

Hong Kong Jockey Club

**Main Arena of the 2008
Olympic Equestrian
Event**

Environmental Monitoring
& Audit Manual

Final

Hong Kong Jockey Club
Main Arena of the 2008 Olympic Equestrian Event

Environmental Monitoring & Audit Manual



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ABBREVIATION

ANL	Acceptable Noise Level
APCO	Air Pollution Control Ordinance
AQO	Air Quality Objectives
Arup	Ove Arup and Partners Hong Kong Ltd
ASR	Air Sensitive Receiver
BMP	Best Management Practice
BOCOg	The Beijing Organising Committee for the Games of the 29th Olympiad
BNL	Basic Noise Level
BOD ₅	5-day Biochemical Oxygen Demand
C&D	Construction and Demolition
CNP	Construction Noise Permit
DO	Dissolved Oxygen
DP	Designated Project
EIA	Environmental Impact Assessment
EIAO	Environmental Impact Assessment Ordinance
EM	Environmental Manager
EMP	Environmental Management Plan
EMIS	Environmental Mitigation Implementation Schedule
EM&A	Environmental Monitoring and Audit
E&M	Electrical and mechanical
EP	Environmental Permit
EPD	Environmental Protection Department
ER	Engineer's Representative
ET	Environmental Team
ETWBTC	Environment, Transport and Works Bureau Technical Circular
FEI	Federation Equestre Internationale
HKGC	Hong Kong Golf Club
HKPSG	Hong Kong Planning Standards and Guidelines
HKSARG	Hong Kong Special Administration Region Government
HKSI	Hong Kong Sports Institute
IEC	Independent Environmental Checker
IOC	The International Olympic Committee
NCO	Noise Control Ordinance
NSRs	Noise Sensitive Receivers
OZP	Outline Zoning Plan
PCW	Prescribed Construction Work
PlanD	Planning Department
PME	Powered Mechanical Equipment
ProPECC	Practice Note for Professional Persons
SS	Suspended Solid
SWL	Sound Power Level
TCLP	Toxicity Characteristic Leaching Procedure
TMs	Technical Memoranda
TM-GW	Technical Memorandum on Noise from Construction Work other than Percussive Piling
TM-DA	Technical Memorandum on Noise from Construction Work in Designated Areas
TM-EIA	Technical Memorandum on Environmental Impact Assessment Process
TM-Places	Technical Memorandum on Noise from Places other than Domestic Premises, Public Places or Construction Sites
TM-PP	Technical Memorandum on Noise from Percussive Piling
TM-Water	Technical Memorandum on Standards for Effluents Discharged into Drainage and Sewerage Systems, Inland and Coastal Waters
TPH	Total Petroleum Hydrocarbon
TSP	Total Suspended Particulates
USEPA	United State Environmental Protection Agency
VSR	Visually Sensitive Receivers
WBTC	Works Branch Technical Circular
WDO	Waste Disposal Ordinance
WMP	Waste Management Plan

WPCO Water Pollution Control Ordinance
WQO Water Quality Objective
WSR Water Sensitive Receiver

1. INTRODUCTION

1.1 Project Background

The proposed Main Arena of the 2008 Olympic Equestrian Event is classified as a Designated Project (DP) under item O7, Part 1, Schedule 2 of the Environmental Impact Assessment Ordinance (EIAO). Other than the Main Arena, the rest of the facilities in the Project are non-Designated Projects (non-DP). Table 1-1 gives an account of the DP and non-DP for the project.

Table 1-1: DP and non-DP of the project

DP	Non-DP
Main Arena for 20,000 spectators	Logistic Compound, Food & Merchandise, Spectator Entry & Broadcast Compound, Stable Complex (including a veterinary), Various Training Arenas

In accordance with the requirements of Section 5(1) of the EIAO, a project profile (No. PP-266/2005) was submitted to Environmental Protection Department (EPD) for the application of an EIA Study Brief on 17 October 2005. Pursuant to Section 5(7)(a) of the EIAO, EPD issued to the Hong Kong Jockey (HKJC) a study brief (ref: EIA Study Brief No: ESB-136/2005 dated 7 November 2005) to carry out an EIA study.

The venues will be operational for one month during the main Olympic event, with the competition expected to last from between 10 to 14 days. 14 days after the Olympic Events, the Paralympic competition will be staged, which will last for a few days. The Paralympic Event is open to paid spectators estimated to be less than 10,000.

One year before the actual Olympic Events, the site will be occupied for the Test Event, which is used by all divisions of the Olympic Organising Committee to test their organisational capabilities for the Games and Event Management to trail the equine facilities and the footing (riding surface) of the Main Arena, Stables and Training Facilities. These mock up events are known as the 'Test Event Mode', and limited public access will be given.

1.2 Construction Programme

The implementation of the Project is scheduled from July 2006 to January 2009. Table 1-2 gives the tentative project timetable and phasing.

Table 1-2: Project timetable and phasing for the Project

Task	Start	Finish
Pre- Test Event Construction	July 2006	June 2007
Test Event	August 2007 (2 weeks)	
Post Test Event Construction	September 2007	June 2008
Olympic Event	August 2008 (2 weeks)	
Paralympic Event	September 2008	
Reinstatement of HKSI	October 2008	January 2009

2. PURPOSES OF THIS MANUAL

This Manual outlines the monitoring and audit programme to be undertaken during the construction/reinstatement and operation of the Olympic Equestrian Event. It aims to provide systematic procedures for monitoring, auditing and minimising of the environmental impacts

associated with the construction and operational activities. The purposes of this EM&A manual are to:

- guide the setup of an EM&A programme;
- ensure compliance with the recommendations as stated in EIA; and
- identify any need for additional mitigation measures or remedial action.

Relevant environmental regulations, Guidelines for Development Projects in Hong Kong, Environmental Monitoring and Audit, and recommendations in the Main Arena of the 2008 Olympic Equestrian Event EIA report have been used to set up this Manual. This Manual contains the following:

- Responsibilities of the Independent Environmental Checker (IEC), Environmental Team (ET), Engineer's Representative (ER), Contractor, Operator and Environmental Monitoring Agent (Operational) (EMA(O)) with respect to the environmental monitoring and audit requirements during construction and operation;
- Information on project organization and programming of construction and operation activities for the project;
- Requirements with respect to the construction schedule and the necessary environmental monitoring and audit programme to track the varying environmental impacts;
- Details of the monitoring methodologies, including all field works, laboratory analytical procedures, quality assurance and quality control;
- Definition of Action and Limit levels;
- Establishment of Event and Action plans;
- Requirements for reviewing pollution sources and working procedures in the event of non-compliance of the environmental criteria and complaints;
- Requirements for reviewing the effectiveness of the recommended mitigation measures; and
- Requirements of presentation of EM&A data and appropriate reporting procedures including real-time reporting of monitoring data for the Project through a dedicated internet website.

For the purpose of this manual, the ER shall refer to the Engineer as defined in the Contract, in cases where the Engineer's powers have been delegated to the ER, in accordance with the Contract. The ET leader, who shall be responsible for and in charge of the ET, shall refer to the person delegated the role of executing the environmental monitoring and audit requirements.

3. PROJECT ORGANISATION

An organisation consisting of ER, Contractor, ET, IEC, Operator and EMA(O) shall be formed to take the responsibilities of the environmental protection matters during construction/reinstatement and operational phases. The project organisation and lines of communication with respect to environmental protection works are shown in Appendix 3-1. The responsibilities of respective parties are detailed in the following:

3.1 Engineer's Representative

The ER shall:

- monitor the Contractor's compliance with Contract Specifications, including the effective implementation and operation of the environmental mitigation measures;
- instruct the Contractor to follow the agreed protocols or those in the Contract Specifications in the event of exceedances or complaints; and
- comply with the agreed Event Contingency Plan in the event of any exceedance.

3.2 Contractor

The Contractor shall:

- work within the scopes of the construction Contract and other tender conditions with respect to environmental requirements;
- submit proposals on mitigation measures in case of exceedances of Action and Limit levels in accordance with the Event and Action Plans;
- implement measures to reduce impact whenever Action and Limit levels are exceeded;
- implement the corrective actions instructed by the Engineer; and
- accompany joint site inspection undertaken by the ET.

3.3 Environmental Team

The ET shall:

- set up all the required environmental monitoring stations;
- monitor various environmental parameters for both baseline and impact monitoring as required by this Manual;
- investigate and audit the Contractor's equipment and work methodologies with respect to pollution control and environmental mitigation, and to anticipate environmental issues that may require mitigation before the problem arises;
- audit and prepare audit reports on the environmental monitoring data and the site environmental conditions;
- report the environmental monitoring and audit results to the Contractor, ER and IEC;
- undertake regular on-site audits/inspections and report to the Contractor, ER and IEC of any potential non-compliance; and
- follow up and close out the non-compliance actions.

3.4 Independent Environmental Checker

An IEC shall not be in any way an associated body of the Contractor or ET of the project. The IEC can serve as an individual independent of the Contractor to audit the overall EM&A programme and report to ER directly. The main duties of IEC are to:

- review and comment on Contractor's environmental submissions as per the Environmental Permit;
- arrange and conduct monthly site inspection;

- review the programme of work to anticipate any potential environmental impacts that may arise;
- ensure the impact monitoring is conducted at the correct locations and frequency as identified in this Manual;
- check the mitigation measures that have been recommended in the EIA and this Manual, and ensure they are properly implemented in a timely manner, when necessary; and
- report the findings of site inspections and other environmental performance reviews to EPD.

3.5 Operator

The operator shall be the party responsible for the management of all equestrian facilities at HKSI during operational phase (i.e. Test Event and Olympic & Paralympic Event). The main duties of the operators with respect to environmental protection are to:

- employ an EMA(O) to undertake operational odour patrols and noise monitoring; and
- implement the corrective actions upon agreement with IEC.

3.6 Environmental Monitoring Agent (Operational) (EMA(O))

The EMA(O) shall be employed by the Operator and shall have the following responsibilities:

- engage a recognised odour patrol team to undertake odour patrols following the requirements in Section 5.2 of this Manual.
- undertake operational noise monitoring following the requirements in Section 5.3 of this Manual.

4. CONSTRUCTION/REINSTATEMENT ENVIRONMENTAL MONITORING

4.1 Air Quality Monitoring

The EIA Study for the Project concluded that there would be no adverse air quality impact during the construction/reinstatement and operational phases of the Project with the implementation of the procedures and requirements in accordance with the Air Pollution Control (Construction Dust) Regulation and recommended mitigation measures respectively. Air monitoring during construction phase is therefore not required.

4.2 Noise Monitoring

4.2.1 Construction Noise Monitoring

4.2.1.1 Monitoring Parameters

The construction noise level shall be measured in terms of the A-weighted equivalent continuous sound pressure level (L_{Aeq}). $L_{Aeq,30\text{ mins}}$ shall be used as the monitoring parameter for the time period between 0700-1900 hours on normal weekdays. For all other time periods (including restricted hours), $L_{Aeq,5\text{ mins}}$ shall be employed for comparison with the Noise Control Ordinance (NCO) criteria.

As supplementary information for data auditing, statistical results such as L_{10} and L_{90} shall also be obtained for reference. A sample data record sheet is shown in Appendix 4-1 for reference.

4.2.1.2 Monitoring Equipment

In accordance with the Technical Memorandum (TM) issued under the NCO, sound level meters in compliance with the International Electrotechnical Commission Publications 651: 1979 (Type 1) and 804: 1985 (Type 1) specifications shall be used for carrying out the noise monitoring. 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 level from before and after the noise measurement agree to within 1.0dB.

The ET Leader shall be responsible for the provision, installation and maintenance of the monitoring equipment. He shall ensure that sufficient noise monitoring equipment and associated instrumentation are available for carrying out the baseline monitoring, regular impact monitoring and ad hoc monitoring. All the equipment and associated instrumentation shall be clearly labelled. The location of equipment installation should be proposed by the ET Leader and agreed with the ER and EPD in consultation with the IEC.

Noise measurements should not be made in the presence of fog, rain, wind with a steady speed exceeding 5m/s or wind with gusts exceeding 10m/s. The wind speed shall be checked with a portable wind speed meter capable of measuring the wind speed in m/s.

4.2.1.3 Monitoring Locations

The noise monitoring locations are shown in Drawing No. ST/R/S/HK/302 and summarised in Table 4.1. If status and locations of Noise Sensitive Receivers (NSRs) have changed at the time implementation, the ET Leader shall propose alternative monitoring locations and seek approval from IEC and EPD.

Table 4.1: Construction noise monitoring locations

Monitoring ID	Location
NM1	HKJC Staff Quarters
NM2	Racecourse Villa
NM3	Ravana Garden

When alternative monitoring locations are proposed, the monitoring locations should be chosen based on the following criteria:

- at locations close to the major site activities which are likely to have noise impacts;
- close to the noise sensitive receivers; and
- for monitoring locations in the vicinity of the sensitive receivers, care should be taken to avoid disturbance to the occupants during monitoring.

The monitoring station shall normally be at a point 1m from the exterior of the sensitive receivers building facade and be at a position 1.2m above the ground. If there is constraint with access to the normal monitoring position, an alternative position may be chosen, and a correction to the measurements shall be made. For reference, a façade correction of +3dB(A) shall be made to the free field measurements. The ET Leader shall agree with the IEC on the monitoring positions and the corrections adopted. Once the positions for the monitoring stations are chosen, the baseline monitoring and the impact monitoring shall be carried out at the same positions.

4.2.1.4 Baseline Monitoring

The ET shall carry out baseline noise monitoring prior to the commencement of the construction works. There shall not be any construction activities in the vicinity of the stations during the baseline monitoring.

The baseline monitoring shall be carried out continuously over the daytime period (0700-1900) for every normal weekday and Saturday for at least two consecutive weeks using the $L_{Aeq,(30mins)}$ parameters. Monitoring during the restricted periods in normal weekdays and Saturday shall comprise 3 consecutive $L_{Aeq,(5mins)}$ readings at least once in every restricted period (1900-2300 and 2300-0700). For Sunday / public holidays, 3 consecutive $L_{Aeq,(5mins)}$ readings shall also be measured in Sunday/General Holiday for each period of 0700-1900, 1900-2300 and 2300-0700 of next day. A schedule on the baseline monitoring shall be submitted to the ER and IEC for approval before the monitoring starts.

In exceptional case, when insufficient baseline monitoring data or questionable results are obtained, the ET Leader shall liaise with IEC and EPD to agree on an appropriate set of data to be used as a baseline reference and submit to ER for approval.

4.2.1.5 Impact Monitoring

During normal construction working hours (0700-1900 Monday to Saturday), monitoring of $L_{Aeq, 30min}$ noise levels (as six consecutive $L_{Aeq, 5min}$ readings) shall be carried out at the agreed monitoring locations once every week in accordance with the methodology in the TM.

Other noise sources such as road traffic may make a significant contribution to the overall noise environment. Therefore, the results of noise monitoring activities shall take into account such influencing factors, which may not be presented during the baseline monitoring period.

In case of non-compliance with the construction noise criteria, more frequent monitoring as specified in the Event and Action Plan in S4.2.1.6 shall be carried out. This additional monitoring shall be continued until the recorded noise levels are rectified or proven to be unrelated to the construction activities.

4.2.1.6 Event and Action Plan for Construction Noise

The Action and Limit levels for construction noise are defined in Table 4.2. Should non-compliance of the criteria occur, actions in accordance with the Event/Action Plan in Table 4.3 shall be carried out.

Table 4.2: Action and limit levels for construction noise

Time Period	Action	Limit
0700-1900 hrs on normal weekdays	When one documented complaint is received	75 ^[1] dB(A)
0700-2300 hrs on holidays; and 1900-2300 hrs on all other days		65 dB(A)
2300-0700 hrs of next day		50 dB(A)

Note:

[1] For school, 70 dB(A) for normal days and 65 dB(A) during examination periods.

Table 4.3: Event/Action plan for airborne construction noise

Event	Action			
	ET Leader	IEC	ER	Contractor
Action Level	1. Notify IEC and the Contractor. 2. Carry out investigation.	1. Review with analysed results submitted by ET. 2. Review the	1. Confirm receipt of notification of exceedance in writing. 2. Notify the Contractor.	1. Submit noise mitigation proposals to IEC. 2. Implement noise

Event	Action			
	ET Leader	IEC	ER	Contractor
	3. Report the results of investigation to IEC and the Contractor. 4. Discuss with the Contractor and formulate remedial measures. 5. Increase monitoring frequency to check mitigation measures.	proposed remedial measures by the Contractor and advise ER accordingly. 3. Supervise the implementation of remedial measures.	3. Require the Contractor to propose remedial measures for the analysed noise problem. 4. Ensure remedial measures are properly implemented.	mitigation proposals.
Limit Level	1. Identify the source. 2. Notify IEC, ER, EPD and the Contractor. 3. Repeat measurement to confirm findings. 4. Increase monitoring frequency. 5. Carry out analysis of Contractor's working procedures to determine possible mitigation to be implemented. 6. Inform IEC, ER, and EPD the causes & actions taken for the exceedances. 7. Assess effectiveness of the Contractor's remedial actions and keep IEC, EPD and ER informed of the results. 8. If exceedance stops, cease additional monitoring	1. Discuss amongst ER, ET Leader and the Contractor on the potential remedial actions. 2. Review the Contractor's remedial actions whenever necessary to assure their effectiveness and advise ER accordingly. 3. Supervise the implementation of remedial measures.	1. Confirm receipt of notification of exceedance in writing. 2. Notify the Contractor. 3. Require the Contractor to propose remedial measures for the analysed noise problem. 4. Ensure remedial measures are properly implemented. 5. If exceedance continues, consider what activity of the work is responsible and instruct the Contractor to stop that activity of work until the exceedance is abated.	1. Take immediate action to avoid further exceedance. 2. Submit proposals for remedial actions to IEC within 3 working days of notification. 3. Implement the agreed proposals. 4. Resubmit proposals if problem still not under control. 5. Stop the relevant activity of works as determined by the ER until the exceedance is abated.

4.3 Water Quality

The water quality assessment in the EIA report for the project identified that the key issue in terms of water quality would be related to surface runoff during construction and operational phase. The EIA concluded that the identified water quality impacts could be minimized by implementing the recommended mitigation measures. No unacceptable residual water quality impact was expected. Water quality monitoring during construction/reinstatement and operational phases is therefore not required.

4.4 Waste Management

Waste management shall be the contractor's responsibility to ensure that all wastes produced during the construction works for the project are handled, stored and disposed of in accordance with good waste management practices and EPD's regulations and requirements.

Waste materials generated during construction activities, such as construction and demolition (C&D) materials and general refuse, shall be audited at regular intervals (at least quarterly) to ensure that proper storage, transportation and disposal practices are being implemented. This monitoring of waste management practices shall ensure no illegal dumping of solid wastes into the adjacent nullahs. The Contractor shall be responsible for the implementation of any mitigation measures to minimise waste or redress problems arising from the waste materials.

4.4.1 Construction Phase

It is not anticipated that adverse impacts from waste management would arise, provided that good site practices are strictly followed. Recommendations for good site practices during construction phase include:

- nomination of approved personnel, such as a site manager, to be responsible for good site practices, and making arrangements for collection of all wastes generated at the site and effective disposal to an appropriate facility;
- training of site personnel in proper waste management and chemical waste handling procedures;
- provision of sufficient waste disposal points and regular collection for disposal;
- appropriate measures to minimise windblown litter and dust during transportation of waste by either covering trucks or by transporting wastes in enclosed containers;
- separation of chemical wastes for special handling and appropriate treatment at the Chemical Waste Treatment Facility;
- regular cleaning and maintenance programme for drainage systems, sumps and oil interceptors;
- a recording system for the amount of wastes generated, recycled and disposed (including the disposal sites) should be proposed; and
- a Waste Management Plan shall be prepared by the Contractor and submitted to ER for approval. One may make reference to ETWB TCW No. 15/2003 for details.

Good management and control can prevent the generation of significant amount of waste. Waste reduction is best achieved at the planning and design stage, as well as by ensuring the implementation of good site practices. Recommendations to achieve waste reduction include:

- segregation and storage of different types of waste in different containers, skips or stockpiles to enhance reuse or recycling of materials and their proper disposal;
- to encourage collection of aluminium cans by individual collectors, separate labelled bins shall be provided to segregate this waste from other general refuse generated by the work force;
- proper storage and site practices to minimise the potential for damage or contamination of construction materials;
- plan and stock construction materials carefully to minimise amount of waste generated and avoid unnecessary generation of waste; and
- a recording system for the amount of wastes generated, recycled and disposed (including the disposal sites) should be proposed.

4.4.1.1 General refuse

General refuse should be stored in enclosed bins or compaction units separate from C&D material. A reputable waste collector should be employed by the contractor to remove general refuse from the site, separately from C&D material. An enclosed and covered area is preferred to reduce the occurrence of 'wind blown' light material.

4.4.1.2 Chemical Waste

All the chemical waste should be handled according to the Code of Practice on the Packaging, Labelling and Storage of Chemical Wastes. The Contractor shall be required to register with EPD as a Chemical Waste Producer if chemical wastes are produced at the construction site. Chemical waste should be properly stored on site within suitably designed containers, and should be collected by a licensed chemical waste collector for disposal at the Chemical Waste Treatment Facility or other licensed facility in accordance with the Waste Disposal (Chemical Waste) (General) Regulation under the Waste Disposal Ordinance.

4.4.1.3 Construction and Demolition Material

The C&D material generated from modification works of existing HKSI should be sorted on-site into inert C&D material (i.e. public fill) and C&D waste. In order to minimise off-site disposal of inert C&D material, suitable characteristics / size of fill material should be re-used on-site as far as practicable. Any surplus of C&D material will be disposed of at public filling facilities. In order to monitor the disposal of C&D material and solid wastes at public filling facilities and landfills and to control fly-tipping, a trip-ticket system should be included. One may make reference to ETWB TCW No. 31/2004 for details.

According to Waste Disposal (Charges for Disposal of Construction Waste) Regulation, the Contractor should pay for disposal of C&D waste, which cannot be re-used and/or recycled, at strategic landfills. The Contractor should apply for a billing account for disposal of construction waste from EPD and this account should be used solely for this project if the contract is with a value of \$1 million or above.

4.5 Landscape and Visual

4.5.1 General

Environmental Monitoring and Audit shall be undertaken for the construction, operational and reinstatement phases of the Project to ensure and check that the implementation and maintenance of landscape and visual mitigation measures are carried out. The recommended mitigation measures for this project are described in Section 7.10 of the Landscape and Visual Impact Assessment (LVIA) of the EIA Study. Conflicts between the proposed landscape and visual mitigation measures and other project works should be resolved at the earliest possible date without compromise to the mitigation intentions of these measures. The construction and operational phase EM&A of the landscape and visual environments and mitigation works shall be carried out in accordance with the site audit programme.

4.5.2 Baseline Monitoring

Baseline changes with respect to the landscape and visual environment shall be carried out in reference to the recorded baseline conditions of the site as described in Section 7 of the EIA. The monitoring shall in particular record changes of each landscape resource, landscape character area and the view conditions of each visually sensitive receiver. Parameters used to describe changes in each of the above shall be the same as those in Section 7 of the EIA.

4.5.3 Construction/Reinstatement and Operational Phase Audit

A landscape auditor shall be employed to audit landscape and visual mitigation works. A specialist landscape sub-contractor, who shall in particular be responsible for the protection of retained trees and the transplantation of existing trees, should carry out the implementation of soft

landscape mitigation works. The contractor shall maintain all soft landscape works for a period of 12 months after implementation of the Olympic works and reinstatement works. This period shall be the establishment period. Maintenance after the establishment period will be subject to agreement between the HKSAR Government and HKJC.

The landscape auditor shall be a member of the Environmental Team, who shall audit the implementation and maintenance of landscape and visual mitigation measures during the construction, operation and reinstatement phases. Auditing inspections and reporting regarding general landscape and visual impacts shall be undertaken once every two weeks during the construction, operational and reinstatement phases. The effectiveness of the mitigation works shall also be audited in order to ensure the impact reduction levels are achieved as described in Section 7 of the EIA.

5. OPERATIONAL ENVIRONMENTAL MONITORING (ODOUR AND NOISE)

5.1 Operational Odour Monitoring

5.1.1 Odour Patrol Method

In order to ascertain that the new stable area will not cause any nuisance to the surrounding environment, odour patrols shall be conducted during the Test Event and immediately prior to the Olympic Events after arrival of all competition horses.

A dedicated odour patrol team shall be appointed by the EMA(O) and shall be responsible for conducting the odour patrol. Prior to commencement of the odour patrol, the EMA(O) shall prepare the odour patrol methodology statement with a predetermined odour patrol route for IEC endorsement and EPD approval. Odour intensity shall be determined at 5 different levels according to the criteria below or otherwise agreed by the IEC and approved by EPD.

0	Not detected	No odour perceived or an odour so weak that it cannot be easily characterized or described
1	Slight	Identifiable odour, slight
2	Moderate	Identifiable odour, moderate
3	Strong	Identifiable odour, strong
4	Extreme	Severe odour

Mean value of the odour intensity ratings assessed by the patrol team shall be reported. Location of odour assessment, temperature, wind speed, wind direction, relative humidity and time of patrol shall also be recorded. Raw recording data of each panelist shall be included in the report as appendix. A sample template for the odour patrol record sheet is shown in Appendix 5-1.

5.1.2 Odour Monitoring Locations

The odour patrol monitoring for the ASR locations are shown in Drawing no. ST/R/S/HK/301 and summarised in Table 5.1. If status and locations of ASRs have changed at the time implementation, the EMA(O) Leader shall propose alternative monitoring locations and seek approval from IEC and EPD.

Table 5.1: Odour monitoring locations

ASR	Description
A7	HKJC Staff Quarters
A8	Racecourse Villa
A17	Garden Vista
A18	Pictorial Garden

5.1.3 Odour Patrol Team and Odour Assessors

The odour patrol team shall be a recognized laboratory or institution with at least 5 years of proven track records on odour patrol assessment works. The patrol team shall comprise of at least 2 qualified odour assessors who shall have their individual n-butanol thresholds certified by the recognized laboratory or institution to within the range of 20 to 80 ppb/v. The same odour assessors shall conduct all the odour patrols unless otherwise approved by the IEC.

5.1.4 Odour Patrol Monitoring

There shall be two odour patrol monitoring, the first patrol during the Test Event and the second patrol immediately prior to the commencement of the Olympic Event after the arrival of all competition horses. Each odour patrol shall be conducted along the same predetermined route that comprises of the odour monitoring locations and performed for two consecutive days to ascertain the consistency of the assessment results. The EMA(O) shall be responsible for preparation of an odour patrol monitoring schedule for submission to EPD and IEC approval one month before monitoring starts.

5.1.5 Event/Action Plan

If the average odour intensity perceived at a monitoring location on any day has exceeded an assessment rating of 1, the odour assessors shall immediately identify the source of odour nuisance. If the source of odour nuisance is confirmed to be caused by the new stables, the EMA(O) shall immediately notify the Operator and IEC of the survey result and be responsible for carrying out investigation to determine the cause of nuisance. The EMA(O) shall make recommendation for remedial measures to mitigate the odour impact for IEC approval. The IEC and the Operator shall satisfy themselves with the effectiveness of the odour remedial measures and subsequently request the EMA(O) to conduct a follow-up odour patrol survey to confirm compliance within the assessment rating of 1. The Event/Action Plan in Table 5.2 shall be followed.

Table 5.2: Event/Action plan for odour patrol

Event	Action		
	EMA(O)	IEC	Operator
When the average odour rating at any location on any day exceeds 1	<ol style="list-style-type: none"> 1. Notify the Operator and IEC. 2. Identify the odour source. 3. Report the results of investigation to IEC and Operator 4. Discuss with the Operator and formulate remedial measures. 5. Conduct follow-up odour patrol(s) to confirm the effectiveness of remedial actions. 	<ol style="list-style-type: none"> 1. Review the analysed results submitted by EMA(O). 2. Review the proposed remedial measures recommended by the EMA(O). 	<ol style="list-style-type: none"> 1. Take immediate action to avoid further exceedance 2. Implement remedial actions immediately upon agreement with IEC.

5.2 Operational Noise Monitoring

The purpose of the monitoring programme is to ensure that the EIAO TM requirements and the required performance of the mitigation measures identified in the EIA report could be met. The need of noise limiter device of the PA system is identified in section 4.5.3.2 of the EIA report, and the device should be set in a way such that the maximum noise output of the PA system in accumulation of other noise sources would not exceed the relevant EIAO criteria.

5.2.1 Monitoring Parameters

The operational noise level shall be measured in terms of the A-weighted equivalent continuous sound pressure level (L_{Aeq}). $L_{Aeq(30min)}$ shall be used as the monitoring parameter.

5.2.2 Monitoring Schedule and Locations

The EMA(O) shall carry out noise monitoring during the Olympic Event and Paralympic Event when equestrian competition events are taking place at the Main Arena. The operational noise monitoring locations are shown in Drawing No.: ST/R/S/HK/301 and summarised in Table 5.3. If status and locations of Noise sensitive Receivers (NSRs) have changed at the time of implementation, the EMA(O) shall propose alternative monitoring locations and seek approval from IEC and EPD. The EMA(O) shall liaise with the Operator to propose the noise monitoring schedule and seek approval from IEC and EPD.

Table 5.3: Operational noise monitoring

Monitoring ID	Location
NM1	HKJC Staff Quarters
NM2	Racecourse Villa
NM3	Ravana Garden

When alternative monitoring locations are proposed, the monitoring locations should be chosen based on the following criteria:

- at locations close to the major site activities which are likely to have noise impacts;
- close to the noise sensitive receivers; and
- for monitoring locations in the vicinity of the sensitive receivers, care should be taken to avoid disturbance to the occupants during monitoring.

5.2.3 Event and Action Plan for Operational Noise Monitoring

The Action and Limit levels for operational noise are defined in Table 5.4. Should non-compliance of the criteria occur, actions in accordance with the Action Plan in Table 5.5 shall be carried out.

Table 5.4: Action and limit levels for operational noise

Location	Time Period	Action	Limit (dB(A))
NM1	Day & evening	When one documented complaint is received	59
	Night		50
NM2	Day & evening		55
	Night		50
NM3	Day & evening		57
	Night		50

Note: Day – 0700~1900; Evening – 1900~2300; Night – 2300-0700.

Table 5.5: Event/Action plan for operational noise

Event	Action		
	EMA(O)	IEC	Operator
Action Level	<ol style="list-style-type: none"> 1. Notify the operator and IEC. 2. Identify the noise source. 3. Report the results of investigation to IEC 4. Discuss with the Operator and formulate remedial measures. 	<ol style="list-style-type: none"> 1. Review with analysed results submitted by EMA(O). 2. Review the proposed remedial measures by the Operator. 	<ol style="list-style-type: none"> 1. Take immediate action to avoid further exceedance 2. In consultation with IEC, develop proposals for remedial actions within three working days of notification 3. Amend proposals if required by the IEC 4. Implement remedial actions immediately upon agreement with IEC.
Limit Level	<ol style="list-style-type: none"> 1. Identify the source. 2. Notify the IEC, EPD and Operator 3. In combination with the Operator identify the exact reason for the exceedance 4. Repeat measurement to confirm findings 5. Assess the efficiency of the Operator's remedial actions and keep the Operator, EPD and IEC informed. 	<ol style="list-style-type: none"> 1. Discuss with EMA(O) and the Operator on the potential remedial actions. 2. Review the Operator's remedial actions whenever necessary to assure their effectiveness. 	<ol style="list-style-type: none"> 1. Take immediate action to avoid further exceedance. 2. Advise IEC of remedial proposals within one working day of notification. 3. Amend proposals if required by the IEC. 4. Implement remedial actions immediately upon agreement with IEC. 5. Instruct EMA(O) to assess efficiency of remedial actions.

5.2.4 Advance Notice and Complaint Hotline

The Operator should arrange to distribute advance notices to nearby residential buildings or other noise sensitive uses to alert the people of the date, time, venue and programme of the activity, and the complaint hotline to which they can lodge their concern in case the noise from the activity is considered excessive.

During the competition, the Operator should provide a manned complaint hotline (Tape recording is not acceptable) so that action can be immediately taken to reduce the noise in response to complaints raised by nearby residents or relayed from other Government Department (e.g. Police).

6. ENVIRONMENTAL SITE AUDIT

6.1 Construction/Reinstatement Phase

6.1.1 Site Inspection

Site inspections provide a direct means to trigger and enforce the specified environmental protection and pollution control measures. They shall be undertaken routinely to inspect the construction activities to ensure appropriate environmental protection and pollution control/mitigation measures are properly implemented. With well-defined pollution control and mitigation specifications and a well-established site inspection, deficiency and action reporting system, site inspection is one of the most effective tools to enforce the environmental protection requirements on the construction site.

The ET Leader shall be responsible for formulating the environmental site inspection, deficiency and action reporting system, and carrying out the site inspection works. He shall submit a proposal on site inspection, deficiency and action reporting procedures within 21 days prior to construction commencement to the Contractor for approval by the ER and IEC.

Regular site inspections shall be carried out at least once per week. The areas of inspection shall not be limited to the environmental conditions, pollution control and mitigation measures within the site. It should also review the environmental condition outside the site area which is likely to be affected, directly or indirectly, by the site activities. The ET Leader shall make reference to the following information in conducting the inspection:

- the EIA recommendations on environmental protection and pollution control mitigation measures;
- works progress and programme;
- individual works methodology (which shall include proposal on associated pollution control measures);
- Contract Specifications on environmental protection;
- relevant environmental protection and pollution control laws; and
- previous site inspection results.

The Contractor shall update ET Leader with all relevant information of the construction Contract for him to carry out the site inspections. The inspection results and its associated recommendations on improvements to the environmental protection and pollution control works shall be submitted to ER, IEC and the Contractor within 1 working day for reference and for taking immediate actions. The Contractor shall follow the procedures and time-frame as stipulated in the environmental site inspection, deficiency and action reporting system formulated by the ET Leader to report on any remedial measures subsequent to the site inspections.

Ad hoc site inspections shall also be carried out if significant environmental problems are identified. Inspections may also be required subsequent to receipt of an environmental complaint, or as part of the investigation work, as specified in the Action Plan for environmental monitoring and audit.

6.1.2 Compliance with Legal and Contractual Requirement

There are contractual environmental protection and pollution control requirements as well as environmental protection and pollution control laws in Hong Kong, which the construction activities shall comply with. In order to comply with the contractual requirements, all works method statements submitted by the Contractor to the ER and IEC for approval shall be sent to the ET Leader for vetting, to see whether sufficient environmental protection and pollution control measures have been included.

The ET Leader shall also review the progress and programme of the works to check that relevant environmental laws have not been violated, and that any foreseeable potential for violating the laws can be prevented. The Contractor shall regularly copy relevant documents to the ET Leader so that the checking work can be carried out. The document shall at least include the updated Work Progress Reports, the updated Works Programme, the application letters for different licence/permits under the environmental protection laws, and all the valid licence/permit. The site diary shall also be available for the ET Leader's inspection upon his request.

After reviewing the document, the ET Leader shall advise the ER, IEC and the Contractor of any non-compliance with the contractual and legislative requirements on environmental protection and pollution control for them to take follow-up actions. If the ET Leader's review concludes that the current status on licence/permit application and any environmental protection and pollution

control preparation works may not cope with the works programme, or may result in potential violation of environmental protection and pollution control requirements by the works in due course, he shall also advise the Contractor, ER, and IEC accordingly.

Upon receipt of the advice, the Contractor shall undertake immediate actions to rectify the situation. The ER shall follow up to ensure that appropriate action has been taken by the Contractor such that the environmental protection and pollution control requirements are fulfilled.

6.1.3 Environmental Complaints

Complaints shall be referred to the ET Leader for carrying out complaint investigation. The ET Leader shall undertake the following procedures upon receipt of the complaints:

- log complaint and date of receipt onto the complaint database;
- investigate the complaint to determine its validity, and to assess whether the source of the problem is due to works activities;
- identify mitigation measures if a complaint is valid and due to works;
- advise the Contractor accordingly if mitigation measures are required;
- review the Contractor's response on the identified mitigation measures and the updated situation;
- submit interim report to ER on status of the complaint investigation and follow-up action within the time frame assigned by the ER;
- undertake additional monitoring and audit to verify the situation if necessary, and review that any valid reason for complaint does not recur;
- report the investigation results and the subsequent actions to the source of complaint for responding to complainant (If the source of complaint is EPD, the results should be reported within the time frame assigned by EPD); and
- record the complaint, investigation, the subsequent actions and the results in the monthly EM&A reports.

The Contractor and the ER shall also be notified of the nature of complaints. An investigation shall be initiated to determine the validity of the complaint and to identify the source of the problem. As necessary, the ER shall undertake the following steps:

- Investigate and identify the source of the problem;
- Liaise with the ET and IEC to identify remedial measures;
- Require the Contractor to take action to mitigate the situation;
- Repeat monitoring to check compliance with Action and Limit level; and
- Repeat review procedures to identify further possible areas of improvement if monitoring results show exceedances.

The outcome of the investigation and the action taken shall be documented on the complaints proforma. Where possible, a formal response to each complaint received shall be prepared, within a maximum of seven days, so as to notify the concerned person(s) that action has been taken.

All enquires which trigger this process shall be reported in the monthly EM&A reports which shall include results of inspections undertaken by site staff, and details of the measures taken, and additional monitoring results. It should be noted that the receipt of complaints or enquiries will not, in itself be sufficient reason to introduce additional mitigation measures. They will however initiate the Event/Action Plan and these procedures may lead to the introduction of mitigation measures if they are considered necessary. In all cases the complainant shall be notified of the findings of the Event/Action Plan and audit procedures put in place to ensure that the problem does not recur.

During the complaint investigation work, the Contractor and ER shall cooperate with the ET Leader in providing all the necessary information and assistance for completion of the investigation. If mitigation measures are identified in the investigation, the Contractor shall promptly carry out the mitigation. The ER shall ensure that the measures have been carried out by the Contractor.

The Contractor should provide a manned hotline (tape recording is not acceptable) to serve as the community liaison channel to complaints, comments, suggestions or requests for information during the construction and reinstatement of the Project, so that action can be immediately taken to reduce the environmental nuisance in response to complaints raised by nearby residents or relayed from other Government Department.

A flow chart of the complaint response procedures is shown in Appendix 6-1 and an example of complaint proforma is provided in Appendix 6-2.

6.2 Operational Phase

Environmental site audit during operational phase is not required except for the landscape audits to be conducted by the landscape auditor in accordance with S4.5.3 of the Manual.

7. ENVIRONMENTAL MITIGATION MEASURES

7.1 Air Quality

The Contractor is obliged to follow the procedures and requirements given in the Air Pollution Control (Construction Dust) Regulation and shall be responsible for the design and implementation of the recommended dust control and mitigation measures, which shall include, but not limited to, the following:

- Any excavated dusty material should be covered entirely by impervious sheeting or sprayed with water to maintain the entire surface wet and then removed or backfilled or reinstated where practicable within 24 hours of the excavation or unloading;
- Any dusty materials remaining after a stockpile is removed should be wetted with water and cleared from the surface of roads or streets;
- The load of dusty materials on a vehicle leaving a construction site should be covered entirely by impervious sheeting to ensure that the dusty materials do not leak from the vehicle;
- Where practicable, vehicle washing facilities with high pressure water jet should be provided at every discernible or designated vehicle exit point. The area where vehicle washing takes place and the road section between the washing facilities and the exit point should be paved with concrete, bituminous materials or hardcore;

- When there are open excavation and reinstatement works, hoarding of not less than 2.4m high should be provided as far as practicable along the site boundary with provision for public crossing. Good site practice shall also be adopted by the Contractor to ensure the conditions of the hoardings are properly maintained throughout the construction/reinstatement period;
- The portion of any road leading only to construction site that is within 30m of a vehicle entrance or exit should be kept clear of dusty materials;
- Any area that involves demolition activities should be sprayed with water or a dust suppression chemical immediately prior to, during and immediately after the activities so as to maintain the entire surface wet;
- Where a scaffolding is erected around the perimeter of a building under construction, effective dust screens, sheeting or netting should be provided to enclose the scaffolding from the ground floor level of the building, or a canopy should be provided from the first floor level up to the highest level of the scaffolding; and
- Any skip hoist for material transport should be totally enclosed by impervious sheeting.

The design of proposed stable has incorporated adequate measures to mitigate the odour impact to acceptable levels, the following good housekeeping measures are proposed to further minimize the potential odour impact to nearby sensitive receivers.

- A sanitary environment will always be maintained in the stable area. The current waste management practices as mentioned in Section 3.6.3.2 of the approved EIA Report “Main Arena of the 2008 Olympic Equestrian Event” will be extended to cover the new stable area at HKSI. Detailed design of stable will cater for the health, safety and environmental protection considerations in accordance with the HKJC policy and practice;
- Regular maintenance of the odour removal system, such as carbon filter system will be carried out to maintain the odour removal efficiency; and
- Enclosed containers, similar to those at the existing stables near HKSI, will be provided for the stockpiling of waste.

7.2 Noise

The Contractor shall be responsible for the design and implementation of the construction noise control and mitigation measures, which shall include, but not limited to, the following:

- Use of site hoarding as noise barrier to screen noise;
- Quiet equipment and construction method should be employed;
- Only well-maintained plant shall be operated on site and plant shall be serviced regularly during the construction work;
- Machines and plant that may be in intermittent use (such as breakers) shall be shut down between work periods or should be throttled down to a minimum;
- Mobile plant shall be sited as far away from NSRs as possible;
- Material stockpiles and other structures shall be effectively utilised, where practicable, to screen noise from on-site construction activities;

- Silencers or mufflers on construction equipment should be properly fitted and maintained during the construction works.
- The Contractor shall proactively liaise with the School Representative on a regular basis to collate the latest information on the examination periods, and carefully arrange noisy construction activities to avoid these periods;
- Use of temporary noise barrier for mobile plants.
- Temporary enclosures should be provided for static plant including air compressor, water pump etc.

The detailed design should incorporate the following good practice in order to minimise the nuisance on the neighbouring NSRs.

- Louvers should be orientated away from adjacent NSRs, preferably onto Sha Tin Racecourse which are less sensitive.
- Direct noise mitigation measures including silencers, acoustic louvers and acoustic enclosures should be allowed for in the design.
- A cluster of small power rated loudspeakers should be used instead of a few large power rated loudspeakers; and
- Directional loudspeakers should be used and orientated them to point towards the audience and away from the nearby noise sensitive receivers.

7.3 Water Quality

7.3.1 Construction Runoff

In accordance with the Practice Note for Professional Persons on Construction Site Drainage, Environmental Protection Department, 1994 (ProPECC PN 1/94), construction phase mitigation measures, where appropriate, will include the following:

- At the start of site establishment, perimeter cut-off drains to direct off-site water around the site will be constructed with internal drainage works and erosion and sedimentation control facilities implemented. Channels (both temporary and permanent drainage pipes and culverts), earth bunds or sand bag barriers will be provided on site to direct stormwater to silt removal facilities. The design of the temporary on-site drainage system will be undertaken by the contractor prior to the commencement of construction.
- The dikes or embankments for flood protection will be implemented around the boundaries of earthwork areas. Temporary ditches will be provided to facilitate the runoff discharge into an appropriate watercourse, through a silt/sediment trap. The silt/sediment traps will be incorporated in the permanent drainage channels to enhance deposition rates.
- The design of efficient silt removal facilities will be based on the guidelines in Appendix A1 of ProPECC PN 1/94, which states that the retention time for silt/sand traps should be 5 minutes under maximum flow conditions. Sizes may vary depending upon the flow rate, but for a flow rate of 0.1 m³/s a sedimentation basin of 30m³ would be provided and for a flow rate of 0.5 m³/s the basin would be 150 m³. The detailed design of the sand/silt traps will be undertaken by the contractor prior to the commencement of construction.

- Construction works will be programmed to minimize surface excavation works during the rainy seasons (April to September). All exposed earth areas will be completed and vegetated as soon as possible after earthworks have been completed. If excavation of soil cannot be avoided during the rainy season, or at any time of year when rainstorms are likely, exposed slope surfaces will be covered by tarpaulin or other means.
- The overall slope of the site will be kept to a minimum to reduce the erosive potential of surface water flows, and all trafficked areas and access roads protected by coarse stone ballast.
- All drainage facilities and erosion and sediment control structures will be regularly inspected and maintained to ensure proper and efficient operation at all times and particularly following rainstorms. Deposited silt and grit will be removed regularly and disposed of by spreading evenly over stable, vegetated areas.
- Measures will be taken to minimise the ingress of site drainage into excavations. If the excavation of trenches in wet periods is necessary, they will be dug and backfilled in short sections wherever practicable. Water pumped out from trenches or foundation excavations will be discharged into storm drains via silt removal facilities.
- Open stockpiles of construction materials (for example, aggregates, sand and fill material) of more than 50m³ will be covered with tarpaulin or similar fabric during rainstorms. Measures will be taken to prevent the washing away of construction materials, soil, silt or debris into any drainage system.
- Manholes (including newly constructed ones) will always be adequately covered and temporarily sealed so as to prevent silt, construction materials or debris being washed into the drainage system and storm runoff being directed into foul sewers.
- Precautions be taken at any time of year when rainstorms are likely, actions to be taken when a rainstorm is imminent or forecasted, and actions to be taken during or after rainstorms are summarised in Appendix A2 of ProPECC PN 1/94. Particular attention will be paid to the control of silty surface runoff during storm events, especially for areas located near steep slopes.
- All vehicles and plant will be cleaned before leaving a construction site to ensure no earth, mud, debris and the like is deposited by them on roads. An adequately designed and sited wheel washing facilities will be provided at every construction site exit where practicable. Wash-water should have sand and silt settled out and removed at least on a weekly basis to ensure the continued efficiency of the process. The section of access road leading to, and exiting from, the wheel-wash bay to the public road will be paved with sufficient backfall toward the wheel-wash bay to prevent vehicle tracking of soil and silty water to public roads and drains.
- Oil interceptors will be provided in the drainage system downstream of any oil/fuel pollution sources. The oil interceptors will be emptied and cleaned regularly to prevent the release of oil and grease into the storm water drainage system after accidental spillage. A bypass will be provided for the oil interceptors to prevent flushing during heavy rain.
- Construction solid waste, debris and rubbish on site will be collected, handled and disposed of properly to avoid water quality impacts.

- All fuel tanks and storage areas will be provided with locks and sited on sealed areas, within bunds of a capacity equal to 110% of the storage capacity of the largest tank to prevent spilled fuel oils from reaching water sensitive receivers nearby.
- By adopting the above mitigation measures with Best Management Practices (BMPs) it is anticipated that the impacts of construction site runoff from the construction site will be reduced to satisfactory levels before discharges.

7.3.2 Sewage from Workforce

Portable chemical toilets and sewage holding tanks will be provided for handling the construction sewage generated by the workforce. A licensed contractor will be employed to provide appropriate and adequate portable toilets and be responsible for appropriate disposal and maintenance.

Notices will be posted at conspicuous locations to remind the workers not to discharge any sewage or wastewater into the nearby environment during the construction/reinstatement phase of the Project. Regular environmental audit on the construction site can provide an effective control of any malpractices and can achieve continual improvement of environmental performance on site. It is anticipated that sewage generation during the construction/reinstatement phase of the Project would not cause water quality impact after undertaking all required measures.

7.3.3 Accidental Spillage of Chemicals

Any service shop and maintenance facilities will be located within a bunded area, and sumps and oil interceptors will be provided. Maintenance of equipment involving activities with potential for leakage and spillage will only be undertaken within the areas appropriately equipped to control these discharges.

7.4 Waste Management

The Contractor shall be responsible for controlling wastes within the construction site, removing waste materials, and implementing mitigation measures to minimise waste or redressing problems arising by wastes. The waste materials may include any sewage, waste water or effluent containing sand, cement, silt or any other suspended or dissolved material flowing from the site onto any adjoining land, storm sewer, sanitary sewer, or any waste matter or refuse to be deposited anywhere within the site or onto any adjoining land, as well as public fill generated as part of site formation activities.

The Contractor shall also pay attention to the Waste Disposal Ordinance, the Dumping at Sea Ordinance, the Public Health and Municipal Services Ordinance and the Water Pollution Control Ordinance, and carry out the appropriate waste management work. The relevant licence/permit, such as the effluent discharge licence, the chemical waste producer registration, etc shall be obtained. The Contractor shall refer to the relevant booklets issued by EPD when applying for the licence / permit.

During the site inspections and the document review procedures, the ET Leader shall pay special attention to the issues relating to waste management, and check whether the Contractor has followed the relevant Contract Specifications and the procedures specified under the laws of Hong Kong.

Mitigation measures have been proposed in the EIA to minimise the generation of various wastes and associated environmental impacts. The key measures are summarised below:

- Ensure proper implementation of a trip ticket system;
- Reuse excavated fill material for backfilling and reinstatement;
- Carry out on-site sorting;
- Surplus artificial hard materials should be delivered to Tuen Mun Area 38 recycling plant for recycling into subsequent useful products;
- Use the existing bituminous pavement for paving of construction access and temporary holding / parking areas;
- Use standard formwork as far as practicable to minimise the arising of C&D materials;
- Use metal hoarding to enhance the possibility of being recycled;
- Consider alternatives that generate reduced quantities or even no chemical waste, or less dangerous types of chemical waste;
- Handle chemical waste in accordance with the Code of Practice on the Packaging, Handling and Storage of Chemical Wastes;
- Provide adequate numbers of portable toilets for the workers and maintain the toilet in a clean state;
- Ensure all general refuse is stored in enclosed bins or compaction units and provide waste separation facilities for paper, aluminium cans, plastic bottles etc.
- Waste from horse stables (mainly the horse manure) would be collected on a regular basis following HKJC's sanitary procedures.

7.5 Landscape and Visual

The Contractor is responsible for the implementation of landscape and visual measures within the construction site as follows:

7.5.1 Construction Areas

- Site offices and the construction yard will be decommissioned after construction;
- Construction roads will be decommissioned and landscape areas be restored to its original or newly proposed state;
- The holding nursery for decorative plants at show jumps will be decommissioned after the Olympic events;
- The height of site offices will be controlled in order to avoid visual impacts;
- Where practical the site offices areas, construction yards and storage areas will be screened with decorative hoarding or vegetation around the peripheries until the completion of relevant construction/reinstatement phases;
- Construction plant and building material will be orderly and carefully stored in order to appear neat and avoid visibility from outside where practical;
- Excess materials will be removed from site as soon as practical;
- All construction plant will be removed from site upon completion of construction works;

- Construction light will be oriented away from the viewing location of VSRs;
- All construction lights will have frosted diffusers and reflective cover;
- Temporary construction sites will be restored to standards as good as, or better than, the original condition;
- The potential for soil erosion shall be reduced at the construction stage by minimizing the extent of vegetation disturbance on site and by providing a protective cover over exposed ground; and
- No construction equipment or building materials will be stored under the dripline of retained trees and no vehicle movement or other construction activities like washing, concrete mixing etc will be carried out under the dripline of trees.

7.5.2 Tree Preservation and Planting Works

- The tree compensation to tree loss ratio will be 1:2;
- At least 82 new trees of light standard or larger size will be planted;
- The majority of compensation species will comprise species that already occurs within the LIA boundaries;
- Where practical, trees that require removal will be transplanted on Site;
- New trees, bamboos and shrubs will be planted in groups in order to screen visual impacts and to provide additional shade.
- New slopes with a gradient larger than 30° will have shrub, groundcover or grass planting;
- No tree will be transplanted or felled without prior approval by relevant Government departments in accordance with WBTC 14/2002 and ETWB 2/2004;
- All trees that are marked for retention will be fenced off with a 1.2m high fence;
- Transplant preparation works will be carried out as soon as possible after commencement of construction. Rootball and crown pruning will be carried out over a period of at least 1 month;
- Existing shrub and ground cover planting areas that will not be removed will be maintained in good condition and enhanced where practical;
- All new tree, shrub, groundcover and grass planting works will be maintained in a good condition after planting, which is equal to the present condition or better;
- Site formation works at slopes will be followed with hydroseeding as soon as practical or be covered with shrubs and groundcovers; and
- Grassing will be carried out as soon as practical after construction of footing stratum at one of the General Training Arenas.

7.5.3 Floodlights

- All floodlight units on the floodlight poles will be properly aimed at the competition and practice areas of the Main and Warm-up arenas. In this regards, the central light focus of each floodlight unit will always be aimed on the arena areas and not on any other adjacent area;

- Each floodlight unit will have a built-in anti-glare baffle and visor shield to limit the glare; and
- Operational hours of the floodlights will be restricted to competition hours only. Floodlights will be turned off when spectators have left the seating area.
- The maximum illumination level at the Main Arena shall not exceed 2000 lux as determined by measurement with a precision light meter during testing and commissioning of the floodlight system for the Main Arena. Proper control setting of the power circuits shall then be enabled to maintain the maximum 2000 lux restriction throughout the Olympic and Paralympic Events.

8. REPORTING

8.1 Construction/Reinstatement Phase

The following reporting requirements are based upon a paper document approach. However, the same information can be provided in an electronic medium upon agreeing the format with the ER and EPD. This would enable a transition from a paper/historic and reactive approach to an electronic/real time proactive approach.

8.1.1 Baseline Monitoring Report

The ET Leader shall prepare and submit a Baseline Environmental Monitoring Report, endorsed by IEC, within 10 working days of completion of the baseline monitoring. Copies of the Baseline Environmental Monitoring Report shall be submitted to each of the four parties: the Contractor, IEC, ER and EPD. The ET Leader shall liaise with the relevant parties on the exact number of copies required. The format of the report and the format of the baseline monitoring data in magnetic media to be submitted to EPD shall be agreed with EPD.

The baseline monitoring report shall include at least the following:

- up to half a page executive summary;
- brief project background information;
- drawings showing locations of the baseline monitoring stations;
- monitoring results (in both hard and diskette copies) together with the following information:
 - monitoring methodology
 - equipment used and calibration details
 - parameters monitored
 - monitoring locations (and depth)
 - monitoring date, time, frequency and duration;
- details on influencing factors, including:
 - major activities, if any, being carried out on the site during the period
 - weather conditions during the period
 - other factors which might affect the results

- determination of the Action and Limit Levels for each monitoring parameter and statistical analysis of the baseline data;
- revisions for inclusion in the EM&A Manual; and
- comments and conclusions.

8.1.2 Monthly EM&A Reports

The results and findings of all EM&A works required in this Manual shall be recorded in the monthly EM&A reports prepared by the ET Leader and endorsed by IEC. The EM&A report shall be prepared and submitted within 10 working days of the end of each reporting month, with the first report due in the month after construction commences. Copies of each monthly EM&A report shall be submitted to each of the four parties: the Contractor, ER, IEC and EPD. Before submission of the first EM&A report, the ET Leader shall liaise with the parties on the exact number of copies and format of the monthly reports in both hard copy and electronic medium requirement.

The ET leader shall review the number and location of monitoring stations and monitoring parameters every 6 months or on as needed basis in order to cater for the changes in surrounding environment and nature of works in progress.

8.1.2.1 First Monthly EM&A Report

The first monthly EM&A report shall include at least the following :

- 1-2 pages executive summary;
- basic project information including a synopsis of the project organisation, programme and management structure, and the work undertaken during the month;
- a brief summary of EM&A requirements including:
 - all monitoring parameters
 - environmental quality performance limits (Action and Limit levels)
 - Event-Action Plans
 - environmental mitigation measures, as recommended in the EIA report
 - environmental requirements in Contract documents;
- advice on the implementation status of environmental protection and pollution control/mitigation measures, as recommended in the EIA report and implementation schedule;
- drawings showing the project area, any environmental sensitive receivers and the locations of the monitoring and control stations;
- monitoring results (in both hard and diskette copies) together with the following information:
 - monitoring methodology
 - equipment used and calibration details
 - parameters monitored
 - monitoring locations (and depth)
 - monitoring date, time, frequency, and duration;

- graphical plots of trends of monitored parameters over the past four scheduled audits for representative monitoring stations annotated against the following:
 - major activities being carried out on site during the period
 - weather conditions during the period
 - any other factors which might affect the monitoring results;
- advice on the solid and liquid waste management status;
- a summary of non-compliance (exceedances) of the environmental quality performance limits (Action and Limit levels);
- a review of the reasons for and the implications of non-compliance including review of pollution sources and working procedures;
- a description of the actions taken in the event of non-compliance and deficiency reporting and any follow-up procedures related to earlier non-compliance;
- a summary record of all complaints received (written or verbal) for each media, including locations and nature of complaints, liaison and consultation undertaken, actions and follow-up procedures taken and summary of complaints; and
- An account of the future key issues as reviewed from the works programme and work method statements.

8.1.2.2 Subsequent EM&A Reports

The subsequent monthly EM&A reports shall include the following :

- Title Page;
- Executive Summary (1-2 pages)
 - Breaches of A/L levels
 - Complaint Log
 - Reporting Changes
 - Future key issues;
- Contents Page;
- Environmental Status
 - Drawing showing the project area, any environmental sensitive receivers and the locations of the monitoring and control stations
 - Summary of non-compliance with the environmental quality performance limits
 - Summary of complaints;
- Environmental Issues and Actions
 - Review issues carried forward and any follow-up procedures related to earlier non-compliance (complaints and deficiencies)
 - Description of the actions taken in the event of non-compliance and deficiency reporting
 - Recommendations (should be specific and target the appropriate party for action)

- Implementation status of the mitigation measures and the corresponding effectiveness of the measures;
- Future Key Issues; and
- Appendix
 - A/L levels
 - Graphical plots of trends of monitored parameters at key stations over the past four scheduled audits for representative monitoring stations annotated against the following:
 - major activities being carried out on site during the period
 - weather conditions during the period
 - any other factors which might affect the monitoring results
 - Monitoring schedule for the present and next reporting period
 - Cumulative complaints statistics
 - Details of complaints, outstanding issues and deficiencies.

8.1.3 Quarterly EM&A Summary Reports

A quarterly EM&A summary report of around five pages shall be produced and shall contain at least the following information. Apart from these, the first quarterly summary report should also confirm that the monitoring work is proving effective and that it is generating data with the necessary statistical power to categorically identify or confirm the absence of impact attributable to the works.

- (i) up to half a page executive summary;
- (ii) basic project information including a synopsis of the project organisation, programme, contacts of key management, and a synopsis of works undertaken during the quarter;
- (iii) a brief summary of EM&A requirements including:
 - monitoring parameters;
 - environmental quality performance limits (Action and Limit levels); and
 - environmental mitigation measures, as recommended in the project EIA Final Report;
- (iv) advice on the implementation status of environmental protection and pollution control / mitigation measures, as recommended in the project EIA Final Report, summarised in the updated implementation schedule;
- (v) drawings showing the project area, any environmental sensitive receivers and the locations of the monitoring and control stations;
- (vi) graphical plots of any trends in monitored parameters over the past four months (the last month of the previous quarter and the present quarter) for representative monitoring stations annotated against:
 - the major activities being carried out on site during the period;
 - weather conditions during the period; and
 - any other factors which might affect the monitoring results;

- (vii) advice on the solid and liquid waste management status during the quarter including waste generation and disposal records;
- (viii) a summary of non-compliance (exceedances) of the environmental quality performance limits (Action and Limit levels);
- (ix) a brief review of the reasons for and the implications of any non-compliance, including a review of pollution sources and working procedures;
- (x) a summary description of actions taken in the event of non-compliance and any follow-up procedures related to any earlier non-compliance;
- (xi) a summarised record of all complaints received (written or verbal) for each media, liaison and consultation undertaken, actions and follow-up procedures taken;
- (xii) comments (for examples, a review of the effectiveness and efficiency of the mitigation measures); recommendations (for example, any improvement in the EM&A programme) and conclusions for the quarter; and
- (xiii) proponents' contacts and any hotline telephone number for the public to make enquiries.

8.1.4 Final EM&A Review Reports

The Final EM&A Report shall contain at least the following information:

- Executive Summary (1-2 pages);
- drawings showing the project area, any environmental sensitive receivers and the locations of the monitoring and control stations;
- basic project information including a synopsis of the project organization contacts of key management, and a synopsis of work undertaken during the course of the project or past twelve months;
- a brief summary of EM&A requirements including:
 - (i) environmental mitigation measures, as recommended in the EIA Report;
 - (ii) environmental impact hypotheses tested;
 - (iii) Action/Limit Levels;
 - (iv) all monitoring parameters
 - (v) Event-Action Plans;
- a summary of the implementation status of environmental protection and pollution control/mitigation measures as recommended in the EIA report summarized in the updated implementation schedule;
- graphical plots and the statistical analysis of the trends of monitored parameters over the course of the project, including the post project monitoring (for the past twelve months for annual report) for all monitoring stations against:
 - (i) the major activities being carried out on site during the period;
 - (ii) weather conditions during the period; and
 - (iii) any other factors which might affect the monitoring results
- a summary of non-compliance (exceedances) of the environmental quality performance limits (AL Levels);

- a review of the reasons for and the implications of non-compliance including review of pollution sources and working procedures as appropriate;
- a description of the actions taken in the event of non-compliance;
- a summary record of all complaints received (written or verbal) for each media liaison and consultation undertaken, action and follow-up procedures taken;
- a summary record of notifications of summons and successful prosecutions for breaches of the current environmental protection/pollution control legislations including locations and nature of the breaches, investigation, follow-up actions taken and results;
- a review of the validity of EIA Report predictions and identification of shortcomings in EIA Report recommendations; and
- a review of the effectiveness and efficiency of the mitigation measures; and
- a review of success of the EM&A programme to cost effectively identify deterioration and to initiate prompt effective mitigation action when necessary.

8.1.5 Data Keeping

The site documents such as the monitoring field records, laboratory analysis records, site inspection forms, etc. are not required to be included in the monthly EM&A reports for submission. However, the documents shall be well kept by the ET Leader and be ready for inspection upon request. All relevant information shall be clearly and systematically recorded in the documents. The monitoring data shall also be recorded in magnetic media form. All the documents and data shall be kept for at least one year after completion of the construction Contract.

8.1.6 Interim Notification of Environmental Quality Limit Exceedances

With reference to Event/Action Plans, when the environmental quality limits are exceeded, the ET Leader shall immediately notify ER, IEC and EPD, as appropriate. The notification shall be followed up to advise EPD and IEC on the results of the investigation, proposed action and any necessary follow-up proposals in case of exceedance. A sample template for the interim notifications is shown in Appendix 8-1.

8.1.7 Electronic Environmental Management System (EEMS)

An Electronic Environmental Management System (EEMS) shall be implemented and maintained throughout the construction/reinstatement phase of the Project. The EEMS shall function as a database for the entry of all recorded monitoring and audit information. The monitoring data shall be accessible to the general public through an internet website.

8.2 Operation Phase

8.2.1 Operational Odour Patrol Survey Reports

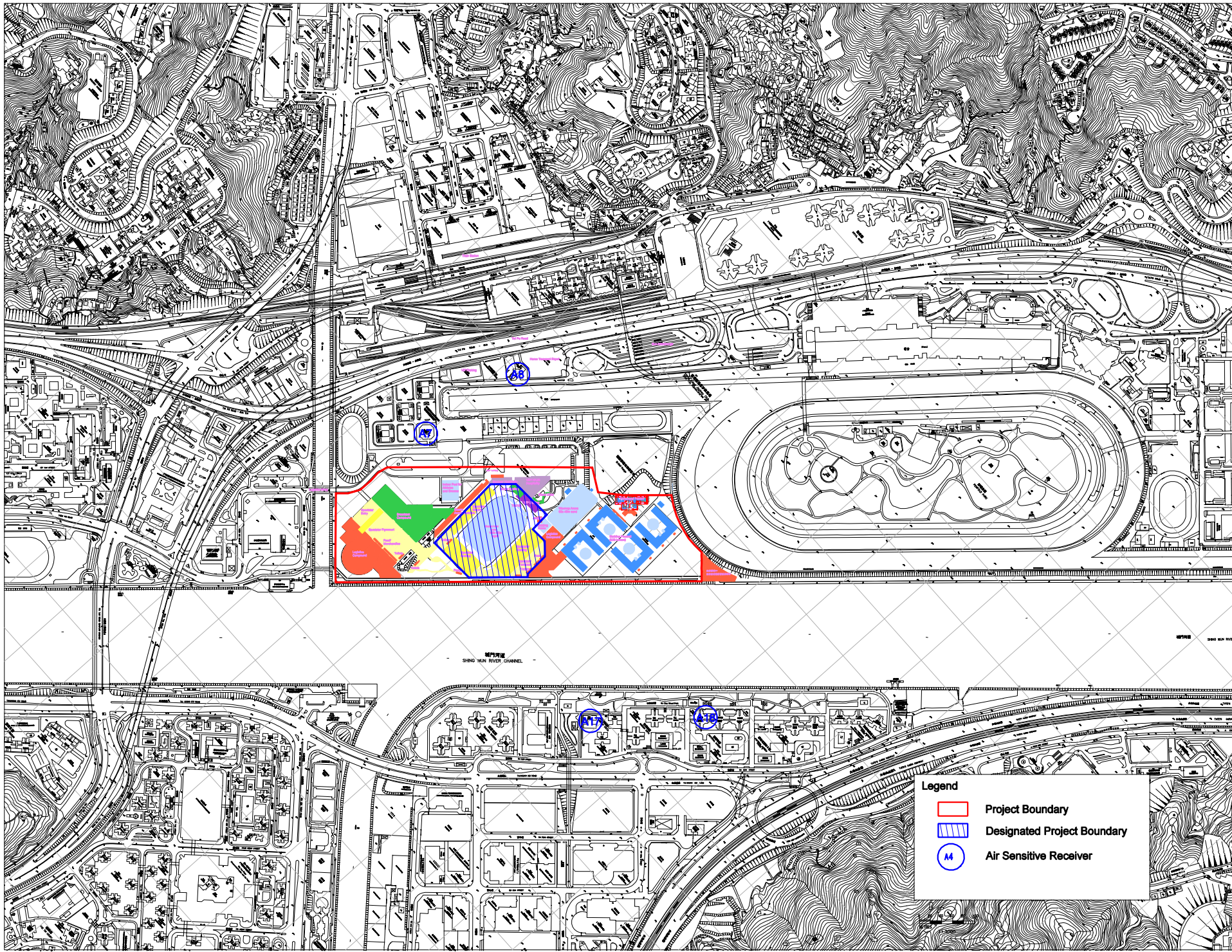
EMA(O) shall prepare and submit the Odour Patrol Survey Report, endorsed by IEC, within 5 working days from completion of each odour patrol. Copies of the Odour Patrol Survey Report shall be submitted to the IEC, Operator and EPD. The EMA(O) shall liaise with the relevant parties on the exact number of copies required. The format of the report shall be agreed with EPD.

8.2.2 Operational Noise Monitoring Reports

The EMA(O) shall prepare and submit weekly report to summarise the noise monitoring results during the week at the end of each reporting week. Copies of weekly operational noise monitoring report shall be submitted to the IEC, Opeartor and EPD. The EMA(O) shall liaise with the relevant parties on the exact number of copies required. The format of the report shall be agreed with EPD.

Figure

Monitoring Location



GENERAL NOTES
 1. THIS DRAWING IS THE PROPERTY OF THE ARCHITECTS
 2. NO PART OF THIS DRAWING IS TO BE REPRODUCED OR TRANSMITTED IN ANY FORM OR BY ANY MEANS, ELECTRONIC OR MECHANICAL, INCLUDING PHOTOCOPYING, RECORDING, OR BY ANY INFORMATION STORAGE AND RETRIEVAL SYSTEM, WITHOUT THE WRITTEN PERMISSION OF THE ARCHITECTS
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NO.	REVISIONS	DATE



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 Sheung Wan, Hong Kong
 levittandbailey.com




2008 OLYMPIC
 EQUESTRIAN VENUES

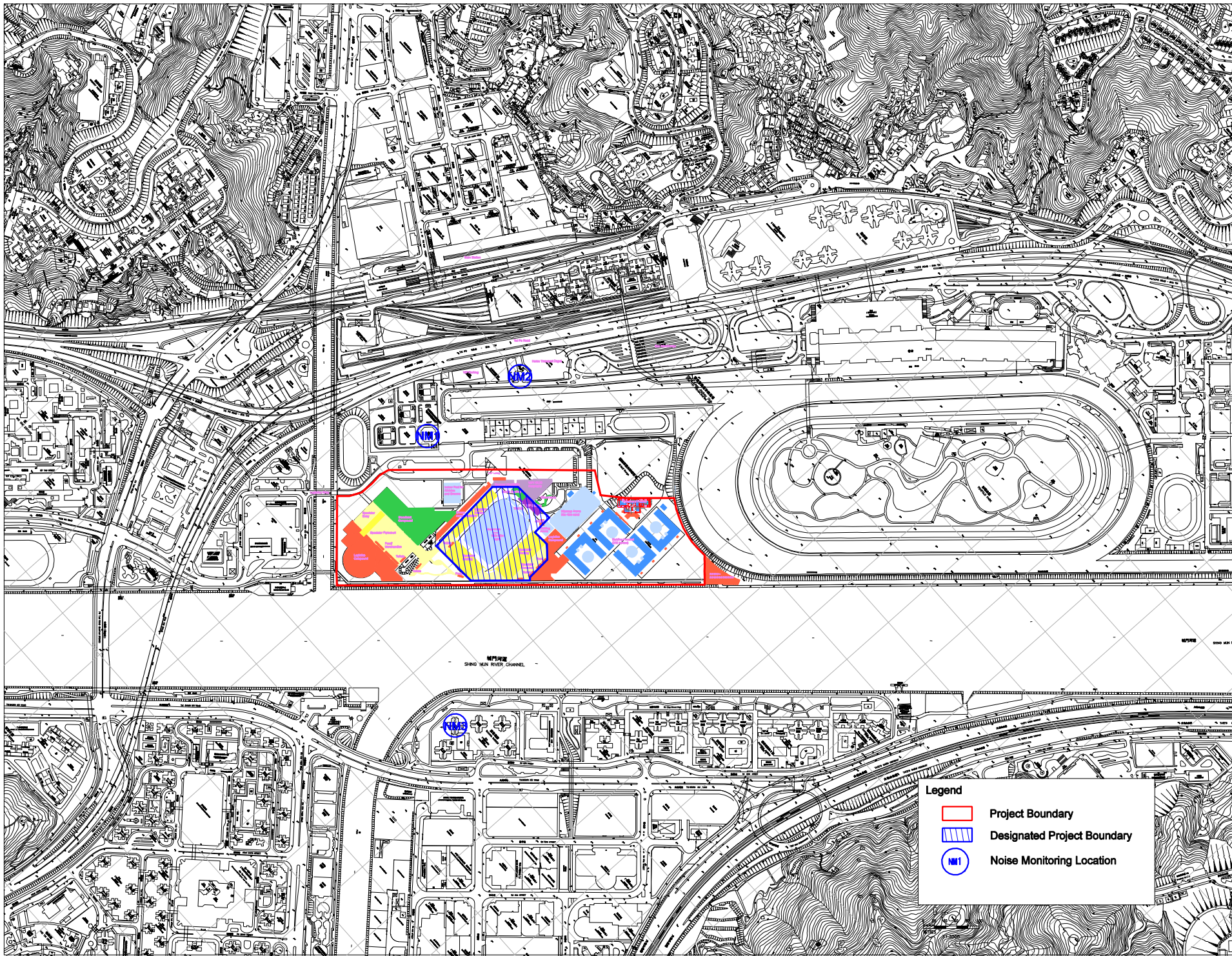
Locations of Representative
 Air Sensitive Receivers

ST/R/S/AR/301

NO.	DATE	BY	CHKD.
24469	18 DEC 2005	ST	ST

Legend

-  Project Boundary
-  Designated Project Boundary
-  Air Sensitive Receiver



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2008 OLYMPIC
EQUESTRIAN VENUES

Monitoring Locations

ST/R/S/HK/302

Scale: 1:24460 AS SHOWN
Date: 13 DEC 2005 FAI
Sheet: ST ST

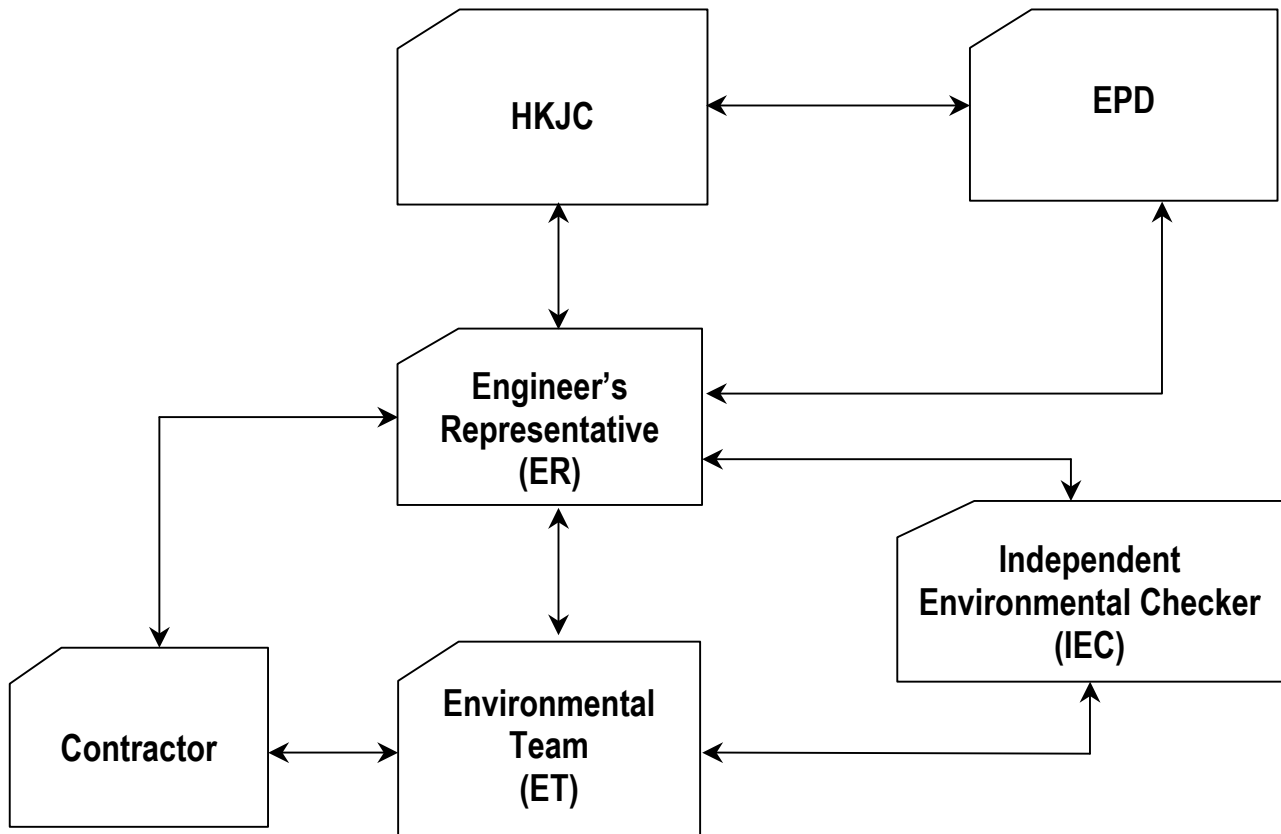
Legend

- Project Boundary
- Designated Project Boundary
- NM1 Noise Monitoring Location

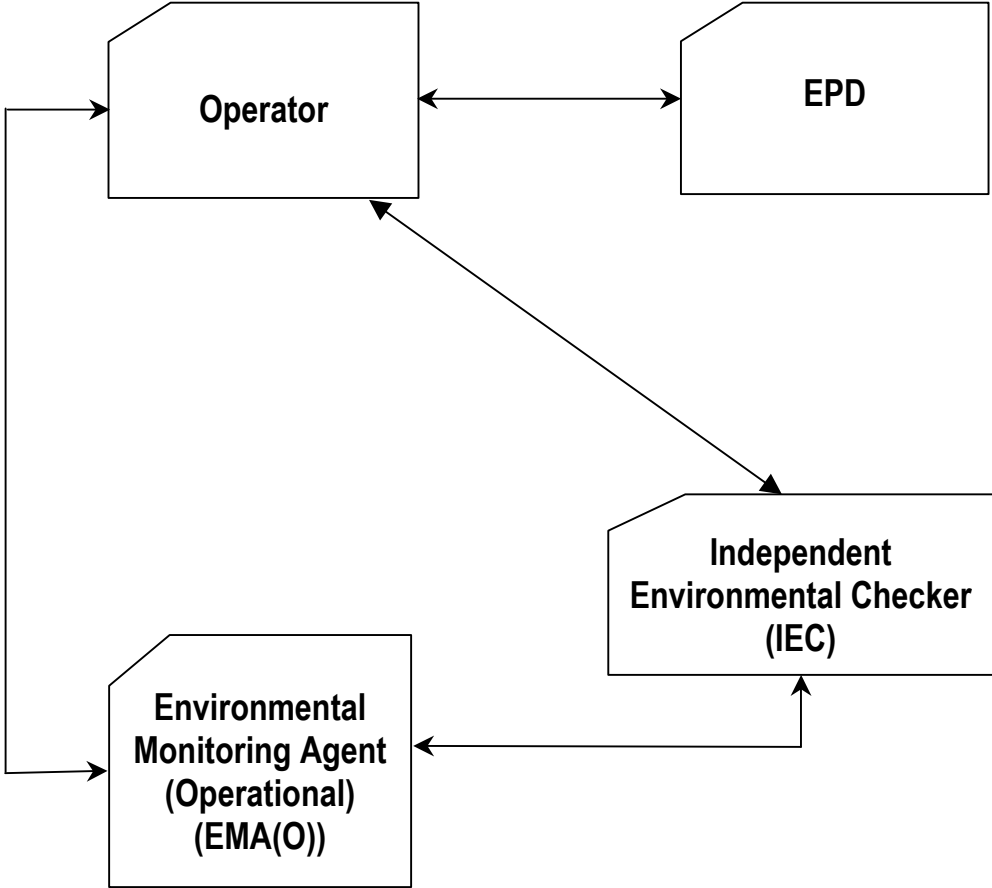
Appendices

Appendix 3-1
Project Organisation

Project Organisation for Construction/Reinstatement Phase



Project Organisation for Operational Phase



Appendix 4-1
Sample Data Sheet

Noise Monitoring Field Record Sheet

Monitoring Location		
Description of Location		
Date of Monitoring		
Measurement Start Time (hh:mm)		
Measurement Time Length (min.)		
Noise Meter Model/Identification		
Calibrator Model/Identification		
Measurement Results	L ₉₀ (dB(A))	
	L ₁₀ (dB(A))	
	Leq (dB(A))	
Major Construction Noise Source(s) During Monitoring		
Other Noise Source(s) During Monitoring		
Remarks		

Name & Designation

Signature

Date

Recorded By :

Checked By :

Appendix 5-1
Sample Odour Patrol
Record Sheet

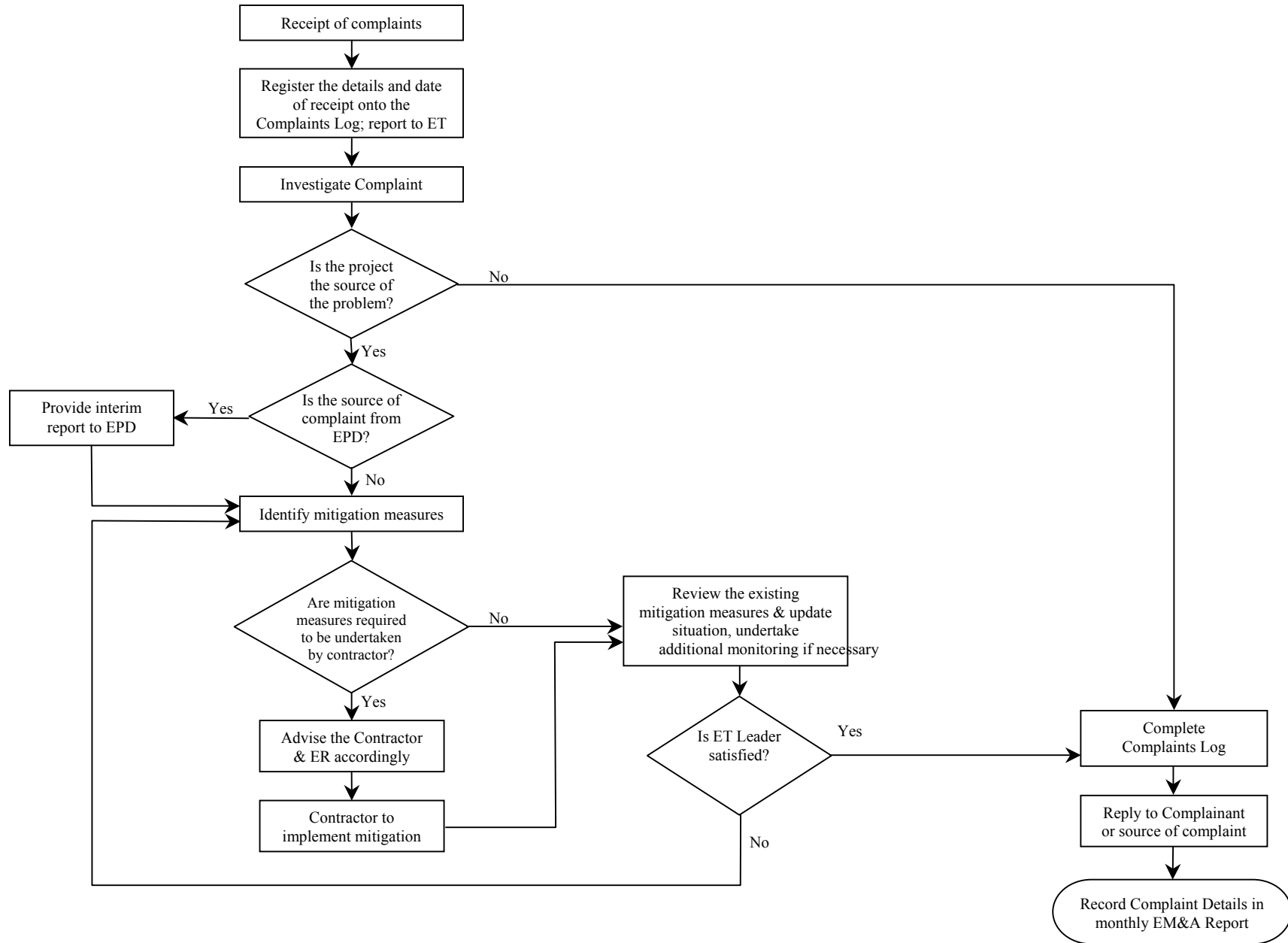
Odour Patrol Record Sheet

Route X

Location	Time		Wind Records		Odour Intensity			On-site Observation		
	Patrol 1	Patrol 2	Speed (m/s)	Direction	Range	(Date of Patrol 1)	(Date of Partol 2)	Mean	Odour nature	Possible source
1										
2										
3										
4										
5										
6										
7										
8										
9										
10										

Ambient Temperature : _____ °C
 Relative Humidity : _____ %

Appendix 6-1
Flow Chart of
Complaint Response
Procedure



Appendix 6-2
Complaint Proforma

Complaint Proforma

Division/Department:		Date:	Ref:
Project:		Job No.:	
COMPLAINANT			
Name:		Address:	
Tel:			
Fax:			
COMPLAINT INVESTIGATION			
Item	Description (cause of impact, type of impact and location, etc.)		
CORRECTIVE & PREVENTIVE ACTION(S)			
Action #	Proposed Action to be taken	To be completed by/on	
Prepared by:			
Name:		Signature:	Date:
FOLLOW UP ACTION(S)			
Confirmed by:			
Name:		Signature:	Date:
ATTACHMENTS:			

Appendix 8-1
Sample Template for
Interim Notification of
Environmental Quality
Limits Exceedances

Sample Template for Interim Notifications of Environmental Quality Limits Exceedances

Incident Report on Action Level or Limit Level Non-compliance

Project	
Date	
Time	
Monitoring Location	
Parameter	
Action & Limit Levels	
Measured Level	
Possible reason for Action or Limit Level Non-compliance	
Actions taken / to be taken	
Remarks	

Location Plan

Prepared by :

Designation :

Signature :

Date :

