

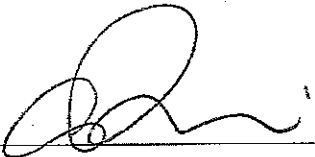
Contract No. : DC/2007/06
River Improvement Works in Upper Lam Tsuen She
Shan River and Upper Tai Po River

ENVIRONMENTAL MONITORING AND AUDIT
FIRST MONTHLY EM&A REPORT of UPPER TAI PO
RIVER for September 2008

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**EM&A Manual in relation to 2-year post construction monitoring program for
Upper Tai Po River**

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EXECUTIVE SUMMARY

This is the first monthly Environmental Monitoring and Audit (EM&A) Report for the river improvement works at Upper Tai Po River under Drainage Service Department Contract No. DC/2007/06 entitled “River Improvement Works in Upper Lam Tsuen River, She Shan River and Upper Tai Po River”. The reporting period is during the 15th of September to 30th of September 2008. The major construction activities carried out by the contractor during this reporting period included access road formation and site preparation works.

The Environmental Team (ET) is responsible for the EM&A works required in the EM&A manual. Site inspections were carried out on weekly basis to investigate and audit the equipment and work methodologies with respect to pollution control and environmental mitigation. The weekly inspections records and photos taken were kept.

Environmental Team had not carried out construction noise monitoring during the reporting period.

Piling works were not scheduled for this period. Therefore, Environmental Team had not carried out vibration monitoring during the reporting period.

Ecological monitoring is not scheduled for the reporting period. The summary of ecological site inspection findings and implementation status of environmental protection and mitigation for ecology, prepared by the Ecologist Dr. Mark Shea, are provided in table 7.2 and table 9.2 respectively.

There was no breaches of Actions and Limit levels for the report period.

There was no non-compliance recorded for the reporting period.

There was no reporting changes for this month.

There was no formal complaint and successful prosecutions against the river improvement work at Upper Tai Po River during the reporting period.

Key construction activities in the coming month will be access road formation and site preparation work. It is expected that noise impacts, runoff impacts and waste

disposal will be generated on site.

ET has reminded the contractor to provide environmental pollution control measures wherever necessary and to keep a good environmental management at site practices.

1.0 Project Information

1.1 Basic Project Information

The Drainage Service Department is implementing this project to upgrade the Upper Tai Po River to alleviate the risks of flooding in Tai Po Rural Areas.

The Maunsell Consultants Asia Limited (MCAL) was awarded the design and construction Consultancy Assignment (Agreement no.CE50/2001) for this project.

The Construction contract (Contract No. DC/2007/06 – River Improvement Works) was awarded to Chiu Hing Construction and Transportation Company Limited on 28th September 2007.

All construction activities should comply with requirements specified in Environmental Permit EM&A manual, Project Profile and Project Specification.

The ET shall be responsible for the EM&A works required in the EM&A Manual for this project.

1.2 Construction Programme

The construction of the proposed improvement works for Upper Tai Po River is scheduled to commence on 15th September 2008 and anticipated to complete in April 2011, with the remaining landscaping works scheduled for completion in April 2012.

Approximately 0.6km of Upper Tai Po River will be improved to enhance the hydraulic performance of the river. The improvement works comprise of the following:

1. re-profiling and realignment of the Channel
2. inclusion of gabions and retaining walls for bank protection whilst providing a natural channel bed:
3. re-provisioning of footbridges and footpaths along the channel

The proposed construction sequence is shown in as follows

- (1) site clearance and preparation works
- (2) construction of the maintenance access which involves the construction of retaining walls
- (3) river channel construction and excavation, involving the excavation works, construction of retaining walls and gabion walls.
- (4) Re-provisioning of footbridges
- (5) construction of footpaths

(6) landscaping works

For detailed Master Program for Upper Tai Po River, please refer to **Appendix A** of this report.

1.3 Management Structure and management

1.3.1 Environmental Management Organization Chart for project DC/2007/06.

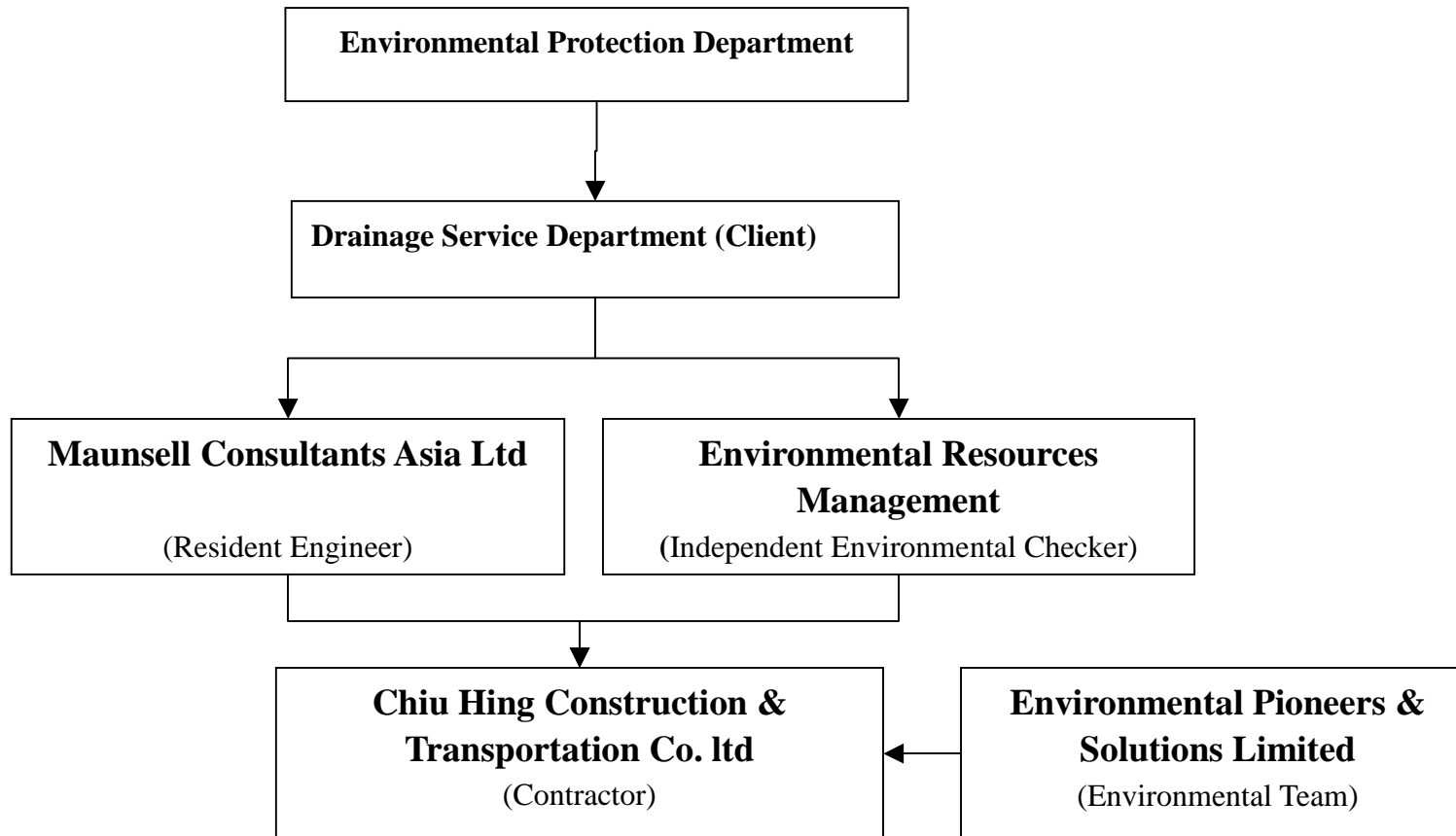


Figure 1.3.2 Environmental Management Organization Chart for the Contractor.

Proposed Environmental Management Organisation Chart
Contract No. DC/2007/06
River Improvemnet Works in Upper Lam Tsuen River,
She Shan River and Tai Po River

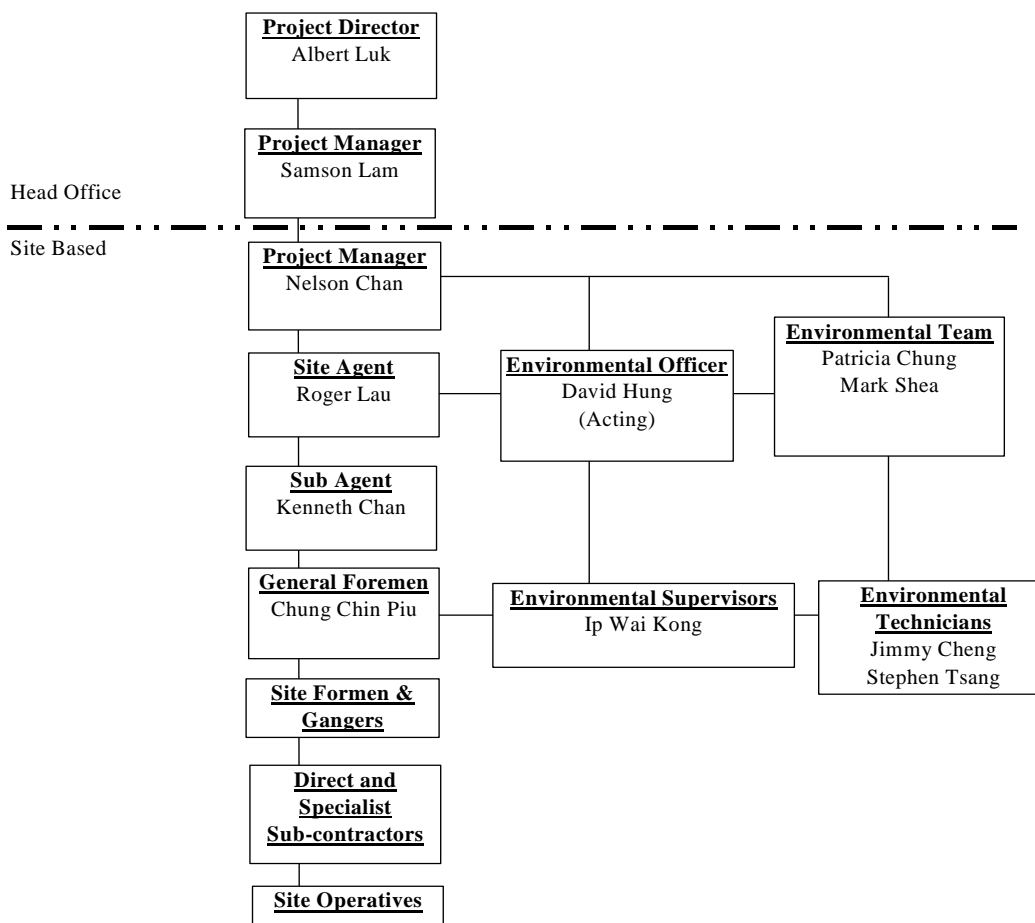


Table 1.3.1 Key Personel Contact information regarding Environmental Issues

Name	Position	Contact Number
Mr. Nelson Chan	Project Manager	24459130
Mr. David Hung	Environmental Officer	24459130
Ms Patricia Chung	Environmental Team Leader	21850123
Dr. Mark Shea	Ecologist	25299593

1.4 Work Undertaken during the reporting period

The major works undertaken in this reporting period includes:

1. Access road formation
2. Site preparation work

2.0 Summary of EM&A requirements

The EM&A requirements for the Upper Tai Po River include Construction Noise Monitoring, Vibration Monitoring, Ecological Monitoring during construction works. The site environmental audits for this reporting period include the weekly inspections for the construction noise, air quality, water quality, waste management and ecology.

3.0 General layouts for Monitoring Locations, Environmental Sensitive receivers

The project area of the proposed drainage channels works at Upper Tai Po River is shown in **Appendix B**.

Locations classified as Noise Sensitive Receivers (N.S.R) for monitoring noise impact that are generated by the construction activities is provided in **Appendix C**.

4.0 Noise Monitoring

4.1 Monitoring Parameters and Methodology

The construction noise level shall be measured in terms of 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 each Noise Sensitive Receiver (NSR) weekly. As supplementary information for data auditing, statistical results such as $L_{A10(30mins)}$ and $L_{A90(30mins)}$ shall also be obtained for reference at the same time during the monitoring measurement. For all other periods (including restricted hours), $L_{Aeq(5mins)}$ shall be employed for comparison with the Noise Control Ordinance (NCO) criteria.

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 portable wind speed meter capable of measuring the wind speed in m/s.

The monitoring station shall normally be at a point 1m from the exterior of the sensitive receivers building façade and be at a position 1.2m above ground. If there is a problem with accessing to the normal monitoring position and without 1m from the exterior of the sensitive receivers building façade, a correction of +3dB(A) for the measurement shall be made to the measurement data and the description of the monitoring location will be classified as free field measurement data.

4.2 Equipment used and Calibration details

Impact noise monitoring was conducted using SVAN sound analysis equipment – SVAN 949, which complied with the International Electro technical Commission Publications 651:1979 (Type 1) and 804:1 985 (Type 1) Specifications as referred to in the Technical Memorandum to the Noise Control Ordinance. The equipment were calibrated and verified by certified laboratory or manufacturer every year to ensure they perform to the same level of accuracy as stated in the manufacturer's specification. Before and after each measurement, the reading of sound level meter was checked with the acoustic calibrator and the measurements were accepted as valid if the calibration levels before and after the noise measurement agreed to within 1.0 dB(A). For the equipment list for Noise monitoring, please refer to **table 4.1** for the equipment list. **For the calibration certificate, please refer to Appendix D of this report.**

Table 4.1 Equipment list for Noise Monitoring

Equipment	Manufacturer & Model No.	Precision Grade	QTY
Integrated sound level meter	SVAN Model 949	IEC 651 Type 1 IEC 804 Type 1	1
Windscreen	Microtech gefell model W2	N/A	1
Acoustical Calibrator	SVAQN SC-30A	IEC 942 Type 1	1
Wind Speed Indicator	Kestrel K1000	N/A	1

4.3 Noise Monitoring Location

In accordance with the EM&A Manual, noise monitoring locations were established at 11 N.S.R. locations which was described in **Section 3.0** and the location is shown in **Appendix C**.

TABLE 4.2 Description of Noise Sensitive Receivers

Sensitive Receiver No.	Location and Description
UTP1	54B, Sheung Wun Yiu
UTP2	Village House in Lai Chi Shan
UTP3	Village House near Upper Tai Po River
UTP4	Village House near Upper Tai Po River
UTP5	Village House near Upper Tai Po River
UTP6	Village House near Upper Tai Po River
UTP7	Village House near Upper Tai Po River
UTP8	Village House near Upper Tai Po River
UTP9	49A, Pun Shan Chau
UTP10	Village House near the proposed access road
UTP11	49G, San Uk Ka

4.4 Monitoring Results

The noise monitoring had not been carried out in this reporting period.

4.5 Action and Limit Levels for Noise Monitoring

The Action and Limit levels for construction noise and the Event/Action plan are summarized in **table 4.3**.

Table 4.3: Action and Limit Levels for Construction Noise

Time Period	Action	Limit
0700-1900 hours on normal weekdays	When one documented complaint is received	75dB(A)
Remarks: If works are to be carried out during restricted hours, the conditions stipulated in the construction noise permit issued by the Noise Control Authority have to be followed.		

*Limit level set in accordance with Particular Specification section 26.03(3)(a).

4.6 Event and Action Plan for Noise Monitoring

Event/Action Plan for airborne construction noise should be carried out when non-compliance of construction noise criteria is recorded either during normal work hours (ie 0700 hours to 1900 hours on normal weekdays) or restricted hours. Should there be any measurement results higher than 75.0dB(A) during normal work hours, which is described as non-compliance of the noise monitoring criteria, action in accordance with the Event / Action Plan which is described in **table 4.4** shall be carried out.

Table 4.4: Event/Action plan for airborne construction noise

Event	Action			
	ET Leader	ER	IEC	Contractor
Action Level	<ol style="list-style-type: none"> 1. Notify IEC,ER and the Contractor. 2. Carry out investigation. 3. Report the results of investigation to IEC,ER and the Contractor. 4. Discuss with the ER and the Contractor and formulate remedial measures. 5. Increase monitoring frequency to check mitigation measures. 	<ol style="list-style-type: none"> 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. 	<ol style="list-style-type: none"> 1. Review with analysed results submitted by ET. 2. Review the proposed remedial measures by the Contractor and advise ER accordingly. 3. Supervise the implement of remedial measures. 	<ol style="list-style-type: none"> 1. Submit noise mitigation proposals to ER / ET. 2. Implement noise mitigation proposals.
Limit Level	<ol style="list-style-type: none"> 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 	<ol style="list-style-type: none"> 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. 	<ol style="list-style-type: none"> 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. 	<ol style="list-style-type: none"> 1. Take immediate action to avoid further exceedance. 2. Submit proposals for remedial actions to ER and 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.

4.7 Noise Mitigation Measures

Construction noise can be mitigated to acceptable level by implementing good site practices such as orientating the noisy plants away from the nearby NSRs, proper fitting of silencers on the construction equipment, use of quiet plant, and use of movable barriers and acoustic mat to screen noise from noisy plants.

The following summaries good site practices and measures that should be followed:

- ◆ Well-maintained plant should be operated on-site and plant should be checked regularly;
- ◆ Plants (such as trucks, cranes) that may be in intermittent use should be shut down between work periods or should be throttled down to a minimum;
- ◆ Plant known to emit noise strongly in one direction, where possible, be orientated so that the noise is directed away from nearby NSRs;
- ◆ Silencers on construction equipment should be properly fitted and maintained during the construction works;
- ◆ Mobile plant should be sited as far away from NSRs as possible and practicable;
- ◆ Quiet plants as listed in Project Profile should be used;
- ◆ 2m high temporary noise barriers, as stipulated in EP condition 2.9, shall be installed;
- ◆ Movable barrier or acoustic mat should be adopted for the PME's as listed in Project Profile (refer to **Table 4.5**).
- ◆

Table 4.5: Quieter PME Recommended for Adoption during Construction Phase

Powered Mechanical Equipment (PME)	Reference	Sound Power Level (SWL)
Excavator / Loader	BS C3/97	105
Dump Truck	BS C9/39	103
Generator	CNP103	95
Crane	BS C7/114	101
Vibratory Roller	BS C3/116	106
Vibration Poker	BS C6/32	100
Concrete Lorry Mixer	BS C6/23	100
Water Pump	CNP 283	85

5.0 Vibration Monitoring

5.1 Monitoring Parameters

The targeted monitoring buildings are Fan Sin Temple and Wun Yiu Liln Site of Sheung Wun Yiu as specified in the Project Profile. They might be affected by the piling process for building a retaining wall along the lower stream of Tai Po River closed to the said premises. The vibration monitoring measures would record the vibration levels at entrance ground level and external wall of Temple building that might be affected by the ground-borne vibration radiated from piling activities in the vicinity.

The ground conditions are soil/rocks base; some surface covered by a cement layer, drilling and piling activities involved dropping a heavy weight on the drill and pile heads. Such activities inevitably produced transient vibrations that would propagate from the ground affecting the nearby structures. The effects of vibration on the nearby structures depended its magnitude and frequency, and also on the type of structures themselves. The measured values will be evaluated as to the possibility of cosmetic, minor or major structural damage to the targeted buildings.

5.2 Monitoring Methodology

Vibrations samples will be taken using a SVAN 949 analyzer. This analyzer will be equipped with a connecting cable MIL-C-17/28 RG 058 and a DYTRAN 3185D accelerometer. The frequency range shall be set to 200Hz and the number of sampling points shall be set to 1024 resulting in a frequency resolution of around 0.2Hz. Hanning window functions shall be selected and maximum hold functions shall be applied over the event to pick up the peak to peak amplitude.

Measurements shall be recorded by attaching the accelerometer to the structural foundation, such as structural steel beam(s) of the building. The accelerometer shall be orientated, either x-, y-or z-directional in order to pick to the maximum amplitude.

If measurements have to be taken on a floor or hard surface next to a structure accelerometer shall be attached firmly on the surface³(or to a triangular metal bracket glued tk a spiked plate).

5.3 Monitoring Locations

Two sites of cultural heritage were identified within 300m of the proposed work area described below in **Table 5.1** and Shown in **Appendix E**.

Table 5.1: Vibration Monitoring Locations

Vibration Monitoring Location	Location
VM1	Remains of a Pottery Kiln at Wun Yiu Village
VM2	Fan Sin Kung Temple at Sheung Wun Yiu

5.4 Monitoring Frequency and Duration

Vibration monitoring works will be conducted upon commencement of piling/ drilling process. Monitoring will be carried out weekly in the first month and bi-weekly in the subsequent months of piling/ drilling process during the construction period if no exceedance of limit were recorded. No disturbance will be made to the fabrics of Fan Sin Temple during the vibration monitoring process

5.5 Monitoring Results

There was no piling works in September 2008 construction activities. Therefore, vibration monitoring was not required for this reporting period.

5.6 Reference Standards

Guidance regarding vibration limits is provided by the following British Standards (or their equivalent ISO standards):

- BS 7385 - Measurement and evaluation of vibration in buildings. Part 2: Guide to damage levels from ground borne vibration.

BS 7385 suggests vibration levels, below which damage is unlikely to occur in 95% of buildings. For cosmetic damage, the level is 15 mm/s at 4 Hz, increasing to 20 mm/s at 15 Hz, increasing to 50 mm/s at 40 Hz and above. Minor structural damage is possible at vibration levels twice those given above, major damage at four times the levels given in **Table 5.2**.

Table 5.2: Transient vibration guide values for cosmetic building damage (BS7385:Part 2 1993)

	Type of Building	Peak component particle velocity (mm/s) in frequency range of predominant pulse
1	Reinforced or framed structures	50 at 4 Hz and above
2	Un-reinforced or light framed structures	15 at 4 Hz, increasing to 20 at 15 Hz, increasing to 50 at 40 Hz and above.

The vibration magnitudes and frequencies refer to Peak Particle Velocities (PPV) occurring in any single direction, measured on the ground level of the building concerned.

5.7 Contingency Plan

Should there be any exceed of limits, i.e. the levels indicated in **Table 5.2**, ET will notify IEC, ER and Contractor at once. A joint investigation will be carried out in order to identify the possible source and remedial actions required and agreed between ER, IEC, ET and the Contractor. During such investigation, piling and drilling works should be suspended.

6.0 Ecological Monitoring

There are four criteria for ecological monitoring at Upper Tai Po River. They include Ecological baseline monitoring, Impact monitoring, Capture survey and Post Construction monitoring. There were two ecological baseline monitorings recorded, the first ecological baseline monitoring was conducted from October to December of 2007, the second ecological baseline monitoring was conducted in July to August of 2008. The ecological impact monitoring will be carried out in January 2009, July 2009, January 2010, July 2010, January 2011 and July 2011. The capture survey was carried out during the Ecological baseline monitoring during the period of October to December 2007. The up coming capture survey will be carried out in November 2008, November 2009 and November 2010 and the capture survey should be carried out before the commencement of work in each dry season. Post construction monitoring will be required monthly for 2 years after the completion of construction works.

6.1 Ecological Monitoring programme

Detailed monitoring parameters methodology and locations for ecological impact monitoring were proposed and summarized in table **6.1 below**. The proposed programme for ecological impact monitoring is shown in Table 6.2.

Table 6.1. Summary of scope of ecological impact monitoring

Item	Parameters	Methodology	Locations	Frequency	Duration
Water quality	DO, pH, conductivity, salinity, BOD, nutrient concentration (nitrate and ammonium)	field sampling and lab, analysis	Upper River, Lower river	twice a year	Within construction period
Sediment characteristics	Mud, sand, rock, boulder, cemented substratum	field observation and measurement	Belt transect	twice a year	Within construction period
Water flow	flow rate	field measurement	Pool, riffle	twice a year	Within construction period
Avifauna	species and abundance	point count, line transect	Upper river, lower river	twice a year	Within construction period
Aquatic macroinvertebrate	species and abundance	netting, kick sampling	Upper river, lower river	twice a year	Within construction period
Newt	abundance	live trapping, netting, observation	Upper River, Lower river	twice a year	Within construction period
Fish	species and abundance	live trapping, netting, observation	Upper River, Lower river	twice a year	Within construction period
Adult Odonate	species and abundance	observation, netting	Line transect	twice a year	Within construction period
Aquatic, emergent and riparian vegetation	species and abundance	observation	Belt and line transect	twice a year	Within construction period

Table 6.2 Proposed programme for ecological impact monitoring

No.	Item	2008	2008	2009	2009	2010	2010	2011
		wet season	dry season	wet season	dry season	wet season	dry season	Wet season
1	Avifauna Surveys	●	●	●	●	●	●	●
2	Fish community survey	●	●	●	●	●	●	●
3	Aquatic macro-invertebrates survey	●	●	●	●	●	●	●
4	Adult Odonate survey	●	●	●	●	●	●	●
5	Newt	●	●	●	●	●	●	●
6	Aquatic, emergent and riparian vegetation	●	●	●	●	●	●	●
7	Water quality sampling and analysis, sediment characteristics, water flow	●	●	●	●	●	●	●
8	Monitoring Reporting	□	□	□	□	□	□	□
9	Monitoring Reporting (Final)							□

6.2 Capture Survey Methodology

Capture survey which cover the entire site for the target species shall be carried out at the beginning of the contract. Detailed monitoring works of capture survey was proposed and summarized in the table 6.3 below, the proposed programme for capture survey is shown in table 6.4. The capture survey route and release location is shown in **Appendix F**.

Table 6.3 Summary of scope of capture survey

No.	Common name	Latin Name	Methodology	Locations	Frequency	Duration
1	Three- lined Chinese Stream Catfish	<i>Pseudobagrus trilineatus</i>	live trapping netting, observation & active searching at night	Entire works area	Once at beginning of the Contract and can be conducted at the same time as baseline survey. Then once in each dry season	Within each dry season during the construction period
2	Predaceous Chub	<i>Parazacco spilurus</i>	live trapping netting, observation	Entire works area	Once at beginning of the Contract and can be conducted at the same time as baseline survey. Then once in each dry season	Within each dry season during the construction period
3	Hong Kong Newt	<i>Paramesotriton hongkongensis</i>	live trapping netting, observation	Entire works area	Once at beginning of the Contract and can be conducted at the same time as baseline survey. Then once in each dry season	Within each dry season during the construction period

Table 6.4 Proposed program for capture survey

No.			Nov. 2007	2008	2009	2010	2011
	Common name	Latin Name	dry season	dry season	dry season	dry season	dry season
1	Three-lined Chinese Stream Catfish*	<i>Pseudobagrus trilineatus</i>	●	●	●	●	●
2	Predaceous Chub	<i>Parazacco spilurus</i>	●	●	●	●	●
3	Hong Kong Newt	<i>Paramesotriton hongkongensis</i>	●	●	●	●	●
4	Monitoring Reporting		□	□	□	□	□

Note:*

1. Night surveys of Three-lined Chinese Stream Catfish will be conducted once at the dry season of 2008, 2009 and 2010 and 2011.

6.3 Ecological post construction monitoring

Ecological post monitoring is required for this project. The schedule for the ecological post construction monitoring will be carried out once every month for two years after the completion of construction activities. Detailed monitoring works of Post construction monitoring was proposed and summarized in the table 6.5 below, proposed programme for post construction monitoring is shown in table 6.6.

Table 6.5 Scope of post construction ecological monitoring

No.	Item	Parameters	Methodology	Locations	Frequency	Duration
1	Water quality	DO, pH, conductivity, salinity, BOD, nutrient concentration (nitrate and ammonium)	field sampling and lab, analysis	Upper River, Lower river	monthly	two years post construction
2	Sediment characteristics	Mud, sand, rock, boulder, cemented substratum	field observation and measurement	Belt transect	monthly	two years post construction
3	Water flow	flow rate	field measurement	Pool, riffle	monthly	two years post construction
4	Avifauna	species and abundance	point count, line transect	Upper river, lower river	monthly	two years post construction
5	Aquatic macroinvertebrate	species and abundance	netting, kick sampling	Upper river, lower river	monthly	two years post construction
6	Newt	abundance	live trapping, netting, observation	Upper River, Lower river	monthly	two years post construction
7	Fish	species and abundance	live trapping, netting, observation	Upper River, Lower river	monthly	two years post construction
8	Adult Odonate	species and abundance	observation, netting	Line transect	monthly	two years post construction
9	Aquatic, emergent and riparian vegetation	species and abundance	observation	Belt and line transect	monthly	two years post construction

Table 6.6 Proposed Programme for Post-construction Ecological Monitoring.

No.	Item	2011	2011	2012	2012
		monthly	monthly	monthly	monthly
1	Avifauna Surveys	●	●	●	●
2	Fish community survey	●	●	●	●
3	Aquatic macro-invertebrates survey	●	●	●	●
4	Adult Odonate survey	●	●	●	●
5	Newt	●	●	●	●
6	Aquatic, emergent and riparian vegetation	●	●	●	●
7	Water quality sampling and analysis, sediment characteristics, water flow	●	●	●	●
8	Monitoring Reporting (monthly)	□	□	□	□
9	Monitoring Reporting (Final)				■

Biotic Data Collection

Avifauna

Avifauna survey will be conducted during the proposed 3-months baseline monitoring period. Special attention will be given to those stream channel area where birds used as feeding and foraging habitat. In general, avifauna survey will be taken in the morning or late afternoon when birds are more active (feeding and foraging). Numerical abundance will be recorded at fixed count points within a fixed radius, e.g. 30-50m according to landscape feature and visual penetration extent. Duration of the point count of birds will be standardized for 10 minutes at each location in order to collect comparable data. Transect count will also be used for the avifauna survey aimed to collect qualitative data. Binoculars and digital camera will be the main instrument to be used. Nomenclature and protection status of the species will follow those documented in the AFCD website (www.hkbiddiversity.net) and Carey et al/ (2001).

The point count will be conducted at two locations with one located at the lower portion of the river channel and the other located at the upper section of the river.

Bird baseline survey will be conducted within three months as specified in the project PS and the survey will cover two seasons, i.e. wet seasons (one survey in October 2007) and dry season (one survey in each month of November and December 2007) and another round of survey in the wet season of 2008 in July/August.

Frequency and duration for impact and post monitoring is given in Tables 6.2 & 6.6.

Fish and newt population

Fish community including target species (Three-lined Chinese Stream Catfish and Predaceous Chub) and Hong Kong Newt population at the specified river channel will be monitored by live trapping, hand nets and direct observation methods. Active searching at night for *Pseudobagrus trilineatus* will also be carried out.

Sampling will be conducted two proposed sampling locations, i.e. upper river and lower sections of the river and will cover major type of stream habitats, e.g. stream pool and riffle. The number of the captured or observed fish will be estimated and recorded.

Baseline surveys for fish and newt will be conducted within three months as specified in the project PS and the survey will cover two seasons, i.e. wet seasons (one survey in October 2007) and dry season (one survey in each month of November and December 2007) and another round of survey in the wet season of 2008 in July/August.

Frequency and duration for impact and post monitoring is given in Tables 6.2 & 6.6.

Aquatic macro-invertebrates

Macro-invertebrates in the likely affected streams will be surveyed. Two sampling points within the affected stream sites will be designed to collect necessary macro-invertebrate fauna for ecological baseline information. Three replicates will be taken at each sampling point and pool together for further sample process. Kick sampling and hand netting will be the main survey methodologies for stream organisms. Dissection microscope, digital camera will be used to aid identification and enumeration. Numerical abundance, species identity will be recorded.

Nomenclature and protection status of the species will follow those documented in the

AFCD website (www.hkiddiversity.net) and other literatures such as Dudgeon (1999) Baseline aquatic macroinvertebrate surveys will be conducted within three months as specified in the projects PS and the survey will cover two seasons, i.e. wet season (one survey in October 2007) and dry season (one survey in each month of November and December 2007) and another round of survey in the wet season of 2008 in July/August.

Frequency and duration for impact and post monitoring is given in Tables 6.2 & 6.6.

Adult Odonate survey

Adult Odonate survey will be conducted within the monitoring area. Transect count will be used for the survey. Binoculars, digital camera and hand net will be utilized to aid identification. In general, all captured fauna will be released immediately after on-site identification or taking photo. Numerical abundance, species identity and other notable behaviour will be recorded. Nomenclature and protection status of the species will follow those documented in the AFCD website (www.hkbiodiversity.net).

Adult Odonate survey will be conducted along line transects in parallel with river channel within works area where access is permitted

Baseline adult Odonate survey will be conducted within three months as specified in the project PS and the survey will cover two seasons, i.e. wet season (one survey in October 2007) and dry season (one survey in each month of November and December 2007) and another round of survey in the wet season on 2008 in July/August.

Frequency and duration for impact and post monitoring is given in Tables 6.2 & 6.6.

Riparian Vegetation

Riparian vegetation including aquatic and emergent will be sampled by line a belt transects along the affected stream channel and riparian habitat. Species, relative abundance, aver heights will be recorded. Vegetation survey will be conducted at two selected belt transects with one located at the lower portion of the river channel and the other at the upper section of the river respectively. The belt transects will be run across the river channel and is aimed to collect quantitative data of vegetation. Similarly, qualitative data of plants will be collected by recording plant species along line transect.

Baseline vegetation survey will be conducted within three months specified in the project PS and the survey will cover two seasons, i.e. wet seasons (one survey in October 2007) and dry season (one survey in each month of November and December 2007) and another round in the wet season of 2008 in July/August.

Frequency and duration for impact and post monitoring is given in Tables 6.2 & 6.6.

Abiotic Data Collection

Water quality monitoring

Dissolved oxygen level, pH value, conductivity, salinity, BOD and nutrient level (nitrate and ammonium) will be sampled and analysed by conventional methods in situ or send to laboratory

Baseline water quality monitoring will be conducted within three months as specified in the project PS and the survey will cover two seasons, i.e. wet season (one monitoring in October 2007) and dry season (one monitoring in November / December 2007) and another round in the wet season of 2008 in July / August

Frequency and duration for impact and post monitoring is given in tables 6.2. & 6.6.

Sediment Characteristics

Sediment/substrate characteristics will be recorded of sediment cover in percentage e.g. mud sand, rock, boulder and cemented bottom in the stream bed.

Baseline sediment / substrate characteristics monitoring will be conducted within three months as specified in the project PS and the survey will cover two seasons, i.e. wet season (one monitoring in October 2007) an dry season(one monitoring in December 2007) and another round in the wet season of 2008 in July / August.

Frequency and duration for impact and post monitoring is given in tables 6.2 & 6.6.

Water flow

Water flow rates in river channel will be measured by record of travel time of a floating material (e.g. floating ball) in a measured distance.

Baseline water flow monitoring will be conducted within three months as specified in the project PS and the survey will cover two seasons, i.e. wet season (one monitoring in October 2007) and dry season (one monitoring in December 2007) and another

round in the wet season of 2008 in July / August

Frequency and duration for impact and post monitoring is given in tables 6.2 & 6.6

Capture survey

Fish and newt capture and relocation

Two fish species, i.e. Three-lined Chinese Stream Catfish, Predaceous Chub and one newt species will be captured by live trapping and hand netting. One suitable relocation point was identified at the upper stream channel where the habitats will not be affected by the river improvement works. The captured fish and newt will be carefully transferred to a container with powered aeration provided and then will be transported to the identified relocation site and to be released.

A thoroughly capture survey which covers the entire site for the faunal species of conservation interest will be carried out once at the beginning of the Contract and can be conducted at the same time as the ecological baseline survey. Then the capture survey will be carried out constantly in the dry season within the construction period. Supplementary night survey with active searching will be conducted aimed to detect the Three-lined Chinese Stream Catfish which was a rare and secretive fish.

Summary of frequency and duration for capture survey is given in Tables 6.3 and 6.4 respectively.

6.4 Ecological water quality monitoring

Ecological water quality monitoring is required for this project. The schedule for the ecological water quality monitoring is the same as impact monitoring schedule.

Therefore, the ecological water-monitoring programme will be conducted in January 2009, July 2009, January 2010, July 2010, January 2011 and July 2011.

7.0 Site Inspection Audit

Environmental site inspections are required to inspect the construction activities of Upper Tai Po River in order to ensure that appropriate environmental protection and pollution control mitigation measures are properly implemented.

Site inspection were conducted on 17 and 24th of September 2008,

A detailed checklist of each site inspection together with comments, relevant photos have been filed and kept. The inspection findings were summarized in **Table 7.1**

Date	Observations	Advice from ET	Action Taken	Closing Date
Sept 17 th	No Major finding for this inspection	No Advised is required	No Action is required to be taken	Sept 24 th
Sept 24 th	No Major finding for this inspection	No Advised is required	No action is required to be taken	Oct 2 nd

A detailed ecologist checklist of each site inspection together comments were prepared by the ecologist, DR. Mark Shea in Table 7.2

Date	Observations	Advice from Ecologist	Action Taken	Closing Date
Sept 17 th	No Major findings for this inspection	No Advice is required	No Action is required to be taken	Sept 24 th
Sept 24 th	No Major findings for this inspection	No Advice is required	No Action is required to be taken	Oct 2 nd

8.0 Summary of Non-Compliance

There was no non-compliance in the reporting period of September 15th to 30th.

8.1 Description of the actions taken in the event of non-compliance

No action is required to be taken.

9.0 Implementation status of environmental protection and mitigation measures

The implementation of environmental protection and mitigation measures shall address all the environmental aspects including noise, air quality, waste, water quality and etc. **Table 9.1** is the advice on the implementation status of environmental protection and mitigation measures. **Table 9.2** is the implementation status of environmental protection and mitigation measures on ecology prepared by Dr. Mark Shea.

Table 9.1 Implementation status of environmental protection and mitigation measures

Environmental Aspect	Protection / Mitigation Measures	Implementation status	Follow-up action
Construction Noise	No percussive piling shall be carried out	Not applicable	Not required
	-Use well maintained construction plant	Implemented	Not required
	-Shut down plants between	Implemented	Not required
	-Install silencers on construction equipment	Implemented	Not required
	-Locate mobile plant far away from NSRs	Implemented	Not required
	-Quiet plants should be used	Implemented	Not required
	-2m high temporary noise barriers, as stipulated in EP condition 2.9, shall be installed	In Progress	In Progress
Fugitive Dust Emission	-Implement regular watering and vehicle washing facilities	Implemented	Not required
	-Cover excavated or stockpile of dusty material by impervious sheeting or sprayed with water	Implemented	Not required
	-Use tarpaulin to cover dusty materials on vehicles	Implemented	Not required
Water Quality	Excavation works within the Tai Po River within the Project shall be carried out in stages and excavation area for each stage shall be limited to section of half width of the channel and less than 100m long at any one time in order to maintain water flow within the river during construction stage	Implemented	Not required
	Land-based plant shall be employed and site run-off shall be directed towards regularly cleaned and maintained silt traps and oil / grease separators to minimize leakage and loss of sediments during excavation	Implemented	Not required
Water quality continue	Large boulders removed from the Tai Po River within the Project during excavation shall be re-instated upon completion of works A section of 150m long natural riverbank on the western side of the river channel (Ch0 –Ch150) shall be retained	Not applicable at this stage	Not required
	The excavation area shall be enclosed with bunds or barriers and dewatered prior to excavation to minimize the impacts upon the downstream of the Tai Po River	Implemented	Not required

	Provide silt trap and oil interceptor to remove the oil, lubricants, grease, silt, grit and debris from the wastewater before pumped to the public stormwater drainage system	Implemented	Not required
	Provide site toilet facilities	Implemented	Not required
Waste Management	Reuse excavated material as far as possible	Implemented	Not required
	Recycle scrap metals or abandoned equipment	Implemented	Not required
	Adopt a trip ticket system for the disposal of C&D materials	Implemented	Not required
	All general refuse should be segregated and stored in enclosed bins or compaction units	Implemented	Not required
Vibration	Percussive piling is to be replaced by bore-hole piling to minimize vibration impacts to the two identified Declared monuments	Not applicable at this stage	Not required
	Carrying out of vibration monitoring to ensure that vibration associated with the construction phase do not exceed the threshold limit otherwise contractor have to review the work method and construction activities have to be slow down or rescheduled to reduce the impacts	Not applicable at this stage	Not required
	Close monitoring and measurement on the cracks of the external wall of Fan Sin Temple during construction works will be carried out. Any changes on the cracks will be recorded for the contractor to slow down the construction activities accordingly; and to review the work methods and equipments immediately	Not Applicable at this stage	Not required

Table 9.2 Implementation status of environmental protection and mitigation measures on ecology prepared by the ecologist, Dr. Mark Shea.

Environmental Aspect	Protection/Mitigation Measures	Implementation Status	Follow-up Action
Ecology	Large boulders will be returned to the riverbed following the excavation works.	Not applicable	Not required
	Construction works from Ch. 0.0m – Ch. 150m would be along one side of the river only	Not applicable	Not required
	Approximately 150m of the existing natural riverbank on the western side of the river would be retained.	Implemented	Not required

	Excavation works within the river channel should be restricted to an enclosed dewater section of the river, and would be limited to sections 50-100m long at any one time.	Not applicable	Not required
	Flows to the area downstream shall be maintained at all times during the construction phase	Not applicable	Not required
	Capture survey shall be conducted within the Tai Po River before commencement of works. The captured target species shall be relocated to areas of the watercourse upstream of the watercourse upstream of the Tai Po River	Capture surveys had been conducted at the beginning of the Contract and also during the wet season July/August 2008	Not required
	Temporary noise barriers should be constructed to control noise impacts to habitats and associated wildlife within and adjacent to the proposed works area	Not applicable	Not required
	Site runoff should be directed towards regularly cleaned and maintained silt traps to minimise the risk of sedimentation and pollution of river water.	Not applicable	Not required
	Excavation works shall be carried out by land based plant within enclosed dry section of river channel.	Not applicable	Not required
Environmental Aspect Continue	Compensatory planting of trees and other vegetation along the banks of the newly improved drainage channel should be provided to compensate for the loss of riparian vegetation.	Not applicable	Not required
Ecology	Operation phase activities in the improved drainage channel would be limited to periodic channel maintenance such as de-silting.	Not applicable	Not required

10.0 Waste Management Status

It is the contractor's responsibility to ensure that all wastes produced during construction phase for the drainage improvement works are handled, stored and disposed of in accordance with good waste management practices and EPD's regulation and requirement. Waste materials generated during construction activities such as construction and demolition(C&D) material, chemical wastes and general refuse, are recommended to be audited at regular intervals to ensure that proper storage, transportation and general reuse are recommended to be audited to ensure that proper storage, transportation and disposal practices are being implemented. **Table 10.1** is a summary Waste Disposal recorded by the Contractor recorded on September 15th to 30th 2008.

Table 10.1 is a summary of Waste Disposal in Sept 2008

Type of waste	Inert Waste	Non-Inert Waste	Chemical Waste
September 15 th to 30 th 2008	0 m ³	0 tones	0
Total	0m ³	0 tones	0

11.0 Status of Environmental Permits and Licenses Obtained by Contractor

This project requires different environmental permits and licenses to be run legally. **Table 11.1** is the summary of permits/ licenses obtained by the contractor.

Table 11.1 Status of Permits and Licenses Obtained

Description	License / Permit No.#	Date of Issue	Date of Expiry	Remarks
Environmental Permit	EP-223/2005	31 st Aug, 2005	N/A	Issued
Construction Noise Permit	N/A	N/A	N/A	N/A
Effluent Discharge License	3678	14 th Mar, 2008	31 st Mar, 2013	Issued
Registration Chemical Producer	5213-724-C3251-03	19 th Dec, 2007	N/A	Issued
Registration of C&D waste producer	N/A	N/A	N/A	N/A

12.0 A summary record of all complaints received (written or verbal) and all action

There was no complaint for the period of September 15th to September 30th 2008.

12.1 Complaint summary for the complaint

Not required for the period of September 15th to September 30th 2008

12.2 Overall complaints received

Environmental Parameters	Cumulative no. Brought forward	No. of complaint September 2008	Overall Total
Air/Dust	0	0	0
Noise	0	0	0
Water	0	0	0
House Keeping Hygiene	0	0	0
Chemical waste	0	0	0
Total	0	0	0

13.0 Future key issues

Key construction activity in the coming month will be the construction of access road formation and site preparation work. The construction activities may generate some environmental impacts. They include air, and waste

The construction site and the site entrance may generate dust. Therefore, proper water spraying, tarpaulin covering and wheel washing at the site entrance are recommended.

The site access road formation and site clearance works may generate open stockpile on site. Tarpaulin covering and proper de-silting facilities should be used to avoid muddy water being discharged into the stream.

It is expected that construction waste would be generated on site for the boulder trap formation and the gabion wall formation. Contractor shall assign proper designated storage areas for waste and construction materials.

14.0 Conclusion

The major construction activities carried out by the contractor during this reporting period from September 15th to 30th 2008 include access road formation and site preparation works.

Regular site meetings and inspection audits led by the seniors for discussing environmental issues were held among project proponent, Contractor and the ET on weekly basis.

Environmental Team had not carried out construction noise monitoring and vibration monitoring for the report period.

From the summary of ecological site inspection findings and implementation status of environmental protection and mitigation for ecology, prepared by the ecologist Dr. Mark Shea, there is no major finding in the reporting period. The ecologist has no further advice and no action suggested to the contractor.

There was no non-compliance recorded for the reporting period.

There was no complaint in the reporting period.

ET has reminded the contractor to provide environmental pollution control measures wherever necessary; and to keep a good environmental management at site practice.

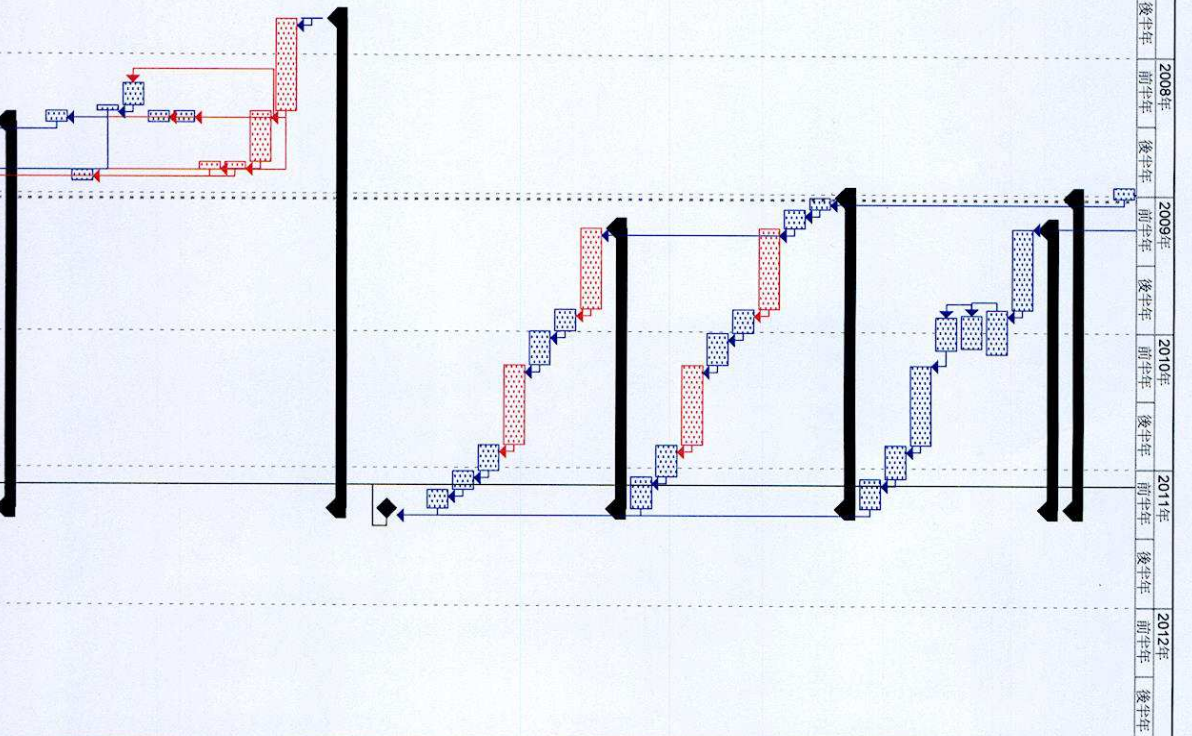
The ET will continue to implement the environmental monitoring & audit programme in accordance with the EM&A Manual and Environmental Permit requirement.

Appendix A: Detail Master Program

Drainage Services Department

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

識別碼 Task Name	工期	最早開始日期	最早完成日期	開始日期	完成日期	2007年		2008年		2009年		2010年		2011年		2012年	
						前半年	後半年	前半年	後半年	前半年	後半年	前半年	後半年	前半年	後半年	前半年	後半年
699 Temp Shoring Works	30 days	2008/12/11	2009/1/9	2008/12/11	2009/1/9												
700																	
701 Chainage from CHL 250 to CHL 130	830 days	2009/1/10	2011/4/19	2009/1/10	2011/4/19												
702 From CHL 250 to CHL 130	749 days	2009/4/1	2011/4/19	2009/4/1	2011/4/19												
703 Wet Season (April to Oct 2009)	214 days	2009/4/1	2009/10/31	2009/4/1	2009/10/31												
704 Excavation	120 days	2009/1/1	2010/2/28	2009/1/1	2010/2/28												
705 Rockfill & Blinding	90 days	2009/1/16	2010/2/13	2009/1/16	2010/2/13												
706 Base Slab Structure	90 days	2009/1/21	2010/2/18	2009/1/21	2010/2/18												
707 Wet Season (April to Oct 2010)	214 days	2010/4/1	2010/10/31	2010/4/1	2010/10/31												
708 Wall Structure	90 days	2010/4/1	2011/1/29	2010/4/1	2011/1/29												
709 Gabion Wall	80 days	2011/1/30	2011/4/19	2011/1/30	2011/4/19												
710 Footbridge, Platform and Cut/Fill Slope	830 days	2009/1/10	2011/4/19	2009/1/10	2011/4/19												
711 Demolition of existing structure	31 days	2009/1/10	2009/2/9	2009/1/10	2009/2/9												
712 Footing for Footbridge (TB3)	50 days	2009/2/10	2009/3/31	2009/2/10	2009/3/31												
713 Wet Season	214 days	2009/4/1	2009/10/31	2009/4/1	2009/10/31												
714 Dwarf Wall	65 days	2009/1/1	2010/3/31	2009/1/1	2010/3/31												
715 Footbridge (TB3)	88 days	2009/1/15	2010/3/31	2009/1/15	2010/3/31												
716 Wet Season	214 days	2010/4/1	2010/10/31	2010/4/1	2010/10/31												
717 Platform & Cut/Fill Slope & Maintenance Stairway	65 days	2010/1/1	2011/1/24	2010/1/1	2011/1/24												
718 Footpaths	85 days	2011/1/25	2011/4/19	2011/1/25	2011/4/19												
719 Footbridge, Platform and Cut/Fill Slope	749 days	2009/4/1	2011/4/19	2009/4/1	2011/4/19												
720 Wet Season	214 days	2009/4/1	2009/10/31	2009/4/1	2009/10/31												
721 Footing for Footbridge (TB2)	60 days	2009/1/1	2009/12/30	2009/1/1	2009/12/30												
722 Dwarf Wall	91 days	2009/12/31	2010/3/31	2009/12/31	2010/3/31												
723 Wet Season	214 days	2010/4/1	2010/10/31	2010/4/1	2010/10/31												
724 Footbridge (TB2)	70 days	2010/1/1	2011/1/9	2010/1/1	2011/1/9												
725 Platform & Cut/Fill Slope & Maintenance Stairway	50 days	2011/1/10	2011/2/28	2011/1/10	2011/2/28												
726 Footpaths	50 days	2011/3/1	2011/4/19	2011/3/1	2011/4/19												
727																	
728 Completion of Area P	0 days	2011/4/19	2011/4/19	2011/4/19	2011/4/19												
729																	
730 Section 3 - Upper Tai Po River (Area N)	1300 days	2007/9/28	2011/4/19	2007/9/28	2011/4/19												
731 Commencement of Work	1 day	2007/9/28	2007/9/28	2007/9/28	2007/9/28												
732 Possession to Portion of the Site (Area N)	244 days	2007/9/29	2008/5/29	2007/9/29	2008/5/29												
733 Temp. Site Access (XP/TTA)	135 days	2008/5/30	2008/10/11	2008/5/30	2008/10/11												
734 Site Clearance	20 days	2008/10/12	2008/10/31	2008/10/12	2008/10/31												
735 Chainlink Fencing Work	20 days	2008/10/12	2008/10/31	2008/10/12	2008/10/31												
736 Initial Survey	30 days	2008/5/30	2008/6/28	2008/5/30	2008/6/28												
737 Condition Surveys / Set up markers	60 days	2008/3/17	2008/5/15	2008/3/17	2008/5/15												
738 Preparation of Temporary Works Design	14 days	2008/5/16	2008/5/29	2008/5/16	2008/5/29												
739 Approval of Temporary Works Design	30 days	2008/1/1	2008/1/30	2008/1/1	2008/1/30												
740 S.I. Works	30 days	2008/1/1	2008/1/30	2008/1/1	2008/1/30												
741 Temp. Shoring Works	30 days	2008/5/30	2008/6/28	2008/5/30	2008/6/28												
742																	
743 Chainage from CHL 230 to CHL 600	1025 days	2008/6/29	2011/4/19	2008/6/29	2011/4/19												



Project Master Programme (REV.6)
Data Date: Jun 2008
Consultant: MCAL

Chiu Hing Construction & Transportation Co., Ltd

Task
Task Progress
Critical Task

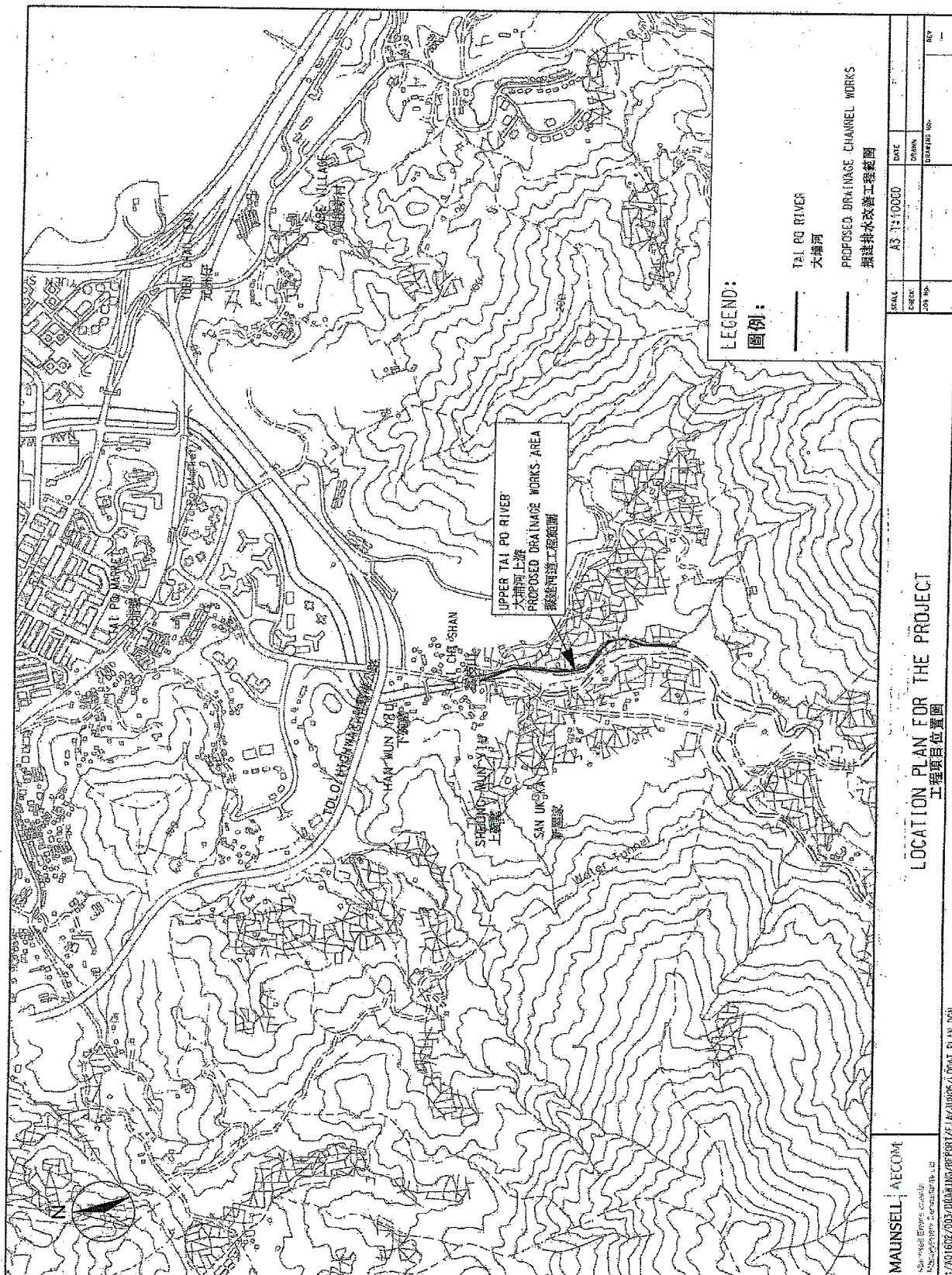
Rollled Up Task
Rollled Up Critical Task
Rollled Up Milestone

Summary

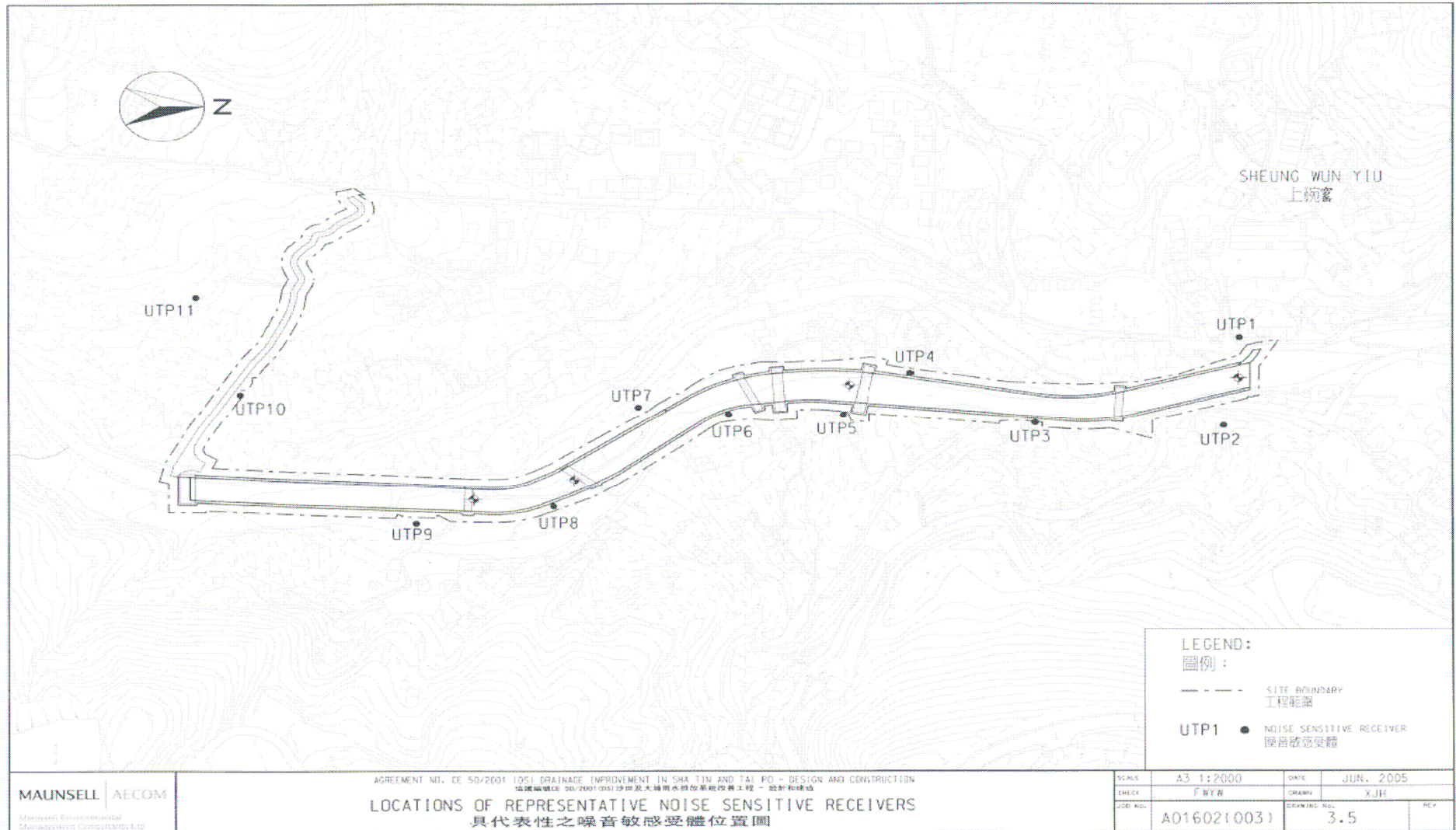
Rollled Up Progress
Split
External Tasks

Project Summary

Appendix B: Project Location and Proposed Drainage Channels



Appendix C: Locations of Noise Sensitive Receiver



Appendix D: Calibration Certificates



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Calibration Certificate

Certificate No. **80440** Page 1 of 4 Pages

Customer : Environmental Pioneers and Solutions Limited
Address : Flat A, 8 Floor, Chaiwan Industrial Centre Building, 20 Lee Chung Street, Chaiwan, Hong Kong.
Order No. : Q80149 **Date of receipt** : 28-Jan-08

Item Tested

Description : Digital Sound Level Meter
Manufacturer : SVAN
Model : 949 **Serial No.** : 8571

Test Conditions

Date of Test : 5-Feb-08 **Supply Voltage** : --
Ambient Temperature : (23 ± 3)°C **Relative Humidity** : (50 ± 25) %

Test Specifications

Calibration check.
 Calibration procedure : Z01.

Test Results

All results were within the IEC 651 Type 1 & IEC 804 Type 1 specification.
 The results are shown in the attached page(s).


Main Test equipment used:

Equipment No.	Description	Cert. No.	Due Date	Traceable to
S017A	Multi-Function Generator	75932	6-Dec-08	SCL-HKSAR
S024	Sound Level Calibrator	71791	16-Jul-08	NIM-PRC & SCL-HKSAR

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

The test equipment used for calibration are traceable to International System of Units (SI).
 The test results apply to the above Unit-Under-Test only

Calibrated by : 
 P.F. Wong

Approved by : 
 Dorothy Cheuk

Date: 6-Feb-08

This Certificate is issued by:
 Hong Kong Calibration Ltd.
 Unit 8B, 24/F., Well Fung Industrial Centre, No. 58-76, Ta Chuen Ping Street, Kwai Chung, NT, Hong Kong.
 Tel: 2425 8801 Fax: 2425 8646

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Calibration Certificate

Certificate No. 80440

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Results :

1. SPL Accuracy

Level Range	UUT Setting			Applied Value (dB)	UUT Reading (dB)	
	Octave Filter	Weight	Response		Before Adjust.	After Adjust.
105 dB	OFF	A	Fast	94.07	94.5	94.1
			Slow		--	94.1
		C	Fast		--	94.1
130 dB	OFF	A	Fast	94.07	--	94.1
			Slow		--	94.1
		C	Fast		--	94.1
	OFF	A	Fast	113.95	--	114.0
			Slow		--	114.0
		C	Fast		--	114.0

IEC 651 Type 1 Spec. : ± 0.7 dB
Uncertainty : ± 0.1 dB

2. **Level Stability** : 0.0 dB
IEC 651 Type 1 Spec. : ± 0.3 dB
Uncertainty : ± 0.01 dB

3. Linearity

3.1 Level Linearity

UUT Range	Applied Value (dB)	UUT Reading (dB)	Variation (dB)	IEC 651 Type 1 Spec. (Primary Indicator Range)
130	114.0	114.2	0.1	± 0.7 dB
	104.0	104.1	0.0	
	94.0	94.1 (Ref.)	--	
150	84.0	84.2	0.1	
	74.0	74.3	0.2	
	64.0	64.3	0.2	
	54.0	54.3	0.2	

Uncertainty : ± 0.1 dB



Calibration Certificate

Certificate No. **80440**

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3.2 Differential level linearity

UUT Range	Applied Value (dB)	UUT Reading (dB)	Variation (dB)	IEC 651 Type 1 Spec.
130	84.0	84.2	0.1	± 0.4 dB
	94.0	94.1	--	
	95.0	95.1	0.0	± 0.2 dB
	104.0	104.1	0.0	± 0.4 dB
	105.0	105.1	0.0	
	114.0	114.2	0.1	± 1.0 dB

Uncertainty : ± 0.1 dB

4. Frequency Weighting

A weighting

Frequency	Attenuation (dB)	IEC 651 Type 1 Spec.
31.5 Hz	- 39.5	- 39.4 dB, ± 1.5 dB
63 Hz	- 26.3	- 26.2 dB, ± 1.5 dB
125 Hz	- 16.3	- 16.1 dB, ± 1 dB
250 Hz	- 8.7	- 8.6 dB, ± 1 dB
500 Hz	- 3.3	- 3.2 dB, ± 1 dB
1 kHz	0.0 (Ref)	0 dB, ± 1 dB
2 kHz	+ 1.3	+ 1.2 dB, ± 1 dB
4 kHz	+ 1.2	+ 1.0 dB, ± 1 dB
8 kHz	- 0.9	- 1.1 dB, + 1.5 dB ~ -3 dB
16 kHz	- 6.8	- 6.6 dB, + 3 dB ~ -∞

Uncertainty : ± 0.1 dB



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Calibration Certificate

Certificate No. **80440**

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5. Time Averaging

Applied Burst duty Factor	Applied Leq Value (dB)	UUT Reading (dB)	IEC 804 Type 1 Spec.
continuous	50.0	--	--
1/10	50.0	49.9	± 0.5 dB
1/10 ²	50.0	49.9	
1/10 ³	50.0	49.9	± 1.0 dB
1/10 ⁴	50.0	49.9	

Uncertainty : ± 0.1 dB

- Remarks :
1. UUT : Unit-Under-Test
 2. The uncertainty claimed is for a confidence probability of not less than 95%.
 3. Atmospheric Pressure : 1 010 hPa.
 4. Pre-amp S/N : No. 10126.

----- END -----



ISO9001 certified

Sound Level Calibrator

Type: **SV30A** Serial No: **7908**

Calibration Chart

Sound pressure level (94dB): **93.99 dB** (THD: **0.09 %**)
Sound pressure level (114dB): **113.99 dB** (THD: **0.09 %**)

Measurement conditions
Temperature: **26 °C**
Relative humidity: **28 %**
Ambient pressure: **999 hPa**

Frequency: 1000 Hz
Short term level stability: 0.05 dB
Frequency stability: 0.01 %

Reference conditions
Temperature: 23.0 °C
Relative humidity: 50 %
Ambient pressure: 1013.2 hPa

CONFORMITY & TEST DECLARATION

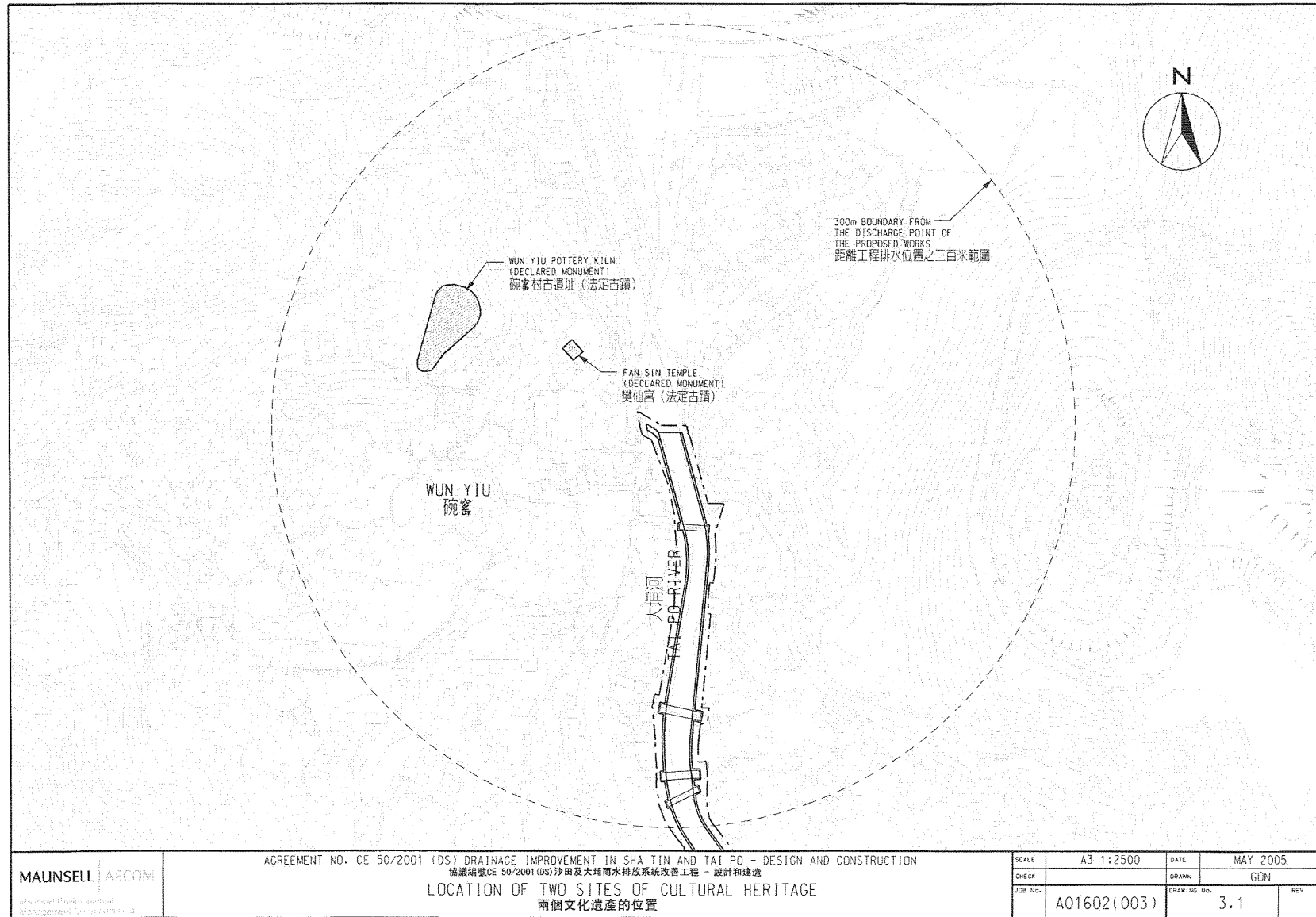
The stated level is valid at reference conditions.
Measured according to IEC 60942:2003.
The stated level is relative to 20 uPa .

The level is traceable to GUM (Central Office of Measures, Poland) with a calculated uncertainty less than ± 0.15 dB (2*sd).

Calibration specialist: 

Date : 2008-06-12

Appendix E: Vibration Monitoring Location



MAUNSELL | AECOM

AGREEMENT NO. CE 50/2001 (05) DRAINAGE IMPROVEMENT IN SHA TIN AND TAI PO - DESIGN AND CONSTRUCTION
協議編號 CE 50/2001 (05) 沙田及大埔雨水排放系統改善工程 - 設計和建造

LOCATION OF TWO SITES OF CULTURAL HERITAGE
兩個文化遺產的位置

SCALE	A3 1:2500	DATE	MAY 2005
CHECK		DRAWN	GDN
JOB NO.	A01602(003)	DRAWING NO.	3.1
		REV	

**Appendix F: Capture survey route and release location at Upper Tai Po
Stream**

