

AGREEMENT No. CE 57/2001

**ENVIRONMENTAL AND TRAFFIC IMPACT ASSESSMENT
STUDY FOR
FILL BANK AT TSEUNG KWAN O AREA 137**

ENVIRONMENTAL MONITORING AND AUDIT MANUAL

Reference : R265-2FADD.02

Client : Civil Engineering Department

Date : March 2002

Project Consultancy Team:

CH2M HILL (China) Limited
in association with
MVA Hong Kong Limited
ACL Asia Limited

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1. INTRODUCTION

1.1 Background

- 1.1.1 An Environmental Impact Assessment (EIA) has been conducted for the proposed fill bank development at Tseung Kwan O Area 137. Figure 1-1 shows the location of the project site. Based on the assessment results, a number of mitigation measures have been recommended where necessary for implementation during the establishment, operation and/or decommissioning phases of the fill bank development.
- 1.1.2 In accordance with the requirement under Section 4 of the EIA Study Brief, this Environmental Monitoring and Audit (EM&A) Manual has been prepared by the EIA Team to specify the recommended environmental monitoring and audit requirements, where considered necessary for the concerned environmental aspects, to ensure effective implementation of the recommended environmental protection and pollution control measures.
- 1.1.3 This Manual provides systematic procedures for the carrying out of recommended monitoring and auditing works for checking of potential environmental impacts which may arise from the project. Mitigation measures recommended in the EIA Report for each key environmental aspect are also summarised and presented in this Manual.
- 1.1.4 The EM&A programme will be useful in providing a means to verify the effectiveness and adequacy of the mitigation measures recommended in the EIA such that additional mitigation measures or remedial action, if deemed necessary, can be formulated during the lifetime of the fill bank project. The recommended EM&A programme is to be carried out by an Environmental Team (ET) formed before the commencement of the works.
- 1.1.5 Environmental regulations currently enforced in Hong Kong pertaining to air quality, noise, water and waste, etc. and the recommendations given in the EIA report have been observed in the preparation of this EM&A Manual.

1.2 Objectives of this EM&A Programme

- 1.2.1 The main objectives of the EM&A programme include:
1. To provide a database on baseline environmental quality for subsequent checking of any short or long term environmental impacts arising from the project;
 2. To provide information at an early stage for identification of potential problem areas and formulation of additional environmental mitigation measures where necessary should any of the environmental control measures or practices fail to achieve the target standards;
 3. To monitor the performance of the project from an environmental viewpoint and the sufficiency and effectiveness of the implemented mitigation measures;
 4. To verify the environmental impacts predicted in the EIA Study for the project;
 5. To determine project compliance with relevant regulatory standards, requirements and guidelines;
 6. To take remedial action should unexpected problems or unacceptable impacts are identified;
 7. To provide baseline and compliance monitoring data to assist the carrying out of effective environmental audits.

1.3 Content of this EM&A Manual

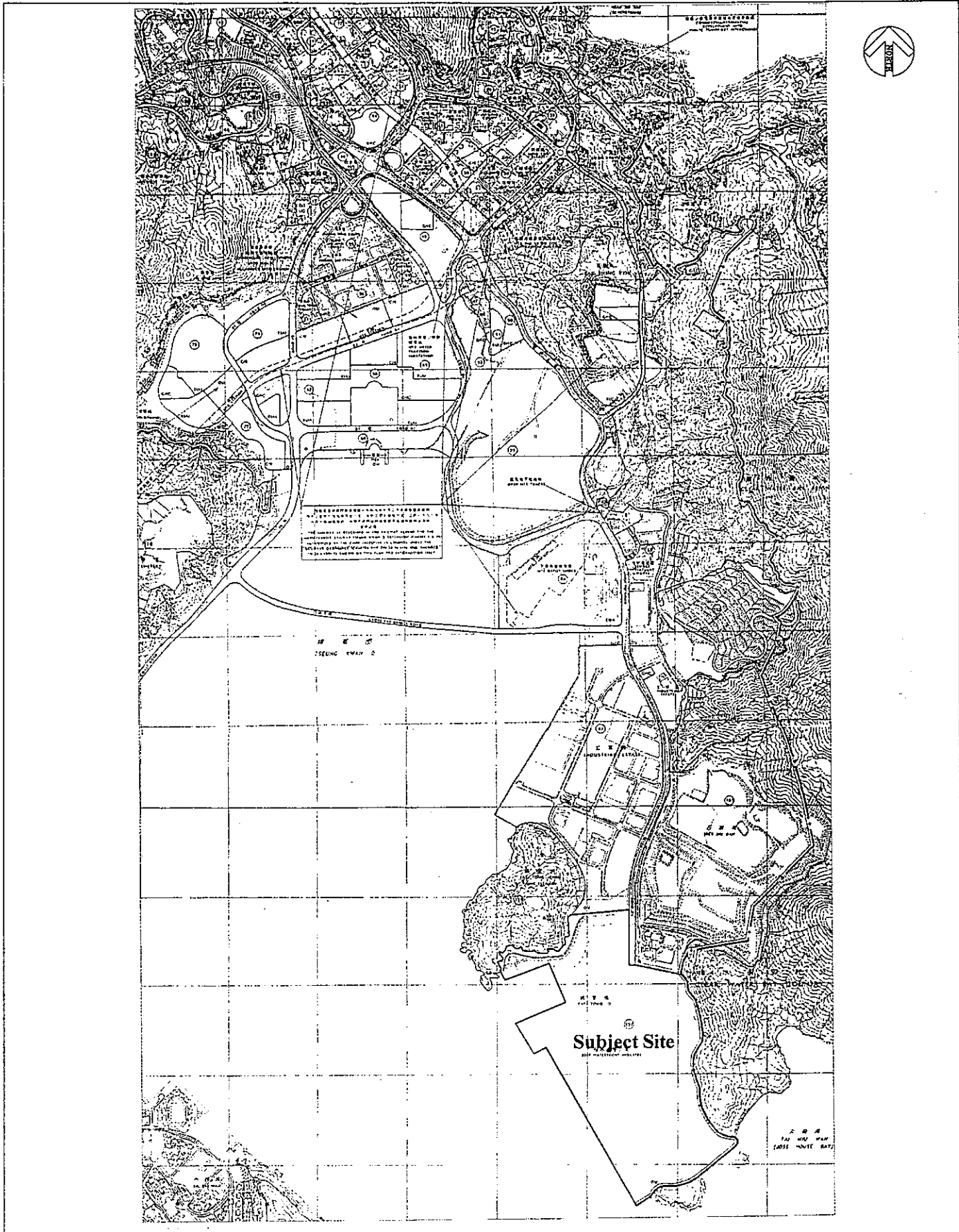
1.3.1 The recommended EM&A programme in this Manual contains the following information:

1. Duties of the Contractor, the Engineer¹ or Engineer's Representative (ER)¹, the Environmental Team (ET) and the Independent Environmental Checker (IC(E)) in the environmental monitoring and audit programme;
2. Information on project organisation, work schedule and activities;
3. Information on the preliminary implementation programme of the fill bank;
4. The recommended environmental monitoring and audit programme on specific environmental parameters;
5. Definition of Action and Limit levels, and establishment of Event and Action Plans;
6. Requirements of reviewing pollution sources and work procedures in the event of non-compliance of the environmental criteria;
7. Requirements of presentation of environmental monitoring and audit data and appropriate reporting procedures;
8. Record forms (Appendix I) to be adopted where applicable during the establishment, operation and decommissioning phases of the Fill Bank development.

1.3.2 For the Implementation Schedule of the environmental mitigation measures required to be prepared under Section 4.3 of the EIA Study Brief, please refer to Appendix 10-1 of the EIA report.

1.3.3 The EM&A Manual shall be regarded as an evolving document that should be updated when necessary in order to maintain its relevance during the detailed design stage and/or the establishment/operation/decommissioning phases of the fill bank (e.g. when alternative monitoring locations are proposed). The updated EM&A Manual shall be submitted to the Engineer's Representative (ER) and EPD for agreement.

¹ For the purpose of this manual, the "Engineer" shall refer to the Engineer as defined in the Contract and the Engineer's Representative (ER), in cases where the Engineer's powers have been delegated to the ER, in accordance with the Contract.



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Location of the Proposed Fill Bank



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FIGURE		1-1	REV 0

2. PROJECT DESCRIPTION

2.1 The Subject Site and its Environs

- 2.1.1 Area 137 is located at the southern side of Tseung Kwan O. The site will occupy an area of approximately 104 hectares upon completion of the on-going reclamation works at the northern side of the site by end of 2003. The reclamation site has served as a public filling area since January 1997 to receive public fill generated from the construction industry. Location of the site is shown in Figure 1-1.
- 2.1.2 Existing landuses located in TKO within 3 km of the site are all of industrial nature. TKO Industrial Estate, Fat Tong Chau (Junk Island) and SENT landfill are located to the north of the site. To the east of the site is the hillside along the eastern boundary of Clear Water Bay Country Park. TVB Broadcast and Production Centre is located adjacent to the northern boundary of the site.
- 2.1.3 Existing residential developments and schools are all located at further distances from the site. The nearest existing residential development, Oscar By The Sea (OBS), is located at some 3.2km from the boundary of the site. Planned residential developments in Area 85 and Area 86 are also located at more than 1.5km and 2.0km from the site, respectively. The first phase of these planned developments are not anticipated to have population intake until 2006 according to information provided by Planning Department.
- 2.1.4 Tseung Kwan O Tunnel is the existing strategic route linking TKO with the Kowloon districts. To the east of the TKO Tunnel lies the TKO Tunnel Road and Wan Po Road which is the most direct access to the site at TKO Area 137. Po Lam Road is the other connection between TKO and Kowloon. However, it is a less direct route and lower standard route than Tseung Kwan O Tunnel. Po Lam Road is a single carriageway of three lanes along most of its length, with various sections of four lanes, in particular at junction approaches. Hang Hau Road provides a convenient access from Tseung Kwan O to Sai Kung and Clear Water Bay. It is a local distributor with one lane in each direction.
- 2.1.5 Figure 2-1 shows the area situated within 300m or 500m radius of the site boundary as well as some representative uses along Wan Po Road.
- 2.1.6 The major committed transport infrastructure in TKO is the MTR Tseung Kwan O Extension, which is scheduled to be operational in September 2002. The MTR provides an alternative mode of transport to/ from the Kowloon districts and within TKO for the TKO population. The Government has also planned the Cross Bay Link and Western Coast Road which will become an alternative major access route to/ from the area.

2.2 Project Design

Establishment, Operation and Decommissioning Programme

- 2.2.1 Figure 2-2 presents a preliminary programme for the establishment, operation and decommissioning phases of the fill bank.
- 2.2.2 Mobilisation and establishment works are planned to commence in early October 2002 to prepare for intake of public fill. Public fill intake would commence in mid October 2002 for stockpiling activities (Phase 1) to commence at the southern side of the site. The remaining works of the Contract CV/97/01 "TKO Port Development at Area 137 Stage 2 – Construction of Seawalls and Reclamation" would be completed by end of 2003 for stockpiling activities (Phase 2) to also proceed at the northern side of the site from January 2004.
- 2.2.3 TKO Area 137 has been planned for longer-term industrial uses commencing from mid/late 2007 under the latest programme. To make the site available for roads and other serving construction,

decommissioning of the fill bank at the northern side of the site is planned to start early in January 2004. Early removal of the public fill would also be beneficial in providing a steady and reliable supply of sorted fill material to meet required quality to meet the programme of those reclamation projects that have commenced from 2004. A minimum area of approximately 55 hectares of land at the northern side of the site would be cleared by September 2005 to allow infrastructure works to commence to prepare for the future industrial uses from mid/ late 2007 in TKO Area 137 planned under the latest programme.

Establishment Phase

- 2.2.4 The establishment phase will involve minor activities as the reclamation site/ public filling area has been established for similar activities. Existing site offices have been established at the northern tip of the site, wheel washing facilities are installed at the site exits, and temporary trapezoidal drainage channels have been installed at the perimeter of the reclaimed land within which surcharge mounds are stockpiled to enhance the soil consolidation process on the reclaimed land. The works during the establishment phase will mainly involve site clearance activities, fabrication of machinery for the Construction and Demolition Material Sorting Facility (C&DMSF) and steel structures for the barging point, and realignment of the existing trapezoidal drainage channels to fit the fill bank design as the stockpiling works proceed for controlling potential water quality impact during the public fill stockpiling activities which will commence from the southern side of the site.

Operational Phase

Fill Bank Design

- 2.2.5 Figure 2-3 presents a general layout of the existing reclaimed land. Figure 2-4 presents the preliminary design of the fill bank showing the stockpiling area, representative fill bank profile when it is fully completed, location of the barging facility and C&DMSF and alignment of the temporary stormwater drainage system to be constructed/ modified from the existing trapezoidal drainage channels along the perimeter of the site. Figure 2-5 presents a representative profile of the fill bank when it is about half completed occupying the southern part of the site. Figure 2-6 and Figure 2-7 show the corresponding north-south cross section of the fill bank when it is fully and half completed, respectively. Figure 2-8 and Figure 2-9 present the preliminary design of the C&DMSF and barging facility, respectively.
- 2.2.6 To accommodate a total quantity of 6 Mm³ public fill, the fill bank would need to be filled up to a maximum height of approximately +35mPD (i.e. about 30m above ground). The fill bank will be constructed platform-by-platform, with compaction and application of adequate load on required areas. The lateral pressure induced and the slope stability and other engineering factors have been carefully considered by CED in the detailed design of the fill bank profile and the implementation will be closely monitored by CED. Measures including the provision of temporary intercepting drains, hydroseeding, coloured geo-textile matting and/or water spraying would be applied for slope protection and reduction of dust emissions. The layout of the temporary intercepting drains at the stockpiling area could be altered from time to time to suit the stockpiling sequence to effectively divert stormwater collected to the trapezoidal channels provided along the perimeter of the fill bank.
- 2.2.7 In view of the proximity of the adjacent TVB Broadcast and Production Centre, a buffer zone of 100m would be allowed between the edge of the stockpile and the boundary of the production centre. Within this buffer zone, no dusty material would be stockpiled. In addition, the slope surface of the stockpile facing the production centre will be protected to minimise any dust impact. A buffer will also be provided between the stockpiling area and the coastline along the eastern and southern side of the site, and between the stockpiling area and the slope along the eastern boundary of the Clear Water Bay Country Park.
- 2.2.8 Capacity of the fill bank would be available in phases. The fill bank will receive public fill at the

southern part of the site commencing from mid October 2002. From October 2002 to December 2003 the available public fill stockpiling capacity will be limited to about 2Mm³ at the southern part of the site. Upon the completion of the ongoing reclamation works in end of 2003, the northern portion of the site will also be made available for stockpiling of an additional quantity of 4Mm³ public fill.

- 2.2.9 The C&DMSF will occupy a site area of about 2 hectares on the eastern side of the site. A minimum buffer distance of 20m will be maintained between the C&DMSF and the waterfront. Oversized C&D materials received at the fill bank by trucks or barges will be broken down into specified size range. Imported materials that do not require sorting (i.e. the materials are already sorted at the origins) could be directly delivered to the stockpiling area after checking. Oversized material will be broken down into specified size ranges. Limited quantity of C&D waste separated from the public fill will be delivered offsite to the nearby SENT landfill for disposal.

Fill Bank Operating Hours

- 2.2.10 The proposed fill bank will be open to the public from 8:00 a.m. to 9:00 p.m. daily except during the Chinese New Year holidays, which is the same the operation hours of the public filling area operated at TKO Area 137. This will provide a convenient outlet of public fill for the construction industry and is considered as an important measure to minimise the disposal of reusable fill material to landfill or illegal dumping. The barging point and the C&DMSF will be closed from 7:00p.m. to 8:00 a.m. daily and will prevent potential visual impact on sensitive receivers from glare.

Public Fill Intake by Barges

- 2.2.11 To minimise the potential traffic and environmental impact associated with the public fill delivery trucks going in and out of the proposed fill bank using Wan Po Road, a barging facility will be established onsite to allow public fill intake by barges as an alternative route to land-based transportation of public fill via Wan Po Road. Through the trip-ticket system, truckloads generated from Government/ Public Corporations' contracts, except those generated within Tseung Kwan O which are expected to be limited, will be diverted away from Wan Po Road. This will be achieved through designating the planned public filling barging point at South East Kowloon (SEK) ex-Kai Tak Airport as the public fill tipping location. As these contracts in Kowloon and part of the New Territories will account for half of the supply of public fill, this control measure will reduce the number of truckloads using Wan Po Road from an average of about 2,000 truckloads per day to an average of 1,000 truckloads per day. This truckload volume would be below the average of about 1,200 truckloads per day encountered in the operation of the existing public filling area at TKO Area 137.

Decommissioning Phase

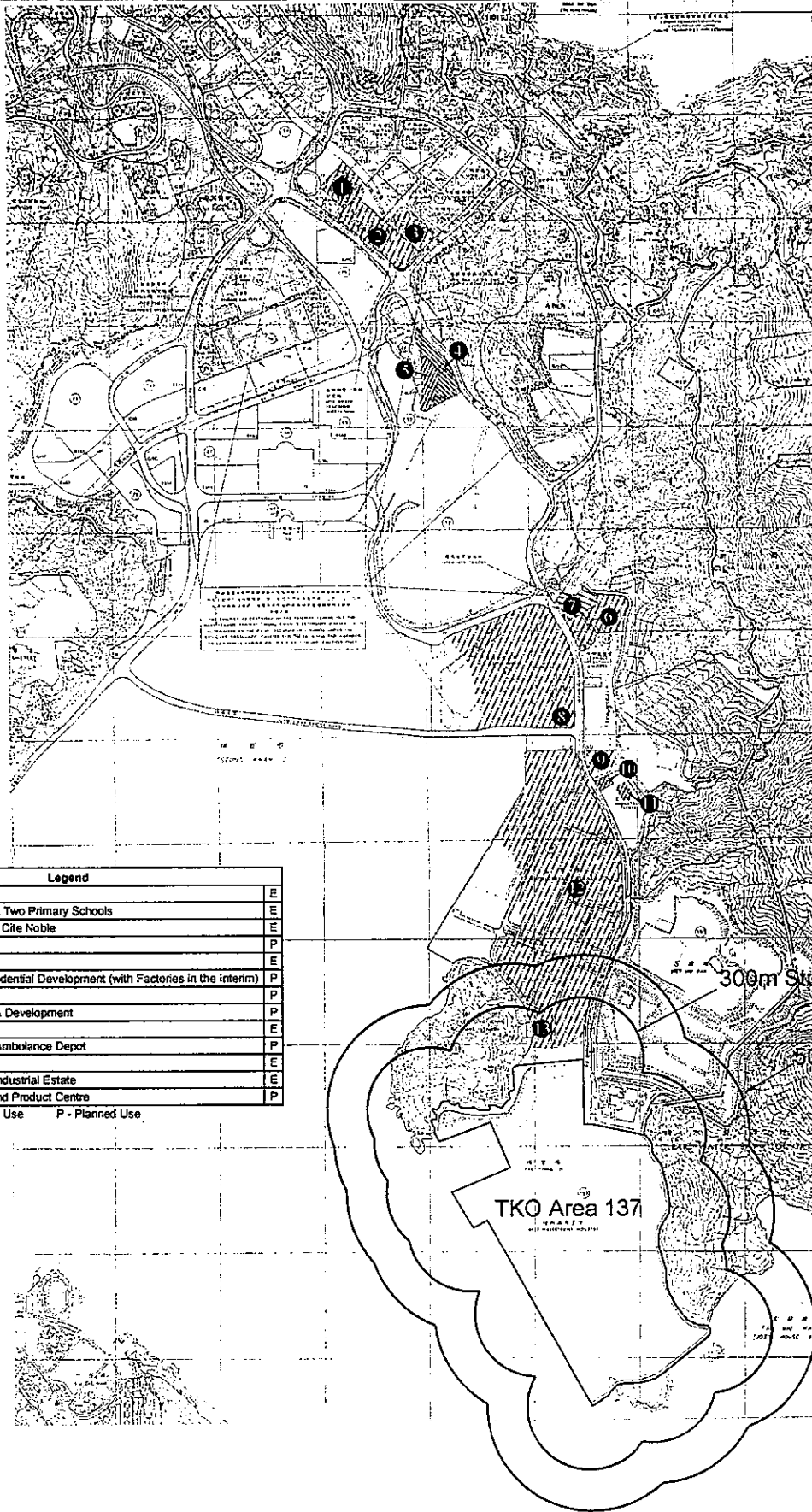
- 2.2.12 Activities carried out during the decommissioning phase will be the reverse of the operational phase. Stockpiled materials will be removed from the fill bank for delivery to reclamation sites mainly by barges for reuse. To minimise the potential cumulative environmental impact arising from the public fill delivery traffic, all public fill removed from the fill bank will be by barges during the period when decommissioning overlap with the operational phase (i.e. from January 2004 to December 2004).
- 2.2.13 Between January 2005 to December 2007, use of barges in delivery of stockpiled public fill will also be maximised but a land-based route will be retained to allow the effective delivery of fill material to land-based project sites (e.g. earth filling project sites) and to nearby construction sites in the area where public fill are demanded. This will avoid double handling of the material by barges and trucks offsite. At least 90% of stockpiled public fill is going to be transported off the site by barges, leaving only 10% of material to be transported by trucks. The maximum public fill delivery truckloads of the fill bank will be controlled to 200 vehicles/day and 30 vehicles/hour during the decommissioning phase through agreeing the public fill dispatch rate by trucks with the users of the public fill.

2.3 Environmental Monitoring and Audit Requirements

2.3.1 The EM&A programme for this study, as recommended in the EIA, cover the following environmental aspects during the establishment, operation and decommissioning phases of the fill bank:

- Fugitive Dust;
- Noise generation from onsite activities;
- Water Quality; and
- Landscape and Visual.

2.3.2 This EM&A Manual has also given recommendations on landfill gas monitoring and protective measures for addressing potential landfill gas/ leachate migration and exposure concern.



Legend		
1	On Ning Garden	E
2	Nan Fung Plaza & Two Primary Schools	E
3	Maritime Bay & La Cite Noble	E
4	Planned School	P
5	Oscar by the Sea	E
6	TKO Area 85 Residential Development (with Factories in the Interim)	P
7	Planned School	P
8	TKO Area 86 CDA Development	P
9	Wong's Circuits	E
10	Fire Station cum Ambulance Depot	P
11	Factory	E
12	Tseung Kwan O Industrial Estate	E
13	TVB Broadcast And Product Centre	P

Note: E - Existing Use P - Planned Use

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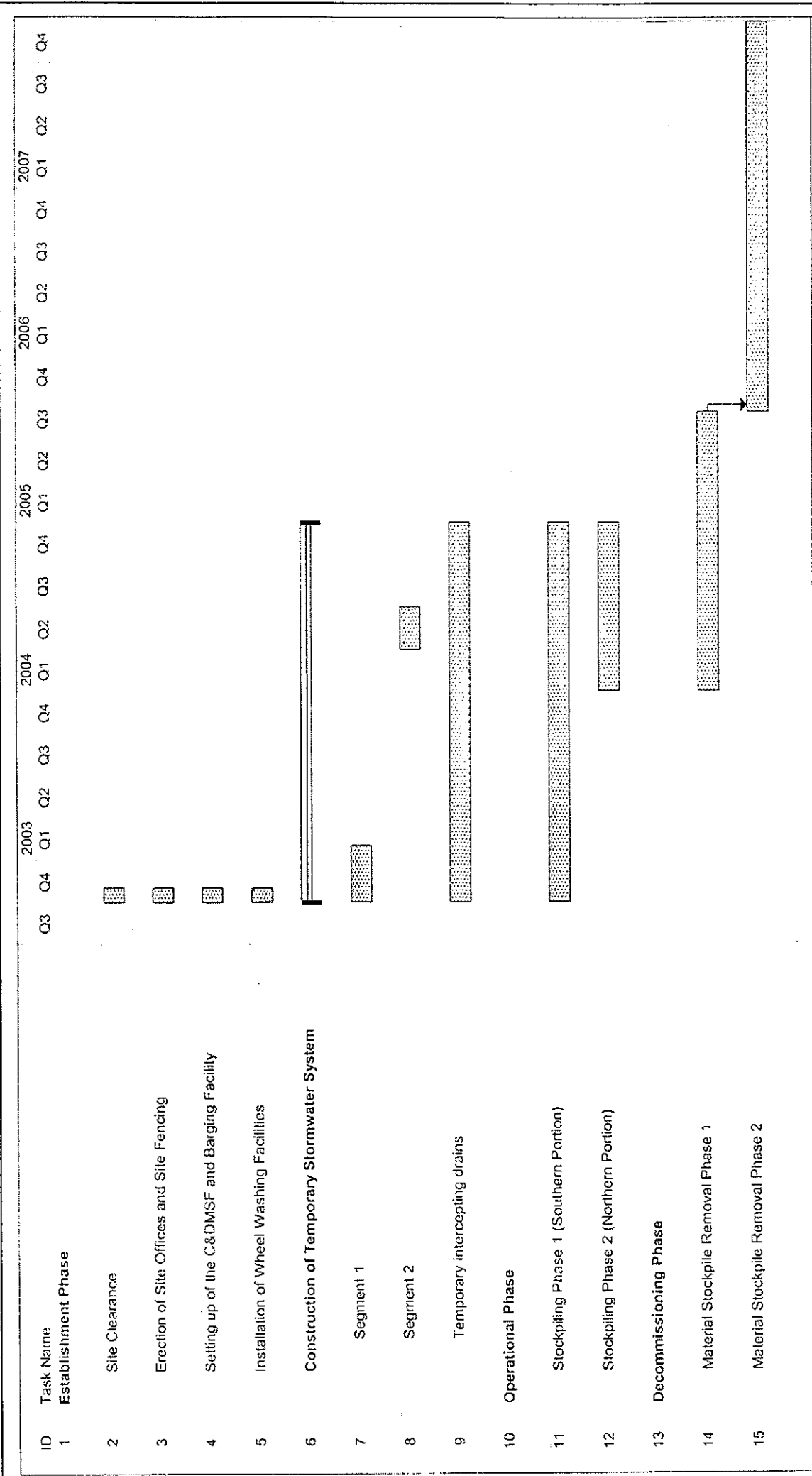
ENVIRONMENTAL AND TRAFFIC IMPACT ASSESSMENT STUDY
FOR FILL BANK AT TSEUNG KWAN O AREA 137 - INVESTIGATION


Area situated within 300m / 500m radius of the site boundary
and representative uses along Wan Po Road

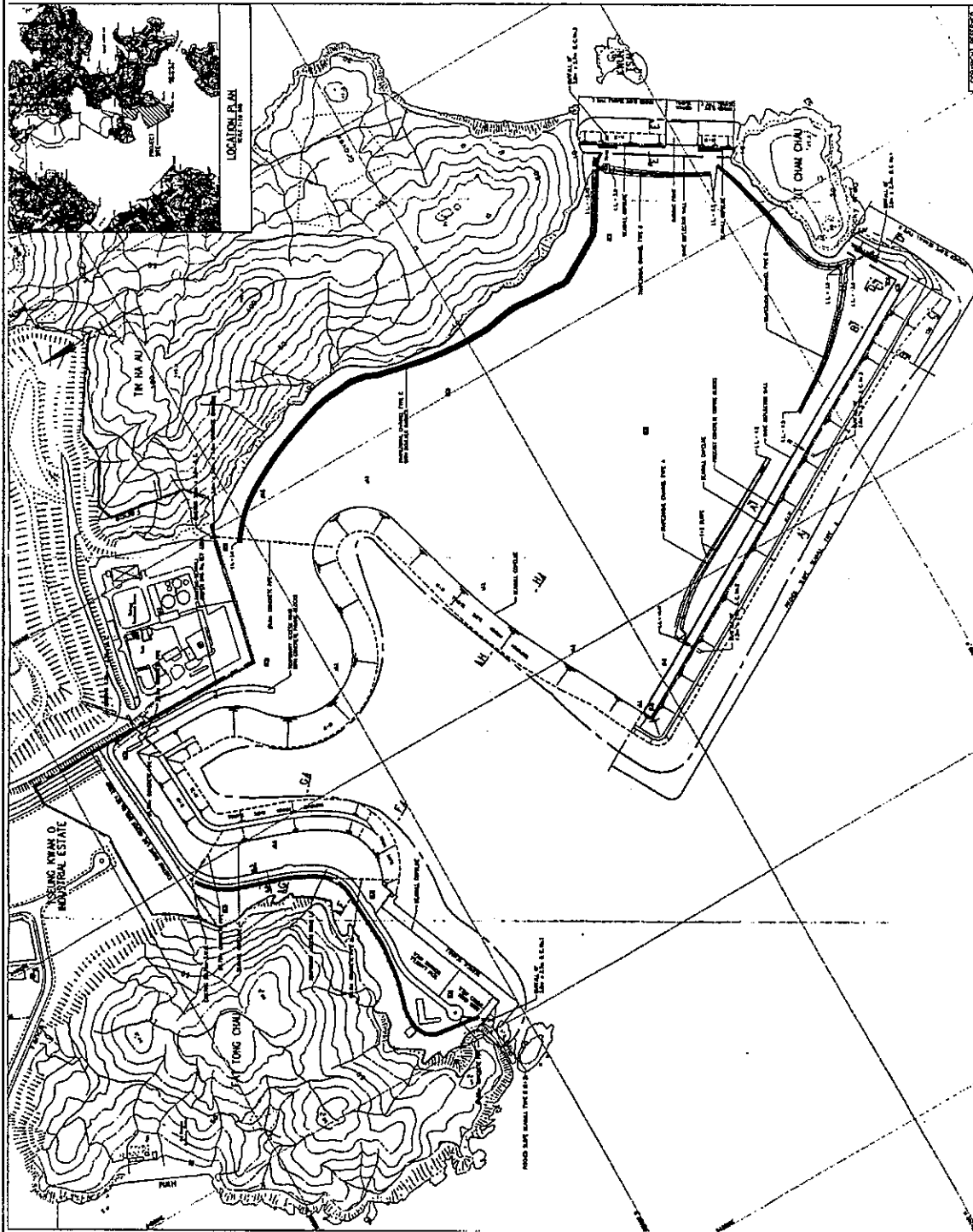


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Fill Bank Preliminary Development Programme				FIGURE NO. 2-2
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**ENVIRONMENTAL AND TRAFFIC IMPACT ASSESSMENT STUDY FOR FILL BANK AT
 TSEUNG KWAN O AREA 137 - INVESTIGATION**

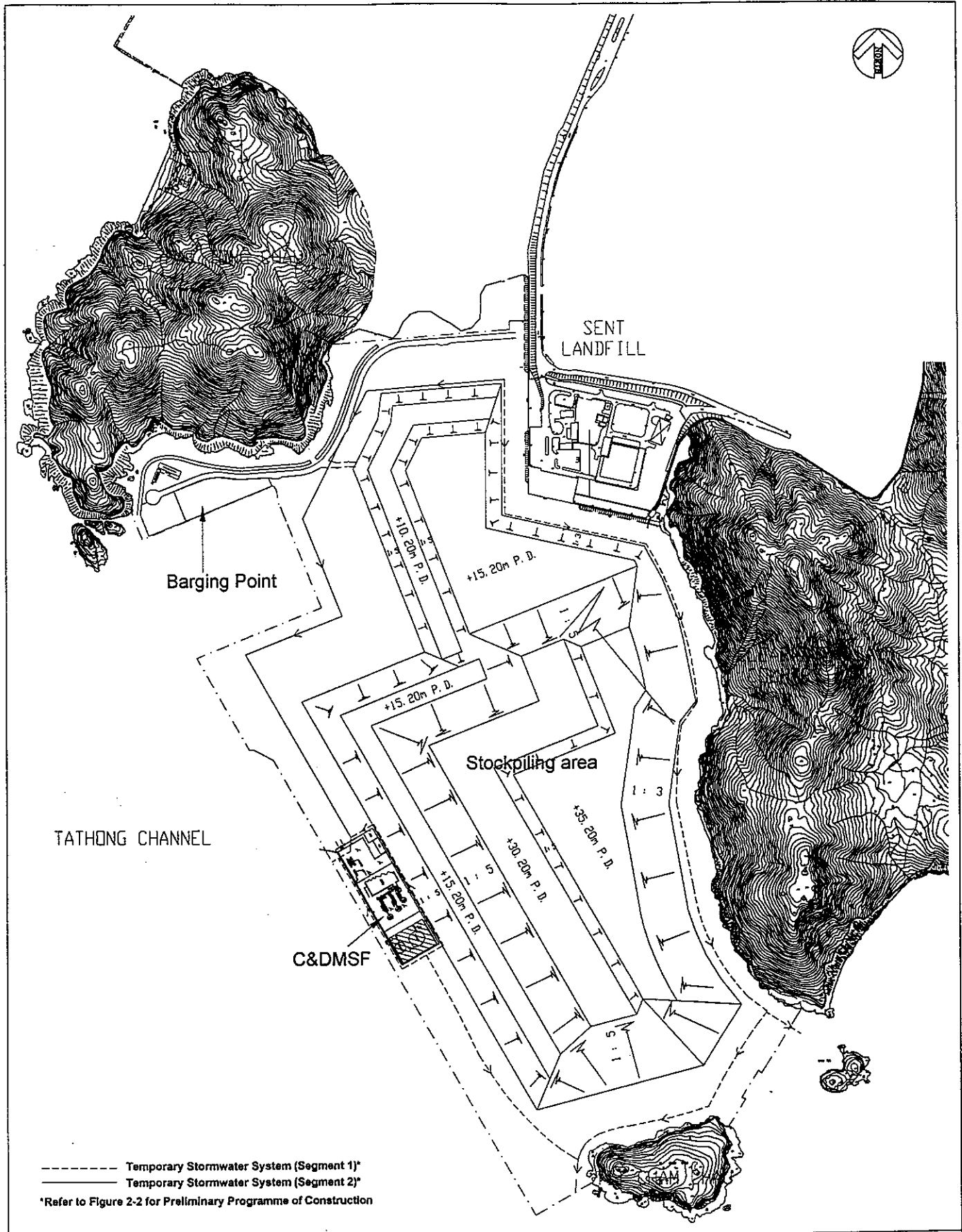
General layout of the existing reclaimed land at TKO Area 137

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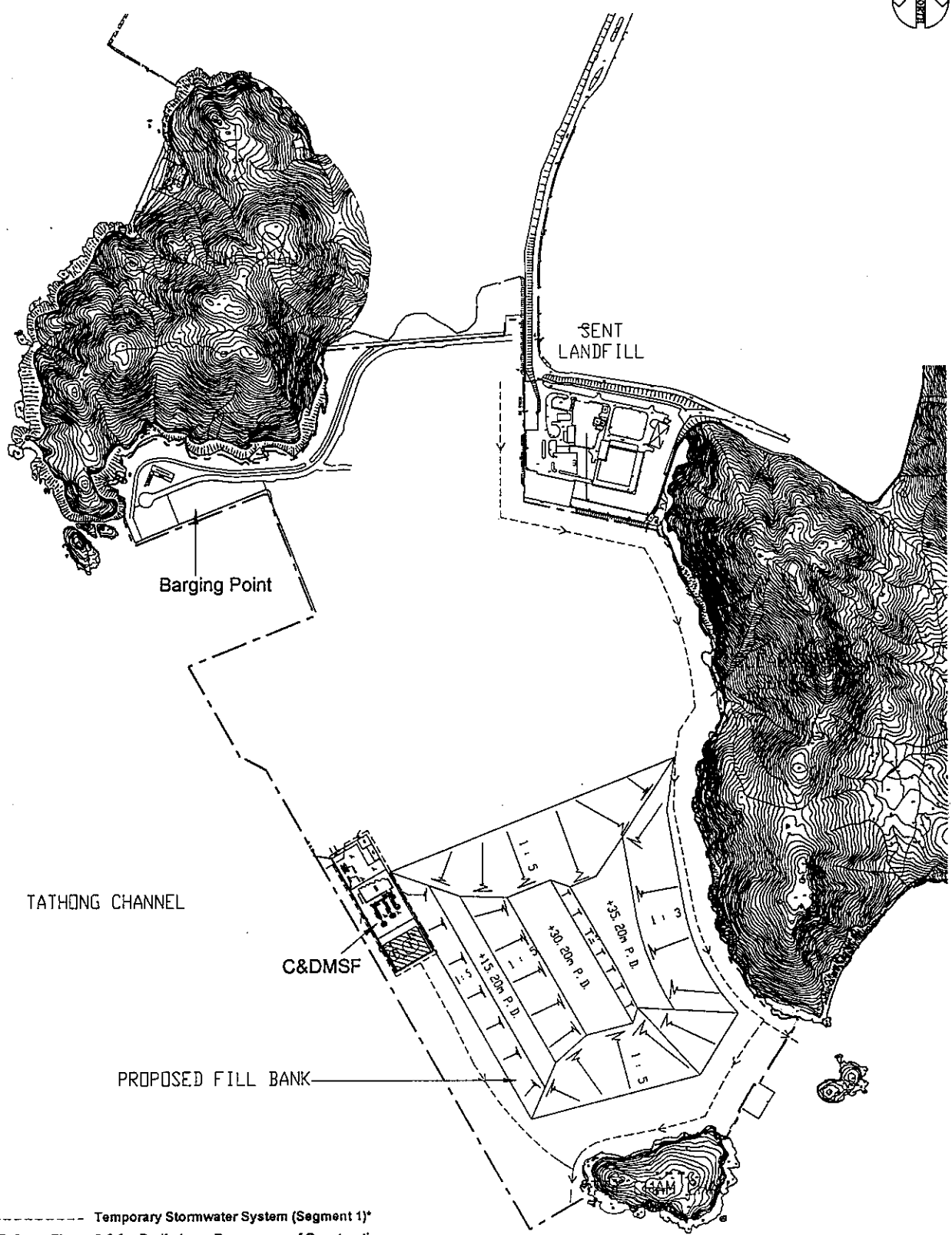
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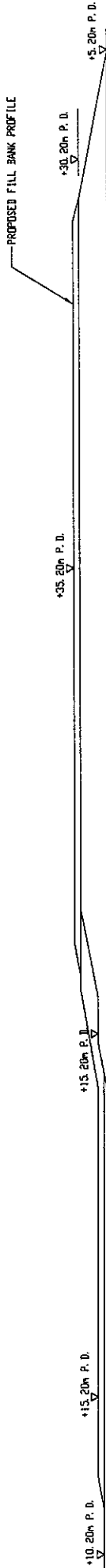
Preliminary design of the fill bank

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FIGURE		2-4	REV 0



----- Temporary Stormwater System (Segment 1)*
 *Refer to Figure 2-2 for Preliminary Programme of Construction

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	Representative fill bank profile (southern site portion)		SCALE NTS DESIGNED AW FIGURE 2-5	DATE Mar 2002 DRAWN BH REV 0



LONGITUDINAL SECTION OF FILL BANK PARALLEL TO THE SEAWALL
(UPPER PORTION FILLED UP TO +15.20m P. D.)

SCALE : 1 : 5000



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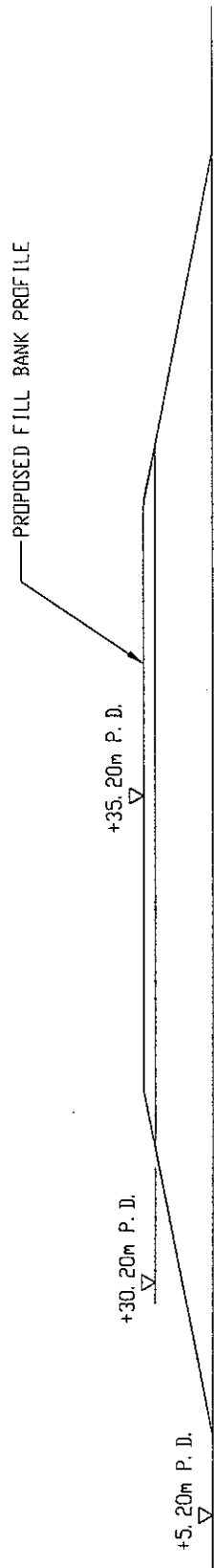
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FIGURE			2-6
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FILL BANK AT TSEUNG KWAN O AREA I37 - INVESTIGATION

North-south cross section of the fill bank (north and southern site portion)

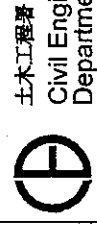
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PROPOSED FILL BANK PROFILE



LONGITUDINAL SECTION OF FILL BANK PARALLEL TO THE SEAWALL (PORTION)

SCALE : 1 : 5000



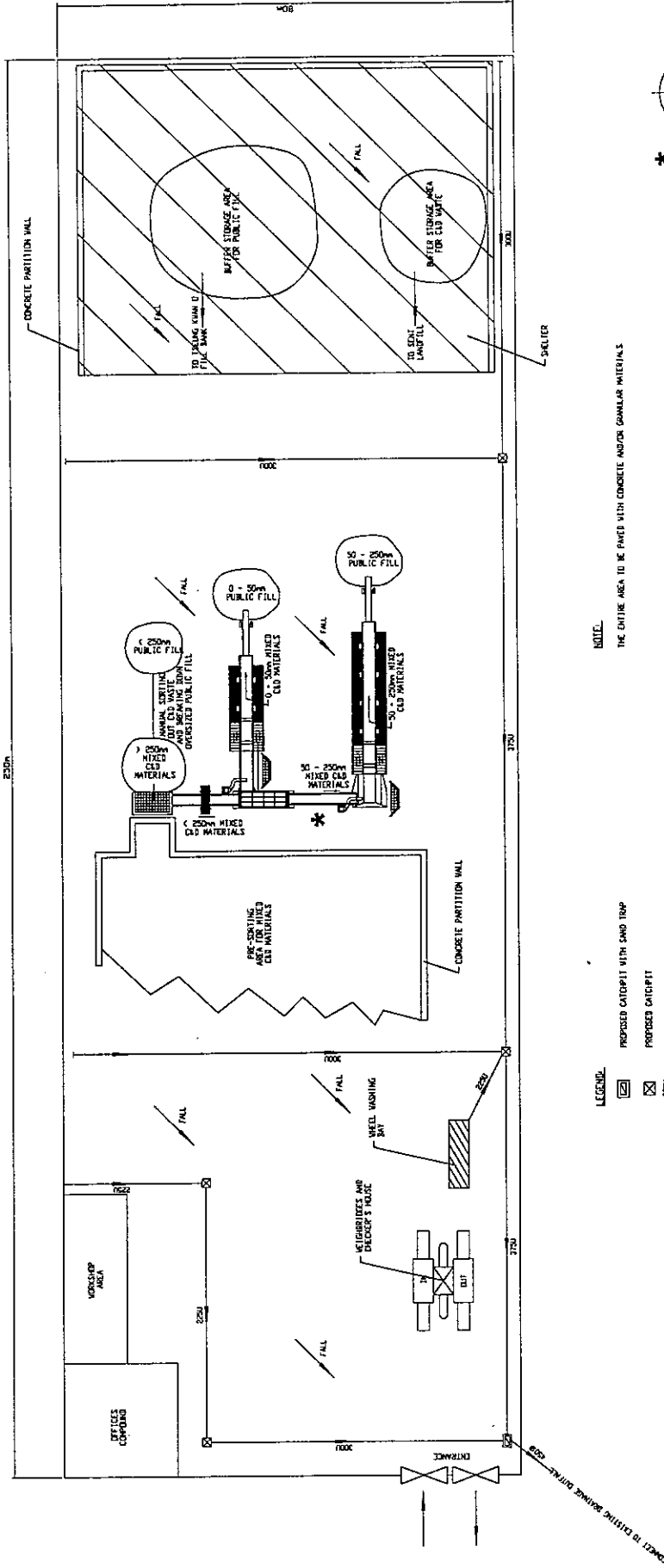
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FIGURE 2-7			0

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ENVIRONMENTAL AND TRAFFIC IMPACT ASSESSMENT STUDY FOR
FILL BANK AT TSEUNG KWAN O AREA 137 - INVESTIGATION

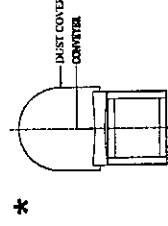
North-south cross section of the fill bank (southern site portion)

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- LEGEND:**
- PROPOSED CATCHPIT WITH SAND TRAP
 - PROPOSED CATCHPIT
 - PROPOSED U-DRAIN WITH HEAVY DUTY GRATING
 - PROPOSED DRAIN PIPE

NOTE:
THE ENTIRE AREA TO BE FINED WITH CONCRETE AND/OR GRANULAR MATERIALS



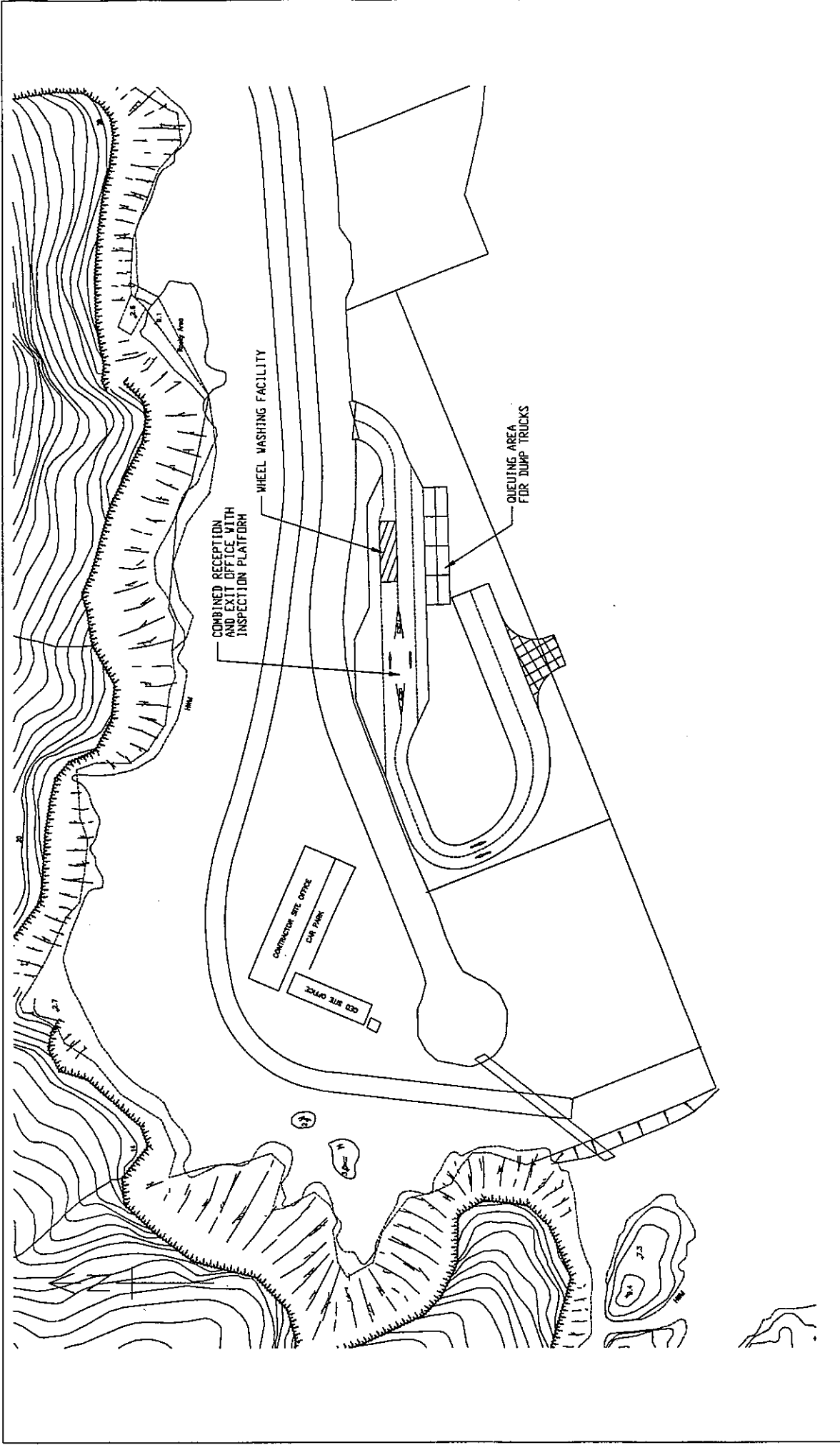
Conveyor Belt Provided with Dust Cover (Sectional View)


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FIGURE 2-8				REV
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Preliminary Design of the C&DMSF

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FIGURE			2-9
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AGREEMENT NO. CE 57/2001
**ENVIRONMENTAL AND TRAFFIC IMPACT ASSESSMENT STUDY FOR
 FILL BANK AT TSEUNG KWAN O AREA 137 - INVESTIGATION**

Preliminary design of the barging point onsite

CH2M HILL (China) Limited
In association with
MVA Hong Kong Limited
ACL Asia Limited

3. PROJECT ORGANISATION

3.1.1 Involvement of relevant parties in a collaborative and interactive manner is essential for the implementation of the recommended EM&A programme. The key parties in an EM&A programme include:

- Civil Engineering Department (CED) (Project Proponent);
- Environmental Protection Department (EPD) (Environmental Regulations Enforcer);
- the Engineer or the Engineer's representative (ER) (i.e. Engineers from CED if the fill bank design and/or implementation are to be implemented by in-house staff of CED);
- the Contractor of the fill bank;
- the Environmental Team (ET);
- the Independent Checker (Environment) (IC(E))

Environmental Team

3.1.2 An Environmental Team (ET) shall be appointed to carry out the recommended EM&A works for the fill bank project. The ET shall not be an associated company of the Contractor. The ET Leader² shall plan, organise and manage the implementation of the EM&A programme, and to ensure that the EM&A works are undertaken to the required standards. The ET Leader shall have relevant professional qualifications in Environmental Sciences or Environmental Engineering, and possesses at least 7 years experience in EM&A and/ or environmental management.

3.1.3 The ET Leader shall be responsible for the implementation of the EM&A programme in accordance with the EM&A requirements specified in this Manual. The ET Leader shall keep a contemporaneous log-book of each and every instance or circumstance or change of circumstances which may affect the EIA and each and every non-compliance with the Environmental Permit or the recommendations in the EIA report. This log-book shall be kept readily available for inspection by the IC(E), and Director of Environmental Protection (DEP) or his authorized officers. The ET shall not be an associated body of the IEC in the project.

3.1.4 Sufficient and suitably qualified professional and technical staff shall be employed by the respective parties to ensure full compliance with their duties and responsibility, as required under the EM&A programme for the duration of the project. The ET shall not be in any way an associated body of the Contractor. The ET shall be under the supervision of the ET Leader in fulfilling the EM&A duties specified in this Manual. The board categories of woks of the ET comprise the followings:

1. Sampling, analysis and statistical evaluation of monitoring parameters with reference to the EIA study recommendations and requirements;
2. Environmental site surveillance;
3. Audit of compliance with environmental protection, and pollution prevention and control regulations;
4. Monitor the implementation of environmental mitigation measures;
5. Monitor compliance with the environmental protection clauses/specifications in the Contract;
6. Review establishment, operation and decommissioning programmes of the fill bank and provide comments as necessary;

² The Environmental Team (ET) leader, who shall be responsible for and in charge of the ET, refers to the person delegated the role of executing the environmental monitoring and audit requirements.

7. Review work methodologies which may affect the extent of environmental impact during the establishment, operation and decommissioning phases and comment as necessary;
 8. Complaint investigation, evaluation and identification of corrective measures;
 9. Liaison with the Project Independent Checker (Environmental) (IC(E)) on all environmental performance matters, and timely submission of all relevant EM&A proforma for IC(E)'s approval;
 10. Advice to the Contractor on environmental improvement, awareness, enhancement matters, etc., on site; and
 11. Timely submission of the EM&A report to the Project Proponent and the DEP.
- 3.1.5. In the event of any exceedance in action/ limit levels, the ET shall immediately inform the IC(E), Engineer/ ER and the Contractor so that appropriate remedial action can be undertaken by the Contractor promptly. The ET is also responsible for the preparation of the monthly EM&A reports for submission to IC(E), the Contractor and the Engineer/ ER, and through the Engineer/ ER to EPD. The ET shall assist the Contractor and the Engineer/ ER in formulating any necessary corrective actions and/ or additional mitigation measures, and liaising with relevant Government Departments where necessary.

Independent Checker (Environment)

- 3.1.6 The Independent Checker (Environment) (IC(E)) shall advise the ER on environmental issues related to the project. The IC(E) shall not be in any way an associated body of the Contractor or the ET for the Project. The IC(E) shall be empowered to audit from an independently viewpoint the environmental performance during the establishment, operation and decommissioning of the fill bank. The IC(E) shall be a person who has at least 7 years' experience in EM&A or environmental management. The IC(E) shall be responsible for the duties defined in the Environmental Permit and this EM&A Manual, and shall audit the overall EM&A programme, including the implementation of all environmental mitigation measures, submissions required in this EM&A Manual, and any other submissions required under the Environmental Permit. The IC(E) shall be responsible for verifying the environmental acceptability of permanent and temporary works, relevant design plans and submissions under the Environmental Permits. The IC(E) shall verify the log-book prepared and kept by the ET Leader. The IC(E) shall notify DEP by fax, within 24 hours of each and every occurrence, change of circumstances or non-compliance with the EIA Report or the Environmental Permit, which might affect the monitoring or control of adverse environmental impact.
- 3.1.7 The main duty of the IC(E) is to carry out independent environmental audit of the project. This shall include, inter alias, the followings:
1. Review and audit in an independent, objective and professional manner in all aspects of the EM&A programme;
 2. Validate and confirm the accuracy of monitoring results; appropriateness of monitoring equipment, monitoring locations with reference to the locations of the nearby sensitive receivers, and monitoring procedures;
 3. Carry out random sample check and audit on monitoring data and sampling procedures, etc;
 4. Conduct random site inspection;
 5. Audit the EIA recommendations and requirements against the status of implementation of environmental protection measures on site;
 6. Review the effectiveness of environmental mitigation measures and project environmental performance;
 7. On a need basis, verify and certify the environmental acceptability of the construction methodology (both temporary and permanent works), relevant design plans and submissions under the environmental permit. Where necessary, the IC(E) shall agree in consultation with the ET Leader and the Contractor the least impact alternative;

8. Verify investigation results of complaint cases and the effectiveness of corrective measures;
9. Verify EM&A report submitted and certified by the ET Leader; and
10. Feedback audit results to ET/CED/ER by signing according to the Event/ Action Plans specified in this EM&A Manual.

The Contractor

- 3.1.8 The Contractor is responsible for providing requested information to the ET in the event of any exceedance in the environmental criteria (action/ limit levels) specified in this Manual or other current environmental standards, and to rectify unacceptable practices. The Contractor shall discuss with the ET, IC(E) and ER on any additional mitigation measures identified to be required by the ET and implement the agreed measures to alleviate any identified environmental impact to acceptable levels. The Contractor shall report to the ET on the actions taken targeting at environmental protection for inclusion in the monthly report to be prepared by the ET.

CED

- 3.1.9 Civil Engineering Department is the project proponent in this project and shall hold ultimate responsibility for the project. CED shall be the decision-making Authority and shall liaise with EPD on environmental issues associated with the project.

EPD

- 3.1.10 EPD is the statutory enforcement body for environmental protection matters in Hong Kong. Apart from the provision of mandatory environmental standards, EPD also forms consultation board for environmental issues arising from the project.

The Engineer or the Engineer's Representative

- 3.1.11 The Engineer, or the ER shall be responsible for overseeing the operations of the Contractor, the ET. He shall advise, co-ordinate and give instruction when appropriate for efficient implementation of any specific environmental mitigation measures identified to be required by the contractor, and/or outstanding EM&A works required to be carried out by ET in consultation with the IC(E). The ER shall supervise the Contractor's activities and ensure that the requirements in the EIA Report and EM&A Manual are fully complied with. He shall inform the Contractor when action is required to reduce impacts in accordance with the Event/ Action Plans. He shall review the EM&A Reports submitted by the ET and follow up the recommendations. He shall ensure that the Contractor is implementing the environmental controls and mitigation measures as set out in the EIA report and EM&A Manual, as well as additional measures necessary for compliance with the relevant environmental standards.
- 3.1.12 CED will play the role of Engineer or the ER should the detailed design and implementation of the fill bank project is to be implemented by in-house staff of CED.

4. AIR QUALITY

4.1 Air Quality Parameters

- 4.1.1 Monitoring and audit of Total Suspended Particulate (TSP) levels shall be carried out by the ET during the establishment, operation and decommissioning of the fill bank to ensure that any deteriorating air quality could be readily detected and timely action taken to rectify the situation.
- 4.1.2 24-hour and 1-hour TSP levels shall be measured according to the recommended programme. 24-hour and 1-hour TSP levels shall be measured by following the standard high volume sampling method as set out in *Title 40 of the Code of Federal Regulations, Chapter 1 (Part 50), Appendix B*.
- 4.1.3 Upon approval of the ER on the advice of EPD, 1-hour TSP levels can alternatively be measured by direct reading methods which are capable of producing comparable results as that by the high volume sampling method, to indicate short event impacts. However, the ET should submit sufficient information to the IC(E) and the ER to prove that the instrument is capable of achieving a comparable result as that a High Volume Sampler (HVS) and maybe used for 1-hr sampling.
- 4.1.4 All relevant data including temperature, pressure, weather conditions, elapsed-time meter reading for the start and stop of the sampler, identification and weight of the filter paper, and other special phenomena and work progress of the concerned site etc. shall be recorded down in details, where appropriate. A sample data sheet is shown in Figure 4-1.

4.2 Monitoring Equipment

- 4.2.1 Regarding the high volume sampling method, HVS in compliance with the following specifications shall be used for carrying out the 1-hour and 24-hour TSP monitoring:
1. 0.6-1.7 m³/min. (20-60 SCFM) adjustable flow range;
 2. Equipped with a timing/control device with +/- 5 minutes accuracy for 24 hours operation;
 3. Installed with elapsed-time meter with +/- 2 minutes accuracy for 24 hours operation;
 4. Capable of providing a minimum exposed area of 406 cm² (63 in²);
 5. Flow control accuracy: +/- 2.5% deviation over 24-hr sampling period;
 6. Equipped with a shelter to protect the filter and sampler;
 7. Incorporated with an electronic mass flow rate controller or other equivalent devices;
 8. Equipped with a flow recorder for continuous monitoring;
 9. Provided with a peaked roof inlet;
 10. Incorporated with a manometer;
 11. Able to hold and seal the filter paper to the sampler housing at horizontal position;
 12. Easy to change the filter; and
 13. Capable of operating continuously for 24-hr period.
- 4.2.2 If the ET proposes to use a direct reading dust meter to measure 1-hr TSP levels, he shall submit sufficient information to the IC(E) to prove that the instruments is capable of achieving a comparable result as that the HVS and may be used for the 1-hr sampling. The instrument shall also be calibrated regularly, and the 1-hr sampling shall be determined periodically by HVS to check the validity and accuracy of the results measured by direct reading method.
- 4.2.3 During the course of the project, the ET is responsible for provision of the monitoring equipment. He shall ensure that sufficient number of HVSs with an appropriate calibration kit, and direct reading dust meters are available for the carrying out of baseline monitoring, regular impact monitoring and ad hoc monitoring.

- 4.2.4 The HVSs shall be equipped with an electronic mass flow controller and be calibrated against a traceable standard at regular intervals. All the equipment, calibration kit, filter papers, etc. shall be clearly labelled.
- 4.2.5 Initial calibration of HVSs shall be conducted upon installation and thereafter at bi-monthly intervals. The transfer standard shall be traceable to the internationally recognised primary standard and be calibrated annually. The calibration data shall be properly documented for future reference by the concerned parties such as the IC(E). All the data should be converted into standard temperature and pressure condition.
- 4.2.6 The flow-rate of the sampler before and after the sampling exercise with the filter in position shall be verified to be constant and be recorded down in the data sheet given in Figure 4-1.
- 4.2.7 Wind data monitoring equipment shall also be provided and set up at a conspicuous location for logging wind speed and wind direction near to the dust monitoring locations. The location for equipment installation shall be proposed by the ET and agreed with the ER and IC(E). For installation and operation of wind data monitoring equipment, the following points shall be observed:
1. The wind sensors should be installed on masts at an elevated level 10m above ground so that they are clear of obstructions or turbulence caused by the buildings;
 2. The wind data should be captured by a data logger and to be downloaded for processing at least once a month;
 3. The wind data monitoring equipment should be re-calibrated at least once every six months; and
 4. Wind direction should be divided into 16 sectors of 22.5 degrees each.
- 4.2.8 In exceptional situations, the ET may propose alternative methods to obtain representative wind data upon approval from the ER and agreement from the IC(E).

4.3 Laboratory Measurement / Analysis

- 4.3.1 A clean laboratory with constant temperature and humidity control, and equipped with necessary measuring and conditioning instruments, to handle the dust samples collected, shall be available for sample analysis, and equipment calibration and maintenance. The laboratory should be HOKLAS accredited.
- 4.3.2 If a site laboratory is set up or a non-HOKLAS accredited laboratory is hired for carrying out the laboratory analysis, the laboratory equipment shall be approved by the ER in consultation with the IC(E) and the measurement procedures shall be witnessed by the IC(E) and the ER. The ET shall provide the ER with one copy of *the Title 40 of the Code of Federal Regulations, Chapter 1 (Part 50), Appendix B* for his reference.
- 4.3.3 Filter paper of size 8"x10" shall be labelled before sampling. It shall be a clean filter paper with no pin hole, and shall be conditioned in a humidity controlled chamber for over 24-hr and be pre-weighed before use for the sampling.
- 4.3.4 After sampling, the filter paper loaded with dust shall be kept in a clean and tightly sealed plastic bag. The filter paper is then returned to the laboratory for reconditioning in the humidity controlled chamber followed by accurate weighing by an electronic balance with a readout down to 0.1 mg. The balance shall be regularly calibrated against a traceable standard.
- 4.3.5 All the collected samples shall be kept in a good condition for 6 months before disposal.

4.4 Proposed Monitoring Locations

- 4.4.1 The air quality impact assessment presented in the EIA report indicated that the nearby air sensitive receivers (ASRs) would not be subjected to adverse dust impact among all phases of the project when standard dust mitigation measures are properly applied onsite. The dust mitigation measures have been recommended and shall be implemented by the Contractor in accordance with the requirements under the *Air Pollution Control (Construction Dust) Regulation*. The contractor shall be responsible for the design and implementation of the dust mitigation measures.
- 4.4.2 Figure 4-2 shows the locations of the proposed dust monitoring locations (A1 and A2) identified at this early planning stage. The appointed ET may like to propose alternative monitoring locations taking into consideration of the latest status, availability and/or accessibility of the various possible monitoring locations. The alternative monitoring locations proposed by the ET shall be approved by the ER and agreed by IC(E).
- 4.4.3 When alternative monitoring locations are proposed, the following criteria should be followed as far as practicable:
- At the site boundary or such locations close to the major dust emission sources;
 - Close to the sensitive receptors; and
 - Take into account the prevailing meteorological conditions.
- 4.4.4 The ET shall agree with the ER in consultation with the IC(E) on the position of the HVS for installation of the monitoring equipment. When positioning the samplers, the following points shall be noted:
- A horizontal platform with appropriate support to secure the samplers against gusty wind should be provided;
 - No two samplers should be placed less than 2 meter apart;
 - The distance between the sampler and an obstacle, such as buildings, must be at least twice the height that the obstacle protrudes above the sampler;
 - A minimum of 2 metres of separation from walls, parapets and penthouses is required for rooftop samplers;
 - A minimum of 2 metre separation from any supporting structure, measured horizontally is required;
 - No furnace or incinerator flue is nearby;
 - Airflow around the sampler is unrestricted;
 - The sampler is more than 20 metres from the dripline;
 - Any wire fence and gate, to protect the sampler, should not cause any obstruction during monitoring;
 - Permission must be obtained to set up the samplers and to obtain access to the monitoring stations; and
 - A secured supply of electricity is needed to operate the samplers.

4.5 Baseline Monitoring

- 4.5.1 Baseline monitoring shall be carried out by the appointed ET in at least one of the recommended monitoring stations for at least 14 consecutive days to obtain daily 24-hr TSP samples. 1-hr sampling shall also be done at least 3 times per day during daytime while the highest dust impact would be anticipated during the operational phase of the fill bank. One of the three 1-hour TSP monitoring shall cover the fill bank operational peak predicted at 11:00a.m. to 12:00 hour. The

ET should inform the IC(E) of the baseline monitoring programme before commencement such that the IC(E) can conduct on-site audit when the baseline monitoring commence to check for the appropriateness of the adopted methodology.

- 4.5.2 During the baseline monitoring, there should not be any dust generation construction activities in the vicinity of the monitoring stations arising from the proposed fill bank project.
- 4.5.3 In case the baseline monitoring cannot be carried out at the designated monitoring locations during the baseline monitoring period, the ET Leader shall carry out the monitoring at alternative locations which can effectively represent the baseline conditions at the impact monitoring locations. The alternative baseline monitoring locations shall be approved by the ER and agreed with IC(E).
- 4.5.4 If the ET considers that the ambient conditions have been changed during any stage of the operation/ decommissioning phase, and a repeat of the baseline monitoring is considered necessary for obtaining the updated baseline levels, the monitoring should be carried out at times when the contractor's activities are not generating dust in the proximity of the monitoring stations. Should change in ambient conditions be determined, the baseline levels and, in turn, the air quality criteria (action/ limit levels), should be revised. The revised baseline levels and air quality criteria should be agreed with the IC(E) and EPD.

4.6 Impact Monitoring

- 4.6.1 The ET shall carry out impact monitoring during the course of the project at the recommended dust monitoring stations during the establishment, operation and decommissioning phases. For regular impact monitoring, a sampling frequency of at least one in every six-days shall be followed at the selected monitoring stations for 24-hr TSP monitoring. The specific time to start and stop the 24-hr TSP monitoring shall be clearly defined and be strictly followed by the operator. Before commencement, the ET Leader shall inform the IC(E) of the impact monitoring programme such that the IC(E) can conduct on-site audit to ensure accuracy of the impact monitoring results.
- 4.6.2 For 1-hr TSP monitoring, a sampling frequency of at least three times per day in every six-days should be undertaken during the hours when the highest dust impact is predicted to occur based on the nature of the construction works. The fill bank peak operating hour expected to occur at approximately 11:00a.m. to 12:00 hour shall be covered in the 1-hour TSP monitoring. The 1-hr TSP monitoring can be undertaken on the same day as the 24-hr TSP monitoring.
- 4.6.3 In case of non-compliance with the air quality criteria, more frequent monitoring exercise, as specified in the following section, shall be conducted within 24 hours after the result is obtained. This additional monitoring shall be continued until the excessive dust emission or the deterioration in air quality is rectified.

4.7 Event and Action Plan for Air Quality

- 4.7.1 The baseline monitoring results form the basis for determining the air quality criteria for the impact monitoring. The ET shall compare the impact monitoring results with air quality criteria set up for 24-hour TSP and 1-hour TSP. Table 4-1 shows the air quality criteria, namely Action and Limit levels to be used. Should non-compliance of the air quality criteria occurs, the ET shall undertake the relevant action in accordance with the Action Plan in Table 4-2.

Table 4-1 Action and Limit Levels for Air Quality

Parameters	Action	Limit
24 Hour TSP Level in $\mu\text{g}/\text{m}^3$	For baseline level $\leq 200 \mu\text{g}/\text{m}^3$, Action level = (Baseline level x 1.3 + Limit level) / 2; For baseline level $> 200 \mu\text{g}/\text{m}^3$, Action level = Limit level;	260 $\mu\text{g}/\text{m}^3$
1 Hour TSP Level in $\mu\text{g}/\text{m}^3$	For baseline level $\leq 384 \mu\text{g}/\text{m}^3$, Action level = (Baseline level x 1.3 + Limit level) / 2; For baseline level $> 384 \mu\text{g}/\text{m}^3$, Action level = Limit level;	500 $\mu\text{g}/\text{m}^3$

Table 4-2 Event/Action Plan for Air Quality

ACTION LEVEL				
EVENT	ET Leader	IC (E)	ER	CONTRACTOR
ACTION LEVEL				
Exceedance for one sample	<ol style="list-style-type: none"> 1. Identify source, investigate the causes of exceedance and propose remedial measures 2. Inform ER, IC(E) and Contractor 3. Repeat measurement to confirm finding 4. Increase monitoring frequency to daily 	<ol style="list-style-type: none"> 1. Check monitoring data submitted by ET 2. Check Contractor's working method 	<ol style="list-style-type: none"> 1. Notify Contractor 	<ol style="list-style-type: none"> 1. Rectify any unacceptable practice 2. Amend working methods if appropriate
Exceedance for two or more consecutive samples	<ol style="list-style-type: none"> 1. Identify source, investigate the causes of exceedance and propose remedial measures 2. Inform IC(E) and Contractor 3. Repeat measurements to confirm findings 4. Increase monitoring frequency to daily 5. Discuss with IC(E) and Contractor on remedial actions 6. If exceedance continues, arrange meeting with IC(E) and ER 7. If exceedance stops, cease additional monitoring 	<ol style="list-style-type: none"> 1. Checking monitoring data submitted by ET 2. Check Contractor's working method 3. Discuss with ET and Contractor on possible remedial measures 4. Advise the ER on the effectiveness of the proposed remedial measures 5. Supervisor implementation of remedial measures 	<ol style="list-style-type: none"> 1. Confirm receipt of notification of failure in writing 2. Notify Contractor 3. Ensure remedial measures properly implemented 	<ol style="list-style-type: none"> 1. Submit proposals for remedial actions to IC(E) within 3 working days of notification 2. Implement the agreed proposals 3. Amend proposal if appropriate
LIMIT LEVEL				
Exceedance for one sample	<ol style="list-style-type: none"> 1. Identify source, investigate the causes of exceedance and propose remedial measures 2. Inform ER, Contractor and EPD 3. Repeat measurement to confirm finding 4. Increase monitoring frequency to daily 5. Assess effectiveness of Contractor's remedial actions and keep IC(E), EPD and ER informed of the results 	<ol style="list-style-type: none"> 1. Checking monitoring data submitted by ET 2. Check Contractor's working method 3. Discuss with ET and Contractor on possible remedial measures 4. Advise the ER on the effectiveness of the proposed remedial measures 5. Supervisor implementation of remedial measures 	<ol style="list-style-type: none"> 1. Confirm receipt of notification of failure in writing 2. Notify Contractor 3. Ensure remedial measures properly implemented 	<ol style="list-style-type: none"> 1. Take immediate action to avoid further exceedance 2. Submit proposals for remedial actions to IC(E) within 3 working days of notification 3. Implement the agreed proposals 4. Amend proposal if appropriate
Exceedance for two or more consecutive samples	<ol style="list-style-type: none"> 1. Identify source, investigate the causes of exceedance and propose remedial measures 2. Notify IC(E), ER, Contractor and EPD 3. Repeat measurement to confirm findings 4. Increase monitoring frequency to daily 5. Carry out analysis of Contractor's working procedures to determine possible mitigation to be implemented 6. Arrange meeting with IC(E) and ER to discuss the remedial actions to be taken 7. Assess effectiveness of Contractor's remedial actions and keep IC(E), EPD and ER informed of the results 8. If exceedance stops, cease additional monitoring 	<ol style="list-style-type: none"> 1. Discuss amongst ER, ET and Contractor on the potential remedial actions 2. Review Contractor's remedial actions whenever necessary to assure their effectiveness and advise the ER accordingly 3. Supervise the implementation of remedial measures 	<ol style="list-style-type: none"> 1. Confirm receipt of notification of failure in writing 2. Notify Contractor 3. In consultation with the IC(E), agree with the Contractor on the remedial measures to be implemented 4. Ensure remedial measures properly implemented 5. If exceedance continues, consider what portion of the work is responsible and instruct the Contractor to stop that portion of work until the exceedance is abated remedial actions 	<ol style="list-style-type: none"> 1. Take immediate action to avoid further exceedance 2. Submit proposals for remedial actions to IC(E) within 3 working days of notification 3. Implement the agreed proposals 4. Resubmit proposals if problem still not under control 5. Stop the relevant portion of works as determined by the ER until the exceedance is abated

4.8 Dust Mitigation Measures

4.8.1 The EIA report has recommended various dust control/ mitigation measures in accordance with the requirements of the *Air Pollution Control (Construction Dust) Regulation*. The key dust control measures that are considered most relevant during the establishment, operational and decommissioning phases are highlighted below.

Establishment Phase

4.8.2 The dust control measures required under the *Air Pollution Control (Construction Dust) Regulation* should be implemented. Working areas where excavation or earthmoving operation shall be sprayed with water or a dust suppression chemical. Any stockpiling of excavated material shall be covered by impervious sheeting or sprayed with water or a dust suppression chemical. The following site facilities shall also be provided as part of the establishment to prevent potential dust impact during the fill bank operation and decommissioning:

- Erection of site hoarding of at least 2.4m high (from ground level) along the northern side of the site boundary except at the site entrance/exit location;
- Installation of vehicle wheel washing facilities including a high pressure water jet provided at designated vehicle exit points;
- Construction of additional temporary stormwater system at required locations;
- Paving the designated main haul roads with concrete, bituminous materials, hardcores or metal plates;
- The machinery of the C&DMSF shall be enclosed in a shelter and equipped with proper dust filtration system (e.g. bag filters);
- The C&DMSF shall also be designed to facilitate the loading of fill material from public fill delivery trucks and with minimized drop height. At the C&DMSF, the storage areas shall at least be enclosed on three sides;
- In designing the barging point, the drop height from the barge to vehicles and vice versa shall be minimized;
- The tipping hall for transfer of public fill from trucks to barges at the barging point shall be partially enclosed

Operational Phase

4.8.3 Any works that involve the stockpiling of dusty materials are regulated under the *Air Pollution Control (Construction Dust) Regulation* as regulatory work. In accordance with the requirements of the *Air Pollution Control (Construction Dust) Regulation*, sufficient dust control/ mitigation measures shall be implemented to ensure full protection of the nearby ASRs. The dust control measures that are considered to be particularly relevant to the operation (and decommissioning) of the fill bank are summarised below.

Site Haul Road

4.8.4 Public fill delivery trucks entering/ leaving TKO Area 137 shall be required to follow the planned main haul route that is covered with concrete, bituminous materials, hardcores or metal plates. The main haul route provided for regular transport of public fill from the barging point to the C&DMSF shall also be constructed with similar material to minimise dust emissions. The buffer distance between the designated haul roads and the nearest ASRs shall be maximised. Water lorries and/or road sweepers shall be provided and used in dust suppression. Truck speed shall be controlled to within 10km/hr. Truck drivers using the fill bank should be checked to have a valid dumping licence.

Loading/unloading of Public Fill

- 4.8.5 All dusty fill material shall be sprayed with water or a dust suppression chemical prior to loading, unloading or transfer (transfer of fill material between trucks, barges, C&DMSF and the stockpiles) so as to maintain the fill material wet, except for situations where the moisture content of the dusty material is a matter of concern. Frequent water (at least three times per day) of the worksites with active dusty operations is recommended. The frequency shall be increased when the weather is dry.
- 4.8.6 Loading of public fill delivered by barges to the site shall be sprayed with water at the material landing point to minimize dust emission. The public fill is expected to be dampen when the material is first loaded from trucks to the barges at the public filling barging point. Therefore, any mist spraying applied should only dampen the dusty material and overwatering should be avoided.
- 4.8.7 The machinery of the C&DMSF shall be fully enclosed and provided with proper dust filtration system to alleviate dust emission. The C&DMSF shall also be designed to facilitate the loading of fill material from public fill delivery trucks with minimized drop height. At the C&DMSF, temporary storage of dusty material shall be sprayed with water and the storage area shall be at least enclosed on three sides. Storage time of pre-sorted and sorted materials and waste should be minimised. Over-sized material subject to crushing shall also be sprayed with water before being crushed to minimize dust emission.

Site Entrance/ Exit

- 4.8.8 Vehicle washing facilities including high pressure water jet installed at the existing exit shall be maintained and operated by designated staff to ensure that these dust control measures are being used. Before leaving the fill bank site, every vehicle shall be washed to remove any dusty materials from its body and wheels.
- 4.8.9 Trucks carrying dusty load entered to the site shall be sprayed with water once the impervious sheeting covering the load is removed.

Stockpiling of Public Fill

- 4.8.10 A buffer zone of at least 100m shall be maintained between the edge of the public fill stockpiling area and the nearest ASRs at the TKO Industrial Estate. Within the buffer zone, no dusty material shall be stockpiled and no loading/ unloading and similar activities should be allowed. Stockpiling activities at the fill bank shall be administrated by the contractor with care in proper manner to minimise dust emissions from loading/ unloading activities and wind erosion.
- 4.8.11 Public fill at the stockpiling area should be handled with care in proper manner that would not result in segregation, deterioration, erosion or instability of the material, especially for the stockpiling surface facing to the north of the site.
- 4.8.12 The portions of site and stockpiling height allocated and allowed by the project engineers for stockpiling of public fill shall be followed in the daily operation of the fill bank. Temporary slope surfaces shall be covered with tarpaulin sheet or other impermeable sheeting, sprayed with water or a dust suppression chemical, or protected by other methods approved by CED. The amount of mist spraying should be just enough to dampen the material surface without overwatering, which could result in unnecessary surface water runoff. Final slope surfaces, especially those facing to the north of the site, shall be treated by compaction, followed by hydroseeding, vegetation planting or sealing with shotconcrete, latex, vinyl, bitumen, or other suitable surface stabiliser approved by CED to prevent the washing away of stockpiled material.

Transfer of Fill Material with Belt Conveyor System

- 4.8.13 Belt conveyor systems used for transfer of fill material at the C&DMSF shall be enclosed on top and 2 sides. Every transfer point between any two conveyors shall be totally enclosed.
- 4.8.14 An effective belt scraper or equivalent device shall be installed at the head pulley of every belt conveyor to dislodge fine particles that may adhere to the belt surface, and to reduce carrying back of fine particles on the return belt. The belt scraper or equivalent device shall be equipped with bottom plates or other similar means to prevent falling of material from the return belt. Every stockpiling belt conveyor shall be provided with a mechanism to adjust its level such that the vertical distance between the belt conveyor and the material landing point is maintained at no more than 1m. Dusty material loaded from a belt conveyor outlet to stockpiles, storage bins, trucks, barges and other open areas shall be sprayed with water or a dust suppression chemical.

General Site Management

- 4.8.15 Appropriate working methods should be devised and arranged to minimise dust emissions and to ensure any installed air pollution control system and measures are operated and/or implemented in accordance with their design merits. In the event of malfunctioning of any control system or equipment, the relevant dusty activities shall stop until the relevant control system or equipment are restored to proper functioning.


Frequent mist spraying should be applied on dusty areas. The frequency of spraying required will depend upon local meteorological conditions such as rainfall, temperature, wind speed and humidity. The amount of mist spraying should be just enough to dampen the material without over-watering, which could result in unnecessary surface water runoff.

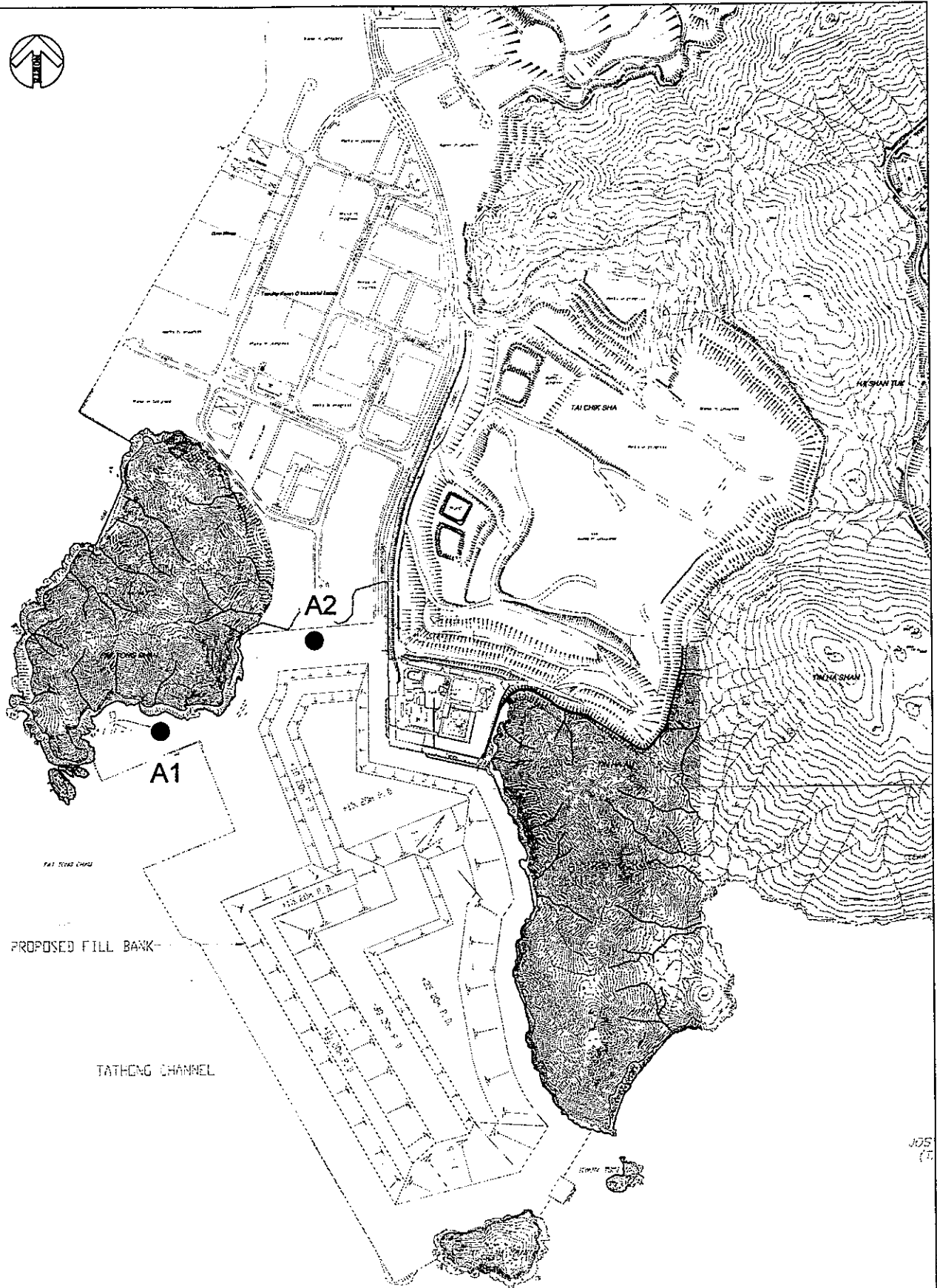
Decommissioning Phase

- 4.8.16 The dust control measures recommended for the operational phase shall continue to be applicable during the decommissioning phase of the project. For excavation activities and removal of fill material, the material handled shall also be sprayed with water or a dust suppression chemical before and after the operation so as to maintain the entire surface wet. The contractor shall implement these measures in accordance with the requirements of the *Air Pollution Control (Construction Dust) Regulation*. In designing the barging point, the vertical distance between the barges and the unloading platform at the barging point shall be minimized to reduce dust generation. The tipping hall at the barging point shall be enclosed on top and three sides. All public fill delivery trucks carrying dusty load leaving the fill bank to Wan Po Road shall be required to be covered entirely by clean impervious sheeting in prior to ensure that the dusty materials do not leak from the vehicles.
- 4.8.17 The implementation schedule for the mitigation measures recommended above for the establishment, operation and decommissioning phases is presented in Appendix 10-1 of the EIA Report. The Contractor shall be responsible for the design and implementation of these measures. If the above measures are not sufficient to restore any monitored air quality to acceptable levels. Upon the advice and discussion with the ET, IC(E) and ER, the ET shall propose some other mitigation measures for implementation by the Contractor.

Monitoring Location		
Details of Location		
Sampler Identification		
Date & Time of Sampling		
Elapsed-time Meter Reading	Start (min.)	
	Stop (min.)	
Total Sampling Time (min.)		
Weather Conditions		
Site Conditions		
Initial Flow Rate, Qsi	Pi (mmHg)	
	Ti (°C)	
	Hi (in.)	
	Qsi (Std. m ³)	
Final Flow Rate, Qsf	Pf (mmHg)	
	Tf (°C)	
	Hf (in.)	
	Qsf (Std. m ³)	
Average Flow Rate (Std. m ³)		
Total Volume (Std. m ³)		
Filter Identification No.		
Initial Wt. of Filter (g)		
Final Wt. of Filter (g)		
Measured TSP Level (µg/m ³)		

	<u>Name & Designation</u>	<u>Signature</u>	<u>Date</u>
Field Operator :	_____	_____	_____
Laboratory Staff :	_____	_____	_____
Checked by :	_____	_____	_____

CH2M HILL (China) Limited <i>in association with</i> MVA Hong Kong Limited ACL Asia Limited	AGREEMENT NO. CE 57/2001 ENVIRONMENTAL AND TRAFFIC IMPACT ASSESSMENT STUDY FOR FILL BANK AT TSEUNG KWAN O AREA 137 - INVESTIGATION	 土木工程署 Civil Engineering Department	SCALE	NA	DATE	Mar 2002
	Air Quality Monitoring Field Record Sheet		DESIGNED	AW	DRAWN	BH
		FIGURE NO. 4-1				



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ACL Asia Limited

AGREEMENT NO. CE 57/2001
**ENVIRONMENTAL AND TRAFFIC IMPACT ASSESSMENT STUDY
 FOR FILL BANK AT TSEUNG KWAN O AREA 137 - INVESTIGATION**

Locations of the Proposed Air Quality Monitoring Stations



土木工程署
**Civil Engineering
 Department**

SCALE	NTS	DATE	Mar 2002
DESIGNED	AW	DRAWN	BH
FIGURE 4-2			REV 0

5. NOISE GENERATION FROM ONSITE ACTIVITIES

5.1 Introduction

5.1.1 Given the vast distance separation between the Noise Sensitive Receivers (NSRs) and the fill bank site, the construction/ fixed noise impact assessment revealed that noise generated from onsite activities would satisfy the noise criteria specified in the relevant Technical Memoranda at the NSRs. Nevertheless, noise management measures have been recommended to be implemented onsite as good site practices. To check for the implementation of these measures, the ET shall include the checking on the implementation of noise control measures by the contractor in the regular site environmental audit.

5.2 Environmental Audit

5.2.1 As described in Section 9 of the Manual, the ET leader is responsible for formulation of the environmental site inspection, deficiency and action reporting system, and for carrying out site inspections under the EM&A Programme. The ET shall check for the implementation of the noise control measures agreed to be implemented by the contractor as good site practices in his regular site inspections, including the following measures as specified in the Implementation Schedule:

During the Establishment Phase

- (i) All construction works will be carried out during the non-restricted hours (i.e. 7:00 a.m. to 7 p.m. on weekdays other than general holidays);
- (ii) Before the commencement of any work that may generate a significant noise impact, the Contractor shall submit to the Engineer for approval the method of working, equipment and sound-reducing measures (e.g. use of silenced type of equipment, etc.) intended to be used;

During the Operational and Decommissioning Phases

- (iii) The operating hours of the fill bank shall be restricted to 8:00 a.m. to 9:00 p.m.;
- (iv) The operating hours of the barging point and the C&DMSF within the fill shall be restricted to 8:00 a.m. to 7:00 p.m.;
- (v) Before the commencement of any work that may generate a significant noise impact, the Contractor shall submit to the Engineer for approval the method of working, equipment and sound-reducing measures (e.g. use of silenced type of equipment, etc.) intended to be used;
- (vi) The noise standards specified in the *Technical Memorandum for the Assessment of Noise From Places Other Than Domestic Premises, Public Places or Construction Sites* shall be met;

5.2.2 To gain objective data as part of the environmental audit, the ET shall carry out noise monitoring onsite on a monthly basis during the regular site inspections. Figure 5-1 shows a sample data record sheet for reference. The noise monitoring data gained will be useful in allowing the ET and IC(E) to identify precisely any significant change in noise levels at the measurement point such that significant noise levels can be identified, and measures taken where necessary to minimize the noise generation as good site practices.

5.2.3 The noise measurement points shall be proposed by the ET leader taking into the location of the work areas and dominant noise source(s) for agreement with the IC(E) prior to regular noise monitoring at the agreed positions. Near field measurements should be avoided. Measurements of the L_{Aeq} noise levels shall be made over a 30-minute period. L_{A90} and L_{A10} noise levels shall also be recorded for the same measurement period. Given that the nearest Noise Sensitive Receivers are located to the northern and western sides of the fill bank, it is recommended that

- the noise monitoring shall be selected at assessment points each along the northern and western boundaries of the site.
- 5.2.4 Noise measurements should be made by the ET onsite in accordance with standard acoustical principles and practices in relation to weather conditions. Measurements should not be made in the presence of fog, rain, wind with a steady speed exceeding 5 m/s or wind with gust exceeding 10 m/s.
- 5.2.5 As referred to in the Technical Memorandum issued under the *Noise Control Ordinance (NCO)*, sound level meters in compliance with the *International Electrotechnical Commission Publications 651: 1979 (Type 1) and 804: 1985 (Type 1) specifications* shall be used for carrying out of 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.

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 : _____

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	Noise Monitoring Field Record Sheet	SCALE	NA	DATE	Mar 2002
		DESIGNED	AW	DRAWN	BH
FIGURE NO. 5-1				REV 0	

6. LANDFILL GAS AND LEACHATE

6.1 Landfill Gas Monitoring Requirements

- 6.1.1 The requirement to carry out periodic/ routine monitoring by the Contractor's Safety Officer/ Supervisor during ground works, in all excavations, and works within confined spaces if any shall be specified in the contract document. A properly-trained Safety Officer/ Supervisor shall be recruited by the site contractor who should be present onsite throughout the periods when there are any excavation works undertaken within/ near the consultation zone of the SENT landfill which has the potential for the presence of landfill gas, and the risk of explosion or asphyxiation as recommended in the EIA report.
- 6.1.2 The Safety Officer/ Supervisor should be provided with an intrinsically safe portable instrument(s), appropriately calibrated and capable of measuring the gases in the ranges indicated as given in Table 6-1.

Table 6-1 Details of LFG Monitoring Equipment Requirement

Gas	Range of Detection
Methane	0-100% LEL and 0-100% v/v
Carbon dioxide	0-100%
Oxygen	0-21%
Others	Unit/Range of Detection
Barometric pressure	mBar (absolute)
Gas pressure (relative to atmosphere)	Pascals
Temperature	0-100 °C

- 6.1.3 The landfill gas monitoring instrument shall:
- Where possible, comply with BS6020 and be approved by BASEEFA as intrinsically safe, suitable for use in a Zone 2 area to BS5345;
 - Be capable of continuous monitoring of methane, oxygen and carbon dioxide;
 - Be capable of continuous barometric pressure and gas pressure measurement;
 - Normally operate in diffusion mode unless required for spot sampling, when it should be capable of operating by means of an aspirator or pump;
 - Have low battery, fault and over range indication incorporated; and
 - Store monitoring data, and shall be capable of being down-loaded directly to a PC
- 6.1.4 The monitoring equipment shall alarm (both audibly and visually) in the event that the concentrations of the following area exceeded:
- Methane – higher than 10% LEL
 - Carbon dioxide – higher than 0.5%
 - Oxygen – lower than 18% by volume
- 6.1.5 An appropriate LFG monitoring programme should be formulated by the Safety Officer/ Supervisor or by any appropriately qualified person, where necessary, taking into account the locations of the work areas. Periodic/ routine monitoring should be conducted during ground-works, in all excavations, and works within confined spaces if any.

6.2 Landfill Gas Limit Level and Action Plan

6.2.1 An action plan specifying the limit level is recommended as shown in Table 6-2.

Table 6-2 Action Plan - LFG Monitoring During the Construction Stage

Parameter	Measured Level	Action
Methane (CH ₄)	>10% LEL	Post "No Smoking" signs Prohibit hot works Ventilate to restore CH ₄ to below 10% LEL.
	>20% LEL	Stop works Evacuate personnel /prohibit entry
Carbon Dioxide (CO ₂)	>0.5%	Ventilate to restore CO ₂ to less than 0.5%
	>1.5%	Stop works Evacuate personnel/ prohibit entry Increase ventilation to restore to less than 0.5%
Oxygen (O ₂)	<19%	Ventilation trench/ void to restore O ₂ level to more than 19%
	<18%	Stop works Evacuate personnel/ prohibit entry Increase ventilation to restore O ₂ to more than 19%

6.3 Landfill Gas Protective Measures for works within the SENT landfill Consultation Zone

6.3.1 As a landfill gas migration preventive measures, the container office will be supported by a raised hollow platform, or equivalent measure should be provided. This will allow passive ventilation and avoid accumulation of landfill gas, if any, beneath the container office. Main site offices and other site facilities having the potential to trap landfill gas shall be located outside the SENT landfill consultation zone. No underground drainage and sewage system including underground pipelines and chambers shall be constructed within the SENT landfill consultation zone. Access to the fill bank by the general public shall be restricted.

6.3.2 During the establishment, operation and decommissioning phases of the fill bank, hazards may arise as a result of the flammability of landfill gas or its potentially asphyxiating properties. It is advisable to include appropriate specified clauses for incorporation in the contract documents for the project. In general, the contractor should be aware of, and should inform supervisor and workers of the following:

- Methane and carbon dioxide are always likely to be present in the soil voids;
- Physical and chemical nature of landfill gas;
- Methodologies for landfill gas detection;
- Fire and explosion hazards associated with landfill gas;
- Toxicity effects and health hazards associated with landfill gas;
- Potential health effects from direct contact with leachate/ groundwater contaminated by leachate; and
- Provide the contingency measures for leachate/ groundwater contamination.

- 6.3.3 Precautions should be clearly laid down and rigidly adhered for activities such as excavation, trenching and creation of confined or semi-confined spaces, if any, carried out within or near the consultation zone. In addition to normal site safety procedures, gas detection equipment and appropriate breathing apparatus should be available and used when entering confined spaces or trenches deeper than 2 metres.
- 6.3.4 Personnel entering the container office shall be fully informed of the risk associated with potential landfill gas exposure.
- 6.3.5 Concentration of methane, carbon dioxide and oxygen within the manholes or the like shall also be checked in prior and confirmed to be within a safe level before any workers shall enter the enclosed space within the landfill site consultation zone.
- 6.3.6 Safety measures including the following should be addressed in the contract document:
- Proper warning of the potential hazards in the vicinity of excavations;
 - Appropriate training for workers who work in, or have responsibility for "at risk" areas;
 - Preparation of an excavation procedure or code of practice;
 - Prohibition of smoke and naked flames within any excavation or ground-level confined space;
 - Proper control of welding, flame-cutting or other hot works from any trench, confined spaces or excavation area;
 - Proper location for mobile offices, equipment stores, mess rooms, etc.;
 - Provision of adequate fire extinguishing equipment, fire-resistant clothing and breathing apparatus;
 - Preparation of a "method-of-working" statement covering all normal and emergency procedures before beginning of any required drilling operations.

6.4 Leachate Protective Measures

- 6.4.1 During the establishment, operation and decommissioning phases of the fill bank, the workers should be instructed to adopt good hygiene practices to prevent direct exposure to any leachate or leachate-contaminated groundwater i.e. wash thoroughly after work, eat only in clean area after washing hands, and wear protective gear including gloves and appropriate clothing in excavation activities. Should there be any sign of leachate-contaminated groundwater being encountered, the SENT landfill operator should be informed so that this can be collected and transported back to the sewage treatment works of the SENT landfill for treatment by the SENT landfill operator, and the leachate control system/ measures at source can be reviewed.
- 6.4.2 The implementation schedule for the mitigation measures recommended above for the establishment, operation and decommissioning phases is presented in Appendix 10-1 of the EIA Report. The Contractor shall be responsible for the design and implementation of these measures.

7. WATER QUALITY

7.1 Introduction

- 7.1.1 CED is currently implementing a comprehensive water quality monitoring programme as part of the Contract (CV/97/01) "Tseung Kwan O Port Development at Area 137 Stage 2 - Construction of Seawalls and Reclamation". Figure 7-1 shows the locations of the existing control and impact monitoring stations (M1 through M4 and C1 through C2). The water quality parameters including turbidity in NTU, dissolved oxygen (DO) in mg/l and suspended solids (SS) in mg/l are being monitored three days per week at mid-flood and mid-ebb tides.
- 7.1.2 It is considered that the existing water quality monitoring data obtained under the reclamation project can be adopted to establish the baseline water quality, and after the fill bank is implemented, to allow potential cumulative water quality impact arising from the reclamation works and the fill bank be monitored. Repeating the water quality monitoring already carried out under the reclamation works is not considered necessary. As an alternative, the ET Leader of the fill bank project should review each set of water quality monitoring data obtained through CED once the laboratory results are available for checking compliance with the action/ limit levels established for the fill bank operation, and for formulation of the corresponding event and action plan.
- 7.1.3 After completion of the water quality monitoring programme carried out under the Stage 2 reclamation works at TKO Area 137, the ET of the fill bank project shall continue the water quality monitoring by initializing its own programme. Given the nature of the fill bank project which essentially involves land-based activities without marine works (e.g. dredging/ filling), it is considered that the scale of the water quality monitoring programme could be reduced, and water quality monitoring at the control station C1 and impact station M4 near the most sensitive water sensitive receiver - Tung Lung Chau fish culture zone would be adequate.

7.2 Baseline Monitoring

- 7.2.1 Baseline water quality conditions shall be established by the ET Leader and agreed with the DEP. As an alternative to the carrying out actual water quality monitoring, the baseline water quality conditions can be established by a review of the water quality monitoring data obtained under the ongoing EM&A programme under the Stage 2 reclamation works. The ET Leader shall seek approval from the IC(E) and DEP on the appropriate set of water quality monitoring data to be adopted in establishing the baseline.

7.3 Water Quality Parameters

- 7.3.1 Upon the completion of the on-going EM&A programme carried out under the Stage 2 reclamation works at TKO Area 137, monitoring of water quality parameters including turbidity in NTU, dissolved oxygen (DO) in mg/l and suspended solids (SS) in mg/l shall be carried out by the ET of the fill bank project to ensure that any deteriorating water quality associated with the fill bank operation and decommissioning can be identified and actions are taken timely to rectify the situation.
- 7.3.2 In association, other relevant data such as monitoring locations/positions, time, water depth, water temperature, salinity, weather conditions, sea conditions, tidal stage and any special phenomena and work underways should be recorded. A sample monitoring record sheet is shown in Figure 7-2 for reference.

7.4 Monitoring Equipment

- 7.4.1 All monitoring equipment shall be provided by the ET and approved by the ER in consultation with the IE(C).

Dissolved Oxygen and Temperature Measuring Equipment

- 7.4.2 The instrument shall be a portable, weatherproof dissolved oxygen measuring instrument complete with cable, sensor, comprehensive operation manuals, and use a DC power source. It should be capable of measuring:

- a dissolved oxygen level in the range of 0-20 mg/l and 0-200% saturation; and
- a temperature of 0-45° C.

- 7.4.3 It shall have a membrane electrode with automatic temperature compensation complete with a cable. Sufficient stocks of spare electrodes and cables shall be available for replacement where necessary (e.g. YSI model 59 meter, YSI 5739 probe, YSI 5795A submersible stirrer with reel and cable or an approved similar instrument).

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

Turbidity Measurement Instrument

- 7.4.5 The instrument shall be a portable, weatherproof turbidity-measuring instrument complete with comprehensive operation manual. The equipment shall use a DC power source. It shall have a photoelectric sensor capable of measuring turbidity between 0-1000 NTU and be complete with a cable (e.g. Hach model 2100P or an approved similar instrument).

Suspended Solids

- 7.4.6 A water sampler comprises a transparent PVC cylinder, with a capacity of not less than 2 litres and can be effectively sealed with latex cups at both ends. The sampler shall also have a positive latching system to keep it open and prevent premature closure until released by a messenger when the sampler is at the selected water depth (e.g. Kahlsico Water Sampler or an approved similar instrument).

- 7.4.7 Water samples for suspended solids measurement should be collected in high density polythene bottles, packed in ice (cooled to 4°C without being frozen), and delivered to the laboratory as soon as possible after collection.

Water Depth Detector

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

Salinity

- 7.4.9 A portable salinometer capable of measuring salinity in the range of 0-40ppt shall be provided for measuring salinity of the water at each monitoring location.

Checking and Calibration of Equipment

- 7.4.10 A hand-held or boat-fixed type digital Global Positioning System (GPS) with way point bearing indication or other equivalent instrument of similar accuracy shall be provided and used during monitoring to ensure the monitoring vessel is at the correct location before taking measurements.
- 7.4.11 All in-situ monitoring instrument shall be checked, calibrated and certified by a laboratory accredited under HOKLAS or any other international accreditation scheme before use, and subsequently re-calibrated at 3 monthly intervals throughout all stages of the water quality monitoring. Responses of sensors and electrodes shall be checked with certified standard solutions before each use. Wet bulb calibration for a DO meter shall be carried out before measurement at each monitoring location.
- 7.4.12 For the on site calibration of field equipment, the BS 127:1993, "Guide to Field and on-site test methods for the analysis of waters" shall be observed.
- 7.4.13 Sufficient stocks of spare parts shall be maintained for replacements when necessary. Backup monitoring equipment shall also be made available so that monitoring can proceed uninterrupted even when some equipment is under maintenance, calibration, etc.

7.5 Laboratory Measurement / Analysis

- 7.5.1 Analysis of suspended solids shall be carried out in a HOKLAS or other internationally accredited laboratory. Water samples of about 1,000 ml shall be collected at the monitoring stations for carrying out the laboratory SS determination. The detection limit shall be 1 mgL-1 or better. The SS determination work shall start within 24 hours after collection of the water samples. The SS determination shall follow APHA 17ed 2540D or equivalent methods subject to approval of DEP.
- 7.5.2 If a site laboratory is set up, or a non-HOKLAS and non-international accredited laboratory, is hired for carrying out the laboratory analysis, the laboratory equipment, analytical procedures, and quality control shall be approved by the DEP. All the analyses shall be witnessed by the ER and the IC(E). The ET Leader shall provide the ER and IC(E) with one copy of the relevant chapters of the "Standard Methods for the Examination of Water and Wastewater" updated edition and any other relevant document for his reference.
- 7.5.3 For the testing methods of other parameters as recommended by the EIA or required by DEP, detailed testing methods, pre-treatment procedures, instrument use, Quality Assurance/Quality Control (QA/QC) details (such as blank, spike recovery, number of duplicate samples per batch, etc.), detection limits and accuracy shall be submitted to DEP for approval prior to the commencement of monitoring programme. The QA/QC shall be in accordance with the requirement of HOKLAS or international accredited scheme. The QA/QC results shall be reported. DEP may also request the laboratory to carry out analysis of known standards provided by DEP for quality assurance. Additional duplicate samples may be required by DEP for inter laboratory calibration. Remaining samples after analysis shall be kept by the laboratory for 3 months in case repeat analysis is required. If in-house or non-standard methods are proposed, details of the method verification may also be required to be submitted to DEP. In any circumstance, the sample testing shall have comprehensive quality assurance and quality control programme. The laboratory shall be prepared to demonstrate the programmes to DEP or his representatives when requested.

7.6 Proposed Monitoring Locations

- 7.6.1 Upon completion of the ongoing EM&A programme under the Stage 2 reclamation works, the ET shall continue the water quality monitoring at the impact station M4 and control station C1. Locations of the water quality monitoring stations are shown in Figure 7-1.
- 7.6.2 If alternative locations for the impact and control monitoring stations are proposed by the ET, the ET Leader shall seek prior approval from the IC(E) and DEP.
- 7.6.3 When alternative monitoring locations are proposed, they should be chosen based on the following criteria:
- at locations close to and preferably at the boundary of the mixing zone of the major site activities, which are likely to have water quality impacts;
 - close to the sensitive receptors which are directly or likely to be affected;
 - for monitoring locations located in the vicinity of the sensitive receptors, care should be taken to cause minimal disturbance during monitoring; and
 - control station shall be selected at a location to allow a comparison of the water quality at the potentially impacted site with the ambient water quality. The control station shall be selected such that it is located within the same body of water as the impact monitoring station but is located outside the area of influence of the works.
- 7.6.4 Similar to the ongoing water quality monitoring programme, measurements shall be taken under two tidal conditions (mid-flood and mid-ebb) at 3 water depths, namely, 1 m below water surface, mid-depth and 1 m above seabed, except where the water depth is less than 6m, the mid-depth station may be omitted. At monitoring stations coincident with seawater intakes, the SS and turbidity measurements should make reference to the vertical levels of the individual intake pipes. Should the water depth be less than 3m, only the mid-depth station will be monitored. The ET Leader shall seek approval from the IC(E) and DEP on all monitoring station locations. Replicates in situ measurements and sample collected from each independent sampling event are required for all parameters to ensure a robust statistically interpretable dataset.

7.7 Impact Monitoring

- 7.7.1 Upon completion of the ongoing EM&A programme implemented under the Stage 2 reclamation works, monitoring shall be undertaken by the ET at a frequency of three days per week, at mid-flood and mid-ebb tides similar to the ongoing monitoring programme but with sampling/measurement at the designated monitoring stations M4 and C1 only. The interval between two sets of monitoring shall not be less than 36 hours except where there are exceedances of Action and/or Limit levels, in which case the monitoring frequency shall be increased.
- 7.7.2 Upon completion of the decommissioning phase of the fill bank, a post project monitoring exercise on water quality shall be carried out for two weeks in the same manner as the impact monitoring.
- 7.7.3 Proposed water quality monitoring schedule shall be faxed to EPD at least 1 week before the first day of the monitoring month. EPD shall also be notified immediately for any changes in schedule by fax.

7.8 Event and Action Plan for Water Quality

7.8.1 The water quality criteria, namely Action and Limit levels shall be based on the results of baseline monitoring, the Water Quality Objectives, or based on the results of statistical analysis on the difference between impact monitoring results and 30% above control, and/or specific levels defined for the sensitive receivers. Should non-compliance of the action or limit levels occurs, the ET should review and identify the potential source(s) of the impact, devise and implement appropriate mitigate measures in a collaborative manner. A project specific event/ action plan shall be designed by the ET Leader taking into account collaborative action required to be established with the contractor/ environmental team of the reclamation works through CED. The ET shall seek approval of the event/ action plan from DEP before implementation.

Table 7-1 Typical Action and Limit Levels for Water Quality

Parameters	Action	Limit
DO in mg/l (Surface, Middle & Bottom)	Surface & Middle 5%-ile of baseline data for surface and middle layer; or Bottom 5%-ile of baseline data for bottom layer; or	<u>Surface & Middle</u> 4 mg/l except 5 mg/l for M4 at Fish Culture Zone (FCZ) or 1%-ile of baseline data for surface and middle layer <u>Bottom</u> 2 mg/l or 1%-ile of baseline data for bottom layer
SS in mg/l (depth-averaged)	95%-ile of baseline data or 120% of upstream control station's SS at the same tide of the same day	99%-ile of baseline, 130% of upstream control station's SS at the same tide of the same day and specific sensitive receiver water quality requirements (e.g. required suspended solids level at FCZ)
Turbidity (Tby) in NTU (depth-averaged)	95%-ile of baseline data or 120% of upstream control station's Tby at the same tide of the same day	99%-ile of baseline or 130% of upstream control station's Tby at the same tide of the same day

7.9 Control/ Mitigation Measures Addressing Water Quality Impact

7.9.1 The various mitigation measures recommended in the EIA Report for controlling potential water quality impact arising from the fill bank are summarised in this section.

7.9.2 Control of potential water quality impact arising from the establishment, operation and decommissioning phases of the fill bank shall be effected based on the following principles:

- Prevention or minimisation of the likelihood of the identified pollutants being in contact with rainfall or runoff; and
- Measures to abate pollutants in the stormwater runoff.

7.9.3 These principles shall be achieved through the implementation of the Best Management Practices (BMPs) in controlling water pollution during the construction phase. The guidelines for handling and disposal of construction site discharges as detailed in EPD's ProPECC Note PN1/94 "Construction Site Drainage" should be followed. The water pollution control measures that are considered most relevant to this study are listed below which should be implemented by the contractor during the execution of the site formation and roadworks, where practicable.

7.9.4 Proper water pollution control measures are recommended for implementation by the Contractor during the establishment, operation and decommissioning phases to minimise potential impacts

associated with the implementation of the fill bank. These measures are recommended to be included in the Contract Specification for the Contractor to follow the environmental requirements such that well designed site drainage system and pre-treatment facilities are provided onsite. All effluent discharge from the site during the construction, operation and decommissioning phases shall meet the relevant discharge limits specified in the *Technical Memorandum on Standards for Effluents Discharged into Drainage and Sewerage Systems, Inland and Coastal Waters*.

Provision of Stormwater Interception Facilities and Buffer Zone

- 7.9.5 Existing trapezoidal channels were already constructed along most lengths at the perimeter of the TKO Area 137 site for intercepting polluted runoff generated from the reclamation works and associated activities (e.g. stockpiling of surcharge mounds). Galvanized drainage screens were installed as part of the drainage system. The existing drainage channels should be used for the fill bank or realigned to fit the fill bank operation. The existing/ realigned drainage channels should be equipped with sand/ de-silting traps. During the stockpiling of public fill, temporary intercepting drains should be used at the stockpiling area to divert polluted stormwater to the intercepting channels.
- 7.9.6 Before complete realignment of the existing channel to fit the fill bank design, earth bunds and sand bag barriers shall be used at required locations to effectively divert stormwater to the existing/ realigned drainage channels. The temporary drainage facilities provided shall allow polluted stormwater to be diverted to existing/ realigned intercepting channels before stockpiling of public fill should begin. The intercepting channels shall be equipped with adequately designed sand/ silt removal facilities to allow the stormwater to be treated before discharge at the designated outfalls. Effluent discharge from the site during the establishment, operation and decommissioning phases shall meet the relevant discharge limits specified in the Technical Memorandum.
- 7.9.7 To minimise potential water quality impact associated with runoff of polluted surface water, based on the current preliminary fill bank design, a buffer distance of about 100m would be provided between the edge of the public fill stockpiling area and the seafront. Open channels and/or other effective drainage system shall be constructed at the perimeter of the site for intercepting and directing runoff to sand/ silt removal facilities prior to discharge. The existing trapezoidal drainage channels lying along the perimeter of the site constructed under the Contract (CV/97/01) "Tseung Kwan O Port Development at Area 137 Stage 2 – Construction of Seawalls and Reclamation" shall be used or realigned where necessary and new sections constructed at required locations.

Excavated Material generated during Establishment

- 7.9.8 Excavated material generated from the establishment of the onsite facilities that are not required to be backfilled should be transported as soon as possible to the public fill storage area to avoid potential water quality impact especially during the rainy season.

Proper Design of C&DMSF

- 7.9.9 A buffer distance of at least 20m should also be maintained between the boundary of the C&DMSF and the seafront. Operation of the C&DMSF shall also be served by an effective stormwater intercepting system.
- 7.9.10 Pre-sorted C&D material, and sorted public fill and C&D waste should be handled and stored properly within concrete partition wall or other equivalent structures that are at least enclosed on three sides. Storage time of sorted materials at the buffer storage area should be minimised by transferring sorted public fill and C&D waste to the stockpiling area and SENT landfill respectively as soon as possible. The materials stored at the buffer area shall be minimised before

rainstorm and shall be properly covered when there is any chance for the material to be washed away. The sorting facility shall be provided with an associated drainage system especially in the vicinity of the storage areas for collection of runoff and removal of suspended solid before the stormwater is discharged to the sea at the designated outlets.

Sorted Public Fill

- 7.9.11 Public fill transported to the stockpiling area for storage should not contain unsuitable material such as peat, vegetation, timber, organic, soluble or perishable material, dangerous or toxic material, floatable materials (such as bottle, plastic bags, foam box), and materials susceptible to combustion.

Surface Protection Measures for Slope

- 7.9.12 Public fill at the stockpiling area should be handled with care in proper manner that will not result in segregation, deterioration, erosion or instability of the material. The designated positions for the unloading of fill material in the daily operation of the fill bank should be followed. Temporary slope surfaces shall be covered as far as practicable and as soon as possible with tarpaulin sheets or other impermeable sheeting or protected by other methods approved by CED when rainstorms are likely, especially when a rainstorm is imminent or forecast. Final slope surfaces shall be treated by compaction, followed by hydroseeding, vegetation planting or sealing with shotconcrete, latex, vinyl, bitumen, or other suitable surface stabiliser approved by CED to prevent the washing away of stockpiled material.

Maintenance of Sand/ Silt Removal Facilities

- 7.9.13 Adequately designed and constructed catchpits, sand and silt removal facilities and intercepting channels should be maintained, and the deposited silt and grit should be removed weekly and on a need basis especially during the onset of and after each rainstorm to ensure that these facilities are functioning properly at all times during the establishment, operation and decommissioning phases.

Wheel Washing Facilities

- 7.9.14 All vehicles and plant bodies should be cleaned before they leave the fill bank site to ensure that no earth, mud or debris is deposited by them on roads. A wheel washing bay should be provided at the site exits and wash-water should have sand and silt settled out or removed before the water is being reused or discharged into storm drains. The section of construction road between the wheel washing bay and the public road should be paved with concrete, bituminous materials or hardcores to reduce vehicle tracking of soil and to prevent site run-off from entering public road drains.

Wastewater from Site Facilities

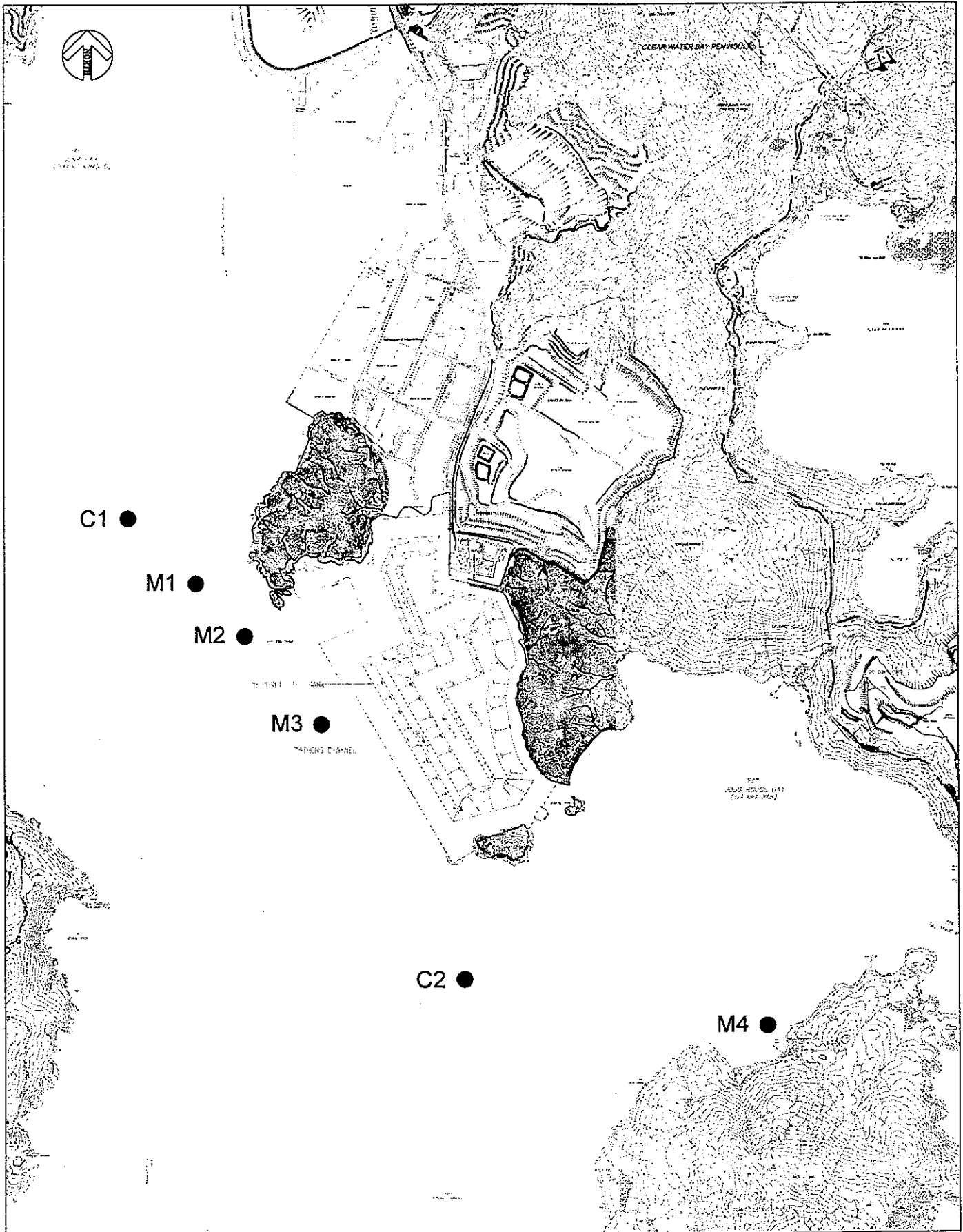
- 7.9.15 Sewage from toilets and similar facilities should be discharged into a foul sewer, or chemical toilets should be provided. Should the use of chemical toilets be necessary, these should be provided by a licensed contractor, who will be responsible for appropriate disposal and maintenance of these facilities. Wastewater collected from canteen kitchens, including that from basins, sinks and floor drains, should be discharged into foul sewers via grease traps. Drainage system provided at car parking areas shall be provided with oil interceptors in addition to sand/silt removal facilities.

Use of Barges

- 7.9.16 All barges used in the transportation of fill material during the operation/ decommissioning stages should be of appropriate size such that adequate clearance is maintained between the vessels and the sea bed at all states of the tide to ensure that undue turbidity is not generated by turbulence from vessel movement or propeller wash. All vessels used for transportation of fill material should have tight fitting seals to their bottom openings to prevent leakage of material during transport. For the transfer of public fill from the barges to TKO Area 137, relevant design and environmental control measures taking into account the technical to be used shall be specified in the Technical Specification to avoid dropping of fill material into the sea during the transfers, including:
- When backhoe fixed on an appropriately design flat-top pontoon is in use, the reach of the backhoe shall be controlled to within the flat-top pontoon of sufficient length to avoid accidental dropping of public fill into the sea;
 - When hopper barges with mobile crane is in use, guardrails or equivalent shall be fixed alongside the berthing faces to guide the movement of the crane to avoid accidental dropping of fill material into the sea;
 - When derrick barges with built-in crane are in use, the reach of the jig shall be controlled to within the length of the barge to avoid accidental dropping of public fill into the sea.
- 7.9.17 These recommended measures for transfer of public fill from barges to the fill bank are illustrated in Figure 7-3 through Figure 7-5.
- 7.9.18 Should other equivalent transfer methods and environmental protection measures be proposed by the future contractor, these shall be subject to approval of CED and DEP. Besides, barges should not be filled to a level which may cause the overflow of material during loading or transportation. Barge effluents (e.g. muddy water) should be properly collected and treated prior to disposal. The work activities should not cause any visible foam, oil, grease, scum, litter or other objectionable matters to be present on the water in the vicinity of the barging point. Silt curtains and refuse containment booms are deployed in the ongoing reclamation activities in TKO Area 137. These water pollution control measures will offer further protection in minimising potential water quality impact in the fill bank operation.
- 7.9.19 After the completion of the reclamation works in December 2003, CED will require the fill bank contractor to provide silt curtains at the outward side of the basin near the barging point throughout the operational phase when there is public fill intake by barges to the fill bank. The total length of the silt curtains would be about 160 to 180m, and a gap of about 80m will be left open for access of barges. The silt curtains shall be properly designed such that it can also serve the function of refuse containment boom to confine floating refuse. Throughout the operation and decommissioning phases of the fill bank, a waste collection vessel should be deployed to remove floating refuse on the sea near the fill bank for proper disposal.

Construction Site Drainage Guidelines

- 7.9.20 Other best management practices to reduce stormwater and non-point source pollution recommended under ProPECC PN 1/94 on *Construction Site Drainage* should be properly followed.
- 7.9.21 The implementation schedule for the mitigation measures recommended above for the establishment, operation and decommissioning phases is presented in Appendix 10-1 of the EIA Report. The Contractor shall be responsible for the design and implementation of these measures. If the above measures are not sufficient to restore any water quality impact monitored to acceptable levels, upon the advice and discussion with the ET, IC(E) and ER, the ET shall propose some other mitigation measures for implementation by the Contractor. The ET shall carry out regular site audit to ensure timely implementation of best management practices (e.g. ProPECC Note PN1/94) and the relevant mitigating measures. Further details of the audit programme are described in Section 9.



CH2M HILL (China) Limited

in association with

*MVA Hong Kong Limited
ACL Asia Limited*

AGREEMENT NO. CE 57/2001

**ENVIRONMENTAL AND TRAFFIC IMPACT ASSESSMENT STUDY
FOR FILL BANK AT TSEUNG KWAN O AREA 137 - INVESTIGATION**



土木工程署

**Civil Engineering
Department**

Locations of the Proposed Water Quality Monitoring Stations

SCALE	NTS	DATE	Mar 2002
DESIGNED	AW	DRAWN	BH
FIGURE 7-1			REV 0

Location			
Date			
Start Time (hh:mm)			
Weather			
Sea Conditions			
Tidal Mode			
Water Depth (m)			
Monitoring Depth	Surface	Middle	Bottom
Salinity			
Temperature (°C)			
DO Saturation (%)			
DO (mg/l)			
Turbidity (NTU)			
SS Sample Identification			
SS (mg/l)			
Observed Construction Activities	<100m from location		
	>100m from location		
Other Observations			

Name & Designation


Signature

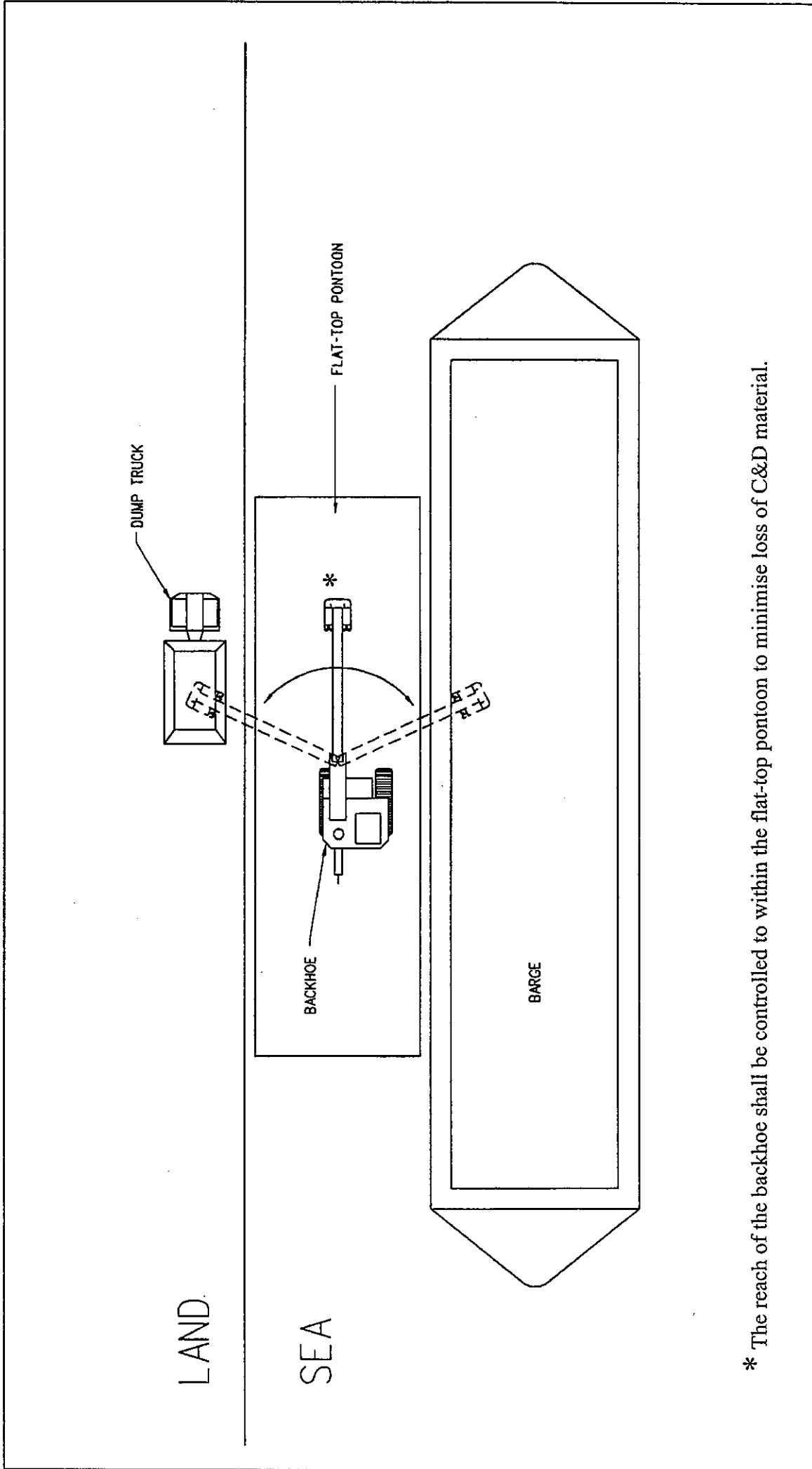
Date

Recorded By : _____

Checked By : _____

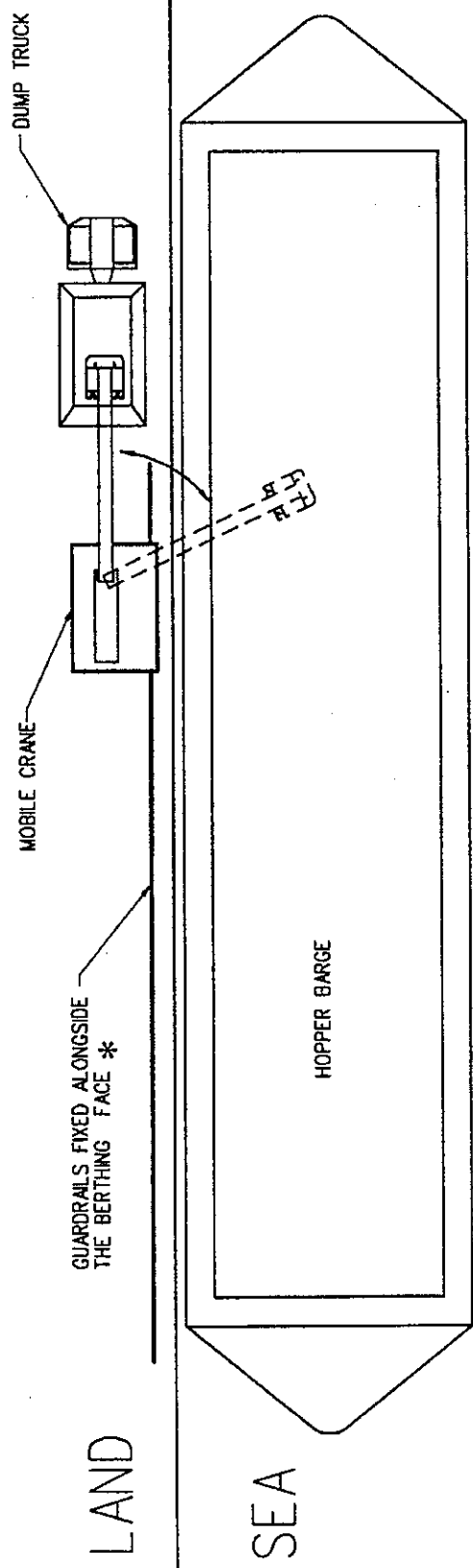
Note: The SS results are to be filled up once they are available from the laboratory.

CH2M HILL (China) Limited <i>in association with</i> MVA Hong Kong Limited ACL Asia Limited	AGREEMENT NO. CE 57/2001 ENVIRONMENTAL AND TRAFFIC IMPACT ASSESSMENT STUDY FOR FILL BANK AT TSEUNG KWAN O AREA 137 - INVESTIGATION		 土木工程署 Civil Engineering Department		
	Sample Water Quality Monitoring Record Sheet		SCALE DESIGNED	NA AW	DATE DRAWN Mar 2002 BH
			FIGURE NO. 7-2		REV 0




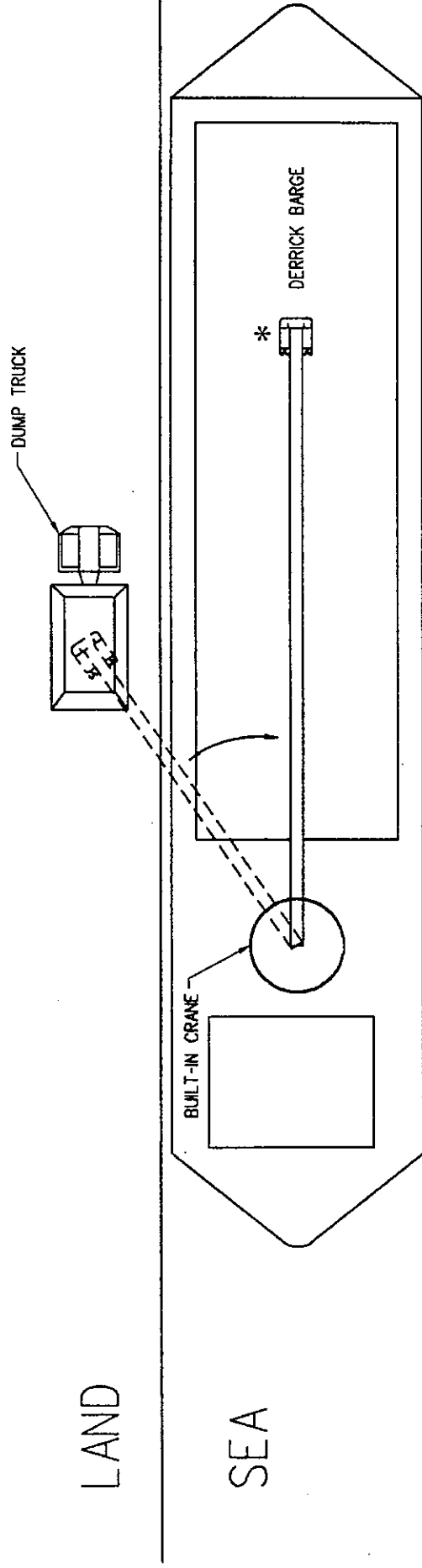
* The reach of the backhoe shall be controlled to within the flat-top pontoon to minimise loss of C&D material.

<p>CH2M HILL (China) Limited <i>in association with</i> MYA Hong Kong Limited <i>ACL Asia Limited</i></p>	<p>AGREEMENT NO. CE 57/2001 ENVIRONMENTAL AND TRAFFIC IMPACT ASSESSMENT STUDY FOR FILL BANK AT TSEUNG KWAN O AREA 137 - INVESTIGATION</p> <p>Use of Backhoe Fixed on a Well Design Flat-top Pontoon</p>	<p>土木工務署 Civil Engineering Department</p>						
<table border="1"> <tr> <td>SCALE</td> <td>NA</td> <td>DATE</td> <td>Mar 2002</td> </tr> <tr> <td>DESIGNED</td> <td>EN</td> <td>DRAWN</td> <td>CC</td> </tr> </table> <p>FIGURE NO. 7-3</p> <p>REV 0</p>			SCALE	NA	DATE	Mar 2002	DESIGNED	EN
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* Guardrails should be fixed alongside the berthing faces to guide movement of the crane to minimise loss of C&D material.

CH2M HILL (China) Limited <i>in association with</i> MVA Hong Kong Limited <i>ACL Asia Limited</i>	<p style="text-align: center;"> AGREEMENT NO. CE 57/2001 ENVIRONMENTAL AND TRAFFIC IMPACT ASSESSMENT STUDY FOR FILL BANK AT TSEUNG KWAN O AREA 137 - INVESTIGATION </p> <p style="text-align: center;"> Use of Hopper Barges with Mobile Crane </p>	<div style="text-align: center;">  <p> 土木工程署 Civil Engineering Department </p> </div> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 25%;">SCALE</td> <td style="width: 25%;">N/A</td> <td style="width: 25%;">DATE</td> <td style="width: 25%;">Mar 2002</td> </tr> <tr> <td>DESIGNED</td> <td>EN</td> <td>DRAWN</td> <td>CC</td> </tr> </table> <p style="text-align: right;"> FIGURE NO. 7-4 REV 0 </p>	SCALE	N/A	DATE	Mar 2002	DESIGNED	EN	DRAWN	CC
SCALE	N/A	DATE	Mar 2002							
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* The reach of the jig shall be controlled to within the length of the barge to minimise loss of C&D material.

<p>CH2M HILL (China) Limited <i>in association with</i> MVA Hong Kong Limited ACL Asia Limited</p>	<p style="text-align: center;">AGREEMENT NO. CE 57/2001 ENVIRONMENTAL AND TRAFFIC IMPACT ASSESSMENT STUDY FOR FILL BANK AT TSEUNG KWAN O AREA 137 - INVESTIGATION</p> <p style="text-align: center;">Use of Derrick Barges with Built-in Crane</p>	<p style="text-align: center;">  土木工務署 Civil Engineering Department</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 25%;">SCALE</td> <td style="width: 25%;">NA</td> <td style="width: 25%;">DATE</td> <td style="width: 25%;">Mar 2002</td> </tr> <tr> <td>DESIGNED</td> <td>EN</td> <td>DRAWN</td> <td>CC</td> </tr> </table> <p style="text-align: right;">FIGURE NO. 7-5</p> <p style="text-align: right;">REV 0</p>	SCALE	NA	DATE	Mar 2002	DESIGNED	EN	DRAWN	CC
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8. LANDSCAPE AND VISUAL

8.1 Introduction

8.1.1 The EIA Report predicts that the operation and decommissioning of the Fill Bank will require a range of mitigation measures which have been designed to minimise predicted landscape and visual impacts, and to compensate for lost landscape resources as far as is possible given the project constraints. The mitigation measures identified through the EIA process have taken into consideration of the following criteria:

- Consideration of the contouring of new slopes in order to visually integrate them into the existing topography.
- Use of vegetation or materials to visually integrate the landform into the surrounding landscape.
- Protection of existing natural slopes adjacent to the site.

8.1.2 The landscape and visual mitigation measures are detailed in Section 8 of the EIA Report, the Landscape and Visual Impact Assessment.

8.1.3 Audit of mitigation measures to avoid impacts on landscape and visual resources by the Environmental Team will be required during the operation period. In particular this will include supervision of the bund design and supervision of the hydroseeding, and to ensure successful establishment of the seeding.

8.2 Baseline Monitoring

8.2.1 Area 137 is an area of relatively recent reclamation of low quality and sensitivity, with little vegetation present. As there are no tree species present on the site, there will be no requirement to undertake a baseline monitoring for the landscape resources. The landscape baseline will be determined with reference to the Landscape Resource Plan included in Section 8 of the EIA report. The visual amenity baseline can be based on the visual amenity and impacts in Section 8 of the EIA report.

8.3 Impact Monitoring

8.3.1 The implementation of the recommended landscape and visual mitigation measures for the Fill Bank development should start with a detailed review of the detailed design and tender package to ensure that the proposals meet the objectives described in the LVIA. The Project Engineers should identify and review any deviations from the original proposals and confirm with the Authority to ensure that the level of mitigation is adequate. This may involve further impact assessments for areas affected by refinements to the project if necessary.

8.4 Operation Phase Audit

8.4.1 The Contractor for the implementation of landscape works should employ a Registered Landscape Architect who should supervise the formation of the bunds, hydroseeding and subsequent maintenance operations during the operation period. New hydroseeding works shall be carried out by a Government approved Landscape Contractor.

8.4.2 The Environmental Team shall audit all measures undertaken for both the Contractor and

Landscape Contractor during the operational phase. This will be completed on a regular basis to ensure compliance with the intended aims of the LVIA. Site inspections should be undertaken at least once every month throughout the operation period of the fill bank, including the operation-decommissioning overlapping period (i.e. from October 2002 to December 2004), and once every two months during the decommissioning phase (i.e. from January 2005 to December 2007). In addition, audit of mitigation measures to avoid impacts on landscape and visual resources will be required during the operation period. The findings of these inspections shall be reported in the monthly audit reports.

8.5 Decommissioning Phase Audit

8.5.1 The landscape contractor shall carry out the maintenance of all hydroseeded areas for at least 12 months following application. Maintenance works shall comply the Government General Specification for Soft Landscape Works. The key tasks to ensure the proper plant establishment will include *inter alia*:

- Regular watering, weeding and fertilising of all areas of grass reinstatement;
- Regular grass cutting for reinstated areas;
- Regular checking and eradication of pests, fungal infection, etc.
- Prompt regrassing of failed areas of grass.

8.5.2 The implementation schedule for the mitigation measures recommended above for the establishment, operation and decommissioning phases is presented in Appendix 10-1 of the EIA Report. The Contractor shall be responsible for the design and implementation of these measures and shall appoint a registered landscape architect for the works. If the above measures are not sufficient to restore any landscape and/or visual impact monitored to acceptable levels. Upon the advice and discussion with the ET, IC(E) and ER, the Landscape Architect shall propose alternative mitigation measures for implementation.

9. SITE ENVIRONMENTAL AUDIT

9.1 Site Surveillance

- 9.1.1 Site surveillance provides a direct means to trigger and enforce the specified environmental protection and pollution control measures are in compliance with the contract specifications. They shall be undertaken regularly and routinely by ET to inspect the activities at the fill bank site in order to ensure that appropriate environmental protection and pollution control mitigation measures are properly implemented by the Contractor in accordance with the EM&A recommendations. With well-defined pollution control and mitigation specifications and a well-established site inspection, deficiency and action reporting system, the site inspection is one of the most effective tools to enforce the environmental protection requirements on the site.
- 9.1.2 The ET Leader is responsible for formulation of the environmental site inspection, deficiency and action reporting system, and for carrying out the site inspections under the EM&A works. He shall prepare and submit a proposal on the site inspection, deficiency and action reporting procedures within 21 days of the construction contract commencement to the Contractor for agreement and to the ER and IC(E) for approval. A preliminary site inspection, deficiency and action reporting system in form of a flow chart is prepared for reference. This is shown in Figure 9-1 for review and refinement by the ET at the commencement of the Project.
- 9.1.3 Regular site inspections shall be carried out at least once per week during the establishment, operation and decommissioning of the fill bank. The areas of inspection shall not be limited to the environmental situation, pollution control and mitigation measures within the site, it should also review the environmental situation 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:
1. The EIA recommendations on environmental protection and pollution control mitigation measures with regard to air quality, noise, water quality, landfill gas hazard and visual/landscape impacts;
 2. Works progress and programme;
 3. Individual works methodology proposals (which shall include proposal on associated pollution control measures);
 4. The contract specifications on environmental protection and pollution prevention control;
 5. The relevant environmental protection and pollution control laws, ProPECC Notes; and
 6. Previous site inspection results.
- 9.1.4 The Contractor shall update with the ET on all relevant information of the 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 the IC(E) and the Contractor in a site inspection proforma within 24 hours, for reference and for taking immediate action. 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 to report on any remedial measures subsequent to the site inspections.
- 9.1.5 Ad hoc site inspections shall be carried out by the ET if significant environmental problems are identified. Independent audits shall also be carried out by the IC(E). 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.

9.2 Compliance with Legal and Contractual Requirements

- 9.2.1 There are contractual environmental protection and pollution control requirements as well as environmental protection and pollution control laws in Hong Kong, which the activities at the fill bank shall comply.
- 9.2.2 The ET shall 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.
- 9.2.3 The Contractor shall regularly copy relevant documents to the ET 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's inspection upon his request.
- 9.2.4 After reviewing the document, the ET shall advise the ER 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'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 and the ER accordingly. The review shall be copied to IC(E) for any follow-up action.
- 9.2.5 Upon receipt of the advice, the Contractor shall undertake immediate action to remedy the situation. The ER shall check that appropriate action has been taken by the Contractor in order that the environmental protection and pollution control requirements are fulfilled.

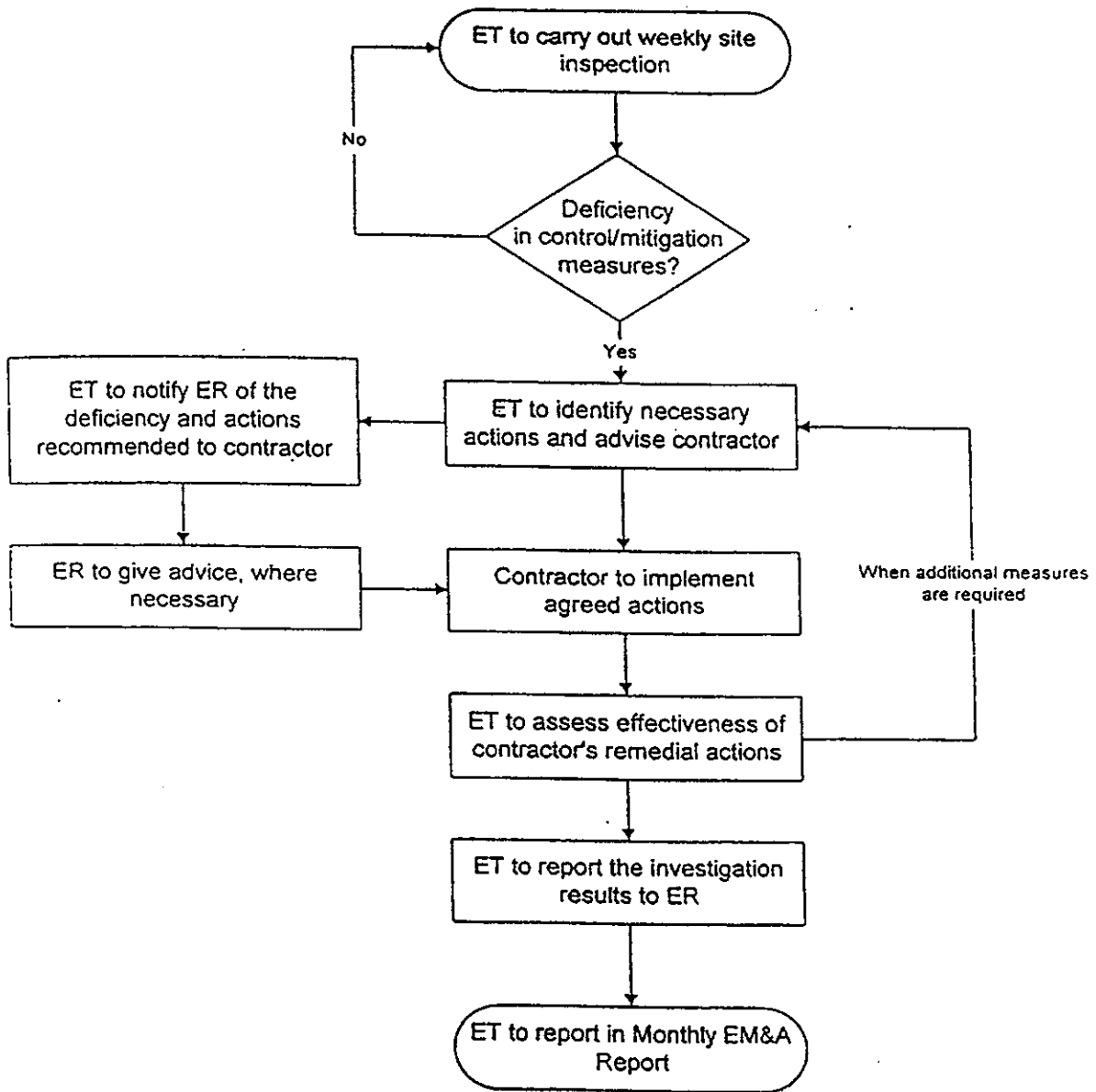
9.3 Environmental Complaints

- 9.3.1 Complaints received on environmental issues shall be referred to the ET Leader for carrying out complaint investigation procedures. The ET shall undertake the steps given below in (1) to (9) upon receipt of the complaints. The complaint investigation procedures are also presented in form of a flow chart in Figure 9-2 for easy reference.
1. Log complaint and date of receipt onto the complaint database and inform the IC(E) immediately;
 2. Investigate the complaint to determine its validity, and to assess whether the source of the problem is due to works activities;
 3. If a complaint is valid and due to works, identify mitigation measures in consultation with the IC(E);
 4. If mitigation measures are required, advise the Contractor accordingly;
 5. Review the Contractor's implementation of the identified mitigation measures, and the concurrent situation;
 6. If the complaint is transferred from EPD, submit interim report to EPD on status of the complaint investigation and follow-up action within the time frame assigned by EPD;
 7. Undertake additional monitoring and audit to verify the compliant if necessary, and ensure that any valid reason for complaint does not recur through proposed amendments to work methods, procedures, machines and/or equipment, etc;
 8. Report the investigation results and the subsequent actions to the source of complaint (If the source of complaint is identified through EPD, the results should be reported within the time frame assigned by EPD); and

9. Log a record on the complaint, investigation, the subsequent actions and the results in the monthly EM&A reports.
- 9.3.2 The ER shall notify the project proponent of any complaints received and keep him well informed of the actions being taken to settle these complaints.
- 9.3.3 During the complaint investigation work, the Contractor and ER shall co-operate with the ET Leader in providing all the necessary information and assistance for completion of the investigation. If mitigation measures are identified to be required in the investigation in consultation with the IC(E), the Contractor shall promptly carry out the measures. The ER shall ensure that the measures have been carried out by the Contractor.

9.4 Documentation

- 9.4.1 All documentation is required to be filed in a traceable and systematically manner and ready for inspection upon request. All EM&A results and findings shall be documented in the EM&A report prepared by the ET and endorsed by IC(E) prior to circulation to the Contractor, ER and EPD.



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AGREEMENT NO. CE 57/2001
 ENVIRONMENTAL AND TRAFFIC IMPACT
 ASSESSMENT STUDY FOR FILL BANK AT
 TSEUNG KWAN O AREA 137 - INVESTIGATION

**Preliminary Site Inspection, Deficiency
 and Action Reporting System**

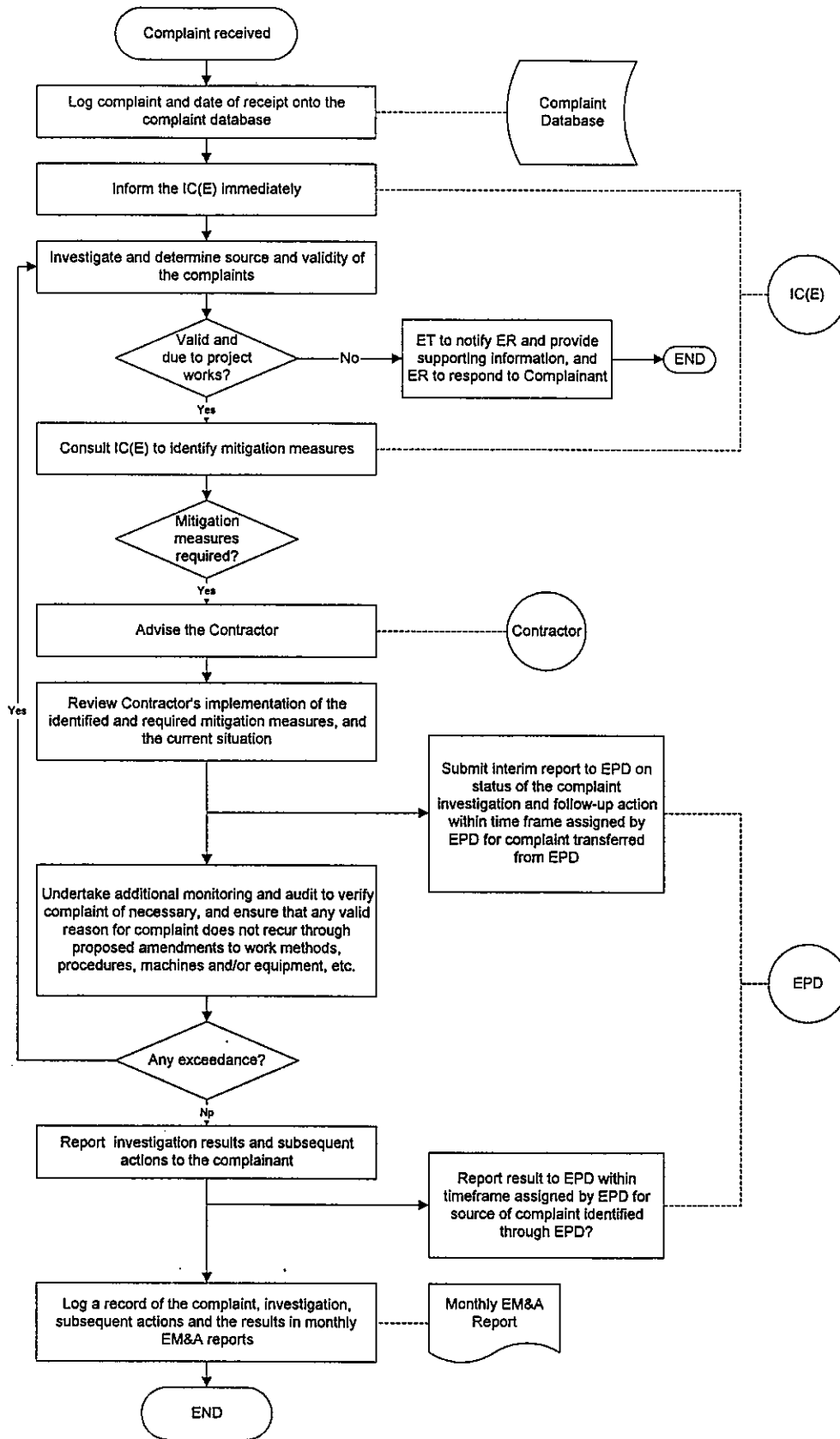


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FIGURE NO. 9-1

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AGREEMENT NO. CE 57/2001
**ENVIRONMENTAL AND TRAFFIC IMPACT
 ASSESSMENT STUDY FOR FILL BANK AT
 TSEUNG KWAN O AREA 137 - INVESTIGATION**

Complaint-Response Procedures



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**Civil Engineering
 Department**

SCALE	NA	DATE	Mar 2002
DESIGNED	AW	DRAWN	BH

FIGURE NO. 9-2

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10. REPORTING

10.1 General

10.1.1 The following reporting requirements based upon a paper-documented approach. However, the same information shall be provided in an electronic medium upon agreeing the format with the ER and EPD. All the monitoring data (baseline and impact) shall also be submitted in an agreed electronic format in accordance with the requirements under Section 4.2 of the EIA Study Brief. This would enable a transition from a paper/historic and reactive approach to an electronic/real time proactive approach.

10.2 Baseline Monitoring Report

10.2.1 The ET Leader shall prepare and submit a Baseline Environmental Monitoring Report 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, the IC(E), the ER, and EPD. The ET Leader shall liaise with the relevant parties on the exact number of copies needed. The format and content of the report, and the representation of the baseline monitoring data to be submitted to EPD shall be agreed with EPD.

10.2.2 The baseline monitoring report shall include at least the following:

1. Up to half a page executive summary;
2. Brief project background information;
3. Drawings showing locations of the baseline monitoring stations;
4. An updated programme on construction/ operation/ decommissioning of the fill bank with milestones of environmental protection/mitigation activities annotated;
5. Monitoring results (in both hard and diskette copies) together with the following information:
 - Monitoring methodology;
 - Name of laboratory and types of equipment used and calibration details;
 - Parameters monitored;
 - Monitoring locations (and depth);
 - Monitoring date, time, frequency and duration;
 - QA/QC results and detection limits.
6. 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.
7. Determination of the Action and Limit Levels (AL levels) for each monitoring parameter and statistical analysis of the baseline data, the analysis shall conclude if there is any significant difference between control and impact stations for the parameters monitored;
8. Revisions for inclusion in the EM&A Manual; and
9. Comments and conclusions.

10.3 Monthly EM&A Reports

- 10.3.1 The results and findings of all EM&A work required in the Manual shall be presented in a monthly EM&A report that shall be prepared by the ET Leader. The EM&A report shall be endorsed by IC(E), and then submitted to EPD within 10 working days of the end of each reporting month. The first report due in the month after the establishment phase commences. A maximum of 4 copies of each monthly EM&A report shall be submitted to each of the four parties: the Contractor, the IC(E), the ER 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 required.
- 10.3.2 The ET Leader shall review the number and location of monitoring stations and parameters to monitor every 6 months or on as needed basis in order to cater for the changes in surrounding environment and nature of works in progress.

10.4 First Monthly EM&A Report

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

1. Executive Summary (1-2 pages);
 - Breaches of AL levels;
 - Complaint Log;
 - Notifications of any summons and successful prosecutions;
 - Reporting Changes;
 - Future key issues.
2. Basic Project Information
 - Project organisation including key personnel contact names and telephone numbers;
 - Programme with fine tuning of activities showing the inter-relationship with environmental protection/mitigation measures for the month;
 - Management structure;
 - Works undertaken during the month.
3. Environmental Status
 - Works undertaken during the month with illustrations (such as location of works, daily, dredging/filling rates, percentage fines in the fill material used);
 - Drawing showing the project area, any environmental sensitive receivers and the locations of the monitoring and control stations.
4. 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 project EIA study final report;
 - Environmental requirements in contract documents;

5. Implementation Status
 - Advice on the implementation status of environmental protection and pollution control/mitigation measures as recommended in the project EIA study report, summarised in the updated implementation schedule.
6. Monitoring Results (in both hard and electronic copies) together with the following information;
 - Monitoring methodology;
 - Name of laboratory and types of equipment used and calibration details;
 - Parameters monitored;
 - Monitoring locations (and depth);
 - Monitoring date, time, frequency, and duration;
 - Weather conditions during the period;
 - Graphical plots of the monitored parameters in the month annotated against:
 - Major activities being carried out on site during the period;
 - Weather conditions that may affect the results;
 - Any other factors which might affect the monitoring results;
 - QA/QC results and detection limits;
 - All monitoring results should be tabulated with exceedances highlighted for ease of reference.
7. Report on Non-compliance, Complaints, Notifications of Summons and Successful Prosecutions
 - Record of all noncompliance (exceedances) of the environmental quality performance limits (Action and Limit levels);
 - Record of all complaints received (written or verbal) for each media, including locations and nature of complaints investigation, liaison and consultation undertaken, actions and follow-up procedures taken, results and summary;
 - Record of all 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, result and summary;
 - Review of the reasons for and the implications of non-compliance, complaints, summons and prosecutions including review of pollution sources and working procedures;
 - Description of the actions taken in the event of non-compliance and deficiency reporting and any follow-up procedures related to earlier non-compliance;
8. Others
 - An account of the future key issues reviewed from the works programme and work method statements;
 - Advice on the solid and liquid waste management status;
 - Submission of implementation status proforma, proactive environmental protection proforma, regulatory compliance proforma, site inspection proforma, data recovery schedule and complaint log summarizing the EM&A of the period.

10.5 Subsequent Monthly EM&A Reports

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

1. Executive Summary (1-2 pages)
 - Breaches of AL levels;
 - Complaint Log;
 - Notifications of any summons and successful prosecutions;
 - Reporting Changes;
 - Future key issues.
2. Environmental Status
 - Programme with fine tuning of activities showing the inter-relationship with environmental protection/mitigation measures for the month;
 - Works undertaken during the month with illustrations including key personnel contact names and telephone numbers;
 - Drawing showing the project area, any environmental sensitive receivers and the locations of the monitoring and control stations.
3. Implementation Status
 - Advice on the implementation status of environmental protection and pollution control/mitigation measures as recommended in the EIA report as summarised in the updated implementation schedule.
4. Monitoring Results to provide monitoring results (in both hard and electronic copies) together with the following information
 - Monitoring methodology;
 - Name of laboratory and types of equipment used and calibration details;
 - Parameters monitored;
 - Monitoring locations (and depth);
 - Monitoring date, time, frequency, and duration;
 - Weather conditions during the period;
 - Graphical plots of the monitored parameters in the month annotated against:
 - Major activities being carried out on site during the period;
 - Weather conditions that may affect the results;
 - Any other factors which might affect the monitoring results;
 - QA/QC results and detection limits;
 - All monitoring results should be tabulated with exceedances highlighted for ease of reference.
5. Report on Non-compliance, Complaints, Notifications of Summons and Successful Prosecutions
 - Record of all non-compliance (exceedances) of the environmental quality performance limits (Action and Limit levels);
 - Record of all complaints received (written or verbal) for each media, including locations and nature of complaints investigation, liaison and consultation undertaken, actions and follow-up procedures taken, results and summary;

- Record of all 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, result and summary;
 - Review of the reasons for and the implications of non-compliance, complaints, summons and prosecutions 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.
6. Others
- An account of the future key issues reviewed from the works programme and work method statements;
 - Advice on the solid and liquid waste management status.
 - Submission of implementation status proforma, proactive environmental protection proforma, regulatory compliance proforma, site inspection proforma, data recovery schedule and complaint log summarizing the EM&A of the period.
7. Appendix
- AL levels
 - Graphical plots of trends of monitored parameters at key stations over the past four reporting periods for representative monitoring stations annotated against the following:
 - i. Major activities being carried out on Site during the period;
 - ii. Weather conditions during the period;
 - iii. Any other factors which might affect the monitoring results
 - Monitoring schedule for the present and next reporting period
 - Cumulative statistics on complaints, notifications of summons and successful prosecutions
 - Outstanding issues and deficiencies

10.6 Quarterly EM&A Summary Reports

- 10.6.1 The quarterly EM&A summary report, which should generally be around 5 pages (including about 3 of text and tables and 2 of figures) should contain at least the following listed 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.
1. Up to half a page executive summary;
 2. Basic project information including a synopsis of the project organisation, programme, contacts of key management, and a synopsis of work undertaken during the quarter;
 3. 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 study final report;
 4. Advice on the implementation status of environmental protection and pollution control/mitigation measures, as recommended in the project EIA study report, summarised in the updated implementation schedule;

5. Drawings showing the project area, any environmental sensitive receivers and the locations of the monitoring and control stations;
 6. Graphical plots of the trends of monitored parameters over the past 4 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;
 7. Advice on the solid and liquid waste management status;
 8. A summary of non-compliance (exceedances) of the environmental quality performance limits (Action and Limit levels);
 9. A brief review of the reasons for and the implications of non-compliance including review of pollution sources and working procedures;
 10. For project where measurement of suspended solids is required, quarterly assessment of impacts on suspended solids at the project site, including, but not limited to, a comparison of the difference between the quarterly mean and 1.3 times of the ambient mean, which is defined as 30% increase of the baseline data or EPD data, of the related parameters by using appropriate statistical procedures. Suggestion of appropriate mitigation measures if the quarterly assessment analytical results demonstrate that the quarterly mean is significantly higher than the 1.3 on water quality times of the ambient mean ($p < 0.05$);
 11. A summary description of the actions taken in the event of non-compliance and any follow-up procedures related to earlier non-compliance;
 12. A summary record of all complaints received (written or verbal) for each media, liaison and consultation undertaken, actions and follow-up procedures taken;
 13. A summary record of all notifications of summons and successful prosecutions for breaches of the current environmental protection/pollution control legislations, locations and nature of the breaches, investigation, follow-up actions taken and results;
 14. Comments (e.g. effectiveness and efficiency of the mitigation measures), recommendations (e.g. any improvement in the EM&A programme) and conclusions for the quarter; and
 15. Proponents' contacts and any hotline telephone number for the public to make enquiries.
- 10.6.2 Apart from the above, the first quarterly summary report should also confirm that the monitoring works are proven to be effective, and the monitoring works are generating data with the necessary statistical power to categorically identify or confirm the absence of impact attributable to the works.

10.7 Final EM&A Summary Reports

- 10.7.1 Timing for completion of the EM&A Programme shall be confirmed by ER in liaison with the IC(E). Impact monitoring shall continue before the completion of work activities associated with the establishment, operation and decommissioning of the fill bank.
- 10.7.2 The final EM&A summary report shall include the following:
1. An executive summary;
 2. Basic project information including a synopsis of the project organisation, programme, contacts of key management, and a synopsis of work undertaken during the entire establishment, operation and decommissioning period of the fill bank;
 3. 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 study final report;
4. Advice on the implementation status of environmental protection and pollution control/mitigation measures, as recommended in the project EIA study report, summarised in the updated implementation status proformas;
 5. Drawings showing the project area, any environmental sensitive receivers and the locations of the monitoring and control stations;
 6. Graphical plots of the trends of monitored parameters over the period of establishment, operation and decommissioning of the fill bank for representative monitoring stations annotated against;
 - The major activities being carried out on site during the period;
 - Weather conditions during the period;
 - Any other factors which might affect the monitoring results; and
 - The return of ambient environmental conditions in comparison with baseline data.
 7. Compare and contrast the EM&A data with the EIA predictions and annotate with explanation for any discrepancies;
 8. Provide clear-cut decisions on the environmental acceptability of the project with reference to the specific impact hypothesis;
 9. Advice on the solid and liquid waste management status;
 10. A summary of non-compliance (exceedances) of the environmental quality performance limits (Action and Limit levels);
 11. A brief review of the reasons for and the implications of non-compliance including review of pollution sources and working procedures;
 12. A summary description of the actions taken in the event of non-compliance and any follow-up procedures related to earlier non-compliance;
 13. A summary record of all complaints received (written or verbal) for each media, liaison and consultation undertaken, actions and follow-up procedures taken;
 14. Review the monitoring methodology adopted and with the benefit of hindsight, comment on its effectiveness (including cost effectiveness);
 15. A summary record of all notifications of summons and successful prosecutions for breaches of the current environmental protection/pollution control legislations, locations and nature of the breaches, investigation, follow-up actions taken and results;
 16. Review the practicality and effectiveness of the EIA process and EM&A programme (e.g. effectiveness and efficiency of the mitigation measures), recommend any improvement in the EM&A programme; and
 17. A conclusion to state the return of ambient and/or the predicted scenario as per EIA findings.

10.8 Forms to be Adopted

10.8.1 To facilitate the management of the EM&A programme for the fill bank implementation, the record forms presented in Appendix I (including those presented in the preceding sections) should be adopted where applicable during the establishment, operation and decommissioning phases of the Project. These forms are listed as follows:

1. Implementation Schedule;
2. Implementation Status Proforma;
3. Data Recovery Schedule;
4. Site Inspection Proforma;

5. Proactive Environmental Protection Proforma;
6. Regulatory Compliance Proforma;
7. Compliant Log;
8. Sample Template for Interim Notifications of Environmental Quality;
9. Limits Exceedances;
10. Data Sheet for TSP Monitoring; and
11. Noise Monitoring Field Record Sheet.

10.9 Data Keeping

10.9.1 The site document 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 document shall be well kept by the ET and be ready for inspection upon request. All relevant information shall be clearly and systematically recorded in the document. The monitoring data shall also be recorded in magnetic media form, and the software copy can be available upon request. The water quality data software format shall be agreed with EPD. All the documents and data shall be kept for at least one year after completion of the fill bank contract.

10.10 Interim Notifications of Environmental Quality Limit Exceedances

10.10.1 With reference to Event/Action Plans in previous sections, when the environmental quality limits are exceeded, the ET shall immediately notify the ER & EPD, as appropriate. The notification shall be followed up with advice to EPD on the results of the investigation, proposed action and success of the action taken, with any necessary follow-up proposals. A sample template for the interim notifications is shown in Figure 10-1.

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	

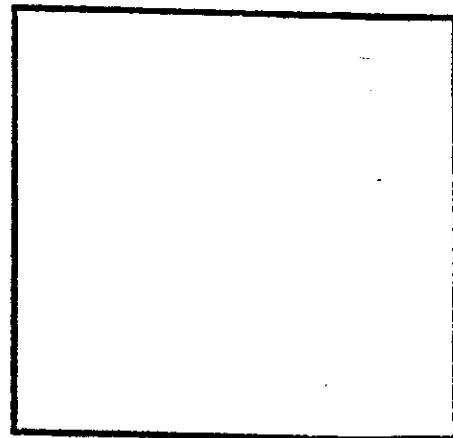
Location Plan


Prepared by: _____

Designation: _____

Signature: _____

Date: _____



CH2M HILL (China) Limited <i>in association with</i> MVA Hong Kong Limited ACL Asia Limited	AGREEMENT NO. CE 57/2001 ENVIRONMENTAL AND TRAFFIC IMPACT ASSESSMENT STUDY FOR FILL BANK AT TSEUNG KWAN O AREA 137 - INVESTIGATION	 土木工程署 Civil Engineering Department								
	Sample Template for Interim Notifications of Environmental Quality Limits Exceedances	<table border="1"> <tr> <td>SCALE</td> <td>NA</td> <td>DATE</td> <td>Mar 2002</td> </tr> <tr> <td>DESIGNED</td> <td>AW</td> <td>DRAWN</td> <td>BH</td> </tr> </table>	SCALE	NA	DATE	Mar 2002	DESIGNED	AW	DRAWN	BH
	SCALE	NA	DATE	Mar 2002						
DESIGNED	AW	DRAWN	BH							
FIGURE NO. 10-1	REV 0									

APPENDIX I
Record Forms

IMPLEMENTATION STATUS PROFORMA

Ref: _____

Ref**	Environmental Protection Measures*	Implementation Status

* All recommended and requirements resulted during the Course of EIA/EA Process, including ACE and/or accepted public comment to the proposed project
** EIA Ref/EM&A Log Ref/Design Document Ref

Signed by Environmental Team Leader: _____ Date: _____

Audited by Independent Checker (Environment): _____ Date: _____

DATA RECOVERY SCHEDULE

Ref: _____

Date	Air Quality Monitoring Monitoring Station *					Noise Monitoring Monitoring Location *					Water Quality Monitoring Monitoring Location *					
	A1	A2	A3	A4	A5	N1	N2	N3	N4	N5	W1	W2	W3	W4	W5	
	1															
2																
3																
4																
5																
6																
7																
8																
9																
10																
11																
12																
13																
14																
15																
16																
17																
18																
19																
20																
21																
22																
23																
24																
25																
26																
27																
28																
29																
30																
31																
% of R																

* Remark type of parameters
 % of R The percentage of Data Recovery is the actual monitoring over the scheduled monitoring

Signed by Environmental Team Leader: _____ Date: _____

Copy to Independent Checker (Environment)



SITE INSPECTION PROFORMA

Ref: _____

Date	Location	Req't Ref.*	Observation/Deficiency	Mitigation Action** (Responsible Agency)	Date*** of Confirmation

* EIA Ref/EM&A Log Ref/Design Document Ref/Environmental Protection Contract Clause
 ** Specific Environmental Mitigation Measures should be stated, such as, equipment, processes, systems, practices or technologies
 *** The required completion date to confirm the specified Environmental Protection Action

This Proforma is an Environmental Protection Instruction for: _____ on _____

Signed by Environmental Team Leader: _____ Date: _____

Copy to Independent Checker (Environment)

PROACTIVE ENVIRONMENTAL PROTECTION PROFORMA

Ref: _____

Ref*	Proposed Construction Method**	Location / Working Period	Anticipated Impacts	Recommended Mitigation Measures

* EIA Ref/EM&A Log Ref/Design Document Ref
 ** Details of equipment, vehicles, plants, processes, technologies for the option of construction method

Reviewed by Environmental Team Leader: _____ Date: _____

Approved by Independent Checker (Environment): _____ Date: _____



REGULATORY COMPLIANCE PROFORMA

Ref: _____

Ref**	Environmental License/Permit*	Control Area/Facility/Location	Effective Date

* *Name of Applicant, Business Corporation, relevant regulation and remark of license/permit conditions*
 ** *File reference of the licensee/permittee*

Recorded by Environmental Team Leader: _____ Date: _____

Signed by Independent Checker (Environment): _____ Date: _____

COMPLAINT LOG

Ref: _____

Log Ref	Date/Location	Complainant/ Date of Contact	Details of Complaint	Investigation/Mitigation Action	File Closed

Filed by Environmental Team Leader: _____

Date: _____

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	

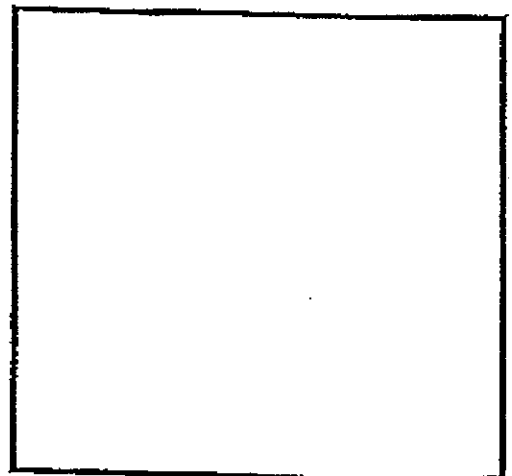
Location Plan

Prepared by: _____

Designation: _____

Signature: _____

Date: _____



Data Sheet for TSP Monitoring

Monitoring Location		
Details of Location		
Sampler Identification		
Date & Time of Sampling		
Elapsed-time	Start (min.)	
Meter Reading	Stop (min.)	
Total Sampling Time (min.)		
Weather Conditions		
Site Conditions		
Initial Flow Rate, Q _{si}	P _i (mmHg)	
	T _i (°C)	
	H _i (in.)	
	Q _{si} (Std. m ³)	
Final Flow Rate, Q _{sf}	P _f (mmHg)	
	T _f (°C)	
	H _f (in.)	
	Q _{sf} (Std. m ³)	
Average Flow Rate (Std. m ³)		
Total Volume (Std. m ³)		
Filter Identification No.		
Initial Wt. of Filter (g)		
Final Wt. of Filter (g)		
Measured TSP Level (µg/m ³)		

	<u>Name & Designation</u>	<u>Signature</u>	<u>Date</u>
Field Operator :	_____	_____	_____
Laboratory Staff :	_____	_____	_____
Checked by :	_____	_____	_____

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))	
	L_{eq} (dB(A))	
Major Construction Noise Source(s) During Monitoring		
Other Noise Source(s) During Monitoring		
Remarks		

	<u>Name & Designation</u>	<u>Signature</u>	<u>Date</u>
Recorded By :	_____	_____	_____
Checked By :	_____	_____	_____