DETAILED PLAN FOR MONITORING IMPACTS OF CONSTRUCTION ACTIVITIES TO HKCG GAS HOLDER AND SHELL DEPOT

Contract No. DC/2008/09

Harbour Area Treatment Scheme Stage 2A

Construction of Sewage Conveyance System

from Ap Lei Chau to Aberdeen

Revision 2

CONTENTS

Appendices

Section 1 Introduction

This project is a part of the "Harbour Area Treatment Scheme Stage 2A". The Contract No. is DC/2008/09. A deep underground twin conveyance system of about 1.3 m long and 600mm diameter (drainage tunnel) from Ap Lei Chau to Aberdeen will be constructed. A continuous monitoring system would be set up to keep track on the risk of ground settlement, vibration and gas leakage for ensuring that minimal adverse impact could be induced during the course of construction.

This plan is to present the system for monitoring the impacts of construction activities to the HKCG Gas Holder and Shell LPG Depot at Ap Lei Chau, and emergency plan.

This plan shall be submitted to HKCG and Shell.

Section 2 Monitoring Plan

Total 5 nos. of settlement markers are located at Tin Wan Praya Road or close to the HKCG Gas Holder for monitoring. The location plan of monitoring points is enclosed in Appendix 1.

Total 22 nos. of settlement markers are located at Ap Lei Chau for monitoring ground settlement. Total 6 nos. of vibration check points are located at or close to Shell LPG Depot for monitoring vibration. Total 5 nos. of gas detectors are located at Shell LPG Compound for monitoring gas leakage. The location plan of monitoring points is enclosed in Appendix 1.

The monitoring frequency is shown in Table 1.

Table 1

Instrument Type	Monitoring Frequency		Influence Zone
	Standard Monitoring (outside influence zone)	Active Monitoring (within influence zone)	
Ground Settlement Monitoring	Weekly	Daily	400m
Vibration Monitoring	Weekly	Daily	400m

The monitoring report shall be submitted to HKCG and Shell on regular basis for reference.

Section 3 Ground Settlement and Vibration Monitoring

3.1 AAA Trigger Levels

The "Alert, Action and Alarm" (AAA) trigger levels for each of the monitoring instruments shall be established for developing the plan for action in case construction activities cause ground settlement and vibration.

For ground settlement monitoring, the maximum settlement within HKCG Gas Holder and Ap Lei Chau Shell Depot shall be limited to 13mm and the maximum settlement at other areas shall be limited to 25mm. For vibration limit monitoring, the maximum vibration shall be limited to 5mm/s.

The Alert level shall be set at the point where remedial measures and timing of implementation shall be developed.

The Action level shall be set at the point at which the agreed remedial measures must be implemented. The Contractor shall consider that works to be stopped subject to the review of monitoring data based on the trends of recent monitoring results.

The Alarm level is defined as the point when the estimated serviceability limit has been reached or exceeded. This level may be reached without the structure rendered inoperative or unserviceable but consideration to stop construction activities shall be made upon reaching this level. The planned remedial measures shall be fully implemented and the trend of the monitoring data and remaining construction activities reviewed. Agreement with the Engineer shall be obtained prior to resumption of the works.

Table 2 shows the AAA Trigger Levels for each monitoring elements.

Table 2

Element	Alert Level	Action Level	Alarm Level	Maximum Limit
Ground Settlement at HKCG Gas Holder and Shell Depot	7mm	10mm	13mm	13mm
Ground Settlement at Other Areas	13mm	20mm	25mm	25mm
Vibration Level	4.5mm/s	4.75mm/s	4.9mm/s	5mm/s

3.2 Procedure in Managing Exceedance of AAA Trigger Levels

In the event the AAA trigger levels for any instrument are exceeded, a Detailed Plan of Action Identifying specific remedial measures and construction works in the site area shall be developed within 48 hours of the exceedance. The implementation of the remedial actions included in this Detailed Plan of Action shall be agreed with the Engineer.

The Generalised Plan of Action for exceeding the each AAA trigger levels is follows:-

(1) Alert Level

(i) The Engineer shall be informed immediately;

(ii) HKCG or Shell shall be informed immediately (Mr. K.S. Chung/HKCG at 2765 5275 or Mr. Martin Chung/Shell at 2449 0405);

(iii) The Contractor shall submit an investigation report to describe works being undertaken, to review the instrument responses and to study the cause of undue response;

(iv) The Contractor shall review and increase the instrumentation monitoring and reporting frequency, if applicable;

(v) The Contractor shall submit a Detailed Plan of Action describing the measures to be taken should the concerned instrument reach the Action level to the Engineer for approval.

(2) Action Level

(i) The Engineer shall be informed immediately;

(ii) HKCG or Shell shall be informed immediately (Mr. K.S. Chung/HKCG at 2765 5275 or Mr. Martin Chung/Shell at 2449 0405);

(iii) The active construction works may require to suspended subject to the review of monitoring data;

(iv) The Contractor shall immediately implement the measures as defined in the Detailed Plan of Action to prevent further ground movement / groundwater drawdown / excessive vibration etc.;

(v) The Contractor shall prepare a detailed investigation report to study the cause of the exceedance;

(vi) The Contractor shall propose a Contingency Plan for the Engineer's approval in the event that Alarm value is reached or exceeded;

(vii) The Contractor shall develop an Emergency Plan for the Emergency Plan for the Engineer's approval in the event the applied contingency measures cannot control the situation;

(viii) The Contractor shall meet the Engineer to discuss the instrument response and review the effectiveness of the implemented measures.

(3) Alarm Level.

(i) Consideration shall be given to suspend all active construction works and the Engineer shall be informed immediately;

(ii) HKCG or Shell shall be informed immediately (Mr. K.S. Chung/HKCG at 2765 5275 or Mr. Martin Chung/Shell at 2449 0405);

(iii) The Contractor shall immediately implement the measures defined in the Contingency Plan;

(iv) The Contractor shall implement the measures defined in the Emergency Plan in the event that the applied contingency measures are found inadequate;

(v) The Contractor shall provide a complete report to examine the construction method and review the response of the instruments with full history of the monitoring data and construction activities;

(vi) To resume the suspended activities, the Contractor shall demonstrate to the Engineer's satisfaction that it is safe to do so with approval from the Engineer.

Section 4 Gas Leakage Detector System in LPG Depot

The gas leakage detector system in LPG Depot is described as follows:-

(1) Crowcon Xgard Type 5 – LPG gas detector (total 5 nos.) will be installed within the protected areas of the Shell LPG Compound. All LPG Gas Detectors will be installed at low level wall mount with approx. 100mm from ground level.

(2) Crowcon Gasmaster Control Panels (total 2 nos.) for LPG Gas Detectors will be located inside the existing Control Room of DSD Ap Lei Chau Preliminary Treatment Works.

(3) Measuring range of the Xgard Type 5 – LPG gas detector will be 0 to 100% LEL LPG with alarm set at 20% LEL LPG.

(4) When the preset alarm level 20% LEL LPG is detected:-

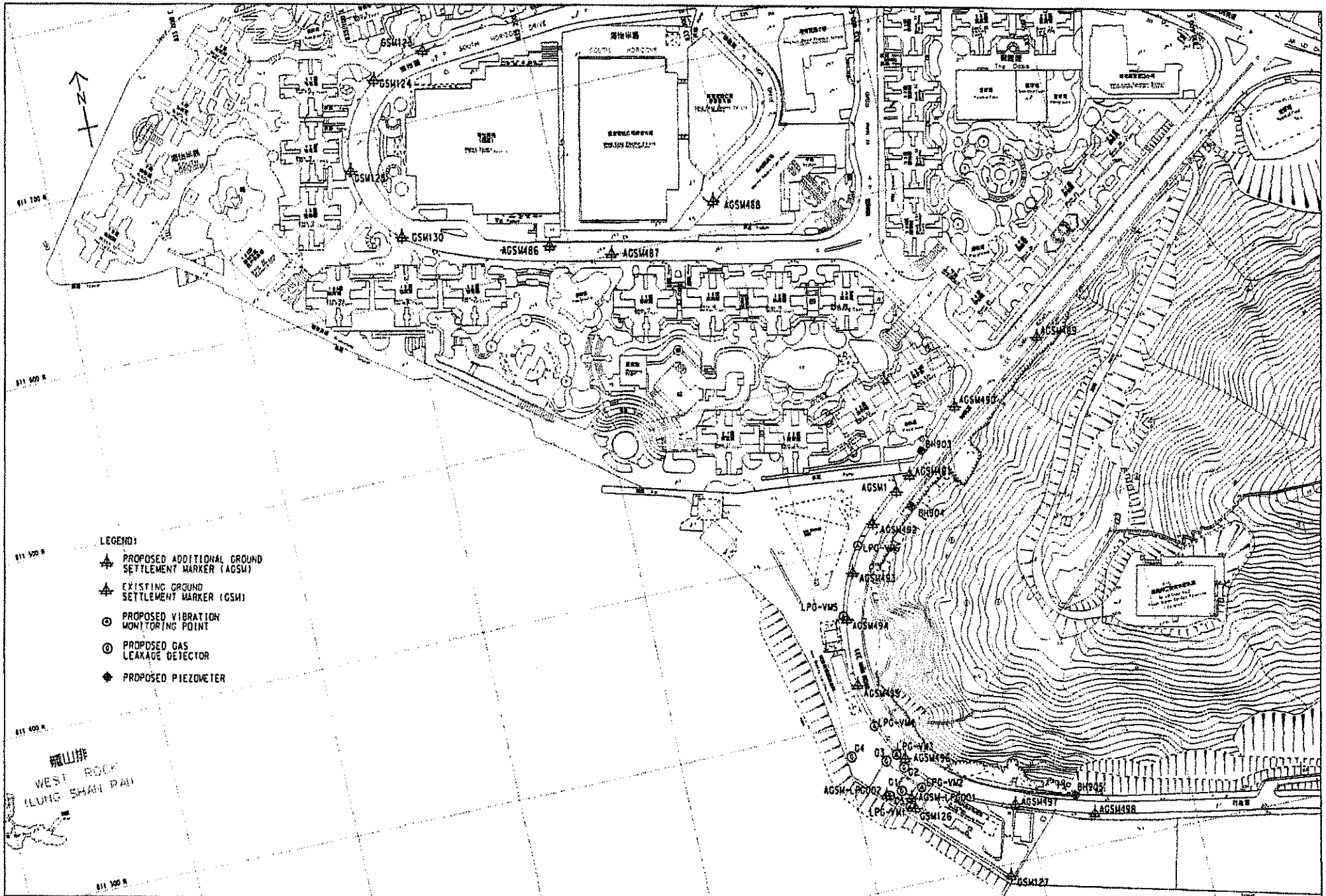
   (i) Alarm relay output will be transmitted automatically from the Crowncon Gasmaster Control Panel to the Auto Dialer for Alarm SMS transmission. Alarm SMS will first be sent to the Contractor's specified mobile phones and the Contractor will then notify Shell's emergency response team follow up action accordingly.

   (ii) Alarm can only be reset automatically when LPG gas concentration is lower than 20% LEL.

Section 5 Emergency Plan for Gas Leakage

The emergency plan for gas leakage is enclosed in Appendix 2.

APPENDIX 1



AECOM
Metcalf & Eddy – AECOM Joint Venture

CONTRACT No. DC/2008/09 – HARBOUR AREA TREATMENT SCHEME STAGE 2A
CONSTRUCTION OF SEWAGE CONVEYANCE SYSTEM FROM AP LEI CHAU TO ABERDEEN

LAYOUT PLAN FOR LOCATION OF AGSM486 TO AGSM498, AGSM1, GSM123 TO GSM127, GSM130, AGSM-LPG001, AGSM-LPG002, LPG-VM1 TO LPG-VM6, G1 TO G5, BH903 TO BH905 (SHEET 1 OF 2)

SCALE	1:2000 (A3)	DATE	04 FEB 2010
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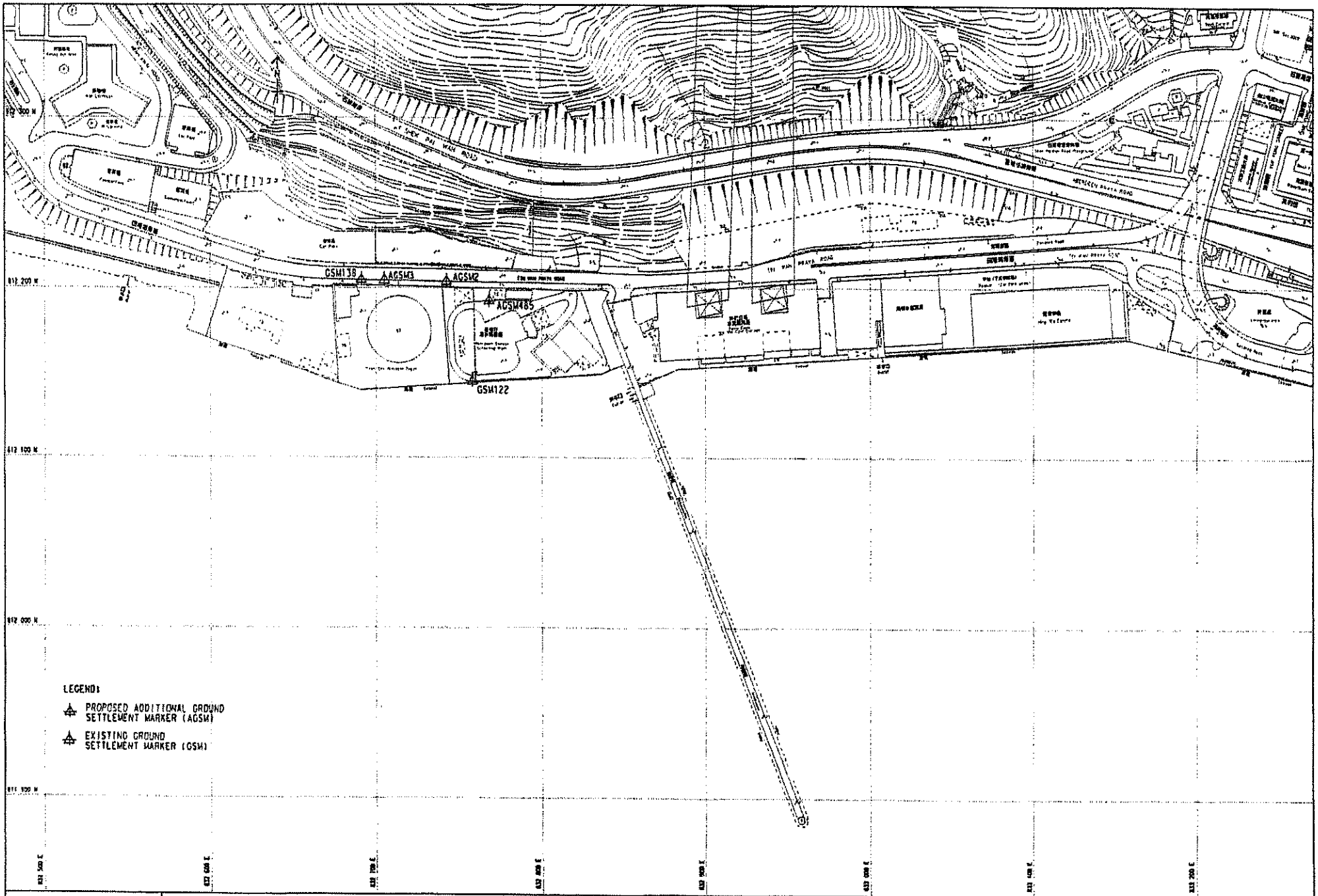

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CONTRACT No. DC/2008/09 – HARBOUR AREA TREATMENT SCHEME STAGE 2A
CONSTRUCTION OF SEWAGE CONVEYANCE SYSTEM FROM AP LEI CHAU TO ABERDEEN

LAYOUT PLAN FOR LOCATION OF AGSM2, AGSM3, AGSM485, GSM122 & GSM138 (SHEET 2 OF 2)

SCALE	1:2000 (A3)	DATE	04 FEB 2010
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SITE SKETCH NO.	90806/DC200809/SK/0019		REV -

APPENDIX 2

保華建築有限公司
Paul Y. Construction Company, Limited

CONTRACT NO.DC/2008/09
HABOUR AREA TREATMENT SCHEME STAGE 2A
CONSTRUCTION OF SEWAGE CONVEYANCE SYSTEM FROM AP LEI CHAU TO ABERDEEN

Tile : Emergency Plan

Version : 6

Version No.	Effective Date	Prepared by	Approved by
6	18.03.2010		
		Banny Poon Safety Officer	Ricky Hon Deputy Agent

Contingency Arrangement

1. Emergency Response Team

1. Mr. ***Joe Au*** (Agent) should act as Emergency Team Leader and he has to appoint emergency response team. He should clearly define the scope of work for all emergency response team members and prepare a report if and when emergency occurred. Using Form (SHE10-02)
2. Mr. Ricky Hon (Deputy Agent) will be appointed as Deputy Emergency Team Leader and take up the duty of Team Leader who is absent in the occurrence of emergency.
3. Mr. Banny Poon (Safety Officer) and Mr. Ben Lam (Assistant Environmental Officer) should act as facilitator or advisor in establishing the emergency response team.
4. The emergency response team should include the following members and their contact telephone numbers should be displayed on all site notice boards.
   - Superintendent/ Senior Foreman
   - Safety Officer
   - First Aider
   - Plant Supervisor/HDD Team Leader
   - Security Guard

2. Arrangement of emergency preparedness

2.1 The means of escape and emergency assembly point A (Main vehicle entrance of the site near Guard House) is showing on the site facilities layout plan. The plan shall be displayed on all notice boards, site offices. Adequate exit and arrow signs stuck on each means of escape.

2.2 The fire fighting facilities such as fire extinguishers, hoses shall be provided at the designated location, which mentioned on the site facilities plan.

2.3 Emergency battery-cell lighting will be provided at the emergency escape routes, main access, emergency exit and staircase on every floor of the site.

2.4 An emergency response team leaded by emergency response team leader is formed to handle emergency situations.

2.5 Availability of first-aider (Full time certified first aider) will stay on site during working hours and responsible for maintaining all first aid facilities in good condition and fulfil the legal and contractual requirements.

2.6 Emergency and medical services- the telephone list of emergency and medical services will be displayed on the safety notice boards.

2.7 The site office was designated as emergency control centre at Abd-i .

2.8 When there is an emergency occurred, the emergency response team leader should investigate the case in writing using form (SHE10-02).

3. Emergency Procedures

3.1 Emergency situations in case of Gases Leakage

A **Class (A) emergency**
Release of Town Gas from gas holder

B. **Class (B) emergency**
Leaking of gas from Shell Depot

3.2 Emergency and rescue operations for Class (A&B) Emergencies

1. When an emergency occurs on the site, for example town gas release etc.
2. To inform the site emergency response team leader immediately.
3. Emergency response team leader will determine whether the incident should be classified as an emergency case or not, depending on the seriousness of impact on the public, the nearby occupiers or the estate residents.
4. In addition, the emergency response team leader shall immediately notify the 'Emergency' to the Police by dialling 999 or directly address the urgent situation to the Town Gas at 2880 6999 or to the Shell Hong Kong at 2322 2000 when he decided it is an emergency case. If the emergency situation is arising from gas leakage, the Gas Standards Office of EMSD Shall also be informed as follows:
   - Tel: 8108 5989 for town gas leakage
   - Tel: 8105 5722 for LPG leakage
5. Emergency response team leader shall also inform our head office ***Deputy Head - Civil***, Client and our head office Safety and Environment Department immediately by phone or any other convenient means of communication available at that moment.
6. The emergency response team leader will gather all emergency response members and use site office or other suitable area as emergency control point, e.g. mechanic workshop.

7. Gong or whistle, which represents the emergency signals, is used by general labour who hits the gong or blowing the whistle while walking through the site for signalizing all personnel in the construction site.
8. The Emergency members will announce on loudspeaker as follows:-

   English version:

   Attention please! Attention please! There is an emergency incident occurred at (Simple description of the location, e.g. Site Office) the site, please evacuate to the site emergency assembly point at the open space near the Guard House and report to the person in-charge.

   Chinese version:

   請注意! 請注意!地盤（*簡述發生的正確位置如：地盆寫字樓*） 現在發生一宗緊急事故，請各同事立即離開你的工作地方，前往地盤出入口之緊急集合處，向當值人士報到。

   The above two messages will be voiced repeatedly during the emergency.

9. First aiders shall administer minor medical treatment to any injured and assist them to casualty as and when necessary. He will record the personal details of the injured.
10. An emergency response member will standby at the assembly points waiting for the arrival of the Police, Fire Service or Ambulances.
11. All the site personnel including clients (DSD) representatives, project consultants, sub-contractors' workers and visitors will leave their working position orderly to the above-mentioned emergency assembly point, then head count will be conducted by each divisional manager, client, consultant engineer and sub-contractors in charge.
12. The emergency response members will block any access to the scene of emergency to prevent any person from entering.
13. The emergency response team leader shall at any time provide updated information about the condition of emergency to all relevant parties as stated in 3.2.4 & 3.2.5 respectively, whether the level of emergency shall need to be raise or lowered, or whether any additional measures shall be taken or not.
14. Nobody is allowed to return to the work area for any reason until authorized to do so.
15. All managers and sub-contractors' representatives shall report the result of head count to the emergency coordinator.
16. If anybody is missing, the emergency coordinator should report to the Police / Fire Officer for searching.
17. When the site is confirmed in safe condition, the emergency coordinator will inform the relevant parties and make announcement on the loudspeaker as follows:

English version:
Emergency is now under control, you can return to your work area.

Chinese version:
現在緊急事故經已消除,各位同事可以返回原來工作崗位

18. The emergency response team will record the details of the emergency.
19. A meeting will be held following the emergency for reviewing the problems arisen. Minutes of the meeting will be recorded.

3.3 Recovery Procedure for Class (A&B) Emergencies

1. Emergency response team leader shall notify the security guard to close the site or part of the site to prevent trespass until the site is recovered.
2. Emergency response team leader shall gather all emergency response members and relevant person such as competent person of scaffold inspection, plant inspection, earthwork inspection and Agent/Deputy Agent at the site office.
3. The emergency response team leader shall divide the ERT in some sub-teams for at least 2 members or competent persons conducting specific inspection of the enclosed area. All inspectors shall carry effective communication means such as mobile telephone or walkie-talkie, and carry a camera if necessary. Special attention shall be paid to the following area during inspection: Access, Stagnant water, power supply, chemical storage area, scaffolding, plant and earthwork. Photograph shall be taken to any suspected lost of properties or to any potential hazardous areas.
4. All sub-team members shall report their finding to the emergency response team leader.
5. After received the reports from sub-teams, emergency response team leader shall hold a meeting with all ERT members for discussing recovery method and to allocate necessary resources.
6. Emergency response team leader shall monitor the implementation of planned recovery method and follow-up actions.
7. Emergency response team leader shall instruct the security guard to open the site after all recovery works were completed.
8. Emergency response team leader should report the case to head office.

4. Equipment Preparation

4.1 First Aid Equipment

1. First aider will standby for any first aid equipment and first aid treatment.
2. Sufficiently supplied first aid boxes including a first aid guide, sterilized unmediated dressings of various sizes, waterproof adhesive & wound dressings of assorted sizes, triangular bandages, zinc oxide adhesive plaster, cotton wool pressure bandage, safety pins and eye baths shall always be retained in sufficient amount.
3. The first aid boxes should be inspected by first aider at least once a week and result of inspection will be kept in the site office.
4. A stretcher shall be placed in the First-aid Room.

4.2 Rescue Equipment

The rescue equipment should include:

1. Two safety harnesses with adequate length of rope taking into account the distance of different workplace locations.
2. Intrinsically safe hand torches.
3. First aid equipment.
4. Fire fighting apparatus.
5. At least 2 sets of suitable breathing apparatus and emergency breathing pack.

These equipments shall be already in the first aid room and kept in a good condition. Only trained and assigned rescuers are allowed to use the equipment.

4.3 Equipment standby on site

The primary emergency response equipment will be available at the site office including the followings:

- Adequate portable fire extinguishers;
- First-aid equipment;
- Personal protective equipment including rubber gloves, rain boots, helmet, face shields, raincoats, respirators, safety goggles, safety harness, fall arrestor and independent lifeline etc.;
- Sand bags;
- Breathing apparatus;
- Gas detector;
- Personal Alarms;
- Spill Kits;
- Water pumps.

4.4 Alarm and communication systems

- On site communications will be conducted by telephones through the telephone intercom system, mobile phones, pager and also walkie-talkie radio, etc.
- In addition, gongs/whistles are used to represent the emergency signals and if emergency happens, general labour hit the gongs or blow the whistle while walking through the site to warn all personnel in the construction site.

5. Training/Drill

1. All emergency response team members should receive a proper training in these aspects after being appointed.
2. Safety Officer shall plan each emergency drill once every 6 months. (Please refer to the Time Table attached in this plan.)

6. Time Table of Emergency Drill

Class	Jan. 2010	Feb 2010	Mar. 2010	Apr 2010	May 2010	Jun. 2010	Jul. 2010	Aug. 2010	Sept. 2010	Oct. 2010	Nov 2010
A			✓						✓		
B				✓						✓	

7. Appendix

1 Emergency contact telephone numbers

Contact Place	Emergency Contact Number
Hong Kong China Gas	2880 6999
Shell Hong Kong	2322 2000
Ap Lei Chau F.S. Station	2814 8836
Aberdeen F.S. Station	2552 5280
Hong Kong Police Force	999 or 2552 1766 (Aberdeen Sub-Division)

Gas Standards Office of EMSD	8105 5989 (town gas leakage) 8105 5723 (LPG leakage)
Paul Y. Site 24 hours Emergency Contact	9702 0020

2 The contact telephone list of the site emergency response team

3 Evacuation Escape Route Plans

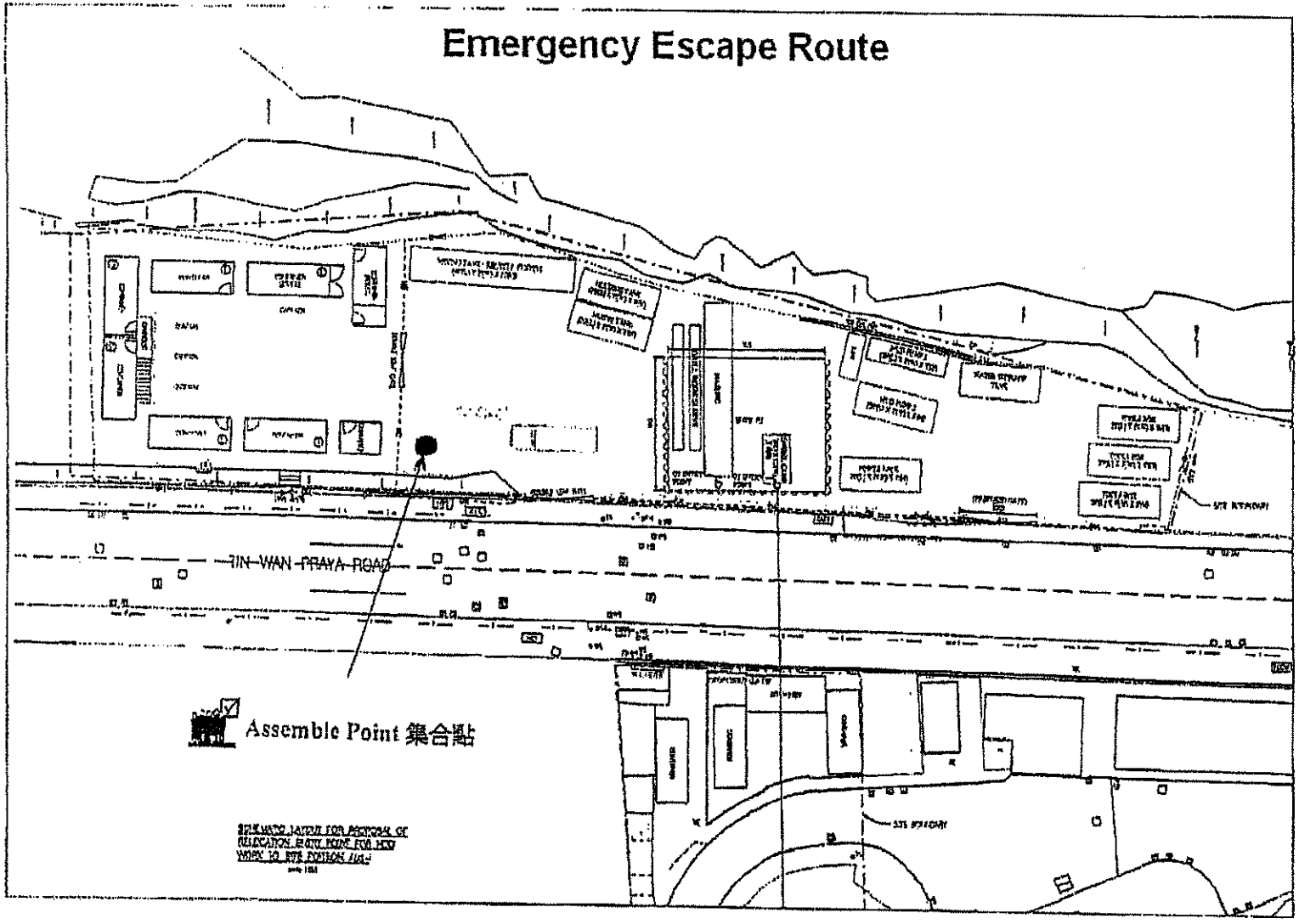
4 Accident Emergency Procedures

Appendix 2 Emergency Team Contact List

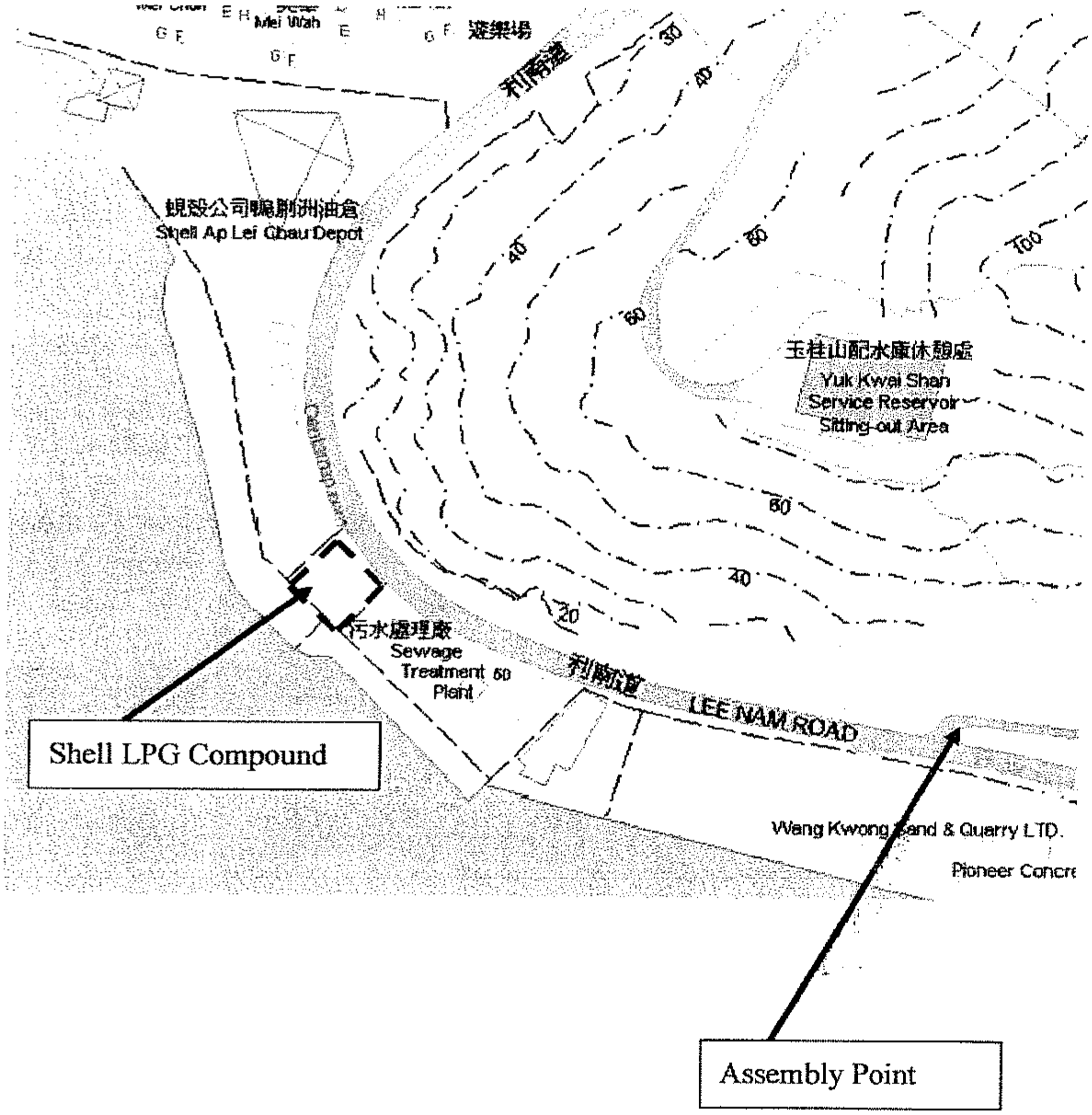
Main Contractor - Paul Y. Construction Co., Ltd.

Mr. Joe Au (Agent)	*9378 3331*
Mr. Ricky Hon (Deputy Agent)	6330 1785
Mr. Wong Tak Kiu (Superintendent)	6138 7425
Mr. Fan Shu (Senior Foreman)	9426 7997
Mr. Banny Poon (Safety Officer)	6333 0872
Mr. Ben Lam (Assistant Environmental Officer)	6084 1206
Mr. Paul Ng (Senior Security Officer)	9121 8244
Security Dept.	7290 3753
24 Hours Hotline	9702 0020

Appendix – 3(a)


Emergency Escape Route
TIN WAN PRAYA ROAD
Assemble Point 集合點

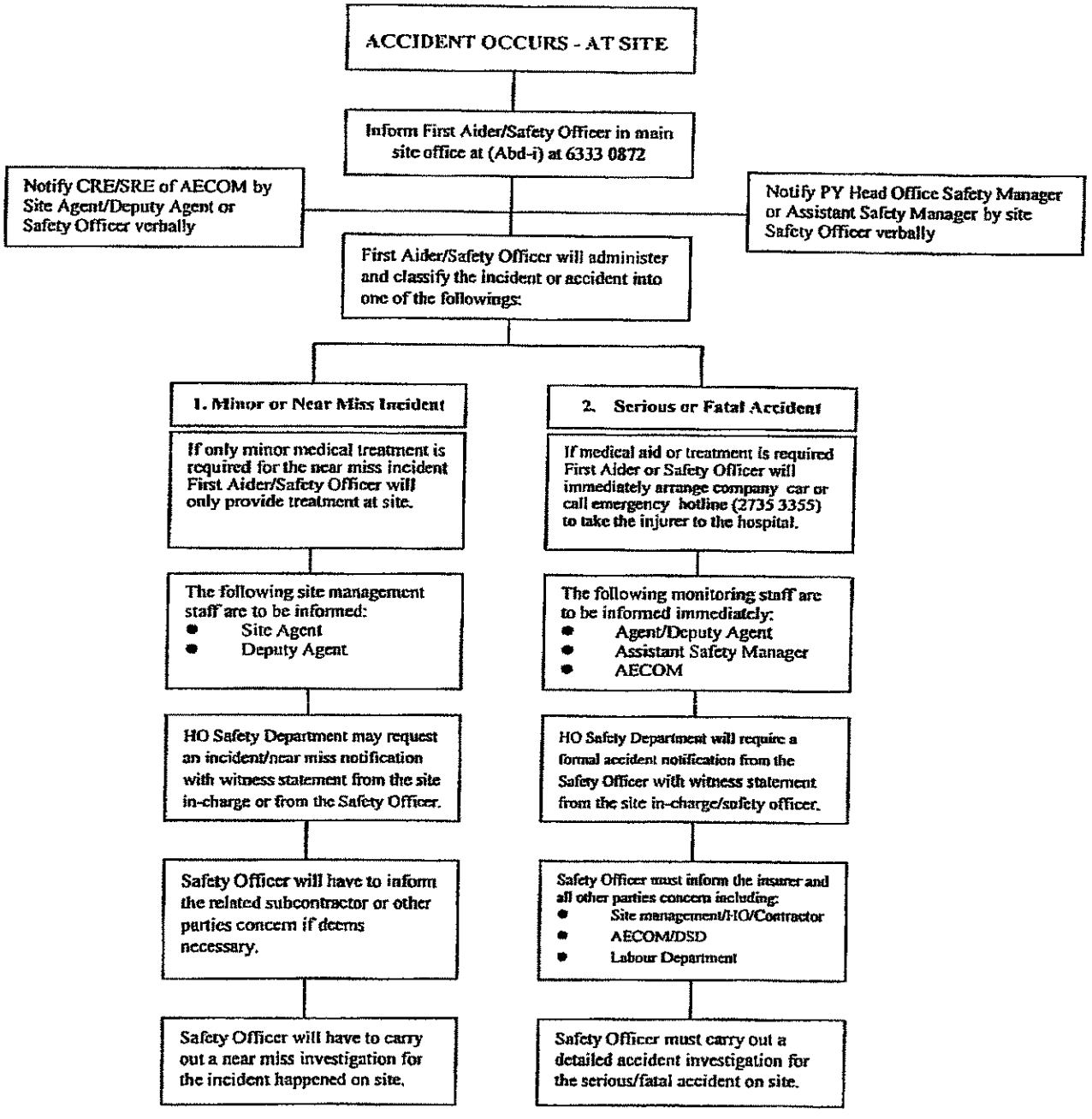
Appendix – 3(b)



Mei Wah
遊樂場
利南道
蜆殼公司鴨脷洲油倉
Shell Ap Lei Chau Depot
玉桂山配水庫休憩處
Yuk Kwai Shan
Service Reservoir
Sitting-out Area
污水處理廠
Sewage
Treatment
Plant
利南道
LEE NAM ROAD
Wang Kwong Sand & Quarry LTD.
Pioneer Concr
Shell LPG Compound
Assembly Point

Appendix - 4

ACCIDENT EMERGENCY PROCEDURE FOR SITE (DC/2008/09)



Note :

1. **It is important that the scene of the incident is not disturbed, especially for the serious/fatal accident.**
2. **Make a list of all personnel at the scene of the incident and their contact telephone numbers.**
3. **It is important to make a list of all equipment and vehicles at the scene.**
4. **If the First Aider/Safety Officer is not available, the Senior Person on site will follow the same procedure.**
5. **Site 24 hours Emergency Hotline is 9702 0020**