Waste disposal (Chemical Waste) (General) Regulation.	To minimize water quality impact from accidental spillage	Contractor	All construction sites where practicable	Construction stage	WPCO ProPECC PN1/94 EIAO-TM TM-Water	# ^ ^ ^
S8.72 of Ref.2	Regular site inspections should be undertaken to inspect the construction activities and works areas	To ensure the recommended water quality mitigation measures are properly implemented	Contractor	All construction sites	Construction stage	EIAO-TM WPCO ProPECC PN 1/94 TM-DSS WDO	^

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Waste Management (Construction Phase)							
S11.4.1.1 of Ref. 1; S9.80 – 9.83 of Ref. 2; S11.4.1.1 of Ref.3	<u>Onsite sorting of C&D material</u> Geological assessment will be carried out by competent persons onsite during excavation to identify materials which are not suitable to use as aggregate in structural concrete (eg, volcanic rock, Aplite dyke rock, etc). Volcanic rock and Aplite dyke rock will be separated at the source sites as far as practicable and stored at designated stockpile areas preventing them from delivering to crushing facilities. The crushing plant operator will also be reminded to set up measures to prevent unsuitable rock from ended up at concrete batching plants and be turned into concrete for structural use. Details regarding control measures at source site and crushing facilities will be submitted by the Contractors for the Engineer to review and agree. In addition, site records will also be kept for the types of rock materials excavated and the traceability of delivery will be ensured with the implementation of Trip Ticket System and enforced by site supervisory staff as stipulated under DEVB TC(W) ref: 6/2010 for tracking of the correct delivery to the rock crushing facilities for processing into aggregates. Alternative disposal option for the reuse of volcanic rock and Aplite Dyke rock, etc will also be explored.	Separation of unsuitable rock from ending up at concrete batching plants and be turned into concrete for structural use	Contractor	All construction sites	Construction stage	DEVB TC(W) ref. 6/2010	^
S11.5.1 of Ref.1; S9.72 – 9.74 of Ref. 2; S11.5.1 of Ref.3	<u>Construction and demolition material</u> • Maintain temporary stockpiles and reuse excavated fill material for backfilling and reinstatement. • Carry out onsite sorting. • Make provisions in the Contract documents to allow and promote • The use of recycled aggregates where appropriate. • Adopt 'selective demolition' technique to demolish the existing structures and facilities with a view to recovering broken concrete effectively for recycling purpose, where possible. • Implement a trip-ticket system for each works contract to ensure that the disposal of C&D materials are properly documented and verified. • Implement an enhanced Waste Management Plan similar to ETWBTC (Works) ref 19/2005 – "Environmental Management on Construction Sites" to encourage on-site sorting of C&D materials and to minimize their generation during the course of construction. • In addition, disposal of the C&D materials onto any sensitive locations such as agricultural lands, etc. will be avoided. The	Good site practice to minimise the waste generation and recycle the C&D materials as far as practicable so as to reduce the amount for final disposal	Contractor	All construction sites	Construction stage	Land (Miscellaneous Provisions) Ordinance Waste Disposal Ordinance ETWB TCW Ref 19/2005	^ ^ ^ ^ ^ ^ ^ ^

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	contractor will propose the final disposal sites to the Project Proponent and EPD and get their approval before implementation.						
S11.5.1 of Ref.1; S9.73 of Ref. 2; S11.5.1 of Ref.3	C&D waste • Standard formwork or pre-fabrication will be used as far as practicable in order to minimise the arising of C&D materials. The use of more durable formwork or plastic facing for the construction works will be considered. Use of wooden hoardings will not be used, as in other projects. Metal hoarding will be used to enhance the possibility of recycling. The purchasing of construction materials will be carefully planned in order to avoid over ordering and wastage. • The contractor will recycle as much of the C&D materials as possible onsite. Public fill and C&D waste will be segregated and stored in different containers or skips to enhance reuse or recycling of materials and their proper disposal. Where practicable, concrete and masonry can be crushed and used as fill. Steel reinforcement bar can be used by scrap steel mills. Different areas of the sites will be considered for such segregation and storage.	Good site practice to minimise the waste generation and recycle the C&D materials as far as practicable so as to reduce the amount for final disposal	Contractor	All construction sites	Construction stage	Land (Miscellaneous Provisions) Ordinance Waste Disposal Ordinance ETWB TCW Ref 19/2005	^ ^
S11.5.1 of Ref.1; S9.100-9.102 of Ref.2; S11.5.1 of Ref. 3	General refuse • General refuse generated onsite will be stored in enclosed bins or compaction units separately from construction and chemical wastes. • A reputable waste collector will be employed by the contractor to remove general refuse from the site, separately from construction and chemical wastes, on a daily basis to minimise odour, pest and litter impacts. Burning of refuse on construction sites is prohibited by law. • Aluminium cans will be often recovered from the waste stream by individual collectors if they are segregated and made easily accessible. Separate labelled bins for their deposit will be provided if feasible. • Office wastes will be reduced through the recycling of paper if volumes are large enough to warrant collection. Participation in a local collection scheme will be considered by the contractor.	Minimize production of the general refuse and avoid odour, pest and litter impacts	Contractor	All construction sites	Construction stage	Waste Disposal Ordinance	* ^ ^ ^

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S11.5.1 of Ref.1; S9.84 – 9.93 of Ref. 2	Land-based sediment • The basic requirements and procedures for excavated sediment disposal specified under ETWB TC(W) No. 34/2002 shall be followed. • The Project Proponent should agree in advance with MFC of CEDD on the site allocation. Subject to the final decision by MFC, Type 1 sediments are typically disposed to South Cheung Chau and/or East of Ninepin as open sea disposal while Type 2 sediments are disposed to East Sha Chau as confined marine disposal. • Sampling and Testing Plan(s) should be prepared in accordance with ETWB TC(W) No. 34/2002. Site investigation, based on the Sediment Sampling and Testing Plan(s), should be carried out in order to confirm the disposal arrangements for the proposed excavated sediments. A Sediment Quality Report (SQR) should then be submitted to EPD for agreement prior to the tendering of the construction contract, discussing in details the site investigation, testing results as well as the delineation of each of the categories of excavated materials and the corresponding types of disposal. • The excavated sediments is expected to be loaded onto the dumping trucks and transferred to the barging point where the sediments would be transported via barge to the existing designated disposal sites allocated by the MFC. The excavated sediment would be disposed of according to its determined disposal options and ETWB TC(W) No. 34/2002. • Requirements of the Air Pollution Ordinance (Construction Dust) Regulation, where relevant, shall be adhered to during excavation, transportation and disposal of sediments. • Stockpiling of contaminated sediments should be avoided as far as possible. If temporary stockpiling of contaminated sediments is necessary, the excavated sediment should be covered by tarpaulin and the area should be placed within earth bunds or sand bags to prevent leachate from entering the ground, nearby drains and/or surrounding water bodies. The stockpiling areas should be completely paved or covered by linings in order to avoid contamination to underlying soil or groundwater. Separate and clearly defined areas should be provided for stockpiling of contaminated and uncontaminated materials. Leachate, if any, should be	To ensure the sediment is handled and disposed of in a least impacted way and in accordance to the statutory	Contractor	All construction sites	Construction stage	ETWB TC(W) NO. 34/2002 Dumping at Sea Ordinance (DASO) APCO WPCO	N/A N/A N/A N/A N/A N/A

EIA Ref.	Recommended mitigation measures for Works Contract 1112	Objectives of the recommended measures & main concerns to address	Who to implement the measures?	Location of the measures	When to implement the measures?	What requirements or standards for measures to achieve?	Status
	collected and discharged according to the Water Pollution Control Ordinance (WPCO). • In order to minimize the potential odour / dust emissions during excavation and transportation of the sediment, the excavated sediments should be wetted during excavation / material handling and should be properly covered when placed on trucks or barges. Loading of the excavated sediment to the barge should be controlled to avoid splashing and overflowing of the sediment slurry to the surrounding water. • The barge transporting the sediments to the designated disposal sites should be equipped with tight fitting seals to prevent leakage and should not be filled to a level that would cause overflow of materials or laden water during loading or transportation. • In order to minimize the exposure to contaminated materials, workers should, when necessary, wear appropriate personal protective equipments (PPE) when handling contaminated sediments. Adequate washing and cleaning facilities should also be provided on site.						^ N/A N/A
S11.5.1 of Ref.1; S8.94 – 9.97 of Ref. 2; S11.5.1 of Ref. 3	Chemical waste • Chemical waste that is produced, as defined by Schedule 1 of the Waste Disposal (Chemical Waste) (General) Regulation, will be handled in accordance with the Code of Practice on the Packaging, Labelling and Storage of Chemical Wastes. • Containers used for the storage of chemical wastes will be suitable for the substance they are holding, resistant to corrosion, maintained in a good condition, and securely closed; have a capacity of less than 450L unless the specification has been approved by the EPD; and display a label in English and Chinese in accordance with instructions prescribed in Schedule 2 of the regulation. • The storage area for chemical wastes will be clearly labelled and used solely for the storage of chemical waste; be enclosed on at least 3 sides; have an impermeable floor and bunding of sufficient capacity to accommodate 110% of the volume of the largest container or 20 % of the total volume of waste stored in that area, whichever is the greatest; have adequate ventilation; be covered to prevent rainfall entering;	Control the chemical waste and ensure proper storage, handling and disposal.	Contractor	All construction sites	Construction stage	Waste Disposal (Chemical Waste) General) Regulation Code of Practice on the Packaging, Labelling and Storage of Chemical Waste	* ^ *

EIA Ref.	Recommended mitigation measures for Works Contract 1112	Objectives of the recommended measures & main concerns to address	Who to implement the measures?	Location of the measures	When to implement the measures?	What requirements or standards for measures to achieve?	Status
	and be arranged so that incompatible materials are adequately separated. • Disposal of chemical waste will be via a licensed waste collector; and be to a facility licensed to receive chemical waste, such as the Chemical Waste Treatment Centre which also offers a chemical waste collection service and can supply the necessary storage containers; or be to a reuser of the waste, under approval from the EPD.						^
S9.98 – 9.99 of Ref 2	Asbestos wastes • All storage of asbestos waste should be carried out properly in a secure place isolated from other substances so as to prevent any possible release of asbestos fibres into the atmosphere and contamination of other substances. The storage area should bear warning panels to alert people of the presence of asbestos waste. Collection, transportation and disposal of asbestos waste will follow the trip-ticket system. • Licensed asbestos waste collectors will be appointed to collect the asbestos waste and deliver to the designated landfill for disposal. The Project Proponent should notify to EPD in advance for disposal of asbestos waste. After processing the notification, EPD will issue specific instructions and directions for disposal. The waste producer must strictly follow these directions	To ensure the asbestos wastes are handled and disposed of in accordance with the statutory requirements	Contractor	All construction sites	Construction stage	Code of practice on the Handling, Transportation and Disposal of Asbestos Waste	N/A N/A

EIA Ref.	Recommended mitigation measures for Works Contract 1112	Objectives of the recommended measures & main concerns to address	Who to implement the measures?	Location of the measures	When to implement the measures?	What requirements or standards for measures to achieve?	Status
Land Contamination							
S10.24 – 10.34 of Ref 2	Precautionary measures • Precautionary measures such as visual inspection are recommended to be undertaken during construction activities that disturb soil. The inspection process should involve a visual observation of excavated soils for discolouration and the presence of oils, together with identifying the presence of odours, which may also indicate soil and/or groundwater contamination. • If soil discolouration or the presence of oil/unnatural odour is noted during visual inspection, sampling and testing should also be undertaken to verify the presence of contamination.	To act as a general precautionary measure to screen soils for the presence contamination during construction	Contractor	All construction sites	Construction stage	"Guidance Note for Contaminated Land Assessment and Remediation" "Guidance Manual for Use of Risk-based Remediation Goals for Contaminated Land Management	^ ^
S10.35 of Ref 2	• Potential remediation of contaminated soil • If land contamination is identified, CAR and RAP detailing the proposed remediation works should be prepared. RR should then be prepared and submitted to EPD to demonstrate that the decontamination work is adequate and has been carried out in accordance with the endorsed CAR and RAP. Information such as soil treatment/disposal records (including trip tickets), confirmatory sampling results and photographs should be included in the RR. No construction work should be carried out prior to endorsement of the RR by EPD. • In order to minimise environmental impacts arising from the handling of potentially contaminated materials, the following environmental precautionary measures are recommended to be utilised during the course of any required site remediation: • Excavation profiles must be properly designed and executed with attention to the relevant requirements for environment, health and safety; • Excavation should be carried out during dry season as far as possible to minimise contaminated runoff from contaminated soils; • Supply of suitable clean backfill material is needed after excavation;	To remediate contaminated soil	Contractor	All construction sites	Construction stage	"Guidance Notes for Investigation and Remediation of Contaminated Sites of Petrol Filling Stations, Boatyards and Car Repair /Dismantling Workshop"	N/A N/A N/A N/A N/A N/A

EIA Ref.	Recommended mitigation measures for Works Contract 1112	Objectives of the recommended measures & main concerns to address	Who to implement the measures?	Location of the measures	When to implement the measures?	What requirements or standards for measures to achieve?	Status
	• If proposed remediation methods employ chemical oxidation methods as the contaminant mass reduction technology, chemicals will be securely and separately stored away from sources of ignition or oxidisable items. Handling will be undertaken by personnel with appropriate training and Personal Protective Equipment • Vehicles containing any excavated materials should be suitably covered to limit potential dust emissions or contaminated wastewater run-off, and truck bodies and tailgates should be sealed to prevent any discharge during transport or during wet conditions; • Speed control for the trucks carrying coVehicle wheel and body washing facilities at the site's exit points should be established and used; and contaminated materials should be enforced; • Pollution control measures for air emissions e.g. from biopile blower, noise emissions e.g. from blower, and water discharges e.g. runoff control should be implemented and complied with relevant regulations and guidelines.						N/A ^ ^ ^
S10.36 of Ref 2	The Occupation Safety and Health Ordinance (OSHO) (Chapter 509) and its subsidiary Regulations should be followed by all site personnel working on the site at all times. In addition, the following basic health and safety measures should be implemented as far as possible: Set up a list of safety measures for site workers. Provide written information and training on safety for site workers. Keep a log-book and plan showing the contaminated zones and clean zones. Maintain a hygienic working environment. Avoid dust generation. Provide face and respiratory protection gear to site workers. Provide personal protective clothing (e.g. chemical resistant jackboot, liquid tight gloves) to site workers. Provide first aid training and materials to site workers.	To minimise the potentially adverse effects on health and safety of construction workers during the course of site remediation.	Contractor	All construction sites	Site remediation and prior to construction phase	"Guidance Note for Contaminated Land Assessment and Remediation" "Guidance Manual for Use of Risk-based Remediation Goals for Contaminated Land Management "Occupation Safety and Health Ordinance (Chapter 509)"	^

EIA Ref.	Recommended mitigation measures for Works Contract 1112	Objectives of the recommended measures & main concerns to address	Who to implement the measures?	Location of the measures	When to implement the measures?	What requirements or standards for measures to achieve?	Status
EM&A Project							
S14.2 – 14.4 of Ref. 1; S13.2 – 13.4 of Ref. 3 1.	• An Environmental Team needs to be employed as per this EM&A Manual. • Prepare a systematic EMP to ensure effective implementation of the mitigation measures. • An environmental impact monitoring needs to be implementing by the Environmental Team to ensure all the requirements given in this EM&A Manual are fully complied with.	Perform environmental monitoring & auditing	Contractor	All construction sites	Construction stage	EIAO Guidance Note Ref4/2010 EIAO-TM	^

Remark for Status:
^ Compliance of mitigation measure
+ Non-compliance but rectified by the contractor
N/A Not Applicable
X Non-compliance of mitigation measure
* Recommendation was made during site audit but improved/rectified by the contractor
# Recommendation was made during site audit and improvement/rectification not yet completed by the contractor

Notes:
Ref. 1 – EIA Report for SCL (TAW-HUH)
Ref. 2 – EIA Report for SCL (MKK-HUH)
Ref. 3 – EIA Report for SCL (HHS)

This EMIS contains only those requirements that are relevant to Works Contract 1112 in terms of:

- EM&A required under Works Contract 1112
- Who to implement the measures – the Contractor (Leighton)
- The location of the measures – within and in the vicinity of the Works Contract 1112 Site Boundary
- When to implement the measures – during the design and construction

APPENDIX I

Event and Action Plan

Event and Action Plan for Landscape and Visual Impact Monitoring

Event	ET	IEC	ER	Contractor
Action level				
Non-conformity on one occasion	1. Inform the contractor, the IEC and the ER 2. Discuss remedial actions with the IEC, the ER and the Contractor 3. Monitor remedial actions until rectification has been completed	1. Check inspection report 2. Check the contractor's working method 3. Discuss with the ET, ER and the contractor on possible remedial measures 4. Advise the ER on effectiveness of proposed remedial measures.	1. Confirm receipt of notification of non-conformity in writing 2. Review and agree on the remedial measures proposed by the contractor 3. Supervise implementation of remedial measures	1. Identify source and investigate the non-conformity 2. Implement remedial measures 3. Amend working methods agreed with the ER as appropriate 4. Rectify damage and undertake any necessary replacement
Repeated Non-conformity	1. Identify source 2. Inform the contractor, the IEC and the ER 3. Increase inspection frequency 4. Discuss remedial actions with the IEC, the ER and the contractor 5. Monitor remedial actions until rectification has been completed 6. If non-conformity stops, cease additional monitoring	1. Check inspection report 2. Check the contractor's working method 3. Discuss with the ET and the Contractor on possible remedial measures 4. Advise the ER on effectiveness of proposed remedial measures	1. Notify the contractor 2. In consultation with the ET and IEC, agree with the contractor on the remedial measures to be implemented 3. Supervise implementation of remedial measures.	1. Identify source and investigate the non-conformity 2. Implement remedial measures 3. Amend working methods agreed with the ER as appropriate 4. Rectify damage and undertake any necessary replacement. Stop relevant portion of works as determined by the ER until the non-conformity is abated.

Event and Action Plan for Air Quality

Event	ET	IEC	ER	Contractor
Action level				
1. Exceedance for one sample	1. Inform the IEC, Contractor and ER 2. Discuss with the Contractor, IEC and ER on the remedial measures required 3. Repeat measurement to confirm findings 4. Increase monitoring frequency	1. Check monitoring data submitted by the ET 2. Check Contractor's working method 3. Review and advise the ET and ER on the effectiveness of the proposed remedial measures	1. Confirm receipt of notification of exceedance in writing	1. Identify source(s), investigate the causes of exceedance and propose remedial measures; 2. Implement remedial measures; 3. Amend working methods agreed with the ER as appropriate
2. Exceedance for two or more consecutive samples	1. Inform the IEC, Contractor and ER 2. Discuss with the ER, IEC and Contractor on the remedial measures required 3. Repeat measurements to confirm findings 4. Increase monitoring frequency to daily 5. If exceedance continues, arrange meeting with the IEC, ER and Contractor 6. If exceedance stops, cease additional monitoring	2. Check monitoring data submitted by the ET 3. Check Contractor's working method 4. Review and advise the ET and ER on the effectiveness of the proposed remedial measures	1. Confirm receipt of notification of exceedance in writing 2. Review and agree on the remedial measures proposed by the Contractor 3. Supervise Implementation of remedial measures	1. Identify source and investigate the causes of exceedance 2. Submit proposals for remedial measures to the ER with a copy to ET and IEC within three working days of notification 3. Implement the agreed proposals 4. Amend proposal as appropriate

Event	ET	IEC	ER	Contractor
Limit Level				
1. Exceedance for one sample	1. Inform the IEC, EPD, Contractor and ER 2. Repeat measurement to confirm findings 3. Increase monitoring frequency to daily 4. Discuss with the ER, IEC and contractor on the remedial measures and assess the effectiveness.	1. Check monitoring data submitted by the ET 2. Check the Contractor's working method 3. Discuss with the ET, ER and Contractor on possible remedial measures 4. Review and advise the ER and ET on the effectiveness of Contractor's remedial measures.	1. Confirm receipt of notification of exceedance in writing 2. Notify the Contractor, IEC and ET 3. Review and agree on the remedial measures proposed by the Contractor 4. Supervise implementation of remedial measures.	1. Identify source(s) and investigate the causes of exceedance 2. Take immediate action to avoid further exceedance 3. Submit proposals for remedial measures to ER with a copy to ET and IEC within three working days of notification 4. Implement agreed proposals 5. Amend proposal if appropriate.
2. Exceedance for two or more consecutive samples	1. Notify IEC, Contractor & EPD 2. Repeat measurement to confirm findings 3. Increase monitoring frequency to daily 4. Carry out analysis of the Contractor's working procedures with the ER to determine possible mitigation to be implemented 5. Arrange meeting with the IEC, Contractor and ER to discuss the remedial measures to be taken 6. Review the effectiveness of the Contractor's remedial measures and keep IEC, EPD and ER informed of the results 7. If exceedance stops, cease additional monitoring.	1. Check monitoring data submitted by the ET 2. Check the Contractor's working method 3. Discuss with ET, ER, and Contractor on the potential remedial measures 4. Review and advise the ER and ET on the effectiveness of Contractor's remedial measures.	1. Confirm receipt of notification of exceedance in writing 2. Notify the Contractor, IEC and ET 3. In consultation with the ET and IEC, agree with the Contractor on the remedial measures to be implemented 4. Supervise the implementation of remedial measures 5. If exceedance continues, consider what portion of the work is responsible and instruct the Contractor to stop that portion of work until the exceedance is abated.	1. Identify source(s) and investigate the causes of exceedance 2. Take immediate action to avoid further exceedance 3. Submit proposals for remedial measures to the ER with a copy to the IEC and ET within three working days of notification 4. Implement the agreed proposals 5. Revise and resubmit proposals if problem still not under control 6. Stop the relevant portion of works as determined by the ER until the exceedance is abated.

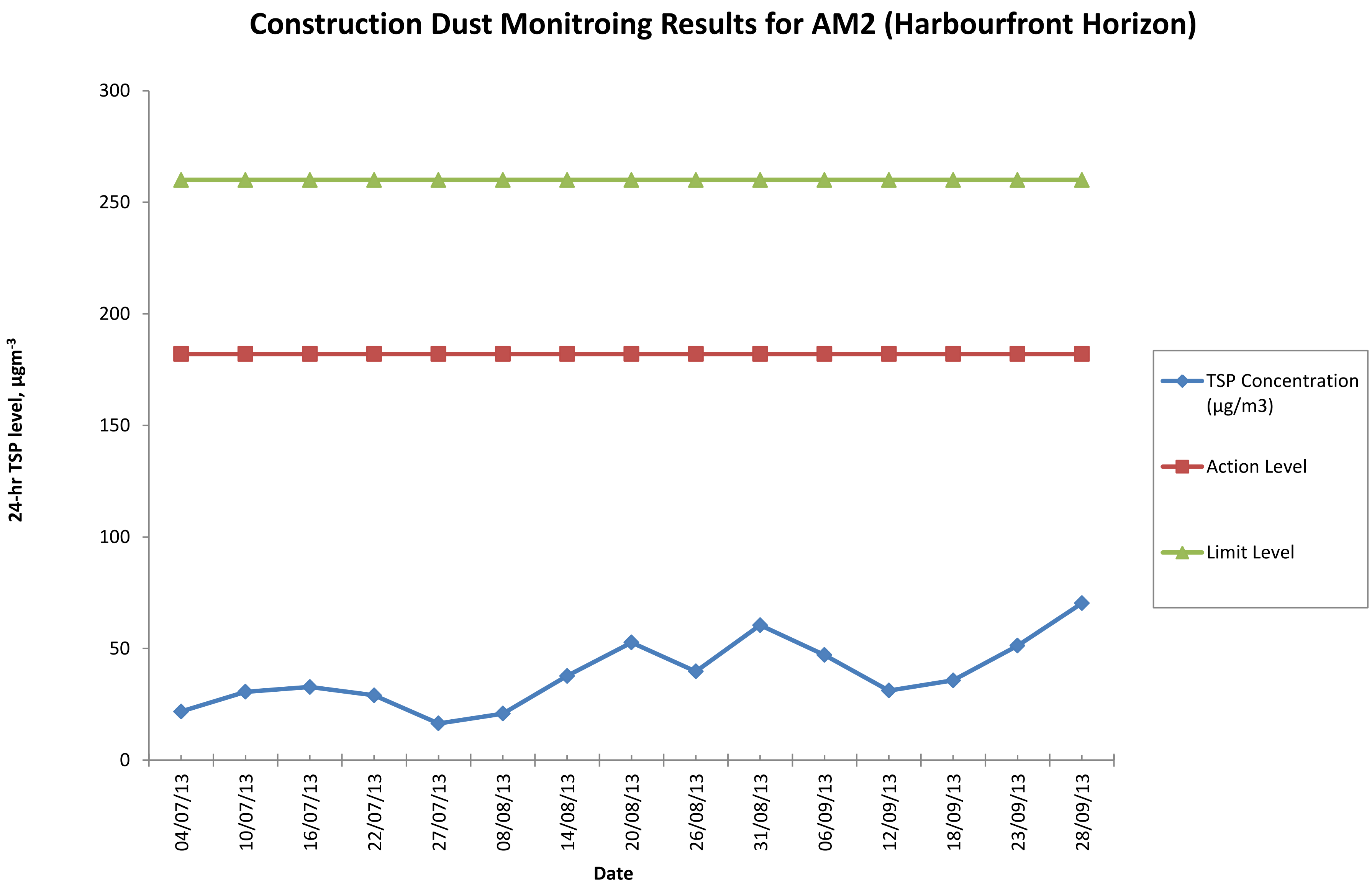
Note:
ET – Environmental Team, IEC – Independent Environmental Checker, ER – Engineer's Representative

APPENDIX J

Monitoring Results and their Graphical Presentations

Air Quality Monitoring Results for AM2

Sampling Date	Wt. of paper (g)				Elapse Time			Flow Rate (CFM)			Total Volume (m^3)	TSP Concentration (μg/m3)	Weather	Reference
	Paper No.	Initial Wt.	Final Wt.	Wt. of dust	Initial	Final	Sampling Hour	Initial	Final	Avg Flow Rate				
06/09/13	205044	3.5260	3.6028	0.0768	10029.06	10053.06	24	40	40	40	1631.05	47.0862	Sunny	-
12/09/13	205045	3.5516	3.6024	0..0508	10053.06	10077.06	24	40	40	40	1631.05	31.1456	Sunny	-
18/09/13	205046	3.5391	3.5974	0.0583	10077.06	10101.06	24	40	40	40	1631.05	35.7438	Sunny	-
23/09/13	205047	3.5472	3.6308	0.0836	10101.06	10125.06	24	40	40	40	1631.05	51.2553	Cloudy	-
28/09/13	205048	3.5456	3.6603	0.1147	10125.06	10149.06	24	40	40	40	1631.05	70.3228	Cloudy	-


Construction Dust Monitroing Results for AM2 (Harbourfront Horizon)
24-hr TSP level, µgm-3
300
250
200
150
100
50
0
04/07/13
10/07/13
16/07/13
22/07/13
27/07/13
08/08/13
14/08/13
20/08/13
26/08/13
31/08/13
06/09/13
12/09/13
18/09/13
23/09/13
28/09/13
Date
TSP Concentration (µg/m3)
Action Level
Limit Level

APPENDIX K

Waste Flow Table

Waste Flow Table												
Month	Actual Quantities of Inert C&D Materials Generated Monthly							Actual Quantities of non-intert C&D Wastes Generated Monthly				
	Generated		Disposed					Recycled			Disposed	
	Total Quantity Generated	Hard Rock and Broken Concrete	Reused in the Contract	Reused in other Projects	Disposed as Public Fills at HH Barging Point	Disposed as Public Fills at TKO137	Disposed as Public Fills at TM38	Metals	Paper/cardboard packaging	Plastics	Chemical Waste	General Refuse [Note 2]
Unit	(in '000m^3)	(in '000m^3)	(in '000m^3)	(in '000m^3)	(in '000m^3)	(in '000m^3)	(in '000m^3)	(in '000Kg)	(in '000Kg)	(in '000Kg)	(in '000Kg)	(in '000Kg)
Jun-13	0	0	0	0	0	0	0	137.301	0	0	0	6.55
Jul-13	0.361	0	0	0	0	0	0.361	365.335	0	0	0	16.87
Aug-13	1.6809	0	0	0	0.0479	0	1.633	69.979	0.253	0	0	12.67
Sep-13	3.389	0	0	0	0.196	0	3.193	22.78	0.223	0.46	0	16.25
Oct-13												
Nov-13												
Dec-13												
TOTAL	**5.4309**	**0**	**0**	**0**	**0.2439**	**0**	**5.187**	**595.395**	**0.476**	**0.46**	**0**	**52.34**

Note:
1. Assume the density of fill is 2 ton/m^3.
2. Refuses disposed of at NENT landfill.

APPENDIX L

Cumulative Statistics on Complaints, Notifications of Summons and Successful Prosecutions

Cumulative Statistics on Complaints, Notifications of Summons and Successful Prosecutions

	Date Received	Subject	Status	Total no. received in this month	Total no. recorded since project commencement
Environmental complaints	-	-	-	0	0
Notification of summons	-	-	-	0	0
Successful Prosecution	-	-	-	0	0

Appendix I

4th Monthly EM&A Report for Works Contract 1108 – Kai Tak Station and Associated Tunnels

MTR Corporation Limited

Shatin to Central Link –
Tai Wai to Hung Hom Section

Monthly EM&A Report

[Period from 1 to 30 September 2013]

Works Contract 1108 –Kai Tak Station and Associated Tunnels

(September 2013)

Certified by: Goldie Fung

Position: Environmental Team Leader

Date: 10 - oct - 2013

Kaden – Chun Wo Joint Venture (KCJV)

Shatin to Central Link –

Contract 1108

Kai Tak Station and Associated Tunnels

Monthly Environmental Monitoring & Auditing Report for

September 2013

The Contents of this report have been certified by: Ms. Goldie Fung (Environmental Team Leader)

Environmental Pioneers & Solutions Limited
Flat A, 19/F, Chaiwan Industrial Centre,
20 Lee Chung Street, Chai Wan, Hong Kong
Tel: 2556 9172 Fax: 2856 2010

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Executive Summary

This is the forth monthly Environmental Monitoring and Audit (EM&A) Report for **MTR Shatin to Central Link (SCL) Works Contract 1108 – Kai Tak Station and Associated Tunnels**. The project commenced on 17th June 2013. This report documents the finding of EM&A Works conducted from 1st September 2013 to 30th September 2013.

Summary of the Construction Works undertaken during the Reporting Month

The major site activities in this reporting period were including:

- Installation of sheetpile cutoff wall
- Installation of dewatering well
- Installation of ground monitoring instrumentation
- Advance excavation to +3.5mPD
- Breaking of concrete pavement and material stockpile on site
- Commencement pumping test
- Additional boreholes and CPT for ground investigation works.
- Commence existing nullah decks removal works for downstream portion

Variation in Construction Method

No variation in construction method from the proposed construction programme was noted in this reporting month.

Environmental Monitoring and Audit Progress

Culture Heritage

As tunneling works have not commenced, no audit for the Lung Tsun Stone Bridge and Former Kowloon City Pier was conducted during the reporting month.

Landscape and Visual

The implementation of landscape and visual mitigation measures was inspected during the weekly environmental site inspection. Most of the necessary mitigation measures have been implemented. Details of the audit findings and implementation status are presented in Section 6.

Waste Management

According to Contractor's waste flow data, 19,754 m^3 of inert C&D materials were generated during this reporting month and were disposed to the receiving facility of Contract 1108A. 24 m^3 of non-inert C&D waste were generated and disposed at landfill site.

Environmental Site Inspection

Joint weekly inspections were conducted by representatives of the Contractor, Engineer and ET on 3rd, 10th, 16th and 24th September 2013. The representative of the IEC jointed the site inspection on 10th September 2013. Details of the audit findings and implementation status are presented in Section 6.

Environmental Exceedance / Non-conformance / Compliant / Summons and Successful Prosecution

No breaches of Action and Limits levels, non-compliance event, environmental complaint, notification of summons and successful prosecution against the Project were received in this reporting month.

Future Key Issues

The major construction works to be undertaken in the next reporting month include:

- Continue installation of sheetpile cutoff wall
- Continue advance excavation to +3.5mPD and preparation of subsequent excavation down to -3.5mPD
- Continue installation of dewatering well and ground monitoring instrumentation
- Continue pumping test
- CPT for ground investigation works.
- Continue removal of nullah decks at the downstream potion
- Commencement of existing nullah decks removal works for upstream portion

1 Introduction

The Environmental Team (ET), Environmental Pioneers & Solutions Limited (EPSL), was appointed by Kaden – Chun Wo Joint Venture (KCJV) to undertake the Environmental Monitoring and Audit (EM&A) programme during construction phase of the MTR Shatin to Central Link (SCL) Works Contract 1108 – Kai Tak Station and Associated Tunnels (the Project). The project commenced on 17th June 2013.

1.1 Purpose of the Report

This is the forth monthly EM&A Report which summarises the audit findings for the EM&A programme during the reporting period from 1st September 2013 to 30th September 2013.

1.2 Structure of the Report

The structure of the report is as follow:

Section 1: Introduction - details the scope and structure of the report.

Section 2: Project Information - summarises background and scope of the project, site description, project organization and contact details, construction programme, the construction works undertaken and the status of Environmental Permits/Licenses during the reporting period.

Section 3: Environmental Monitoring Requirement - summarises the monitoring requirements and environmental mitigation measures as recommended in the EIA report and relevant environmental requirements.

Section 4: Implementation Status on Environmental Mitigation Measures - summarises the implementation of environmental protection measures during the reporting period.

Section 5: Monitoring Results - summarises the monitoring results obtained in the reporting period.

Section 6: Environmental Site Inspection - summarises the audit findings of the weekly site inspections undertaken within the reporting period.

Section 7: Environmental Non-conformance - summarises any monitoring exceedance, environmental complaints and environmental summons within the reporting period.

Section 8: Future Key Issues - summarises the impact forecast and monitoring schedule for the next three months.

Section 9: Conclusions and Recommendations

2 Project Information

2.1 Background

The Shatin to Central Link – Tai Wai to Hung Hom Section (SCL (TAW-HUH)) is an approximately 11 km long extension of the Ma On Shan Line and links up with the West Rail Line at Hung Hom forming a strategic East-West rail corridor. It is a Designated Project under the Environmental Impact Assessment Ordinance (Cap. 499) (EIAO).

The construction of the SCL (TAW-HUH) and SCL (HHS) have been divided into a series of civil construction works contracts. This Works Contract 1108 covers the construction of Kai Tak Station (KAT) and the section of tunnel between KAT and Sung Wong Toi Station (SUW) plus a short section of tunnel from KAT towards Diamond Hill Station (DIH). This construction contract was awarded to Kaden - Chun Wo Joint Venture (KCJV) in April 2013.

2.2 General Site Description

The works area includes work sites in the Kai Tak New Development Area. The construction of tunnel will employ cut & cover method. The alignment and works area for the Project is shown in **Appendix A**.

2.3 Construction Programme and Activities

A summary of the major construction activities undertaken in this reporting period is shown as follows. The tentative construction programme is presented in **Appendix B**.

- Installation of sheetpile cutoff wall
- Installation of dewatering well
- Installation of ground monitoring instrumentation
- Advance excavation to +3.5mPD
- Breaking of concrete pavement and material stockpile on site
- Commencement pumping test
- Additional boreholes and CPT for ground investigation works.
- Commence existing nullah decks removal works for downstream portion

2.4 Project Organization

The project organization chart and contact details are shown in **Appendix C.**

2.5 Status of Environmental Licences, Notification and Permits

A summary of the relevant permits, licences, and notifications on environmental protection for this Project is presented in Table 2.1.

Table 2.1 Summary of the Status of Environmental Licences, Notification and Permits

Permit / License No.	**Valid Period**		**Status**
	From	**To**	
Environmental Permit (EP)			
EP-438/2012/C	30/04/2013	12/09/2013	Superseded by EP-438/2012/D
EP-438/2012/D	13/09/2013	N/A	Valid
Notification pursuant to Air Pollution Control (Construction Dust) Regulation			
Ref. Number 359540	16/05/2013	N/A	Valid
Waste Disposal (Charges for Disposal of Construction Waste) Regulation			
Billing Account No. 7017544	07/06/2013	N/A	Valid
Construction Noise Permit for the Carrying Out of Percussive Piling			
PP-RE0026-13	02/07/2013	01/09/2013	Superseded by PP-RE0039-13
PP-RE0039-13	02/09/2013	28/02/2014	Valid
Construction Noise Permit for General Works			
GW-RE0720-13	12/07/2013	08/01/2014	Valid
GW-RE0998-13	23/09/2013	15/03/2014	Valid
Effluent Discharge License			
WT00016451-2013	26/08/2013	31/08/2018	Valid
Registration of Chemical Waste Producer			
WPN 5213-286-K3069-01	09/07/2013	N/A	Valid

2.6 Summary of EM&A Requirements

The EM&A programme under Works Contract 1108 require regular environmental site audits. The EM&A requirements are described in the following sections, including:

- Weekly inspection for Cultural Heritage;
- Weekly inspection for Landscape and Visual;
- Environmental mitigation measures, as recommended in the Project EIA study final report; and
- Environmental requirements in contract documents.

The advice on the implementation status of environmental protection and pollution control/mitigation measures is summarized in Section 6 of this report.

3 Environmental Monitoring Requirements

3.1 Culture Heritage

In accordance with the EM&A Manual, a buffer zone shall be maintained between both Lung Tsun Stone Bridge and Former Kowloon City Pier and SCL (TAW-HUH) works sites during the tunneling work. For Lung Tsun Stone Bridge, a horizontal distance of 25m between the bridge and the buffer boundary shall be maintained. For Former Kowloon City Pier, a vertical buffer distance of 1.8 – 2.2m from the top of the tunnel shall be maintained. The layout of the buffer zone was attached in **Appendix D**. No at-grade construction activities shall be allowed within the buffer zone. Audit shall be conducted on a weekly basis throughout the construction period for the mined tunnel within the horizontal buffer zone.

3.2 Landscape and Visual

In accordance with the EM&A Manual, the landscape and visual mitigation measures shall be implemented and a site inspection shall be conducted every week throughout the construction period. The implementation status is given in **Appendix G**.

The event/action plan for Landscape and Visual during Construction Stage is attached in **Appendix E**.

4 Implementation Status on Environmental Protection Requirements

The Contractor has implemented environmental mitigation measures and requirements as stated in the EIA Report, the Environmental Permit and EM&A Manual. The implementation status of the environmental mitigation measures of the reporting period is summarized in **Appendix G**. Status of required submissions under the Environmental Permit (EP) as of the reporting period is presented in Table 4.1.

Table 4.1 Status of Required Submissions under EP

EP Condition	Submission	Submission Date
Condition 3.4	Third Monthly EM&A Report	13th September 2013

5 Monitoring Results

5.1 Cultural Heritage

As tunneling works have not been commenced, no audit was conducted during the reporting month.

5.2 Landscape and Visual

Inspections of the implementation of landscape and visual mitigation measures were conducted on weekly basis. The observations and recommendations made during the audit sessions are summarized in Table 6.1.

5.3 Waste Management

With reference to relevant handling records and trip tickets of this Project, the quantities of different types of waste generated in the reporting month are summarised in Table 5.1. The inert C&D materials were disposed to the Contract 1108A receiving facility. The general refuse was disposed to designated landfill site. No steel metals, paper/cardboard packaging and plastics were generated during this reporting month. Detail of waste management data is presented in **Appendix F**.

Table 5.1 Quantities of Waste Disposed from the Project

<table>
<tr><th rowspan="4">Reporting Month</th><th colspan="6">Quantity</th></tr>
<tr><th rowspan="3">C&D Materials (inert) (a)</th><th colspan="5">C&D Materials (non-inert) (b)</th></tr>
<tr><th rowspan="2">General Refuse</th><th rowspan="2">Chemical Waste</th><th colspan="3">Recycled materials</th></tr>
<tr><th>Paper/cardboard</th><th>Plastics</th><th>Metals</th></tr>
<tr><td>September 2013</td><td>19,754m^3</td><td>24 m^3</td><td>0 kg</td><td>0 kg</td><td>0 kg</td><td>0 kg</td></tr>
<tr><td colspan="7">Notes:
(a) Inert C&D materials include bricks, concrete, building debris, rubble and excavated soil.
(b) Non-inert C&D materials include steel, paper/cardboard packaging waste, plastics and other wastes such as general refuse and vegetative wastes. Steel metal generated from the Project are grouped into non-inert C&D materials as the materials were not disposed of with other inert C&D materials.</td></tr>
</table>

6 Environmental Site Inspection

6.1 Site Audit

Site audit was carried out by ET on weekly basis to monitor the timely implementation of proper environmental management practices and mitigation measures in the Project site.

Joint weekly inspections were conducted by representatives of the Contractor, Engineer and ET on 3rd, 10th, 16th and 24th September 2013. The representative of the IEC jointed the site inspection on 10th September 2013. EPD conducted a site inspection on 27th September 2013. EPD has reminded the Contractor to provide water spraying during concrete breaking and enhance regular water spraying to reduce dust impact. The details of observations during site audit can refer to Table 6.1.

6.2 Implementation Status of Environmental Mitigation Measures

According to the EIA Study Report, Environmental Permit and the EM&A Manual of the Project, the mitigation measures detailed in the documents are recommended to be implemented during the construction phase. Updated summary of the Environmental Mitigation Implementation Schedule (EMIS) is provided in **Appendix G**.

During site inspections in the reporting month, no non-conformance was identified. The observations and recommendations made during the audit sessions are summarized in Table 6.1.

Table 6.1 Summary results of site inspections findings

Parameters	Date	Findings	Advice from ET	Action taken	Closing date	Remarks
Noise	N/A	N/A	N/A	N/A	N/A	/
Air Quality	30 Jul 13	Dust suppression measure for concrete breaking was not observed.	Contractor was reminded to provide water spraying during concrete breaking.	Sufficient water spraying was provided for concrete breaking works. No fugitive dust was observed during concrete breaking.	10 Sep 13	/
	20 Aug 13	Black smoke was observed from an excavator.	Contractor was advised to provide maintenance for the excavator. Contractor was reminded to check	Maintenance was provided for the excavator to prevent	3 Sep 13	/

Parameters	Date	Findings	Advice from ET	Action taken	Closing date	Remarks
			and maintain the machinery on-site regularly to avoid emission of black smoke.	emission of black smoke.		
	10 Sep 13	The work site was observed to be dry and dusty.	Contractor was advised to provide sufficient water spraying to avoid dust generation.	Additional water spraying truck was observed to perform more frequent water spraying. The work site was generally wet and no dust was observed..	24 Sep 13	/
	16 Sep 13	No dust suppression measure was observed for the concrete breaking works at Area 3.	Contractor was advised to provide water spraying during concrete breaking to reduce the dust impact.	Follow up action will be needed in next reporting month.	N/A	/
	16 Sep 13	Dark smoke was emitted from a hydraulic breaker at Area 3	Contractor was recommended to stop using the concerned breaker and provide regular checking and maintenance for the machinery on-site to avoid further emission of dark smoke.	Maintenance was provided for the hydraulic breaker at Area 3 to avoid further emission of dark smoke	24 Sep 13	/
	16 Sep 13	Some stockpiles of excavated material were not covered properly	Contractor was reminded to cover the stockpile entirely with impervious material.	Follow up action will be needed in next reporting month.	N/A	/
Water Quality	25 Jun 13	Muddy surface runoff entered into an existing channel was observed.	Contractor was reminded to block the remaining sections of channel as soon as possible.	During the inspection on 18 Jul 13, the section of channel near the buffer zone was blocked by sandbags. Rectification for other sections is still in progress.	N/A	/
	13 Aug 13	Equipments attached with oil were observed to be placed on bared ground.	Contractor was reminded to provide tarpaulin or other impervious material underneath the equipments to avoid land contamination.	The equipments attached with oil were removed.	3 Sep 13	/

Parameters	Date	Findings	Advice from ET	Action taken	Closing date	Remarks
	30 Aug 13	The outlets of some drip trays on site were not properly plugged and water leakage was observed.	Contractor was reminded to properly plug the outlets to avoid land contamination in case of leakage.	Follow up action will be needed in next reporting month.	N/A	/
	10 Sep 13	Some bottles and containers were observed within the drip trays.	Contractor was reminded to remove the items to maintain sufficient capacity for storage of leaked oil in case of leakage.	The drip trays which had waste inside were removed.	16 Sep 13	/
	24 Sep 13	Drip tray was missing for some oil/chemical containers	Contractor was reminded to provide drip tray underneath oil/chemical containers for storing leaked oil.	Follow up action will be needed in next reporting month.	N/A	/
	24 Sep 13	Silty water was observed to be generated from the nullah deck removal work	Contractor was reminded to provide preventive measures to avoid runoff of silty water entering into the nullah.	Follow up action will be needed in next reporting month.	N/A	/
Waste / Chemical Management	N/A	N/A	N/A	N/A	N/A	/
Cultural Heritage	N/A	N/A	N/A	N/A	N/A	/
Landscape and Visual	N/A	N/A	N/A	N/A	N/A	/
Permits/ Licenses	N/A	N/A	N/A	N/A	N/A	/

7 Environmental Non-Conformance

7.1 Summary of Environmental Exceedances

No breaches of Action and Limit levels was recorded in the reporting month.

7.2 Summary of Environmental Non-Compliance

No environmental non-compliance was recorded in the reporting month.

7.3 Summary of Environmental Complaint

No environmental project-related complaint was received in the reporting month.

7.4 Summary of Environmental Summon and Successful Prosecution

There was no successful environmental prosecution or notification of summons received since the Project commencement.

The Cumulative Log for environmental exceedance, non-compliance, complaint and summon and successful prosecution since the commencement of the Project is presented in **Appendix H**.

8 Future Key Issues

The major construction activities in the coming month will include:

- Continue installation of sheetpile cutoff wall
- Continue advance excavation to +3.5mPD and preparation of subsequent excavation down to -3.5mPD
- Continue installation of dewatering well and ground monitoring instrumentation
- Continue pumping test
- CPT for ground investigation works.
- Continue removal of nullah decks at the downstream potion
- Commencement of existing nullah decks removal works for upstream portion

Potential environmental impacts arising from the above construction activities are mainly associated with dust, construction noise and waste management. The Contractor has been reminded to properly implement dust and construction noise control measures as well as proper waste management in order to minimize the potential environmental impacts due to the construction works of the Project.

9 Conclusions and Recommendations

9.1 Conclusions

This is the forth monthly Environmental Monitoring and Audit (EM&A) Report presenting the EM&A works undertaken during 1st September 2013 to 30th September 2013 in accordance with the EM&A Manual and the requirement under EP-438/2012/D.

4 nos. of environmental site inspections were carried out in this reporting month. Recommendations on remedial actions were given to the Contractor for the deficiencies identified during the site audit.

No exceedances, non-compliance event, complaint and summons/prosecution was received during the reporting period.

The ET will keep tracking of the EM&A programme to ensure compliance of environmental requirements and the proper implementation of all the necessary mitigation measures.

9.2 Recommendations

According to the environmental audit performed in the reporting month, the following recommendations were made:

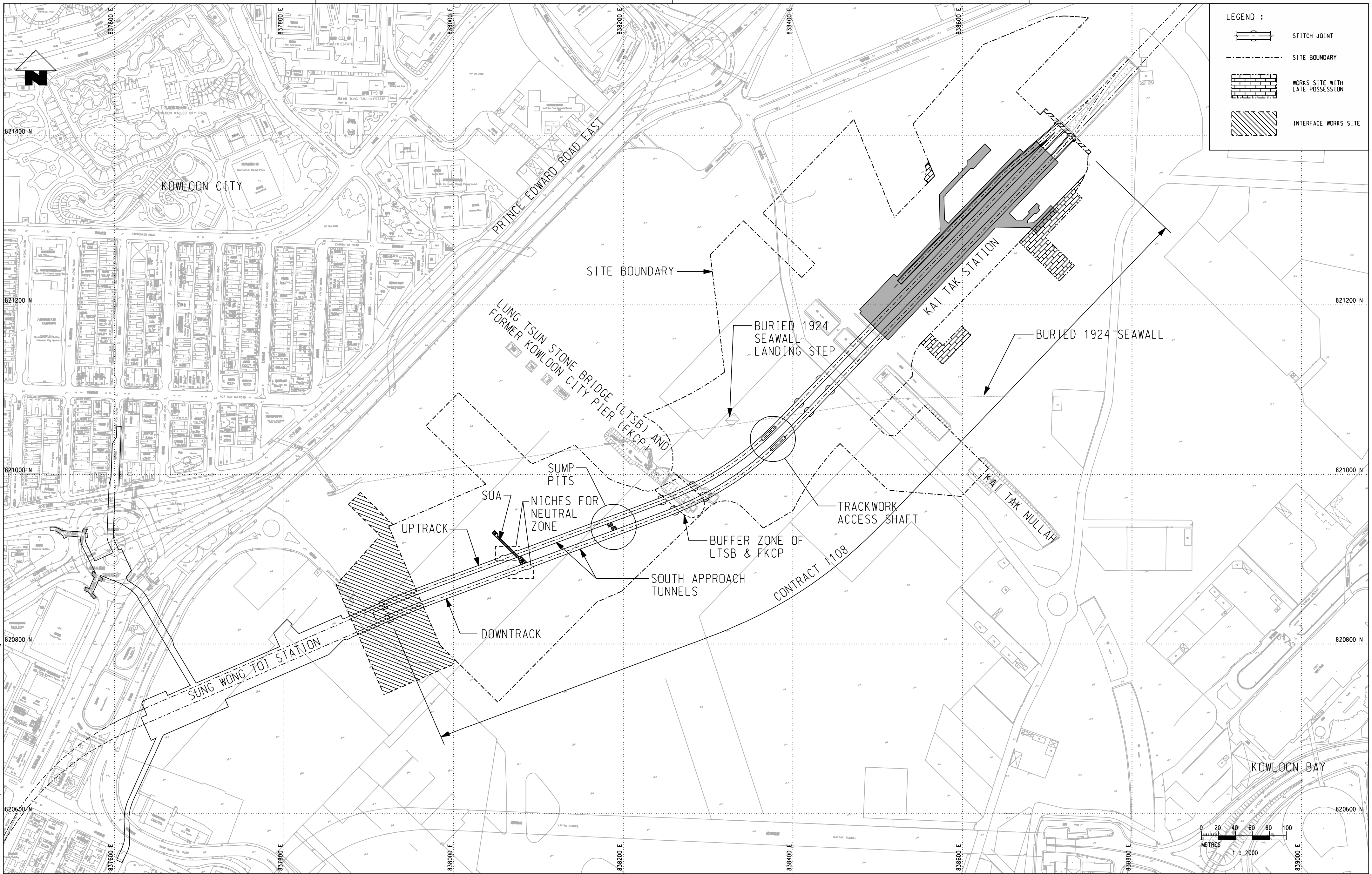
<u>Dust Impact</u>

- Enhance regular water spraying of the site to reduce the dust impact.
- Provide effective dust suppression measure for dust generating activities, i.e. concrete breaking.
- Cover dusty stockpiles entirely with impervious material to avoid dust generation

<u>Water Quality Impact</u>

- Provide preventive measure to avoid discharge of surface runoff.
- Provide drip tray with adequate capacity for fuel-powered equipment and fuel/chemical containers to prevent accidental spillage.
- Check and plug the outlets of drip trays to avoid chemical leakage.

Appendix A – Site Location Plan



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REV	DESCRIPTION	BY	DATE	APPROVED
B	ISSUE FOR TENDER	CC	31AUG12	FK
A	ISSUE FOR TENDER	CC	31JAN12	FK

DRAWN	TWY
DESIGNED	CC
CHECKED	NN
APPROVED	FK
DATE	31JAN12

MTR

SHATIN TO CENTRAL LINK

ORIGINATOR

MEINHARDT
Meinhardt (Hong Kong) Ltd. Consulting Engineers
邁進(香港)工程顧問有限公司
in association with
Aedas, Mott MacDonald, MVA, DLS, Wilkinson Murry, Evans & Peck, AA

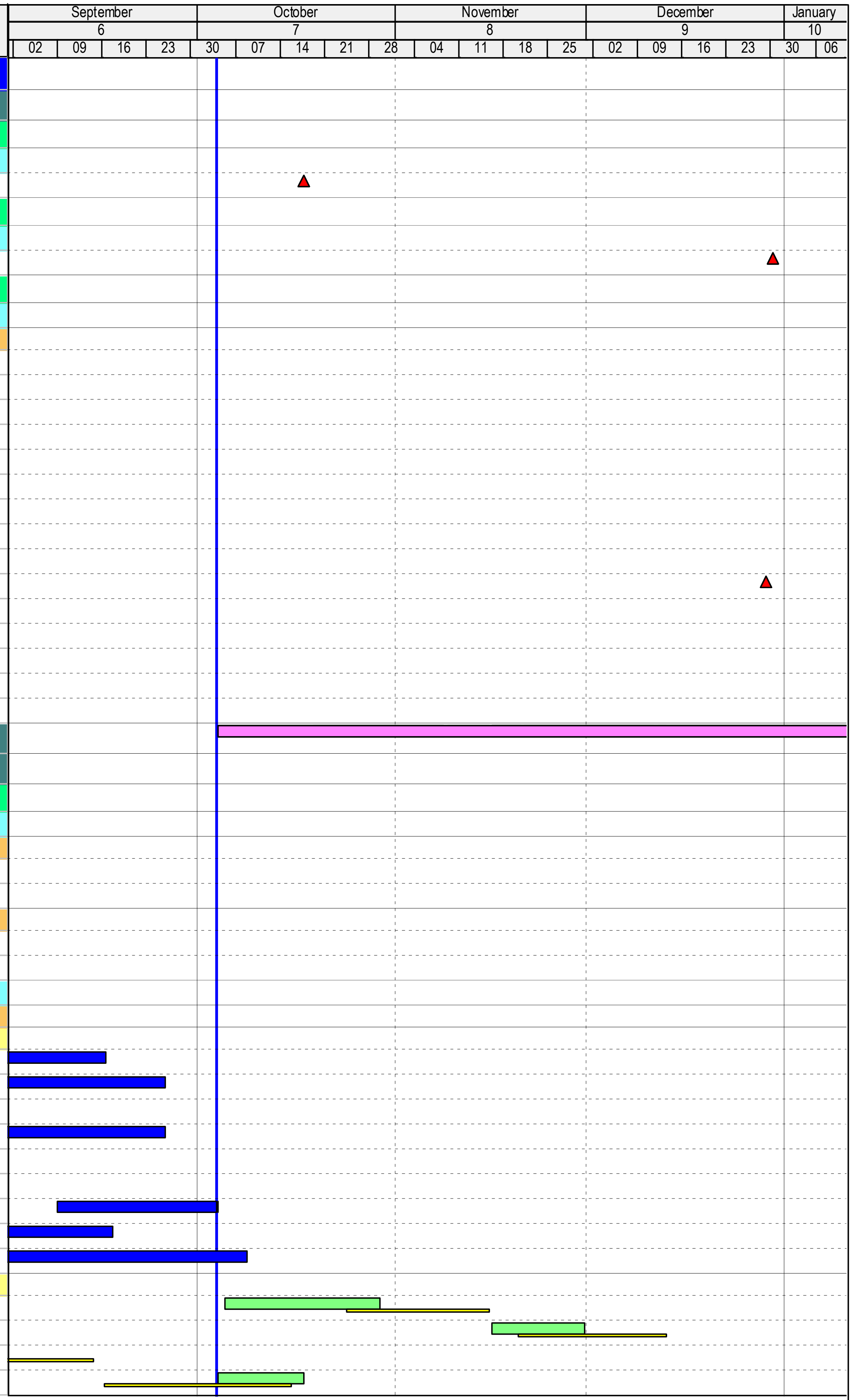
CADD REF. 1108_T_340_MHK_C01_201B.dgn

TITLE
CONTRACT 1108
KAI TAK STATION AND ASSOCIATED TUNNELS
GENERAL CIVIL WORKS
LOACTION PLAN

SCALE 1:2000 @ A1
DRAWING NO. 1108/T/340/MHK/C01/201
REV. B

Appendix B –Construction Programme

Activity ID	Activity Name	Activity % Complete	Start	Finish
Contract 1108 Kai Tak Station and Associated Tunnels				
Contractual Dates and Project Key Dates				
IPS Milestone Dates				
Cost Centre B - Kai Tak Station, Entrances and Adits				
01108.MSB01	B1 - Pump test completed, accepted by Engineer & ready for open cut excavation of KAT station (Week No.36/13, 8-Sep-13	0%		17-Oct-13
Programme Data				
Interface with Contract 1107				
01108.PD4-IF1107.1	Contract 1107 Provide access to Contract 1108 at interface area for ELS Works (Week No. 52/13, 29-Dec-13)	0%	30-Dec-13*	
Schedule of Access & Vacate Dates for Works Areas				
Possession Dates				
Works Areas				
01108.ACWA1	Works Area 1108.A1 (Within 3 weeks from commencement of works)	100%	29-Apr-13 A	
01108.ACWA2	Works Area 1108.A2 (Within 3 weeks from commencement of works)	100%	29-Apr-13 A	
01108.ACWA3	Works Area 1108.A3 (Within 3 weeks from commencement of works)	100%	29-Apr-13 A	
01108.ACWA4	Works Area 1108.A4 (Within 3 weeks from commencement of works)	100%	29-Apr-13 A	
01108.ACW01	Works Area 1108.W1 (Within 3 weeks from commencement of works)	100%	29-Apr-13 A	
01108.ACW10	Works Area 1108.W10 (Within 3 weeks from commencement of works)	100%	29-Apr-13 A	
01108.ACW11	Works Area 1108.W11 (Within 3 weeks from commencement of works)	100%	29-Apr-13 A	
01108.ACW12	Works Area 1108.W12 (Within 3 weeks from commencement of works)	100%	29-Apr-13 A	
01108.ACW13	Works Area 1108.W13 (Within 3 weeks from commencement of works)	100%	29-Apr-13 A	
01108.ACW01a	Works Area 1108.W1a (Week No. 52/13)	0%	29-Dec-13*	
01108.ACW02	Works Area 1108.W2 (Within 3 weeks from commencement of works)	100%	29-Apr-13 A	
01108.ACW04	Works Area 1108.W4 (04-Jan-16)	100%	15-Jul-13 A	
01108.ACW07	Works Area 1108.W7 (Within 3 weeks from commencement of works)	100%	29-Apr-13 A	
01108.ACW08	Works Area 1108.W8 (Within 3 weeks from commencement of works)	100%	29-Apr-13 A	
01108.ACW09	Works Area 1108.W9 (Within 3 weeks from commencement of works)	100%	29-Apr-13 A	
A - Preliminaries				
B - Kai Tal Station, Entrances and Adits				
B1 KAT Station				
Preliminaries				
General Items				
01108.STN.HR0100	Demoliation of existing abandoned nullah, No. 1, ~120m L at GL 1/2~4/5 running northwards	100%	01-Aug-13 A	30-Aug-13 A
01108.STN.HR0010	Erection of hoarding and haul road	100%	15-Jun-13 A	30-Aug-13 A
Ground Investigation, Instrumentation & Monitoring				
01108.STN.GI13-17	Ground investigation - Boreholes BH13 to BH17, 5 nr.	100%	02-Jul-13 A	30-Aug-13 A
01108.STN.IM0000	Instrumentation - Install & monitor, GS markers 7+6+9nr, 7nr on utilities & 3 nr on structure; VM, 2 nr; PZ, 4 nr; etc.	100%	02-Jul-13 A	30-Aug-13 A
B1.2 Station - Excavation				
B1.2.2 Temporary Works				
Temporary Works Design, Review & Approval				
01108.STN.DN09.2.1	Advance Open Excavation - Design, ICE & Submit to MTRC for review	100%	07-Jun-13 A	16-Sep-13 A
01108.STN.DN09.2.3	Advance Open Excavation - No-adverse-comment by RDO/ BD/ GEO	100%	08-Aug-13 A	26-Sep-13 A
01108.STN.DN09.2.2	Advance Open Excavation - Revision, if required, & Submit to RDO/ BD/ GEO	100%	08-Aug-13 A	21-Aug-13 A
01108.STN.DN09.1.3	Hydraulic Cut Off - No-adverse-comment by RDO/ BD/ GEO	100%	19-Jul-13 A	26-Sep-13 A
01108.STN.DN09.1.2	Hydraulic Cut Off - Revision, if required, & Submit to RDO/ BD/ GEO	100%	15-Jul-13 A	20-Jul-13 A
01108.STN.DN09.1.1	Hydraulic Cut Off - Design, ICE & Submit to MTRC for review	100%	21-Jun-13 A	30-Jul-13 A
01108.STN.DN04.1.3	Open Cut Design - No-adverse-comment by RDO/ BD/ GEO	100%	09-Sep-13 A	04-Oct-13
01108.STN.DN04.1.2	Open Cut Design - Revision, if required, & Submit to RDO/ BD/ GEO	100%	22-Aug-13 A	17-Sep-13 A
01108.STN.DN04.1.1	Open Cut Design, ICE & Submit to MTRC for review	100%	22-Aug-13 A	08-Oct-13 A
Dewatering Wells & Observation Wells				
01108.STN.DWAN-10	Adj.Nul~GL10 Dewatering wells, 35 nr PW80~PW114; Observation wells, 6 nr OW25~OW30; Piezometers 2 nr PZ3&PZ17 (2	0%	05-Oct-13	29-Oct-13
01108.STN.DWAN-10t	GL 00~10 Pumping tests	0%	16-Nov-13	30-Nov-13
01108.STN.DW10-19	Stage 1 Dewatering wells, 32 nr PW115~PW146; Observation wells, 7 nr OW31~OW37; Piezometers, 2 nr PZ2&PZ18 (4 Rigs	100%	24-Jul-13 A	31-Aug-13 A
01108.STN.DW10-19t	Stage 1 Pumping tests	0%	04-Oct-13	17-Oct-13



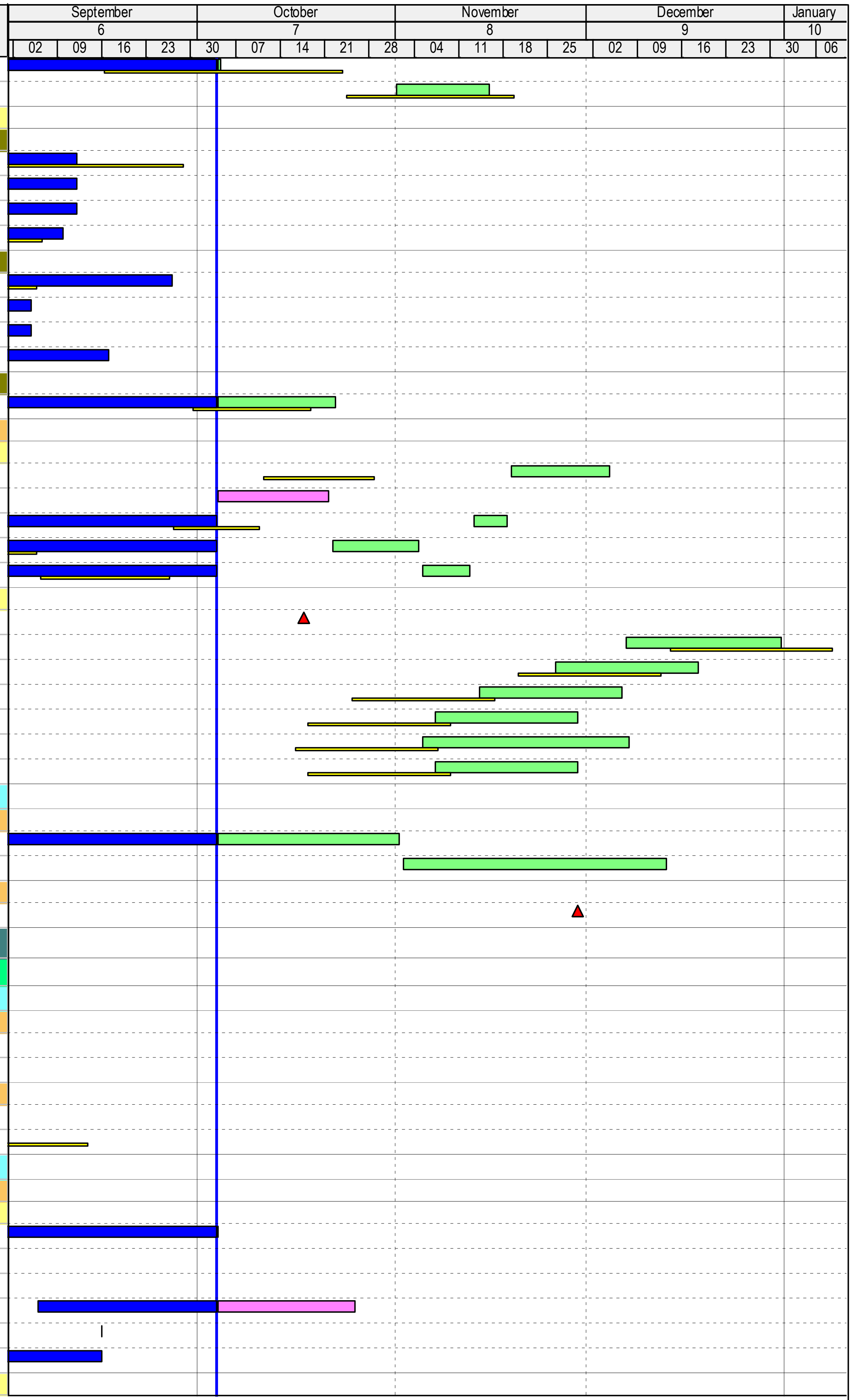
Milestone
Critical Milestone
Critical Remaining Work
Remaining Work
Primary Baseline
Actual Work

Contract 1108
Kai Tak Station and Associated Tunnels

3-Month Rolling Programme (September 2013)

Kaden 基利
Kaden – Chun Wo Joint Venture

Activity ID	Activity Name	Activity % Complete	Start	Finish
01108.STN.DW19-24	Stage 2 Dewatering wells, 15 nr PW147~PW161; Observation wells, 2 nr OW38~OW39; Piezometers, 1 nr PZ19 (2 Rigs)	95%	19-Aug-13 A	04-Oct-13
01108.STN.DW19-24t	Stage 2 Pumping tests	0%	01-Nov-13	15-Nov-13
Sheet Piles				
Cut-off Wall at NW Side				
01108.STN.SPAN-10w	GL 01~10 Sheet piling, 223 nr - 50 x 12.5m, 25 x 15.5m, 43 x 18.5m, 70 x 21.5m, 35 x 23.5m (4136m, 274t, total)	100%	15-Jul-13 A	12-Sep-13 A
01108.STN.SP19-22w	GL 07~10 & GL 19~22 Sheet piling, 191 nr - 15 x 12.5m, 25 x 15.5m, 151 x 18.5m (3369m, 223t, total) (2 Rigs)	100%	15-Jul-13 A	12-Sep-13 A
01108.STN.SP10-19w	GL 10~19 Sheet piling, 304 nr x 18.5m (5624m, 372t, total) (2 Rigs)	100%	11-Jul-13 A	12-Sep-13 A
01108.STN.SP22-STw	GL 22~Stub Tunnel Area - Sheet piling, 137 nr - 95 x 18.5m, 42 x 20.5m (2619m, 173t, total)	100%	22-Jul-13 A	10-Sep-13 A
Cut-off Wall at SE Side				
01108.STN.SP00-10e	GL 00~10 Sheet piling, 223 nr - 16 x 23.5m, 25 x 26.5m, 182 x 28.5m (6226m, 412t, total)	100%	22-Jul-13 A	27-Sep-13 A
01108.STN.SP19-22e	GL 07~10 & GL 19~22 Sheet piling, 190nr x 23.5m (4465m, 295t, total) (2 Rigs)	100%	22-Jul-13 A	05-Sep-13 A
01108.STN.SP10-19e	GL 10~19 Sheet piling, 295 nr x 23.5m (6933m, 459t, total) (2 Rigs)	100%	22-Jul-13 A	05-Sep-13 A
01108.STN.SP22-STe	GL 22~Stub Tunnel Area - Sheet piling, 176 nr x 23.5m (4664m, 308t, total)	100%	23-Jul-13 A	17-Sep-13 A
Cut-off Wall - Enclosure at Nullah Area				
01108.STN.SP00-00	Enclosure adj. Nullah Area - Sheet piling, 232 nr - 38 x 26.5m, 194 x 28.5m (6536m, 432t, total)	0%	23-Aug-13 A	22-Oct-13
B1.2.3 Earthworks				
General Site Clearance & Trim to +3.5mPD				
01108.STN.EX00-06	Adj to Nullah to GL06 General clearance & trim existing ground to +3.5mPD, 11906 m3	0%	19-Nov-13	04-Dec-13
01108.STN.EX0000	Construct station drainge protection system	0%	04-Oct-13	21-Oct-13
01108.STN.EX06-10	GL 06~10 General clearance & trim existing ground to +3.5mPD, 8614 m3	50%	31-Jul-13 A	18-Nov-13
01108.STN.EX10-19	GL 10~19 General clearance & trim existing ground to +3.5mPD, 20381 m3	50%	31-Jul-13 A	04-Nov-13
01108.STN.EX19-24	GL 19~24 General clearance & trim existing ground to +3.5mPD, 11469 m3	50%	31-Jul-13 A	12-Nov-13
Excavation to Formation Level				
01108.MSB01P	Commencement of excavation after pumping test for area from GL 10~19	0%		17-Oct-13
01108.STN.EX06-08	GL 06~08 Excavation, 31442 m3 (3 nr. backhoe)	0%	07-Dec-13	31-Dec-13
01108.STN.EX08-10	GL 08~10 Excavation, 31442 m3	0%	26-Nov-13	18-Dec-13
01108.STN.EX10-12	GL 10~12 Excavation, 31294 m3	0%	14-Nov-13	06-Dec-13
01108.STN.EX12-14	GL 12~14 Excavation, 31199 m3	0%	07-Nov-13	29-Nov-13
01108.STN.EX14-16	GL 14~16 Excavation, 38998 m3	0%	05-Nov-13	07-Dec-13
01108.STN.EX16-19	GL 16~19 Excavation, 38998 m3	0%	07-Nov-13	29-Nov-13
B1.3 Station - U/G C&S Works (Below Concourse Level Soffit)				
Temporary Foundation for Lifting Crane Tower				
01108.STN.BL000	Design, ICE & submission of temporary foundation for lifting crane tower, 3 nr at GL 11-12, GL 19-20, GL 4-5	0%	01-Aug-13 A	01-Nov-13
01108.STN.BL001	Temporary foundation for lifting crane tower, 3 nr., Approved	0%	02-Nov-13	13-Dec-13
Base Slab				
01108.STN.BS0	Commencement of Structure after excavation & test completed to GL 10~19	0%		29-Nov-13
C - South Approach Tunnel				
C1 Open Cut Tunnels (U=341m; D=340m)				
Preliminaries				
General Items				
01108.OCT.HR0100	Diversiion of ex. AP2- DN1200/ DN1800 drain, ~170mL crossing at ~CH U99187 (near SUA) SE direction	100%	02-Jul-13 A	30-Aug-13 A
01108.OCT.HR0020	Haul road, condition survery, incl. utility survey	100%	02-Jul-13 A	30-Aug-13 A
Ground Investigation, Instrumentation & Monitoring				
01108.OCT.G08-0010	Ground investigation - Boreholes BH1 to BH7, 7 nr.	100%	01-Aug-13 A	30-Aug-13 A
01108.OCT.IM00000	Instrumentation - Install & monitor, GS markers 8+12+8nr & 4 nr on utilities; PZ, 8 nr; etc	100%	01-Aug-13 A	30-Aug-13 A
C1.2 Excavation				
C1.2.2 Temporary Works				
Temporary Works Design & Approval				
01108.OCT.DN09.1.3	Hydraulic Cut Off - No-adverse-comment by RDO/ BD/ GEO	100%	21-Aug-13 A	04-Oct-13
01108.OCT.DN09.1.2	Hydraulic Cut Off - Revision, if required, & Submit to RDO/ BD/ GEO	100%	21-Jun-13 A	22-Aug-13 A
01108.OCT.DN09.1.1	Hydraulic Cut Off - Design, ICE & Submit to MTRC for review	100%	21-Jun-13 A	24-Jun-13 A
01108.OCT.DN06.1.3	Open Cut (CH 98976 to 99222) - Design - No-adverse-comment by RDO/ BD/ GEO	0%	06-Sep-13 A	25-Oct-13
01108.OCT.DN06.1.2	Open Cut (CH 98976 to 99222) - Design Revision, if required, & Submit to RDO/ BD/ GEO	100%	16-Sep-13 A	16-Sep-13 A
01108.OCT.DN06.1.1	Open Cut (CH 98976 to 99222) - Design, ICE & Submit to MTRC for review	100%	21-Jun-13 A	16-Sep-13 A
Dewatering and Observation Wells				



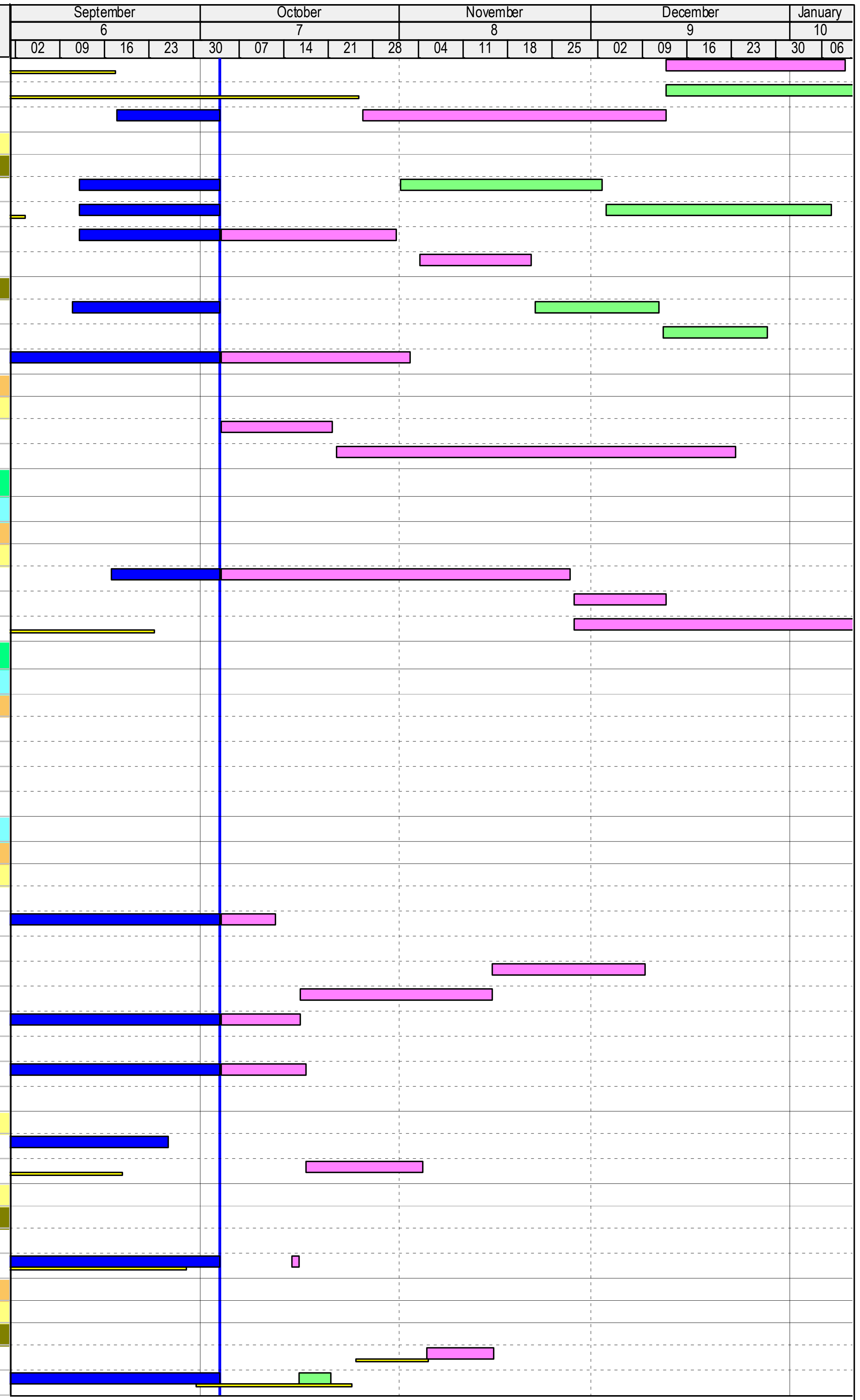
Milestone
Critical Milestone
Critical Remaining Work
Remaining Work
Primary Baseline
Actual Work

Contract 1108
Kai Tak Station and Associated Tunnels

3-Month Rolling Programme (September 2013)

Kaden – Chun Wo Joint Venture

Activity ID	Activity Name	Activity % Complete	Start	Finish
01108.OCT.DW9080t	Ch 98926~99080 Pumping tests	0%	12-Dec-13	09-Jan-14
01108.OCT.DW9185	Ch 99080~99185 Dewatering wells, 21 nr PW19~PW39; Observation wells, 6 nr OW5~OW10	0%	12-Dec-13	17-Feb-14
01108.OCT.DW9080	To Ch 99080 Dewatering, 22 nr PW40~61; Recharge 10 nr RW1~10; Observation, 8 nr OW11~18; Piezometer, 5 nr (3 Rigs)	9%	18-Sep-13 A	12-Dec-13
Sheet Piles				
Water Cut-off Wall at NW Side				
01108.OCT.SP9185w	Ch 99080~99185 Sheet piling, 238 nr - 120 x 18.5m, 25 x 20m, 93 x 21.5m (4720m, 312t, total)	0%	12-Sep-13 A	02-Dec-13
01108.OCT.SP9258w	Ch 99185~99258 Sheet piling, 382nr - 340 x 12.5m, 42 x 15m (4880m, 323t, total)	0%	12-Sep-13 A	07-Jan-14
01108.OCT.SP9080w	Point G to Ch 99080 Sheet piling, 192 nr x 21.5m (4128m, 273t, total)	0%	12-Sep-13 A	31-Oct-13
01108.OCT.SP9081w	Point J to Point D Sheet piling, 136 nr x 21.5m (2924m, 193t, total)	0%	04-Nov-13	21-Nov-13
Water Cut-off Wall at SE Side				
01108.OCT.SP9185e	Ch 99080~99185 Sheet piling, 238 nr x 12.5m (2975m, 197t, total)	0%	11-Sep-13 A	11-Dec-13
01108.OCT.SP9258e	Ch 99185~99258 Sheet piling, 188 nr x 12.5m (2350m, 155t, total)	0%	12-Dec-13	28-Dec-13
01108.OCT.SP9080e	To Ch 99080 Sheet piling, 316 nr - 215 x 12.5, 37 x 15m, 64 x 18.5m (4427m, 293t, total)	0%	16-Aug-13 A	02-Nov-13
C1.2.3 Excavation CH 98975 to CH 99217				
General Site Clearance				
01108.OCT.EX0010	Construct drainge protection system	0%	04-Oct-13	21-Oct-13
01108.OCT.EX0015	General clearance & trim existing ground by +3.5mPD	0%	22-Oct-13	23-Dec-13
C2 Mined Tunnels (U=41m; D=39m)				
C2.1 Excavation				
C2.1.2 Temporary Works and ELS				
Design, Temporary Works Design, Approval, Fabrication & Installation of Tunnel Formwork				
01108.MIT.DN07.1.1	MIT Shaft ELS - Design, ICE & Submit to MTRC for review	0%	17-Sep-13 A	27-Nov-13
01108.MIT.DN07.1.2	MIT Shaft ELS - Revision, if required, & Submit to RDO/ BD/ GEO	0%	28-Nov-13	12-Dec-13
01108.MIT.DN07.2.1	MIT Temporary Support - Design & Method statement, ICE & Submit to MTRC for review	0%	28-Nov-13	01-Feb-14
C3 Cut and Cover Tunnels (U=297m; D=307m)				
Preliminaries				
General Items				
01108.CCT.HR0020	Condition survery, incl. utility survey	100%	02-Jul-13 A	30-Aug-13 A
01108.CCT.HR0010	Erection of hoarding and haul road	100%	02-Jul-13 A	30-Jul-13 A
01108.CCT.HR0030	Relocate existing haul road	100%	01-Aug-13 A	30-Aug-13 A
01108.CCT.HR0040	Trail trench for existing seawall	100%	15-Jul-13 A	30-Aug-13 A
C3.2 Excavation CH 98636 to CH 98866 and CH 98907 to CH 98975				
C3.2.2 Temporary Works and ELS				
Temporary Works Design & Approval				
01108.CCT.DN05.1a.1	CCT Cofferdam (CH 98636 to 98777) for KTND - Design, ICE & Submit to MTRC for review	100%	30-Jul-13 A	30-Jul-13 A
01108.CCT.DN05.1a.3	CCT Cofferdam (CH 98636 to 98777) for KTND - No-adverse-comment by RDO/ BD/ GEO	0%	30-Jul-13 A	12-Oct-13
01108.CCT.DN05.1a.2	CCT Cofferdam (CH 98636 to 98777) for KTND - Revision, if required, & Submit to RDO/ BD/ GEO	100%	30-Jul-13 A	30-Jul-13 A
01108.CCT.DN05.2.3	CCT ELS (CH 98777 to 98976) - Design No-adverse-comment by RDO/ BD/ GEO	0%	15-Nov-13	09-Dec-13
01108.CCT.DN05.2.2	CCT ELS (CH 98777 to 98976) - Design Revision, if required, & Submit to RDO/ BD/ GEO	0%	16-Oct-13	15-Nov-13
01108.CCT.DN05.2.1	CCT ELS (CH 98777 to 98976) - Design, ICE & Submit to MTRC for review	50%	25-Jul-13 A	16-Oct-13
01108.CCT.DN05.1b.1	CCT ELS/ Hydraulic (CH 98636 to 98777) - Design, ICE & Submit to MTRC for review	100%	30-Jul-13 A	30-Jul-13 A
01108.CCT.DN05.1b.3	CCT ELS/ Hydraulic (CH 98636 to 98777) - No-adverse-comment by RDO/ BD/ GEO	70%	20-Aug-13 A	17-Oct-13
01108.CCT.DN05.1b.2	CCT ELS/ Hydraulic (CH 98636 to 98777) - Revision, if required, & Submit to RDO/ BD/ GEO	100%	30-Jul-13 A	20-Aug-13 A
Dewatering and Observation Wells				
01108.CCT.DW0030	Install dewatering wells, 51 nos. and observation wells, 10nr (4 Rigs) (CH 98636 to 98777)	100%	29-Aug-13 A	26-Sep-13 A
01108.CCT.DW0040	Pumping tests (CH 98636 to 98770)	0%	17-Oct-13	04-Nov-13
Sheet Piles				
Partial Open Cut				
01108.CCT.SP0010a	Pre-bored existing seawall for sheet piling, 2 x ~30m horizontal run	100%	02-Jul-13 A	30-Aug-13 A
01108.CCT.SP0020	Sheet piling as cut-off walls, 2x 525nr x 12m L, 2 x 6300m total (2 rigs)	97%	30-Jul-13 A	16-Oct-13
C3.2.3 Earthworks				
Partial Open Cut				
Open Cut from Existing Ground Level to -3.5mPD				
01108.CCT.EX8657c	CH 98636~98657 Excavation to -3.5mPD, 5586 m3	0%	05-Nov-13	15-Nov-13
01108.CCT.EX8636	CH 98636~98866 Clearance & trim ground level to +3.5mPD, 18480 m3	80%	17-Jul-13 A	21-Oct-13



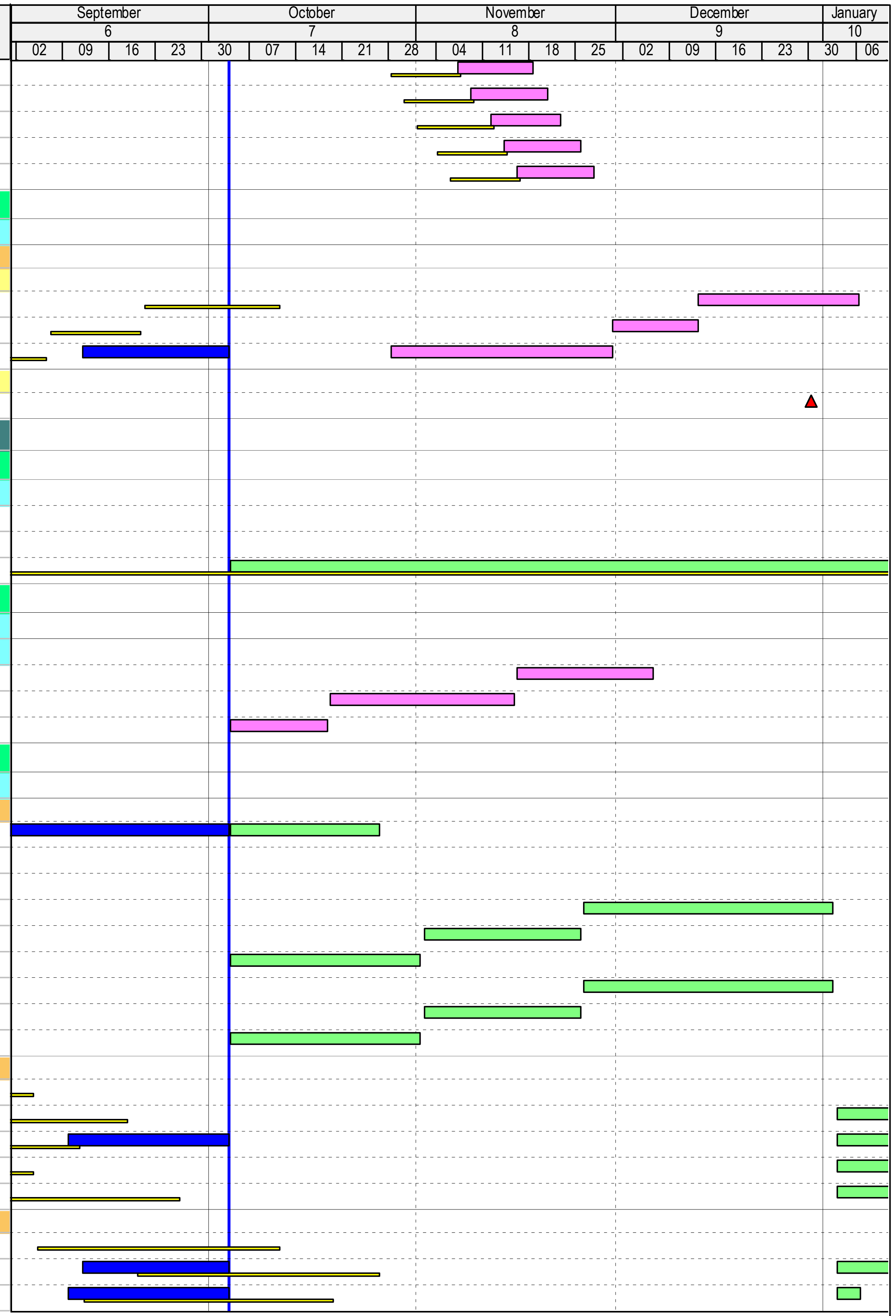
Milestone
Critical Milestone
Critical Remaining Work
Remaining Work
Primary Baseline
Actual Work

Contract 1108
Kai Tak Station and Associated Tunnels

3-Month Rolling Programme (September 2013)

Kaden – Chun Wo Joint Venture

Activity ID	Activity Name	Activity % Complete	Start	Finish
01108.CCT.EX8678c	CH 98657~98678 Excavation to -3.5mPD, 5166 m3 + 420 m3 seawall	0%	07-Nov-13	18-Nov-13
01108.CCT.EX8699c	CH 98678~98699 Excavation to -3.5mPD, 3381 m3 + 2205 m3 seawall	0%	09-Nov-13	20-Nov-13
01108.CCT.EX8720c	CH 98699~98720 Excavation to -3.5mPD, 3381 m3 + 2205 m3 seawall	0%	12-Nov-13	22-Nov-13
01108.CCT.EX8741c	CH 98720~98741 Excavation to -3.5mPD, 3381 m3 + 2205 m3 seawall	0%	14-Nov-13	25-Nov-13
01108.CCT.EX8762c	CH 98741~98762 Excavation to -3.5mPD, 3906 m3 + 1680 m3 seawall	0%	16-Nov-13	27-Nov-13
C4 Stub Tunnels (U=32m; D=32m; R=33m)				
C4.1 Excavation CH 98255 to CH 98290				
Temporary Works				
Temporary Works Design, Review & Approval				
01108.STT.DN04.2.3	Stub Tunnel Interface with C1107 - Design No-adverse-comment by RDO/ BD/ GEO	0%	13-Dec-13	06-Jan-14
01108.STT.DN04.2.2	Stub Tunnel Interface with C1107 - Design Revision, if required, & Submit to RDO/ BD/ GEO	0%	30-Nov-13	13-Dec-13
01108.STT.DN04.2.1	Stub Tunnel Interface with C1107 - Design, ICE & Submit to MTRC for review	30%	12-Sep-13 A	30-Nov-13
Temporay Works - Sheet Pile & ELS				
01108.IF1107.1P	Contract 1107 provide access to Contract 1108 at interface area for ELS works	0%	30-Dec-13	
D - Associated Works				
D3 Instrumentation and Monitoring				
Instrumentation Installation and Monitoring				
01108.AWM.0020	Baseline Reading	100%	01-Aug-13 A	31-Aug-13 A
01108.AWM.0010	Installation of piezometers, inclinometers, ground/ bldg/ utility settlement markers	100%	01-Aug-13 A	31-Aug-13 A
01108.AWM.0030	Regular Monitorings and Submit Monitoring Reports (weekly for 50 months)	0%	04-Oct-13	28-Aug-17
D4 Landscape				
Soft Landscape				
Site Formation Works for Engineers's Accommodation				
01108.AWS.0030	Filling to formation level for Engineer's accommodation, imported natural material, 3544 m3	0%	16-Nov-13	06-Dec-13
01108.AWS.0020	Site formation for Engineer's accommodation - Approval	0%	19-Oct-13	15-Nov-13
01108.AWS.0010	Site formation for Engineer's accommodation - Design, ICE and submission	0%	04-Oct-13	18-Oct-13
D5 Utilities Diversion				
Diversion of Existing Nullah				
Temporary Works & Hydraulic Assessment				
01108.AWD.DNA1.3	KTND Hydraulic Assessment - No-adverse-comment by DSD	50%	08-Aug-13 A	26-Oct-13
01108.AWD.DNA1.2	KTND Hydraulic Assessment - Revision, if required, & Submit to DSD	100%	24-Jul-13 A	24-Jul-13 A
01108.AWD.DNA1.1	KTND Hydraulic Assessment, incl. pre-construction CCTV, as-built survey - Design, ICE & TW & Submit to MTRC for reviev	100%	11-Jul-13 A	24-Jul-13 A
01108.AWD.DN09.6.3	KTND Temp. Suppport for Demolishing Ex. KTN Decking - Design - No-adverse-comment by DSD & RDO/ BD/ GEO	0%	26-Nov-13	02-Jan-14
01108.AWD.DN09.6.2	KTND Temp. Suppport for Demolishing Ex. KTN Decking - Design Revision, if required, & Submit to DSD & RDO/BD/ GEO	0%	02-Nov-13	25-Nov-13
01108.AWD.DN09.6.1	KTND Temp. Suppport for Demolishing Ex. KTN Decking - Design, ICE & TW & Submit to MTRC for review	0%	04-Oct-13	01-Nov-13
01108.AWD.DN09.5.3	KTND Temporary Channel - Design - No-adverse-comment by DSD & RDO/ BD/ GEO	0%	26-Nov-13	02-Jan-14
01108.AWD.DN09.5.2	KTND Temporary Channel - Design Revision, if required, & Submit to DSD & RDO/ BD/ GEO	0%	02-Nov-13	25-Nov-13
01108.AWD.DN09.5.1	KTND Temporary Channel - Design, ICE & TW & Submit to MTRC for review	0%	04-Oct-13	01-Nov-13
North Section				
01108.AWD.0120	Connection section: North/ upstream - Remove concrete surface	100%	01-Aug-13 A	30-Aug-13 A
01108.AWD.0124	Connection section: North/ upstream - Remove saw-cut precast slab and beam, 140 pieces	0%	03-Jan-14	17-Feb-14
01108.AWD.0122	Connection section: North/ upstream - Saw-cut precast slab and beam, 140 pieces	15%	10-Sep-13 A	11-Feb-14
01108.AWD.0110	North section across haul road : Concrete lining with concrete pipes & shotcrete surfaces, 24mL x 36.4mW x 0.4mT	0%	03-Jan-14	03-Feb-14
01108.AWD.0100	North section: Open cut excavation, 205mL x 36.4mW x ~4mD, 25750 m3	0%	03-Jan-14	27-Feb-14
South Section				
01108.AWD.0220	Connection section: South/ downstream - Remove concrete surface	100%	01-Aug-13 A	30-Aug-13 A
01108.AWD.0224	Connection section: South/ downstream - Remove saw-cut precast slab and beam, 84 pieces	15%	12-Sep-13 A	05-Feb-14
01108.AWD.0222	Connection section: South/ downstream - Saw-cut precast slab and beam, 84 pieces	90%	10-Sep-13 A	06-Jan-14



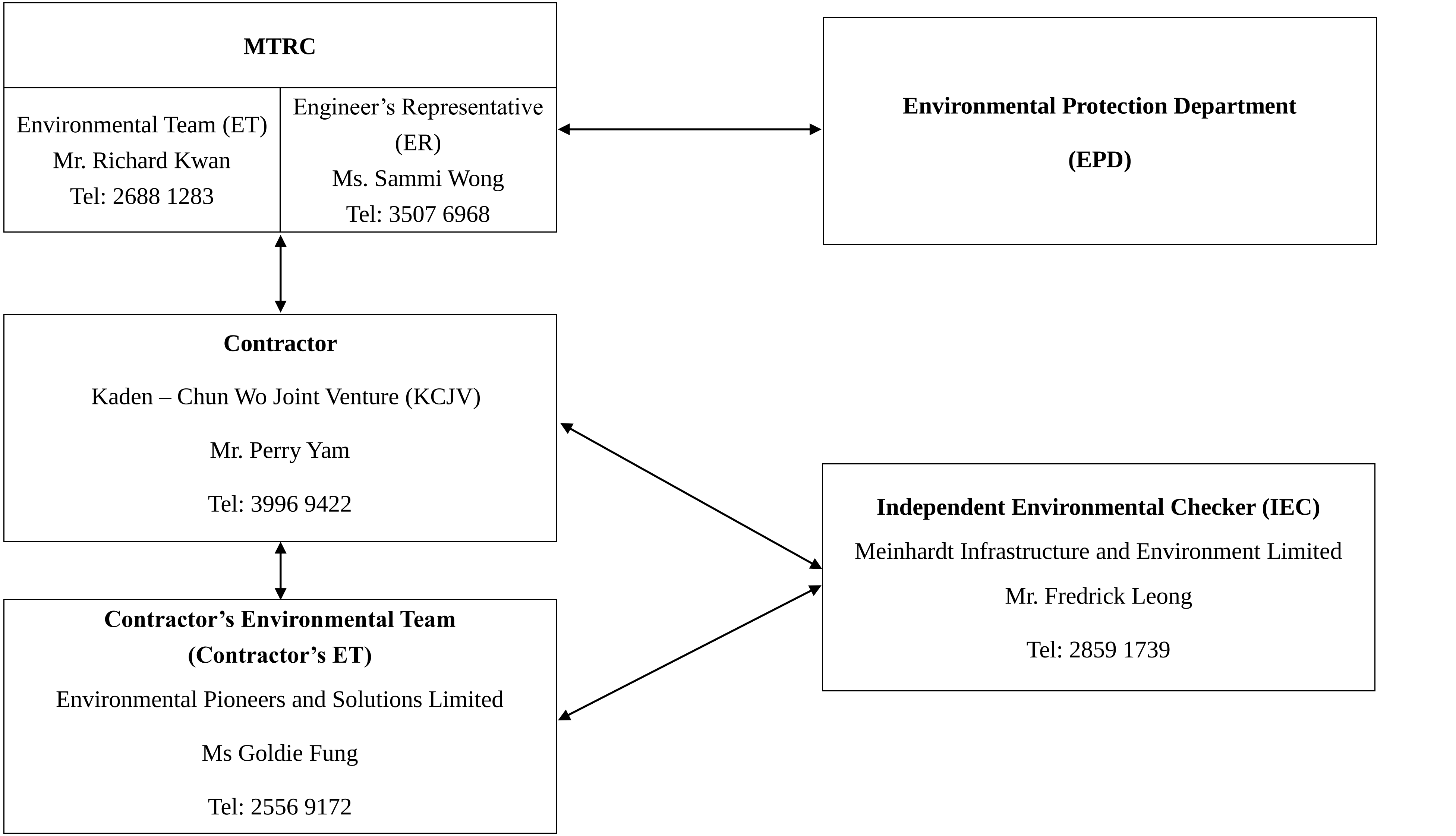
Milestone
Critical Milestone
Critical Remaining Work
Remaining Work
Primary Baseline
Actual Work

Contract 1108
Kai Tak Station and Associated Tunnels

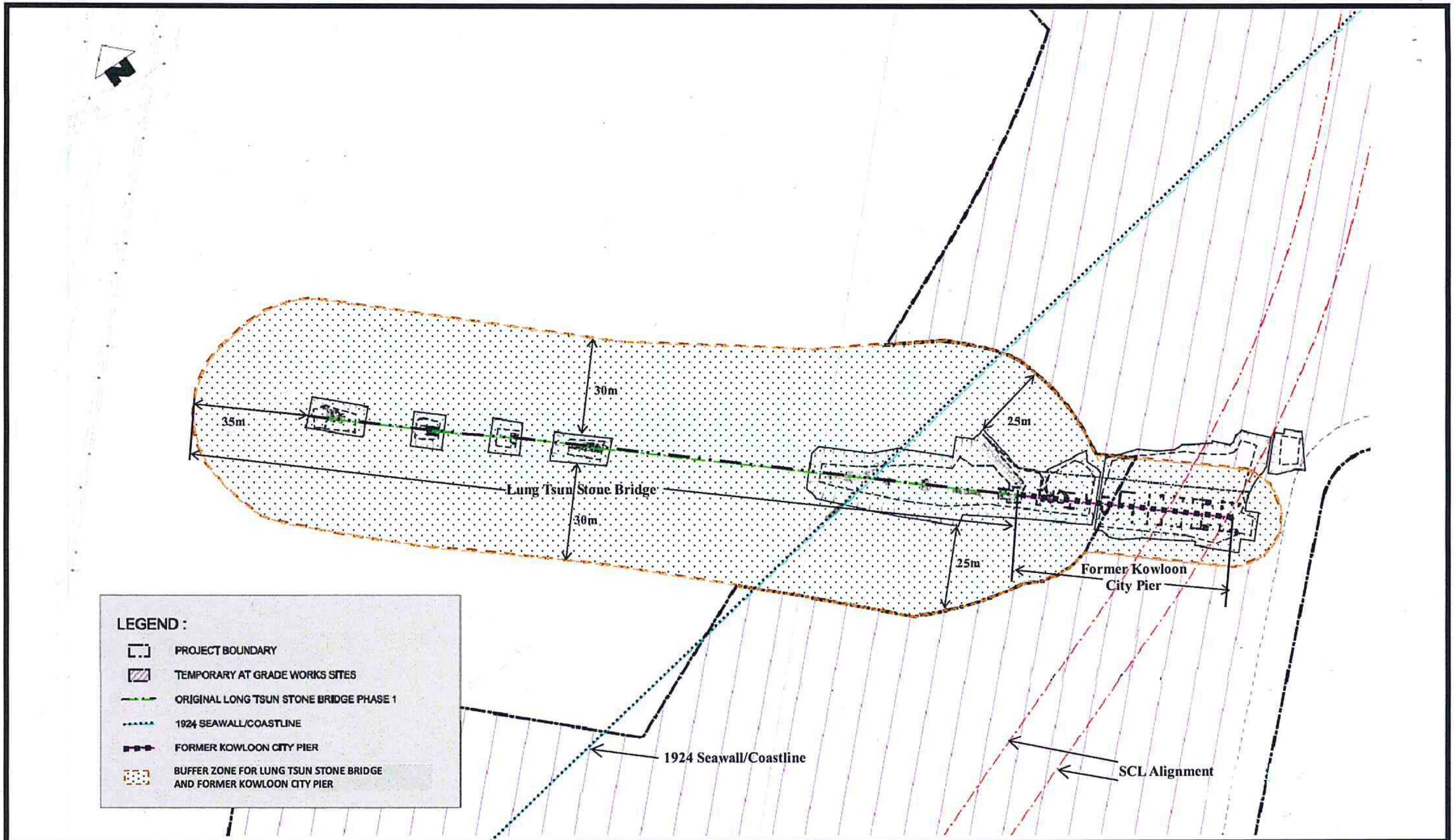
3-Month Rolling Programme (September 2013)

Kaden – Chun Wo Joint Venture

Appendix C –Project Organization Chart & Contact Details


MTRC
Environmental Team (ET)
Mr. Richard Kwan
Tel: 2688 1283
Engineer's Representative (ER)
Ms. Sammi Wong
Tel: 3507 6968
Environmental Protection Department (EPD)
Contractor
Kaden – Chun Wo Joint Venture (KCJV)
Mr. Perry Yam
Tel: 3996 9422
Independent Environmental Checker (IEC)
Meinhardt Infrastructure and Environment Limited
Mr. Fredrick Leong
Tel: 2859 1739
Contractor's Environmental Team (Contractor's ET)
Environmental Pioneers and Solutions Limited
Ms Goldie Fung
Tel: 2556 9172
Line of communication

Appendix D – Buffer Zone for Lung Tsun Stone Bridge & Former Kowloon City Pier



Project Title 工程名稱	Shatin to Central Link (SCL) - Tai Wai to Hung Hom Section(TAW-HUH) 沙田至中環綫 - 大圍至紅磡段	Environmental Permit No.: EP-438/2012/D 環境許可證編號：EP-438/2012/D
Figure 6 圖六	Buffer Zone from the Boundary of Lung Tsun Stone Bridge 龍津石橋界線之緩衝區 [This figure was prepared based on Figure 4.3 of the SCL(TAW-HUH) EIA Report (No.: AEIAR-167/2012)] [本圖是根據沙田至中環綫-大圍至紅磡段環境影響評估報告(編號: AEIAR-167/2012)中圖 4.3 編制]	

EIAC EPD

Appendix E – Event/Action Plan for landscape & Visual During Construction Stage

Event / Action Plan for Landscape and Visual during Construction Stage

Action Level	ET	IEC	ER	Contractor
Non-conformity on one occasion	1) Inform the Contractor, the IEC and the ER 2) Discuss remedial actions with the IEC, the ER and the Contractor 3) Monitor remedial actions until rectification has been completed	1) Check inspection report 2) Check the Contractor's working method 3) Discuss with the ET, ER and the Contractor on possible remedial measures 4) Advise the ER on effectiveness of proposed remedial measures.	1) Confirm receipt of notification of non-conformity in writing 2) Review and agree on the remedial measures proposed by the Contractor 3) Supervise implementation of remedial measures	1) Identify Source and investigate the non-conformity 2) Implement remedial measures 3) Amend working methods agreed with the ER as appropriate 4) Rectify damage and undertake any necessary replacement
Repeated Non-conformity	1) Identify Source 2) Inform the Contractor, the IEC and the ER 3) Increase inspection frequency 4) Discuss remedial actions with the IEC, the ER and the Contractor 5) Monitor remedial actions until rectification has been completed 6) If non-conformity stops, cease additional monitoring	1) Check inspection report 2) Check the Contractor's working method 3) Discuss with the ET and the Contractor on possible remedial measures 4) Advise the ER on effectiveness of proposed remedial measures	1) Notify the Contractor 2) In consultation with the ET and IEC, agree with the Contractor on the remedial measures to be implemented 3) Supervise implementation of remedial measures.	1) Identify Source and investigate the non-conformity 2) Implement remedial measures 3) Amend working methods agreed with the ER as appropriate 4) Rectify damage and undertake any necessary replacement. Stop relevant portion of works as determined by the ER until the non-conformity is abated.

Appendix F – Waste Flow Table

Monthly Summary Waste Flow Table for _2013__ (year)

Month	Actual Quantities of Inert C&D Materials Generated Monthly						Actual Quantities of Non-inert C&D Wastes Generated Monthly				
	Total Quantity Generated	Hard Rocks & Broken Concrete	Reused in the Contract	Reused in other Projects	Disposed as Public Fill		Metals	Paper / cardboard packaging	Plastics	Chemical Waste	Others (general refuse)
					1108A*	CEDD#					
	(in ‘000m^3)	(in ‘000m^3)	(in ‘000m^3)	(in ‘000m^3)	(in ‘000m^3)		(in ‘000kg)	(in ‘000kg)	(in ‘000kg)	(in ‘000kg)	(in ‘000m^3)
Jan	--	--	--	--	--	--	--	--	--	--	--
Feb	--	--	--	--	--	--	--	--	--	--	--
Mar	--	--	--	--	--	--	--	--	--	--	--
Apr	0	0	0	0	0	0	0	0	0	0	0
May	0	0	0	0	0	0	0	0	0	0	0
June	0.376	0	0	0	0.376	0	0	0	0	0	0
Sub-total	0.376	0	0	0	0.376	0	0	0	0	0	0
July	7.256	0	0	0	7.256	0	0	0	0	0	2.370
Aug	22.400	0	0	0	22.400	0	0	0	0	0	0.018
Sept	19.754	0	0	0	19.754	0	0	0	0	0	0.024
Oct											
Nov											
Dec											
Total	49.786	0	0	0	49.786		0	0	0	0	2.412

Appendix G – Updated Environmental Mitigation Implementation Schedule

Environmental Mitigation Implementation Schedule –SCL Contract 1108 (Kai Tak Station and Associated Tunnels)

EIA Ref.	EM&A Log Ref	Recommended Mitigation Measure	Objectives of the Recommended Measures & Main Concerns to address	Who to implement the measures?	Location of the measures	When to implement the measures?	Implementation Status
Cultural Heritage Impact (Construction and Operational Phase)							
S4.9	CH4	Maintain a buffer distance as shown in **Appendix D**. A 1.8-2.2m vertical separation distance shall be maintained between the top of tunnel and the piles of the Former Kowloon City Pier.	Reserve sufficient area for necessary archaeological conservation and display works for Lung Tsun Stone Bridge in the future. Avoid direct impact on the Lung Tsun Stone Bridge and the Former Kowloon City Pier.	MTR Corporation Contractor	Lung Tsun Stone Bridge & Former Kowloon City Pier.	During the Construction of the tunnel section at Kai Tak	✔
Landscape & Visual (Construction Phase)							
S6.9.3	LV1	The following good site practices and measures for minimisation and avoidance of potential impacts are recommended: <u>Re-use of Existing Soil</u> • For soil conservation, existing topsoil shall be re-used where possible for new planting areas within the project. The construction program shall consider using the soil removed from one phase for backfilling another. Suitable storage ground, gathering ground and mixing ground may be set up on-site as necessary.	Minimize visual & landscape impact	Contractor	Within Project Site	Construction stage	✔

EIA Ref.	EM&A Log Ref	Recommended Mitigation Measure	Objectives of the Recommended Measures & Main Concerns to address	Who to implement the measures?	Location of the measures	When to implement the measures?	Implementation Status
		No-intrusion Zone • To maximize protection to existing trees, ground vegetation and the associated under storey habitats, construction contracts may designate "No-intrusion Zone" to various areas within the site boundary with rigid and durable fencing for each individual no-intrusion zone. The contractor should closely monitor and restrict the site working staff from entering the "no-intrusion zone", even for indirect construction activities and storage of equipment. Protection of Retained Trees • All retained trees should be recorded photographically at the commencement of the Contract, and carefully protected during the construction period. Detailed tree protection specification shall be allowed and included in the Contract Specification, which specifying the tree protection requirement, submission and approval system, and the tree monitoring system. • The Contractor shall be required to submit, for approval, a detailed working method statement for the protection of trees prior to undertaking any works adjacent to all retained trees,					
S6.12	LV12	Decorative Hoarding Erection of decorative screen during construction stage to screen	Minimize visual & landscape impact	Contractor	Within Project Site	Detailed design and	N/A

EIA Ref.	EM&A Log Ref	Recommended Mitigation Measure	Objectives of the Recommended Measures & Main Concerns to address	Who to implement the measures?	Location of the measures	When to implement the measures?	Implementation Status
		off undesirable views of the construction site for visual and landscape sensitive areas. Hoarding should be designed to be compatible with the existing urban context <u>Management of facilities on work sites</u> • To provide proper management of the facilities on the sites, give control on the height and disposition/ arrangement of all facilities on the works site to minimize visual impact to adjacent VSRs. <u>Tree Transplanting</u> • Trees of high to medium survival rate would be affected by the works shall be transplanted where possible and practicable. Tree transplanting proposal including final location for transplanted trees shall be submitted separately to seek relevant government department's approval, in accordance with ETWB TCW No 3/2006.				construction stage	
Air Quality (Construction Phase)							
/	A1	<u>Emission from Vehicles and Plants</u> • All vehicles shall be shut down in intermittent use. • Only well-maintained plant should be operated on-site and plant should be serviced regularly to avoid emission of black smoke. • All diesel fuelled construction plant within the works areas shall be	Reduce air pollution emission from construction vehicles and plants	Contractor	All construction sites	Construction stage	*

EIA Ref.	EM&A Log Ref	Recommended Mitigation Measure	Objectives of the Recommended Measures & Main Concerns to address	Who to implement the measures?	Location of the measures	When to implement the measures?	Implementation Status
		powered by ultra low sulphur diesel fuel (ULSD).					
/	A2	Open burning shall be prohibited.	Reduce air pollution emission from work site	Contractor	All construction sites	Construction stage	✔
Construction Dust Impact							
S7.6.5	D1	The contractor shall follow the procedures and requirements given in the Air Pollution Control (Construction Dust) Regulation	Minimize dust impact at the nearby sensitive receivers	Contractor	All construction sites	Construction stage	✔
S7.6.5	D2	Mitigation measures in form of regular watering under a good site practice should be adopted. Watering once per hour on exposed worksites and haul road in the Kowloon area should be conducted to achieve dust removal efficiencies of 91.7%. While the above watering frequencies are to be followed, the extent of watering may vary depending on actual site conditions but should be sufficient to maintain an equivalent intensity of no less than 1.8 L/m^2 to achieve the dust removal efficiency.	Minimize dust impact at the nearby sensitive receivers	Contractor	All construction sites	Construction stage	*
S7.6.5	D3	• Proper watering of exposed spoil should be undertaken throughout the construction phase: • Any excavated or stockpile of dusty material should be covered entirely by impervious sheeting or sprayed with water to maintain the entire surface wet and then removed or backfilled or reinstated where practicable within 24 hours of the excavation or unloading; • Any dusty materials remaining after a stockpile is removed should be wetted with water and cleared from the surface of roads; • A stockpile of dusty material should not be extend beyond the	Minimize dust impact at the nearby sensitive receivers	Contractor	All construction sites	Construction stage	*

EIA Ref.	EM&A Log Ref	Recommended Mitigation Measure	Objectives of the Recommended Measures & Main Concerns to address	Who to implement the measures?	Location of the measures	When to implement the measures?	Implementation Status
		pedestrian barriers, fencing or traffic cones. • The load of dusty materials on a vehicle leaving a construction site should be covered entirely by impervious sheeting to ensure that the dusty materials do not leak from the vehicle; • Where practicable, vehicle washing facilities with high pressure water jet should be provided at every discernible or designated vehicle exit point. The area where vehicle washing takes place and the road section between the washing facilities and the exit point should be paved with concrete, bituminous materials or hardcores; • When there are open excavation and reinstatement works, hoarding of not less than 2.4m high should be provided and properly maintained as far as practicable along the site boundary with provision for public crossing; Good site practice shall also be adopted by the Contractor to ensure the conditions of the hoardings are properly maintained throughout the construction period; • The portion of any road leading only to construction site that is within 30m of a vehicle entrance or exit should be kept clear of dusty materials; • Surfaces where any pneumatic or power-driven drilling, cutting, polishing or other mechanical breaking operation takes place should be sprayed with water or a dust suppression chemical continuously;					

EIA Ref.	EM&A Log Ref	Recommended Mitigation Measure	Objectives of the Recommended Measures & Main Concerns to address	Who to implement the measures?	Location of the measures	When to implement the measures?	Implementation Status
		• Any area that involves demolition activities should be sprayed with water or a dust suppression chemical immediately prior to, during and immediately after the activities so as to maintain the entire surface wet; • Where a scaffolding is erected around the perimeter of a building under construction, effective dust screens, sheeting or netting should be provided to enclose the scaffolding from the ground floor level of the building, or a canopy should be provided from the first floor level up to the highest level of the scaffolding; • Any skip hoist for material transport should be totally enclosed by impervious sheeting; • Every stock of more than 20 bags of cement or dry pulverised fuel ash (PFA) should be covered entirely by impervious sheeting or placed in an area sheltered on the top and the 3 sides; • Cement or dry PFA delivered in bulk should be stored in a closed silo fitted with an audible high level alarm which is interlocked with the material filling line and no overfilling is allowed; Loading, unloading, transfer, handling or storage of bulk cement or dry PFA should be carried out in a totally enclosed system or facility, and any vent or exhaust should be fitted with an effective fabric filter or equivalent air pollution control system; and • Exposed earth should be properly treated by compaction, turfing,					

EIA Ref.	EM&A Log Ref	Recommended Mitigation Measure	Objectives of the Recommended Measures & Main Concerns to address	Who to implement the measures?	Location of the measures	When to implement the measures?	Implementation Status
		hydroseeding, vegetation planting or sealing with latex, vinyl, bitumen, shotcrete or other suitable surface stabiliser within six months after the last construction activity on the construction site or part of the construction site where the exposed earth lies.					
Construction Noise (Airborne)							
S8.3.6	N1	Implement the following good site practices: • only well-maintained plant should be operated on-site and plant should be serviced regularly during the construction programme; • machines and plant (such as trucks, cranes) that may be in intermittent use should be shut down between work periods or should be throttled down to a minimum; • plant known to emit noise strongly in one direction, where possible, be orientated so that the noise is directed away from nearby NSRs; • silencers or mufflers on construction equipment should be properly fitted and maintained during the construction works; • mobile plant should be sited as far away from NSRs as possible and practicable; • material stockpiles, mobile container site office and other structures should be effectively utilised, where practicable, to screen noise from on-site construction activities.	Control construction airborne noise	Contractor	All construction sites	Construction stage	✔
S8.3.6	N2	Install temporary hoarding located on the site boundaries between noisy	Reduce the construction noise	Contractor	All construction sites	Construction	✔

EIA Ref.	EM&A Log Ref	Recommended Mitigation Measure	Objectives of the Recommended Measures & Main Concerns to address	Who to implement the measures?	Location of the measures	When to implement the measures?	Implementation Status
		construction activities and NSRs. The conditions of the hoardings shall be properly maintained throughout the construction period.	levels at low-level zone of NSRs through partial screening.			stage	
S8.3.6	N3	Install movable noise barriers (typical design is wooden framed barrier with a small-cantilevered on a skid footing with 25mm thick internal sound absorptive lining), acoustic mat or full enclosure, screen the noisy plants including air compressor, generators and saw.	Screen the noisy plant items to be used at all construction sites	Contractor	All construction sites where practicable	Construction stage	✔
S8.3.6	N4	Use “Quiet plants”	Reduce the noise levels of plant items	Contractor	All construction sites where practicable	Construction stage	✔
S8.3.6	N5	Sequencing operation of construction plants where practicable.	Operate sequentially within the same work site to reduce the construction airborne noise	Contractor	All construction sites where practicable	Construction stage	✔
Water Quality (Construction Phase)							
S10.7.1	W1	In accordance with the Practice Noise for Professional Persons on Construction Site Drainage, Environmental Protection Department, 1994 (ProPECC PN1/94), construction phase mitigation measures shall include the following: <u>Construction Runoff and Site Drainage</u> • At the start of site establishment (including the barging facilities), perimeter cut-off drains to direct off-site water around the site	To minimize water quality impact from construction site runoff and general construction activities	Contractor	All construction sites where practicable	Construction stage	*

EIA Ref.	EM&A Log Ref	Recommended Mitigation Measure	Objectives of the Recommended Measures & Main Concerns to address	Who to implement the measures?	Location of the measures	When to implement the measures?	Implementation Status
		should be constructed with internal drainage works and erosion and sedimentation control facilities implemented. Channels (both temporary and permanent drainage pipes and culverts), earth bunds or sand bag barriers should be provided on site to direct stormwater to silt removal facilities. The design of the temporary on-site drainage system will be undertaken by the contractor prior to the commencement of construction. • The dikes or embankments for flood protection should be implemented around the boundaries of earthwork areas. Temporary ditches should be provided to facilitate the runoff discharge into an appropriate watercourse, through a site/sediment trap. The sediment/silt traps should be incorporated in the permanent drainage channels to enhance deposition rates • The design of efficient silt removal facilities should be based on the guidelines in Appendix A1 of ProPECC PN 1/94, which states that the retention time for silt/sand traps should be 5 minutes under maximum flow conditions. Sizes may vary depending upon the flow rate, but for a flow rate of 0.1 m^3/s a sedimentation basin of $30m^3$ would be required and for a flow rate of 0.5 m^3/s the basin would be 150 m^3. The detailed design of the sand/silt traps shall be undertaken by the contractor prior to the commencement of construction.					

EIA Ref.	EM&A Log Ref	Recommended Mitigation Measure	Objectives of the Recommended Measures & Main Concerns to address	Who to implement the measures?	Location of the measures	When to implement the measures?	Implementation Status
		• All exposed earth areas should be completed and vegetated as soon as possible after earthworks have been completed, or alternatively, within 14 days of the cessation of earthworks where practicable. Exposed slope surfaces should be covered by tarpaulin or other means. • The overall slope of the site should be kept to a minimum to reduce the erosive potential of surface water flows, and all traffic areas and access roads protected by coarse stone ballast. An additional advantage accruing from the use of crushed stone is the positive traction gained during prolonged periods of inclement weather and the reduction of surface sheet flows. • All drainage facilities and erosion and sediment control structures should be regularly inspected and maintained to ensure proper and efficient operation at all times and particularly following rainstorms. Deposited silt and grit should be removed regularly and disposed of by spreading evenly over stable, vegetated areas. • Measures should be taken to minimise the ingress of site drainage into excavations. If the excavation of trenches in wet periods is necessary, they should be dug and backfilled in short sections wherever practicable. Water pumped out from trenches or foundation excavations should be discharged into storm drains via silt removal facilities.					

EIA Ref.	EM&A Log Ref	Recommended Mitigation Measure	Objectives of the Recommended Measures & Main Concerns to address	Who to implement the measures?	Location of the measures	When to implement the measures?	Implementation Status
		• Open stockpiles of construction materials (for example, aggregates, sand and fill material) of more than $50m^3$ should be covered with tarpaulin or similar fabric during rainstorms. Measures should be taken to prevent the washing away of construction materials, soil, silt or debris into any drainage system. • Manholes (including newly constructed ones) should always be adequately covered and temporarily sealed so as to prevent silt, construction materials or debris being washed into the drainage system and storm runoff being directed into foul sewers. • Precautions be taken at any time of year when rainstorms are likely, actions to be taken when a rainstorm is imminent or forecasted, and actions to be taken during or after rainstorms are summarised in Appendix A2 of ProPECC PN 1/94. Particular attention should be paid to the control of silty surface runoff during storm events, especially for areas located near steep slopes. • All vehicles and plant should be cleaned before leaving a construction site to ensure no earth, mud, debris and the like is deposited by them on roads. An adequately designed and sited wheel washing facilities should be provided at every construction site exit where practicable. Wash-water should have sand and silt settled out and removed at least on a weekly basis to ensure the					

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		continued efficiency of the process. The section of access road leading to, and exiting from, the wheel-wash bay to the public road should be paved with sufficient backfall toward the wheel-wash bay to prevent vehicle tracking of soil and silty water to public roads and drains. • Oil interceptors should be provided in the drainage system downstream of any oil/fuel pollution sources. The oil interceptors should be emptied and cleaned regularly to prevent the release of oil and grease into the storm water drainage system after accidental spillage. A bypass should be provided for the oil interceptors to prevent flushing during heavy rain. • Construction solid waste, debris and rubbish on site should be collected, handled and disposed of properly to avoid water quality impacts. • All fuel tanks and storage areas should be provided with locks and sited on sealed areas, within bunds of a capacity equal to 110% of the storage capacity of the largest tank to prevent spilled fuel oils from reaching water sensitive receivers nearby. • All the earth works involving should be conducted sequentially to limit the amount of construction runoff generated from exposed areas during the wet season (April to September) as far as practicable.					

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		• Adopt best management practices					
S10.7.1	W2	Tunnelling Works • Cut-&-cover/ open cut tunnelling work should be conducted sequentially to limit the amount of construction runoff generated from exposed areas during the wet season (April to September) as far as practicable. • Uncontaminated discharge should pass through sedimentation tanks prior to off-site discharge • The wastewater with a high concentration of SS should be treated (e.g. by sedimentation tanks with sufficient retention time) before discharge. Oil interceptors would also be required to remove the oil, lubricants and grease from the wastewater. • Direct discharge of the bentonite slurry (as a result of D-wall and bored tunnelling construction) is not allowed. It should be reconditioned and reused wherever practicable. Temporary storage locations (typically a properly closed warehouse) should be provided on site for any unused bentonite that needs to be transported away after all the related construction activities are completed. The requirements in ProPECC PN 1/94 should be adhered to in the handling and disposal of bentonite slurries.	To minimize construction water quality impact from tunneling works	Contractor	All tunneling portion	Construction stage	N/A
S10.7.1	W3	Sewage Effluent • Portable chemical toilets and sewage holding tanks are	To minimize water quality from sewage effluent	Contractor	All construction sites where practicable	Construction stage	✔

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		recommended for handling the construction sewage generated by the workforce. A licensed contractor should be employed to provide appropriate and adequate portable toilets and be responsible for appropriate disposal and maintenance.					
S10.7.1	W4	Groundwater from Contaminated Area: • No direct discharge of groundwater from contaminated areas should be adopted. Prior to the excavation works within these potentially contaminated areas, the groundwater quality should be reviewed with reference to the site investigation data in this EIA report for compliance to the Technical Memorandum on Standards for Effluents Discharged into Drainage on Sewerage Systems, Inland and Coastal Waters (TM-Water) and the existence of prohibited substance should be confirmed. The review results should be submitted to EPD for examination If the review results indicated that the groundwater to be generated from the excavation works would be contaminated; the contaminated groundwater should be either properly treated in compliance with the requirements of the TM-Water or properly recharged into the ground. • If wastewater treatment is deployed, the wastewater treatment unit shall deploy suitable treatment process (e.g. oil interceptor / activated carbon) to reduce the pollution level to an acceptable	To minimize groundwater quality impact from contaminated area	Contractor	Excavation areas where contamination is found	Construction stage	N/A

EIA Ref.	EM&A Log Ref	Recommended Mitigation Measure	Objectives of the Recommended Measures & Main Concerns to address	Who to implement the measures?	Location of the measures	When to implement the measures?	Implementation Status
		standard and remove any prohibited substances (e.g. TPH) to undetectable range. All treated effluent from wastewater treatment plant shall meet the requirements as stated in TM-Water and should be discharged into the foul sewers. • If groundwater recharging wells are deployed, recharging wells should be installed as appropriate for recharging the contaminated groundwater back into the ground. The recharging wells should be selected at places where the groundwater quality will not be affected by the recharge operation as indicated in the Section 2.3 of TM-Water. The baseline groundwater quality shall be determined prior to the selection of the recharge wells, and submit a working plan (including the laboratory analytical results showing the quality of groundwater at the proposed recharge location(s) as well as the pollutant levels of groundwater to be recharged) to EPD for agreement. Pollution levels of groundwater to be recharged shall not be higher than pollutant levels of ambient groundwater at the recharge well. Prior to recharge, any prohibited substances such as TPH products should be removed as necessary by installing the petrol interceptor. The Contractor should apply for a discharge licence under the WPCO through the Regional Office of EPD for groundwater recharge operation or discharge of treated groundwater.					

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S10.7.1	W7	In order to prevent accidental spillage of chemicals, the following is recommended: • All the tanks, containers, storage area should be bunded and the locations should be locked as far as possible from the sensitive watercourse and stormwater drains. • The Contractor should register as a chemical waste producer if chemical wastes would be generated. Storage of chemical waste arising from the construction activities should be stored with suitable labels and warnings. • Disposal of chemical wastes should be conducted in compliance with the requirements as stated in the Waste disposal (Chemical Waste) (General) Regulation.	To minimize water quality impact from accidental spillage	Contractor	All construction sites where practicable	Construction stage	*
Waste Management (Construction Waste)							
S11.4.1.1	WM1	On-site sorting of C&D material • Geological assessment should be carried out by competent persons on site during excavation to identify materials which are not suitable to use as aggregate in structural concrete (e.g. volcanic rock, Aplite dyke rock, etc). Volcanic rock and Aplite dyke rock should be separated at the source sites as far as practicable and stored at designated stockpile areas preventing them from delivering to crushing facilities. The crushing plant operator should also be reminded to set up measures to prevent unsuitable rock	Separation of unsuitable rock from ending up at concrete batching plants and be turned into concrete for structural use	Contractor	All construction sites	Construction stage	✔

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		from ended up at concrete batching plants and be turned into concrete for structural use Details regarding control measures at source site and crushing facilities should be submitted by the Contractors for the Engineer to review and agree. In addition, site records should also be kept for the types of rock materials excavated and the traceability of delivery will be ensured with the implementation of Trip Ticket System and enforced by site supervisory staff as stipulated under DEVB TC(W) No. 6/2010 for tracking of the correct delivery to the rock crushing facilities for processing into aggregates. Alternative disposal option for the reuse of volcanic rock and Aplite Dyke rock, etc should also be explored.					
S11.5.1	WM2	Construction and Demolition Material • Maintain temporary stockpiles and reuse excavated fill material for backfilling and reinstatement; • Carry out on-site sorting; • Make provisions in the Contract documents to allow and promote the use of recycled aggregates where appropriate; • Adopt 'Selective Demolition' technique to demolish the existing structures and facilities with a view to recovering broken concrete effectively for recycling purpose, where possible; • Implement a trip-ticket system for each works contract to ensure	Good site practice to minimize the waste generation and recycle the C&D materials as far as practicable so as to reduce the amount for final disposal	Contractor	All construction sites	Construction stage	✔

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		that the disposal of C&D materials are properly documented and verified; and • Implement an enhanced Waste Management Plan similar to ETWBTC (Works) No. 19/2005 – "Environmental Management on Construction Sites" to encourage on-site sorting of C&D materials and to minimize their generation during the course of construction. • In addition, disposal of the C&D materials onto any sensitive locations such as agricultural lands, etc. should be avoided. The Contractor shall propose the final disposal sites to the Project Proponent and get its approval before implementation					
S11.5.1	WM3	C&D Waste • Standard formwork or pre-fabrication should be used as far as practicable in order to minimise the arising of C&D materials. The use of more durable formwork or plastic facing for the construction works should be considered Use of wooden hoardings should not be used, as in other projects. Metal hoarding should be used to enhance the possibility of recycling. The purchasing of construction materials will be carefully planned in order to avoid over ordering and wastage. • The Contractor should recycle as much of the C&D materials as possible on-site. Public fill and C&D waste should be segregated and stored in different containers or skips to enhance reuse or	Good site practice to minimize the waste generation and recycle the C&D materials as far as practicable so as to reduce the amount for final disposal	Contractor	All construction sites	Construction stage	✔

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		recycling of materials and their proper disposal. Where practicable, concrete and masonry can be crushed and used as fill. Steel reinforcement bar can be used by scrap steel mills. Different areas of the sites should be considered for such segregation and storage.					
S11.5.1	WM4	General Refuse • General refuse generated on-site should be stored in enclosed bins or compaction units separately from construction and chemical wastes. • A reputable waste collector should be employed by the Contractor to remove general refuse from the site, separately from construction and chemical wastes, on a daily basis to minimize odour, pest and litter impacts. Burning of refuse on construction sites is prohibited by law. • Aluminium cans are often recovered from the waste stream by individual collectors if they are segregated and made easily accessible. Separate labelled bins for their deposit should be provided if feasible. • Office wastes can be reduced through the recycling of paper if volumes are large enough to warrant collection. Participation in a local collection scheme should be considered by the Contractor.	Minimize production of the general refuse and avoid odour, pest and litter impacts	Contractor	All construction sites	Construction stage	✔
S11.5.1	WM6	Land-based and Marine-based Sediment	To control pollution due to	Contractor	Within Project Site	Construction	N/A

EIA Ref.	EM&A Log Ref	Recommended Mitigation Measure	Objectives of the Recommended Measures & Main Concerns to address	Who to implement the measures?	Location of the measures	When to implement the measures?	Implementation Status
		• All construction plant and equipment shall be designed and maintained to minimize the risk of silt, sediments, contaminants or other pollutants being released into the water column or deposited in the locations other than designated location; • All vessels shall be sized such that adequate draft is maintained between vessels and the sea bed at all states of the tide to ensure that undue turbidity is not generated by turbulence from vessel movement or propeller wash; • Before moving the vessels which are used for transporting dredged material, excess material shall be cleaned from the decks and exposed fittings of vessels and the excess materials shall never be dumped into the sea except at the approved locations; • Adequate freeboard shall be maintained on barges to ensure that decks are not washed by wave action. • The Contractors shall monitor all vessels transporting material to ensure that no dumping outside the approved location takes place. The Contractor shall keep and produce logs and other records to demonstrate compliance and that journeys are consistent with designated locations and copies of such records shall be submitted to the engineers; • The Contractors shall comply with the conditions in the dumping licence.	marine sediment		Area	Stage	

EIA Ref.	EM&A Log Ref	Recommended Mitigation Measure	Objectives of the Recommended Measures & Main Concerns to address	Who to implement the measures?	Location of the measures	When to implement the measures?	Implementation Status
		• All bottom dumping vessels (Hopper barges) shall be fitted with tight fittings seals to their bottom openings to prevent leakage of material; • The material shall be placed into the disposal pit by bottom dumping; • Contaminated marine mud shall be transported by spit barge of not less than 750m ^{3} capacity and capable of rapid opening and discharge at the disposal site; • Discharge shall be undertaken rapidly and the hoppers shall be closed immediately. Material adhering to the sides of the hopper shall not be washed out of the hopper and the hopper shall remain closed until the barge returns to the disposal site. • For Type 3 special disposal treatment, sealing of contaminant with geosynthetic containment before dropping into designated mud pit would be a possible arrangement. A geosynthetic containment method is a method whereby the sediments are sealed in geosynthetic containers and, the containers would be dropped into the designated contaminated mud pit where they would be covered by further mud disposal and later by the mud pit capping at the disposal site, thereby fulfil confined mud disposal.					
S11.5.1	WM7	Chemical Waste • Chemical waste that is produced, as defined by Schedule 1 of the	Control the chemical waste and ensure proper storage,	Contractor	All construction sites	Construction stage	✔

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		Waste Disposal (Chemical Waste) (General) Regulation, should be handled in accordance with the Code of Practice on the Packaging, Labelling and Storage of Chemical Wastes. • Containers used for the storage of chemical wastes should be suitable for the substance they are holding, resistant to corrosion, maintained in a good condition, and securely closed; have a capacity of less than 450 liters unless the specification has been approved by the EPD; and display a label in English and Chinese in accordance with instructions prescribed in Schedule 2 of the regulation. • The storage area for chemical wastes should be clearly labelled and used solely for the storage of chemical waste; enclosed on at least 3 sides; have an impermeable floor and bunding of sufficient capacity to accommodate 110% of the volume of the largest container or 20 % of the total volume of waste stored in that area, whichever is the greatest; have adequate ventilation; covered to prevent rainfall entering; and arranged so that incompatible materials are adequately separated. • Disposal of chemical waste should be via a licensed waste collector; be to a facility licensed to receive chemical waste, such as the Chemical Waste Treatment Centre which also offers a chemical waste collection service and can supply the necessary	handling and disposal.				

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		storage containers; or be to a reuser of the waste, under approval from the EPD.					
EM&A Project							
S14.2 – 14.4	EM2	1) An Environmental Team needs to be employed as per the EM&A Manual. 2) Prepare a systematic Environmental Management Plan to ensure effective implementation of the mitigation measures. 3) An environmental impact monitoring needs to be implementing by the Environmental Team to ensure all the requirements given in the EM&A Manual are fully complied with.	Perform environmental monitoring & auditing	MTR Corporation/ Contractor	All construction sites	Construction stage	✔

Remarks :

✔ Compliance of mitigation measure

X Non-compliance of mitigation measure

• Non-compliance but rectified by the contractor

* Recommendation was made during site audit but improved/rectified by the contractor.

N/A Not Applicable

Appendix H – Cumulative Log for Environmental Exceedance, Complaints, Notification of Summons and Successful Prosecutions

Cumulative Log for Environmental Exceedance, Complaints, Notification of Summons and Successful Prosecution

Reporting Month	Number of Exceedance	Number of Environmental Complaints	Number of Notification of Summons	Number of Successful Prosecutions
June 2013	0	0	0	0
July 2013	0	0	0	0
August 2013	0	0	0	0
September 2013	0	0	0	0
Total	0	0	0	0