KIN WING CONSTRUCTION CO., LTD.

Remediation Method Statement

for

Biopiling
(ex-GFS Building)

Contract No. : KL/2008/02

Method Statement No. : MS-007

Rev. No. : 3

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0. Revision Status Sheet

Rev. no.	Effective Date	Summary of Revision
0	27 May 2009	Initial issue
1	02 July 2009	Revision 1
2	09 September 2009	Revision 2
3	30 October 2009	Revision 3

CONTENTS

Section

Attachment

Attachment 1 Location of Decontamination Works Area
(Drawing Nos. 3.3 and 3.4)

Attachment 2 Biopiles Location Plan
(Drawing No. 60022408/15/6001B)

Attachment 3 Schematic Diagram of Biopile
(Drawing No. 60022408/15/2007B/1 & No. 60022408/15/2007B/2)

1.0 Introduction

In accordance with the requirements of EP Condition (EP-339/2009/A), this remediation plan will cover the biopiling operations to be conducted at the ex-GFS Building. The nature and extent of contamination were based on the Contamination Assessment Report / Remediation Action Plan (CAR/RAP) in Appendix 5.2b for the Kai Tak Development EIA Report.

2.0 Scope of Works

2.1 Scope of Works

There are various remediation methods available for treating TPH and / or benzo(a)pyrene contaminated soil. Excavation and Biopiling have been identified as the remediation method for the treatment of soils contaminated with TPH / semi volatile organic compounds (SVOC) / volatile organic compounds (VOC) until attainment of the soil cleanup targets.

According to the site investigations for land contamination assessment approximately 72m^3 of hydrocarbon contamination soil is to be treated through the biopiling process. Since the estimated quantity of contaminated soil is small, it was recommended under Section 4.2.2 of Remediation Action Plan (RAP) that all contaminated soil identified in the ex-GFS Building will be treated together with other contaminated soil identified in South Apron of the former Kai Tak Airport.

Based on the recent contamination assessments, no remediation work is required for the remaining area of ex-GFS Building. Removal of underground fuel tank/fuel pipelines is also not anticipated for the current decommissioning works at ex-GFS building. In case underground fuel tank/fuel pipelines are encountered during the decommissioning works, soil samples will be taken at the bottom of the tank/pipelines to confirm no contamination upon removal of the tank/pipelines. If test results of the soil samples reveal any sign of contamination, supplementary contamination assessment plan for the contaminated area will be prepared and submitted to EPD for approval. Upon completion of the supplementary contamination assessment, a contamination assessment report/remediation action plan will be submitted to EPD for approval prior to remediation work at this area.

2.2 Regulatory Requirements

During the course of site remediation, full compliance with all legislation including the Noise Control Ordinance (Cap.400), Air Pollution Control Ordinance (Cap.311), Water Pollution Control Ordinance (Cap.358), Waste Disposal Ordinance (Cap.354), Dangerous Goods (General) Ordinance (Cap.295), Occupational Safety and Health Ordinance (Cap.509) and Factories and Industrial Undertakings Ordinance (Cap.59) shall be followed by all site personnel at all times.

2.3 Site Layout

The site plans showing the location of the decontamination works area at the ex-GFS Building are shown in Attachment 1.

2.4 Health and Safety Training

All workers must wear the appropriate PPE and the Health and Safety Plan for carrying out the Decontamination works shall be strictly followed.

Site Management

The toolbox talk and site specific training, which will focus on a different specific health or safety topic each time, are intended to enhance general health and safety awareness amongst operation. Toolbox talks will be conducted by the respective front line foremen / supervisor for the operatives under their immediate control to provide safety advice or information related to the nature of the works currently in progress on the site.

Site Hazards Analysis and Control

Some General Possible Hazard and Its Mitigation Methods

Hazard	**Typical Hazard Sources**	**Possible Mitigation Methods**
Exposure to organic contaminants in soil or organic liquid	Organic contaminants	- Monitoring - Good housekeeping - Gloves, coveralls, boot covers

Site Control

Rules on the bio-piling system:

1. Only well trained staff can operate the bio-piling system.
2. Sufficient protective equipment should be worn before and during the operation of the bio-piling system.
3. All records of biopiles should be filled and checked in order to reduce the risk of contamination.
4. Immediately report of any accident or abnormal record of the system to the supervisor.
5. No eat or drink near the system.
6. No smoking.

Personal Protective Equipment

Every related person are trained with adequate training in the use of PPE

a. Every person who engages in de-contamination works should wear proper clothes for avoidance of bodily contacting the contamination soil.
b. Proper respirator should be used for reducing the risks of respiratory injury due to breathing airborne contamination.
c. Eye protector should be used if necessary.
d. Gloves should be used for avoiding directly touching the contaminated soil.
e. Hand-wash and showering facility should be provided for personal decontamination.

Remediation Zones

The remediation zone types to be established at Kai Tak site are as follows:

(i) Support Zone

Support zones are uncontaminated areas, where contaminated clothing and equipment will not be allowed to enter this zone. Any movement from the Biopiling area (Area 5) to the support zone shall only be via the Contamination Reduction Zone. Site offices, storage area and parking shall be located within this area.

(ii) Contamination Reduction Zone

The Contamination Reduction Zone is where the transition from contaminated areas to non-contaminated areas occurs. All plant and site personnel shall be de-contaminated before leaving this zone.

(iii) Exclusion Zone

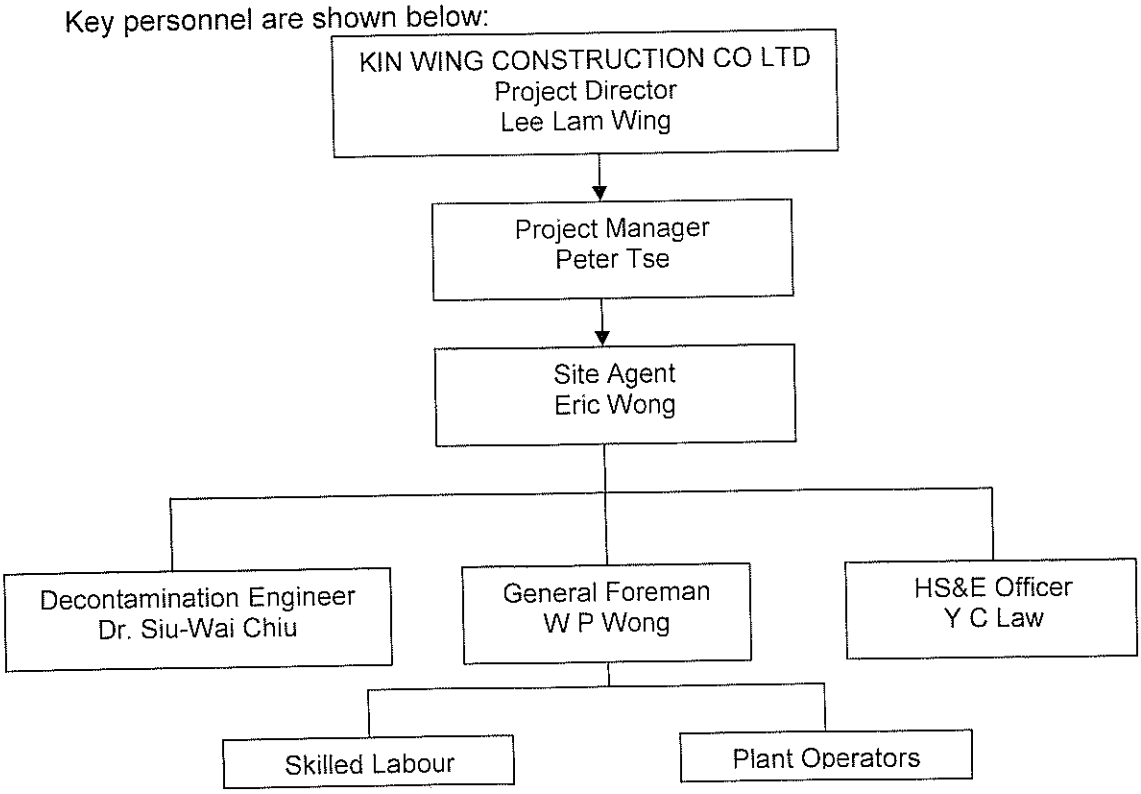
The area designated for the biopile operation (Area 5) shall be classified as an exclusion zone. All person who engages in this exclusion zone should wear PPE and strictly follow the associated health and safety requirements.

Emergency Procedures

An emergency reporting procedure incorporating the contact telephone number will be displayed on conspicuous location at site for emergency use.

2.5 Organisation Structure

Key personnel are shown below:



During the soil remediation process, Decontamination Engineer will be responsible for management and overseeing of the decontamination process as well as undertaking cleanup progress monitoring, conduct sampling and testing, supervise biopiling process, prepare monthly progress reports and VOC measurements. General Foreman will be responsible for routine leachate monitoring, daily inspection and maintenance works.

3.0 Methodologies and Procedures

The detailed arrangements for the construction of biopile system shall refer to Section 3.0 of the previous approved Remediation Method Statement (Rev. 4) under EP No. 285/2008 and our submitted letter ref. KW-KL200802-L-0189 dated 14 October 2008.

3.1 Biopile Construction

The Biopile Construction is mainly consisted of:

- Site Preparation
- Base Construction
- Aeration System
- Leachate Collection System
- Biopile Formation

3.2 Site Preparation

For the project of Decommissioning and Decontamination Works at the South Apron of the Former Kai Tak Airport, two biopiles were constructed at the designated decontamination works area as shown in the "Biopiles Location Plan" – Drawing No. 60022408/15/6001B (Attachment 2). However, all contamination soil excavated from the ex-GFS Building will be transported to Biopile No. 2 only for Biopile treatment. Biopile No. 2 (46.5m(l) x 67.368m(w) x 3.0m(h)) will be modified in order to provide sufficient area for deposition of the contamination soil excavated from the ex-GFS Building.

3.3 Base Construction

The biopile base consists of impermeable liner, concrete bund and leachate collection channel. The foundation for the biopile will be graded at approximately 1% to 2% fall toward the leachate collection channel. The foundation will extend approximately 1 to 2m beyond the biopile base to allow for the construction of concrete bund, leachate collection channel and aeration manifold.

The concrete bund which is of 0.5m high is constructed at 3 sides of the biopile to ensure any leachate will be collected in a control manner. The concrete bund serves as a containment to divert all leachate to the collection channel. At the remaining side of the biopile, the leachate collection channel which is of 0.2 – 0.3m deep is constructed to divert all collected leachate to a sump pit located at one corner of the biopile.

The impermeable liner will be placed over the concrete base. The liner is typically a 0.75mm thick plastic material such as high-density polyethylene (HDPE). The liner will

be made large enough to cover the desired base, concrete bund and the leachate collection channel.

The wastewater collection tank will be set up on site to collect leachate generated from biopile, wastewater and decontamination water. The wastewater in wheel washing facility shall be minimized and recycled.

Upon formation of the biopile, the biopile will be operated in a fully enclosed system covering by anchored low permeability geotextiles to prevent contaminated runoff. The leachate volume will be expected relatively low and the leachate generated from the operation of biopiling will be diverted to a sump pit located at the lowest point of the biopile. All leachate generated from the operation of biopiling will be collected and recycled to the biopile for further treatment or disposed by the licensed waste collector subject to further agreement with EPD and the Engineer. The centralized wastewater treatment unit will be provided and maintained for treatment of leachate, decontaminated waste from equipment decontamination and wastewater from wheel washing. The existing drainage system within the site will be maintained to collect the rainfall runoff.

Prior to the installation of biopile base liner, the ground surface will be cleared of debris and other obstacles to ensure that there are no protrusions that may puncture and compromise the integrity of the lose liner.

The biopile base will consist of minimum 3 levels of protective system, which include the top 100mm thick sand protective layer, 0.75mm thickness HDPE layer and bottom water-proofing paints on the existing apron slab. The purpose of each protective layer is as follows:

a) Top 100mm thick sand layer: This sand layer protects the HDPE liner from protrusions of equipment and any objects within the contaminated material that may be present in the base.

b) 0.75mm HDPE: This HDPE liner prevents seepage of leachate through the base of the biopile and ensure that leachate will drain to collection sump at the lowe point of the bunded area.

c) Bottom water-proofing paint: This water-proofing paint prevents the biopile leachate contaminate the conrete apron slab and the clean soil underneath.

To ensure that leakage through the biopile liner will not occur, the following steps will be followed:

- Sheet of HDPE utilized for the liner will be selected so that a minimum number of seams are required;
- Individual inspections of HDPE sheets will be carried out after placement to observe for any damage;
- Seaming equipment used for the seaming together of panels will be fusion process equipment;

- Prior to welding, the seam area will be free from moisture, dust, dirt, sand, or debris of any nature. Additionally, it shall be verified that the seam is properly overlapped, heat tacked and abraded for welding;

- Seams will be visually checked for integrity to demonstrate leak resistance;

- All required repair work is to be performed by patching, grinding and re-welding, spot welding, flap welding, capping or topping;

- All repair areas will be non-destructively tested; and

- A final inspection of the liner installation works will be performed.

3.4 Aeration System

The establishment of an aeration system is to ensure sufficient air is provided to the biopile in which hydrocarbon-degrading bacteria will consume oxygen during the degradation process. The aeration system will be operated in the extraction mode and comprises the following components:

- Aeration pipelines including perforated pipe and main suction pipe
- Valves at the manifold branch points
- Air blowers – high performance pressure blower, centrifugal type
- Carbon filter units
- Pressure gauge, pressure switch and sampling points

Water knockout cyclones are regarded as a partial component of the aeration system. The cyclones are set up to protect the air blowers from condensation and leachate.

3.4.1 Aeration Pipelines

The aeration pipelines consist of perforated pipes and main suction pipe for each biopile.

Perforated pipe

The perforated pipe is a heavy-duty corrugated, high density polyethylene (HDPE) plastic pipe. The standard dimension of each piece of perforated pipe is 6.09m long and 150mm diameter. The perforated pipe will be connection using external snap coupler and the connection between perforated pipes will be wrapped with self-adhering waterproofing membrane to prevent air leakage. The connection perforated pipes are placed on the impermeable liner with a distance of 3m between each pipe. Along each perforated pipe, the perforated section will be wrapped with a 145g/m^2 geotextile filter or other equivalent 5mm slots in width will be provided to prevent clogging of air inlets and embedded in the contamined soil in a single layer. Non-perforated section will be connection to the main suction pipe.

Main suction pipe

The main suction pipe is an unplasticized PVC pipe to BS3506 Class 'B'. The pipe is of 300mm diameter and will be cut in a suitable length for proper connection.

3.4.2 *Air Extraction Container*

An air blower, a carbon filter unit and a control panel will be housed in an acoustic insulated (i.e. 50mm rockwool with protective perforated metal) container with a size of 6m x 2.5m x 2.5m. A vent from carbon filter is at the top and a flange opening (i.e. air inlet to blower) is at one side of the container.

Air blower

The blower is a centrifugal type high performance pressure blower which is designated to provide moderate air flow rate with high static pressure and has been used in various types of soil remediation work. Pressure gauges will be installed at both the suction side and pressure side for monitoring of blower performance. Basic information of the blower is summarized in Table 3.4

Table 3.4 Blower Technical Data

Fan Design			
Size/Model	32014	Wheel Width	100.0%
Wheel Type	Aluminium	Drive Type	Belt
Wheel Material	Aluminium	Wheel Diameter	100.0%
Operating Conditions			
Fan Static Pressure	6,000CFM	Maximum Operating Temperature	70DegF
Outlet Velocity	20.0inwg	Fan Speed	1940rpm
Sound Power (Total Fan)	114.9 dB	Operating Temperature	30.5bhp
Operating Inlet Air Stream Density	0.0750lb/ft^3	Mechanical Efficiency	67.82%
Static Efficiency	61.75%	Maximum Safe Operating Speed	3200rpm

Carbon filter unit

The off-gas treatment system is a carbon filter unit which is established to remove volatile organic compound (VOC). The carbon filter system with at least 99% removal efficiency for Total Organic Compounds (TOC) will be installed, operated and maintained to treat the vent air from the biopile before releasing to the atmosphere.

To cater for this particular gas stream with high air flow and low VOC level and to minimise the pressure loading of the blower, a panel type in-line activated carbon filter, comprising a corrosion resistant housing, removable access door, pre-filter and carbon filter, will be used. For a 6,000 cfm air flow, the size of bed filter together with housing is about 1.9m (H) x 0.6m (W) x 0.9m (L). A pressure gauge will be installed at the inlet of the carbon filter unit for monitoring of pressure drop across the filter. Moreover, sampling points will be provided at both the inlet and outlet of the filter for keeping track the filter performance and checking whether filter bed is saturated or not (i.e. if filter bed is saturated, adsorption process no longer takes place). By checking pressure drop and measuring VOC level at the sampling points, whether maintenance is necessary or not can easily be determined.

3.5 Leachate Collection System

The establishment of a leachate collection system is to ensure that leachate arising from biopile operation will be properly collected without any leakage. Leachate collection system comprises the following componets:

- Leachate collection channel and sump pit
- Water knockout cyclone

3.5.1 Leachate Collection Channel and Sump Pit

The leachate collection channel which is of 0.2 – 0.3m deep is constructed at the lower side of the biopile to divert all leachate to a sump pit located at a corner (i.e. the lowest point) of the biopile.

3.5.2 Water Knockout Cyclone

A water knockout cyclone is a device to separate the bulk of the water carried through the main suction pipe from the biopile. The cyclone is constructed by galvanized metal and with a dimension of 1.8m high and 2.0m diameter (5.65m^3). All collected leachate will be recycled to the biopile for further treatment or disposed by the licensed waste collector subject to further agreement with EPD and the Engineer.

3.6 Biopile Formation

The formation of the pile will be done using backhoe and dump truck. Depending on the dimensions of each biopile, it requires to form one to two dump truck driveways (with each of at least 1m thick and 6m wide) across/on the base liner. Backhoe driveways with each of at least 1m thick and 6m wide (and approximately 6m apart) will be formed along each side of the dump thick driveways. Starting at one side and moving to the other side, each row of soil fills the base to the desired height of 3m. The backhoe and dump truck must never be allowed to drive over formed pile and must also be careful not to damage the aeration pipes. The top of the pile should be smooth and have a slight gradient so as to avoid pooling of water on the cover. The biopiles will be formed at areas away from residential buildings as far as practicable. Nutrient and water may be added at this stage if necessary. After the biopile is formed, the "impermeable" sheeting will be installed progressively to ensure that no more than 5m of the biopile is exposed to the air. Biopile details shall refer to the Schematic Diagram of Biopile – Drawing No. 60022408/15/2007B/1 and No. 60022408/15/2007B/2 (Attachment 3).

Soil gas monitoring probes will be installed at various locations within the piles. Sampling of oxygen, carbon dioxide, methane and VOC concentrations in the soil gas will be conducted once every month. The depth of the monitoring probe is typically 1m below the pile top and a minimum of 0.3m above the performed pipe. The proposed location of the soil gas monitoring probes will be evenly distributed in the Biopile (with density of one monitoring prob per 1000m^3). The exact location and total quantity of the monitoring probes will be agreed with the Engineer prior to commencing the installation.

4.0 Biopile System Management

4.1 Operation and Maintenance

Biopile treatment requires a period of operation and maintenance (O&M) before cleanup target can be reached. The approved O&M Manual under Contract No. KL/2008/02-Decommissioning and Decontamination Works for the South Apron of the Former Kai Tak Airport will be used during the biopile operation.

- Process Description – provides an introduction and overall equipment description, purpose, function and simplified theory of operation;
- Operation Requirements – describes methods for operating a full-scale biopile (e.g. system startup and shutdown, routine operation and operational monitoring plan);
- Maintenance Requirements – describes the routine maintenance required to ensure continued operation of the biopile (e.g. aeration manifold, cover repair, piping repair, blower, cyclone and off-gas treatment system maintenance);
- Training Requirements – details the requirements of various types of training including health and safety;
- Environmental Mitigation Measures – describes measures to be taken during biopile operation for mitigation potential noise, air, water and waste impacts;

4.2 Process Improvement Mesaures

As the estimated organic contaminated soil is only 72m^3, no process improvement measure is considered necessary.

Nutrient Addition

Chemical fertilizer, which is in the form of pellet with a composition of 12%N, 12%P, 17%K and 2%Mg, will be added if necessary to the biopile by spraying over the pile during oil mixing and tilling process. The fertilizer will be supplied in bag or bulk form to the site.

pH Adjustment

If the soil is too acidic (i.e. pH <5.5), the pH will be adjusted by adding lime into the soil. The lime, which is in powder form, will be sprayed over the biopile during soil mixing and tilling process.

Moisture Addition

Moisture content in the pile is one of the critical factors for a successful biopile treatment. Water will be periodically added to the soil to maintain the moisture content within 10% to 20%.

5.0 Confirmation Soil Sampling and Testing

5.1 Profile of Existing Contaminated Soil

The extent of the TPH and/or Phenanthrene / Benzo(a)pyrene / Fluoranthene / Pyrene contaminants have been divided into 2 zones. Those areas contaminated with TPH and/or Phenanthrene / Benzo(a)pyrene / Fluoranthene / Pyrene are summarised in Table 5.1 below:

Table 5.1 Estimated Volume of TPH / Phenanthrene / Benzo(a)pyrene / Fluoranthene / Pyrene Contaminated Soil for Biopiling

Zone I.D.	Sample I.D.	Depth (m BBC)	Contaminant	Concentration (mg/kg)	Estimated Contamination Extent		
					Vertical (m BBC)	Horizontal (m^2)	Estimated Volume (m^3)
A	GFSA-18	1	Phenanthrene	14	0.5-1.5m	36	36
			Benzo(a)pyrene	11			
			Fluoranthene	19			
			Pyrene	17			
D	GFSB-01	1.65	TPH	2875	1.15-2.15	36*	36
Total Volume of Estimated Contaminated Soil = 72m^3							

Remarks:
BBC = Below Base of Existing Concrete Pavement

Based on the information (Area and Depth) as stipulated in the CAR/RAP Drawings, the total amount of soil contaminated with TPH and/or Benzo(a)pyrene is estimated approx. 72m^3. The actual quantity of contaminated soils will be subject to final excavation depth as determined by the confirmatory soil sample.

5.2 Confirmation Soil Sampling and Testing for Soil Excavation

5.2.1 Before excavation, pre-sampling of the sidewall samples at the middle depth of the contaminated soil will be proposed in order to determine the extent of the contamination. If the analytical results are below the action levels; the pre-sampling results will be considered as the final results of the confirmation samples.

5.2.2 After excavation, the confirmation sampling and testing will be carried out at the pre-determined depth in order to ensure that all contaminated soil has been excavated. The soil samples will be dispatched to the approved laboratory for testing.

5.2.3 One confirmation sample will be collected from the base and one from each sidewall of the excavation.

5.2.4 If the analytical results of the confirmation samples exceed the action levels, further excavation with 1m increment laterally or 0.5m increment vertically or the increment as determined by the Engineer.

The Concerned Action Levels for Soil Excavation will be referred to the Table 5.2 below:

Table 5.2 Concerned Action Levels for Soil Excavation

Contaminant	Action Level (mg/kg)
TPH (adopt standard for Mineral Oil)	1,000
Phenanthrene	10
Fluoranthene	10
Benzo(a)pyrene	1
Pyrene	10

5.3 Verification and Sampling Testing for Soil Excavation

5.3.1 1 per 10 soil samples of the parallel samples for spot checking on the confirmation sampling and testing will be collected by ET.

5.3.2 The parallel samples will then be dispatched to the independent accredited laboratory employed by ET for testing.

5.3.3 About 1 kg of soil samples will be taken and placed into appropriate clean glass bottles or sampling containers provided by the laboratory for parallel testing on the confirmation sampling.

6.0 Clean Up Progress Monitoring

6.1 Sampling Requirement

6.1.1 One sample will be collected monthly for the analysis of the soil parameters as listed in Table 6.1 below.

6.1.2 About 1 kg soil sample will be taken and placed into clean glass bottles or sampling containers immediately and stored in an ice box and dispatched to the laboratory for analysis.

6.1.3 Once the cleanup targets at a location have been achieved, sampling will be discontinued at that particular location.

6.1.4 All sampling tools will be cleaned after each sampling location.

6.1.5 The Concerned Cleanup Targets for Biopiling shall refer to the Table 6.1 below:

Table 6.1 Concerned Cleanup Targets for Biopiling

Contaminant	Action Level (mg/kg)
TPH	1,000
Phenanthrene	10
Fluoranthene	10
Benzo(a)pyrene	1
Pyrene	10

6.1.6 The Event and Action Plan for Confirmation Sampling/Testing for Biopiling shall refer to the Table 6.2 below:-

Table 6.2 Event and Action Plan for Confirmation Sampling/Testing for Biopiling.

Event	Action	Action Party
Exceedance of any cleanup targets for the contaminants	Concerned biopile treatment system shall be restarted to fully decontaminate the soil.	Contractor

7.0 Closure Assessment

7.1 Sampling Requirement

7.1.1 Closure assessment will be conducted after two consecutive cleanup progress monitoring results meet the cleanup targets or whenever considered appropriate by the Engineer.

7.1.2 Soil sampling for closure assessment will be collected in one sample per 100m^3 of treated soil. The sampling location will be performed systematically at the soil lot according to grids outlined by each aeration leg, i.e. soil volume between two adjacent aeration legs.

7.1.3 The sampling locations will be through opening of heat bonded cover panels and the openings will be closed after each sampling. Soil sampling will be accomplished using the hand-driven sampler.

7.1.4 All soil samples will be analysed in a HOKLAS accredited, or equivalent, laboratory for TPH (USEDA Method 8015 Mod) and SVOC's (USEPA Method 8270c).

7.1.5 QA/QC sampling including field duplicate sampling and equipment blanks will be undertaken in one sample / day or one sample per 20 confirmation samples whichever is greater.

7.1.6 All soil samples will be analyzed for TPH,/Phenanthrene, Benzo(a)pyrene, Fluoranthene and Pyrene results are considered satisfactory when the cleanup targets are met.

7.1.7 Only when the whole soil lot meets the cleanup targets, the soil lot of concern will be considered complete. The treated soil will be re-used as fill materials/backfilled or future use on site.

7.1.8 In the event that the closure soil samples still exceed the cleanup targets, the biopile decontamination system will be restarted and treatment will continue until all closure soil samples have attained the cleanup targets.

7.2 Verification and Sampling Testing for Closure Assessment

7.2.1 1 per 10 soil samples of the parallel samples for spot checking on the confirmation sampling and testing will be collected by ET.

7.2.2 The parallel samples will then be dispatched to the independent accredited laboratory employed by ET for testing.

7.2.3 About 1 kg of soil samples will be taken and placed into appropriate clean glass bottles or sampling containers provided by the laboratory for parallel testing on the confirmation sampling.

7.3 Event and Action Plan

7.3.1 Air Dust Monitoring

In the event of an exceedance of air emission levels, the actions to be taken are outlined in Table 7.2.

7.3.2 Biopiling System Discharge Emissions Monitoring and Ambient VOC Monitoring

In the event of an exceedance of discharge emissions monitoring and ambient VOC monitoring, the actions to be taken are outlined in Table 7.3.

Table 7.2 Event and Action Plan for Air Dust Monitoring

EVENT	ACTON			
	ET	IEC	ER	CONTRACTOR
Action Level being exceeded by one sampling	1. Identify source and investigate the causes of exceedance; 2. Inform Contractor, IEC and ER; 3. Repeat measurement to confirm finding.	1. Checking monitoring data submitted by ET; 2. Check Contractor's working method.	1. Notify Contractor.	1. Rectify any unacceptable 2. Amend working methods if appropriate.
Action Level being exceeded by two or more consecutive sampling	1. Identify source and investigate the causes of exceedance; 2. Inform Contractor, IEC and ER; 3. Increase monitoring frequency to daily; 4. Discuss with IEC and Contractor on remedial actions required; 5. Assess the effectiveness of Contractor's remedial actions; 6. If exceedance continues, arrange meeting with IEC and ER; 7. If exceedance stops, cease additional monitoring.	1. Check 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.	1. Confirm receipt of notification of exceedance in writing; 2. Notify Contractor; 3. In consolidation with the IEC, agree with the Contractor on the remedial measures to be implemented; 4. Supervise implementation of remedial measures; 5. Conduct meeting with ET and IEC if exceedance continues.	1. Discuss with ET and IEC on proper remedial actions; 2. Submit proposals for remedial actions to ER and IEC within three working days of notification; 3. Implement the agreed proposals; 4. Amend proposal if appropriate.
Limit Level being exceeded by one sampling	1. Identify source and investigate the causes of exceedance; 2. Inform Contractor, IEC, ER and EPD; 3. Repeat measurement to confirm finding; 4. Assess effectiveness of Contractor's remedial actions and keep EPD, IEC and ER informed of the results.	1. Check 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.	1. Confirm receipt of notification of exceedance in writing; 2. Notify Contractor; 3. In consolidation with the IEC, agree with the Contractor on the remedial measures to be implemented; 4. Supervise implementation of remedial measures; 5. Conduct meeting with ET and IEC if exceedance continues.	1. Take immediate action to avoid further exceedance; 2. Discuss with ET and IEC on proper remedial actions; 3. Submit proposals for remedial actions to ER and IEC within three working days of notification; 4. Implement the agreed proposals.

Table 7.2 Event and Action Plan for Air Dust Monitoring (continue)

EVENT	ACTON			
	ET	IEC	ER	CONTRACTOR
Limit Level being exceeded by two or more consecutive sampling	1. Notify IEC, ER, Contractor and EPD; 2. Repeat measurement to confirm findings; 3. Carry out analysis of Contractor's working procedures to identify source and investigate the causes of exceedance; 4. Increase monitoring frequency to daily; 5. Arrange meeting with IEC, ER and Contractor to discuss the remedial actions to be taken; 6. Assess effectiveness of Contractor's remedial actions and keep EPD, IEC and ER informed of the results; 7. If exceedance stops, cease additional monitoring.	1. Checking monitoring data submitted by ET; 2. Check Contractor's working method; 3. Discuss amongst ER, ET and Contractor on the potential remedial actions; 4. Review Contractor's remedial actions whenever necessary to assure their effectiveness and advise the ER accordingly. .	1. Confirm receipt of notification of exceedance in writing; 2. Notify Contractor; 3. In consolidation with the IEC, agree with the Contractor on the remedial measures to be implemented; 4. Supervise implementation of remedial measures; 5. If exceedance continues, consider stopping the Contractor to continue working on that portion of work which causes the exceedance until the exceedance is abated.	1. Take immediate action to avoid further exceedance; 2. Discuss with ET, ER and IEC on proper remedial actions; 3. Submit proposals for remedial actions to IEC within three working days of notification; 4. Implement the agreed proposals; 5. Submit further remedial actions if problem still not under control; 6. Stop the relevant portion of works as instructed by the ER until the exceedance is abated.

Table 7.3 Event and Action Plan for Biopiling System Discharge Emissions Monitoring and Ambient VOC Monitoring

EVENT	ACTON			
	ET	IEC	ER	CONTRACTOR
Exceedance for one sample	1. Identify source and investigate the causes of exceedance and 2. Inform Contractor, IEC and ER; 3. Assess effectiveness of Contractor's remedial actions and keep IEC, EPD and ER informed of the results	1. Checking monitoring data submitted by ET; 2. Check Contractor's working method; 3. Discuss with ET and Contractor on possible remedial measures. .	1. Confirm receipt of notification of exceedance in writing; 2. Check Contractor's working method; 3. Discuss with ET and Contractor on possible remedial measures.	1. Take immediate action to avoid further exceedance; 2. Submit proposals for remedial action to IEC within 3 working days of notification; 3. Implement the agreed proposals; 4. Amend proposal if appropriate.
Exceedance for two or more consecutive samples	1. Identify source and investigate the causes of exceedance; 2. Inform Contractor, IEC, ER and EPD; 3. Discuss with IEC and Contractor on remedial actions required; 4. Assess the effectiveness of Contractor's remedial actions; 5. If exceedance continues, arrange meeting with IEC and ER.	1. Check 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 mesaures.	1. Confirm receipt of notification of exceedance in writing; 2. Notify Contractor; 3. In consolidation with the IEC, agree with the Contractor on the remedial measures to be implemented; 4. Supervise implementation of remedial measures; 5. Conduct meeting with ET and IEC if exceedance continues and instruct the Contractor to slow down or stop the process until the exceedance is abated.	1. Discuss with ET and IEC on proper remedial actions; 2. Submit proposals for remedial actions to ER and IEC within three working days of notification; 3. Implement the agreed proposals; 4. Resubmit proposals if problem still notunder control; 5. Slow down or stop the process as determined by the ER until the exceedance is abated.

8.0 Recovery of free product of Total Petroleum Hydrocarbon (TPH) from the contaminated groundwater

There are various remediation methods available for recovery of free product, skimming is considered as the most practical and cost effective method.

8.1 As indicated in the CAR/RAP that no free product was detected during the site investigation. The amount of free product, if any, encountered during the excavation works should be very small. Thickness of the floating oil should be less than 1mm. Based on the past experiences from the other soil remediation projects, manual skimming is the most effective method for removal of such thin layer of floating oil. Should a large amount of free product is detected during excavation, the use of mechanical skimming device or passive skimming equipment will be considered.

8.2 When free products of hydrocarbons are encountered during soil excavation, the free product will be skimmed off manually. The movable working platform should be set up at the downward of the excavation pit for collection of the free product by using the hand tools such as spade and bucket. All workers involved in the skimming works should wear appropriate clothing and personal protective equipment such as gloves and masks. No eating and smoking will be allowed during the skimming works.

8.3 The skimmed free product will be collected and stored in a designed storage area complying with the requirements in the Waste Disposal (Chemical Waste) (General Regulation) and related Codes of Practice.

8.4 Steel drums with 1mm thickness, with capacity of 200 litres will be used for storing the skimmed free product.

8.5 The licensed chemical waste collector will be employed for the collection of free product.

8.6 Visual inspection will be undertaken out to ensure all TPH free product is totally removed.

8.7 A confirmation sample of groundwater will be collected at the surface of the groundwater with the sampling frequency of one water sample per 15mx15m groundwater surface and analyzed for TPH by the laboratory.

8.8 If the TPH concentration in groundwater sample is below the allowable TPH concentration (213mg/L), the removal of TPH free product is considered complete.

9.0 Handling procedures for the spillage of contaminated soil

9.1 Any accidental spillage of contaminated soil during excavation or transport, immediate clean up and removal of the contaminated soil will be carried out.

9.2 Visual inspection will be carried out to check the extent of contamination and vertify the complete removal / clearance of spilled soils.

9.3 Use of PID measurement to check the contaminant level (limit level of 200ppm) at the location of spillage.

10.0 Environmental Mitigation Measures

10.1 Mitigation Measures for Dust Control during the Soil Excavation

In order to minimize the potentially adverse environmental impacts arising from the handling of potentially. Contaminated materials, the following environmental mitigation measures are proposed during the course of the soil excavation:

10.1.1 Excavation profiles should be properly designed and executed.

10.1.2 The excavation area should be limited to as small in size as possible and backfilled with clean and/or treated soil shortly after excavation work.

10.1.3 The exposed excavated area shall be covered by the tarpaulin during night time.

10.1.4 The top layer soils shall be sprayed with fine misting of water immediately before the excavation.

10.1.5 Stockpiling site(s) shall be lined with impermeable sheeting and bunded. Stockpiles shall be fully covered by impermeable sheeting to reduce dust and other air pollutants emission.

10.1.6 Misting for the dusty material shall be carried out before being loaded into the vehicle.

10.1.7 Any vehicle with an open load carrying area shall be have properly fitted side boards.

10.1.8 Material having the potential to creat dust shall not be loaded from a level higher than the side and tail boards and shall be dampened and covered by a tarpaulin.

10.1.9 The tarpaulin shall be properly secured and shall extent at least 300mm over the edges of the sides and tailboards. The material shall also be dampened if necessary before transportation.

10.1.10 The vehicles shall be restricted to maximum speed of 10km per hour and confined haulage and delivery vehicle to designated roadways insider the site. On-site unpaved roads shall be compacted and kept free of lose materials.

10.1.11 Vehicle washing facilities should be provided at every vehicle exit point.

10.1.12 The area where vehicle washing takes place and the section of the road between the washing facilities and the exit point should be paved with concrete, bituminous materials or hardcores.

10.1.13 Every main haul road should be scaled with concrete and kept clear of dusty materials or sprayed with water so as to maintain the entire road surface wet.

10.1.14 Every stock of more than 20 bags of cement should be covered entirely by impervious sheeting placed in an area sheltered on the top and the three sides.

10.1.15 Every vehicle should be washed to remove any dusty materials from its body and wheel before leaving the construction sites.

10.2 Air Quality Mitigation Measures during the Process of Biopiling and VOC Control

In order to minimize the potentially adverse environmental impacts arising from the handling of potentially contaminated materials, the following environmental mitigation measures are proposed during the process of biopiling:

10.2.1 The aeration of the biopiles should be done by extraction mode so as to avoid the dispersion of fugitive dust or other air pollutants into the atmosphere.

10.2.2 The exhaust gas from the aeration system should be fitted into off-gas treatment system (i.e. carbon filter) to remove air pollutant prior to discharge into the atmosphere.

10.2.3 Routine exhaust gas monitoring for VOCs should be performed to ensure effectiveness of the gas treatment unit.

10.2.4 Routine inspection and maintenance of the biopile cover should be carried out to ensure the integrity of the biopile cover so as to suppress the dispersion of fugitive dust and other air pollutant into the atmosphere.

10.2.5 Water spraying should be applied during soil mixing and tiling.

10.2.6 During the course of biopile formation, the stockpiled soils at the biopiles shall be covered by tarpaulin or low permeable sheet to avoid fugitive emissions of dust or any air pollutants from the biopiles affecting the surrounding environment and to minimise runoff from the stockpiled soils. Biopile(s) shall be covered by impermeable sheeting (such that no longer than 5m of a biopile shall be exposed to open air) to avoid fugitive emissions of dust or any pollutants from the biopile(s).

10.2.7 Upon formation of a biopile, the biopile shall be covered by low permeable geotextiles to prevent dust emission and runoff.

10.2.8 During the operation of biopile, the biopiles shall be fully covered to control the extraction of VOCs.

10.2.9 Carbon absorber with 99% control efficiency shall be installed for the biopiling system to treat the off-gas prior to discharge and the location of the exhaust of the carbon filter should be sited as far away as possible from the nearby ASRs.

10.2.10 Spent activated carbon of the carbon absorber shall be replaced regularly such that the VOC emission rate from the system is acceptable (i.e. the measured TVOC is below 20 ppm). The carbon adsorption system should also be monitored regularly to check the performance of the carbon filter.

10.2.11 Gas samples at the exhaust of the carbon filter for VOCs should be monitored regularly. The biopile operation shall be terminated when unacceptable air quality is monitored at the site boundary. The ambient VOC measurement shall be carried out on a monthly basis. Resumption of biopiling will only be allowed after confirmation and implementation of appropriate mitigation measures.

10.2.12 In order to monitor VOC emissions from the biopile vents, a continuous emission monitoring (CEM) system will be installed during decommissioning and decontamination process. This (CEM) system will measure VOC in real time and other plant performance parameter, such as oxygen, carbon dioxide and carbon monoxide continuously. The results of the measurements should be recorded immediately such that timely remedial action can be implemented in case of exceedance of emission standard.

10.3 Noise Mitigation Measures for Construction Noise Impacts

No mitigation measures and noise monitoring are considered necessary. However, the following good site practices should be implemented:

10.3.1 Only well-maintained plant should be operated on-site and plant should be serviced regularly during the construction program;

10.3.2 Mobile plant, if any, should be sited as far away from NSRs as possible;

10.3.3 Machines and plant (such as trucks) that may be in intermittent use should be shut down between works periods or should be throttled down to a minimum;

10.3.4 Plant known to emit noise strongly in one direction should, wherever possible, be orientated so that the noise is directed away from the nearby NSRs;

10.3.5 Material stockpiles and other structures should be effectively utilised, wherever practicable, in screening noise from on-site construction activities.

10.3.6 The blower system should be housed into an acoustic insulated container so as to suppress noise nuisance to the nearby noise sensitive receivers.

10.3.7 The noisy equipment should be sited as far as possible and practicable to the nearby noise sensitive receivers.

10.3.8 Construction Noise Permit should be applied for operation of powered mechanical equipment after normal working hours.

10.4 Water Quality Mitigation Measures

(i) Water quality impact arising from the decommissioning works would be minor. However the following mitigation measures to control the leachate and contaminated runoff should be implemented during the process of biopiling.

10.4.1 All leachate from biopiles should be diverted to leachate collection tank and avoid runoff outside the foundation of the biopiles.

10.4.2 All collected leachate will be collected and recycled to the biopile for further treatment or disposed by the licensed waste collector subject to further agreement with EPD and the Engineer.

10.4.3 Routine inspection and maintenance of concrete bund should be carried out to avoid potential leakage or seepage of leachate.

10.4.4 The biopile cover should extend over the perimeter bunds to prevent rainfall runoff from mixing with leachate from biopiles and to prevent rainfall runoff from passing through or beneath the biopiles.

10.4.5 Impermeable liner will be placed at the bottom of the biopiles and leachate collection sump will be constructed along the perimeter of the biopiles to prevent leachate from contaminating the underlying soil / groundwater.

10.4.6 Concrete bund will be constructed along the perimeter of biopiles to prevent the runoff coming out from the contaminated soil.

10.4.7 Biopiles after formation and during rain will be covered by anchored low permeability geotextiles to prevent contaminated runoff.

(ii) Water quality impact arising from the soil excavation works would be minor. However the following mitigation measures to control the water quality should be implemented during the soil excavation:

10.4.8 During excavation, all exposed pits shall be whenever possible backfilled immediately or covered. Where it is unavoidable to transiently pile up soils next to the excavation pit, the transient pile shall be bottom-lined, bunded and covered with impervious membrane during rain event in order to avoid generation of contaminated runoff.

10.4.9 The HDPE impermeable liner with earth bund or sand barrier will be placed at the bottom of the stockpiling area to prevent water seeping/draining from the soil being excavated or placed on transient stockpiles.

10.4.10 Final surfaces after excavation shall be well compacted and the subsequent permanent work or surface protection shall be carried out as soon as practical after the final surfaces are formed to prevent erosion caused by rainstorms. Appropriate intercepting channels and partial shelters shall be provided where necessary to prevent rainwater from collecting within trenches or footing excavations.

10.5 Waste Mitigation Measures

Waste generated from the decommissioning works should be sorted on-site into inert C&D material and C&D waste for disposal to public fill and landfill respectively.

10.5.1 The spent filters and absorbing materials from the off-gas treatment system should be handled as chemical waste and collected by licensed waste collector for further disposal / treatment.

10.5.2 The silt deposited in leachate collection tank should be handled as contaminated material and recycled back into the biopile for treatment.

10.5.3 Routine inspection and maintenance should be conducted to remove any rubbish trapped in the leachate channel.

11.0 Precautionary measures, health and safety of workers

In order to minimise the potentially adverse effects on the health and safety of construction workers and the impacts arising from the handling of potentially contaminated materials, the following measures should be implemented.

11.1 Construction workers' potential contact with contaminated materials should be minimised by using bulk earth-moving excavator equipment;

11.2 Exposure to any contaminated materials should be minimised by wearing appropriate clothing and personal protective equipment such as gloves and masks (when interacting directly with suspected contaminated material), providing adequate hygiene and washing facilities and preventing smoking and eating during such activities.

11.3 Stockpiling of contaminated excavated materials on site should be avoided as far as possible.

11.4 The use of contaminated soil for landscaping should be prohibited unless there is proper treatment of soil.

11.5 Vehicles containing any excavated materials should be suitably covered to limit potential dust emissions or contaminated wastewater run-off, and truck bodies and tallgates should be sealed to prevent any discharge during transport or during wet conditions.

11.6 Only licensed waste haulers should be used to collect and transport any contaminated material to an appropriate treatment / disposal site and procedures should be developed to ensure that illegal disposal of waste does not occur.

11.7 Speed control for the trucks carrying contaminated materials should be enforced;

11.8 The necessary waste disposal permits should be obtained, as required, from the appropriate authorities, in accordance with the Waste Disposal Ordinance (Cap 354), Waste Disposal (Chemical Waste) (General) Regulation (Cap 35), as required.

11.9 Records of the quantities of wastes generated and disposed of should be maintained.

11.10 Silt traps should be used to reduce the impact to drainage caused by suspended solids arising from disturbed ground, or any construction materials such as cement and gravel. Wastewater, surface runoff or extracted groundwater should be disposal of in accordance with the Water Pollution Control Ordinance (WPCO).

11.11 After excavation, all exposed pits will be backfilled immediately to prevent precipitation from failing on the pits.

11.12 Personal Protective Equipment (PPE) will be used by site worker during soil excavation / free product / skimming, such as coverall, respirator...etc.

11.13 The temporary fencing or warning ribbon will be provided to the boundary of excavation, slope crest and temporarily stockpiled areas to restrict unauthorized entrance.

11.14 A combustible Gas Indicator (CGI) will be used to check the presence of explosive gas in the excavation pits.

11.15 Suitable training on handling contaminated waste will be provided to site workers.

11.16 Provide written information and training on safety for site workers.

11.17 Maintain a hygienic working environment.

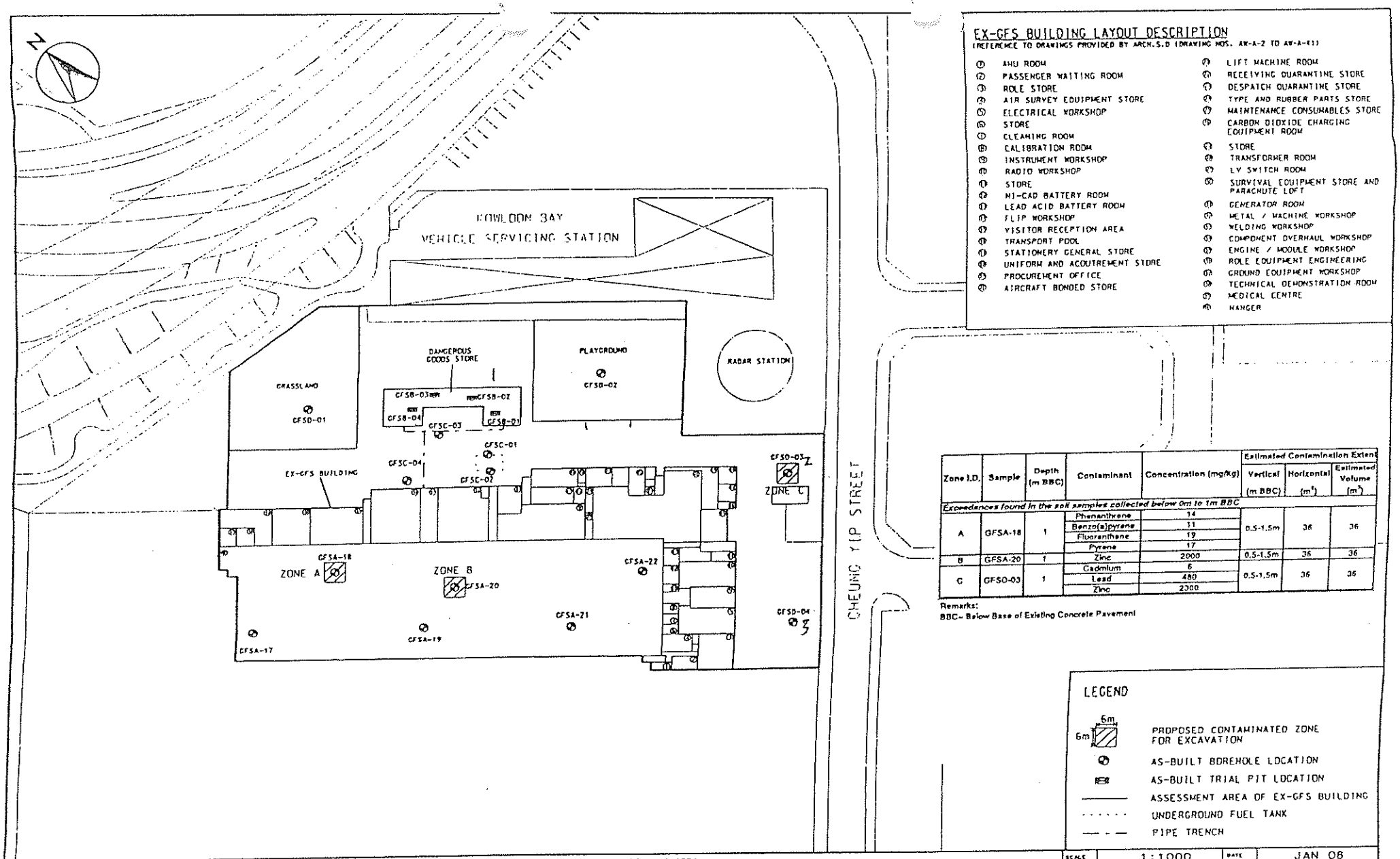
11.18 Provide face and respiratory protection gear to site workers.

11.19 Provide first aid training and materials to site workers.

11.20 Other than the existing barging points at the runway, there is no planned concurrent work in the vicinity of the South Apron before end 2009. In order to safeguard the users of the access road to the barging points, the access road across the site is isolated by the two rows of chain link fence along the road, and a buffer distance of no less than 20 meters between the access road and the nearest Contamination Zone will be maintained.

ATTACHMENT 1

Location of Decontamination Works Area (Drawing nos. 3.3 and 3.4)



EX-GFS BUILDING LAYOUT DESCRIPTION

(REFERENCE TO DRAWINGS PROVIDED BY ARCH.S.D (DRAWING NOS. AW-A-2 TO AW-A-41))

1. AHU ROOM
2. PASSENGER WAITING ROOM
3. ROLE STORE
4. AIR SURVEY EQUIPMENT STORE
5. ELECTRICAL WORKSHOP
6. STORE
7. CLEANING ROOM
8. CALIBRATION ROOM
9. INSTRUMENT WORKSHOP
10. RADIO WORKSHOP
11. STORE
12. NI-CAD BATTERY ROOM
13. LEAD ACID BATTERY ROOM
14. FLIP WORKSHOP
15. VISITOR RECEPTION AREA
16. TRANSPORT POOL
17. STATIONERY GENERAL STORE
18. UNIFORM AND ACCUTREMENT STORE
19. PROCUREMENT OFFICE
20. AIRCRAFT BONDED STORE
21. LIFT MACHINE ROOM
22. RECEIVING QUARANTINE STORE
23. DESPATCH QUARANTINE STORE
24. TYPE AND RUBBER PARTS STORE
25. MAINTENANCE CONSUMABLES STORE
26. CARBON DIOXIDE CHARGING EQUIPMENT ROOM
27. STORE
28. TRANSFORMER ROOM
29. LV SWITCH ROOM
30. SURVIVAL EQUIPMENT STORE AND PARACHUTE LOFT
31. GENERATOR ROOM
32. METAL / MACHINE WORKSHOP
33. WELDING WORKSHOP
34. COMPONENT OVERHAUL WORKSHOP
35. ENGINE / MODULE WORKSHOP
36. ROLE EQUIPMENT ENGINEERING
37. GROUND EQUIPMENT WORKSHOP
38. TECHNICAL DEMONSTRATION ROOM
39. MEDICAL CENTRE
40. HANGER

Zone I.D.	Sample	Depth (m BBC)	Contaminant	Concentration (mg/kg)	Estimated Contamination Extent		
					Vertical (m BBC)	Horizontal (m^2)	Estimated Volume (m^3)
Exceedances found in the soil samples collected below 0m to 1m BBC							
A	GFSA-18	1	Phenanthrene	14	0.5-1.5m	36	36
			Benzo(a)pyrene	11			
			Fluoranthene	19			
			Pyrene	17			
B	GFSA-20	1	Zinc	2000	0.5-1.5m	36	36
C	GFSD-03	1	Cadmium	6	0.5-1.5m	36	36
			Lead	480			
			Zinc	2300			

Remarks:
BBC= Below Base of Existing Concrete Pavement

LEGEND

- PROPOSED CONTAMINATED ZONE FOR EXCAVATION (6m x 6m)
- AS-BUILT BOREHOLE LOCATION
- AS-BUILT TRIAL PIT LOCATION
- ASSESSMENT AREA OF EX-GFS BUILDING
- UNDERGROUND FUEL TANK
- PIPE TRENCH

MAUNSELL | AECOM
Maunsell Consultants Asia Ltd

AGREEMENT NO. CE 35/2006 (CE)
KAI TAK DEVELOPMENT ENGINEERING STUDY CUM DESIGN AND CONSTRUCTION OF ADVANCE WORKS-INVESTIGATION, DESIGN AND CONSTRUCTION

LOCATIONS OF PROPOSED CONTAMINATED ZONES FOR EXCAVATION (A-C)

SCALE	1:1000	DATE	JAN 08
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JOB NO.	60022503	DRAWING NO.	3.3
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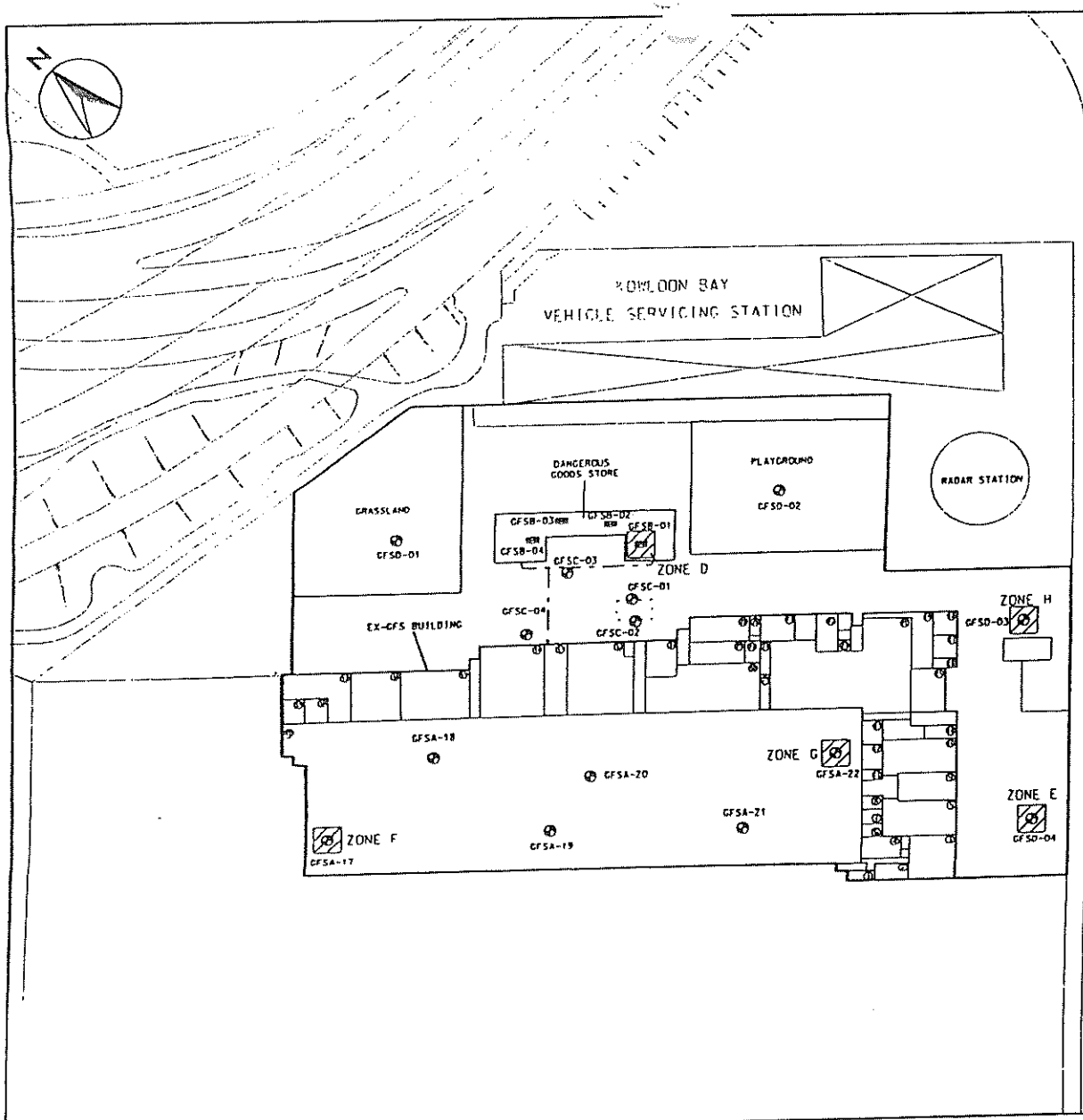

EX-GFS BUILDING LAYOUT DESCRIPTION

REFERENCE TO DRAWINGS PROVIDED BY ARCH.S.D (DRAWING NOS. AW-A-2 TO AW-A-431)

1. AHU ROOM
2. PASSENGER WAITING ROOM
3. ROLE STORE
4. AIR SURVEY EQUIPMENT STORE
5. ELECTRICAL WORKSHOP
6. STORE
7. CLEANING ROOM
8. CALIBRATION ROOM
9. INSTRUMENT WORKSHOP
10. RADIO WORKSHOP
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36. ROLE EQUIPMENT ENGINEERING
37. GROUND EQUIPMENT WORKSHOP
38. TECHNICAL DEMONSTRATION ROOM
39. MEDICAL CENTRE
40. HANGER

Zone I.D.	Sample	Depth (m BBC)	Contaminant	Concentration (mg/kg)	Estimated Contamination Extent		
					Vertical (m BBC)	Horizontal (m^2)	Estimated Volume (m^3)
Exceedances found in the soil samples collected below 1m to 6m BBC							
D	GFSB-01	1.65	TPH	2875	1.15-2.15	36*	36
E	GFSD-04	2.2-2.65	Cadmium	15	1.7-4.15	36	88.2
			Lead	430			
		3.2-3.65	Lead	300			
F	GFSA-17	3.25-3.7	Lead	200	2.75-4.2	36	52.2
G	GFSA-22	3.25-3.7	Copper	150	2.75-4.2	36	52.2
H	GFSD-03	3.3-3.75	Cadmium	510	2.8-4.25	36	52.2
			Nickel	410			
			Cobalt	1200			

Remarks:
BBC= Below Base of Existing Concrete Pavement
* Due to space constraint within the D.G. Store, 6m X 6m square centered at GFSB-01 may not be feasible. The frame for excavation would have to be adjusted on site based on the actual site condition.

LEGEND

- PROPOSED CONTAMINATED ZONE FOR EXCAVATION
- AS-BUILT BOREHOLE LOCATION
- AS-BUILT TRIAL PIT LOCATION
- ASSESSMENT AREA OF EX-GFS BUILDING
- UNDERGROUND FUEL TANK
- PIPE TRENCH

MAUNSELL | AECOM
Maunsell Consultants Asia Ltd

AGREEMENT NO. CE 35/2006 (CE)
KAI TAK DEVELOPMENT ENGINEERING STUDY CUM DESIGN AND CONSTRUCTION OF ADVANCE WORKS-INVESTIGATION, DESIGN AND CONSTRUCTION

LOCATIONS OF PROPOSED CONTAMINATED ZONES FOR EXCAVATION (D-H)

SCALE	1:1000	DATE	FEB 08
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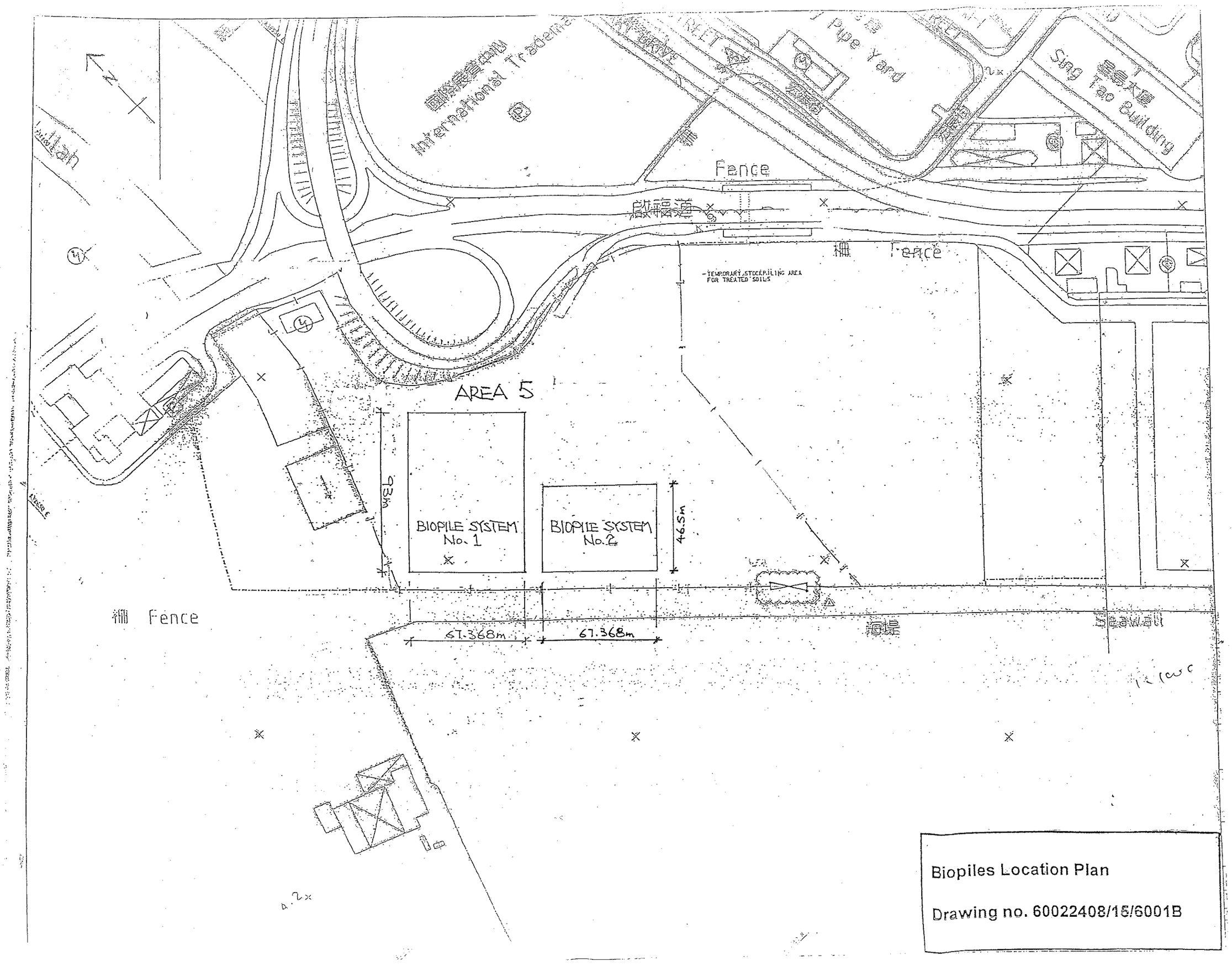
ATTACHMENT 2

Biopiles Location Plan
(Drawing no. 60022408/15/6001B)

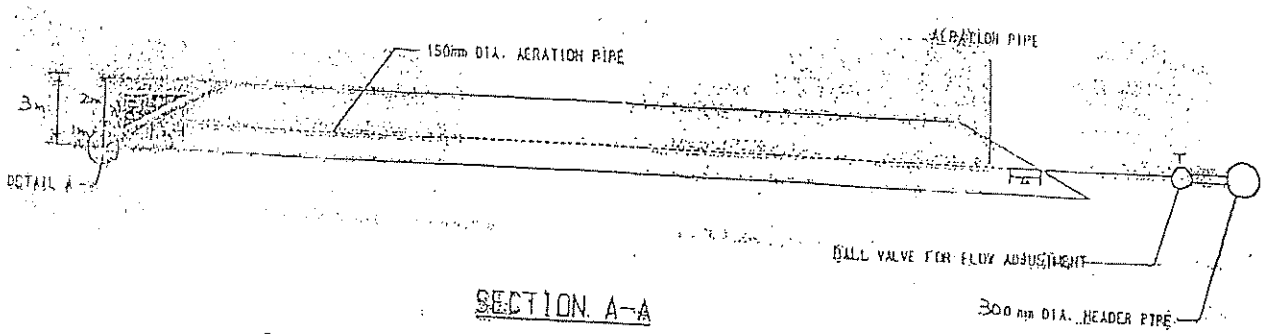


Biopiles Location Plan

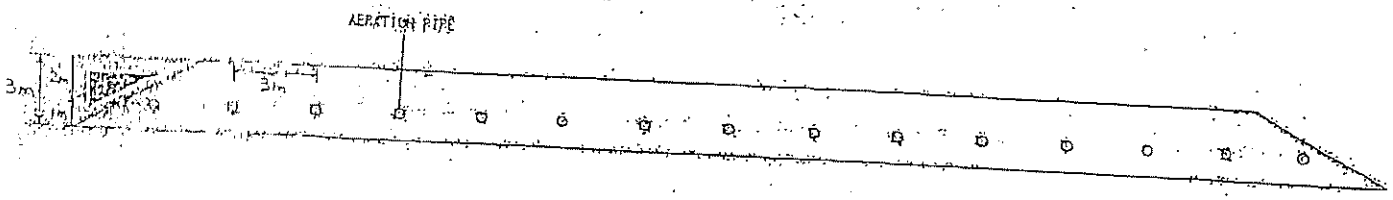
Drawing no. 60022408/15/6001B

ATTACHMENT 3

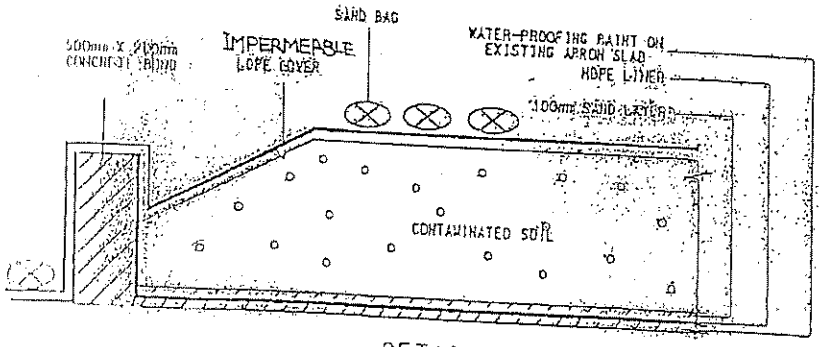
Schematic Diagram of Biopile (Drawing no. 60022408/15/2007B/1 & No. 60022408/15/2007B/2)



SECTION A-A



SECTION B-B

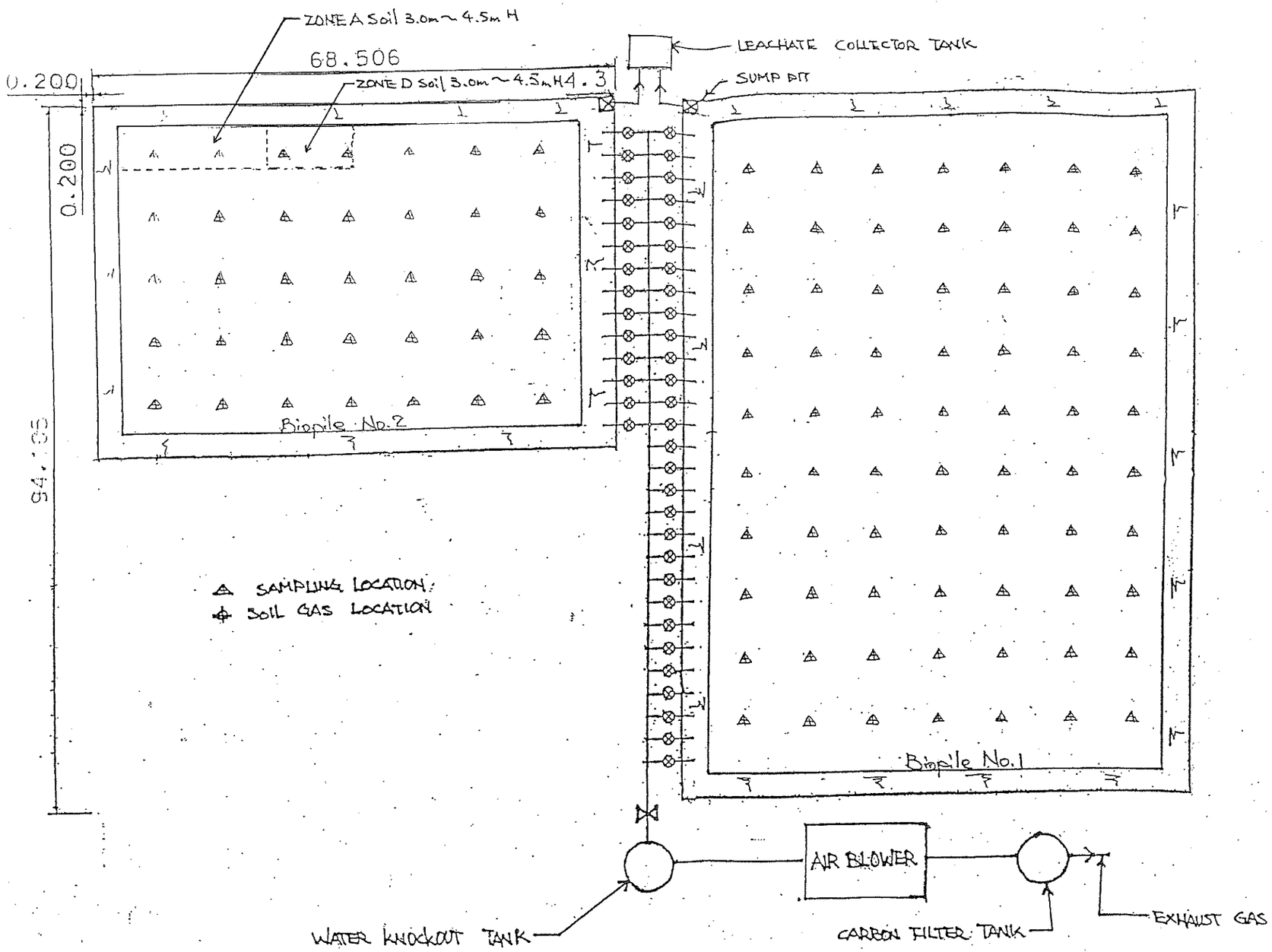


DETAIL A

N.T.S.

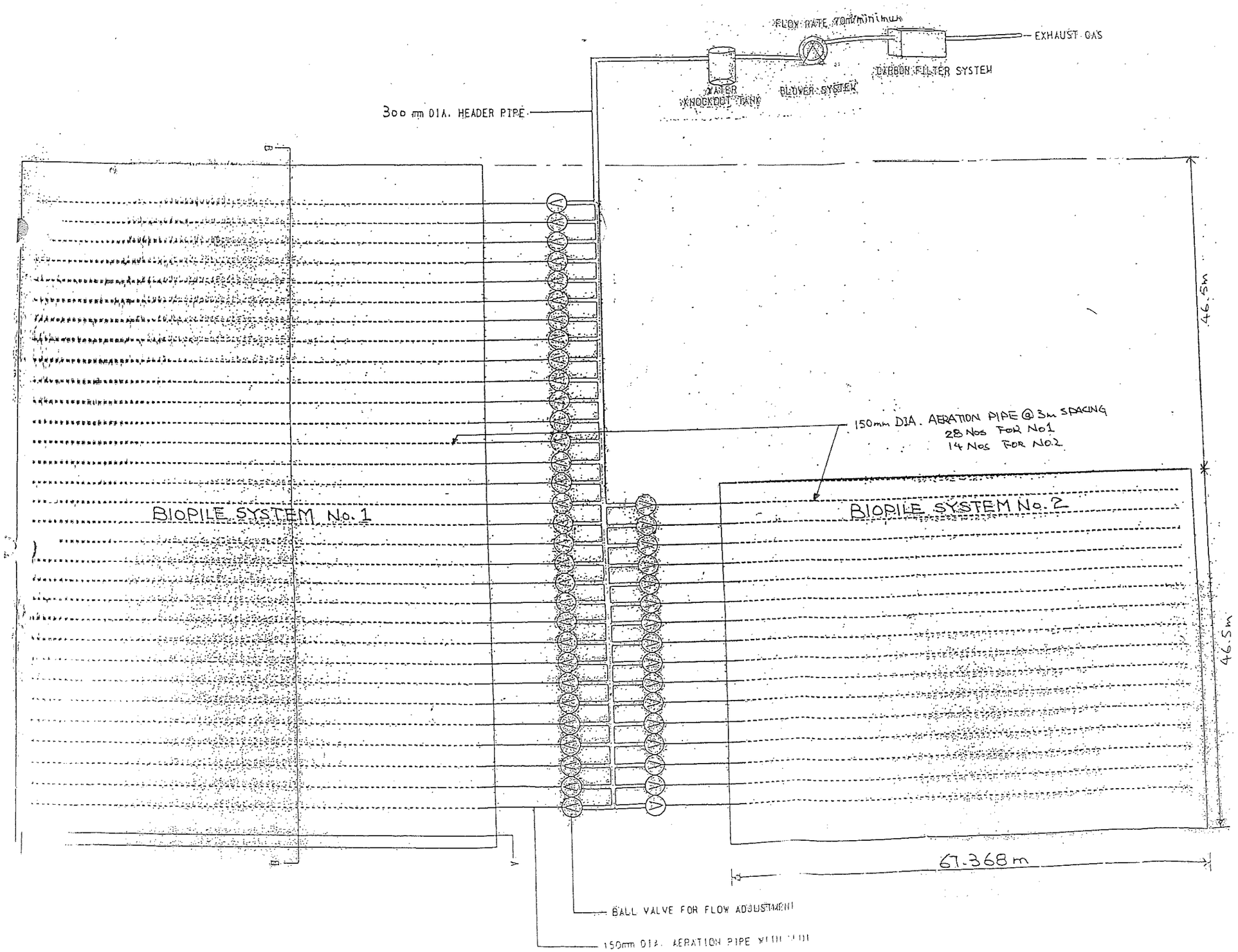
Schematic Diagram of Biopile

Drawing no. 60022408/15/2007B/1



Drawing No.

60022408/15/2007B/1



Schematic Diagram of Biopile

Drawing no. 60022408/15/2007B/1

KIN WING CONSTRUCTION CO., LTD.

Remediation

Method Statement

for

Cement Solidification / Stabilization Process
(ex-GFS Building)

Contract No. : KL/2008/02

Method Statement No. : MS-008

Rev. No. : 3

Effective Date : 30 October 2009

0. Revision Status Sheet

Rev. no.	Effective Date	Summary of Revision
0	27 May 2009	Initial issue
1	02 July 2009	Revision 1
2	09 September 2009	Revision 2
3	30 October 2009	Revision 3

CONTENTS

Section

Attachment

1.0 Introduction

In accordance with the requirements of EP Condition (EP-339/2009/A) and the Contamination Assessment Report/Remediation Action Plan (CAR/RAP) in Appendix 5.2b of the Kai Tak Development EIA Report for the Decontamination Works at ex-GFS Building, we shall refer to the Universal Treatment Standards of U.S. Resources Conservation and Recovery Act to remedy metal contaminants and recommend the operational criteria for the solidification/stabilisation decontamination system for the engineer's approval.

2.0 Scope of Works

2.1 Scope of Works

There are various remediation methods available for treating heavy metals, such as Soil Washing, Electrokinetic Separation and Solidification / Stabilization. As recommended in the CAR/RAP, Cement Solidification has been identified as the remediation method for the treatment of soils contaminated with heavy metals until attainment of the soil cleanup targets.

According to the predetermined depth of the contaminated soil in the CAR/RAP, total volume of the contaminated with heavy metals require cement solidification is approximately 316.8m^3.

2.2 Regulatory Requirements

During the course of site remediation, the Occupation Safety and Health Ordinance (OSHO) (Chapter 509), the Noise Control Ordinance (Cap.400), Air Pollution Control Ordinance (Cap.311), Water Pollution Control Ordinance (Cap. 358), Waste Disposal Ordinance (Cap.354), Dangerous Goods (General) Ordinance (Cap.295), Occupational Safety and Health Ordinance (Cap.509) and Factories and Industrial Undertakings Ordinance (Cap.59) and the requirements as stipulated in Environmental Permit No. EP-339/2008 under Environmental Impact Assessment Ordinance (EIAO) will be followed by all site personnel at all times.

2.3 Site Layout

The site plans showing the location of the decontamination works area at the ex-GFS Building are as shown in Attachment 1.

2.4 Health and Safety Training

Site Management

The toolbox talk and site specific training, which will focus on a different specific health or safety topic each time, are intended to enhance general health and safety awareness amongst operation. Toolbox talks will be conducted by the respective front line foremen / supervisor for the operatives under their immediate control to provide safety advice or information related to the nature of the works currently in progress on the site.

Site Hazards Analysis and Control

Some General Possible Hazard and Its Mitigation Methods

Hazard	**Typical Hazard Sources**	**Possible Mitigation Methods**
Exposure to heavy metal contaminants in soil or in liquid	Heavy metal contaminants	- Monitoring - Good housekeeping - Gloves, coveralls, boot covers

Site Control

Rules on the cement solidification process:

1. Only well trained staff can operate the cement solidification facilities.
2. Sufficient protective equipment should be worn before and during the operation of the cement solidification process.
3. All records of solidification works should be filled and checked in order to reduce the risk of contamination.
4. All excavation pits should be properly fenced off.
5. Temporary shelter should be provided for sorting and curing.
6. Area of cement mixing should be provided with a shed to avoid dust emissions and the generation of leachate. The mixing pit should be a watertight structure.
7. Workers who engage for soil sampling should wear PPE.
8. Every stock of more than 20 bags of cement should be properly covered.
9. The backfilling work should be suspended during the rain events.
10. Immediately report of any accident or abnormal record of the system to the supervisor.
11. No eat or drink near the system.
12. No smoking.

Personal Protective Equipment

Every related person are trained with adequate training in the use of PPE

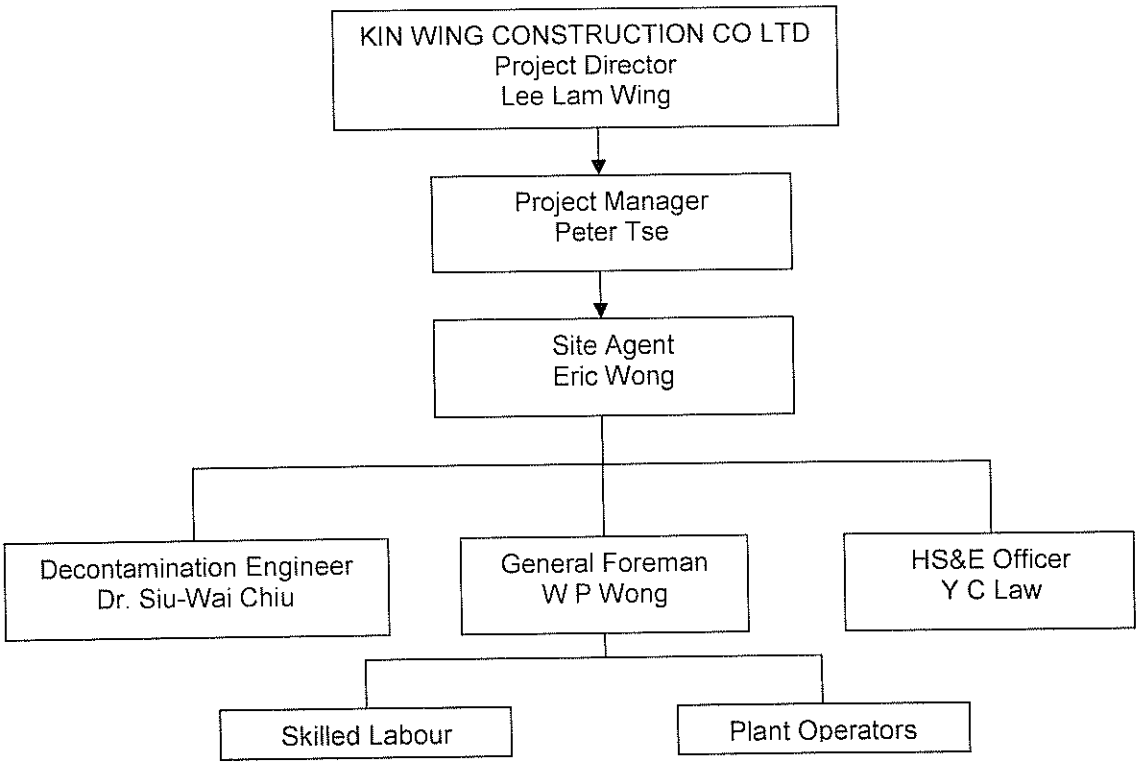
a. Every person who engages in cement solidification works should wear proper clothes for avoidance of bodily contacting the contamination soil.
b. Proper respirator should be used for reducing the risks of respiratory injury due to breathing airborne contamination.
c. Eye protector should be used if necessary.
d. Gloves should be used for avoiding directly touching the contaminated soil.

Emergency Procedures

An emergency reporting procedure incorporating the contact telephone number will be displayed on conspicuous location at site for emergency use.

2.5 Organisation Structure

Key personnel are shown below:



3.0 Methodologies and Procedures

As the estimated quantity of metals contaminated soil is only 316.8m³, all metals contaminated soil identified within the ex-GFS building will be treated by using the same solidification plant under the Project of the Decommissioning of the Former Kai Tak Airport other than the North Apron.

3.1 Detailed Design

The cement solidification facility for the treatment of excavated soils contaminated with heavy metals will be set up on site for operation and maintenance until attainment of the soil cleanup targets. The sequence of works involved with cement solidification works are:

a) Lay 0.75mm thickness of a high-density polyethylene (HDPE) liner at the bottom of mixing pit to prevent seepage of leachate.

b) Provide temporary cover to prevent rainfall falling on the mixing pit;

c) Transfer of the contaminated soils with heavy metals to mixing pit;

d) Remove any debris, rock fragments and oversize materials from the metal – contaminated soil by the worker's visual inspection. Workers undertaking this work must wear PPE. High pressure water jet will be employed to remove the surface contaminants attached on the oversize materials. The collected surface contaminants should then be transported to mixing pit for treatment.

e) Add predetermined amount of cement, water and additives.

f) Uniform mixing of cement, water and additives.

g) Setting of soil-cement-water mixture;

h) Sampling for the TCLP and UCS tests in frequency of one sample per 50m^3 of solidified soils.

It is proposed that the treatment works of the Cement Solidification / Stabilization Process will be carried out in Area 5. The majority of the excavation and mixing works will be done by machinery i.e. backhoe. However, all workers should wear PPE and disposable gloves should be worn if any soils have to be handled. The location of the major set-up for solidification process including temporary stockpiling area, sorting area, curing area and mixing pit should refer to Layout Plan as shown in Attachment 3.

3.1.1 Profile of Existing Contaminated Soil

The extent of the heavy metal contaminants have been divided into 6 zones. Those areas contaminated with heavy metals are summarised in Table 3.1a below:

Table 3.1a Estimated Volume of Metal Contaminated Soil for Solidification / Stabilization

Zone I.D.	Sample I.D.	Depth (m BBC)	Contaminant	Concentration (mg/kg)	Estimated Contamination Extent		
					Vertical (m BBC)	Horizontal (m^2)	Estimated Volume (m^3)
B	GFSA-20	1	Zinc	2000	0.5-1.5m	36	36
C	GFSD-03	1	Cadmium	6	0.5-1.5m	36	36
			Lead	480			
			Zinc	2300			
E	GFSD-04	2.2-2.65	Cadmium	15	1.7-4.15	36	88.2
			Lead	430			
		3.2-3.65	Lead	300			
F	GFSA-17	3.25-3.7	Lead	200	2.75-4.2	36	52.2
G	GFSA-22	3.25-3.7	Copper	150	2.75-4.2	36	52.2
H	GFSD-03	3.3-3.75	Cadmium	510	2.8-4.25	36	52.2
			Nickel	410			
			Cobalt	1200			
Total Volume of Estimated Contaminated Soil = 316.8m^3							

Remarks:
BBC = Below Base of Existing Concrete pavement

Based on the information (Area and Depth) as stipulated in the CAR/RAP; the total amount of soil contaminated with heavy metal that requires solidification is estimated approx. 316.8m^3. The actual quantity of contaminated soils will be subject to final excavation depth as determined by the confirmatory soil sample.

3.1.2 Pilot Trials

The pilot test is to assess the required binding agent, water and lime to produce a homogenous solidified / stabilized mass and to provide details to assist in determining the following design parameters:

- Portland cement will be selected as the binding agent for solidification process.
- Various ratios of cement, that is 5%, 7% and 10% weight per weight (w/w) should be added to the soil samples.
- The soil samples mixed with the various percentage of cement should then be left to cure (e.g. 3 to 7 days).
- The water content (typically ranges between 10 and 15%) will be added to the soil samples. The exact amount of water to be added in the mixing process will be subject to the findings of the pilot trials.
- Once the curing has been completed, the solidification soils will be sent for TCLP and UCS tests of not less than 1 MPa.

Based on the TCLP and UCS results, a suitable mixture and feasible curing time should have been established. The test report for the pilot test will be submitted to the Engineer prior to full scale operation of the solidification process.

3.1.3 Site Preparation for Full Scale of Solidification Process

- The treatment works of the Cement Solidification / Stabilization Process will be carried out in the proposed decontamination works area in Area 5.
- The HDPE impermeable membrane / sheet will be placed at the bottom of mixing pit for the durations of the Solidification Treatment Process.
- Concrete bund or sand bags will be constructed or placed along the perimeter of the mixing pit to prevent leachate from escaping out of the cement solidification facility.
- Before transferring untreated soil to the mixing area, oversize materials such as concrete debris and rock fragment within the soil contaminated is required to be segregated as stated in clause 26.35(1) of Particular Specification.

All oversize materials will be used as filling material for backfilling or reuse on site. Sorted materials will be collected and transferred to the mixing pit for cement solidification. The concrete debris and rock fragment of larger than 200mm diameter should be screened out and high pressure water jet will be employed to remove the surface contaminants attached on the oversize materials. The collected surface contaminants should then be transferred to mixing pit for treatment.

3.2 Confirmation Soil Sampling and Testing for Soil Excavation

3.2.1 Sampling Requirement

- Before excavation, pre-sampling of the sidewall samples at the middle depth of the contaminated soil will be proposed in order to determine the extent of the contamination. If the analytical results are below the action levels; the pre-sampling results will be considered as the final results of the confirmation samples.

- After excavation, the confirmation sampling and testing will be carried out at the pre-determined depth in order to ensure that all contaminated soil has been excavated. The soil samples will be dispatched to the approved laboratory for testing.

- If the analytical results of the confirmation samples exceed the action levels, further excavation with 1m increment laterally or 0.5m increment vertically or the increment as determined by the Engineer.

- The Concerned Action Levels for Soil Excavation will be refer to the Table 3.2 below:

Table 3.2 Concerned Action Levels for Soil Excavation

Contaminant	**Action Level (mg/kg)**
Lead	150
Copper	100
Cadmium	5
Nickel	100
Cobalt	50
Zinc	500

3.2.2 Verification and Sampling Testing

- 1 per 10 soil samples of the parallel samples for spot checking on the confirmation sampling and testing will be collected by ET.
- The parallel samples will then dispatched to the independent accredited laboratory employed by ET for testing.
- About 1 kg of soil samples will be taken and placed into appropriate clean glass bottles or sampling containers provided by the laboratory for parallel testing on the confirmation sampling.

3.3 Performance Sampling and Testing for Solidification / Stabilization

Upon completion of the cement stabilization process, performance test including unconfined compressive strength (UCS) test and toxicity characteristic leaching procedure (TCLP) will be conducted to demonstrate the achievement of the stabilization target. The sampling frequency for the TCLP and UCS tests will be one sample per 50m³ of solidified soils. Each sample will be a composite of five random sub-samples from the 50m³ solidified soils. 1 per 10 soil samples for verification samples for spot checking of the soil treated by cement solidification process will be collected by ET. The solidified soils which have attained the TCLP and UCS tests will be transported to designated stockpile area in Area 5. In case the solidified soils fail the TCLP test or can not achieve the UCS test (1 MPa), solidified soils will be broken up and returned to the mixing pit. The details of Sampling and Testing requirements should refer to Sampling and Testing Plan for Cement Solidification as shown in Attachment 2.

3.3.1 Event and Action Plan for Confirmation Sampling / Testing for Solidification / Stabilization

In case of the cleanup targets or unconfined compressive strength have not been achieved. The Event and Action Plan for confirmation sampling / testing for the solidification work is outlined as below Table 3.3.

Table 3.3 Event and Action Plan for Confirmation Sampling / Testing for Solidification / Stabilization

Event	Action
Respective cleanup targets of any confirmation samples have not been attained.	The treated material shall be crushed and returned to the solidification / stabilization until the respective cleanup targets have been achieved.
Unconfined compressive strength of 1 MPa has not been attained for all confirmation samples.	The treated material shall be crushed and returned to the solidification / stabilization until the respective cleanup targets have been achieved.

3.4 Storage Facility

All solidified soils which have attained the TCLP tests will be transported to designated area in Area 5 (45m x 45m) as shown in drawing no. 60022408/15/1003A (Attachment 3). The designated stockpiling area for cement s/s facility should be concrete-paved or lined with impervious floor membrane and shall have its perimeter constructed of a continuous, impermeable, concrete bund or sand bags in order to avoid any contaminated leachate from migrating out of the area.

3.5 Operational Process

- Initial screening of the oversize materials that has come directly from the excavation areas on site will be undertaken to remove large rocks and stones and to break up soil lumps.

- The soils will be placed into a watertight mixing pit for cement batching and mixing. The chosen percentages (as determined by the pilot test) of cement, additives and water will be added to the soils. The soil / cement / water will be uniformly mixed within the pit by means of backhoe.

- Once the soil had been mixed with the cement, it will be placed in designated area for curing. This area must be concrete or have an impermeable surface.

- All batches must be given an identification number and dated.

- After the curing time established during the pilot trials has been reached, a composite sample should be collected from the relevant batch for analysis of TCLP and UCS testing.

- Any pile of solidified soils that does not meet the cleanup target will be crushed and returned to Solidification Treatment. The cement solidification process should be repeated and the re-treated pile will be tested again until attainment of TCLP cleanup target.

- The treated soils which have attained the clean up targets will be reused as fill materials / backfilled on site at a depth of not less than 1 meter above the groundwater level and be covered by 1 meter of clean fill.

4.0 Handling Procedures for the Spillage of Contaminated Soil

4.1 Any accidental spillage of contaminated soil during excavation or transport, immediate clean up and removal of the contaminated soil will be carried out.

4.2 Visual inspection will be carried out to check the extent of contamination and verify the complete removal / clearance of spilled soils.

5.0 Environmental Mitigation Measures

5.1 Mitigation Measures for Dust Control

As identified in the EIA report, the Project would not cause any adverse air quality impacts. However, regular site inspection is required in order to monitor the air quality impacts. The Mitigation Measures for Dust Control during the Soil Excavation shall also refer to Section 10.1 of the Remediation Method Statement for biopiling and the following good site practices should be followed:

5.1.1 The mixing pit should be sheltered and the area of excavated contaminated soil unloading / loading should be provided with a shed to avoid dust emissions.

5.1.2 The loading, unloading, handling, transfer or storage of other materials which may generate airborne dust emissions such as untreated soil and oversize materials and stabilized soil stockpiled in the designated handling area, should be carried out in such a manner to prevent or minimise dust emissions. These materials should be adequately wetted prior to and during the loading, unloading and handling operations.

5.1.3 The top layer soils shall be sprayed with fine misting of water immediately before the excavation.

5.1.4 Stockpiling site(s) shall be lined with impermeable sheeting and bunded. Stockpiles shall be fully covered by impermeable sheeting to reduce dust and other air pollutants emission.

5.1.5 Misting for the dusty material shall be carried out before being loaded into the vehicle.

5.1.6 Any vehicle with an open load carrying area shall be have properly fitted side boards.

5.1.7 Material having the potential to create dust shall not be loaded from a level higher than the side and tail boards and shall be dampened and covered by a tarpaulin.

5.1.8 The tarpaulin shall be properly secured and shall extent at least 300mm over the edges of the sides and tailboards. The material shall also be dampened if necessary before transportation.

5.1.9 Every stock of more than 20 bags of cement should be covered entirely by impervious sheeting placed in an area sheltered on the top and the three sides.

5.2 Noise Mitigation Measures for Construction Noise Impacts

As identified in EIA Report of Register No. AEIAR-130/2009, no mitigation measures and noise monitoring are required. However, the following good site practices should be implemented:

5.2.1 Only well-maintained plant should be operated on-site and plant should be serviced regularly during the construction program;

5.2.2 Mobile plant, if any, should be sited as far away from NSRs as possible;

5.2.3 Machines and plant (such as trucks) that may be in intermittent use should be shut down between works periods or should be throttled down to a minimum;

5.2.4 Plant known to emit noise strongly in one direction should, wherever possible, be orientated so that the noise is directed away from the nearby NSRs;

5.2.5 Material stockpiles and other structures should be effectively utilised, wherever practicable, in screening noise from on-site construction activities.

5.2.6 Construction Noise Permit should be applied for operation of powered mechanical equipment after normal working hours.

5.2.7 Fitting approved silencers to power operated plants.

5.3 Water Quality Mitigation Measures

Water quality impact arising from the cement solidification works would be minor. However the following mitigation measures to control the leachate and contaminated runoff should be implemented.

5.3.1 All leachate from the temporary stockpiling area should be diverted to leachate collection tank and avoid runoff outside the foundation of the stockpiling area.

5.3.2 The leachate generated from the cement solidification/stabilization process will be treated in the centralized wastewater treatment unit and reused on site for dust suppression or cement mixing in the cement solidification/stabilization process.

5.3.3 Routine inspection and maintenance of concrete bund or sand bags should be carried out to avoid potential leakage or seepage of leachate from the temporary stockpiling area.

5.3.4 Suspend the operations during periods of heavy and prolonged rainfall in order to minimize the generations of excessive leachate from the solidification operations.

5.3.5 Mixing for cement solidification will be carried out in a watertight concrete structure such that the water table will not cause any leaching of the excavated contaminated soils into underlying soils and groundwater.

5.3.6 An impermeable membrane / sheet should be placed at the bottom and sidewalls of mixing pit during the solidification process.

5.4 Precautionary measures, health and safety of workers

In order to minimise the potentially adverse effects on the health and safety of construction workers and the impacts arising from the handling of potentially contaminated materials, the following measures should be implemented.

5.4.1 Construction workers' potential contact with contaminated materials should be minimised by using bulk earth-moving excavator equipment;

5.4.2 Exposure to any contaminated materials should be minimised by wearing appropriate clothing and personal protective equipment such as gloves and masks (when interacting directly with suspected contaminated material), providing adequate hygiene and washing facilities and preventing smoking and eating during such activities.

5.4.3 Stockpiling of contaminated excavated materials on site should be avoided as far as possible.

5.4.4 The use of contaminated soil for landscaping should be prohibited unless there is proper treatment of soil.

5.4.5 Vehicles containing any excavated materials should be suitably covered to limit potential dust emissions or contaminated wastewater run-off, and truck bodies and tailgates should be sealed to prevent any discharge during transport or during wet conditions.

5.4.6 Only licensed contractor should be used to collect leachate or chemical waste for disposal.

5.4.7 Speed control for the trucks carrying contaminated materials should be enforced;

5.4.8 The necessary waste disposal permits should be obtained, as required, from the appropriate authorities, in accordance with the Waste Disposal Ordinance (Cap 354), Waste Disposal (Chemical Waste) (General) Regulation (Cap 35), as required.

5.4.9 Silt traps should be used to reduce the impact to drainage caused by suspended solids arising from disturbed ground, or any construction materials such as cement and gravel. Wastewater, surface runoff or extracted groundwater should be disposal of in accordance with the Water Pollution Control Ordinance (WPCO).

5.4.10 If all confirmatory test results meet the cleanup target, the exposed pits will be backfilled immediately to prevent precipitation from failing on the pits.

5.4.11 Personal Protective Equipment (PPE) will be used by site worker during soil excavation / free product / skimming, such as coverall, respirator, liquid tight gloves and chemical resistant jackboot....etc.

5.4.12 The temporary fencing or warning ribbon will be provided to the boundary of excavation, slope crest and temporarily stockpiled areas to restrict unauthorized entrance.

5.4.13 Suitable training on handling contaminated waste will be provided to site workers.

5.4.14 Provide written information and training on safety for site workers.

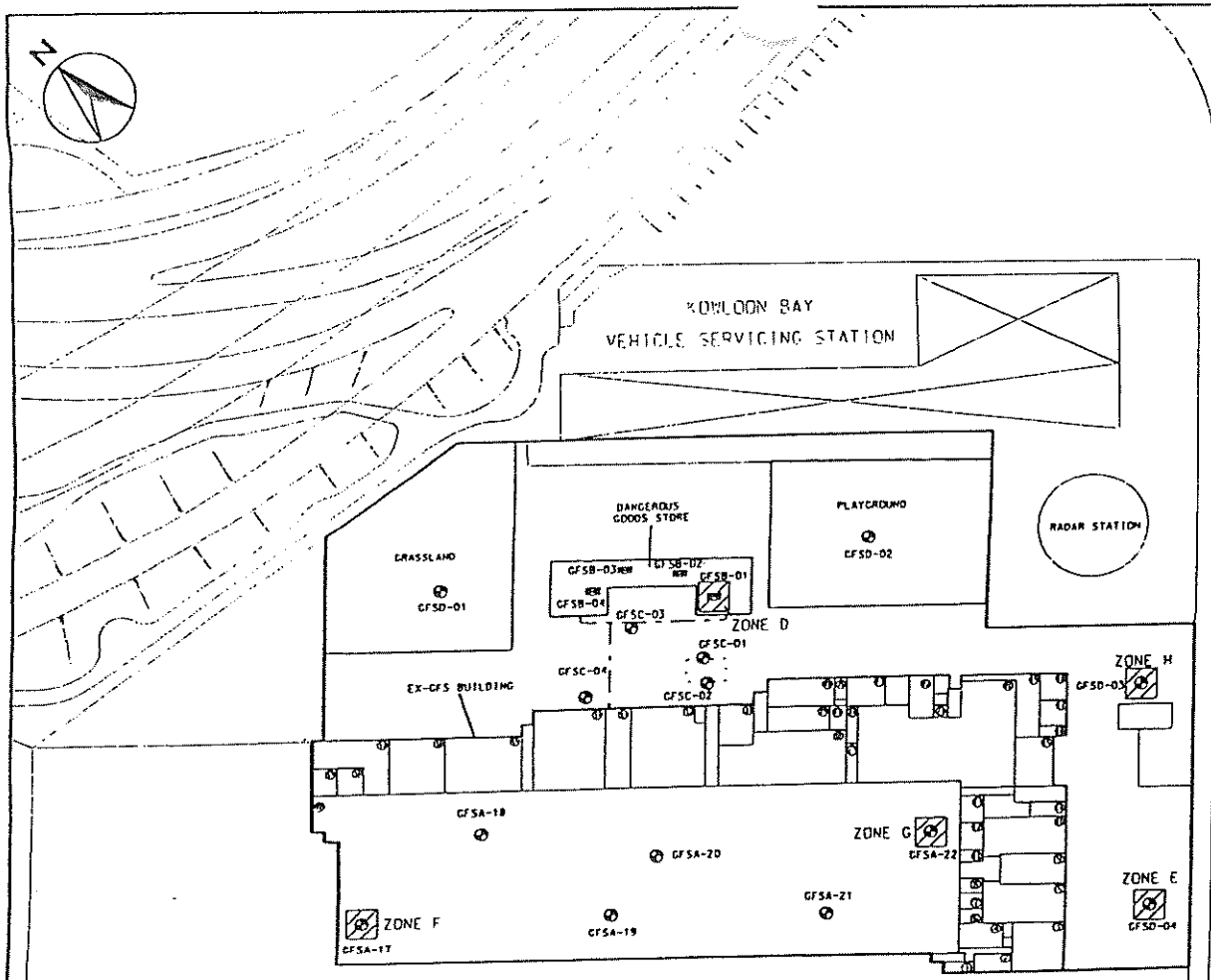
5.4.15 Maintain a hygienic working environment.

5.4.16 Provide first aid training and materials to site workers.

5.4.17 Other than the existing barging points at the runway, there is no planned concurrent work in the vicinity of the South Apron before end 2009. In order to safeguard the users of the access road to the barging points, the access road across the site is isolated by the two rows of chain link fence along the road, and a buffer distance of no less than 20 meters between the access road and the nearest Contamination Zone will be maintained.

ATTACHMENT 1

Location of Decontamination Works Area (Drawing nos. 3.3 and 3.4)



X-GFS BUILDING LAYOUT DESCRIPTION

(REFERENCE TO DRAWINGS PROVIDED BY ARCH.S.D (DRAWING NOS. AW-A-2 TO AW-A-41)

1. AHU ROOM
2. PASSENGER WAITING ROOM
3. ROLE STORE
4. AIR SURVEY EQUIPMENT STORE
5. ELECTRICAL WORKSHOP
6. STORE
7. CLEANING ROOM
8. CALIBRATION ROOM
9. INSTRUMENT WORKSHOP
10. RADIO WORKSHOP
11. STORE
12. NI-CAD BATTERY ROOM
13. LEAD ACID BATTERY ROOM
14. FLIP WORKSHOP
15. VISITOR RECEPTION AREA
16. TRANSPORT POOL
17. STATIONERY GENERAL STORE
18. UNIFORM AND ACCUTREMENT STORE
19. PROCUREMENT OFFICE
20. AIRCRAFT BONDED STORE
21. LIFT MACHINE ROOM
22. RECEIVING QUARANTINE STORE
23. DESPATCH QUARANTINE STORE
24. TYRE AND RUBBER PARTS STORE
25. MAINTENANCE CONSUMABLES STORE
26. CARBON DIOXIDE CHARGING EQUIPMENT ROOM
27. STORE
28. TRANSFORMER ROOM
29. LV SWITCH ROOM
30. SURVIVAL EQUIPMENT STORE AND PARACHUTE LOFT
31. GENERATOR ROOM
32. METAL / MACHINE WORKSHOP
33. WELDING WORKSHOP
34. COMPONENT OVERHAUL WORKSHOP
35. ENGINE / MODULE WORKSHOP
36. ROLE EQUIPMENT ENGINEERING
37. GROUND EQUIPMENT WORKSHOP
38. TECHNICAL DEMONSTRATION ROOM
39. MEDICAL CENTRE
40. HANGER

Zone I.D.	Sample	Depth (m BBC)	Contaminant	Concentration (mg/kg)	Estimated Contamination Extent		
					Vertical (m BBC)	Horizontal (m^2)	Estimated Volume (m^3)
Exceedances found in the soil samples collected below 1m to 6m BBC							
D	GFSB-01	1.65	TPH	2875	1.15-2.15	36*	36
E	GFSD-04	2.2-2.65	Cadmium	15	1.7-4.15	36	88.2
			Lead	430			
		3.2-3.65	Lead	300			
F	GFSA-17	3.25-3.7	Lead	200	2.75-4.2	36	52.2
G	GFSA-22	3.25-3.7	Copper	150	2.75-4.2	36	52.2
H	GFSD-03	3.3-3.75	Cadmium	510	2.8-4.25	36	52.2
			Nickel	410			
			Cobalt	1200			

Remarks:

BBC= Below Base of Existing Concrete Pavement

* Due to space constraint within the D.G. Store, 6m X 6m square centered at GFSB-01 may not be feasible. The frame for excavation would have to be adjusted on site based on the actual site condition.

LEGEND

- PROPOSED CONTAMINATED ZONE FOR EXCAVATION
- AS-BUILT BOREHOLE LOCATION
- AS-BUILT TRIAL PIT LOCATION
- ASSESSMENT AREA OF EX-GFS BUILDING
- UNDERGROUND FUEL TANK
- PIPE TRENCH

MAUNSELL | AECOM

Agreement No. CE 35/2006 (CE)
Kai Tak Development Engineering Study cum Design and Construction of Advance Works-Investigation, Design and Construction

LOCATIONS OF PROPOSED CONTAMINATED ZONES FOR EXCAVATION (D-H)

SCALE	1:1000	DATE	FEB 08
CHECK	ELYC	DRAWN	POHM
JOB No.	60022503	DRAWING No.	3.4
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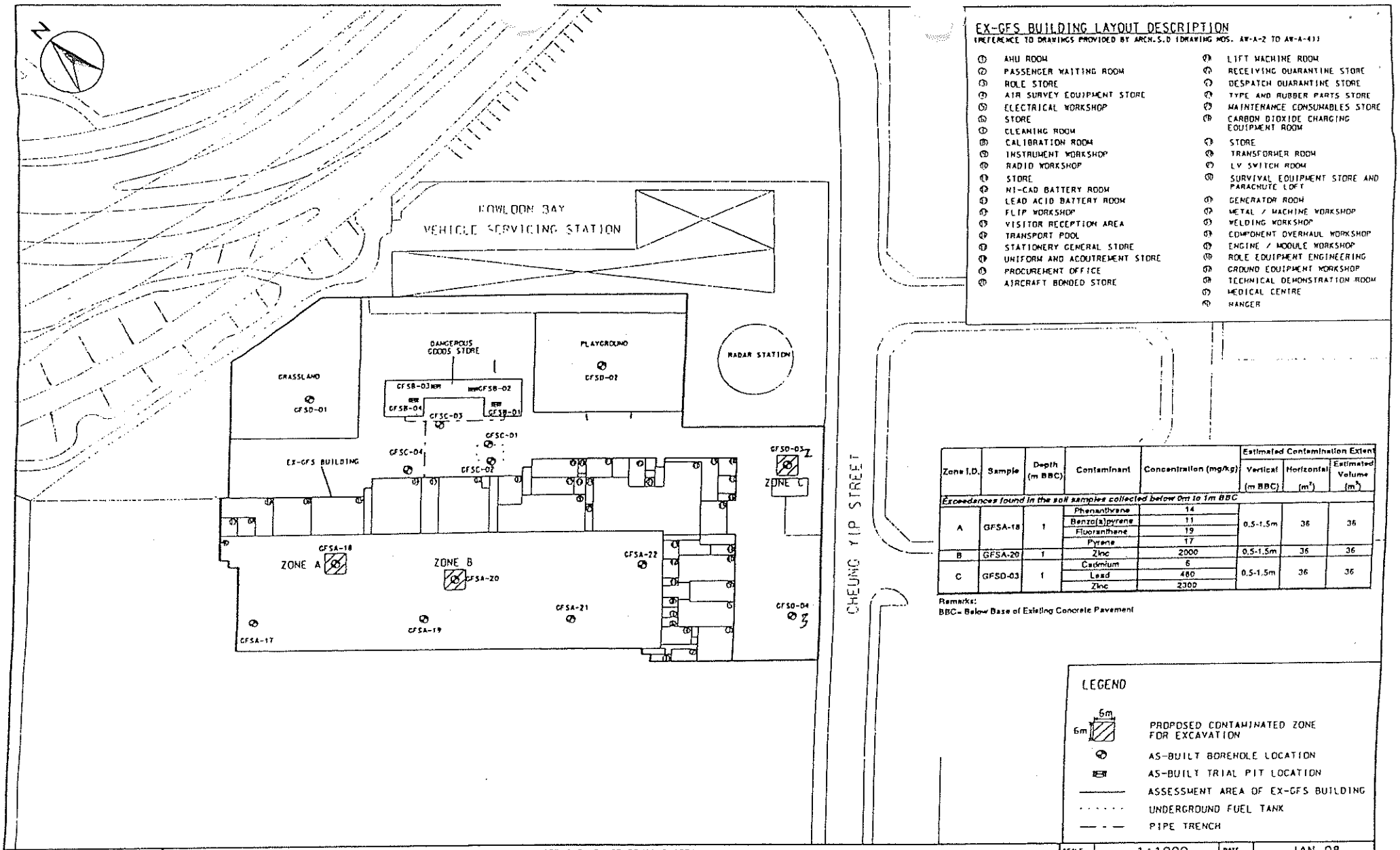

EX-GFS BUILDING LAYOUT DESCRIPTION

(REFERENCE TO DRAWINGS PROVIDED BY ARCH.S.D (DRAWING NOS. AW-A-2 TO AW-A-43))

1. AHU ROOM
2. PASSENGER WAITING ROOM
3. ROLE STORE
4. AIR SURVEY EQUIPMENT STORE
5. ELECTRICAL WORKSHOP
6. STORE
7. CLEANING ROOM
8. CALIBRATION ROOM
9. INSTRUMENT WORKSHOP
10. RADIO WORKSHOP
11. STORE
12. NI-CAD BATTERY ROOM
13. LEAD ACID BATTERY ROOM
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20. AIRCRAFT BONDED STORE
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23. DESPATCH QUARANTINE STORE
24. TYPE AND RUBBER PARTS STORE
25. MAINTENANCE CONSUMABLES STORE
26. CARBON DIOXIDE CHARGING EQUIPMENT ROOM
27. STORE
28. TRANSFORMER ROOM
29. LV SWITCH ROOM
30. SURVIVAL EQUIPMENT STORE AND PARACHUTE LOFT
31. GENERATOR ROOM
32. METAL / MACHINE WORKSHOP
33. WELDING WORKSHOP
34. COMPONENT OVERHAUL WORKSHOP
35. ENGINE / MODULE WORKSHOP
36. ROLE EQUIPMENT ENGINEERING
37. GROUND EQUIPMENT WORKSHOP
38. TECHNICAL DEMONSTRATION ROOM
39. MEDICAL CENTRE
40. HANGER

Zone I.D.	Sample	Depth (m BBC)	Contaminant	Concentration (mg/kg)	Estimated Contamination Extent		
					Vertical (m BBC)	Horizontal (m^2)	Estimated Volume (m^3)
Exceedances found in the soil samples collected below 0m to 1m BBC							
A	GFSA-18	1	Phenanthrene	14	0.5-1.5m	36	36
			Benzo(a)pyrene	11			
			Fluoranthene	19			
			Pyrene	17			
B	GFSA-20	1	Zinc	2000	0.5-1.5m	36	36
C	GFSD-03	1	Cadmium	6	0.5-1.5m	36	36
			Lead	480			
			Zinc	2300			

Remarks:
BBC= Below Base of Existing Concrete Pavement

LEGEND

- 6m x 6m — PROPOSED CONTAMINATED ZONE FOR EXCAVATION
- AS-BUILT BOREHOLE LOCATION
- AS-BUILT TRIAL PIT LOCATION
- ASSESSMENT AREA OF EX-GFS BUILDING
- UNDERGROUND FUEL TANK
- PIPE TRENCH

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Maunsell Consultants Asia Ltd

AGREEMENT NO. CE 35/2006 (CE)
KAI TAK DEVELOPMENT ENGINEERING STUDY CUM DESIGN AND CONSTRUCTION OF ADVANCE WORKS-INVESTIGATION, DESIGN AND CONSTRUCTION

LOCATIONS OF PROPOSED CONTAMINATED ZONES FOR EXCAVATION (A-C)

SCALE	1:1000	DATE	JAN 08
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ATTACHMENT 2

Sampling and Testing Plan for Cement Solidification

KIN WING CONSTRUCTION CO., LTD.

Sampling and Testing Plan

for

Cement Solidification

Contract No. : KL/2008/02

CONTENTS

Section

Attachment

1.0 Introduction

Upon completion of the cement solidification process, performance test including unconfined compressive strength (UCS) test and toxicity characteristic leaching procedure (TCLP) shall be conducted to demonstrate the achievement of the solidification target. The solidified soil samples will be broken into small pieces with maximum size of 250mm. The sample preparation method of USEPA Method 1311 will be followed for the TCLP analysis.

The purpose of this Cement Stabilization Sampling and Testing Plan is to outline the requirement and procedure of the soil sampling and testing to be followed. The QA/QC requirement and the reporting of the monitoring results will also be highlighted.

2.0 Sampling Plan

2.1 Sampling Requirement

The soil sampling requirement for stabilized soil has been identified as a minimum density of 1 sample per 50m^3 soil for each of the solidified soils after Solidification Treatment. Each solidified sample will be taken in a composite of 5 random sub-samples. A manageable size of 250g solidified soil for each composite sample will be taken and placed into appropriate clean glass bottles for testing in order to ensure unbiased composite sample to be collected. The solidified soil sample will be broken up to small pieces with longest dimension of 10cm with the maximum surface area of grain size should be equal to or less than 3.1cm^2 in accordance with the USEAP Method 1311.

2.2 Sampling Method

Soil mix samples shall be collected using hand tools. Backhoe will be employed to facilitate the sampling process if necessary. In summary the following procedures will be used :

- Manual wash and scrub ?? soil sampling equipment with non-phosphate detergent ;
- Distilled water rinsing of ;?? soil sampling equipment ;
- Air drying of sampling equipment ;
- Use of disposable latex gloves for collection of each sample, to minimize any cross-contaminated ; and
- Chain-of-custody tracking of samples.

The stabilized soil samples will be sent to the approved laboratory for TCLP and UCS testing after 3 days for setting. For each sample, a manageable size of 0.2-0.5kg soil sample shall be taken and placed into appropriate clean glass bottles or sampling containers for TCLP test and into 100mm x 100mm x 100mm mould for UCS test (provided by the laboratory) immediately after collection. Samples shall be dispatched to a HOKLAS accredited laboratory for analysis following sampling. All samples shall be handled under chain-of-custody protocols and relinquished to the laboratory representative at the sampling site or a location specified by the laboratory. A standard form of chain of custody is given in Appendix 1 (Chain of Custody – Cement Stabilization).

2.3 Sample Identification Protocol

Given the large number of samples that will be collected from each pile of stabilized soil, it is important to uniquely identify each sample such that it's origin can be identified. For this reason, a sample identification protocol is required whereby the sample number and sampling date are identified. The nomenclature for the unique sample number is demonstrated through the following example :

B##-DDMMYY-T#

Where B## = Sample No. (i.e. B02 means soil sample taken at the 2nd batch of 50m³ stabilized soil of the sampling date)

DDMMYY = Date of sampling (i.e. 030508 means sample taken on 3rd May 2008)

T# = Test identification

T1 = **UCS, Independent laboratory**

T2 = **TCLP, Independent laboratory**

3.0 Testing Plan

The testing parameters and testing method are tabulated as in Table 3.1.

Table 3.1 Summary of Stabilized Soil Testing

Pararmeters	**Reference Method**
Cadmium	USEPA Method 1311
Cobalt	
Copper	
Lead	
Nickel	
Zinc	
Unconfined Compressive Strength (UCS)	USEPA guidelines (1986) – Handbook of Stabilization / Solidification of Hazardous Wastes, EPA/540/2-86-00

Notes : 1) Subject to review depending on the testing method used by the independent laboratory

4.0 Quality Assurance/Quality Control (QA/QC)

Samples representative of field conditions will be collected using soil sampling procedures summarized in Section 2.2. Samples will be labelled according to procedures outlined in Section 2.3. All sample containers will be provided by the contracted laboratory, who guarantee their sterilisation and preservation contents.

The following QA/QC samples will be submitted to the contracted lab as part of the solidification process soil sampling :

- One field duplicate soil sample of 1 per 10 soil samples for the full suite of analyses.
- One water field blank of 1 per 10 soil samples for the full suite of analyses.
- One equipment blank of 1 per 10 soil samples for the full suite of analyses.

- One parallel soil sample of 1 per 10 soil samples for the full suite of analyses.

Field duplicate samples are designed to test the laboratory's performance and their ability to reproduce results. Field and equipment QA/QC samples are designed to help identify potential sources of external sample contamination and to evaluate potential error introduced by sample collection and handling.

Field duplicates are collected by obtaining a soil sample from one sample location, followed by homogenising it in a decontaminated stainless steel bowl. The homogenised mixture is than split into two parts, and a soil sample collected from each. Two clean sample jars are filled and labelled with different sample numbers and are submitted to the laboratory for the same suite of analyses.

Collection of field blanks is intended to check for the presence of contaminants introduced in the air during sample collection. A water sample, provided by the laboratory is shipped from the lab to the field. The water sample is opened and is left open during sample collection and is then closed and shipped back to the laboratory for analysis. The same parameters that are being analysed for the soil samples will be analysed in the field blank water samples.

A equipment blank sample is used to test the equipement decontamination procedures in the field. An equipment blank, otherwise called an equipment rinse sample, will be collected from the decontaminated sampling equipment before it is used to obtain the actual sample. Following sample collection, the equipment shall be decontaminated. Deionized water will then be rinsed over the decontaminated sample apparatus and transferred to a sample bottle. The same parameters that are being analysed for the soil samples will be analysed in the equipment rinse samples.

A parallel sample for spot checking on the solidified soil is collected by ET. The sample will be dispatched to the independent accreditied laboratory employed by ET for testing.

5.0 Results Interpretation

The soil testing results shall be compared with the TCLP Limits as shown in the following Table 5.1 and have the minimum UCS requirement of 1 Mpa. The following arrangement should be followed :-

- If the test result fails, re-test of the same batch of stabilized soil sample will be arranged ; and
- If the test result of re-tested sample fails, the whole batch of stabilized soil (~50m^3) will be broken up and delivered back to the mixing process for "re-treatment".

If the soil testing results are below the limits and meet the minimum strength requirement, the cement stabilization process is deemed complete. Otherwise, the stabilization process shall be repeated until all criteria are satisfied.

Table 5.1 Universal Treatment Standards for Concerned Heavy Metals

Area	**Excavation Zone**	**Contaminant**	**Cleanup Target**
Ex-GFS Building	C,E,F	Lead	0.75 mg/L as TCLP
	G	Copper	7.8 mg/L as TCLP
	C,E,H	Cadmium	0.11 mg/L as TCLP
	H	Nickel	11.0 mg/L as TCLP
	H	Cobalt	Not Available
	B,C	Zinc	4.3 mg/L as TCLP

Remarks : The cleanup target lsited in Table 4.3 of Appendix 5.2b of the EIA Report for Kai Tak Delevopment is adopted here in Table 5.1.

Appendix 1

Chain of Custody – Cement Stabilization

CHAIN OF CUSTODY DOCUMENTATION

H 004055

ALS Laboratory Group

CLIENT:	SAMPLER:
ADDRESS / OFFICE:	MOBILE:
PROJECT MANAGER (PM):	PHONE
PROJECT ID:	EMAIL REPORT TO:
SITE: P.O. NO.:	EMAIL INVOICE TO: (if different to report)
RESULTS REQUIRED (Date): QUOTE NO.:	ANALYSIS REQUIRED including SUITES (note - suite codes must be listed to attract suite prices)

FOR LABORATORY USE ONLY

COOLER SEAL (circle appropriate)

Intact: Yes No N/A

SAMPLE TEMPERATURE

CHILLED: Yes No

COMMENTS / SPECIAL HANDLING / STORAGE OR DISPOSAL:

Notes: e.g. Highly contaminated samples
e.g. "High PAHs expected"
Extra volume for QC or trace LORs etc.

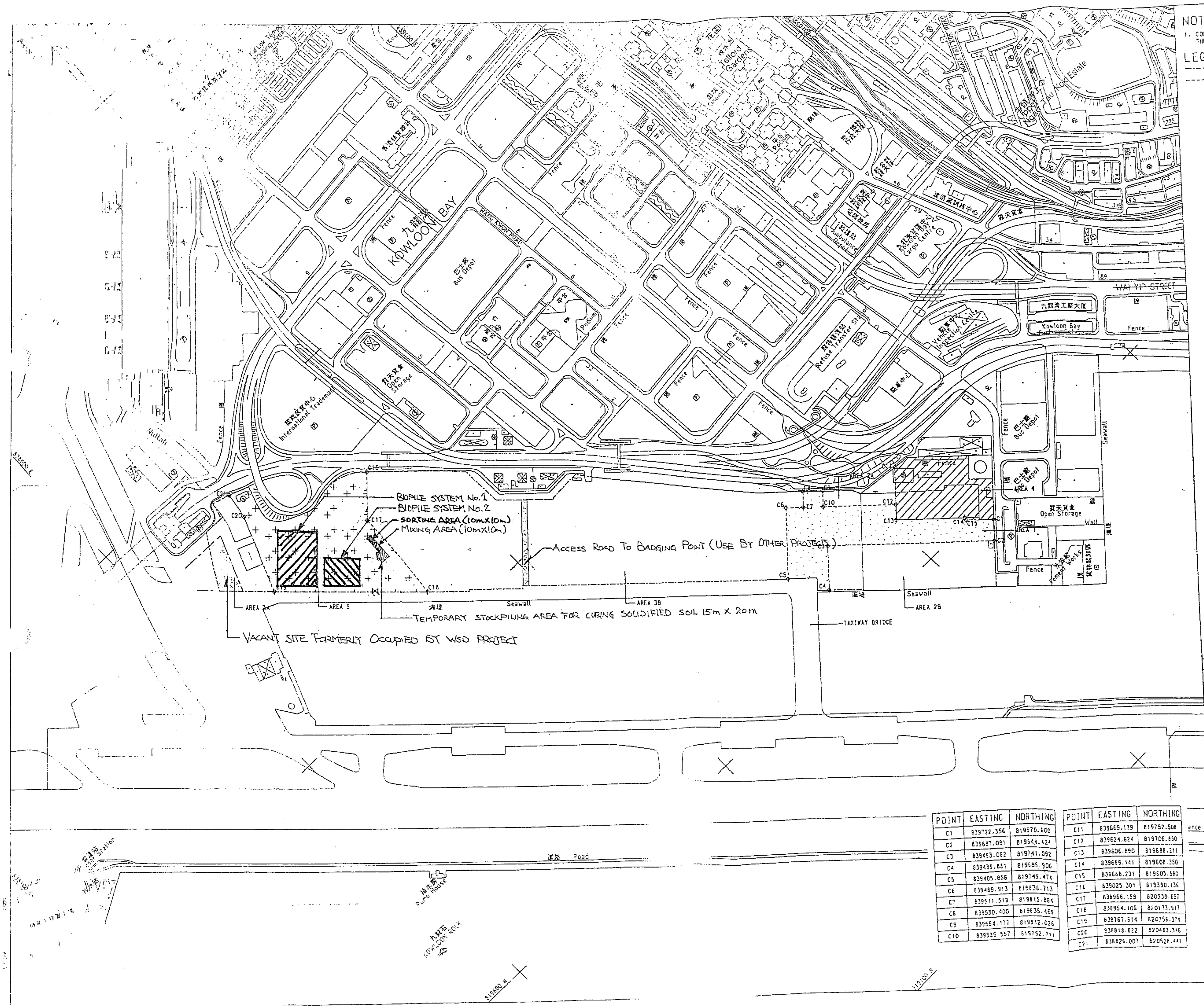
SAMPLE INFORMATION (note; S = Soil, W=Water)					CONTAINER INFORMATION	
ALS ID	SAMPLE ID	MATRIX	DATE	Time	Type / Code	Total bottles

RELINQUISHED BY:		RECEIVED BY		METHOD OF SHIPMENT
Name:	Date:	Name:	Date:	Con' Note No:
Of:	Time:	Of:	Time:	
Name:	Date:	Name:	Date:	Transport Co:
Of:	Time:	Of:	Time:	

Water Container Codes: P = Unpreserved Plastic; N = Nitric Preserved Plastic; ORC = Nitric Preserved ORC; SH = Sodium Hydroxide/Cd Preserved; S = Sodium Hydroxide Preserved Plastic; AG = Amber Glass Unpreserved;
V = VOA Vial HCl Preserved; VS = VOA Vial Sulphuric Preserved; SG = Sulfuric Preserved Amber Glass; H = HCl Preserved Plastic; HS = HCl Preserved Speciation Bottle; SP = Sulfuric Preserved Plastic; F = Formaldehyde Preserved Glass;
Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottle; ST = Sterile Bottle; ASS = Plastic Bag for Acid Sulphate Soil; B = Unpreserved Bag

ATTACHMENT 3

Location Plan of Stockpiling Area, Sorting Area and Mixing Pit (Drawing no. 60022408/15/1003A)



NOTES:

1. COORDINATES TO BE CONFIRMED ON SITE BY THE ENGINEER.

LEGENDS:

- - - - SITE BOUNDARY
- - - - DIVISION LINE BETWEEN AREAS OF THE SITE

POINT	EASTING	NORTHING
C1	839722.356	819570.600
C2	839697.091	819544.424
C3	839493.082	819741.092
C4	839439.881	819685.906
C5	839405.858	819749.474
C6	839489.913	819836.713
C7	839511.519	819815.884
C8	839530.400	819835.469
C9	839554.177	819812.026
C10	839535.557	819792.711

POINT	EASTING	NORTHING
C11	839669.179	819752.508
C12	839624.624	819706.850
C13	839606.890	819688.211
C14	839689.141	819608.350
C15	839688.231	819603.580
C16	839025.301	819390.136
C17	838966.159	820330.657
C18	838954.106	820173.517
C19	838767.614	820356.374
C20	838818.822	820483.346
C21	838826.007	820528.441

REV.	DESCRIPTION				
A	WORKING DRAWING		FMH	LLNK	MAY.
-	TENDER DRAWING		FMH	LLNK	FEB.

Civil Engineering and Development Department
土木工程拓展署
KOWLOON DEVELOPMENT OFFICE
九龍拓展處

KAI TAK DEVELOPMENT
ENGINEERING STUDY CUM DESIGN AND CONSTRUCTION OF ADVANCE WORKS-INVESTIGATION DESIGN AND CONSTRUCTION

CONTRACT NO. KL/2008/02 KAI TAK DEVELOPMENT - DECOMMISSIONING AND DECONTAMINATION WORKS AT THE SOUTH APRON OF THE FORMER KAI TAK AIRPORT

AREAS OF THE SITE

MAUNSELL | AECOM
Maunsell Consultants Asia Ltd.
茂盛(亞洲)工程顧問有限公司

DRG.NO. 圖紙編號 60022408/15/1003A

DESIGNED BY: J.L.
CONTRACT NO.: KL/2008/02
DRAWN BY: TLF
STATUS: WORKING DRAWING
SCALE: A1 1:3000 A3 1:6000
DIMENSIONS ARE IN: METRES