Dragages-Nishimatsu Joint Venture

Contract No. DC/2007/10 Design and Construction of Hong Kong West Drainage Tunnel

Monthly EM&A Report

May 2011

(version 3.0)

Certified By	Chyphit
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REMARKS:	

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EXECUTIVE SUMMARY

Introduction

- 1. This is the 38th Environmental Monitoring and Audit (EM&A) Report prepared by Cinotech Consultants Limited for the "Drainage Improvement in Northern Hong Kong Island Hong Kong West Drainage Tunnel" (the Project). This report documents the findings of EM&A Works conducted in May 2011.
- 2. The site activities undertaken in the reporting month included:
 - Adit excavation and outfall excavation at Western Portal, Adit excavation and River Channel construction at Eastern Portal;
 - West TBM dismantling completed on 20/May/11;
 - Dropshaft pilot hole and reaming on-going at intake HR1, M3, W10 and E5A;
 - Dropshaft reaming completed at Intakes DG1, HKU1 and MA15 on 07/May/11, 14/May/11 and 24/May/11 respectively;
 - Cofferdam construction at Intakes W8, CR1 and P5;
 - P5 dropshaft remedial measures under review.
 - Excavation of intake structure at Intakes E7, W3, BR6, W1, W5, BR4, B2, MA14, RR1 and MA17;
 - Permanent Intake structure works at MBD2, THR2, W10, TP5, BR5, PFLR1,GL1, MB16, TP789 and E5B;
 - Dropshaft Lining Works at MBD2 was completed on 14/May/11. Dropshaft lining works at THR2 was started on 16/May/2011;
 - Permanent Adit Lining works at W0, MB16 & MBD2 on-going;
 - Still Chamber lining works at TP4, TP5, TP789 and THR2;
 - DDA submissions for Adit/Main Tunnel Intersection, Adits, Stilling Chambers and Turning Bays;
 - DDA submissions for temporary works, slope works and permanent works for Intake Structures;
 - DDA submissions for temporary and permanent works for Dropshafts;
 - Environmental impact monitoring;
 - Casting of dropshaft precast rings; and
 - Reinstatement works at Intake SM1 on-going.

Environmental Monitoring Works

- 3. Environmental monitoring for the Project was performed in accordance with the updated EM&A Manual and the monitoring results were checked and reviewed. Site Inspections/Audits were conducted once per week. The implementation of the environmental mitigation measures, Event Action Plans and environmental complaint handling procedures were also checked.
- 4. Proposal for Temporary Suspension of Water Quality Monitoring Western Portal was submitted on 15th September 2009 and approved by EPD on 30th October 2009. Marine water quality monitoring was temporary suspended starting from 31st October 2009 until there is marinebased construction activities resumed at the Western Portal. There is no marine-based

construction activity to be conducted in reporting month.

- 5. In order to assess the effectiveness of the implementation of water quality mitigation measures at Western Portal, site inspections/audits were conducted at least twice per week at Western Portal starting from November 2009.
- 6. Summary of the non-compliance of the reporting month is tabulated in Table I.

Table I Summary Table for Non-compliance Recorded in the Reporting Month

Parameter	No. of Exceedance		No. of Exceedance Due to the Project		Action
	Action Level	Limit Level	Action Level	Limit Level	Taken
Eastern Portal					
1-hr TSP	0	0	0	0	N/A
24-hr TSP	0	0	0	0	N/A
Noise	0	0	0	0	N/A
Western Porta	1		•		
1-hr TSP	0	0	0	0	N/A
24-hr TSP	0	0	0	0	N/A
Noise	0	0	0	0	N/A
Intake DG1					
Noise	0	0	0	0	N/A
Intake E5A					
Noise	0	0	0	0	N/A
Intake E7			·	· · · · · ·	
Noise	0	0	0	0	N/A
Intake MA14					
Noise	0	0	0	0	N/A
Intake PFLR1			•		
Noise	0	0	0	0	N/A
Intake W0		I	1	<u> </u>	

Noise	0	0	0	0	N/A		
Intake RR1							
Noise	0	0	0	0	N/A		
Intake W5							
Noise	0	0	0	0	N/A		
Intake P5	Intake P5						
Noise	0	0	0	0	N/A		
Intake W8							
Noise	0	0	0	0	N/A		
Intake BR6							
Noise	0	0	0	0	N/A		
Intake CR1							
Noise	1	0	1	0	N/A		
Intake GL1							
Noise	1	0	1	0	N/A		

Eastern Portal

1-hour TSP Monitoring

7. All 1-hour TSP monitoring was conducted as scheduled in the reporting month. No Action/Limit Level exceedance was recorded.

24-hour TSP Monitoring

- 8. All 24-hour TSP monitoring was conducted as scheduled in the reporting month. No Action/Limit Level exceedance was recorded. *Construction Noise*
- 9. All construction noise monitoring was conducted as scheduled in the reporting month. No Action/Limit Level exceedance was recorded.

Western Portal

1-hour TSP Monitoring

10. All 1-hour TSP monitoring was conducted as scheduled in the reporting month. No Action/Limit Level exceedance was recorded.

24-hour TSP Monitoring

- 11. All 24-hour TSP monitoring was conducted as scheduled in the reporting month. No Action/Limit Level exceedance was recorded. *Construction Noise*
- 12. All construction noise monitoring was conducted as scheduled in the reporting month. No Action/Limit Level exceedance was recorded.

Water Quality

13. Marine water quality monitoring was temporary suspended starting from 31st October 2009.

Construction Ground Borne Noise

14. All construction ground borne noise monitoring was conducted in the reporting month. No Action/Limit Level exceedance was recorded.

Intake DG1

Construction Noise

15. All construction noise monitoring was conducted as scheduled in the reporting month. No Action/Limit Level exceedance was recorded.

Intake E5A

Construction Noise

16. All construction noise monitoring was conducted as scheduled in the reporting month. No Action/Limit Level exceedance was recorded.

Intake E7

Construction Noise

17. All construction noise monitoring was conducted as scheduled in the reporting month. No Action/Limit Level exceedance was recorded.

Intake MA14

Construction Noise

18. All construction noise monitoring was conducted as scheduled in the reporting month. No Action/Limit Level exceedance was recorded.

Intake PFLR1

Construction Noise

19. All construction noise monitoring was conducted as scheduled in the reporting month. No Action/Limit Level exceedance was recorded.

Intake RR1

Construction Noise

20. All construction noise monitoring was conducted as scheduled in the reporting month. No Action/Limit Level exceedance was recorded.

Intake W0

Construction Noise

21. All construction noise monitoring was conducted as scheduled in the reporting month. No Action/Limit Level exceedance was recorded.

Intake W5

Construction Noise

22. All construction noise monitoring was conducted as scheduled in the reporting month. No Action/Limit Level exceedance was recorded.

Intake P5

Construction Noise

23. All construction noise monitoring was conducted as scheduled in the reporting month. No Action/Limit Level exceedance was recorded.

Intake W8

Construction Noise

24. All construction noise monitoring was conducted as scheduled in the reporting month. No Action/Limit Level exceedance was recorded.

Intake BR6

Construction Noise

25. All construction noise monitoring was conducted as scheduled in the reporting month. No Action/Limit Level exceedance was recorded.

Intake CR1

Construction Noise

26. One Action Level exceedance was recorded due to the complaint received on 30th May 2011.

Intake GL1

Construction Noise

27. One Action Level exceedance was recorded due to the complaint received on 30th May 2011.

Environmental Licenses and Permits

- 28. Licenses/Permits granted to the Project include the Environmental Permit (EP) for the Project, An Environmental Permit No. EP-272/2007 was issued on 26 April 2007 and Environmental Permit No. EP-272/2007/A was issue on 26 October 2007. Later, the further Environmental Permit (FEP-01/272/2007/A) and (FEP-01/272/2007/B) was issued on 28 January 2008 and 25 June 2009 to Dragages-Nishimatsu Joint Venture.
- 29. Registration of Chemical Waste Producer (License: 5213-148-D2393-02 for Eastern Portal and No. 5213-172-D2393-01 for Western Portal).
- 30. Water Discharge License (License No.: EP860/W10/XY0175 for Area of Mount Butler Office, EP860/W10/XY0177 for Eastern Portal, EP820/W9/XT086 and WT00005864-2010 for Western Portal, EP860/W10/XY0183 for Intake W0, WT00003372-2009 for Intake SM1, WT00003737-2009 for Intake MB16, WT00004126-2009 for Intake HKU1, WT00003738-2009 for THR2, WT00004270-2009 for PFLR1, WT00004806-2009 for Intake E7, WT00004808-2009 for MBD2, WT00004885-2009 for Intake RR1, WT00005135-2009 for Intake W10, WT00005357-2009 for Intake W5, WT00005374-2009 for Intake P5, WT00005376-2009 for Intake TP4, WT00005588-2009 for Intake TP5, WT00005643-2009 for Intake E5A, WT00005754-2010 for Intake W8, WT00005954 for Intake TP789, WT00005915 for Intake E5B, WT00006102-2010 for Intake M3, WT00006415-2010 for Intake MA15, WT00006420-2010 for Intake MA17, WT00006428-2010 for Intake BR6, WT00006609-2010 for Intake HR1, WT00006559-2010 for Intake CR1, WT00006929-2010 for Intake W1, WT00006418-2010 for Intake MA14, WT00006865-2010 for Intake BR5, WT00007039-2010 for Intake DG1 WT00007042-2010 for Intake W3, WT00007043-2010 for Intake GL1, WT00007130-2010 for Intake BR4, WT00007139-2010 for Intake BR6 - SNH17 and WT00007319-2010 for Intake B2).
- 31. Construction Noise Permit (License No.: GW-RS0125-11 for Eastern Portal, GW-RS0295-11 and GW-RS0380-11 for Western Portal, GW-RS0244-11 for Eastern Adits, GW-RS0149-11 for Intake W0, GW-RS0167-11 for Intake PFLR1, GW-RS0995-10 for Intake W3, GW-RS1071-10 for Intake MA17, GW-RS0341-11 for Intake SMH17, GW-RS0441-11 for Intake W1, GW-RS0443-11 for Intake BR4, GW-RS0374-11 for adits and tunnel section in Central-Western District.

Key Information in the Reporting Month

32. Summary of key information in the reporting month is tabulated in Table II.

Table II Summary Table for Key Information in the Reporting Month

Event	Event Details		Action Taken	Status	Remark
	Number	Nature			
Complaint received	1	Construction noise at Intake CR1	Investigation report was submitted	Closed	
Complaint received	1	Construction noise at Intake GL1	Investigation report was submitted	Closed	
Changes to the assumptions and key construction / operation activities recorded	0		N/A	N/A	
Status of submissions under EP	1	Monthly EM&A Report (April 2011)	Submitted to EPD on 23 May 2011 (EP condition 3.3)	Verified by IEC	
Notifications of any summons & prosecutions received	0		N/A	N/A	

uture Key Issues:

Major site activities for the coming month include:

- Adit excavation and outfall excavation at Western Portal, Adit excavation and River Channel construction at Eastern Portal;
- Permanent Adit lining works at MB16, W0, MBD2, THR2, TP4, TP5, TP789 and E7;
- Stilling chamber lining works at E5B, GL1, DG1, HKU1, MA15 and TP789;
- Permanent Intake Structure Construction at Intake DG1, PFLR1, BR5 GL1, HKU1, MB16, MBD2 and THR2;
- Excavation of dropshaft at Intakes M3, HR1, E5A, W1 & W10 by Raise Boring method;
- Excavation of intake structure at Intakes E7, E5A, W1, MA17, BR4, BR6, W10, RR1, W5, W3, MA14, B2 and W8;
- Cofferdam construction at Intakes CR1, P5 and W8;
- Casting dropshaft precast rings; and
- Permanent dropshaft lining works at THR2, TP4, TP5 and TP789.

1. INTRODUCTION

Background

- 1.1 Drainage Improvement in Northern Hong Kong Island Hong Kong West Drainage Tunnel is a Designated Project (hereafter referred to as "the Project") under the Environmental Impact Assessment Ordinance (Cap. 449). A study of environmental impact assessment (EIA) was undertaken to consider the key issues of air quality, noise, water quality, ecological, construction waste, landscape and visual, land use, cultural impacts, and identify possible mitigation measures associated with the works. An EIA Report was approved by the Environmental Protection Department (EPD) on 7 April 2006.
- 1.2 The project comprises the construction of a drainage tunnel deep into the ground in Midlevels of the Northern Hong Kong Island from Tai Hang to Pokfulam to intercept and convey the stormwater from the upper catchment directly to the sea near Cyberport. The Drainage tunnel alignment starts from the Eastern Portal near Haw Par Mansion in Tai Hang and ends at the Western Portal located to the north of Cyberport running underneath the Pok Fu Lam, Tai Tam, Aberdeen and Lung Fu Shan Country Parks. The underground main drainage tunnel is 6.25m-7.25m in diameter and about 11km long. Two portals and a series of connecting adits and drop shafts are also been constructed. The general layout of the Project is shown in **Figure 1.1**.
- 1.3 An Environmental Permit (EP) No. EP-272/2007 was issued on 26 April 2007 for Drainage Improvement in Northern Hong Kong Island – Hong Kong West Drainage Tunnel to Drainage Services Department as the Permit Holder. Later, the further Environmental Permit (FEP-01/272/2007/A) and (FEP-01/272/2007/B) was issued on 28 January 2008 and 25 June 2009 to Dragages-Nishimatsu Joint Venture.
- 1.4 Cinotech Consultants Limited was commissioned by the Dragages-Nishimatsu Joint Venture (the Contractor) to undertake the Environmental Monitoring and Audit (EM&A) works for the Project. The Updated EM&A Manual was prepared by Cinotech to fulfil the requirements of the EP. The construction commencement of this Contract at Eastern Portal was on 17th April 2008 and 2nd May 2008 at Western Portal (land-based). The marine construction works was commenced on 30 May 2008. This is the 38th monthly EM&A report summarizing the EM&A works for the Project in May 2011.

Project Organizations

- 1.5 Different parties with different levels of involvement in the project organization include:
 - Project Proponent Drainage Services Department (DSD).
 - The Supervising Officer or Supervising Officer's Representative (SO or SOR) Ove Arup & Partners (ARUP).
 - Environmental Team (ET) Cinotech Consultants Limited (CCL).
 - Independent Environmental Checker (IEC) Allied Environmental Consultants Limited (AEC).
 - Contractor Dragages-Nishimatsu Joint Venture (DNJV).

- 1.6 The responsibilities of respective parties are detailed in Sections 1.14 to 1.28 of the updated EM&A Manual of the Project.
- 1.7 The key contacts of the Project are shown in Table 1.1 and the organization chart of ET is shown in **Figure 2.1**.

Party	Role	Name	Position	Phone No.	Fax No.
DNJV	Permit Holder	Mr. ALTIER Daniel	Project Manager	2671 7333	2671 9300
		Mr. UETAKE H.	Deputy Project Manager	2011 1333	2071 9500
ARUP	Supervising	Mr. Jackson Wong	CRE	6117 6636	2436 1012
ARUP	Officer	Ms. Angela Yan	RE	3961 5206	2430 1012
		Dr. Priscilla Choy	ET Leader	2151 2089	3107 1388
Cinotech	Environmental Team	Ms. Ivy Tam	Project Coordinator and Audit Team Leader	2151 2090	
		Mr. Henry Leung	Monitoring Team Leader	2151 2087	
AEC	Independent Environmental Checker	Ms. Grace Kwok	Independent Environmental Checker	2815 7028	2815 5399
DNJV	Contractor	Mr. Chu Chung Sing	Environmental Officer	3476 0753	2671 9300

Table 1.1Key Project Contacts

Construction Programme

- 1.8 The site activities undertaken in the reporting month included:
 - Adit excavation and outfall excavation at Western Portal, Adit excavation and River Channel construction at Eastern Portal;
 - West TBM dismantling completed on 20/May/11;
 - Dropshaft pilot hole and reaming on-going at intake HR1, M3, W10 and E5A;
 - Dropshaft reaming completed at Intakes DG1, HKU1 and MA15 on 07/May/11, 14/May/11 and 24/May/11 respectively;
 - Cofferdam construction at Intakes W8, CR1 and P5;
 - P5 dropshaft remedial measures under review.
 - Excavation of intake structure at Intakes E7, W3, BR6, W1, W5, BR4, B2, MA14, RR1 and MA17;
 - Permanent Intake structure works at MBD2, THR2, W10, TP5, BR5, PFLR1,GL1, MB16, TP789 and E5B;

- Dropshaft Lining Works at MBD2 was completed on 14/May/11. Dropshaft lining works at THR2 was started on 16/May/2011;
- Permanent Adit Lining works at W0, MB16 & MBD2 on-going;
- Still Chamber lining works at TP4, TP5, TP789 and THR2;
- DDA submissions for Adit/Main Tunnel Intersection, Adits, Stilling Chambers and Turning Bays;
- DDA submissions for temporary works, slope works and permanent works for Intake Structures;
- DDA submissions for temporary and permanent works for Dropshafts;
- Environmental impact monitoring;
- Casting of dropshaft precast rings; and
- Reinstatement works at Intake SM1 on-going.

Protection/Mitigation Measures						
Construction Works	Major Environmental Impact	Control Measures				
AditexcavationatAditexcavationatWesternPortal,AditexcavationandRiverChannelexcavationatEastern PortalWest TBM dismantlingDropshaft pilotholeandreaming on-going at intakeHR1, M3, W10 and E5ACofferdamconstruction atIntakes W8, CR1 and P5Excavationofintakestructureat Intakes W8, CR1 and P5Excavationofintakestructureworks, BR6, W1, W5, BR4,B2,MA14, RR1 andMA17Permanent Intake structureworks at MBD2, THR2,W10,TP5,BR5,PFLR1,GL1,MB16,TP789 and E5BDropshaft Lining Works atMBD2Still Chamber lining worksat TP4, TP5, TP789 andTHR2	Noise, dust impact, water quality and waste generation	Provided water spraying during dust generation works On-site waste sorting and implementation of trip ticket system Appropriate desilting/sedimentation devices provided on site for treatment before discharge Use of quiet plant and well- maintained construction plant Provide movable noise barrier Provide sufficient mitigation measures as recommended in Approved EIA Report				
DDA submissions for Adit/Main Tunnel Intersection, Adits, Stilling Chambers and Turning Bays DDA submissions for temporary works, slope works and permanent works for Intake Structures DDA submissions for temporary and permanent works for Dropshafts Environmental impact monitoring Casting of dropshaft precast rings	Nil	Nil				

Table 1.2 Construction Programme Showing the Inter-Relationship with Environmental Protection/Mitigation Measures

Summary of EM&A Requirements

- 1.9 The EM&A programme requires construction phase monitoring construction noise, air quality and water quality and environmental site audit. The EM&A requirements for each parameter 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.
- 1.10 The advice on the implementation status of environmental protection and pollution control/mitigation measures is summarized in Section 5 of this report.
- 1.11 This report presents the monitoring results, observations, locations, equipment, period, methodology and QA/QC procedures of the required monitoring parameters, namely air quality, water quality and noise levels and audit works for the Project in May 2011.

2. AIR QUALITY

Monitoring Requirements

2.1 1-hour and 24-hour TSP monitoring were conducted to monitor the air quality at Eastern and Western Portals. Appendix A shows the established Action/Limit Levels for the environmental monitoring works.

Monitoring Locations

2.2 Three designated monitoring stations, AQ1, AQ2 and AQ3 were selected for impact dust monitoring. Table 2.1 describes the air quality monitoring locations, which are also depicted in **Figure 3.1a-b**.

Table 2.1 Locations for Air Quality Monitoring

Monitoring Stations	Locations
AQ1	True Light Middle School of Hong Kong
AQ2	Outside Aegean Terrace
AQ3	Outside The Site Office at Western Portal

Monitoring Equipment

2.3 Table 2.2 summarizes the equipment used in the impact air monitoring programme. Copies of calibration certificates are attached in **Appendix B**.

Table 2.2 Air Quality Monitoring Equipment

Equipment	Model and Make	Quantity
Calibrator	G25A	1
1-hour TSP Dust Meter	Laser Dust Monitor – Model LD3B	1
HVS Sampler	GMWS 2310 c/w of TSP sampling inlet	2

Monitoring Parameters, Frequency and Duration

2.4 Table 2.3 summarizes the monitoring parameters and frequencies of impact dust monitoring for the whole construction period. The air quality monitoring schedule for the reporting month is shown in **Appendix D**.

Table 2.3 Impact Dust Monitoring Parameters, Frequency and Duration

Parameters	Frequency
1-hr TSP	Three times / 6 days
24-hr TSP	Once / 6 days

Monitoring Methodology and QA/QC Procedure

1-hour TSP Monitoring

Measuring Procedures

- 2.5 The measuring procedures of the 1-hour dust meters were in accordance with the Manufacturer's Instruction Manual as follows:
 - Pull up the air sampling inlet cover
 - Change the Mode 0 to BG with once
 - Push Start/Stop switch once
 - Turn the knob to SENSI.ADJ and press it
 - Push Start/Stop switch once
 - Return the knob to the position MEASURE slowly
 - Push the timer set switch to set measuring time
 - Remove the cap and make a measurement

Maintenance/Calibration

- 2.6 The following maintenance/calibration was required for the direct dust meters:
 - Check the meter regularly and calibrate the meter at bi-monthly interval throughout all stages of the air quality monitoring.

24-hour TSP Monitoring

Instrumentation

2.7 High volume (HVS) samplers (Model GMWS-2310 Accu-Vol) completed with appropriate sampling inlets were employed for 24-hour TSP monitoring. The sampler was composed of a motor, a filter holder, a flow controller and a sampling inlet and its performance specification complied with that required by USEPA Standard Title 40, Code of Federation Regulations Chapter 1 (Part 50). Moreover, the HVS also met all the requirements in section 2.5 of the updated EM&A Manual.

Operating/Analytical Procedures

- 2.8 Operating/analytical procedures for the operation of HVS were as follows:
 - A horizontal platform was provided with appropriate support 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 sampler was more than 20 meters from the drip line.
- Any wire fence and gate, to protect the sampler, should not cause any obstruction during monitoring.
- 2.9 Prior to the commencement of the dust sampling, the flow rate of the high volume sampler was properly set (between $1.1 \text{ m}^3/\text{min.}$ and $1.4 \text{ m}^3/\text{min.}$) in accordance with the manufacturer's instruction to within the range recommended in USEPA Standard Title 40, CFR Part 50.
- 2.10 Fiberglass filters were used which have a collection efficiency of larger than 99% for particles of 0.3 μm diameter.
- 2.11 The power supply was checked to ensure the sampler worked properly. On sampling, the sampler was operated for 5 minutes to establish thermal equilibrium before placing any filter media at the designated air monitoring station.
- 2.12 The filter holding frame was then removed by loosening the four nuts and a weighted and conditioned filter was carefully centered with the stamped number upwards, on a supporting screen.
- 2.13 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. The applied pressure should be sufficient to avoid air leakage at the edges.
- 2.14 The shelter lid was closed and secured with the aluminum strip.
- 2.15 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).
- 2.16 After sampling, the filter was removed and sent to the HOKLAS laboratory (Wellab Ltd.) for weighing. The elapsed time was also recorded.
- 2.17 Before weighing, all filters were equilibrated in a conditioning environment for 24 hours. The conditioning environment temperature should be between 25°C and 30°C and not vary by more than $\pm 3^{\circ}$ C; the relative humidity (RH) should be < 50% and not vary by more than $\pm 5\%$. A convenient working RH is 40%.

Maintenance/Calibration

- 2.18 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.
 - High volume samplers were calibrated at bi-monthly intervals using G-25A Calibration Kit throughout all stages of the air quality monitoring.

Results and Observations

Eastern Portal (AQ1)

- 2.19 All 1-hour TSP monitoring was conducted as scheduled in the reporting month. No Action/Limit Level exceedance was recorded.
- 2.20 All 24-hour TSP monitoring was conducted as scheduled in the reporting month. No Action/Limit Level exceedance was recorded.

Western Portal (AQ2)

2.21 All 1-hour TSP monitoring was conducted as scheduled in the reporting month. No Action/Limit Level exceedance was recorded.

Western Portal (AQ3)

- 2.22 All 24-hour TSP monitoring was conducted as scheduled in the reporting month. No Action/Limit Level exceedance was recorded.
- 2.23 Wind data was obtained from the Meteorological Observations for King's Park Automatic Weather Station for Eastern Portal and Wong Chuk Hang Automatic Weather Station for Western Portal. These wind data for the reporting period is summarized in **Appendix C.**
- 2.24 The monitoring data and graphical presentations of 1-hour and 24-hour TSP monitoring results are shown in **Appendices E and F** respectively.
- 2.25 The summary of exceedance record in reporting month is shown in **Appendix H**.
- 2.26 In accordance with Condition 4.2 of the EP, all environmental monitoring data was made available to the public via internet access at the website <u>http://www.cinotech.com.hk/projects/WestDrainageTunnel/</u>.
- 2.27 According to our field observations, the major dust source identified at the designated air quality monitoring stations are as follows:

	Station	Major Noise Source
Area		
Eastern Portal	AQ1 – True Light	Road Traffic Dust
	Middle School of	Loading/unloading activities
	Hong Kong	
Western Portal	AQ2 – Outside	Road Traffic Dust
	Aegean Terrace	Loading/unloading activities
	AQ3 – Outside The	
	Site Office at	
	Western Portal	

Parameter	Date	Concentration (µg/m3)	Action Level, µg/m3	Limit Level, µg/m3
Eastern Porta	ıl			L
	3-May-11	145.4		
	3-May-11	185.6		
	3-May-11	171.8		
	9-May-11	87.3		
	9-May-11	76.3		
	9-May-11	101.3		
	13-May-11	103.8		
	13-May-11	67.8		
1-hr TSP	13-May-11	106.6	345	500
(AQ1)	18-May-11	92.7		500
	18-May-11	156.3		
	18-May-11	135.6		
	25-May-11	48.0		
	25-May-11	38.4		
	25-May-11	80.8		
	31-May-11	232.6		
	31-May-11	185.3		
	31-May-11	108.7		
	3-May-11	67.9		260
24-hr TSP	9-May-11	28.8		
(AQ1)	14-May-11	56.9	201	
	20-May-11	40.8		
	26-May-11	144.9		
Western Port				
	3-May-11	80.9		
	3-May-11	90.1		
	3-May-11	73.8		
	9-May-11	76.9		
	9-May-11	88.1		
	9-May-11	86.5		
	13-May-11	74.6		
1.1	13-May-11	77.6		
1 - hr TSP	13-May-11	78.9	321	500
(AQ2)	18-May-11	64.2		
	18-May-11	65.5		
	18-May-11	65.9		
	25-May-11	<u>69.7</u>		
	25-May-11	64.4		
	25-May-11	64.6		
	31-May-11	86.2		
	31-May-11	82.4		
24 h - TOD	31-May-11	79.0	157	260
24-hr TSP	3-May-11	66.6	156	260
(AQ3)	9-May-11	38.0		

Table 2.4 Summary Table of Air Quality Monitoring Results during the reporting month

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14-May-11	22.5	
20-May-11	39.1	
26-May-11	101.4	

3. NOISE

Airborne Construction Noise Monitoring

Monitoring Requirements

3.1 Eighteen noise monitoring stations, namely NC1, NC2, NC3, NC4, NC5, NC6, NC7, NC8, NC9, NC10, NC11, NC12, NC13, NC14, NC15, NC16, NC17, NC18 and NC19 were selected for impact monitoring in the reporting month. **Appendix A** shows the established Action and Limit Levels for the environmental monitoring works.

Monitoring Locations

3.2 Noise monitoring was conducted at ten designated monitoring stations as listed in Table 3.1. **Figure 3.1a-n** shows the locations of these stations.

Monitoring Stations	Locations	
NC1/NC1a	True Light Middle School of Hong Kong/Outside True Light Middle School of Hong Kong	
NC2	The Legend	
NC3	Outside Aegean Terrace	
NC4	Man Yuen Garden	
NC5	Blk D Villa Monte Rosa	
NC6	Rosaryhill School	
NC7	Buddist Li Ka Shing Care & Attention Home for the Elderly	
NC8	Marymount Secondary School	
NC9	117 Blue Pool Road	
NC10	The Harbour View	
NC11	Honey Court	
NC12	Ying Wa Girl's School	
NC13	Peaksville Court	
NC14	Hong Kong Japanese School	
NC15	Hong Kong Academy	
NC16	Raimondi College	
NC17	Hong Kong Institute of Technology	
NC18	Blk A, 80 Robinson Road	
NC19	Villa Veneto	

Table 3.1Noise Monitoring Stations

Monitoring Equipment

3.3 Table 3.2 summarizes the noise monitoring equipment. Copies of calibration certificates are provided in **Appendix B**.

Table 3.2Noise Monitoring Equipment

Equipment	Model and Make	Qty.
Integrating Sound Level Meter	SVAN 955	4
Calibrator	B&K 4231 and SVAN 30A	3

Monitoring Parameters, Frequency and Duration

3.4 Table 3.3 summarizes the monitoring parameters, frequency and total duration of monitoring. The noise monitoring schedule is shown in **Appendix D**.

Table 3.3 Noise Monitoring Parameters, Frequency and Duration

Monitoring Stations	Parameter	Period	Frequency	Measurement
NC1 NC2 NC3 NC4 *NC5 NC6 NC7 NC8 NC9 NC10 *NC11 NC12 NC13 NC14 *NC15 NC16 NC17 NC18 NC19	$L_{10}(30 \text{ min.})$ dB(A) $L_{90}(30 \text{ min.})$ dB(A) $L_{eq}(30 \text{ min.})$ dB(A)	0700-1900 hrs on normal weekdays	Once per week	Façade

*Free Field Measurement

Monitoring Methodology and QA/QC Procedures

- The Sound Level Meter was set on a tripod at a height of 1.2 m above the ground.
- For free field measurement, the meter was positioned away from any nearby reflective surfaces. All records for free field noise levels were adjusted with a correction of +3 dB(A).
- The battery condition was checked to ensure the correct 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

- time weighting : Fast
- time measurement : 30 minutes / 5 minutes

- Prior to and after each noise measurement, the meter was calibrated using a Calibrator for 94.0 dB at 1000 Hz. If the difference in the calibration level before and after measurement was more than 1.0 dB, the measurement would be considered invalid and repeat of noise measurement would be required after re-calibration or repair of the equipment.
- The wind speed was frequently checked with the portable wind meter.
- At the end of the monitoring period, the L_{eq} , L_{90} and L_{10} were recorded. In addition, site conditions and noise sources were recorded on a standard record sheet.
- Noise measurement was paused temporarily during periods of high intrusive noise if possible and observation was recorded when intrusive noise was not avoided.
- 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.

Maintenance and Calibration

- 3.5 The microphone head of the sound level meter and calibrator were cleaned with a soft cloth at quarterly intervals.
- 3.6 The sound level meter and calibrator were checked and calibrated at yearly intervals.
- 3.7 Immediately prior to and following each noise measurement the accuracy of the sound level meter shall be checked using an acoustic calibrator generating a known sound pressure level at a known frequency. Measurements may be accepted as valid only if the calibration levels from before and after the noise measurement agree to within 1.0 dB.

Results and Observations

- 3.8 Noise monitoring (0700-1900 hrs on normal weekdays) at the three designated locations (NC1/NC1a (for restricted hours), NC2 and NC3) was conducted as scheduled in the reporting month for Eastern and Western Portal.
- 3.9 Noise monitoring (0700-1900 hrs on normal weekdays) at NC4, NC5, NC6, NC7, NC8, NC9, NC10, NC11, NC12, NC13, NC14, NC15, NC16, NC17, NC18 and NC19 were conducted as scheduled in the reporting month for Intake BR6, Intake DG1, E5A, E7, MA14, PFLR1, RR1, THR2, W0, W5 and P5 respectively.

Eastern Portal (NC1 & NC2) – 0700-1900 hrs on normal weekdays

3.10 No Action/Limit Level exceedance was recorded.

Western Portal (NC3) – 0700-1900 hrs on normal weekdays

3.11 No Action/Limit Level exceedance was recorded.

Intake BR6 (NC4) - 0700-1900 hrs on normal weekdays

3.12 No Action/Limit Level exceedance was recorded.

Intake DG1 (NC5) - 0700-1900 hrs on normal weekdays

- 3.13 No Action/Limit Level exceedance was recorded.Intake DG1 (NC6) 0700-1900 hrs on normal weekdays
- 3.14 No Action/Limit Level exceedance was recorded.Intake E5A (NC7) 0700-1900 hrs on normal weekdays
- 3.15 No Action/Limit Level exceedance was recorded.Intake E7 (NC8) 0700-1900 hrs on normal weekdays
- 3.16 No Action/Limit Level exceedance was recorded.Intake E7 (NC9) 0700-1900 hrs on normal weekdays
- 3.17 No Action/Limit Level exceedance was recorded.
 <u>Intake MA14 (NC10) 0700-1900 hrs on normal weekdays</u>
- 3.18 No Action/Limit Level exceedance was recorded.
 <u>Intake PFLR1 (NC11) 0700-1900 hrs on normal weekdays</u>
- 3.19 No Action/Limit Level exceedance was recorded.
 Intake RR1 (NC12) 0700-1900 hrs on normal weekdays
- 3.20 No Action/Limit Level exceedance was recorded.
 <u>Intake RR1 (NC13) 0700-1900 hrs on normal weekdays</u>
- 3.21 No Action/Limit Level exceedance was recorded.
 <u>Intake THR2 (NC14) 0700-1900 hrs on normal weekdays</u>
- 3.22 No Action/Limit Level exceedance was recorded.
 <u>Intake W0 (NC15) 0700-1900 hrs on normal weekdays</u>
- 3.23 No Action/Limit Level exceedance was recorded.
 <u>Intake W5 (NC16) 0700-1900 hrs on normal weekdays</u>
- 3.24 No Action/Limit Level exceedance was recorded.

Intake W8 (NC17) – 0700-1900 hrs on normal weekdays

3.25 No Action/Limit Level exceedance was recorded.

Intake W8 (NC18) – 0700-1900 hrs on normal weekdays

3.26 No Action/Limit Level exceedance was recorded.

Intake P5 (NC19) – 0700-1900 hrs on normal weekdays

3.27 No Action/Limit Level exceedance was recorded.

Intake CR1 – 0700-1900 hrs on normal weekdays

3.28 One Action Level exceedance was recorded due to the complaint received on 30th May 2011.

Intake GL1 – 0700-1900 hrs on normal weekdays

- 3.29 One Action Level exceedance was recorded due to the complaint received on 30th May 2011.
- 3.30 The summary of exceedance record in reporting month is shown in **Appendix H**.
- 3.31 The Construction Noise Levels (CNLs) reported in this report were adjusted with the corresponding baseline level (i.e. Measured Leq Baseline Leq = Measured CNL), while the measurement was considered to be interfered by other environmental factors. The average baseline noise level and the Noise Limit Level at each designated noise monitoring station are presented at Table 3.4 for reference.
- 3.32 Noise monitoring results and graphical presentations are shown in **Appendix G**. In accordance with Condition 4.2 of the EP, all environmental monitoring data was made available to the public via internet access at the website http://www.cinotech.com.hk/projects/WestDrainageTunnel/.

3.33 The major noise sources identified at the designated noise monitoring stations are as follows:

	Station	Major Noise Source
Area	2.0000	
Eastern Portal	NC1 – True Light Middle	Traffic Noise
	School of Hong Kong	Loading/unloading activities
	NC2 – The Legend	
Western Portal	NC3 – Outside Aegean	Traffic Noise
	Terrace	Loading/unloading activities
Intake BR6	NC4 - Man Yuen Garden	Traffic Noise
		Excavation works
Intake DG1	NC5 - Blk D Villa Monte	Traffic Noise
	Rosa	Excavation works
	NC6 - Rosaryhill School	
Intake E5A	NC7 - Buddist Li Ka	Traffic Noise
	Shing Care & Attention	Excavation works
	Home for the Elderly	
Intake E7	NC8 – Marymount	Traffic Noise
	Secondary School	Excavation works
	NC9 – 117 Blue Pool	
	Road	
Intake MA14	NC10 - The Harbour	Traffic Noise
	View	Excavation works
Intake PFLR1	NC11 – Honey Court	Traffic Noise
		Excavation works
Intake RR1	NC12 – Ying Wa Girl's	Traffic Noise
	School	Excavation works
	NC13 – Peaksville Court	
Intake THR2	NC14 – Hong Kong	Traffic Noise
	Japanese School	Excavation works
Intake W0	NC15 – Hong Kong	Traffic Noise
Intake W5	Academy	Traffic Noise
Intake w 5	NC16 - Raimondi College	Excavation works
Intake W8	NC17 - Hong Kong	Traffic Noise
make wo	Institute of Technology	Excavation works
	NC18 - Blk A, 80	LACAVATION WORKS
	Robinson Road	
Intake P5	NC19 – Villa Veneto	Traffic Noise
		Excavation works
		LAUTUION TOTAD

Station	Baseline Noise Level, dB (A) (The average level at 0700 – 1900 hrs on normal weekdays)	Noise Limit Level, dB (A) (at 0700 – 1900 hrs on normal weekdays)	
NC1 – True Light Middle School of Hong Kong	70.2	70*	
NC2 – The Legend	64.8		
NC3 – Outside Aegean Terrace	57.7	75	
NC4 – Man Yuen Garden	64.5	15	
NC5 - Blk D Villa Monte Rosa	66.1		
NC6 - Rosaryhill School	64.1	70*	
NC7 - Buddist Li Ka Shing Care & Attention Home for the Elderly	65.1	75	
NC8 – Marymount Secondary School	63.5	70*	
NC9 – 117 Blue Pool Road	63.3		
NC10 – The Harbour View	71.7	75	
NC11 – Honey Court	63.2		
NC12 – Ying Wa Girl's School	67.1	70*	
NC13 - Peaksville Court	65.2	75	
NC14 – Hong Kong Japanese School	60.8		
NC15 – Hong Kong Academy	63.5	70*	
NC16 - Raimondi College	70.4	70.	
NC17 - Hong Kong Institute of Technology	66.0		
NC18 - Blk A, 80 Robinson Road	64.8	75	
NC19 – Villa Veneto	68.6	75	

Table 3.4Baseline Noise Level and Noise Limit Level for Monitoring Stations(Reference)

(*) reduce to 65 dB(A) during school examination periods.

Table 3.5	Summary Table of Noise	Monitoring Results	during the Reporting Month
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Station	Date	Measured Noise Level : Leq(30min) dB (A)	Noise Level due to Construction Works ⁽¹⁾⁽²⁾ : Leq(30min) dB (A)	Exceedance of Limit Level (Yes/No)
07:00 - 19:0	00 hrs on normal	weekdays		
Eastern Port	al			
	4-May-11	67.5	N/A	
NC1	12-May-11	71.2	60.6	No
NCI	16-May-11	70.6	63.3	NO
	26-May-11	66.2	N/A	
	4-May-11	67.4		
NC2	12-May-11	70.5	N/A	No
IIC2	16-May-11	69.2		NO
	26-May-11	64.3		
Western Por				
	4-May-11	53.2		
NC3	12-May-11	53.6		No
nes	16-May-11	51.5	14/7 \$	110
	26-May-11	51.9		
Intake BR6				
	4-May-11	71.2		
NC4	12-May-11	71.2		No
NC4	16-May-11	69.7		NO
	26-May-11	68.7		
Intake DG1				
	4-May-11	65.7		
NC5	12-May-11	69.2		No
nes	16-May-11	67.3		110
	26-May-11	66.7	N/A	
	4-May-11	64.5		
NC6	12-May-11	64.5		No
1100	16-May-11	65.1		110
	26-May-11	63.8		
Intake E5A				
	4-May-11	70.3		
NC7	12-May-11	71.8	N/A	No
1107	16-May-11	70.1		
	26-May-11	75.1	74.6	
Intake E7				
	4-May-11	66.5	N/A	
NC8	12-May-11	64.8		No
INCO	16-May-11	66.2		110
	26-May-11	67.0		
NC9	4-May-11	68.3		No
	12-May-11	73.1		
	16-May-11	67.0		

				
	26-May-11	71.7		
Intake MA1	4			
	4-May-11	72.4		
NC10	12-May-11	70.8	N/A	No
NC10	16-May-11	71.1		110
	26-May-11	70.1		
Intake PFLF	R1			
	4-May-11	67.2		No
NC11	12-May-11	66.8	N/A	
nem	16-May-11	66.2	11/11	110
	26-May-11	66.9		
Intake RR1				
	4-May-11	64.9		
NC12	12-May-11	66.1		No
IIIII	16-May-11	66.2		110
	26-May-11	65.2	N/A	
	4-May-11	68.9	1.1/11	
NC13	12-May-11	65.7		No
1,010	16-May-11	65.3		110
	26-May-11	63.2		
Intake THR	1			
	4-May-11	65.9		
NC14	12-May-11	64.5	N/A	No
	16-May-11	64.9		
	26-May-11	64.3		
Intake W0				
	4-May-11	67.1		
NC15	12-May-11	66.4	N/A	No
	16-May-11	65.1		
	26-May-11	65.2		
Intake W5				
	4-May-11	64.5		
NC16	12-May-11	63.9	N/A	No
IIC III	16-May-11	63.1	10/11	110
	26-May-11	63.2		
Intake W8				
	4-May-11	67.5		
NG (-	12-May-11	67.2		
NC 17	16-May-11	67.2		No
	26-May-11	68.2	NT / A	
	4-May-11	71.2	N/A	
NC 10	12-May-11	70.0		No
NC 18	16-May-11	70.2		No
	26-May-11	69.2	<u> </u>	
Intake P5				
	4-May-11	61.7		
NC19	12-May-11	67.7	N/A	No
	16-May-11	64.6		INU
	26-May-11	66.9		

- (*) reduce to 65 dB(A) during school examination periods, if any.
- (1) The correction of measured noise level will be adopted when the measured noise level exceed the noise limit level. The corrected noise level due to the construction work was calculated by the following formula: $CNL = 10 \log (10^{MNL/10} - 10^{BNL/10})$

Remarks: CNL = Construction Noise Level MNL = Measured Noise Level BNL = Baseline Noise Level (Corresponding Time Period)

- (2) The baseline noise levels were derived from the baseline monitoring results at the corresponding stations and time period.
- (3) N/A Not applicable (Measured Noise Level \leq Limit Level)

Ground Borne Construction Noise Monitoring

Monitoring Requirements

3.34 In accordance with the recommendations of the EIA study, ground borne noise monitoring is required to carry out during the TBM operation. Eight designated monitoring stations (GNC1 to GNC8) are designated for construction groundborne noise monitoring to check for compliance.

Monitoring Locations

- 3.35 Construction Ground Borne Noise Monitoring at GNC3 was temporary suspended since 7 May 2009 as the ISS EastPoint Property Management Ltd. received an instruction from the Incorporated Owners of Aegean Terrace that we are not permitted to conduct any noise monitoring inside Aegean Terrace for the Project.
- 3.36 According to the approved EIA report, noise monitoring should be performed at NSR1a (i.e. Crane Court) when TBM is operating through the tunnel section between points A and B). Therefore, Ground borne noise monitoring has been conducted at Crane Court (GNC4) since 3 June 2009 during the TBM operated.
- 3.37 Ground borne noise monitoring at GNC1 True Light Middle School, GNC2 The Legend and GNC4 Crane Court were completed by end of August 2009 accordingly.
- 3.38 Ground borne noise monitoring at GNC5 was completed by end of November 2009.
- 3.39 Ground borne noise monitoring was conducted at GNC6 French International School in the reporting month during the TBM operation and completed by end of June 2010.
- 3.40 Ground borne noise monitoring was conducted at GNC7 Hong Villa in the reporting month. **Figure 3.10** shows the locations of the monitoring stations.

Monitoring Equipment

3.41 The noise monitoring equipment shall be the same as stated in Section 3.3.

Monitoring Parameters, Frequency and Duration

3.42 Table 3.6 summarizes the monitoring parameters, frequency and total duration of monitoring. The noise monitoring schedule is shown in **Appendix D**.

Table 3.6 Ground Borne Noise Monitoring Parameters, Frequency and Duration

Monitoring Stations	Parameter	Period	Frequency
GNC7	L ₁₀ (30 min.) dB(A) L ₉₀ (30 min.) dB(A) L _{eq} (30 min.) dB(A)	0700-1900 hrs on normal weekdays	Once per week

Results and Observations

3.43 Groundborne Noise monitoring (0700-1900 hrs on normal weekdays) at Hong Villa (GNC7) was conducted as scheduled in the reporting month. The construction ground borne noise standards are presented at Table 3.7.

Hong Villa (GNC7) - 0700-1900 hrs on normal weekdays

3.44 No exceedance was recorded.

Table 3.7 Construction Ground Borne Noise Standards

	Ground Borne Noise Criteria, dB(A) (Leq 30 min)		
Uses	Daytime (except	Daytime during	Night time (2300
	General Holidays	general holidays and	to 0700 hrs)
	and Sundays)*	Sundays and all days	
		during Evening	
		(1900 to 2300 hrs)**	
Domestic Premises	65	55	40
Educational Institutions	60	55	(1)
(normal periods)			
Education Institutions	55	55	(1)
(during examination			
periods)			

*10dB(A) below the noise criteria stipulated in EIAO-TM

**10dB(A) below the noise criteria stipulated in GW-TM

(1) No sensitive uses usually present during these periods

Table 3.8Summary Table of Ground Borne Noise Monitoring Results during the
Reporting Month

Parameter	Date	Construction Ground Borne Noise Level : Leq(30min) dB (A)	Standards	
GNC7	4-May-11	61.2		
	12-May-11	56.7	65 dB(A)	
	16-May-11	60.9	05 dB(A)	
	26-May-11	62.2		

4. WATER QUALITY

Monitoring Requirements

- 4.1 Dissolved oxygen (DO concentration in mg/L and DO saturation in percentage), Turbidity (Tby in NTU), Suspended Solid (SS in mg/L), pH, salinity and both water and ambient temperature monitoring were conducted to monitor the water quality. **Appendix A** shows the established Action/Limit Levels for the environmental monitoring works.
- 4.2 Proposal for Temporary Suspension of Water Quality Monitoring Western Portal was submitted on 15th September 2009 and approved by EPD on 30th October 2009. Marine water quality monitoring was temporary suspended starting from 31st October 2009 until there is marine-based construction activities resumed at the Western Portal. There is no marine-based construction activity to be conducted in reporting month.

Monitoring Locations

4.3 Locations of designated Water Quality Monitoring Stations are shown in **Figure 4.1a-b** and described in Table 4.1. Samples shall be taken at all designated Monitoring and Control Stations.

Monitoring Stations	Coordinates		
Wollitoning Stations	Northing	Easting	
Control Stations			
CE (Ebb)	814956	830026	
CF (Flood)	812420	831778	
Impact Stations			
I1	813654	831088	
I2	813582	831105	
Intake A	813044	831603	
Intake B	814583	830606	

Table 4.1 Locations for Water Quality Monitoring

Results and Observations

4.4 No marine water quality monitoring was conducted during the reporting month.

Underground water level

- 4.5 Ground water levels were measured once per month during the construction phase in order to ensure the water levels at those intakes near to the natural stream courses and thus on the surrounding habitats will not be significantly affected.
- 4.6 Locations of designated ground water level (borehole with piezometer) monitoring station UC1 at Eastern Portal has been changed to ADH48 which was verified by IEC on 5th June 2008. The updated ground water level monitoring stations, TP789_DH2, TP5_DH2, THR2_DH7 and PFLR1_DH2 were also verified by IEC on 19th June 2010.

4.7 Ground water level monitoring location is shown in **Figure 4.2a-e** and the Monitoring data are shown in Table 4.2.

Date	Water Level (from ground)/m	
Location: ADH48 (Eastern Portal)		
24 May 2011	8.43	
Location: TP789_DH2		
18 May 2011	Dry	
Location: TP5_DH2		
18 May 2011	3.18	
Location: THR2_DH7		
6 May 2011	3.20	
Location: PFLR1		
18 May 2011	11.75	

 Table 4.2
 Ground Water Level Monitoring Data

5. ENVIRONMENTAL AUDIT

Site Audits

- 5.1 Site audits were carried out on a 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 I.**
- 5.2 Site audits were conducted on 5th, 12th, 19th and 26th May 2011. IEC site inspections were conducted on 26th May 2011. No non-compliance was observed during the site audits.
- 5.3 In order to assess the effectiveness of the implementation of water quality mitigation measures at Western Portal, additional site inspection was conducted on 3rd, 9th, 18th and 25th May 2011. No non-compliance was observed during the site audits.

Review of Environmental Monitoring Procedures

5.4 The monitoring works conducted by the monitoring team were inspected regularly. The following observations have been recorded for the monitoring works:

Air Quality Monitoring

- The monitoring team recorded all observations around the monitoring stations within and outside the construction site.
- The monitoring team recorded the temperature and weather conditions on the monitoring days.

Noise Monitoring

- The monitoring team recorded all observations around the monitoring stations, which might affect the monitoring result.
- Major noise sources were identified and recorded. Other intrusive noise attributing to the result was trimmed off by pausing the monitoring temporarily.

Status of Environmental Licensing and Permitting

5.5 All permits/licenses obtained for the Project are summarized in Table 5.1.

Status of Spoil Management

Adit spoil handling arrangements in the Western Portal

5.6 The spoils generated during adit excavation (drill-and-blast) were delivered by trains to the Spoil Basin at the tunnel portal. The adit spoils were transferred to a dump truck by means of a backhoe. The dump truck was then discharge the adit spoils onto the barge at the ramp

jetty. The mitigation measures for the spoil handling works at Western Portal are presented in Section 5.21.

5.7 The management status for site arrangements on the delivery and handling of excavated materials at earlier stage of the Project, particularly the Western Portal is provided in the **Annex I** of this report for reference.

Two Blasts Per Day in Western Adits

- 5.8 Blasting works were increased to two times per day to ensure timely completion of the Project, especially when unexpected ground conditions are encountered during adit excavation. Two blasts per days are planned initially for the Adits leading to Intake HKU1, W10 and P5. The proposal of two blasts per day in Western Adits is provided in Annex II of this report.
- 5.9 During this reporting period, a total 25 nos. of dump trucks of waste were delivered to SENT landfill, 201 and 3 trips of C&D waste were delivered to Chai Wan Public Barging Point and TKO Fill Bank respectively. Both the trip ticket system and chit accounting system for disposal of waste were operating smoothly to date. 7 trucks overloading case was recorded during this reporting period (all cases were within the 105% allowable buffer weight). No disposal of inert C&D material to public sorting facilities and no dump truck without cover were reported from CEDD. In respect of the dump truck cover, DNJV keeps on take record photos and inspection to ensure that all dump trucks have fully covered the skip before leaving the site.
- 5.10 The rock materials from the Eastern Portal and Western Portal were received by the alternative disposal sites at ZhongShan. Some of the tunnel spoils from Eastern Tunnel and adits were also received by Leighton site at Ocean Park and in a residential development site at No. 1 Gough Hill Road, the Peak which was started from 24th September 2010.
- 5.11 The amount of wastes generated by the activities of the Project during the reporting month is shown in **Appendix N**.

Table 5.1	Summary of Environmental Licensing and Permit Status
1 4010 011	Summary of Environmental Elections and I crime Status

Permit No.	Valid Period		- Details	Status
From		То	Details	Status
Environmental Permit	t (EP)			
			Construction of a 6.25m-7.25m in diameter	
FEP-01/272/2007/B	25/6/09	N/A	and about 11 km long underground main	Valid
	23/0/09	IN/A	drainage tunnel, 2 portals and a series of	v anu
			connecting adits and drop shafts.	
Effluent Discharge Lie	cense			
EP860/W10/XY0175	23/06/08	30/06/13	Industrial discharge (Area of Mount Butler	Valid
LF 800/ W 10/X 101/3			Office)	
EP860/W10/XY0177	23/06/08	30/06/13	Industrial discharge (Eastern Portal Site)	Valid
EP820/W9/XT086	22/07/08	31/07/13	Industrial discharge (Western Portal Site)	Valid
WT00005864-2010	20/01/10	31/01/15	Industrial discharge (Western Portal Site)	Valid
EP860/W10/XY0183	19/11/08	30/11/13	Industrial discharge (Intake W0, Stubbs Road,	Valid
LF 800/ W 10/A 10185			Wan Chai, HK)	v allu
WT00003372-2009	-	30/4/14	Industrial discharge (Intake SM1)	Valid
WT00003737-2009	-	31/5/14	Industrial discharge (Intake MB16)	Valid
WT00004126-2009		31/5/14	Industrial discharge (Intake HKU1)	Valid
WT00003738-2009	-	31/5/14	Industrial discharge (Intake THR2)	Valid
WT00004270-2009	-	31/7/14	Industrial discharge (Intake PFLR1)	Valid
WT00004806-2009	-	30/09/14	Industrial discharge (Intake E7)	Valid
WT00004808-2009	-	30/09/14	Industrial discharge (Intake MBD2)	Valid
WT00004885-2009	-	30/09/14	Industrial discharge (Intake RR1)	Valid
WT00005135-2009	-	31/10/14	Industrial discharge (Intake W10)	Valid
WT00005374-2009	_	30/11/14	Industrial discharge (Intake P5)	Valid
WT00005376-2009	_	30/11/14	Industrial discharge (Intake TP4)	Valid
WT00005357-2009	-	30/11/14		
WT00005588-2009	-	31/12/14	Industrial discharge (Intake TP5) V	
WT00005643-2009	-	31/12/14		
WT00005754-2010	-	31/01/15	6	
WT00005954-2010	-	28/02/15		
WT00005915-2010	-	31/01/15		
WT00006102-2010	-	28/02/15		
WT00006415-2010	-	30/04/15	8	
WT00006420-2010	-	30/04/15	Industrial discharge (Intake MA17)	Valid
WT00006428-2010	-	30/04/15	Industrial discharge (Intake BR6)	Valid
WT00006609-2010	-	31/05/15	Industrial discharge (Intake HR1)	Valid
WT00006559-2010	-	30/04/15	Industrial discharge (Intake CR1)	Valid
WT00006929-2010	-	30/06/15	Industrial discharge (Intake W1)	Valid
WT00006418-2010	-	30/06/15	Industrial discharge (Intake MA14)	Valid
WT00006865-2010	-	30/06/15	Industrial discharge (Intake BR5)	
WT00007039-2010	-	31/07/15	Industrial discharge (Intake DG1)	Valid
WT00007042-2010	-	31/07/15	Industrial discharge (Intake W3)	Valid
WT00007043-2010	-	31/07/15	Industrial discharge (Intake GL1)	Valid
WT00007130-2010	-	31/07/15	Industrial discharge (Intake BR4)	Valid
WT00007139-2010	-	31/07/15	Industrial discharge (Intake BR6) – SMH17	Valid
WT00007319-2010	_	31/08/15		
Registration of Chemi	cal Waste Pr		industrial disentarge (induce D2)	,
5213-148-D2393-02		N/A	Chemical waste types:	Valid
		1 1/ 2 1	Spent oil	, unu
5213-172-D2393-01		N/A	Chemical waste types:	Valid
		1.111	Spent oil	, uno
			L .	

Permit No.Valid PeriodFromT		Period	= Details	Status
		То	= Detans	Status
Construction Noise	Permit (CNP)			
GW-RS0125-11	24/02/11	23/08/11	/08/11 Construction Noise Permit for the use of powered mechanical equipment for carrying out construction work at Hong Kong West Drainage Tunnel (Eastern Portal) (DSD Contract No. DC/2007/10), Tai Hang Road, Causeway Bay, Hong Kong.	
GW-RS0295-11	14/04/11	Construction Noise Permit for the use of powered mechanical equipment for carrying out construction work and performing		Valid
GW-RS0380-11	03/05/11	02/06/11	prescribed construction work at Hong Kong West Drainage Tunnel (Western Portal), Cyberport Road, Cyberport, Hong Kong (DSD Contract No. DC/2007/10).	vanu
GW-RS0149-11	19/02/11	18/08/11	Construction Noise Permit for the use of powered mechanical equipment for carrying out construction work at a construction site of "Hong Kong West Drainage Tunnel" near Stubbs Road Garden, Wan Chai, Hong Kong	Valid
GW-RS0167-11	19/02/1118/08/11Construction Noise Permit for the use of powered mechanical equipment for carrying out construction work at Section of Pokfulam Road (near Football Field, Pokfulam Road Playground), Hong Kong		Valid	
GW-RS0995-10	30/11/10 30/05/11 powered m out constru Electric Cer		Construction Noise Permit for the use of powered mechanical equipment for carrying out construction work at outside Hongkong Electric Centre, Kennedy Road, Hong Kong	Valid
GW-RS1071-10	09/12/10	08/06/11	Construction Noise Permit for the use of powered mechanical equipment for carrying out construction work and performing prescribed construction work at Junction of Magazine Gap Road and May Road, Mid- levels, Hong Kong.	Valid
GW-RS0244-11	22/03/11	20/09/11	Construction Noise Permit for the use of powered mechanical equipment for carrying out construction work and performing prescribed construction work at main tunnel and adits of Hong Kong West Drainage Tunnel under Wan Chai, Hong Kong.	Valid
GW-RS0341-11	Construction Noise Permit for the use of powered mechanical equipment for carrying out construction work and performing		Valid	

Permit No.	Valid Period		Deteile	Status
Permit No.	From To		= Details	
GW-RS0441-11	23/05/11 22/11/11 Construction Noise Permit for the use of powered mechanical equipment for carrying out construction work and performing prescribed construction work at an area near Lover's Stone Garden at Bowen Road, Wan Chai, Hong Kong.		Valid	
GW-RS0443-11	23/05/11	Construction Noise Permit for the use of powered mechanical equipment for carrying out construction work and performing		Valid
GW-RS0374-11	21/04/11	20/06/11	Construction Noise Permit for the use of powered mechanical equipment for carrying out construction work and performing	

Implementation Status of Environmental Mitigation Measures

5.12 During site inspections in the reporting month, no non-conformance was identified. ET weekly site inspections were carried out during the reporting month and the observations and recommendations are summarized in Table 5.2.

Parameters	Date	Observations and Recommendations	Follow-up	
Reminders	05/05/2011	The Contractor was reminded of the followings: - Clear the oil spillage at spoil basin and two oil drums at Western Portal.	Rectification/improvement was observed during the follow-up audit session.	
	05/05/2011	The Contractor was reminded of the followings:Clear the oil containers and oil spillage at underneath of mobile crane at Intake W3.	Rectification/improvement was observed during the follow-up audit session.	
	05/05/2011	The Contractor was reminded of the followings: - To display CNP and EP at site entrance at SMH17.	Rectification/improvement was observed during the follow-up audit session.	
	05/05/2011	The Contractor was reminded of the followings: - To cover the noisy part of the air receiver at Intake W0.	Rectification/improvement was observed during the follow-up audit session.	
	05/05/2011	The Contractor was reminded of the followings: - Clear the deposited silt and mud at the public road at Intake MB16.	Rectification/improvement was observed during the follow-up audit session.	
	05/05/2011	The Contractor was reminded of the followings: - Clear the stagnant water at H-pile at Intake W10.	Rectification/improvement was observed during the follow-up audit session.	
	05/05/2011	The Contractor was reminded of the followings: - Provide the plug for the drip tray to avoid oil leakage at Intake W10.	Rectification/improvement was observed during the follow-up audit session.	
	05/05/2011	The Contractor was reminded of the followings: - To repair the water pipe to avoid wastage of water at Intake W10.	Rectification/improvement was observed during the follow-up audit session.	
	12/05/2011	The Contractor was reminded of the followings: - Provide the plug for the drip tray to avoid oil leakage at Intake W10.	Rectification/improvement was observed during the follow-up audit session.	
	12/05/2011	The Contractor was reminded of the followings: - Clear the deposited silt and mud at the public road at Intake MB16 and drainage channel at MBD2 respectively.	Rectification/improvement was observed during the follow-up audit session.	
	19/05/2011	The Contractor was reminded of the followings: - Clear the water tube which is not in use at Intake HKU1.	Follow-up action was needed for the item.	
	19/05/2011	The Contractor was reminded of the followings: - Clear the discarded leaves at the drainage channel at the site entrance of Intake W10.	Rectification/improvement was observed during the follow-up audit session.	

Table 5.2 Observations and Recommendations of Site Inspections

Parameters	Date	Observations and Recommendations	Follow-up
	19/05/2011	The Contractor was reminded of the followings: - Provide the plug for the drip tray at Intake MA15.	Rectification/improvement was observed during the follow-up audit session.
	19/05/2011	The Contractor was reminded of the followings: - Clear the deposited mud and silt at the gullies at Intake M3.	Rectification/improvement was observed during the follow-up audit session.
	19/05/2011	The Contractor was reminded of the followings: - To replace the worn sand bags at Intake M3.	Rectification/improvement was observed during the follow-up audit session.
	19/05/2011	The Contractor was reminded of the followings: - To clear the milky water along the u- channel at Intake W3.	Rectification/improvement was observed during the follow-up audit session.
	19/05/2011	The Contractor was reminded of the followings: - To clear the silty water and grease water at Intake DG1.	Rectification/improvement was observed during the follow-up audit session.
	26/05/2011	The Contractor was reminded of the followings: - Provide the plug for the drip tray to avoid oil and grease water leakage at Intake E5A.	Rectification/improvement was observed during the follow-up audit session.
	26/05/2011	The Contractor was reminded of the followings: - To clear the stagnant water and deposited silt along the u-channel at Intake THR2.	Rectification/improvement was observed during the follow-up audit session.
	26/05/2011	The Contractor was reminded of the followings: - The general refuse and C&D waste should be disposed of properly, to avoid storing at near the trees at Intake THR2.	Rectification/improvement was observed during the follow-up audit session.
	26/05/2011	The Contractor was reminded of the followings: - The oil drum should be stored within the drip tray, to avoid oil leakage at Eastern Portal.	Follow-up action was needed for the item.

- 5.13 The monthly IEC audit was carried out on 26th May 2011, the observations were recorded and they are presented as follows:
- 5.14 The last observations were recorded by IEC on 28th April 2011.

<u>26th May 2011</u>

Follow Up Observations:

- Based on photo provided by the Contractor on 24 May 2011, plug was provided for drip tray at W10.
- Based on photo provided by the Contractor on 24 May 2011, stagnant water observed at I-BEAM at HKU1 was cleared.

Observations:

- Oil drums without drip tray were observed at EP near Wetsep. The Contractor was requested to provide rectification measures.
- Drip tray provided for generator was observed without plug at E5A. The Contractor was requested to plug to prevent overflow of grease water.
- Some leaves and construction equipment were observed deposited at u-channel at THR2. The Contractor was requested to clear stuff to prevent channel blockage.
- Some retained trees at THR2 were surrounded by construction materials and equipment. The Contractor was requested to remove the stuff.

Non-compliance Recorded during Site Inspections

5.15 No non-compliance was recorded in the reporting month.

Summary of Mitigation Measures Implemented

- 5.16 The Contractor has implemented the mitigation measures as recommended in the EIA and the updated EM&A Manual in the reporting period except those mitigation measures not applicable at this stage. Status of the implementation of mitigation measures is presented in Table 1.2 and **Appendix J**.
- 5.17 According to the updated EM&A Manual and EP condition, mitigation measures such as noise enclosure and use of quiet PME are required to be implemented.
- 5.18 The actual implementation status of major mitigation measures required under the EP is as follows:
 - Installation of silt curtain during the course of marine works.
 - Provide noise enclosure at Eastern Portal.
 - Submitted the Alternative Plant Inventory (EP condition 2.8(c)).
- 5.19 Alternative plant inventory for the noise performance of plants used in Eastern and Western Portal will be updated from time to time and submitted for ETL's certification and IEC's verification in accordance with EP condition 2.8c.
- 5.20 An updated summary of the EMIS is provided in **Appendix J**.
- 5.21 For the spoil handling works in the Western Portal, the mitigation measures including:
 - Acoustic enclosure for the spoil basin;
 - Sprinkle system underneath the jetty to suppress fugitive dust from unloading spoil; and
 - Side curtains at the jetty to shield the unloading dump truck.

Implementation Status of Event Action Plans

5.22 The Event Action Plans for air quality and noise are presented in **Appendix K**.

Eastern Portal

1-hr TSP Monitoring

- 5.23 No Action/Limit Level exceedance was recorded in the reporting month.
 <u>24-hr TSP Monitoring</u>
- 5.24 No Action/Limit Level exceedance was recorded in the reporting month. <u>Construction Noise</u>
- 5.25 No Action/Limit Level exceedance was recorded in the reporting month.

Western Portal

<u>1-hr TSP Monitoring</u>

5.26 No Action/Limit Level exceedance was recorded in the reporting month.

24-hr TSP Monitoring

5.27 No Action/Limit Level exceedance was recorded in the reporting month.

Construction Noise

5.28 No Action/Limit Level exceedance was recorded in the reporting month.

Water Quality

5.29 Marine water quality monitoring was temporary suspended starting from 31st October 2009.

Construction Ground Borne Noise

5.30 No Limit Level exceedance was recorded.

Intake DG1

Construction Noise

5.31 No Action/Limit Level exceedance was recorded in the reporting month.

Intake E5A

Construction Noise

5.32 No Action/Limit Level exceedance was recorded in the reporting month.

Intake E7

Construction Noise

5.33 No Action/Limit Level exceedance was recorded in the reporting month.

Intake MA14

Construction Noise

5.34 No Action/Limit Level exceedance was recorded in the reporting month.

Intake PFLR1

Construction Noise

5.35 No Action/Limit Level exceedance was recorded in the reporting month.

Intake RR1

Construction Noise

5.36 No Action/Limit Level exceedance was recorded in the reporting month.

Intake THR2

Construction Noise

5.37 No Action/Limit Level exceedance was recorded in the reporting month.

Intake W0

Construction Noise

5.38 No Action/Limit Level exceedance was recorded in the reporting month.

Intake W5

Construction Noise

5.39 No Action/Limit Level exceedance was recorded in the reporting month.

Intake P5

Construction Noise

5.40 No Action/Limit Level exceedance was recorded in the reporting month.

Intake W8

Construction Noise

5.41 No Action/Limit Level exceedance was recorded in the reporting month.

Intake BR6

Construction Noise

5.42 No Action/Limit Level exceedance was recorded in the reporting month.

Intake CR1

Construction Noise

5.43 One Action Level exceedance was recorded due to the complaint received on 30th May 2011.

Intake GL1

Construction Noise

5.44 One Action Level exceedance was recorded due to the complaint received on 30th May 2011.

Summary of Complaint, Warning, Notification of any Summons and Successful Prosecution

5.45 Two environmental complaints were received in the reporting month. For the details, please refer to the following table: -

Complaint No.	Date	Complaint Details
COM-2011-05-210	30 May 2011	The complaint was raised from the resident of Green Lane, who complained about the construction noise at the intake GL1.
COM-2011-05-211	30 May 2011	The complaint was received from the resident of Conduit Tower who complained about the construction noise at the intake CR1. The complainant mainly concerned that the noisy works at Intake CR1 started at 8:00 hrs everyday is too early. He requested to defer the working hours later.

- 5.46 No warning, summon and notification of successful prosecution was received in the reporting month.
- 5.47 From project commencement, there were a total of 88 project-related environmental complaints, no warning, summons and successful prosecution received since the commencement of the Project. The Complaint Log is attached in **Appendix L**.

6. FUTURE KEY ISSUES

Key Issues for the Coming Month

- 6.1 Key environmental issues at Eastern and Western Portals, Intake MA16, MBD2, E5A, E5B, E7, PFLR1, RR1, THR2, SM1, W0, W5, P5, M3, TP4, TP5, TP789, HKU1, W10, W3, W8, MA15, MA17, GL1, HR1, W1, DG1, CR1, BR4, BR5, GL1, MA14 and BR6 in the coming month include:
 - Noise from operation of the equipment, especially for rock-breaking activities, piling works and machinery on-site;
 - Dust generation from stockpiles of dusty materials, excavation works and rock breaking activities;
 - Runoff from exposed slope;
 - Wastewater and runoff discharge from site;
 - Regular removal of silt, mud and sand along u-channels and sedimentation tanks;
 - Review and implementation of temporary drainage system for the surface runoff;
 - Proper storage of construction materials on site;
 - Storage of chemicals/fuel and chemical waste/waste oil on site;
 - Watering for rock breaking activity, soil nailing and on haul road;
 - Accumulation of general and construction waste on site.
- 6.2 The tentative program of major site activities and the impact prediction and control measures for the coming two months, i.e. June 2011 to July 2011 are summarized as follows:

Construction Works	Major Impact Prediction	Control Measures
 Adit excavation at Western Portal, Adit excavation and River Channel excavation at Eastern Portal; West TBM dismantling; Dropshaft pilot hole and reaming on-going at intake HR1, M3, W10 and E5A; Cofferdam construction at Intakes W8, CR1 and P5; Excavation of intake structure at Intakes E7, W3, BR6, W1, W5, BR4, B2, MA14, RR1 and MA17; Permanent Intake structure works at MBD2, THR2, W10, TP5, BR5, PFLR1,GL1, MB16, TP789 and E5B; Dropshaft Lining Works at MBD2; Permanent Adit Lining works at W0, MB16 & MBD2; and Still Chamber lining works at TP4, TP5, TP789 and THR2. 	Air impact (dust) Water quality impact (surface run-off) Noise Impact	 a) Frequent watering of haul road and unpaved/exposed areas; b) Frequent watering or covering stockpiles with tarpaulin or similar means; and c) Watering of any earth moving activities. d) Diversion of the collected effluent to de-silting facilities for treatment prior to discharge to public storm water drains; e) Provision of adequate de-silting facilities for treating surface run-off and other collected effluents prior to discharge; f) Provision of perimeter protection such as sealing of hoarding footings to avoid run-off from entering the existing storm water drainage system via public road; and g) Provision of measures to prevent discharge into the stream. h) Scheduling of noisy construction activities if necessary to avoid persistent noisy operation; i) Controlling the number of plants use on site; j) Regular maintenance of machines; and k) Use of acoustic barriers if necessary.

Monitoring Schedule for the Next Month

6.3 The tentative environmental monitoring schedules for the next month are shown in **Appendix D**.

Construction Program for the Next Month

6.4 The tentative construction program for the Project is provided in **Appendix M**.

7. CONCLUSIONS AND RECOMMENDATIONS

Conclusions

7.1 Environmental monitoring works were performed in the reporting month and all monitoring results were checked and reviewed.

1-hr TSP Monitoring

7.2 All 1-hr TSP monitoring was conducted as scheduled in the reporting month. No Action/Limit Level exceedance was recorded.

24-hr TSP Monitoring

7.3 All 24-hr TSP monitoring was conducted as scheduled in the reporting month. No Action/Limit Level exceedance was recorded.

Construction Noise Monitoring

7.4 All noise monitoring was conducted as scheduled in the reporting month. Two Action Level exceedances were recorded due to the complaints received at Intake GL1 and CR1 respectively.

Construction Ground Borne Noise Monitoring

7.5 All construction ground borne noise monitoring was conducted in the reporting month. No Limit Level exceedance was recorded.

Water Quality

7.6 Marine water quality monitoring was temporary suspended starting from 31st October 2009.

Complaint and Prosecution

7.7 Two environmental complaints and no environmental prosecution were received in the reporting month.

Recommendations

7.8 According to the environmental audit performed in the reporting period, the following recommendations were made:

Air Quality Impact

- To prohibit any open burning on site.
- To regularly maintain the quality of machinery and vehicles on site.
- To implement dust suppression measures on all haul roads, stockpiles, dry surfaces and excavation works.
- To provide hoarding along the entire length of that portion of the site boundary.

Noise Impact

- To inspect the noise sources inside the site.
- To space out noisy equipment and position the equipment as far away as possible from sensitive receivers.
- To provide temporary noise barriers for operations of noisy equipment near the noise sensitive receivers in an appropriate location.

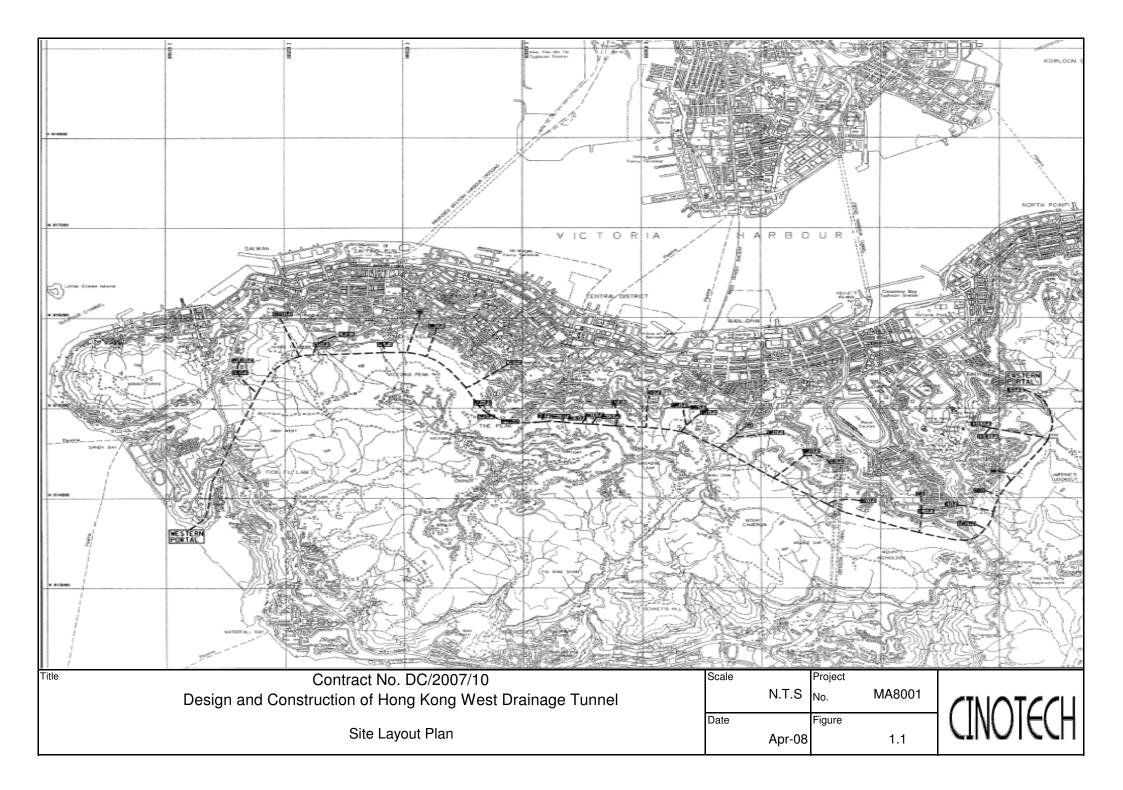
Water Impact

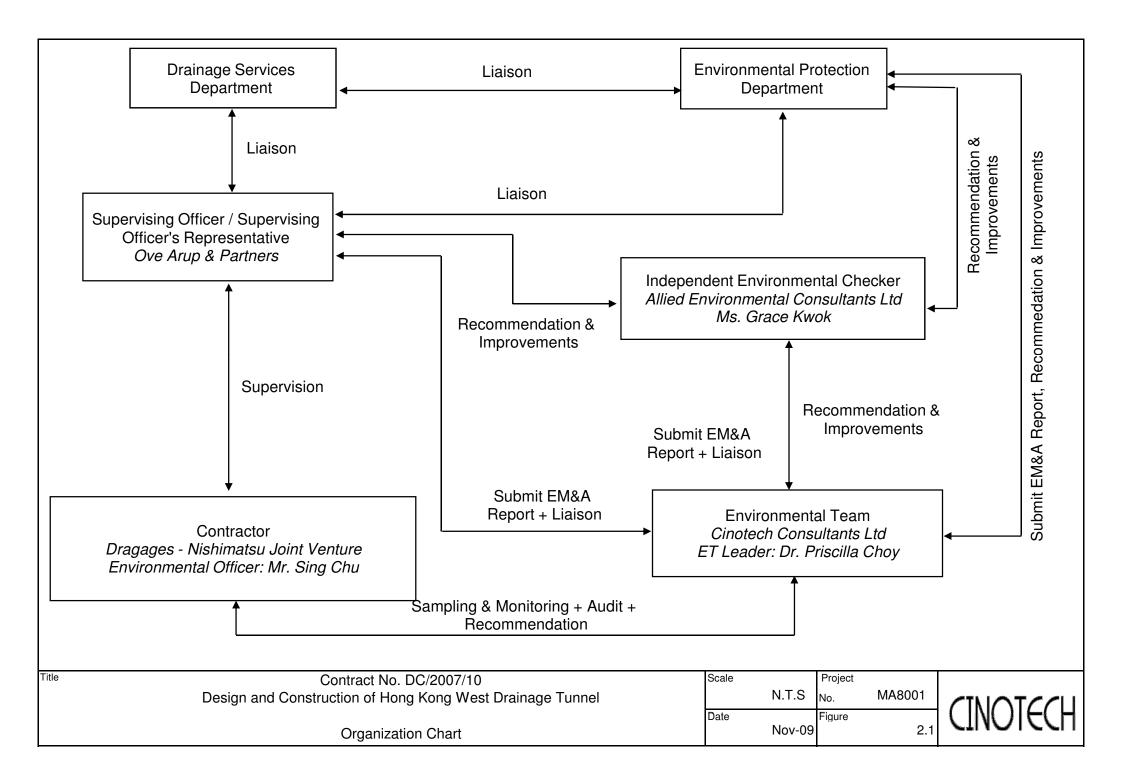
- To prevent any surface runoff discharge into any stream course.
- To review and implement temporary drainage system.
- To identify any wastewater discharges from site.
- To ensure properly maintenance for de-silting facilities.
- To clear the silt and sediment in the sedimentation tanks.
- To review the capacity of de-silting facilities for discharge.
- To divert all the water generated from construction site to de-silting facilities with enough handling capacity before discharge.
- To avoid accumulation of stagnant and ponding water on site.

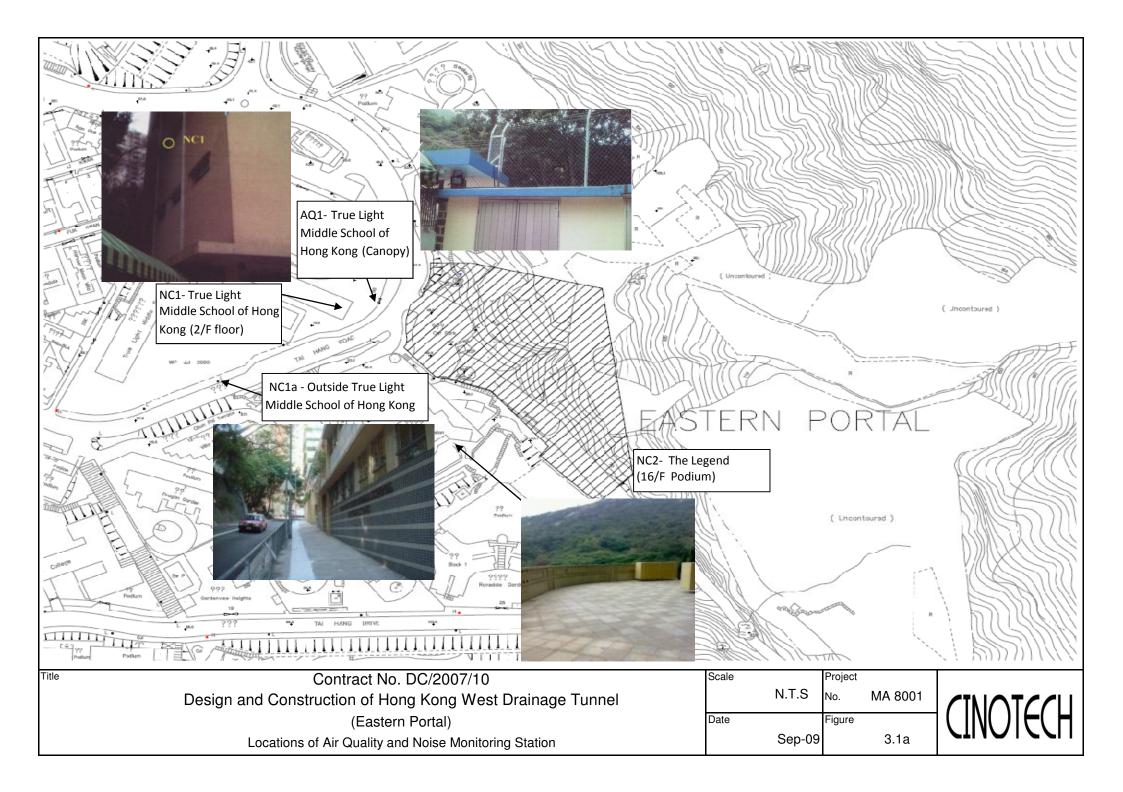
Waste/Chemical Management

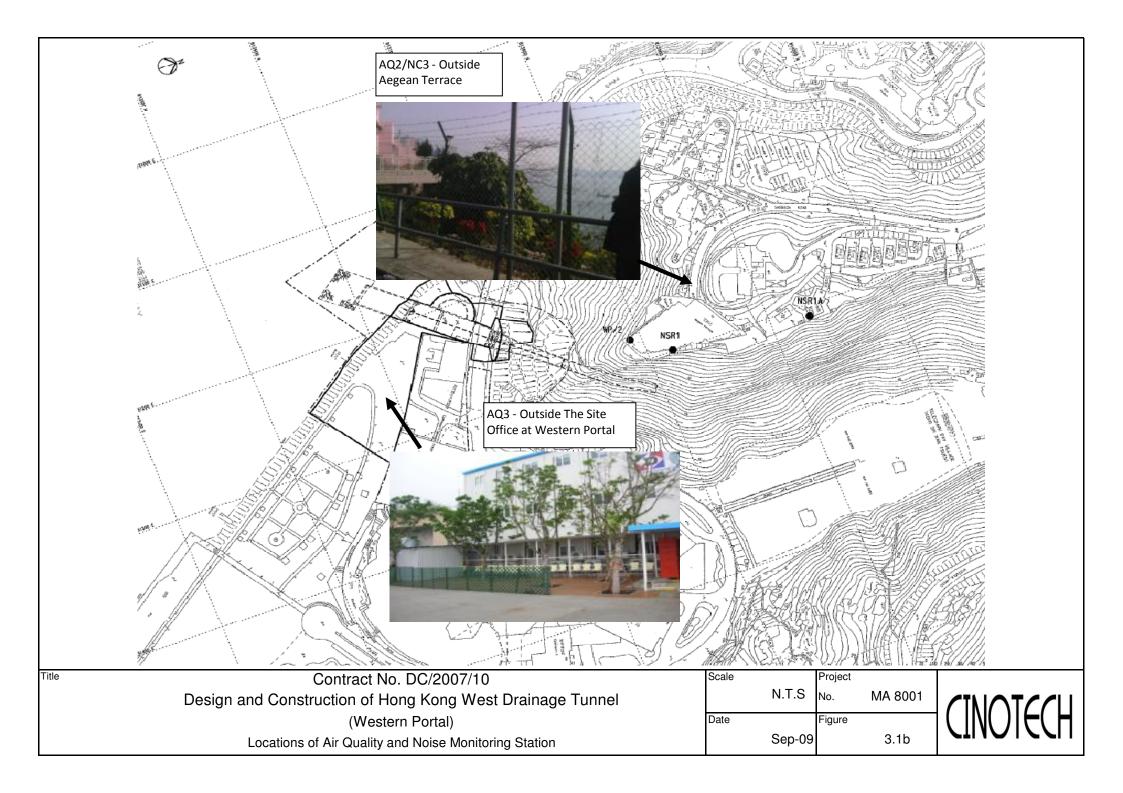
- To check for any accumulation of waste materials or rubbish on site.
- To ensure the performance of sorting of C&D materials at source (during generation);
- To carry out inspection of dump truck at site exit to ensure inert and non-inert C&D materials are properly segregated before removing off site.
- To avoid any discharge or accidental spillage of chemical waste or oil directly from the site.
- To avoid improper handling or storage of oil drum on site.

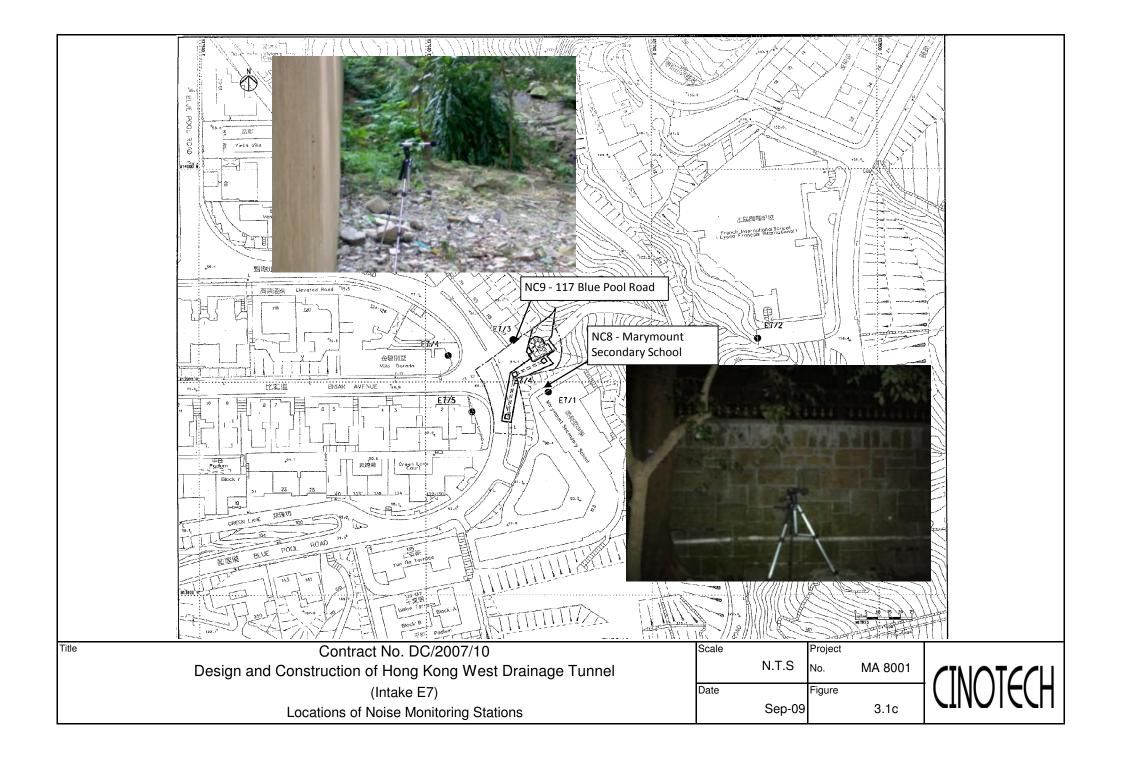
FIGURES

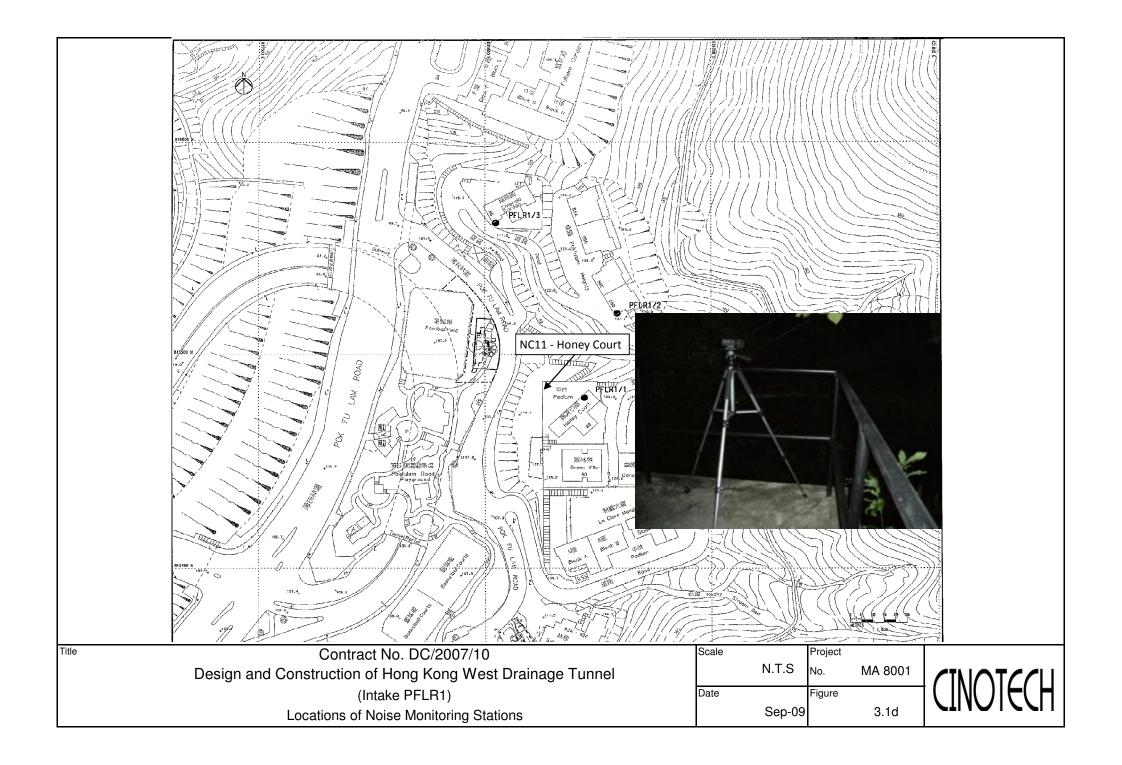




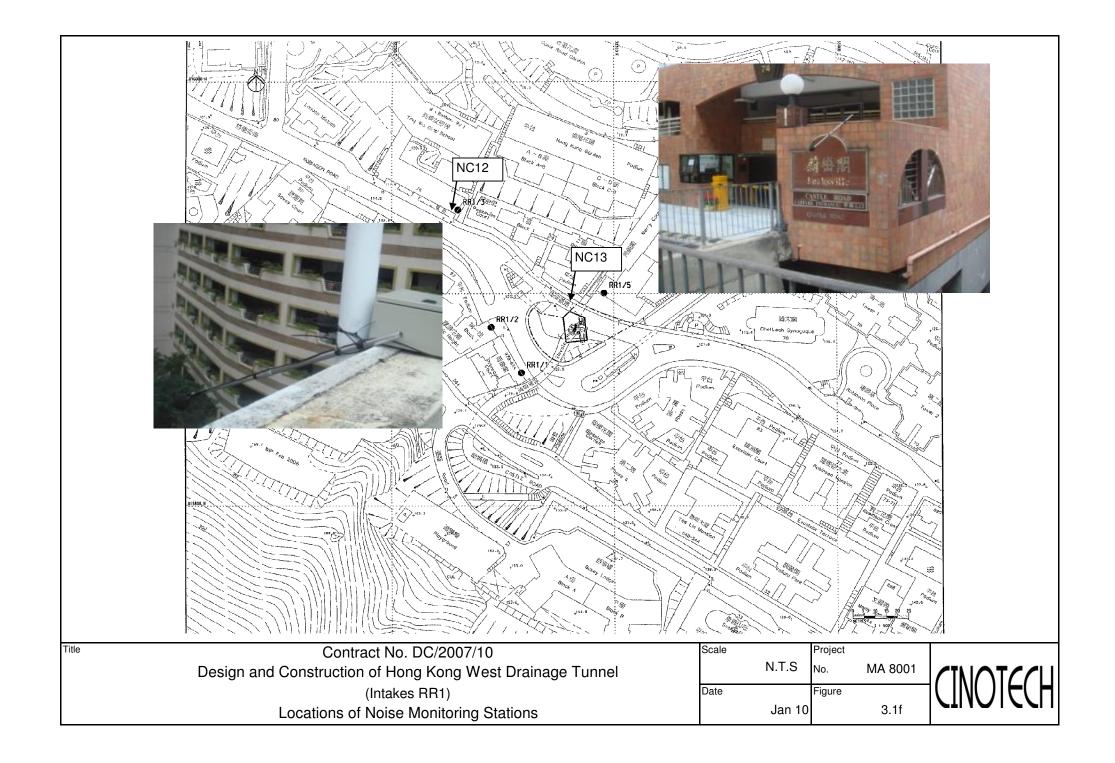


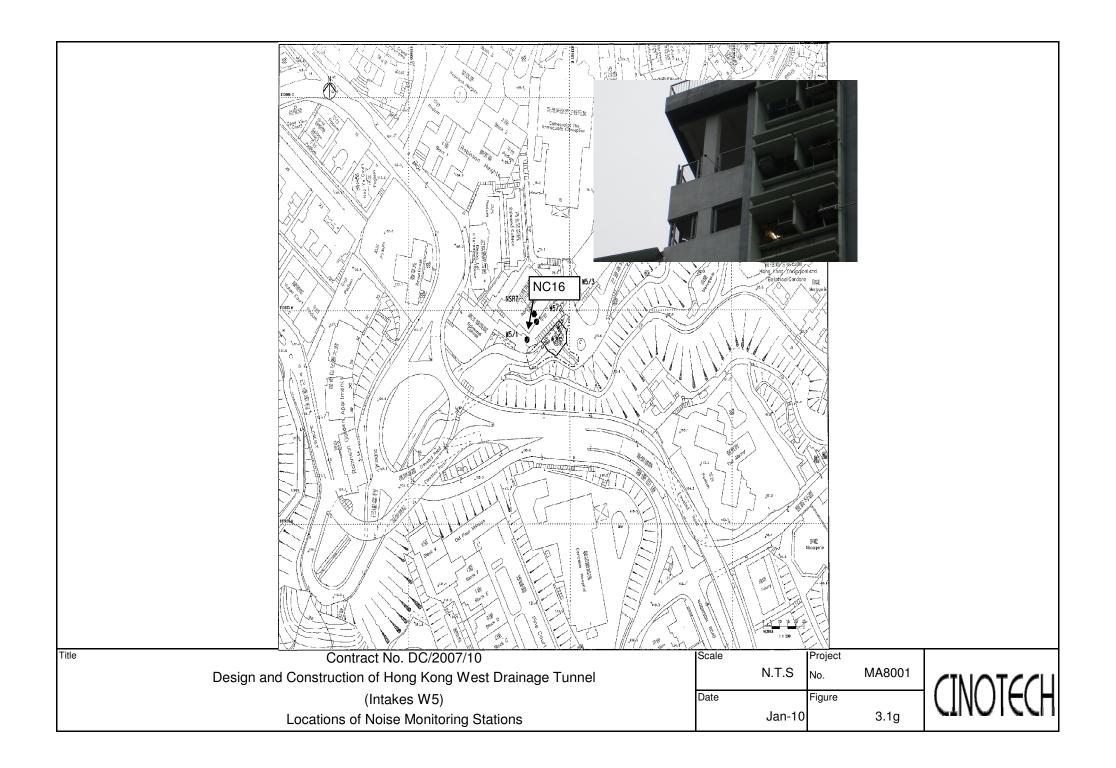


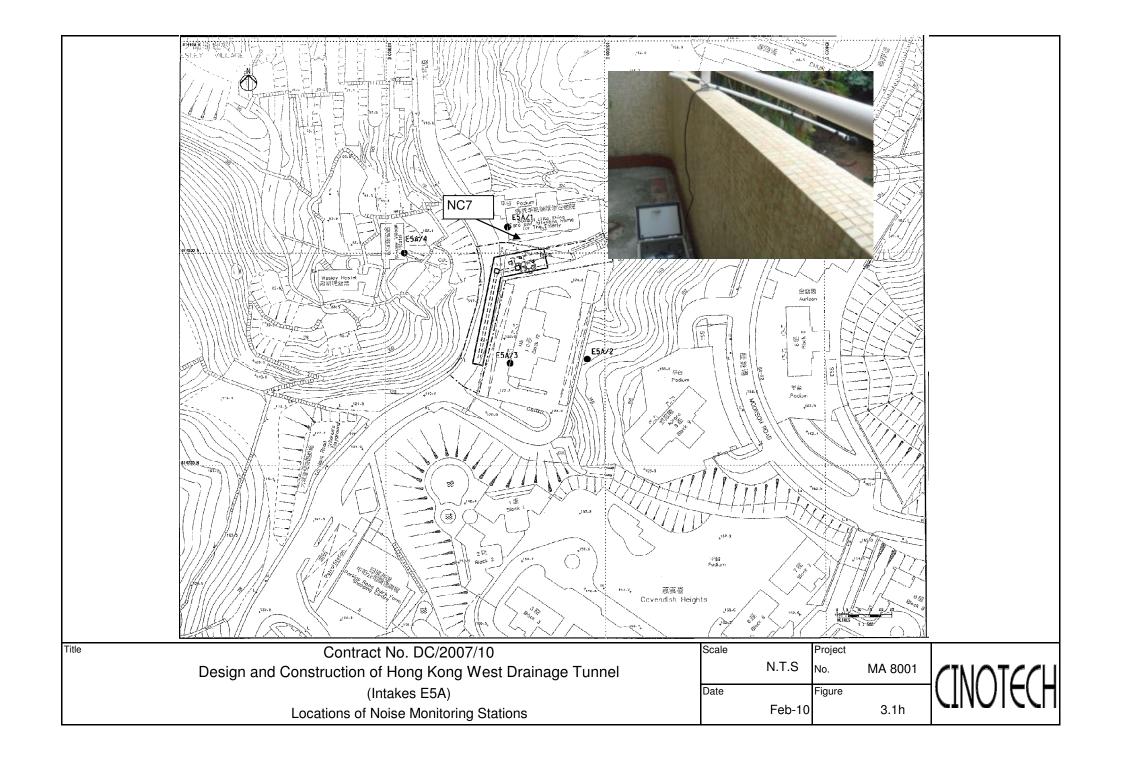


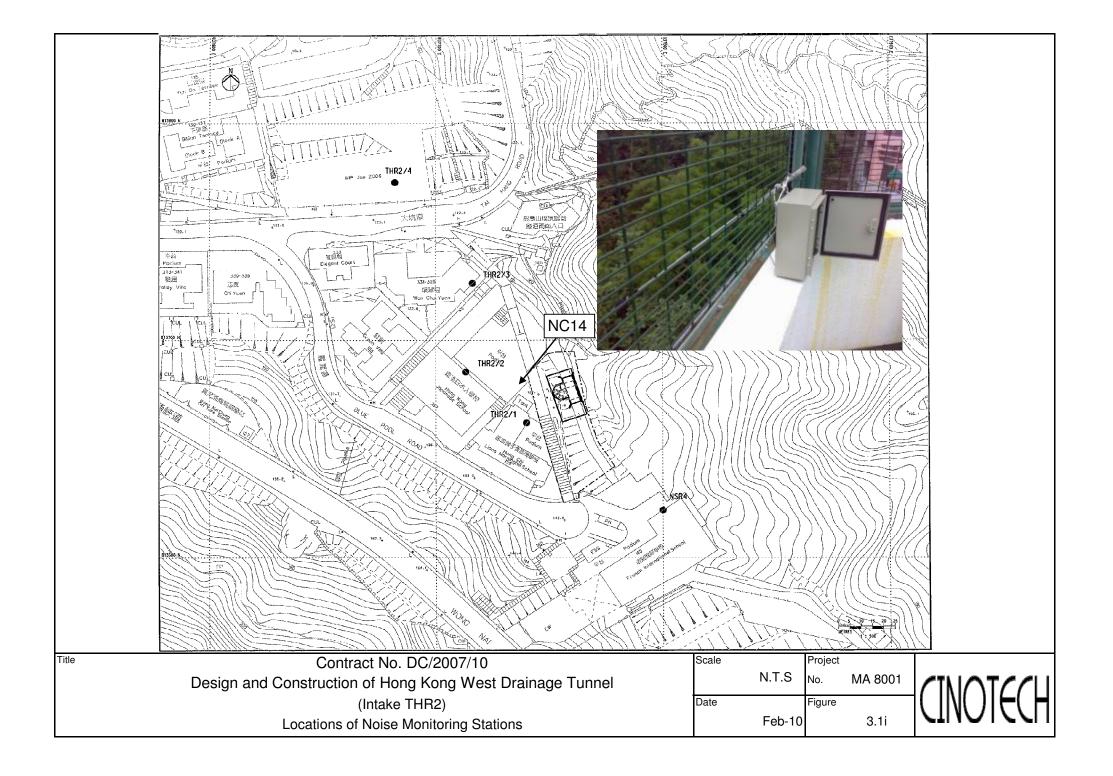


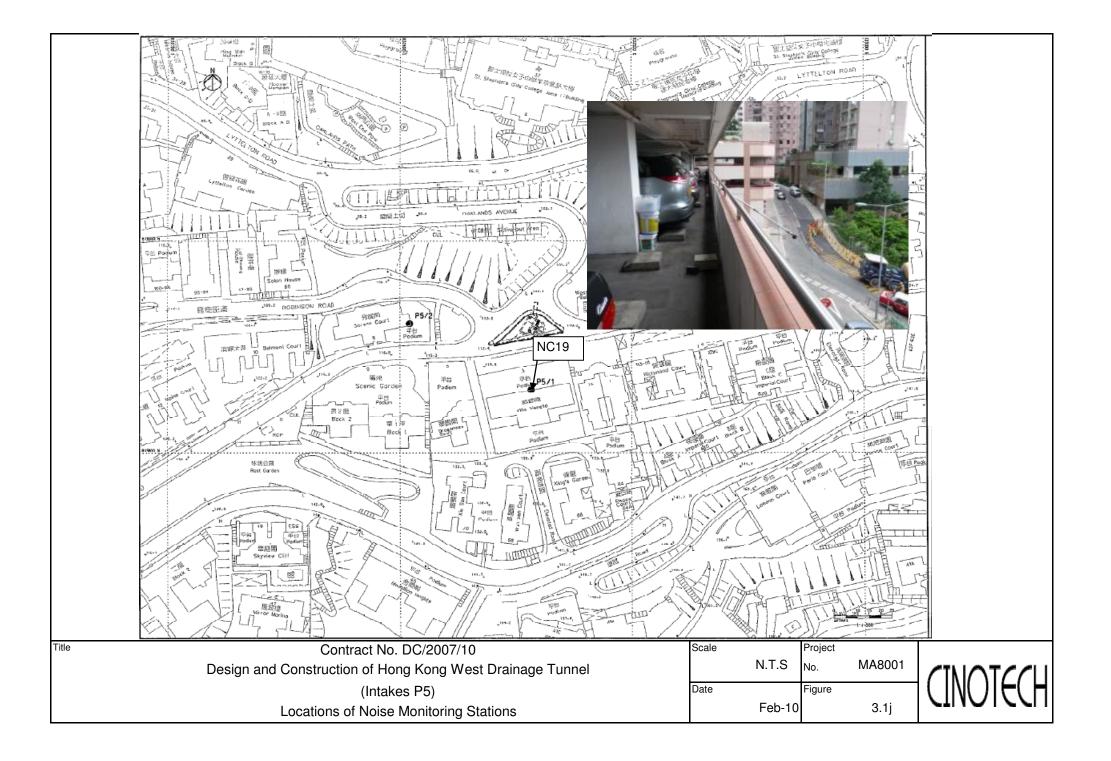


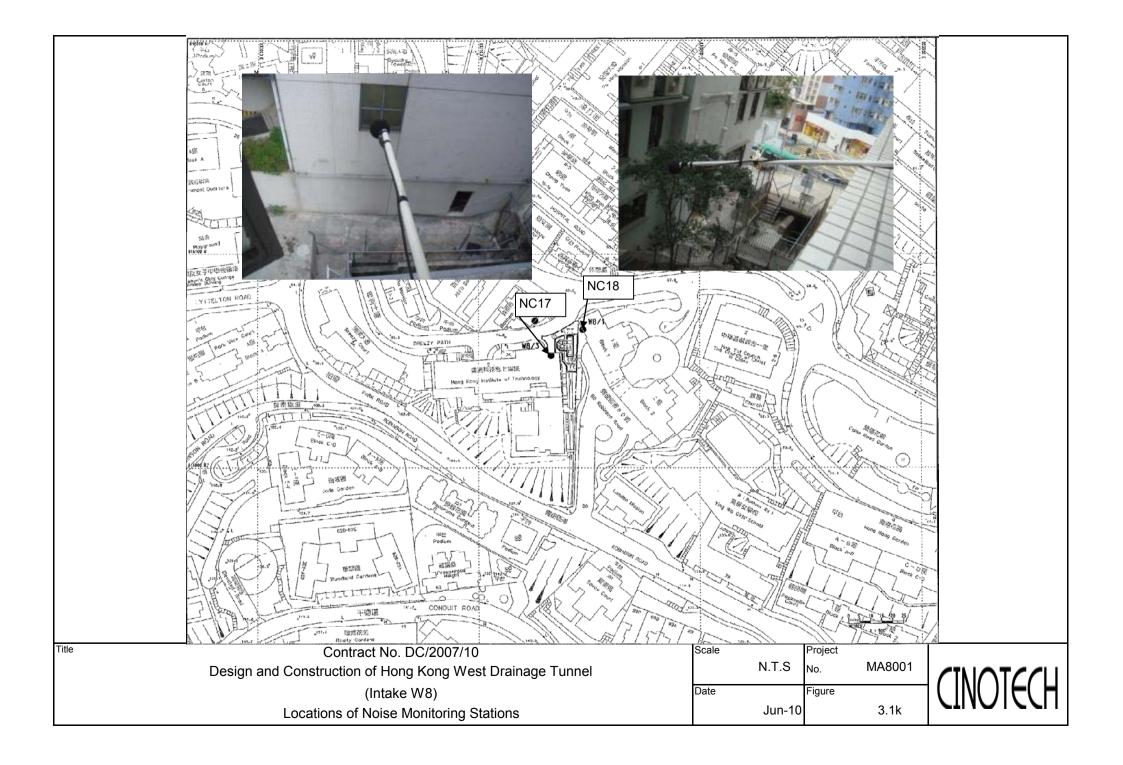




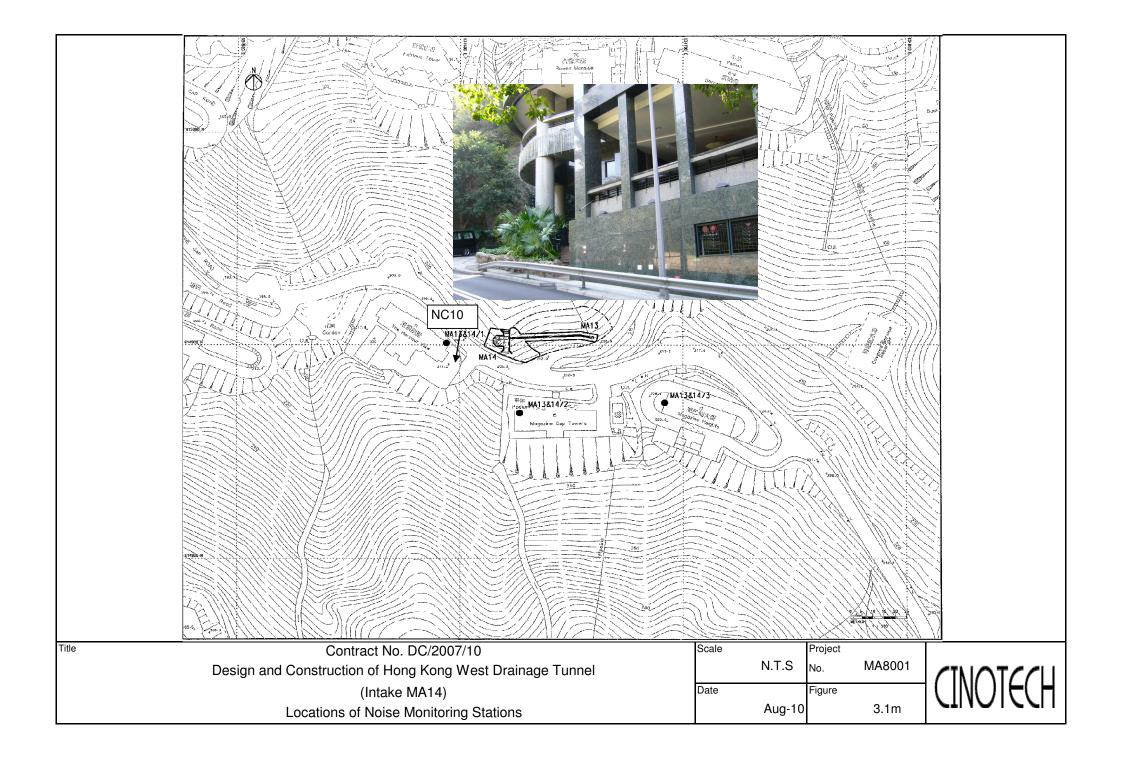


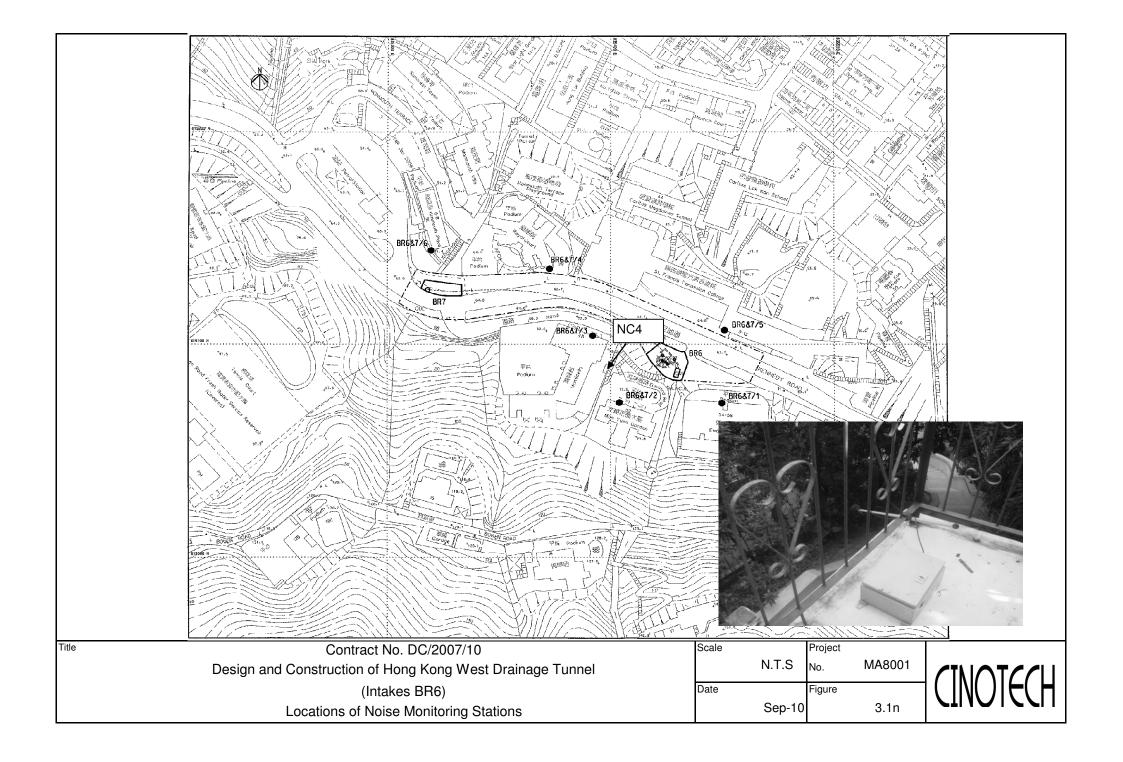


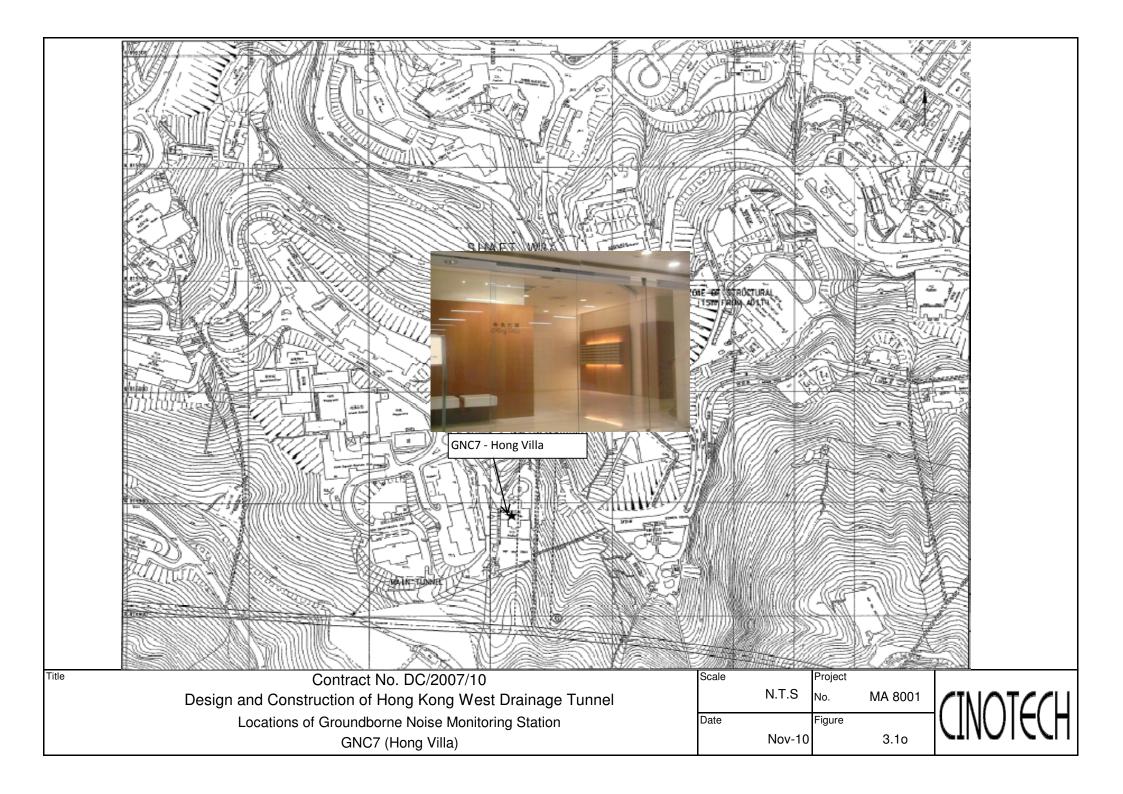


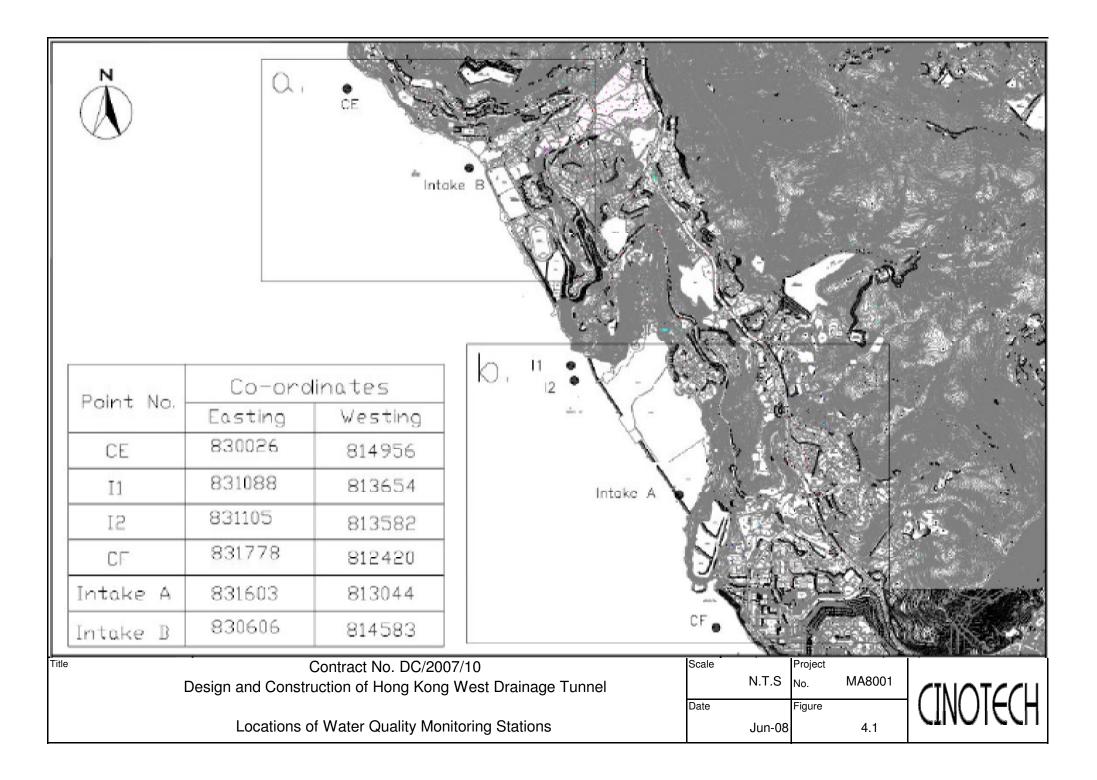


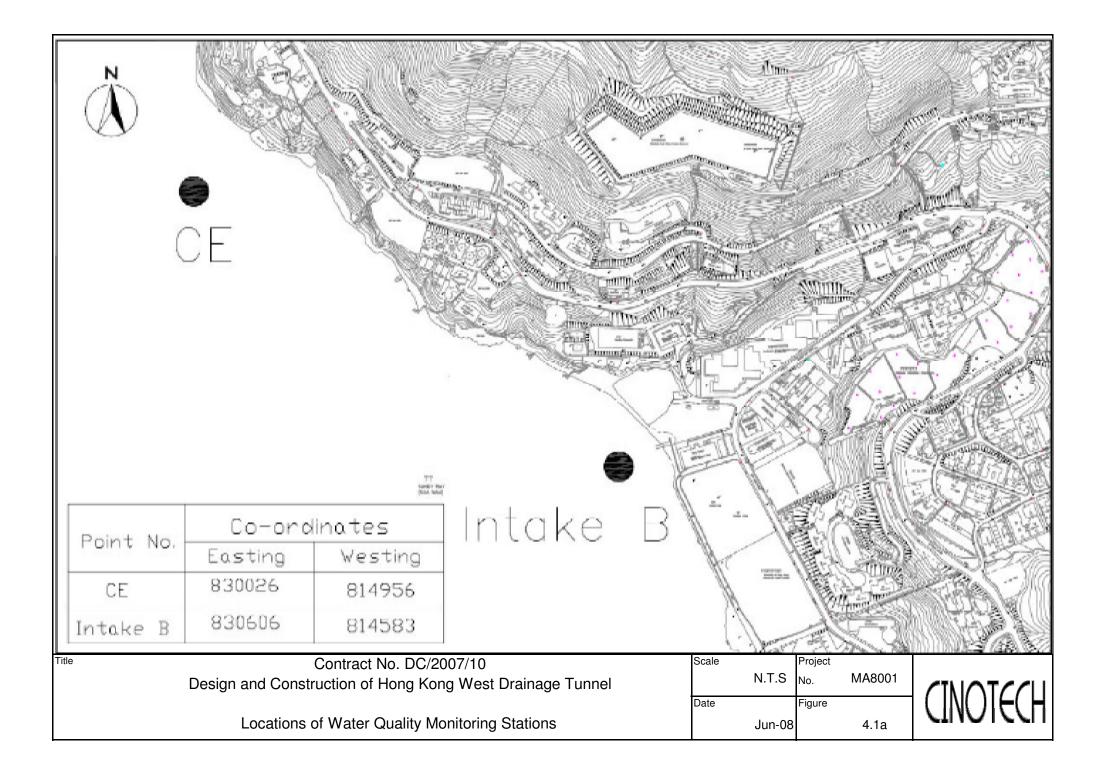


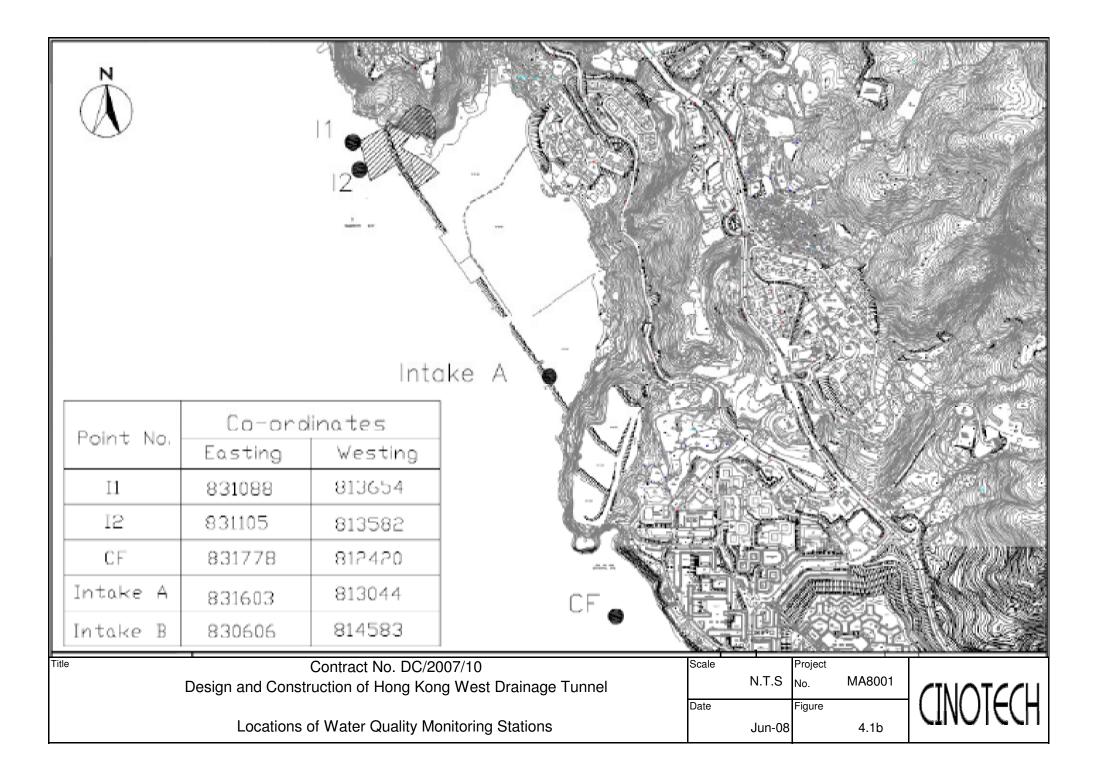


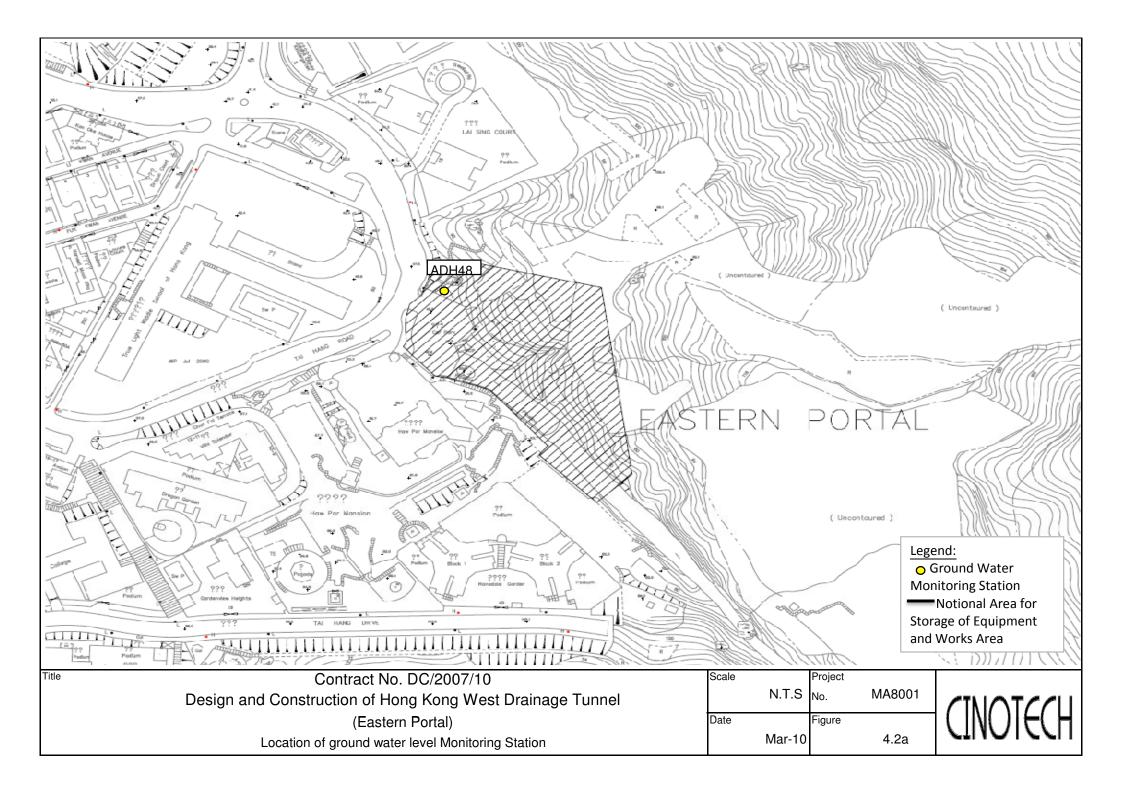


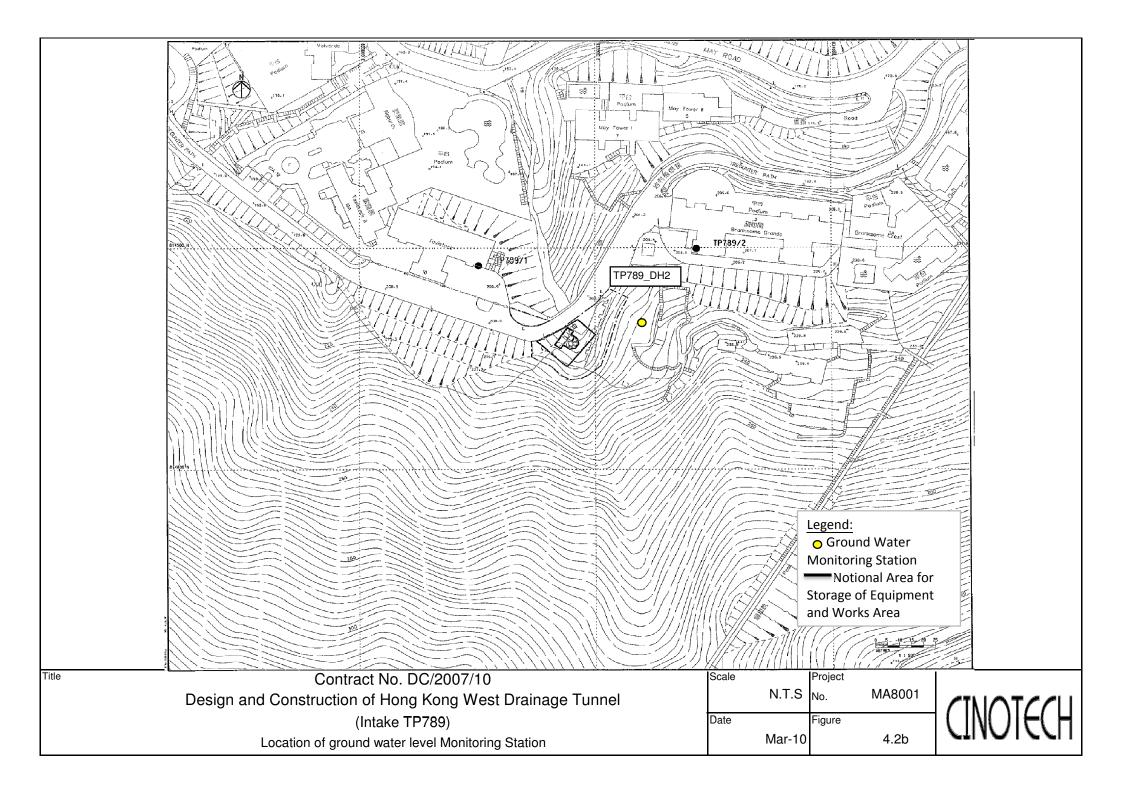


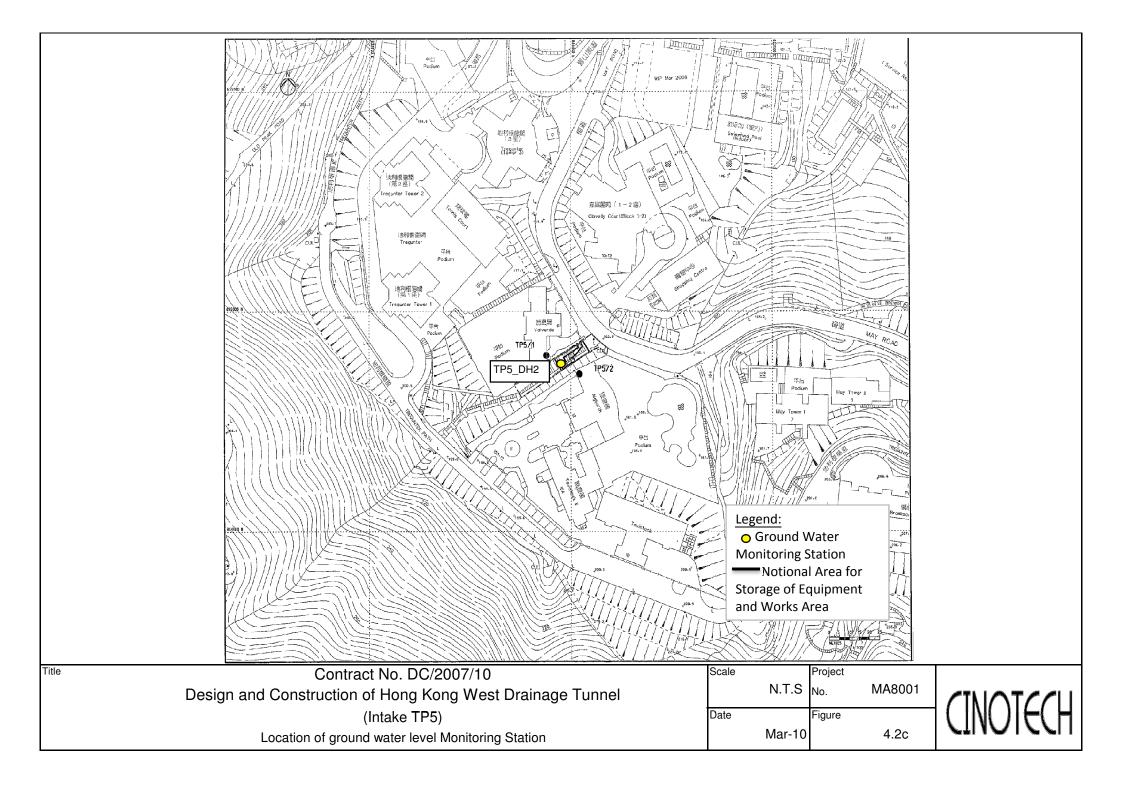


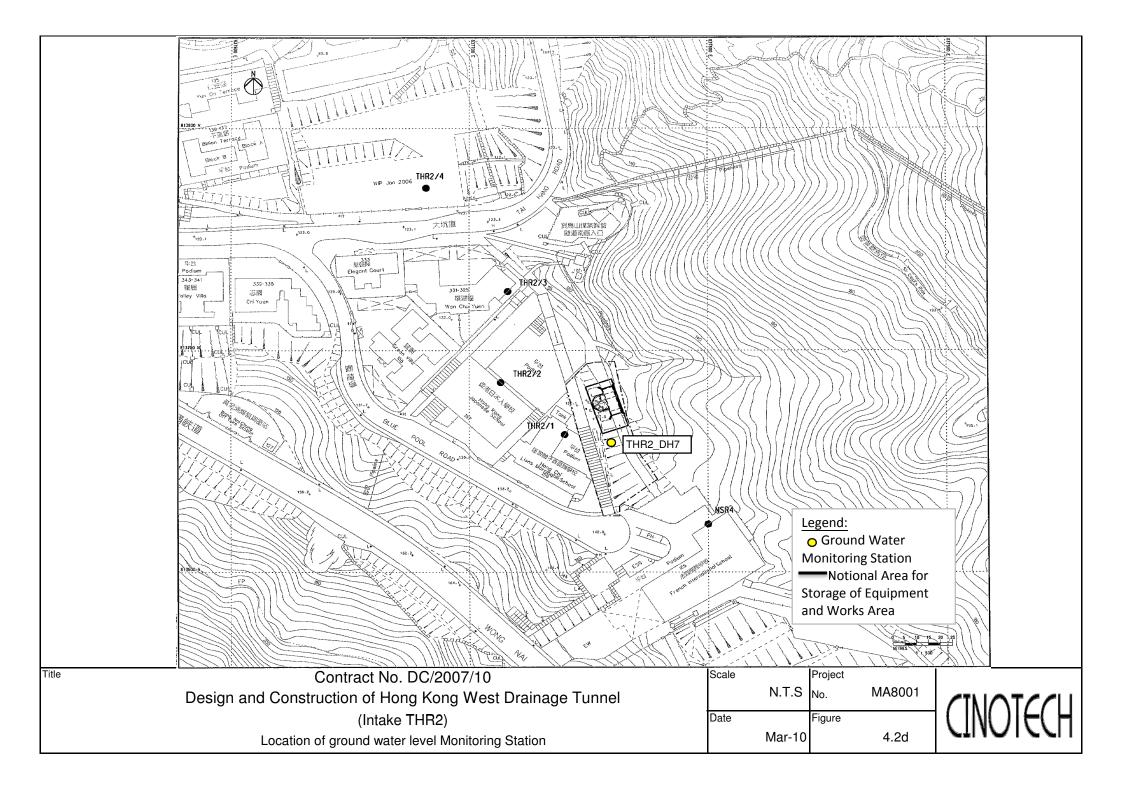


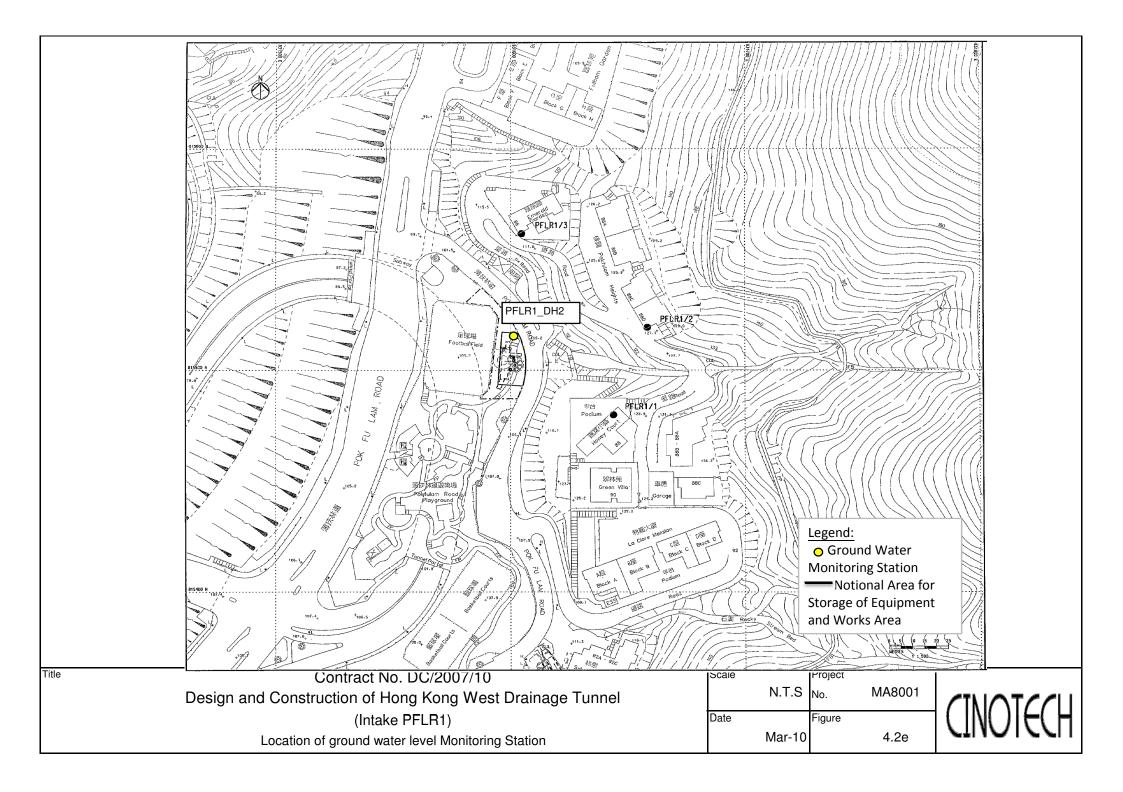












APPENDIX A ACTION AND LIMIT LEVELS

Appendix A - Action and Limit Levels

Location	Action Level, $\mu g/m^3$	Limit Level, µg/m ³
AQ1	345	500
AQ2	321	500

Table A-1 Action and Limit Levels for 1-Hour TSP

Table A-2 Action and Limit Levels for 24-Hour TSP

Location	Action Level, µg/m ³	Limit Level, µg/m ³
AQ1	201	260
AQ3	156	200

Action and Limit Levels for Construction Noise Table A-3

Time Period	Action Level	Limit Level
0700-1900 hrs on normal weekdays		75* dB(A)
0700-2300 hrs on holidays; and 1900- 2300 hrs on all other days	When one documented complaint is received	60/65/70** dB(A)
2300-0700 hrs of next day	··· r ·· ···	45/50/55** dB(A)

(*) reduce to 70 dB(A) for schools and 65 dB(A) during school examination periods.
 (**) to be selected based on Area Sensitivity Rating.

Table A-4 Action and Limit Levels for Water Quality

Parameter		Action	Limit
DO, mg/L	Surface and Middle	6.3	6.2
	Bottom	6.0	5.8
SS, mg/L		15.7 or 120% of upstream control station's SS at the same tide of the same day	16.4 or 130% of SS readings at the upstream control station at the same tide of same day and specific sensitive receiver water quality requirements
Turbidity, NTU		10.2 or 120% of upstream control station's turbidity at the same tide of the same day	11.1 or 130% of turbidity at the upstream control station at the same tide of same day

APPENDIX B COPIES OF CALIBRATION CERTIFCATES

High-Volume TSP Sampler 5-POINT CALIBRATION DATA SHEET

CINOTECH

			· ·			File No	MA8001/44/0021
Station	AQ1 - True Ligh	nt Middle School	of Hong Kong	Operator:	WК		-
Date:	27-A	pr-11		Next Due Date:	26-Jun	-11	_
Equipment No.:	A-0	1-44		Serial No.	1316		-
t turur e		······	Ambient	Condition	National and	<u>.</u>	a de la companya
Temperati	ure, Ta (K)	298.9	Pressure, Pa	a (mmHg)		760.2	
en en egylene. Hereitettettettettettettettettettettettette		0	ifice Transfer St	andard Inform	nation	ejska-je če	
Equipm	ent No.:	A-04-01	Slope, mc	0.0462	Intercep		-0.0163
Last Calibr	ation Date:	11-Oct-10			bc = [ΔH x (Pa/76		
Next Calibr	ration Date:	9-Oct-11		Qstd = {[ΔH	x (Pa/760) x (298	/Ta)] ^{1/2} -bc}	/ mc
	n de la compañía de Transmismo de la compañía de la comp		Calibration of	TSP Sampler	, in a straight an an agu	e e salasido 	
Calibration		Or	fice			HVS	
Point	ΔH (orifice), in. of water	[ДН x (Pa/76	0) x (298/Ta)] ^{1/2}	Qstd (CFM) X - axis	ΔW (HVS), in. of oil		760) x (298/Ta)] ^{1/2} Y- axis
1	11.5		3.39	73.65	7.8		2.79
2	9.5		3.08	66.98	6.4		2.53
3	7.3		2.70	58.75	4.9		2.21
4	5.0	2	2.23	48.69	3.3		1.81
5	3.2		.79	39.02	1.9		1.38
Slope , mw = Correlation c *If Correlation (· · · · · · · · · · · · · · · · · · ·	0.9 0, check and reca	994 Ilibrate.	-	-0.18(
			Set I Unit V	Calculation			
	ield Calibration C						
From the Regres	ssion Equation, the	e "Y" value acco	rding to				
Therefore, S	et Point; W = (m		$Qstd + bw = [\Delta W]$ $x (760 / Pa) x (7)$		298/Ta)] ^{1/2} 2.44		
Remarks:							
Conducted by: Checked by:	Wk Tang	Signature: Signature:	Kwo	n.	• •	Date: Date:	27/4/11 27 April 2011

High-Volume TSP Sampler 5-POINT CALIBRATION DATA SHEET

CINOTECH

File No. MA8001/18/0020 Station AQ3 - Outside Site Office (Western Portal) Operator: WK Date: 27-Apr-11 26-Jun-11 Next Due Date: Equipment No.: A-01-18 0723 Serial No. Ambient Condition Temperature, Ta (K) 299 Pressure, Pa (mmHg) 760 Orifice Transfer Standard Information Equipment No.: A-04-01 Slope, mc 0.0462 Intercept, bc -0.0163 mc x Qstd + be = $[\Delta H x (Pa/760) x (298/Ta)]^{1/2}$ Last Calibration Date: 11-Oct-10 Qstd = { $[\Delta H \times (Pa/760) \times (298/Ta)]^{1/2}$ -bc} / mc Next Calibration Date: 9-Oct-11 **Calibration of TSP Sampler** Orfice HVS Calibration ΔH (orifice), Ostd (CFM) $[\Delta W \times (Pa/760) \times (298/Ta)]^{1/2}$ Y-ΔW [ΔH x (Pa/760) x (298/Ta)]^{1/2} Point in. of water X - axis (HVS), in. of oil axis 1 11.4 3.37 73.31 7.7 2.77 2 9.8 68.00 3.13 6.5 2.55 3 7.5 2.73 59.53 5.0 2.23 4 5.3 2.30 50.10 3.2 1.79 5 3.3 1.81 39.61 2.1 1.45 By Linear Regression of Y on X Intercept, bw -0.1594 Slope , mw = 0.0398 Correlation coefficient* = 0.9984 *If Correlation Coefficient < 0.990, check and recalibrate. Set Point Calculation From the TSP Field Calibration Curve, take Qstd = 43 CFM mw x Qstd + bw = $[\Delta W x (Pa/760) x (298/Ta)]^{1/2}$ Therefore, Set Point; W = $(mw \times Qstd + bw)^2 \times (760 / Pa) \times (Ta / 298) =$ 2.42 Remarks:

From the Regression Equation, the "Y" value according to

Conducted by: ______ Signature: ______ Signature: Kewon Date: Date:



1 of 1

TEST REPORT

APPLICANT:	Cinotech Consultants Limited	Test Report No.:	C/11/110503
	Room 1710, Technology Park,	Date of Issue:	2011-05-03
	18 On Lai Street,	Date Received:	2011-04-29
	Shatin, NT, Hong Kong	Date Tested:	2011-04-29
		Date Completed:	2011-05-03
		Next Due Date:	2012-05-02

ATTN:

Mr. Henry Leung

Certificate of Calibration

Page:

Item for calibration:

Description	: RS232 Integral Vane Digital Anemometer
Manufacturer	: AZ Instrument
Model No.	: AZ8904
Serial No.	: 974835
Equipment No.	: A-03-03
ditions:	

Test conditions:

Room Temperature	: 23 degree Celsius
Relative Humidity	: 65%
Pressure	: 101.3 kPa

Methodology:

The anemometer 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:

	Reference Set Point	Instrument Readings
Measuring Air Velocity, m/s	2.00	2.00
Temperature, °C	21.0	21.0

PREPARED AND CHECKED BY: For and On Behalf of WELLAB Ltd.

PATRICK TSE Laboratory Manager



TEST REPORT

DescriptionCalibration OrificeSerial No.1536Model No.G25ADate11 October 2010

Manufacturer Temperature,Ta (K) Pressure, Pa (mmHg) Thermo Andersen 295 751.5

Plate	Diff.Vol (m ³)	Diff.Time (min)	Diff.Hg (mm)	Diff.H₂O (in.)
1	1.00	1.3050	3.8	1.50
2	1.00	0.9250	7.6	3.00
3	1.00	0.8540	8.9	3.50
4	1.00	0.7530	11.4	4.50
5	1.00	0.6210	16.5	6.50

DATA TABULATION

Vstd	(X axis) Qstd	(Y axis)		
0.9938	0.7615	1.2240		
0.9888	1.0689	1.7311		
0.9870	1.1558	1.8698		
0.9837	1.3064	2.1201		
0.9769	1.5732	2.5481		
Y axis= SQRT[H ₂ O(Pa/760)(298/Ta)]				

Qstd Slope (m) = 1.63228

Intercept (b) = -0.01631

 $Coefficient(r) = \underline{0.99998}$

Va	(X axis) Qa	(Y axis)		
0.9949	0.7624	0.7674		
0.9899	1.0701	1.0852		
0.9882	1.1571	1.1722		
0.9848	1.3079	1.3291		
0.9780	1.5749	1.5974		
Y axis= SQRT[H ₂ O(Ta/Pa)]				

 $axis = SQRI[H_2O(Ia/Pa)]$ Oa Slope(m) = 1.02211

wa Siope (m)		1.04411
Intercept (b)	Ξ	-0.01022
Coefficient (r)	Π	0.99998

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

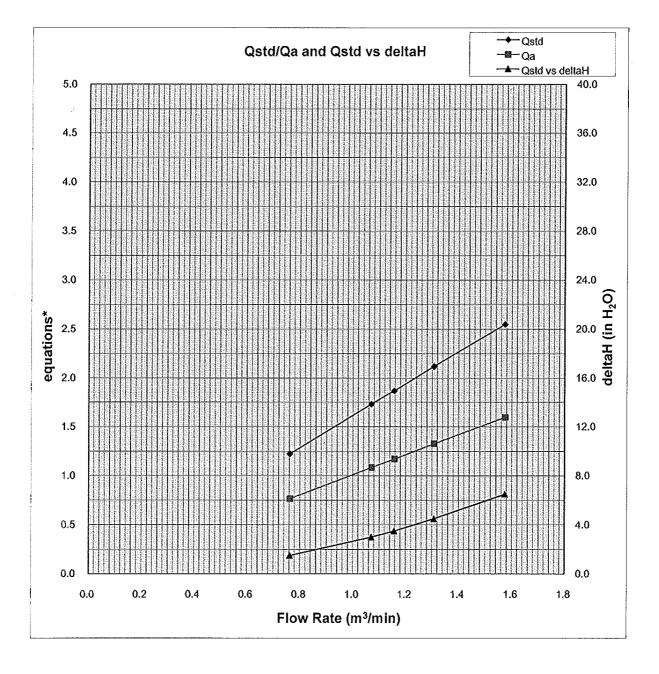
> PREPARED AND CHECKED BY: For and On Behalf of WELLAB Ltd.

atthe

PATRICK TSE Laboratory Manager



TEST REPORT



Y-axis equations:

Qstd series: SQRT[Δ H(Pa/Pstd)(Tstd/Ta)]

Qa series: SQRT[\triangle H(Ta/Pa)]



2011-06-25

1 of 1

TEST REPORT

Next Due Date:

Page:

APPLICANT:	Cinotech Consultants Limited	Test Report No.:	C/110421/3
	Room 1710, Technology Park,	Date of Issue:	2011-04-26
	18 On Lai Street,	Date Received:	2011-04-21
	Shatin, NT, Hong Kong	Date Tested:	2011-04-21
		Date Completed:	2011-04-26

ATTN:

Mr. W. K. Tang

Certificate of Calibration		
Item for Calibration:		
Description	: Laser Dust Monitor	
Manufacturer	: Sibata	
Model No.	: LD-3B	
Serial No.	: 095029	
Sensitivity (K) 1 CPM	: 0.001 mg/m ³	
Sen. Adjustment Scale Setting	: 551 CPM	
Equipment No.	: A-02-10	
Test Conditions:		
Room Temperature	: 22 degree Celsius	
Relative Humidity	: 66%	

Test Specifications & Methodology:

Instruction and Operation Manual High Volume Sampler, Andersen Samplers, Inc.
 In-house method in according to the instruction manual: The Laser Dust Monitor was compared with a calibrated High Volume Sampler and the result was used to generate the Correlation Factor (CF) between the Laser Dust Monitor and High Volume Sampler.

Results:

Correlation Factor (CF)	0.0030
****	****

PREPARED AND CHECKED BY: For and On Behalf of WELLAB Ltd.

PATRICK TSE Laboratory Manager



TEST REPORT **Cinotech Consultants Limited** Test Report No.: C/N/100924/3 **APPLICANT:** Room 1710, Technology Park, Date of Issue: 2009-09-24 18 On Lai Street, Date Received: 2010-09-22 Shatin, NT, Hong Kong Date Tested: 2010-09-22 Date Completed: 2010-09-24 Next Due Date: 2011-09-23 ATTN: 1 of 1 Mr. Henry Leung Page: **Certificate of Calibration** Item for calibration: Description : 'SVANTEK' Integrating Sound Level Meter Manufacturer : SVANTEK Model No. : SVAN 955 Serial No. : 12563 Microphone No. : 34377 Equipment No. : N-08-03 **Test conditions:** Room Temperatre : 22 degree Celsius **Relative Humidity** : 59% **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.

42h 1

PATRICK TSE Laboratory Manager



TEST REPORT APPLICANT: Cinotech Consultants Limited Test Report No.: C/N/110117/1 Date of Issue: Room 1710, Technology Park, 2011-01-17 18 On Lai Street, Date Received: 2011-01-14 Shatin, NT, Hong Kong Date Tested: 2011-01-14 Date Completed: 2011-01-17 Next Due Date: 2012-01-16 ATTN: Mr. Henry Leung Page: 1 of 1 **Certificate of Calibration** Item for calibration: Description : 'SVANTEK' Integrating Sound Level Meter Manufacturer : SVANTEK Model No. : SVAN 955 Serial No. : 14302 Microphone No. : 17204 Equipment No. : N-08-04 **Test conditions:** Room Temperatre : 22 degree Celsius **Relative Humidity** : 58% **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

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PATRICK TSE Laboratory Manager



TEST REPORT Test Report No.: **APPLICANT: Cinotech Consultants Limited** C/N/110124/1 Room 1710, Technology Park, Date of Issue: 2011-01-24 18 On Lai Street, Date Received: 2011-01-21 Shatin, NT, Hong Kong Date Tested: 2011-01-21 Date Completed: 2011-01-24 Next Due Date: 2012-01-23 ATTN: Mr. Henry Leung Page: 1 of 1 **Certificate of Calibration** Item for calibration: Description : 'SVANTEK' Integrating Sound Level Meter Manufacturer : SVANTEK Model No. : SVAN 955 Serial No. : 14303 Microphone No. : 17204 Equipment No. : N-08-05 **Test conditions:** Room Temperatre : 23 degree Celsius **Relative Humidity** : 55%. **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

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TEST REPORT APPLICANT: Cinotech Consultants Limited Test Report No.: C/N/100904/1 Room 1710, Technology Park, Date of Issue: 2010-09-04 18 On Lai Street, Date Received: 2010-09-03 Shatin, NT, Hong Kong Date Tested: 2010-09-03 Date Completed: 2010-09-04 Next Due Date: 2011-09-03 ATTN: Mr. Henry Leung Page: 1 of 1 Certificate of Calibration Item for calibration: Description : 'SVANTEK' Integrating Sound Level Meter Manufacturer : SVANTEK Model No. : SVAN 955 Serial No. :21139 Microphone No. : 43690 Equipment No. : N-08-06 **Test conditions:** Room Temperatre : 23 degree Celsius **Relative Humidity** :65% **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

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PATRICK TSE Laboratory Manager



APPLICANT:	Cinotech Consultants Room 1710, Technolog		Test Report No.: Date of Issue:	C/N/101115/1 2010-11-15
	18 On Lai Street,	5, ~ ~ ~ ~ ,	Date Received:	2010-11-12
	Shatin, NT, Hong Kon	ıg	Date Tested:	2010-11-12
			Date Completed: Next Due Date:	2010-11-15 2011-11-14
ATTN:	Mr. Henry Leung		Page:	1 of 1
Item for calibra	tion:			
1	Description	: Acoustic	al Calibrator	
1	Manufacturer	: Brüel &]	Kjær	
1	Model No.	: 4231		
S	Serial No.	: 2326353		
l	Project No.	: C13		
ł	Equipment No.	: N-02-01		
Test conditions	1			
I	Room Temperatre	: 22 degree	e Celsius	

Methodology:

The sound 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	$114.0 \pm 0.1 \text{ dB}$

PREPARED AND CHECKED BY: For and On Behalf of WELLAB Ltd.

PATRICK TSE Laboratory Manager



Test Report No.: C/N/100902-3 **APPLICANT: Cinotech Consultants Limited** Date of Issue: 2010-09-02 Room 1710, Technology Park, Date Received: 2010-09-01 18 On Lai Street, Shatin, NT, Hong Kong Date Tested: 2010-09-01 Date Completed: 2010-09-02 Next Due Date: 2011-09-01 ATTN: Mr. Henry Leung Item for calibration: : Acoustical Calibrator Description Manufacturer : Brüel & Kjær Model No. : 4231 Serial No. : 2412367

TEST REPORT

Test conditions:

Room Temperatre Relative Humidity

Equipment No.

: 23 degree Celsius : 65%

: N-02-03

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 Laboratory Manager



TEST REPORT				
APPLICANT:	Cinotech Consultants Limited Room 1710, Technology Park,	Test Report No.: Date of Issue:	C/N/100924/2 2010-09-24	
	18 On Lai Street,	Date Received:	2010-09-22	
	Shatin, NT, Hong Kong	Date Tested:	2010-09-22	
		Date Completed:	2010-09-24	
		Next Due Date:	2011-09-23	
ATTN:	Mr. Henry Leung	Page:	1 of 1	

Item for calibration:

Description: Acoustical CalibratorManufacturer: SVANTEKModel No.: SV30ASerial No.: 10929Equipment No.: N-09-01

Test conditions:

Room Temperatre Relative Humidity : 22 degree Celsius : 59%

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 Laboratory Manager

APPENDIX C WIND DATA

Appendix C -	Wind Data	(Eastern Portal)
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Date	Time	Wind Speed m/s	Direction
1-May-2011	0:00	1.3	W
1-May-2011	1:00	1.1	W
1-May-2011	2:00	1.1	WSW
1-May-2011	3:00	0.9	WSW
1-May-2011	4:00	1.0	E
1-May-2011	5:00	1.0	E
1-May-2011	6:00	0.9	E
1-May-2011	7:00	1.0	E
1-May-2011	8:00	1.1	E
1-May-2011	9:00	1.4	E
1-May-2011	10:00	1.8	E
1-May-2011	11:00	1.9	ENE
1-May-2011	12:00	2.1	ESE
1-May-2011	13:00	2.3	ESE
1-May-2011	14:00	2.1	E
1-May-2011	15:00	2.0	E
1-May-2011	16:00	2.1	E
1-May-2011	17:00	2.2	E
1-May-2011	18:00	1.5	E
1-May-2011	19:00	1.2	E
1-May-2011	20:00	1.2	NNE
1-May-2011	21:00	1.6	NNE
1-May-2011	22:00	1.7	N
1-May-2011	23:00	1.2	NNE
2-May-2011	0:00	1.2	NNE
2-May-2011	1:00	1.3	N
2-May-2011	2:00	1.2	ENE
2-May-2011	3:00	1.0	ESE
2-May-2011	4:00	1.0	NE
2-May-2011	5:00	1.1	NNE
2-May-2011	6:00	1.0	Ν
2-May-2011	7:00	1.0	NNE
2-May-2011	8:00	1.3	NNE
2-May-2011	9:00	1.4	SSE
2-May-2011	10:00	1.8	SE
2-May-2011	11:00	2.0	ESE
2-May-2011	12:00	2.0	Ν
2-May-2011	13:00	2.0	Ν
2-May-2011	14:00	2.1	NNE
2-May-2011	15:00	1.7	NE
2-May-2011	16:00	1.6	NE
2-May-2011	17:00	1.5	ENE
2-May-2011	18:00	1.7	ESE
2-May-2011	19:00	1.5	SE
2-May-2011	20:00	1.3	SE
2-May-2011	21:00	1.5	SE
2-May-2011	22:00	1.4	E
2-May-2011	23:00	1.4	ESE
3-May-2011	0:00	1.4	E
3-May-2011	1:00	1.5	ESE
3-May-2011	2:00	1.4	E
3-May-2011	3:00	1.3	ESE
3-May-2011	4:00	1.1	ESE
3-May-2011	5:00	1.2	E

Appendix C -	Wind Data	(Eastern Portal)
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Date	Time	Wind Speed m/s	Direction
3-May-2011	6:00	0.9	ESE
3-May-2011	7:00	1.1	ESE
3-May-2011	8:00	1.4	ESE
3-May-2011	9:00	1.5	E
3-May-2011	10:00	1.6	ESE
3-May-2011	11:00	2.0	E
3-May-2011	12:00	1.7	E
3-May-2011	13:00	1.7	ESE
3-May-2011	14:00	1.7	ESE
	15:00	2.0	NW
3-May-2011			
3-May-2011	16:00	2.0	WNW
3-May-2011	17:00	2.0	NW
3-May-2011	18:00	1.4	SW
3-May-2011	19:00	1.3	WSW
3-May-2011	20:00	1.0	WSW
3-May-2011	21:00	1.0	WSW
3-May-2011	22:00	0.8	SW
3-May-2011	23:00	1.2	SW
4-May-2011	0:00	1.2	WSW
4-May-2011	1:00	1.4	WNW
4-May-2011	2:00	1.4	NW
4-May-2011	3:00	1.5	SSE
4-May-2011	4:00	1.4	SSE
4-May-2011	5:00	1.2	WSW
4-May-2011	6:00	1.1	WSW
4-May-2011	7:00	1.2	SE
4-May-2011	8:00	1.8	SE
4-May-2011	9:00	1.5	ESE
4-May-2011	10:00	1.5	ESE
4-May-2011	11:00	1.6	SE
4-May-2011	12:00	1.8	SE
4-May-2011	13:00	1.8	SE
4-May-2011	14:00	1.5	E
4-May-2011	15:00	1.6	ESE
4-May-2011	16:00	1.6	ESE
4-May-2011	17:00	1.4	E
4-May-2011	18:00	1.4	E
4-May-2011	19:00	1.2	E
4-May-2011	20:00	1.3	E
4-May-2011	20:00	1.4	E
4-May-2011 4-May-2011	22:00	1.4	E
4-May-2011 4-May-2011	23:00	1.5	NE
	0:00	1.5	ENE
5-May-2011	1:00	1.5	ENE
5-May-2011	2:00	1.2	N
5-May-2011			
5-May-2011	3:00	1.3	<u>N</u>
5-May-2011	4:00	1.1	<u> </u>
5-May-2011	5:00	1.0	<u> </u>
5-May-2011	6:00	1.1	E
5-May-2011	7:00	1.3	E
5-May-2011	8:00	1.2	E
5-May-2011	9:00	1.3	E
5-May-2011	10:00	1.5	E
5-May-2011	11:00	1.7	E

Appendix C -	Wind Data	(Eastern Portal)
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Date	Time	Wind Speed m/s	Direction
5-May-2011	12:00	1.6	E
5-May-2011	13:00	1.5	Е
5-May-2011	14:00	1.5	E
5-May-2011	15:00	1.4	E
5-May-2011	16:00	1.3	E
5-May-2011	17:00	1.4	ESE
5-May-2011	18:00	1.5	E
5-May-2011	19:00	1.3	E
5-May-2011	20:00	1.4	SSE
	20:00	1.4	SSE
5-May-2011			
5-May-2011	22:00	1.2	SSE
5-May-2011	23:00	1.0	S
6-May-2011	0:00	1.0	SW
6-May-2011	1:00	1.1	N
6-May-2011	2:00	0.9	N
6-May-2011	3:00	1.1	ESE
6-May-2011	4:00	0.9	ESE
6-May-2011	5:00	0.7	ESE
6-May-2011	6:00	0.8	ESE
6-May-2011	7:00	0.8	E
6-May-2011	8:00	1.1	SE
6-May-2011	9:00	1.0	SE
6-May-2011	10:00	1.0	SE
6-May-2011	11:00	1.2	E
6-May-2011	12:00	1.2	E
6-May-2011	13:00	1.1	ESE
6-May-2011	14:00	1.0	SE
6-May-2011	15:00	1.0	E
6-May-2011	16:00	1.3	E
6-May-2011	17:00	1.0	E
6-May-2011	18:00	1.2	E
6-May-2011	19:00	1.2	E
6-May-2011	20:00	1.2	ESE
6-May-2011	21:00	1.3	ESE
6-May-2011	22:00	1.3	E
6-May-2011	23:00	1.3	ESE
7-May-2011	0:00	1.2	NE
7-May-2011	1:00	1.0	ENE
7-May-2011	2:00	1.1	E
7-May-2011	3:00	0.8	W
7-May-2011	4:00	0.8	ENE
7-May-2011	5:00	0.8	E
7-May-2011 7-May-2011	6:00	0.6	ENE
7-May-2011 7-May-2011	7:00	0.8	E
7-May-2011 7-May-2011	8:00	0.8	Ē
7-May-2011 7-May-2011	9:00		E
7-May-2011 7-May-2011		1.0	E
	10:00 11:00	1.0	E
7-May-2011		1.1	
7-May-2011	12:00	1.3	E
7-May-2011	13:00	1.1	E
7-May-2011	14:00	1.1	E
7-May-2011	15:00	1.2	NNE
7-May-2011	16:00	1.0	NNE
7-May-2011	17:00	1.0	NNE

Appendix C -	Wind Data	(Eastern Portal)
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Date	Time	Wind Speed m/s	Direction
7-May-2011	18:00	1.0	Ν
7-May-2011	19:00	1.3	Ν
7-May-2011	20:00	1.2	Ν
7-May-2011	21:00	1.2	NE
7-May-2011	22:00	1.1	S
7-May-2011	23:00	1.4	SE
8-May-2011	0:00	1.3	SW
8-May-2011	1:00	1.4	ESE
8-May-2011	2:00	1.3	SE
8-May-2011	3:00	1.4	SE
8-May-2011	4:00	1.3	E
8-May-2011	5:00	1.0	E
8-May-2011	6:00	1.2	NE
8-May-2011	7:00	1.0	SE
8-May-2011	8:00	1.0	NNE
8-May-2011	9:00	1.0	NE
8-May-2011	10:00	1.2	SSE
8-May-2011	11:00	1.2	SE
8-May-2011	12:00	1.5	SE
8-May-2011	12:00	1.5	SSE
8-May-2011	14:00	1.5	SE
	15:00	1.5	SE
8-May-2011 8-May-2011	16:00	1.5	SE
8-May-2011	17:00	1.4	SE
8-May-2011	18:00	1.7	S S
8-May-2011	19:00	1.4	SE
8-May-2011	20:00	1.4	ESE
8-May-2011	20:00	1.5	ESE
8-May-2011	21:00	1.4	ENE
8-May-2011	23:00	1.5	ESE
9-May-2011	0:00	1.0	ENE
9-May-2011	1:00	0.9	ENE
9-May-2011	2:00	1.0	ENE
9-May-2011	3:00	1.0	ENE
9-May-2011	4:00	1.1	ENE
9-May-2011	5:00	1.1	ESE
9-May-2011	6:00	1.0	ENE
9-May-2011	7:00	0.9	ENE
9-May-2011	8:00	1.0	ENE
9-May-2011	9:00	1.0	ENE
9-May-2011	10:00	1.2	ENE
9-May-2011 9-May-2011	11:00	1.3	ESE
		1.3	ESE
9-May-2011	12:00 13:00	1.3	WNW
9-May-2011	13:00	1.2	WNW
9-May-2011 9-May-2011	15:00	1.1	SSW
9-May-2011 9-May-2011	16:00	1.2	<u>55</u> ₩
	17:00	1.1	W
9-May-2011 9-May-2011	18:00	1.1	WSW
9-May-2011 9-May-2011	19:00	1.3	SW
9-May-2011	<u>20:00</u> 21:00	0.8	W
9-May-2011	21:00	0.8	W
9-May-2011 9-May-2011	22:00	1.0	ENE
9-1VIAY-2011	23.00	1.0	

Appendix C -	Wind Data	(Eastern Portal)
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Date	Time	Wind Speed m/s	Direction
10-May-2011	0:00	1.1	ENE
10-May-2011	1:00	1.1	SSW
10-May-2011	2:00	1.5	NE
10-May-2011	3:00	1.0	S
10-May-2011	4:00	0.7	SSW
10-May-2011	5:00	0.7	SW
10-May-2011	6:00	0.7	ESE
10-May-2011	7:00	0.7	WNW
10-May-2011	8:00	0.9	SW
10-May-2011	9:00	0.9	SW
10-May-2011	10:00	1.4	WNW
10-May-2011	11:00	1.2	W
10-May-2011	12:00	1.0	W
10-May-2011	13:00	1.1	W
10-May-2011	14:00	1.4	ENE
10-May-2011	15:00	1.2	NE
10-May-2011	16:00	1.4	ENE
10-May-2011	17:00	1.2	NE
10-May-2011	18:00	0.8	NE
10-May-2011	19:00	0.9	SSW
10-May-2011	20:00	1.0	SW
10-May-2011	21:00	1.0	WSW
10-May-2011	22:00	1.2	SSW
10-May-2011	23:00	1.1	S
11-May-2011	0:00	1.0	sw
11-May-2011	1:00	1.1	ENE
11-May-2011	2:00	1.1	ENE
11-May-2011	3:00	1.2	ENE
11-May-2011	4:00	1.4	ESE
11-May-2011	5:00	1.2	NE
11-May-2011	6:00	0.8	ENE
11-May-2011	7:00	0.7	NE
11-May-2011	8:00	0.9	WNW
11-May-2011	9:00	1.1	W
11-May-2011	10:00	1.0	W
11-May-2011	11:00	1.1	WNW
11-May-2011	12:00	1.0	NE
11-May-2011	13:00	1.0	NNE
11-May-2011	14:00	1.0	NE
11-May-2011	15:00	1.0	ENE
11-May-2011	16:00	1.0	WSW
11-May-2011	17:00	0.8	WNW
11-May-2011	18:00	0.9	WNW
11-May-2011	19:00	0.9	W
11-May-2011	20:00	0.9	WNW
11-May-2011	21:00	1.0	NE
11-May-2011	22:00	1.0	NE
11-May-2011	23:00	0.6	NE
12-May-2011	0:00	0.6	NNE
12-May-2011	1:00	0.8	NE
12-May-2011	2:00	0.8	NE
12-May-2011	3:00	0.6	NNE
12-May-2011	4:00	0.7	NE NE
12-May-2011	5:00	0.9	NE

Appendix C -	Wind Data	(Eastern Portal)
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Date	Time	Wind Speed m/s	Direction
12-May-2011	6:00	0.8	NE
12-May-2011	7:00	0.7	Ν
12-May-2011	8:00	0.8	Ŵ
12-May-2011	9:00	0.9	N
12-May-2011	10:00	1.0	WSW
12-May-2011	11:00	1.1	Wew
12-May-2011	12:00	1.1	W
12-May-2011	13:00	1.2	ENE
12-May-2011	14:00	1.2	WNW
12-May-2011	15:00	1.4	WNW
· · · · · ·			
12-May-2011	16:00	1.5	SSW
12-May-2011	17:00	1.1	SSW
12-May-2011	18:00	1.1	W
12-May-2011	19:00	1.3	W
12-May-2011	20:00	1.1	W
12-May-2011	21:00	1.1	W
12-May-2011	22:00	1.2	SW
12-May-2011	23:00	1.3	WSW
13-May-2011	0:00	1.1	ESE
13-May-2011	1:00	1.0	WSW
13-May-2011	2:00	0.8	S
13-May-2011	3:00	0.8	WNW
13-May-2011	4:00	1.2	WNW
13-May-2011	5:00	0.8	SSW
13-May-2011	6:00	0.9	Ν
13-May-2011	7:00	0.9	WNW
13-May-2011	8:00	0.9	SW
13-May-2011	9:00	0.9	SW
13-May-2011	10:00	0.9	WSW
13-May-2011	11:00	1.0	WSW
13-May-2011	12:00	1.4	WNW
13-May-2011	13:00	1.3	WNW
13-May-2011	14:00	1.3	W
13-May-2011	15:00	1.3	SW
13-May-2011	16:00	1.0	WNW
13-May-2011	17:00	1.1	WNW
13-May-2011	18:00	1.3	W
13-May-2011	19:00	0.9	WSW
13-May-2011	20:00	0.8	SSW
13-May-2011	20:00	1.0	WNW
13-May-2011	22:00	1.0	WSW
13-May-2011	23:00	1.2	WSW
14-May-2011		1.0	W
	0:00 1:00	1.2	W
14-May-2011	2:00	1.3	WNW
14-May-2011			
14-May-2011	3:00	1.2	WNW
14-May-2011	4:00	1.0	WSW
14-May-2011	5:00	0.8	NNE
14-May-2011	6:00	0.7	E
14-May-2011	7:00	0.8	ENE
14-May-2011	8:00	0.8	SSW
14-May-2011	9:00	1.0	NW
14-May-2011	10:00	0.8	SW
14-May-2011	11:00	1.0	SW

Appendix C -	Wind Data	(Eastern Portal)
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Date	Time	Wind Speed m/s	Direction
14-May-2011	12:00	1.1	WSW
14-May-2011	13:00	1.2	W
14-May-2011	14:00	1.1	WNW
14-May-2011	15:00	1.0	W
14-May-2011	16:00	0.8	W
14-May-2011	17:00	0.8	WSW
14-May-2011	18:00	1.0	W
14-May-2011	19:00	1.3	ENE
14-May-2011	20:00	1.4	NE
14-May-2011	20.00	1.4	N
			ESE
14-May-2011	22:00 23:00	1.3	NNW
14-May-2011			
15-May-2011	0:00	1.2	ENE
15-May-2011	1:00	1.2	ENE
15-May-2011	2:00	1.2	NE
15-May-2011	3:00	1.0	N
15-May-2011	4:00	1.0	NNE
15-May-2011	5:00	0.9	SSW
15-May-2011	6:00	0.8	W
15-May-2011	7:00	1.1	SW
15-May-2011	8:00	1.0	WNW
15-May-2011	9:00	1.0	W
15-May-2011	10:00	1.0	ENE
15-May-2011	11:00	0.9	WNW
15-May-2011	12:00	0.9	NE
15-May-2011	13:00	1.1	NE
15-May-2011	14:00	1.1	WSW
15-May-2011	15:00	1.1	SSW
15-May-2011	16:00	1.0	ENE
15-May-2011	17:00	0.9	WSW
15-May-2011	18:00	1.1	SSW
15-May-2011	19:00	1.0	ENE
15-May-2011	20:00	1.0	NNE
15-May-2011	21:00	1.2	NE
15-May-2011	22:00	1.3	NW
15-May-2011	23:00	1.4	ENE
16-May-2011	0:00	1.4	NE
16-May-2011	1:00	1.3	ESE
16-May-2011	2:00	1.0	NE
16-May-2011	3:00	1.1	NNE
16-May-2011	4:00	1.0	N
16-May-2011	5:00	0.9	NW
16-May-2011	6:00	0.9	N
16-May-2011	7:00	0.9	SW
16-May-2011	8:00	0.8	S S
16-May-2011	9:00	1.1	
ž	10:00	0.9	SE
16-May-2011			
16-May-2011	11:00	1.1	SE
16-May-2011	12:00	1.0	SSE
16-May-2011	13:00	1.1	SSE
16-May-2011	14:00	1.0	SW
16-May-2011	15:00	1.1	W
16-May-2011	16:00	1.1	SSW
16-May-2011	17:00	1.0	WNW

Appendix C -	Wind Data	(Eastern Portal)
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Date	Time	Wind Speed m/s	Direction
16-May-2011	18:00	1.2	NE
16-May-2011	19:00	0.9	NE
16-May-2011	20:00	0.8	WSW
16-May-2011	21:00	0.9	SSW
16-May-2011	22:00	1.0	SSW
16-May-2011	23:00	0.9	SSW
17-May-2011	0:00	1.1	ESE
17-May-2011	1:00	1.1	ENE
17-May-2011	2:00	1.0	ESE
17-May-2011	3:00	1.0	SSE
17-May-2011	4:00	1.0	SSE
17-May-2011	5:00	0.8	ENE
17-May-2011	6:00	0.8	ENE
17-May-2011	7:00	0.8	NE
17-May-2011	8:00	0.8	NE
17-May-2011	9:00	0.9	NE
17-May-2011	10:00	1.0	NNE
17-May-2011	11:00	1.1	NE
17-May-2011	12:00	1.0	ENE
17-May-2011	13:00	1.0	NE
17-May-2011	14:00	1.1	NE
17-May-2011	15:00	1.1	ENE
17-May-2011	16:00	1.2	ENE
17-May-2011	17:00	1.0	NE
17-May-2011	18:00	1.1	ENE
17-May-2011	19:00	1.2	SSW
17-May-2011	20:00	0.9	NE
17-May-2011	21:00	1.2	ENE
17-May-2011	22:00	1.0	NE
17-May-2011	23:00	1.1	NE
18-May-2011	0:00	1.1	NE
18-May-2011	1:00	1.1	NE
18-May-2011	2:00	1.2	NE
18-May-2011	3:00	1.0	NE
18-May-2011	4:00	1.0	NE
18-May-2011	5:00	1.1	SSE
18-May-2011	6:00	1.3	ENE
18-May-2011	7:00	1.3	E
18-May-2011	8:00	1.2	ENE
18-May-2011	9:00	1.3	N
18-May-2011	10:00	1.3	ENE
18-May-2011	11:00	1.1	ENE
18-May-2011	12:00	1.0	ENE
18-May-2011	13:00	1.2	ENE
18-May-2011	14:00	1.2	E
18-May-2011	15:00	1.3	NE
18-May-2011	16:00	1.3	NE
18-May-2011	17:00	1.1	NE
18-May-2011	18:00	1.0	ENE
18-May-2011	19:00	1.0	NE
18-May-2011	20:00	1.0	NNE
18-May-2011	21:00	1.0	NE
18-May-2011	22:00	1.1	NNE
18-May-2011	22:00	1.1	NNE
10-11/1ay-2011	23.00	1.1	

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Date	Time	Wind Speed m/s	Direction
19-May-2011	0:00	1.0	NNE
19-May-2011	1:00	1.2	Ν
19-May-2011	2:00	1.0	NE
19-May-2011	3:00	1.0	NE
19-May-2011	4:00	0.9	NE
19-May-2011	5:00	0.9	SE
19-May-2011	6:00	0.8	N
19-May-2011	7:00	0.8	NE
19-May-2011	8:00	0.9	N
19-May-2011	9:00	0.9	NNE
19-May-2011	10:00	1.0	ENE
19-May-2011	11:00	1.0	NE
19-May-2011	12:00	1.0	NNE
19-May-2011	13:00	1.0	NE
19-May-2011	14:00	1.0	NNE
19-May-2011	15:00	1.1	NE
19-May-2011	16:00	0.9	NNE
19-May-2011	17:00	0.9	NNE
19-May-2011	18:00	0.9	NE
19-May-2011	19:00	1.0	NE
19-May-2011	20:00	1.2	NE
19-May-2011	21:00	1.3	NE
19-May-2011	22:00	1.3	NE
19-May-2011	23:00	1.2	NNE
20-May-2011	0:00	1.2	ENE
20-May-2011	1:00	1.1	ENE
20-May-2011	2:00	1.0	S
20-May-2011	3:00	1.0	NE
20-May-2011	4:00	0.9	NNE
20-May-2011	5:00	0.8	NNE
20-May-2011	6:00	0.8	ENE
20-May-2011	7:00	0.9	NE
20-May-2011	8:00	0.8	NNE
20-May-2011	9:00	1.0	NNE
20-May-2011	10:00	1.0	ENE
20-May-2011	11:00	0.9	ENE
20-May-2011	12:00	1.0	Ν
20-May-2011	13:00	1.0	ENE
20-May-2011	14:00	1.1	NNE
20-May-2011	15:00	1.1	ENE
20-May-2011	16:00	1.0	ENE
20-May-2011	17:00	0.9	ENE
20-May-2011	18:00	1.0	NE
20-May-2011	19:00	1.1	NNE
20-May-2011	20:00	1.0	N
20-May-2011	21:00	1.2	NE
20-May-2011 20-May-2011	22:00	1.2	ESE
20-May-2011 20-May-2011	23:00	1.1	ESE
21-May-2011	0:00	1.3	NE
21-May-2011	1:00	1.1	ENE
21-May-2011	2:00	0.8	SE
21-May-2011	3:00	1.0	SSE
21-May-2011	4:00	1.0	NE
21-May-2011	5:00	1.0	NE

Date	Time	Wind Speed m/s	Direction
21-May-2011	6:00	0.9	WSW
21-May-2011	7:00	0.8	ENE
21-May-2011	8:00	0.9	E
21-May-2011	9:00	1.1	SW
21-May-2011	10:00	1.1	N
21-May-2011	11:00	1.1	NNE
21-May-2011	12:00	1.0	SSW
21-May-2011	13:00	1.2	SW
21-May-2011	14:00	1.0	SE
		1.0	SE
21-May-2011	15:00	-	
21-May-2011	16:00	1.2	SSE
21-May-2011	17:00	1.1	NE
21-May-2011	18:00	1.1	SSW
21-May-2011	19:00	1.0	ENE
21-May-2011	20:00	1.1	NE
21-May-2011	21:00	1.1	WSW
21-May-2011	22:00	0.9	SSW
21-May-2011	23:00	1.0	SSW
22-May-2011	0:00	1.0	SSW
22-May-2011	1:00	1.0	W
22-May-2011	2:00	0.8	WSW
22-May-2011	3:00	1.1	W
22-May-2011	4:00	0.9	WNW
22-May-2011	5:00	0.9	W
22-May-2011	6:00	0.9	WSW
22-May-2011	7:00	0.8	WSW
22-May-2011	8:00	1.0	WNW
22-May-2011	9:00	1.0	SW
22-May-2011	10:00	1.3	W
22-May-2011	11:00	1.2	W
22-May-2011	12:00	1.2	W
22-May-2011	13:00	1.2	W
22-May-2011	14:00	1.1	SW
22-May-2011	15:00	1.1	W
22-May-2011	16:00	1.3	W
22-May-2011	17:00	1.1	ENE
22-May-2011	18:00	1.1	NNE
22-May-2011	19:00	1.3	NNE
22-May-2011	20:00	1.1	WNW
22-May-2011	21:00	1.2	W
22-May-2011	22:00	1.3	W
22-May-2011	23:00	1.3	ENE
23-May-2011	0:00	1.3	N
23-May-2011	1:00	1.0	N
23-May-2011	2:00	0.8	ESE
23-May-2011	3:00	0.8	ESE
23-May-2011		1.0	S ESE
23-May-2011	4:00		SSW
	5:00	1.0	
23-May-2011	6:00	0.8	W
23-May-2011	7:00	0.7	SSW
23-May-2011	8:00	0.7	SSW
23-May-2011	9:00	1.0	SSW
23-May-2011	10:00	1.0	SSW
23-May-2011	11:00	1.0	SW

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Date	Time	Wind Speed m/s	Direction
23-May-2011	12:00	1.2	NNE
23-May-2011	13:00	1.1	NNE
23-May-2011	14:00	1.0	NNE
23-May-2011	15:00	0.9	NE
23-May-2011	16:00	0.9	NE
23-May-2011	17:00	0.8	NE
23-May-2011	18:00	1.1	NE
23-May-2011	19:00	1.1	ENE
23-May-2011	20:00	1.3	E
23-May-2011	20.00	1.3	ENE
23-May-2011	22:00	1.3	ENE
23-May-2011	23:00	1.2	NE
24-May-2011	0:00	1.3	NNE
24-May-2011	1:00	1.2	NE
24-May-2011	2:00	1.3	NE
24-May-2011	3:00	1.6	NE
24-May-2011	4:00	1.7	ENE
24-May-2011	5:00	1.5	ENE
24-May-2011	6:00	1.3	NNE
24-May-2011	7:00	1.3	ENE
24-May-2011	8:00	1.0	ENE
24-May-2011	9:00	1.4	E
24-May-2011	10:00	1.8	Ν
24-May-2011	11:00	1.8	NNE
24-May-2011	12:00	1.8	Ν
24-May-2011	13:00	2.0	Ν
24-May-2011	14:00	2.0	ENE
24-May-2011	15:00	1.9	ENE
24-May-2011	16:00	1.9	E
24-May-2011	17:00	2.0	ENE
24-May-2011	18:00	1.7	E
24-May-2011	19:00	1.5	ENE
24-May-2011	20:00	1.9	ENE
24-May-2011	21:00	1.7	ESE
24-May-2011	22:00	1.6	NE
24-May-2011	23:00	1.5	NE
25-May-2011	0:00	1.4	ENE
25-May-2011	1:00	1.3	ENE
25-May-2011	2:00	1.5	NNE
25-May-2011	3:00	1.5	ENE
25-May-2011	4:00	1.4	SSE
25-May-2011	5:00	1.4	NNE
25-May-2011	6:00	1.4	NE
25-May-2011	7:00	1.4	SSE
25-May-2011	8:00	1.2	35 <u>E</u>
25-May-2011	9:00	1.3	ENE
	10:00	1.3	ENE
25-May-2011			ENE
25-May-2011	11:00	1.6	
25-May-2011	12:00	1.6	ENE
25-May-2011	13:00	1.4	NE
25-May-2011	14:00	1.5	NNE
25-May-2011	15:00	1.4	ENE
25-May-2011	16:00	1.1	ENE
25-May-2011	17:00	1.0	NE

Appendix C -	Wind Data	(Eastern Portal)
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Date	Time	Wind Speed m/s	Direction
25-May-2011	18:00	1.0	ENE
25-May-2011	19:00	1.3	ENE
25-May-2011	20:00	1.2	ENE
25-May-2011	21:00	1.2	NNE
25-May-2011	22:00	1.4	NE
25-May-2011	23:00	1.3	ENE
26-May-2011	0:00	1.1	SSW
26-May-2011	1:00	1.1	ENE
26-May-2011	2:00	1.2	NE
26-May-2011	3:00	1.1	ENE
26-May-2011	4:00	0.7	NE
26-May-2011	5:00	0.7	NE
26-May-2011	6:00	0.9	NE
26-May-2011	7:00	1.0	ENE
26-May-2011	8:00	0.8	ENE
26-May-2011	9:00	1.0	NE
26-May-2011	10:00	1.0	E
26-May-2011	11:00	1.1	NE
26-May-2011	12:00	1.1	NNE
26-May-2011	13:00	1.1	NNE
26-May-2011	14:00	1.1	NNE
26-May-2011	15:00	1.0	NNE
26-May-2011	16:00	1.0	NNE
26-May-2011	17:00	1.0	NNE
26-May-2011	18:00	1.1	NE
26-May-2011	19:00	1.0	NE
26-May-2011	20:00	1.3	NNE
26-May-2011	21:00	1.4	NNE
26-May-2011	22:00	1.3	NE
26-May-2011	23:00	1.2	NE
27-May-2011	0:00	1.1	ENE
27-May-2011	1:00	1.1	NE
27-May-2011	2:00	1.2	ENE
27-May-2011	3:00	1.0	NNE
27-May-2011	4:00	0.9	NNE
27-May-2011	5:00	0.9	NNE
27-May-2011	6:00	0.9	ENE
27-May-2011	7:00	1.0	SE
27-May-2011	8:00	1.1	SE
27-May-2011	9:00	1.2	ENE
27-May-2011	10:00	1.3	NE
27-May-2011	11:00	1.2	ESE
27-May-2011	12:00	1.0	SE
27-May-2011	13:00	1.1	E
27-May-2011	14:00	1.2	SE
27-May-2011	15:00	1.2	SE
27-May-2011	16:00	1.0	SSE
27-May-2011	17:00	1.0	WNW
27-May-2011	18:00	1.2	WSW
27-May-2011	19:00	1.1	SW
27-May-2011	20:00	1.4	WSW
27-May-2011	21:00	1.3	WSW
27-May-2011	22:00	1.3	WSW
27-May-2011	23:00	1.1	WSW

Appendix C -	Wind Data	(Eastern Portal)
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Date	Time	Wind Speed m/s	Direction
28-May-2011	0:00	1.1	SW
28-May-2011	1:00	1.2	SSW
28-May-2011	2:00	1.0	WNW
28-May-2011	3:00	0.9	ESE
28-May-2011	4:00	0.9	WNW
28-May-2011	5:00	1.0	WNW
28-May-2011	6:00	0.8	NNE
28-May-2011	7:00	0.8	ESE
28-May-2011	8:00	0.7	WNW
28-May-2011	9:00	0.8	WNW
28-May-2011	10:00	0.9	W
28-May-2011	11:00	0.9	WNW
28-May-2011	12:00	1.1	WNW
28-May-2011	13:00	1.0	WNW
28-May-2011	14:00	0.9	WNW
28-May-2011	15:00	1.0	W
28-May-2011	16:00	1.0	W
28-May-2011	17:00	1.1	W
28-May-2011	18:00	1.1	WSW
28-May-2011	19:00	1.1	N
28-May-2011	20:00	1.1	N
28-May-2011	21:00	1.0	Ν
28-May-2011	22:00	0.9	E
28-May-2011	23:00	0.9	ENE
29-May-2011	0:00	1.0	SSE
29-May-2011	1:00	1.1	SSE
29-May-2011	2:00	0.5	ESE
29-May-2011	3:00	0.7	ENE
29-May-2011	4:00	0.6	ENE
29-May-2011	5:00	0.6	ESE
29-May-2011	6:00	0.7	SE
29-May-2011	7:00	0.6	SE
29-May-2011	8:00	0.5	SSE
29-May-2011	9:00	0.7	SSE
29-May-2011	10:00	0.9	SE
29-May-2011	11:00	0.9	SSE
29-May-2011	12:00	0.7	SSE
29-May-2011	13:00	0.9	SSE
29-May-2011	14:00	1.0	SE
29-May-2011	15:00	0.8	ESE
29-May-2011	16:00	0.9	SSE
29-May-2011	17:00	0.9	SSE
29-May-2011	18:00	1.0	SSE
29-May-2011 29-May-2011	19:00	0.9	SE
29-May-2011 29-May-2011	20:00	0.9	SE
			ENE
29-May-2011	21:00	1.0	
29-May-2011	22:00	1.1	ESE
29-May-2011	23:00	1.1	E
30-May-2011	0:00	0.9	ENE
30-May-2011	1:00	0.8	SW
30-May-2011	2:00	0.7	SSW
30-May-2011	3:00	0.9	SSW
30-May-2011	4:00	1.0	E
30-May-2011	5:00	0.8	WSW

Date	Time	Wind Speed m/s	Direction
30-May-2011	6:00	0.7	Ν
30-May-2011	7:00	0.8	Ν
30-May-2011	8:00	0.6	NNE
30-May-2011	9:00	1.0	NNE
30-May-2011	10:00	1.0	NNE
30-May-2011	11:00	1.0	ENE
30-May-2011	12:00	1.3	E
30-May-2011	13:00	1.3	ENE
30-May-2011	14:00	1.2	SSE
30-May-2011	15:00	1.3	SSE
30-May-2011	16:00	1.2	SSE
30-May-2011	17:00	1.1	ENE
30-May-2011	18:00	1.5	NE
30-May-2011	19:00	1.5	ENE
30-May-2011	20:00	1.4	SSE
30-May-2011	21:00	1.1	SSE
30-May-2011	22:00	1.0	ESE
30-May-2011	23:00	1.1	NE
31-May-2011	0:00	1.3	NE
31-May-2011	1:00	1.4	ESE
31-May-2011	2:00	1.2	SSE
31-May-2011	3:00	1.3	SSE
31-May-2011	4:00	1.4	E
31-May-2011	5:00	2.0	SSE
31-May-2011	6:00	1.3	SE
31-May-2011	7:00	0.9	SE
31-May-2011	8:00	1.0	ESE
31-May-2011	9:00	1.7	ESE
31-May-2011	10:00	1.8	ESE
31-May-2011	11:00	1.6	ESE
31-May-2011	12:00	1.8	ESE
31-May-2011	13:00	2.1	NE
31-May-2011	14:00	1.7	NNE
31-May-2011	15:00	1.9	ESE
31-May-2011	16:00	2.0	SSE
31-May-2011	17:00	2.2	ESE
31-May-2011	18:00	2.0	SSE
31-May-2011	19:00	2.0	ENE
31-May-2011	20:00	1.9	ENE
31-May-2011	21:00	2.1	SE
31-May-2011	22:00	2.3	SE
31-May-2011	23:00	1.9	E

Appendix C - Wind Data (Eastern Portal)

Appendix C -	Wind Data	(Western	Portal)
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Date	Time	Wind Speed m/s	Direction
1-May-2011	0:00	2.3	S
1-May-2011	1:00	2.6	S
1-May-2011	2:00	4.2	N
1-May-2011	3:00	4.2	WNW
1-May-2011	4:00	3.7	Ν
1-May-2011	5:00	3	SW
1-May-2011	6:00	3	W
1-May-2011	7:00	3.4	WNW
1-May-2011	8:00	3.7	ESE
1-May-2011	9:00	3.3	WNW
1-May-2011	10:00	2.5	NNE
1-May-2011	11:00	2.8	N
1-May-2011	12:00	2.5	SSE
1-May-2011	13:00	1.7	SSE
1-May-2011	14:00	2.1	ENE
1-May-2011	15:00	1.2	ESE
1-May-2011	16:00	2.3	SSW
1-May-2011	17:00	1.2	SE
1-May-2011	18:00	1.6	NNE
1-May-2011	19:00	1.7	N
1-May-2011	20:00	1.9	N
1-May-2011	21:00	0.8	E
1-May-2011	22:00	2	SE
1-May-2011	23:00	3.1	ESE
2-May-2011	0:00	3.4	WNW
2-May-2011	1:00	3.4	ENE
2-May-2011	2:00	3.9	SSE
2-May-2011	3:00	3	ESE
2-May-2011	4:00	2.6	SE
2-May-2011	5:00	2.2	NE
2-May-2011	6:00	2.4	SSE
2-May-2011	7:00	2.5	ESE
2-May-2011	8:00	0.9	SSE
2-May-2011	9:00	0.4	SE
2-May-2011	10:00	0.4	ESE
2-May-2011	11:00	1.2	SSE
2-May-2011	12:00	1.5	SSE
2-May-2011	13:00	1.2	ESE
2-May-2011	14:00	1.3	NE
2-May-2011	15:00	0.6	SE
2-May-2011	16:00	1.3	ESE
2-May-2011	17:00	2	ENE
2-May-2011	18:00	0.5	ESE
2-May-2011	19:00	0.8	ESE
2-May-2011	20:00	0.8	ESE
2-May-2011	21:00	1.6	SSE
2-May-2011	22:00	2.2	ESE
2-May-2011	23:00	2.2	SE
3-May-2011	0:00	2.6	ESE
	1:00	3.1	ESE WNW
3-May-2011			E
3-May-2011	2:00	3.2	
3-May-2011	3:00	3.6	NNE
3-May-2011	4:00	4.1	NNE
3-May-2011	5:00	3.4	ENE

Appendix C -	Wind Data	(Western Portal)	
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Date	Time	Wind Speed m/s	Direction
3-May-2011	6:00	3.5	NE
3-May-2011	7:00	2.4	ENE
3-May-2011	8:00	2.6	SSE
3-May-2011	9:00	1.4	SSE
3-May-2011	10:00	1.4	NE
3-May-2011	11:00	4	NW
3-May-2011	12:00	2.8	NW
3-May-2011	13:00	1.9	E
3-May-2011	14:00	3.7	S
3-May-2011	15:00	3.7	<u> </u>
		2.2	NW
3-May-2011	16:00		
3-May-2011	17:00	0.7	SW
3-May-2011	18:00	1.6	S
3-May-2011	19:00	2	WSW
3-May-2011	20:00	1.8	NE
3-May-2011	21:00	1.3	NE
3-May-2011	22:00	2	NNE
3-May-2011	23:00	1.2	S
4-May-2011	0:00	2.1	WNW
4-May-2011	1:00	2.5	NE
4-May-2011	2:00	3	NE
4-May-2011	3:00	2.9	NNE
4-May-2011	4:00	2.7	Ν
4-May-2011	5:00	4.5	NE
4-May-2011	6:00	3.7	NE
4-May-2011	7:00	3.8	NE
4-May-2011	8:00	3.5	SE
4-May-2011	9:00	3.4	ESE
4-May-2011	10:00	2.6	ENE
4-May-2011	11:00	3.4	SW
4-May-2011	12:00	2.8	W
4-May-2011	13:00	2.9	NE
4-May-2011	14:00	3.4	NE
4-May-2011	15:00	2.7	NE
4-May-2011	16:00	2.5	SE
4-May-2011	17:00	1.6	ENE
4-May-2011	18:00	1.5	W
4-May-2011	19:00	2.2	SW
4-May-2011	20:00	2.6	SSW
4-May-2011	21:00	2.9	ESE
4-May-2011	22:00	3.3	NNE
4-May-2011	23:00	3	SE
5-May-2011	0:00	2.9	E
5-May-2011	1:00	2.9	W
5-May-2011	2:00	3	ESE
5-May-2011	3:00	4.4	SE
		4.4	SE SW
5-May-2011	4:00	N	
5-May-2011	5:00	3.6	SW
5-May-2011	6:00	4.4	SE
5-May-2011	7:00	2.3	ESE
5-May-2011	8:00	4	ESE
5-May-2011	9:00	4	ESE
5-May-2011	10:00	3.5	ESE
5-May-2011	11:00	2	ESE

Appendix C -	Wind Data	(Western Portal)	
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Date	Time	Wind Speed m/s	Direction
5-May-2011	12:00	3.1	ESE
5-May-2011	13:00	2.6	ESE
5-May-2011	14:00	3.1	SE
5-May-2011	15:00	4.5	SE
5-May-2011	16:00	3.7	ESE
5-May-2011	17:00	3.2	SE
5-May-2011	18:00	4.6	SE
5-May-2011	19:00	2.8	SE
5-May-2011	20:00	3.2	SE
	20:00	2.1	ESE
5-May-2011			
5-May-2011	22:00	3.3	ESE
5-May-2011	23:00	2.9	ESE
6-May-2011	0:00	4	SE
6-May-2011	1:00	4	SSE
6-May-2011	2:00	2.9	ESE
6-May-2011	3:00	3.6	ESE
6-May-2011	4:00	2.8	SSE
6-May-2011	5:00	2	SSE
6-May-2011	6:00	1.7	NNE
6-May-2011	7:00	1.1	SSE
6-May-2011	8:00	1.5	SE
6-May-2011	9:00	2.6	WNW
6-May-2011	10:00	2.2	WSW
6-May-2011	11:00	2.6	SW
6-May-2011	12:00	1.9	SW
6-May-2011	13:00	2.6	NNE
6-May-2011	14:00	1.9	NE
6-May-2011	15:00	1.4	ENE
6-May-2011	16:00	3.7	ENE
6-May-2011	17:00	2	SE
6-May-2011	18:00	2.8	SSE
6-May-2011	19:00	2.2	SE
6-May-2011	20:00	1.9	ENE
6-May-2011	21:00	1.1	SSE
6-May-2011	22:00	1.1	SE
6-May-2011	23:00	1.2	ESE
7-May-2011	0:00	2.1	ESE
7-May-2011	1:00	1.7	ESE
7-May-2011	2:00	1.7	NNE
7-May-2011	3:00	1.7	ENE
7-May-2011	4:00	1.4	E
7-May-2011	5:00	1.5	ESE
7-May-2011 7-May-2011	6:00	0.3	NNE
7-May-2011 7-May-2011	7:00	1	NE
	8:00	1.4	ENE
7-May-2011	9:00	2.1	ENE
7-May-2011			
7-May-2011	10:00	2.8	ENE
7-May-2011	11:00	3.2	NE
7-May-2011	12:00	3.3	NNE
7-May-2011	13:00	2.9	ENE
7-May-2011	14:00	3.7	ENE
7-May-2011	15:00	4.3	NE
7-May-2011	16:00	2.4	NE
7-May-2011	17:00	2.1	NNE

Appendix C -	Wind Data	(Western Portal)	
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Date	Time	Wind Speed m/s	Direction
7-May-2011	18:00	1.2	NNE
7-May-2011	19:00	1.5	NNE
7-May-2011	20:00	1.6	NNE
7-May-2011	21:00	2.3	NE
7-May-2011	22:00	2	ENE
7-May-2011	23:00	1.2	NE
8-May-2011	0:00	1.2	NE
8-May-2011	1:00	2	SSE
8-May-2011	2:00	1.7	ENE
8-May-2011	3:00	0.9	E
8-May-2011	4:00	1.9	ENE
8-May-2011	5:00	2.1	SSE
8-May-2011	6:00	2.5	ESE
8-May-2011	7:00	1.8	ENE
8-May-2011	8:00	1.2	E
8-May-2011	9:00	1.2	SSE
8-May-2011	10:00	2.2	NE
8-May-2011	11:00	2.5	NE
8-May-2011	12:00	2.7	NNE
8-May-2011	13:00	2.2	NNE
8-May-2011	14:00	1.8	ENE
8-May-2011	15:00	2.8	SE
8-May-2011	16:00	1.1	NE
8-May-2011	17:00	1.1	SE
8-May-2011	18:00	1.2	SE
8-May-2011	19:00	1.7	ESE
8-May-2011	20:00	1.4	SE
8-May-2011	21:00	2.2	SSE
8-May-2011	22:00	1.4	WNW
8-May-2011	23:00	0.5	W
9-May-2011	0:00	1.8	WSW
9-May-2011	1:00	2.6	WSW
9-May-2011	2:00	2.2	WSW
9-May-2011	3:00	2.4	ESE
9-May-2011	4:00	1	WNW
9-May-2011	5:00	1.7	SE
9-May-2011	6:00	0.9	SSE
9-May-2011	7:00	1.3	ESE
9-May-2011	8:00	2.7	WNW
9-May-2011	9:00	3.9	ENE
9-May-2011	10:00	2.8	ENE
9-May-2011	11:00	2.8	NNE
9-May-2011	12:00	3.8	ESE
9-May-2011	13:00	3.2	NE
9-May-2011	14:00	1.8	NE
9-May-2011	15:00	2.8	W
9-May-2011	16:00	2.7	WNW
9-May-2011	17:00	2.9	WNW
9-May-2011	18:00	1.9	N
9-May-2011	19:00	1.8	N
9-May-2011	20:00	1.2	SW
9-May-2011	21:00	1.6	WNW
9-May-2011	22:00	1.4	WNW
9-May-2011	23:00	2	W

Appendix C -	Wind Data	(Western	Portal)
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Date	Time	Wind Speed m/s	Direction
10-May-2011	0:00	1.5	W
10-May-2011	1:00	0.5	W
10-May-2011	2:00	0.7	SW
10-May-2011	3:00	0.2	WSW
10-May-2011	4:00	0.1	SW
10-May-2011	5:00	0.6	WNW
10-May-2011	6:00	0.6	SE
10-May-2011	7:00	1	NNE
10-May-2011	8:00	0.4	ESE
10-May-2011	9:00	0.2	WNW
10-May-2011	10:00	1.2	NE
10-May-2011	11:00	1.6	NE
10-May-2011	12:00	1.6	W
10-May-2011	13:00	1.8	Ν
10-May-2011	14:00	1.6	Ν
10-May-2011	15:00	0.7	WSW
10-May-2011	16:00	1.6	N
10-May-2011	17:00	1.5	Ν
10-May-2011	18:00	1.2	Ν
10-May-2011	19:00	0.9	ENE
10-May-2011	20:00	0.8	W
10-May-2011	21:00	1.2	SSE
10-May-2011	22:00	1.5	W
10-May-2011	23:00	1.9	NNE
11-May-2011	0:00	1.6	ENE
11-May-2011	1:00	2.2	WNW
11-May-2011	2:00	2	W
11-May-2011	3:00	1.7	SSE
11-May-2011	4:00	0.5	NNW
11-May-2011	5:00	1.6	NNW
11-May-2011	6:00	1.8	SSE
11-May-2011	7:00	1.8	NNE
11-May-2011	8:00	0.8	NE
11-May-2011	9:00	0.2	WNW
11-May-2011	10:00	0.2	SSE
11-May-2011	11:00	1.4	ESE
11-May-2011	12:00	0.9	ESE
11-May-2011	13:00	1.1	ESE
11-May-2011	14:00	1.3	SSW
11-May-2011	15:00	0.8	WNW
11-May-2011	16:00	1.6	ENE
11-May-2011	17:00	0.5	W
11-May-2011	18:00	0.4	W
11-May-2011	19:00	0.2	WNW
11-May-2011	20:00	0.5	SE
11-May-2011	21:00	0.1	ESE
11-May-2011	22:00	0.3	NE
11-May-2011	23:00	0.1	NE
12-May-2011	0:00	0.5	E
12-May-2011	1:00	0.3	NE
12-May-2011	2:00	0.6	ESE
12-May-2011	3:00	0.5	ENE
12-May-2011	4:00	0.3	NNE
12-May-2011	5:00	0.5	WSW

Appendix C -	Wind Data	(Western	Portal)
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Date	Time	Wind Speed m/s	Direction
12-May-2011	6:00	0.2	NE
12-May-2011	7:00	0.1	NE
12-May-2011	8:00	1.3	NE
12-May-2011	9:00	1.4	ESE
12-May-2011	10:00	2.5	ESE
12-May-2011	11:00	2.5	ENE
12-May-2011	12:00	2.4	SE
12-May-2011	13:00	2.4	SE
12-May-2011	14:00	1.5	ENE
12-May-2011	15:00	1.3	ENE
12-May-2011	16:00	1	ENE
12-May-2011	17:00	0.4	SE
12-May-2011	18:00	0.1	SE
12-May-2011	19:00	1	NNE
12-May-2011	20:00	0.8	NNE
12-May-2011	21:00	0.5	NE
12-May-2011	22:00	0.2	ENE
12-May-2011	23:00	1.7	NNE
13-May-2011	0:00	0.1	ENE
13-May-2011	1:00	0.1	SSE
13-May-2011	2:00	0.3	SSE
13-May-2011	3:00	0.2	NNE
13-May-2011	4:00	0.5	ENE
13-May-2011	5:00	0.5	ENE
13-May-2011	6:00	1.4	ENE
13-May-2011	7:00	1.7	NNE
13-May-2011	8:00	0.5	SSE
13-May-2011	9:00	0.3	ENE
13-May-2011	10:00	0.2	SE
13-May-2011	11:00	1.4	ENE
13-May-2011	12:00	2	SW
13-May-2011	13:00	1.8	SSW
13-May-2011	14:00	3.1	ESE
13-May-2011	15:00	2	SE
13-May-2011	16:00	2.3	WSW
13-May-2011	17:00	1.9	ESE
13-May-2011	18:00	1.8	<u>LOL</u>
13-May-2011	19:00	1.3	NNE
13-May-2011	20:00	0.8	NNE
13-May-2011	21:00	2.3	NNE
13-May-2011	22:00	2.5	NE
13-May-2011	23:00	1.9	NE
14-May-2011	0:00	2.4	NE
14-May-2011	1:00	2.4	NE
14-May-2011	2:00	2.3	W
14-May-2011	3:00	2.5	WSW
14-May-2011	4:00	1.2	W
14-May-2011	5:00	1.5	W
14-May-2011	6:00	1.8	WSW
14-May-2011 14-May-2011	7:00	1.0	WSW
	8:00	2.7	SW
14-May-2011			
14-May-2011	9:00	1.5	SSW
14-May-2011	10:00	1.4	SSW
14-May-2011	11:00	2.3	W

Appendix C -	Wind Data	(Western Porta	I)
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Date	Time	Wind Speed m/s	Direction
14-May-2011	12:00	2.1	WNW
14-May-2011	13:00	1.3	WNW
14-May-2011	14:00	2.2	SE
14-May-2011	15:00	1.1	SE
14-May-2011	16:00	0.8	ENE
14-May-2011	17:00	1.7	NE
14-May-2011	18:00	1.8	WNW
14-May-2011	19:00	1.8	N
14-May-2011	20:00	2	NNE
14-May-2011	20:00	1.7	WNW
· · · · · ·			
14-May-2011	22:00	1.9	ENE
14-May-2011	23:00	2 2	ENE
15-May-2011	0:00		N
15-May-2011	1:00	0.8	N
15-May-2011	2:00	1.1	SW
15-May-2011	3:00	1.6	NE
15-May-2011	4:00	2.4	SSW
15-May-2011	5:00	3	SSE
15-May-2011	6:00	3.3	SE
15-May-2011	7:00	2.7	SE
15-May-2011	8:00	2.3	E
15-May-2011	9:00	2.4	ENE
15-May-2011	10:00	1.8	ENE
15-May-2011	11:00	2.4	ESE
15-May-2011	12:00	2.7	ESE
15-May-2011	13:00	2.5	SSE
15-May-2011	14:00	2.9	ESE
15-May-2011	15:00	2.5	ESE
15-May-2011	16:00	2.4	S
15-May-2011	17:00	2.3	SSE
15-May-2011	18:00	1.9	SE
15-May-2011	19:00	1.3	SE
15-May-2011	20:00	1.5	SE
15-May-2011	21:00	2	NW
15-May-2011	22:00	1.8	W
15-May-2011	23:00	2.1	NE
16-May-2011	0:00	1.5	ENE
16-May-2011	1:00	3.2	WNW
16-May-2011	2:00	1.9	NNE
16-May-2011	3:00	1.7	SSE
16-May-2011	4:00	1.4	SSE
16-May-2011	5:00	1.4	SSW
16-May-2011	6:00	0.6	WNW
16-May-2011	7:00	0.8	N
16-May-2011	8:00	0.8	E
16-May-2011		1	L WSW
ź	9:00	1.9	W
16-May-2011	10:00		
16-May-2011	11:00	1.5	SW
16-May-2011	12:00	2	WSW
16-May-2011	13:00	2.1	WNW
16-May-2011	14:00	1.2	NE
16-May-2011	15:00	0.3	NE
16-May-2011	16:00	0.1	ESE
16-May-2011	17:00	1.3	ESE

Appendix C -	Wind Data	(Western Portal)	
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Date	Time	Wind Speed m/s	Direction
16-May-2011	18:00	0.4	WNW
16-May-2011	19:00	0.7	S
16-May-2011	20:00	0.4	W
16-May-2011	21:00	1.5	WSW
16-May-2011	22:00	1	WNW
16-May-2011	23:00	2.4	NW
17-May-2011	0:00	2.8	W
17-May-2011	1:00	2.7	SW
17-May-2011	2:00	2.1	WSW
17-May-2011	3:00	2.3	WSW
17-May-2011	4:00	1.6	WSW
17-May-2011	5:00	1.9	NNE
17-May-2011	6:00	2.9	W
17-May-2011	7:00	3	WNW
17-May-2011	8:00	2.8	NNE
17-May-2011	9:00	1.8	WSW
17-May-2011	10:00	2.4	ENE
17-May-2011	11:00	2.9	ENE
17-May-2011	12:00	3.3	SSE
17-May-2011	13:00	2.7	S
17-May-2011	14:00	1.9	NE
17-May-2011	15:00	2.3	SE
17-May-2011	16:00	1.6	ESE
17-May-2011	17:00	1	SE
17-May-2011	18:00	0.7	SSE
17-May-2011	19:00	0.3	SE
17-May-2011	20:00	1.1	<u>N</u>
17-May-2011	21:00	1.4	N
17-May-2011	22:00	1.4	ESE
17-May-2011	23:00	1.5	ESE
18-May-2011	0:00	2.4	ESE
18-May-2011	1:00	2.5	ENE
18-May-2011	2:00	2.3	SSE
18-May-2011	3:00	1.4	NE
18-May-2011	4:00	0.7	ENE
18-May-2011	5:00	0.9	ENE
18-May-2011	6:00	0.7	NE
18-May-2011	7:00	0.5	ENE
18-May-2011	8:00	1.2	S
18-May-2011	9:00	1.7	WSW
18-May-2011	10:00	1.8	WSW
18-May-2011	11:00	1.6	W
18-May-2011	12:00	3.4	NE
18-May-2011	13:00	2.8	ESE
18-May-2011	14:00	2.6	NNE
18-May-2011	15:00	2.9	NNE
18-May-2011	16:00	3.1	W
18-May-2011	17:00	2.7	W
18-May-2011	18:00	2.6	WSW
18-May-2011	19:00	2.2	SW
18-May-2011	20:00	2	ESE
18-May-2011	21:00	0.3	WNW
18-May-2011	22:00	0.7	N
18-May-2011	23:00	1.2	NE
10-1viay-2011	23.00	1.2	

Appendix C -	Wind Data	(Western Portal)	
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Date	Time	Wind Speed m/s	Direction
19-May-2011	0:00	1.3	ENE
19-May-2011	1:00	1.4	NNE
19-May-2011	2:00	2.1	N
19-May-2011	3:00	2.4	NE
19-May-2011	4:00	1.4	ESE
19-May-2011	5:00	1.4	ESE
19-May-2011	6:00	0.4	ESE
19-May-2011	7:00	0.4	ESE
19-May-2011	8:00	1.6	ENE
19-May-2011	9:00	0.7	NE
	10:00	0.6	NE
19-May-2011	11:00	2.3	WSW
19-May-2011	12:00	3.1	W
19-May-2011	13:00	3.1	W
19-May-2011	14:00	2.3	NE
19-May-2011			
19-May-2011	15:00	1.5	NE
19-May-2011	16:00	1.9	ESE
19-May-2011	17:00	2.3	ESE
19-May-2011	18:00	0.3	ESE
19-May-2011	19:00	0.2	WSW
19-May-2011	20:00	1.6	N
19-May-2011	21:00	2.2	ENE
19-May-2011	22:00	1.7	NNE
19-May-2011	23:00	1.2	NNE
20-May-2011	0:00	1.3	NE
20-May-2011	1:00	1.6	SSE
20-May-2011	2:00	2	ENE
20-May-2011	3:00	0.9	ENE
20-May-2011	4:00	1.4	SSE
20-May-2011	5:00	1.2	SE
20-May-2011	6:00	1.2	SSE
20-May-2011	7:00	1.9	NE
20-May-2011	8:00	0.4	ENE
20-May-2011	9:00	1.1	ENE
20-May-2011	10:00	1.1	NE
20-May-2011	11:00	2.1	NNE
20-May-2011	12:00	0.9	ENE
20-May-2011	13:00	1.6	WNW
20-May-2011	14:00	0.5	WNW
20-May-2011	15:00	0.1	WSW
20-May-2011	16:00	0.8	W
20-May-2011	17:00	1	W
20-May-2011	18:00	1.2	NE
20-May-2011	19:00	1.5	NE
20-May-2011	20:00	0.9	ESE
20-May-2011	21:00	0.9	NNE
20-May-2011	22:00	0.2	ENE
20-May-2011	23:00	0.2	ESE
21-May-2011	0:00	0.8	SSE
21-May-2011	1:00	1	NNE
21-May-2011	2:00	1.5	Ν
21-May-2011	3:00	1.6	Ν
21-May-2011	4:00	1.5	SW
21-May-2011	5:00	1	SSE
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Appendix C -	Wind Data	(Western Portal)	
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Date	Time	Wind Speed m/s	Direction
21-May-2011	6:00	1.5	W
21-May-2011	7:00	1.6	NE
21-May-2011	8:00	1.5	SE
21-May-2011	9:00	0.9	SE
21-May-2011	10:00	1.9	SSE
21-May-2011	11:00	1	ESE
21-May-2011	12:00	2	E
21-May-2011	13:00	1.5	ESE
21-May-2011	14:00	1.6	ESE
21-May-2011	15:00	0.9	E
21-May-2011	16:00	2.1	SE
21-May-2011	17:00	2.3	SE
21-May-2011	18:00	1.2	ESE
21-May-2011	19:00	0.5	ESE
21-May-2011	20:00	0.7	ESE
21-May-2011	21:00	1.5	ENE
21-May-2011	22:00	0.6	NE
21-May-2011	23:00	0.7	ENE
22-May-2011	0:00	1.6	NE
22-May-2011	1:00	1.1	NE
22-May-2011	2:00	1.5	ENE
22-May-2011	3:00	1.2	ENE
22-May-2011	4:00	0.8	NNE
22-May-2011	5:00	0.9	NNE
22-May-2011	6:00	1.6	ENE
22-May-2011	7:00	0.7	WSW
22-May-2011	8:00	1.9	SW
22-May-2011	9:00	1.9	WSW
22-May-2011	10:00	0.5	W
22-May-2011	11:00	1.6	W
22-May-2011	12:00	1.5	NE
22-May-2011	13:00	0.4	ESE
22-May-2011	14:00	1	WSW
22-May-2011	15:00	3.3	SW
22-May-2011	16:00	3.2	ESE
22-May-2011	17:00	2.2	WNW
22-May-2011	18:00	2.2	NE
22-May-2011	19:00	2.2	ENE
22-May-2011	20:00	1.7	SW
22-May-2011	20:00	1.2	SW
22-May-2011	22:00	0.5	SSE
22-May-2011 22-May-2011	23:00	1.6	WNW
23-May-2011	0:00	1.0	ENE
23-May-2011 23-May-2011	1:00	1	E
23-May-2011	2:00	0.7	ESE
23-May-2011	3:00	0.7	ENE
23-May-2011	4:00	0.4	ENE
23-May-2011 23-May-2011	5:00	0.9	NNE
23-May-2011	6:00	0.5	NE
23-May-2011	7:00	0.4	NNE
23-May-2011	8:00	0.4	NNE
23-May-2011	9:00	0.2	NE
23-May-2011 23-May-2011	10:00	0.8	NNE
23-May-2011 23-May-2011	11:00	1.6	NNE
23-1Vlay-2011	11.00	1.0	

Appendix C -	Wind Data	(Western Porta	I)
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Date	Time	Wind Speed m/s	Direction
23-May-2011	12:00	1.7	NE
23-May-2011	13:00	2.7	NNE
23-May-2011	14:00	1.5	NE
23-May-2011	15:00	3.5	NE
23-May-2011	16:00	3.5	E
23-May-2011	17:00	3.1	ENE
23-May-2011	18:00	3.3	E
23-May-2011 23-May-2011	19:00	3	NE
23-May-2011	20:00	3.3	W
23-May-2011 23-May-2011	20.00	3.8	NE
	21:00		ENE
23-May-2011		4.6	
23-May-2011	23:00	4	NE
24-May-2011	0:00	3.5	N
24-May-2011	1:00	2.8	ESE
24-May-2011	2:00	2.9	SSE
24-May-2011	3:00	1.7	SSE
24-May-2011	4:00	1.5	NNE
24-May-2011	5:00	2	ENE
24-May-2011	6:00	0.8	ENE
24-May-2011	7:00	1.3	Ν
24-May-2011	8:00	1.7	NE
24-May-2011	9:00	2.2	NE
24-May-2011	10:00	3.4	NE
24-May-2011	11:00	3.5	NNE
24-May-2011	12:00	0.9	ENE
24-May-2011	13:00	0.8	NE
24-May-2011	14:00	1	E
24-May-2011	15:00	1.6	ENE
24-May-2011	16:00	1.1	E
24-May-2011	17:00	1.3	SSE
24-May-2011	18:00	3.5	NNE
24-May-2011	19:00	4	NNE
24-May-2011	20:00	3.3	ENE
24-May-2011	21:00	3.7	N
24-May-2011	22:00	3.4	NNE
24-May-2011	23:00	4	N
25-May-2011	0:00	3.8	W
25-May-2011	1:00	2.7	NNE
25-May-2011	2:00	3.5	ENE
25-May-2011	3:00	2.4	N
25-May-2011	4:00	3.4	WNW
25-May-2011	5:00	4.3	N
25-May-2011	6:00	3.2	NE
25-May-2011 25-May-2011	7:00	3.5	NE NE
25-May-2011 25-May-2011	8:00	3.2	WSW
	9:00	4	W
25-May-2011		3.6	WNW
25-May-2011	10:00		
25-May-2011	11:00	3.4	N
25-May-2011	12:00	2.7	N
25-May-2011	13:00	1.4	N
25-May-2011	14:00	1.4	N
25-May-2011	15:00	0.7	NE
25-May-2011	16:00	1.4	N
25-May-2011	17:00	0.4	NE

Date	Time	Wind Speed m/s	Direction
25-May-2011	18:00	1	NE
25-May-2011	19:00	0.9	NE
25-May-2011	20:00	2.1	NE
25-May-2011	21:00	1.2	E
25-May-2011	22:00	1.2	NNE
25-May-2011	23:00	1.1	NE
26-May-2011	0:00	1.5	NNE
26-May-2011	1:00	1.4	NE
26-May-2011	2:00	0.9	NE
26-May-2011	3:00	1.7	NE
26-May-2011	4:00	1	E
26-May-2011	5:00	0.7	NE
26-May-2011	6:00	0.3	NNE
26-May-2011	7:00	0.2	NW
26-May-2011	8:00	1.2	WNW
26-May-2011	9:00	0.4	WNW
26-May-2011	10:00	0.1	W
26-May-2011	11:00	0.6	WSW
26-May-2011	12:00	1.1	SSE
26-May-2011	13:00	2.3	SSE
26-May-2011	14:00	0.3	W
26-May-2011	15:00	0.6	WSW
26-May-2011	16:00	1.3	NNE
26-May-2011	17:00	0.9	NNE
26-May-2011	18:00	0.7	S
26-May-2011	19:00	0.7	NNE
26-May-2011	20:00	0.1	ENE
26-May-2011	21:00	0.7	E
26-May-2011	22:00	0.2	E
26-May-2011	23:00	1.5	SW
27-May-2011	0:00	1.5	NNE
27-May-2011	1:00	0.9	ENE
27-May-2011	2:00	1.2	ENE
27-May-2011	3:00	1.8	ENE
27-May-2011	4:00	1.4	ENE
27-May-2011	5:00	2	ENE
27-May-2011	6:00	1.3	ENE
27-May-2011	7:00	1.2	ENE
27-May-2011	8:00	1	ENE
27-May-2011	9:00	1	ENE
27-May-2011	10:00	1.1	ENE
27-May-2011	11:00	1.1	ENE
27-May-2011	12:00	1.5	ENE
27-May-2011	13:00	1.8	NNE
27-May-2011	14:00	1.6	NNE
27-May-2011	15:00	1.6	ENE
27-May-2011	16:00	1.3	ENE
27-May-2011	17:00	1.4	ENE
27-May-2011	18:00	0.8	WNW
27-May-2011	19:00	0.6	W
27-May-2011	20:00	0.2	NNE
27-May-2011 27-May-2011	21:00	3.5	ENE
27-May-2011	22:00	0.2	ENE
27-May-2011	23:00	1.3	ENE

Appendix C -	Wind Data	(Western	Portal)
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	Wind Speed m/s	Direction
0:00	1.4	ENE
	1.7	NE
	2.4	ENE
		SE
		ENE
		SE
		SSE
		ESE
		ENE
		SSE
		ENE
		ENE
		NNE
		NNE
		NE
		ESE
		NE
		NE
		SE
		ENE
		SSE
		ESE
		NE
		NE
		NE
		NNE
		NNE
		NE
		ENE
		ENE
		NE
		NE
		NNE
		ENE
		SSE
		NE
		ENE
		ENE
		E
		ENE
		SSE
		ENE
		NE
		ENE
		NE
		NE
		ENE
5:00	2.0	NNE
	1:00 2:00 3:00 4:00 5:00 6:00 7:00 8:00 9:00 10:00 11:00 12:00 13:00 14:00 15:00 16:00 17:00 18:00 19:00 20:00 21:00 23:00 0:00 1:00 2:00 3:00 4:00 5:00 6:00 7:00 8:00 9:00 10:00 11:00 12:00 13:00 14:00 15:00 16:00 17:00 18:00 19:00 20:00 21:00 22:00 23:00 0:00 10:00 21:00 <t< td=""><td>1:00$1.7$$2:00$$2.4$$3:00$$1.7$$4:00$$1.8$$5:00$$1.4$$6:00$$2.6$$7:00$$2.3$$8:00$$2.8$$9:00$$2.3$$10:00$$2.9$$11:00$$2.7$$12:00$$2.3$$13:00$$2.4$$14:00$$0.6$$15:00$$0.5$$16:00$$0.6$$17:00$$1.5$$18:00$$0.6$$19:00$$2.7$$20:00$$2.2$$21:00$$2.6$$22:00$$2.6$$23:00$$3.4$$0:00$$3.2$$1:00$$3.2$$1:00$$3.2$$1:00$$3.2$$1:00$$3.2$$1:00$$3.2$$1:00$$3.2$$1:00$$3.2$$1:00$$3.2$$1:00$$3.2$$1:00$$3.2$$1:00$$3.2$$1:00$$3.2$$1:00$$3.2$$1:00$$3.2$$1:00$$3.3$$1:00$$3.3$$1:00$$0.7$$2:00$$0.7$$2:00$$0.7$$2:00$$0.7$$2:00$$1.1$$3:00$$0.7$$2:00$$0.7$$2:00$$0.7$$2:00$$0.7$$2:00$$0.7$$2:00$$0.7$$2:00$$0.7$$2:00$$0.7$</td></t<>	1:00 1.7 $2:00$ 2.4 $3:00$ 1.7 $4:00$ 1.8 $5:00$ 1.4 $6:00$ 2.6 $7:00$ 2.3 $8:00$ 2.8 $9:00$ 2.3 $10:00$ 2.9 $11:00$ 2.7 $12:00$ 2.3 $13:00$ 2.4 $14:00$ 0.6 $15:00$ 0.5 $16:00$ 0.6 $17:00$ 1.5 $18:00$ 0.6 $19:00$ 2.7 $20:00$ 2.2 $21:00$ 2.6 $22:00$ 2.6 $23:00$ 3.4 $0:00$ 3.2 $1:00$ 3.2 $1:00$ 3.2 $1:00$ 3.2 $1:00$ 3.2 $1:00$ 3.2 $1:00$ 3.2 $1:00$ 3.2 $1:00$ 3.2 $1:00$ 3.2 $1:00$ 3.2 $1:00$ 3.2 $1:00$ 3.2 $1:00$ 3.2 $1:00$ 3.2 $1:00$ 3.3 $1:00$ 3.3 $1:00$ 0.7 $2:00$ 0.7 $2:00$ 0.7 $2:00$ 0.7 $2:00$ 1.1 $3:00$ 0.7 $2:00$ 0.7 $2:00$ 0.7 $2:00$ 0.7 $2:00$ 0.7 $2:00$ 0.7 $2:00$ 0.7 $2:00$ 0.7

Date	Time	Wind Speed m/s	Direction
30-May-2011	6:00	2.5	SE
30-May-2011	7:00	1.9	NNE
30-May-2011	8:00	1.4	Ν
30-May-2011	9:00	1.7	NE
30-May-2011	10:00	0.7	NNE
30-May-2011	11:00	1.8	SSE
30-May-2011	12:00	0.9	SSE
30-May-2011	13:00	1.8	E
30-May-2011	14:00	0.5	NNE
30-May-2011	15:00	1.9	Ν
30-May-2011	16:00	1.4	NE
30-May-2011	17:00	1.7	ESE
30-May-2011	18:00	1.8	NNE
30-May-2011	19:00	1.9	NNE
30-May-2011	20:00	1.6	NE
30-May-2011	21:00	2	NE
30-May-2011	22:00	1.8	NNE
30-May-2011	23:00	2.3	NE
31-May-2011	0:00	2.6	NE
31-May-2011	1:00	2.8	NE
31-May-2011	2:00	3.4	WNW
31-May-2011	3:00	2.4	SW
31-May-2011	4:00	2.4	WSW
31-May-2011	5:00	1.8	ENE
31-May-2011	6:00	1.6	ESE
31-May-2011	7:00	1.8	WSW
31-May-2011	8:00	1	SSW
31-May-2011	9:00	1.5	NE
31-May-2011	10:00	1.2	ENE
31-May-2011	11:00	1.2	ENE
31-May-2011	12:00	1.2	ENE
31-May-2011	13:00	1.1	NNE
31-May-2011	14:00	1.1	E
31-May-2011	15:00	1.1	NE
31-May-2011	16:00	1.8	NNE
31-May-2011	17:00	1.6	ESE
31-May-2011	18:00	1.5	NNE
31-May-2011	19:00	1.7	Ν
31-May-2011	20:00	2.1	NE
31-May-2011	21:00	2	ENE
31-May-2011	22:00	2	ENE
31-May-2011	23:00	1.5	ENE

Appendix C - Wind Data (Western Portal)

APPENDIX D ENVIRONMENTAL MONITORING SCHEDULES

Sunday	Monday Tuesday		Wednesday	Thursday	Friday	Saturday	
1-May	2-May	3-May	4-May	5-May	6-May	7-May	
		1 hr TSP X 3					
		1 III 13F X 5					
			Noise				
			Daytime (07:00-19:00)				
		24 hrs TSP					
8-May	9-May	10-May	11-May	12-May	13-May	14-May	
	1 hr TSP X 3				1 hr TSP X 3		
				Noise			
				Daytime (07:00-19:00)			
15-May	24 hrs TSP 16-May	17-May	18-May	19-May	20-May	24 hrs TSP 21-May	
10 1111	10 1014	17 10149		17 Way	20 114	21 1111	
			1 hr TSP X 3				
	Naina						
	<u>Noise</u> Daytime (07:00-19:00)						
	•						
					24 hrs TSP		
22-May	23-May	24-May	25-May	26-May	27-May	28-May	
			1 hr TSP X 3				
				<u>Noise</u> Daytime (07:00-19:00)			
				Daytime (07.00-19.00)			
				24 hrs TSP			
29-May	30-May	31-May					
		1 hr TSP X 3					
		1 III 1 SF A 3					

Drainage Improvement in Northern Hong Kong Island - Hong Kong West Drainage Tunnel Impact Air and Noise Monitoring Schedule for May 2011 (Eastern Portal)

Air Quality Monitoring Station

Noise Monitoring Station

AQ1 - True Light Middle School of HK

NC1 - True Light Middle School of HK NC2 - The Legend

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
1-May	2-May	3-May	4-May	5-May	6-May	7-May
		1 hr TSP X 3	Noise			
			Daytime (07:00-19:00)			
		24 hrs TSP		10.14	10.14	14.16
8-May	9-May	10-May	11-May	12-May	13-May	14-May
	1 hr TSP X 3				1 hr TSP X 3	
				<u>Noise</u> Daytime (07:00-19:00)		
	24 hrs TSP					24 hrs TSP
15-May	16-May	17-May	18-May	19-May	20-May	21-May
			1 hr TSP X 3			
	Noise Daytime (07:00-19:00)					
					24 hrs TSP	
22-May	23-May	24-May	25-May	26-May	27-May	28-May
			1 hr TSP X 3			
				<u>Noise</u> Daytime (07:00-19:00)		
				24 hrs TSP		
29-May	30-May	31-May				
		1 hr TSP X 3				

Drainage Improvement in Northern Hong Kong Island - Hong Kong West Drainage Tunnel Impact Air and Noise Monitoring Schedule for May 2011 (Western Portal)

Air Quality Monitoring Station

Noise Monitoring Station

AQ2 - Outside Aegean Terrace (1 hour TSP)

AQ3 - Outside Site Office at Western Portal (24 hours TSP)

NC3 - Outside Aegean Terrace

Drainage Improvement in Northern Hong Kong Island - Hong Kong West Drainage Tunnel Impact Noise Monitoring Schedule for May 2011 (Intake BR6, DG1, E5A, E7, MA14, PFLR1, PR1, THR2, W0, W5, W8 and P5)

Sunday	Monday	Tuesday	Wednesday	Thursday	Saturday		
1-May	2-May	3-May	4-May	5-May	Friday 6-May	7-May	
			<u>Noise</u> Daytime (07:00-19:00)				
8-May	9-May	10-May	11-May	12-May	13-May	14-May	
				<u>Noise</u> Daytime (07:00-19:00)			
15-May	16-May	17-May	18-May	19-May	20-May	21-May	
	<u>Noise</u> Daytime (07:00-19:00)						
22-May	23-May	24-May	25-May	26-May	27-May	28-May	
				<u>Noise</u> Daytime (07:00-19:00)			
29-May	30-May	31-May					

Noise Monitoring Station

Intake BR6 - Man Yuen Garden (NC4) Intake DG 1 - Blk D Villa Monte Rosa (NC5) and Rosaryhill School (NC6) Intake E5A - Buddist Li Ka Shing Care & Attention Home for the Elderly (NC7) Intake E7 - Marymount Secondary School (NC8) and 117 Blue Pool Road (NC9) Intake MA14 - The Harbour View (NC10) Intake PFLR1 - Honey Court (NC11) Intake PFLR1 - Honey Court (NC11) Intake RR1 - Ying Wa Girl's School (NC12) and Peaksville Court (NC13) Intake THR2 - Hong Kong Japanese School (NC14) Intake W0 - Hong Kong Academy (NC15) Intake W5 - Raimondi College (NC16) Intake W8 - Hong Kong Institute of Technology (NC17) and Blk A, 80 Robinson Road (NC18) Intake P5 - Villa Veneto (NC19)

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
1-May	2-May	3-May	4-May	5-May	6-May	7-May
			<u>Noise</u> Daytime (07:00-19:00)			
8-May	9-May	10-May	11-May	12-May	13-May	14-May
				<u>Noise</u> Daytime (07:00-19:00)		
15-May	16-May	17-May	18-May	19-May	20-May	21-May
	<u>Noise</u> Daytime (07:00-19:00)					
22-May	23-May	24-May	25-May	26-May	27-May	28-May
				<u>Noise</u> Daytime (07:00-19:00)		
29-May	30-May	31-May				

Drainage Improvement in Northern Hong Kong Island - Hong Kong West Drainage Tunnel Impact Ground Borne Constructon Noise Schedule for May 2011

Noise Monitoring Station

GNC7 - Hong Villa

Sunday	Monday Tuesday Wednesday Thursday		Thursday	Friday Saturday			
			1-Jun	2-Jun	3-Jun	4-Jun	
					1 hr TSP X 3		
					1 nr 15P X 5		
				Noise			
				Daytime (07:00-19:00)			
5-Jun	6-Jun	7-Jun	24 hrs TSP 8-Jun	9-Jun	10-Jun	11-Jun	
Jun	0-Juli	/-Juli	0-Juli	9-Juli	10-5411	11-5011	
				1 hr TSP X 3			
					<u>Noise</u> Daytime (07:00-19:00)		
					Daytime (07.00-19.00)		
		24 hrs TSP					
12-Jun	13-Jun	14-Jun	15-Jun	16-Jun	17-Jun	18-Jun	
			1 hr TSP X 3				
			1 III 1 SF A 5				
				Noise			
				Daytime (07:00-19:00)			
	24 hrs TSP					24 hrs TSP	
19-Jun		21-Jun	22-Jun	23-Jun	24-Jun	24 ms 13F 25-Jun	
		1 hr TSP X 3					
				N. 1			
				<u>Noise</u> Daytime (07:00-19:00)			
				,			
					24 hrs TSP		
26-Jun	27-Jun	28-Jun	29-Jun	30-Jun	1-Jul	2-Jul	
	1 hr TSP X 3						
	1 11 101 75 5						
		Noise					
		Daytime (07:00-19:00)					
				24 hrs TSP			
				24 nrs 15P			

Drainage Improvement in Northern Hong Kong Island - Hong Kong West Drainage Tunnel Tentative Impact Air and Noise Monitoring Schedule for June 2011 (Eastern Portal)

The schedule may be changed due to unforeseen circumstances (adverse weather, etc)

Air Quality Monitoring Station

Noise Monitoring Station

AQ1 - True Light Middle School of HK

NC1 - True Light Middle School of HK NC2 - The Legend

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
			1-Jun	2-Jun	3-Jun	4-Jun
					1 hr TSP X 3	
				Noise		
				Daytime (07:00-19:00)		
			24 hrs TSP			
5-Jun	6-Jun	7-Jun	8-Jun	9-Jun	10-Jun	11-Jun
				1 hr TSP X 3		
					Noise	
					<u>Noise</u> Daytime (07:00-19:00)	
		24 hrs TSP				
12-Jun	13-Jun	14-Jun	15-Jun	16-Jun	17-Jun	18-Jun
			1 h., TCD V 2			
			1 hr TSP X 3			
				Noise		
				Daytime (07:00-19:00)		
	24 hrs TSP					24 hrs TSP
19-Jun	20-Jun	21-Jun	22-Jun	23-Jun	24-Jun	25-Jun
		1 h., TOD V 2				
		1 hr TSP X 3				
				Noise		
				Daytime (07:00-19:00)		
					24 hrs TSP	
26-Jun	27-Jun	28-Jun	29-Jun	30-Jun	1-Jul	2-Jul
	1 hr TSP X 3					
		Noise				
		Daytime (07:00-19:00)				
				24 hrs TSP		

Drainage Improvement in Northern Hong Kong Island - Hong Kong West Drainage Tunnel Tentative Impact Air and Noise Monitoring Schedule for June 2011 (Western Portal)

Air Quality Monitoring Station

Noise Monitoring Station

AQ2 - Outside Aegean Terrace (1 hour TSP)

AQ3 - Outside Site Office at Western Portal (24 hours TSP)

NC3 - Outside Aegean Terrace

Drainage Improvement in Northern Hong Kong Island - Hong Kong West Drainage Tunnel Tentative Impact Noise Monitoring Schedule for June 2011 (Intake BR6, DG1, E5A, E7, MA14, PFLR1, PR1, THR2, W0, W5, W8 and P5)

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
			1-Jun	2-Jun	3-Jun	4-Jun
				<u>Noise</u> Daytime (07:00-19:00)		
5-Jun	6-Jun	7-Jun	8-Jun	9-Jun	10-Jun	11-Jun
					<u>Noise</u> Daytime (07:00-19:00)	
12-Jun	13-Jun	14-Jun	15-Jun	16-Jun	17-Jun	18-Jun
				<u>Noise</u> Daytime (07:00-19:00)		
19-Jun	20-Jun	21-Jun	22-Jun	23-Jun	24-Jun	25-Jun
				<u>Noise</u> Daytime (07:00-19:00)		
26-Jun	27-Jun	28-Jun	29-Jun	30-Jun	1-Jul	2-Jul
		<u>Noise</u> Daytime (07:00-19:00)				

The schedule may be changed due to unforeseen circumstances (adverse weather, etc)

Noise Monitoring Station

Intake BR6 - Man Yuen Garden (NC4) Intake DG 1 - Blk D Villa Monte Rosa (NC5) and Rosaryhill School (NC6) Intake E5A - Buddist Li Ka Shing Care & Attention Home for the Elderly (NC7) Intake E7 - Marymount Secondary School (NC8) and 117 Blue Pool Road (NC9) Intake MA14 - The Harbour View (NC10) Intake PFLR1 - Honey Court (NC11) Intake PFLR1 - Honey Court (NC11) Intake RR1 - Ying Wa Girl's School (NC12) and Peaksville Court (NC13) Intake THR2 - Hong Kong Japanese School (NC14) Intake W0 - Hong Kong Academy (NC15) Intake W5 - Raimondi College (NC16) Intake W8 - Hong Kong Institute of Technology (NC17) and Blk A, 80 Robinson Road (NC18) Intake P5 - Villa Veneto (NC19)

Sunday	Monday Tuesday		Wednesday	Thursday	Friday	Saturday
			1-Jun	2-Jun	3-Jun	4-Jun
				<u>Noise</u> Daytime (07:00-19:00)		
5-Jun	6-Jun	7-Jun	8-Jun	9-Jun	10-Jun	11-Jun
					<u>Noise</u> Daytime (07:00-19:00)	
12-Jun	13-Jun	14-Jun	15-Jun	16-Jun	17-Jun	18-Jun
				<u>Noise</u> Daytime (07:00-19:00)		
19-Jun	20-Jun	21-Jun	22-Jun	23-Jun	24-Jun	25-Jun
				<u>Noise</u> Daytime (07:00-19:00)		
26-Jun	27-Jun	28-Jun	29-Jun	30-Jun	1-Jul	2-Jul
		<u>Noise</u> Daytime (07:00-19:00)				

Drainage Improvement in Northern Hong Kong Island - Hong Kong West Drainage Tunnel Tentative Impact Ground Borne Constructon Noise Schedule for June 2011

The schedule may be changed due to unforeseen circumstances (adverse weather, etc)

Noise Monitoring Station

GNC7 - Hong Villa

APPENDIX E 1-HOUR TSP MONITORING RESULTS AND GRAPHICAL PRESENTATION

Appendix E - 1-hour TSP Monitoring Results

Station AQ1 (True Light Middle School of Hong Kong)

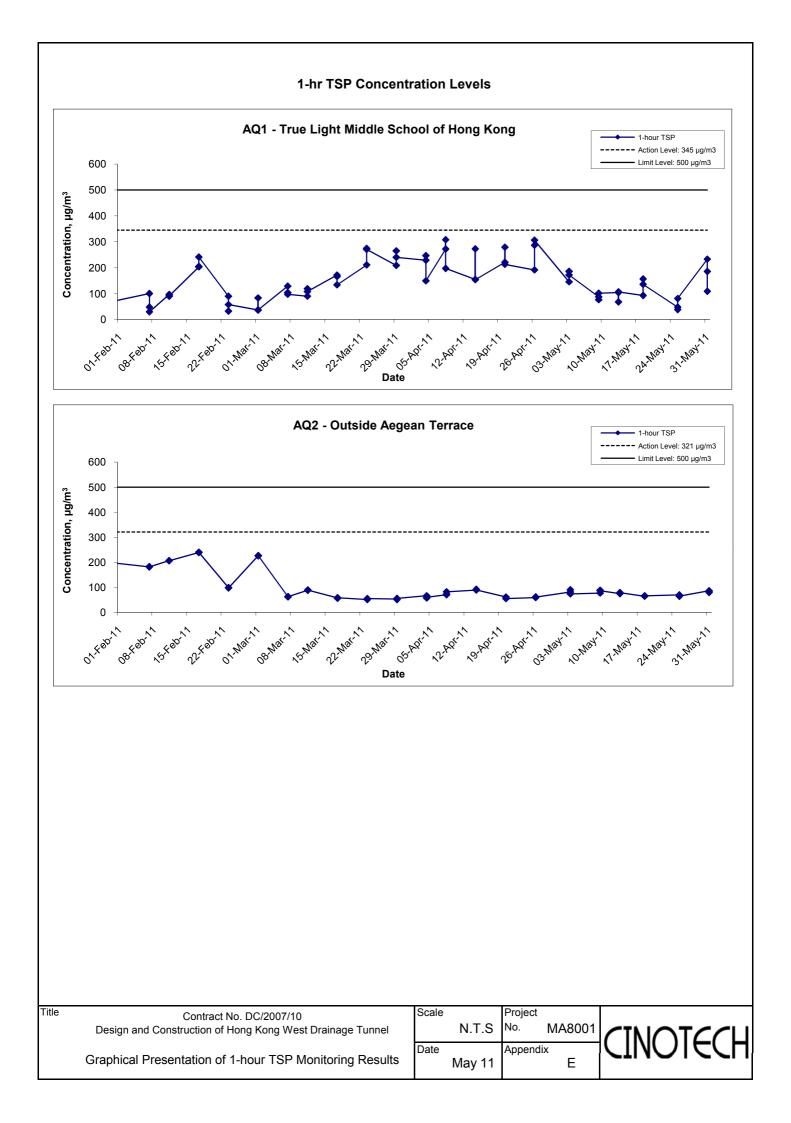
Date	Sampling	Weather	Air	Atmospheric	Filter W	eight (g)	Particulate	Elapse	e Time	Sampling	Flow Rate	e (m ³ /min.)	Av. flow	Total vol.	Conc.
Date	Time	Condition	Temp. (K)	Pressure (Pa)	Initial	Final	weight (g)	Initial	Final	Time(hrs.)	Initial	Final	(m ³ /min)	(m ³)	(µg/m ³)
3-May-11	9:00	Cloudy	300.6	760.1	3.4297	3.4402	0.0105	6310.3	6311.3	1.0	1.20	1.20	1.20	72.2	145.4
3-May-11	10:05	Cloudy	300.8	759.9	3.4033	3.4167	0.0134	6312.3	6313.3	1.0	1.20	1.20	1.20	72.2	185.6
3-May-11	11:08	Cloudy	300.9	759.7	3.4110	3.4234	0.0124	6313.3	6314.3	1.0	1.20	1.20	1.20	72.2	171.8
9-May-11	9:00	Sunny	301.1	759.3	3.3866	3.3929	0.0063	6338.3	6339.3	1.0	1.20	1.20	1.20	72.1	87.3
9-May-11	10:00	Sunny	301.3	759.2	3.4076	3.4131	0.0055	6339.3	6340.3	1.0	1.20	1.20	1.20	72.1	76.3
9-May-11	11:00	Sunny	301.5	759.1	3.4225	3.4298	0.0073	6340.3	6341.3	1.0	1.20	1.20	1.20	72.1	101.3
13-May-11	13:00	Sunny	299.9	759.9	3.3963	3.4038	0.0075	6365.3	6366.3	1.0	1.20	1.20	1.20	72.3	103.8
13-May-11	14:00	Sunny	300.1	759.7	3.4110	3.4159	0.0049	6366.3	6367.3	1.0	1.20	1.20	1.20	72.3	67.8
13-May-11	15:00	Sunny	300.3	759.5	3.3362	3.3439	0.0077	6367.3	6368.3	1.0	1.20	1.20	1.20	72.2	106.6
18-May-11	13:00	Sunny	300.0	760.4	3.1730	3.1797	0.0067	6392.3	6393.3	1.0	1.21	1.21	1.21	72.3	92.7
18-May-11	14:00	Sunny	300.0	760.3	3.1946	3.2059	0.0113	6393.3	6394.3	1.0	1.21	1.20	1.20	72.3	156.3
18-May-11	15:00	Sunny	300.2	760.1	3.0925	3.1023	0.0098	6394.3	6395.3	1.0	1.20	1.20	1.20	72.3	135.6
25-May-11	9:00	Sunny	293.9	761.0	3.4150	3.4185	0.0035	6416.3	6417.3	1.0	1.22	1.22	1.22	73.0	48.0
25-May-11	10:00	Sunny	293.9	761.0	3.4025	3.4053	0.0028	6417.3	6418.3	1.0	1.22	1.22	1.22	73.0	38.4
25-May-11	11:00	Sunny	293.9	761.0	3.3816	3.3875	0.0059	6418.3	6419.3	1.0	1.22	1.22	1.22	73.0	80.8
31-May-11	13:00	Sunny	303.4	757.1	3.3251	3.3418	0.0167	6443.3	6444.3	1.0	1.20	1.20	1.20	71.8	232.6
31-May-11	14:00	Sunny	303.6	756.9	3.3351	3.3484	0.0133	6444.3	6445.3	1.0	1.20	1.20	1.20	71.8	185.3
31-May-11	15:00	Sunny	303.7	756.7	3.3117	3.3195	0.0078	6445.3	6446.3	1.0	1.20	1.20	1.20	71.7	108.7
														Min	38.4

Max 232.6

Average 118.0

Appendix E - 1-hour TSP Monitoring Results

ation AQ2 (Out	side Aegean	Terrace)	
Date	Time	Weather	Particulate Concentration (µg/m ³)
3-May-11	13:00	Sunny	80.9
3-May-11	14:00	Sunny	90.1
3-May-11	15:00	Sunny	73.8
9-May-11	13:00	Sunny	76.9
9-May-11	14:00	Sunny	88.1
9-May-11	15:00	Sunny	86.5
13-May-11	9:00	Sunny	74.6
13-May-11	10:00	Sunny	77.6
13-May-11	11:00	Sunny	78.9
18-May-11	13:00	Sunny	64.2
18-May-11	14:00	Sunny	65.5
18-May-11	15:00	Sunny	65.9
25-May-11	9:00	Sunny	69.7
25-May-11	10:00	Sunny	64.4
25-May-11	11:00	Sunny	64.6
31-May-11	13:00	Sunny	86.2
31-May-11	14:00	Sunny	82.4
31-May-11	15:00	Sunny	79.0
		Average	76.1
		Maximum	90.1
		Minimum	64.2



APPENDIX F 24-HOUR TSP MONITORING RESULTS AND GRAPHICAL PRESENTATION

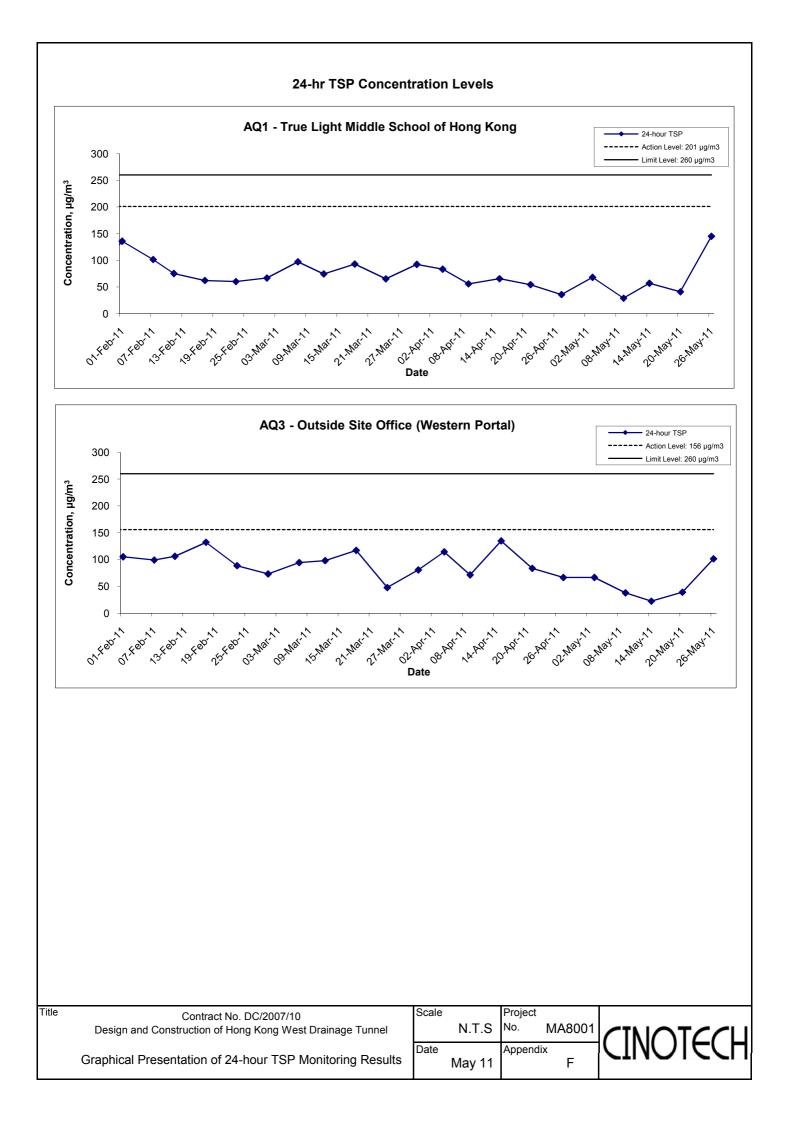
Appendix F - 24-hour TSP Monitoring Results

Station AQ1 - True Light Middle School of Hong Kong

Start Date	Weather	Air	Atmospheric	Filter W	eight (g)	Particulate	Elapse	e Time	Sampling	Flow Rate	e (m ³ /min.)	Av. flow	Total vol.	Conc.
Start Date	Condition	Temp. (K)	Pressure (Pa)	Initial	Final	weight (g)	Initial	Final	Time(hrs.)	Initial	Final	(m ³ /min)	(m ³)	(µg/m³)
3-May-11	Cloudy	303.8	758.9	3.4267	3.5438	0.1171	6314.3	6338.3	24.0	1.20	1.20	1.20	1723.8	67.9
9-May-11	Sunny	301.1	759.3	3.3950	3.4449	0.0499	6341.3	6365.3	24.0	1.20	1.20	1.20	1731.1	28.8
14-May-11	Sunny	296.9	763.1	3.4050	3.5043	0.0993	6368.3	6392.3	24.0	1.21	1.21	1.21	1746.0	56.9
20-May-11	Sunny	300.3	759.8	3.4014	3.4722	0.0708	6392.3	6416.3	24.0	1.20	1.20	1.20	1733.7	40.8
26-May-11	Sunny	296.6	760.8	3.4019	3.6547	0.2528	6419.3	6443.3	24.0	1.21	1.21	1.21	1744.4	144.9
													Min	28.8
													Max	144.9
													Average	67.9

Station AQ3 - Outside Site Office (Western Portal)

Start Date	Weather	Air	Atmospheric	Filter W	eight (g)	Particulate	Elapse	e Time	Sampling	Flow Rate	e (m ³ /min.)	Av. flow	Total vol.	Conc.
Start Date	Condition	Temp. (K)	Pressure (Pa)	Initial	Final	weight (g)	Initial	Final	Time(hrs.)	Initial	Final	(m ³ /min)	(m ³)	(µg/m³)
3-May-11	Cloudy	300.6	760.1	3.3885	3.5046	0.1161	10163.1	10187.1	24.0	1.21	1.21	1.21	1742.7	66.6
9-May-11	Sunny	301.1	759.3	3.4088	3.4749	0.0661	10187.1	10211.1	24.0	1.21	1.21	1.21	1740.5	38.0
14-May-11	Sunny	296.9	763.1	3.4099	3.4494	0.0395	10211.1	10235.1	24.0	1.22	1.22	1.22	1755.6	22.5
20-May-11	Sunny	300.3	759.8	3.4109	3.4791	0.0682	10235.1	10259.1	24.0	1.21	1.21	1.21	1743.1	39.1
26-May-11	Sunny	296.6	760.8	3.4070	3.5849	0.1779	10259.1	10283.1	24.0	1.22	1.22	1.22	1754.0	101.4
													Min	22.5
													Max	101.4
													Average	53.5



APPENDIX G NOISE MONITORING RESULTS AND GRAPHICAL PRESENTATION

Appendix G - Noise Monitoring Results

Location NC1	Location NC1 - True Light Middle School of Hong Kong												
Date	Time	Weather	Measured Noise Level Limit Level Baseline Level Construction Noise										
			L _{eq}	L ₁₀	L 90	L _{eq}	L _{eq}	L _{eq}					
4-May-11	17:00	Cloudy	67.5	68.2	61.7	70.0	N/A	67.5 Measured \leq Limit Level					
12-May-11	13:00	Cloudy	71.2	72.5	68.7	70.0	70.8	60.6					
16-May-11	17:00	Cloudy	70.6 72.4 64.1 70.0 69.7 63.3										
26-May-11	16:50	Sunny	66.2	66.2 67.3 63.0 70.0 N/A 66.2 Measured ≦ Limit Level									

Location NC2 - The Legend												
						Unit: dB (A)) (30-min)					
Date	Time	Weather	Mea	sured Noise I	Level	Limit Level	Baseline Level	Construction Noise Level				
			L _{eq}	L ₁₀	L ₉₀	L _{eq}	L _{eq}	L _{eq}				
4-May-11	16:20	Cloudy	67.4	69.1	63.7		N/A	67.4 Measured \leq Limit Level				
12-May-11	13:41	Cloudy	70.5	72.3	68.5	75.0	N/A	70.5 Measured \leq Limit Level				
16-May-11	16:15	Cloudy	69.2	72.1	65.6	75.0	N/A	69.2 Measured \leq Limit Level				
26-May-11	16:05	Sunny	64.3	66.2	61.5		N/A	64.3 Measured ≦ Limit Level				

Location NC3	- Outside A	egean Terrac	e					
						Unit: dB (A)) (30-min)	
Date	Time	Weather	Mea	sured Noise	Level	Limit Level	Baseline Level	Construction Noise Level
			L _{eq}	L ₁₀	L ₉₀	L _{eq}	L _{eq}	L _{eq}
4-May-11	8:00	Sunny	53.2	55.6	47.8		N/A	52.3 Measured \leq Limit Level
12-May-11	8:20	Sunny	53.6	55.8	47.9	75.0	N/A	53.6 Measured \leq Limit Level
16-May-11	8:10	Cloudy	51.5	55.2	48.1	75.0	N/A	51.5 Measured \leq Limit Level
26-May-11	8:00	Sunny	51.9	55.6	48.2		N/A	51.9 Measured \leq Limit Level

Location NC4	Location NC4 - Man Yuen Garden												
				Unit: dB (A) (30-min)									
Date	Time	Weather	Mea	Measured Noise Level Limit Level Baseline Level Construction									
			L _{eq} L ₁₀ L ₉₀ L _{eq} L _{eq} L _{eq}										
4-May-11	13:05	Sunny	71.2	74.3	65.9		N/A	71.2 Measured \leq Limit Level					
12-May-11	13:00	Sunny	71.2	74.8	66.9	75.0	N/A	71.2 Measured \leq Limit Level					
16-May-11	13:00	Cloudy	69.7	72.3	64.9	75.0	N/A	69.7 Measured \leq Limit Level					
26-May-11	11:30	Sunny	68.7	72.1	62.9		N/A	68.7 Measured \leq Limit Level					

Location NC5	Location NC5 - Blk D Villa Monte Rosa												
				Unit: dB (A) (30-min)									
Date	Time	Weather	Mea	sured Noise	Level	Limit Level	Baseline Level	Construction Noise Level					
			L _{eq}	L ₁₀	L ₉₀	L _{eq}	L _{eq}	L _{eq}					
4-May-11	9:30	Sunny	65.7	68.6	59.2		N/A	65.7 Measured \leq Limit Level					
12-May-11	9:50	Sunny	69.2	70.8	61.4	75.0	N/A	69.2 Measured \leq Limit Level					
16-May-11	9:40	Cloudy	67.3	70.1	61.5	75.0	N/A	67.3 Measured \leq Limit Level					
26-May-11	9:30	Sunny	66.7	70.2	61.5		N/A	66.7 Measured \leq Limit Level					

Location NC6	Location NC6 - Rosaryhill School												
			Unit: dB (A) (30-min)										
Date	Time	Weather	Mea	sured Noise	Level	Baseline Level	Construction Noise Level						
			L _{eq} L ₁₀ L ₉₀ L _{eq} L _{eq} L _{eq}										
4-May-11	10:05	Sunny	64.5	67.2	60.3	70.0	N/A	64.5 Measured \leq Limit Level					
12-May-11	10:25	Sunny	64.5	67.2	60.1	70.0	N/A	64.5 Measured \leq Limit Level					
16-May-11	10:20	Cloudy	65.1	66.8	59.5	70.0	N/A	65.1 Measured \leq Limit Level					
26-May-11	10:05	Sunny	63.8	67.3	60.2	70.0	N/A	63.8 Measured \leq Limit Level					

Location NC7	Location NC7 - Buddist Li Ka Shing Care & Attention Home for the Elderly											
						Unit: dB (A)) (30-min)					
Date	Time	Weather	Measured Noise Level Limit Level Baseline Level Construction Noise Le									
			L _{eq}	L _{eq} L ₁₀ L ₉₀ L _{eq} L _{eq} L _{eq}								
4-May-11	15:25	Cloudy	70.3	72.6	65.7		N/A	70.3 Measured \leq Limit Level				
12-May-11	16:30	Cloudy	71.8	73.3	69.8	75.0	N/A	71.8 Measured \leq Limit Level				
16-May-11	15:15	Sunny	70.1	73.0	64.2	75.0	N/A	70.1 Measured \leq Limit Level				
26-May-11	15:20	Sunny	75.1									

Appendix G - Noise Monitoring Results

Location NC8	Location NC8 - Marymount Secondary School												
				Unit: dB (A) (30-min)									
Date	Time	Weather	Mea	Measured Noise Level			Baseline Level	Construction Noise Level					
			L _{eq} L ₁₀ L ₉₀ L _{eq} L _{eq} L _{eq}										
4-May-11	13:55	Cloudy	66.5	68.2	60.8	70.0	N/A	66.5 Measured \leq Limit Level					
12-May-11	14:30	Cloudy	64.8	68.3	59.2	70.0	N/A	64.8 Measured \leq Limit Level					
16-May-11	14:25	Cloudy	66.2	68.0	61.6	70.0	N/A	66.2 Measured \leq Limit Level					
26-May-11	14:25	Sunny	67.0	69.6	61.4	70.0	N/A	67.0 Measured \leq Limit Level					

Location NC9	Location NC9 - 117 Blue Pool Road												
				Unit: dB (A) (30-min)									
Date	Time	Weather	Mea	sured Noise I	Level	Limit Level	Baseline Level	Construction Noise Level					
			L _{eq}	L ₁₀	L ₉₀	L _{eq}	L _{eq}	L _{eq}					
4-May-11	14:35	Cloudy	68.3	69.4	60.4		N/A	68.3 Measured \leq Limit Level					
12-May-11	15:03	Cloudy	73.1	75.2	69.7	75.0	N/A	73.1 Measured \leq Limit Level					
16-May-11	13:45	Sunny	67.0	69.3	63.7	75.0	N/A	67.0 Measured \leq Limit Level					
26-May-11	13:50	Sunny	71.7	73.1	61.0		N/A	71.7 Measured \leq Limit Level					

Location NC1	0 - The Harb	our View									
				Unit: dB (A) (30-min)							
Date	Time	Weather	Mea	sured Noise I	Level	Limit Level	Baseline Level	Construction Noise Level			
			L _{eq}	L ₁₀	L 90	L _{eq}	L _{eq}	L _{eq}			
4-May-11	11:10	Sunny	72.4	74.7	68.2		N/A	72.4 Measured \leq Limit Level			
12-May-11	11:30	Sunny	70.8	73.7	66.5	75.0	N/A	70.8 Measured \leq Limit Level			
16-May-11	11:20	Cloudy	71.1	74.6	67.3	75.0	N/A	71.1 Measured \leq Limit Level			
26-May-11	11:10	Sunny	70.1	73.2	66.8		N/A	70.1 Measured \leq Limit Level			

Location NC1	Location NC11 - Honey Court											
						Unit: dB (A)) (30-min)					
Date	Time Weather		Mea	sured Noise	Level	Limit Level	Baseline Level	Construction Noise Level				
			L _{eq}	L ₁₀	L 90	L _{eq}	L _{eq}	L _{eq}				
4-May-11	8:40	Sunny	67.2	69.4	63.1		N/A	67.2 Measured \leq Limit Level				
12-May-11	9:00	Sunny	66.8	69.2	61.4	75.0	N/A	66.8 Measured \leq Limit Level				
16-May-11	8:50	Cloudy	66.2	68.8	62.1	75.0	N/A	66.2 Measured \leq Limit Level				
26-May-11	8:40	Sunny	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$									

Location NC1	2 - Ying Wa	Girl's School						
						Unit: dB (A)) (30-min)	
Date	Time Weather		Measured Noise Level			Limit Level	Baseline Level	Construction Noise Level
			L _{eq}	L ₁₀	L ₉₀	L _{eq}	L _{eq}	L _{eq}
4-May-11	13:50	Sunny	64.9	68.1	61.2	70.0	N/A	64.9 Measured \leq Limit Level
12-May-11	13:45	Sunny	66.1	68.9	62.6	70.0	N/A	66.1 Measured \leq Limit Level
16-May-11	13:45	Cloudy	66.2	69.4	63.2	70.0	N/A	66.2 Measured \leq Limit Level
26-May-11	13:00	Sunny	65.2	67.3	61.4	70.0	N/A	65.2 Measured \leq Limit Level

Location NC1	3 - Peaksvill	e Court							
						Unit: dB (A)) (30-min)		
Date	Time	Weather	Measured Noise Level Limit Level Baseline Lev				Baseline Level	Construction Noise Level	
			L _{eq}	L _{eq}					
4-May-11	14:25	Sunny	68.9	71.2	62.3		N/A	68.9 Measured \leq Limit Level	
12-May-11	14:30	Sunny	65.7	65.7 69.2 61.3 TE O N/A 65.7 M		65.7 Measured \leq Limit Level			
16-May-11	14:30	Sunny	65.3	69.2	60.2	75.0	N/A	65.3 Measured \leq Limit Level	
26-May-11	14:30	Sunny	63.2 68.4 59.3 N/A 63.2 Measured ≦ Limit L						

Appendix G - Noise Monitoring Results

Location NC1	Location NC14 - Hong Kong Japanese School											
						Unit: dB (A)) (30-min)					
Date	Date Time		Measured Noise Level			Limit Level	Baseline Level	Construction Noise Level				
			L _{eq}	L _{eq}								
4-May-11	13:00	Cloudy	65.9	69.5	63.2	70.0	N/A	65.9 Measured \leq Limit Level				
12-May-11	15:43	Cloudy	64.5	69.4	62.5	70.0	N/A	64.5 Measured \leq Limit Level				
16-May-11	13:00	Cloudy	64.9	69.7	62.5	70.0	N/A	64.9 Measured \leq Limit Level				
26-May-11	13:00	Sunny	64.3	65.1	59.3	70.0	N/A	64.3 Measured \leq Limit Level				

Location NC1	5 - Hong Ko	ng Academy						
						Unit: dB (A)) (30-min)	
Date	Time	Weather	Measured Noise Level Limit Level Baseline Level Construction Noise					
			L _{eq}	L ₁₀	L ₉₀	L _{eq}	L _{eq}	L _{eq}
4-May-11	17:35	Sunny	67.1	68.7	61.8	70.0	N/A	67.1 Measured \leq Limit Level
12-May-11	17:30	Sunny	66.4 68.5 62.4 70.0 N/A 66.4 Measured ≦ Limit I				66.4 Measured \leq Limit Level	
16-May-11	17:45	Cloudy	65.1	67.7	61.8	70.0	N/A	65.1 Measured \leq Limit Level
26-May-11	17:00	Sunny	65.2	69.3	60.9	70.0	N/A	65.2 Measured \leq Limit Level

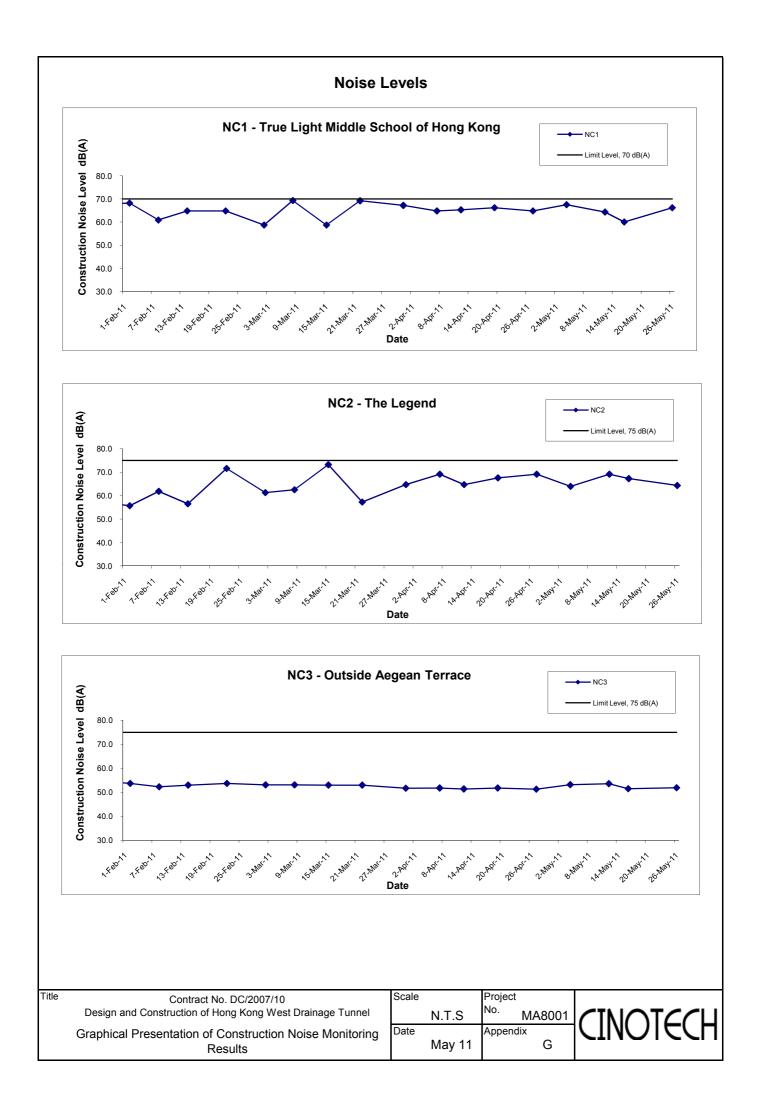
Location NC1	Location NC16 - Raimondi College												
				Unit: dB (A) (30-min)									
Date	Time Weather		Measured Noise Level			Limit Level	Baseline Level	Construction Noise Level					
			L _{eq}	L ₁₀	L 90	L _{eq}	L _{eq}	L _{eq}					
4-May-11	15:15	Sunny	64.5	66.5	57.7	70.0	N/A	64.5 Measured \leq Limit Level					
12-May-11	15:15	Sunny	63.9	66.2	58.1	70.0	N/A	63.9 Measured \leq Limit Level					
16-May-11	15:20	Cloudy	63.1	66.7	58.2	70.0	N/A	63.1 Measured \leq Limit Level					
26-May-11	13:45	Sunny	63.2	67.8	59.4	70.0	N/A	63.2 Measured \leq Limit Level					

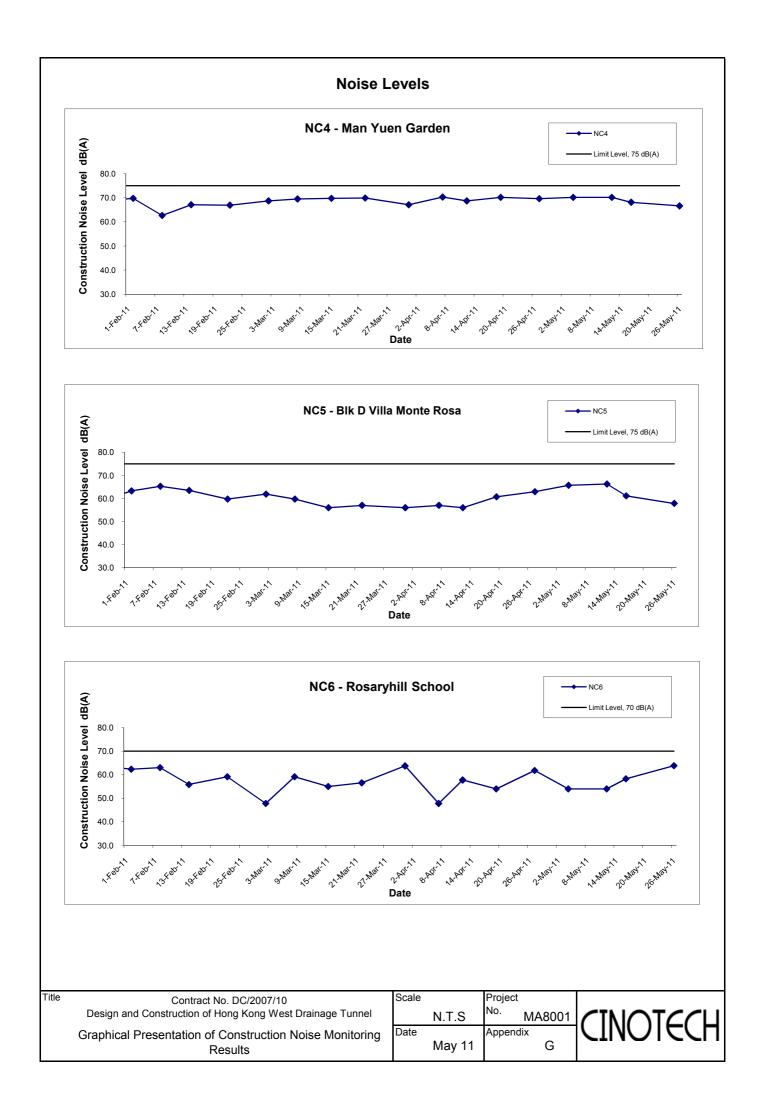
Location NC1	Location NC17 - Hong Kong Institute of Technology											
						Unit: dB (A)) (30-min)					
Date	Date Time		Mea	sured Noise	Level	Limit Level	Baseline Level	Construction Noise Level				
			L _{eq}	L _{eq}								
4-May-11	16:05	Sunny	67.5	72.1	64.2	70.0	N/A	67.5 Measured \leq Limit Level				
12-May-11	16:05	Sunny	67.2	72.3	64.7	70.0	N/A	67.2 Measured \leq Limit Level				
16-May-11	16:10	Cloudy	67.2 72.3 64.7 70.0 N/A 67.2 Measured ≦ Limit Level									
26-May-11	15:15	Sunny	$\begin{tabular}{cccccccccccccccccccccccccccccccccccc$									

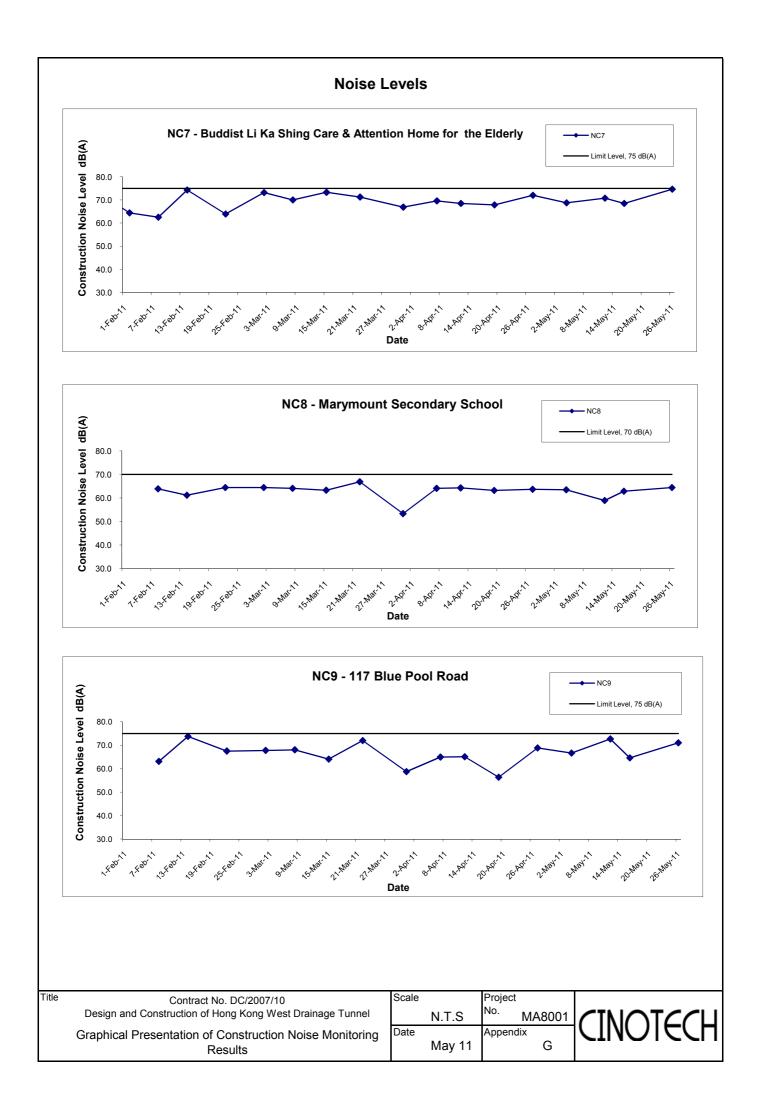
Location NC1	8 - Blk A, 80	Robinson Ro	ad									
				Unit: dB (A) (30-min)								
Date	Date Time Weather		Mea	sured Noise I	Level	Limit Level	Baseline Level	Construction Noise Level				
			L _{eq} L ₁₀ L ₉₀		L _{eq}	L _{eq}	L _{eq}					
4-May-11	16:45	Sunny	71.2	74.9	67.2		N/A	71.2 Measured \leq Limit Level				
12-May-11	16:40	Sunny	70.0	74.3	67.5	75.0	N/A	70.0 Measured \leq Limit Level				
16-May-11	16:45	Cloudy	70.2	74.1	66.5	75.0	N/A	70.2 Measured \leq Limit Level				
26-May-11	16:05	Sunny	$69.2 73.9 65.7 N/A 69.2 Measured \leq Limit L$									

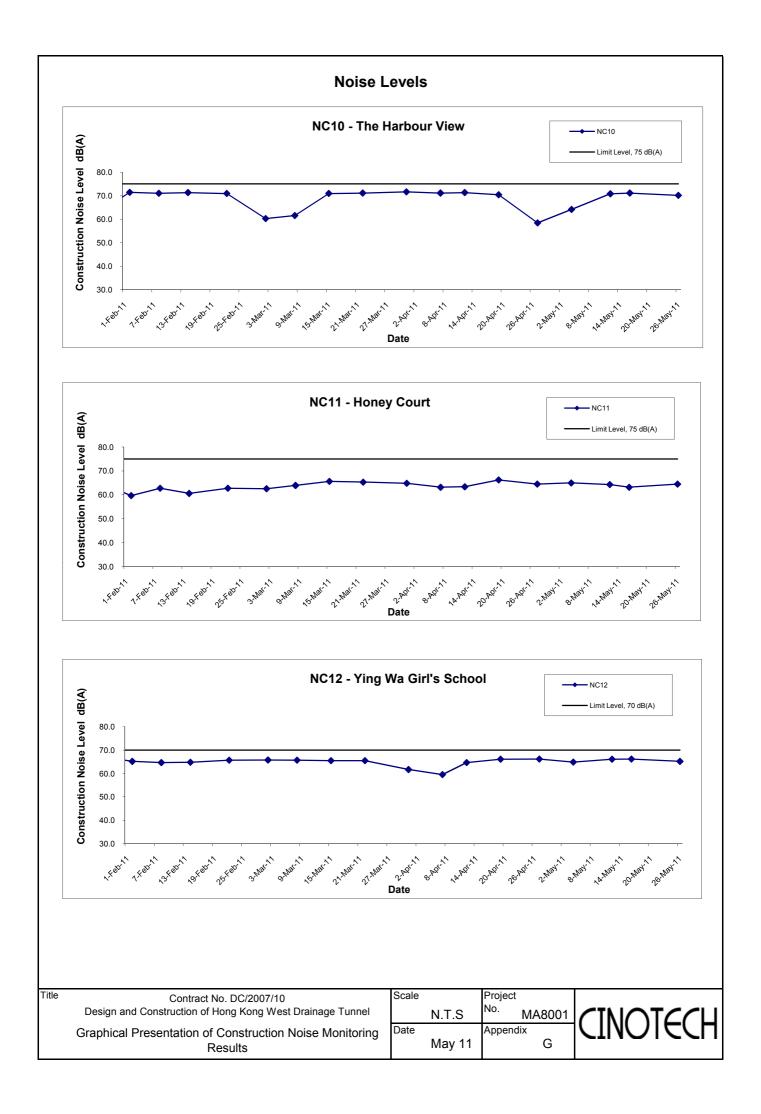
Location NC1	9 - Villa Ven	eto									
				Unit: dB (A) (30-min)							
Date	Time	Weather	Measured Noise Level Limit Level Baseline Level Constru					Construction Noise Level			
			L _{eq}	L ₁₀	L _{eq}						
4-May-11	10:35	Cloudy	61.7	63.3	54.7		N/A	61.7 Measured \leq Limit Level			
12-May-11	10:36	Cloudy	67.7	68.9	59.7	75.0	N/A	67.7 Measured \leq Limit Level			
16-May-11	11:00	Cloudy	64.6	67.3	60.5	75.0	N/A	64.6 Measured \leq Limit Level			
26-May-11	9:30	Sunny	66.9	69.6	62.8		N/A	66.9 Measured \leq Limit Level			

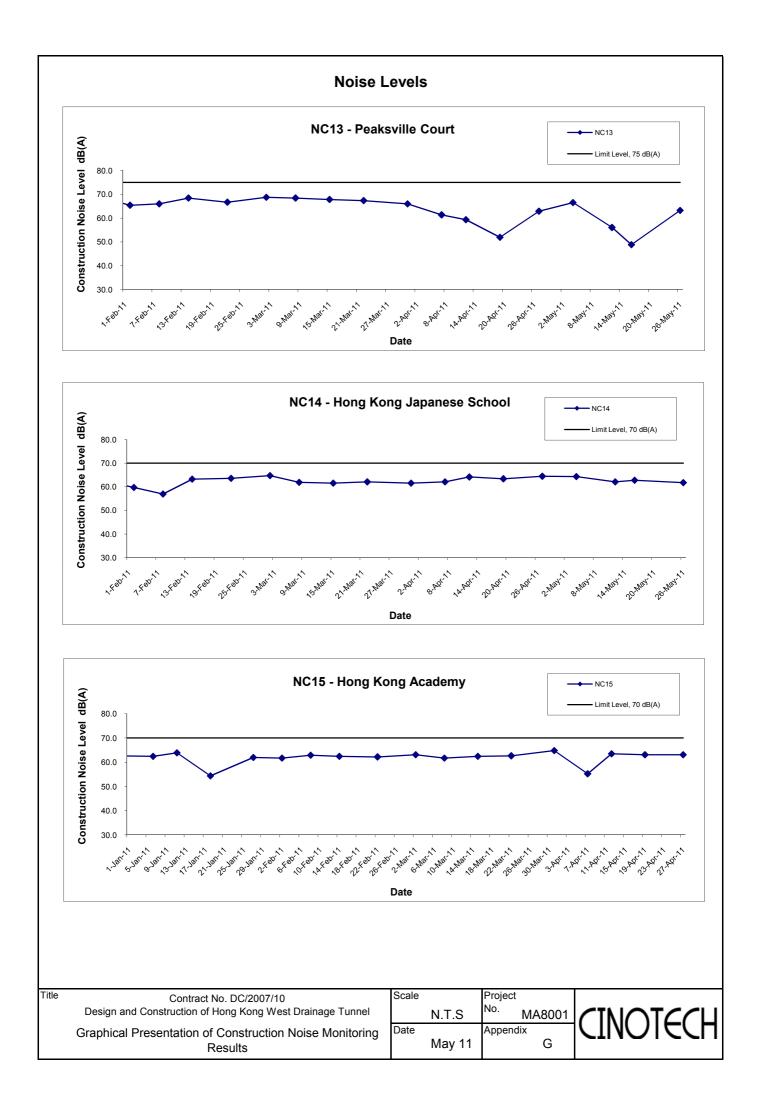
Location GNC7 - Hong Villa												
Unit: dB (A) (30-min)												
Date	Time	sured Noise I	_evel									
			L _{eq}	L ₁₀	L ₉₀							
4-May-11	9:00	Cloudy	61.2	62.8	57.2							
12-May-11	9:02	Cloudy	56.7	59.6	55.3							
16-May-11	9:15	Cloudy	60.9	61.4	53.7							
26-May-11	10:55	Sunny	62.2	64.5	52.6							



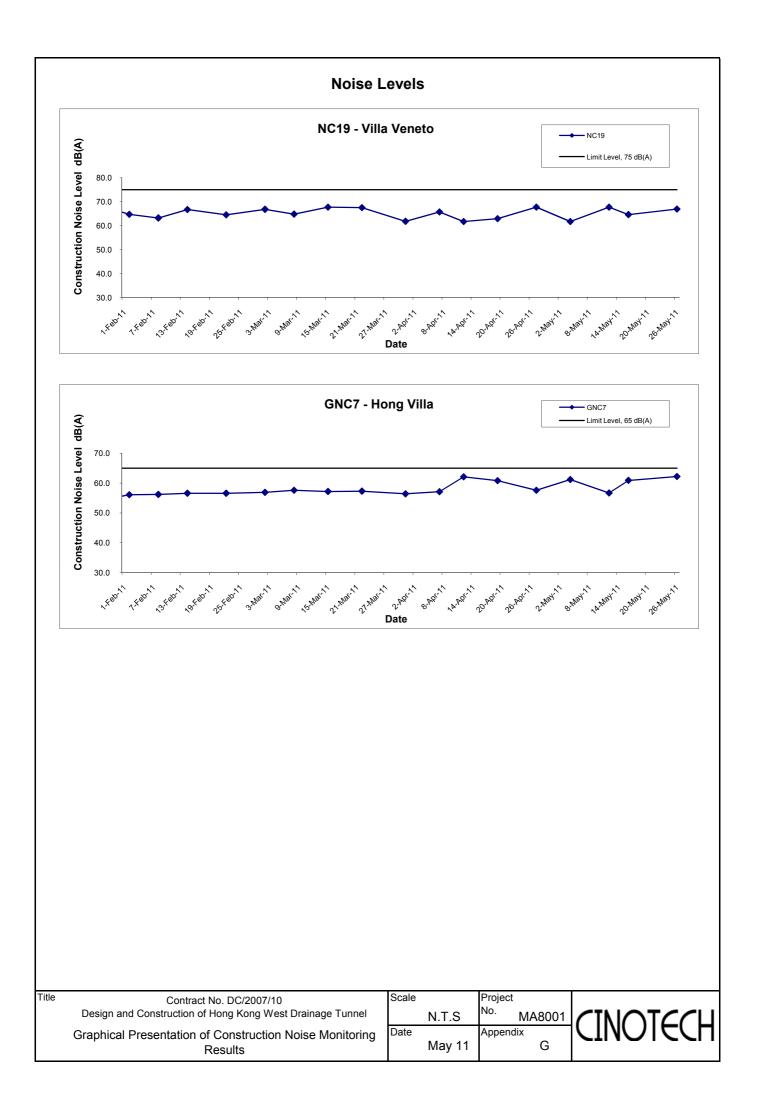












APPENDIX H SUMMARY OF EXCEEDANCE Contract No. DC/2007/10 – Design and Construction of Hong Kong West Drainage Tunnel Exceedance Report

Eastern Portal

- (A) Exceedance Report for Air Quality (1 hour TSP) (NIL in the reporting month)
- (B) Exceedance Report for Air Quality (24 hours TSP) (NIL in the reporting month)
- (C) Exceedance Report for Construction Noise (NIL in the reporting month)

Western Portal

- (D) Exceedance Report for Air Quality (1 hour TSP) (NIL in the reporting month)
- (E) Exceedance Report for Air Quality (24 hours TSP) (NIL in the reporting month)
- (F) Exceedance Report for Construction Noise (NIL in the reporting month)

Intake DG1

(G) Exceedance Report for Construction Noise (NIL in the reporting month)

Intake E5A

(H) Exceedance Report for Construction Noise (NIL in the reporting month)

Intake E7

(I) Exceedance Report for Construction Noise (NIL in the reporting month)

Intake MA14

(J) Exceedance Report for Construction Noise (NIL in the reporting month)

Intake PFLR1

(K) Exceedance Report for Construction Noise (NIL in the reporting month)

Intake RR1

(L) Exceedance Report for Construction Noise (NIL in the reporting month)

Intake THR2

(M)Exceedance Report for Construction Noise (NIL in the reporting month)

Intake W0

(N) Exceedance Report for Construction Noise (NIL in the reporting month) Intake W5

(O) Exceedance Report for Construction Noise (NIL in the reporting month)

Intake P5

(P) Exceedance Report for Construction Noise (NIL in the reporting month)

Intake W8

(Q) Exceedance Report for Construction Noise (NIL in the reporting month)

Intake BR6

(R) Exceedance Report for Construction Noise (NIL in the reporting month)

Intake CR1

(S) Exceedance Report for Construction Noise (One Action Level exceedance was recorded for the complaint received on 30 May 2011)

Intake GL1

(T) Exceedance Report for Construction Noise (One Action Level exceedance was recorded for the complaint received on 30 May 2011)

APPENDIX I SITE AUDIT SUMMARY

Contract No. DC/2007/10 Design and Construction of Hong Kong West Drainage Tunnel

Weekly Site Inspection Record Summary Inspection Information

Checklist Reference Number	110505
Date	5 May 2011
Time	08:30 - 17:30

Ref. No.	Non-Compliance	Related Item No.
-	None identified	-
Ref. No.	Remarks/Observations	Related Item No.
	A. Water Quality	
	No environmental deficiency was identified during site inspection.	
	B. Air Quality	
	No environmental deficiency was identified during site inspection.	
	C. Noise	
	No environmental deficiency was identified during site inspection.	
	D. Waste / Chemical Management	·
	No environmental deficiency was identified during site inspection.	
	E. Ecology	
	No environmental deficiency was identified during site inspection.	
	· ·	
	F. Marine Ecology	
	No environmental deficiency was identified during site inspection.	
	G. Reminders	
110505-R01	Clear the oil spillage at spoil basin and two oil drum at Western Portal.	F2i.
110505-R02	• Clear the oil containers and oil spillage at underneath of mobile crane at Intake W3.	F2i.
110505-R03	• To display CNP and EP at site entrance at SMH17.	H4
110505-R04	• To cover the noisy part of the air receiver at Intake W0.	E7
110505-R05	Clear the deposited silt and mud at the public road at Intake MB16.	F9
110505-R06	Clear the stagnant water at H-pile at Intake W10.	B15
110505-R07	• Provide the plug for the drip tray to avoid oil leakage at Intake W10.	F9
110505-R08	To repair the water pipe to avoid wastage of water at Intake W10.	B15
· · · · · · · · · · · · · · · · · · ·	H. Others	
2	• Follow-up on previous audit section (Ref. No.:110428), all environmental deficiencies were improved/ rectified by the Contractor except item 110428 - R02 and R03. Follow-up action is needed and remarked as 110505- R08 and R07.	
	• 110428 - R05 was not observed during the site inspection, follow-up action is needed for the outstanding items.	

	Name	Signature	Date
Recorded by	TY Yeung	Tr.	5 May 2011
Checked by	Dr. Priscilla Choy	NI	5 May 2011
	• • • • • • • • • • • • • • • • • • •	1	

Weekly Site Inspection Record Summary (For Western Portal Only)

Inspection Information

Checklist Reference Number	110503
Date	3 May 2011 (Tuesday)
Time	14:45-15:15

5 4 N		Related
Ref. No.	Non-Compliance	Item No.
	None identified	-
		Related
Ref. No.	Remarks/Observations	Item No.
	A. Water Quality	
	No environmental deficiency was identified during site inspection.	
	G. Reminders	
	No environmental deficiency was identified during site inspection.	
	H. Others	
	• NIL	

	Name	Signature	Date
Recorded by	Chiu King Wai	lon	3 May 2011
Checked by	Dr. Priscilla Choy	NI	3 May 2011

Contract No. DC/2007/10 Design and Construction of Hong Kong West Drainage Tunnel

Weekly Site Inspection Record Summary Inspection Information

Checklist Reference Number	110512
Date	12 May 2011
Time	09:00 - 17:00

Ref. No.	Non-Compliance	Related Item No.
-	None identified	-
Ref. No.	Remarks/Observations	Related Item No.
	A. Water Quality	
	No environmental deficiency was identified during site inspection.	
	B. Air Quality	
	No environmental deficiency was identified during site inspection.	
	C. Noise	
	No environmental deficiency was identified during site inspection.	
	D. Waste / Chemical Management	
	No environmental deficiency was identified during site inspection.	
	E. Ecology	
	No environmental deficiency was identified during site inspection.	
	F. Marine Ecology	
	No environmental deficiency was identified during site inspection.	
	G. Reminders	
10512-R01	• Provide the plug for the drip tray to avoid oil leakage at Intake W10.	F9
10512-R02	• Clear the deposited silt and mud at the public road at Intake MB16 and drainage channel at MBD2 respectively.	F9
	H. Others	
*	 Follow-up on previous audit section (Ref. No.:110505), all'environmental deficiencies were improved/ rectified by the Contractor except item 110505 - R05 and R07. Follow-up action is needed and remarked as 110512- R02 and R01. 	

	Name	Signature	Date
Recorded by	TY Yeung	tor.	12 May 2011
Checked by	Dr. Priscilla Choy	NI	12 May 2011
			ł

Weekly Site Inspection Record Summary (For Western Portal Only)

Inspection Information

Checklist Reference Number	110509
Date	9 May 2011 (Monday)
Time	14:30-15:05

Ref. No.	Non-Compliance	Related Item No.
-	None identified	-
Ref. No.	Remarks/Observations	Related Item No.
	A. Water Quality	
	No environmental deficiency was identified during site inspection.	
	G. Reminders	
	No environmental deficiency was identified during site inspection.	
	H. Others	
	• NIL	

	Name	Signature	Date
Recorded by	Chiu King Wai	lh	9 May 2011
Checked by	Dr. Priscilla Choy	WZ	9 May 2011

Contract No. DC/2007/10 Design and Construction of Hong Kong West Drainage Tunnel

Weekly Site Inspection Record Summary Inspection Information

Checklist Reference Number	110519
Date	19 May 2011
Time	08:30 - 17:30

Ref. No.	Non-Compliance	Related Item No.
-	None identified	-
Ref. No.	Remarks/Observations	Related Item No.
	A. Water Quality	
	No environmental deficiency was identified during site inspection.	
	B. Air Quality	
	No environmental deficiency was identified during site inspection.	
	C. Noise	
	No environmental deficiency was identified during site inspection.	
	D. Waste / Chemical Management	
	No environmental deficiency was identified during site inspection.	
	E. Ecology	
	No environmental deficiency was identified during site inspection.	
	F. Marine Ecology	
	No environmental deficiency was identified during site inspection.	
	G. Reminders	
10519-R01	Clear the water tube which is not in use at Intake HKU1.	F9
10519-R02	• Clear the discarded leaves at the drainage channel at the site entrance of Intake W10.	F1i.
10519-R03	Provide the plug for the drip tray at Intake MA15.	F9
10519-R04	Clear the deposited mud and silt at the gullies at Intake M3.	B9
10519-R05	• To replace the worn sand bags at Intake M3.	B9
10519-R06	• To clear the milky water along the u-channel at Intake W3.	B9
10519-R07	To clear the silty water and grease water at Intake DG1.	B15
	H. Others	
	 Follow-up on previous audit section (Ref. No.:110512), all environmental deficiencies were improved/ rectified by the Contractor. 	

		Signature	Date
Recorded by	TY Yeung	An	19 May 2011
Checked by Dr.	Priscilla Choy	WEL	19 May 2011

Weekly Site Inspection Record Summary (For Western Portal Only)

Inspection Information

Checklist Reference Number	110518
Date	18 May 2011 (Wednesday)
Time	15:10-15:35

		Related
Ref. No.	Non-Compliance	Item No
-	None identified	-
		Related
Ref. No.	Remarks/Observations	Item No
	A. Water Quality	
	• No environmental deficiency was identified during site inspection.	
	G. Reminders	
	No environmental deficiency was identified during site inspection.	
	H. Others	
	• NIL	

	Name	/ Signature	Date
Recorded by	Chiu King Wai	(m	18 May 2011
Checked by	Dr. Priscilla Choy	w.Z	18 May 2011
		·	

Contract No. DC/2007/10 Design and Construction of Hong Kong West Drainage Tunnel

Weekly Site Inspection Record Summary Inspection Information

Checklist Reference Number	110526
Date	26 May 2011
Time	14:15 – 17:30

Ref. No.	Non-Compliance	Related Item No.
-	None identified	-
Ref. No.	Remarks/Observations A. Water Quality	Related Item No.
	No environmental deficiency was identified during site inspection.	
	 B. Air Quality No environmental deficiency was identified during site inspection. 	
	C. Noise	
	No environmental deficiency was identified during site inspection.	
	D. Waste / Chemical Management	
	No environmental deficiency was identified during site inspection.	
	E. Ecology	
	No environmental deficiency was identified during site inspection.	
	 F. Marine Ecology No environmental deficiency was identified during site inspection. 	
	G. Reminders	
110526-R01	• Provide the plug for the drip tray to avoid oil and grease water leakage at Intake E5A.	F9
110526-R02	• To clear the stagnant water and deposited silt along the u-channel at Intake THR2.	B14 & B15
110526-R03	• The general refuse and C&D waste should be disposed of properly, to avoid storing at near the trees at Intake THR2.	F1iii. & F5ii.
110526-R04	• The oil drum should be stored within the drip tray, to avoid oil leakage at Eastern Portal.	F3i.
	H. Others	
110526-F05	• Intake HKU1, W10, MA15, M3, W3 and DG1 were not inspected during the site inspection. Follow-up actions are needed for all outstanding items.	

	Name	Signature	Date
Recorded by	TY Yeung	for	26 May 2011
Checked by	Dr. Priscilla Choy	WZ	26 May 2011

Weekly Site Inspection Record Summary (For Western Portal Only)

Inspection Information Checklist Reference Number 110525 Date 25 May 2011 (Wednesday) Time 14:10-14:40

		Related
Ref. No.	Non-Compliance	Item No.
-	None identified	-
Ref. No.	Remarks/Observations	Related Item No.
	A. Water Quality	
	No environmental deficiency was identified during site inspection.	
	G. Reminders	
	No environmental deficiency was identified during site inspection.	
	H. Others	
	• NIL	

	Name	≸igņature	Date
Recorded by	Chiu King Wai	h	25 May 2011
Checked by	Dr. Priscilla Choy	KIL	25 May 2011

APPENDIX J ENVIRONMENTAL MITIGATION IMPLEMENTATION SCHEDULE (EMIS)

Types of Impacts	Mitigation Measures	Status
	 Dust Mitigation Measures The Contractor shall undertake at all times to prevent dust nuisance as a result of his activities. Effective dust suppression measures should be installed to minimize air quality impacts, at the boundary of the site and at any sensitive receivers. No blasting shall be carried out when the strong wind signal or tropical cyclone warning signal No. 3 or higher is hoisted (unless prior permission of the Commissioner of Mines is obtained). Effective water sprays shall be used during the delivery and handling of all raw sand, aggregate and other similar materials, when dust is likely to be created, to dampen all stored materials during dry and windy weather. Watering of exposed surfaces shall be conducted as often as possible depending on the circumstances. A watering programme of once every 2 hours in normal weather conditions, and hourly in dry/windy conditions. Any stockpile of dusty material cannot be immediately transported out of the Site shall be either: a) covered entirely by impervious sheeting; b) placed in an area sheltered on the top and the three sides; or c) sprayed with water or a dust suppression chemical so as to maintain the entire surface wet. Should a conveyor system be used, the Contractor shall implement the following precautionary measures. Conveyor belts shall be fitted within windboards. Conveyor transfer points and hopper discharge areas shall be enclosed to minimize dust emission. All conveyors under control of the Contractor, and carrying materials which have the potential to create dust, shall be provided. Exhaust fans shall be provided for this enclosure and vented via a suitable fabric filter system. The heights from excavated spoils are dropped should be minimise to reduce the fugitive dust arising from unloading/loading. The contractor shall confine haulage and delivery vehicles to designated roadways inside the site. If in the opinion of the Engineer, any motorising vehicle is c	Status ^ * *
	 surface materials and / or be regularly watered. Wheel cleaning facilities shall be installed for both portals and used by all vehicles leaving the site. No earth, mud, debris, dust and the like shall be deposited on public roads. Water in the wheel cleaning facility shall be changed at frequent intervals and sediments shall be removed regularly. The Contractor shall submit details of proposals for the wheel cleaning facilities to the Engineer prior to construction of the facility. Such wheel cleaning facilities shall be usable prior to any earthwork excavation activity on site. The Contractor shall provide a hard-surfaced road between any cleaning facility and the public road. 	^
	Chemical wetting agents shall only be used on completed cuts and fills to reduce wind erosion.	N/A

Appendix J - Summary of Environmental Mitigation Implementation Schedule

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

N/A Not Applicable at this stage; * Recommendation was made during site audit but improved/rectified by the contractor;

[#] Non-compliance but rectified/improved by the contractor and awaiting IEC's further comment.

Types of Impacts	Mitigation Measures	Status
	 No vehicle exhausts shall be directed towards the ground or downwards to minimize dust nuisance. 	^
	• Ventilation system, equipped with proprietary filters, should be provided to ensure the safe working environment inside the tunnel. Particular attention should be paid to the location and direction of the ventilation exhausts. The exhausts should not be allowed to face any sensitive receivers directly. Consideration should also be given to the location of windows, doors and direction of prevailing winds in relation to the nearby sensitive receivers.	^
	• In the event of any spoil or debris from construction works being deposited on adjacent land, or stream, or any silt being washed down to any area, then all such spoil, debris or material and silt shall be immediately removed and the affected land and areas restored to their natural state by the Contractor to the satisfaction of the Engineers.	٨
	In addition, based on the Air Pollution Control (Construction Dust) Regulation, any works involved regulatory and notifiable works, such as stockpiling, loading and unloading of dusty materials, shall take precautions to suppress dust nuisance.	
	• The working area of any excavation or earthmoving operation shall spray with water or a dust suppression chemical immediately before, during and immediately after the operation so as to maintain the entire surface wet;	^
	• Exposed earth shall be properly treated by compaction, turfing, hydroseeding, vegetation planting or sealing with latex, vinyl, bitumen 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; and	^
	• Any stockpile of dusty materials (greater than 20m ³) shall be either covered entirely by impervious sheeting or placed in an area sheltered on the top and three sides; and sprayed with water or a dust suppression chemical so as to maintain the entire surface wet.	^
	• Other suitable dust control measures as stipulated in Air Pollution Control (Construction Dust). Regulation, where appropriate, should be adopted.	^

N/A N/A Applicable at this stage;
 Non-compliance but rectified by the contractor;
 Recommendation was made during site audit but improved/rectified by the contractor;
 Mon-compliance but rectified/improved by the contractor and awaiting IEC's further comment.

Fypes of Impacts	Mitigation Measures	Status
F	<u>Air borne noise</u>	
	In general, potential construction noise impact can be minimized or avoided by imposing a combination of the following mitigation measures:	
	• Noisy equipment and activities should be sited by the Contractor as far from close-proximity sensitive receivers as practical. Prolonged operation of noisy equipment close to dwellings should be avoided.	٨
	• The Contractor should minimise construction noise exposure to the schools (especially during examination periods). The Contractor should liaise with the school and the Examination Authority to ascertain the exact dates and times of all examination periods during the course of the works contract and to avoid noisy activities during these periods.	*
	 Noisy plant or processes should be replaced by quieter alternatives. Silenced diesel and gasoline generators and power units, as well as silenced and super-silenced air compressor, can be readily obtained. 	٨
	• Noisy activities should be scheduled to minimise exposure of nearby sensitive receivers to high levels of construction noise. For example, noisy activities can be scheduled for midday, or at times coinciding with periods of high background noise (such as during peak traffic hours).	^
	• Idle equipment should be turned off of throttled down. Noisy equipment should be properly maintained and used no more often than is necessary.	^
onstruction	• The power units of non-electric stationary plant and earth-moving plant should be quietened by vibration isolation and partial or full acoustic enclosures for individual noise-generating components.	^
oise	• Construction activities should be planned so that parallel operation of several sets of equipment close to a given receiver is avoided, thus reducing the cumulative impacts between operations. The numbers of operating items of powered mechanical equipment should be minimised. Noise can be reduced by increasing the distance between the operating equipment and the NSRs or by reducing the number of items of equipment and/or construction activity in the area at any one time.	^
	 The use of quiet plant working methods can further reduce noise level. Quiet plant is defined as Powered Mechanical Equipment (PME) whose actual sound power level is less than the value specified in the TMs for the same piece of equipment. To allow the Contractor some flexibility to select equipment to suit his needs, it is considered too restrictive to specify which specific items of silenced equipment to be used for the construction operations. It should be noted that various types of silenced equipment can be found in Hong Kong and are readily available on the market. BS 5228 also provides examples of quiet construction plant and their SWL. 	۸
	 Construction plant should be properly maintained (well-greased, damage and worn parts promptly replaced) and operated. Construction equipment often has silencing measures built in or added on, e.g. bulldozer silencers, compressor panels, and mufflers. Silencing measures should be properly maintained and utilised. Rubber or damping materials should be introduced between metal panels to avoid rattle and reverberation of noise. 	^
	 Equipment known to emit sound strongly in one direction should be oriented so that the noise is directed away from nearby NSRs. 	٨
	• Materials stockpile and other structures (such as site offices) should be effectively utilised to shield construction noise. Noise	^

Compliance of mitigation measure; X Non-compliance of mitigation measure;
 N/A Not Applicable at this stage;

 Non-compliance but rectified by the contractor;
 Recommendation was made during site audit but improved/rectified by the contractor;
 Mon-compliance but rectified/improved by the contractor and awaiting IEC's further comment.

Types of mpacts	Mitigation Measures	Status
T	can also be reduced by construction of temporary noise barriers which screen the lower floors from viewing the sites. Temporary noise barriers should be installed at active parts of construction areas where construction equipment is being operated in close proximity to NSRs.	
	 It is noted that under the WBTC No. 19/2001, all construction sites are required to use metallic site hoarding can be slightly modified (with the addition of steel backings) into temporary noise barriers. These barriers should be gap free and have a surface mass density of at least 7kg/m². 	۸
	 All hand-held percussive breakers and air compressors should comply the Noise Control (Hand-held Percussive Breakers) Regulations respectively under the NCO (Ordinance No. 75/88, NCO Amendment 1992 No.6). 	^
	The Contractor shall devise, arrange methods of working and carry out the works in such manner as to minimise noise impacts on the surrounding environment, and shall provide experienced personnel with suitable training to ensure that these measures are implemented properly.	^
	Level 2 Use of Barriers	
	Level 2 mitigation measures include providing movable barriers for sites which have sufficient space for installation, full enclosures during the drilling activities at Eastern Portal and at muck pit areas for Eastern portals and cantilever-typed high rise noise barrier for intake W5 (P) and W8.	۸
	Before construction of the full enclosure at muck pit area, the use of full enclosure noise barrier (Stage A) for the drilling activities at the Eastern Portal area is required. A full enclosure for the muck pit area will then be constructed at this later stage (Stage B). The full enclosure shall be gap free apart from necessary entrance/exits, which shall face towards the entrance of eastern portal to minimize the amount of noise generated from affecting the nearest RNSRs especially school (True Light Middle School of Hong Kong).	^
	5m high cantilever-typed hoarding barrier to be built at W5 (P) and W8. These enclosures/barriers should have no gaps and have a superficial surface density of at least 10kg/m ² . Good site practice shall also be adopted by the Contractor to ensure the conditions of the hoardings are properly maintained throughout the construction period. To schedule the noise barrier erection and dismantling to the non sensitive periods of school to avoid adverse impact to W8/3.	۸
	Movable barriers of 3 to 5m height with a small cantilevered upper portion and skid footing to be located within about 5 m or more for mobile equipment such that the line of sight is blocked. To provide purposes-built noise barriers or screens constructed of appropriate materials (minimum superficial density of 10kg/m ²) located close to the operating PME.	٨
	Pre-drilling following by chemical splitting instead of using large excavator mounted breaker should be used as mitigation measure for rock breaking and rock drilling.	^

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

N/A Not Applicable at this stage; • Non-compliance but rectified by * Recommendation was made during site audit but improved/rectified by the contractor; • Non-compliance but rectified by the contractor;

[#] Non-compliance but rectified/improved by the contractor and awaiting IEC's further comment.

Types of Impacts	Mitigation Measures	Status
	No construction activity is recommended during the examination period.	^
	Ground borne noise	
	The noise level should be measured on the ground floor inside the nearest building during the TBM construction work in the daytime. If the daytime monitored ground borne noise exceeds the relevant evening/night ground borne noise criteria, evening/night construction work would not be carried out for the concerned tunnel section. Evening/night time construction work is subject to CNP application under the control of NCO.	Λ
	Public relationship strategy with 24-hour hotline system.	

	Mitigation Measures	Status
Water Quality C A T W SI SI SI SI SI SI SI SI SI SI	 Precautionary measures for construction work near natural streams The government provides guidelines (ETWB TCW NO. 5/2005 and DSD TC 2/2004) are providing guidelines to minimize impacts when there is construction work carried out at near natural streams course. Relevant mitigation measures for the intakes are summarised as follows: Temporary site access to the work sites should be carefully planned and located to minimize disturbance caused to the substrates of streams/rivers and riparian vegetation by construction plant. Locations well away from the rivers/streams for temporary storage of materials (e.g equipment, filling materials, chemicals and fuel) and temporary stockpile of construction debris and spoil should be identified before commencement of works. Proposed works site areas inside, or in the proximity of, natural rivers and streams should be temporarily isolated to prevent adverse impacts on the stream water qualities. Stockpiling of construction materials, if necessary, should be completely properly covered and located away from any natural stream/river. Construction debris and spoil should be covered up and/or properly disposed of as soon as possible to avoid being washed into nearby rivers/streams by rain and local runoff. Construction vessel shall be provided to collect refuse or materials lost into the sea. The respective areas of the marine works will be completely enclosed by the silt curtain. The curtain shall be extended from water surface down to the seabed where it is anchored using sinker blocks. The Contractor shall inspect the silt curtain on regular basis to ensure its integrity and it is serviceable for all times. 	^ ^ ^ ^ N/A

Types of Impacts	Mitigation Measures	Status
	Transfer of armour rock onto the seabed from barge at the temporary pier location should be conducted by careful grabbing and unloading to the seabed (to minimize sediment migration).	^
	The conveyor belt should be completely covered and muddy effluent from the temporary barge should be contained, treated and disposed. Where there is transfer of excavated wastes, the Contractor should provide appropriate measures to ensure that the waste is free from floatables, putrescibes, organic wastes and toxic materials and when required a refuse collection vessel be provided to collect float refuse.	۸
	Construction of stilling basin at Western Portal outfall	
	All construction for the basin should be carried out inside the temporary cofferdam which is a temporary watertight enclosure built in the water and pumped dry to expose the bottom so that construction of stilling basin can be undertaken.	^
	During the dewatering process, appropriate desilting/sedimentation devices should be provided on site for treatment before discharge. The Contractor should ensure discharge water from the sedimentation tank meet the WPCO/TM requirements before discharge.	^
	The cofferdam will remain on site until after the construction of stilling basin has been completed. The coffer dam shall be regularly inspected and maintained to ensure no spillage of waste or wastewater into the sea. Conveyance of dredged materials from the coffer dam shall be carried out cautiously to avoid spillage into the sea.	^
	The filled material for the stilling basin should be contained inside the temporary cofferdam. The top level of the cofferdam shall be constructed higher than the final backfilled level.	^
	The Contractor shall be responsible for the design, installation and maintenance of the silt curtains to minimize the impacts on the water quality and the protection of water quality. The design and specification of the silt curtains shall be submitted by the Contractor to the Engineer for approval.	N/A
	Silt curtains shall be formed from tough, abrasion resistant, permeable membranes, suitable for the purpose, supported on floating booms in such a way as to ensure that the sediment plume shall be restricted to within the limit of the works area. The silt curtain shall be formed and installed in such a way that tidal rise and fall are accommodated, with the silt curtains always extending from the surface to the bottom of the water column and held with anchor blocks. The removal and reinstallation of such curtains during typhoon conditions shall be as agreed with the Director of Marine Department. The contractor shall regularly inspect the silt curtains and check that they are moored and marked to avoid danger to marine traffic. Any damage to the silt curtain shall be repaired by the Contractor promptly and the works shall be stopped until the repair is fixed to the satisfaction of the Engineer.	N/A

N/A N/A Applicable at this stage;
 Non-compliance but rectified by the contractor;
 Recommendation was made during site audit but improved/rectified by the contractor;
 Mon-compliance but rectified/improved by the contractor and awaiting IEC's further comment.

Types of Impacts	Mitigation Measures	Status
	Transfer of rock fill material (armour rock) from the barge onto the site location should be conducted by grabbing and placement on the seabed to minimize sediment migration. No free dropping of the material will be allowed.	^
	Prior to the construction of armor rock based panel, a silt curtain shall also be installed prior to carry out any marine works as a preventive mitigation measure.	N/A
	Construction of TBM tunnel at both portals and intakes	
	Recycled water will be used at the cutter face for cooling purposes. Used water will be collected and discharged to a settling tank for settlement. Excess water from the settling tank will be transferred to the water treatment plant on site where the addition of flocculants will assist in settlement of solids. The Contractor should ensure discharge water from the sedimentation tank meet the WPCO/TM requirements before discharge.	^
	During the drilling process, all flushing water will be recycled for use. Discharge of the treated water to nearby drainage system shall be allowed provided that it has been treated to a level meeting with statutory requirements.	۸
	Water flow at streams should be maintained by a temporary diversion system during the construction phase of intakes and manhole drop shafts.	^
	General Construction Activities and Workforce	
	A. Surface runoff	
	Effluent produced from construction activities are subjected to WPCO control. Effluent produced from sites should be diverted away from stream courses. Construction works near stream course should be scheduled in the dry season as far as practical to avoid excessive site runoff discharge.	*
	Under the <i>Water Pollution Control Ordinance</i> (WPCO), turbid water from construction sites must be treated to minimize the solids content before being discharged into storm drains. The suspended solids load can be reduced by directing the runoff into temporary sand traps or other silt-removal facilities, and other good and appropriate site management practices. Advice on the handling and disposal of construction site discharge is provided in the ProPECC Paper (PN 1/94) on Construction Site Drainage.	*
	A drainage system layout should be prepared by the Contractor for each of the works areas (portals and intakes), detailing the facilities and measures to manage pollution arising from surface runoff from those works areas. The drainage layout and an associated drainage management plan to reduce surface runoff sediments and pollutants entering watercourses, should be submitted to the Engineer for approval and to EPD for agreement.	*

Remarks: ^ Compliance of mitigation measure; X Non-compliance of mitigation measure; • Non-compliance but rectified by the contractor;

N/A Not Applicable at this stage; • Non-compliance but rectified by * Recommendation was made during site audit but improved/rectified by the contractor; # Non-compliance but rectified/improved by the contractor and awaiting IEC's further comment.

Types of Impacts	Mitigation Measures	Status
	The system should be capable of handling stormwater from the site and directing it to sediment removal facilities before discharge. If oil and grease is used on the site or brought to the site, the stormwater should pass through oil interceptors before discharge. The interceptors should have a bypass to prevent washout in heavy storms.	٨
	A temporary channel system or earth bunds or sand barriers should be provided in works areas on site to direct stormwater to silt- removal facilities. Stockpiled materials, if susceptible to erosion of rain or wind, should be covered with tarpaulins (or/similar fabric0 or hydroseedings as far as practicable especially during the wet season.	*
	Silt removal facilities should be checked and the deposited silt and grit should be removed regularly to ensure these facilities are in good working condition and to prevent blockages.	*
	Vehicle washing areas should be drained into a settlement into a settlement basin to settle out the suspended solid before discharge to storm water drains. The water should be recycled on site whenever possible. It is suggested that the wash water from the wheel wash basin is either reused for road watering or pumped to the on-site settling tanks for treatment. Water used for dust depression purposes should be minimized and an alternative soil holding agent should be considered.	^
	B. Spillage, Oil and Solvents Any contractor generating waste oil or other chemicals as a result of his activities should register as a chemical waste producer and provide a safe storage area for chemicals on site. Oil interceptors need to be regularly inspected and cleaned to avoid wash-out of oil during storm conditions. A bypass should be provided to avoid overload of the interceptor's capacity.	^
	Any spillage should be cleaned up immediately and the resulting contaminated absorbent material should be properly managed according to Waste Disposal Regulations. Spills should be contained to avoid spreading and contaminating the water resources.	^
	Oil and fuels should be used and stored properly in designated area. All fuel tanks and storage areas should be provided with locks and be sited on within sealed areas within surrounded by bunds of with a capacity equal to 110% of the storage capacity of the largest tank.	*
	Good housekeeping practices are required to minimize careless spillage and keep the work space in a tidy and clean condition. Appropriate training, including safety codes and relevant manuals, should be given to the personnel who regularly handle the chemicals on site.	^

Types of Impacts	Mitigation Measures	Status
	C. On-Site Effluent Generation	
	Sewage arising from the additional population of workers on site should be collected in a suitable storage facility (chemical mobile toilets). Most of the work site locations are close to the public sewerage system, and therefore the use of septic tanks isare, therefore, not encouraged. Portable toilets should be used coupled with tickering away services provided by a licensed collector. They should be positioned at appropriate locations across the site to ensure no direct discharge of foul water off-site.	^
	D. Protection of Existing Flora and Fauna	
	The Contractor should provide details of the plant and operation plans at each site for approval by the Engineer before commencing construction. The plans should include how the existing flora and fauna will be protected. Locations required for groundwater levels monitoring are Eastern Portal, PFLR1(P), THR2(P), TP5, TP789 and W12.	۸
	The construction and demolition of the temporary pier may create short term impacts on the local marine water quality. The situation will be restored once the work is finished by proper phasing of the works programme and implementation of the adequate mitigation measures (e.g. silt curtain) the impacts will be minimized.	۸
	Maintaining Baseflow in Downstream Watercourses	
	The final design will be developed during the detailed design stage. The exact base flow rates to be maintained at each of the intakes will be subject to detailed site investigation at design stage.	
	 Purpose of the by-pass device is to maintain the base-flow of the affected stream course. The by-pass system comprises an approach link and a trapezoidal channel. The approach link is section with inclined profiled surface at a gradient of 1 in 100. It is used to direct the base flow to the bypass trapezoidal channel at its down stream end during the normal days. The trapezoidal channel is sized such that it could handle the base flow in the affected stream course which is estimated to be no more than 20 l/s. Whenever the flow in the stream course exceeding the base flow rate, the excessive flow will overflow into the intake structure via the bottom rack structure. The bottom rack structure has bar screen on the top and inclined channel at the bottom. The top level of the bar screen is level with the by-pass channel with an aim to receive the overflow from the by-pass channel. The by-pass channel is designed requiring minimum maintenance. However, it is recommended that the maintenance authority carry out regular maintenance inspection prior to onset of seasons and after significant rainstorm event to prevent blockage of the by-pass and bottom rack structure. 	N/A N/A N/A N/A N/A

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

N/A N/A Applicable at this stage;
 Non-compliance but rectified by the contractor;
 Recommendation was made during site audit but improved/rectified by the contractor;
 Mon-compliance but rectified/improved by the contractor and awaiting IEC's further comment.

Types of Impacts	Mitigation Measures	Status
	Mitigation Measures General A proper waste management plan should be implemented to promote waste minimisation at source. Where waste generation is unavoidable then the potential for recycling or reuse should be explored and opportunities taken. If wastes cannot be recycled then the recommended disposal routes should be followed. All waste materials shall be segregated into categories covering: • Excavated material or construction waste suitable for reuse on-site • Excavated material or construction waste suitable for public filling areas • Remaining C&D waste for landfill • Chemical waste, and • General refuse Proper segregation and disposal of construction waste should be implemented. Separate containers for inert and non-inert wastes should be provided. The inert waste should be taken to public filling area and the non-inert waste should be transported to strategic landfills. A trip-ticket system on the solid waste transfer/disposal operations should be included as one of the contractual requirements (ETWB TCW No. 31/2004). The Independent Environmental Checker (IEC) should responsible for auditing this system. IEC should also responsible for auditing the well-documented record system which includes: (i) quantity of waste generation, (ii)	
	quantity of recycled material, (iii) quantity of disposed material, (iv) disposal methods and (v) sites should be implemented during construction phase. Regular cleaning and maintenance of the waste storage area should be conducted throughout the construction stage.	^
	Excavated spoil Control measures for soil temporarily stockpiled on-site should be taken in order to minimize the noise, generation of dust, pollution of water and visual impact. Key impacts include:	۸

Ypes of mpacts	Mitigation Measures	Status
	• Curfess of starbuild soil should be watted with water when reasons encould be during dry assess	
	 Surface of stockpiled soil should be wetted with water when necessary especially during dry season Disturbance of stockpiled soil should be minimized 	^
	 Disturbance of stockpiled soil should be minimized Stockpiled soil should be properly sourced with tempoling sense islly because rain storms. 	^
	 Stockpiled soil should be properly covered with tarpaulins especially heavy rain storms Stockpiling areas should be enclosed if possible 	^
	 Stockpling areas should be enclosed if possible Stockpling location should be away from the shoreline 	
	 An independent surface water drainage system equipped with silt traps should be installed at the stockpiling area 	~
	Chemical wastes	
	For those processes that generate chemical waste, it may be possible to find alternatives which generate reduced quantities or even no chemical waste, or less dangerous types of chemical waste.	^
	Construction processes produce chemical waste, the contractor must register with EPD as a Chemical Waste Producer. Wastes classified as chemical wastes are listed in the Waste Disposal (Chemical Waste) (General) Regulation (CWR). It should be handled in accordance with the Code of Practice on the Packaging, Handling and Storage of Chemical Waste published by the EPD. A producer of chemical wastes should be registered as chemical waste producer and registered with EPD.	^
	The chemical waste generated shall be properly labelled, stored and disposed of according to the CWR. Proper storage area shall be allocated on site for storage of chemical waste. The chemical waste should only be collected by a licensed collector. An updated list of licensed chemical waste collector can be obtained from EPD.	^
	In case of spillage, spill absorbent material and emulsifiers should be available on site. This material should be replaced on a regular basis and the contaminated material stored in a designated, secure place.	*
	<u>General refuse</u> A reputable waste collector should be employed by the contractor to remove general refuse from the site, separate from C&DM and chemical wastes, and on regular basis in order to minimize odour, pest and litter impacts. The burning of refuse at site is not permitted under the Air Pollution Control Ordinance (Cap 311).	^
	Office waste can be reduced through recycling of paper if volumes are large enough to warrant collection.	^
	Good management practices should be implemented to ensure that refuse is properly stored and is transported for disposal of at licensed landfills.	٨

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

 N/A
 Not Applicable at this stage;
 • Non-compliance but rectified by the contractor;

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

 #
 Non-compliance but rectified/improved by the contractor and awaiting IEC's further comment.

Types of Impacts	Mitigation Measures	Status
Terrestrial Ecology	 During the detailed design stage, the following issues should also be considered as possible to further minimise the impacts: Adjustment of site boundary to minimise use of mixed woodland as temporary works area. In particular, the woodland habitat in temporary works area of the Eastern Portal will be avoided, thereby greatly reducing the area of temporary loss of woodland habitat. Minimizing felling of large trees. About 20% of trees within the works area will be transplanted. The individual of Artocarpus hypargyreus recorded within the temporary works area of HKU1, if to be encroached, would also be transplanted. Standard site practices including the following, should be enforced to minimise the disturbance to the surroundings: Treat any damage that may occur to large individual trees in the adjacent area using materials and methods appropriate for tree surgery. Reinstate work sites/disturbed areas immediately after completion of the construction works, in particular, through on-site tree/shrub planting along the woodland and shrubland section within the temporary works area. Tree/shrub species used should make reference from those in the surrounding area. Regularly check the work site boundaries to ensure that they are not exceeded and that no damage occurs to surrounding areas. A total of 1.02 ha would be provided within the channelised section to maintain a deeper water depth in the expanded channel, in particular during dry season as well as a basin at the end of the channelised section to provide living space for aquatic life. Step chute in the form of a series of descending water pools would be constructed between the low flawe channel, and the form of a series of descending water pools would be constructed between the low flawe channel and the undisturbed stream course. There would also be openings for aquatic fauna between each chute step (pool). These could work like a "ladder" to help avoid isolating the aqu	

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

N/A N/A Applicable at this stage;
 Non-compliance but rectified by the contractor;
 Recommendation was made during site audit but improved/rectified by the contractor;
 Mon-compliance but rectified/improved by the contractor and awaiting IEC's further comment.

Types of Impacts	Mitigation Measures	Status
	Surveys of amphibians at E4(P), PFLR1(P), W12(P), MB16, E5(B)(P), TP789(P) and P5(P) prior to commencement of construction is recommended. Frogs, including Hong Kong Cascade Frog and Lesser Spiny Frog, and tadpoles found at work areas of these proposed intake points will be collected and translocated to nearby streams that will not be affected by the project. These procedures should be performed by experienced herpetologists. A detailed translocation proposal will be submitted during the detailed design stage.	^
	Measures should also be taken to avoid runoff to streams and marine habitats. Stream/channel which could potentially be affected during construction should be prevented from sedimentation by erection of sediment barriers. Site runoff should be desilted by siltation traps in streams/channels or diverted, to reduce the potential for suspended sediments, organics and other contaminants to enter the local stream environment.	۸
Marine Ecology	Silt curtains will be deployed during the construction and demolition of the temporary berthing point. Deployment of silt curtains around the berthing point area would effectively avoid adverse water quality impacts due to barge filling. No significant ecological impact is anticipated.	N/A
	The invert of the stilling basin would be at -5.4 mPD. A cofferdam in the form of pipe-pile wall is to be constructed outside the stilling basin prior to the construction of basin. The cofferdam will be dewatered to provide a working area for construction of the stilling basin. The boulders from the seawall will then be removed by landbased grabs.	^
	Although the speed of the working vessels to be used in the Project (mainly barges) would not be high, a speed limit for marine traffic is proposed as a precautionary measure. A speed limit of 10 knots should be strictly enforced in the works area, in particular in the waters between the outfall location and the navigation channel in East Lamma Channel.	^

Types of Impacts	Mitigation Measures	Status
Landscape and Visual	The proposed landscape and visual mitigation measures during the construction phase include: CM1 - Topsoil, where identified, should be stripped and stored for re-use in the construction of the soft landscape works, where practical. CM2 - Existing trees to be retained on site should be carefully protected during construction. The detailed proposal for any trees felling and transplantation is subject to Lands Department's approval on tree felling application at the detailed design stage. CM3 - Trees unavoidably affected by the works should be transplanted where practical. CM4 - Compensatory tree planting should be provided to compensate for felled trees. CM5 - The extent of disturbance on the existing stream course should be minimized. Any temporary works areas within the stream course shall be reinstated after construction. CM7 - Control of night-time lighting CM8 - Erection of decorative screen hoarding	

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

Types of Impacts	Mitigation Measures	Status
Cultural Heritage	The Cultural Heritage Impact Assessment has identified the following resources which will require mitigation measures during the construction stage;	
	<u>Haw Par Mansion (including boundary wall and gate)</u> A condition survey must be undertaken by a qualified professional prior to the commencement of construction works for the tunnel portal in order to assess the structural integrity of the mansion, wall and gate (with special attention paid to any fragile architectural features). A report containing description of the types of construction, identification of fragile elements, an appraisal of the condition and a photographic record must be prepared. The report must also provide an assessment indicating whether further precautionary measures will be necessary during the construction phase, and if so provide details for sufficient protective measures, including monitoring for vibration control to ensure that no damage to the structure and fabric of the house, wall and gate results from the construction works. The report must be submitted to AMO for approval before construction activities commence. Upon approval the appropriate monitoring and precautionary measures shall be put into place.	۸
	A buffer zone with a minimum width of 3 metres and an obstruction free access point must be maintained between the boundary wall/gate and the temporary works area (during construction works associated for both the tunnel portal and the permanent vehicle access ramp). This is to enable access for routine maintenance works on the wall and to ensure that the wall is not damaged by machinery operation or related construction activities. The temporary works area will be enclosed by standard DSD site hoarding.	۸
	Former Explosive Magazine of Victoria Barracks	
	A condition survey must be undertaken by a qualified professional prior to the commencement of construction works in order to assess the structural integrity of the retaining wall and the extent of damage from cracks and vegetation growth. A report containing a description of the wall's construction materials, identification of fragile and/or endangered elements, an appraisal of the condition and a photographic record of the retaining wall must be prepared. The report must also provide an assessment indicating whether further precautionary measures will be necessary during the construction phase, and if so provide details for sufficient protective measures, such as monitoring for vibration control, to ensure that no damage to the retaining wall results from the construction works. The report must be submitted to AMO for approval before construction activities commence. Upon approval the appropriate monitoring and precautionary measures shall be put into place.	Λ
	A buffer zone with a minimum width of 3 metres and an obstruction free access point must be maintained between the retaining wall and the temporary works area (for the duration of the construction phase). The works area will be enclosed by standard DSD site hoarding.	^

N/A N/A Applicable at this stage;
 Non-compliance but rectified by the contractor;
 Recommendation was made during site audit but improved/rectified by the contractor;
 Mon-compliance but rectified/improved by the contractor and awaiting IEC's further comment.

Types of Impacts	Mitigation Measures	Status
Fisheries	Silt curtain will be deployed during the construction and demolition of the temporary berthing point. With the deployment of silt curtains around the berthing point area, adverse water quality impact associated with the filling would not be anticipated. No significant fisheries impact is anticipated.	N/A
	The invert of stilling basin will be found at -5.4 mPD. A cofferdam in the form of pipe-pipe wall is to be constructed outside the stilling basin prior to the construction of basin. The cofferdam will be dewatered to provide a working space for the construction of stilling basin. The boulders from the seawall will then be removed by landbased grabs.	۸
Hazard to Life	There will be no overnight storage of explosives for this project. Transportation of explosives to site for the construction of adit will be undertaken on a daily basis. The contractor is required to destroy any unused explosives before nightfall. If contractor wishes to set up magazines for overnight storage of explosives, it is necessary to carry out risk assessment and seek the relevant approval following the EIAO process.	^

APPENDIX K EVENT ACTION PLANS

Appendix K - Event Action Plans

Event/Action Plan for Air Quality

	ACTION							
EVENT	ET	IEC	SUPERVISING OFFICER'S REPRESENTATIVE	CONTRACTOR				
ACTION LEVEL								
1.Exceedance for one sample	 Identify the source and investigate the causes and propose remedial measures Inform Supervising Officer's Representative & IEC Repeat measurement to confirm finding Increase monitoring frequency to daily 	 Check monitoring data submitted by ET Check Contractor's working methods 	1.Notify Contractor	 Rectify any unacceptable practice Amend working methods if appropriate 				
2.Exceedance for two or more consecutive samples	 Identify the source Inform Supervising Officer's Representative & IEC Repeat measurements to confirm findings Increase monitoring frequency to daily Discuss with Supervising Officer's Representative & IEC for remedial actions required If exceedance continues, arrange meeting with Supervising Officer's Representative & IEC If exceedance stops, cease additional monitoring 	 Checking monitoring data submitted by ET Check Contractor's working methods Discuss with ET, IEC and Contractor on proposed remedial actions Advise the Supervising Officer's Representative & ET on the effectiveness of the proposed remedial measures Supervise the implementation of the remedial measures 	 1.Confirm receipt of notification of failure in writing 2.Notify Contractor 3.Ensure remedial actions properly implemented 	 Submit proposals for remedial actions to Supervising Officer's Representative within 3 working days of notification Implement the agreed proposals Amend proposal if appropriate 				
LIMIT LEVEL								
1.Exceedance for one sample	 Identify source,,investigate the causes and propose remedial measures Inform Supervising Officer's Representative & IEC and EPD Repeat measurement to confirm finding Increase monitoring frequency to daily Assess effectiveness of Contractor's remedial actions and keep EPD and Supervising Officer's Representative & IEC informed of the results 	 Check monitoring data submitted by ET Check Contractor's working methods Discuss with ET and Contractor on proposed remedial actions Advise the Supervising Officer's Representative on the effectiveness of the proposed remedial measures Supervise the implementation of the remedial measures 	1.Confirm receipt of notification of failure in writing2.Notify Contractor3.Ensure remedial actions properly implemented	 Take immediate action to avoid further exceedance Submit proposals for remedial actions to Supervising Officer's Representative within 3 working days of notification Implement the agreed proposals Amend proposal if appropriate 				
2.Exceedance for two or more consecutive samples	 Identify source Inform Supervising Officer's Representative, IEC and EPD the causes & actions taken for the exceedances Repeat measurement to confirm findings 	 Discuss amongst Supervising Officer's Representative, ET and Contractor on the potential remedial actions Review Contractor's remedial actions to assure their effectiveness and advise the 	 Confirm receipt of notification of failure in writing Notify Contractor In consultation with the IEC, agree with the Contractor on the remedial measures to be 	 Take immediate action to avoid further exceedance Submit proposals for remedial actions to Supervising Officer's Representative within 3 working 				

		ACTION					
EVENT	ET	IEC	SUPERVISING OFFICER'S	CONTRACTOR			
			REPRESENTATIVE				
ACTION LEVEL							
	 4. Increase monitoring frequency to daily 5. Investigate the causes of exceedance 6. Arrange meeting with & IEC and Supervising Officer's Representative to discuss the remedial actions to be taken 7. Assess effectiveness of Contractor's remedial actions and keep ER, IEC and EPD informed of the results 8. If exceedance stops, cease additional monitoring 	Supervising Officer's Representative accordingly 3.Supervise the implementation of the remedial measures	 implemented 4.Ensure remedial measure are properly implemented 5.If exceedance continues, consider what portion of the work is responsible and instruct the Contractor to stop that portion of work until the exceedance is abated 	 days of notification 3. Implement the agreed proposals 4. Resubmit proposals if problem still not under control 5. Stop the relevant portion of works as determined by the ER until the exceedance is abated 			

Event/Action Plan for Construction Noise

EVENT		ACT	ION	
	ET	IEC	SUPERVISING OFFICER'S REPRESENTATIVE	Contractor
Action Level	 Notify IEC, Supervising Officer's Representative and Contractor carry our investigation by reviewing all the relevant monitoring data and the corresponding construction activities. Exceedances should also be confirmed by immediate verification in the field as far as practical. Report the results of investigation to the IEC, Supervising Officer's Representative and Contractor Discuss with the Contractor and formulate remedial measures increase monitoring frequency to check mitigation effectiveness 	 Review the analysed results submitted by the ET Review the proposed remedial measures by the Contractor and advise the Supervising Officer's Representative & ET accordingly Supervise the implementation of remedial measures 	 Confirm receipt of notification of complaint in writing Notify Contractor require Contractor to proposed remedial measures for analyzed noise problem Ensure remedial measures are properly implemented 	 Identify practicable measures to minimize the noise impact. Submit noise mitigation proposals to ET, IEC and ET. Implement noise mitigation proposals
Limit Level	 Notify IEC, Supervising Officer's Representative, EPD and Contractor Identify the source(s) of impact by reviewing all the relevant monitoring data and the corresponding construction activities. Exceedances should also be confirmed by immediate verification in the field as far as practical. Repeat measurement to confirm findings Increase monitoring frequency Carry out analysis of Contractor's working procedures to determine possible mitigation to be implemented. inform IEC, Supervising Officer's Representative and EPD the cause & actions taken for the exceedances Assess effectiveness of Contractor's remedial actions and keep IEC, EPD and Supervising Officer's Representative informed of the results If exceedance stops, cease additional monitoring. 	 Discuss amongst Supervising Officer's Representative, ET, and Contractor on the potential remedial actions Review Contractor's remedial actions to assure their effectiveness and advise the Supervising Officer's Representative &ET accordingly Supervise the implementation of the remedial measures 	 Confirm receipt of notification of exceedance in writing Notify Contractor Require Contractor to propose remedial measures for the analyzed noise problem Ensure remedial measures are properly implemented If exceedance continuous, consider what portion of the work is responsible and instruct the Contractor to stop that portion of work until the exceedance is aborted 	 Take immediate action to avoid further exceedance Identify practicable measures to minimize the noise impact. Submit proposals for remedial actions to Supervising Officer's Representative within three working days of notification Implement the agreed proposals Resubmit proposal if problem still not under control Stop the relevant portion of works as determined by the Supervising Officer's Representative until the exceedance is abated

Event/Action Plan for Water Quality

	ACTION							
EVENT	ET	IEC	SUPERVISING OFFICER'S REPRESENTATIVE	CONTRACTOR				
ACTION LEVEL		l						
Action level being exceeded by one sampling day	 Repeat in situ measurement to confirm findings; Identify source(s) of impact; Inform IEC, contractor and Supervising Officer's Representative; Check monitoring data, all plant, equipment and Contractor's working methods. Discuss mitigation measures with IEC and Contractor Repeat measurement on next day of exceedance. 	 Discuss with ET and Contractor on the mitigation measures. Review proposals on mitigation measures submitted by Contractor and advise the Supervising Officer's Representative accordingly; and Assess the effectiveness of the implemented mitigation measures. 	 Discuss with IEC on the proposed mitigation measures; and Make agreement on the mitigation measures to be implemented. 	 Inform the Supervising Officer's Representative and confirm notification of the non-compliance in writing; Rectify unacceptable practice; Check all plant and equipment; Consider changes of working methods; Discuss with ET and IEC and propose mitigation measures to IEC and Supervising Officer's Representative; Implement the agreed mitigation measures. 				
Action level being exceeded by more than one consecutive sampling days	 Repeat in-situ measurement to confirm findings; Identify source(s) of impact; Inform IEC, contractor; Check monitoring data, all plant, equipment and Contractor's working methods; Discuss mitigation measures with IEC, Supervising Officer's Representative and Contractor; Ensure mitigation measures are implemented; Prepare to increase the monitoring frequency to daily; Repeat measurement on next day of exceedance. 	 Discuss with ET and Contractor on the mitigation measures. Review proposals on mitigation measures submitted by Contractor and advise the Supervising Officer's Representative accordingly; and Assess the effectiveness of the implemented mitigation measures. 	 Discuss with IEC on the proposed mitigation measures; and Make agreement on the mitigation measures to be implemented. Assess the effectiveness of the implemented mitigation measures. 	 Inform the Supervising Officer and confirm notification of the non-compliance in writing; Rectify unacceptable practice; Check all plant and equipment and Consider changes of working methods; Discuss with ET and IEC and propose mitigation measures to IEC and Supervising Officer's Representative within 3 working days; Implement the agreed mitigation measures. 				
LIMIT LEVEL								
Limit level being exceeded by one sampling day	 Repeat measurement on next of exceedance to confirm findings; Identify source(s) of impact; Inform IEC, contractor, Supervising Officer's Representative and EPD; Check monitoring data, all plant, equipment and Contractor's working methods; Discuss mitigation measures with IEC, Supervising Officer's Representative and Contractor. 	 Check monitoring data submitted by ET and Contractor's working methods. Discuss with ET and Contractor on possible mitigation measures; Review the proposed mitigation measures submitted by Contractor and advise the Supervising Officer's Representative accordingly; 	 Confirm receipt of notification of failure in writing Discuss with IEC, ET and Contractor on the proposed mitigation. Request Contractor to view the working methods. Ensure mitigation measures are properly implemented. 	 Inform the Supervising Officer's Representative and confirm notification of the non-compliance in writing; Rectify unacceptable practice; Check all plant and equipment and consider changes of working methods; Discuss with ET, IEC and Supervising Officer's Representative and propose mitigation measures to Supervising Officer's Representative and IEC within 3 working days; 				

		AC	CTION	
EVENT	ET	IEC	SUPERVISING OFFICER'S REPRESENTATIVE	CONTRACTOR
				5. Implement the agreed mitigation measures.
Limit level being exceeded by more than one consecutive sampling days	 Repeat measurement on next of exceedance to confirm findings; Identify source(s) of impact; Inform IEC, contractor, Supervising Officer's Representative and EPD; Check monitoring data, all plant, equipment and Contractor's working methods; Discuss mitigation measures with IEC, Supervising Officer's Representative and Contractor; Ensure mitigation measures are implemented; Increase the monitoring frequency to daily until no exceedance of Limit level for two consecutive days. 	 Check monitoring data submitted by ET and Contractor's working methods. Discuss with ET and Contractor on possible mitigation measures; Review the proposed mitigation measures submitted by Contractor and advise the Supervising Officer's Representative accordingly; Supervise the implementation of mitigation measures. 	 Discuss with IEC, ET and Contractor on the proposed mitigation measures; Request Contractor to critically review the working methods; Make agreement on the mitigation measures to be implemented; Ensure mitigation measures are properly implemented; Consider and instruct, if necessary, the Contractor to slow down or to stop all or part of the construction activities until no exceedance of Limit level 	 Take immediate action to avoid further exceedance Discuss with ET, IEC and Supervising Officer's Representative and propose mitigation measures to Supervising Officer's Representative and IEC within 3 working days; Implement the agreed mitigation measures; Resubmit proposals of mitigation measures if problem still not under control; As directed by the Supervising Officer, to slow down or to stop all or part of the construction activities until no exceedance of Limit level.

APPENDIX L COMPLAINT LOG

APPENDIX L – COMPLAINT LOG

Log Ref. Loca	ation	Received Date	Details of Complaint	Investigation/Mitigation Action	Status
Cons	struction at Eastern	Received Date	Details of Complaint The complaint was lodged by a complainant on 22 May 2008 regarding noise nuisance generated from the construction activities at the construction site of Eastern Portal	According to the Contractor, only one excavator and one generator were operated for the excavation works around 8 am on 22 May 2008 at the Eastern portal. No other construction activities were conducted. In response to the complaint, The Contractor agreed to reschedule their current works activities, with immediate effect from 23 May 2008, that only site preparation works without noise nuisance to the nearby residents will be carried out from 7:00 am to 8:00 am at the Eastern Portal area. Base on the information collected and the monitoring results, the complaint was considered not justifiable since (1) no exceedance of	Status
				the noise monitoring results was recorded in May and (2) no non- compliance or observation on noise was recorded.	

Log Ref.	Location	Received Date	Details of Complaint	Investigation/Mitigation Action	Status
Com-2008-05-004	Construction site at Western Portal (Marine Works)	31 May 2008	The complaint was lodged by one of the local resident on 31 May 2008 regarding the noise nuisance generated from the marine works at Western Portal.	According to the Contractor, only two derrick barges and one tug boat were operated for the seabed formation works around 18:00 hrs on 31 May 2008 at the Western Portal. No other construction activities were conducted. Base on the information collected and the monitoring results, the complaint was considered not justifiable since (1) no exceedance of the noise monitoring results was recorded in May and (2) no non- compliance or observation on noise was recorded.	Closed
Com-2008-07-007	Construction site at Eastern Portal	2 July 2008	The complaint was lodged by a resident of The Legend on 2 July 2008 regarding noise nuisance generated from the construction activities at the construction site of Eastern Portal	2 July 2008 at the Eastern portal.	Closed

Log Ref.	Location	Received Date	Details of Complaint	Investigation/Mitigation Action	Status
				In response to the complaint, The Contractor review his forthcoming operations within the Eastern Portal site as previous they agreed, reschedule their current works activities, with immediate effect from 23 May 2008, that only site preparation works without noise nuisance to the nearby residents will be carried out from 7:00 am to 8:00 am at the Eastern Portal area. Additional noise monitoring was conducted on 16 and 17 July 2008 during the drilling rig (Jumbo), excavator and wheel loader were operated for drilling works.	
				Base on the information collected and the monitoring results, the complaint was considered not justifiable since (1) no exceedance of the noise monitoring results was recorded in June and July 2008 and additional noise monitoring (2) no non-compliance or observation on noise was recorded.	

Log Ref.	Location	Received Date	Details of Complaint	Investigation/Mitigation Action	Status
COM-2008-10-011	Construction site at Western Portal	11 October 2008	The complaint was lodged by one of the resident of Victoria Road on 11 October regarding about the noise nuisance generated from the construction works at Western Portal	excavation works and marine works including sheet piling works were also conducted at the time of complaint at Western Portal	Closed

Log Ref.	Location	Received Date	Details of Complaint	Investigation/Mitigation Action	Status
				noise limit of 75 dB(A). Also, the Contractor has implemented the remedial measure that reschedule the starting time of the construction works to 8:15am on every Saturday immediately after receiving the complaint to minimize the noise nuisance to the nearby residents.	
COM-2008-10-012	Construction site at Intake TP5	15 October 2008	The complaint was lodged by a complainant on 15 October 2008 regarding about the noise generated from the GI works, which starts from 8:30 hrs to 17:30 hrs next to Aigburth at May Road.	According to the information provided by the Contractor, only rotary type drill rigs and water pumps were operated for the GI works at the time of complaint at	Closed
COM-2008-10-013	Construction site at Intake TP5	31 October 2008	The complaint was lodged by a complainant on 31 October 2008 regarding the black smoke is emitted and noise is generated from the machine at the site (Intake TP5), he needed to close the windows to prevent the black smoke from entering his flat and to attenuate the noise.	monitoring at the podium of the Valverde at May Road were conducted on 3 Nov 2008 and 24 Oct, 5 Nov, 7 Nov 2008 respectively. The Contractor agreed to reschedule	

Log Ref.	Location	Received Date	Details of Complaint	Investigation/Mitigation Action	Status
COM-2008-11-015	Construction site at Intake TP5	4 November 2008	The complaint was lodged by a complainant on 4 November regarding the noise nuisance generated from the construction works at Intake TP5.	 without noise nuisance to the nearby residents will be carried out from 7:00 am to 8:00 am at Intake TP5. Acoustic insulating materials have been applied for enclosing water pump and rotary type drill rigs to minimize the noise nuisance to the nearest residents. Base on the information collected, the noise level measured at the podium of the Valverde at May Road were well below the construction noise limit of 75 dB(A) after the Contractor has implemented the remedial measure. 	
COM-2008-11-016	Construction site at Western Portal	17 November 2008	soil nailing works at the		Closed

Log Ref.	Location	Received Date	Details of Complaint	Investigation/Mitigation Action	Status
			Road.	Portal (AQ3), the dust levels measured at AQ2 for 1 hour TSP and at AQ3 for 24 hour TSP were well below the Action Level (321µg/m3 for 1 hour TSP and 156µg/m3 for 24 hour TSP). Also, the Contractor has implemented the dust suppression measures to prevent dust nuisance from the construction activities including soil nailing works.	
COM-2008-11-019	Construction site at Western Portal	29 November 2008	The complaint was lodged by a complainant on 1 December 2008 regarding noise nuisance at Western Portal at 08:30 hrs approx on 29 November 2008 and 00:30 on 1 December 2008.	the temporary jetty at the time of complaint (00:30 on 1 December 2008) at Western Portal.	Closed
	Construction site at Western Portal			The complaint was considered not justifiable as Construction Noise Permit (CNP) – CNP No. GW- RS0827-08 has been granted from	Closed

Log Ref.	Location	Received Date	Details of Complaint	Investigation/Mitigation Action	Status
COM-2008-12-020		28 December 2008	The complaint was lodged by a complainant on 28 December 2008 regarding the excavator was found working within Western Portal works area on Sunday.	EPD for carrying out the construction works at Hong Kong West Drainage Tunnel (Western Portal), Cyberport Road, Cyberport, Hong Kong (DSD Contract No.	
COM-2009-01-021	Muddy Water Discharged into Sea at Western Portal	21 January 2009	Muddy water was observed from discharging into the sea at Western Portal Site	Base on the information collected, the muddy water discharged into the sea is considered due to the operations of excavation of stilling basin and poor condition of the silt curtain. The Contractor agreed to review their current provisions to prevent any muddy water from discharging into the sea again and close check the	Closed

Log Ref.	Location	Received Date	Details of Complaint	Investigation/Mitigation Action	Status
				condition of the silt curtain.	
COM-2009-01-022(A)	Construction	12 January 2009	The complaint was lodged by a complainant, the assistant of Southern District Councillor about the resident in Baguio Villa near Victoria Road, the complainant concerns on the noisy activities carried out at Western Portal site.	Base on the information collected, the noise level measured at outside Aegean Terrace during the construction works at Western Portal site were well below the construction noise limit of 75 dB(A). Aegean	
COM-2009-01-022(B)	Construction site at Western Portal	21 January 2009	The complaint was lodged by resident of Aegean Terrace at Sassoon Road about the noise nuisance generated from Western Portal Site.	Terrace is at location close to the major site activities compared with Baguio Vila. Also, The Contractor agreed to reschedule their current works activities, no noisy work will	Closed
COM-2009-01-022(C)		21 January 2009	The complaint was lodged by the resident in Baguio Villa near Victoria Road about noisy works at Western Portal Site.	be carried out at Western Portal Site before 8:00a.m.	
COM-2009-02-023	Construction site at Eastern Portal	7 February 2009	Complaint of Construction Noise at Early Morning (07:45hrs) at Eastern Portal	Based on the information collected, the construction noise at about 07:45hrs on 7 February 2009 was due to the checking of the backhole by the sub-contractor.	Closed

Log Ref.	Location	Received Date	Details of Complaint	Investigation/Mitigation Action	Status
			Site	The Contractor was reminded to strengthen their site supervision and provide sufficient site-specific environmental training for sub- contractor to ensure that such situation would not be recurred.	
COM-2009-03-025	Construction site at Western Portal	2 March 2009 4 March 2009	Complaint of noise generated by midnight works and night- time lighting at Western Portal Site	the regular noise monitoring was	
COM-2009-03-026		7 March 2009	Complaint of pipe hitting noise at midnight at Western Portal Site.	below the construction noise limit of	
				The Contractor was reminded to strengthen their site supervision and implement necessary noise mitigation measures to minimize and avoid the construction noise impact to the residents nearby especially during the restricted hours.	Closed
				Regarding the complaint of spotlight hanging on the plant at the site portion WP, The Contractor was reminded to implement the	

Log Ref.	Location	Received Date	Details of Complaint	Investigation/Mitigation Action	Status
				mitigation measures for Visual during the construction by controlling the night-time lighting so that the residual visual impacts can be accepted.	
COM-2009-04-028	Construction site at Western Portal	7 April 2009	Complaint of noise generated from the construction works conducted till 11:00pm at Western Portal of the Hong Kong West Drainage Tunnel.	provided by The Contractor, TBM, conveyor belt, ventilation fan, tower	
COM-2009-04-029		10 April 2009	Complaint of noise generated by TBM works at Western Portal.		
				According to the photos taken on 8 April 2009, misplacement of plant was observed at Western Portal Site. Upon advice, The Contractor immediately moved the fan properly.	Closed
			Based on the information collected, the construction noise levels measured were well below the construction noise limit of 75 dB(A) for the period of 0700-1900 hrs on normal weekdays, 65 dB(A) for the		

Log Ref.	Location	Received Date	Details of Complaint	Investigation/Mitigation Action	Status
				period of 0700-2300 hrs on holiday;	
				and 1900-2300 hrs on all other days	
				and baseline level for the period of	
				2300-0700 hrs of next day. The	
				ground borne noise levels measured	
				were also well below the	
				construction ground borne noise	
				standards (i.e. $65 \text{ dB}(A)$ – Daytime	
				(except General Holiday and	
				Sundays) and 55 $dB(A)$ – Daytime	
				during general holidays and Sunday	
				and all days during Evening (1900 to	
				2300 hrs). No exceedances of noise level have been recorded in March	
				and April 2009.	
				and April 2009.	
				The Contractor was advised to	
				strictly follow the conditions of the	
				permit to avoid any misplacement of	
				plants in the future. Also, The	
				Contractor should take sufficient	
				noise mitigation measures to	
				minimize the environmental impact	
				on the nearby community as	
				recommended in the approved EIA	
				report.	
				In addition, DNJV already arranged	
				tailors made training for the	
				Production Team including the	

Log Ref.	Location	Received Date	Details of Complaint	Investigation/Mitigation Action	Status
				senior management and foreman to explain the conditions and requirements listed on the CNP and delegated one Engineer to ensure all construction activities and PMEs to be used are fully complying with CNP and legislation requirements before the commencement of the construction activities during the restricted hour.	
				Base on the information collected, regular noise Monitoring was conducted during the night time to check the noise levels are complying with the construction noise criteria. The noise levels measured at NC3 during the construction works at night time were well below the construction noise limit.	
				The Contractor was reminded to strengthen their site supervision by delegated Engineer to ensure all construction activities and PMEs to be used are fully complying with CNP and legislation requirements and implement necessary noise mitigation measures as	

Log Ref.	Location	Received Date	Details of Complaint	Investigation/Mitigation Action	Status
				recommended in the Approved EIA report to minimize and avoid the construction noise impact to the residents nearby especially during the restricted hours.	
COM-2009-04-030	Construction site at Western	30 April 2009	Complaint of Construction Noise Generated at Night at Western Portal.	diaries, TBM chainage, TBM excavation, installation of segment ring, pea gravel & mortar injection	
COM-2009-05-031	Portal	4 May 2009	Complaint of low frequency noise emitted from the construction site at Western Portal.	and installation cables & pipes at gantries were the activities conducted in the night of 30 April 2009.	
		11 May 2009	Complaint of Construction Noise nuisance generated from the Western Portal Site from day to night.	visit on 15 May 2009, the noise levels at Aegean Terrace was not high but with occasionally sound of locomotive and tower crane operations.	Closed
				No exceedance of noise level was recorded since the commencement of the project works at Western Portal Site. The noise levels measured at NC3 during the construction works were well below the construction noise limit.	
				The Contractor will continue	

Log Ref.	Location	Received Date	Details of Complaint	Investigation/Mitigation Action	Status
COM 2000 05 022		12 M 2000		implementing their mitigation measures (e.g. Instruct workers not to shout during work in the evening; no horn signal of locomotive after 6:55 pm).	
COM-2009-05-032	Construction site at Eastern Portal	13 May 2009	The complaint was lodged by a resident regarding the Construction Noise Nuisance from the construction works that were carried out from early morning till night time at Eastern Portal Site Area.	construction works were well below	Closed
COM-2009-06-035	Hong Kong West Drainage Tunnel Construction Site at Cyberport	3 June 2009	EPD received a public complaint raised by local resident regarding the transportation and disposal of construction wastes from Hong Kong West Drainage Tunnel Construction Site at Cyberport on 3 June 2009.	Base on the information collected, alternative disposal ground is proposed by The Contractor and they have been submitted the relevant information and sought the approval from Supervising Officer. The	Closed

Log Ref.	Location	Received Date	Details of Complaint	Investigation/Mitigation Action	Status
COM-2009-06-037 COM-2009-06-038	Construction site at Eastern Portal	23 June 2009	The few noise complaints were lodged by a resident of The Legend and Ronsdale Garden regarding the Construction Noise Nuisance from the construction works at Eastern Portal Site Area since 7:00a.m and in the afternoon.The complaint was raised by a representative of Goodwell 	the noise levels measured at NC1 and NC2 during the construction works were well below the construction noise limit or baseline level.	Closed
COM-2009-08-040	Construction site at Intake PFLR1	26 August 2009	The complaint was relating to the noise generated from the construction activities of breaking of the existing boundary wall of Pokfulam Road Playground by use of	was recorded. In addition, based on	Closed

Log Ref.	Location	Received Date	Details of Complaint	Investigation/Mitigation Action	Status
			the hand-held electric breaker.	atIntakePFLR1,noobservation/non-complianceonairqualitywasidentified.Theenvironmental conditions of the sitewillbecontinuouslyreviewedandmonitored.DNJVhadinstalledtarpaulinshieldingandcover tomitigatenotonlythepotentialemissionofexhaustedsmoke,butalsothevisualimpacttothevisualimpactto	
COM-2009-09-042	Construction site at Eastern Portal	21 September 2009	The complaint was raised by a resident of The Legend regarding poor housekeeping and construction noise nuisance from the Eastern Portal Site Area.	Based on the information gathered in the Investigation, the Contractor had taken action immediately to rectify the complaint of poor housekeeping. The white site office was painted green in harmony with the surrounding environment and the site was maintained in a clean and tidy condition. All materials required for temporary works were stored in an orderly manner. Regarding the complaint of construction noise impact, the noise levels measured at The Legend	Closed

Log Ref.	Location	Received Date	Details of Complaint	Investigation/Mitigation Action	Status
				 (NC2) during the construction works in the normal working hours were well below the construction noise limit level. Nevertheless, the Contractor is also committed to implementing sufficient noise mitigation measures as recommended in the approved EIA report to minimize the nuisance caused to the nearby residents and provide training for the workers to increase awareness of their environmental responsibilities. 	
COM-2009-10-044	Construction site at Eastern Portal	6 and 7 October 2009	The complaint was raised by a resident of The Legend and Ronsdale Garden regarding the construction noise nuisance from the Eastern Portal Site Area.	Based on the information gathered in the Investigation, the noise levels measured (additional noise monitoring) at The Legend (NC2) and Ronsdale Garden during the construction works including rock breaking works and soil nailing works were ranged from 68.4dB(A) to 75.3 dB(A) in the normal working hours. The Contractor is committed to implementing sufficient noise mitigation measures as	Closed

Log Ref.	Location	Received Date	Details of Complaint	Investigation/Mitigation Action	Status
				recommended in the approved EIA report to minimize the nuisance caused to the nearby residents and provide training for the workers to increase awareness of their environmental responsibilities. It is recommended to increase the construction noise monitoring frequency for Eastern Portal Site to check the mitigation effectiveness.	
COM-2009-11-054	Construction site at Western Portal	23 and 29 November 2009	The complaint was raised by a resident of Aegean Terrace regarding the construction noise nuisance from the Western Portal Site Area.	the noise levels measured at NC3 during the construction works were	Closed

Log Ref.	Location	Received Date	Details of Complaint	Investigation/Mitigation Action	Status
COM-2009-12-059	Construction site at Intake MB16	27 November 2009	The complaint was received on 2 November 2009 regarding the dust nuisance caused by the works at the Construction Site at Mount Butler Road near Clementi Road (Intake MB16). EPD subsequently issued a notice of complaint.	the Contractor has implemented the dust suppression measures to prevent dust nuisance from the construction activities.During the site inspection in	Closed
COM-2009-12-061	Construction site at Intake PFLR1	23 and 28 December 2009	Two public complaints were received from the resident of Pok Fu Lam Road on 23rd and 28th December 2009 respectively about the construction noise nuisance from the construction site at Intake PFLR 1.	the Investigation, the noise levels measured at Honey Court (NC11)	Closed

Log Ref.	Location	Received Date	Details of Complaint	Investigation/Mitigation Action	Status
				routine site inspection. The innovation works included hammering and drilling on the outer walls of the building and contributed significantly to the noisy environment.	
COM-2010-01-062	Construction site at Western Portal	3 January 2010	The public complaint was received from the resident of Bel-Air through the project hotline on 3rd January 2010 about "wooing" sound heard after midnight, and he suspected that the sound was coming the construction sites at Cyberport.	the noise levels measured at NC3 during the construction works were well below the baseline level. The location of the designated noise monitoring station (NC3 – Outside Aegean Terrace) is at location close	Closed
COM-2010-01-063	Intake MB16	20 January 2010	The first complaint was raised by the resident at No.	Based on the EIA assessment results, No. 58 Mount Butler Road and	
COM-2010-01-066(1), (2) and (3)		23, 25, 27 Januaryand 2 February2010	58 Mount Butler Road about the noise and vibration generated from the works on 20 January 2010.Three complaints were raised	ground borne noise sensitive	Closed

Log Ref.	Location	Received Date	Details of Complaint	Investigation/Mitigation Action	Status
			by the resident of Amber Lodge through the Project Hotline regarding the low frequent vibration from underground on 23, 25, 27 January and 2 February 2010.	The additional ground borne noise levels measured at inside Amber Lodge during the TBM works were well within the construction ground borne noise standards. The Contractor volunteered to stop the operation of the East TBM between midnight and 07:00 hours in Week 6 and 7 after which the machine has moved far away from these premises	
COM-2010-02-073	Western Portal	3 February 2010	Complaint of noise generated by the operation of plants, rock falling and flash lighting within Western Portal site area.	the noise levels measured at NC3 during the construction works were	Closed
COM-2010-03-080	Intake PFLR1	1 March 2010		Based on the information gathered in the Investigation, the noise levels	Closed

Log Ref.	Location	Received Date	Details of Complaint	Investigation/Mitigation Action	Status
			noise nuisance from the construction site at Intake PFLR 1		
COM-2010-03-081	Intake TP789	5 March 2010	The complaint was received from Kerry Management Ltd. on 5th March 2010 about the construction noise complaints raised by some tenants of Tavistock. They complained about the noisy activities being carried out at Intake TP789 on Saturday.	the investigation, the noise levels measured at Tregunter Path near Tavistock were below the construction noise limit and the Contractor has already implemented the noise mitigation measures to	Closed

Log Ref.	Location	Received Date	Details of Complaint	Investigation/Mitigation Action	Status
COM-2010-03-082 and COM-2010-03-087	Western Portal	6 March 2010 15 March 2010	Two public complaints were received from the residents of Bel-Air at Western Portal on 6th and 15th March 2010 about the Construction Noise and Dust Nuisance from Hong Kong West Drainage Tunnel Construction Site at Cyberport (i.e. Western Portal Site) respectively.	the noise and air quality levels measured at NC3 and AQ2/AQ3 during the construction works were below the noise and air quality criteria respectively. Also, the Contractor has implemented appropriate environmental mitigation	Closed
COM-2010-04-094	Western Portal	9 April 2010	The public complaint was received by EPD hotline on 9 th April 2010 regarding construction dust nuisance from the Hong Kong West Drainage Tunnel construction site at Cyberport (i.e. Western Portal Site)	the air quality levels measured at AQ2 and AQ3 during the construction works were below the air quality criteria. Also, the Contractor has implemented	Closed

Log Ref.	Location	Received Date	Details of Complaint	Investigation/Mitigation Action	Status
				AQ3 were below the air quality criteria, we advised the Contractor to maintain the existing air quality mitigation measures, to reduce the environmental impact on the nearby residents. Nevertheless, the Contractor was reminded to review the existing measures if such measures are enough and appropriate to suit the	
COM 2010 04 007		22.4.11.2010		site condition from time to time during different construction phases to minimize the dust nuisance.	
COM-2010-04-097	Intake TP789/TP4	22 April 2010	The complaint was received from resident of Tregunter Tower on 22 nd April 2010 about the noisy activities being carried out at Intake TP789/TP4 in the morning.	Tavistock were below the construction noise limit and the Contractor has further improved the noise mitigation measures to reduce noise impact to the residents arising from the noise generation works.	Closed
				The Contractor agreed to reschedule the starting time of the noisy works to 9:00am on in the morining that no noisy works such as rock breaking	

Log Ref.	Location	Received Date	Details of Complaint	Investigation/Mitigation Action	Status
				will be conducted before 9:00am. In addition, enclosures consist of noise absorption blankets have been applied for enclosing Intakes construction areas to minimize the noise nuisance to the nearest residents.	
COM-2010-04-100	Western Portal	30 April 2010	The public complaint was received from the resident of Bel-Air on 30 th April 2010 regarding the dust nuisance generated during loading / unloading operation from two barges at pier of Cyberport. Dark smoke was also emitted from the two barges.	AQ2 and AQ3 during the construction works were below the air quality criteria. The Contractor has taken initiative to	Closed

Log Ref.	Location	Received Date	Details of Complaint	Investigation/Mitigation Action	Status
COM-2010-05-105	Western Portal	7 May 2010	The second complaint was received via EPD Hotline on 7 May 2010. The anonymous complainant concerned about the dark smoke emitted from the barges on 4 May 2010 and many dump trucks parking outside the Western Portal Site on 5, 6 and 7 May	the air quality levels measured at AQ2 and AQ3 during the construction works were below the air quality criteria.Although the air quality levels measured at AQ2 and AQ3 were below the air quality	
COM-2010-05-105 (2)		17 May 2010	2010. The complaint was received via EPD Hotline on 17 May 2010. The anonymous complainant complaint about the open stockpile of dusty materials without covered entirely.	mitigation measures and review the existing measures if such measures are	Closed
				Other suitable dust control measures as stipulated in the Air Pollution Control (Construction Dust) Regulation, where appropriate, should be adopted.	
				Nevertheless, the Contractor is also committed to take sufficient dust mitigation measures as recommended in the approved EIA report including	

Log Ref.	Location	Received Date	Details of Complaint	Investigation/Mitigation Action	Status
				installation of 3-sided curtain-like enclosure at the conveyor discharge point to the barge to minimize the dust nuisance on the nearby residents.	
COM-2010-06-113	Intake PFLR1	2 June 2010	The complaint was received by DSD on 2 June 2010 regarding siren sound was generated from the site throughout the day which caused nuisance.	the alert system of the backhoe during operation. The backhoe was	Closed
	Western Portal	15 June 2010	A public complaint was received by EPD hotline on 15th June 2010 complained about the construction works from Hong Kong West Drainage Tunnel construction site at Cyberport (i.e. Western Portal Site) affect their health of respiratory system	the air quality levels measured at AQ2 and AQ3 during the construction works were below the Action Level $(321\mu g/m3 \text{ for } 1 \text{ hour TSP} \text{ and } 156\mu g/m3 \text{ for } 24 \text{ hour }$	Closed
COM-2010-07-121	Western Portal	15 July 2010	Cyberport Management Office lodged a complaint in	DNJV has delivered the reply letter to Cyberport Management Office on	Closed

Log Ref.	Location	Received Date	Details of Complaint	Investigation/Mitigation Action	Status
			writing regarding the sands and mud left by the dump trucks on Cyberport road	26 July 2010 stating the following:- The stain is not mud or debris. It is liquid of granite powder. Stain on the road was caused by heavy rainstorm which brings moisture to granite powder in trucks.	
				The trucks have been equipped with tailor-made tanks to receive the liquid of granite powder. To prevent reoccurrence, DNJV will reinforce checking of these tanks and other truck conditions at work site to ensure no dripping before departure.	
				In this regard, the Contractor was reminded that all vehicles and plant should be cleaned before leaving the construction site to ensure no earth, mud and debris or other wastes is deposited on roads. Proper maintenance of the tailor-made tanks equipped at the trucks is also needed to avoid any leakage.	
COM-2010-07-123 (1)	Eastern Portal	2 August 2010	The complaint was received through the Project Hotline regarding the noise generated from construction vehicles.	Based on the information collected,	Closed

Log Ref.	Location	Received Date	Details of Complaint	Investigation/Mitigation Action	Status
COM-2010-07-123 (2)		2 August 2010	The complaint was received by DSD concerning the noise generated from construction site at 19:00.		
COM-2010-08-125		3 August 2010	The complaint was received by DSD concerning the noise generated from construction site until 8:00 pm every night.	measures as recommended in the	
COM-2010-08-124	Intake TP789/TP4	2 August 2010	The complaint was received by DSD regarding the construction works at Tregunter Path is extremely noisy and diminishes the ability of residents of the neighborhood to enjoy outdoor facilities	the investigation, the noise levels at Tregunter Tower was within the construction noise limit of 75dB(A). The Contractor has taken initiative to minimize noise nuisance to the	Closed
COM-2010-08-124 (con'd)		5 August 2010	The complaint was received by DSD regarding the construction works at Tregunter Path is extremely noisy and diminishes the ability of residents of the neighborhood to enjoy outdoor facilities	 as below: Properly maintained and operated the construction plant (well-greased, damage and worn parts promptly replaced) 	
COM-2010-08-129		12 August 2010	The complaint was raised by the resident of Tregunter Path for the noisy works which	mitigate noise generated by the	

Log Ref.	Location	Received Date	Details of Complaint	Investigation/Mitigation Action	Status
			was carried out after 18:00hrs at Intake TP4	working period at Tregunter Path starting from 13th August 2010	
COM-2010-08-129		12 August 2010	The complaint was received from Protech Property Management Limited (the building manager of Tregunter Tower, 14 Tregunter Path, Mid-Levels, Hong Kong) regarding the noisy construction works at Tregunter Path	as below: Monday – Friday: 08:00hrs to 18:00hrs Saturday: 08:30hrs to 18:00hrs Sunday and Public Holiday: No Works	
COM-2010-08-129 (2)		13 August 2010	The complaint was received by RSS concerning the noisy work from the construction site on Saturday		
COM-2010-10-151	Eastern Portal	15 October 2010	A complaint was received from the resident of The Legend through the supervising officer on 15th October 2010 about the construction dust nuisance from Eastern Portal Site Area.	Based on the information gathered in the investigation, no exceedance of air quality level was recorded at AQ1 since the commencement of the project works for Eastern Portal Site. The potential source of air quality impact arising from the removal of tunneling spoils from the tunnel portals as well as the vehicular emissions is minimized as all TBM excavation works have been completed since 5 October 2010.	Closed

Log Ref.	Location	Received Date	Details of Complaint	Investigation/Mitigation Action	Status
COM-2010-10-154	Eastern Portal	18 October 2010	A complaint was received from the resident of Ronsdale Garden through the DSD on 18th October 2010 about the construction noise nuisance from Eastern Portal Site Area. According to the complainant, the noise seems to be generated by a pump.	Based on the information gathered in the investigation, the noise levels measured at The Legend (NC2) and outside True Light Middle School of Hong Kong (NC1) were well below the limit level. The Contractor agreed to terminate the operation of pump during the evening (1900 – 2300) and night (2300 – 0700) time since end of October 2010 and committed to implementing sufficient noise mitigation measures as recommended in the approved EIA report to minimize the nuisance caused to the nearby residents.	Closed
COM-2010-10-155	Intake RR1	11 October 2010	A letter from the Property Management of Peaksville Court - Hong Yip Service Company Ltd was received by DNJV on 11th October 2010 about the construction noise nuisance and wastewater generated from Intake RR1 Site Area.	Based on the information gathered in the investigation, the noise levels measured at Peaksville Court (NC13) and Ying Wa Girl's School (NC12) were below the baseline/limit level. In addition, water runoff was observed leaked out to the public road from the site area according to the regular site inspection. The Contractor will seal the bottom of barriers with concrete or provided	Closed

Log Ref.	Location	Received Date	Details of Complaint	Investigation/Mitigation Action	Status
				with sandbag as early as possible.	
COM-2010-11-160	Intake TP789	5 November 2010	The complaint was received from Kerry Property Management and advised that some complaints from the residents of Tavistock about low frequency noise generated by the power pack within Site Portion TP789.	Based on the information gathered in the investigation, the noise levels measured at near Intake TP789 were	Closed
COM-2010-11-160(2)	Intake TP789	9 November 2010	Some residents complained the low frequency noise after the addition of sound proof sheets on the power pack at Intake TP789.	generation activities.	
COM-2010-11-163	Western Portal	6 November 2010	A complaint was received from a complainant regarding noise nuisance caused by spoils dropping directly from conveyor belt into barge (rock hitting sound) at Western Portal.		Closed
COM-2010-11-163(2)	Western Portal	7 November 2010	A complaint was received from a complainant regarding noise nuisance caused by spoils dropping from conveyor belt into storage basin (rock hitting sound). The complainant also		Closed

Log Ref.	Location	Received Date	Details of Complaint	Investigation/Mitigation Action	Status
			complained the noise of ventilation fans at the Western Portal area.		
COM-2010-11-164 COM-2010-11-165	Intake TP5 Intake TP5	10 November 2010 15 and 17 November 2010	Kerry Property Management Services received several complaints from the residents of Valverde on 10 November 2010 morning regarding working noise emitted from the Intake TP5 work site in early morning (before 7:30am). Kerry Property Management Ltd phoned DSD at about 17:08 hrs on 15 November 2010 relaying some complaints from the residents	the ad-hoc noise monitoring results measured at near Valverde was met the acceptable noise levels. Drill and blast is not considered with respect to noise annoyance, as the duration of blasting is very short and infrequent. The Contractor volunteered to cancel late blasts and scheduling all blasts before 7pm as far as possible until	Closed
			of Valverde about the noise/vibration due to the blasting works in past weeks. Jennifer also requested DNJV not to carry out blasting works at nights.	the nearby adit blasting works completed by mid of December 2010 tentatively.	
COM-2010-12-170	Intake DG1	7 December 2010	The complaint was received regarding the noise arising from the excavation works, starting from 9:00 hrs, in the construction site near Evergreen Villa of Stubbs	the Investigation, the noise levels measured at NC4 and NC6 in November and December 2010 were below the construction noise limit	Closed

Log Ref.	Location	Received Date	Details of Complaint	Investigation/Mitigation Action	Status
			Road.	The Contractor has taken initiative to erect noise absorption blankets at the site boundary to minimize noise nuisance to the nearby residents.	
				The Contractor was reminded to review the effectiveness of the implemented noise mitigation measures from time to time during different construction phases.	
COM-2010-12-171	Intake MB16	8 December 2010	The complainant complained the works near Mount Butler Road generated dust, thus affecting the air quality in the vicinity.	DNJV would arrange water spraying at the entrance of Area B. In addition, Environmental Team and RSS would closely monitor to ensure relevant measures are effectively implemented.	Closed
COM-2010-12-173	Intake W5	14 December 2010	A complaint was received from a complainant regarding noisy construction activities at Site Portion W5 had affected her niece's study to prepare for examination.	DSD are now constructing an intake at the subject site under Hong Kong West Drainage Tunnel project. The construction work at Site Portion is expected for completion in end 2011. At the moment, the pipe piling works have been completed and the Contractor will carry out grouting work in this week and then excavation work afterwards. The noise generated by excavation works should be less than that of pipe piling	Closed

Log Ref.	Location	Received Date	Details of Complaint	Investigation/Mitigation Action	Status
				works. Nevertheless, DSD would closely monitor the works in order to mitigate the noise impact to the nearby residents.	
COM-2010-12-178	Intake TP5	22 December 2010	Kerry Property Management Ltd notified that some complaints from the residents regarding the early commencement of the noise works at Intake Ste TP5 (earlier than 08:00hrs) in the past few days.		Closed
COM-2010-12-179	Eastern Portal	24 December 2010	The Property Management Office of The Legend referred the complaint from the resident to DSD regarding the intermediate noise from Eastern Portal site portion in the morning and at night.	Based on the information gathered in the investigation, the noise levels measured at NC1 and NC2 were below the limit level.	Closed
COM-2011-01-181	Eastern Portal	21 January 2011	The Property Management Office of Legend called DNJV to reflect a resident's concern on early construction noise at 8:30am on Saturday.		Closed
COM-2011-02-186	Intake GL1	18 February 2011	A complaint was received from the resident of Green Lane through the ICC on 18th February 2011 about the	Based on the information gathered in the investigation, the noise levels measured at near Green Lane was	Closed

Log Ref.	Location	Received Date	Details of Complaint	Investigation/Mitigation Action	Status
			construction noise generated from the plant equipments being operated at Intake GL1 from early in the morning and ends at around 19:00 at night.	noise limit. However, the Contractor has already implemented the noise mitigation measures to reduce noise impact. The major noise source due to the raise boring works has been finished since 26th February 2011	
COM-2011-02-188	Western Portal	25 February 2011	The complaint was received from the resident of Bel Air who called hotline at 3am and 4pm on 25 Feb 2011 to complaint about noise. The complainant refuses to give details on the nosie. He claims that he will report this to the Police and requested DNJV to provide him with copy of CNP.	Based on the information gathered in the investigation, the noise levels measured at NC3 was below the limit level.	Closed
COM-2011-03-189	Western Portal	7 March 2011	Property management office of Aigburth and Valverde transferred noise complaints of residents about the vibration and early working noise emitting from the TP5 and TP789. DNJV replied to explain to the PMO.	Property management office of Aigburth and Valverde about the progress and arrangement at Site Portion TP5. The raise boring work	Closed
COM-2011-03-190	Western Portal	7 March 2011	The complaint was received from the resident of Aegean	Based on the information gathered in the investigation, the noise levels	Closed

Log Ref.	Location	Received Date	Details of Complaint	Investigation/Mitigation Action	Status
COM-2011-03-193 (1)	Western Portal	14 March 2011	Terrace who complained about the night-time noise of Western Portal. DNJV would	measured at Western Portal was below the construction noise limit. However, the Contractor has already	
COM-2011-03-193 (2)	Western Portal	16 March 2011	review the works during the restricted hours and further improve the enclosure where necessary.	implemented the noise mitigation measures to reduce noise impact.	
COM-2011-03-192	Intake B2	14 March 2011	The PMO of Grand House at Macdonnell Road complained about the construction noise at the intake B2. In the site portion, rock excavation works was being carried out. The works was anticipated to complete in end April 2011.	Based on the information gathered in the investigation, the noise levels measured at near B2 was marginal below the construction noise limit. The Contractor has taken initiative to enclose the hydraulic breaker with noise absorption blankets to minimize noise nuisance to the nearby residents. The Contractor was reminded to review the effectiveness of the implemented noise mitigation measures from time to time during different construction phases.	Closed
COM-2011-03-195	Intake CR1	28 March 2011	The complaint was received from the resident of Conduit Tower, who complained about the construction noise at the intake CR1.	Based on the information gathered in the investigation, the noise levels measured at near CR1 was well below the construction noise limit. The Contractor has taken initiative to erect noise absorption blankets at the whole site boundary to minimize noise nuisance to the nearby residents.	Closed

Log Ref.	Location	Received Date	Details of Complaint	Investigation/Mitigation Action	Status
				The Contractor was reminded to	
				review the effectiveness of the	
				implemented noise mitigation	
				measures from time to time during	
				different construction phases.	
COM-2011-05-210	Intake GL1	30 May 2011	The complaint was raised	Based on the information gathered in	
			from the resident of Green	the investigation, the noise levels	
			Lane, who complained about	measured at near Green Lane was	
			the construction noise at the	well below the construction noise	Closed
			intake GL1.	limit.	Closed
				However, the Contractor has already	
				implemented the noise mitigation	
				measures to reduce noise impact.	
COM-2011-05-211	Intake CR1	30 May 2011	The complaint was received	•	
			from the resident of Conduit	e ,	
			Tower, who complained		
			about the construction noise		
			at the intake CR1. The		
			complainant mainly	1	
			concerned that the noisy		Closed
			works at Intake CR1 started	5	Closed
			at 8:00 hrs everyday is too		
			early. He requested to defer		
			the working hours later.	review the effectiveness of the	
				implemented noise mitigation	
				measures from time to time during	
				different construction phases.	

APPENDIX M CONSTRUCTION PROGRAMME

Act ID	Activity Description	Orig Dur	Rem Dur	Anticipated Start	Anticipated Finish	% Comp	Actual Duration	Draft Works Prog						
								WP6B EF Variance	M APR	MAY	2011 JUI	N J	IUL	AUG
	est Adit + Intake													
CC01 - PRE Milestone	ELIMINARIES & GENERAL REQUIREMENTS													
General M1-1240	1.24-Complete to All Obligat's From1141to1200d	0	0		29MAR11A	100	0	0	♦MC 122					
M1-1240 M1-1660	1.66-Acceptance of Monthly Report on TDMS(37M)	0	0		29MAR11A 29MAR11A	100	0	0	◆MC 122					
M1-1670 M1-1220	1.67-Acceptance of Monthly Report on TDMS(38M) 1.22-Complete to All Obligat's From 1021to1080d	0	0		06MAY11A 23MAY11*	100	0	-19 -36		MC 123				
M1-1680	1.68-Acceptance of Monthly Report on TDMS(39M)	0	0		23MAY11*	0	0	-36			•			
M1-1690 M1-1700	1.69-Acceptance of Monthly Report on TDMS(40M) 1.70-Acceptance of Monthly Report on TDMS(41M)	0	0		23MAY11* 23MAY11*	0	0	-36 -23			1			
M1-1250	1.25-Complete to All Obligat's From1201to1260d	0	0		31MAY11*	0	0	0			•			
M1-1710 M1-1720	1.71-Acceptance of Monthly Report on TDMS(42M) 1.72-Acceptance of Monthly Report on TDMS(43M)	0	0		31MAY11* 30JUN11*	0	0	0			•			
M1-1820	1.82-Subm. of Draft Operation&Maintenance Manual	0	0		30JUN11*	0	0	0				•		
M1-1260 M1-1730	1.26-Complete to All Obligat's From1261to1320d 1.73-Acceptance of Monthly Report on TDMS(44M)	0	0		31JUL11* 31JUL11*	0	0	0						•
	SIGN & DESIGN CHECKING OF THE WORKS													
Design Stage Secton 1 (Ea	e astern Portal)													
D00275	APP Cofferdam for Intake Shaft DDA APP Reinst Perm Slope at Coff Intake Shaft DDA	42 92	7	21MAY08A 31OCT09A	30MAY11 30MAY11	90 90	1,098 570	-36 -36		_				
·	0,Adits,East & West Portal,Main Tunl)		,	1	1			00						
D00480 Section 2 (P	P&S Adit/main tun intrct Perm Ling at W0 AIP	63	7	12MAY10A	30MAY11	90	377	-36						
D00686	APP E5A-Permanent Works Intake DDA	92	7	29NOV09A	30MAY11	90	541	-36			†	 		
Section 12 (D01265	Portion W1) APP W1-Permanent Works Intake DDA	92	7	31JAN10A	30MAY11	90	478	-36						
Section 14 (Portion BR6)		-	I		· · ·								
D01365 Section 16 (APP BR6-Permanent Works Intake DDA Portion B2)	92	7	31JAN10A	30MAY11	90	478	-36			—			
D01465 D01469	APP B2-Permanent Works Intake DDA APP B2-Temp Works & Drainage Diversion DDA	92 92	7	01MAR10A 27MAR10A	30MAY11 30MAY11	90 90	449 423	-36 -36						
L	Portion MA14)	92	/	27MAR IUA	JUNATT	90	423	-30			Γ	 		
D01515 Section 20 (APP MA14-Permanent Works Intake DDA	92	7	31DEC09A	30MAY11	90	509	-36						
D01689	APP M3-Temp Works & Drainage Diversion DDA	92	7	12FEB10A	30MAY11	90	466	-36			 	 		
Section 25 (D01965	Portion CR1) APP CR1-Permanent Works Intake DDA	92	7	28FEB10A	30MAY11	90	450	-36				 		
Section 27 (Portion W8)			I	1						T			
D02069 Section 28 (APP W8-Temp Works & Drainage Diversion DDA Portion P5)	122	0	23SEP09A	20APR11A	100	575	2		P				
D02115	APP P5-Permanent Works Intake DDA	92	7	29NOV09A	30MAY11	90	541	-36			 	 		
Section 29 (D02165	Portion W10) APP W10-Permanent Works Intake DDA	92	7	13NOV09A	30MAY11	90	557	-36						
E&M		07			00455144	100	10			_				
D02350 D02360	Submit Equipment, Material & Shop Drawings (EP) Statutory Submissions	37 91	0 61	15MAR11A 25APR11A	23APR11A 23JUL11	100 0	40 29	0	- 1					
D02355	Method Statement Submissions (EP)	30	30	24MAY11	22JUN11	0	0	-30						
D04024	P&S Re-design Leaky Cable Communication Sys-AIP	62	25	12MAR11A	17JUN11	5	73	-36						
D04028 D04026	P&S Leaky Cable Communication Sys-DDA APP Re-design Leaky Cable Communication Sys-AIP	62 28	62 28	18JUN11 18JUN11	18AUG11 15JUL11	0	0	-36 -36				· · ·	1	
D04020	APP Leaky Cable Communication Sys-DDA	28	28	19AUG11	1550E11 15SEP11	0	0	-36					-	
Penstock D03014	P&S Penstock(E5B,E7,THR2,GL1,MA14,M3) - P3	30	0	01FEB11A	31MAR11A	100	59	0						
D03012	P&S Penstock(W3,B2,TP789,TP5,W5,RR1,PFLR1) - P2	30	0	24FEB11A	31MAR11A	100	36	0						
D03030 D03028	APP Penstock(E5B,E7,THR2,GL1,MA14,M3) - P3 APP Penstock(W3,B2,TP789,TP5,W5,RR1,PFLR1) - P2	30 30	13 17	01APR11A 01APR11A	05JUN11 09JUN11	50 50	53 53	-36 -36				 		
D03016	P&S Penstock(HR1,DG1,MA15,MA17,W8,P5) - P4	30	30	24MAY11*	22JUN11	0	0	-36						
D03018 D03032	P&S Penstock(E5A,BR4,W1,BR5,BR6,W0,CR1,EP) - P5 APP Penstock(HR1,DG1,MA15,MA17,W8,P5) - P4	30 30	30 30	24MAY11* 23JUN11	22JUN11 22JUL11	0	0	-36 -36						
D03034	APP Penstock(E5A,BR4,W1,BR5,BR6,W0,CR1,EP) - P5	30	30	23JUN11	22JUL11	0	0	-36	, , , ,					
Milestone Design Subi	mission													
M2-1130 M2-1250	2.13-DDA-Dropshaft Submission 2.25-Approval of As-built Records of Dropshafts	0	0		23MAY11 23MAY11	0	0	-36 -36			1			
	COF SECTION 1 OF THE WORKS(MAIN TUNNEL)	U	U				J	-30				 		
Construction														
TBM Excava W1320	ation (Western Tunnel) Conveyor Removal-(MT)	48	0	07FEB11A	04MAY11A	100	70	0						
W1323 W1322	TBM Dismantle, Demobilizatn&Removal(via W Portal) Install West Side Mono rail system	77 25	0 11	07FEB11A 05MAR11A	14MAY11A 04JUN11	100 60	78 62	21 -26				- 		
W1322 W1332	West Temp.Ventilation Removal (for MainTunnel)	25 48	11 48	05MAR11A 07JUN11	04JUN11 02AUG11	60	62 0	-26 3						
TBM Excava	ation (Eastern Tunnel) TBM Dismantle,Demobilizatn&Removal(via E Portal)	36	0	080CT10A	03MAY11A	100	166	0						
E1617 E1618	Remove East&West TBM Main Bearing via East Tnl	18	0	080CT10A 04MAY11A	19MAY11A	100	13	10			<u>+</u>			
Milestone Section 1 (N	Main Tunnel)													
M3-1100	3.10-Removal of TBM Site after of M.T(7.25m dia)	0	0		06MAY11A	100	0	34	M APR	MC 123	JUI	N J	IUL	AUG
											2011			
rt Date ish Date	30NOV07 03AUG12		105A De	sion & Const	ruction of II	K West	Drainage	Sheet 1 of 10			RAMME APPF			hprove
ta Date n Date	24MAY11 Last Month Progre 27MAY11 11:15 Progress Bar	ss 104A			ontract No. E	DC/2007/	10	1		roved Works P	rogramme # 1	S	OR	Approved 804B
	Critical Activity				TH ROLLING 2011 MONT					roved Works P roved Works P	•		OR OR	9032 9116
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International matrix Internati	Act ID	Activity Description	Orig Dur	Rem Dur	Anticipated Start	Anticipated Finish	% Comp	Actual Duration	Draft Works Prog	i					
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Dit Dit Dit of an of a set of a se	LS1009 S	Start Demob of East&West TBM Main Bearing	0	0		09MAY11A	100	0	0			•			
Alt Transmission Strume Lange State Non-Normal State No-No-Normal State							-	-	-	- 1				1	
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CL1141 Ling Ling Ling Ling Ling Ling Ling Ling			43	43	01JUL11	12AUG11	0	0	-21						
QL 141 Turning Lawy Mark 30 30 55.00111 19.40111 0 0 1.41 Adit Turnet Excerctions A Turnet Linner, MD2 U U 10 0 0 1.41 Adit Turnet Excerctions A Turnet Linner, MD2 U U 10 0 0 1.41 Adit Turnet Excerctions A Turnet Linner, MD2 U 0 0 0 0 1.41 Adit Turnet Excerctions A Turnet Linner, MD2 U 0 <td< td=""><td></td><td></td><td>58</td><td>18</td><td>21FEB11A</td><td>14JUN11</td><td>60</td><td>73</td><td>-11</td><td></td><td></td><td></td><td></td><td></td><td></td></td<>			58	18	21FEB11A	14JUN11	60	73	-11						
Abit Towel Excertion & Turnel Linking -14802 Instrument of the second of t	L1141 1	Turning bay MB16	30	30	15JUN11*	14JUL11	0	0	-14						
CL10 Lung MAD2 (100m) 50 25 APR114 17.34411 0 0 11 CL110 Lung MAD2 (100m) 30 0 0.44101 0 0 11 CL110 Lung MAD2 (100m) 30 0 0.44101 0 0 11 CL120 Tunit Second Stand Lung SET			30	30	15JUL11	18AUG11	0	0	-11						
10.110 Turning Example (F) 10 0 0 11 10.111 Atti unit Silling Charles Exacetion (F) 164 3 2041/110 0 0 1 CA1221 Turning Example (F) 164 3 2041/110 0 0 0 CA123 Lining F / Pert (147m) 66 50 1540/11 0 0 7 Atti Turning Example (F) 104/10 10 0 7 104/10 0 7 Atti Turning Example (F) 11/10 10 0 2 2 264/11 100/10 0 7 Atti Turning Example (F) 10 10 2 264/11 0 0 2 2 Atti Turning Example (F) 11 0 1 0 1 <td< td=""><td>L119 L</td><td>Lining MBD2 (108m)</td><td></td><td></td><td></td><td></td><td>-</td><td>-</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></td<>	L119 L	Lining MBD2 (108m)					-	-							
CH-1200 Turning by D7 Charles Constant Encontants (F) (H = 3) 201.01.01 200.01.11 0 0 5 CL121 Lining CF Patt (K1/m) 68 68 350.011 0 0 7 CL122 Lining CF Patt (K1/m) 69 66 350.011 0 0 7 CL125 Lining CF Patt (K1/m) 60 62 200.011 0 0 28 CL136 Lining FM2 (11/m) 60 62 200.011 0 0 28 CL136 Lining FM2 (11/m) 61 6 200.011 200.011 1 1 1 1 S00203 00000 (Introte Encortent (A1/m) 0 0 0 0 0 0 0 0 S00203 00000 (Introte Encortent (A1/m) 0 </td <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>-</td> <td>-</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>							-	-							
Q1.221 Turning Days Print 30 204.04/11 20.04/11 0 0 0 Q1.232 Lingig F Pent (147m) 60 60 10.04/01 0 0 7 Q1.232 Lingig F Pent (147m) 60 60 10.04/01 0 0 7 Q1.232 Lingig T Red (147m) 60 60 10.04/01 0 0 20 Q1.232 Lingig T Red (147m) 60 60 20.04/11 20.04/11 10.01 1 -1 Q1.232 Lingig Dy TH2 0 0 0 10 10 1 -1 Q00101 Add Execution 5 V Lingig Det The Target Det Tar			464	0		26144144	07	244	06						
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Aft Tume Excession & Tume Linng - Hit 0 7 7 7 Sp0013 Aut Excession by Call Biell Chi 22 Add(HT) 11 0 27APHTIA 11MA/14 100 11 1 Sp0013 Aut Excession by Call Biell Chi 22 Add(HT) 11 0 27APHTIA 11MA/14 100 11 1 Sp0013 Aut Excession by Call Biell Chi 22 Add(HT) 10 0 131 1-1 Sp0013 Aut Excession by Automatic Ling - D61 - - - - - Sp0013 Aut Excession by Management (D1) 10 0 100 0 0 0 0 Chi 44 Ling DC Americ Facilyson Biell 30 0 20AU(S11) 108FP11 0 0 0 0 Chi 45 Excession by Management D(27) 100 10AU(Ling Biell							-	-		_					
Silling Canadia Elization shull then Elizargement (Hell) 11 0 0 13 Add Townel Excernation & Turnel Ling, DB1 Silling Canadia Elization shull theng, DB1 0 0 13 Silling Canadia Elization shull theng, DB1 0 0 0 Silling Canadia Elization shull theng, DB1 30 20 22AUL11 1985(P11 0 0 0 Add Encontrol Silling Canadia Add Encontrol Silling Canadia 30 20 22AUL11 1985(P11 0 0 0 Add Encontrol Silling Canadia Add Encontrol Silling Canadia 41 14 1	dit Tunnel Ex	cavation & Tunnel Lining - HR1													
QL123 Stabilistics with RMR 0 0 172UL11 172UL11 18UL11 0 0 13 Att Tunnel Excertion & Tunnel Linge, DO1 10 3 14UAA11A 20MV11 00 0 0 QL142 Linge DO1 Part (1p0m) 00 30 202UU11 15SEP11 0 0 0 QL1444 Turning bay QD1 30 202UU11 15SEP11 0 0 0 QL1444 Turning bay QD1 30 202UU11 15SEP11 0 0 0 QL1510001 Att Excertation CF 1010- BR4 22 22UU111 10UA111 0 0 -12 QH5110001 Att Excertation CF 1010- BR4 41 14 14UAA11A 09UU11 0 0 -12 QH5110001 Att Excertation CF Turnel Linge, BR5 37 37 27 27UU111 0 0 0 0 0 QH5110001 Att Excertation CF Turnel Linge, BR5 37 37 27 27UU111 0 0 1 0 11 0 0 0 0 <t< td=""><td></td><td></td><td></td><td>-</td><td></td><td>-</td><td></td><td>-</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></t<>				-		-		-							
S10020 Silling Chamber Enlargement (IGG) 10 3 444.44114 190 65 -26 Q1-42 Linning Bay DG1 30 00 20.442 Linning Bay DG1 0 0 Q1-444 Linning Bay DG1 30 00 20.442 Linning Bay DG1 0 0 0 Q1-5110000 Add Execution by Mech Encore time 7m- IB4 53 0 10.444114 254.0411 10.0 62 0 Q1-5110007 Salling Chamber Execution Time 7m- IB4 47 24 20MR11A 10.00 62 0 12 Q1-5110007 Salling Chamber Execution Time 7m- IB4 47 72 22MR11A 10.00 1-22 14 Q1-511007 Salling Chamber Execution Time 7m- IB4 18 18 170.00 0 0 -22 Q1-511007 Salling Chamber Execution Time 7m- IB4 47 24 20MR11A 12.00 0 -24 Q1-51107 Catter and Ca	L132 S	Stabilisation shaft HR1		-											
QL:42 Luing DOI Purt 1(104m) 90 20 220,UL11 1958P11 0 0 Adit Turnel Excavation & Turnel Lining - BM 0 0 0 0 0 Christ 10656 Adit Excavation Christo - Chillo - BR4 53 0 102AH11A 250AUG11 1455 40 0 0 Christ 10656 Adit Excavation Christo - Chillo - BR4 47 <td></td> <td></td> <td>10</td> <td>3</td> <td>14MAR11A</td> <td>26MAY11</td> <td>90</td> <td>55</td> <td>-26</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>			10	3	14MAR11A	26MAY11	90	55	-26						
Acti Lamel Exercention Name Exercention Name BR4 Oral Antila Oral An	L142 L	Lining DG1 Part 1 (104m)					-	-							
CPHS10006 Adit Excavation by Mech Exac first Tm: BR4 63 0 10.AN11A 25MAR11A 11.011 62 0 CPHS10056 Adit Excavation Chilo Chilo 74 22MAR11A 21.LUN11 45 44 12 CPHS10056 Adit Excavation Chilo Chilo 0 -12 0 -12 CPHS10057 Stilling Chamber Excavation - BR4 16 18 17AL/CHI 0 0 -12 CPHS10257 Adit and Stilling Chamber Excavation - RPA 48 14 14MAR11A 00LVN11 20 55 6 CPHS10257 Adit and Stilling Chamber Excavation CH33 - RPS 37 37 27.UNN11 09AUG11 0 0 0 CPHS10424 Adit Excavation CH407 - CH407 (160m) (408) 40 40 27MAV11 15JUL11 0 0 -11 CPHS10424 Adit Excavation CH407 - CH407 (160m) (408) 58 68 16JUL11 23LUL11 0 0 -11 CPHS10426 Adit Excavation CH407 - CH407 (160m) (409) 72 0 23FEB11A 19MAY15A 100 68 -11 </td <td></td> <td></td> <td>30</td> <td>30</td> <td>20AUG11*</td> <td>18SEP11</td> <td>0</td> <td>0</td> <td>0</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>			30	30	20AUG11*	18SEP11	0	0	0						
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Adit Turnel Eccavation & Turnel Lining. W1 48 14 14MAR11A 09JUN11 20 55 6 Adit Turnel Eccavation & Turnel Lining. RES 0 0 0 0 0 0 Adit Turnel Eccavation & Turnel Lining. RES 0					-										
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OHS130275 Adit and Silling Chamber Excavation CH330 - BRS 37 37 27 JUN11' 09AUG11 0 0 Adit Tumel Excavation A Tunnel Lining - BRS 0 1 27MUV11 15UU11 0 0			48	14	14MAR11A	09JUN11	20	55	6						
Adit Tumel Excavation & Tumel Lining - BR6 V QHS14042 Adit Excavation CH7 - CH247 (240m) - (BR6) 91 4 12FEB11A 27MAY11 80 60 -23 QHS14042 Adit Excavation CH47 - CH407 (160m) - (BR6) 58 58 16,ULL11 2SUPERTITION 0 -111 QHS14044 Adit Excavation CH47 - CH407 (160m) - (W3) 72 0 22FEB11A 19MAY11A 100 68 -141 QHS150353 Adit Excavation CH47 - CH427 (140m) - (W3) 72 0 22FEB11A 19MAY11A 100 68 -144 QHS150355 Adit Excavation CH47 - CH324 (177m) - (W3) 73 18 18 25JUL11 13JUL11 0 0 -155 QHS150357 Stall Chamber Excavation - 182 92 28 2JUN11 70 96 1 Adit Tumel Excavation - 8 Tumel Lining - TPS -26 -26 -26 -26 -26 QL055 Stabilisation shaft M3 5 5 5 JSUUL11 0 -133 Adit Tumel Excavation & Tumel Lining - TPS -26 0 28MAR11A 02APR11A 100 6		· · · · · · · · · · · · · · · · · · ·	37	37	27JUN11*	09AUG11	0	0	0						
OHS14044 Adit Excavation CH247 - CH407 (160m) - (BR6) 40 28MAY11 15JUL11 0 0 -111 OHS14044 Adit Excavation CH407 - CH496 (88m) (BR6) 58 58 16JUL11 22SEP11 0 0 -111 OHS150385 Adit Excavation CH47 - CH436 (88m) (BR6) 58 58 16JUL11 0 0 -111 OHS150385 Adit Excavation CH7 - CH424 (177m) - (W3) 72 0 2SFEB11A 19MAY11A 100 68 -144 OHS150385 Adit Excavation CH147 - CH324 (177m) - (W3) 55 51 20MAY11A 12JUL11 0 3 -15 OHS150385 Adit Excavation CH147 - CH324 (177m) - (W3) 53 51 2JUL11 13JUL11 0 3 -15 OHS150385 Sill Chamber Excavation - B2 92 28 2JJAN11A 2JUL11 70 96 1 Adit Tunnel Excavation - M3 57 3 24NOV10A 26MAY111 95 143 -26 QL055 Stabilisation shaft M3 5 5 15JUL11 2JUL11 0 -13 Adit Tunnel	dit Tunnel Ex	cavation & Tunnel Lining - BR6													
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QHS150353 Adit Excavation CH7 - CH147 (140m) - (W3) 72 0 23FEB11A 19MAY11A 100 68 -14 QHS150355 Adit Excavation CH147 - CH24 (177m) - (W3) 53 51 20MAY11A 23JUL11 0 0 -15 QHS150357 SHIC Chamber Excavation - (W3) 18 18 2SJUL11 13AUG11 0 0 -15 Adit Tunnel Excavation - (W3) 18 18 2SJUL11 13AUG11 70 96 1 Adit Tunnel Excavation - Runel Lining - M3 T 73 24NOV10A 26MAY11 95 143 -26 QL055 Stabilisation shaft M3 5 5 15JUL11 2JUL11 0 -13 QL055 Stabilisation shaft TP789 6 0 28MAR11A 02APR11A 100 6 0 QL051 Stabilisation shaft TP789 6 0 28MAR11A 02APR11A 100 6 0 -4 QL053 Lining TP789 (7m) 18 18 24JUN11 13JUL11 0 0 -18 QL049 Junclon main tunnel TP5 <td>HS14046 A</td> <td>Adit Excavation CH407 - CH495 (88m) -(BR6)</td> <td>58</td> <td>58</td> <td>16JUL11</td> <td>22SEP11</td> <td>0</td> <td>0</td> <td>-11</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>	HS14046 A	Adit Excavation CH407 - CH495 (88m) -(BR6)	58	58	16JUL11	22SEP11	0	0	-11						
QHS150357 Skill Chamber Excavation - (W3) 18 18 25JUL11 13AUG11 0 0 -15 Adit Tunnel Excavation & Tunnel Lining - B2 92 28 21JAN11A 25JUN11 70 96 1 QHS150285 Adit and Stilling Chamber Excavation - M3 57 3 24NOV10A 26MAY11 95 143 -26 QHS200515 Adit and Stilling Chamber Excavation - M3 57 5 15JUL1 2JUL11 0 -13 Adit Tunnel Excavation & Tunnel Lining - TP789 6 0 28MAR11A 02APR11A 100 6 0 QL053 Lining TP789 (7m) 18 18 24JUN11 15JUL1 0 0 -18 QL044 Lining TP789 (7m) 18 24JUN11 15JUL1 0 0 -18 QL045 Junction main tunnel TP5 36 36 01AUG11 03SEP11 0 0 -18 QL044 Lining TP4 (32m) 26 26 24MAY11 23JUN11 0 0 -18 QL045 Tunnel Lining - V5 33 17		· · · · · · · · · · · · · · · · · · ·	72	0	23FEB11A	19MAY11A	100	68	-14						
Adit Tunnel Excavation & Tunnel Lining - B2 92 28 2JAN11A 2SJUN11 70 96 1 Adit Tunnel Excavation & Tunnel Lining - M3							-	-							
Adit Tunnel Excavation & Tunnel Lining - M3 57 3 24NOV10A 26MAY11 95 143 -26 QHS200515 Adit and Stilling Chamber Excavation - M3 5 5 5 15JUL11 20JUL11 0 0 -13 Adit Tunnel Excavation & Tunnel Lining - TP789 6 0 28MAR11A 02APR11A 100 6 0 QL053 Lining TP789 (7m) 18 18 24JUN11 15JUL11 0 4 Adit Tunnel Excavation & Tunnel Lining - TP789 6 0 28MAR11A 02APR11A 100 6 0 QL053 Lining TP789 (7m) 18 18 24JUN11 15JUL11 0 0 4 Adit Tunnel Excavation & Tunnel Lining - TP5			10	18	25JULTT	IJAUGTI	0	0	-15						
QHS200515 Adit and Stilling Chamber Excavation - M3 57 3 24NOV10A 26MAY11 95 143 -26 QL055 Stabilisation shaft M3 5 5 15JUL11 20JUL11 0 0 -13 Adit Tunnel Excavation & Tunnel Lining - TP789 6 0 28MAR11A 02APR11A 100 6 0 QL051 Stabilisation shaft TP789 6 0 28MAR11A 102APR11A 100 6 0 QL053 Lining TP789 (7m) 18 18 24JUN11 15JUL11 0 0 4 Adit Tunnel Excavation & Tunnel Lining - TP5 0 28MAR11A 02APR11 0 -18 QL048 Lining TP5 (103m) 45 45 08JUN11 0JUL11 0 0 -18 QL044 Lining TP4 (32m) 36 36 01AUG11 03SEP11 0 0 -76 Adit Tunnel Excavation & Tunnel Lining - TP4 2 2 2 2 2 2 4MAY11 2JUN11 0 0 -77 S240354 Adit Excavation by Drill & Blast	HS160285 A	Adit and Stilling Chamber Excavation - B2	92	28	21JAN11A	25JUN11	70	96	1						
Adit Tunnel Excavation & Tunnel Lining - TP789 6 0 28MAR11A 02APR11A 100 6 0 QL051 Stabilisation shaft TP789 6 0 28MAR11A 02APR11A 100 6 0 QL053 Lining TP789 (7m) 18 18 24JUN11 15JUL11 0 0 4 Adit Tunnel Excavation & Tunnel Lining - TP5 U U 0 -18 0 QL048 Lining TP5 (103m) 45 45 08JUN11 10SEP11 0 0 -18 QL049 Junction main tunnel TP5 36 36 01AUG11 10SEP11 0 0 -18 QL044 Lining TP4 (32m) 26 26 24MAY11 23JUN11 0 0 -7 Adit Tunnel Excavation & Tunnel Lining - TP4 U U QL044 Lining TP4 (32m) 26 26 24 MAY11 23JUN11 0 0 -7 S240354 Adit Excavation by Drill & Blast Ch210 - 390(W5) 53 0 13JAN11A 03MAY11A 100 87 0 S240356A Adit Excavatio	HS200515 A	Adit and Stilling Chamber Excavation - M3		-										 	
QL051 Stabilisation shaft TP789 6 0 28MAR11A 02APR11A 100 6 0 QL053 Lining TP789 (7m) 18 18 24JUN11 15JUL11 0 0 4 Adit Tunnel Excavation & Tunnel Lining - TP5 0 -18 -18 QL048 Lining TP5 (103m) 45 45 08JUN11 30JUL11 0 0 -18 QL049 Junction main tunnel TP5 36 36 01AUG11 10SEP11 0 0 -18 QL044 Lining TP4 (32m) 26 26 24MAY11 23JUN11 0 0 -7 Adit Tunnel Excavation & Tunnel Lining - TP4 0 -7 QL044 Lining TP4 (32m) 26 26 24MAY11 23JUN11 0 0 -7 Adit Tunnel Excavation & Tunnel Lining - WS <td></td> <td></td> <td>5</td> <td>5</td> <td>15JUL11</td> <td>20JUL11</td> <td>0</td> <td>0</td> <td>-13</td> <td>1</td> <td></td> <td></td> <td></td> <td></td> <td></td>			5	5	15JUL11	20JUL11	0	0	-13	1					
Adit Tunnel Excavation & Tunnel Lining - TP5 QL048 Lining TP5 (103m) 45 45 08JUN11 30JUL11 0 -18 QL049 Junction main tunnel TP5 36 36 01AUG11 10SEP11 0 -18 QL050 Turning bayTP5 30 30 01AUG11 03SEP11 0 0 -18 Adit Tunnel Excavation & Tunnel Lining - TP4 Uning TP4 (32m) 26 26 24 MAY11 23JUN11 0 0 -7 Adit Tunnel Excavation & Tunnel Lining - W5 S240354 Adit Excavation by Drill & Blast Ch210 - 390(W5) 53 0 13JAN11A 03MAY11A 100 87 0 S240356 Adit Excavation by Drill & Blast Ch390 - 463(W5) 33 17 04MAY11A 13JUN11 65 16 0 S240356 Adit Excavation & Tunnel Lining - CR1 U 14 JUN11 06 JUL11 0 0 0 Adit Tunnel Excavation & Tunnel Lining - CR1 53 4 28FEB11A 27MAY11 90 67 4 QHS250527 Adit Excavation CH149 - CH268 (119m) - CR1 36 36 28MAY11 </td <td>L051 S</td> <td>Stabilisation shaft TP789</td> <td></td> <td>-</td> <td>-</td> <td></td> <td></td> <td>-</td> <td></td> <td></td> <td></td> <td></td> <td>-</td> <td></td> <td></td>	L051 S	Stabilisation shaft TP789		-	-			-					-		
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QL050 Turning bayTP5 30 30 01AUG11 03SEP11 0 0 -18 Adit Tunnel Excavation & Tunnel Lining - TP4 Lining TP4 (32m) 26 26 24MAY11 23JUN11 0 0 -7 Adit Tunnel Excavation & Tunnel Lining - W5 Image: Constraint of the second and	L048 L	Lining TP5 (103m)					-	-				_			
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QHS250529 Adit Excavation CH149 - CH268 (119m) - CR1 36 36 28MAY11 11JUL11 0 0 4			53	4	28FFB114	27MAY11	90	67	4						
QHS250531 Still Chamber Excavation - CR1 18 18 12JUL11 01AUG11 0 0 4	HS250529 A	Adit Excavation CH149 - CH268 (119m) - CR1	36	36	28MAY11	11JUL11	0	0	4						
	HS250531 S	Still Chamber Excavation - CR1	18	18	12JUL11	01AUG11	0	0	4						
M APR MAY JUN										м	APR	MAY	JUN	JUL	AUG
2011															
art Date 30NOV07 Early Bar 105A Sheet 2 of 10 WORKS PROGRAMME APPROVAL HIS	ite	30NOV07		105A					Sheet 2 of 10		WC	RKS PROCE			
nish Date 03AUG12 Last Month Progress 104A Design & Construction of HK. West Drainage Tunnel Date Revision (Date	03AUG12 24MAY11 Last Month Pro	gress 104A						Tunnel			Revis	sion	Checked	Approved
un Date 27MAY11 11:15 Progress Bar Contract No. DC/2007/10 13JAN09 Approved Works Programme # 1 Critical Activity 3 MONTH ROLLING PROGRAMME 27MAR09 Approved Works Programme # 2		2//////////////////////////////////////			3 MONT	H ROLLING	G PROG	GRAMME	C I	27MAR09	Approv	ed Works Pro	gramme # 2	SOR SOR	804B 9032
MAY /2011 MONTHLY REPORT 10DEC10 Approved Works Programme # 3 01MAR10 Approved Works Programme # 4					MAY /	2011 MONT	HLY R	EPORT						SOR SOR	9116 003A
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Act ID	Activity Description	Orig Dur	Rem Dur	Anticipated Start	Anticipated Finish	% Comp I		Draft Works Prog WP6B EF Varianco		VPR	MA	Y	2011 JUN	JUL	AUG
Adit Tunnel E	xcavation & Tunnel Lining - RR1							Variance	M	APR	MA	Ŷ	JUN	JUL	AUG
	Adit Excavation by Drill & Blast Ch115- 331(RR1)	78	2	30SEP10A	25MAY11	97	188	-26				,_			
L	Still Chamber Excavation & Enlargement	18	18	26MAY11	16JUN11	0	0	-26							
	Adit Excavation CH92 - CH271 (179m) (W8)	77	44	14MAR11A	15JUL11	45	55	0				-			
	Stilling Chamber Excavation (W8) Excavate lowest 5m of dropshaft by Adit Team(W8)	18 5	18 5	16JUL11 06AUG11*	05AUG11 11AUG11	0	0	0							
	xcavation & Tunnel Lining - P5						I		1						
	Adit Excavation by Drill & Blast Ch400 - 600(P5) Adit Excavation by Drill & Blast Ch600 - 800(P5)	72	0 33	31DEC10A 13APR11A	12APR11A 02JUL11	100	83 30	0							
	Stilling Chamber Enlargement-(P5)	18	18	04JUL11	23JUL11	0	0	9							
QL022	Turning bay P5	30	30	25JUL11	27AUG11	0	0	9				_			
	Adit Excavation & Tunnel Lining - HKU1	115	0	20NOV10A	09APR11A	100	114	0							
L	Lining HKU1 (258m)	54	54	05JUL11	05SEP11	0	0	0							
	Acavation & Tunnel Lining - PFLR1	26	0	16MAR11A	07MAY11A	100	41	4							
1	xcavation & Tunnel Lining - SM1		-					-							
	Stilling Chamber Enlargement (SM1) Stilling chamber Lining - SM 1	20 38	17 38	09MAR11A 15JUN11	13JUN11 29JUL11	60 0	59 0	-25 12							
	Insitu Lining - 7.16m ID2.3 (SM1)	6	6	28JUL11	03AUG11	0	0	12							
QL0011	Lining SM1-Still Chamber to PFLR1 Junction(165m)	42	42	04AUG11	22SEP11	0	0	12							
Milestone Section 1 (Adi	its)														
M41030	4.003-75% Completion of Excav'n (Adit E5A)	0	0		29MAR11A	100	0	0	♦MC 122						
M41040 M41720	4.004-100% Completion of Excav'n (Adit E5A) 4.072-50% Completion of Excavation(Adit B2)	0	0		29MAR11A 29MAR11A	100 100	0	0	♦MC 122 ♦MC 122						
-	4.072-50% Completion of Excavation(Adit B2) 4.115-50% Completion of Excavation(Adit W8)	0	0		29MAR11A 29MAR11A	100	0	0	◆MC 122						
M41320	4.032-100% Completion of Excavation (Adit DG1)	0	0		06MAY11A	100	0	-16		MC 1					
M41500 M41590	4.050-50% Completion of Excavation(Adit W1) 4.059-50% Completion of Excavation (Adit BR6)	0	0		06MAY11A 06MAY11A	100 100	0	12 23		MC 1 MC 1					
	4.123-80% Completion of Excavation (Adit BR6) 4.123-80% Completion of Excavation(Adit P5)	0	0		06MAY11A	100	0	70		MC 1					
M42390	4.139-100% Completion of Excavation(Adit PFLR1)	0	0		06MAY11A	100	0	7		MC 1	23�				
M41110 M41580	4.011-100% Lining & Stilling Chamber(Adit MB16) 4.058-25% Completion of Excavation (Adit BR6)	0	0		23MAY11 23MAY11	0	0	-36 -36				ļ			
M41670	4.067-50% Completion of Excavaton(Adit W3)	0	0		23MAY11	0	0	-33				♦			
	4.122-60% Completion of Excavation(Adit P5)	0	0		23MAY11	0	0	-24				1			
M42350 M42100	4.135-100% Completion of Excavation(Adit HKU1) 4.110-50% Completion of Excavation(Adit RR1)	0	0		23MAY11 25MAY11	0	0	-36 -36				•			
	4.105-50% Completion of Excavation(Adit CR1)	0	0		29MAY11	0	0	4				•			
	4.051-100% Completion of Excavation(Adit W1) 4.043-35% Completion of Excavation(Adit BR4)	0	0		09JUN11 12JUN11	0	0	-16					•		
	4.099-70% Completion of Excavation(Adit W5)	0	0		13JUN11	0	0	0					<u>♦</u>		
	4.096-100% Lining&Stilling Chamber (Adit TP4)	0	0		23JUN11	0	0	-8					•		
	4.073-100% Completion of Excavation(Adit B2) 4.015-50% Completion of Lining (Adit MBD2)	0	0		25JUN11 06JUL11	0	0	-11					•	•	
	4.100-100% Completion of Excavation(Adit W5)	0	0		06JUL11	0	0	0						♦	
	4.090-100% Lining&Stilling Chamber(Adit TP789) 4.005-25% Completion of Lining (Adit E5A)	0	0		15JUL11 16JUL11	0	0	5 22						♦	
	4.124-100% Completion of Excavation(Adit P5)	0	0		23JUL11	0	0	11						•	
	4.044-70% Completion of Excavation(Adit BR4)	0	0		28JUL11	0	0	-14						♦	
	4.093-100% Lining&Stilling Chamber (Adit TP5)4.106-100% Completion of Excavation(Adit CR1)	0	0		30JUL11 01AUG11	0	0	-21 4							, ♦
	4.136-50% Completion of Lining(Adit HKU1)	0	0		04AUG11	0	0	0							♦
	4.116-100% Completion of Excavation(Adit W8)	0	0		05AUG11 07AUG11	0	0	0							•
	4.038-100% Completion of Excavation(Adit W0) 4.055-100% Completion of Excavation(Adit BR5)	0	0		07A0G11 09AUG11	0	0	0							•
	4.020-50% Completion of Lining (Adit E7)	0	0		11AUG11	0	0	7							♦
	4.068-100% Completion of Excavation(Adit W3) 4.125-20% Completion of Lining (Adit P5)	0	0		13AUG11 14AUG11	0	0	-17 0							•
M41120	4.012-Junction Between M.Tunnel &Adit(Adit MB16)	0	0		18AUG11	0	0	-13							
L	4.060-75% Completion of Excavation (Adit BR6)	0	0		19AUG11	0	0	-12							
Section 3 (Po M91020	rtion E5B) 9.02-Lining & Stilling Chamber (Adit)	0	0		12AUG11	0	0	-21							•
Adit Tunnel E	xcavation & Tunnel Lining - HR1														
	15.02-100% Excavation (Adit)	0	0		23MAY11	0	0	-14				-			
C5-PART O	OF SECTION 1 OF THE WORKS (EAST PORTAL														
East Portal As	ssembly Chamber Lining Works					·									
E-1872	Assembly of Arch Formwork(CH133 to CH163)	19 70	19 70	24MAY11 16JUN11	15JUN11 06SEP11	0	0	0							
-	Ining ((;H133-163)	10	10		500EF11		U	0							
E-1874	Lining (CH133-163) take Chamber/Tunnel Finishing Work			16AUG11	03OCT11	0	0	0							
E-1874 East Portal In E-1950	take Chamber/Tunnel Finishing Work Intake Chamber (CH27.5 to CH43)	40	40	TOAUGTT		· · · · ·						—			
E-1874 East Portal In E-1950 East Portal Ma	take Chamber/Tunnel Finishing Work Intake Chamber (CH27.5 to CH43) aintenance Chamber Finishing Works					0	14	0							
E-1874 East Portal In E-1950 East Portal Ma E-1888	take Chamber/Tunnel Finishing Work Intake Chamber (CH27.5 to CH43)	40 33 57	40 19 57	06MAY11A 09JUN11	15JUN11 15AUG11	0	14 0	0							
E-1874 East Portal In E-1950 East Portal Ma E-1888 E-1900 E-1902	take Chamber/Tunnel Finishing Work Intake Chamber (CH27.5 to CH43) Inintenance Chamber Finishing Works Dismantle Portal Enclosure & Hoist crane & vent Cast Side wall & arch Cast Center/end/retaining walls	33	19	06MAY11A	15JUN11										
E-1874 East Portal In E-1950 East Portal M E-1888 E-1900 E-1902	take Chamber/Tunnel Finishing Work Intake Chamber (CH27.5 to CH43) Inintenance Chamber Finishing Works Dismantle Portal Enclosure & Hoist crane & vent Cast Side wall & arch	33 57	19 57	06MAY11A 09JUN11	15JUN11 15AUG11	0	0	0							
E-1874 East Portal In E-1950 East Portal Ma E-1888 E-1900 E-1902 East Portal Ri E-2020	take Chamber/Tunnel Finishing Work Intake Chamber (CH27.5 to CH43) Intake Chamber Finishing Works Dismantle Portal Enclosure & Hoist crane & vent Cast Side wall & arch Cast Center/end/retaining walls iver Channel Finishing Works	33 57 18	19 57 18	06MAY11A 09JUN11 16AUG11	15JUN11 15AUG11 05SEP11	0	0	0							
E-1874 East Portal In E-1950 East Portal Ma E-1888 E-1900 E-1902 East Portal Ri E-2020	take Chamber/Tunnel Finishing Work Intake Chamber (CH27.5 to CH43) Intake Chamber Finishing Works Dismantle Portal Enclosure & Hoist crane & vent Cast Side wall & arch Cast Center/end/retaining walls iver Channel Finishing Works Excavation	33 57 18 18	19 57 18 0	06MAY11A 09JUN11 16AUG11 22FEB11A	15JUN11 15AUG11 05SEP11 27APR11A	000000000000000000000000000000000000000	0 0 52	0 0 0 0		APR	MA1	Y	JUN 2011	JUL	AUG
E-1874 East Portal In E-1950 East Portal Ma E-1888 E-1900 E-1902 East Portal Ri E-2020 E-2030	take Chamber/Tunnel Finishing Work Intake Chamber (CH27.5 to CH43) aintenance Chamber Finishing Works Dismantle Portal Enclosure & Hoist crane & vent Cast Side wall & arch Cast Center/end/retaining walls iver Channel Finishing Works Excavation Construct River Channel Structure Bioxed Structure Cast Side Wall & arch Cast Side Wall & arch Excavation Construct River Channel Structure Bioxed Structure Cast Side Wall & arch Cast Side Wall & arch Cast Side Wall & arch Cast Center/end/retaining walls Excavation Construct River Channel Structure Cast Side Wall & arch Cast Side Wall & arch Cast Side Wall & arch Cast Center/end/retaining walls Excavation Construct River Channel Structure Cast Side Wall & arch Cast Center/end/retaining walls Excavation Construct River Channel Structure Cast Side Wall & arch Cast S	33 57 18 18	19 57 18 0 21	06MAY11A 09JUN11 16AUG11 22FEB11A 23MAR11A	15JUN11 15AUG11 05SEP11 27APR11A 17JUN11	0 0 100 80	0 0 52 47	0 0 -32 Sheet 3 of 10			RKS PRO	GRAM	2011 ME APPROVA		AUG
E-1874 East Portal In E-1950 East Portal Ma E-1888 E-1900 E-1902 East Portal Ri E-2020 E-2030 t Date sh Date a Date	aintenance Chamber (CH27.5 to CH43) laintenance Chamber Finishing Works Dismantle Portal Enclosure & Hoist crane & vent Cast Side wall & arch Cast Center/end/retaining walls iver Channel Finishing Works Excavation Construct River Channel Structure 30NOV07 03AUG12 24MAY11	33 57 18 18 30	19 57 18 0 21	06MAY11A 09JUN11 16AUG11 22FEB11A 23MAR11A	15JUN11 15AUG11 05SEP11 27APR11A 17JUN11	0 0 100 80 K. West I	0 0 52 47 Drainage	0 0 -32 Sheet 3 of 10 Tunnel	Date	WOF		GRAMM	2011 ME APPROVA	L HISTORY	Approve
E-1874 East Portal In E-1950 East Portal Ma E-1888 E-1900 E-1902 East Portal Ri E-2020 E-2030 t Date	Solution of the second system take Chamber/Tunnel Finishing Work Intake Chamber (CH27.5 to CH43) aintenance Chamber Finishing Works Dismantle Portal Enclosure & Hoist crane & vent Cast Side wall & arch Cast Center/end/retaining walls iver Channel Finishing Works Excavation Construct River Channel Structure S0NOV07 03AUG12	33 57 18 18 30	19 57 18 0 21	06MAY11A 09JUN11 16AUG11 22FEB11A 23MAR11A sign & Const 3 MONT	15JUN11 15AUG11 05SEP11 27APR11A 17JUN11 ruction of HI patract No. E	0 0 100 80 K. West I DC/2007/ G PROG	0 0 52 47 Drainage 10 RAMMH	0 0 -32 Sheet 3 of 10 Tunnel 1 2	Date 3JAN09 A 7MAR09 A	WOF Approve	RKS PRO Re d Works I d Works I	GRAMM evision Prograi Prograi	2011 ME APPROVAI mme # 1 mme # 2	L HISTORY Checked / SOR SOR	Approved 804B 9032
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	Act ID	Activity Description	Orig Dur	Rem Dur	Anticipated Start	Anticipated Finish	%	Actual	Draft Works								
		Description	Dur	Dur	Start	Finish	Comp	Duration	EF								
	East Portal R	River Channel Finishing Works							Variance	M	APR	MAY		JUN	JUL	AUG	
Line Biological Line (Line (Lin		•	0	0		17JUN11	0	0	-32					•	 		
11 100 bitsty of by of			48	48	31MAY11	27JUL11	0	0	-32								
Company Company <t< td=""><td></td><td></td><td></td><td></td><td></td><td></td><td>-</td><td>-</td><td>-</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></t<>							-	-	-								
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IMI: 1020 16/22-Decoration (Dropshoft) 0 0 28/AV11 0 0 21 Construction			0.	0.				Ţ									
C229-SECTION 23 OF THE WORKS (PORTION TP4) Construction Construction Mit Timmel Extensition & Turmel Lining - TP4 C229-SECTION 23 OF THE WORKS (PORTION TP4) Construction & Turmel Lining - TP4 Construction & Construction Bruth's - Stage 2(TP4) Construction & Const	· · · · ·		0	0		00144		0	01								
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QLQ-3 [Silling chamber Lining - TP4 36 0 14MAR11A 20MAV11A 100 63 -5 Dep3shaft - Excention/S Multicing (Stoge 2) Dep3shaft - Excention/S Multicing (Stoge 2) -																	
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QH:S230141 BS/VortexPenstock/Drain Dw/TS - Stage 2(TP4) 96 86 15,UL11 26AUG11 0 0 -7 QH:S230100 Local Intake Test & Commissioning - (TP4) 12 12 12AUG11 25AUG11 0 0 -7 Section 23 (Portion TP4) Mo21030 20.30-Lining (Dropshaft) 0 0 14JUL11 0 0 -8 CC12-SECTION 6 OF THE WORKS (PORTION E7) Construction			0	0	24144144		-	0	26								
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tart Date 30NOV07 inish Date 03AUG12 ata Date 24MAY11 un Date 27MAY11 11:15 Critical Activity										M	APR	MAY			JUL	AUG	
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27MAY11 11:15 Progress Bar Critical Activity Progress Bar Critical Activity Critical Activity Criti	Start Date Finish Date	03AUG12	ress 104A		sign & Const	ruction of H	K. West	Drainao		Date	WO			APPROVA		Approved	
MAY /2011 MONTHLY REPORT 10DEC10 Approved Works Programme # 3 SOR 9116 01MAR10 Approved Works Programme # 4 SOR 003A 25MAR11 Approved Works Programme # 5 SOR 301E	Data Date Run Date	24MAY11 27MAY11 11:15 Progress Bar			C	ontract No. E	DC/2007	//10		3JAN09		d Works P	rogramr		SOR	804B	
01MAR10 Approved Works Programme # 4 SOR 003A		Critical Activity							÷.								
© Primavera Systems, Inc. 25MAR11 Approved Works Programme # 5 SOR 301F										1MAR1) Approve	d Works P	rogramr	ne # 4	SOR	003A	
	© Primave	era Systems, Inc.								5MAR1	Approve	d Works P	rogramr	ne # 5	SOR	301F	

Act ID	Activity Description	Orig Dur	Rem Dur	Anticipated Start	Anticipated Finish	% Comp	Actual Duration	Draft Works Prog							
								WP6B EF Variance	м	APR	MAY	,	2011 JUN	JUL	AUG
Pipe Laying QHS060250		74	10	13JAN11A	03JUN11	80	103	-12					I		
QHS060272 QHS060277		78 68	78 68	24MAY11* 04JUN11	24AUG11 24AUG11	0	0	-11 -12							
	VO15-Drain frm SMH16 to Existing MH Upstream(E7)	51	51	04JUN11	04AUG11	0	-	-12							
Milestone Section 6 (Pe	ortion E7)														
M121040	12.04-Excavation (Intake)	0	0		27JUN11	0	-	3						•	
M121010 M121020	12.01-Pre-drilling & Grouting Works(Dropshaft) 12.02-Excavation (Dropshaft)	0	0		23AUG11 23AUG11	0	-	3	- 1					 	
	ION 4 OF THE WORKS (PORTION MB16)														
Construction Intakes - Inte	ernal Structures (Stage 2)														
QHS040244 QHS040100	0 ()	36 12	7 12	19MAR11A 24MAY11	31MAY11 07JUN11	70	50 0	-15 -20							
QHS040242	Penstock Delivery - (MB16)	0	0	24MAY11*		0	0	-20				•			
QHS040245 QHS040246		21 18	21 18	01JUN11 27JUN11	25JUN11 18JUL11	0	0	-15 -15				1	÷		
QHS040247		18	18	19JUL11	08AUG11	0	0	-15							
Pipe Laying QHS040249		32	15	23MAR11A	10JUN11	40	47	-26							
QHS040250	Excav/pipelay/Manhole Constr SMH5 to SMH3 (MB16)	46	46	11JUN11	04AUG11	0	0	-26				+			
QHS040251 Milestone	Permanent reinstatement along Mt Butler Rd(MB16)	3	3	05AUG11	08AUG11	0	0	-26				+			-
General	10.00 Section 4 MP16 Lipsday or to 20	0	0		08AUG11	0	0	40							
M101090 Section 4 (Po	10.09-Section4 MB16 Handover to SO ortion MB16)	0	0			0	U	-18				+		 	•
M101030 M101050	10.03-Lining (Dropshaft) 10.05-Concrete Structure (Intake)	0	0		23MAY11 23MAY11	0	0	-36 -36				1			
M101070	10.07-100% of PipeLength of Drain.Works&Reins't	0	0		08AUG11	0	0	-31							٠
M101080	10.08-Slopeworks, Backfilling & Reinstatment ION 5 OF THE WORKS (PORTION MBD2)	0	0		08AUG11	0	0	-31				_			•
Construction															
Adit Tunnel I	Excavation & Tunnel Lining - MBD2 Stilling chamber Lining - MBD2	30	0	07MAR11A	01APR11A	100	26	0						 	
Dropshaft - E	Excavation/ Shaft Lining				1										
QS050310	Positioning, Fix & Grout - 87.86m ID2.3 (MBD2) ernal Structures (Stage 2)	44	0	06APR11A	14MAY11A	100	29	9				-			
QH050102	Intake Permanent Structure(3 pours) Stage 1-MBD2	62	0	16FEB11A	04APR11A	100	41	0			_		_		
QH050101 QH0501029	Intake Permanent Structure(3 pours)Stage 1b-MBD2 Penstock Delivery - MBD2	36 0	29 0	16MAY11A 15JUL11*	27JUN11	10 0	7 0	9 0	- 1					•	
QH0501031 Pipe Laying		33	33	15AUG11	22SEP11	0	0	9				-			
QH050103 QH050104 Milestone	Remaining Drainage works SMH10-SMH11 - Part 1 Remain Drain works MBD2-SMH24/SMH11-MBD2 -Part 2	40 40	40 40	28JUN11 06AUG11	13AUG11 22SEP11	0	0 0	9 9							
	ortion MBD2) 11.03-Lining (Dropshaft)	0	0		23MAY11	0	0	2							
CC28-SECT	ION 22 OF THE WORKS (PORTION TP5)	U	Ū		23007111	0	Ū	2							
	ternal Structures (Stage1)		•												
	Intake Structure (4 pours) Stage 1(TP5) Excavation & Tunnel Lining - TP5	60	0	08MAR11A	23MAY11A	100	60	-6							
QL047	Stilling chamber Lining - TP5	36	12	28FEB11A	07JUN11	75	67	-18							
	Excavation/ Shaft Lining Positioning,Fix & Grout- 128.06m ID1.5 (TP5)	36	36	08JUN11	20JUL11	0	0	-18			_	_			
	ernal Structures (Stage 2)	00	- 00	04 11 11 44	24411044		0	40							
	BS/Vortex/Penstock/Drain Dvn/TS - Stage 2(TP5) Penstock Delivery - (TP5)	36 0	36 0	21JUL11 08AUG11*	31AUG11	0	0	-18 0							۵
QHS220100	Local Intake Test & Commissioning - (TP5)	12	12	18AUG11	31AUG11	0	0	-18				_			
Milestone Section 22 (F			T												
M28-1030	28.03-Lining (Dropshaft) TON 8 OF THE WORKS (PORTION GL1)	0	0		20JUL11	0	0	-22				+		•	
CC14-SECT Construction														 	
Intakes - Ext QH080601	ternal Structures (Stage1) Intake Permanent Structure(3 pours) Stage 1a GL1	54	0	15MAR11A	22MAY11A	100	53	8							
Adit Tunnel I	Excavation & Tunnel Lining - GL1														
QL133 Dropshaft - E	Stilling chamber Lining - GL1 Excavation/ Shaft Lining	36	36	24MAY11	28JUN11	0	0	-14						· · ·	
QS080310	Positioning, Fix & Grout - 43.49m ID1.5 (GL1)	26	26	29JUN11	29JUL11	0	0	-12							
	ernal Structures (Stage 2) Intake Permanent Remaining(4 pours)Stage 1b(GL1)	38	38	30JUL11	12SEP11	0	0	-12							
	Penstock Delivery - (GL1)	0	0	22AUG11*		0	0	0				_		 	
Milestone Section 8 (Pe															
M141030	14.03-Lining (Dropshaft)	0	0		29JUL11	0	0	-14							•
									м	APR	MAY	,	JUN	JUL	AUG
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tart Date	30NOV07		105A					Sheet 5 of 10		16/		BANNA		HISTOPY	
inish Date ata Date	03AUG12 24MAY11 Last Month Progre	ess 104A		sign & Const				e Tunnel	Date		Re	vision		Checked	Approve
un Date	27MAY11 11:15 Critical Activity			3 MONT	TH ROLLING	G PROC	GRAMM		3JAN09 7MAR0		ved Works F ved Works F			SOR SOR	804B 9032
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ata Date	24MAY11 Last Month Progre 27MAY11 11:15 Progress Bar	ess 104A		Co 3 MONT	ontract No. D TH ROLLING	DC/2007 G PROC	/10 GRAMM	e Tunnel	Date 3JAN09	W Approv	ORKS PROO Re ved Works F	GRAMM evision Program	2011 E APPROVA	L HISTORY Checked SOR	

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CLOBA Silling durandru Linnig - KA15 36 38 2AUN11 104U011 0 0 CPS10950 Rts Setup/Reaming/Democilization(MA15) (151m) 68 0 006MA154 21MAV11A 1000 71 0 CPS10952 Red Mabization & PML beld editing - (MA15) 23 0 006MA154 221MAV11A 1000 41 22 CPS10952 Red Mabization & PML beld editing - (MA15) 33 0 23MAR11A 21MAV11A 1000 41 22 CPS10952 Red Mabization & PML beld editing - (MA15) 3 0 24MAV11 0 0 0 CPS10952 Stabilisation shift MA15 6 5 24MAV11 0 0 1 CPS10942 Stabilisation shift MA15 6 5 24MAV11 0 0 1 Mettoring & Groutin Works (Dropath) 0 0 23MAV11 0 0 1 Mattoring & Carbon Stabilization (MA15) 0 0 23MAV11 0 0 3 Ma	
IQS180600 RIS Staup/Fearming/Demobilization(MA15) (151m) 68 2 IQS180651 RIS Mubilization & Pilot Hold ediling (140K45) 281 0 GMMAR14A 21MAV11A 100 11 IQS180651 Risk Mabilization & Pilot Hold ediling (140K45) 38 0 2 20MAR14A 22MAV11A 100 11 IMMAS Hintmas Structures (Stop 2) 0 0 0 1 (QL636) Statulisation shaft MA15 6 6 22MAV11 0 0 1 (QL636) Statulisation shaft MA15 6 6 22MAV11 0 0 1 (QL636) Statulisation shaft MA15 6 6 22MAV11 0 0 1 (QL636) Statulisation shaft MA15 0 0 22MAV11 0 0 1 (QL64) Statulisation shaft MA15 0 0 22MAV11 0 0 3 (QL64) Statulisation shaft MA15 0 0 1 23MAV11 0 1 3 3 23MAV11 0 3 3 23MAV11 0	
025109051 RBM Mobilization & Fluid Hold milling - (MA15) 23 0 09MAR11A 2MAR11A 100 17 0 025109052 Raw Hrawing & Accout - 151.13m (D1.5 (MA15) 37 37 11ALIG11 23SEP11 0 0 0 0 0 02103052 Stabilisation shaft At15 5 5 24MAY11 20 0 0 0 0 0210305 Stabilisation shaft At15 5 5 24MAY11 0 0 1 0	
0P380300 Positioning Pix & Groud - 151.13m 1D1.5 (MA15) 37 37 11AUG11 238EP11 0 0 11ables - Internal Structures (Stage 2)	
QL083 Stabilisation shaft MA15 5 6 24MAY11 0 0 1 QHS180555 Penstock Delivey (MA15) 0 0 22AUG11* 0 0 0 Section 18 (Portion MA15) Marking 0 0 23MAY11 0 0 1 M24100 24.01 Pre-drilling & Grouing Works (Dropshaft) 0 0 23MAY11 0 0 1 M24102 24.04 Execution (Initale) 0 0 23MAY11 0 0 3 CC3S-SECTION 30 OF THE WORKS (PORTION HKU1) 0 0 23MAY11 0 0 3 Cu14 Stilling Asmather Lining - HKU1 36 3 24MAY11A 0 0 1 QS00505 RB Steup Reaming/Demobilization(HKU1) (52m) 25 0 2 0 0 QS00505 RB Molkatation 8 Pliot Hole atiling - (HKU1) 21 0 24MAR11A 100 14 0 0 QS00505 RBM Molkatation 8 Pliot Hole atiling - (HKU1) 12 0 24MAR11A 100 14 0 0 0	
Milestone Section 18 (Portion MA15) M241010 24.0.1-Pre-dilling & Grouting Works (Dropshaft) 0 0 23MAY11 0 0 36 M241020 24.0-Exeavation (Intake) 0 0 23MAY11 0 0 36 CC38-SECTION 30 OF THE WORKS (PORTION HKU1) Construction	
M241010 24.01-Pre-drilling & Grouing Works (Dropshaft) 0 0 23MAY11 0 0 1 M241020 24.02-Excavation (Dropshaft) 0 0 23MAY11 0 0 1 M241020 24.04-Excavation (Intake) 0 0 23MAY11 0 0 1 CC35c-SECTION 30 OF THE WORKS (PORTION HKU1) 5 2 0 0 23MAY11 0 0 36 CA11 Tunnel Excavation & Tunnel Lining - HKU1 36 34 21MAY11A 04JUL11 5 2 0 Cussous20 RS Setup, Reaming/Demobilization(HKU1) (52m) 35 0 24MAR11A 12MAY11A 100 37 0 Cussous20 RS Setup, Reaming/Demobilization(HKU1) 12 0 24MAR11A 12MAY11A 100 14 0 Cussous20 RBA Kenning & Demobilization(HKU1) 28 28 05JUL11 0 0 0 0 Cussous20 Resk Rearing & Grout- 52.03m 102.3(HKU1) 26 28 05JUL11 0 0 0 0 0 0 0 0	
M241040 24.04-Excavation (Intake) 0 0 23MAY11 0 0 -36 CC365-SECTION 30 OF THE WORKS (PORTION HKU1) U <td></td>	
Construction Adit Tunnel Excavation & Tunnel Lining - HKU1 QL014 Silling chember Lining - HKU1 36 34 21MAY11A 04JUL11 5 2 0 Dropshaft - Excavation & Shaft Lining QS300520 RB Setup / Reaming Demobilization(HKU1) 35 0 24MAR11A 100 37 0 QS300555 Back Reaming & Demobilization, HKU1) 20 24MAR11A 100 14 0 QPS300300 Positioning, Fix & Grout-52.03m ID2.01(HKU1) 103 AUG11 100 23 0 QPS300300 Positioning, Fix & Grout-52.03m ID2.01(HKU1) 26 26 0.5UL11 0.0 0 Intakes - Internal Structures (Stage 2) 0 0 0 OH33000801 BisVorteX-Penstock/Drain Dvn/TS - Stage 2(HKU1) 0 0 15JUL11* 0 0 0 0 OH33000801 BisVorteX-Penstock/Drain Dvn/TS - Stage 2(HKU1) 0 0 23MAY11 0 0 -36 <t< td=""><td></td></t<>	
QL014 Stilling chamber Lining - HKU1 36 34 21MAY11A 04JUL11 5 2 0 Dropshaft - Excavation/ Shaft Lining -	
QS300520 RB Setup /Reaming/Demobilization (HKU1) (52m) 35 0 24MAR11A 12MAY11A 100 37 0 QS300545 RBM Mobilization & Pitot Hole drilling - (HKU1) 12 0 24MAR11A 09APR11A 100 14 0 QS300555 Back Reaming & Demobilization - (HKU1) 23 0 11APR11A 12MAY11A 100 23 0 QPS300300 Positioning, Fix & Grout 52.03m ID2.3(HKU1) 26 0 0JL11 33AUG11 0 0 0 Intakes - Internal Structures (Stage 2) U 20MAY11A 100 0 0 0 0 0 QL111 Stabilisation shaft - HKU1 6 0 20MAY11A 100 0 0 0 QHS3008030 Pensitock Orbitary - (HKU1) 36 36 04AUG11 15SEP11 0 0 0 QHS300804 BS/Vortex/Penstock/Drain Dvn/TS - Stage 2(HKU1) 36 36 04AUG11 15SEP11 0 0 0 16Mas1030 36.03-Lining (Dropshaft) 0 0 0 -11 3031030 36.03-Lining (Dropsh	•
QS300555 Back Reaming & Demobilization - (HKU1) 23 0 11APR11A 12MAY11A 100 23 0 QPS300300 Positioning, Fix & Grout- 52.03m ID2.3(HKU1) 26 26 05JUL11 03AUG11 0 0 0 Intakes - Internal Structures (Stage 2)	•
Intakes - Internal Structures (Stage 2) Intakes - Internal Structures (Stage 2) QL011 Stabilisation shaft - HKU1 6 0 20MAY11A 100 0 0 QH5300803 Penstock Delivery - (HKU1) 0 0 15JUL11* 0 0 0 QH5300804 BS/Vortex/Penstock/Drain Dvn/TS - Stage 2(HKU1) 36 36 04AUG11 15SEP11 0 0 0 Milestone Section30 (Portion HKU1) 0 0 0 23MAY11 0 0 -36 M361020 36.02-Excavation (Dropshaft) 0 0 0 0 -111 M361030 36.03-Lining (Dropshaft) 0 0 0 0 0 Construction Construction for THR2 0 0 0 0 0 0 0 QL127 Stilling chamber Lining - THR2 30 5 18MAR11A 28MAY11 75 67 -28 Dropshaft - Excavation & Tunnel Lining - THR2 26 13 16MAY11A 14JUN11 <t< td=""><td>•</td></t<>	•
QL011 Stabilisation shaft - HKU1 6 0 20MAY11A 100 0 0 QHS300803 Penstock Delivery - (HKU1) 0 0 15JUL11* 0 0 0 QHS300804 BS/Vortex/Penstock/Drain Dvn/TS - Stage 2(HKU1) 36 36 04AUG11 15SEP11 0 0 0 Milestone	•
QHS300804 BS/Vortex/Penstock/Drain Dvn/TS - Stage 2(HKU1) 36 36 04AUG11 15SEP11 0 0 0 Milestone Section30 (Portion HKU1) 0 0 0 0 0	
Section30 (Portion HKU1) Image: Section Sectin Sectin Sectin Section Sectin Section Section Sectin Section Sec	•
M361020 36.02-Excavation (Dropshaft) 0 0 23MAY11 0 0 -11 M361030 36.03-Lining (Dropshaft) 0 0 0 03AUG11 0 0 0 CC13-SECTION 7 OF THE WORKS (PORTION THR2) Construction Adit Tunnel Excavation & Tunnel Lining - THR2 QL127 Stilling chamber Lining - THR2 30 5 18MAR11A 28MAY11 75 67 -28 Dropshaft - Excavation/ Shaft Lining QPS077070 Positioning, Fix & Grout- 62m ID2.3 (THR2) 26 13 16MAY11A 14JUN11 0 7 -9 Intakes - Internal Structures (Stage 2) QH070602 BS/Vortex/Penstock/Drain Dvn/TS - Stage 2(THR2) 36 36 15JUN11 27JUL11 0 0 -9 QH070603 Permanent Channel Diversion(THR2) 12 12 14JUL11 27JUL11 0 0 -9 QH070603 Permanent Channel Diversion(THR2) 21 21 21 21 21 21 21 21 21 21 21 0	•
CC13-SECTION 7 OF THE WORKS (PORTION THR2) Construction Adit Tunnel Excavation & Tunnel Lining - THR2 30 5 18MAR11A 28MAY11 75 67 -28 Dropshaft - Excavation/Shaft Lining Ult23 30 5 18MAR11A 28MAY11 75 67 -28 Dropshaft - Excavation/Shaft Lining Ult23 26 13 16MAY11A 14JUN11 0 7 -9 Intakes - Internal Structures (Stage 2) Ult23 36 36 15JUN11 27JUL11 0 0 -9 QH070602 BS/Vortex/Penstock/Drain Dvn/TS - Stage 2(THR2) 36 36 15JUN11 27JUL11 0 0 -9 QH070603 Permanent Channel Diversion(THR2) 21 21 21JUL11 13AUG11 0 0 -9	· • •
Adit Tunnel Excavation & Tunnel Lining - THR2 QL 127 Stilling chamber Lining - THR2 30 5 18MAR11A 28MAY11 75 67 -28 Dropshaft - Excavation/ Shaft Lining QPS077070 Positioning, Fix & Grout- 62m ID2.3 (THR2) 26 13 16MAY11A 14JUN11 0 7 -9 Intakes - Interrunces (Stage 2) QH070602 BS/Vortex/Penstock/Drain Dvn/TS - Stage 2(THR2) 36 36 15JUN11 27JUL11 0 0 -9 QH070603 Permanent Channel Diversion(THR2) 21 21 21JUL11 13AUG11 0 0 -9	
Dropshaft - Excavation/ Shaft Lining Operation Operation <t< td=""><td></td></t<>	
QPS077070 Positioning, Fix & Grout- 62m ID2.3 (THR2) 26 13 16MAY11A 14JUN11 0 7 -9 Intakes - Internal Structures (Stage 2) QH070602 BS/Vortex/Penstock/Drain Dvn/TS - Stage 2(THR2) 36 36 15JUN11 27JUL11 0 0 -9 QHS070100 Local Intake Test & Commissioning - (THR2) 12 12 14JUL11 27JUL11 0 0 -9 QH070603 Permanent Channel Diversion(THR2) 21 21 21JUL11 13AUG11 0 0 -9	
QH070602 BS/Vortex/Penstock/Drain Dvn/TS - Stage 2(THR2) 36 36 15JUN11 27JUL11 0 0 -9 QHS070100 Local Intake Test & Commissioning - (THR2) 12 12 14JUL11 27JUL11 0 0 -9 QH070603 Permanent Channel Diversion(THR2) 21 21 21JUL11 13AUG11 0 0 -9	
QH070603 Permanent Channel Diversion(THR2) 21 21 21 21JUL11 13AUG11 0 0 -9	
QH070600 Penstock Delivery - (THR2) 0 0 0 08AUG11* 0 0 0 0	→
QH070604 Finishing works / PS BW / Reinstatement (THR2) 39 39 15AUG11 29SEP11 0 0 -9 Milestone	
Section 7 (Portion THR2) 0 0 14JUN11 0 0 -12	
M13-1050 13.05-Concrete Structure (Intake) 0 0 27JUL11 0 0 -11	•
CC9 - SECTION 3 OF THE WORKS (PORTION E5B) Construction	
Adit Tunnel Excavation & Tunnel Lining - E5B QL108 Stilling chamber Lining - E5B 36 32 20MAY11A 30JUN11 5 3 -18	
Dropshaft - Excavation/ Shaft Lining QS030360 RB Setup/Reaming/Demobilization(E5B) (48m) 36 0 01MAR11A 06APR11A 100 31 0	
QS311415 Back Reaming & Demobilization - (E5B) 22 0 15MAR11A 06APR11A 100 19 0 QS030370 Positioning, Fix & Grout - 47.53m ID1.5 (E5B) 23 23 02JUL11 28JUL11 0 0 -18	
Intakes - Internal Structures (Stage 2) QL104 Stabilisation shaft E5B 6 0 11APR11A 16APR11A 100 6 0	
QPSH03501 BS/Vortex/Penstock/Drain Dvn/TS - Stage 2(E5B) 33 33 29JUL11 05SEP11 0 0 -18 QPSH03499 Penstock Delivery - (E5B) 0 0 22AUG11* 0 0 0 0	
QHS030100 Local Intake Test & Commissioning - (E5B) 12 12 23AUG11 05SEP11 0 0 -18 Milestone	
Section 3 (Portion E5B) M91050 9.05-Excavation (Dropshaft) 0 0 06MAY11A 100 0 -19 MC 123	
M91060 9.06-Lining (Dropshaft) 0 0 28JUL11 0 0 -21 CC26-SECTION 20 OF THE WORKS (PORTION M3) 0 0 28JUL11 0 0 -21	•
Construction Intakes - External Structures (Stage1)	
S200390 Excavation + ELS Part 1-(M3) 37 0 11FEB11A 11APR11A 100 50 0	
Adit Tunnel Excavation & Tunnel Lining - M3 QL056 Stilling chamber Lining - M3 36 36 21JUL11 31AUG11 0 0 -13	
Dropshaft - Excavation/ Shaft Lining QS200520 RB Setup/Reaming/Demobilization(M3) (133m) 64 43 12APR11A 14JUL11 10 31 -13 QS2005275 DBM Mabilization & Dilated drilling All 20 0 13ADD11A 100 20 1	
QS200575 RBM Mobilization & Pilot Hole drilling - (M3) 22 0 12APR11A 09MAY11A 100 20 -1 QS200577 Back Reaming & Demobilization - (M3) 42 40 21MAY11A 14JUL11 0 2 -13	
Intakes - Internal Structures (Stage 2) QHS200409 Part 2 Rock Excav+Rock Stab&Drain Divn works -M3 74 74 21JUL11 18OCT11 0 0 -13	
M APR MAY JUN	JUL AUG
2011	
Start Date 30NOV07 Finish Date 03AUG12 Early Bar Early Bar Early Bar	
Finish Date 03AUG12 Last Month Progress 104A Design & Construction of HK. West Drainage Tunnel Date Revision Data Date 24MAY11 Progress Bar Contract No. DC/2007/10 13JAN09 Approved Works Programme # 1	Checked Approved SOR 804B
Finish Date 03AUG12 Data Date 24MAY11 Last Month Progress 104A Last Month Progress 104A Construction of HK. West Drainage Tunnel Date Revision	Checked Approved

ID Milestone	Activity Description	Orig Rem Dur Dur	Anticipated Start	Anticipated Finish	% Actual Comp Duration	Draft Works Prog WP6B EF Variance	6	APR MAY	2011 JUN	JUL	AUG
Section 20 (P M261013	Portion M3) 26.04-Excavation (Intake)	0 0		06MAY11A	100 0	-19		MC 123♦		 	
M261011	26.02-Excavation (Dropshaft)	0 0		14JUL11	0 0	-16				•	
Construction	ION 16 OF THE WORKS (PORTION B2)										
Preliminary V S160230	Open Excavation-(B2)	50 4	07FEB11A	27MAY11	90 85	-17					
S160232 S160240	Grouting Works-(B2) Main Structure Const + RBM Platform -(B2)	18 18 33 33	28MAY11 20JUN11	18JUN11 28JUL11	0 0 0 0	-17 -17					
Dropshaft - E	xcavation/ Shaft Lining RB Setup/Reaming/Demobilization(B2) (65m)	41 41	29JUL11	15SEP11	0 0	-17					
QS160293 QS160295	RBM Mobilization & Pilot Hole drilling - (B2) Back Reaming & Demobilization - (B2)	15 15 26 26	29JUL11 16AUG11	15AUG11 15SEP11		-17					
Intakes - Inte	rnal Structures (Stage 2)			1552P11							•
QHS160123 Milestone	Penstock Delivery - (B2)	0 0	08AUG11*		0 0	0					•
Section 16 (P M22-1040	Portion B2) 22.04-Excavation (Intake)	0 0		27MAY11	0 0	-21			٠	 	
M22-1010	22.01-Pre-drilling & Grouting Works (Dropshaft)	0 0		15AUG11	0 0	-20				 	♦
Construction											
Intakes - External	ernal Structures (Stage1) Cofferdam Excavation -(BR6)	116 0	28SEP10A	09MAY11A	100 179	-4				 	
S140191 QHS140298	Dropshaft Excavation -(BR6) Flow Diversion & Backdrop manhole (BR6)	38 23 69 69	11MAY11A 24MAY11*	20JUN11 13AUG11	10 11 0 0	0-26					
S140192 S140193	Install Protection cover inside dropshaft (BR6) Intake structure Stage 1, (5 pours) (BR6)	10 10 60 60	21JUN11 04JUL11	02JUL11 10SEP11	0 0	0					
Intakes - Inte	rnal Structures (Stage 2)										
Pipe Laying	Penstock Delivery - (BR6)	0 0	22AUG11*	[0				 	
S140202 S140310	Pipejacking SMH17 to Intake CH23-Ch46 (BR6) Site Inspection, trial pits & UU diversion	77 4 54 0	18JAN11A 01MAR11A	27MAY11 16MAY11A	85 99 100 60	-26 -2					
S140204 S140320	Pipejacking SMH17 to Intake CH46-Ch69 (BR6) Finalize design details for drains & MH	61 55 36 36	17MAY11A 24MAY11	02AUG11 06JUL11	10 6 0 0	-20 -8					
S140330 S140206	MH construction SMH17 to BR7	72 72 61 61	07JUL11 03AUG11	29SEP11 15OCT11	0 0	-8 -20					
Milestone	Pipejacking SMH17 to Intake CH69-Ch94 (BR6)	01 01	USAUGTI	1300111	0 0	-20					
Section 14 (P M201060	Portion BR6) 20.06-50% P.Length of TrenchlessDrainageWorks	0 0		10JUN11	0 0	-24			٠		
M201020 M201040	20.02-Excavation (Dropshaft) 20.04-Excavation (Intake)	0 0		13AUG11 13AUG11	0 0	-30 -30				 	♦♦
CC21-SECTI Construction	ION 15 OF THE WORKS (PORTION W3)									 	
Intakes - Exte	ernal Structures (Stage1) Still Chamber Excavation +36mPD - W3		I		1 1						
S150198		F 4 4 4									
S150199	Still Chamber Excavation +33mPD - W3	54 41 53 53	10MAR11A 13JUL11	12JUL11 12SEP11	50 58 0 0	-8 -8					
Intakes - Inte											•
Intakes - Inte QHS150203 CC27-SECTI	Still Chamber Excavation +33mPD - W3 rnal Structures (Stage 2)	53 53	13JUL11		0 0	-8					٠
Intakes - Inte QHS150203 CC27-SECTI Construction Adit Tunnel E	Still Chamber Excavation +33mPD - W3 rnal Structures (Stage 2) Penstock Delivery - (W3) ON 21 OF THE WORKS (PORTION TP789) Excavation & Tunnel Lining - TP789	53 53	13JUL11 08AUG11*	12SEP11	0 0	-8					٠
Intakes - Inte QHS150203 CC27-SECTI Construction Adit Tunnel E QL052 Dropshaft - E	Still Chamber Excavation +33mPD - W3 rnal Structures (Stage 2) Penstock Delivery - (W3) ON 21 OF THE WORKS (PORTION TP789) Excavation & Tunnel Lining - TP789 Stilling chamber Lining - TP789 Excavation/ Shaft Lining	53 53 0 0 36 15	13JUL11 08AUG11* 30APR11A	12SEP11	0 0 0 0	-8 0 12					•
Intakes - Inte QHS150203 CC27-SECTI Construction Adit Tunnel E QL052 Dropshaft - E QPS210280	Still Chamber Excavation +33mPD - W3 rnal Structures (Stage 2) Penstock Delivery - (W3) ON 21 OF THE WORKS (PORTION TP789) Excavation & Tunnel Lining - TP789 Stilling chamber Lining - TP789 Excavation/ Shaft Lining Positioning, Fix & Grout- 162.08m ID2.3 (TP789) rnal Structures (Stage 2)	53 53	13JUL11 08AUG11*	12SEP11	0 0	-8					•
Intakes - Inte QHS150203 CC27-SECTI Construction Adit Tunnel E QL052 Dropshaft - E QPS210280 Intakes - Inte QH210601	Still Chamber Excavation +33mPD - W3 rnal Structures (Stage 2) Penstock Delivery - (W3) ON 21 OF THE WORKS (PORTION TP789) Excavation & Tunnel Lining - TP789 Stilling chamber Lining - TP789 Excavation/ Shaft Lining Positioning, Fix & Grout- 162.08m ID2.3 (TP789)	53 53 0 0 36 15	13JUL11 08AUG11* 30APR11A	12SEP11	0 0 0 0	-8 0 12					•
Intakes - Inte QHS150203 CC27-SECTI Construction Adit Tunnel E QL052 Dropshaft - E QPS210280 Intakes - Inte QH210601 QHS210407 QHS210409	Still Chamber Excavation +33mPD - W3 rnal Structures (Stage 2) Penstock Delivery - (W3) ON 21 OF THE WORKS (PORTION TP789) Excavation & Tunnel Lining - TP789 Stilling chamber Lining - TP789 Excavation/ Shaft Lining Positioning, Fix & Grout- 162.08m ID2.3 (TP789) rnal Structures (Stage 2) Overhad Gantry erection TP789	53 53 0 0 36 15 55 55 	13JUL11 08AUG11* 30APR11A 15JUN11 12MAY11A	12SEP11 14JUN11 18AUG11	0 0 0 0 18 0 18 0 0 90 10	-8 0 12 12 -15					•
Intakes - Inte QHS150203 CC27-SECTI Construction Adit Tunnel E QL052 Dropshaft - E QPS210280 Intakes - Inte QH210601 QHS210407 QHS210409 Milestone Section 21 (P	Still Chamber Excavation +33mPD - W3 rnal Structures (Stage 2) Penstock Delivery - (W3) ON 21 OF THE WORKS (PORTION TP789) Excavation & Tunnel Lining - TP789 Stilling chamber Lining - TP789 Excavation/ Shaft Lining Positioning, Fix & Grout- 162.08m ID2.3 (TP789) rnal Structures (Stage 2) Overhad Gantry erection TP789 Penstock Delivery - (TP789) BS/Vortex/Penstock/Drain Dvn/TS - Stage 2(TP789) Portion TP789)	53 53 0 0 36 15 55 55 14 3 0 0 36 36	13JUL11 08AUG11* 30APR11A 15JUN11 12MAY11A 08AUG11*	12SEP11 14JUN11 18AUG11 26MAY11 30SEP11	0 0 0 0 18 0 18 0 0 0 0 90 10 0 0 0 0	-8 0 12 12 -15 0 12					•
Intakes - Inte QHS150203 C27-SECTI Construction Adit Tunnel E QL052 Dropshaft - E QPS210280 Intakes - Inte QH210601 QHS210407 QHS210409 Milestone Section 21 (P M27-1030	Still Chamber Excavation +33mPD - W3 rnal Structures (Stage 2) Penstock Delivery - (W3) ION 21 OF THE WORKS (PORTION TP789) Excavation & Tunnel Lining - TP789 Stilling chamber Lining - TP789 Excavation/ Shaft Lining Positioning, Fix & Grout- 162.08m ID2.3 (TP789) rnal Structures (Stage 2) Overhad Gantry erection TP789 Penstock Delivery - (TP789) BS/Vortex/Penstock/Drain Dvn/TS - Stage 2(TP789) Portion TP789) 27.02-Excavation (Dropshaft) 27.03-Lining (Dropshaft)	53 53 0 0 36 15 55 55 14 3 0 0	13JUL11 08AUG11* 30APR11A 15JUN11 12MAY11A 08AUG11*	12SEP11 14JUN11 14JUN11 18AUG11 26MAY11	0 0 0 0 0 18 0 18 0 0 90 10 0 0	-8 0 12 12 -15 0	• MCC	: 122			•
Intakes - Inte QHS150203 C27-SECTI Construction Adit Tunnel E QL052 Dropshaft - E QPS210280 Intakes - Inte QH210601 QHS210407 QHS210409 Milestone Section 21 (P M27-1030	Still Chamber Excavation +33mPD - W3 rnal Structures (Stage 2) Penstock Delivery - (W3) ION 21 OF THE WORKS (PORTION TP789) Excavation & Tunnel Lining - TP789 Stilling chamber Lining - TP789 Excavation/ Shaft Lining Positioning, Fix & Grout- 162.08m ID2.3 (TP789) rnal Structures (Stage 2) Overhad Gantry erection TP789 Penstock Delivery - (TP789) BS/Vortex/Penstock/Drain Dvn/TS - Stage 2(TP789) Portion TP789) 27.02-Excavation (Dropshaft)	53 53 0 0 36 15 55 55 14 3 0 0 36 36 36 55 55 55 55 55 55 55 55 36 0 0 36 36 0 0 36 36 55 55	13JUL11 08AUG11* 30APR11A 15JUN11 12MAY11A 08AUG11*	12SEP11 14JUN11 14JUN11 18AUG11 26MAY11 30SEP11 29MAR11A	0 0 0 0 0 0 18 0 18 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	-8 0 12 12 -15 0 12	MC	: 122			•
Intakes - Inte QHS150203 CC27-SECTI Construction Adit Tunnel E QL052 Dropshaft - E QPS210280 Intakes - Inte QH210601 QHS210407 QHS210409 Milestone Section 21 (P M27-1020 M27-1030 CC35-SECTI Construction Intakes - Exte	Still Chamber Excavation +33mPD - W3 rnal Structures (Stage 2) Penstock Delivery - (W3) ION 21 OF THE WORKS (PORTION TP789) Excavation & Tunnel Lining - TP789 Stilling chamber Lining - TP789 Excavation/ Shaft Lining Positioning, Fix & Grout- 162.08m ID2.3 (TP789) rnal Structures (Stage 2) Overhad Gantry erection TP789 Penstock Delivery - (TP789) BS/Vortex/Penstock/Drain Dvn/TS - Stage 2(TP789) Portion TP789) 27.02-Excavation (Dropshaft) 27.03-Lining (Dropshaft) ION 29 OF THE WORKS (PORTION W10)	53 53 0 0 36 15 55 55 14 3 0 0 36 36 36 55 55 55 55 55 55 55 55 36 0 0 36 36 0 0 36 36 55 55	13JUL11 08AUG11* 30APR11A 15JUN11 12MAY11A 08AUG11*	12SEP11 14JUN11 14JUN11 18AUG11 26MAY11 30SEP11 29MAR11A	0 0 0 0 0 0 18 0 18 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	-8 0 12 12 -15 0 12	MC	: 122			•
Intakes - Inte QHS150203 C27-SECTI Construction Adit Tunnel E QL052 Dropshaft - E QPS210280 Intakes - Inte QH210601 QHS210407 QHS210407 QHS210409 Milestone Section 21 (P M27-1020 M27-1030 C35-SECTI Construction Intakes - Exte QHS290582 QHS290584	Still Chamber Excavation +33mPD - W3 rnal Structures (Stage 2) Penstock Delivery - (W3) ION 21 OF THE WORKS (PORTION TP789) Excavation & Tunnel Lining - TP789 Stilling chamber Lining - TP789 Stilling chamber Lining - TP789 Excavation/Shaft Lining Positioning, Fix & Grout- 162.08m ID2.3 (TP789) rnal Structures (Stage 2) Overhad Gantry erection TP789 Penstock Delivery - (TP789) BS/Vortex/Penstock/Drain Dvn/TS - Stage 2(TP789) Portion TP789) 27.02-Excavation (Dropshaft) 27.03-Lining (Dropshaft) ION 29 OF THE WORKS (PORTION W10) Intake (4 pours)+RBM Platform-Stage 1a(W10) Intake Struct Part 2 (4 pours) - Stage 1b (W10)	53 53 0 0 36 15 55 55 14 3 0 0 36 36 36 36 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	13JUL11 08AUG11* 30APR11A 15JUN11 12MAY11A 08AUG11* 19AUG11	12SEP11 14JUN11 14JUN11 18AUG11 26MAY11 30SEP11 29MAR11A 18AUG11	0 0 0 0 0 0 18 0 18 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	-8 0 12 12 12 12 12 12 12 0 12	MC	: 122			•
Intakes - Inte QHS150203 CC27-SECTI Construction Adit Tunnel E QL052 Dropshaft - E QPS210280 Intakes - Inte QH210601 QHS210407 QHS210407 QHS210400 Milestone Section 21 (P M27-1020 M27-1030 CC35-SECTI Construction Intakes - Exter QHS290582 QHS290584 Adit Tunnel E QL013	Still Chamber Excavation +33mPD - W3 rnal Structures (Stage 2) Penstock Delivery - (W3) ION 21 OF THE WORKS (PORTION TP789) Excavation & Tunnel Lining - TP789 Stilling chamber Lining - TP789 Positioning, Fix & Grout- 162.08m ID2.3 (TP789) rnal Structures (Stage 2) Overhad Gantry erection TP789 Penstock Delivery - (TP789) BS/Vortex/Penstock/Drain Dvn/TS - Stage 2(TP789) Portion TP789) 27.02-Excavation (Dropshaft) 27.03-Lining (Dropshaft) Intake (4 pours)+RBM Platform-Stage 1a(W10) Intake (4 pours)+RBM Platform-Stage 1a(W10) Intake Struct Part 2 (4 pours) - Stage 1b (W10) Excavation & Tunnel Lining - W10 Stilling chamber Lining - W10	53 53 0 0 36 15 55 55 14 3 0 0 14 3 0 0 36 36 36 36 0 0 0 0 0 0 36 36 36 36 4 3	13JUL11 08AUG11* 30APR11A 30APR11A 15JUN11 12MAY11A 08AUG11* 19AUG11 19AUG11	12SEP11 14JUN11 14JUN11 18AUG11 26MAY11 30SEP11 29MAR11A 18AUG11 18AUG11	0 0 0 0 0 18 0 18 0 0 90 10 0 0 100 0 100 0 0 0 90 10 90 10 90 0 90 59	-8 0 12 12 12 12 12 0 12 12 0 12 12	MC	:122			•
Intakes - Inte QHS150203 CC27-SECTI Construction Adit Tunnel E QL052 Dropshaft - E QPS210280 Intakes - Inte QH210601 QHS210407 QHS210409 Milestone Section 21 (P M27-1020 M27-1030 CC35-SECTI Construction Intakes - Exter QHS290582 QHS290584 Adit Tunnel E QL013 Dropshaft - E QS290580	Still Chamber Excavation +33mPD - W3 rnal Structures (Stage 2) Penstock Delivery - (W3) ION 21 OF THE WORKS (PORTION TP789) Excavation & Tunnel Lining - TP789 Stilling chamber Lining - TP789 Excavation/Shaft Lining Positioning, Fix & Grout- 162.08m ID2.3 (TP789) rnal Structures (Stage 2) Overhad Gantry erection TP789 Penstock Delivery - (TP789) BS/Vortex/Penstock/Drain Dvn/TS - Stage 2(TP789) Portion TP789) 27.02-Excavation (Dropshaft) 27.03-Lining (Dropshaft) ION 29 OF THE WORKS (PORTION W10) Intake (4 pours)+RBM Platform-Stage 1a(W10) Intake Struct Part 2 (4 pours) - Stage 1b (W10) Excavation & Tunnel Lining - W10 Stilling chamber Lining - W10 Excavation/Shaft Lining RB Setup/Reaming/Demobilization(W10) (95m)	53 53 0 0 36 15 55 55 14 3 0 0 36 36 14 3 0 0 36 36 0 0 36 36 40 40 40 40 36 36 55 55	13JUL11 08AUG11* 30APR11A 30APR11A 15JUN11 15JUN11 12MAY11A 08AUG11* 19AUG11 19AUG11 09MAR11A 13AUG11 13AUG11	12SEP11 14JUN11 14JUN11 18AUG11 26MAY11 30SEP11 30SEP11 29MAR11A 18AUG11 29MAR11A 18AUG11 29MAR11A 18AUG11 24SEP11 24SEP11 05AUG11	0 0 0 0 0 18 0 18 0 0 90 10 0 0 90 10 0 0 90 0 100 0 90 59 0 0	-8 0 12 12 12 12 12 0 12 0 12 12 12 12 12 12 12 12 12 12 12 12 12	MCC	: 122			
Intakes - Inte QHS150203 CC27-SECTI Construction Adit Tunnel E QL052 Dropshaft - E QPS210280 Intakes - Inte QH210601 QHS210407 QHS210409 Milestone Section 21 (P M27-1020 M27-1030 CC35-SECTI Construction Intakes - Exter QHS290582 QHS290584 Adit Tunnel E QL013 Dropshaft - E	Still Chamber Excavation +33mPD - W3 rnal Structures (Stage 2) Penstock Delivery - (W3) ION 21 OF THE WORKS (PORTION TP789) Excavation & Tunnel Lining - TP789 Stilling chamber Lining - TP789 Stilling chamber Lining - TP789 Stilling chamber Lining - TP789 Excavation / Shaft Lining Positioning, Fix & Grout- 162.08m ID2.3 (TP789) rnal Structures (Stage 2) Overhad Gantry erection TP789 Penstock Delivery - (TP789) BS/Vortex/Penstock/Drain Dvn/TS - Stage 2(TP789) Portion TP789) 27.02-Excavation (Dropshaft) 27.03-Lining (Dropshaft) Intake (4 pours)+RBM Platform-Stage 1a(W10) Intake (4 pours)+RBM Platform-Stage 1b (W10) Excavation & Tunnel Lining - W10 Stilling chamber Lining - W10 Excavation / Shaft Lining	53 53 0 0 36 15 55 55 14 3 0 0 36 36 14 3 0 0 36 36 40 0 48 3 40 40 36 36	13JUL11 08AUG11* 30APR11A 15JUN11 15JUN11 12MAY11A 08AUG11* 19AUG11 19AUG11 09MAR11A 13AUG11 13AUG11	12SEP11 14JUN11 14JUN11 18AUG11 26MAY11 30SEP11 30SEP11 29MAR11A 18AUG11 29MAR11A 18AUG11 29MAR11A 18AUG11 29MAR11A	0 0 0 0 0 18 0 18 0 0 90 10 0 0 90 10 0 0 90 0 100 0 90 59 0 0 90 599 0 0	8 0 12 12 12 -15 0 12 12 0 12 12 12 12 12 12 12 12 12 12 12 12 12	MC	:122			•
Intakes - Inte QHS150203 CC27-SECTI Construction Adit Tunnel E QL052 Dropshaft - E QPS210280 Intakes - Inte QH210601 QHS210407 QHS210407 QHS210407 Milestone Section 21 (P M27-1020 M27-1030 CC35-SECTI Construction Intakes - Exte QHS290582 QHS290584 Adit Tunnel E QL013 Dropshaft - E QS290580 QS290604 QS290606 Intakes - Inte	Still Chamber Excavation +33mPD - W3 rmal Structures (Stage 2) Penstock Delivery - (W3) ION 21 OF THE WORKS (PORTION TP789) Excavation & Tunnel Lining - TP789 Stilling chamber Lining - TP789 Excavation/Shaft Lining Positioning, Fix & Grout- 162.08m ID2.3 (TP789) rmal Structures (Stage 2) Overhad Gantry erection TP789 Penstock Delivery - (TP789) BS/Vortex/Penstock/Drain Dvn/TS - Stage 2(TP789) Portion TP789) 27.02-Excavation (Dropshaft) 27.03-Lining (Dropshaft) ION 29 OF THE WORKS (PORTION W10) Intake (4 pours)+RBM Platform-Stage 1a(W10) Intake (4 pours)+RBM Platform-Stage 1b (W10) Excavation & Tunnel Lining - W10 Excavation / Shaft Lining RB Setup/Reaming/Demobilization(W10) (95m) RBM Mobilization & Pilot Hole drilling - (W10) Back Reaming & Demobilization - (W10) rmal Structures (Stage 2)	53 53 0 0 36 15 55 55 414 3 0 0 36 36 36 36 36 36 36 36 48 3 40 40 36 36 59 59 40 40 40 40 40 40 40 40 40 40 40 40 40 40	13JUL11 08AUG11* 30APR11A 30APR11A 15JUN11 12MAY11A 08AUG11* 19AUG11 13AUG11 13AUG11 13AUG11 13AUG11 13AUG11 13AUG11 27MAY11 27MAY11 20JUN11	12SEP11 14JUN11 14JUN11 18AUG11 26MAY11 26MAY11 30SEP11 30SEP11 29MAR11A 18AUG11 29MAR11A 18AUG11 29SEP11 24SEP11 24SEP11 18JUN11	0 0 0 0 0 18 0 18 0 0 90 10 0 0 90 10 0 0 90 10 0 0 90 59 0 0 90 599 0 0 0 0 0 0 0 0 0 0 0 0	-8 0 12 12 12 12 12 0 12 12 12 12 12 12 12 12 12 12 12 12 12		:122			
Intakes - Inte QHS150203 CC27-SECTI Construction Adit Tunnel E QL052 Dropshaft - E QPS210280 Intakes - Inte QH210601 QHS210407 QHS210407 QHS210409 Milestone Section 21 (P M27-1020 M27-1020 M27-1030 CC35-SECTI Construction Intakes - Exte QHS290582 QHS290584 Adit Tunnel E QL013 Dropshaft - E QS290580 QS290604 QS290606 Intakes - Inte QHS290368 QL010	Still Chamber Excavation +33mPD - W3 rnal Structures (Stage 2) Penstock Delivery - (W3) ION 21 OF THE WORKS (PORTION TP789) Excavation & Tunnel Lining - TP789 Stilling chamber Lining - TP789 Excavation/Shaft Lining Positioning, Fix & Grout- 162.08m ID2.3 (TP789) rnal Structures (Stage 2) Overhad Gantry erection TP789 Penstock Delivery - (TP789) BS/Vortex/Penstock/Drain Dvn/TS - Stage 2(TP789) Portion TP789) 27.02-Excavation (Dropshaft) 27.03-Lining (Dropshaft) ION 29 OF THE WORKS (PORTION W10) Intake (4 pours)+RBM Platform-Stage 1a(W10) Intake (4 pours)+RBM Platform-Stage 1b (W10) Excavation & Tunnel Lining - W10 Excavation/ Shaft Lining RB Setup/Reaming/Demobilization(W10) (95m) RBM Mobilization & Pilot Hole drilling - (W10) Back Reaming & Demobilization - (W10) rnal Structures (Stage 2)	53 53 0 0 36 15 55 55 414 3 0 0 36 36 36 36 36 36 36 36 36 36 36 36 36 36 36 36 36 36 48 3 40 40 36 36 59 59 19 19 40 40	13JUL11 08AUG11* 30APR11A 30APR11A 15JUN11 12MAY11A 08AUG11* 19AUG11 19AUG11 09MAR11A 13AUG11 13AUG11 13AUG11 13AUG11 27MAY11	12SEP11 14JUN11 14JUN11 18AUG11 26MAY11 26MAY11 30SEP11 30SEP11 29MAR11A 18AUG11 29MAR11A 18AUG11 29SEP11 24SEP11 24SEP11 18JUN11	0 0 0 0 0 18 0 18 0 0 90 10 90 10 0 0 90 0 100 0 0 0 90 59 0 0 90 59 0 0 0 0 0 0 0 0 0 0 0 0 0 0	-8 0 12 12 12 12 12 0 12 12 12 12 12 12 12 12 12 12 12 12 12		122			
Intakes - Inte QHS150203 CC27-SECTI Construction Adit Tunnel E QL052 Dropshaft - E QPS210280 Intakes - Inte QH210601 QHS210407 QHS210409 Milestone Section 21 (P M27-1020 M27-1030 CC35-SECTI Construction Intakes - Exte QHS290582 QHS290584 Adit Tunnel E QL013 Dropshaft - E QS290580 QS290604 QS290606 Intakes - Inte QHS290368 QL010 Milestone Section 29 (P	Still Chamber Excavation +33mPD - W3 mal Structures (Stage 2) Penstock Delivery - (W3) ON 21 OF THE WORKS (PORTION TP789) Excavation & Tunnel Lining - TP789 Stilling chamber Lining - TP789 Stilling chamber Lining - TP789 Stilling chamber Lining - TP789 Positioning, Fix & Grout- 162.08m ID2.3 (TP789) Tral Structures (Stage 2) Overhad Gantry erection TP789 Penstock Delivery - (TP789) BS/Vortex/Penstock/Drain Dvn/TS - Stage 2(TP789) Portion TP789 27.02-Excavation (Dropshaft) 27.03-Lining (Dropshaft) OVerhad Satuctures (Stage1) Intake (4 pours)+RBM Platform-Stage 1a(W10) Intake Struct Part 2 (4 pours) - Stage 1b (W10) Excavation & Tunnel Lining - W10 Excavation & Stage 1b (W10) Excavation / Shaft Lining RB Mobilization & Pilot Hole drilling - (W10) Back Reaming /Demobilization (W10) (95m) RBM Mobilization & Pilot Hole drilling - (W10) Excavation Shaft Lining RB Mobilization a Pilot Hole drilling - (W10) Excavation	53 53 0 0 36 15 55 55 14 3 0 0 14 3 0 0 36 36 36 36 0 0 36 36 4 3 0 0 36 36 40 40 40 40 59 59 19 19 40 40 00 0	13JUL11 08AUG11* 30APR11A 30APR11A 15JUN11 12MAY11A 08AUG11* 19AUG11 19AUG11 09MAR11A 13AUG11 13AUG11 13AUG11 13AUG11 13AUG11 13AUG11 13AUG11	12SEP11 14JUN11 14JUN11 18AUG11 26MAY11 26MAY11 30SEP11 30SEP11 29MAR11A 18AUG11 29MAR11A 18AUG11 24SEP11 24SEP11 05AUG11 18JUN11 05AUG11 18JUN11	0 0 0 0 0 18 0 18 0 0 90 10 0 0 90 10 0 0 100 0 0 0 90 59 0 0 90 59 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	-8 0 12 12 12 12 12 0 12 12 12 12 12 12 12 12 12 12 12 12 12		:122			
Intakes - Inte QHS150203 CC27-SECTI Construction Adit Tunnel E QL052 Dropshaft - E QPS210280 Intakes - Inte QH210601 QHS210409 Milestone Section 21 (P M27-1020 M27-1020 M27-1030 CC35-SECTI Construction Intakes - Exte QHS290582 QHS290584 Adit Tunnel E QL013 Dropshaft - E QS290580 QS290604 QS290606 Intakes - Inte QHS290368 QL010 Milestone	Still Chamber Excavation +33mPD - W3 rnal Structures (Stage 2) Penstock Delivery - (W3) ION 21 OF THE WORKS (PORTION TP789) Excavation & Tunnel Lining - TP789 Stilling chamber Lining - TP789 Excavation/Shaft Lining Positioning, Fix & Grout- 162.08m ID2.3 (TP789) rnal Structures (Stage 2) Overhad Gantry erection TP789 Penstock Delivery - (TP789) BS/Vortex/Penstock/Drain Dvn/TS - Stage 2(TP789) Portion TP789) 27.02-Excavation (Dropshaft) 27.03-Lining (Dropshaft) ION 29 OF THE WORKS (PORTION W10) Intake (4 pours)+RBM Platform-Stage 1a(W10) Intake Struct Part 2 (4 pours) - Stage 1b (W10) Excavation & Tunnel Lining - W10 Excavation / Shaft Lining RB Setup/Reaming/Demobilization(W10) (95m) RBM Mobilization & Pilot Hole drilling - (W10) Back Reaming & Demobilization - (W10) Stabilisation shaft W10	53 53 0 0 36 15 55 55 4 3 0 0 36 36 36 36 36 36 48 3 40 40 36 36 55 55	13JUL11 08AUG11* 30APR11A 30APR11A 15JUN11 12MAY11A 08AUG11* 19AUG11 19AUG11 09MAR11A 13AUG11 13AUG11 13AUG11 13AUG11 13AUG11 13AUG11 13AUG11	12SEP11 14JUN11 14JUN11 18AUG11 26MAY11 26MAY11 209MAR11A 18AUG11 29MAR11A 18AUG11 24SEP11 24SEP11 05AUG11 18JUN11 05AUG11	0 0 0 0 0 18 0 18 0 0 90 10 90 10 0 0 90 0 100 0 90 0 90 0 90 0 90 0 90 0 90 0 90 0 90 0 90 0 90 0 90 0 90 0 90 0 90 0 90 0 90 0 90 0 90 0 90 0	-8 0 12 12 12 12 12 0 12 12 12 12 12 12 12 12 12 12 12 12 12					
Intakes - Inte QHS150203 CC27-SECTI Construction Adit Tunnel E QL052 Dropshaft - E QPS210280 Intakes - Inte QH210601 QHS210407 QHS210409 Milestone Section 21 (P M27-1020 M27-1030 CC35-SECTI Construction Intakes - Exte QHS290582 QHS290584 Adit Tunnel E QL013 Dropshaft - E QS290580 QS290604 QS290604 QS290606 Intakes - Inte QHS290368 QL010 Milestone Section 29 (P	Still Chamber Excavation +33mPD - W3 mal Structures (Stage 2) Penstock Delivery - (W3) ON 21 OF THE WORKS (PORTION TP789) Excavation & Tunnel Lining - TP789 Stilling chamber Lining - TP789 Stilling chamber Lining - TP789 Stilling chamber Lining - TP789 Positioning, Fix & Grout- 162.08m ID2.3 (TP789) Tral Structures (Stage 2) Overhad Gantry erection TP789 Penstock Delivery - (TP789) BS/Vortex/Penstock/Drain Dvn/TS - Stage 2(TP789) Portion TP789 27.02-Excavation (Dropshaft) 27.03-Lining (Dropshaft) OVerhad Satuctures (Stage1) Intake (4 pours)+RBM Platform-Stage 1a(W10) Intake Struct Part 2 (4 pours) - Stage 1b (W10) Excavation & Tunnel Lining - W10 Excavation & Stage 1b (W10) Excavation / Shaft Lining RB Mobilization & Pilot Hole drilling - (W10) Back Reaming /Demobilization (W10) (95m) RBM Mobilization & Pilot Hole drilling - (W10) Excavation Shaft Lining RB Mobilization a Pilot Hole drilling - (W10) Excavation	53 53 0 0 36 15 55 55 14 3 0 0 14 3 0 0 36 36 36 36 0 0 36 36 4 3 0 0 36 36 40 40 40 40 59 59 19 19 40 40 00 0	13JUL11 08AUG11* 30APR11A 30APR11A 15JUN11 12MAY11A 08AUG11* 19AUG11 19AUG11 09MAR11A 13AUG11 13AUG11 13AUG11 13AUG11 13AUG11 13AUG11 13AUG11	12SEP11 14JUN11 14JUN11 18AUG11 26MAY11 26MAY11 30SEP11 30SEP11 29MAR11A 18AUG11 29MAR11A 18AUG11 24SEP11 24SEP11 05AUG11 18JUN11 05AUG11 18JUN11	0 0 0 0 0 18 0 18 0 0 90 10 0 0 90 10 0 0 100 0 0 0 90 59 0 0 90 59 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	-8 0 12 12 12 12 12 0 12 12 12 12 12 12 12 12 12 12 12 12 12		APR MAY			 AUG
Intakes - Inte QHS150203 CC27-SECTI Construction Adit Tunnel E QL052 Dropshaft - E QPS210280 Intakes - Inte QH210601 QHS210407 QHS210409 Milestone Section 21 (P M27-1020 M27-1030 CC35-SECTI Construction Intakes - Exter QHS290582 QHS290584 Adit Tunnel E QL013 Dropshaft - E QS290580 QS290580 QS290604 QS290605 Intakes - Inte QHS290368 QL010 Milestone Section 29 (P M351010	Still Chamber Excavation +33mPD - W3 rnal Structures (Stage 2) Penstock Delivery - (W3) ON 21 OF THE WORKS (PORTION TP789) Stilling chamber Lining - TP789 Stilling chamber Lining - TP789 Stilling chamber Lining - TP789 Coverhad Gantry erection TP789 Penstock Delivery - (TP789) BS/Vortex/Penstock/Drain Dvn/TS - Stage 2(TP789) Portion TP789 27.02-Excavation (Dropshaft) 27.03-Lining (Dropshaft) 27.03-Lining (Dropshaft) CON 29 OF THE WORKS (PORTION W10) Intake Struct Part 2 (4 pours) - Stage 1b (W10) Excavation & Tunnel Lining - W10 Stilling chamber Lining - W10 Stilling chamber Lining - W10 RB Setup/Reaming/Demobilization (W10) (95m) RBM Mobilization & Pilot Hole drilling - (W10) Back Reaming & Demobilization - (W10) Stabilisation shaft W10 Portion W10) 35.01-Pre-drilling & Grouting Works (Dropshaft)	53 53 0 0 36 15 55 55 14 3 0 0 14 3 0 0 36 36 36 36 0 0 36 36 36 36 36 36 36 36 48 3 40 40 36 36 9 9 9 19 19 19 40 40 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	13JUL11 08AUG11* 30APR11A 15JUN11 12MAY11A 08AUG11* 19AUG11 19AUG11 09MAR11A 13AUG11 13AUG11 13AUG11 27MAY11 27MAY11 20JUN11 27MAY11 20JUN11	12SEP11 14JUN11 14JUN11 18AUG11 26MAY11 30SEP11 30SEP11 29MAR11A 18AUG11 29MAR11A 18AUG11 29SEP11 24SEP11 24SEP11 18JUN11 05AUG11 18JUN11 18JUN11	0 0 0 0 0 18 0 18 0 0 90 10 90 10 0 0 90 0 100 0 90 0 90 0 90 59 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	-8 0 12 12 12 12 12 12 12 12 0 12 0 12 0 12 0 12 0 12 0 0 -13 -2 0 -2 0 -2 0 -2 -2 -2 -2 -2 -2 -2 -2 -2 -2 -2 -2 -2 -2 -2 -2 -2 -2 -2 -2 -2 -2 -2 -2 -2 -2		APR MAY	2011 AMME APPROVAL		
Intakes - Inte QHS150203 C27-SECTI Construction Adit Tunnel E QL052 Dropshaft - E QPS210280 Intakes - Inte QH210601 QHS210407 QHS210409 Milestone Section 21 (P M27-1020 M27-1030 C35-SECTI Construction Intakes - Exte QHS290582 QHS290584 Adit Tunnel E QL013 Dropshaft - E QS290580 QS290604 QS290606 Intakes - Inte QHS290368 QL010 Milestone Section 29 (P M351010	Still Chamber Excavation +33mPD - W3 rnal Structures (Stage 2) Penstock Delivery - (W3) ION 21 OF THE WORKS (PORTION TP789) Excavation & Tunnel Lining - TP789 Stilling chamber Lining - TP789 Stilling chamber Lining - TP789 rnal Structures (Stage 2) Overhad Gantry erection TP789 Penstock Delivery - (TP789) BS/Vortex/Penstock/Drain Dvn/TS - Stage 2(TP789) Portion TP789) 27.02-Excavation (Dropshaft) 27.03-Lining (Dropshaft) 27.03-Lining (Dropshaft) 27.03-Lining (Dropshaft) CN 29 OF THE WORKS (PORTION W10) Intake (4 pours)+RBM Platform-Stage 1a(W10) Intake (4 pours)+RBM Platform-Stage 1a(W10) Intake Struct Part 2 (4 pours) - Stage 1b (W10) Excavation / Shaft Lining RB Setup/Reaming/Demobilization(W10) (95m) RBM Mobilization & Pilot Hole drilling - (W10) Back Reaming & Demobilization - (W10) Stabilisation shaft W10 Portion W10 35.01-Pre-drilling & Grouting Works (Dropshaft)	53 53 0 0 36 15 55 55 14 3 0 0 14 3 0 0 36 36 36 36 0 0 36 36 36 36 36 36 36 36 48 3 40 40 36 36 9 9 9 19 19 19 40 40 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	13JUL11 08AUG11* 30APR11A 30APR11A 15JUN11 12MAY11A 08AUG11* 19AUG11 19AUG11 09MAR11A 13AUG11 13AUG11 27MAY11 27MAY11 20JUN11 15JUL11* 06AUG11 15JUL11*	12SEP11 14JUN11 14JUN11 18AUG11 26MAY11 20MAR11A 18AUG11 29MAR11A 18AUG11 29SEP11 24SEP11 24SEP11 05AUG11 18JUN11 05AUG11 18JUN11 18JUN11 18JUN11	0 0 0 0 0 18 0 0 90 10 0 0 90 10 0 0 90 10 100 0 100 0 90 59 90 59 0 0	-8 0 12 12 12 12 12 -15 0 12 -13 -2 0 -2		APR MAY WORKS PROGR WORKS PROGR	JUN 2011 AMME APPROVAL sion gramme # 1	- HISTORY Checked SOR	Approved 804B
Intakes - Inte QHS150203 CC27-SECTI Construction Adit Tunnel E QL052 Dropshaft - E QPS210280 Intakes - Inte QH210601 QHS210407 QHS210409 Milestone Section 21 (P M27-1020 M27-1030 CC35-SECTI Construction Intakes - Exter QHS290582 QHS290584 Adit Tunnel E QL013 Dropshaft - E QS290604 QS290604 QHS290368 QL010 Milestone Section 29 (P M351010	Still Chamber Excavation +33mPD - W3 rnal Structures (Stage 2) Penstock Delivery - (W3) ION 21 OF THE WORKS (PORTION TP789) Excavation & Tunnel Lining - TP789 Stilling chamber Lining - TP789 Excavation / Shaft Lining Positioning, Fix & Grout- 162.08m ID2.3 (TP789) rnal Structures (Stage 2) Overhad Gantry erection TP789 Penstock Delivery - (TP789) BS/Vortex/Penstock/Drain Dvn/TS - Stage 2(TP789) Portion TP789) 27.02-Excavation (Dropshaft) 27.03-Lining (Dropshaft) 27.03-Lining (Dropshaft) Intake (4 pours)+RBM Platform-Stage 1a(W10) Intake Struct Part 2 (4 pours) - Stage 1b (W10) Excavation / Shaft Lining RB Setup/Reaming/Demobilization(W10) (95m) RBM Mobilization & Pilot Hole drilling - (W10) Back Reaming & Demobilization - (W10) rnal Structures (Stage 2) Penstock Delivery - (W10) Stabilisation shaft W10	53 53 0 0 36 15 55 55 14 3 0 0 14 3 0 0 14 3 0 0 36 36 4 3 0 0 36 36 4 3 4 3 4 40 40 40 59 59 19 19 40 40 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	13JUL11 08AUG11* 30APR11A 30APR11A 15JUN11 12MAY11A 08AUG11* 19AUG11 19AUG11 09MAR11A 13AUG11 27MAY11 27MAY11 20JUN11 15JUL11* 06AUG11 15JUL11* 06AUG11 15JUL11*	12SEP11 14JUN11 14JUN11 18AUG11 26MAY11 26MAY11 209MAR11A 18AUG11 29MAR11A 18AUG11 29SEP11 24SEP11 24SEP11 05AUG11 18JUN11 05AUG11 18JUN11 05AUG11 18JUN11 18JUN11 18JUN11	0 0 0 0 0 18 0 0 90 10 0 0 90 10 0 0 90 10 100 0 100 0 90 59 0 0 90 59 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	-8 0 12 12 12 12 12 12 12 -15 0 12 -13 -2 0 -2 0 -2 0 -2 0 -2 0 -2		APR MAY WORKS PROGRA WORKS PROGRA Revis Approved Works Pro Approved Works Pro Approved Works Pro	JUN 2011 AMME APPROVAL sion gramme # 1 gramme # 2 gramme # 3	- HISTORY	Approved

Act ID	Activity Description	Orig Dur	Rem Dur	Anticipated Start	Anticipated Finish	% Actual Comp Duratio	Draft Works Prog WP6B	i			2011		
							EF Variance	м	APR	MAY	JUN	JUL	AUG
Section 29 (P M351020	Portion W10) 35.02-Excavation (Dropshaft)	0	0		05AUG11	0 0	-2		- 				٠
	ION 2 OF THE WORKS (PORTION E5A)								 				
Construction	ernal Structures (Stage1)												
S020230	Cofferdam Excavation, ELS & RBM Platform - (E5A)	132	0	17NOV10A	09APR11A	100 117	15	-					
Adit Tunnel E QL105	Excavation & Tunnel Lining - E5A Stilling chamber Lining - E5A	30	30	17JUN11	16JUL11	0 0	22	-	, 				
Dropshaft - E	Excavation/ Shaft Lining				1								
QS020290 QS020293	RB Setup/Reaming/Demobilization(E5A) (43m) RBM Mobilization & Pilot Hole drilling - (E5A)	41	14 4	16MAY11A 16MAY11A	09JUN11 27MAY11	0 7	18	-	1		5		
QS020295	Back Reaming & Demobilization - (E5A)	10	10	28MAY11	09JUN11	0 0	18		 		—		_
QS020350	Positioning, Fix & Grout - 42.78m ID2.3 (E5A)	31	31	11AUG11	16SEP11	0 0	18	_	 			 	
QHS020297	rnal Structures (Stage 2) Rock Excav stage 2 (122cu, 4cu/day) -(E5A)	69	40	11APR11A	10AUG11	20 32	18				-		
QL103 QHS020296	Stabilisation shaft E5A	6	6 6	10JUN11 17JUN11	16JUN11 23JUN11	0 0	18 18	-	 				
Vilestone	Install Protective cover over bored shaft -(E5A)	0	0	1730111	2330111	0 0	10		 				
Section 2 (Po		0	0		001441/44		00		 				
M81040 M81010	8.04-Excavation (Intake) 8.01-Pre-drilling&Grouting Works(Dropshaft)	0	0		23MAY11 27MAY11	0 0	-23	-	 		♦		
M81020	8.02-Excavation (Dropshaft)	0	0		09JUN11	0 0	21				<u>♦</u>		
C37-SECTI	ION 31 OF THE WORKS (PORTION PFLR1)								 				
	ernal Structures (Stage1)								 				
S311252 S311330	Dropshaft pre-grouting - (PFLR1) Blinding-(PFLR1)	12	0	22MAR11A 04APR11A	04APR11A 04APR11A	100 12 100 1	0	_					
S311330 S311340	Blinding-(PFLR1) Base Slabs-(PFLR1)	2 12	0	04APR11A 06APR11A	04APR11A 08APR11A	100 1 100 3	0	-					
S311350	External Walls-(PFLR1)	27	3	09APR11A	26MAY11	10 33 0 0	-9	_					
S311380 S311385	Backfilling & Compaction-(PFLR1) VO#23 Const Manhole SMH21+Extend struct-(PFLR1)	6 44	6 44	27MAY11 03JUN11	02JUN11 26JUL11	0 0	-9 -9	-					I
	Remove Temporary Steel Deck	6	6	27JUL11	02AUG11	0 0	-9	_	1				
	Excavation/ Shaft Lining RB Setup/Reaming/Demobilization(PFLR1) (56m)	51	51	06AUG11	07OCT11	0 0	-2	-	1				
QS311425	RBM Mobilization & Pilot Hole drilling - (PFLR1)	18	18	06AUG11	26AUG11	0 0	-2		 				
	Prnal Structures (Stage 2) Penstock Delivery - (PFLR1)	0	0	08AUG11*		0 0	0	-					♦
	ION9 OF THE WORKS(PORTION HR1)								 				
Construction													
S090250	ernal Structures (Stage1) Cofferdam Excavation + RBM Platform-(HR1)	85	0	15NOV10A	09MAY11A	100 140	11	-					
S090260	Main Structure Construction-(HR1)	60	60	19JUL11	27SEP11	0 0	13		 				
Adit Tunnel E QL134	Excavation & Tunnel Lining - HR1 Stilling chamber Lining - HR1	36	36	19JUL11	23AUG11	0 0	20	-					
	Excavation/ Shaft Lining						1 10		1				
QS090290 QS090293	RB Setup/Reaming/Demobilization(HR1) (45m) RBM Mobilization & Pilot Hole drilling - (HR1)	53 25	40	11MAY11A 11MAY11A	11JUL11 07JUN11	0 11	13	-	1				J
QS090295	Back Reaming & Demobilization - (HR1)	28	28	08JUN11	11JUL11	0 0	13		 				1
	Prnal Structures (Stage 2) Penstock Delivery - (HR1)	0	0	22AUG11*		0 0	0	-	 				
lilestone									 				
Section 9 (Po M151090	Diftion HR1) 15.09-Excavation (Intake)	0	0		29MAR11A	100 0	0	•	MC 122				
M151060	15.06-Pre-drilling & Grouting Works (Dropshaft)	0	0		07JUN11	0 0	15		 		٠		
M151070	15.07-Execavation (Dropshaft) ION 19 OF THE WORKS (PORTION MA17)	0	0		11JUL11	0 0	15		 				
Construction													
Intakes - Exte S190336	ernal Structures (Stage1) Excavate & Strut to +170mPD+ Drain Divers-(MA17)	18	5	23MAR11A	28MAY11	0 47	-13						
S190336 S190337	Excavate & Strut to +170mPD+ Drain Divers-(MA17) Excavate & Strut to +166.5mPD-(MA17)	18	5 18	23MAR11A 30MAY11	28MAY11 20JUN11	0 47	-13						
S190339	Hard Excavation up to +162.5mPD	39	39	21JUN11	05AUG11	0 0	-13		, 				
S190345 <mark>Dropshaft - E</mark>	Install RBM Steel Platform Excavation/ Shaft Lining	10	10	06AUG11	17AUG11	0 0	-13						
QS190620	RB Setup/Reaming/Demobilization(MA17) (117m)	69	69	18AUG11	09NOV11	0 0	-13		 				
QS190655 C17-SECTI	RBM Mobilization & Pilot Hole drilling - (MA17) ION 11 OF THE WORKS (PORTION BR4)	23	23	18AUG11	14SEP11	0 0	-13		 				
construction									 				
	ernal Structures (Stage1) Open Excavation to +102.5mPD + Dropshaft Grout	60	15	21MAR11A	10JUN11	45 49	0						
S110198 S110200	Construct Intake Stage 1 (4 pours)+ RBM Platform	61	61	2 IMARTIA 11JUN11	22AUG11	45 49 0 0	0						
	rnal Structures (Stage 2) Penstock Delivery - (BR4)	0	0	22AUG11*		0 0	0						
QHS110434 lilestone		U	0	22AUG11*		0 0	U		 			 	
Section 11 (P					40 11 11 12 1		^		 				
M171040 C23-SECTI	17.04-Excavation (Intake)	0	0		10JUN11	0 0	0		 		•	1	
onstruction									 				
Intakes - Exte S170294	ernal Structures (Stage1) Cofferdam Excavation + ELS Installation-(MA14)	80	5	08MAR11A	28MAY11	75 60	-6						
S170294 S170296	Intake Stage 1/RBM platform & OHC Install-(MA14)	59	59	30MAY11	08AUG11	0 0	-6						
								м	APR	MAY	JUN	JUL	AU
											2011		
Date 1 Date	30NOV07 03AUG12		105A			T7 TT7	Sheet 8 of 10				AMME APPROV		
Date Date Date	27MAY11 11:15 Progress Bar	ess 104A	De	C	ontract No. l			Da 13JA	ate N09 Approve	Revi d Works Pro		Checked SOR	Approv 804B
	Critical Activity			3 MONT	TH ROLLIN	G PROGRAMI FHLY REPOR	1E	27MA	R09 Approve	ed Works Pro	ogramme # 2 ogramme # 3	SOR	9032
				141741			Ļ				ogramme # 3	SOR SOR	9116 003A
							ŀ				ogramme # 5	SOR	301F

Act ID	Activity Description	Orig Rem Dur Dur	Anticipated Start	Anticipated Finish	% Actual Comp Duration	Draft Works Prog WP6B EF Variance	M	APR	MAY	2011	JUN	JUL	AU
lestone ection 17 ((Portion MA14)			1								 	
123-1040	23.04-Excavation (Intake) TION 13 OF WORKS (PORTION BR5)	0 0		28MAY11	0 0	-7				•		 	
onstruction	1											 	
ntakes - Ex 130200	Cternal Structures (Stage1) Open Excavation-(BR5)	62 0	260CT10A	06APR11A	100 133	13						1 	
130210	Construct Intake Stage 1 (5 pours) - (BR5)	56 4	07APR11A	27MAY11	95 35	30		_				 	
130215	Construct RBM Platform - (BR5) TION 12 OF THE WORKS (PORTION W1)	12 12	28MAY11	11JUN11	0 0	30] 	
onstruction												 	
ntakes - Ex 120216	ternal Structures (Stage1) Open Excav +97-92mPD + RBM Platform - (W1)	62 16	16MAR11A	11JUN11	75 53	8						 	
PS120251		64 64	18AUG11	03NOV11	0 0	16					•	 	
ropshaft - S120293	Excavation/ Shaft Lining RBM Mobilization & Pilot Hole drilling - (W1)	27 27	13JUN11	14JUL11	0 0	16							
S120293	RB Setup/Reaming/Demobilization(W1) (50m)	56 56	13JUN11 13JUN11	14JUL11 17AUG11	0 0	16							
S120295	Back Reaming & Demobilization - (W1)	29 29	15JUL11	17AUG11	0 0	16							
lestone ection 12 ((Portion W1)												
181040	18.04-Excavation (Intake)	0 0		11JUN11	0 0	10					♦		
181010 181020	18.01-Pre-drilling & Grouting Works (Dropshaft) 18.02-Excavation (Dropshaft)	0 0		14JUL11 17AUG11	0 0	19 19						· •	
	TION 24 OF THE WORKS (PORTION W5)						1						
nstruction takes - Ex	1 kternal Structures (Stage1)											 	
HS240342	2 Cofferdam/S Diversion/ELS/Dropshaft Excav - (W5)	366 3	05DEC09A	26MAY11	98 429	-12				Posses	sion date 0	5/Dec/09	
HS240343 HS240345	 Construct Temporary Dropshaft Lining - (W5) Intake Structure (8 pours) Stage 1 (W5) 	46 46 89 89	27MAY11 22JUL11	21JUL11 05NOV11	0 0	-12 -12				 			
	Excavation & Tunnel Lining - W5	09 09				-12							
L034	Stilling chamber Lining - W5	36 36	02AUG11	12SEP11	0 0	4						 	
	ternal Structures (Stage 2) 4 Penstock Delivery - (W5)	0 0	08AUG11*		0 0	0						 	
estone												 	
ection 24 (301040	(Portion W5) 30.04-Excavation (Intake)	0 0		29MAR11A	100 0	0	♦M	2 122				 	
301020	30.02-Excavation (Dropshaft)	0 0		21JUL11	0 0	-14						•	
31-SECT	TION 25 OF THE WORKS (PORTION CR1)											 	
	ternal Structures (Stage1)											 	
250275 250280	Cofferdam Wall Piling 32m -(CR1) Cofferdam Wall Curtain Grout & Shaft Grout-(CR1)	30 16 24 24	14MAR11A 13JUN11	11JUN11 11JUL11	55 55 0 0	-15 -15							
250280	OHC Installation -(CR1)	12 12	12JUL11	25JUL11	0 0	-15							1
250300	Cofferdam Excavation & ELS -(CR1)	46 46	26JUL11	17SEP11	0 0	-15						[] 	
32-SEC I	TION 26 OF THE WORKS (PORTION RR1)											1	
												1	
	tternal Structures (Stage1)				1	1						 	
260368	Cofferdam Excavation & ELS - (RR1)	49 22 84 84	26FEB11A 20JUN11	18JUN11 27SEP11	25 68 0 0	-17					_		
260368 HS260374	Cofferdam Excavation & ELS - (RR1) 4 Stage 1 structure (5 pours) - (RR1) Excavation & Tunnel Lining - RR1	84 84	20JUN11	27SEP11		-17					-		
260368 HS260374 <mark>dit Tunnel</mark> L025	Cofferdam Excavation & ELS - (RR1) 4 Stage 1 structure (5 pours) - (RR1) Excavation & Tunnel Lining - RR1 Stilling chamber Lining - RR1												
260368 HS260374 dit Tunnel L025 takes - Int	Cofferdam Excavation & ELS - (RR1) 4 Stage 1 structure (5 pours) - (RR1) Excavation & Tunnel Lining - RR1	84 84	20JUN11	27SEP11	0 0	-17							•
260368 HS260374 dit Tunnel L025 takes - Int HS260373 estone	Cofferdam Excavation & ELS - (RR1) 4 Stage 1 structure (5 pours) - (RR1) Excavation & Tunnel Lining - RR1 Stilling chamber Lining - RR1 ternal Structures (Stage 2) 3 Penstock Delivery - (RR1)	84 84 36 36	20JUN11	27SEP11	0 0	-17 -26		_					•
260368 HS260374 dit Tunnel L025 takes - Int HS260373 estone ection 26 (Cofferdam Excavation & ELS - (RR1) 4 Stage 1 structure (5 pours) - (RR1) Excavation & Tunnel Lining - RR1 Stilling chamber Lining - RR1 ternal Structures (Stage 2)	84 84 36 36	20JUN11	27SEP11	0 0	-17 -26		_					•
260368 HS260374 dit Tunnel L025 takes - Int HS260373 estone ection 26 (32-1040 33-SECT	Cofferdam Excavation & ELS - (RR1) Stage 1 structure (5 pours) - (RR1) Excavation & Tunnel Lining - RR1 Stilling chamber Lining - RR1 ternal Structures (Stage 2) Penstock Delivery - (RR1) (Portion RR1) 32.04-Excavation (Intake) TION 27 OF THE WORKS (PORTION W8)	84 84 36 36 0 0	20JUN11	27SEP11 29JUL11	0 0 	-17 -26 0					•		•
260368 HS260374 dit Tunnel L025 takes - Int HS260373 estone ection 26 (32-1040 33-SECT nstruction	Cofferdam Excavation & ELS - (RR1) Stage 1 structure (5 pours) - (RR1) Excavation & Tunnel Lining - RR1 Stilling chamber Lining - RR1 ternal Structures (Stage 2) Penstock Delivery - (RR1) (Portion RR1) 32.04-Excavation (Intake) TION 27 OF THE WORKS (PORTION W8)	84 84 36 36 0 0	20JUN11	27SEP11 29JUL11	0 0 	-17 -26 0					•		•
260368 HS260374 dit Tunnel L025 takes - Int HS260373 estone ection 26 (32-1040 33-SECT nstruction takes - Ex 270310	Cofferdam Excavation & ELS - (RR1) Stage 1 structure (5 pours) - (RR1) Excavation & Tunnel Lining - RR1 Stilling chamber Lining - RR1 ternal Structures (Stage 2) Penstock Delivery - (RR1) (Portion RR1) 32.04-Excavation (Intake) TION 27 OF THE WORKS (PORTION W8) TION 27 OF THE WORKS (PORTION W8) Cofferdam Wall Driving - (W8)	84 84 36 36 0 0 0 0 131 0	20JUN11 17JUN11 08AUG11* 19OCT10A	27SEP11 29JUL11 18JUN11 29MAR11A	0 0 0 0 0 0 0 0 0 0 0 0	-17 -26 0 -21					•		•
260368 HS260374 dit Tunnel L025 takes - Int HS260373 estone ection 26 (32-1040 33-SECT nstruction takes - Ex 270310 270312	Cofferdam Excavation & ELS - (RR1) Stage 1 structure (5 pours) - (RR1) Excavation & Tunnel Lining - RR1 Stilling chamber Lining - RR1 ternal Structures (Stage 2) Penstock Delivery - (RR1) (Portion RR1) 32.04-Excavation (Intake) TION 27 OF THE WORKS (PORTION W8) ternal Structures (Stage1)	84 84 36 36 0 0 0 0	20JUN11 17JUN11 08AUG11*	27SEP11 29JUL11 18JUN11	0 0 	-17 -26 0 -21					•		•
260368 HS260374 dit Tunnel L025 takes - Int HS260373 estone ection 26 (32-1040 33-SEC1 nstruction takes - Ex 270310 270312 270320 270321	Cofferdam Excavation & ELS - (RR1) 4 Stage 1 structure (5 pours) - (RR1) 1 Excavation & Tunnel Lining - RR1 Stilling chamber Lining - RR1 ternal Structures (Stage 2) 3 Penstock Delivery - (RR1) 32.04-Excavation (Intake) TION 27 OF THE WORKS (PORTION W8) N Cofferdam Wall Driving - (W8) Curtain Grouting -(W8) Mibilization Excavation + ELS to +63.6mPD - (W8) Excavation + ELS to +58.5mPD - (W8)	84 84 36 36 0 0 0 0 10 0 131 0 20 0	20JUN11 17JUN11 08AUG11* 08AUG11* 19OCT10A 30MAR11A	27SEP11 29JUL11 18JUN11 29MAR11A 26APR11A	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	-17 -26 0 -21 0 0 0					•		•
260368 HS260374 dit Tunnel L025 takes - Int HS260373 estone ection 26 (32-1040 33-SECT nstruction takes - Ex 270310 270312 270320 270321 34-SECT	Cofferdam Excavation & ELS - (RR1) Stage 1 structure (5 pours) - (RR1) Excavation & Tunnel Lining - RR1 Stilling chamber Lining - RR1 ternal Structures (Stage 2) Penstock Delivery - (RR1) (Portion RR1) 32.04-Excavation (Intake) TION 27 OF THE WORKS (PORTION W8) Cofferdam Wall Driving - (W8) Cofferdam Wall Driving - (W8) Curtain Grouting -(W8) Mibilization Excavation + ELS to +63.6mPD -(W8) Excavation + ELS to +58.5mPD - (W8) TION 28 OF THE WORKS (PORTION P5)	84 84 36 36 0 0 0 0 131 0 20 0 770 42	20JUN11 17JUN11 08AUG11* 08AUG11* 19OCT10A 30MAR11A 27APR11A	27SEP11 29JUL11 18JUN11 29MAR11A 26APR11A 13JUL11	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	-17 -26 0 -21 0 0 0 0 7					•		•
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	Act ID	Activity Description	Orig Dur	Rem Dur	Anticipated Start	Anticipated Finish		Actual Duration	Draft Works Prog						
									WP6B				2011		
									EF Variance	м	APR	MAY	JUN	JUL	AUG
Inta	kes - Inter	nal Structures (Stage 2)													
QHS	S321633	Penstock Delivery (SM1)	0	0	15JUL11*		0	0	0					♦	
QHS	S321634	Penstock/Finish/PSBW/RI - Intake Stage 2 (SM1)	19	19	25JUL11	15AUG11	0	0	-9			- +			
Miles	stone														
Gen	neral													 	
M38	31070	38.07-Section32 - SM1 Handover to SO	0	0		15AUG11	0	0	-11					 	♦
Sec	tion 32 (Po	ortion SM1)													
M38	31030	38.03-Lining (Dropshaft)	0	0		03AUG11	0	0	14						♦
M38	31050	38.05-Concrete Structure (Intake)	0	0		15AUG11	0	0	-11						♦
M38	31060	38.06-Slopeworks, Backfilling & Reinstatement	0	0		15AUG11	0	0	-11					1	♦

			M	APR	MAY	JUN 2011	JUL	AUG
Start Date 30NOV07 Finish Date 03AUG12 Data Date 24MAY11 Run Date 27MAY11 11:15 © Primavera Systems, Inc.	Early Bar Last Month Progress 104A Progress Bar Critical Activity	MAY /2011 MONTHLY REPORT	Date 13JAN09 27MAR09 10DEC10 01MAR10	Approved Approved Approved Approved	RKS PROGRAMM Revision d Works Prograd d Works Prograd d Works Prograd d Works Prograd d Works Prograd	mme # 1 mme # 2 mme # 3 mme # 4	HISTORY Checked SOR SOR SOR SOR SOR	Approved 804B 9032 9116 003A 301F

APPENDIX N WASTE GENERATED QUANTITY

Monthly Waste Flow Table

		Actual	Quantities of In	ert C&D Materia	lls Generated N	Ionthly	Actu	al Quantities o	f C&D Wastes	Generated Mo	onthly
Quarter ending	Total Quantity Generated	Broken Concrete	Reused in the Contract	Reused in other Projects	Disposed as Public Fill	Imported Fill	Metals	Paper/ cardboard packaging	Plastics (see notes 2)	Chemical Waste	Others, e.g. general refuse
	$(\operatorname{in} \mathrm{m}^3)$	$(\text{ in } \text{m}^3)$	$(\text{ in } \text{m}^3)$	$(\operatorname{in} \mathrm{m}^3)$	$(\operatorname{in} \mathrm{m}^3)$	$(\operatorname{in} \mathrm{m}^3)$	(in Kg)	(in Kg)	(in Kg)	(in Kg)	$(\operatorname{in} \mathrm{m}^3)$
Jan 2011	24478	0	24	22424	1992	38	25905	385	0	0	84
Feb 2011	11114	0	0	10034	1080	0	128470	385	0	4924	73
Mar 2011	14052	0	4	12042	2006	0	273060	700	0	3072	101
Apr 2011	11795	0	0	10441	1354	0	496610	315	0	0	84
May 2011	12099	0	0	11134	965	0	54330	315	0	0	140
Jun 2011											
Sub-Total	73538	0	28	66075	7397	38	978375	2100	0	7996	482
July 2011											
Aug 2011											
Sep 2011											
Oct 2011											
Nov 2011											
Dec 2011											
Total											

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/foam from packaging material.

(3) Quantities in May 2011 are upto 31 May 2011.

(4) Assuming the conversion factor from m^3 to ton for rock is 2.5.

(5) The materials reused in other Project shall not be treated as waste under the Waste Disposal Ordinance (Cap 354).

(6) The figures are included for the sake of completeness of record.

ANNEX I REVIEW REPORT FOR "HANDLING & DELIVERY OF EXCAVATED MATERIALS AT THE WESTERN PORTAL"

Background

1. Project

"Dragages - Nishimatsu Joint Venture (DNJV)" is the principal contractor undertaking the contract work (DSD Contract No.: DC/2007/10) for the construction of:

- A drainage tunnel (Main Tunnel) from Tai Hang to Cyberport, having an internal diameter from 6.25m to 7.25m;
- A network of adits connecting to the Main Tunnel; and
- 32 intakes to collect surface runoffs into the Main Tunnel via the adit network. The water collected will be discharged into the sea at Cyberport.

The entire drainage tunnel network is built in rock strata, composed of granite and volcanic rocks. Two tunnel boring machines (TBM) are employed for the excavation of the Main Tunnel – one TBM is driving from the East to West whereas the other TBM is operating from West to East. The two tunnels will be broken through at a point near Stubb Road. The conventional drill and blast method is adopted for the excavation of the adits. The excavation of the Main Tunnels and the adits are concurrently carried out.

In addition, mechanical excavation, raise boring method, reverse circulation drilling and handdug caisson are used for the excavation of intakes cofferdam and dropshafts.

To facilitate the operation of the TBM and tunnel excavation, a temporary barging point was formed at the Western Portal in Cyberport to provide support for the supplies to both TBM; for handling of excavated materials; and for the berthing of vessels.

In the West Tunnel, the excavated materials generated from the TBM operations are delivered by a conveyor belt to the tunnel portal and are discharged either onto the barge or the TBM Spoil Basin. On the other hand, materials generated by drill-and-blast method in the adits are delivered to the Adit Spoil Basin at the portal for subsequent discharge onto the barge.

All excavated materials generated from tunneling operations at the West Portal are delivered by barges to the approved disposal ground for recycling use.

2. Environmental Impact Assessment (EIA)

The Work is a "designated project" under Schedule 2 of Environmental Impact Assessment Ordinance, Cap. 499. An EIA Study has been undertaken by Black & Veatch Hong Kong Ltd. for the Project to provide information on the nature and extent of potential environmental impacts arising from the construction and operation of the Project and related activities taking place concurrently, and to contribute to decisions on the overall environmental acceptability of the Project.

The EIA Report was issued in January 2006, and was approved by EPD under the EIAO (Register No.: AEIAR-099/2006 dated 7-Apr-06). In March 2006, Drainage Services Department (DSD) commissioned Ove Arup and Partners Hong Kong Limited (Arup) to undertake the consultancy assignment of Agreement No. CE 17/2005 (DS), based upon more detailed design information. The Technical Note on Supplementary Environmental Assessment was issued on 29-Mar-07 to highlight the changes since the approval of the EIA Report; evaluate the associated environmental implications; and review the mitigation measures required.

The following is mentioned in Chapter 6: Air Quality Assessment of the EIA Report (Register No.: AEIAR-099/2006) prepared by Black & Veatch:

"6.5.7 For Western portal, spoil generated will be delivery to barges by means of a covered conveyor belt. As a result, the number of vehicles entering the site will be reduced hugely and no vehicle-generated air pollution problems will arise. However, dust may be emitted from the transfer points of the conveyor. Proper design and maintenance of the conveyor will reduce dust emissions from the transfer points to ensure low dust impact."

The intent of this Clause is to reduce the impact on air quality arising from handling and delivery of spoil to a minimum.

There are comments from concerned groups over the site arrangements for the handling and delivery of excavated materials from the tunnel and adits.

3. Environmental Permit

The Environmental Permit (EP-272/2007) was first issued to DSD on 26-Apr-07. An application for construction and operation of the designated project was subsequently made and the revised Permit (EP-272/2007/A) was issued on 26-Oct-07. After the award of the Contract, DNJV applied for the issue of Further Environmental Permit (FEP-01/272/2007/A) which was subsequently issued on 28-Jan-08. A variation to the Further Environmental Permit was made in June 2009 and the revised Permit (FEP-01/272/2007/B) was issued on 25-Jun-09.

Purpose and Scope

A review was performed on the current site arrangements on the delivery and handling of excavated materials, particularly the Western Portal, within the context of the EIA Report and over their impact on the environment.

Delivery and Handling of Excavated Materials

1. Excavated Materials from TBM

Excavated materials generated from the operation of the tunnel boring machine are small (often less than 100mm) and the sizes are quite uniform. These materials are carried by a covered conveyor belt system installed near the crown of the Main Tunnel; and are discharged directly onto the barge berthed at the seawall. *Owing to the mode of TBM operation, there are times that TBM excavated materials must be re-handled*.

Typical examples include:

• A barge is already full and has to leave the Site. When there is no barge at the seawall, the materials will be discharged into the TBM Spoil Basin.

• When the TBM operates during night time, we have to discharge the TBM excavated materials into the TBM Spoil Basin in accordance with the conditions of the Construction Noise Permit in force.

When the next barge comes during daytime, the materials stored in the TBM Spoil Basin will be picked up by a backhoe and are transferred into a side conveyor. The side conveyor carried the materials to the main conveyor for discharge onto the barge (*Photo 1*).



Photo 1: View of the Western Portal

The Main Conveyor and the Side Conveyor are fully enclosed by sound absorptive panels.

2. Excavated Materials from Drill-and-Blast Adits

Excavated materials generated by drill-and-blast are bigger (over 200mm) and they are of irregular sizes and shapes.

The materials are picked up by either the Häggloader (*Photo 2*) or the John Deere skid loader (*Photo 3*) at the adit face; and they are then transferred onto train cars (Shuttle Cars as in *Photo 4*). These Shuttle Cars will be brought to the Adit Spoil Basin at the tunnel portal (*Photo 5*). A backhoe is deployed at the surface adjacent to the Adit Spoil Basin transferring the excavated materials from the Adit Spoil Basin onto a 24-T dump truck that travels less than 100m within the Site from the Adit Spoil to the ramp jetty and vice versa.

The Adit Spoil Basin is provided with noise covers such that the entire basin is fully enclosed for nighttime operation.

The ramp jetty is enclosed at 3 sides – the top and the lateral sides. It is equipped with curtains and water sprinkler system for dust suppression. (*Photo 6 & 7*)



Photo 2: Häggloader



<u>Photo 5</u>: Shuttle car discharging excavated materials at the Adit Spoil Basin



Photo 3: John Deere Skid Loader



Photo 6: The Ramp Jetty



Photo 4: Shuttle Car



<u>Photo 7</u>: Dump truck discharging excavated materials onto the barge at the ramp jetty

Environmental Considerations

DNJV chooses the current mode of handling and delivery of excavated materials after careful consideration to its impact on the environment. (i.e. TBM excavated materials by conveyor belt onto barge or the TBM Spoil Basin; and Adit excavated materials by trains to the Adit Spoil Basin and onto the barge by dump trucks)

It is because excavated materials from Drill-and-Blast Adits cannot be handled by a conveyor system due to their big sizes and heavy weight. If a conveyor system was used, we need to mechanically break the materials into small chunks at the portal surface, using hydraulic breakers or by other means. That will certainly have an impact to the environment (e.g. more noise produced, more dust generated, more diesel fuel consumed).

All wastewater collected from surface runoffs and from the spoil basins are pumped into Wetsep and the water treatment plant at the Western Portal for treatment before discharge into the sea in accordance with the conditions of the Effluent Discharge Licences in force.

The current mode of operation has the least impact to the environment in terms of noise, air and water. Mitigating measures in place at the Western Portal are described in details in the next section. Moreover, excavated materials from TBM operation (uniform size) and those from drill-and-blast operations in the adits (irregular sizes) are delivered to the approved disposal locations for reuse (e.g. site formation).

Environmental Mitigation Measures at Western Portal

1. Covered Conveyors

Both the main and side conveyors (*Photo 8*) are entirely covered to mitigate noise propagation and avoid fugitive dust during the transportation of excavated materials.

- 2. <u>Dust Suppression</u>
 - A sprinkler system (*Photo 9*) was installed underneath the ramp jetty for dust suppression when excavated materials are being loaded onto the barge.
 - Dust curtains (*Photo 10*) were also installed at the outer rims of the conveyor enclosure in order to shield fugitive dust, if any, arising from the discharge of excavated materials from the conveyor.
 - The 24T dump truck transporting materials from the Adit Spoil Basin to the ramp jetty is fitted with mechanical covers.
- 3. <u>Noise Enclosure at Western Portal and the Adit Spoil Basin</u>

All logistics movements take place inside a sophisticated and purposely-built acoustic enclosure. Mobile plant such as locomotives and train cars are travelling inside the noise enclosure and into the tunnel under construction. In addition, movable noise covers (*Photo 11*) were provided in the Adit Spoil basin to block noise propagation during the unloading of excavated materials from the shuttle cars.

4. Noise Barriers at Western Portal

In addition to the noise enclosure erected at the Western Portal, a row of noise barrier was built in the Western Portal adjacent the pea gravel storage yard (*Photo 12*). The barrier does not only screen the mobile plant at the pea gravel storage yard from the views of the Aegean Terrace residents, but it shields part of the noise generated from the operation of such plant. There is another row of barriers erected at the side abutting the Cyberport Road (*Photo 13*).



Photo 8: Covered Conveyors



<u>Photo 9</u>: Sprinkler system installed at the ramp jetty

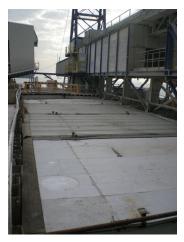


Photo 11: Noise covers at the Adit Spoil Basin



<u>Photo 12</u>: Noise barrier at the pea gravel storage yard at the side facing Aegean Terrace



<u>Photo 10</u>: Dust curtains at the discharge point



Photo 13: Noise barrier along Cyberport Road

Air Quality Monitoring

DNJV has been undertaking the 24-hour Total Suspended Particulates (TSP) monitoring since commencement of the Work. The TSP station is installed within our site boundaries rather than the designated location at Aegean Terrace as stipulated in the E&MA Manual. The reason is that residents at Aegean Terrace refused to allow the environmental team to set up the instrument on their premises. Sampling and analysis are conducted by an HOKLAS laboratory to collect TSP filtering sample in a frequency of once every 6 days.

The 24-hour TSP monitoring results indicate that the TSP levels are all below Action (156 μ g/m³). No exceedance on monitoring limits was recorded. The agreed and pre-set Action and Limit levels and the actual TSP monitoring levels in the past 4 months are shown below.

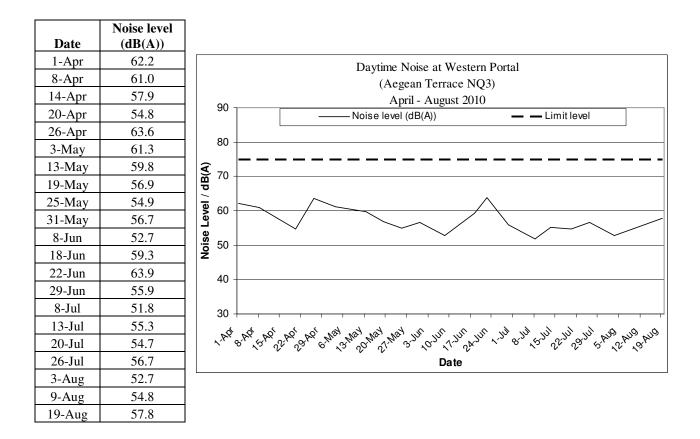
The impact on air quality arising from the handling and delivery of excavated material is insignificant.

	TSP level	
Date	$(\mu g/m^3)$	
7-Apr	108	TSP 24-hour monitoring at Western Portal (AQ3)
13-Apr	47.6	April - August 2010
19-Apr	123.9	$300 - TSP \text{ level } (\mu g/m3) Action \text{ level } - Limit \text{ level}$
24-Apr	135.5	
30-Apr	62.2	250
6-May	60.7	
12-May	86.5	200
18-May	103.6	
24-May	133.5	
29-May	68.5	
4-Jun	94.9	
10-Jun	38.0	
15-Jun	74.5	
21-Jun	53.4	
26-Jun	39.0	
2-Jul	63.9	0 +
8-Jul	95.9	1. A & A & 1. A & B A & May 2 May 2 May 2 W & Way 2 W & 2 W
14-Jul	84.6	1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1
20-Jul	116.6	Date
26-Jul	117.8	
31-Jul	89.7	
6-Aug	102.8	
12-Aug	42.0	
18-Aug	103.8	

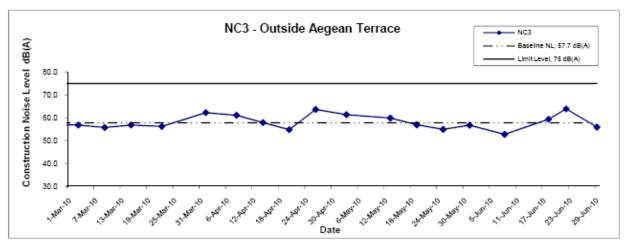
Environmental Noise Monitoring

The E&MA Programme requires the carrying out of baseline noise monitoring prior to the commencement of construction work and impact noise monitoring when actual construction work started on the Site. DNJV employs an environmental team to conduct periodic noise monitoring during daytime, evening and nighttime. The designated noise monitoring station is adjacent to the Aegean Terrace, the nearest noise sensitive receiver. The daytime noise levels in the months from April to August as well as corresponding readings during daytime, evening and nighttime in the previous quarter are tabulated and graphically illustrated below.

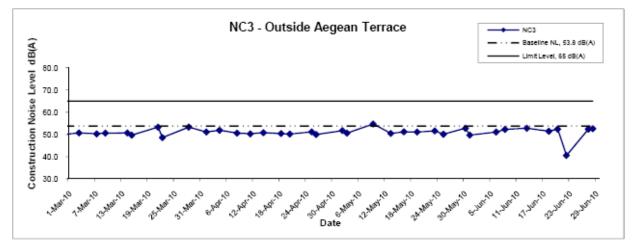
There is no exceedance of noise levels recorded in the past 4 months. The noise impact arising from the handling and delivery of excavated material is insignificant.



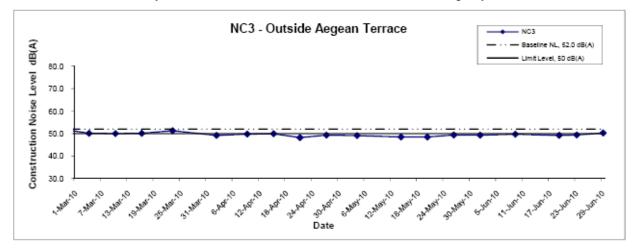
Noise Levels



Noise Levels (Restricted Hours - 07:00 - 23:00 holidays & 19:00 - 23:00 on all other days)



Noise Levels (Restricted Hours - 23:00 to 07:00 on all days)



Conclusion

The current mode of handling and delivery of excavated materials from TBM operation and adit excavation (drill-and-blast) has insignificant impact to the environment. It does not deviate from the intent of the EIA Report on the control of air quality – Clause 6.5.7 of the Report, and does not constitute material change of the EIA of Hong Kong West Drainage Tunnel Project.

It also concludes that the current spoil transportation arrangement does not constitute a breach of Condition 1.7 of the Further Environmental Permit that the HKWDT Project is designed and constructed in accordance with the information and all recommendations described in the EIA Report.

Appropriate mitigation measures are designed and implemented with due consideration of actual work method and site constraints to ensure compliance with the respective air quality and noise emission limits at the nearby sensitive receivers. These are in line with the recommendations of the EIA Report and comply with the conditions of the Further Environmental Permit.

ANNEX II PROPOSAL OF TWO BLASTS PER DAY IN WESTERN ADITS

Proposal of Two Blasts Per Day in Western Adits

1. Objectives

The objectives of this document are to:

- Explain the proposed arrangement of 2 blasts per day and the construction sequence,
- Review environmental implications and mitigation of the proposed arrangement,
- Review the related documents under EIA Ordinance to check whether there are any conditions/restrictions applicable to the proposed blasting arrangement.

2. The Project

The Hong Kong West Drainage Tunnel (DSD Contract No.: DC/2007/10) is a stormwater drainage tunnel running between Tai Hang (Eastern Portal) and Cyberport (Western Portal) with a network of adit tunnels. It is designed to collect stormwater from the upper catchments by a system of intake points, dropshafts and adits to relieve the flooding problem at the lower catchments of northern Hong Kong Island during heavy rainstorms. The Main Tunnel comprises 2 tunnel sections, namely:

- A main tunnel with internal diameter of 6.25m from Ch+43 (Eastern Portal) to Ch3+955.
- A main tunnel with internal diameter of 7.25m from Ch3+955 to Ch10+534 (Western Portal)

The 2 Main Tunnel Sections are excavated by the operation of 2 tunnel boring machines (TBM). On the other hand, the adits are excavated by drill and blast method.

3. Blasting in the West Adits

DNJV is currently adopting drill and blast method for the construction of the Western Adits. The blasting direction is from the Main Tunnel towards the intake dropshafts. For safety reason and full evacuation of personnel from the TBM, blasting can only be commenced when the TBM excavation has progressed some 200m beyond the adit and tunnel junction. This criterion is a restriction to the progress of adit excavation (especially when hard ground conditions or fault zones are encountered) though a number of adits can be excavated concurrently by drill and blast (*concurrent blasting*).

At present, drill and blast operation is now being conducted at 8 adits (including SM1, P5, HKU1, RR1, W5, TP4, TP5 and TP789) <u>concurrently</u> during daytime. It is worthwhile noting that the blasting faces are located from 2,100m to 4,200m from the tunnel portal.

Figure 1 illustrates the alignment of the West Tunnel and West Adits and the progress of TBM excavation in the West Tunnel.

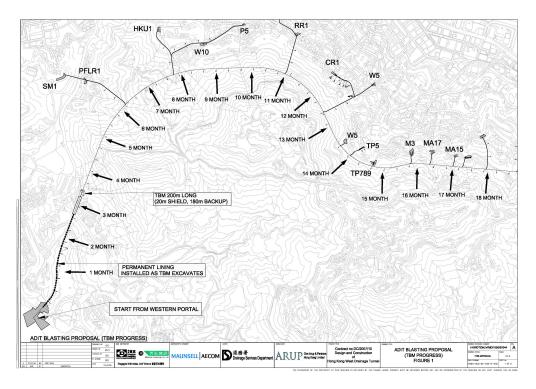


Figure 1: West Tunnel/Adit Alignment and TBM Progress

Lockable blast doors are installed at each main tunnel and adit junction where blasting is to be carried out. Besides, ventilation fans are installed to induce forced ventilation during mucking out and extraction ventilation immediately after blasting.

All daily blasting are carried out at the same time and therefore all adit working faces will be cleared prior to blasting the charged adits along the entire section of the tunnel. The daytime blasting window is somewhere between 13:00 hours and 19:00 hours. A typical work cycle includes the following activities:

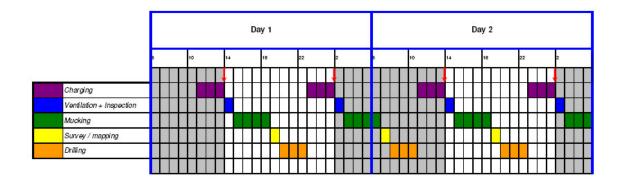
- (1) Drilling
- (2) Charging
- (3) Blasting
- (4) Ventilation (extraction of blast fumes)
- (5) Inspection (check for misfire and loose rocks)
- (6) Mucking
- (7) Installation of temporary tunnel support
- (8) Survey/mapping

Owing to the working cycle for a single concurrent blast and the progress of the tunneling works (the adits to be blasted are getting deeper and deeper in the Main Tunnel), the daytime blasting schedule is pushed to the latter part of the blasting window.

4. Two Blasts Per Day

The Hong Kong West Drainage Tunnel Project is a flood relief programme for the northern shore of Hong Kong Island. The timely completion of the Project is important to the safety of the people living in the low-lying areas along the northern shore of Hong Kong Island. DNJV proposes to increase the blasting work to two times per day to ensure timely completion of the Project, especially when unexpected ground conditions are encountered during adit excavation. Two blasts per days are planned initially for the Adits leading to Intakes HKU1, W10 and P5.

Because of the time taken for a typical work cycle, it is anticipated that the second blast will take place in the early hours of the day (around 01:00 to 03:00 hours).



For the planned arrangement for two blasts per day, it is important to note the following points: -

- (1) The blasting faces are currently located from 2,100m to 4,200m from the tunnel portal and 120m 150m below the surface. The distances will increase as tunnel and adit excavation progress. Besides, the blast faces
- (2) For nighttime blasting, DNJV will attempt to limit the number of blast faces (1 to 2).
- (3) There is no change in construction methodology for adit excavation. As mentioned in the EIA Report, blasting is seen as the most suitable method of excavation for adits.
- (4) There is no change in the number and type of prescribed powered mechanical equipment used in the nighttime blasting.
- (5) There is no overnight storage of explosives on Site. There will two deliveries of explosives to Site by the Mines Division one in the morning and the other in late afternoon. The explosives will be delivered to the blasting locations inside tunnel by means of a special train and under the strict supervision by the Mines Department.

5. Environmental Implications and Mitigations

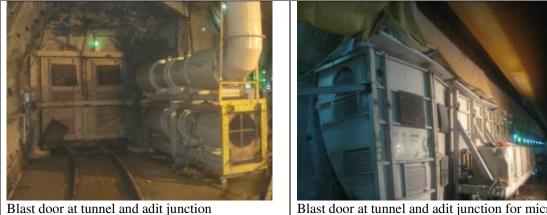
Air Quality

- Water sprinklers and water spraying are used to suppress dust and fumes generated by blasting.
- A fume scrubber is installed at the tunnel portal for further dust and fume suppression.
- The TSP monitoring station is now installed within the site boundaries at the Western Portal. Air monitoring has been carried out since the commencement of construction work. No exceedance has been registered even after adit blasting was conducted inside the tunnel.

Noise

- No new plant and equipment will be introduced as a result of 2 blasts per day or nighttime blasting. The existing powered mechanical plant pertaining to works under restricted hours both at the surface and inside tunnel still apply. A Construction Noise Permit (GW-RS0774-10) was granted to cover all PME essential for the drill & blast works and nighttime operation.
- Blast doors will be installed at the tunnel and adit junctions to confine the blast areas.
- As the blasting faces are all deep inside the tunnel (the rock cover 120m -150m), the number of blast faces is limited and the noise generated during blasting is transient in nature, the noise impact on the nearby communities will be insignificant.
- The noise enclosure at the tunnel portal area will remain, allowing for operation of PME within the enclosure during restricted hours.
- Noise monitoring at designated locations as described in the EM&A Manual will continue.

Photos of Mitigation Measures for Blasting Works



Blast door at tunnel and adit junction for microblasting



Water Treatment and Handling of Excavated Materials

- Water collected from the main tunnel will either by treated before discharge or temporarily stored for reuse.
- Valid effluent discharge licences are in force at the Western Portal and periodic water samplings are performed in accordance with the licence conditions.
- Excavated materials from adit blasting will be transported to the tunnel portal (inside the noise enclosure) for overnight storage in the Adit Spoil Basin which is fully covered by noise panels. Removal of excavated materials from the Adit Spoil Basin to the barge will only be done in the following morning.

6. Environmental Document Review

The following environmental documents under EIA Ordinance and related to the Project have been reviewed:

- (1) The EIA Report (Register No.: AEIAR-099/2006) prepared by Black & Veatch Co.
- (2) The Technical Notes on Supplementary Environmental Assessment prepared by Ove Arup in March 2007.
- (3) The Technical Notes to Support VEP Application, prepared by Ove Arup in October 2007.
- (4) The Environmental Permit (EP-272/2007/B) previously held by DSD and the Further Environmental Permit (FEP-01/272/2007/B) currently held by DNJV.

EIA Report

The following clauses are relevant the subject matter:

"2.4.5 Blasting is seen as the most suitable method of excavation for the adits due to the relative cost of alternative methods of construction. Blasting is not seen as a suitable method of excavation or the shafts due to the noise generated. Given the proximity of the intake shaft locations to sensitive receivers, blasting would need to be severely restricted to remain within the noise restrictions. Construction of shafts by drill and blast would also necessitate the shafts to be constructed larger than the 2.3 diameter required enabling spoil to be removed. This would consequently lead to slower progress

and would also cause difficulties at many intake locations, where the working area is very restricted.

- 6.5.9(ii) No blasting shall be carried out when the strong wind signal or tropical cyclone warning signal No. 3 or higher is hoisted (unless prior permission of the Commissioner of Mines is obtained).
- 13.3.2 For the adit construction, drill and blast method will be adopted for the majority of the works. As the storage of explosives relates to the extent of the drill and blast component of works, it is important to review the rate of work, storage/delivery arrangements and the duration of the works. The blasting works will require about 30 months to complete. Based on the proposed construction programme and the blasting frequencies, there will be no requirement for overnight storage of explosive on site. The delivery of the explosive will be once per day. The delivery of explosives from Government Explosives Depots to the blasting site is controlled by the Explosives Delivery Unit of the Mines Division. Explosives are classified as Category I Dangerous Goods and use of explosives is controlled under the Dangerous Good Ordinance (Chapter 295). Since there will be no overnight storage of explosive on site, no Quantitative Risk Assessment is required for this study."

Technical Notes on Supplementary Environmental Assessment

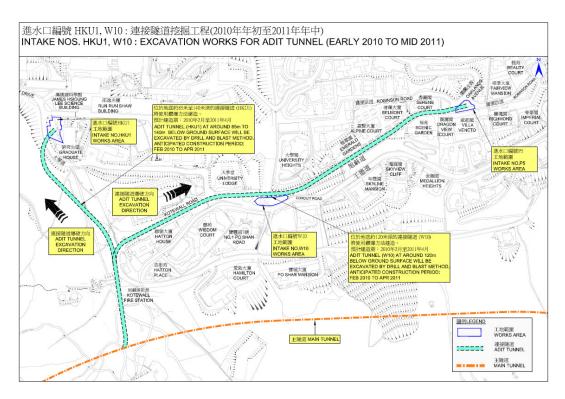
Table 1-1: 'Summary of General Design Changes Since Approval of EIA' in page 2 of the Technical Notes states the following:

EIA Assumptions	Proposed Improvements	Justifications	Environmental Concerns
Delivery of	Delivery of explosive once	Additional delivery and	No impact on the EIA is anticipated since
explosives once per day	or twice per day	blasting will expedite the progress of construction	there are still no overnight storage of explosive (see Section 12)

The proposed improvement in the Technical Notes does allow for 2 blasts per day and confirms no environmental concerns with such an improvement.

Technical Notes to Support VEP Application

The Technical Notes were prepared to address the impact of the proposed slight southward shift of the HKU1-W10-P5 Adit Junction due to the corresponding shift of the main tunnel alignment. However, there is no change in the HKU1-W10-P5 intake locations. The Notes do not mention anything about the blasting along the adits and in particular the HKU1-W10-P5 Adits.



Environmental Permit & Further Environmental Permit

There are no General Conditions or Special Conditions in the EP and FEP for blasting works on Site.

7. Environmental Team Leader's Comments

The Environmental Team Leader (Dr. Priscilla Choy) expressed her professional opinion in her letter of 8 September 2010 that there is no specific restriction on 2 blasts per day including nighttime blasting work.

8. Conclusion

DNJV proposes 2 blasts per day in the West Adits – one in the daytime and the other one during nighttime. The review concludes that there is no restriction in all relevant environmental documents under the EIA Ordinance on 2 blasts per day (even nighttime blasting).

In addition, there is no adverse impact on the environment as a result of 2 blasts per day and nighttime blasting.

End of Text



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Dragages-Nishimatsu Joint Venture 27/F., 625 King's Road North Point, Hong Kong

Attn: Mr. Daniel Altier

By Fax (2671 9300) & E-mail 8th September 2010

Dear Sir,

Contract No. DC/2007/10 Design and Construction of Hong Kong West Drainage Tunnel <u>Proposal for 2 blasts in the West Adits</u>

We refer to your message regarding the environmental aspects for proposing 2 blasts per day in the West Adits via e-mail on 3rd September 2010 for the captioned project.

After reviewing the relevant Environmental Permit, EIA Reports (including Technical Notes on Supplementary Environmental Assessment) for the captioned Contract, we would like to confirm that there is no specific restriction for 2 blasts per day including nightime blasting for the Project. However, the EIA Report specifies that there will be no ovemight storage of explosives for this project.

Although there is no restriction for 2 blasts per day, the following mitigation measures are recommended in the EIA Report for blasting operation:

Air Quality

No blasting shall be carried out when the strong wind signal or tropical cyclone warning signal No. 3 or higher is hoisted (unless prior permission of the Commissioner of Mines is obtained).

Hazard to Life

No overnight storage of explosives for this project.

If you have queries, please contact the undersigned at 2151 2089.

Yours faithfully, Cinotech Consultants Limited

Dr. Priscilla Choy Environmental Team Leader

Directors: Dr H FChan (Managing Director), Dr Priscilla Choy A MEMBER OF CINOTECH GROUP



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