



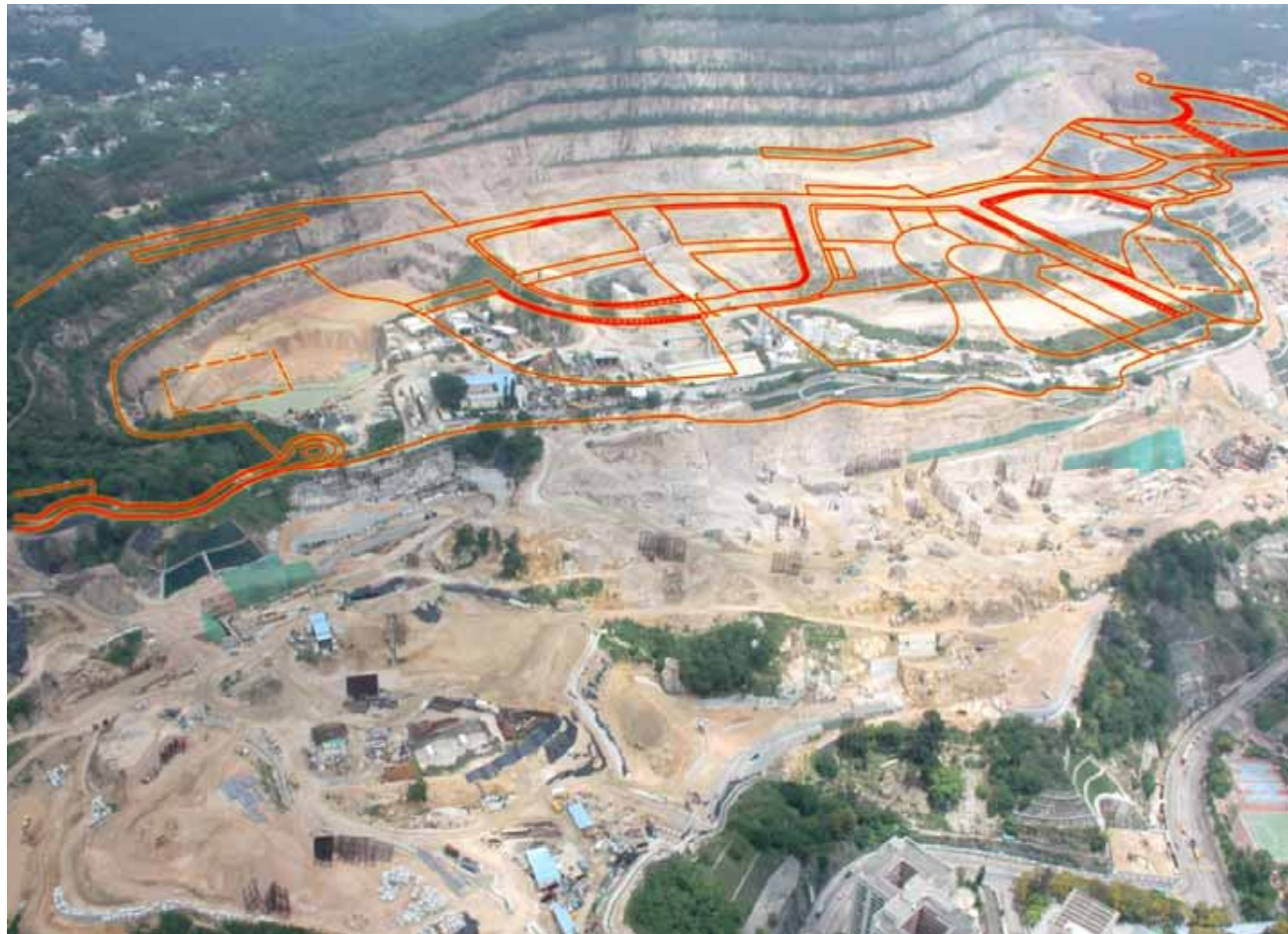
Civil Engineering and  
Development Department

New Territories East  
Development Office

**Agreement No. CE 18/2012 (CE)  
Development of Anderson Road Quarry – Investigation**

**Final Contamination Assessment Plan  
(Rpt Ref. 227724-REP-020-02)**

Civil Engineering and Development  
Department  
**Agreement No. CE 18/2012 (CE)  
Development of Anderson Road  
Quarry - Investigation  
Final Contamination Assessment  
Plan**  
  
227724-REP-020-02  
  
Final | 13 August 2013



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Job number 227724


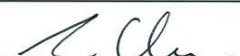

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ARUP

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# 1 INTRODUCTION

## 1.1 Background

**1.1.1** The Anderson Road Quarries have been in operation since 1956. In 1998, the Central and East Kowloon Development Statement proposed new housing developments at a platform site covering about 40 ha of Anderson Road Quarries (the upper quarry site, now called the Anderson Road Quarry site) and at an area below Anderson Road covering about 20 ha (the lower quarry site, now called the Anderson Road Development).

**1.1.2** The site formation works of the lower quarry site are now in progress under Contract No. CV/2007/03 'Development at Anderson Road – Site Formation and Associated Infrastructure Works'.

**1.1.3** PlanD commissioned Arup on 27 January 2011 under Agreement No. CE/4/2010(TP) to undertake a Planning Study on Future Land Use at Anderson Road Quarry to examine the future land use and explore the development potential of the upper quarry area. The recommendations and the Recommended Outline Development Plan proposed under the Planning Study will provide the basis for the development at the Anderson Road Quarry site.

**1.1.4** CEDD commissioned Arup on 26 October 2012 under Agreement No. CE 18/2012 (CE) 'Development of Anderson Road Quarry – Investigation' (this Assignment) to undertake the feasibility study of the development proposals at the Anderson Road Quarry site recommended in the Planning Study and the associated road improvement works and pedestrian connectivity to Kwun Tong Town Centre and nearby MTR stations.

**1.1.5** The site formation works of the proposed Development of Anderson Road Quarry is envisaged to commence in mid 2016 for completion in 2020, with the first population intake in 2022 and full population intake in 2026.

## 1.2 The Assignment

**1.2.1** The proposed scope of the Project comprises the following principal works elements:

- (1) Miscellaneous engineering impact assessments, site investigation works for the development proposals at the Anderson Road Quarry site (the Recommended Development Proposal);
- (2) Feasibility study for the associated road improvement works and pedestrian connectivity to Kwun Tong Town Centre and nearby MTR stations; and
- (3) Environmental Impact Assessment of impacts related to the Recommended Development Proposal other than the rock cavern developments.

## 1.3 Study Area

**1.3.1** The Study Area, as delineated in **Figure 227724/E/0001**, is located on the south-western slopes of the Tai Shueng Tok Hill at the far north-eastern edge of urban East Kowloon, and lies close to the major population centres of Kwun Tong, Lam Tin and

Sau Mau Ping. Specifically, the Study Area covers an area of about 86 ha, which includes a platform area of about 40 ha.

## 1.4 Objective of Contamination Assessment Plan

**1.4.1** The purpose of this Contamination Assessment Plan (CAP) is to provide information, guidance and instruction to characterise land contamination and identify where contaminations are or may be present before the construction of the Study Area. In accordance with Section 3.4.9 and Appendix E2 of the EIA Study Brief No. ESB-247/2012 the objectives of this CAP are:

- (1) To provide an account of the present land use within Study Area boundary and relevant past land use history in relation to possible land contamination;
- (2) To identify areas of potential contamination and the associated impacts, risks or hazards; and
- (3) To identify the chemicals of concern and scoping of requirements for sampling and laboratory testing of soil and groundwater samples.

## 1.5 Statutory Legislation and Evaluation Criteria

**1.5.1** This CAP is prepared in accordance with the following Technical Memorandum and Guidance Notes:

- (1) Annex 19 of the Technical Memorandum on Environmental Impact Assessment Process (TM-EIA), Guidelines for Assessment of Impact On Sites of Cultural Heritage and Other Impacts (Section 3: Potential Contaminated Land Issues), EPD, 1997;
- (2) Guidance Manual for Use of Risk-Based Remediation Goals (RBRGs) for Contaminated Land Management, EPD, 2007;
- (3) Guidance Notes for Contaminated Land Assessment and Remediation, EPD, 2007; and
- (4) Practice Guide for Investigation and Remediation of Contaminated Land, EPD, 2011.

**1.5.2** In accordance with EPD's Guidance Note for Contaminated Land Assessment and Remediation, a contamination assessment evaluation should:

- (1) Provide a clear and detailed account of the present land use and the relevant past land history, in relation to possible land contamination;
- (2) Identify areas of potential contamination and associated impacts, risks or hazards; and
- (3) Submit a plan to evaluate the actual contamination conditions for soil and/or groundwater, if required.

**1.5.3** The EPD's Guidance Notes include a summary of the general steps of a contamination assessment study.

**1.5.4** Under Annex 19 of the TM-EIAO, a number of potentially contaminating historical land uses should be considered, including oil installations, gas works, metal workshops,

car repair and dismantling workshops, which have the potential to cause or have caused land contamination.

**1.5.5** This CAP, which is one of the land contamination requirements as set out in the EIA Study Brief, sets out the requirements for a baseline contamination evaluation of the Study Area. A Contamination Assessment Report (CAR) will be prepared following site investigation activities. If contamination is identified in the CAR, a Remediation Action Plan (RAP) will be developed to deal with these areas prior to the construction works for the Project. The RAP would follow the requirements specified in EPD's Practice Guide for Investigation and Remediation of Contaminated Sites. A Remediation Report (RR) would be prepared to demonstrate adequate clean-up and submitted to EPD for agreement prior to the commencement of construction/development works of the Project.

## 2 INITIAL SITE APPRAISAL

### 2.1 Desktop Review

**2.1.1** A desktop study has been conducted to review past and present land uses, activities and installations within the Study Area that may have potential for land contamination.

**2.1.2** The following sections present the findings from desktop review.

### 2.2 Aerial Photographs and Historical Land Use

**2.2.1** Selected historical aerial photographs between year 1963 and 2011 of the Study Area have been reviewed in order to ascertain any historical land uses with the potential for land contamination. The review findings are summarized in the **Table 2.1**. The historical photographs are shown in **Appendix A**.

**Table 2.1:** Description of Historical Land Use of the Study Area

| Year | Description   |
|------|---|
| 1963 | Parts of the area between the southern and western portions were exposed, which are seen that the quarry was operated. The northern and eastern parts were natural terrain. Farm lands could be observed on the most northern area near the site boundary. Anderson Road had been seen.   |
| 1973 | The area of the quarry activities was extended between the southern and western areas. The area next to the farm lands on the northern portion was also exposed. Several temporary structures could be seen within these exposed areas. The eastern part was still natural terrain.   |
| 1982 | Most of the areas between the southern and western portions were exposed and quarry-operated. Temporary structures could be seen on the southern, western and northern areas. The layouts of the structures on the northern area were similar to the existing layout. Several conveyor belts could also be seen on the southern and northern areas. Farm lands on the most northern area were replaced by the vegetation. Several village houses were erected on the western area and close to the quarry. The eastern part was still natural terrain.  |
| 1993 | No significant changes of the land use on the eastern and southern portions as compared with Year 1982. On the northern area, more temporary structures and offices were erected, and suspected as industrial activities or factories. The conveyor belts on the northern area were dismantled. The layouts of these building were similar to the existing layout. The village houses on the western area were dismantled.  |
| 2001 | No significant changes of the land use on the southern portions as compared with Year 1993. The quarry was further extended to the eastern area. On the southwestern and western areas, more temporary structures were erected and suspected as industrial activities or factories. Several conveyor belts was also be seen on the western area. On the northern area, the structures and office observed in Year 1993 were still existed and no significant changes. In addition, on the most northern part of the site, the area was exposed and a lagoon was formed. Apart from the southern area, the layouts of the structures and office were similar to the existing layout. |
| 2011 | No significant changes of the land use as compared with Year 2001 except the southern area, which the temporary structures and conveyor belts were dismantled. On the most northern part, part of the lagoon had been filled and the size was reduced significantly as  |

| Year | Description  |
|------|--|
|      | compared with Year 2001. Along the western and southern boundary, the site formation works at the nearby construction site was commenced and the area was exposed. |

## 2.3 Site Geology

**2.3.1** According to the Hong Kong Geological Map, Series HGM20, Scale 1:20,000 published by the Geotechnical Control Office (GCO, 1988) supplemented by the information from the Geotechnical Area Studies Programme, the solid geology underlying the Study Area is fine to medium grained GRANITE, fine ash vitric TUFF and HORNFELS with Eutaxite and Basalt veins. Part print of the geological map centred at the Study Area is attached in **Figure 227724/E/5001**.

**2.3.2** Study Area is majorly underlain by fine- and fine- to medium-grained granite which is partly capped by fine ash vitric tuff in some of the eastern portion. The platform area of the Study Area is generally on granitic bedrock overlain by less than 10m of fill material, except at the locations of three depressions, namely “Drop Cuts”, with their extents shown in **Figure 227724/E/5002** to **Figure 227724/E/5004**.

## 2.4 Other Relevant Information

**2.4.1** Acquisition of other relevant information from Fire Services Department (FSD) and EPD was summarized below:

### **Information Request from Fire Services Department**

**2.4.2** The FSD has been contacted in January 2013 to obtain the following information:

- (1) The records of Dangerous Goods License issued to the Study Area;
- (2) Any past and present information related to the use and/or storage of dangerous goods in the Study Area; and
- (3) Past and present incident records of the Study Area.

**2.4.3** Based on the information provided by FSD on 25 January 2013, the list for storage of dangerous goods in the Study Area are summarized in **Table 2.2**. Also, according to FSD record, no incident record was found in the Study Area. The copy of letter to FSD and the formal reply are given in **Appendix B**.

**Table 2.2:** List for Storage of Dangerous Goods of the Study Area

| No. | Type of Dangerous Goods | Quantity | Unit     | Method of Storage |
|-----|-------------------------|----------|----------|-------------------|
| 1   | Oxygen                  | 14       | Cylinder | Temporary Store   |
| 2   | Acetylene               | 10       | Cylinder | Temporary Store   |
| 3   | Diesel                  | 22,500   | Litre    | Underground Tank  |
| 4   | Diesel                  | 22,500   | Litre    | Underground Tank  |
| 5   | Acetylene               | 10       | Cylinder | Temporary Store   |
| 6   | Oxygen                  | 14       | Cylinder | Temporary Store   |
| 7   | Acetylene               | 18       | Cylinder | Temporary Store   |

| No. | Type of Dangerous Goods | Quantity | Unit     | Method of Storage  |
|-----|-------------------------|----------|----------|--------------------|
| 8   | Oxygen                  | 18       | Cylinder | Temporary Store    |
| 9   | EP Gold Emulsion Matrix | 20       | Tonne    | Temporary Store    |
| 10  | Ammonium Nitrate        | 20       | Tonne    | Temporary Store    |
| 11  | Emulex (LD1000)         | 20       | Tonne    | Temporary Store    |
| 12  | EP Gold Emulsion Matrix | 18       | Tonne    | Temporary Store    |
| 13  | EP Gold Emulsion Matrix | 18       | Tonne    | Temporary Store    |
| 14  | Ammonium Nitrate        | 18       | Tonne    | Temporary Store    |
| 15  | Ammonium Nitrate        | 18       | Tonne    | Temporary Store    |
| 16  | Ammonium Nitrate        | 20       | Tonne    | Temporary Store    |
| 17  | Emulsion Matrix         | 20       | Tonne    | Temporary Store    |
| 18  | Diesel                  | 45,460   | Litre    | Above-ground Tanks |

**2.4.4** As advised by the operator, the usage of the dangerous goods is summarized and given in **Table 2.3**. The composition of the emulsion (i.e. EP Gold Emulsion Matrix, Emulex (LD 1000) and Emulsion Matrix) are mainly Ammonium Nitrate, Sodium Nitrate and Calcium Nitrate. According to EPD’s RBRGs, these chemicals are not the land contamination concerned chemicals.

**Table 2.3:** Usage of Dangerous Goods of the Study Area

| Type of Dangerous Goods | Matrix         | Usage              | Land Contamination Concerned Chemicals |
|-------------------------|----------------|--------------------|--|
| Oxygen                  | Gas            | Welding, hot works | No                                     |
| Acetylene               | Gas            | Welding, hot works | No                                     |
| Diesel                  | Liquid         | Fuel               | Yes                                    |
| Ammonium Nitrate        | Powder/ Liquid | Blasting           | No                                     |
| EP Gold Emulsion Matrix | Liquid         | Blasting           | No                                     |
| Emulex (LD1000)         | Liquid         | Blasting           | No                                     |
| Emulsion Matrix         | Liquid         | Blasting           | No                                     |

### **Information Request from Environmental Protection Department**

**2.4.5** The EPD was contacted in January 2013 to obtain the following information:

- (1) The records for Chemical Waste Producers Registration of the Study Area, and
- (2) Past and present chemical spillage/leakage records of the Study Area.

**2.4.6** Based on the information provided by EPD on 29 January 2013, there are 7 Chemical Waste Producers within the Study Area and the types of chemical waste include spent engine/lubricating oil, spent filter, contaminated rags and spent mineral oil. With regards to the details of the Chemical Waste Producers, EPD advised to go for a record

review at the EPD offices. A list of Chemical Waste Producers within the Study Area are shown below.

- (1) KWP Quarry Co. Ltd.;
- (2) K.Wah Construction Products Ltd.;
- (3) K.Wah Asphalt Plant;
- (4) K.Wah Concrete Plant;
- (5) Anderson Concrete Ltd.;
- (6) Pioneer Asphalts Plant; and
- (7) China State Construction Limited.

**2.4.7** Also, there was no chemical spillage/leakage record of the Study Area. A copy of the letters to EPD and the formal reply are given in **Appendix C**.

## **2.5 Site Survey**

**2.5.1** A site surveys was conducted on 18 January and 13 June 2013 to identify the existing land use within the Study Area which may have potential for causing soil contamination. The findings of the site survey are described in the following sub-sections.

**2.5.2** The Study Area is divided into northern (ARQ-N) and southern (ARQ-S) parts by Anderson Road, which is under the management by KWP Quarry Co. Ltd. and China State Construction Limited (i.e. main contractor of Contract No. CV/2007/03 Development at Anderson Road) respectively. Approximately 90% Study Area falls within the northern part. Detailed location is shown in **Figure 227724/E/5005**.

### **Southern Part (ARQ-S)**

**2.5.3** During the site survey, it was observed that the entire area managed by China State Construction Limited was exposed and site formation works was in progress. As advised by the Engineer, the land contamination assessment had been carried out at this area under the Agreement No. CE 55/2005 (CE) "Design and Construction of Development at Anderson Road". The Contamination Assessment Report & Remediation Action Plan (CAR & RAP) had been prepared to present the findings and was endorsed by EPD in November 2006.

**2.5.4** According to the approved CAR & RAP, it was revealed that some area was contaminated with heavy metals (i.e. copper, zinc, lead, arsenic, chromium and nickel) and total petroleum hydrocarbons (TPH). Detail of the approved CAR & RAP is given in the **Appendix D**.

**2.5.5** In addition, as advised by the engineer, the remediation exercise including the contaminated soil excavation and treatment (including cement solidification/ stabilization for heavy metal contaminated soil and landfill disposal for organic contaminated soil) was completed in accordance with the approved CAR & RAP. The organic contaminated soil was disposed of at landfill and the treated soil (i.e. after cement solidification/ stabilization treatment) was stockpiled at the designated area for

on-site backfilling. Once the backfilling works is completed, a Remediation Report (RR) would be prepared and submitted to EPD for approval under the site formation contract.

**2.5.6** Based on the aforesaid information, it is revealed that the contaminated soil due to the historical land use(s) had been completely removed and treated. In addition, based on the recent site survey and advice given by the Engineer, no potential land contamination activities including maintenance workshops, chemical/ chemical waste storage area are identified in this area (i.e. ARQ-S). Therefore, potential land contamination issue in the area ARQ-S is considered unlikely.

### **Northern Part (ARQ-N)**

**2.5.7** The facilities identified in the KWP Quarry Co. Ltd. include:

- (1) KWP Quarry Co. Ltd.
- (2) K.Wah Construction Products Ltd.;
- (3) K.Wah Asphalt Plant;
- (4) K.Wah Concrete Plant;
- (5) Anderson Concrete Ltd.; and
- (6) Pioneer Asphalts Plant.

**2.5.8** In order to facilitate the assessment, the northern part is further divided into nine sub-sections, namely **ARQ-01** to **ARQ-09** as shown in **Figure 227724/E/5006** to **Figure 227724/E/5015**. The site survey findings of each sub-section and their respective potentially contamination sources/areas are summarized in **Table 2.4**. The site walkover checklists of respective sub-section are given in **Appendix E**.

**2.5.9** In addition, 7 nos. of electric sub-stations were also identified within the Study Area. Amongst these 7 electric sub-stations, 3 of which are located within ARQ-01, ARQ-03 and ARQ-08. The locations of the electric sub-stations are shown in **Figure 227724/E/5016**. The site survey findings of each electric sub-station are summarized in **Table 2.5**.

**Table 2.4: Site Survey Findings and Potentially Contamination Sources**

| Sub-Section ID | Company                          | Figure No.    | Site Observation   | Potentially Contamination Sources   | Photo No.  | Potentially Contaminated |
|----------------|----------------------------------|---------------|--|---|--|--------------------------|
| ARQ-S          | China State Construction Limited | 227724/E/5005 | <ul style="list-style-type: none"> <li>Site formation works was in progress in entire area.</li> <li>Remediation exercise was completed.</li> <li>The treated soil (i.e. after cement solidification/ stabilization treatment) was stockpiled at the designated area for on-site backfilling.</li> </ul>   | Nil   | Nil  | No                       |
| ARQ-01         | KWP Quarry Co. Ltd.              | 227724/E/5007 | <ul style="list-style-type: none"> <li>The majority of the site was used for site office and car parking (<b>Photo P01-1</b>) except the eastern part, which were the maintenance workshops. The whole site was concrete paved and intact;</li> <li>Two temporary structures were used for maintenance workshop including materials storage and maintenance activities (<b>Photo P01-2</b> and <b>Photo P01-3</b>);</li> <li>As advised by the operator, the maintenance activities involved the site vehicle (e.g. loader, dump truck and excavator) and equipments (e.g. drilling rig) maintenance;</li> <li>Chemical and chemical waste storage rooms were located next to the maintenance workshop (<b>Photo 01-4</b>);</li> <li>One fuel station (<b>Photo P01-5</b>) with capacity 22,500L underground diesel tank was located next to the maintenance workshop;</li> <li>No oil stain was observed in these areas;</li> <li>Electric sub-station (ESS-01) (<b>Photo P01-6</b>) was located next to the carpark. The condition inside the sub-station could not be identified due to restricted access.</li> </ul> | <ul style="list-style-type: none"> <li>Site vehicles repairing and maintenance workshops</li> <li>Chemical and chemical waste storage room</li> <li>Underground diesel tank with fuel station</li> <li>Electric sub-station (ESS-01)</li> </ul> | <ul style="list-style-type: none"> <li>P01-2 &amp; P01-3</li> <li>P01-4</li> <li>P01-5</li> <li>P01-6</li> </ul> | Yes                      |
| ARQ-02         | K. Wah Asphalt Plant             | 227724/E/5008 | <ul style="list-style-type: none"> <li>The asphalt production machines (<b>Photo P02-1</b>) were in operation and the area is concrete paved and intact. No oil stain was observed;</li> <li>As advised by the operator, asphalt residual would be generated during the production and would be disposed to Public Fill Facilities as this asphalt residual is an inert material. Potential land contamination issue at the asphalt production facilities was not observed;</li> <li>Diesel pump (<b>Photo P02-2</b>) was observed in the centre of the site.</li> </ul>   | <ul style="list-style-type: none"> <li>Diesel pump</li> <li>Underground diesel tank with fuel station</li> <li>Site vehicles repairing and maintenance workshop</li> </ul>  | <ul style="list-style-type: none"> <li>P02-2</li> <li>P02-3</li> <li>P02-4</li> </ul>                            | Yes                      |

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| Sub-Section ID | Company                           | Figure No.    | Site Observation   | Potentially Contamination Sources   | Photo No.  | Potentially Contaminated |
|----------------|-----------------------------------|---------------|--|---|--|--------------------------|
| ARQ-03         | K. Wah Construction Products Ltd. | 227724/E/5009 | <ul style="list-style-type: none"> <li>No oil stain was observed;</li> <li>The fuel station (<b>Photo P02-3</b>) with underground diesel tank (capacity 45,460L) was located in the eastern part. No oil stain was observed;</li> <li>Maintenance workshop (<b>Photos 02-4</b>) was located in the temporary structure at the southern part. The workshop was concrete paved and intact;</li> <li>As advised by the operator, the maintenance activities involved the site vehicle (e.g. truck, asphalt paver, road roller and fork lifter) and equipments (e.g. asphalt production machines) maintenance;</li> <li>The area next to the workshop was used for chemical and chemical waste storage area (<b>Photo P02-5</b>). Bunding filled with sand was used in this area.</li> </ul>   | <ul style="list-style-type: none"> <li>Chemical and chemical waste storage room</li> </ul>  | <ul style="list-style-type: none"> <li>P02-5</li> </ul>  |                          |
| ARQ-04         | KWP Quarry                        | 227724/E/5010 | <ul style="list-style-type: none"> <li>A brick production plant (<b>Photo P03-1</b>) located in the northern part of the site. The whole area was concrete paved and intact;</li> <li>Several production machines including dryer are installed inside the production plant and one chemical storage room was also identified (<b>Photo P03-2</b>);</li> <li>One aboveground diesel tank (<b>Photo P03-3</b>) was observed which is located at the roof of production plant;</li> <li>Maintenance workshop was located next to the production plant. Equipments (e.g. brick production machines) and site vehicles (e.g. loader and fork lifter) maintenance activities were observed (<b>Photo P03-4</b>). The workshop was concrete paved and intact;</li> <li>Stockpiling area (<b>Photo P03-5</b>) for sand and broken glasses was located at the southern part;</li> <li>Electric sub-station (ESS-02) (<b>Photo P03-6</b>) was located next to the entrance. The condition inside the sub-station could not be identified due to restricted access.</li> </ul> | <ul style="list-style-type: none"> <li>Chemical storage room</li> <li>Aboveground diesel tank</li> <li>Site vehicles repairing and maintenance workshop</li> <li>Electric sub-station (ESS-02)</li> </ul> | <ul style="list-style-type: none"> <li>P03-2</li> <li>P03-3</li> <li>P03-4</li> <li>P03-6</li> </ul> | Yes                      |
| ARQ-04         | KWP Quarry                        | 227724/E/5010 | <ul style="list-style-type: none"> <li>The screening plant and crushing plant were located in the site. Several conveyor belts are connected between them (<b>Photo P04-1</b>);</li> </ul>   | <ul style="list-style-type: none"> <li>Maintenance workshop</li> </ul>  | <ul style="list-style-type: none"> <li>P04-3</li> </ul>  | Yes                      |

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| Sub-Section ID | Company                | Figure No.    | Site Observation  | Potentially Contamination Sources   | Photo No.  | Potentially Contaminated |
|----------------|------------------------|---------------|---|---|--|--------------------------|
|                | Co. Ltd.               |               | <ul style="list-style-type: none"> <li>The temporary structure located in the western part was used for stockpiling the rocks after crushing from crushing plants. <b>(Photo P04-2)</b>.</li> <li>Maintenance workshop <b>(Photo P04-3)</b> for equipments maintenance was located next to the crushing plant. The workshop was concrete paved and intact. No oil stain was observed;</li> <li>Four 200L drum <b>(Photo P04-4)</b> placed outside the workshop were used for chemical waste storage.</li> </ul>   | <ul style="list-style-type: none"> <li>Chemical waste storage area</li> </ul>                               | <ul style="list-style-type: none"> <li>P04-4</li> </ul>                |                          |
| ARQ-05         | K. Wah Concrete Plant  | 227724/E/5011 | <ul style="list-style-type: none"> <li>The concrete production facilities <b>(Photo P05-1)</b> including several silo and raw materials stockpiling area are located in the northern part of the site. The whole area was concrete paved and intact. No oil stain was observed;</li> <li>As advised by the operator, the main activities is mixing the sand, rock, cement and water in the production facilities, and then unloading to the concrete mixing truck. A concrete residual would be generated during the production and would be disposed to Public Fill Facilities as this concrete residual is an inert material. Potential land contamination issue at the concrete production facilities was not observed;</li> <li>Maintenance workshop <b>(Photo P05-2)</b> was identified in the southern part. As advised by the operator, only equipment maintenance (i.e. concrete mixer) was carried out in the workshop. The workshop was concrete paved and intact;</li> <li>Chemical waste storage area <b>(Photo P05-3)</b> was identified in the maintenance workshop.</li> </ul> | <ul style="list-style-type: none"> <li>Maintenance workshop</li> <li>Chemical waste storage area</li> </ul> | <ul style="list-style-type: none"> <li>P05-2</li> <li>P05-3</li> </ul> | Yes                      |
| ARQ-06         | Anderson Concrete Ltd. | 227724/E/5012 | <ul style="list-style-type: none"> <li>The concrete production facilities <b>(Photo P06-1)</b> and <b>Photo 06-2)</b> including several silo and raw materials stockpiling area are located in the northern part of the site. The whole area was concrete paved and intact. No oil stain was observed;</li> <li>As advised by the operator, the main activities is mixing the sand, rock, cement and water in the production facilities, and then unloading to the concrete mixing truck. A concrete residual would be generated during the production and would be disposed to Public Fill Facilities as this concrete residual is an inert material. Potential land</li> </ul>  | <ul style="list-style-type: none"> <li>Chemical storage area</li> <li>Diesel drums storage room</li> </ul>  | <ul style="list-style-type: none"> <li>P06-3</li> <li>P06-4</li> </ul> | Yes                      |

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| Sub-Section ID | Company                | Figure No.    | Site Observation   | Potentially Contamination Sources   | Photo No.   | Potentially Contaminated |
|----------------|------------------------|---------------|--|---|---|--------------------------|
|                |                        |               | <p>contamination issue at the concrete production facilities was not observed;</p> <ul style="list-style-type: none"> <li>One chemical storage cabinet <b>(Photo P06-3)</b> for lubricant oil storage was located in the centre area;</li> <li>A small temporary structure located in the southeast boundary was used for diesel storage with maximum 3 no. of 200L diesel drums <b>(Photo P06-4)</b>.</li> </ul>  |   |   |                          |
| ARQ-07         | Anderson Concrete Ltd. | 227724/E/5013 | <ul style="list-style-type: none"> <li>The majority of the site is maintenance workshop <b>(Photo P07-1)</b>. The whole area was concrete paved and intact;</li> <li>As advised by the operator, the maintenance activities involved the site vehicle (e.g. truck, concrete mixing truck) and equipments (e.g. concrete production machines) maintenance;</li> <li>Chemical waste storage area <b>(Photo P07-2)</b> was observed in the workshop;</li> <li>Two temporary structures located at the northern area were used for materials storage <b>(Photo P07-3)</b> and site office <b>(Photo P07-4)</b>.</li> </ul>   | <ul style="list-style-type: none"> <li>Site vehicles repairing and maintenance workshop</li> <li>Chemical waste storage area</li> </ul>   | <ul style="list-style-type: none"> <li>P07-1</li> <li>P07-2</li> </ul>  | Yes                      |
| ARQ-08         | Pioneer Asphalts Plant | 227724/E/5014 | <ul style="list-style-type: none"> <li>The plant was abandoned and was being dismantled during site survey. The whole area was concrete paved and intact. As no site representative could be interviewed. The details information of asphalt plant operation could not be obtained. Therefore, for conservative purpose, the area of asphalt production facilities <b>(Photo P08-6)</b> is considered to be potentially contaminated;</li> <li>Apart from the area of asphalt production facilities was identified potentially contaminated, the other areas of potential sources of contamination had also been identified including chemical storage areas <b>(Photo P08-1)</b> and <b>Photo P08-2)</b>, site vehicles repairing and maintenance workshop <b>(Photo P08-3)</b>, chemical waste storage room <b>(Photo P08-4)</b>, aboveground diesel tank <b>(Photo P08-5)</b> and boiler <b>(Photo P08-6)</b>. All these areas are located in northern part of the site.</li> <li>In southern part of the site, there were the stockpiling area for raw materials storage such as sand and rock and temporary site office <b>(Photo P08-7)</b>. Potential land contamination issue at this area is</li> </ul> | <ul style="list-style-type: none"> <li>Chemical storage area</li> <li>Site vehicles repairing and maintenance workshop</li> <li>Chemical waste storage room</li> <li>Aboveground diesel tank</li> <li>Asphalt production facilities and boiler</li> </ul> | <ul style="list-style-type: none"> <li>P08-1 &amp; P08-2</li> <li>P08-3</li> <li>P08-4</li> <li>P08-5</li> <li>P08-6</li> </ul> | Yes                      |

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| Sub-Section ID | Company                | Figure No.    | Site Observation   | Potentially Contamination Sources   | Photo No.   | Potentially Contaminated |
|----------------|------------------------|---------------|--|---|---|--------------------------|
| ARQ-09         | Anderson Concrete Ltd. | 227724/E/5015 | unlikely;<br><ul style="list-style-type: none"> <li>Electric sub-station (ESS-05) (Photo P08-8) was located next to the maintenance workshop. Transformer was observed in the sub-station.</li> <li>Open car park for concrete mixing vehicle (Photo P09-1 and Photo P09-2);</li> <li>The whole area was unpaved but clean and no oil stain was observed.</li> </ul> | <ul style="list-style-type: none"> <li>Electric sub-station (ESS-05)</li> </ul> | <ul style="list-style-type: none"> <li>P08-8</li> </ul> | No                       |

Table 2.5: Site Survey Findings of Electric Sub-stations

| Electric sub-station ID | Location   | Figure No.                      | Site Observation   | Photo No. | Potentially Contaminated |
|-------------------------|--|---------------------------------|--|-----------|--------------------------|
| ESS-01                  | Within the area ARQ-01                                       | 227724/E/5007 and 227724/E/5016 | The condition of sub-station could not be identified due to restricted access. | PES-1     | Yes                      |
| ESS-02                  | Within the area ARQ-03                                       | 227724/E/5009 and 227724/E/5016 |  | PES-2     |                          |
| ESS-03                  | Between Anderson Road and the area ARQ-04                    | 227724/E/5016                   |  | PES-3     |                          |
| ESS-04                  | Next to Anderson Road and between the area ARQ-07 and ARQ-08 | 227724/E/5016                   |  | PES-4     |                          |
| ESS-05                  | Within the area ARQ-08                                       | 227724/E/5014 and 227724/E/5016 | Transformer was observed in the sub-station.                                   | PES-5     | Yes                      |
| ESS-06                  | Next to Anderson Road and between the area ARQ-08 and ARQ-09 | 227724/E/5016                   | Transformer was observed in the sub-station.                                   | PES-6     |                          |
| ESS-07                  | Nearby the area ARQ-09                                       | 227724/E/5016                   | The condition of sub-station could not be identified due to restricted access. | PES-7     |                          |

## 2.6 Future Land Use

2.6.1 The RBRGs have developed four different post-restoration land uses, namely “Urban Residential”, “Rural Residential”, “Industrial” and “Public Parks”, to reflect actual settings which people could be exposed to contaminated soil or groundwater. Definitions of post-restoration land uses are given in EPD’s *Guidance Manual for Use of Risk-Based Remediation Goals for Contaminated Land Management*.

2.6.2 According to the Recommended Outline Development Plan of the project, the development plan would be consisted of different facilities, such as residential buildings, schools, amenity, commercial, police and fire stations, pumping station, open space and pedestrian walkway etc. Hence, the most relevant RBRGs corresponding to its future land use should be adopted in assessing its land contamination level. Corresponding RBRGs land use of the associated facilities are defined and given in **Table 2.6**.

Table 2.6: Post-restoration Land Use and RBRGs Land Use

| Landuse   | Corresponding RBRGs Land Use               |
|---|--|
| Commercial / Residential<br><ul style="list-style-type: none"> <li>Urban High Rise</li> <li>Low Rise in Rural Area</li> </ul> | Urban Residential<br>Rural Residential     |
| Commercial / Business & Office  | Urban Residential                          |
| School  | Rural Residential                          |
| Public Park with Indoor Games Hall  | Lower of Public Parks or Urban Residential |
| Warehouse & Storage   | Industrial                                 |
| Government, Institution & Community Facilities  | Urban Residential                          |
| Road including Pedestrian Walkway   | Lower of Industrial or Public Parks        |
| Railway   | Industrial                                 |
| Open Space  | Public Parks                               |
| Public Utilities  | Industrial                                 |

### 3 POTENTIALLY CONTAMINATED AREA

#### 3.1 Identification of Potentially Contaminated Area

**3.1.1** Potentially contaminated area within the Study Area have been identified based on selected aerial photos, and the information collected during site survey (refer to **Section 2.5** for details). The areas with those activities, posing the highest potential for contamination, have been identified in accordance with the criteria in EPD's *Practice Guide for Investigation and Remediation of Contaminated Land*.

**3.1.2** Desktop review of available historical records e.g. historical aerial photos have been used to assist the identification of potentially contaminated areas.

**3.1.3** After reviewing of the aforesaid information, the following areas are identified as potentially contaminated in the Study Area (refer to **Table 2.4** and **Table 2.5** for details):

- (1) Total 8 areas (i.e. ARQ-01 to ARQ-08);
- (2) The area of electric sub-stations (3 electric sub-stations are located in ARQ-01, ARQ-03 and ARQ-08; the remaining 4 electric sub-stations are located standalone).

#### 3.2 Environmental Site Investigation

**3.2.1** As mentioned in **Section 2.3**, the geology of the Study Area is majority underlain by fine and fine to medium granite (i.e. Grade III Rock) except the depression area (i.e. Drop Cuts) where the granitic bedrock underlain by fill materials. The locations of the surveyed premises, electric sub-stations and its geology are shown in **Figure 227724/E/5017**.

**3.2.2** As revealed from the **Figure 227724/E/5017**, it is shown that the areas ARQ-01 to ARQ-03 are located on rock layer, ARQ-05 to ARQ-08 are located on fill materials, and ARQ-04 is located on the area between rock layer and fill materials. In addition, the photo taken during site survey shown in **Figure 227724/E/5018** also demonstrated that the facilities in ARQ-01 to ARQ-03 are located on the rock layer, which is in line with the Study Area geology.

**3.2.3** For areas ARQ-01 to ARQ-03, the penetration of the contaminants through the rock layer is unlikely. Therefore, the environmental Site Investigation (SI) of these areas is not required.

**3.2.4** Environmental SI (i.e. borehole drilling, and soil and groundwater sampling and testing) is recommended to be carried out for the areas ARQ-05 to ARQ-08 where located on the fill materials to determine the types and quantities of contaminants by applying off-set square grid pattern (i.e. herringbone pattern). In addition, as part of the ARQ-04 is located on the fill materials, the environmental SI is also recommended for conservative purpose.

**3.2.5** Apart from the environmental SI is required for the electric sub-station located in ARQ-08 which its geology is fill materials, the environmental SI of the remaining electric sub-stations is not required as all sub-stations are located on the rock layer.

**3.2.6** As revealed from the historical aerial photos review, site survey findings and advices of the facilities operators, the facilities layout and its operation nature of potentially contaminated areas have not been significantly changed since the facilities commencement. Therefore, it is considered that the potentially contaminated areas due to the contamination activities are also confined in specific area.

**3.2.7** The footprint of each contaminated areas are approximately ranged from 10 to 688 m<sup>2</sup>. Their corresponding square grid sizes are ranged from 7.5 to 13 m according to the EPD's *Practice Guide for Investigation and Remediation of Contaminated Land*. A total of 29 boreholes are proposed for soil and groundwater sampling. The Environmental SI of potentially contaminated areas is summarized in **Table 3.1** and the locations of proposed boreholes are shown in **Figure 227724/E/5019** to **Figure 227724/E/5023**.

**Table 3.1:** Summary of Environmental Site Investigation of Potentially Contaminated Area

| Sub-Section ID | Company                           | Potentially Contamination Sources   | Geology                 | Environmental Site Investigation | Approximate Potentially Contaminated Area (m <sup>2</sup> ) | Square Grid Size (m) | No. of Boreholes Recommended | Figure No.    |
|----------------|-----------------------------------|---|-------------------------|----------------------------------|---|----------------------|------------------------------|---------------|
| ARQ-01         | KWP Quarry Co. Ltd.               | <ul style="list-style-type: none"> <li>Site vehicles repairing and maintenance workshops</li> <li>Chemical and chemical waste storage room</li> <li>Underground diesel tank with fuel station</li> <li>Electric sub-station (ESS-01)</li> </ul> | Rock                    | Not required                     | N/A   | N/A                  | N/A                          | N/A           |
| ARQ-02         | K. Wah Asphalt Plant              | <ul style="list-style-type: none"> <li>Diesel pump</li> <li>Underground diesel tank with fuel station</li> <li>Site vehicles repairing and maintenance workshop</li> <li>Chemical and chemical waste storage room</li> </ul>                    | Rock                    | Not required                     | N/A   | N/A                  | N/A                          | N/A           |
| ARQ-03         | K. Wah Construction Products Ltd. | <ul style="list-style-type: none"> <li>Chemical storage room</li> <li>Aboveground diesel tank</li> <li>Site vehicles repairing and maintenance workshop</li> <li>Electric sub-station (ESS-02)</li> </ul>                                       | Rock                    | Not required                     | N/A   | N/A                  | N/A                          | N/A           |
| ARQ-04         | KWP Quarry Co. Ltd.               | <ul style="list-style-type: none"> <li>Maintenance workshop with chemical waste storage area</li> </ul>   | Rock and Fill materials | Required                         | 131   | 7.5                  | 3                            | 227724/E/5019 |
| ARQ-05         | K. Wah Concrete Plant             | <ul style="list-style-type: none"> <li>Maintenance workshop with chemical waste storage area</li> </ul>   | Fill materials          | Required                         | 635   | 13                   | 6                            | 227724/E/5020 |
| ARQ-06         | Anderson Concrete Ltd.            | <ul style="list-style-type: none"> <li>Chemical storage area</li> </ul>   | Fill materials          | Required                         | 20  | --                   | 1                            | 227724/E/5021 |
|                |                                   | <ul style="list-style-type: none"> <li>Diesel drums storage room</li> </ul>   |                         |                                  | 10  | --                   | 1                            |               |

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| Sub-Section ID                 | Company                | Potentially Contamination Sources   | Geology        | Environmental Site Investigation | Approximate Potentially Contaminated Area (m <sup>2</sup> ) | Square Grid Size (m) | No. of Boreholes Recommended | Figure No.    |  |
|--------------------------------|------------------------|---|----------------|----------------------------------|---|----------------------|------------------------------|---------------|--|
| ARQ-07                         | Anderson Concrete Ltd. | <ul style="list-style-type: none"> <li>Site vehicles repairing and maintenance workshop with chemical waste storage area</li> </ul> | Fill materials | Required                         | 562   | 12.5                 | 4                            | 227724/E/5022 |  |
| ARQ-08                         | Pioneer Asphalts Plant | <ul style="list-style-type: none"> <li>Chemical storage area</li> </ul>   | Fill materials | Required                         | 183   | 9                    | 3                            | 227724/E/5023 |  |
|                                |                        | <ul style="list-style-type: none"> <li>Site vehicles repairing and maintenance workshop</li> </ul>                                  |                |                                  |   |                      |                              |               |  |
|                                |                        | <ul style="list-style-type: none"> <li>Chemical waste storage room</li> </ul>   |                |                                  |   |                      |                              |               |  |
|                                |                        | <ul style="list-style-type: none"> <li>Aboveground diesel tank</li> </ul>   |                |                                  |   |                      |                              |               |  |
|                                |                        | <ul style="list-style-type: none"> <li>Asphalt production facilities and boiler</li> </ul>  |                |                                  |   |                      |                              |               |  |
|                                |                        | <ul style="list-style-type: none"> <li>Electric sub-station (ESS-05)</li> </ul>   |                |                                  | 24  | --                   | 1                            |               |  |
| <b>Total no. of boreholes:</b> |                        |   |                |                                  |   |                      | <b>29</b>                    |               |  |

**Table 3.2:** Summary of Environmental Site Investigation of Potentially Contaminated Area of Electric Sub-stations

| Electric sub-station ID | Location   | Geology        | Environmental Site Investigation | Approximate Potentially Contaminated Area (m <sup>2</sup> ) | Square Grid Size (m) | No. of Boreholes Recommended | Figure No.    |
|-------------------------|--|----------------|----------------------------------|---|----------------------|------------------------------|---------------|
| ESS-01                  | Within the area ARQ-01                                       | Rock           | Not required                     | N/A   | N/A                  | N/A                          | N/A           |
| ESS-02                  | Within the area ARQ-03                                       |                |                                  |   |                      |                              |               |
| ESS-03                  | Between Anderson Road and the area ARQ-04                    |                |                                  |   |                      |                              |               |
| ESS-04                  | Next to Anderson Road and between the area ARQ-07 and ARQ-08 |                |                                  |   |                      |                              |               |
| ESS-05                  | Within the area ARQ-08                                       | Fill materials | Required                         | 24  | --                   | 1                            | 227724/E/5023 |
| ESS-06                  | Next to Anderson Road and between                            | Rock           | Not required                     | N/A   | N/A                  | N/A                          | N/A           |

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| Electric sub-station ID | Location   | Geology | Environmental Site Investigation | Approximate Potentially Contaminated Area (m <sup>2</sup> ) | Square Grid Size (m) | No. of Boreholes Recommended | Figure No. |
|-------------------------|--|---------|----------------------------------|---|----------------------|------------------------------|------------|
| ESS-07                  | the area ARQ-08 and ARQ-09<br>Near the area ARQ-09 | Rock    | Not required                     | N/A   | N/A                  | N/A                          | N/A        |

## 4 POTENTIAL HEALTH RISK AND ENVIRONMENTAL IMPACTS

### 4.1 Potential Impact on Receptors

4.1.1 The potential impacts to the Project from contaminated soil and groundwater are judged by the following risks associated:

- (1) Health risk to site workers;
- (2) Disposal of contaminated soils, where encountered;
- (3) Disposal of contaminated groundwater, where encountered; and
- (4) Potential health risks to future users of the sites.

### 4.2 Health Risk to Site Workers

4.2.1 Site construction workers may be exposed to contaminated soils and groundwater during earth moving operations and the laying of pipelines or underground services. The main exposure routes for site construction workers are accidental direct ingestion of contaminated materials through poor hygiene and eating or smoking on site, or through direct contact with potentially toxic or harmful contaminants in excavated soil.

### 4.3 Disposal of Contaminated Soil

4.3.1 In the event that any contaminated soils are identified during SI works or further environmental investigations, they may require remediation prior to, or as part of the construction programme. The possibility of carrying out in situ remediation and recycling and reuse of remediated materials should be explored first. Ex situ remedial measures could then be considered if the in situ remediation is not considered to be practical. Off-site disposal of contaminated materials to landfills should be adopted only as a last resort. Acceptance of contaminated soil at a landfill requires an approval from the EPD. Permission for disposal via an admission ticket system needs to be obtained from the EPD prior to the delivery of contaminated soil to a landfill. Waste for disposal to landfills is required to meet the Landfill Disposal Criteria for Contaminated Soil, in terms of Toxicity Characteristic Leaching Procedure (TCLP) limits, as shown in Table 4.4 of EPD's *Practice Guide for Investigation and Remediation of Contaminated Land*. The actual type(s) and concentration(s) of contaminates would determine the final disposal requirements, following agreement of the proper disposal options with the Waste Facilities Management Group, and/or Water Policy and Science Group of EPD as appropriate.

4.3.2 Feasible measures should be implemented to minimize or avoid disposal of contaminated soils off site. Any contaminated soils would be handled, treated and re-used on site as far as practicable.

## 4.4 Contaminated Groundwater Disposal

4.4.1 Where excavations for the Project take place below the groundwater table, there may be a need to dewater the pits for safety and construction purposes. Where dewatering takes place through layers of contaminated material or where any contaminated soil is being excavated, the groundwater may become contaminated, thereby requiring appropriate handling and disposal. Depending on the level of contamination encountered, and subject to the agreement of EPD, groundwater will need to be disposed of in an appropriate manner, compliant with Water Pollution Control Ordinance (WPCO).

## 4.5 Potential Health Risks to the Future Users of the Study Area

4.5.1 During operational phase, there is little potential for impacts associated with contaminated soils. In case contaminated material is identified during the construction stage, appropriate remedial measures should be undertaken so that such material shall be properly treated, mitigated or removed. Any direct contact with such materials should be avoided.

## 5 SITE INVESTIGATION

### 5.1 Proposed Site Investigation for Potentially Contaminated Areas

5.1.1 SI is recommended to be carried out in 5 potentially contaminated areas (i.e. ARQ-04 to 08) to determine the types and quantities of contaminants (refer to **Section 3.2** for details).

5.1.2 Total 29 boreholes are proposed for soil and groundwater sampling and testing as summarized in **Table 5.1**. The locations of proposed boreholes are shown in **Figure 227724/E/5019** to **Figure 227724/E/5023**.

**Table 5.1:** Proposed Soil and Groundwater Sampling Location

| Sub-Section ID | Borehole No.   | Potentially Contaminated Areas                        | Sampling Type |              | Figure No.    |
|----------------|----------------|---|---------------|--------------|---------------|
|                |                |   | Soil          | Ground-water |               |
| ARQ-04         | BH-01 to BH-03 | Maintenance workshops and chemical waste storage area | √             | √            | 227724/E/5019 |
| ARQ-05         | BH-04          | Chemical waste storage area                           | √             | √            | 227724/E/5020 |
|                | BH-05 to BH-09 | Maintenance workshop                                  | √             | √            |               |
| ARQ-06         | BH-10          | Chemical storage area                                 | √             | √            | 227724/E/5021 |
|                | BH-11          | Diesel drums storage room                             | √             | √            |               |
| ARQ-07         | BH-12 to BH-15 | Site vehicles repairing and maintenance workshop      | √             | √            | 227724/E/5022 |
|                | BH-13          | Chemical waste storage area                           | √             | √            |               |
| ARQ-08         | BH-16 to BH-18 | Chemical storage area                                 | √             | √            | 227724/E/5023 |
|                | BH-19 to BH-21 | Site vehicles repairing and maintenance workshop      | √             | √            |               |
|                | BH-22          | Chemical waste storage room                           | √             | √            |               |
|                | BH-23          | Above-ground diesel tank                              | √             | √            |               |
|                | BH-24 to BH-28 | Asphalt production facilities and boiler              | √             | √            |               |
|                | BH-29          | Electric sub-station (ESS-05)                         | √             | √            |               |

5.1.3 As the Study Area is managed by private owner and still in operation, undertaking the SI works at this stage is not feasible. Therefore, the SI would be commenced once the operation is terminated and the land is resumed.

## 5.2 Sampling and Testing Strategy

### General

- 5.2.1** Sampling and analytical programme is proposed based on EPD's *Practice Guide for Investigation and Remediation of Contaminated Land*. The sampling work procedures should follow appropriate protocols to minimize potentials for cross-contamination between samples and different sampling locations. The sampling methods are based on techniques developed by the United States Environmental Protection Agency (USEPA), which includes decontamination procedures, sample collection, preparation and preservation, as well as chain-of-custody documentation.
- 5.2.2** Samples for laboratory testing will be taken with clean stainless steel hand tools and clean latex gloves and placed in rigid containers made of a material that is non-reactive with the likely contaminants.
- 5.2.3** In addition to the samples collected for laboratory analysis, a strata log will be kept for record of additional data to aid in the interpretation of results. Information on the general structure of the subsurface strata including grain size, colour, and wetness, and the depth and thickness of each soil/rock layer will be noted. The presence of any foreign material such as metals, wood, or plastics is also to be recorded.
- 5.2.4** All field personnel should wear adequate personal protective equipment when working in contaminated areas.

### Decontamination Procedures

- 5.2.5** Equipment in contact with the ground should be thoroughly decontaminated between each sampling event to minimize the potential for cross contamination. The equipment should be decontaminated by steam cleaning, washed with phosphate-free detergent and rinsed with water. A clean area immediately adjacent to the sample location should be established with a clean plastic sheet where all cleaned and foil wrapped equipment should be placed.
- 5.2.6** During sampling and decontamination activities, disposable latex gloves should be worn to prevent the transfer of contaminants from other sources. Disposable accessories, such as latex gloves, would be discarded properly after use.
- 5.2.7** The drilling equipment and sampling equipment should be cleaned according to the above procedures between sampling holes.

### Soil Sampling

- 5.2.8** Total 29 boreholes are proposed to be collected the soil samples throughout the potentially contaminated areas. Collection of soil sample is proposed at depths of 0.5m, 1.5m & 3.0m, and then at 3.0m below ground level (mbgl) intervals using inspection pits (0.5 and 1.5mbgl) and boreholes (3.0 and after 3.0mbgl). Borehole should be undertaken by means of dry rotary drilling method (without the use of flushing medium to prevent cross-contamination during sampling). The on-site Land Contamination Specialist would decide the appropriate depth for sampling on point by point basis.

- 5.2.9** An undisturbed U100 sample should be collected from each sampling point except depth 0.5 and 1.5mbgl, which inspection pit method should be employed for the collection of disturbed samples. The disturbed samples should be placed in the pre-cleaned glass sample jar. The jar lid should be covered with laboratory solvent washed aluminium foils and lids. Each sample jar should be labelled. Records should be made of the details of the sampling location and other pertinent data. Samples would be stored between 2°C – 4°C, and delivered to the laboratory within 24 hours. All samples would be collected under chain-of-custody protocols.

### Groundwater Sampling

- 5.2.10** Total 29 groundwater samples are proposed to be collected throughout the potentially contaminated areas. In case no groundwater is encountered on the designated locations, the on-site Land Contamination Specialist should decide on the location of which groundwater samples should be collected in accordance with the actual geological situation of the borehole.
- 5.2.11** Each sample would be truly representative of the groundwater at the point from which it is taken, without dilution or contamination by water from other sources or by other materials.
- 5.2.12** A groundwater monitoring well would be installed at each borehole, and upon completion of installation of monitoring wells, approximately five times volume of well would be flushed to remove silt and drilling fluid residue from the wells. The wells would then be allowed to stand for a day to permit groundwater conditions to equilibrate. Groundwater level and thickness of free product layer, if present would be measured by dip meter and interface probe respectively, before groundwater samples are taken. Moreover, prior to groundwater sampling, the sampling wells would be purged (at least three times volume of well) to remove fine-grained materials and to collect freshly refilled groundwater samples. After purging, one groundwater sample would then be collected at each sampling well. Field measurement of temperature and pH would also be taken for each of the samples. The free products, if present, would also be sampled to allow identification by the laboratory. Typical details of proposed groundwater monitoring well is shown in **Appendix F**.
- 5.2.13** If the permeability of the surrounding strata and storage is low, dewatering by purging may dry up the hole, in which case the on-site Land Contamination Specialist would decide whether the requirement to purge three times the liquid volume is to be waived.
- 5.2.14** After the dewatering process (and allowing groundwater to percolate back into the hole if it has been purged dry), enough quantity of groundwater sample would be collected from each borehole, and then stored in different sample containers for analysis. Immediately after collection, samples would be transferred to labelled sample containers containing the necessary preservatives (supplied by the laboratory). Samples would be stored between 2°C – 4°C, and delivered to the laboratory within 24 hours. All samples would be collected under chain-of-custody protocols.

**Analytical Parameters**

**5.2.15** The collected soil and groundwater samples would be analyzed for the parameters which have been selected with reference to the EPD’s *Practice Guide for Investigation and Remediation of Contamination Land* and based on the potentially contaminated sources.

**5.2.16** All samples should be analyzed by a Hong Kong Laboratory Accreditation Scheme (HOKLAS) accredited laboratory. The proposed sampling and testing schedule is shown in **Table 5.2** and the analytical methods are shown in **Table 5.3**. The proposed testing parameters included:

- (1) **Metals:** Arsenic, Cadmium, Chromium III, Chromium VI, Copper, Lead, Mercury, Manganese, Nickel, Zinc
- (2) **Polyaromatic Hydrocarbons (PAHs)**<sup>1</sup>: Acenaphthene, Acenaphthylene, Anthracene, Benzo(a)anthracene, Benzo(a)pyrene, Benzo(b)fluoranthene, Benzo(g,h,i)perylene, Benzo(k)fluoranthene, Chrysene, Dibenzo(a,h)anthracene, Fluoranthene, Fluorene, Indeno(1,2,3-cd)pyrene, Naphthalene, Phenanthrene, Pyrene
- (3) **Semi Volatile Organic Compounds (SVOCs):** PAHs, Bis-(2-Ethylhexyl)phthalate, Hexachlorobenzene and Phenol
- (4) **Volatile Organic Compounds (VOCs):** Acetone, Benzene, Ethylbenzene, Methyl tert-Butyl Ether, Toluene, Trichloroethene, Xylenes (total)
- (5) **Petroleum Carbon Ranges (PCRs):** Carbon Ranges C6-C8, C9-C16 and C17-C35
- (6) **Polychlorinated Biphenyls (PCBs):** PCBs

<sup>1</sup> PAHs is the whole list of Chemical of Concern (COCs) listed under group of Semi-volatile Organic Compounds (SVOCs) in the RBRGs Table except *Bis-(2-Ethylhexyl)phthalate*, *Hexachlorobenzene* and *Phenol*.

**Table 5.2:** Proposed Soil and Groundwater Testing Schedule

| Sub-Section ID | Borehole No.   | Potentially Contamination Sources                    | Potentially Contaminants <sup>(6)</sup>   | Sampling Type                                | Testing Parameters <sup>(1)</sup>                                |                         |   |      |      |
|----------------|----------------|--|---|--|--|-------------------------|---|------|------|
|                |                |  |   |  | Metals <sup>(2)</sup>  | SVOCs <sup>(3)</sup>    | VOCs <sup>(5)</sup>                     | PCRs | PCBs |
| ARQ-04         | BH-01 to BH-03 | Maintenance workshop and chemical waste storage area | <ul style="list-style-type: none"> <li>• Metals (Chromium, Copper, lead, Nickel, Manganese, Zinc);</li> <li>• Polyaromatic Hydrocarbons;</li> <li>• Volatile Organic Compounds (Acetone, BTEX, MTBE and Trichloroethene);</li> <li>• Fuels (total petroleum hydrocarbons).</li> </ul> | Soil at all sampling depths and ground-water | Chromium III, Chromium VI, Copper, Lead, Manganese, Nickel, Zinc | PAHs <sup>(3)</sup> [4] | Acetone, BTEX, MTBE and Trichloroethene | ✓    | -    |
| ARQ-05         | BH-04 to BH-09 | Maintenance workshop and chemical waste storage area | <ul style="list-style-type: none"> <li>• Metals (Chromium, Copper, lead, Nickel, Manganese, Zinc);</li> <li>• Polyaromatic Hydrocarbons;</li> <li>• Volatile Organic Compounds (Acetone, BTEX, MTBE and Trichloroethene);</li> <li>• Fuels (total petroleum hydrocarbons).</li> </ul> | Soil at all sampling depths and ground-water | Chromium III, Chromium VI, Copper, Lead, Manganese, Nickel, Zinc | PAHs <sup>(3)</sup> [4] | Acetone, BTEX, MTBE and Trichloroethene | ✓    | -    |
| ARQ-06         | BH-10          | Chemical storage area                                | <ul style="list-style-type: none"> <li>• Metals (Chromium, Copper, lead, Nickel, Manganese, Zinc);</li> <li>• Polyaromatic Hydrocarbons;</li> <li>• Volatile Organic Compounds (Acetone, BTEX, MTBE and Trichloroethene);</li> <li>• Fuels (total petroleum hydrocarbons).</li> </ul> | Soil at all sampling depths and ground-water | Chromium III, Chromium VI, Copper, Lead, Manganese, Nickel, Zinc | PAHs <sup>(3)</sup> [4] | Acetone, BTEX, MTBE and Trichloroethene | ✓    | -    |
|                | BH-11          | Diesel drums storage room                            | <ul style="list-style-type: none"> <li>• Metals (lead);</li> <li>• Polyaromatic Hydrocarbons;</li> <li>• Volatile Organic Compounds (BTEX and MTBE);</li> <li>• Fuels (total petroleum hydrocarbons).</li> </ul>  | Soil at all sampling depths and ground-water | Lead   | PAHs <sup>(3)</sup> [4] | BTEX and MTBE                           | ✓    | -    |



| Sub-Section ID | Borehole No.   | Potentially Contamination Sources  | Potentially Contaminants <sup>(6)</sup>   | Sampling Type                                | Testing Parameters <sup>[1]</sup>                                |                          |   |      |      |
|----------------|----------------|--|---|--|--|--------------------------|---|------|------|
|                |                |  |   |  | Metals <sup>[2]</sup>  | SVOCs                    | VOCs <sup>[5]</sup>                     | PCRs | PCBs |
| ARQ-07         | BH-12 to BH-15 | Site vehicles repairing and maintenance workshop and chemical waste storage area | hydrocarbons).  | Soil at all sampling depths and ground-water | Chromium III, Chromium VI, Copper, Lead, Manganese, Nickel, Zinc | PAHs <sup>[3][4]</sup>   | Acetone, BTEX, MTBE and Trichloroethene | ✓    | --   |
|                |                |  | <ul style="list-style-type: none"> <li>Metals (Chromium, Copper, lead, Nickel, Manganese, Zinc);</li> <li>Polyaromatic Hydrocarbons;</li> <li>Volatile Organic Compounds (Acetone, BTEX, MTBE and Trichloroethene);</li> <li>Fuels (total petroleum hydrocarbons).</li> </ul> |  |  |                          |   |      |      |
| ARQ-08         | BH-16 to BH-18 | Chemical storage area  | <ul style="list-style-type: none"> <li>Metals (Chromium, Copper, lead, Nickel, Manganese, Zinc);</li> <li>Polyaromatic Hydrocarbons;</li> <li>Volatile Organic Compounds (Acetone, BTEX, MTBE and Trichloroethene);</li> <li>Fuels (total petroleum hydrocarbons).</li> </ul> | Soil at all sampling depths and ground-water | Chromium III, Chromium VI, Copper, Lead, Manganese, Nickel, Zinc | PAHs <sup>[3][4]</sup> , | Acetone, BTEX, MTBE and Trichloroethene | ✓    | --   |
|                | BH-19 to BH-21 | Site vehicles repairing and maintenance workshop                                 |   |  |  |                          |   |      |      |
|                | BH-22          | Chemical waste storage room  |   |  |  |                          |   |      |      |
|                | BH-23          | Above-ground diesel tank   |   |  |  |                          |   |      |      |
| BH-24 to BH-28 |                | Asphalt production facilities and boiler   | <ul style="list-style-type: none"> <li>Metals;</li> <li>Polyaromatic Hydrocarbons;</li> <li>Volatile Organic Compounds (BTEX and MTBE);</li> <li>Fuels (total petroleum hydrocarbons).</li> </ul>   | Soil at all sampling depths and ground-water | Lead   | PAHs <sup>[3][4]</sup>   | BTEX and MTBE                           | ✓    | --   |
|                |                |  |   |  |  |                          |   |      |      |
| BH-29          |                | Electric sub-station   | <ul style="list-style-type: none"> <li>Dielectric fluid</li> </ul>  |  | Arsenic, Cadmium, Chromium III, Chromium VI, Mercury,            | Naphthalene and Phenol   | BTEX                                    | ✓    | ✓    |

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| Sub-Section ID | Borehole No. | Potentially Contamination Sources | Potentially Contaminants <sup>(6)</sup> | Sampling Type | Testing Parameters <sup>[1]</sup> |       |                     |      |      |
|----------------|--------------|-----------------------------------|---|---------------|-----------------------------------|-------|---------------------|------|------|
|                |              |                                   |   |               | Metals <sup>[2]</sup>             | SVOCs | VOCs <sup>[5]</sup> | PCRs | PCBs |
|                |              |                                   |   |               | Nickel                            |       |                     |      |      |

Notes:

[1] Determination of the testing parameters is based on the EPD's *Practice Guide for Investigation and Remediation of Contaminated Land*.[2] Since only the RBRGs value of Metal *Mercury* is available for groundwater, no Metal parameter would be tested in the groundwater samples of Boreholes BH-01 to BH-28.[3] PAHs is the whole list of Chemical of Concern (COCs) listed under group of Semi-volatile Organic Compounds (SVOCs) in the RBRGs Table except *Bis-(2-Ethylhexyl)phthalate*, *Hexachlorobenzene* and *Phenol*.[4] Since the RBRGs value of *Benzo(a)anthracene*, *Benzo(a)pyrene*, *Benzo(g,h,i)perylene*, *Benzo(k)fluoranthene*, *Dibenzo(a,h)anthracene*, *Indeno(1,2,3-cd)pyrene* are not available for groundwater, the captioned chemicals parameters would not be tested in the groundwater sample[5] BTEX = *Benzene*, *Toluene*, *Ethylbenzene* and *Xylene (total)*. MTBE = *Methyl tert-Butyl Ether*[6] As advised by the operator, the chemicals including oils, fuels, lubricants, grease and solvents were mainly used for maintenance activities, and the chemical waste including spent lubricating oil, spent filter and spent mineral oil were also generated from these activities. The site survey was also revealed the chemical using and chemical waste generated, which were in line with the operator's advises and the information obtained from EPD (refer to **Section 2.4.5** for details). Therefore, the key Chemicals of Concern (COCs) of land use types "*Motor vehicle/ equipment depot, repairing, service centre*" given in Table 2.3 "*Contaminated Land Types and Key Chemicals of Concern (COCs)*" of EPD's *Practice Guide for Investigation and Remediation of Contaminated Land* are adopted for chemical storage area and chemical waste storage area.

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**Table 5.3:** Proposed Analytical Method for Soil and Groundwater Samples

| Parameter                   | Referenced Analytical Method | Reporting Limit for Soil (mg/kg) | Reporting Limit for Groundwater (mg/L) |
|-----------------------------|------------------------------|----------------------------------|--|
| <b>VOCs</b>                 |                              |                                  |  |
| Acetone                     | USEPA Method 8260            | 50                               | 0.5                                    |
| Benzene                     |                              | 0.2                              | 0.005                                  |
| Ethylbenzene                |                              | 0.5                              | 0.005                                  |
| Methyl tert-Butyl Ether     |                              | 0.5                              | 0.005                                  |
| Toluene                     |                              | 0.5                              | 0.005                                  |
| Trichloroethene             |                              | 0.1                              | 0.005                                  |
| Xylenes (Total)             |                              | 2                                | 0.02                                   |
| <b>SVOCs</b>                |                              |                                  |  |
| Acenaphthene                | USEPA Method 8270            | 0.5                              | 0.002                                  |
| Acenaphthylene              |                              | 0.5                              | 0.002                                  |
| Anthracene                  |                              | 0.5                              | 0.002                                  |
| Benzo(a)anthracene          |                              | 0.5                              | --                                     |
| Benzo(a)pyrene              |                              | 0.5                              | --                                     |
| Benzo(b)fluoranthene        |                              | 1.0                              | 0.001                                  |
| Benzo(g,h,i)perylene        |                              | 0.5                              | --                                     |
| Benzo(k)fluoranthene        |                              | 1.0                              | --                                     |
| Chrysene                    |                              | 0.5                              | 0.001                                  |
| Dibenzo(a,h)anthracene      |                              | 0.5                              | --                                     |
| Fluoranthene                |                              | 0.5                              | 0.002                                  |
| Fluorene                    |                              | 0.5                              | 0.002                                  |
| Indeno(1,2,3-cd)pyrene      |                              | 0.5                              | --                                     |
| Naphthalene                 |                              | 0.5                              | 0.002                                  |
| Phenanthrene                |                              | 0.5                              | 0.002                                  |
| Pyrene                      |                              | 0.5                              | 0.002                                  |
| Hexachlorobenzene           |                              | 0.2                              | 0.004                                  |
| Bis-(2-Ethylhexyl)phthalate |                              | 5.0                              | --                                     |
| Phenol                      |                              | 0.5                              | --                                     |
| <b>Metals</b>               |                              |                                  |  |
| Arsenic                     | USEPA Method 6020            | 1                                | --                                     |
| Cadmium                     |                              | 1                                | --                                     |
| Lead                        |                              | 1                                | --                                     |
| Copper                      |                              | 1                                | --                                     |
| Manganese                   |                              | 1                                | --                                     |
| Nickel                      |                              | 1                                | --                                     |
| Zinc                        |                              | 1                                | --                                     |
| Mercury                     | APHA Method 3112B            | 0.2                              | 0.0005                                 |

| Parameter    | Referenced Analytical Method                   | Reporting Limit for Soil (mg/kg) | Reporting Limit for Groundwater (mg/L) |
|--------------|--|----------------------------------|--|
| Chromium III | By Calculation(1)                              | 1                                | --                                     |
| Chromium VI  | USEPA Method 3060<br>APHA(2) Method 3500 Cr: D | 1                                | --                                     |
| <b>PCRs</b>  |  |                                  |  |
| C6-C8        | USEPA 8260/8015                                | 5                                | 0.02                                   |
| C9-C16       |  | 200                              | 0.5                                    |
| C17-C35      |  | 500                              | 0.5                                    |
| <b>PCBs</b>  |  |                                  |  |
| PCBs         | USEPA 8270C                                    | 0.2                              | 0.1                                    |

Note:

(1) Chromium III = Total Chromium – Chromium VI.

(2) "APHA" refers American Public Health Association.

**5.2.17** A HOKLAS accredited testing laboratory would be appointed to conduct chemical analysis for the soil and groundwater samples. All laboratory test methods should be accredited by the HOKLAS or one of its Mutual Recognition Arrangement Partners.

**Assessment Criteria**

As mentioned in **Section 2.6**, the most relevant RBRGs corresponding to the future landuse should be adopted in assessing its land contamination level. Laboratory testing results from site investigation should be compared with correspondent RBRGs for the testing parameters stated in **Section 5.2.16** in accordance with the EPD's *Guidance Manual for Use of RBRGs for Contaminated Land Management*. The RBRGs for soil and soil saturation limits as well as groundwater and groundwater solubility limits are shown in **Appendix G**.

**Storage of Surplus Soil Samples**

**5.2.18** Landfill disposal may be a practical option if the scale of contamination is localized and the quantity of soil expected to require cleanup is small. Additional tests in terms of Toxicity Characteristic Leaching Procedure (TCLP) would be required to meet the criteria for disposal to landfills. Hence, surplus soil samples obtained during the site investigation would be stored for subsequent TCLP tests if identified necessary.

**5.2.19** The allowable storage time for mercury in soil samples is 8 days while the storage time for the rest of the parameters in **Table 5.4** in soil samples could be up to 6 months. Soil samples, if stored beyond the allowable storage time, are not considered representative of the actual site conditions.

**5.2.20** Nevertheless, as mentioned in **Section 4.3**, feasible measures should be implemented to minimize the amount of contaminated soils, if any, to be excavated from the site and to avoid disposal of contaminated soils. Any contaminated soils would be handled, treated and re-used on site as far as possible, and the landfill disposal would be treated as last resort for handling of contaminated soils.

### 5.2.21 Landfill disposal criteria for contaminated soil is given in **Table 5.4**.

**Table 5.4:** Landfill Disposal Criteria for Contaminated Soil

| Parameter | TCLP Limit (mg/L) | Referenced Method          | Analytical | Reporting Limit (mg/L) |
|-----------|-------------------|----------------------------|------------|------------------------|
| Cadmium   | 10                | USEPA Method 1311 and 6020 |            | 0.01                   |
| Chromium  | 50                |                            |            | 0.1                    |
| Copper    | 250               |                            |            | 0.1                    |
| Nickel    | 250               |                            |            | 0.1                    |
| Lead      | 50                |                            |            | 0.1                    |
| Zinc      | 250               |                            |            | 0.1                    |
| Mercury   | 1                 |                            |            | 0.002                  |
| Tin       | 250               |                            |            | 0.1                    |
| Silver    | 50                |                            |            | 0.1                    |
| Antimony  | 150               |                            |            | 0.1                    |
| Arsenic   | 50                |                            |            | 0.1                    |
| Beryllium | 10                |                            |            | 0.1                    |
| Thallium  | 50                |                            |            | 0.01                   |
| Vanadium  | 250               |                            |            | 0.1                    |
| Selenium  | 1                 |                            |            | 0.02                   |
| Barium    | 1000              |                            |            | 0.1                    |

Ref:

EPD's Practice guide for Investigation and Remediation of Contaminated Land

#### **Quality Assurance and Quality Control (QA/QC)**

**5.2.22** A proper QA/QC program should be established so that the data collected are accurate and representative of actual soil (and groundwater, if encountered) conditions. At each sampling location, samples will be collected using pre-cleaned sampling equipment.

**5.2.23** The QA/QC Programme would include the following:

- (1) 1 duplicate sample per 20 samples;
- (2) 1 equipment blank sample per 20 samples;
- (3) 1 field blank sample per 20 samples; and
- (4) 1 trip blank per trip for the analysis of volatile parameters.

#### **Sample Handling, Packaging and Transport**

**5.2.24** The soil and groundwater sampling should be conducted by an experienced sampling technician and supervised by an on-site Land Contamination Specialist, and appropriate procedures should be adhered to. Sampling methodologies are based on the techniques developed by the USEPA. Sampling tools should be cleaned thoroughly before, in-between and after each sampling. Special care would be taken to prevent any cross contamination of samples during collection, handling and storage.

**5.2.25** Sample containers should be laboratory cleansed, airtight and made of glass or other suitable materials with Teflon-lined lids so that the container does not react with sample or absorb contaminants. Care should be taken when recording and labelling the sample information on the containers. Information such as date/time, sample point codes, depths and any other relevant data should be included. Samples would be stored in an icebox (at about 2°C - 4°C) immediately after collection and labelled, until they are transported to the laboratory for analysis. All samples should be delivered to the laboratory within 24 hours.

## 6 REMEDIATION MEASURES

### 6.1 General

**6.1.1** Following the submission of CAP and completion of SI and lab testing works, a CAR would be prepared. The CAR would present the findings of the site investigation and evaluate the level and extent of potential contamination. The CAR would evaluate the potential environmental and human health impact based on the extent of potential contamination identified. If remediation is required, a RAP will be prepared. The objectives of RAP are:

- (1) To undertake further site investigation where required;
- (2) To evaluate and recommend appropriate remedial measures for the contaminated materials identified in the assessment;
- (3) To recommend good handling practices for the contaminated materials during the remediation works;
- (4) To recommend approximate handling and disposal measures; and
- (5) To formulate optimal and cost-effective mitigation and remedial measures for EPD's agreement.

**6.1.2** A RR would also be prepared to demonstrate that the clean-up works are adequate. No construction/development works would be carried out within the potentially contaminated areas in the Study Area prior to the agreement of the RR.

### 6.2 Possible Remediation Methods

**6.2.1** The possible contaminants that might be found in the Study Area include, as previously mentioned, metals, volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), petroleum carbon ranges (PCRs) and polychlorinated biphenyls (PCBs).

**6.2.2** The criteria listed below would be used as basis on which to address soil remediation options applicable to the subject contaminants in the Study Area:

- (1) Nature and level of contamination;
- (2) Extent of contamination;
- (3) Site characteristic, e.g. soil type and site hydrology;
- (4) Site constraints, e.g. available space;
- (5) Technical and cost effectiveness;
- (6) Technology development status;
- (7) Environmental benefits and disbenefits;
- (8) Commercial availability;
- (9) Time allowable;
- (10) Experience; and

(11) Expertise requirement.

### Remediation Methods for Contaminated Soil

**6.2.3** Common *in-situ* and *ex-situ* treatment technologies that were screened for the targeted soil contaminants are presented in **Table 6.1** below. The technologies are classified into biological treatment, physical / chemical treatment and removal, and grouped under *in-situ* and *ex-situ* methods.

**Table 6.1:** Treatment Technologies for Contaminated Soil with VOCs / SVOCs / Metals / PCRs/ PCBs

| Technology                    | In-situ Treatment   | Ex-situ Treatment  |
|-------------------------------|---|--|
| Biological Treatment          | <ul style="list-style-type: none"> <li>• Natural Attenuation</li> <li>• Soil Venting</li> </ul>   | <ul style="list-style-type: none"> <li>• Biopiling</li> <li>• Landfarming</li> </ul>   |
| Physical / Chemical Treatment | <ul style="list-style-type: none"> <li>• Electrokinetic Separation</li> <li>• Thermal Desorption</li> <li>• Permeable Reactive Barrier</li> </ul> | <ul style="list-style-type: none"> <li>• Solidification/Stabilization</li> <li>• Soil Washing</li> <li>• Incineration</li> </ul> |
| Removal                       | <ul style="list-style-type: none"> <li>• NA</li> </ul>  | <ul style="list-style-type: none"> <li>• Excavation and Landfill Disposal</li> </ul>   |

**6.2.4** The applicability, limitations and environmental benefits and disbenefits of the above remediation techniques for contaminated soil are described in **Table 6.2**.

### Remediation Methods for Contaminated Groundwater

**6.2.5** The applicability, limitations and environmental benefits and disbenefits of different remediation techniques contaminated groundwater are described in **Table 6.3**.

### 6.3 Surmountability of Potentially Contaminated Premises

**6.3.1** The contamination problem in the Study Area that are identified as potentially contaminated would not be considered insurmountable in the supportive view that these areas are relatively small in size, the individual operation involving contaminating activities are likely to be small in scale, the extent of potential contamination are relatively localised, likely contaminants are generic and easily remediated, remediation methods available in the market are well established and nature of the possible contaminants can be dealt with by sufficient local remediation experience.

Table 6.2: Treatment Technologies for Contaminated Soil

| Remediation Option             | Remediation Effectiveness | Descriptions   | Applicability / Environmental Benefits  | Limitations / Environmental Disbenefits  |
|--------------------------------|---------------------------|--|---|--|
| Biopiling                      | VOCs, SVOCs and PCRs      | An Ex-situ bioremediation method that facilitates bacterial growth in contaminated soil and degradation of waste into harmless products.   | <ul style="list-style-type: none"> <li>Effective to PCRs and other wide range of organic contaminants with some successful local case studies, e.g. decontamination works at the Cheoy Lee Shipyard at Penny's Bay, reclamation works at North Tsing Yi Shipyard site, decommissioning of Kwan Chung Incinerator.</li> <li>Most cost-effective for large volumes of contaminated soil</li> <li>All materials and equipment commercially available</li> <li>Can be designed to be a closed system; vapour emissions can be controlled</li> </ul> | <ul style="list-style-type: none"> <li>Labour-intensive; considerable maintenance required</li> <li>Time-consuming (~12 months period) and not cost-effective for treating small soil samples.</li> <li>Space required for biopile construction</li> </ul>             |
| Soil Venting                   | VOCs, SVOCs and PCRs      | An In-situ bioremediation method using indigenous bacterial degradation of contaminants. Bacterial activity enhanced by air flow inducement (using extraction or injection wells) and, if required, by adding nutrients. | <ul style="list-style-type: none"> <li>Very effective to PCRs</li> <li>Suitable for remediation in built up areas as wells can be placed between and/or below buildings</li> <li>Applicable to extensive contamination in large sites</li> <li>Uses readily available equipment; easy to install</li> <li>Vapour emissions can be controlled but not to the extent of biopiling depending on underground soil in-situ properties</li> </ul>   | <ul style="list-style-type: none"> <li>Effectiveness hindered by underground soil features e.g. soil moisture content, permeability, etc.</li> <li>Potential air emission to the sensitive receivers</li> <li>Large area requirement for system development</li> </ul> |
| Solidification / Stabilization | Metals                    | Ex-situ immobilization technique treating contaminated soil by mixing soil with binding agents, e.g. cement so as to physically bind contaminants into stable mass.  | <ul style="list-style-type: none"> <li>Applicable to clean-up inorganic contaminants such as heavy metals.</li> <li>Solidification/stabilization are used on certain contaminated sites in Hong Kong and successfully demonstrated treatment method for inorganic contaminated soil, e.g. decontamination works at the Cheoy Lee Shipyard at Penny's Bay, reclamation works at North Tsing Yi Shipyard site, decommissioning of Kwan Chung Incinerator, and few isolated sites identified in the Deep Bay Link project.</li> </ul>              | <ul style="list-style-type: none"> <li>Effective in reducing presence of organic contaminants</li> <li>Possible hindrance of large boulders in mixing process. Soil sorting necessary prior to treatment.</li> </ul>   |

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| Remediation Option               | Remediation Effectiveness          | Descriptions   | Applicability / Environmental Benefits   | Limitations / Environmental Disbenefits   |
|----------------------------------|------------------------------------|--|--|---|
| Soil Washing                     | Metals, SVOCs, PCRs and PCBs       | An Ex-situ soil separation method primarily based on mineral processing techniques. A water-based process for scrubbing soils ex-situ to remove contaminants.  | <ul style="list-style-type: none"> <li>Applicable to clean inorganic contaminants such as heavy metals from coarse-grained soils.</li> </ul>   | <ul style="list-style-type: none"> <li>Effectiveness of treatment dependent on soil coarseness. Fine soil particles may require addition of polymer for removal of contaminant by the washing fluid.</li> <li>Complex waste mixtures make formulating washing fluid difficult.</li> <li>Further treatment and disposal for residuals required.</li> </ul>   |
| Electrokinetic Separation        | Metals                             | This In-situ method uses electrochemical and electrokinetic processes to desorb and remove metals and polar organics from soil. Low intensity direct current is applied to the soil to mobilize the charged species. | <ul style="list-style-type: none"> <li>Applicable to treat soil with low permeability and heavily contaminated with metals.</li> </ul>   | <ul style="list-style-type: none"> <li>Effectiveness dependent on moisture content of soil and decreases with moisture content less than 10%.</li> <li>Require further treatment for removal of desorbed contaminants and thus increase cost of remediation.</li> <li>Variability of electrical conductivity in soil may be induced by presence of anomalies such as large gravels and insulating material. This may reduce treatment effectiveness.</li> </ul>   |
| Excavation and Landfill Disposal | Metals, VOCs, SVOCs, PCRs and PCBs | Ex-situ method whereby contaminants are removed by excavation of the contaminated soil and direct disposal to landfill   | <ul style="list-style-type: none"> <li>Most simple and quickest way to dispose of large volume of contaminated soil.</li> <li>Contamination is removed definitely.</li> <li>Higher certainty of success.</li> <li>Wide experience in Hong Kong.</li> <li>Applicable to all waste or mixture that meet land disposal restriction treatment standards.</li> <li>Common practice for shallow, highly-contaminated soils.</li> </ul> | <ul style="list-style-type: none"> <li>Pre-treatment may be required for contaminated soil to meet landfill disposal criteria</li> <li>Landfill space limited and valuable.</li> <li>Indirect costs to the landfill management on monitoring and maintenance.</li> <li>Potential long-term liabilities to landfill</li> <li>Need large volume of clean backfill materials</li> <li>No access to the working site until completion of backfilling</li> <li>Least desirable management option.</li> </ul> |

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| Remediation Option | Remediation Effectiveness  | Descriptions  | Applicability / Environmental Benefits  | Limitations / Environmental Disbenefits  |
|--------------------|----------------------------|---|---|--|
| Thermal Desorption | VOCs, SVOCs, PCRs and PCBs | A method to increase the volatility of contaminants by applying heat to the contaminated soil so that the contaminants can be removed / separated from the soil matrix. | <ul style="list-style-type: none"> <li>Low temperature thermal desorption systems are targeted for soils contaminated with VOCs, SVOCs and fuel components.</li> <li>PAHs, PCBs, and pesticides can be treated with high temperature thermal desorption.</li> <li>Less polluting method when compared with incineration.</li> </ul> | <ul style="list-style-type: none"> <li>Have varying degrees of effectiveness against the full spectrum of organic contaminants</li> <li>Processor unit can potentially be vulnerable to highly abrasive feed</li> <li>Reaction time can vary with feed content as a result of binding of contaminants</li> </ul>   |
| Incineration       | VOCs, SVOCs, PCRs and PCBs | Ex-situ or in-situ treatment of contaminated soils and hazardous materials by incinerating in order to break down contaminants.   | <ul style="list-style-type: none"> <li>Applicable to soil contaminated with hazardous wastes such as dioxins, PCBs, and chlorinated hydrocarbons.</li> <li>Wide experience in Hong Kong.</li> <li>Common practice for highly-contaminated soils.</li> </ul>   | <ul style="list-style-type: none"> <li>Process produces ash residues which contains volatile heavy metals</li> <li>Ash residues leaving the combustion unit requires gas treatment prior to release</li> <li>Contaminants can react to each other forming more volatile and toxic compounds which may require breaking down in a caustic quench</li> </ul> |

Table 6.3: Treatment Technologies for Contaminated Groundwater

| Remediation Option                         | Remediation Effectiveness | Descriptions  | Applicability and Environmental Benefits   | Limitations and Environmental Disbenefits  |
|--|---------------------------|---|--|--|
| Vapour extraction / Groundwater extraction | PCRs                      | Vacuum is applied to well(s) above water table to recover vapour phase and residual hydrocarbons and to help maintain high water table. Free product and / or groundwater is recovered from wells by pumps. | <ul style="list-style-type: none"> <li>Low to moderately permeable materials (silts and silty sands). Often used to enhance recovery of hydrocarbons.</li> </ul>   | <ul style="list-style-type: none"> <li>Water and vapour treatment is typically required</li> <li>Phase separation is required</li> <li>Initial startup times are longer than other conventional methods</li> <li>Moderate to large capital investment, medium to high operation and maintenance costs</li> </ul> |
| Dual phase (liquid and vapour) recovery    | VOCs, SVOCs and PCRs      | Both liquids and vapours are recovered from same well. Groundwater production is minimized, and water table is stabilized.  | <ul style="list-style-type: none"> <li>Generally low permeability materials (clay, clayey silts, silts, silty / clayey sands). Requires surface seal (either naturally occurring clay or man-made) to prevent short-circuiting of vacuum.</li> <li>High vacuum increases groundwater and product recovery.</li> <li>Minimizes drawdown and “smearing” of product.</li> <li>Expedites site cleanup by recovering all hydrocarbon phases.</li> </ul> | <ul style="list-style-type: none"> <li>Usually requires vapour and groundwater treatment</li> <li>Phase separation is required</li> <li>Longer initial startup time</li> <li>Higher capital costs</li> </ul>   |
| Skimming systems                           | PCRs                      | Free product is recovered from a pit or trench without recovering groundwater   | <ul style="list-style-type: none"> <li>Applicable to settings in which the amount of free product is small and exists in permeable conduits such as utility bedding or buried underground open structures.</li> <li>Low cost and simple operation and maintenance.</li> <li>Ideal for shallow groundwater level and soil excavation works.</li> </ul>  | <ul style="list-style-type: none"> <li>Recovery rates depend on pit/trench size</li> <li>Frequent media replacement</li> <li>Requires manual adjustment</li> </ul>   |

| Remediation Option                                | Remediation Effectiveness          | Descriptions   | Applicability and Environmental Benefits   | Limitations and Environmental Disbenefits  |
|---|------------------------------------|--|--|--|
| Free product recovery with water table depression | PCRs                               | Free product is recovered from a well or trench along with groundwater. Groundwater is pumped to create cone of depression in water table to expand area of influence. | <ul style="list-style-type: none"> <li>Requires moderately permeable to permeable subsurface materials (silts, sands, and gravels). Can be used in setting with deep water tables. Often used in long term (&gt; 1 year) remedial actions. Produced groundwater can be expensive to treat.</li> <li>Recovered groundwater can be oxygenated and re-injected for bioremediation.</li> </ul> | <ul style="list-style-type: none"> <li>Recovered fluids usually require treatment</li> <li>Product can be “smeared” across area of depression resulting in greater formation storage</li> <li>Higher permeability formations may require high pumping rates</li> <li>Well network design requires capture zone analysis</li> </ul> |
| Permeable Reactive Barriers                       | Metals, VOCs, SVOCs, PCRs and PCBs | In-situ treatment of contaminated water by means of engineering and use of reactive materials.   | <ul style="list-style-type: none"> <li>Applicable to groundwater contaminated with volatile organic compounds, metals, and radioactive contaminants.</li> <li>Common method for reducing chlorinated contaminants such as TCE and PCE.</li> <li>Effective method for immobilizing metals such as uranium, chromium and arsenic.</li> </ul>   | <ul style="list-style-type: none"> <li>Method only applies to relatively shallow aquifers</li> <li>Treatment effectiveness is highly dependent on groundwater chemistry / flow rate, ground geochemistry, site topography, seasonal changes in hydrogeological conditions.</li> </ul>  |


## Figures

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Legend  
 Study Area

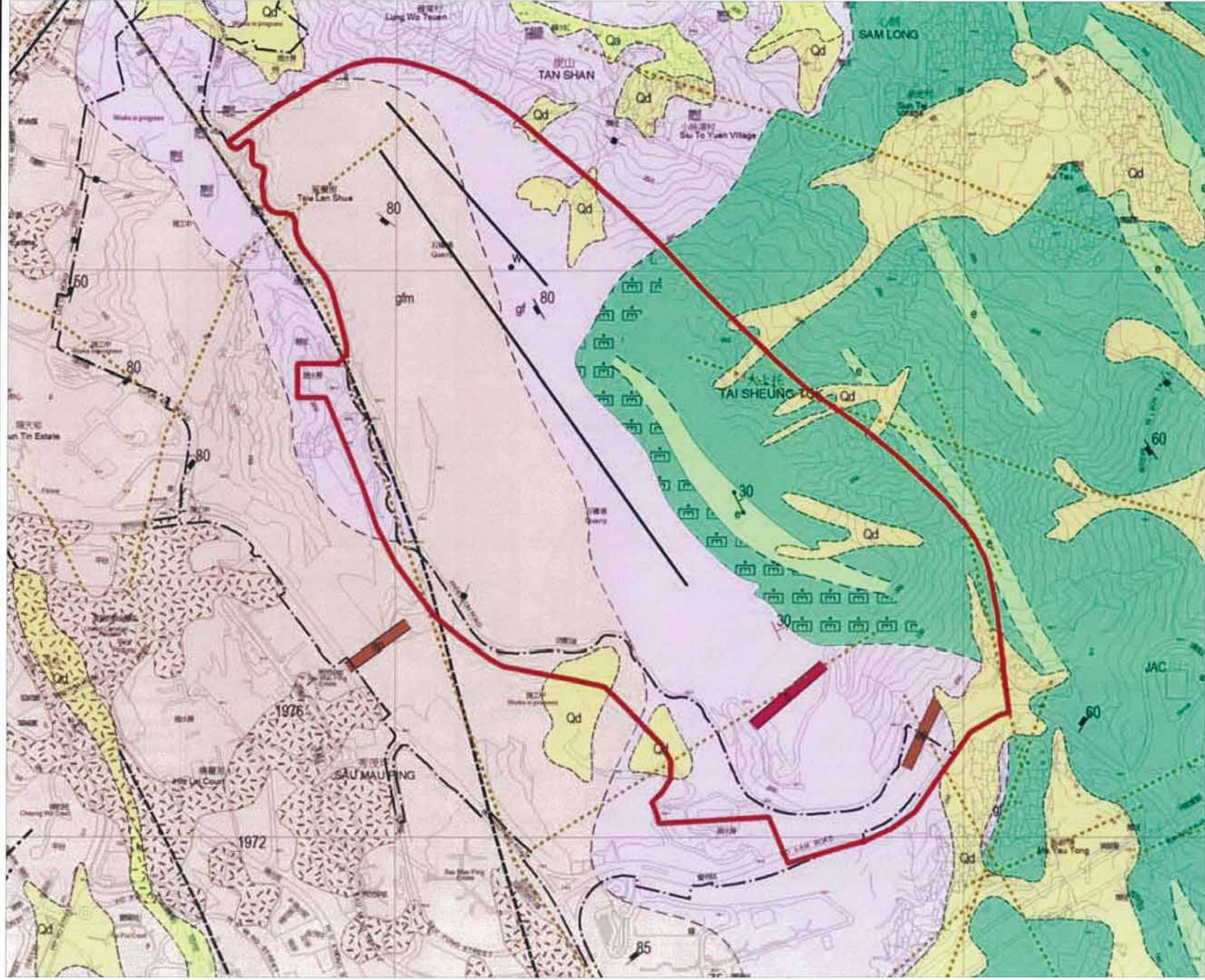


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- Legend**
- Study Area
  - Structural Geology**
  - Fault Plane
  - Flow fabric
  - Jointing
  - Vertical Jointing
  - Geological Line Feature**
  - Fault, observed
  - Fault, inferred
  - Photolineament
  - Photolineament (GASP Report)
  - Superficial Geology**
  - Fill
  - Qa Alluvium
  - Qd Debris flow deposits
  - Solid Geology**
  - ap Aplite
  - b Basalt
  - e Eutaxite
  - gf Fine-grained granite
  - glm Fine- to medium-grained granite
  - gm Medium-grained granite
  - JAC Fine ash vitric tuff
  - JSM Fine ash to coarse ash tuffs, tuff-breccia and tuffite
  - rf Feldsparphyric rhyolite
  - rq Quartzphyric rhyolite
  - tb Tuff-breccia and pyroclastic breccia
  - Metamorphosed Geology**
  - Hornfels

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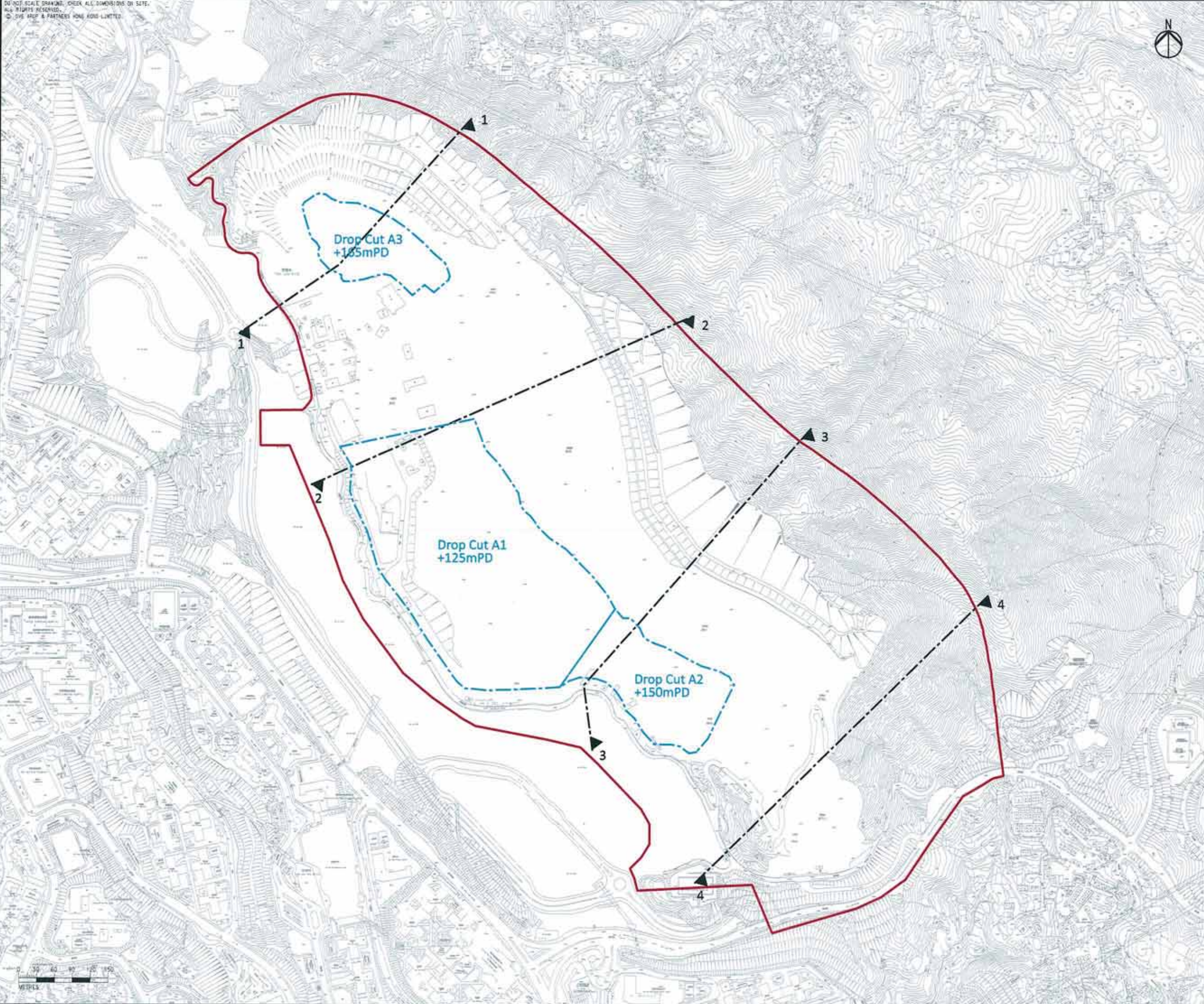
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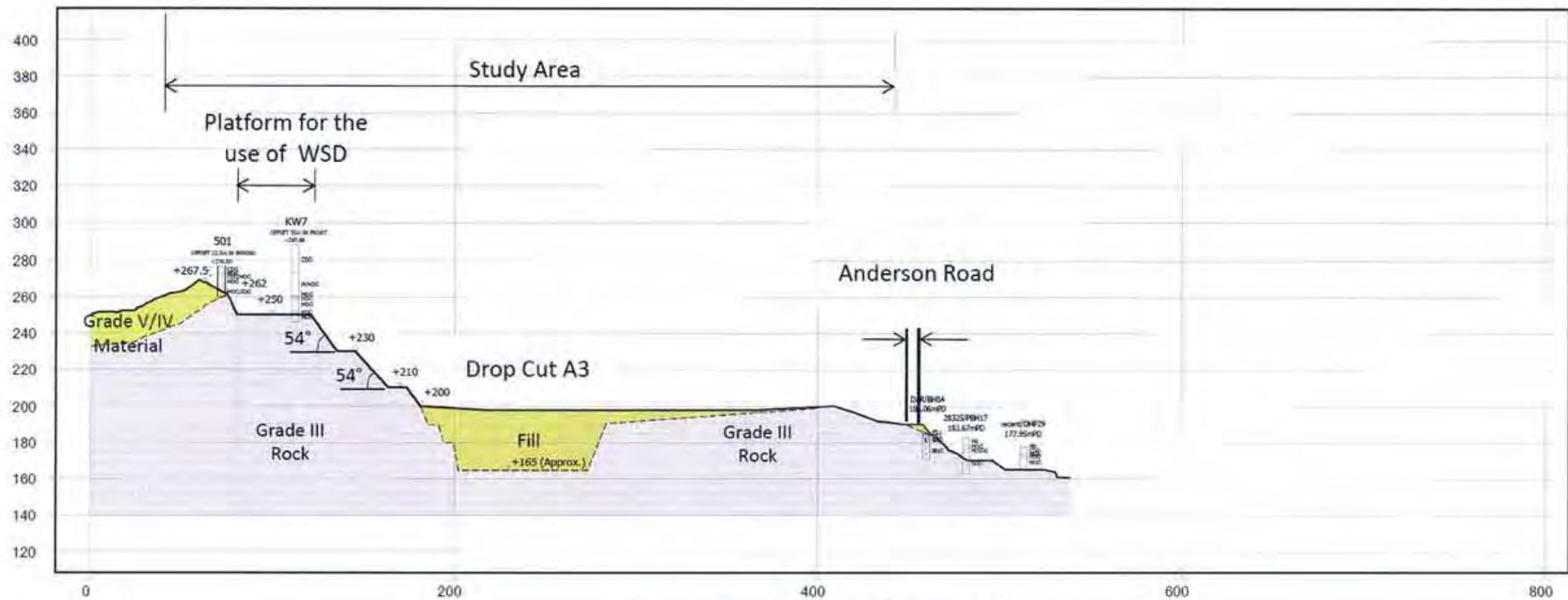


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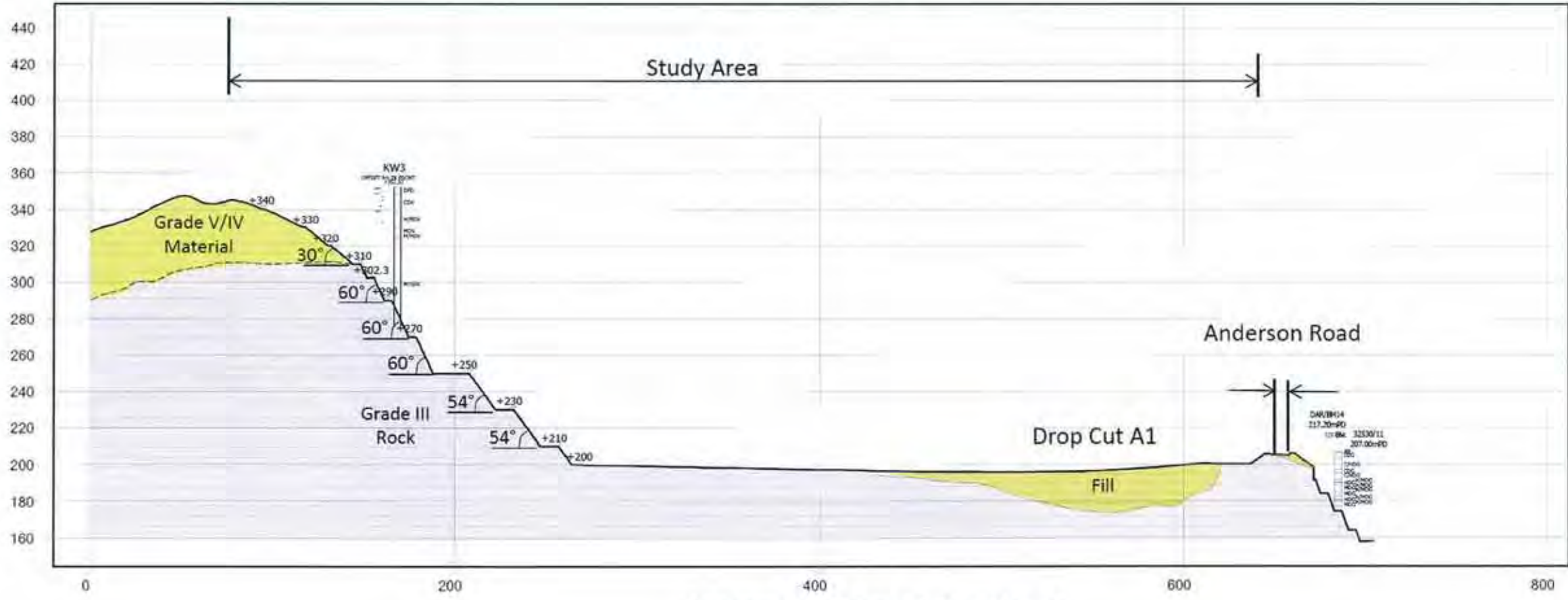
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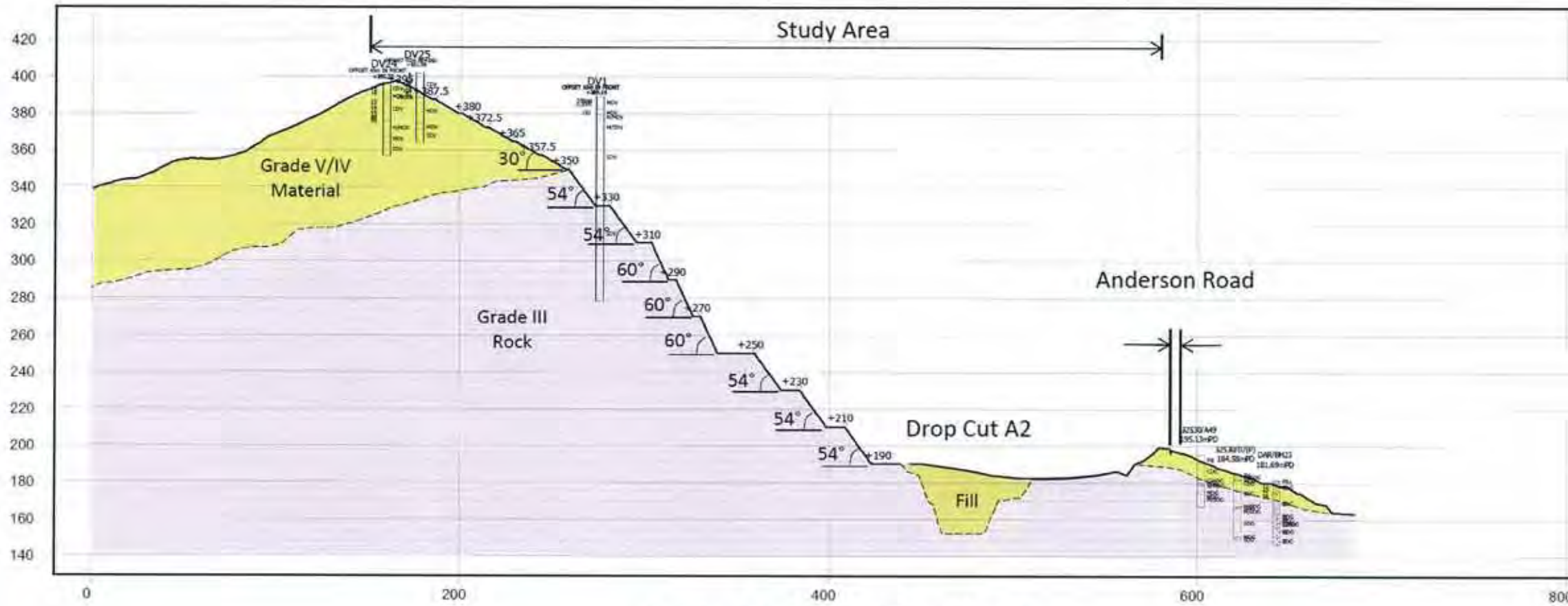
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  - Completely / Highly Decomposed Granite / Tuff
  - Moderately Decomposed Granite / Tuff

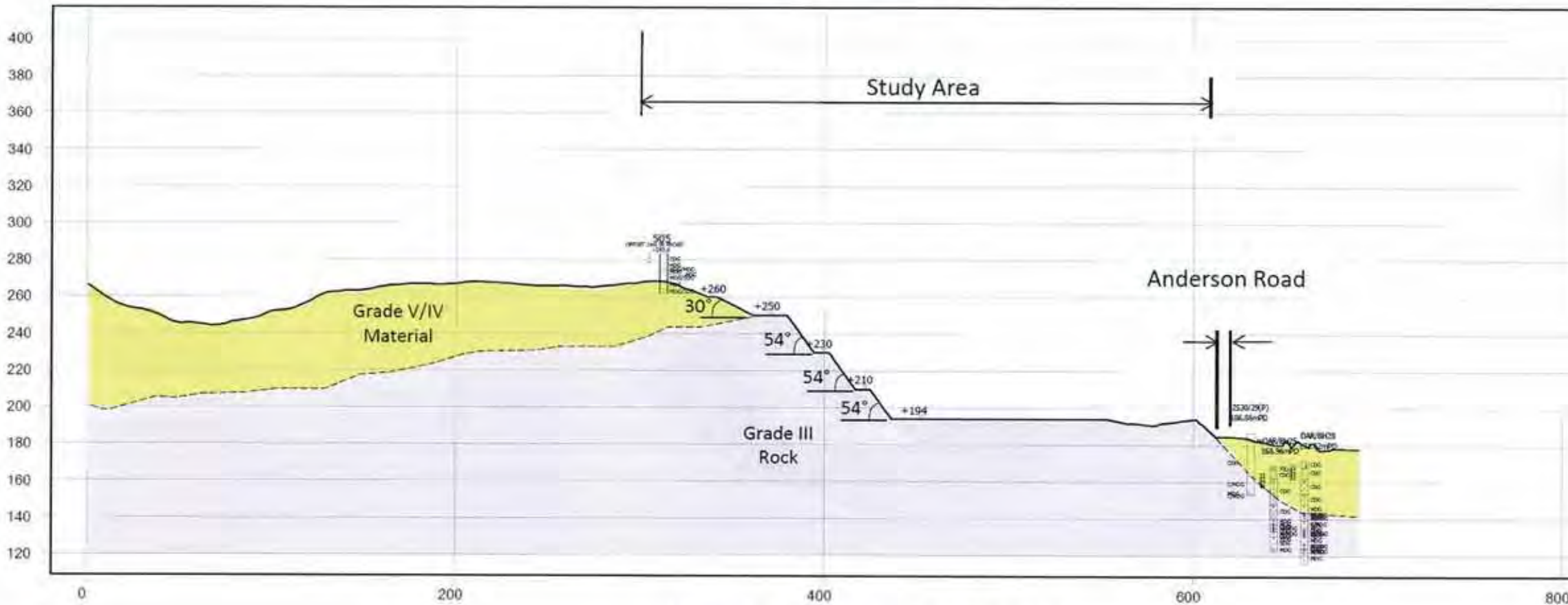
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Section 3-3 (Planned Landform)  
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Section 4-4 (Planned Landform)  
 Scale: 1:4000 (A4)

Legend

- Inferred Geological Contact
- General Fill
- Completely / Highly Decomposed Granite / Tuff
- Moderately Decomposed Granite / Tuff

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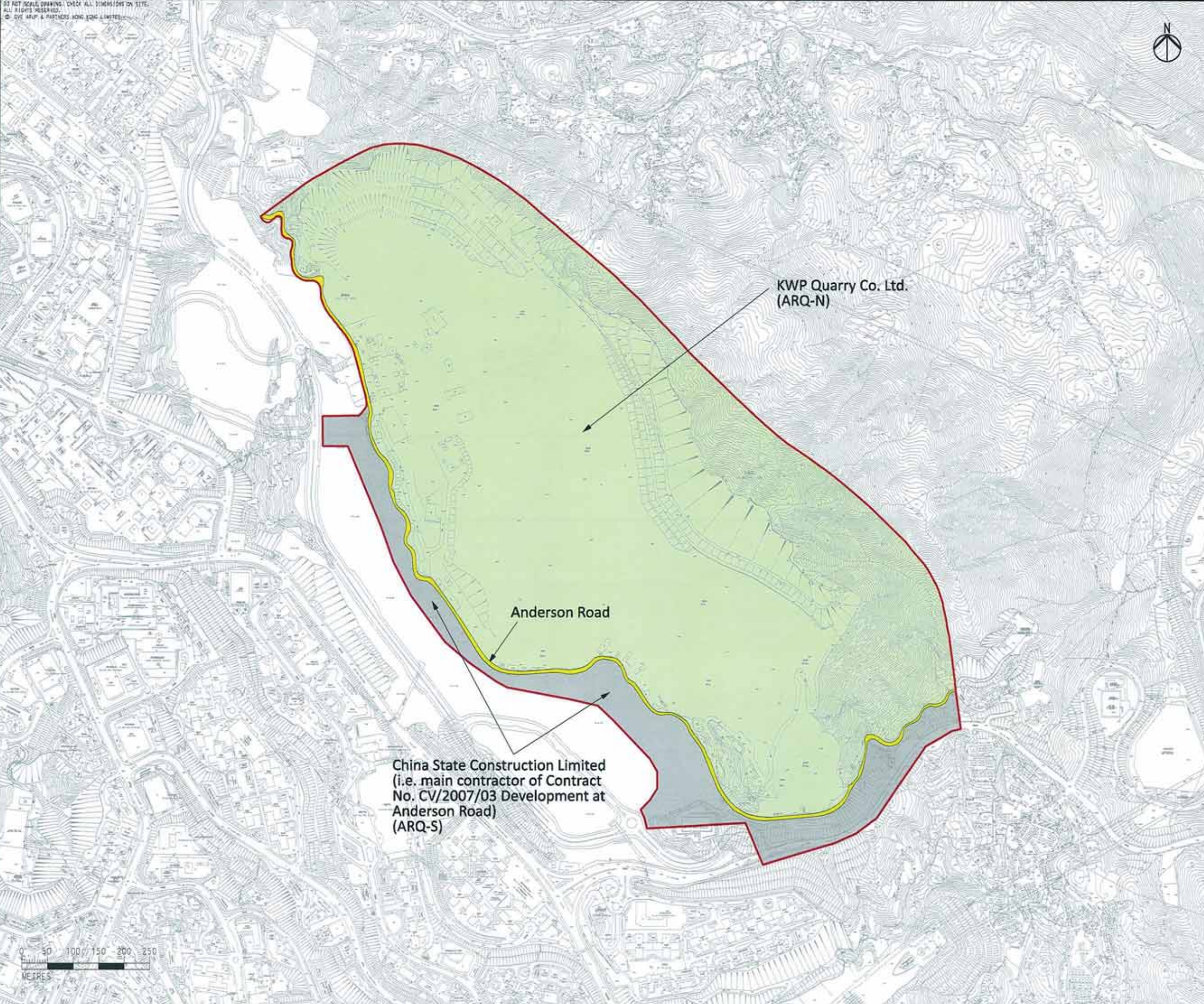
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  - ARQ-S
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(ARQ-N)

Anderson Road

China State Construction Limited  
(i.e. main contractor of Contract  
No. CV/2007/03 Development at  
Anderson Road)  
(ARQ-S)



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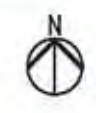
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Photo no. : P01-2



Photo no. : P01-3



- Legend**
- Surveyed Premises
  - Chemical / Chemical Waste Storage Areas
  - Maintenance Workshop
  - Fuel Storage
  - Boiler
  - Electric Sub-station
  - View Angle

|     |              |    |       |
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|----------|--|
| P01-1    | Site office and car park                         |
| P01-2    | Site vehicles repairing and maintenance workshop |
| P01-3    | Site vehicles repairing and maintenance workshop |
| P01-4    | Chemical and chemical waste storage rooms        |
| P01-5    | Fuel station                                     |
| P01-6    | Electric sub-station (ESS-01)                    |

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- Legend**
- Surveyed Premises
  - Chemical / Chemical Waste Storage Areas
  - Maintenance Workshop
  - Fuel Storage
  - Boiler
  - View Angle

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| Photo No | Description                                      |
|----------|--|
| P02-1    | Asphalt production facilities                    |
| P02-2    | Diesel pump                                      |
| P02-3    | Fuel station                                     |
| P02-4    | Site vehicles repairing and maintenance workshop |
| P02-5    | Chemical and chemical waste storage area         |

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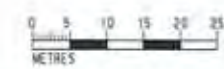
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Anderson Road Quarry -  
Investigation

Drawing title  
Location of Surveyed  
Premises  
(ARQ - 02)

|                           |               |                    |                |
|---------------------------|---------------|--------------------|----------------|
| Drawing no. 227724/E/5008 |               | Rev. B             |                |
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Photo no. : P03-1



Photo no. : P03-4



Photo no. : P03-6



Photo no. : P03-2



Photo no. : P03-5



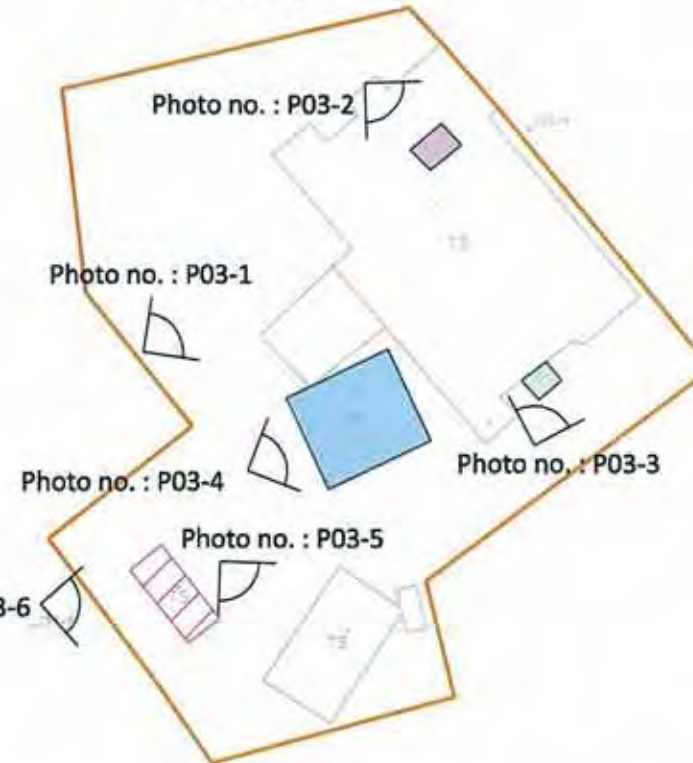
Photo no. : P03-3

| Photo No | Description                                      |
|----------|--|
| P03-1    | Production plant                                 |
| P03-2    | Chemical storage area                            |
| P03-3    | Above ground fuel tank                           |
| P03-4    | Site vehicles repairing and maintenance workshop |
| P03-5    | Stockpiling area                                 |
| P03-6    | Electric sub-station (ESS-02)                    |

Legend

- Surveved Premises
- Chemical / Chemical Waste Storage Areas
- Maintenance Workshop
- Fuel Storage
- Boiler
- Electric Sub-station
- View Angle

ARQ - 03



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Drawing Title  
Location of Surveved Premises (ARQ - 03)

Drawing no. 227724/E/5009 Rev. B

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Photo no. : P04-1



Photo no. : P04-3



Photo no. : P04-4



Photo no. : P04-2

ARQ - 04

Photo no. : P04-4

Photo no. : P04-3

Photo no. : P04-1

Photo no. : P04-2

Legend

- Surveyed Premises
- Chemical / Chemical Waste Storage Areas
- Maintenance Workshop
- Fuel Storage
- Boiler
- View Angle

|     |              |    |       |
|-----|--------------|----|-------|
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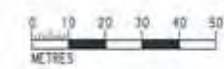
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Investigation

Drawing title  
Location of Surveyed  
Premises  
(ARQ - 04)

|                           |               |                    |                |
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| Photo No | Description                               |
|----------|---|
| P04-1    | Secondary crusher plants and convey belts |
| P04-2    | Stockpiling area                          |
| P04-3    | Maintenance workshop                      |
| P04-4    | Chemical waste containers                 |

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Photo no. : P05-1



Photo no. : P05-2



Photo no. : P05-3

WP Jan 2012

| Photo No | Description                    |
|----------|--------------------------------|
| P05-1    | Concrete production facilities |
| P05-2    | Maintenance workshop           |
| P05-3    | Chemical waste storage area    |



- Legend**
- Surveyed Premises
  - Chemical / Chemical Waste Storage Areas
  - Maintenance Workshop
  - Fuel Storage
  - Boiler
  - Electric Sub-station
  - View Angle

| Rev | Description  | By | Date  |
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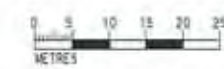
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Drawing title  
**Location of Surveyed Premises (ARQ - 05)**

|             |               |          |             |
|-------------|---------------|----------|-------------|
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Photo no. : P06-1



Photo no. : P06-4



Photo no. : P06-2

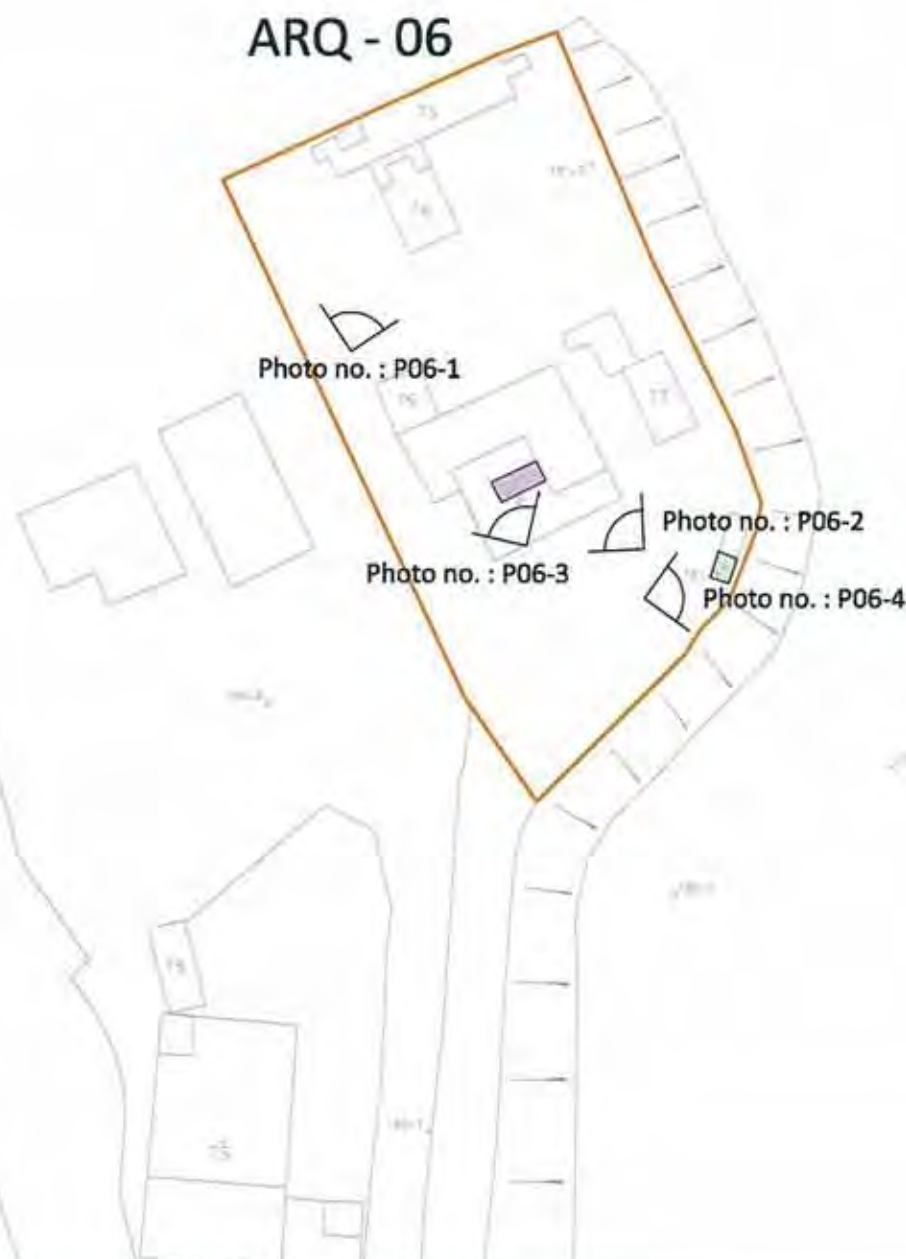


Photo no. : P06-3

| Photo No | Description                    |
|----------|--------------------------------|
| P06-1    | Concrete production facilities |
| P06-2    | Concrete production facilities |
| P06-3    | Chemical storage cabinet       |
| P06-4    | Diesel storage area            |

WCP June 2012

ARQ - 06



- Legend**
- Surveyed Premises
  - Chemical / Chemical Waste Storage Areas
  - Maintenance Workshop
  - Fuel Storage
  - Boiler
  - View Angle

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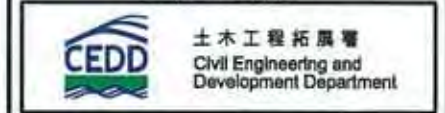
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Drawing title  
Location of Surveyed Premises (ARQ - 06)

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Photo no. : P07-1



Photo no. : P07-4



Photo no. : P07-2



Photo no. : P07-3



- Legend**
- Surveyed Premises
  - Chemical / Chemical Waste Storage Areas
  - Maintenance Workshop
  - Fuel Storage
  - Boiler
  - View Angle

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| Photo No. | Description                                      |
|-----------|--|
| P07-1     | Site vehicles repairing and maintenance workshop |
| P07-2     | Chemical waste storage area                      |
| P07-3     | Materials storage                                |
| P07-4     | Site office                                      |

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 Investigation

Drawing title  
 Location of Surveyed  
 Premises  
 (ARQ - 07)

|                           |               |                       |                |
|---------------------------|---------------|-----------------------|----------------|
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Photo no. : P08-1



Photo no. : P08-5



Photo no. : P08-6



Photo no. : P08-2



Photo no. : P08-7



Photo no. : P08-3



Photo no. : P08-4



Photo no. : P08-8



Legend

- Surveyed Premises
- Chemical / Chemical Waste Storage Areas
- Maintenance Workshop
- Fuel Storage
- Boiler
- Asphalt Production Facilities
- Electric Sub-station
- View Angle

| Photo No. | Description                                      |
|-----------|--|
| P08-1     | Chemical storage area                            |
| P08-2     | Chemical storage area                            |
| P08-3     | Site vehicles repairing and maintenance workshop |
| P08-4     | Chemical waste storage area                      |
| P08-5     | Diesel tank                                      |
| P08-6     | Boiler and asphalt production facilities         |
| P08-7     | Site office                                      |
| P08-8     | Electric sub-station (ESS-05)                    |

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Drawing title  
Location of Surveyed Premises (ARQ - 08)

|                           |                    |            |             |
|---------------------------|--------------------|------------|-------------|
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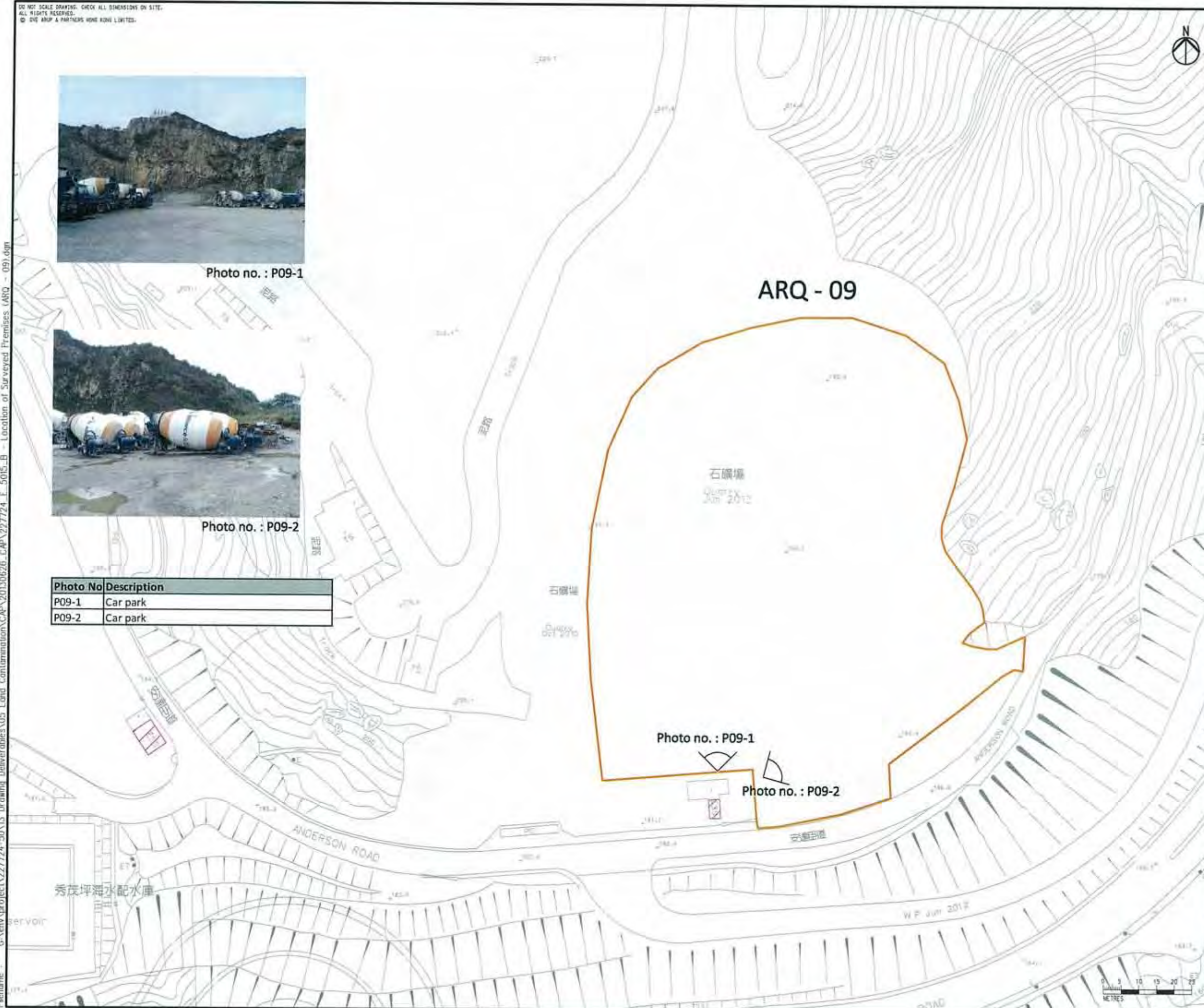
Photo no. : P09-1



Photo no. : P09-2

| Photo No | Description |
|----------|-------------|
| P09-1    | Car park    |
| P09-2    | Car park    |

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**Legend**

- Surveyed Premises
- Chemical / Chemical Waste Storage Areas
- Maintenance Workshop
- Fuel Storage
- Boiler
- Electric Sub-station
- View Angle

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Drawing title  
**Location of Surveyed Premises (ARQ - 09)**

|                   |                    |                    |             |
|-------------------|--------------------|--------------------|-------------|
| Drawing no.       | 227724/E/5015      | Rev.               | B           |
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- Legend**
- Study Area
  - Surveyed Premises
  - Anderson Road
  - Electric Sub-station
  - View Angle

| Photo No. | Description                   |
|-----------|-------------------------------|
| PES-1     | Electric sub-station (ESS-01) |
| PES-2     | Electric sub-station (ESS-02) |
| PES-3     | Electric sub-station (ESS-03) |
| PES-4     | Electric sub-station (ESS-04) |
| PES-5     | Electric sub-station (ESS-05) |
| PES-6     | Electric sub-station (ESS-06) |
| PES-7     | Electric sub-station (ESS-07) |

|     |             |    |       |
|-----|-------------|----|-------|
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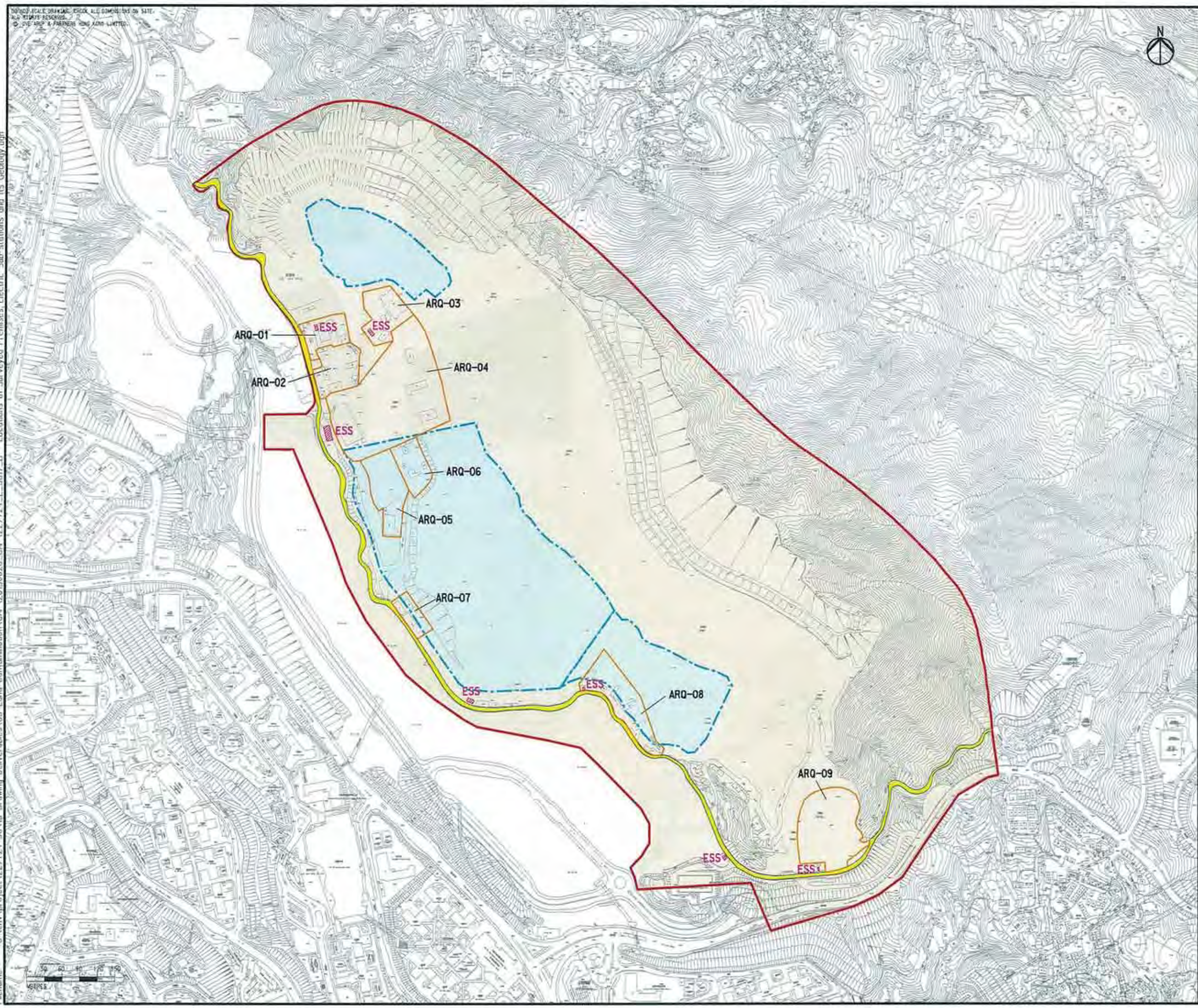
Drawing title  
Locations of Surveyed Premises and nearby Electric Sub-stations

|                           |               |                       |                |
|---------------------------|---------------|-----------------------|----------------|
| Drawing no. 227724/E/5016 |               | Rev. A                |                |
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- Legend**
- Study Area
  - Surveyed Premises
  - Fill Materials
  - Rock Layer
  - Anderson Road
  - Electric Sub-station

| Rev | Description  | By | Date  |
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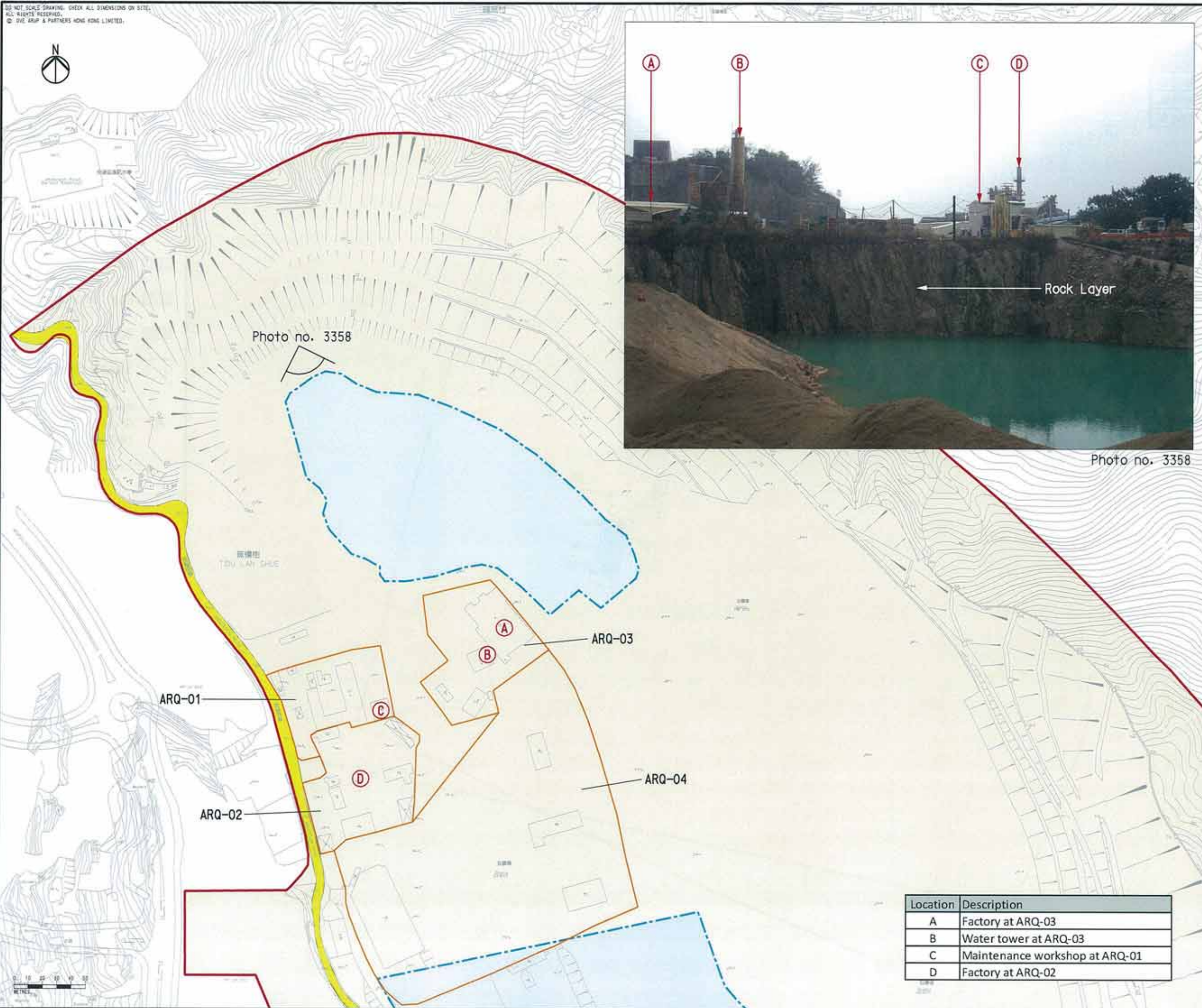
Drawing title  
 Locations of Surveyed  
 Premises, Electric  
 Sub-stations and its  
 Geology

|                           |                       |               |                |
|---------------------------|-----------------------|---------------|----------------|
| Drawing no. 227724/E/5017 |                       | Rev. B        |                |
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- Legend**
- Study Area
  - Surveyed Permisses
  - Fill Materials
  - Rock Layer
  - Anderson Road
  - ∠ View Angle



Photo no. 3358

Photo no. 3358

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Drawing title  
**Geology Profile Photo**

|                           |               |                       |                |
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| Location | Description                    |
|----------|--------------------------------|
| A        | Factory at ARQ-03              |
| B        | Water tower at ARQ-03          |
| C        | Maintenance workshop at ARQ-01 |
| D        | Factory at ARQ-02              |

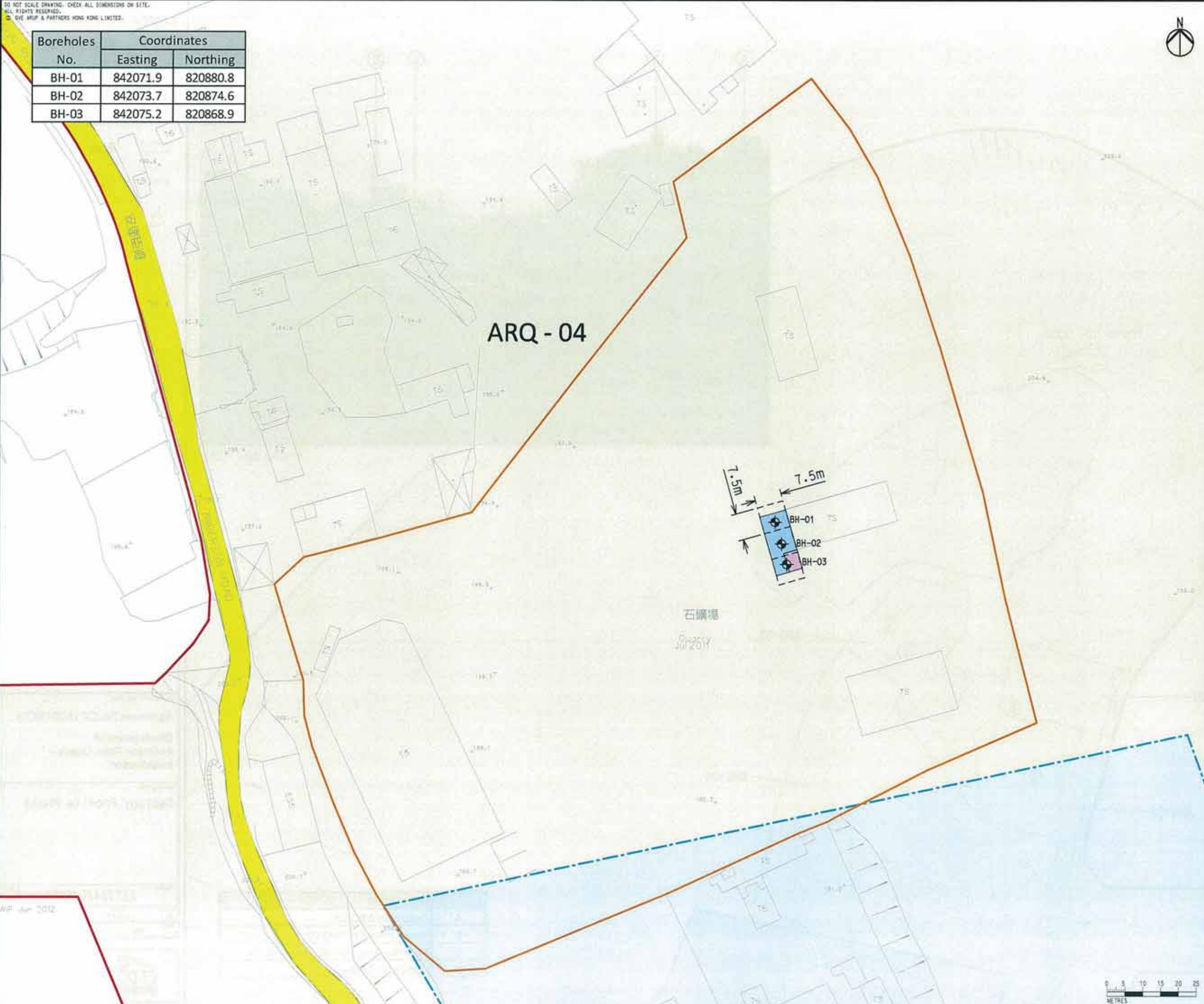


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| Boreholes No. | Coordinates |          |
|---------------|-------------|----------|
|               | Easting     | Northing |
| BH-01         | 842071.9    | 820880.8 |
| BH-02         | 842073.7    | 820874.6 |
| BH-03         | 842075.2    | 820868.9 |



- Legend**
- Study Area
  - Surveyed Premises
  - Fill Materials
  - Rock Layer
  - Anderson Road
  - Chemical / Chemical Waste Storage Areas
  - Maintenance Workshop
  - Fuel Storage
  - Boiler
  - Square Grid
  - Proposed Soil & Groundwater Borehole Location



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Drawing title  
 Locations of Proposed SI Boreholes (ARQ - 04)

|                           |            |                    |             |
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| Boreholes No. | Coordinates |          |
|---------------|-------------|----------|
|               | Easting     | Northing |
| BH-04         | 842035.0    | 820660.1 |
| BH-05         | 842036.4    | 820645.7 |
| BH-06         | 842035.6    | 820634.0 |
| BH-07         | 842046.5    | 820656.6 |
| BH-08         | 842045.8    | 820645.0 |
| BH-09         | 842045.0    | 820633.1 |



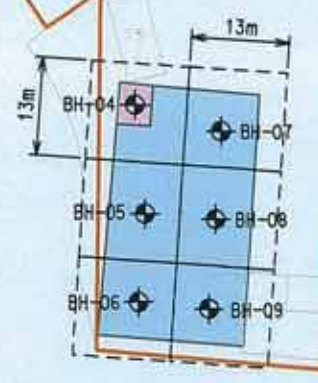
- Legend**
- Study Area
  - Surveyed Premises
  - Fill Materials
  - Rock Layer
  - Anderson Road
  - Chemical / Chemical Waste Storage Areas
  - Maintenance Workshop
  - Fuel Storage
  - Boiler
  - Square Grid
  - Proposed Soil & Groundwater Borehole Location

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WP JUN 2012

WP JUN 2012

ARQ - 05



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Drawing Title  
Locations of Proposed SI Boreholes (ARQ - 05)

|                           |            |                    |             |
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| Boreholes No. | Coordinates |          |
|---------------|-------------|----------|
|               | Easting     | Northing |
| BH-10         | 842081.6    | 820735.4 |
| BH-11         | 842109.5    | 820723.7 |



- Legend**
- Study Area
  - Surveyed Premises
  - Fill Materials
  - Rock Layer
  - Anderson Road
  - Chemical / Chemical Waste Storage Areas
  - Maintenance Workshop
  - Fuel Storage
  - Boiler
  - Square Grid
  - Proposed Soil & Groundwater Borehole Location

ARQ - 06



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Contract No. and Title  
 Agreement No. CE 18/2012(CE)  
 Development of Anderson Road Quarry - Investigation

Drawing title  
 Locations of Proposed SI Boreholes (ARQ - 06)

|                           |            |                    |             |
|---------------------------|------------|--------------------|-------------|
| Drawing no. 227724/E/5021 |            | Rev. B             |             |
| Drawn GL                  | Date 07/13 | Checked TC         | Approved ST |
| Scale 1:500 @ A3          |            | Status PRELIMINARY |             |

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Printed by: 7/11/2013  
 Filename: G:\env\project\227724-50\13 Drawing Deliverables\05 Land Contamination\CAP\20130626\_CAP\227724\_E\_5021\_B - Location of Proposed SI Boreholes (ARQ - 06).dgn

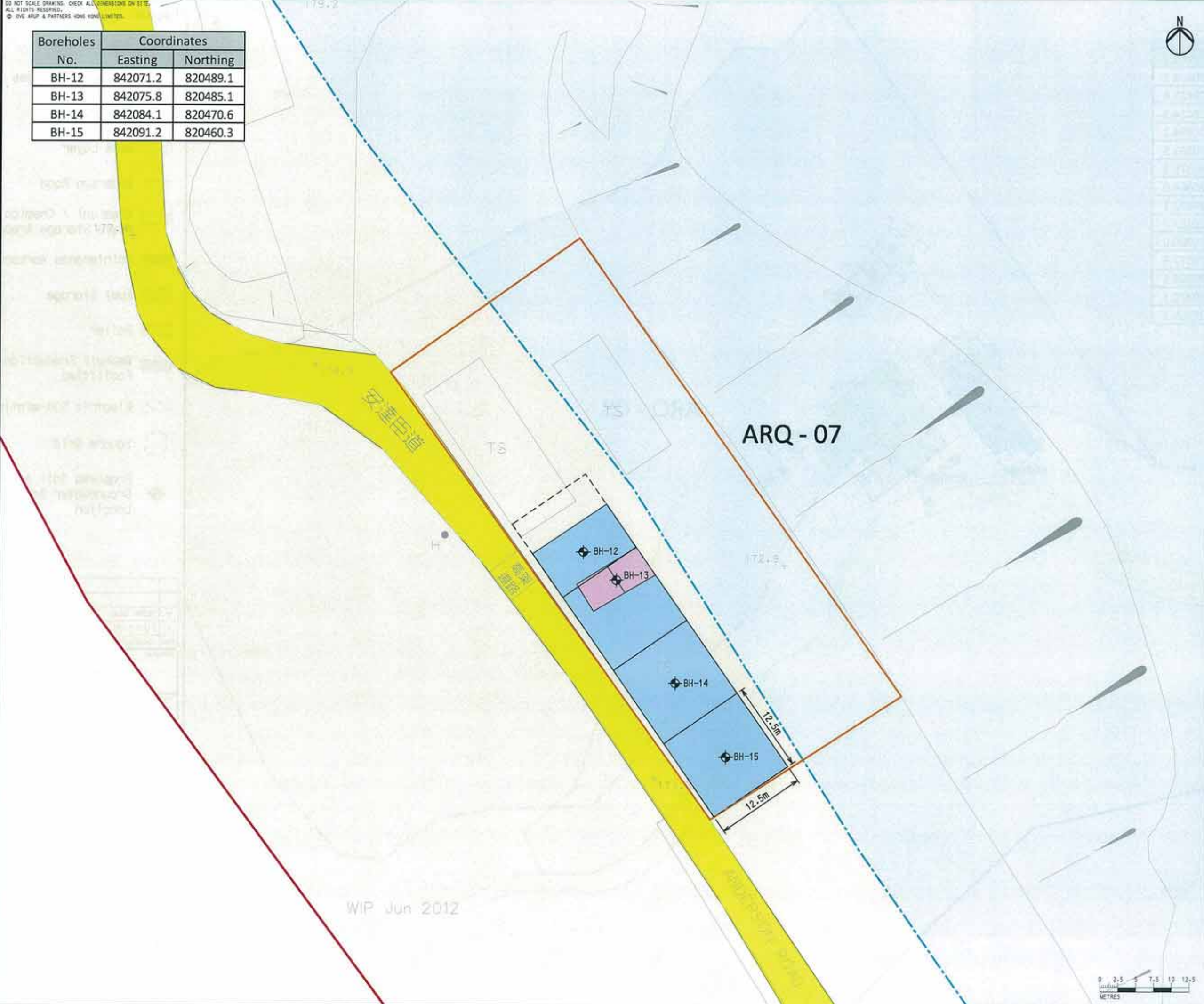
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| Boreholes No. | Coordinates |          |
|---------------|-------------|----------|
|               | Easting     | Northing |
| BH-12         | 842071.2    | 820489.1 |
| BH-13         | 842075.8    | 820485.1 |
| BH-14         | 842084.1    | 820470.6 |
| BH-15         | 842091.2    | 820460.3 |



- Legend**
- Study Area
  - Surveyed Premises
  - Fill Materials
  - Rock Layer
  - Anderson Road
  - Chemical / Chemical Waste Storage Areas
  - Maintenance Workshop
  - Fuel Storage
  - Boiler
  - Square Grid
  - Proposed Soil & Groundwater Borehole Location

Printed by : 7/1/2013  
 Filename : G:\env\project\227724-50\13 Drawing Deliverables\05 Land Contamination\CAP\20130626\_CAP\227724\_E\_5022\_B - Location of Proposed SI Boreholes (ARQ - 07).dgn



ARQ - 07

WIP Jun 2012

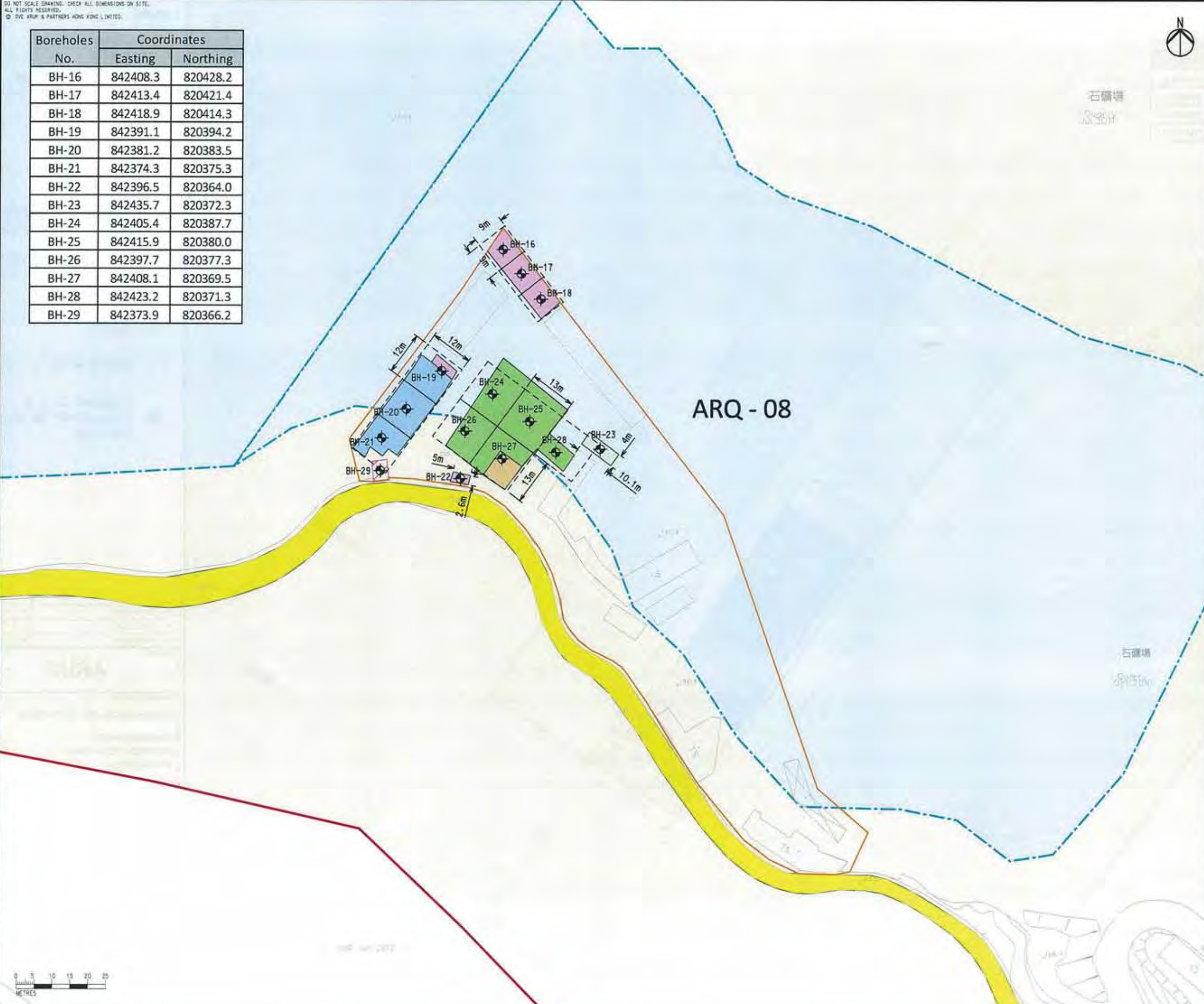
|   |                    |
|---|--------------------|
|   |                    |
| B SECOND ISSUE  | GL 07/13           |
| A FIRST ISSUE   | GL 04/13           |
| Rev Description   | By Date            |
| <b>ARUP</b>   |                    |
| Contract No. and Title                                  |                    |
| Agreement No. CE 18/2012(CE)                            |                    |
| Development of Anderson Road Quarry - Investigation     |                    |
| Drawing Title   |                    |
| Locations of Proposed SI Boreholes (ARQ - 07)           |                    |
| Drawing no. 227724/E/5022                               | Rev. B             |
| Drawn GL  | Date 07/13         |
| Checked TC  | Approved ST        |
| Scale 1:500 @ A3  | Status PRELIMINARY |
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| 土木工程拓展署<br>Civil Engineering and Development Department |                    |

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| Boreholes No. | Coordinates |          |
|---------------|-------------|----------|
|               | Easting     | Northing |
| BH-16         | 842408.3    | 820428.2 |
| BH-17         | 842413.4    | 820421.4 |
| BH-18         | 842418.9    | 820414.3 |
| BH-19         | 842391.1    | 820394.2 |
| BH-20         | 842381.2    | 820383.5 |
| BH-21         | 842374.3    | 820375.3 |
| BH-22         | 842396.5    | 820364.0 |
| BH-23         | 842435.7    | 820372.3 |
| BH-24         | 842405.4    | 820387.7 |
| BH-25         | 842415.9    | 820380.0 |
| BH-26         | 842397.7    | 820377.3 |
| BH-27         | 842408.1    | 820369.5 |
| BH-28         | 842423.2    | 820371.3 |
| BH-29         | 842373.9    | 820366.2 |



- Legend**
- Study Area
  - Surveyed Premises
  - Fill Materials
  - Rock Layer
  - Anderson Road
  - Chemical / Chemical Waste Storage Areas
  - Maintenance Workshop
  - Fuel Storage
  - Boiler
  - Asphalt Production Facilities
  - Electric Sub-station
  - Square Grid
  - Proposed Soil & Groundwater Borehole Location



ARQ - 08

| Rev | Description  | By | Date  |
|-----|--------------|----|-------|
| B   | SECOND ISSUE | GL | 07/13 |
| A   | FIRST ISSUE  | GL | 04/13 |

Consultant  
**ARUP**

Contract No. and Title  
Agreement No. CE 18/2012(CE)  
Development of Anderson Road Quarry - Investigation

Drawing title  
Locations of Proposed SI Boreholes (ARQ - 08)

|                           |            |                    |             |
|---------------------------|------------|--------------------|-------------|
| Drawing no. 227724/E/5023 |            | Rev. B             |             |
| Drawn GL                  | Date 07/13 | Checked TC         | Approved ST |
| Scale 1:1000 @ A3         |            | Status PRELIMINARY |             |

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Civil Engineering and Development Department

Printed by : 7/2/2015  
Filename : G:\env\project\227724-50\13 Drawing Deliverables\05 Land Contamination\CAP\20130626\_CAP\227724\_E\_5023\_B - Location of Proposed SI Boreholes (ARQ - 08).dgn





## **Appendix A**

### **Historical Aerial Photos**



Farm Land

Natural Terrain

Quarry Site In Operation

Anderson Road







Vegetation Area  
(Previous Farmland)

Conveyor Belts

Temporary Structures

Natural Terrain

Temporary Structures

Village Houses

Anderson Road

Conveyor Belts



Temporary Structures

Natural Terrain

Temporary Structures

Anderson Road

Conveyor Belts



Lagoon

Conveyor Belts

Temporary Structures

Natural Terrain

Temporary Structures

Anderson Road

Conveyor Belts



Lagoon

Conveyor Belts

Site Formation Works

Anderson Road

Temporary Structures

Natural Terrain

Temporary Structures

**Appendix B**  
**Letters of FSD**



Our ref 227724/5.20/SYC/TC/JC/0063  
Your ref

BY POST & FAX (No. 2311 0066)

Director of Fire Services  
Fire Services Department  
Fire Services Headquarters Building  
No.1 Hong Chong Road  
Tsim Sha Tsui East  
Kowloon

**ARUP**

Level 5 Festival Walk  
80 Tat Chee Avenue  
Kowloon Tong  
Kowloon  
Hong Kong  
t+852 2528 3031  
d +852 2268 3536  
f+852 2268 3950  
siu-yuen.chan@arup.com  
www.arup.com

11 January 2013

Dear Sir/Madam

**Agreement No. CE 18/2012 (CE)**  
**Development of Anderson Road Quarry - Investigation**  
**Request for Information of Dangerous Goods and Incident Records**

We, Ove Arup & Partners Hong Kong Ltd., have been appointed by the Civil Engineering and Development Department (CEDD) to conduct the captioned study (the Assignment). One of the major tasks of the Assignment is to undertake an Environmental Impact Assessment (EIA) in accordance with the requirements stipulated in the EIA Study Brief (No. ESB 247/2012).

As part of the Environmental Impact Assessment Study, we are required to review the historical and present land use around the area, and evaluate any potential land contamination issues in the Study Area as shown in the **Attachment 1**. We would appreciate if you could kindly provide the following information for our assessment:

- The records of Dangerous Goods License issued to the Study Area;
- Any past and present information related to the use and/or storage of dangerous goods in the Study Area; and
- Past and present incident records of the Study Area.

In view of the tight programme of the Assignment, your prompt response by **24 January 2013** would be much appreciated. Should you have any query, please feel free to contact our Mr. Jacky Chan at 3447 6292 or Mr. Arnold Lee at 2268 3659.

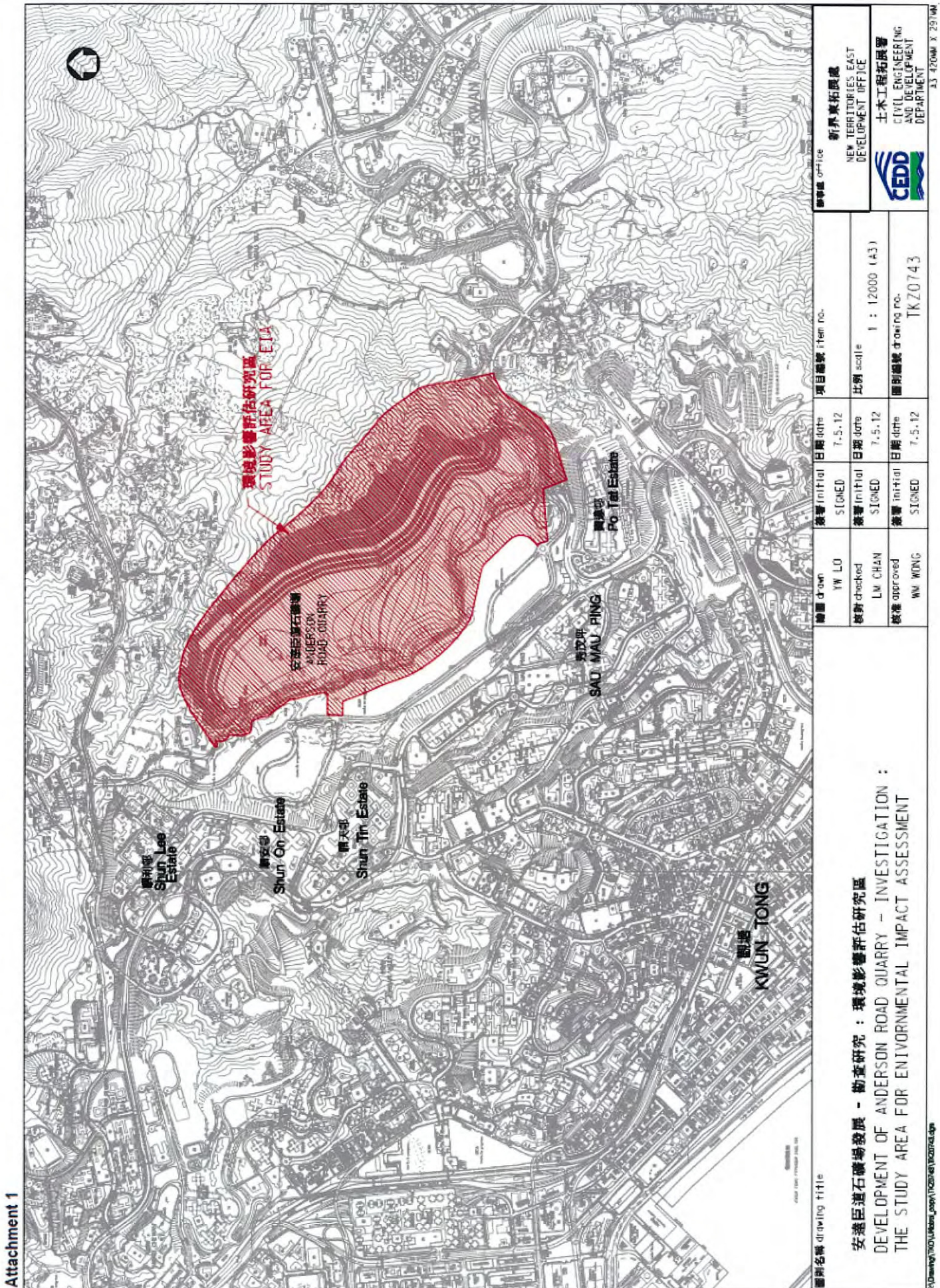
Yours faithfully



S Y Chan  
Senior Project Manager

Encl. (Attachment 1: The Study Area for EIA)

c.c. CE/NTE1, CEDD Attn: Mr. Stephen T S Li (w/e)



Attachment 1

|                    |   |
|--------------------|---|
| 項目編號 Item No.      | 新界東發展處<br>NEW TERRITORIES EAST<br>DEVELOPMENT OFFICE  |
| 比例 scale           | 1 : 12000 (A3)  |
| 圖則編號 Drawing No.   | TK Z0743  |
| 繪圖日期 Date          | 7.5.12  |
| 繪圖人 Drawn          | YW LO   |
| 校對日期 Date          | 7.5.12  |
| 校對人 Checked        | LM CHAN   |
| 繪圖日期 Date          | 7.5.12  |
| 校對人 Approved       | WM WONG   |
| 繪圖人 Drawn          | YW LO   |
| 校對人 Checked        | LM CHAN   |
| 繪圖日期 Date          | 7.5.12  |
| 校對人 Approved       | WM WONG   |
| 圖則名稱 Drawing Title | 安達石礦場發展 - 調查研究 - 環境影響評估研究區<br>DEVELOPMENT OF ANDERSON ROAD QUARRY - INVESTIGATION :<br>THE STUDY AREA FOR ENVIRONMENTAL IMPACT ASSESSMENT |

**消防處**  
香港九龍尖沙咀東部廣道1號  
消防總部大廈



**FIRE SERVICES DEPARTMENT**  
FIRE SERVICES HEADQUARTERS  
BUILDING,  
No.1 Hong Cheng Road,  
Tsim Sha Tsui East, Kowloon,  
Hong Kong.

本處編號 OUR REF. : (26) in FSD GR 6-5/4 R Pt. 3  
來函編號 YOUR REF. : 227724/5.20.SYC/TC/JC/0063  
電子郵件 E-mail : hkfsdenq@hkfsd.gov.hk  
圖文傳真 FAX NO. : 2739 5879  
電話 TEL NO. : 2733 7741

227724/5.20  
copy to Thomas Chan  
Louisa Cheung

25 January 2013

ARUP  
Level 5 Festival Walk,  
80 Tat Chee Avenue,  
Kowloon Tong,  
Kowloon,  
Hong Kong.  
**(Attn: Mr. S. Y. CHAN, Senior Project Manager)**

By fax (2268 3950) & post

Dear Mr. CHAN,

**Development of Anderson Road Quarry - Investigation  
Request for Information of Dangerous Goods & Incident Records**

I refer to your letter of 11<sup>th</sup> January 2013 regarding the captioned request and my replies are stated as follows:-

- 1 & 2) Please see Appendix A for storage of dangerous goods.
- 3) According to our record, no incident record was found at the aforesaid location with your given conditions.

Should you have further questions, please feel free to contact the undersigned.

|                           |     |                    |
|---------------------------|-----|--------------------|
| ARUP                      |     | Job No. 227724     |
| Reply Ref.                |     | File No. 8120      |
| Action Ref.               |     | By: Date           |
| Received 29 JAN 2013 0144 |     |                    |
| Init's.                   | SYC | Louisa Thomas Chan |
| Action                    | X   |                    |
| Init.                     | X   |                    |
| City                      | X   |                    |

Yours sincerely,

(LO Kit-nung, Eric)  
for Director of Fire Services

Appendix A

**Development of Anderson Road Quarry - Investigation  
Request for Information of Dangerous Goods**

| S/N | Type of Dangerous Goods | Category | Class | Quantity | Unit     | Method of Storage |
|-----|-------------------------|----------|-------|----------|----------|-------------------|
| 1   | Oxygen                  | 2        | 1     | 14       | cylinder | Temporary Store   |
| 2   | Acetylene               | 2        | 3     | 10       | cylinder | Temporary Store   |
| 3   | Diesel                  | 5        | 3     | 22500    | litre    | Underground Tank  |
| 4   | Diesel                  | 5        | 3     | 22500    | litre    | Underground Tank  |
| 5   | Acetylene               | 2        | 3     | 10       | cylinder | Temporary Store   |
| 6   | Oxygen                  | 2        | 1     | 14       | cylinder | Temporary Store   |
| 7   | Acetylene               | 2        | 3     | 18       | cylinder | Temporary Store   |
| 8   | Oxygen                  | 2        | 1     | 18       | cylinder | Temporary Store   |
| 9   | EP Gold Emulsion Matrix | 7        | -     | 20       | Tonne    | Temporary Store   |
| 10  | Ammonium Nitrate        | 7        | -     | 20       | Tonne    | Temporary Store   |
| 11  | Emulex (LD1000)         | 7        | -     | 20       | Tonne    | Temporary Store   |
| 12  | EP Gold Emulsion Matrix | 7        | -     | 18       | Tonne    | Temporary Store   |
| 13  | EP Gold Emulsion Matrix | 7        | -     | 18       | Tonne    | Temporary Store   |
| 14  | Ammonium Nitrate        | 7        | -     | 18       | Tonne    | Temporary Store   |
| 15  | Ammonium Nitrate        | 7        | -     | 18       | Tonne    | Temporary Store   |
| 16  | Ammonium Nitrate        | 7        | -     | 20       | Tonne    | Temporary Store   |
| 17  | Emulsion Matrix         | 7        | -     | 20       | Tonne    | Temporary Store   |
| 18  | Diesel                  | 5        | 3     | 45460    | Litre    | Above-ground Tank |

**Appendix C**  
**Letters of EPD**

Our ref 227724/5.20/SYC/TC/JC/0064  
Your ref

# ARUP

Level 5 Festival Walk  
80 Tat Chee Avenue  
Kowloon Tong  
Kowloon  
Hong Kong  
t+852 2528 3031  
d +852 2268 3536  
f+852 2268 3950  
siu-yuen.chan@arup.com  
www.arup.com

**BY POST & FAX (NO. 2756 8588)**

Director of Environmental Protection  
Environmental Protection Department  
Regional Office (East)  
5/F., Nan Fung Commercial Centre,  
19 Lam Lok Street,  
Kowloon Bay  
Kowloon, Hong Kong

Attn.: Mr. NG Kai Ming, Alfred

11 January 2013

Dear Mr. Ng,

**Agreement No. CE 18/2012 (CE)**  
**Development of Anderson Road Quarry - Investigation**  
**Request for Information of Chemical Waste Producer and Chemical Spillage**  
**Accident Records**

We, Ove Arup & Partners Hong Kong Ltd., have been appointed by the Civil Engineering and Development Department (CEDD) to conduct the captioned study (the Assignment). One of the major tasks of the Assignment is to undertake an Environmental Impact Assessment (EIA) in accordance with the requirements stipulated in the EIA Study Brief (No. ESB 247/2012).

As part of the Environmental Impact Assessment Study, we are required to review the historical and present land use around the area, and evaluate any potential land contamination issues in the Study Area as shown in the **Attachment 1**. We would appreciate if you could kindly provide the following information for our assessment:

- The records of Chemical Waste Producers Registration of the Study Area; and
- Past and present chemical spillage / leakage records of the Study Area.

In view of the tight programme of the Assignment, your prompt response by 24 January 2013 would be much appreciated. Should you have any query, please feel free to contact our Mr. Jacky Chan at 3447 6292 or Mr. Arnold Lee at 2268 3659.

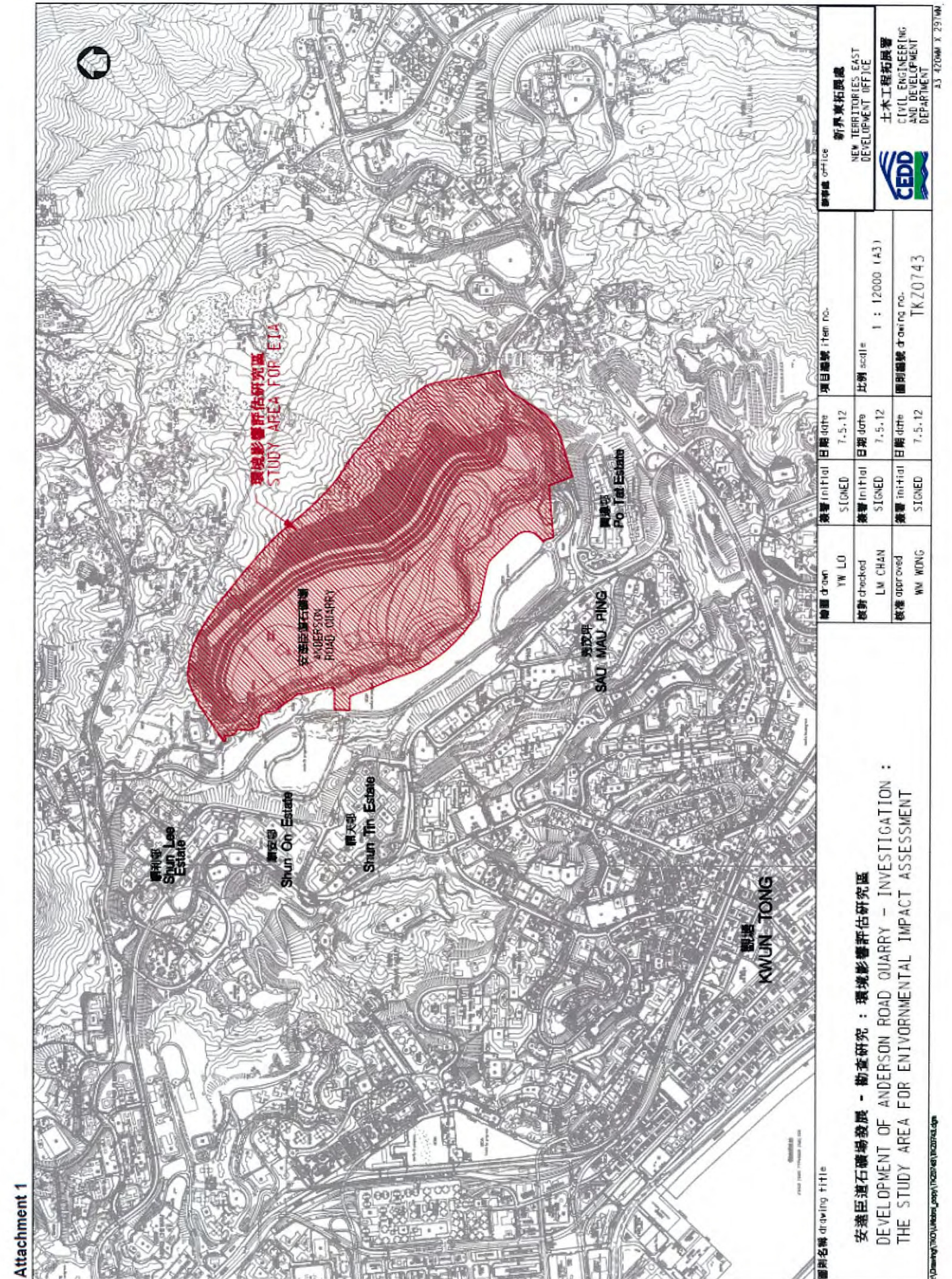
Yours faithfully



S Y Chan  
Senior Project Manager

c.c. CE/NTE1, CEDD Attn: Mr. Stephen T S Li (w/e)

Encl: (Attachment 1: The Study Area for EIA)



本署編號  
 Our Ref: EP670/EA/KT/001  
 來函編號  
 Your Ref: 227724/5.20/SYC/TC/JC/0064  
 電話  
 Tel. No.: 2117 7523  
 圖文傳真  
 Fax No.: 2756 8588  
 電子郵件  
 E-Mail:  
 網址  
 Homepage: <http://www.epd.gov.hk>

**Environmental Protection Department**  
**Environmental Compliance Division**  
**Regional Office (East)**  
 5<sup>th</sup> Floor, Nan Fung Commercial Centre,  
 19 Lam Lok Street, Kowloon Bay,  
 Kowloon, Hong Kong.



**環境保護署**  
**環保法規管理科**  
**區域辦事處(東)**  
 香港九龍九龍灣藍樂街  
 十九號南豐商業中心五樓

By Mail and Fax

29 January 2013

ARUP

Level 5  
 Festival Walk  
 80 Tat Chee Avenue  
 Kowloon Tong

Attention: SY Chan  
 Senior Project Manager

Dear Sir,

**Agreement No. CE 18/2012 (CE)**  
**Development of Anderson Road Quarry – Investigation Request for Information of**  
**Chemical Waste Producer and Chemical Spillage Accident Records**

I refer to your letter dated 11 January 2013 regarding the captioned.

According to the information in hand, there are seven Chemical Waste Producers in the Study Area and the types of chemical waste include spent engine/lubricating oil, spent filter and contaminated rags and spent mineral oil. Also, there was no chemical spillage/leakage record of the Study Area.

Please feel free to contact the undersigned at 2117 7523 should you have any query or require any clarification.

|                       |             |        |      |
|-----------------------|-------------|--------|------|
| ARUP                  |             | 227724 |      |
| Reply Ref.:           | EP          | Date   | 2013 |
| Action Required:      |             |        |      |
| Received - 4 FEB 2013 |             |        |      |
| Inits.                | Thomas Chan |        | SYC  |
| Action                |             |        |      |
| Info.                 |             |        |      |
| Copy                  | ✓           |        | ✓    |

Yours faithfully,

(Chris CC Cheung)  
 Environmental Protection Officer  
 Regional Office (East)  
 for Director of Environmental Protection

**Appendix D**

Agreement No. CE55/2005 (CE)  
Development at Anderson Road  
– Design and Construction  
Contamination Assessment  
Report and Remediation Action  
Plan

Civil Engineering & Development Department

Agreement No. CE 55/2005 (CE)  
Development at Anderson Road - Design and Construction

Contamination Assessment Report & Remediation Action Plan

November 2006

Ove Arup & Partners Hong Kong Ltd  
Level 5, Festival Walk, 80 Tat Chee Avenue, Kowloon Tong, Kowloon, Hong Kong  
Tel +852 2528 3031 Fax +852 2268 3953  
www.arup.com

Job number 24711

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## APPENDICES

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## 1. INTRODUCTION

### 1.1 Background

Ove Arup & Partners Hong Kong Ltd (Arup) have been commissioned by the Civil Engineering & Development Department (CEDD) to undertake the Design and Construction of development at Anderson Road under Agreement No. CE 55/2005(CE). The project is under a fast track approach to allow invitation for tender in mid 2007. Potential contamination problem is to be addressed in this Assignment.

Contaminated land study on the Project Area was presented in the Environmental Impact Assessment (EIA) report under Agreement No. CE7/97 Development at Anderson Road – Planning and Engineering Feasibility Study (DARFS EIA) and was approved by EPD in March 1999 (Register No. AEIAR-005/1999). Subsequently, a review report of the Design & Construction of Development at Anderson Road was prepared by Scott Wilson (Hong Kong) Ltd. in year 2000 including a series of environmental site investigation with soil sampling and laboratory analysis under a separate Contract CV/99/14 “Ground Investigation for Development near Choi Wan Road and Jordan Valley and Development at Anderson Road”.

Under this Assignment, a three-stage series of investigations including the formulation of a Contamination Assessment Plan and followed by a Contamination Assessment Report and a Remedial Action Plan where necessary have been adopted as stipulated in the EIAO-TM and in line with the previous investigation work under Contract CV/99/14. A Supplementary Contamination Assessment Plan (CAP), stipulating the sampling strategy to collect up-to-date information to supplement previous findings, was prepared and approved by EPD in 27 July 2006.

### 1.2 Report Objectives

The purpose of this Contamination Assessment Report (CAR) & Remediation Action Plan (RAP), being the second and third part of the three-stage series of investigations, is to present the findings of the contamination assessment for approval by EPD, and to formulate necessary remedial measures for the identified contaminated soil.

The structure of this CAR & RAP is as follows:

- Section 1 with an introduction;
- Section 2 on site investigations;
- Section 3 on interpretation of results;
- Section 4 on remediation action plan; and
- Section 5 on summary and the way forward.

This CAR & RAP is prepared with reference to the standards and guidelines presented in:

- the Practice Note for Professional Persons – Contaminated Land Assessment and Remediation (ProPECC PN 3/94)
- the Guidance Notes for Investigation and Remediation of Contaminated Sites of Petrol Filling Stations, Boatyards, and Car Repair/Dismantling Workshops” (Guidance Notes)
- Dutch Intervention Value (DIV), as presented in The Netherlands Ministry of Housing, Spatial Planning and Environment’s Circular on “Target Values and Intervention Values for Soil Remediation.

In addition, the Draft CAR & RAP prepared under CE95/98 (August 2000) has also been reviewed to adopt relevant information during data interpretation purpose.



## 2. SITE INVESTIGATIONS

A series of environmental site investigation (SI) with soil sampling and laboratory analysis has been conducted in year 2000 under a separate Contract CV/99/14 "Ground Investigation for Development near Choi Wan Road and Jordan Valley and Development at Anderson Road". Potential contaminative uses were identified including truck repair and maintenance workshops, vehicle repair and maintenance activities, abandoned factory, open storage and illegal dumping area. A total of 21 boreholes and 21 trial pits were constructed at those areas identified within the project site for land contamination assessment. Details of land contamination findings of the previous investigation were summarized in the Supplementary CAP under this Assignment and approved by EPD.

Further to the previous site investigations conducted in year 2000, a sampling strategy has been proposed in the Supplementary CAP and implemented under the current CE 55/2005(CE). The sampling strategy, locations and sampling methodology are presented in Sections 2.1 and 2.2 below.

### 2.1 Sampling Strategy and Locations

Additional ground investigation works have been carried out by GEO's Term Contractor under Works Order No. GE/2005/03.51A in September to October 2006. Details of ground investigation are listed below:

- Additional sampling for those locations with contamination depth not yet determined in previous SI – 9 locations in total, namely B1, B2, B3, B8, B11, T6, T9, T11 and T12.
- Additional sampling for those locations with soil contamination level exceeding Dutch C level identified in the previous SI (to verify the contamination level subsequent to the investigation in year 2000) – 6 locations in total, namely B4, B19, T3, T7, T12 and T13.
- Additional sampling for the "informal" truck repair and maintenance activities next to the previous Location 3, with possible contamination activities still exist – 2 locations in total, namely B6 and B7.

A total of 16 locations (note T12 serves dual purposes) have been investigated in the form of either trial pit or borehole. For those hot spots where contaminative activities already ceased operation long ago before the previous site investigation under Contract CV/99/14, the parameters to be analysed for the soil samples will be limited to those with exceedance of the Dutch B level in the previous site investigation.

The scope and analytical parameters for land contamination assessment works are summarised in Table 2.1. The locations for the proposed investigation stations and actual monitoring locations are shown in Drawing no. 24711/WM/001A and 24711/WM/002A. It shall be noted that certain locations have been shifted due to or subject to:

- Site constraint such as access, disruption to existing plant and equipment, location etc, and
- Site confirmation of test location.

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| 24711/WM/001A   | Locations of Proposed and Actual Investigation Station Locations                     |
| 24711/WM/002A   | Locations of Proposed and Actual Investigation Station Locations                     |
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| <b>APPENDICES</b>   |  |
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| Appendix II   | Latest Ground Investigation Analytical Result  |
| Appendix III  | Corrected Dutch Intervention Value for Latest Ground Investigation Analytical Result |

## 1. INTRODUCTION

### 1.1 Background

Ove Arup & Partners Hong Kong Ltd (Arup) have been commissioned by the Civil Engineering & Development Department (CEDD) to undertake the Design and Construction of development at Anderson Road under Agreement No. CE 55/2005(CE). The project is under a fast track approach to allow invitation for tender in mid 2007. Potential contamination problem is to be addressed in this Assignment.

Contaminated land study on the Project Area was presented in the Environmental Impact Assessment (EIA) report under Agreement No. CE7/97 Development at Anderson Road – Planning and Engineering Feasibility Study (DARFS EIA) and was approved by EPD in March 1999 (Register No. AEIAR-005/1999). Subsequently, a review report of the Design & Construction of Development at Anderson Road was prepared by Scott Wilson (Hong Kong) Ltd. in year 2000 including a series of environmental site investigation with soil sampling and laboratory analysis under a separate Contract CV/99/14 “Ground Investigation for Development near Choi Wan Road and Jordan Valley and Development at Anderson Road”.

Under this Assignment, a three-stage series of investigations including the formulation of a Contamination Assessment Plan and followed by a Contamination Assessment Report and a Remedial Action Plan where necessary have been adopted as stipulated in the EIAO-TM and in line with the previous investigation work under Contract CV/99/14. A Supplementary Contamination Assessment Plan (CAP), stipulating the sampling strategy to collect up-to-date information to supplement previous findings, was prepared and approved by EPD in 27 July 2006.

### 1.2 Report Objectives

The purpose of this Contamination Assessment Report (CAR) & Remediation Action Plan (RAP), being the second and third part of the three-stage series of investigations, is to present the findings of the contamination assessment for approval by EPD, and to formulate necessary remedial measures for the identified contaminated soil.

The structure of this CAR & RAP is as follows:

- Section 1 with an introduction;
- Section 2 on site investigations;
- Section 3 on interpretation of results;
- Section 4 on remediation action plan; and
- Section 5 on summary and the way forward.

This CAR & RAP is prepared with reference to the standards and guidelines presented in:

- the Practice Note for Professional Persons – Contaminated Land Assessment and Remediation (ProPECC PN 3/94)
- the Guidance Notes for Investigation and Remediation of Contaminated Sites of Petrol Filling Stations, Boatyards, and Car Repair/Dismantling Workshops” (Guidance Notes)
- Dutch Intervention Value (DIV), as presented in The Netherlands Ministry of Housing, Spatial Planning and Environment’s Circular on “Target Values and Intervention Values for Soil Remediation.

In addition, the Draft CAR & RAP prepared under CE95/98 (August 2000) has also been reviewed to adopt relevant information during data interpretation purpose.

## 2. SITE INVESTIGATIONS

A series of environmental site investigation (SI) with soil sampling and laboratory analysis has been conducted in year 2000 under a separate Contract CV/99/14 "Ground Investigation for Development near Choi Wan Road and Jordan Valley and Development at Anderson Road". Potential contaminative uses were identified including truck repair and maintenance workshops, vehicle repair and maintenance activities, abandoned factory, open storage and illegal dumping area. A total of 21 boreholes and 21 trial pits were constructed at those areas identified within the project site for land contamination assessment. Details of land contamination findings of the previous investigation were summarized in the Supplementary CAP under this Assignment and approved by EPD.

Further to the previous site investigations conducted in year 2000, a sampling strategy has been proposed in the Supplementary CAP and implemented under the current CE 55/2005(CE). The sampling strategy, locations and sampling methodology are presented in Sections 2.1 and 2.2 below.

### 2.1 Sampling Strategy and Locations

Additional ground investigation works have been carried out by GEO's Term Contractor under Works Order No. GE/2005/03.51A in September to October 2006. Details of ground investigation are listed below:

- Additional sampling for those locations with contamination depth not yet determined in previous SI – 9 locations in total, namely B1, B2, B3, B8, B11, T6, T9, T11 and T12.
- Additional sampling for those locations with soil contamination level exceeding Dutch C level identified in the previous SI (to verify the contamination level subsequent to the investigation in year 2000) – 6 locations in total, namely B4, B19, T3, T7, T12 and T13.
- Additional sampling for the "informal" truck repair and maintenance activities next to the previous Location 3, with possible contamination activities still exist – 2 locations in total, namely B6 and B7.

A total of 16 locations (note T12 serves dual purposes) have been investigated in the form of either trial pit or borehole. For those hot spots where contaminative activities already ceased operation long ago before the previous site investigation under Contract CV/99/14, the parameters to be analysed for the soil samples will be limited to those with exceedance of the Dutch B level in the previous site investigation.

The scope and analytical parameters for land contamination assessment works are summarised in Table 2.1. The locations for the proposed investigation stations and actual monitoring locations are shown in Drawing no. 24711/WM/001A and 24711/WM/002A. It shall be noted that certain locations have been shifted due to or subject to:

- Site constraint such as access, disruption to existing plant and equipment, location etc, and
- Site confirmation of test location.

Table 2.1 Summary of Ground Investigation for Supplementary Land Contamination Assessment

| Area of Concern  | Sampling Point | As-built Sampling Coordinates | Method and Sampling Depth(s)   | Laboratory Analysis Parameter |
|--|----------------|-------------------------------|--|-------------------------------|
| <i>(i) Additional sampling for those locations with contamination depth not yet determined in previous SI [8 locations total]</i>  |                |                               |  |                               |
| Truck repairing and maintenance workshop (Location 3)  | B1             | E 841881.169<br>N 820941.088  | Borehole down to 6.0m below ground level, or 1.0m below groundwater (whichever shallower). Sampling depths shall be 4.0m, 5.0m and 6.0m below ground level. Groundwater if encountered, groundwater sample shall be collected. | Cu                            |
| Truck repairing and maintenance workshop (Location 3)  | B2             | E 841896.182<br>N 820891.364  |  | Pb                            |
| Truck repairing and maintenance workshop (Location 3)  | B3             | E 841903.263<br>N 820857.387  |  | Pb, Cu                        |
| Open storage areas (Location 11)   | B8             | E 842086.533<br>N 820324.789  |  | Pb                            |
| Open storage areas (Location 11)   | B11            | E 842098.415<br>N 820310.021  |  | Pb                            |
| Abandoned factory sites (Between Locations 4 & 21)   | T6             | E 841941.330<br>N 820684.420  |  | Pb                            |
| Abandoned factory sites (Between Locations 4 & 21)   | T9             | E 841969.077<br>N 820575.22   |  | Pb                            |
| Abandoned factory sites (Between Locations 4 & 21)   | T11            | E 842019.977<br>N 820490.008  |  | Pb                            |
| <i>(ii) Additional sampling for those locations with soil contamination level exceeding Dutch C level (to verify the contamination level subsequent to the investigation in year 2000) [5 locations total]</i> |                |                               |  |                               |
| Truck repairing and maintenance workshop (Location 3)  | B4             | E 841869.647<br>N 820910.899  | Trial pit 1.3-1.8m below ground level  | Cu                            |
| Open storage areas (Locations 16 & 17)   | B19            | E 842515.311<br>N 820085.710  | Trial pit 0-0.5m below ground level  | TPH                           |
| Illegal dump site (Location 2)   | T3             | E 841737.307<br>N 821087.558  | Trial pit 1-1.5m below ground level  | Pb                            |
| Abandoned factory sites (Between Locations 4 & 21)   | T7             | E 841907.880<br>N 820615.310  | Trial pit 0-0.5m below ground level  | Cu, Pb, Zn, As                |
| Abandoned factory sites (Between Locations 4 & 21)   | T13            | E 842038.034<br>N 820477.654  | Trial pit 0-0.5m below ground level  | Ni, Cr                        |
| <i>(iii) Dual purpose sampling location covering (i) &amp; (ii) [1 location only]</i>  |                |                               |  |                               |

| Area of Concern  | Sampling Point | As-built Sampling Coordinates | Method and Sampling Depth(s)   | Laboratory Analysis Parameter  |
|--|----------------|-------------------------------|--|--|
| Abandoned factory sites<br>(Between Locations 4 & 21)  | T12            | E 842011.877<br>N 820477.093  | Borehole down to 6.0m below ground level, or 1.0m below groundwater (whichever shallower). Sampling depths shall be 0-0.5m, 4.0m, 5.0m and 6.0m below ground level. Groundwater if encountered, groundwater sample shall be collected. | Pb   |
| <i>Additional sampling for the "informal" truck repair and maintenance activities next to the previous Location 3, with contaminative activities still exist [2 locations total]</i> |                |                               |  |  |
| "Informal" truck repair and maintenance<br>(Next to Location 3)  | B6             | E 841866.876<br>N 820850.014  | Borehole down to 3.0m below ground level. Sampling depths shall be 0-0.5m, 0.5-1.0m, 1.0-1.5m, 1.5-2.0m, 2.0-2.5m, and 2.5-3.0m below ground level. Groundwater if encountered, groundwater samples shall be collected.                | Heavy metals (Pb, Cr, Cu),<br>TPH<br>BTEX<br>PAHs<br>VOCs<br>SVOCs<br>Asbestos |
| "Informal" truck repair and maintenance<br>(Next to Location 3)  | B7             | E 841889.087<br>N 820842.213  |  |  |

The sampling locations have been as close as possible to but not on the same exact sampling locations previously investigated under Contract CV/99/14. Setting out of the locations has been undertaken by the GI Contractor and as-built location of the supplementary GI have been agreed on-site by Arup's and/or the Environmental Scientist.

## 2.2 Description of Works

The soil sampling methodology and testing specifications as presented in the approved Supplementary CAP was followed.

### 2.2.1 Field Sampling

Soil samples at the proposed locations have been taken at the specified depth(s) below the undisturbed ground surface or soil layer by the GI Contractor. During the course of soil sampling works, soil inspection including soil colour, odours, etc. at regular intervals have been conducted by a qualified Geologist for the subsequent preparation of soil strata/boring log.

For borehole drilling, inspection pit with dimensions of 1.5m wide by 1.5m long and 1.5m deep has been constructed for inspection of soil immediately beneath the undisturbed ground surface or soil layer and for identification of underground utilities if any. Should underground utility and/or other site constraints be identified, alternative size of inspection pit and/or alternative sampling locations have been proposed by the Contractor and approved by Arup and/or the Environmental Scientist.

For each location with sampling depth of 1.5m below the undisturbed ground level or soil layer, undisturbed soil/rock core has been drilled by a rotary drill rig without water flushing (i.e. dry drilling) down to the sampling depth with a thin-walled (Sheelby Tube) samplers, split-barrel drive samplers or other appropriate samplers as approved by Arup and/or the

Environmental Scientist. Sufficient undisturbed bulk soil samples have been collected from the core for inspection on the spot to decide on the depths at which the soil samples should be taken for contamination analysis. Soil sample have been, as far as possible, taken at the specified depths below ground level.

All the soil samples have been contained either within the coring tube with proper sealant, or scooped by ceramic spoon into the containers provided by the Laboratory. The samples have been properly labelled and refrigerated on-site and during transit at or below 4°C but not frozen.

On completion of the GI works, the Contractor have filled in and compacted all pits and boreholes using uncontaminated materials, level and reinstate the site as approved by Arup.

### 2.2.2 Laboratory Testing

The laboratory analyses have been carried out by GEO's Term Laboratory under Service Order No. GE/2005/47.26. Soil samples have been analyzed for the contaminants as presented in Table 2.1 using the analytical methods stated in Table 2.2.

Table 2.2 Methods of Analysis for Samples Collected during the Supplementary Land Contamination Assessment

| Parameter   | Reference Analytical Method(s)                                      | Reporting Limit <sup>1</sup>  |
|---|---|---|
| Total Petroleum Hydrocarbon (TPH)   | GC/MS/FID<br>(USEPA 8015 modified)                                  | 100 mg/kg dry soil  |
| Heavy Metals<br>Copper (Cu)<br>Lead (Pb)<br>Zinc (Zn)<br>Arsenic (As)<br>Nickel (Ni)<br>Chromium (Cr) | ICPMS<br>(USEPA 6020)   | 10 mg/kg dry soil<br>15 mg/kg dry soil<br>50 mg/kg dry soil<br>3 mg/kg dry soil<br>10 mg/kg dry soil<br>25 mg/kg dry soil |
| Benzene, Toluene, Ethylbenzene, Xylene (BTEX)   | Purge and Trap GC/MS<br>(USEPA 8260)                                | Benzene<br>0.05 mg/kg dry soil<br>Others<br>0.3 mg/kg dry soil  |
| Polynuclear Aromatic Hydrocarbons (PAHs)  | HPLC (USEPA 8310)<br>or<br>GC/MS (USEPA 8270)                       | 2.0 mg/kg dry soil  |
| Volatile Organic Carbons (VOCs)   | GC/MS<br>(USEPA 8260A)  | 0.5 mg/kg dry soil  |
| Semi-volatile Organic Carbons (SVOCs)   | GC/MS<br>(USEPA 8270)   | 0.5 mg/kg dry soil  |
| Asbestos  | Polarised light microscopy (Presence, type, and % asbestos content) | 1% asbestos content by area   |

Note:

- Reporting Limit refers to the minimum concentration that can be reported by the overall test procedures employed by the Laboratory. For a particular test, it refers to the overall precision that covers the proposed sample preparation and test methods, instruments and personnel employed and other elements as covered by the QA/QC system for such a test. The reporting limits are chosen to be equivalent to the Dutch B standards as referred to in the EPD's ProPECC PN 3/94 for the respective contaminants, where appropriate.

## 2.3 Observations during Site Works

As a conservative approach, no PID measurement has been undertaken; instead, VOC/SVOC analyses have been performed.

No groundwater was encountered in all sampling locations during the course of environmental site investigation. Therefore no groundwater analysis has been undertaken.

The site observations in general agreed with those presented in section 2.3 of the draft CAR & RAP under CE95/98, except that plant, equipment or vehicle were no longer in place due to resumption and fence-off of the yards by the Government.

## 2.4 Analytical Results

The analytical results of the environmental site investigation conducted and presented in the draft CAR & RAP under CE95/98 have been included in Appendix I of this CAR & RAP. The current environmental site investigation analytical results have been presented in Appendix II of this CAR & RAP. Both results have been referred for combined analysis and interpretation purposes.

## 3. INTERPRETATION OF RESULTS

### 3.1 Criteria for Assessment

#### 3.1.1 Dutch Intervention Value

Conventionally and as presented in ProPECC PN 3/94, criteria presented in the Dutch ABC List have been directly adopted for land contamination assessment in Hong Kong, where soil samples with analytical results higher than Dutch B values are considered contaminated and remediation necessary.

Subsequently, the conventional Dutch ABC List has been replaced in the Netherlands with a series of Intervention Values, (also known as Dutch Intervention Value, or DIV in short) which are based on a consideration of risks to human health and ecological receptors. For each contamination of concern, the reference DIV is adjusted to account for properties of the soil which may affect the mobility of the contaminant, specifically the clay content and the proportion of organic matter.

#### 3.1.2 Adjustment for Dutch Intervention Values

For inorganic contaminants, the following formula has been used to determine the adjusted intervention values:

$$I_e = I_{st} \times \frac{A + Bx\%clay + Cx\%org.mat}{A + Bx25 + Cx10}$$

Where:

- $I_e$  = intervention value applying for the soil being evaluated (mg/kg)
- $I_{st}$  = intervention value for the standard soil (mg/kg)
- %clay = measured % of clay in the soil being evaluated
- % org.mat. = measured % of organic matter in the soil being evaluated
- A, B and C = constants which depend on the substance given under the "Circular on intervention values for soil remediation" issued by the government of the Netherlands.

For organic contaminants, on the other hand, the following formula has been used to determine the adjusted intervention values:

$$I_e = I_{st} \times \frac{\%org.mat}{10}$$

Where:

- $I_e$  = intervention value applying for the soil being evaluated (mg/kg)
- $I_{st}$  = intervention value for the standard soil (mg/kg)
- % org.mat. = measured % of organic matter in the soil being evaluated. Where the organic matter measured is more than 30% or less than 2%, values of 30% and 2% respectively are used.

The adjusted DIVs are tabulated in Appendix III. It should be noted that for the laboratory results conducted under CE95/98, single organic content and clay content have been applied for all soil samples to determine the adjusted DIVs. Under the current environmental site

investigation, however, organic content and clay content for each soil sample has been obtained and therefore individual adjusted DIVs are available.

Findings obtained from the land contamination investigation are compared with the adjusted DIV to determine if there was land contamination, i.e.

- if contamination levels in soil are found to be less than the intervention values, no soil remediation is recommended; and
- if contamination levels in soil are found to exceed the intervention values, the concerned soils are remediated.

### 3.2 Summary of Samples Exceeding Assessment Criteria

The samples exceeding the assessment criteria (i.e. the adjusted DIV) are shown in Table 3.1 below.

Table 3.1 Summary of Samples Exceeding the Assessment Criteria

| Sampling Location  | Depth (m below grade) | Parameter of Concern | Concentration (mg/kg) | Adjusted DIV (mg/kg) |
|--|-----------------------|----------------------|-----------------------|----------------------|
| <b>Exceedances Identified under CE95/98</b>                      |                       |                      |                       |                      |
| C/B1   | 4.9-5.1               | Cu                   | 190                   | 95                   |
| C/B3   | 2.6-3.1               | Cu                   | 150                   | 95                   |
| C/B4   | 0.8-1.3               | Cu                   | 350                   | 95                   |
|  | 1.3-1.8               | Cu                   | 700                   | 95                   |
|  | 1.3-1.8               | Zn                   | 540                   | 296                  |
|  | 1.8-2.3               | Cu                   | 190                   | 95                   |
| C/B6   | 0.5-1.0               | Pb                   | 380                   | 343                  |
| C/B7   | 1.5-2.0               | Pb                   | 410                   | 343                  |
| C/B8   | 0.8-1.2               | Pb                   | 350                   | 343                  |
|  | 1.2-1.9               | Pb                   | 470                   | 343                  |
|  | 1.9-2.1               | Pb                   | 350                   | 343                  |
|  | 2.4-3.0               | Pb                   | 430                   | 343                  |
| C/B16  | 0.0-0.5               | Zn                   | 310                   | 296                  |
| C/B19  | 0.0-0.5               | TPH                  | 5700                  | 2500                 |
| C/T3   | 1.0-1.5               | Pb                   | 850                   | 343                  |
| C/T6   | 1.5-2.0               | Pb                   | 530                   | 343                  |
|  | 2.0-3.0               | Pb                   | 450                   | 343                  |
| C/T7   | 0.0-0.5               | As                   | 99                    | 32                   |
|  | 0.0-0.5               | Cr                   | 210                   | 190                  |
|  | 0.0-0.5               | Cu                   | 790                   | 95                   |
|  | 0.0-0.5               | Ni                   | 190                   | 60                   |
|  | 0.0-0.5               | Pb                   | 16000                 | 343                  |
| C/T9   | 0.0-0.5               | Zn                   | 3900                  | 296                  |
|  | 2.0-3.0               | Pb                   | 440                   | 343                  |
| C/T12  | 0.5-1.0               | Pb                   | 520                   | 343                  |
| C/T13  | 0.0-0.5               | Cr                   | 370                   | 190                  |
|  | 0.0-0.5               | Cu                   | 180                   | 95                   |
|  | 0.0-0.5               | Ni                   | 1800                  | 60                   |
|  | 0.0-0.5               | Zn                   | 1000                  | 296                  |
| <b>Exceedances Identified under the Supplementary Assessment</b> |                       |                      |                       |                      |
| T12  | 5.0-5.17              | Pb                   | 420                   | 368                  |
|  | 5.5-5.95              | Pb                   | 550                   | 380                  |
| T7   | 0.35                  | Cu                   | 670                   | 130                  |
|  | 0.35                  | Pb                   | 2300                  | 412                  |
|  | 0.35                  | Zn                   | 1400                  | 496                  |

### 3.3 Contamination Assessment and Discussion

#### 3.3.1 Organic Compounds

TPH results have been assessed by comparison with the adjusted DIVs for mineral oils (2,500mg/kg).

The TPH value is exceeded in one sample only, from borehole C/B19 at depth of 0.0-0.5m (in previous environmental site investigation under CE95/98). As mentioned in the draft CAR & RAP under CE95/98, this is likely a result of a localised surface spillage of either fuel or oil of an open storage area.

Apart from the above discrete exceedance, all soil samples collected under the previous and current environmental site investigation showed compliance with the adjusted DIV for mineral oils.

Further, BTEX, PAH, PCB, VOC, SVOC, are within the respective adjusted DIVs, and in vast majority of cases, the values recorded were near or at the relevant reporting limits.

#### 3.3.2 Metals

Individual heavy metals results have been assessed by comparison with the respective adjusted DIVs. With reference to the results in environmental site investigation under CE95/98, a total of 28 exceedances have been identified in 19 samples. Parameters of concern include As, Cu, Cr, Ni, Pb, and Zn. The sampling locations showed exceedances in heavy metals are C/B1, C/B3, C/B4, C/B6, C/B7, C/B8, C/B16, C/T3, C/T6, C/T7, C/T9, C/T12, and C/T13.

In the supplementary assessment conducted under the current environmental site investigation, exceedances in adjusted DIVs were found in T12 and T7. Parameters of concern include As, Cu, Pb and Zn. The limited exceedance is attributable to the design of the supplementary assessment that only "targeted" locations are re-assessed. The finding from the supplementary assessment implies that contamination is of limited extent and further confirms the statement in the draft CAR & RAP that "contamination is not in a mobile form and has not migrated to underlying strata to a significant degree".

#### 3.3.3 Other Inorganic Contamination

Concentrations of total cyanide were below the reporting limits in all samples.

No asbestos was detected in any of the samples analysed.

#### 3.3.4 TCLP Testing

A total of 43 samples were tested for TCLP in previous environmental site investigation under CE95/98; in all samples the TCLP analyses were within the standards for landfill disposal as presented in Annex E of the Guidance Notes. This suggests that the contaminated soil would be suitable for landfill disposal if necessary, without requirement for treatment.

## 4. REMEDIATION ACTION PLAN

### 4.1 General and Remediation Objectives

It is estimated that in the proposed Development at Anderson Road, a total of approximately 5.82 Mm<sup>3</sup> of surplus rock and soil material will be excavated and disposed of. Only suitable, uncontaminated material will be stored for backfilling and future landscaping purposes.

Material will be considered suitable for use as clean public fill or backfill material provided that the concentration of contaminants are below the respective adjusted DIVs. Materials with exceedances as presented in Table 3.1 shall either be treated or disposed of at landfill.

Provided that the contaminated materials are properly handled, the future site occupiers are not considered as sensitive receivers.

### 4.2 Factors for Consideration

According to ProPECC PN 3/94, the selection of appropriate remedial measures should consider the following factors:

- Nature of Contamination;
- Degree of Contamination;
- Potential sensitive receivers;
- Time constraint;
- Treatment cost;
- Local expertise availability - whether the expertise - staff and equipment are available locally.

Several remediation measures have been considered. However, some of them are considered not suitable for this site as these methods are unable to deal with heavy metals in the soil matrix such as recovery trenches or wells, soil venting and air sparging.

Other soil treatment methods like extracting or stabilising of the heavy metals in the contaminated soils have been explored. These include soil flushing/ washing, chemical extraction and solidification/ stabilisation.

### 4.3 Summary and Estimated Extent of Contaminated Material

#### 4.3.1 Organic Contamination

The volume of material involved in organic (TPH) contamination is expected to be small due to the fact that the analytical results do not show any widespread of TPH contamination. It is proposed that the extent of the oily patch identified at C/B19 is approximately 5m by 5m (horizontal area) and with depth of 1.0m (i.e. further 0.5m below the identified contamination layer of 0.5m below grade). This is equivalent to an estimated volume of 25m<sup>3</sup>.

#### 4.3.2 Heavy Metal Contamination

Elevated concentrations of various heavy metals have been identified in T7 and T13. For T7, the proposal of remediating the whole previous factory site of 8400m<sup>2</sup> and depth of 0.0-0.5m as presented in the previous draft CAR & RAP would be appropriate. Therefore, the remediation volume of 4200m<sup>3</sup> of soil would be derived from this previous factory site. Similarly, for T13 the proposed remediation area of 15m by 15m and depth of 0.0-1.5m as

presented in the draft CAR & RAP would be followed. The remediation volume of the abandoned factory site is estimated to be approximately 340m<sup>3</sup>.

Apart from the above-mentioned factory sites, the contamination pattern due to heavy metals is considered discrete and localised. A radius of 5m centred at the sampling locations (in contrast to radius of 10m as proposed in the draft CAR & RAP) with exceedances would be adopted, i.e. a horizontal area of approximately 80m<sup>2</sup>. This results in the following list of remediation volumes:

- C/B1: 4.5-5.5m, volume approximately 80m<sup>3</sup>.
- C/B3: 2.5-3.5m, volume approximately 80m<sup>3</sup>.
- C/B4: 0.5-2.5m, volume approximately 160m<sup>3</sup>.
- C/B6: 0-1.5m, volume approximately 120m<sup>3</sup>.
- C/B7: 1.0-2.5m, volume approximately 120m<sup>3</sup>.
- C/B8: 0.5-3.5m, volume approximately 240m<sup>3</sup>.
- C/B16: 0-1.0m, volume approximately 80m<sup>3</sup>.
- C/T3: 0.5-2.0m, volume approximately 120m<sup>3</sup>.
- C/T6: 1.0-3.5m, volume approximately 200m<sup>3</sup>.
- C/T9: 1.5-3.5m, volume approximately 160m<sup>3</sup>.
- C/T12: 0-1.5m & 4.5-6.0m, volume approximately 240m<sup>3</sup>. (bedrock has been identified to be at about 6.0m).

In summary, the total volume of soil to be treated due to heavy metal contamination is estimated to be 6,140m<sup>3</sup>.

### 4.4 Evaluation and Selection of Remediation Approaches

#### 4.4.1 Soil Flushing and Soil Washing

Soil flushing and washing refers to elutriation of the contaminants from soil for recovery and treatment. It can be done in-situ by flooding the site with appropriate washing solution and recollect the elutriate from shallow wellpoints or subsurface drains or ex-situ by excavating the soil from the ground and extracting the heavy metals from contaminated soil by running the soil through washing solution.

The advantages of this treatment method is that the removal of contaminants is permanent and no additional treatments are necessary if the process is successful. However, the technology might introduce potential toxins into the soil system from the flushing solution. In addition, the treatment and transport of the used flushing solution is cost-intensive and has a risk of transporting the contaminants to uncontaminated area.

In consideration of the small volume of contaminated soils and a small site, the practicability of the soil flushing or washing method is considered low.

#### 4.4.2 Electro-kinetic Separation

The principle of electro-kinetic remediation relies upon application of a low-intensity direct current through the soil between ceramic electrodes that are divided into a cathode array and an anode array. This mobilises charged species, causing ions and water to move toward the electrodes. Metal ions, ammonium ions, and positively charged organic compounds will move toward the cathode. Anions such as chloride, cyanide, fluoride, nitrate, and negatively charged

organic compounds will move toward the anode. The current creates an acid front at the anode and a base front at the cathode. This generation of acidic condition in-situ may help to mobilise sorbed metal contaminants for transport to the collection system at the cathode.

Collected metals have to be treated or stabilised prior to disposal and the efficiency of the method depends largely on the soil properties. Also, undesirable products (e.g., chlorine gas) can form as a by-product of the oxidation/reduction reactions. This effective remediation technology for heavy metal contaminated soil, however, is not well established in Hong Kong and local availability of the equipment also restricts adoption of this method. Not to mention the relatively high cost of operation and maintenance of the system.

#### 4.4.3 Capping

Capping for contaminated soil is a physical separation method to prevent exposure of sensitive receivers to the contaminants buried under the ground. Soil caps can range from a one-layer system of vegetated soil to a complex multi-layer system of soils and geosynthetics.

The capping system does not remove or reduce toxicity, mobility, or volume of hazardous wastes in the soil, but does mitigate migration. A cap, by itself, cannot prevent the horizontal flow of ground water through the waste, only the vertical entry of water into the waste.

Future high-rise residential development is proposed at the site, where excavation works and bore piling into the ground is inevitable. These activities will penetrate through the soil cap and expose the contaminated soil to the workers.

Due to the massive cut and fill activities of the proposed development, the applicability of soil capping as the remediation method is considered impractical and thus not recommended.

#### 4.4.4 Cement Solidification/ Stabilisation

Contaminants can be physically bound or enclosed within a stabilised mass (solidification), or chemical reactions can be induced between the stabilising agent and contaminants to reduce their mobility (stabilisation).

Cement solidification/stabilisation (S/S) reduces the mobility of hazardous substances and contaminants in the environment through both physical and chemical means. Unlike other remedial technologies, cement S/S seeks to trap or immobilise contaminants within their "host" medium (i.e., the soil for the subject site), instead of removing them through chemical or physical treatment. Leachability testing shall be performed to measure the immobilisation of contaminants. Cement S/S techniques can be used alone or combined with other treatment and disposal methods to yield a product or material suitable for land disposal or, in other cases that can be applied to beneficial use. These techniques have been used as both final and interim remedial measures. The volume of soil will usually increase by up to 50% after the cement S/S process.

#### 4.4.5 Excavation and Disposal to Landfill

Contaminated soil can be excavated from the site and transported to a permitted off-site treatment and/or disposal facilities. Some pre-treatment of the contaminated media usually is required in order to meet land disposal restrictions, i.e. TCLP limits. Landfill space is valuable and limited in Hong Kong, excavation and disposal to landfills should only be considered when no in-situ remediation can be proved to be feasible and the contamination are localised and the quantity of contaminated soil for landfilling is small.

#### 4.4.6 Remediation Selection

After considering factors such as nature and degree of contamination, potential sensitive receivers, time constraint, treatment cost, amount of contaminated soil and availability of local expertise and technology, cement S/S followed by on-site backfill for heavy metal

contaminated soil is recommended. On the other hand, landfill disposal for organic contaminated soil is recommended based on the rationale that the quantity is small and scale of remediation is considered impractical.

### 4.5 Methodology for Cement Solidification/Stabilisation

#### 4.5.1 General Description of Cement Solidification/Stabilisation

Cement S/S proposed here refers to the process where cement, fly ash and other inert solids such as sand are physically blended with the contaminated soil and allowed to set into a solid monolithic block. The metal contaminants will become physically bound into the matrix of the concrete monolith and will be extremely resistant for further release except under the most aggressive acidic conditions.

Typically, between 5 and 30% cement will be added to soil to form a mixture that will set. Test will be conducted prior to the exercise to determine the suitable amount of cement to be added, in order to be able contain the contaminants. The total volume of the concrete block will increase up to 150 % of the original soil volume. It is expected that the 6,100m<sup>3</sup> of soil will produce up to 9,200m<sup>3</sup> of solidified concrete and soil.

#### 4.5.2 Implementation and Required Tests

Soil from various hotspots will be excavated and transferred to the solidification compound. Oversize boulder (i.e. excavated material with >50mm diameter) within the extent of contaminated soil, if any, will be screened out during excavation. Since the oversize boulder is unlikely to be contaminated by heavy metals, and cement S/S is not applicable for the oversize material, steam-clean at 60°C for the material surface to remove surface contaminants and backfill with other cement S/S soil will be applied instead.

The batching of the blocks would be conducted in a series of in-ground, compacted pits, approximately 1.5 metres deep and 100m<sup>2</sup>. The soil, cement, water and other additives (if required) will be poured in pre-determined proportions into the pit and blended using an excavator. The pits will be located at a designated, non-contaminated area of the development site.

Each batch will be covered up during the entire setting time and with bunds placed around each batch to prevent rainwater from entering or falling onto the batch.

Typically the mixture will solidify within about 4-5 days and will then be tested for leachability and compressive strength. If the blocks fail either test, the batch will be crushed, returned and re-processed.

Unconfined compressive strength (UCS) test of at least 150 psi (1.0MPa) shall be achieved for solidified soil with reference to USEPA guideline (USEPA 1986) for hazardous waste solidification requirement. In addition, the TCLP test shall be conducted according to USEPA Method 1311 and compared with the Universal Treatment Standards (UTS) of U.S. Resource Conservation and Recovery Act (RCRA) wastes that contain metals (in 40 CFR 268).

If, in the worst case that the stabilized/solidified soils still cannot meet the landfill disposal criteria, other alternatives or further treatments will be proposed for agreement by EPD.

#### 4.5.3 On-site Backfilling Requirements

Upon completion of the cement S/S process and with passing results of TCLP and UCS tests, the solidified product shall be backfilled on-site at a filling location such that the solidified product is:



- Located under a layer of clean fill of at least 1.0m thick (excluding any underground utilities);
- At a horizontal distance of more than 30m away from any stream or watercourse;
- Vertically above the groundwater table by at least 1.0m; and
- Not used for any structural or landscaping purposes.

The exact locations, depths and ultimate volume of the buried solidified product shall be presented in the eventual Remediation Report.

#### 4.6 Methodology for Excavation of Contaminated Material

##### 4.6.1 Excavation

Contaminated soil will be excavated mainly with conventional earthmoving equipment such as excavators. Dust will be well controlled by the use of water sprays and other standard construction techniques. Workers, vehicles, instruments, and equipment will be decontaminated before leaving the site.

Excavated soils intended for disposal will be directly loaded onto dump trucks for disposal at landfill to avoid double handling. Once loaded onto dump truck, the contaminated soil shall be covered with a plastic sheet to avoid dust generation and spillage during transport.

##### 4.6.2 Documentation Required for Disposal

Application for soil disposal to landfill together with the approved CAR and RAP will be submitted to Facilities Management Group (FMG) of EPD 3 months prior to disposal.

##### 4.7 Confirmatory Testing

Upon complete excavation of contaminated soil in the pre-determined limits, soil samples at the horizontal and vertical excavation boundaries will be collected as confirmatory samples. Analyses of confirmatory samples shall be conducted and then compared with the respective adjusted DIVs by a HOKLAS-accredited laboratory to determine whether all contaminated soil has been properly cleared or not.

Should the confirmatory samples failed fulfilling the respective adjusted DIVs, further excavation in the particular direction(s) shall be undertaken until at the extent where all contaminated material has been completely cleared.

#### 4.8 Health and Safety Precautions

Safety measures including but not be limited to the following shall be included in the specifications for the remediation works:

- Proper warning of the potential hazards in the vicinity of excavations;
- Appropriate training/ briefing to workers who work in, or have responsibility for "at risk" areas;
- Preparation of an excavation plan by the remediation contractor, detailing the sequence and programme of excavation and drilling works;
- Prohibition of smoke and naked flames within any excavation or ground-level confined space;

- Proper control of welding, flame-cutting or other hot works from any trench, confined spaces or excavation area;
- Proper location for mobile offices, equipment stores, mess rooms etc;
- Provision of adequate fire extinguishing equipment, fire-resistant clothing and breathing apparatus; and
- Workers engaged in the samples taken should wear protective clothing, goggles, boots and gloves, where appropriate.

## 5. SUMMARY

Site investigation for contamination has been conducted in accordance with the approved Supplementary CAP. Dutch Intervention Values (DIVs) with adjustment with soil organic content and clay content has been used to determine whether the soil has been contaminated or not.

It has been revealed that contamination of soil (approximately 6,140m<sup>3</sup> for heavy metal contaminated soil and 25m<sup>3</sup> of organic contaminated soil) was evident, as a result of previous industrial uses or discrete/localised sources.

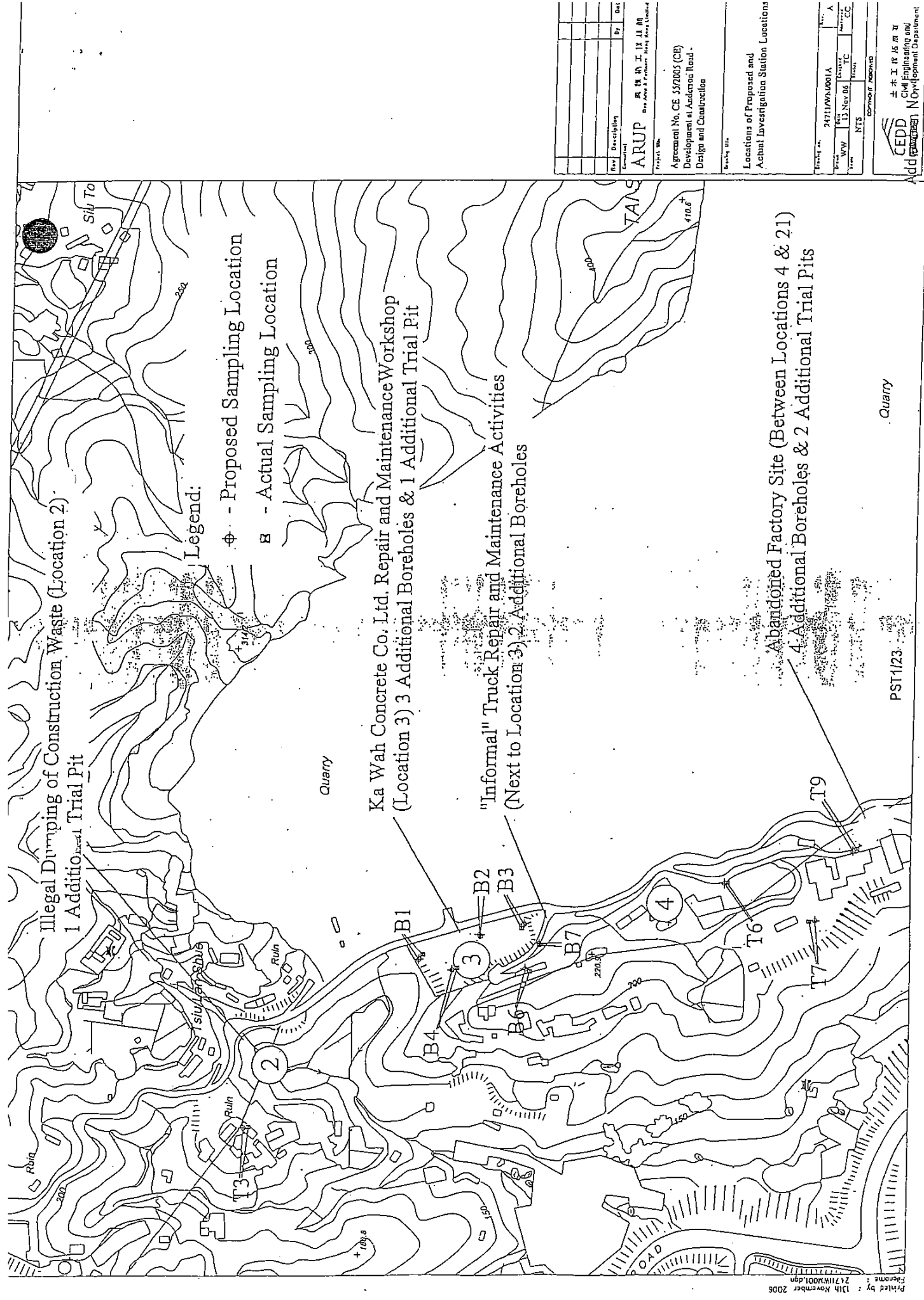
Various remedial measures have been evaluated. The most suitable approach based on evaluation would be cement solidification/ stabilisation prior to on-site backfill for heavy metal contaminated soil, and excavation followed by disposal at designated landfill for organic contaminated soil. The brief approaches of remediation approaches have been described.

Upon completion of the proposed remediation exercise as outlined in this CAR & RAP, a Remediation Report will be compiled for submission to EPD to demonstrate that the proposed soil remediation has been carried out properly and satisfactorily. Results from the confirmation tests will also be included in the Remediation Report. Photos showing the area of excavation, the solidification process, and remediated soil and site shall also be included in the report for reference.

## 6. REFERENCES

- Scott Wilson (Hong Kong) Limited (August 2000), Agreement No. CE95/98 Development at Anderson Road – Design and Construction, Draft Contamination Assessment Report and Remediation Action Plan.
- Scott Wilson (Hong Kong) Limited (May 2000), Agreement No. CE95/98 Development at Anderson Road – Design and Construction, Final Review Report.
- Scott Wilson (Hong Kong) Limited (December 2000), Contract CV/99/14 Ground Investigation for Development Near Choi Wan Road and Jordan Valley and Development at Anderson Road, Final Fieldwork Report for Contaminated Land Investigation.
- Scott Wilson (Hong Kong) Limited (February 2001), Contract CV/99/14 Ground Investigation for Development Near Choi Wan Road and Jordan Valley and Development at Anderson Road, Final Laboratory Chemical Testing Report for Site Investigation in Contaminated Land at Anderson Road.
- Hong Kong Environmental Protection Department (1993), Practice Note for Professional Persons – Contaminated Land Assessment and Remediation (“ProPECC PN 3/94”).
- Hong Kong Environmental Protection Department (1999), Guidance Notes for Investigation and Remediation of Contaminated Sites of Petrol Filling Stations, Boatyards, and Car Repair/Dismantling Workshops.
- The Netherlands Ministry of Housing (February 2000), Spatial Planning and Environment’s Circular on “Target Values and Intervention Values for Soil Remediation”, Ref. DBO/1999226863.

FIGURES





Preliminary Results

Project : Contract no. CV/99/14 Ground Investigation Works for Development near Choi Wan Road and Jordan Valley and Development at Anderson Road

Appendix 1  
Chemical Testing Analysis Result

| Client Reference | Test(s) required    |      |     |     |     |     |     |      |     |     |     |
|------------------|---------------------|------|-----|-----|-----|-----|-----|------|-----|-----|-----|
|                  | Metals <sup>1</sup> |      |     |     |     |     |     |      |     |     |     |
|                  | Cd                  | Cr   | Cu  | Ni  | Pb  | Zn  | Hg  | As   | Sn  | Se  |     |
| C/B/1            | 2.4-2.9             | 0.3  | 2.6 | 13  | 1   | 44  | 70  | <0.1 | 1.5 | <5  | <5  |
| C/B/1            | 2.9-3.4             | <0.2 | 3.1 | 9   | <1  | 56  | 50  | <0.1 | 1.1 | <5  | <5  |
| C/B/1            | 3.4-3.9             | 3.2  | 1.8 | 6   | 1.1 | 130 | 130 | 0.3  | 2.7 | <5  | 8.2 |
| C/B/1            | 3.9-4.4             | <0.2 | 3.2 | 13  | 1.5 | 28  | 57  | <0.1 | 1.2 | <5  | <5  |
| C/B/1            | 4.4-4.9             | <0.2 | 6.6 | 63  | 16  | 33  | 81  | <0.1 | 1.5 | <5  | <5  |
| C/B/1            | 4.9-5.1             | 0.3  | 4   | 190 | 3.1 | 46  | 230 | 0.3  | 3   | 6.1 | <5  |
| C/B/2            | 0.0-0.8             | <0.2 | 1.8 | 23  | 1.2 | 52  | 74  | 0.5  | 1.4 | <5  | <5  |
| C/B/2            | 0.8-1.3             | <0.2 | <1  | 20  | <1  | 47  | 58  | 0.5  | 1.3 | <5  | <5  |
| C/B/2            | 1.3-1.8             | <0.2 | 1.5 | 4   | <1  | 81  | 63  | 0.7  | 2   | <5  | <5  |
| C/B/2            | 1.8-2.4             | <0.2 | 1.7 | 1.9 | 1.1 | 130 | 57  | 0.8  | 2.4 | <5  | <5  |
| C/B/2            | 2.8-4.0             | <0.2 | <1  | 1.8 | <1  | 170 | 34  | 0.2  | 1.3 | <5  | <5  |
| C/B/3            | 0.0-0.6             | 1.2  | 6.3 | 64  | <1  | 34  | 110 | 0.2  | 3   | <5  | 8.2 |
| C/B/3            | 0.6-1.1             | 0.8  | 2.5 | 4.1 | <1  | 30  | 43  | 0.1  | 2.8 | <5  | 11  |
| C/B/3            | 1.1-1.6             | 0.9  | 2.2 | 8   | <1  | 24  | 54  | 0.3  | 2.2 | <5  | 5.7 |
| C/B/3            | 1.6-2.1             | 0.4  | 17  | 40  | 20  | 120 | 80  | 0.2  | 3   | <5  | <5  |
| C/B/3            | 2.1-2.6             | 0.2  | 1.9 | 5.3 | 2.2 | 290 | 31  | 0.1  | 1.8 | <5  | <5  |
| C/B/3            | 2.6-3.1             | 0.2  | 4.4 | 150 | 4.3 | 130 | 160 | <0.1 | 2.2 | <5  | <5  |
| C/B/4            | 0.3-0.8             | 0.3  | 3.3 | 35  | 1.8 | 47  | 110 | 0.1  | 2.7 | <5  | <5  |
| C/B/4            | 0.8-1.3             | 0.2  | 2.3 | 350 | 1.4 | 33  | 280 | <0.1 | 2   | <5  | <5  |
| C/B/4            | 1.3-1.8             | 0.5  | 9.3 | 700 | 3.9 | 62  | 540 | <0.1 | 3.1 | 6.6 | <5  |
| C/B/4            | 1.8-2.3             | 0.3  | 8.1 | 190 | 4.2 | 43  | 190 | <0.1 | 1.8 | <5  | <5  |
| C/B/4            | 2.3-2.8             | 0.3  | 25  | 56  | 2.5 | 40  | 110 | <0.1 | 1.9 | <5  | <5  |
| C/B/4            | 2.8-3.3             | 0.5  | 5.4 | 41  | 2.6 | 50  | 130 | <0.1 | 2.2 | <5  | <5  |
| C/B/5            | 0.0-0.5             | <0.2 | 6.8 | 5.7 | 2   | 110 | 40  | <0.1 | 4   | <5  | <5  |
| C/B/5            | 0.5-1.0             | <0.2 | 3.3 | 1.5 | 1.3 | 69  | 15  | <0.1 | 2.6 | <5  | <5  |
| C/B/5            | 1.0-1.5             | <0.2 | 1.2 | 12  | 1.1 | 120 | 26  | <0.1 | 1.8 | <5  | <5  |
| C/B/6            | 0.0-0.5             | <0.2 | 2.9 | 2.1 | 2.2 | 130 | 32  | <0.1 | 3   | <5  | <5  |
| C/B/6            | 0.5-1.0             | <0.2 | <1  | 7.6 | 3.5 | 380 | 130 | <0.1 | 1.2 | <5  | <5  |
| C/B/6            | 1.0-1.5             | <0.2 | <1  | 3   | 1.9 | 270 | 42  | 0.3  | 1.4 | <5  | <5  |
| C/B/6            | 1.5-2.0             | <0.2 | <1  | 4.1 | 1.3 | 63  | 63  | <0.1 | <1  | <5  | <5  |
| C/B/6            | 2.5-2.9             | <0.2 | <1  | 3.3 | <1  | 47  | 40  | <0.1 | 1.2 | <5  | <5  |
| C/B/7            | 0.0-0.5             | <0.2 | 2.8 | 3.8 | 2   | 71  | 39  | 0.7  | 2.6 | <5  | <5  |
| C/B/7            | 0.5-1.0             | <0.2 | <1  | 1.7 | <1  | 330 | 20  | <0.1 | 1.6 | <5  | <5  |
| C/B/7            | 1.0-1.5             | <0.2 | <1  | 2.9 | <1  | 200 | 42  | 0.7  | 1.2 | <5  | <5  |
| C/B/7            | 1.5-2.0             | <0.2 | <1  | 3.7 | <1  | 410 | 96  | 0.8  | 1.6 | <5  | <5  |
| C/B/7            | 2.5-3.0             | <0.2 | <1  | 2   | <1  | 140 | 28  | 0.5  | 2.8 | <5  | <5  |
| C/B/8            | 0.0-0.5             | <0.2 | 4.3 | 4.7 | 2.4 | 150 | 66  | 0.3  | 3.8 | 5.5 | <5  |
| C/B/8            | 0.5-0.8             | <0.2 | <1  | 5.4 | 1.2 | 280 | 33  | <0.1 | 1.1 | <5  | <5  |
| C/B/8            | 0.8-1.2             | <0.2 | <1  | 10  | 2.7 | 350 | 47  | <0.1 | 1.3 | <5  | <5  |
| C/B/8            | 1.2-1.9             | <0.2 | <1  | 13  | 1.4 | 470 | 45  | 0.4  | <1  | <5  | <5  |
| C/B/8            | 1.9-2.1             | <0.2 | <1  | 37  | 1.4 | 350 | 74  | <0.1 | <1  | <5  | <5  |
| C/B/8            | 2.1-2.4             | <0.2 | <1  | 20  | <1  | 320 | 44  | <0.1 | 1.2 | <5  | <5  |
| C/B/8            | 2.4-3.0             | <0.2 | 1.1 | 31  | 2.3 | 430 | 44  | <0.1 | 3.8 | <5  | <5  |
| C/B/9            | 0.0-0.5             | <0.2 | 3.6 | 2.5 | 3.1 | 33  | 45  | 0.8  | 3.8 | <5  | <5  |
| C/B/9            | 0.5-0.8             | <0.2 | 2.9 | 1.2 | 1.5 | 38  | 70  | 0.6  | 2.2 | <5  | <5  |
| C/B/9            | 0.8-1.2             | <0.2 | <1  | 14  | 1.7 | 190 | 43  | 0.5  | 1   | <5  | <5  |
| C/B/10           | 0.0-0.2             | <0.2 | 4.8 | 32  | 2.9 | 110 | 88  | 0.4  | 3.8 | <5  | <5  |
| C/B/10           | 0.2-0.5             | <0.2 | <1  | 7.9 | 2.3 | 130 | 64  | 0.5  | 2.2 | <5  | <5  |
| C/B/10           | 0.5-0.6             | <0.2 | 1.7 | 51  | 2   | 120 | 83  | 0.5  | 2.3 | <5  | <5  |
| C/B/10           | 0.6-0.7             | <0.2 | 0.5 | 1.8 | 1.2 | 210 | 42  | <0.1 | 1.2 | <5  | <5  |

Remark: 1. Sample results were in mg/kg

## Preliminary Results

Project : Contract no. CV/99/14 Ground Investigation Works for Development near  
Choi Wan Road and Jordan Valley and Development at Anderson Road

| Client Reference | Test(s) required | Metals <sup>1</sup> |         |      |     |     |     |      |     |      |     |
|------------------|------------------|---------------------|---------|------|-----|-----|-----|------|-----|------|-----|
|                  |                  | Cd                  | Cr      | Cu   | Ni  | Pb  | Zn  | Hg   | As  | Sn   | Se  |
|                  |                  | C/B/11              | 0.0-0.5 | <0.2 | 3.7 | 5.3 | 1.4 | 47   | 35  | <0.1 | 2.5 |
| C/B/11           | 0.5-1.0          | <0.2                | 3.6     | 3.7  | 2   | 82  | 27  | 0.1  | 3.2 | <5   | <5  |
| C/B/11           | 1.0-1.5          | <0.2                | 2.7     | 8.5  | 1   | 84  | 42  | <0.1 | 4.1 | <5   | <5  |
| C/B/11           | 2.6-3.1          | <0.2                | 5.1     | 15   | 1.1 | 180 | 33  | <0.1 | 1.8 | <5   | <5  |
| C/B/12           | 0.0-0.5          | <0.2                | 5.5     | 22   | 2.1 | 35  | 90  | 0.7  | 4.1 | <5   | <5  |
| C/B/12           | 0.5-1.0          | <0.2                | 5.2     | 48   | 1.6 | 25  | 110 | 0.3  | 4.6 | <5   | <5  |
| C/B/12           | 1.0-1.5          | <0.2                | 2.2     | 2.6  | <1  | 25  | 16  | <0.1 | 2.6 | <5   | <5  |
| C/B/12           | 1.5-2.0          | <0.2                | 1.2     | 2.5  | <1  | 47  | 28  | <0.1 | 3.4 | <5   | <5  |
| C/B/12           | 2.5-3.0          | <0.2                | <1      | 2.2  | <1  | 63  | 80  | <0.1 | <1  | <5   | <5  |
| C/B/13           | 0.0-0.5          | <0.2                | 4.9     | 8.5  | 1.1 | 27  | 56  | 0.1  | 4.1 | <5   | <5  |
| C/B/13           | 0.5-1.0          | <0.2                | 3       | 4.2  | 1   | 49  | 19  | 0.2  | 3.3 | <5   | <5  |
| C/B/13           | 1.0-1.5          | <0.2                | 6.3     | 7.7  | 4.6 | 37  | 21  | 0.4  | 5.8 | <5   | <5  |
| C/B/13           | 1.5-1.8          | <0.2                | 4       | 13   | 1.6 | 34  | 23  | 0.1  | 4.4 | <5   | <5  |
| C/B/14           | 0.0-0.5          | <0.2                | 5.4     | 6    | 1.4 | 43  | 45  | <0.1 | 2.7 | <5   | <5  |
| C/B/14           | 0.5-1.0          | <0.2                | 4.8     | 2.4  | 1.1 | 16  | 18  | 0.3  | 4.4 | <5   | <5  |
| C/B/14           | 1.0-1.5          | <0.2                | 4.8     | 67   | <1  | 14  | 58  | <0.1 | 3.5 | <5   | <5  |
| C/B/14           | 1.5-2.0          | <0.2                | 1.2     | 2.4  | <1  | 15  | 12  | <0.1 | 2.1 | <5   | <5  |
| C/B/14           | 2.5-3.0          | <0.2                | <1      | 11   | <1  | 6.7 | 10  | <0.1 | <1  | <5   | <5  |
| C/B/15           | 0.0-0.5          | <0.2                | 3.3     | 8.2  | 1.4 | 51  | 81  | <0.1 | 2.7 | <5   | <5  |
| C/B/15           | 0.5-1.0          | <0.2                | 2.4     | 6.6  | <1  | 49  | 33  | <0.1 | 2.4 | <5   | <5  |
| C/B/15           | 1.0-1.5          | <0.2                | 1.5     | 15   | <1  | 56  | 39  | <1   | 1.5 | <5   | <5  |
| C/B/15           | 1.5-2.0          | <0.2                | <1      | 6.1  | <1  | 100 | 22  | <0.1 | <1  | <5   | <5  |
| C/B/15           | 2.5-3.0          | <0.2                | <1      | 3.2  | <1  | 57  | 26  | <0.1 | <1  | <5   | <5  |
| C/B/16           | 0.0-0.5          | 0.5                 | 5.3     | 42   | 2.6 | 50  | 310 | <0.1 | 3   | <5   | <5  |
| C/B/16B          | 0.0-0.5          | <0.2                | 3.1     | 11   | 1.1 | 24  | 77  | <0.1 | 3.4 | <5   | <5  |
| C/B/16B          | 0.5-1.0          | <0.2                | 3.3     | 4.2  | 1.3 | 26  | 42  | <0.1 | 4.2 | <5   | <5  |
| C/B/16B          | 1.0-1.5          | <0.2                | 3.6     | 2.1  | 1.2 | 110 | 40  | 0.1  | 6.4 | <5   | <5  |
| C/B/16B          | 1.5-2.0          | 0.3                 | 3.6     | 3.2  | 1.8 | 40  | 41  | <0.1 | 4.8 | <5   | <5  |
| C/B/16B          | 2.5-3.0          | 0.4                 | 1.7     | 2.1  | 1.7 | 41  | 43  | 0.2  | 3   | <5   | <5  |
| C/B/17           | 0.0-0.5          | 0.2                 | 6.2     | 4.6  | 3.1 | 48  | 78  | 0.3  | 2   | <5   | <5  |
| C/B/17           | 0.5-1.0          | <0.2                | 2.6     | 4.2  | 1.1 | 29  | 47  | 0.3  | <1  | <5   | <5  |
| C/B/17           | 1.0-1.5          | <0.2                | 1.2     | 9.7  | 2.1 | 61  | 57  | 0.1  | 5.2 | <5   | <5  |
| C/B/17           | 1.5-2.0          | <0.2                | 4       | 5    | 6.6 | 38  | 58  | 0.3  | 3.4 | <5   | <5  |
| C/B/17           | 2.0-2.5          | <0.2                | <1      | 16   | <1  | 38  | 100 | 0.1  | <1  | <5   | <5  |
| C/B/17           | 2.5-3.0          | <0.2                | 3.7     | 5.8  | 2.6 | 45  | 77  | 0.1  | 2.6 | <5   | <5  |
| C/B/18           | 0.0-0.5          | <0.2                | 3.5     | 8.1  | 1.6 | 64  | 55  | 0.1  | 1.4 | <5   | <5  |
| C/B/18           | 0.5-1.0          | 1.2                 | 6.8     | 28   | 3.6 | 91  | 130 | 0.5  | 1.3 | 5.6  | <5  |
| C/B/18           | 1.0-1.5          | 1.3                 | 8.4     | 87   | 5.6 | 95  | 190 | 0.4  | 6.2 | 6.8  | <5  |
| C/B/18           | 1.5-2.0          | 4                   | 11      | 50   | 7   | 110 | 190 | 0.7  | 1.8 | 9.2  | <5  |
| C/B/19           | 0.0-0.5          | <0.2                | 2.2     | 49   | 3.2 | 27  | 84  | 0.2  | <1  | <5   | <5  |
| C/B/19           | 0.5-1.0          | <0.2                | 4.2     | 17   | 1.8 | 26  | 59  | 0.3  | 2.4 | <5   | <5  |
| C/B/19           | 1.0-1.5          | <0.2                | 4.9     | 12   | 2.4 | 27  | 63  | 0.2  | 2.5 | <5   | <5  |
| C/B/19           | 1.5-2.0          | <0.2                | 6.6     | 34   | 4.9 | 53  | 92  | 0.3  | 2.6 | <5   | <5  |
| C/B/19           | 2.0-2.5          | 0.3                 | 27      | 52   | 19  | 36  | 180 | 0.3  | 6   | <5   | <5  |
| C/B/19           | 2.5-3.0          | 0.4                 | 3.4     | 7    | 1.4 | 12  | 38  | 0.4  | 2   | <5   | <5  |
| C/B/20           | 0.0-0.5          | <0.2                | 5.5     | 23   | 2.4 | 42  | 130 | 0.2  | 3.6 | <5   | <5  |
| C/B/20           | 0.5-1.0          | <0.2                | 4.3     | 16   | 1.8 | 21  | 43  | 0.3  | 3.3 | <5   | <5  |
| C/B/20           | 1.0-1.5          | <0.2                | 1       | 3.6  | <1  | 8.4 | 14  | 0.2  | <1  | <5   | <5  |
| C/B/20           | 1.0-1.5          | <0.2                | 1.2     | 4.3  | <1  | 8.6 | 33  | 0.3  | <1  | <5   | <5  |
| C/B/20           | 1.5-2.0          | <0.2                | 1.6     | 7    | <1  | 16  | 23  | 0.2  | 2   | <5   | <5  |

Remark : 1. Sample results were in mg/kg

Appendix I

## Preliminary Results

Project : Contract no. CV/99/14 Ground Investigation Works for Development near  
Choi Wan Road and Jordan Valley and Development at Anderson Road

| Client Reference | Test(s) required | Metals <sup>1</sup> |         |      |     |     |    |      |     |     |     |
|------------------|------------------|---------------------|---------|------|-----|-----|----|------|-----|-----|-----|
|                  |                  | Cd                  | Cr      | Cu   | Ni  | Pb  | Zn | Hg   | As  | Sn  | Se  |
|                  |                  | C/B/20              | 2.0-2.5 | <0.2 | 1.4 | 2.5 | <1 | 21   | 14  | 0.1 | 1.7 |
| C/B/20           | 2.5-3.0          | <0.2                | <1      | 23   | <1  | 93  | 27 | 0.2  | 1   | <5  | <5  |
| C/B/21           | 0.0-0.5          | <0.2                | 2.5     | 2.1  | 1.2 | 85  | 13 | <0.1 | 1.7 | <5  | <5  |
| C/B/21           | 0.5-1.0          | <0.2                | 1.9     | 71   | 1.3 | 89  | 54 | <0.1 | 1.6 | <5  | <5  |
| C/B/21           | 1.0-1.5          | <0.2                | <1      | 26   | <1  | 62  | 32 | <0.1 | <1  | <5  | <5  |
| C/B/21           | 1.5-2.0          | <0.2                | <1      | 2.9  | <1  | 77  | 15 | <0.1 | 1.1 | <5  | <5  |
| C/B/21           | 2.0-2.5          | <0.2                | <1      | 5    | <1  | 58  | 17 | <0.1 | <1  | <5  | <5  |
| C/B/21           | 2.5-3.0          | <0.2                | <1      | 1.7  | <1  | 46  | 15 | <1   | 1   | <5  | <5  |
| C/B/21           | 3.0-3.5          | <0.2                | <1      | 6.2  | <1  | 56  | 18 | 0.2  | <1  | <5  | <5  |
| C/B/21           | 3.5-4.0          | <0.2                | <1      | 9.1  | <1  | 80  | 67 | <0.1 | <1  | <5  | <5  |
| C/B/21           | 4.0-4.5          | <0.2                | <1      | 1.4  | <1  | 69  | 22 | 0.5  | <1  | <5  | <5  |
| C/B/21           | 4.5-5.0          | <0.2                | <1      | <1   | <1  | 180 | 29 | 0.6  | <1  | <5  | <5  |
| C/B/21           | 5.0-5.5          | <0.2                | <1      | 7.6  | <1  | 160 | 26 | 0.2  | 1.1 | <5  | <5  |
| C/B/21           | 5.5-6.0          | <0.2                | <1      | 17   | <1  | 75  | 22 | 0.2  | <1  | <5  | <5  |

Remark : 1. Sample results were in mg/kg

Appendix I



## Preliminary Results

Project : Contract no. CV/99/14 Ground Investigation Works for Development near Choi Wan Road and Jordan Valley and Development at Anderson Road

| Client Reference | Depth (m) | Test(s) required  |          |          |          |          |          |          | TCN <sup>1</sup> |
|------------------|-----------|-------------------|----------|----------|----------|----------|----------|----------|------------------|
|                  |           | PCBs <sup>1</sup> |          |          |          |          |          |          |                  |
|                  |           | PCB-1016          | PCB-1221 | PCB-1232 | PCB-1242 | PCB-1248 | PCB-1254 | PCB-1260 |                  |
| C/B/20           | 2.0-2.5   | <0.01             | <0.01    | <0.01    | <0.01    | <0.01    | <0.01    | <0.01    | <1               |
| C/B/20           | 2.5-3.0   | <0.01             | <0.01    | <0.01    | <0.01    | <0.01    | <0.01    | <0.01    | <1               |
| C/B/21           | 0.0-0.5   | <0.01             | <0.01    | <0.01    | <0.01    | <0.01    | <0.01    | <0.01    | <1               |
| C/B/21           | 0.5-1.0   | <0.01             | <0.01    | <0.01    | <0.01    | <0.01    | <0.01    | <0.01    | <1               |
| C/B/21           | 1.0-1.5   | <0.01             | <0.01    | <0.01    | <0.01    | <0.01    | <0.01    | <0.01    | <1               |
| C/B/21           | 1.5-2.0   | <0.01             | <0.01    | <0.01    | <0.01    | <0.01    | <0.01    | <0.01    | <1               |
| C/B/21           | 2.0-2.5   | <0.01             | <0.01    | <0.01    | <0.01    | <0.01    | <0.01    | <0.01    | <1               |
| C/B/21           | 2.5-3.0   | <0.01             | <0.01    | <0.01    | <0.01    | <0.01    | <0.01    | <0.01    | <1               |
| C/B/21           | 3.0-3.5   | <0.01             | <0.01    | <0.01    | <0.01    | <0.01    | <0.01    | <0.01    | <1               |
| C/B/21           | 3.5-4.0   | <0.01             | <0.01    | <0.01    | <0.01    | <0.01    | <0.01    | <0.01    | <1               |
| C/B/21           | 4.0-4.5   | <0.01             | <0.01    | <0.01    | <0.01    | <0.01    | <0.01    | <0.01    | <1               |
| C/B/21           | 4.5-5.0   | <0.01             | <0.01    | <0.01    | <0.01    | <0.01    | <0.01    | <0.01    | <1               |
| C/B/21           | 5.0-5.5   | <0.01             | <0.01    | <0.01    | <0.01    | <0.01    | <0.01    | <0.01    | <1               |
| C/B/21           | 5.5-6.0   | <0.01             | <0.01    | <0.01    | <0.01    | <0.01    | <0.01    | <0.01    | <1               |

Remark: 1. Sample results were in mg/kg.

Appendix 1

## Preliminary Results

Project : Contract no. CV/99/14 Ground Investigation Works for Development near Choi Wan Road and Jordan Valley and Development at Anderson Road

| Client Reference | Depth (m) | Test(s) required |                  |                    |                   |          |         |                   |       |
|------------------|-----------|------------------|------------------|--------------------|-------------------|----------|---------|-------------------|-------|
|                  |           | TOC <sup>2</sup> | TPH <sup>1</sup> | SVOCs <sup>1</sup> |                   |          |         | PAHs <sup>1</sup> |       |
|                  |           |                  |                  | Tri-CBs (Total)    | Tetra-CBs (Total) | Penta-CB | Hexa-CB | NAP               | ANY   |
| C/B/1            | 2.4-2.9   | -                | 88               | <0.10              | <0.10             | <0.10    | <0.10   | <0.10             | <0.10 |
| C/B/1            | 2.9-3.4   | -                | 120              | <0.10              | <0.10             | <0.10    | <0.10   | <0.10             | <0.10 |
| C/B/1            | 3.4-3.9   | -                | 39               | <0.10              | <0.10             | <0.10    | <0.10   | <0.10             | <0.10 |
| C/B/1            | 3.9-4.4   | -                | 480              | <0.10              | <0.10             | <0.10    | <0.10   | <0.10             | <0.10 |
| C/B/1            | 4.4-4.9   | -                | 910              | <0.10              | <0.10             | <0.10    | <0.10   | <0.10             | <0.10 |
| C/B/1            | 4.9-5.1   | -                | 180              | <0.10              | <0.10             | <0.10    | <0.10   | <0.10             | <0.10 |
| C/B/2            | 0.0-0.8   | -                | <20              | <0.10              | <0.10             | <0.10    | <0.10   | <0.10             | <0.10 |
| C/B/2            | 0.8-1.3   | -                | <20              | <0.10              | <0.10             | <0.10    | <0.10   | <0.10             | <0.10 |
| C/B/2            | 1.3-1.8   | -                | <20              | <0.10              | <0.10             | <0.10    | <0.10   | <0.10             | <0.10 |
| C/B/2            | 1.8-2.4   | -                | <20              | <0.10              | <0.10             | <0.10    | <0.10   | <0.10             | <0.10 |
| C/B/2            | 2.4-4.0   | -                | <20              | <0.10              | <0.10             | <0.10    | <0.10   | <0.10             | <0.10 |
| C/B/3            | 0.0-0.5   | -                | <20              | <0.10              | <0.10             | <0.10    | <0.10   | <0.10             | <0.10 |
| C/B/3            | 0.6-1.1   | -                | <20              | <0.10              | <0.10             | <0.10    | <0.10   | <0.10             | <0.10 |
| C/B/3            | 1.1-1.6   | -                | <20              | <0.10              | <0.10             | <0.10    | <0.10   | <0.10             | <0.10 |
| C/B/3            | 1.6-2.1   | -                | <20              | <0.10              | <0.10             | <0.10    | <0.10   | <0.10             | <0.10 |
| C/B/3            | 2.1-2.6   | -                | <20              | <0.10              | <0.10             | <0.10    | <0.10   | <0.10             | <0.10 |
| C/B/3            | 2.6-3.1   | -                | <20              | <0.10              | <0.10             | <0.10    | <0.10   | <0.10             | <0.10 |
| C/B/4            | 0.3-0.8   | -                | <20              | <0.10              | <0.10             | <0.10    | <0.10   | <0.10             | <0.10 |
| C/B/4            | 0.8-1.3   | -                | <20              | <0.10              | <0.10             | <0.10    | <0.10   | <0.10             | <0.10 |
| C/B/4            | 1.3-1.8   | -                | 80               | <0.10              | <0.10             | <0.10    | <0.10   | <0.10             | <0.10 |
| C/B/4            | 1.8-2.3   | -                | 45               | <0.10              | <0.10             | <0.10    | <0.10   | <0.10             | <0.10 |
| C/B/4            | 2.3-2.8   | -                | 48               | <0.10              | <0.10             | <0.10    | <0.10   | <0.10             | <0.10 |
| C/B/4            | 2.8-3.3   | -                | 61               | <0.10              | <0.10             | <0.10    | <0.10   | <0.10             | <0.10 |
| C/B/5            | 0.0-0.5   | -                | <20              | <0.10              | <0.10             | <0.10    | <0.10   | <0.10             | <0.10 |
| C/B/5            | 0.5-1.0   | -                | <20              | <0.10              | <0.10             | <0.10    | <0.10   | <0.10             | <0.10 |
| C/B/5            | 1.0-1.5   | -                | <20              | <0.10              | <0.10             | <0.10    | <0.10   | <0.10             | <0.10 |
| C/B/6            | 0.0-0.5   | -                | <20              | <0.10              | <0.10             | <0.10    | <0.10   | <0.10             | <0.10 |
| C/B/6            | 0.5-1.0   | -                | <20              | <0.10              | <0.10             | <0.10    | <0.10   | <0.10             | <0.10 |
| C/B/6            | 1.0-1.5   | -                | <20              | <0.10              | <0.10             | <0.10    | <0.10   | <0.10             | <0.10 |
| C/B/6            | 1.5-2.0   | -                | <20              | <0.10              | <0.10             | <0.10    | <0.10   | <0.10             | <0.10 |
| C/B/6            | 2.5-2.9   | -                | <20              | <0.10              | <0.10             | <0.10    | <0.10   | <0.10             | <0.10 |
| C/B/7            | 0.0-0.5   | -                | <20              | <0.10              | <0.10             | <0.10    | <0.10   | <0.10             | <0.10 |
| C/B/7            | 0.5-1.0   | -                | <20              | <0.10              | <0.10             | <0.10    | <0.10   | <0.10             | <0.10 |
| C/B/7            | 1.0-1.5   | -                | <20              | <0.10              | <0.10             | <0.10    | <0.10   | <0.10             | <0.10 |
| C/B/7            | 1.5-2.0   | -                | <20              | <0.10              | <0.10             | <0.10    | <0.10   | <0.10             | <0.10 |
| C/B/7            | 2.5-3.0   | -                | <20              | <0.10              | <0.10             | <0.10    | <0.10   | <0.10             | <0.10 |
| C/B/8            | 0.0-0.5   | -                | 30               | <0.10              | <0.10             | <0.10    | <0.10   | <0.10             | <0.10 |
| C/B/8            | 0.5-0.8   | -                | 20               | <0.10              | <0.10             | <0.10    | <0.10   | <0.10             | <0.10 |
| C/B/8            | 0.8-1.2   | -                | 22               | <0.10              | <0.10             | <0.10    | <0.10   | <0.10             | <0.10 |
| C/B/8            | 1.2-1.9   | -                | <20              | <0.10              | <0.10             | <0.10    | <0.10   | <0.10             | <0.10 |
| C/B/8            | 1.9-2.1   | -                | <20              | <0.10              | <0.10             | <0.10    | <0.10   | <0.10             | <0.10 |
| C/B/8            | 2.1-2.4   | -                | <20              | <0.10              | <0.10             | <0.10    | <0.10   | <0.10             | <0.10 |
| C/B/8            | 2.4-3.0   | -                | <20              | <0.10              | <0.10             | <0.10    | <0.10   | <0.10             | <0.10 |
| C/B/9            | 0.0-0.5   | -                | <20              | <0.10              | <0.10             | <0.10    | <0.10   | <0.10             | <0.10 |
| C/B/9            | 0.5-0.8   | -                | <20              | <0.10              | <0.10             | <0.10    | <0.10   | <0.10             | <0.10 |
| C/B/9            | 0.8-1.2   | -                | <20              | <0.10              | <0.10             | <0.10    | <0.10   | <0.10             | <0.10 |
| C/B/10           | 0.0-0.2   | -                | <20              | <0.10              | <0.10             | <0.10    | <0.10   | <0.10             | <0.10 |
| C/B/10           | 0.2-0.5   | -                | <20              | <0.10              | <0.10             | <0.10    | <0.10   | <0.10             | <0.10 |
| C/B/10           | 0.5-0.6   | -                | <20              | <0.10              | <0.10             | <0.10    | <0.10   | <0.10             | <0.10 |
| C/B/10           | 0.6-0.7   | -                | <20              | <0.10              | <0.10             | <0.10    | <0.10   | <0.10             | <0.10 |

Remark: 1. Sample results were in mg/kg  
2. Sample results were in %

Appendix 1



### Preliminary Results

Project: Contract no. CV/99/14 Ground Investigation Works for Development near Choi Wan Road and Jordan Valley and Development at Anderson Road

| Client Reference | Test(s) required |                  |                    |                   |          |         |                   |       |       |
|------------------|------------------|------------------|--------------------|-------------------|----------|---------|-------------------|-------|-------|
|                  | TOC <sup>2</sup> | TPH <sup>1</sup> | SVOCs <sup>1</sup> |                   |          |         | PAHs <sup>1</sup> |       |       |
|                  |                  |                  | Tri-CBs (Total)    | Tetra-CBs (Total) | Penta-CB | Hexa-CB | NAP               | ANY   |       |
| C/B/11           | 0.0-0.5          | -                | <20                | <0.10             | <0.10    | <0.10   | <0.10             | <0.10 | <0.10 |
| C/B/11           | 0.5-1.0          | -                | <20                | <0.10             | <0.10    | <0.10   | <0.10             | <0.10 | <0.10 |
| C/B/11           | 1.0-1.5          | -                | <20                | <0.10             | <0.10    | <0.10   | <0.10             | <0.10 | <0.10 |
| C/B/11           | 2.6-3.1          | -                | <20                | <0.10             | <0.10    | <0.10   | <0.10             | <0.10 | <0.10 |
| C/B/12           | 0.0-0.5          | -                | <20                | <0.10             | <0.10    | <0.10   | <0.10             | <0.10 | <0.10 |
| C/B/12           | 0.5-1.0          | -                | 32                 | <0.10             | <0.10    | <0.10   | <0.10             | <0.10 | <0.10 |
| C/B/12           | 1.0-1.5          | -                | <20                | <0.10             | <0.10    | <0.10   | <0.10             | <0.10 | <0.10 |
| C/B/12           | 1.5-2.0          | -                | <20                | <0.10             | <0.10    | <0.10   | <0.10             | <0.10 | <0.10 |
| C/B/12           | 2.5-3.0          | -                | <20                | <0.10             | <0.10    | <0.10   | <0.10             | <0.10 | <0.10 |
| C/B/13           | 0.0-0.5          | -                | <20                | <0.10             | <0.10    | <0.10   | <0.10             | <0.10 | <0.10 |
| C/B/13           | 0.5-1.0          | -                | <20                | <0.10             | <0.10    | <0.10   | <0.10             | <0.10 | <0.10 |
| C/B/13           | 1.0-1.5          | -                | <20                | <0.10             | <0.10    | <0.10   | <0.10             | <0.10 | <0.10 |
| C/B/13           | 1.5-1.8          | -                | <20                | <0.10             | <0.10    | <0.10   | <0.10             | <0.10 | <0.10 |
| C/B/14           | 0.0-0.5          | -                | <20                | <0.10             | <0.10    | <0.10   | <0.10             | <0.10 | <0.10 |
| C/B/14           | 0.5-1.0          | -                | 44                 | <0.10             | <0.10    | <0.10   | <0.10             | <0.10 | <0.10 |
| C/B/14           | 1.0-1.5          | -                | <20                | <0.10             | <0.10    | <0.10   | <0.10             | <0.10 | <0.10 |
| C/B/14           | 1.5-2.0          | -                | <20                | <0.10             | <0.10    | <0.10   | <0.10             | <0.10 | <0.10 |
| C/B/14           | 2.5-3.0          | -                | <20                | <0.10             | <0.10    | <0.10   | <0.10             | <0.10 | <0.10 |
| C/B/15           | 0.0-0.5          | -                | <20                | <0.10             | <0.10    | <0.10   | <0.10             | <0.10 | <0.10 |
| C/B/15           | 0.5-1.0          | -                | <20                | <0.10             | <0.10    | <0.10   | <0.10             | <0.10 | <0.10 |
| C/B/15           | 1.0-1.5          | -                | <20                | <0.10             | <0.10    | <0.10   | <0.10             | <0.10 | <0.10 |
| C/B/15           | 1.5-2.0          | -                | <20                | <0.10             | <0.10    | <0.10   | <0.10             | <0.10 | <0.10 |
| C/B/15           | 2.5-3.0          | -                | <20                | <0.10             | <0.10    | <0.10   | <0.10             | <0.10 | <0.10 |
| C/B/16           | 0.0-0.5          | -                | <20                | <0.10             | <0.10    | <0.10   | <0.10             | <0.10 | <0.10 |
| C/B/16B          | 0.0-0.5          | -                | <20                | <0.10             | <0.10    | <0.10   | <0.10             | <0.10 | <0.10 |
| C/B/16B          | 0.5-1.0          | -                | <20                | <0.10             | <0.10    | <0.10   | <0.10             | <0.10 | <0.10 |
| C/B/16B          | 1.0-1.5          | -                | <20                | <0.10             | <0.10    | <0.10   | <0.10             | <0.10 | <0.10 |
| C/B/16B          | 1.5-2.0          | -                | <20                | <0.10             | <0.10    | <0.10   | <0.10             | <0.10 | <0.10 |
| C/B/16B          | 2.5-3.0          | -                | <20                | <0.10             | <0.10    | <0.10   | <0.10             | <0.10 | <0.10 |
| C/B/17           | 0.0-0.5          | -                | <20                | <0.10             | <0.10    | <0.10   | <0.10             | <0.10 | <0.10 |
| C/B/17           | 0.5-1.0          | -                | 43                 | <0.10             | <0.10    | <0.10   | <0.10             | <0.10 | <0.10 |
| C/B/17           | 1.0-1.5          | -                | <20                | <0.10             | <0.10    | <0.10   | <0.10             | <0.10 | <0.10 |
| C/B/17           | 1.5-2.0          | -                | <20                | <0.10             | <0.10    | <0.10   | <0.10             | <0.10 | <0.10 |
| C/B/17           | 2.0-2.5          | -                | <20                | <0.10             | <0.10    | <0.10   | <0.10             | <0.10 | <0.10 |
| C/B/17           | 2.5-3.0          | -                | <20                | <0.10             | <0.10    | <0.10   | <0.10             | <0.10 | <0.10 |
| C/B/18           | 0.0-0.5          | -                | <20                | <0.10             | <0.10    | <0.10   | <0.10             | <0.10 | <0.10 |
| C/B/18           | 0.5-1.0          | -                | <20                | <0.10             | <0.10    | <0.10   | <0.10             | <0.10 | <0.10 |
| C/B/18           | 1.0-1.5          | -                | <20                | <0.10             | <0.10    | <0.10   | <0.10             | <0.10 | <0.10 |
| C/B/18           | 1.5-2.0          | -                | <20                | <0.10             | <0.10    | <0.10   | <0.10             | <0.10 | <0.10 |
| C/B/19           | 0.0-0.5          | -                | 5700               | <0.10             | <0.10    | <0.10   | <0.10             | <0.10 | <0.10 |
| C/B/19           | 0.5-1.0          | -                | <20                | <0.10             | <0.10    | <0.10   | <0.10             | <0.10 | <0.10 |
| C/B/19           | 1.0-1.5          | -                | <20                | <0.10             | <0.10    | <0.10   | <0.10             | <0.10 | <0.10 |
| C/B/19           | 1.5-2.0          | -                | <20                | <0.10             | <0.10    | <0.10   | <0.10             | <0.10 | <0.10 |
| C/B/19           | 2.0-2.5          | -                | <20                | <0.10             | <0.10    | <0.10   | <0.10             | <0.10 | <0.10 |
| C/B/19           | 2.5-3.0          | -                | <20                | <0.10             | <0.10    | <0.10   | <0.10             | <0.10 | <0.10 |
| C/B/20           | 0.0-0.5          | 1.3              | <20                | <0.10             | <0.10    | <0.10   | <0.10             | <0.10 | <0.10 |
| C/B/20           | 0.5-1.0          | 0.15             | <20                | <0.10             | <0.10    | <0.10   | <0.10             | <0.10 | <0.10 |
| C/B/20           | 1.0-1.5          | <0.05            | <20                | <0.10             | <0.10    | <0.10   | <0.10             | <0.10 | <0.10 |
| C/B/20           | 1.0-1.5          | <0.05            | <20                | <0.10             | <0.10    | <0.10   | <0.10             | <0.10 | <0.10 |
| C/B/20           | 1.5-2.0          | <0.05            | <20                | <0.10             | <0.10    | <0.10   | <0.10             | <0.10 | <0.10 |

Remark: 1. Sample results were in mg/kg  
2. Sample results were in %

Appendix 1

### Preliminary Results

Project: Contract no. CV/99/14 Ground Investigation Works for Development near Choi Wan Road and Jordan Valley and Development at Anderson Road

| Client Reference | Test(s) required |                  |                    |                   |          |         |                   |       |       |
|------------------|------------------|------------------|--------------------|-------------------|----------|---------|-------------------|-------|-------|
|                  | TOC <sup>2</sup> | TPH <sup>1</sup> | SVOCs <sup>1</sup> |                   |          |         | PAHs <sup>1</sup> |       |       |
|                  |                  |                  | Tri-CBs (Total)    | Tetra-CBs (Total) | Penta-CB | Hexa-CB | NAP               | ANY   |       |
| C/B/20           | 2.0-2.5          | <0.05            | <20                | <0.10             | <0.10    | <0.10   | <0.10             | <0.10 | <0.10 |
| C/B/20           | 2.5-3.0          | <0.05            | <20                | <0.10             | <0.10    | <0.10   | <0.10             | <0.10 | <0.10 |
| C/B/21           | 0.0-0.5          | 0.05             | <20                | <0.10             | <0.10    | <0.10   | <0.10             | <0.10 | <0.10 |
| C/B/21           | 0.5-1.0          | 0.1              | 90                 | <0.10             | <0.10    | <0.10   | <0.10             | <0.10 | <0.10 |
| C/B/21           | 1.0-1.5          | <0.05            | <20                | <0.10             | <0.10    | <0.10   | <0.10             | <0.10 | <0.10 |
| C/B/21           | 1.5-2.0          | <0.05            | 34.8               | <0.10             | <0.10    | <0.10   | <0.10             | <0.10 | <0.10 |
| C/B/21           | 2.0-2.5          | <0.05            | <20                | <0.10             | <0.10    | <0.10   | <0.10             | <0.10 | <0.10 |
| C/B/21           | 2.5-3.0          | <0.05            | <20                | <0.10             | <0.10    | <0.10   | <0.10             | <0.10 | <0.10 |
| C/B/21           | 3.0-3.5          | <0.05            | <20                | <0.10             | <0.10    | <0.10   | <0.10             | <0.10 | <0.10 |
| C/B/21           | 3.5-4.0          | <0.05            | <20                | <0.10             | <0.10    | <0.10   | <0.10             | <0.10 | <0.10 |
| C/B/21           | 4.0-4.5          | <0.05            | <20                | <0.10             | <0.10    | <0.10   | <0.10             | <0.10 | <0.10 |
| C/B/21           | 4.5-5.0          | <0.05            | <20                | <0.10             | <0.10    | <0.10   | <0.10             | <0.10 | <0.10 |
| C/B/21           | 5.0-5.5          | <0.05            | <20                | <0.10             | <0.10    | <0.10   | <0.10             | <0.10 | <0.10 |
| C/B/21           | 5.5-6.0          | <0.05            | <20                | <0.10             | <0.10    | <0.10   | <0.10             | <0.10 | <0.10 |

Remark: 1. Sample results were in mg/kg  
2. Sample results were in %

Appendix 1









Preliminary Results

Project: Contract no. CV/99/14 Ground Investigation Works for Development near Choi Wan Road and Jordan Valley and Development at Anderson Road

| Client Reference | Test(s) required  |             |       |       |         |       |         |       |             |       |
|------------------|-------------------|-------------|-------|-------|---------|-------|---------|-------|-------------|-------|
|                  | VOCs <sup>1</sup> |             |       |       |         |       |         |       |             |       |
|                  | 1,1-DCE           | cis-1,2,DYE | TCM   | TCE   | 1,2-DCE | TEM   | 1,2-DCP | TYE   | cis-1,3-DCP |       |
| C/B/20           | 2.0-2.5           | <0.10       | <0.10 | <0.10 | <0.10   | <0.10 | <0.10   | <0.10 | <0.10       | <0.10 |
| C/B/20           | 2.5-3.0           | <0.10       | <0.10 | <0.10 | <0.10   | <0.10 | <0.10   | <0.10 | <0.10       | <0.10 |
| C/B/21           | 0.0-0.5           | <0.10       | <0.10 | <0.10 | <0.10   | <0.10 | <0.10   | <0.10 | <0.10       | <0.10 |
| C/B/21           | 0.5-1.0           | <0.10       | <0.10 | <0.10 | <0.10   | <0.10 | <0.10   | <0.10 | <0.10       | <0.10 |
| C/B/21           | 1.0-1.5           | <0.10       | <0.10 | <0.10 | <0.10   | <0.10 | <0.10   | <0.10 | <0.10       | <0.10 |
| C/B/21           | 1.5-2.0           | <0.10       | <0.10 | <0.10 | <0.10   | <0.10 | <0.10   | <0.10 | <0.10       | <0.10 |
| C/B/21           | 2.0-2.5           | <0.10       | <0.10 | <0.10 | <0.10   | <0.10 | <0.10   | <0.10 | <0.10       | <0.10 |
| C/B/21           | 2.5-3.0           | <0.10       | <0.10 | <0.10 | <0.10   | <0.10 | <0.10   | <0.10 | <0.10       | <0.10 |
| C/B/21           | 3.0-3.5           | <0.10       | <0.10 | <0.10 | <0.10   | <0.10 | <0.10   | <0.10 | <0.10       | <0.10 |
| C/B/21           | 3.5-4.0           | <0.10       | <0.10 | <0.10 | <0.10   | <0.10 | <0.10   | <0.10 | <0.10       | <0.10 |
| C/B/21           | 4.0-4.5           | <0.10       | <0.10 | <0.10 | <0.10   | <0.10 | <0.10   | <0.10 | <0.10       | <0.10 |
| C/B/21           | 4.5-5.0           | <0.10       | <0.10 | <0.10 | <0.10   | <0.10 | <0.10   | <0.10 | <0.10       | <0.10 |
| C/B/21           | 5.0-5.5           | <0.10       | <0.10 | <0.10 | <0.10   | <0.10 | <0.10   | <0.10 | <0.10       | <0.10 |
| C/B/21           | 5.5-6.0           | <0.10       | <0.10 | <0.10 | <0.10   | <0.10 | <0.10   | <0.10 | <0.10       | <0.10 |

Remark: 1. Sample results were in mg/kg

Preliminary Results

Project: Contract no. CV/99/14 Ground Investigation Works for Development near Choi Wan Road and Jordan Valley and Development at Anderson Road

| Client Reference | Test(s) required  |           |         |       |       |       |             |           |       |
|------------------|-------------------|-----------|---------|-------|-------|-------|-------------|-----------|-------|
|                  | VOCs <sup>1</sup> |           |         |       |       |       |             |           |       |
|                  | trans-1,3-DCP     | 1,1,2-TCE | 1,2-DBM | TEE   | CHB   | STY   | 1,1,2,2-TCE | 1,3,5-TMB |       |
| C/B/1            | 2.4-2.9           | <0.10     | <0.10   | <0.10 | <0.10 | <0.10 | <0.10       | <0.10     | <0.10 |
| C/B/1            | 2.9-3.4           | <0.10     | <0.10   | <0.10 | <0.10 | <0.10 | <0.10       | <0.10     | <0.10 |
| C/B/1            | 3.4-3.9           | <0.10     | <0.10   | <0.10 | <0.10 | <0.10 | <0.10       | <0.10     | <0.10 |
| C/B/1            | 3.9-4.4           | <0.10     | <0.10   | <0.10 | <0.10 | <0.10 | <0.10       | <0.10     | <0.10 |
| C/B/1            | 4.4-4.9           | <0.10     | <0.10   | <0.10 | <0.10 | <0.10 | <0.10       | <0.10     | <0.10 |
| C/B/1            | 4.9-5.1           | <0.10     | <0.10   | <0.10 | <0.10 | <0.10 | <0.10       | <0.10     | <0.10 |
| C/B/2            | 0.0-0.8           | <0.10     | <0.10   | <0.10 | <0.10 | <0.10 | <0.10       | <0.10     | <0.10 |
| C/B/2            | 0.8-1.3           | <0.10     | <0.10   | <0.10 | <0.10 | <0.10 | <0.10       | <0.10     | <0.10 |
| C/B/2            | 1.3-1.8           | <0.10     | <0.10   | <0.10 | <0.10 | <0.10 | <0.10       | <0.10     | <0.10 |
| C/B/2            | 1.8-2.4           | <0.10     | <0.10   | <0.10 | <0.10 | <0.10 | <0.10       | <0.10     | <0.10 |
| C/B/2            | 2.4-4.0           | <0.10     | <0.10   | <0.10 | <0.10 | <0.10 | <0.10       | <0.10     | <0.10 |
| C/B/3            | 0.0-0.6           | <0.10     | <0.10   | <0.10 | <0.10 | <0.10 | <0.10       | <0.10     | <0.10 |
| C/B/3            | 0.6-1.1           | <0.10     | <0.10   | <0.10 | <0.10 | <0.10 | <0.10       | <0.10     | <0.10 |
| C/B/3            | 1.1-1.6           | <0.10     | <0.10   | <0.10 | <0.10 | <0.10 | <0.10       | <0.10     | <0.10 |
| C/B/3            | 1.6-2.1           | <0.10     | <0.10   | <0.10 | <0.10 | <0.10 | <0.10       | <0.10     | <0.10 |
| C/B/3            | 2.1-2.6           | <0.10     | <0.10   | <0.10 | <0.10 | <0.10 | <0.10       | <0.10     | <0.10 |
| C/B/3            | 2.6-3.1           | <0.10     | <0.10   | <0.10 | <0.10 | <0.10 | <0.10       | <0.10     | <0.10 |
| C/B/4            | 0.3-0.8           | <0.10     | <0.10   | <0.10 | <0.10 | <0.10 | <0.10       | <0.10     | <0.10 |
| C/B/4            | 0.8-1.3           | <0.10     | <0.10   | <0.10 | <0.10 | <0.10 | <0.10       | <0.10     | <0.10 |
| C/B/4            | 1.3-1.8           | <0.10     | <0.10   | <0.10 | <0.10 | <0.10 | <0.10       | <0.10     | <0.10 |
| C/B/4            | 1.8-2.3           | <0.10     | <0.10   | <0.10 | <0.10 | <0.10 | <0.10       | <0.10     | <0.10 |
| C/B/4            | 2.3-2.8           | <0.10     | <0.10   | <0.10 | <0.10 | <0.10 | <0.10       | <0.10     | <0.10 |
| C/B/4            | 2.8-3.3           | <0.10     | <0.10   | <0.10 | <0.10 | <0.10 | <0.10       | <0.10     | <0.10 |
| C/B/5            | 0.0-0.5           | <0.10     | <0.10   | <0.10 | <0.10 | <0.10 | <0.10       | <0.10     | <0.10 |
| C/B/5            | 0.5-1.0           | <0.10     | <0.10   | <0.10 | <0.10 | <0.10 | <0.10       | <0.10     | <0.10 |
| C/B/5            | 1.0-1.5           | <0.10     | <0.10   | <0.10 | <0.10 | <0.10 | <0.10       | <0.10     | <0.10 |
| C/B/6            | 0.0-0.5           | <0.10     | <0.10   | <0.10 | <0.10 | <0.10 | <0.10       | <0.10     | <0.10 |
| C/B/6            | 0.5-1.0           | <0.10     | <0.10   | <0.10 | <0.10 | <0.10 | <0.10       | <0.10     | <0.10 |
| C/B/6            | 1.0-1.5           | <0.10     | <0.10   | <0.10 | <0.10 | <0.10 | <0.10       | <0.10     | <0.10 |
| C/B/6            | 1.5-2.0           | <0.10     | <0.10   | <0.10 | <0.10 | <0.10 | <0.10       | <0.10     | <0.10 |
| C/B/6            | 2.5-2.9           | <0.10     | <0.10   | <0.10 | <0.10 | <0.10 | <0.10       | <0.10     | <0.10 |
| C/B/7            | 0.0-0.5           | <0.10     | <0.10   | <0.10 | <0.10 | <0.10 | <0.10       | <0.10     | <0.10 |
| C/B/7            | 0.5-1.0           | <0.10     | <0.10   | <0.10 | <0.10 | <0.10 | <0.10       | <0.10     | <0.10 |
| C/B/7            | 1.0-1.5           | <0.10     | <0.10   | <0.10 | <0.10 | <0.10 | <0.10       | <0.10     | <0.10 |
| C/B/7            | 1.5-2.0           | <0.10     | <0.10   | <0.10 | <0.10 | <0.10 | <0.10       | <0.10     | <0.10 |
| C/B/7            | 2.5-3.0           | <0.10     | <0.10   | <0.10 | <0.10 | <0.10 | <0.10       | <0.10     | <0.10 |
| C/B/8            | 0.0-0.5           | <0.10     | <0.10   | <0.10 | <0.10 | <0.10 | <0.10       | <0.10     | <0.10 |
| C/B/8            | 0.5-0.8           | <0.10     | <0.10   | <0.10 | <0.10 | <0.10 | <0.10       | <0.10     | <0.10 |
| C/B/8            | 0.8-1.2           | <0.10     | <0.10   | <0.10 | <0.10 | <0.10 | <0.10       | <0.10     | <0.10 |
| C/B/8            | 1.2-1.9           | <0.10     | <0.10   | <0.10 | <0.10 | <0.10 | <0.10       | <0.10     | <0.10 |
| C/B/8            | 1.9-2.1           | <0.10     | <0.10   | <0.10 | <0.10 | <0.10 | <0.10       | <0.10     | <0.10 |
| C/B/8            | 2.1-2.4           | <0.10     | <0.10   | <0.10 | <0.10 | <0.10 | <0.10       | <0.10     | <0.10 |
| C/B/8            | 2.4-3.0           | <0.10     | <0.10   | <0.10 | <0.10 | <0.10 | <0.10       | <0.10     | <0.10 |
| C/B/9            | 0.0-0.5           | <0.10     | <0.10   | <0.10 | <0.10 | <0.10 | <0.10       | <0.10     | <0.10 |
| C/B/9            | 0.5-0.8           | <0.10     | <0.10   | <0.10 | <0.10 | <0.10 | <0.10       | <0.10     | <0.10 |
| C/B/9            | 0.8-1.2           | <0.10     | <0.10   | <0.10 | <0.10 | <0.10 | <0.10       | <0.10     | <0.10 |
| C/B/10           | 0.0-0.2           | <0.10     | <0.10   | <0.10 | <0.10 | <0.10 | <0.10       | <0.10     | <0.10 |
| C/B/10           | 0.2-0.5           | <0.10     | <0.10   | <0.10 | <0.10 | <0.10 | <0.10       | <0.10     | <0.10 |
| C/B/10           | 0.5-0.6           | <0.10     | <0.10   | <0.10 | <0.10 | <0.10 | <0.10       | <0.10     | <0.10 |
| C/B/10           | 0.6-0.7           | <0.10     | <0.10   | <0.10 | <0.10 | <0.10 | <0.10       | <0.10     | <0.10 |

Remark: 1. Sample results were in mg/kg







### Preliminary Results

Project: Contract no. CV/99/14 Ground Investigation Works for Development near Choi Wan Road and Jordan Valley and Development at Anderson Road

| Client Reference | Test(s) required  |             |                   |               |         |             |          |       |
|------------------|-------------------|-------------|-------------------|---------------|---------|-------------|----------|-------|
|                  | VOCs <sup>1</sup> |             | BTEX <sup>1</sup> |               |         |             |          |       |
|                  | 1,2,4-TMB         | DCB (Total) | Benzene           | Ethyl Benzene | Toluene | m,p-Xylenes | o-Xylene |       |
| C/B/20           | 2.0-2.5           | <0.10       | <0.10             | <0.05         | <0.05   | <0.05       | <0.10    | <0.05 |
| C/B/20           | 2.5-3.0           | <0.10       | <0.10             | <0.05         | <0.05   | <0.05       | <0.10    | <0.05 |
| C/B/21           | 0.0-0.5           | <0.10       | <0.10             | <0.05         | <0.05   | <0.05       | <0.10    | <0.05 |
| C/B/21           | 0.5-1.0           | <0.10       | <0.10             | <0.05         | <0.05   | <0.05       | <0.10    | <0.05 |
| C/B/21           | 1.0-1.5           | <0.10       | <0.10             | <0.05         | <0.05   | <0.05       | <0.10    | <0.05 |
| C/B/21           | 1.5-2.0           | <0.10       | <0.10             | <0.05         | <0.05   | <0.05       | <0.10    | <0.05 |
| C/B/21           | 2.0-2.5           | <0.10       | <0.10             | <0.05         | <0.05   | <0.05       | <0.10    | <0.05 |
| C/B/21           | 2.5-3.0           | <0.10       | <0.10             | <0.05         | <0.05   | <0.05       | <0.10    | <0.05 |
| C/B/21           | 3.0-3.5           | <0.10       | <0.10             | <0.05         | <0.05   | <0.05       | <0.10    | <0.05 |
| C/B/21           | 3.5-4.0           | <0.10       | <0.10             | <0.05         | <0.05   | <0.05       | <0.10    | <0.05 |
| C/B/21           | 4.0-4.5           | <0.10       | <0.10             | <0.05         | <0.05   | <0.05       | <0.10    | <0.05 |
| C/B/21           | 4.5-5.0           | <0.10       | <0.10             | <0.05         | <0.05   | <0.05       | <0.10    | <0.05 |
| C/B/21           | 5.0-5.5           | <0.10       | <0.10             | <0.05         | <0.05   | <0.05       | <0.10    | <0.05 |
| C/B/21           | 5.5-6.0           | <0.10       | <0.10             | <0.05         | <0.05   | <0.05       | <0.10    | <0.05 |

Remark: 1. Sample results were in mg/kg

Appendix 1

### Preliminary Results

Project: Contract no. CV/99/14 Ground Investigation Works for Development near Choi Wan Road and Jordan Valley and Development at Anderson Road

| Client Reference | Test(s) required    |      |     |     |     |       |      |      |     |     |    |
|------------------|---------------------|------|-----|-----|-----|-------|------|------|-----|-----|----|
|                  | Metals <sup>1</sup> |      |     |     |     |       |      |      |     |     |    |
|                  | Cd                  | Cr   | Cu  | Ni  | Pb  | Zn    | Hg   | As   | Sn  | Se  |    |
| C/T/1            | 0.0-0.5             | <0.2 | 3.2 | <1  | <1  | 5.5   | 9    | <0.1 | 1.8 | <5  | <5 |
| C/T/1            | 0.5-1.0             | <0.2 | 1.8 | <1  | <1  | 23    | 15   | <0.1 | 2.2 | <5  | <5 |
| C/T/1            | 1.0-1.5             | <0.2 | 2.4 | <1  | <1  | 16    | 8.4  | <0.1 | 2.4 | <5  | <5 |
| C/T/1            | 1.5-2.0             | <0.2 | 2.6 | <1  | <1  | 21    | 7.7  | <0.1 | 1.8 | <5  | <5 |
| C/T/1            | 2.0-3.0             | <0.2 | 2.2 | <1  | <1  | 23    | 14   | <0.1 | 1.9 | <5  | <5 |
| C/T/2            | 0.0-0.5             | <0.2 | 8.8 | <1  | <1  | 21    | 50   | <0.1 | 4.5 | <5  | <5 |
| C/T/2            | 0.5-1.0             | <0.2 | 4.8 | <1  | <1  | 13    | 6.4  | <0.1 | 2.4 | <5  | <5 |
| C/T/2            | 1.0-1.5             | <0.2 | 3.7 | <1  | <1  | 19    | 6.5  | <0.1 | 2.1 | <5  | <5 |
| C/T/2            | 1.5-2.0             | <0.2 | 3.2 | <1  | <1  | 10    | 9.5  | <0.1 | 2.3 | <5  | <5 |
| C/T/2            | 2.0-3.0             | <0.2 | 1.9 | <1  | <1  | 32    | 7.4  | <0.1 | 1.8 | <5  | <5 |
| C/T/3            | 0.0-0.5             | <0.2 | <1  | 1.5 | <1  | 7.8   | 16   | <0.1 | 2.2 | <5  | <5 |
| C/T/3            | 0.5-1.0             | <0.2 | 2   | <1  | <1  | 21    | 11   | <0.1 | 1.1 | <5  | <5 |
| C/T/3            | 1.0-1.5             | <0.2 | <1  | <1  | <1  | 850   | 33   | <0.1 | 2.2 | <5  | <5 |
| C/T/3            | 1.5-2.0             | <0.2 | <1  | <1  | <1  | 80    | 19   | <0.1 | <1  | <5  | <5 |
| C/T/3            | 2.0-3.0             | <0.2 | <1  | <1  | <1  | 100   | 19   | <0.1 | <1  | <5  | <5 |
| C/T/4            | 0.0-0.5             | <0.2 | 2.1 | <1  | <1  | 230   | 96   | <0.1 | 2.8 | <5  | <5 |
| C/T/4            | 0.5-1.0             | <0.2 | <1  | 2.4 | <1  | 140   | 100  | <0.1 | 2.4 | <5  | <5 |
| C/T/4            | 1.0-1.5             | <0.2 | <1  | 2.3 | <1  | 80    | 14   | <0.1 | 1.3 | <5  | <5 |
| C/T/4            | 1.5-2.0             | <0.2 | <1  | 1.5 | <1  | 55    | 13   | <0.1 | <1  | <5  | <5 |
| C/T/4            | 2.0-3.0             | <0.2 | <1  | 1.4 | <1  | 130   | 31   | <0.1 | <1  | <5  | <5 |
| C/T/5            | 0.0-0.5             | <0.2 | 2   | <1  | <1  | 23    | 7.8  | <0.1 | 1.5 | <5  | <5 |
| C/T/5            | 0.5-1.0             | <0.2 | <1  | <1  | <1  | 42    | 11   | <0.1 | <1  | <5  | <5 |
| C/T/5            | 1.0-1.5             | <0.2 | 1.4 | <1  | 2.7 | 55    | 7.3  | <0.1 | <1  | <5  | <5 |
| C/T/5            | 1.5-2.0             | <0.2 | <1  | <1  | 1.2 | 240   | 11   | <0.1 | <1  | <5  | <5 |
| C/T/5            | 2.0-3.0             | <0.2 | <1  | <1  | <1  | 83    | 12   | 0.1  | <1  | <5  | <5 |
| C/T/6            | 0.0-0.5             | <0.2 | 1.1 | 1.2 | 1.5 | 140   | 37   | 0.1  | 1.6 | <5  | <5 |
| C/T/6            | 0.5-1.0             | <0.2 | <1  | <1  | 1.2 | 150   | 19   | <0.1 | <1  | <5  | <5 |
| C/T/6            | 1.0-1.5             | <0.2 | <1  | <1  | <1  | 150   | 21   | <0.1 | <1  | <5  | <5 |
| C/T/6            | 1.5-2.0             | <0.2 | <1  | <1  | 1.1 | 530   | 27   | <0.1 | <1  | <5  | <5 |
| C/T/6            | 2.0-3.0             | <0.2 | <1  | <1  | 1.8 | 450   | 20   | <0.1 | <1  | <5  | <5 |
| C/T/7            | 0.0-0.5             | 2.7  | 210 | 790 | 190 | 16000 | 3900 | 6.8  | 99  | 27  | <5 |
| C/T/7            | 0.5-1.0             | <0.2 | 1.1 | 3.8 | 1.2 | 260   | 21   | 0.1  | 1.8 | <5  | <5 |
| C/T/7            | 1.0-1.5             | <0.2 | <1  | 3.2 | <1  | 150   | 9    | <0.1 | <1  | <5  | <5 |
| C/T/7            | 1.5-2.0             | <0.2 | <1  | 2.7 | 1   | 150   | 16   | 0.1  | 2.6 | <5  | <5 |
| C/T/7            | 2.0-3.0             | <0.2 | <1  | 1.7 | <1  | 110   | 16   | 0.1  | 1.2 | 5.3 | <5 |
| C/T/8            | 0.0-0.5             | <0.2 | 2.4 | 3.5 | 1.4 | 160   | 21   | <0.1 | <1  | <5  | <5 |
| C/T/8            | 0.5-1.0             | <0.2 | <1  | 1.1 | 1.1 | 240   | 20   | <0.1 | 1.1 | <5  | <5 |
| C/T/8            | 1.0-1.5             | <0.2 | <1  | <1  | 1.4 | 150   | 6.6  | 0.1  | <1  | <5  | <5 |
| C/T/8            | 1.5-2.0             | <0.2 | <1  | <1  | 1.6 | 330   | 18   | 0.3  | <1  | <5  | <5 |
| C/T/8            | 2.0-2.5             | 0.3  | 2.1 | 5.5 | 1.5 | 130   | 40   | 0.2  | 2.3 | <5  | <5 |
| C/T/8            | 2.5-3.0             | <0.2 | <1  | <1  | 1.3 | 94    | 24   | 0.2  | <1  | <5  | <5 |
| C/T/9            | 0.0-0.5             | <0.2 | 3.1 | 15  | <1  | 29    | 20   | <0.1 | 3.8 | <5  | <5 |
| C/T/9            | 0.5-1.0             | <0.2 | <1  | 1.4 | <1  | 42    | 14   | <0.1 | 2.1 | <5  | <5 |
| C/T/9            | 1.0-1.5             | <0.2 | <1  | <1  | <1  | 15    | 12   | <0.1 | 1.8 | <5  | <5 |
| C/T/9            | 1.5-2.0             | <0.2 | <1  | <1  | <1  | 24    | 12   | <0.1 | 3.6 | <5  | <5 |
| C/T/9            | 2.0-3.0             | <0.2 | <1  | 2   | <1  | 440   | 25   | <0.1 | 1.8 | <5  | <5 |
| C/T/10           | 0.0-0.5             | 0.2  | 25  | 71  | 24  | 110   | 54   | <0.1 | 11  | 6.1 | <5 |
| C/T/10           | 0.5-1.0             | <0.2 | 2.9 | 8.3 | 1   | 26    | 14   | <0.1 | 2.9 | <5  | <5 |
| C/T/10           | 1.0-1.5             | <0.2 | <1  | <1  | <1  | 20    | 13   | <0.1 | 2.9 | <5  | <5 |
| C/T/10           | 1.5-2.0             | <0.2 | <1  | 1.1 | <1  | 32    | 11   | <0.1 | 2.3 | <5  | <5 |
| C/T/10           | 2.0-2.5             | <0.2 | <1  | <1  | <1  | 120   | 18   | <0.1 | 1.2 | <5  | <5 |

Remark: 1. Sample results were in mg/kg

Appendix 1

## Preliminary Results

Project: Contract no. CV/99/14 Ground Investigation Works for Development near Choi Wan Road and Jordan Valley and Development at Anderson Road

| Client Reference | Test(s) required | Metals <sup>1</sup> |      |      |     |      |      |     |      |     |    |
|------------------|------------------|---------------------|------|------|-----|------|------|-----|------|-----|----|
|                  |                  | Cd                  | Cr   | Cu   | Ni  | Pb   | Zn   | Hg  | As   | Sn  | Se |
|                  |                  | SL/10 2.5-3.0       | <0.2 | <1   | 1.8 | <1   | 110  | 17  | <0.1 | 1.6 | <5 |
| SL/11 0.0-0.5    | 1.3              | 19                  | 41   | 7.8  | 68  | 240  | 0.7  | 6.3 | <5   | <5  |    |
| SL/11 0.5-1.0    | 0.5              | 7.3                 | 4.8  | 2.3  | 36  | 53   | 0.2  | 3.8 | <5   | <5  |    |
| SL/11 1.0-1.5    | 1                | 12                  | 10   | 5.1  | 85  | 92   | 0.3  | 4.8 | <5   | <5  |    |
| SL/11 1.5-2.0    | <0.2             | <1                  | 1.6  | <1   | 74  | 13   | 0.1  | 2   | <5   | <5  |    |
| SL/11 2.0-2.5    | <0.2             | 0.7                 | 2.2  | <1   | 100 | 16   | 0.2  | 1.5 | <5   | <5  |    |
| SL/11 2.5-3.0    | <0.2             | <1                  | 2    | 1.1  | 160 | 24   | 0.2  | 2.1 | <5   | <5  |    |
| SL/12 0.5-1.0    | <0.2             | 2.5                 | 6.9  | 4.3  | 520 | 91   | <0.1 | 3   | 6.2  | <5  |    |
| SL/12 1.0-1.5    | <0.2             | <1                  | 1.1  | 1.5  | 300 | 25   | <0.1 | 1.8 | <5   | <5  |    |
| SL/12 1.5-2.0    | <0.2             | <1                  | 1.1  | 1.6  | 290 | 28   | <0.1 | 2.5 | <5   | <5  |    |
| SL/12 2.0-2.5    | <0.2             | <1                  | 1.5  | <1   | 230 | 69   | 0.3  | 2.3 | <5   | <5  |    |
| SL/12 2.5-3.0    | <0.2             | <1                  | <1   | <1   | 200 | 36   | <0.1 | 2.2 | <5   | <5  |    |
| SL/13 0.0-0.5    | 0.2              | 370                 | 180  | 1800 | 140 | 1000 | 6    | 3.3 | 6.2  | <5  |    |
| SL/13 0.5-1.0    | <0.2             | 5.5                 | 2.1  | 2.3  | 30  | 36   | 0.2  | 4.5 | <5   | <5  |    |
| SL/13 1.0-1.5    | <0.2             | 8.9                 | 3.2  | 3    | 64  | 120  | 0.2  | 5.9 | <5   | <5  |    |
| SL/13 1.5-2.0    | <0.2             | 8.3                 | 2.5  | 2.4  | 46  | 44   | 0.2  | 5.4 | <5   | <5  |    |
| SL/13 2.0-3.0    | <0.2             | 9.2                 | 1.5  | 2.4  | 41  | 36   | 0.1  | 5.1 | <5   | <5  |    |
| SL/14 0.0-0.5    | 0.2              | 8.7                 | 2.4  | 1.4  | 57  | 42   | 0.2  | 7.4 | <5   | <5  |    |
| SL/14 0.5-1.0    | <0.2             | 3.1                 | <1   | <1   | 6.9 | 22   | 0.2  | 2.3 | <5   | <5  |    |
| SL/14 1.0-1.5    | <0.2             | 2.5                 | <1   | <1   | 77  | 18   | 0.2  | 1.1 | <5   | <5  |    |
| SL/14 1.5-2.0    | <0.2             | <1                  | <1   | <1   | 8.7 | <10  | 0.2  | 1.4 | <5   | <5  |    |
| SL/14 2.0-2.5    | <0.2             | <1                  | <1   | <1   | 11  | <10  | 0.2  | 1.7 | <5   | <5  |    |
| SL/14 2.5-3.0    | <0.2             | <1                  | <1   | <1   | 38  | 17   | 0.1  | 1.8 | <5   | <5  |    |
| SL/15 0.0-0.5    | <0.2             | <1                  | <1   | 1.3  | 190 | 29   | 0.2  | <1  | <5   | <5  |    |
| SL/15 0.5-1.0    | <0.2             | 1.6                 | <1   | <1   | 12  | <10  | 0.2  | 1.2 | <5   | <5  |    |
| SL/15 1.0-1.5    | <0.2             | 1                   | <1   | <1   | 15  | <10  | 0.2  | <1  | <5   | <5  |    |
| SL/15 1.5-2.0    | <0.2             | <1                  | <1   | <1   | 18  | 16   | 0.2  | <1  | <5   | <5  |    |
| SL/15 2.0-2.5    | <0.2             | <1                  | 1.3  | <1   | 57  | 27   | 0.2  | 3.4 | <5   | <5  |    |
| SL/15 2.5-3.0    | <0.2             | <1                  | <1   | <1   | 14  | <10  | 0.2  | 1   | <5   | <5  |    |
| SL/16 0.0-0.5    | <0.2             | 2.8                 | 2.1  | 2.3  | 120 | 46   | 0.2  | 2.1 | <5   | <5  |    |
| SL/16 0.5-1.0    | <0.2             | 1.3                 | 1.4  | 2.1  | 100 | 25   | 0.3  | 2   | <5   | <5  |    |
| SL/16 1.0-1.5    | <0.2             | 1.2                 | 1.4  | 1.5  | 85  | 47   | 0.2  | 1.5 | 9.8  | <5  |    |
| SL/16 1.5-2.0    | <0.2             | 1.1                 | <1   | 1.3  | 66  | 28   | 0.3  | 2   | <5   | <5  |    |
| SL/16 2.0-2.1    | <0.2             | 1.1                 | 1.9  | 1.1  | 62  | 25   | 0.1  | 1.7 | <5   | <5  |    |
| SL/17 0.0-0.5    | <0.2             | 3                   | 1    | 2.8  | 89  | <10  | <0.1 | 1.9 | <5   | <5  |    |
| SL/17 0.5-1.0    | <0.2             | <0.1                | <1   | 2.4  | 140 | 13   | 0.6  | 1.2 | <5   | <5  |    |
| SL/17 1.0-1.5    | <0.2             | <1                  | <1   | 1.8  | 170 | 24   | 0.2  | <1  | <5   | <5  |    |
| SL/17 1.5-2.0    | <0.2             | <1                  | <1   | 1.2  | 120 | 16   | <0.1 | <1  | <5   | <5  |    |
| SL/17 2.0-2.5    | <0.2             | <1                  | <1   | 2.3  | 220 | 17   | 0.1  | <1  | <5   | <5  |    |
| SL/17 2.5-3.0    | <0.2             | <1                  | <1   | 1.5  | 150 | 12   | <0.1 | <1  | <5   | <5  |    |
| SL/18 0.0-0.5    | <0.2             | <1                  | 1.2  | 2.2  | 160 | 26   | 0.1  | <1  | <5   | <5  |    |
| SL/18 0.5-1.0    | <0.2             | <1                  | <1   | <1   | 56  | 70   | 0.3  | <1  | <5   | <5  |    |
| SL/19 0.0-0.5    | <0.2             | <1                  | <1   | <1   | 33  | 22   | <0.1 | <1  | <5   | <5  |    |
| SL/19 0.5-1.0    | <0.2             | <1                  | 2.9  | <1   | 42  | 26   | <0.1 | 1.6 | <5   | <5  |    |
| SL/20 0.0-0.5    | <0.2             | 14                  | 5    | 2.3  | 84  | 66   | 0.1  | 2.4 | <5   | <5  |    |
| SL/20 0.5-1.0    | <0.2             | <1                  | 2    | <1   | 52  | 42   | <0.1 | 1.2 | <5   | <5  |    |
| SL/21 0.0-0.5    | <0.2             | 7.2                 | 2.1  | <1   | 26  | 17   | 0.1  | 3.3 | <5   | <5  |    |
| SL/21 0.5-1.0    | <0.2             | <1                  | <1   | <1   | 13  | 16   | <0.1 | <1  | <5   | <5  |    |
| SL/21 1.5-2.0    | <0.2             | 1.7                 | <1   | <1   | 12  | 14   | <0.1 | <1  | <5   | <5  |    |

Remark: 1. Sample results were in mg/kg

Appendix 1

## Preliminary Results

Project: Contract no. CV/99/14 Ground Investigation Works for Development near Choi Wan Road and Jordan Valley and Development at Anderson Road

| Client Reference | Test(s) required | PCBs <sup>1</sup> |          |          |          |          |          |          | TCN <sup>1</sup> | TOC <sup>2</sup> |
|------------------|------------------|-------------------|----------|----------|----------|----------|----------|----------|------------------|------------------|
|                  |                  | PCB-1016          | PCB-1221 | PCB-1232 | PCB-1242 | PCB-1248 | PCB-1254 | PCB-1260 |                  |                  |
|                  |                  | SL/1 0.0-0.5      | <0.01    | <0.01    | <0.01    | <0.01    | <0.01    | <0.01    |                  |                  |
| SL/1 0.5-1.0     | <0.01            | <0.01             | <0.01    | <0.01    | <0.01    | <0.01    | <0.01    | <1       | -                |                  |
| SL/1 1.0-1.5     | <0.01            | <0.01             | <0.01    | <0.01    | <0.01    | <0.01    | <0.01    | <1       | -                |                  |
| SL/1 1.5-2.0     | <0.01            | <0.01             | <0.01    | <0.01    | <0.01    | <0.01    | <0.01    | <1       | -                |                  |
| SL/1 2.0-3.0     | <0.01            | <0.01             | <0.01    | <0.01    | <0.01    | <0.01    | <0.01    | <1       | -                |                  |
| SL/2 0.0-0.5     | <0.01            | <0.01             | <0.01    | <0.01    | <0.01    | <0.01    | <0.01    | <1       | -                |                  |
| SL/2 0.5-1.0     | <0.01            | <0.01             | <0.01    | <0.01    | <0.01    | <0.01    | <0.01    | <1       | -                |                  |
| SL/2 1.0-1.5     | <0.01            | <0.01             | <0.01    | <0.01    | <0.01    | <0.01    | <0.01    | <1       | -                |                  |
| SL/2 1.5-2.0     | <0.01            | <0.01             | <0.01    | <0.01    | <0.01    | <0.01    | <0.01    | <1       | -                |                  |
| SL/2 2.0-3.0     | <0.01            | <0.01             | <0.01    | <0.01    | <0.01    | <0.01    | <0.01    | <1       | -                |                  |
| SL/3 0.0-0.5     | <0.01            | <0.01             | <0.01    | <0.01    | <0.01    | <0.01    | <0.01    | <1       | -                |                  |
| SL/3 0.5-1.0     | <0.01            | <0.01             | <0.01    | <0.01    | <0.01    | <0.01    | <0.01    | <1       | -                |                  |
| SL/3 1.0-1.5     | <0.01            | <0.01             | <0.01    | <0.01    | <0.01    | <0.01    | <0.01    | <1       | -                |                  |
| SL/3 1.5-2.0     | <0.01            | <0.01             | <0.01    | <0.01    | <0.01    | <0.01    | <0.01    | <1       | -                |                  |
| SL/3 2.0-3.0     | <0.01            | <0.01             | <0.01    | <0.01    | <0.01    | <0.01    | <0.01    | <1       | -                |                  |
| SL/4 0.0-0.5     | <0.01            | <0.01             | <0.01    | <0.01    | <0.01    | <0.01    | <0.01    | <1       | -                |                  |
| SL/4 0.5-1.0     | <0.01            | <0.01             | <0.01    | <0.01    | <0.01    | <0.01    | <0.01    | <1       | -                |                  |
| SL/4 1.0-1.5     | <0.01            | <0.01             | <0.01    | <0.01    | <0.01    | <0.01    | <0.01    | <1       | -                |                  |
| SL/4 1.5-2.0     | <0.01            | <0.01             | <0.01    | <0.01    | <0.01    | <0.01    | <0.01    | <1       | -                |                  |
| SL/4 2.0-3.0     | <0.01            | <0.01             | <0.01    | <0.01    | <0.01    | <0.01    | <0.01    | <1       | -                |                  |
| SL/5 0.0-0.5     | <0.01            | <0.01             | <0.01    | <0.01    | <0.01    | <0.01    | <0.01    | <1       | -                |                  |
| SL/5 0.5-1.0     | <0.01            | <0.01             | <0.01    | <0.01    | <0.01    | <0.01    | <0.01    | <1       | -                |                  |
| SL/5 1.0-1.5     | <0.01            | <0.01             | <0.01    | <0.01    | <0.01    | <0.01    | <0.01    | <1       | -                |                  |
| SL/5 1.5-2.0     | <0.01            | <0.01             | <0.01    | <0.01    | <0.01    | <0.01    | <0.01    | <1       | -                |                  |
| SL/5 2.0-3.0     | <0.01            | <0.01             | <0.01    | <0.01    | <0.01    | <0.01    | <0.01    | <1       | -                |                  |
| SL/6 0.0-0.5     | <0.01            | <0.01             | <0.01    | <0.01    | <0.01    | <0.01    | <0.01    | <1       | -                |                  |
| SL/6 0.5-1.0     | <0.01            | <0.01             | <0.01    | <0.01    | <0.01    | <0.01    | <0.01    | <1       | -                |                  |
| SL/6 1.0-1.5     | <0.01            | <0.01             | <0.01    | <0.01    | <0.01    | <0.01    | <0.01    | <1       | -                |                  |
| SL/6 1.5-2.0     | <0.01            | <0.01             | <0.01    | <0.01    | <0.01    | <0.01    | <0.01    | <1       | -                |                  |
| SL/6 2.0-3.0     | <0.01            | <0.01             | <0.01    | <0.01    | <0.01    | <0.01    | <0.01    | <1       | -                |                  |
| SL/7 0.0-0.5     | <0.01            | <0.01             | <0.01    | <0.01    | <0.01    | <0.01    | <0.01    | <1       | -                |                  |
| SL/7 0.5-1.0     | <0.01            | <0.01             | <0.01    | <0.01    | <0.01    | <0.01    | <0.01    | <1       | -                |                  |
| SL/7 1.0-1.5     | <0.01            | <0.01             | <0.01    | <0.01    | <0.01    | <0.01    | <0.01    | <1       | -                |                  |
| SL/7 1.5-2.0     | <0.01            | <0.01             | <0.01    | <0.01    | <0.01    | <0.01    | <0.01    | <1       | -                |                  |
| SL/7 2.0-3.0     | <0.01            | <0.01             | <0.01    | <0.01    | <0.01    | <0.01    | <0.01    | <1       | -                |                  |
| SL/8 0.0-0.5     | <0.01            | <0.01             | <0.01    | <0.01    | <0.01    | <0.01    | <0.01    | <1       | -                |                  |
| SL/8 0.5-1.0     | <0.01            | <0.01             | <0.01    | <0.01    | <0.01    | <0.01    | <0.01    | <1       | -                |                  |
| SL/8 1.0-1.5     | <0.01            | <0.01             | <0.01    | <0.01    | <0.01    | <0.01    | <0.01    | <1       | -                |                  |
| SL/8 1.5-2.0     | <0.01            | <0.01             | <0.01    | <0.01    | <0.01    | <0.01    | <0.01    | <1       | -                |                  |
| SL/8 2.0-2.5     | <0.01            | <0.01             | <0.01    | <0.01    | <0.01    | <0.01    | <0.01    | <1       | -                |                  |
| SL/8 2.5-3.0     | <0.01            | <0.01             | <0.01    | <0.01    | <0.01    | <0.01    | <0.01    | <1       | -                |                  |
| SL/9 0.0-0.5     | <0.01            | <0.01             | <0.01    | <0.01    | <0.01    | <0.01    | <0.01    | <1       | -                |                  |
| SL/9 0.5-1.0     | <0.01            | <0.01             | <0.01    | <0.01    | <0.01    | <0.01    | <0.01    | <1       | -                |                  |
| SL/9 1.0-1.5     | <0.01            | <0.01             | <0.01    | <0.01    | <0.01    | <0.01    | <0.01    | <1       | -                |                  |
| SL/9 1.5-2.0     | <0.01            | <0.01             | <0.01    | <0.01    | <0.01    | <0.01    | <0.01    | <1       | -                |                  |
| SL/9 2.0-3.0     | <0.01            | <0.01             | <0.01    | <0.01    | <0.01    | <0.01    | <0.01    | <1       | -                |                  |
| SL/10 0.0-0.5    | <0.01            | <0.01             | <0.01    | <0.01    | <0.01    | <0.01    | <0.01    | <1       | -                |                  |
| SL/10 0.5-1.0    | <0.01            | <0.01             | <0.01    | <0.01    | <0.01    | <0.01    | <0.01    | <1       | -                |                  |
| SL/10 1.0-1.5    | <0.01            | <0.01             | <0.01    | <0.01    | <0.01    | <0.01    | <0.01    | <1       | -                |                  |
| SL/10 1.5-2.0    | <0.01            | <0.01             | <0.01    | <0.01    | <0.01    | <0.01    | <0.01    | <1       | -                |                  |
| SL/10 2.0-2.5    | <0.01            | <0.01             | <0.01    | <0.01    | <0.01    | <0.01    | <0.01    | <1       | -                |                  |

Remark: 1. Sample results were in mg/kg  
2. Sample results were in %

Appendix 1















### Preliminary Results

Project: Contract no. CV/99/14 Ground Investigation Works for Development near Choi Wan Road and Jordan Valley and Development at Anderson Road

| Client Reference | Test(s) required | BTEX <sup>1</sup> |               |         |             |          |
|------------------|------------------|-------------------|---------------|---------|-------------|----------|
|                  |                  | Benzene           | Ethyl Benzene | Toluene | m,p-Xylenes | o-Xylene |
| C/T/10           | 2.5-3.0          | <0.05             | <0.05         | <0.05   | <0.10       | <0.05    |
| C/T/11           | 0.0-0.5          | <0.05             | <0.05         | <0.05   | <0.10       | <0.05    |
| C/T/11           | 0.5-1.0          | <0.05             | <0.05         | <0.05   | <0.10       | <0.05    |
| C/T/11           | 1.0-1.5          | <0.05             | <0.05         | <0.05   | <0.10       | <0.05    |
| C/T/11           | 1.5-2.0          | <0.05             | <0.05         | <0.05   | <0.10       | <0.05    |
| C/T/11           | 2.0-2.5          | <0.05             | <0.05         | <0.05   | <0.10       | <0.05    |
| C/T/11           | 2.5-3.0          | <0.05             | <0.05         | <0.05   | <0.10       | <0.05    |
| C/T/12           | 0.5-1.0          | <0.05             | <0.05         | <0.05   | <0.10       | <0.05    |
| C/T/12           | 1.0-1.5          | <0.05             | <0.05         | <0.05   | <0.10       | <0.05    |
| C/T/12           | 1.5-2.0          | <0.05             | <0.05         | <0.05   | <0.10       | <0.05    |
| C/T/12           | 2.0-2.5          | <0.05             | <0.05         | <0.05   | <0.10       | <0.05    |
| C/T/12           | 2.5-3.0          | <0.05             | <0.05         | <0.05   | <0.10       | <0.05    |
| C/T/13           | 0.0-0.5          | <0.05             | <0.05         | <0.05   | <0.10       | <0.05    |
| C/T/13           | 0.5-1.0          | <0.05             | <0.05         | <0.05   | <0.10       | <0.05    |
| C/T/13           | 1.0-1.5          | <0.05             | <0.05         | <0.05   | <0.10       | <0.05    |
| C/T/13           | 1.5-2.0          | <0.05             | <0.05         | <0.05   | <0.10       | <0.05    |
| C/T/13           | 2.0-3.0          | <0.05             | <0.05         | <0.05   | <0.10       | <0.05    |
| C/T/14           | 0.0-0.5          | <0.05             | <0.05         | <0.05   | <0.10       | <0.05    |
| C/T/14           | 0.5-1.0          | <0.05             | <0.05         | <0.05   | <0.10       | <0.05    |
| C/T/14           | 1.0-1.5          | <0.05             | <0.05         | <0.05   | <0.10       | <0.05    |
| C/T/14           | 1.5-2.0          | <0.05             | <0.05         | <0.05   | <0.10       | <0.05    |
| C/T/14           | 2.0-2.5          | <0.05             | <0.05         | <0.05   | <0.10       | <0.05    |
| C/T/14           | 2.5-3.0          | <0.05             | <0.05         | <0.05   | <0.10       | <0.05    |
| C/T/15           | 0.0-0.5          | <0.05             | <0.05         | <0.05   | <0.10       | <0.05    |
| C/T/15           | 0.5-1.0          | <0.05             | <0.05         | <0.05   | <0.10       | <0.05    |
| C/T/15           | 1.0-1.5          | <0.05             | <0.05         | <0.05   | <0.10       | <0.05    |
| C/T/15           | 1.5-2.0          | <0.05             | <0.05         | <0.05   | <0.10       | <0.05    |
| C/T/15           | 2.0-2.5          | <0.05             | <0.05         | <0.05   | <0.10       | <0.05    |
| C/T/15           | 2.5-3.0          | <0.05             | <0.05         | <0.05   | <0.10       | <0.05    |
| C/T/16           | 0.0-0.5          | <0.05             | <0.05         | <0.05   | <0.10       | <0.05    |
| C/T/16           | 0.5-1.0          | <0.05             | <0.05         | <0.05   | <0.10       | <0.05    |
| C/T/16           | 1.0-1.5          | <0.05             | <0.05         | <0.05   | <0.10       | <0.05    |
| C/T/16           | 1.5-2.0          | <0.05             | <0.05         | <0.05   | <0.10       | <0.05    |
| C/T/16           | 2.0-2.1          | <0.05             | <0.05         | <0.05   | <0.10       | <0.05    |
| C/T/17           | 0.0-0.5          | <0.05             | <0.05         | <0.05   | <0.10       | <0.05    |
| C/T/17           | 0.5-1.0          | <0.05             | <0.05         | <0.05   | <0.10       | <0.05    |
| C/T/17           | 1.0-1.5          | <0.05             | <0.05         | <0.05   | <0.10       | <0.05    |
| C/T/17           | 1.5-2.0          | <0.05             | <0.05         | <0.05   | <0.10       | <0.05    |
| C/T/17           | 2.0-2.5          | <0.05             | <0.05         | <0.05   | <0.10       | <0.05    |
| C/T/17           | 2.5-3.0          | <0.05             | <0.05         | <0.05   | <0.10       | <0.05    |
| C/T/18           | 0.0-0.5          | <0.05             | <0.05         | <0.05   | <0.10       | <0.05    |
| C/T/18           | 0.5-1.0          | <0.05             | <0.05         | <0.05   | <0.10       | <0.05    |
| C/T/19           | 0.0-0.5          | <0.05             | <0.05         | <0.05   | <0.10       | <0.05    |
| C/T/19           | 0.5-1.0          | <0.05             | <0.05         | <0.05   | <0.10       | <0.05    |
| C/T/20           | 0.0-0.5          | <0.05             | <0.05         | <0.05   | <0.10       | <0.05    |
| C/T/20           | 0.5-1.0          | <0.05             | <0.05         | <0.05   | <0.10       | <0.05    |
| C/T/21           | 0.0-0.5          | <0.05             | <0.05         | <0.05   | <0.10       | <0.05    |
| C/T/21           | 0.5-1.0          | <0.05             | <0.05         | <0.05   | <0.10       | <0.05    |
| C/T/21           | 1.5-2.0          | <0.05             | <0.05         | <0.05   | <0.10       | <0.05    |

Remark: 1. Sample results were in mg/kg

### Preliminary Results

Project: Contract no. CV/99/14 Ground Investigation Works for Development near Choi Wan Road and Jordan Valley and Development at Anderson Road

| Client Reference | Test(s) required | TCLP Testing - Metals <sup>1</sup> |    |    |    |    |     |       |    |    |    |    |
|------------------|------------------|------------------------------------|----|----|----|----|-----|-------|----|----|----|----|
|                  |                  | Cd                                 | Cr | Cu | Ni | Pb | Zn  | Hg    | As | Sn | V  | Sb |
| C/B/1            | 0.0-0.5          | <0.2                               | <1 | <1 | <1 | <1 | <1  | <0.01 | <1 | <1 | <1 | <1 |
| C/B/2            | 0.0-0.5          | <0.2                               | <1 | <1 | <1 | <1 | <1  | <0.01 | <1 | <1 | <1 | <1 |
| C/B/3            | 0.0-0.5          | <0.2                               | <1 | <1 | <1 | <1 | <1  | <0.01 | <1 | <1 | <1 | <1 |
| C/B/4            | 0.0-0.5          | <0.2                               | <1 | <1 | <1 | <1 | <1  | <0.01 | <1 | <1 | <1 | <1 |
| C/B/5            | 0.0-0.5          | <0.2                               | <1 | <1 | <1 | <1 | <1  | <0.01 | <1 | <1 | <1 | <1 |
| C/B/6            | 0.0-0.5          | <0.2                               | <1 | <1 | <1 | <1 | <1  | <0.01 | <1 | <1 | <1 | <1 |
| C/B/7            | 0.0-0.5          | <0.2                               | <1 | <1 | <1 | <1 | <1  | <0.01 | <1 | <1 | <1 | <1 |
| C/B/8            | 0.0-0.5          | <0.2                               | <1 | <1 | <1 | <1 | <1  | <0.01 | <1 | <1 | <1 | <1 |
| C/B/9            | 0.0-0.5          | <0.2                               | <1 | <1 | <1 | <1 | <1  | <0.01 | <1 | <1 | <1 | <1 |
| C/B/10           | 0.0-0.2          | <0.2                               | <1 | <1 | <1 | <1 | <1  | <0.01 | <1 | <1 | <1 | <1 |
| C/B/11           | 0.0-0.5          | <0.2                               | <1 | <1 | <1 | <1 | <1  | <0.01 | <1 | <1 | <1 | <1 |
| C/B/12           | 0.0-0.5          | <0.2                               | <1 | <1 | <1 | <1 | 2.2 | <0.01 | <1 | <1 | <1 | <1 |
| C/B/13           | 0.0-0.5          | <0.2                               | <1 | <1 | <1 | <1 | <1  | <0.01 | <1 | <1 | <1 | <1 |
| C/B/14           | 0.0-0.5          | <0.2                               | <1 | <1 | <1 | <1 | <1  | <0.01 | <1 | <1 | <1 | <1 |
| C/B/15           | 0.0-0.5          | <0.2                               | <1 | <1 | <1 | <1 | <1  | <0.01 | <1 | <1 | <1 | <1 |
| C/B/16           | 0.0-0.5          | <0.2                               | <1 | <1 | <1 | <1 | <1  | <0.01 | <1 | <1 | <1 | <1 |
| C/B/16B          | 0.0-0.5          | <0.2                               | <1 | <1 | <1 | <1 | <1  | <0.01 | <1 | <1 | <1 | <1 |
| C/B/17           | 0.0-0.5          | <0.2                               | <1 | <1 | <1 | <1 | <1  | <0.01 | <1 | <1 | <1 | <1 |
| C/B/18           | 0.0-0.5          | <0.2                               | <1 | <1 | <1 | <1 | <1  | <0.01 | <1 | <1 | <1 | <1 |
| C/B/19           | 0.0-0.5          | <0.2                               | <1 | <1 | <1 | <1 | <1  | <0.01 | <1 | <1 | <1 | <1 |
| C/B/20           | 0.0-0.5          | <0.2                               | <1 | <1 | <1 | <1 | <1  | <0.01 | <1 | <1 | <1 | <1 |
| C/B/21           | 0.0-0.5          | <0.2                               | <1 | <1 | <1 | <1 | <1  | <0.01 | <1 | <1 | <1 | <1 |

1. Sample results were in mg/L

## Preliminary Results

Project: Contract no. CV/99/14 Ground Investigation Works for Development near Choi Wan Road and Jordan Valley and Development at Anderson Road

| Client Reference | Test(s) required | TCLP Testing - Metals |         |    |       |    | Asbestos     |
|------------------|------------------|-----------------------|---------|----|-------|----|--------------|
|                  |                  | Tl                    | Ba      | Ag | Se    | Be |              |
|                  |                  | C/T/1                 | 0.0-0.5 | <1 | <1    | <1 |              |
| C/T/2            | 0.0-0.5          | <1                    | <1      | <1 | <0.01 | <1 | Not detected |
| C/T/3            | 0.0-0.5          | <1                    | <1      | <1 | <0.01 | <1 | Not detected |
| C/T/4            | 0.0-0.5          | <1                    | <1      | <1 | <0.01 | <1 | Not detected |
| C/T/5            | 0.0-0.5          | <1                    | <1      | <1 | <0.01 | <1 | Not detected |
| C/T/6            | 0.0-0.5          | <1                    | <1      | <1 | <0.01 | <1 | Not detected |
| C/T/7            | 0.0-0.5          | <1                    | <1      | <1 | <0.01 | <1 | Not detected |
| C/T/8            | 0.0-0.5          | <1                    | <1      | <1 | <0.01 | <1 | Not detected |
| C/T/9            | 0.0-0.5          | <1                    | <1      | <1 | <0.01 | <1 | Not detected |
| C/T/10           | 0.0-0.5          | <1                    | <1      | <1 | <0.01 | <1 | Not detected |
| C/T/11           | 0.0-0.5          | <1                    | <1      | <1 | <0.01 | <1 | Not detected |
| C/T/12           | 0.5-1.0          | <1                    | <1      | <1 | <0.01 | <1 | Not detected |
| C/T/13           | 0.0-0.5          | <1                    | <1      | <1 | <0.01 | <1 | Not detected |
| C/T/14           | 0.0-0.5          | <1                    | <1      | <1 | <0.01 | <1 | Not detected |
| C/T/15           | 0.0-0.5          | <1                    | <1      | <1 | <0.01 | <1 | Not detected |
| C/T/16           | 0.0-0.5          | <1                    | <1      | <1 | <0.01 | <1 | Not detected |
| C/T/17           | 0.0-0.5          | <1                    | <1      | <1 | <0.01 | <1 | Not detected |
| C/T/18           | 0.0-0.5          | <1                    | <1      | <1 | <0.01 | <1 | Not detected |
| C/T/19           | 0.0-0.5          | <1                    | <1      | <1 | <0.01 | <1 | Not detected |
| C/T/20           | 0.0-0.5          | <1                    | <1      | <1 | <0.01 | <1 | Not detected |
| C/B/1            | 2.4-2.9          | <1                    | <1      | <1 | <0.01 | <1 | Not detected |
| C/B/2            | 0.0-0.8          | <1                    | <1      | <1 | <0.02 | <1 | Not detected |
| C/B/3            | 0.0-0.8          | <1                    | <1      | <1 | <0.01 | <1 | Not detected |
| C/B/4            | 0.3-0.8          | <1                    | <1      | <1 | <0.01 | <1 | Not detected |
| C/B/5            | 0.0-0.5          | <1                    | <1      | <1 | <0.01 | <1 | Not detected |
| C/B/6            | 0.0-0.5          | <1                    | <1      | <1 | <0.01 | <1 | Not detected |
| C/B/7            | 0.0-0.5          | <1                    | <1      | <1 | <0.01 | <1 | Not detected |
| C/B/8            | 0.0-0.5          | <1                    | <1      | <1 | <0.01 | <1 | Not detected |
| C/B/9            | 0.0-0.5          | <1                    | <1      | <1 | <0.01 | <1 | Not detected |
| C/B/10           | 0.0-0.2          | <1                    | <1      | <1 | <0.01 | <1 | Not detected |
| C/B/11           | 0.0-0.5          | <1                    | <1      | <1 | <0.01 | <1 | Not detected |
| C/B/12           | 0.0-0.5          | <1                    | <1      | <1 | <0.01 | <1 | Not detected |
| C/B/13           | 0.0-0.5          | <1                    | <1      | <1 | <0.01 | <1 | Not detected |
| C/B/14           | 0.0-0.5          | <1                    | <1      | <1 | <0.01 | <1 | Not detected |
| C/B/15           | 0.0-0.5          | <1                    | <1      | <1 | <0.01 | <1 | Not detected |
| C/B/16           | 0.0-0.5          | <1                    | <1      | <1 | <0.01 | <1 | Not detected |
| C/B/16B          | 0.0-0.5          | <1                    | <1      | <1 | <0.01 | <1 | Not detected |
| C/B/17           | 0.0-0.5          | <1                    | <1      | <1 | <0.01 | <1 | Not detected |
| C/B/18           | 0.0-0.5          | <1                    | <1      | <1 | <0.01 | <1 | Not detected |
| C/B/19           | 0.0-0.5          | <1                    | <1      | <1 | <0.01 | <1 | Not detected |
| C/B/20           | 0.0-0.5          | <1                    | <1      | <1 | <0.01 | <1 | Not detected |
| C/B/21           | 0.0-0.5          | <1                    | <1      | <1 | <0.01 | <1 | Not detected |

1. Sample results were in mg/L

## Preliminary Result

Project: Contract no. CV/99/14 Ground Investigation Works for Development near Choi Wan Road and Jordan Valley and Development at Anderson Road

### Groundwater Samples

| Client reference |           | Metals (mg/kg) |      |      |      |      |
|------------------|-----------|----------------|------|------|------|------|
| Bore Hole No.    | Depth (m) | Cd             | Cr   | Cu   | Ni   | Pb   |
| C/T/19           | 0.50-1.00 | <0.1           | <0.1 | <0.1 | <0.1 | <0.1 |
| C/T/20           | 1.0       | <0.1           | <0.1 | <0.1 | <0.1 | <0.1 |
| C/T/21           | 1.50-2.00 | <0.1           | <0.1 | <0.1 | 0.1  | <0.1 |

| Client reference |           | Metals (mg/kg) |       |      |      |      |
|------------------|-----------|----------------|-------|------|------|------|
| Bore Hole No.    | Depth (m) | Zn             | Hg    | As   | Sn   | Se   |
| C/T/19           | 0.50-1.00 | <0.1           | <0.01 | <0.1 | <0.1 | <0.1 |
| C/T/20           | 1.0       | <0.1           | <0.01 | <0.1 | <0.1 | <0.1 |
| C/T/21           | 1.50-2.00 | <0.1           | <0.01 | <0.1 | <0.1 | <0.1 |

| Client reference |           | Polychlorinated Biphenyls (µg/kg) |          |          |          |          |          |          |
|------------------|-----------|-----------------------------------|----------|----------|----------|----------|----------|----------|
| Bore Hole No.    | Depth (m) | PCB-1016                          | PCB-1221 | PCB-1232 | PCB-1242 | PCB-1248 | PCB-1254 | PCB-1260 |
| C/T/19           | 0.50-1.00 | <1                                | <1       | <1       | <1       | <1       | <1       | <1       |
| C/T/20           | 1.0       | <1                                | <1       | <1       | <1       | <1       | <1       | <1       |
| C/T/21           | 1.50-2.00 | <1                                | <1       | <1       | <1       | <1       | <1       | <1       |

| Client reference |           | Total Cyanide Content (mg/L) |
|------------------|-----------|------------------------------|
| Bore Hole No.    | Depth (m) |                              |
| C/T/19           | 0.50-1.00 | <0.05                        |
| C/T/20           | 1.0       | <0.05                        |
| C/T/21           | 1.50-2.00 | <0.05                        |

| Client reference |           | Total Organic Carbon Content (mg/L) |
|------------------|-----------|-------------------------------------|
| Bore Hole No.    | Depth (m) |                                     |
| C/T/19           | 0.50-1.00 | <1                                  |
| C/T/20           | 1.0       | <1                                  |
| C/T/21           | 1.50-2.00 | <1                                  |

| Client reference |           | Total Petroleum Hydrocarbons (mg/L) |
|------------------|-----------|-------------------------------------|
| Bore Hole No.    | Depth (m) |                                     |
| C/T/19           | 0.50-1.00 | <1                                  |
| C/T/20           | 1.0       | <1                                  |
| C/T/21           | 1.50-2.00 | <1                                  |

| Client reference |           | Semi-Volatile Organic Compounds (µg/kg) |                   |          |         |
|------------------|-----------|---|-------------------|----------|---------|
| Bore Hole No.    | Depth (m) | Tri-CBs (Total)                         | Tetra-CBs (Total) | Penta-CB | Hexa-CB |
| C/T/19           | 0.50-1.00 | <1.0                                    | <1.0              | <1.0     | <1.0    |
| C/T/20           | 1.0       | <1.0                                    | <1.0              | <1.0     | <1.0    |
| C/T/21           | 1.50-2.00 | <1.0                                    | <1.0              | <1.0     | <1.0    |

# Preliminary Result

Project: Contract no. CV/99/14 Ground Investigation Works for Development near Choi Wan Road and Jordan Valley and Development at Anderson Road

## Groundwater Samples

| Client reference |           | Semi-Volatile Organic Compounds (µg/kg) |      |      |      |      |      |      |
|------------------|-----------|---|------|------|------|------|------|------|
| Bore Hole No.    | Depth (m) | NAP                                     | ANY  | ANA  | FLU  | PHE  | ANT  | CHR  |
| C/T/19           | 0.50-1.00 | <1.0                                    | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| C/T/20           | 1.0       | <1.0                                    | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| C/T/21           | 1.50-2.00 | <1.0                                    | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |

| Client reference |           | Semi-Volatile Organic Compounds (µg/kg) |         |      |      |      |      |      |      |
|------------------|-----------|---|---------|------|------|------|------|------|------|
| Bore Hole No.    | Depth (m) | BaA                                     | BbF&BkF | BaP  | DBA  | FLT  | IPY  | PYR  | BPE  |
| C/T/19           | 0.50-1.00 | <1.0                                    | <1.0    | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| C/T/20           | 1.0       | <1.0                                    | <1.0    | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| C/T/21           | 1.50-2.00 | <1.0                                    | <1.0    | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |

| Client reference |           | Volatile Organic Compounds (µg/kg) |     |     |     |     |     |     |         |     |
|------------------|-----------|------------------------------------|-----|-----|-----|-----|-----|-----|---------|-----|
| Bore Hole No.    | Depth (m) | DFM                                | CHM | DTM | CYE | BRM | CHE | TFM | 1,1-DYE | TEE |
| C/T/19           | 0.50-1.00 | <10                                | <10 | <10 | <10 | <10 | <10 | <10 | <10     | <10 |
| C/T/20           | 1.0       | <10                                | <10 | <10 | <10 | <10 | <10 | <10 | <10     | <10 |
| C/T/21           | 1.50-2.00 | <10                                | <10 | <10 | <10 | <10 | <10 | <10 | <10     | <10 |

| Client reference |           | Volatile Organic Compounds (µg/kg) |         |             |     |     |         |     |         |     |  |
|------------------|-----------|------------------------------------|---------|-------------|-----|-----|---------|-----|---------|-----|--|
| Bore Hole No.    | Depth (m) | DCM                                | 1,1-DCE | cis-1,2-DYE | TCM | TCE | 1,2-DCE | TFM | 1,2-DCP | DFM |  |
| C/T/19           | 0.50-1.00 | <10                                | <10     | <10         | <10 | <10 | <10     | <10 | <10     | <10 |  |
| C/T/20           | 1.0       | <10                                | <10     | <10         | <10 | <10 | <10     | <10 | <10     | <10 |  |
| C/T/21           | 1.50-2.00 | <10                                | <10     | <10         | <10 | <10 | <10     | <10 | <10     | <10 |  |

| Client reference |           | Volatile Organic Compounds (µg/kg) |             |               |           |         |     |
|------------------|-----------|------------------------------------|-------------|---------------|-----------|---------|-----|
| Bore Hole No.    | Depth (m) | TYE                                | cis-1,3-DCP | trans-1,3-DCP | 1,1,2-TCE | 1,2-DBM | TEE |
| C/T/19           | 0.50-1.00 | <10                                | <10         | <10           | <10       | <10     | <10 |
| C/T/20           | 1.0       | <10                                | <10         | <10           | <10       | <10     | <10 |
| C/T/21           | 1.50-2.00 | <10                                | <10         | <10           | <10       | <10     | <10 |

| Client reference |           | Volatile Organic Compounds (µg/kg) |     |             |           |           |             |
|------------------|-----------|------------------------------------|-----|-------------|-----------|-----------|-------------|
| Bore Hole No.    | Depth (m) | GHB                                | STY | 1,1,2,2-TCE | 1,3,5-TMB | 1,2,4-TMB | DGB (Total) |
| C/T/19           | 0.50-1.00 | <10                                | <10 | <10         | <10       | <10       | <10         |
| C/T/20           | 1.0       | <10                                | <10 | <10         | <10       | <10       | <10         |
| C/T/21           | 1.50-2.00 | <10                                | <10 | <10         | <10       | <10       | <10         |

| Client reference |           | BTEX (µg/l) |               |         |             |          |
|------------------|-----------|-------------|---------------|---------|-------------|----------|
| Bore Hole No.    | Depth     | Benzene     | Ethyl Benzene | Toluene | m,p-Xylenes | o-Xylene |
| C/T/21           | 0.00-0.50 | <10         | <10           | <10     | <20         | <10      |
| C/T/22           | 1.00      | <10         | <10           | <10     | <20         | <10      |
| C/T/23           | 1.50-2.00 | <10         | <10           | <10     | <20         | <10      |

## GLOSSARY

|               |   |
|---------------|---|
| ANA           | Acenaphthene  |
| ANT           | Anthracene  |
| ANY           | Acenaphthylene  |
| As            | Arsenic   |
| BaA           | Benzo(a)anthracene  |
| BaP           | Benzo(a)pyrene  |
| BbF & BkF     | Benzo(b)fluoranthene & Benzo(k)fluoranthene                   |
| BPE           | Benzo(ghi)perylene  |
|               | Benzo(k)fluoranthene  |
| BRM           | Bromomethane  |
| Cd            | Cadmium   |
| CHB           | Chlorobenzene   |
| CHE           | Chloroethane  |
| CHR           | Chrysene  |
| CHM           | Chloromethane   |
| Cr            | Chromium  |
| Cu            | Copper  |
| CYE           | Chloroethene  |
| DBA           | Dibenz(ah)anthracene  |
| 1,2-DBM       | 1,2-dibromoethane   |
| DCBs(Total)   | 1,3-Dichlorobenzene, 1,4-Dichlorobenzene, 1,2-Dichlorobenzene |
| 1,1-DCE       | 1,1-dichloroethene  |
| 1,2-DCE       | 1,2-dichloroethane  |
| DCM           | Dichloromethane   |
| 1,2-DCP       | 1,2-dichloropropane   |
| cis-1,3-DCP   | cis-1,3-dichloropropene                                       |
| trans-1,3-DCP | trans-1,3-dichloropropene                                     |
| DFM           | Dichlorodifluoromethane                                       |
| DTM           | 1,2-dichloro-1,1,2,2-tetrafluoroethane                        |
| Cis-1,2-DYE   | cis-1,2-dichloroethene  |
| 1,1-DYE       | 1,1-dichloroethene  |
| FLT           | Fluoranthene  |
| FLU           | Fluorene  |
| HMW PAHs      | High Molecular Weight Polyaromatic Hydrocarbons               |
| Hexa-CB       | Hexachlorobenzene   |
| IPY           | Indeno(1,2,3-cd)pyrene  |
| LMW PAHs      | Low Molecular Weight Polyaromatic Hydrocarbons                |
| NAP           | Naphthalene   |
| Ni            | Nickel  |
| PAHs          | Polyaromatic Hydrocarbons                                     |
| Pb            | Lead  |
| PCBs          | Polychlorinated Biphenyls                                     |
| Penta-CB      | Pentachlorobenzene  |
| PHE           | Phenanthrene  |
| PYR           | Pyrene  |
| Sb            | Antimony  |
| Se            | Selenium  |
| Sn            | Tin   |
| STY           | Styrene   |
| SVOCs         | Semi-volatile Organic Compounds                               |
| TCE           | 1,1,1-trichloroethane   |
| 1,1,2-TCE     | 1,1,2-trichloroethane   |
| 1,1,2,2-TCE   | 1,1,2,2-Tetrachloroethane                                     |
| TCM           | Trichloroethane   |

|           |                                       |
|-----------|---------------------------------------|
| TCN       | Total Cyanide Content                 |
| TEE       | Tetrachloromethene                    |
| TEM       | Tetrachloromethane                    |
| Tl        | Thallium                              |
| Tetra-CBs | Tetrachlorobenzenes                   |
| TFM       | Trichlorofluoromethane                |
| 1,2,4-TMB | 1,2,4-Trimethylbenzene                |
| 1,3,5-TMB | 1,3,5-Trimethylbenzene                |
| Tri-CBs   | Trichlorobenzenes                     |
| TPH       | Total Petroleum Hydrocarbons          |
| TTE       | 1,1,2-trichloro-1,2,2-trichloroethane |
| TYE       | Trichloroethene                       |
| V         | Vanadium                              |
| VOCs      | Volatile Organic Compounds            |
| Zn        | Zinc                                  |



SUMMARY REPORT

Project Name: CEOD Contract No. GE/2005/47 Chemical and Biological Testing of Sediment (Service Contract) Agreement No. CE 55/2005 (CE) - Development at Anderson Road - Design and Construction Environmental Laboratory Testing Schedule for Additional Ground Investigation Works Laboratory Testing of Soil and Groundwater

Customer: Geotechnical Projects Division, Geotechnical Engineering office, Civil Engineering and Development Department

Address: 101 Princess Margaret Road, Kowloon, Hong Kong

Lab. Job No.: J469

Matrix: Sediment

Table with columns: Laboratory Sample ID, Sample Reference (Drillhole No., Depth (m)), Heavy Metals (Cr, Cu, Ni, Pb, Zn, As), PAHs (Low Molecular Weight) (Naphthalene, Acenaphthylene, Acenaphthene, Fluorene, Phenanthrene, Anthracene), PAHs (High Molecular Weight) (Total PAH, Benzo(a)anthracene, Benzo(a)pyrene, Chrysene, Dibenz(a,h)anthracene, Fluoranthene, Pyrene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, Indeno(1,2,3-cd)perylene, Benzo(g,h,i)perylene, Total PAH), TPH (D5-C3, C10-C14, C15-C18, C20-C26), Clay Content (Sand, Silt, Clay), and Organic Content.

Table with columns: PAHs (High Molecular Weight) (Total PAH, Benzo(a)anthracene, Benzo(a)pyrene, Chrysene, Dibenz(a,h)anthracene, Fluoranthene, Pyrene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, Indeno(1,2,3-cd)perylene, Benzo(g,h,i)perylene, Total PAH), TPH (D5-C3, C10-C14, C15-C18, C20-C26), Clay Content (Sand, Silt, Clay), and Organic Content.



**SUMMARY REPORT**  
 Project Name: CEDD Contract No. GE/2005/47 Chemical and Biological Testing of Sediment (Service Contract) Agreement No. CE 55/2005 (CE) - Development at Anderson Road - Design and Construction  
 Environmental Laboratory Testing Schedule for Additional Ground Investigation Works  
 Laboratory Testing of Soil and Groundwater  
 Service Order No.:  
 Customer: Geotechnical Projects Division, Geotechnical Engineering Office,  
 Civil Engineering and Development Department  
 Address: 101 Princess Margaret Road,  
 Kowloon,  
 Hong Kong  
 Lab. Job No.: J469  
 Matrix: Sediment

Appendix II - Latest Ground Inves

Ground Investigation Analytical Result

| Laboratory Sample ID | Sample Reference |                      | BTEX    |         |               |            |          |                    |                         |                    |                           |                       |                    |                      |                    | VOCs            |       |       |  |  |  |  |  |  |  |  |  |
|----------------------|------------------|----------------------|---------|---------|---------------|------------|----------|--------------------|-------------------------|--------------------|---------------------------|-----------------------|--------------------|----------------------|--------------------|-----------------|-------|-------|--|--|--|--|--|--|--|--|--|
|                      | Drillhole No.    | Depth (m)<br>From To | Benzene | Toluene | Ethyl Benzene | m,p-Xylene | o-Xylene | 1,1-Dichloroethane | Para-1,2-Dichloroethane | 1,1-Dichloroethene | Chloro-1,2-Dichloroethane | 1,1,1-Trichloroethane | 1,1-Dichloroethene | Carbon Tetrachloride | 1,2-Dichloroethane | Trichloroethene |       |       |  |  |  |  |  |  |  |  |  |
|                      |                  |                      | mg/kg   | mg/kg   | mg/kg         | mg/kg      | mg/kg    | mg/kg              | mg/kg                   | mg/kg              | mg/kg                     | mg/kg                 | mg/kg              | mg/kg                | mg/kg              | mg/kg           | mg/kg | mg/kg |  |  |  |  |  |  |  |  |  |
|                      |                  |                      | 0.2     | 0.2     | 0.2           | 0.4        | 0.2      | 0.5                | 0.5                     | 0.5                | 0.5                       | 0.5                   | 0.5                | 0.5                  | 0.5                | 0.5             |       |       |  |  |  |  |  |  |  |  |  |
|                      |                  | Report Limit         | 0.2     | 0.2     | 0.2           | 0.4        | 0.2      | 0.5                | 0.5                     | 0.5                | 0.5                       | 0.5                   | 0.5                | 0.5                  | 0.5                | 0.5             |       |       |  |  |  |  |  |  |  |  |  |
| 18158/1              | B3               | 4.00-4.45m           |         |         |               |            |          |                    |                         |                    |                           |                       |                    |                      |                    |                 |       |       |  |  |  |  |  |  |  |  |  |
| 18158/4              | T9               | 4.00-4.45m           |         |         |               |            |          |                    |                         |                    |                           |                       |                    |                      |                    |                 |       |       |  |  |  |  |  |  |  |  |  |
| 18158/5              | T9               | 5.00-5.45m           |         |         |               |            |          |                    |                         |                    |                           |                       |                    |                      |                    |                 |       |       |  |  |  |  |  |  |  |  |  |
| 18158/6              | T9               | 6.00-6.45m           |         |         |               |            |          |                    |                         |                    |                           |                       |                    |                      |                    |                 |       |       |  |  |  |  |  |  |  |  |  |
| 18158/7              | T12              | 0.50-0.95m           |         |         |               |            |          |                    |                         |                    |                           |                       |                    |                      |                    |                 |       |       |  |  |  |  |  |  |  |  |  |
| 18167/1              | T12              | 4.00-4.45m           |         |         |               |            |          |                    |                         |                    |                           |                       |                    |                      |                    |                 |       |       |  |  |  |  |  |  |  |  |  |
| 18167/2              | T12              | 5.00-5.17m           |         |         |               |            |          |                    |                         |                    |                           |                       |                    |                      |                    |                 |       |       |  |  |  |  |  |  |  |  |  |
| 18167/3              | T12              | 5.50-5.95m           |         |         |               |            |          |                    |                         |                    |                           |                       |                    |                      |                    |                 |       |       |  |  |  |  |  |  |  |  |  |
| 18174                | T12              | 4.00-4.45m           |         |         |               |            |          |                    |                         |                    |                           |                       |                    |                      |                    |                 |       |       |  |  |  |  |  |  |  |  |  |
| 57/5                 | B2               | 5.00-5.45m           |         |         |               |            |          |                    |                         |                    |                           |                       |                    |                      |                    |                 |       |       |  |  |  |  |  |  |  |  |  |
| 5                    | B2               | 5.00-5.45m           |         |         |               |            |          |                    |                         |                    |                           |                       |                    |                      |                    |                 |       |       |  |  |  |  |  |  |  |  |  |
| 1L 7                 | B2               | 5.00-5.45m           |         |         |               |            |          |                    |                         |                    |                           |                       |                    |                      |                    |                 |       |       |  |  |  |  |  |  |  |  |  |
| 18167/14             | T13              | 0.50m                |         |         |               |            |          |                    |                         |                    |                           |                       |                    |                      |                    |                 |       |       |  |  |  |  |  |  |  |  |  |
| 18176/1              | B1               | 4.00-4.45m           |         |         |               |            |          |                    |                         |                    |                           |                       |                    |                      |                    |                 |       |       |  |  |  |  |  |  |  |  |  |
| 18176/2              | B1               | 5.00-5.45m           |         |         |               |            |          |                    |                         |                    |                           |                       |                    |                      |                    |                 |       |       |  |  |  |  |  |  |  |  |  |
| 18176/3              | B1               | 6.00-6.45m           |         |         |               |            |          |                    |                         |                    |                           |                       |                    |                      |                    |                 |       |       |  |  |  |  |  |  |  |  |  |
| 18176/4              | T6               | 4.00-4.45m           |         |         |               |            |          |                    |                         |                    |                           |                       |                    |                      |                    |                 |       |       |  |  |  |  |  |  |  |  |  |
| 18176/5              | T6               | 5.00-5.45m           |         |         |               |            |          |                    |                         |                    |                           |                       |                    |                      |                    |                 |       |       |  |  |  |  |  |  |  |  |  |
| 18176/6              | T6               | 6.00-6.45m           |         |         |               |            |          |                    |                         |                    |                           |                       |                    |                      |                    |                 |       |       |  |  |  |  |  |  |  |  |  |
| 18176/7              | T11              | 4.00-4.45m           |         |         |               |            |          |                    |                         |                    |                           |                       |                    |                      |                    |                 |       |       |  |  |  |  |  |  |  |  |  |
| 18176/8              | B11              | 4.00-4.45m           |         |         |               |            |          |                    |                         |                    |                           |                       |                    |                      |                    |                 |       |       |  |  |  |  |  |  |  |  |  |
| 18176/9              | B11              | 5.00-5.25m           |         |         |               |            |          |                    |                         |                    |                           |                       |                    |                      |                    |                 |       |       |  |  |  |  |  |  |  |  |  |
| 18176/10             | B7               | 0.50m                | <0.2    | <0.2    | <0.2          | <0.4       | <0.2     | <0.5               | <0.5                    | <0.5               | <0.5                      | <0.5                  | <0.5               | <0.5                 | <0.5               | <0.5            |       |       |  |  |  |  |  |  |  |  |  |
| 18176/11             | B7               | 1.00m                | <0.2    | <0.2    | <0.2          | <0.4       | <0.2     | <0.5               | <0.5                    | <0.5               | <0.5                      | <0.5                  | <0.5               | <0.5                 | <0.5               | <0.5            |       |       |  |  |  |  |  |  |  |  |  |
| 18176/12             | B7               | 1.50m                | <0.2    | <0.2    | <0.2          | <0.4       | <0.2     | <0.5               | <0.5                    | <0.5               | <0.5                      | <0.5                  | <0.5               | <0.5                 | <0.5               | <0.5            |       |       |  |  |  |  |  |  |  |  |  |
| 18176/13             | B6               | 0.50m                | <0.2    | <0.2    | <0.2          | <0.4       | <0.2     | <0.5               | <0.5                    | <0.5               | <0.5                      | <0.5                  | <0.5               | <0.5                 | <0.5               | <0.5            |       |       |  |  |  |  |  |  |  |  |  |
| 18176/14             | B6               | 1.00m                | <0.2    | <0.2    | <0.2          | <0.4       | <0.2     | <0.5               | <0.5                    | <0.5               | <0.5                      | <0.5                  | <0.5               | <0.5                 | <0.5               | <0.5            |       |       |  |  |  |  |  |  |  |  |  |
| 18176/15             | B6               | 1.50m                | <0.2    | <0.2    | <0.2          | <0.4       | <0.2     | <0.5               | <0.5                    | <0.5               | <0.5                      | <0.5                  | <0.5               | <0.5                 | <0.5               | <0.5            |       |       |  |  |  |  |  |  |  |  |  |
| 18176/16             | B6               | 2.00m                | <0.2    | <0.2    | <0.2          | <0.4       | <0.2     | <0.5               | <0.5                    | <0.5               | <0.5                      | <0.5                  | <0.5               | <0.5                 | <0.5               | <0.5            |       |       |  |  |  |  |  |  |  |  |  |
| 18176/17             | B4               | 1.40m                |         |         |               |            |          |                    |                         |                    |                           |                       |                    |                      |                    |                 |       |       |  |  |  |  |  |  |  |  |  |
| 18176/18             | B19              | 0.50m                |         |         |               |            |          |                    |                         |                    |                           |                       |                    |                      |                    |                 |       |       |  |  |  |  |  |  |  |  |  |
| 18176/19             | T3               | 0.40m                |         |         |               |            |          |                    |                         |                    |                           |                       |                    |                      |                    |                 |       |       |  |  |  |  |  |  |  |  |  |
| 18183/1              | B7               | 2.00m                | <0.2    | <0.2    | <0.2          | <0.4       | <0.2     | <0.5               | <0.5                    | <0.5               | <0.5                      | <0.5                  | <0.5               | <0.5                 | <0.5               | <0.5            |       |       |  |  |  |  |  |  |  |  |  |
| 18183/2              | B7               | 2.50m                | <0.2    | <0.2    | <0.2          | <0.4       | <0.2     | <0.5               | <0.5                    | <0.5               | <0.5                      | <0.5                  | <0.5               | <0.5                 | <0.5               | <0.5            |       |       |  |  |  |  |  |  |  |  |  |
| 18183/3              | B7               | 3.00m                | <0.2    | <0.2    | <0.2          | <0.4       | <0.2     | <0.5               | <0.5                    | <0.5               | <0.5                      | <0.5                  | <0.5               | <0.5                 | <0.5               | <0.5            |       |       |  |  |  |  |  |  |  |  |  |
| 18183/4              | B11              | 6.00-6.45m           |         |         |               |            |          |                    |                         |                    |                           |                       |                    |                      |                    |                 |       |       |  |  |  |  |  |  |  |  |  |
| 18183/5              | T11              | 5.00-5.45m           |         |         |               |            |          |                    |                         |                    |                           |                       |                    |                      |                    |                 |       |       |  |  |  |  |  |  |  |  |  |
| 18183/6              | T11              | 6.00-6.45m           |         |         |               |            |          |                    |                         |                    |                           |                       |                    |                      |                    |                 |       |       |  |  |  |  |  |  |  |  |  |
| 189/1                | B8               | 4.00-4.45m           |         |         |               |            |          |                    |                         |                    |                           |                       |                    |                      |                    |                 |       |       |  |  |  |  |  |  |  |  |  |
| 89/2                 | B8               | 5.00-5.45m           |         |         |               |            |          |                    |                         |                    |                           |                       |                    |                      |                    |                 |       |       |  |  |  |  |  |  |  |  |  |
| 73                   | B8               | 6.00-6.45m           |         |         |               |            |          |                    |                         |                    |                           |                       |                    |                      |                    |                 |       |       |  |  |  |  |  |  |  |  |  |
| 189/4                | T7               | 0.25m                | <0.2    | <0.2    | <0.2          | <0.4       | <0.2     | <0.5               | <0.5                    | <0.5               | <0.5                      | <0.5                  | <0.5               | <0.5                 | <0.5               | <0.5            |       |       |  |  |  |  |  |  |  |  |  |
| 18202/1              | B6               | 2.50m                | <0.2    | <0.2    | <0.2          | <0.4       | <0.2     | <0.5               | <0.5                    | <0.5               | <0.5                      | <0.5                  | <0.5               | <0.5                 | <0.5               | <0.5            |       |       |  |  |  |  |  |  |  |  |  |
| 18202/2              | B6               | 3.00m                | <0.2    | <0.2    | <0.2          | <0.4       | <0.2     | <0.5               | <0.5                    | <0.5               | <0.5                      | <0.5                  | <0.5               | <0.5                 | <0.5               | <0.5            |       |       |  |  |  |  |  |  |  |  |  |
| 18202/3              | T3A              | 1.00m                |         |         |               |            |          |                    |                         |                    |                           |                       |                    |                      |                    |                 |       |       |  |  |  |  |  |  |  |  |  |

| VOCs          |                |                       |                      |                    |                   |                           |                           |                             |                           |        |                |                |                    |                       | SVOCs                 |                   |                        |                     |                     |                   |                        |                    |              |  |  |  |  |  |  | Asbestos |
|---------------|----------------|-----------------------|----------------------|--------------------|-------------------|---------------------------|---------------------------|-----------------------------|---------------------------|--------|----------------|----------------|--------------------|-----------------------|-----------------------|-------------------|------------------------|---------------------|---------------------|-------------------|------------------------|--------------------|--------------|--|--|--|--|--|--|----------|
| Chlorobenzene | Dibromobenzene | 1,1,1-Trichloroethane | 1,1,2-Dichloroethane | 1,2-Dichloroethane | Tetrachloroethane | 1,1,1,2-Tetrachloroethane | 1,1,2,2-Tetrachloroethane | 1,1,1,2,2-Pentachloroethane | Hexachlorocyclopentadiene | Phenol | 2-Chlorophenol | 4-Chlorophenol | 2,4-Dichlorophenol | 2,4,6-Trichlorophenol | 1,2,4-Trichlorophenol | Pentachlorophenol | Dichlorodiphenyl ether | 1,4-Dichlorobenzene | 1,2-Dichlorobenzene | Hexachlorobenzene | 1,2,4-Trichlorobenzene | Pentachlorobenzene | Asbestos     |  |  |  |  |  |  |          |
| mg/kg         | mg/kg          | mg/kg                 | mg/kg                | mg/kg              | mg/kg             | mg/kg                     | mg/kg                     | mg/kg                       | mg/kg                     | mg/kg  | mg/kg          | mg/kg          | mg/kg              | mg/kg                 | mg/kg                 | mg/kg             | mg/kg                  | mg/kg               | mg/kg               | mg/kg             | mg/kg                  | mg/kg              | NA           |  |  |  |  |  |  |          |
| <0.5          | <0.5           | <0.5                  | <0.5                 | <0.5               | <0.5              | <0.5                      | <0.5                      | <0.5                        | <0.5                      | <1     | <1             | <1             | <1                 | <1                    | <1                    | <1                | <1                     | <1                  | <1                  | <1                | <1                     | <1                 | NA           |  |  |  |  |  |  |          |
| <0.5          | <0.5           | <0.5                  | <0.5                 | <0.5               | <0.5              | <0.5                      | <0.5                      | <0.5                        | <0.5                      | <1     | <1             | <1             | <1                 | <1                    | <1                    | <1                | <1                     | <1                  | <1                  | <1                | <1                     | <1                 | Not detected |  |  |  |  |  |  |          |
| <0.5          | <0.5           | <0.5                  | <0.5                 | <0.5               | <0.5              | <0.5                      | <0.5                      | <0.5                        | <0.5                      | <1     | <1             | <1             | <1                 | <1                    | <1                    | <1                | <1                     | <1                  | <1                  | <1                | <1                     | <1                 | Not detected |  |  |  |  |  |  |          |
| <0.5          | <0.5           | <0.5                  | <0.5                 | <0.5               | <0.5              | <0.5                      | <0.5                      | <0.5                        | <0.5                      | <1     | <1             | <1             | <1                 | <1                    | <1                    | <1                | <1                     | <1                  | <1                  | <1                | <1                     | <1                 | Not detected |  |  |  |  |  |  |          |
| <0.5          | <0.5           | <0.5                  | <0.5                 | <0.5               | <0.5              | <0.5                      | <0.5                      | <0.5                        | <0.5                      | <1     | <1             | <1             | <1                 | <1                    | <1                    | <1                | <1                     | <1                  | <1                  | <1                | <1                     | <1                 | Not detected |  |  |  |  |  |  |          |
| <0.5          | <0.5           | <0.5                  | <0.5                 | <0.5               | <0.5              | <0.5                      | <0.5                      | <0.5                        | <0.5                      | <1     | <1             | <1             | <1                 | <1                    | <1                    | <1                | <1                     | <1                  | <1                  | <1                | <1                     | <1                 | Not detected |  |  |  |  |  |  |          |
| <0.5          | <0.5           | <0.5                  | <0.5                 | <0.5               | <0.5              | <0.5                      | <0.5                      | <0.5                        | <0.5                      | <1     | <1             | <1             | <1                 | <1                    | <1                    | <1                | <1                     | <1                  | <1                  | <1                | <1                     | <1                 | Not detected |  |  |  |  |  |  |          |
| <0.5          | <0.5           | <0.5                  | <0.5                 | <0.5               | <0.5              | <0.5                      | <0.5                      | <0.5                        | <0.5                      | <1     | <1             | <1             | <1                 | <1                    | <1                    | <1                | <1                     | <1                  | <1                  | <1                | <1                     | <1                 | Not detected |  |  |  |  |  |  |          |
| <0.5          | <0.5           | <0.5                  | <0.5                 | <0.5               | <0.5              | <0.5                      | <0.5                      | <0.5                        | <0.5                      | <1     | <1             | <1             | <1                 | <1                    | <1                    | <1                | <1                     | <1                  | <1                  | <1                | <1                     | <1                 | Not detected |  |  |  |  |  |  |          |
| <0.5          | <0.5           | <0.5                  | <0.5                 | <0.5               | <0.5              | <0.5                      | <0.5                      | <0.5                        | <0.5                      | <1     | <1             | <1             | <1                 | <1                    | <1                    | <1                | <1                     | <1                  | <1                  | <1                | <1                     | <1                 | Not detected |  |  |  |  |  |  |          |



**SUMMARY REPORT**

Project Name: CEDD Contract No. GE/2005/47 Chemical and Biological Testing of Sediment (Service Contract) Agreement No. CE 55/2005 (CE) - Development at Anderson Road - Design and Construction Environmental Laboratory Testing Schedule for Additional Ground Investigation Works Laboratory Testing of Soil and Groundwater

Service Order No.: GE/2005/47.26  
Customer: Geotechnical Projects Division, Geotechnical Engineering office, Civil Engineering and Development Department

Address: 101 Princess Margaret Road, Kowloon, Hong Kong

Lab. Job No.: J469

Matrix: Groundwater

| Laboratory Sample ID | Sample Reference<br>Drillhole No. | Heavy Metals |      |      |      |      |     |      |      | PAHs (Low Molecular Weight) |                |              |          |              |            |  | Barium |
|----------------------|-----------------------------------|--------------|------|------|------|------|-----|------|------|-----------------------------|----------------|--------------|----------|--------------|------------|--|--------|
|                      |                                   | Cd           | Cr   | Cu   | Ni   | Pb   | Zn  | Hg   | As   | Naphthalene                 | Acenaphthylene | Acenaphthene | Fluorene | Phenanthrene | Anthracene |  |        |
|                      | Report Limit                      | 1.0          | 1.0  | 1.0  | 1.0  | 1.0  | 10  | 1.0  | 1.0  | 0.2                         | 0.2            | 0.2          | 0.2      | 0.2          | 0.2        |  |        |
| 18202/4              | Triole Blank                      | <1.0         | <1.0 | <1.0 | <1.0 | <1.0 | <10 | <1.0 | <1.0 | <0.2                        | <0.2           | <0.2         | <0.2     | <0.2         | <0.2       |  |        |
| 18202/5              | Field Blank                       | <1.0         | <1.0 | <1.0 | <1.0 | <1.0 | <10 | <1.0 | <1.0 | <0.2                        | <0.2           | <0.2         | <0.2     | <0.2         | <0.2       |  |        |

Ground Investigation Analytical Result

Appendix II - Latest Ground

| Date | PAHs (High Molecular Weight) |                |          |                       |              |        |                      |                      |                        |                    | TPH    |         |         |         | BTEX    |         |               |            |          |
|------|------------------------------|----------------|----------|-----------------------|--------------|--------|----------------------|----------------------|------------------------|--------------------|--------|---------|---------|---------|---------|---------|---------------|------------|----------|
|      | Benzo(a)anthracene           | Benzo(a)pyrene | Chrysene | Dibenz(a,h)anthracene | Fluoranthene | Pyrene | Benzo(b)fluoranthene | Benzo(k)fluoranthene | Indeno(1,2,3-cd)pyrene | Benzo(ghi)perylene | C9-C10 | C10-C14 | C15-C18 | C19-C20 | Benzene | Toluene | Ethyl Benzene | m,p-Xylene | o-Xylene |
| 1    | ug/L                         | ug/L           | ug/L     | ug/L                  | ug/L         | ug/L   | ug/L                 | ug/L                 | ug/L                   | ug/L               | ug/L   | ug/L    | ug/L    | ug/L    | ug/L    | ug/L    | ug/L          | ug/L       | ug/L     |
| 1    | 0.2                          | 0.2            | 0.2      | 0.2                   | 0.2          | 0.2    | 0.2                  | 0.2                  | 0.2                    | 0.2                | 10     | 10      | 10      | 10      | 2.0     | 2.0     | 2.0           | 4.0        | 2.0      |
| 2    | <0.2                         | <0.2           | <0.2     | <0.2                  | <0.2         | <0.2   | <0.2                 | <0.2                 | <0.2                   | <0.2               | <10    | <10     | <10     | <10     | <2      | <2      | <2            | <4         | <2       |
| 2    | <0.2                         | <0.2           | <0.2     | <0.2                  | <0.2         | <0.2   | <0.2                 | <0.2                 | <0.2                   | <0.2               | <10    | <10     | <10     | <10     | <2      | <2      | <2            | <4         | <2       |



Laboratories

SUMMARY REPORT

Project Name: CEDD Contract No. GE2005/47 Chemical and Biological Testing of Sediment (Service Contract) Agreement No. CE 65/2005 (CE) - Development at Anderson Road - Design and Construction Environmental Laboratory Testing Schedule for Additional Ground Investigation Works Laboratory Testing of Soil and Groundwater Service Order No.:

Customer: Geotechnical Projects Division, Geotechnical Engineering office, Civil Engineering and Development Department

Address: 101 Princess Margaret Road, Kowloon, Hong Kong

Lab. Job No.: J469

Matrix: Groundwater

| Laboratory | Sample Reference | VOCs               |                          |                       |                        |                       |                    |                    |                       |                       |                           |                           |                             |                           |
|------------|------------------|--------------------|--------------------------|-----------------------|------------------------|-----------------------|--------------------|--------------------|-----------------------|-----------------------|---------------------------|---------------------------|-----------------------------|---------------------------|
|            |                  | 1,1-Dichloroethene | trans-1,2-Dichloroethene | 1,1,1-Trichloroethene | cis-1,2-Dichloroethene | 1,1,1-Trichloroethane | 1,1-Dichloroethane | 1,2-Dichloroethane | 1,1,1-Trichloroethane | 1,1,2-Trichloroethane | 1,1,2,2-Tetrachloroethane | 1,1,1,2-Tetrachloroethane | 1,1,1,2,2-Pentachloroethane | 1,2,2,2-Tetrachloroethane |
|            | Drillhole No.    | ug/L               | ug/L                     | ug/L                  | ug/L                   | ug/L                  | ug/L               | ug/L               | ug/L                  | ug/L                  | ug/L                      | ug/L                      | ug/L                        | ug/L                      |
|            | Report Limit     | 2.0                | 2.0                      | 2.0                   | 2.0                    | 2.0                   | 2.0                | 2.0                | 2.0                   | 2.0                   | 2.0                       | 2.0                       | 2.0                         | 2.0                       |
| 18202/4    | Trip Blank       | <2                 | <2                       | <2                    | <2                     | <2                    | <2                 | <2                 | <2                    | <2                    | <2                        | <2                        | <2                          | <2                        |
| 18202/5    | Field Blank      | <2                 | <2                       | <2                    | <2                     | <2                    | <2                 | <2                 | <2                    | <2                    | <2                        | <2                        | <2                          | <2                        |

| Sample ID | SVOCs                  |                            |                            |                            |                            |                            |                            |                            |                              |                              |                               |                               |                               |                               |                               |                               |
|-----------|------------------------|----------------------------|----------------------------|----------------------------|----------------------------|----------------------------|----------------------------|----------------------------|------------------------------|------------------------------|-------------------------------|-------------------------------|-------------------------------|-------------------------------|-------------------------------|-------------------------------|
|           | 1,2,3-Trichlorobenzene | 1,1,1,2-Tetrachlorobenzene | 1,1,2,2-Tetrachlorobenzene | 1,2,3,4-Tetrachlorobenzene | 1,2,3,5-Tetrachlorobenzene | 1,2,3,6-Tetrachlorobenzene | 1,2,4,5-Tetrachlorobenzene | 1,2,4,6-Tetrachlorobenzene | 1,2,3,4,5-Pentachlorobenzene | 1,2,3,4,6-Pentachlorobenzene | 1,2,3,4,5,6-Hexachlorobenzene | 1,2,3,4,5,6-Hexachlorobenzene | 1,2,3,4,5,6-Hexachlorobenzene | 1,2,3,4,5,6-Hexachlorobenzene | 1,2,3,4,5,6-Hexachlorobenzene | 1,2,3,4,5,6-Hexachlorobenzene |
|           | ug/L                   | ug/L                       | ug/L                       | ug/L                       | ug/L                       | ug/L                       | ug/L                       | ug/L                       | ug/L                         | ug/L                         | ug/L                          | ug/L                          | ug/L                          | ug/L                          | ug/L                          | ug/L                          |
|           | 2.0                    | 2.0                        | 2.0                        | 2.0                        | 2.0                        | 2.0                        | 2.0                        | 2.0                        | 2.0                          | 2.0                          | 2.0                           | 2.0                           | 2.0                           | 2.0                           | 2.0                           | 2.0                           |
|           | <2                     | <2                         | <2                         | <2                         | <2                         | <2                         | <2                         | <2                         | <2                           | <2                           | <2                            | <2                            | <2                            | <2                            | <2                            | <2                            |





SUMMARY REPORT

Project Name: CEDO Contract No. GE/2005/47 Chemical and Biological Testing of Sediment (Service Contract) Agreement No. CE 55/2005 (CE) - Development at Anderson Road - Design and Construction Environmental Laboratory Testing Schedule for Additional Ground Investigation Works Laboratory Testing of Soil and Groundwater Service Order No.:  
 Customer: Geotechnical Projects Division, Geotechnical Engineering Office, Civil Engineering and Development Department  
 Address: 101 Princess Margaret Road, Kowloon, Hong Kong  
 Lab. Job No.: J489  
 Matrix: Corrected DfVs

| Laboratory<br>Sample ID | Sample Reference |                      | Heavy Metals |             |             |             |             |             |                     | PAHs (Low Molecular Weight) |                         |                   |                       |                     |                     |                      |              |     |     |     | Total PAHs<br>ug/kg | Sum of PAHs<br>ug/kg |
|-------------------------|------------------|----------------------|--------------|-------------|-------------|-------------|-------------|-------------|---------------------|-----------------------------|-------------------------|-------------------|-----------------------|---------------------|---------------------|----------------------|--------------|-----|-----|-----|---------------------|----------------------|
|                         | Drillhole<br>No. | Depth (m)<br>From To | Cr<br>mg/kg  | Cu<br>mg/kg | Ni<br>mg/kg | Pb<br>mg/kg | Zn<br>mg/kg | As<br>mg/kg | Hexachloro<br>ug/kg | Acenaphthene<br>ug/kg       | Acenaphthylene<br>ug/kg | Fluorene<br>ug/kg | Phenanthrene<br>ug/kg | Anthracene<br>ug/kg | Total PAHs<br>ug/kg | Sum of PAHs<br>ug/kg |              |     |     |     |                     |                      |
|                         |                  |                      |              |             |             |             |             |             |                     |                             |                         |                   |                       |                     |                     |                      | Report Limit | 6.0 | 7.0 | 4.0 |                     |                      |
| 181581                  | B3               | 4.00-4.45m           |              |             |             |             |             |             |                     |                             |                         |                   |                       |                     |                     |                      |              |     |     |     |                     |                      |
| 181584                  | T9               | 4.00-4.45m           |              |             |             |             |             |             |                     |                             |                         |                   |                       |                     |                     |                      |              |     |     |     |                     |                      |
| 181585                  | T9               | 5.00-5.45m           |              |             |             |             |             |             |                     |                             |                         |                   |                       |                     |                     |                      |              |     |     |     |                     |                      |
| 181586                  | T9               | 5.00-6.45m           |              |             |             |             |             |             |                     |                             |                         |                   |                       |                     |                     |                      |              |     |     |     |                     |                      |
| 181587                  | T12              | 0.50-0.95m           |              |             |             |             |             |             |                     |                             |                         |                   |                       |                     |                     |                      |              |     |     |     |                     |                      |
| 181671                  | T12              | 4.00-4.45m           |              |             |             |             |             |             |                     |                             |                         |                   |                       |                     |                     |                      |              |     |     |     |                     |                      |
| 181672                  | T12              | 5.00-5.17m           |              |             |             |             |             |             |                     |                             |                         |                   |                       |                     |                     |                      |              |     |     |     |                     |                      |
| 181673                  | T12              | 5.50-5.85m           |              |             |             |             |             |             |                     |                             |                         |                   |                       |                     |                     |                      |              |     |     |     |                     |                      |
| 181674                  | T12              | 6.00-6.45m           |              |             |             |             |             |             |                     |                             |                         |                   |                       |                     |                     |                      |              |     |     |     |                     |                      |
| 181675                  | B2               | 4.00-4.45m           |              |             |             |             |             |             |                     |                             |                         |                   |                       |                     |                     |                      |              |     |     |     |                     |                      |
| 181676                  | B2               | 5.00-5.45m           |              |             |             |             |             |             |                     |                             |                         |                   |                       |                     |                     |                      |              |     |     |     |                     |                      |
| 181677                  | B2               | 6.00-6.45m           |              |             |             |             |             |             |                     |                             |                         |                   |                       |                     |                     |                      |              |     |     |     |                     |                      |
| 181678                  | T13              | 0.50m                |              |             |             |             |             |             |                     |                             |                         |                   |                       |                     |                     |                      |              |     |     |     |                     |                      |
| 181679                  | B1               | 4.00-4.45m           |              |             |             |             |             |             |                     |                             |                         |                   |                       |                     |                     |                      |              |     |     |     |                     |                      |
| 181672                  | B1               | 5.00-5.45m           |              |             |             |             |             |             |                     |                             |                         |                   |                       |                     |                     |                      |              |     |     |     |                     |                      |
| 181673                  | B1               | 6.00-6.45m           |              |             |             |             |             |             |                     |                             |                         |                   |                       |                     |                     |                      |              |     |     |     |                     |                      |
| 181674                  | T6               | 4.00-4.45m           |              |             |             |             |             |             |                     |                             |                         |                   |                       |                     |                     |                      |              |     |     |     |                     |                      |
| 181675                  | T6               | 5.00-5.45m           |              |             |             |             |             |             |                     |                             |                         |                   |                       |                     |                     |                      |              |     |     |     |                     |                      |
| 181676                  | T6               | 6.00-6.45m           |              |             |             |             |             |             |                     |                             |                         |                   |                       |                     |                     |                      |              |     |     |     |                     |                      |
| 181677                  | T11              | 4.00-4.45m           |              |             |             |             |             |             |                     |                             |                         |                   |                       |                     |                     |                      |              |     |     |     |                     |                      |
| 181678                  | B11              | 4.00-4.45m           |              |             |             |             |             |             |                     |                             |                         |                   |                       |                     |                     |                      |              |     |     |     |                     |                      |
| 181679                  | B11              | 5.00-5.25m           |              |             |             |             |             |             |                     |                             |                         |                   |                       |                     |                     |                      |              |     |     |     |                     |                      |
| 1816740                 | B7               | 0.50m                |              |             |             |             |             |             |                     |                             |                         |                   |                       |                     |                     |                      |              |     |     |     |                     |                      |
| 1816741                 | B7               | 1.00m                |              |             |             |             |             |             |                     |                             |                         |                   |                       |                     |                     |                      |              |     |     |     |                     |                      |
| 1816742                 | B7               | 1.50m                |              |             |             |             |             |             |                     |                             |                         |                   |                       |                     |                     |                      |              |     |     |     |                     |                      |
| 1816743                 | B6               | 0.50m                |              |             |             |             |             |             |                     |                             |                         |                   |                       |                     |                     |                      |              |     |     |     |                     |                      |
| 1816744                 | B6               | 1.00m                |              |             |             |             |             |             |                     |                             |                         |                   |                       |                     |                     |                      |              |     |     |     |                     |                      |
| 1816745                 | B6               | 1.50m                |              |             |             |             |             |             |                     |                             |                         |                   |                       |                     |                     |                      |              |     |     |     |                     |                      |
| 1816746                 | B6               | 2.00m                |              |             |             |             |             |             |                     |                             |                         |                   |                       |                     |                     |                      |              |     |     |     |                     |                      |
| 1816747                 | B4               | 1.40m                |              |             |             |             |             |             |                     |                             |                         |                   |                       |                     |                     |                      |              |     |     |     |                     |                      |
| 1816748                 | B19              | 0.50m                |              |             |             |             |             |             |                     |                             |                         |                   |                       |                     |                     |                      |              |     |     |     |                     |                      |
| 1816749                 | T3               | 0.40m                |              |             |             |             |             |             |                     |                             |                         |                   |                       |                     |                     |                      |              |     |     |     |                     |                      |
| 181831                  | B7               | 2.00m                |              |             |             |             |             |             |                     |                             |                         |                   |                       |                     |                     |                      |              |     |     |     |                     |                      |
| 181832                  | B7               | 2.50m                |              |             |             |             |             |             |                     |                             |                         |                   |                       |                     |                     |                      |              |     |     |     |                     |                      |
| 181833                  | B7               | 3.00m                |              |             |             |             |             |             |                     |                             |                         |                   |                       |                     |                     |                      |              |     |     |     |                     |                      |
| 181834                  | B11              | 6.00-6.45m           |              |             |             |             |             |             |                     |                             |                         |                   |                       |                     |                     |                      |              |     |     |     |                     |                      |
| 181835                  | T11              | 5.00-5.45m           |              |             |             |             |             |             |                     |                             |                         |                   |                       |                     |                     |                      |              |     |     |     |                     |                      |
| 181836                  | T11              | 6.00-6.45m           |              |             |             |             |             |             |                     |                             |                         |                   |                       |                     |                     |                      |              |     |     |     |                     |                      |
| 181891                  | B8               | 4.00-4.45m           |              |             |             |             |             |             |                     |                             |                         |                   |                       |                     |                     |                      |              |     |     |     |                     |                      |
| 181892                  | B8               | 5.00-5.45m           |              |             |             |             |             |             |                     |                             |                         |                   |                       |                     |                     |                      |              |     |     |     |                     |                      |
| 181893                  | B8               | 6.00-6.45m           |              |             |             |             |             |             |                     |                             |                         |                   |                       |                     |                     |                      |              |     |     |     |                     |                      |
| 181894                  | T7               | 0.35m                |              |             |             |             |             |             |                     |                             |                         |                   |                       |                     |                     |                      |              |     |     |     |                     |                      |
| 182021                  | B6               | 2.50m                |              |             |             |             |             |             |                     |                             |                         |                   |                       |                     |                     |                      |              |     |     |     |                     |                      |
| 182022                  | B6               | 3.00m                |              |             |             |             |             |             |                     |                             |                         |                   |                       |                     |                     |                      |              |     |     |     |                     |                      |
| 182023                  | T3A              | 1.00m                |              |             |             |             |             |             |                     |                             |                         |                   |                       |                     |                     |                      |              |     |     |     |                     |                      |

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| PAHs (High Molecular Weight) |                     |          |                       |              |        |               |                     |                          |                  |            |       |         | TPH     |         |        |      | Clay Content |  |  | Organic<br>Content<br>m/m |
|------------------------------|---------------------|----------|-----------------------|--------------|--------|---------------|---------------------|--------------------------|------------------|------------|-------|---------|---------|---------|--------|------|--------------|--|--|---------------------------|
| Benz(a)anthracene            | Benz(b)fluoranthene | Chrysene | Dibenz(a,h)anthracene | Fluoranthene | Pyrene | Benz(a)pyrene | Benz(b)fluoranthene | Indeno(1,2,3-cd)perylene | Benz(g)hperylene | Total PAHs | C5-C9 | C10-C14 | C15-C18 | C19-C26 | Gravel | Sand | S&A Clay     |  |  |                           |
| ug/kg                        | ug/kg               | ug/kg    | ug/kg                 | ug/kg        | ug/kg  | ug/kg         | ug/kg               | ug/kg                    | ug/kg            | ug/kg      | mg/kg | mg/kg   | mg/kg   | mg/kg   | %      | %    | %            |  |  |                           |
| 170                          | 170                 | 170      | 170                   | 170          | 170    | 170           | 170                 | 170                      | 170              | 170        | 2     | 50      | 50      | 50      | NA     | NA   | NA           |  |  |                           |
|                              |                     |          |                       |              |        |               |                     |                          |                  |            |       |         |         |         | 18     | 69   | 13           |  |  |                           |
|                              |                     |          |                       |              |        |               |                     |                          |                  |            |       |         |         |         | 24     | 63   | 13           |  |  |                           |
|                              |                     |          |                       |              |        |               |                     |                          |                  |            |       |         |         |         | 12     | 71   | 15           |  |  |                           |
|                              |                     |          |                       |              |        |               |                     |                          |                  |            |       |         |         |         | 9      | 70   | 21           |  |  |                           |
|                              |                     |          |                       |              |        |               |                     |                          |                  |            |       |         |         |         | 15     | 77   | 8            |  |  |                           |
|                              |                     |          |                       |              |        |               |                     |                          |                  |            |       |         |         |         | 9      | 81   | 10           |  |  |                           |
|                              |                     |          |                       |              |        |               |                     |                          |                  |            |       |         |         |         | 11     | 79   | 10           |  |  |                           |
|                              |                     |          |                       |              |        |               |                     |                          |                  |            |       |         |         |         | 47     | 41   | 12           |  |  |                           |
|                              |                     |          |                       |              |        |               |                     |                          |                  |            |       |         |         |         | 35     | 50   | 15           |  |  |                           |
|                              |                     |          |                       |              |        |               |                     |                          |                  |            |       |         |         |         | 48     | 37   | 15           |  |  |                           |
|                              |                     |          |                       |              |        |               |                     |                          |                  |            |       |         |         |         | 35     | 51   | 14           |  |  |                           |
|                              |                     |          |                       |              |        |               |                     |                          |                  |            |       |         |         |         | 85     | 14   | 1            |  |  |                           |
|                              |                     |          |                       |              |        |               |                     |                          |                  |            |       |         |         |         | 59     | 34   | 7            |  |  |                           |
|                              |                     |          |                       |              |        |               |                     |                          |                  |            |       |         |         |         | 82     | 17   | 1            |  |  |                           |
|                              |                     |          |                       |              |        |               |                     |                          |                  |            |       |         |         |         | 14     | 71   | 15           |  |  |                           |
|                              |                     |          |                       |              |        |               |                     |                          |                  |            |       |         |         |         | 18     | 69   | 13           |  |  |                           |
|                              |                     |          |                       |              |        |               |                     |                          |                  |            |       |         |         |         | 10     | 65   | 25           |  |  |                           |
|                              |                     |          |                       |              |        |               |                     |                          |                  |            |       |         |         |         | 16     | 75   | 9            |  |  |                           |
|                              |                     |          |                       |              |        |               |                     |                          |                  |            |       |         |         |         | 15     | 75   | 10           |  |  |                           |
|                              |                     |          |                       |              |        |               |                     |                          |                  |            |       |         |         |         | 20     | 72   | 8            |  |  |                           |
|                              |                     |          |                       |              |        |               |                     |                          |                  |            |       |         |         |         | 16     | 75   | 9            |  |  |                           |
|                              |                     |          |                       |              |        |               |                     |                          |                  |            |       |         |         |         | 23     | 51   | 26           |  |  |                           |
|                              |                     |          |                       |              |        |               |                     |                          |                  |            |       |         |         |         | 29     | 54   | 17           |  |  |                           |
|                              |                     |          |                       |              |        |               |                     |                          |                  |            |       |         |         |         | 20     | 51   | 29           |  |  |                           |
|                              |                     |          |                       |              |        |               |                     |                          |                  |            |       |         |         |         | 29     | 57   | 14           |  |  |                           |
|                              |                     |          |                       |              |        |               |                     |                          |                  |            |       |         |         |         | 19     | 51   | 30           |  |  |                           |
|                              |                     |          |                       |              |        |               |                     |                          |                  |            |       |         |         |         | 32     | 39   | 9            |  |  |                           |
|                              |                     |          |                       |              |        |               |                     |                          |                  |            |       |         |         |         | 44     | 44   | 12           |  |  |                           |
|                              |                     |          |                       |              |        |               |                     |                          |                  |            |       |         |         |         | 27     | 66   | 7            |  |  |                           |
|                              |                     |          |                       |              |        |               |                     |                          |                  |            |       |         |         |         | 19     | 59   | 22           |  |  |                           |
|                              |                     |          |                       |              |        |               |                     |                          |                  |            |       |         |         |         | 25     | 46   | 29           |  |  |                           |
|                              |                     |          |                       |              |        |               |                     |                          |                  |            |       |         |         |         | 39     | 43   | 18           |  |  |                           |
|                              |                     |          |                       |              |        |               |                     |                          |                  |            |       |         |         |         | 26     | 57   | 17           |  |  |                           |
|                              |                     |          |                       |              |        |               |                     |                          |                  |            |       |         |         |         | 16     | 69   | 15           |  |  |                           |
|                              |                     |          |                       |              |        |               |                     |                          |                  |            |       |         |         |         | 22     | 53   | 25           |  |  |                           |
|                              |                     |          |                       |              |        |               |                     |                          |                  |            |       |         |         |         | 19     | 73   | 8            |  |  |                           |
|                              |                     |          |                       |              |        |               |                     |                          |                  |            |       |         |         |         | 13     | 71   | 16           |  |  |                           |
|                              |                     |          |                       |              |        |               |                     |                          |                  |            |       |         |         |         | 16     | 69   | 15           |  |  |                           |
|                              |                     |          |                       |              |        |               |                     |                          |                  |            |       |         |         |         | 12     | 79   | 9            |  |  |                           |
|                              |                     |          |                       |              |        |               |                     |                          |                  |            |       |         |         |         | 29     | 56   | 15           |  |  |                           |
|                              |                     |          |                       |              |        |               |                     |                          |                  |            |       |         |         |         | 47     | 48   | 5            |  |  |                           |
|                              |                     |          |                       |              |        |               |                     |                          |                  |            |       |         |         |         | 37     | 60   | 3            |  |  |                           |
|                              |                     |          |                       |              |        |               |                     |                          |                  |            |       |         |         |         | 7      | 50   | 43           |  |  |                           |



**Appendix E**

**Site Walkover Checklist**

Site Walkover Checklist

| 1) GENERAL SITE DETAILS  |                              |
|--|------------------------------|
| Site Owner/ Client   | KWP Quarry Co. Ltd. (ARQ-01) |
| Property Address   | Anderson Road                |
| Person Conducting the Questionnaire (name & position)                                | Jacky Chan and Arnold Lee    |
| Authorised Owner/ Client Representative (if applicable) (name, position & telephone) | Justin Chan                  |

| 2) ACTIVITIES  |             |
|--|-------------|
| Briefly describe activities carried out on site, including types of products/chemicals/materials handled.<br><b>Obtain a flow schematic if possible.</b> |             |
| Number of employees:   |             |
| - Full-time:   | 416         |
| - Part-time:   | N/A         |
| - Temporary/Seasonal:  | N/A         |
| Maximum no. of people on site at any time:   | 416         |
| Typical hours of operation:  | 0700 - 1900 |
| Number of shifts:  | 2 shifts    |
| Days per week:   | 6 days      |
| Weeks per year:  | 52 weeks    |
| Scheduled plant shut-down:   | June 2016   |
| Detail the main sources of energy at the site:   |             |
| Gas (Yes/No)   | No          |
| Electricity (Yes/No)   | Yes         |
| Coal (Yes/No)  | No          |
| Oil (Yes/No)   | Diesel      |
| Other (Yes/No)   | No          |

Site Walkover Checklist

| 3) SITE DESCRIPTION  |  |
|--|--|
| This section is intended to gather information on site setting and environmental receptors on, adjacent or close to the site.    |  |
| What is the total site area:   | 4,087 m <sup>2</sup>   |
| What area of the site is covered by buildings (%):   | 50%  |
| Please list all current and previous owners/occupiers if possible.   | Previous Owner: K. Wah Quarry Ltd.   |
| Is a site plan available? (Yes/No)<br>If yes, please attach.   | No   |
| Are there any other parties on site as tenants or sub-tenants? (Yes/No)<br>If yes, identify those parties.                       | No   |
| Describe surrounding land use (residential, industrial, rural, etc.) and identify neighbouring facilities and types of industry. | North: Quarry site<br>South: K. Wah Asphalt Plant<br>East: K. Wah Construction Products Ltd.<br>West: Anderson Road  |
| Describe the topography of the area (flat terrain, rolling hills, mountains, by a large body of water, vegetation, etc.).        | Flat terrain, rock   |
| State the size and location of the nearest residential communities.  | - Shun Chi Estate, Shun Tin Estate, Shun On Estate, Shun Lee Estate to the west;<br>- Sau Mau Ping Estate and Sau Mau Ping South Estate to the southwest; and<br>- Po Tat Estate to the south. |
| Are there any sensitive habitats nearby, such as nature reserves, parks, wetlands, or sites of special scientific interest?      | No   |

Site Walkover Checklist

| 4) QUESTIONNAIRE WITH EXISTING/ PREVIOUS SITE OWNER OR OCCUPIER  |        |  |
|--|--------|--|
|  | Yes/No | Notes  |
| 1. What are the main activities/operations at the above address?   | --     | Site office, site vehicle and equipment maintenance workshops, material storage and fuel station |
| 2. How long have you been occupying the site?  | --     | Since 1997   |
| 3. Were you the first occupant on site? (If yes, what was the usage of the site prior to occupancy.)   | Yes    | Quarry site  |
| 4. Prior to your occupancy, who occupied the site?   | --     | K.Wah Quarry Ltd.  |
| 5. What were the main activities/operations during their occupancy?  | --     | Quarry site  |
| 6. Have there been any major changes in operations carried out at the site in the last 10 years?   | No     |  |
| 7. Have any polluting activities been carried out in the vicinity of the site in the past?   | No     |  |
| 8. To the best of your knowledge, has the site ever been used as a petrol filling station/car service garage?  | Yes    |  |
| 9. Are there any boreholes/wells or natural springs either on the site or in the surrounding area?   | No     |  |
| 10. Do you have any registered hazardous installations as defined under relevant ordinances? (If yes, please provide details.)                               | Yes    | Underground diesel tank, chemical waste storage room   |
| 11. Are any chemicals used in your daily operations? (If yes, please provide details.)   | Yes    | Diesel fuels, lubricants, grease and solvents  |
| - Where do you store these chemicals?  |        | Underground diesel tank, chemical storage room within the site                                   |
| 12. Material inventory lists, including quantities and locations available? (If yes, how often are these inventories updated?)                               | No     |  |
| 13. Has the facility produced a separate hazardous substance inventory?  | No     |  |
| 14. Have there ever been any incidents or accidents (e.g. spills, fires, injuries, etc.) involving any of these materials? (If yes, please provide details.) | No     | No records of incidents  |
| 15. How are materials received (e.g. rail, truck, etc.) and stored on site (e.g. drums, tanks, carboys, bays, silos, cisterns, vaults and cylinders)?        | --     | Chemicals was received by truck, stored on site using drums                                      |

Site Walkover Checklist

| 4) QUESTIONNAIRE WITH EXISTING/ PREVIOUS SITE OWNER OR OCCUPIER (CONTINUED)  |        |  |
|--|--------|--|
|  | Yes/No | Notes  |
| 16. Do you have any underground storage tanks? (If yes, please provide details.)<br>- How many underground storage tanks do you have on site?<br>- What are the tanks constructed of?<br>- What are the contents of these tanks?<br>- Are the pipelines above or below ground?<br>- If the pipelines are below ground, has any leak and integrity testing been performed?<br>- Have there been any spills associated with these tanks? | Yes    | One<br>Steel<br>Diesel<br>Below ground<br>No testing<br>No |
| 17. Are there any disused underground storage tanks?   | No     |  |
| 18. Do you have regular check for any spillage and monitoring of chemicals handled? (If yes, please provide details.)  | No     |  |
| 19. How are the wastes disposed of?  | --     | Chemical waste collected by the licence collector          |
| 20. Have you ever received any notices of violation of environmental regulations or received public complains? (If yes, please provide details.)   | No     |  |
| 21. Have any spills occurred on site? (If yes, please provide details)<br>- When did the spill occur?<br>- What were the substances spilled?<br>- What was the quantity of material spilled?<br>- Did you notify the relevant departments of the spill?<br>- What were the actions taken to clean up the spill?<br>- What were the areas affected?   | No     |  |
| 22. Do you have any records of major renovation of your site or re-arrangement of underground utilities, pipe work/underground tanks? (If yes, please provide details.)  | No     |  |
| 23. Have disused underground tanks been removed or otherwise secured (e.g. concrete, sand, etc.)?  | Nil    |  |
| 24. Are there any known contaminations on site? (If yes, please provide details.)  | No     |  |
| 25. Has the site ever been remediated? (If yes, please provide details.)   | No     |  |

Site Walkover Checklist

| 5) OBSERVATIONS  |        |   |
|--|--------|---|
|  | Yes/No | Notes   |
| 1. Are chemical storage areas provided with secondary containment (i.e. bund walls and floors)?  | Yes    | Chemical storage area is a concrete building      |
| 2. What are the conditions of the bund walls and floors?   | --     | Good condition and intact, no oil stains          |
| 3. Are any surface water drains located near to drum storage and unloading areas?  | No     |   |
| 4. Are any solid or liquid waste (other than wastewater) generated at the site? (If yes, please provide details.)  | Yes    | Waste lubricant oil, solvents                     |
| 5. Is there a storage site for the wastes?   | Yes    | Chemical waste storage area in site office area   |
| 6. Is there an on-site landfill?   | No     |   |
| 7. Were any stressed vegetation noted on site during the site reconnaissance? (If yes, please indicate location and approximate size.)   | No     |   |
| 8. Were any stained surfaces noted on-site during the site reconnaissance? (If yes, please provide details.)   | No     |   |
| 9. Are there any potential off-site sources of contamination?  | No     |   |
| 10. Does the site have any equipment which might contain polychlorinated biphenyls (PCBs)?   | Yes    | Electrical substation to the west of the entrance |
| 11. Are there any sumps, effluent pits, interceptors or lagoons on site?   | No     |   |
| 12. Any noticeable odours during site walkover?  | No     |   |
| 13. Are any of the following chemicals used on site: fuels, lubricating oils, hydraulic fluids, cleaning solvents, used chemical solutions, acids, anti-corrosive paints, thinners, coal, ash, oily tanks and bilge sludge, metal wastes, wood preservatives, and polyurethane foam? | Yes    | Fuel, lubricating oil, solvent                    |

Site Walkover Checklist

| 1) GENERAL SITE DETAILS  |                               |
|--|-------------------------------|
| Site Owner/ Client   | K. Wah Asphalt Plant (ARQ-02) |
| Property Address   | Anderson Road                 |
| Person Conducting the Questionnaire (name & position)                                | Jacky Chan and Arnold Lee     |
| Authorised Owner/ Client Representative (if applicable) (name, position & telephone) | Steven Leung                  |

| 2) ACTIVITIES  |             |
|--|-------------|
| Briefly describe activities carried out on site, including types of products/chemicals/materials handled.<br><b>Obtain a flow schematic if possible.</b> |             |
| Number of employees:   |             |
| - Full-time:   | 39          |
| - Part-time:   | N/A         |
| - Temporary/Seasonal:  | N/A         |
| Maximum no. of people on site at any time:   | 39          |
| Typical hours of operation:  | 0700 - 1900 |
| Number of shifts:  | 2 shifts    |
| Days per week:   | 6 days      |
| Weeks per year:  | 52 weeks    |
| Scheduled plant shut-down:   | June 2016   |
| Detail the main sources of energy at the site:   |             |
| Gas (Yes/No)   | No          |
| Electricity (Yes/No)   | Yes         |
| Coal (Yes/No)  | No          |
| Oil (Yes/No)   | Diesel      |
| Other (Yes/No)   | No          |

**Site Walkover Checklist**

| 3) SITE DESCRIPTION  |  |
|--|--|
| This section is intended to gather information on site setting and environmental receptors on, adjacent or close to the site.  |  |
| What is the total site area:   | 5,657 m <sup>2</sup>   |
| What area of the site is covered by buildings (%):   | 40%  |
| Please list all current and previous owners/occupiers if possible.   | No   |
| Is a site plan available? (Yes/No)<br>If yes, please attach.   | No   |
| Are there any other parties on site as tenants or sub-tenants? (Yes/No)<br>If yes, identify those parties.   | No   |
| Describe surrounding land use (residential, industrial, rural, etc.) and identify neighbouring facilities and types of industry.<br><br>North:<br>South:<br>East:<br>West: | KWP Quarry Co. Ltd. Site office<br>KWP Quarry Co. Ltd. Screening plant and crushing plant<br>K. Wah Construction Products Ltd.<br>Anderson Road  |
| Describe the topography of the area (flat terrain, rolling hills, mountains, by a large body of water, vegetation, etc.).  | Flat terrain, rock   |
| State the size and location of the nearest residential communities.  | - Shun Chi Estate, Shun Tin Estate, Shun On Estate, Shun Lee Estate to the west;<br>- Sau Mau Ping Estate and Sau Mau Ping South Estate to the southwest; and<br>- Po Tat Estate to the south. |
| Are there any sensitive habitats nearby, such as nature reserves, parks, wetlands, or sites of special scientific interest?  | No   |

**Site Walkover Checklist**

| 4) QUESTIONNAIRE WITH EXISTING/ PREVIOUS SITE OWNER OR OCCUPIER  |        |   |
|--|--------|---|
|  | Yes/No | Notes   |
| 1. What are the main activities/operations at the above address?   | --     | Asphalt production plant, vehicle and equipment workshop, and fuel station  |
| 2. How long have you been occupying the site?  | --     | over 10 years   |
| 3. Were you the first occupant on site? (If yes, what was the usage of the site prior to occupancy.)   | Yes    | Quarry site   |
| 4. Prior to your occupancy, who occupied the site?   | --     | K.Wah Quarry Ltd.   |
| 5. What were the main activities/operations during their occupancy?  | --     | Quarry site   |
| 6. Have there been any major changes in operations carried out at the site in the last 10 years?   | No     |   |
| 7. Have any polluting activities been carried out in the vicinity of the site in the past?   | No     |   |
| 8. To the best of your knowledge, has the site ever been used as a petrol filling station/car service garage?  | No     |   |
| 9. Are there any boreholes/wells or natural springs either on the site or in the surrounding area?   | No     |   |
| 10. Do you have any registered hazardous installations as defined under relevant ordinances? (If yes, please provide details.)                               | Yes    | Underground diesel tank, chemical waste storage room  |
| 11. Are any chemicals used in your daily operations? (If yes, please provide details.)<br><br>- Where do you store these chemicals?                          | Yes    | Diesel fuels, lubricants, grease and solvents<br><br>Underground diesel tank, chemical storage room within the site |
| 12. Material inventory lists, including quantities and locations available? (If yes, how often are these inventories updated?)                               | No     |   |
| 13. Has the facility produced a separate hazardous substance inventory?  | No     |   |
| 14. Have there ever been any incidents or accidents (e.g. spills, fires, injuries, etc.) involving any of these materials? (If yes, please provide details.) | No     | No records of incidents   |
| 15. How are materials received (e.g. rail, truck, etc.) and stored on site (e.g. drums, tanks, carboys, bays, silos, cisterns, vaults and cylinders)?        | --     | Chemicals was received by truck, stored on site using drums   |

Site Walkover Checklist

| 4) QUESTIONNAIRE WITH EXISTING/ PREVIOUS SITE OWNER OR OCCUPIER (CONTINUED)  |        |  |
|--|--------|--|
|  | Yes/No | Notes  |
| 16. Do you have any underground storage tanks? (If yes, please provide details.)<br>- How many underground storage tanks do you have on site?<br>- What are the tanks constructed of?<br>- What are the contents of these tanks?<br>- Are the pipelines above or below ground?<br>- If the pipelines are below ground, has any leak and integrity testing been performed?<br>- Have there been any spills associated with these tanks? | Yes    | One<br>Steel<br>Diesel<br>Below ground<br>No testing<br>No |
| 17. Are there any disused underground storage tanks?   | No     |  |
| 18. Do you have regular check for any spillage and monitoring of chemicals handled? (If yes, please provide details.)  | No     |  |
| 19. How are the wastes disposed of?  | --     | Chemical waste collected by the licence collector          |
| 20. Have you ever received any notices of violation of environmental regulations or received public complains? (If yes, please provide details.)   | No     |  |
| 21. Have any spills occurred on site? (If yes, please provide details)<br>- When did the spill occur?<br>- What were the substances spilled?<br>- What was the quantity of material spilled?<br>- Did you notify the relevant departments of the spill?<br>- What were the actions taken to clean up the spill?<br>- What were the areas affected?   | No     |  |
| 22. Do you have any records of major renovation of your site or re-arrangement of underground utilities, pipe work/underground tanks? (If yes, please provide details.)  | --     | Chemical waste collected by the licence collector          |
| 23. Have disused underground tanks been removed or otherwise secured (e.g. concrete, sand, etc.)?  | No     |  |
| 24. Are there any known contaminations on site? (If yes, please provide details.)  | No     |  |
| 25. Has the site ever been remediated? (If yes, please provide details.)   | No     |  |

Site Walkover Checklist

| 5) OBSERVATIONS  |        |  |
|--|--------|--|
|  | Yes/No | Notes  |
| 1. Are chemical storage areas provided with secondary containment (i.e. bund walls and floors)?  | Yes    | Chemical storage area is a steel cabinet with bunding filled with sand |
| 2. What are the conditions of the bund walls and floors?   | --     | Good condition, no oil stains  |
| 3. Are any surface water drains located near to drum storage and unloading areas?  | No     |  |
| 4. Are any solid or liquid waste (other than wastewater) generated at the site? (If yes, please provide details.)  | Yes    | Waste lubricant oil, solvents  |
| 5. Is there a storage site for the wastes?   | Yes    | Chemical waste storage area in maintenance workshop                    |
| 6. Is there an on-site landfill?   | No     |  |
| 7. Were any stressed vegetation noted on site during the site reconnaissance? (If yes, please indicate location and approximate size.)   | No     |  |
| 8. Were any stained surfaces noted on-site during the site reconnaissance? (If yes, please provide details.)   | No     |  |
| 9. Are there any potential off-site sources of contamination?  | No     |  |
| 10. Does the site have any equipment which might contain polychlorinated biphenyls (PCBs)?   | No     |  |
| 11. Are there any sumps, effluent pits, interceptors or lagoons on site?   | No     |  |
| 12. Any noticeable odours during site walkover?  | No     |  |
| 13. Are any of the following chemicals used on site: fuels, lubricating oils, hydraulic fluids, cleaning solvents, used chemical solutions, acids, anti-corrosive paints, thinners, coal, ash, oily tanks and bilge sludge, metal wastes, wood preservatives, and polyurethane foam? | Yes    | Fuel, lubricating oil, solvent   |



Site Walkover Checklist

| 1) GENERAL SITE DETAILS  |  |
|--|--|
| Site Owner/ Client   | K. Wah Construction Products Ltd. (ARQ-03) |
| Property Address   | Anderson Road                              |
| Person Conducting the Questionnaire (name & position)                                | Jacky Chan and Arnold Lee                  |
| Authorised Owner/ Client Representative (if applicable) (name, position & telephone) | Alex Lam                                   |

| 2) ACTIVITIES  |             |
|--|-------------|
| Briefly describe activities carried out on site, including types of products/chemicals/materials handled.<br><b>Obtain a flow schematic if possible.</b> |             |
| Number of employees:   |             |
| - Full-time:   | 40          |
| - Part-time:   | N/A         |
| - Temporary/Seasonal:  | N/A         |
| Maximum no. of people on site at any time:   | 40          |
| Typical hours of operation:  | 0700 - 1900 |
| Number of shifts:  | 2 shifts    |
| Days per week:   | 6 days      |
| Weeks per year:  | 52 weeks    |
| Scheduled plant shut-down:   | June 2016   |
| Detail the main sources of energy at the site:   |             |
| Gas (Yes/No)   | No          |
| Electricity (Yes/No)   | Yes         |
| Coal (Yes/No)  | No          |
| Oil (Yes/No)   | Diesel      |
| Other (Yes/No)   | No          |

Site Walkover Checklist

| 3) SITE DESCRIPTION  |  |
|--|--|
| This section is intended to gather information on site setting and environmental receptors on, adjacent or close to the site.    |  |
| What is the total site area:   | 5,552 m <sup>2</sup>   |
| What area of the site is covered by buildings (%):   | 40%  |
| Please list all current and previous owners/occupiers if possible.   | No   |
| Is a site plan available? (Yes/No)<br>If yes, please attach.   | No   |
| Are there any other parties on site as tenants or sub-tenants? (Yes/No)<br>If yes, identify those parties.                       | No   |
| Describe surrounding land use (residential, industrial, rural, etc.) and identify neighbouring facilities and types of industry. |  |
| North:   | Quarry site  |
| South:   | KWP Quarry Co. Ltd. Screening plant and crushing plant   |
| East:  | Quarry site  |
| West:  | KWP Quarry Co. Ltd. Site office  |
| Describe the topography of the area (flat terrain, rolling hills, mountains, by a large body of water, vegetation, etc.).        | Flat terrain, rock   |
| State the size and location of the nearest residential communities.  | - Shun Chi Estate, Shun Tin Estate, Shun On Estate, Shun Lee Estate to the west;<br>- Sau Mau Ping Estate and Sau Mau Ping South Estate to the southwest; and<br>- Po Tat Estate to the south. |
| Are there any sensitive habitats nearby, such as nature reserves, parks, wetlands, or sites of special scientific interest?      | No   |

Site Walkover Checklist

| 4) QUESTIONNAIRE WITH EXISTING/ PREVIOUS SITE OWNER OR OCCUPIER  |        |  |
|--|--------|--|
|  | Yes/No | Notes  |
| 1. What are the main activities/operations at the above address?   | --     | Brick production, site vehicle and equipment maintenance workshop                    |
| 2. How long have you been occupying the site?  | --     | Over 15 years  |
| 3. Were you the first occupant on site? (If yes, what was the usage of the site prior to occupancy.)   | Yes    | Quarry site  |
| 4. Prior to your occupancy, who occupied the site?   | --     | K.Wah Quarry Ltd.  |
| 5. What were the main activities/operations during their occupancy?  | --     | Quarry site  |
| 6. Have there been any major changes in operations carried out at the site in the last 10 years?   | No     |  |
| 7. Have any polluting activities been carried out in the vicinity of the site in the past?   | No     |  |
| 8. To the best of your knowledge, has the site ever been used as a petrol filling station/car service garage?  | No     |  |
| 9. Are there any boreholes/wells or natural springs either on the site or in the surrounding area?   | No     |  |
| 10. Do you have any registered hazardous installations as defined under relevant ordinances? (If yes, please provide details.)                               | Yes    | Chemical waste storage room  |
| 11. Are any chemicals used in your daily operations? (If yes, please provide details.)<br>- Where do you store these chemicals?                              | Yes    | Lubricants, grease and solvents<br>Chemical storage room within the production plant |
| 12. Material inventory lists, including quantities and locations available? (If yes, how often are these inventories updated?)                               | No     |  |
| 13. Has the facility produced a separate hazardous substance inventory?  | No     |  |
| 14. Have there ever been any incidents or accidents (e.g. spills, fires, injuries, etc.) involving any of these materials? (If yes, please provide details.) | No     | No records of incidents  |
| 15. How are materials received (e.g. rail, truck, etc.) and stored on site (e.g. drums, tanks, carboys, bays, silos, cisterns, vaults and cylinders)?        | --     | Chemicals was received by truck, stored on site using drums                          |

Site Walkover Checklist

| 4) QUESTIONNAIRE WITH EXISTING/ PREVIOUS SITE OWNER OR OCCUPIER (CONTINUED)  |        |   |
|--|--------|---|
|  | Yes/No | Notes   |
| 16. Do you have any underground storage tanks? (If yes, please provide details.)<br>- How many underground storage tanks do you have on site?<br>- What are the tanks constructed of?<br>- What are the contents of these tanks?<br>- Are the pipelines above or below ground?<br>- If the pipelines are below ground, has any leak and integrity testing been performed?<br>- Have there been any spills associated with these tanks? | No     |   |
| 17. Are there any disused underground storage tanks?   | No     |   |
| 18. Do you have regular check for any spillage and monitoring of chemicals handled? (If yes, please provide details.)  | No     |   |
| 19. How are the wastes disposed of?  | --     | Chemical waste collected by the licence collector |
| 20. Have you ever received any notices of violation of environmental regulations or received public complains? (If yes, please provide details.)   | No     |   |
| 21. Have any spills occurred on site? (If yes, please provide details)<br>- When did the spill occur?<br>- What were the substances spilled?<br>- What was the quantity of material spilled?<br>- Did you notify the relevant departments of the spill?<br>- What were the actions taken to clean up the spill?<br>- What were the areas affected?   | No     |   |
| 22. Do you have any records of major renovation of your site or re-arrangement of underground utilities, pipe work/underground tanks? (If yes, please provide details.)  | No     |   |
| 23. Have disused underground tanks been removed or otherwise secured (e.g. concrete, sand, etc.)?  | No     |   |
| 24. Are there any known contaminations on site? (If yes, please provide details.)  | No     |   |
| 25. Has the site ever been remediated? (If yes, please provide details.)   | No     |   |

Site Walkover Checklist

| 5) OBSERVATIONS  |        |   |
|--|--------|---|
|  | Yes/No | Notes   |
| 1. Are chemical storage areas provided with secondary containment (i.e. bund walls and floors)?  | Yes    | Drip tray is used                                   |
| 2. What are the conditions of the bund walls and floors?   | No     | Good condition, no oil stains                       |
| 3. Are any surface water drains located near to drum storage and unloading areas?  | No     |   |
| 4. Are any solid or liquid waste (other than wastewater) generated at the site? (If yes, please provide details.)  | Yes    | Waste lubricant oil, solvents                       |
| 5. Is there a storage site for the wastes?   | Yes    | Chemical waste storage area in maintenance workshop |
| 6. Is there an on-site landfill?   | No     |   |
| 7. Were any stressed vegetation noted on site during the site reconnaissance? (If yes, please indicate location and approximate size.)   | No     |   |
| 8. Were any stained surfaces noted on-site during the site reconnaissance? (If yes, please provide details.)   | No     |   |
| 9. Are there any potential off-site sources of contamination?  | No     |   |
| 10. Does the site have any equipment which might contain polychlorinated biphenyls (PCBs)?   | Yes    | Electric sub-station near the entrance              |
| 11. Are there any sumps, effluent pits, interceptors or lagoons on site?   | No     |   |
| 12. Any noticeable odours during site walkover?  | No     |   |
| 13. Are any of the following chemicals used on site: fuels, lubricating oils, hydraulic fluids, cleaning solvents, used chemical solutions, acids, anti-corrosive paints, thinners, coal, ash, oily tanks and bilge sludge, metal wastes, wood preservatives, and polyurethane foam? | Yes    | Fuel, lubricating oil, solvent                      |

Site Walkover Checklist

| 1) GENERAL SITE DETAILS  |                              |
|--|------------------------------|
| Site Owner/ Client   | KWP Quarry Co. Ltd. (ARQ-04) |
| Property Address   | Anderson Road                |
| Person Conducting the Questionnaire (name & position)                                | Jacky Chan and Arnold Lee    |
| Authorised Owner/ Client Representative (if applicable) (name, position & telephone) | Justin Chan                  |

| 2) ACTIVITIES  |             |
|--|-------------|
| Briefly describe activities carried out on site, including types of products/chemicals/materials handled.<br><b>Obtain a flow schematic if possible.</b> |             |
| Number of employees:   |             |
| - Full-time:   | 416         |
| - Part-time:   | N/A         |
| - Temporary/Seasonal:  | N/A         |
| Maximum no. of people on site at any time:   | 416         |
| Typical hours of operation:  | 0700 - 1900 |
| Number of shifts:  | 2 shifts    |
| Days per week:   | 6 days      |
| Weeks per year:  | 52 weeks    |
| Scheduled plant shut-down:   | June 2016   |
| Detail the main sources of energy at the site:   |             |
| Gas (Yes/No)   | No          |
| Electricity (Yes/No)   | Yes         |
| Coal (Yes/No)  | No          |
| Oil (Yes/No)   | No          |
| Other (Yes/No)   | No          |

**Site Walkover Checklist**

| 3) SITE DESCRIPTION  |  |
|--|--|
| This section is intended to gather information on site setting and environmental receptors on, adjacent or close to the site.    |  |
| What is the total site area:   | 29,250 m <sup>2</sup>  |
| What area of the site is covered by buildings (%):   | 10%  |
| Please list all current and previous owners/occupiers if possible.   | Previous Owner: K. Wah Quarry Ltd.   |
| Is a site plan available? (Yes/No)<br>If yes, please attach.   | No   |
| Are there any other parties on site as tenants or sub-tenants? (Yes/No)<br>If yes, identify those parties.                       | No   |
| Describe surrounding land use (residential, industrial, rural, etc.) and identify neighbouring facilities and types of industry. |  |
| North:   | K. Wah Asphalt Plant and K. Wah Construction Products Ltd.   |
| South:   | K.Wah Concrete Pland and Anderson Concrete Ltd.  |
| East:  | Quarry site  |
| West:  | Anderson Road  |
| Describe the topography of the area (flat terrain, rolling hills, mountains, by a large body of water, vegetation, etc.).        | Flat terrain, rock and fill materials  |
| State the size and location of the nearest residential communities.  | - Shun Chi Estate, Shun Tin Estate, Shun On Estate, Shun Lee Estate to the west;<br>- Sau Mau Ping Estate and Sau Mau Ping South Estate to the southwest; and<br>- Po Tat Estate to the south. |
| Are there any sensitive habitats nearby, such as nature reserves, parks, wetlands, or sites of special scientific interest?      | No   |

**Site Walkover Checklist**

| 4) QUESTIONNAIRE WITH EXISTING/ PREVIOUS SITE OWNER OR OCCUPIER  |        |   |
|--|--------|---|
|  | Yes/No | Notes   |
| 1. What are the main activities/operations at the above address?   | --     | Screening plant, crushing plant, stockpiles area and maintenance workshop |
| 2. How long have you been occupying the site?  | --     | Since 1997  |
| 3. Were you the first occupant on site? (If yes, what was the usage of the site prior to occupancy.)   | Yes    | Quarry site   |
| 4. Prior to your occupancy, who occupied the site?   | --     | K.Wah Quarry Ltd.   |
| 5. What were the main activities/operations during their occupancy?  | --     | Quarry site   |
| 6. Have there been any major changes in operations carried out at the site in the last 10 years?   | No     |   |
| 7. Have any polluting activities been carried out in the vicinity of the site in the past?   | No     |   |
| 8. To the best of your knowledge, has the site ever been used as a petrol filling station/car service garage?  | No     |   |
| 9. Are there any boreholes/wells or natural springs either on the site or in the surrounding area?   | No     |   |
| 10. Do you have any registered hazardous installations as defined under relevant ordinances? (If yes, please provide details.)                               | Yes    | Chemical waste storage room   |
| 11. Are any chemicals used in your daily operations? (If yes, please provide details.)   | Yes    | Lubricants, grease and solvents   |
| - Where do you store these chemicals?  |        | Chemical storage room at site office area                                 |
| 12. Material inventory lists, including quantities and locations available? (If yes, how often are these inventories updated?)                               | No     |   |
| 13. Has the facility produced a separate hazardous substance inventory?  | No     |   |
| 14. Have there ever been any incidents or accidents (e.g. spills, fires, injuries, etc.) involving any of these materials? (If yes, please provide details.) | No     | No records of incidents   |
| 15. How are materials received (e.g. rail, truck, etc.) and stored on site (e.g. drums, tanks, carboys, bays, silos, cisterns, vaults and cylinders)?        | --     | The materials was received by truck, stored on site using drums           |

Site Walkover Checklist

| 4) QUESTIONNAIRE WITH EXISTING/ PREVIOUS SITE OWNER OR OCCUPIER (CONTINUED)  |        |   |
|--|--------|---|
|  | Yes/No | Notes   |
| 16. Do you have any underground storage tanks? (If yes, please provide details.)<br>- How many underground storage tanks do you have on site?<br>- What are the tanks constructed of?<br>- What are the contents of these tanks?<br>- Are the pipelines above or below ground?<br>- If the pipelines are below ground, has any leak and integrity testing been performed?<br>- Have there been any spills associated with these tanks? | No     |   |
| 17. Are there any disused underground storage tanks?   | No     |   |
| 18. Do you have regular check for any spillage and monitoring of chemicals handled? (If yes, please provide details.)  | No     |   |
| 19. How are the wastes disposed of?  | --     | Chemical waste collected by the licence collector |
| 20. Have you ever received any notices of violation of environmental regulations or received public complains? (If yes, please provide details.)   | No     |   |
| 21. Have any spills occurred on site? (If yes, please provide details)<br>- When did the spill occur?<br>- What were the substances spilled?<br>- What was the quantity of material spilled?<br>- Did you notify the relevant departments of the spill?<br>- What were the actions taken to clean up the spill?<br>- What were the areas affected?   | No     |   |
| 22. Do you have any records of major renovation of your site or re-arrangement of underground utilities, pipe work/underground tanks? (If yes, please provide details.)  | No     |   |
| 23. Have disused underground tanks been removed or otherwise secured (e.g. concrete, sand, etc.)?  | No     |   |
| 24. Are there any known contaminations on site? (If yes, please provide details.)  | No     |   |
| 25. Has the site ever been remediated? (If yes, please provide details.)   | No     |   |

Site Walkover Checklist

| 5) OBSERVATIONS  |        |   |
|--|--------|---|
|  | Yes/No | Notes   |
| 1. Are chemical storage areas provided with secondary containment (i.e. bund walls and floors)?  | Yes    | Drip tray is used                                   |
| 2. What are the conditions of the bund walls and floors?   | --     | Good condition, no oil stains                       |
| 3. Are any surface water drains located near to drum storage and unloading areas?  | No     |   |
| 4. Are any solid or liquid waste (other than wastewater) generated at the site? (If yes, please provide details.)  | Yes    | Waste lubricant oil, solvents                       |
| 5. Is there a storage site for the wastes?   | Yes    | Chemical waste storage area in maintenance workshop |
| 6. Is there an on-site landfill?   | No     |   |
| 7. Were any stressed vegetation noted on site during the site reconnaissance? (If yes, please indicate location and approximate size.)   | No     |   |
| 8. Were any stained surfaces noted on-site during the site reconnaissance? (If yes, please provide details.)   | No     |   |
| 9. Are there any potential off-site sources of contamination?  | No     |   |
| 10. Does the site have any equipment which might contain polychlorinated biphenyls (PCBs)?   | No     |   |
| 11. Are there any sumps, effluent pits, interceptors or lagoons on site?   | No     |   |
| 12. Any noticeable odours during site walkover?  | No     |   |
| 13. Are any of the following chemicals used on site: fuels, lubricating oils, hydraulic fluids, cleaning solvents, used chemical solutions, acids, anti-corrosive paints, thinners, coal, ash, oily tanks and bilge sludge, metal wastes, wood preservatives, and polyurethane foam? | Yes    | Lubricating oil, solvent                            |

Site Walkover Checklist

| 1) GENERAL SITE DETAILS  |                                |
|--|--------------------------------|
| Site Owner/ Client   | K. Wah Concrete Plant (ARQ-05) |
| Property Address   | Anderson Road                  |
| Person Conducting the Questionnaire (name & position)                                | Jacky Chan and Arnold Lee      |
| Authorised Owner/ Client Representative (if applicable) (name, position & telephone) | Simon Kwong                    |

| 2) ACTIVITIES  |             |
|--|-------------|
| Briefly describe activities carried out on site, including types of products/chemicals/materials handled.<br><b>Obtain a flow schematic if possible.</b> |             |
| Number of employees:   |             |
| - Full-time:   | 82          |
| - Part-time:   | N/A         |
| - Temporary/Seasonal:  | N/A         |
| Maximum no. of people on site at any time:   | 82          |
| Typical hours of operation:  | 0700 - 1900 |
| Number of shifts:  | 2 shifts    |
| Days per week:   | 6 days      |
| Weeks per year:  | 52 weeks    |
| Scheduled plant shut-down:   | June 2016   |
| Detail the main sources of energy at the site:   |             |
| Gas (Yes/No)   | No          |
| Electricity (Yes/No)   | Yes         |
| Coal (Yes/No)  | No          |
| Oil (Yes/No)   | No          |
| Other (Yes/No)   | No          |

Site Walkover Checklist

| 3) SITE DESCRIPTION  |  |
|--|--|
| This section is intended to gather information on site setting and environmental receptors on, adjacent or close to the site.    |  |
| What is the total site area:   | 6,946 m <sup>2</sup>   |
| What area of the site is covered by buildings (%):   | 30%  |
| Please list all current and previous owners/occupiers if possible.   | Previous Owner: K. Wah Quarry Ltd.   |
| Is a site plan available? (Yes/No)<br>If yes, please attach.   | No   |
| Are there any other parties on site as tenants or sub-tenants? (Yes/No)<br>If yes, identify those parties.                       | No   |
| Describe surrounding land use (residential, industrial, rural, etc.) and identify neighbouring facilities and types of industry. | North: KWP Quarry Co. Ltd. Crushing plant and screening plant<br>South: Quarry site<br>East: Anderson Concrete Plant<br>West: Anderson Road  |
| Describe the topography of the area (flat terrain, rolling hills, mountains, by a large body of water, vegetation, etc.).        | Flat terrain, fill materials   |
| State the size and location of the nearest residential communities.  | - Shun Chi Estate, Shun Tin Estate, Shun On Estate, Shun Lee Estate to the west;<br>- Sau Mau Ping Estate and Sau Mau Ping South Estate to the southwest; and<br>- Po Tat Estate to the south. |
| Are there any sensitive habitats nearby, such as nature reserves, parks, wetlands, or sites of special scientific interest?      | No   |

Site Walkover Checklist

| 4) QUESTIONNAIRE WITH EXISTING/ PREVIOUS SITE OWNER OR OCCUPIER  |        |   |
|--|--------|---|
|  | Yes/No | Notes   |
| 1. What are the main activities/operations at the above address?   | Yes    | Concrete production plant, equipment maintenance                |
| 2. How long have you been occupying the site?  | --     | Over 10 years   |
| 3. Were you the first occupant on site? (If yes, what was the usage of the site prior to occupancy.)   | Yes    | Quarry site   |
| 4. Prior to your occupancy, who occupied the site?   | --     | K.Wah Quarry Ltd.   |
| 5. What were the main activities/operations during their occupancy?  | --     | Quarry site   |
| 6. Have there been any major changes in operations carried out at the site in the last 10 years?   | No     |   |
| 7. Have any polluting activities been carried out in the vicinity of the site in the past?   | No     |   |
| 8. To the best of your knowledge, has the site ever been used as a petrol filling station/car service garage?  | No     |   |
| 9. Are there any boreholes/wells or natural springs either on the site or in the surrounding area?   | No     |   |
| 10. Do you have any registered hazardous installations as defined under relevant ordinances? (If yes, please provide details.)                               | Yes    | Chemical waste storage room                                     |
| 11. Are any chemicals used in your daily operations? (If yes, please provide details.)   | Yes    | Lubricants, grease and solvents                                 |
| - Where do you store these chemicals?  |        | Chemical storage room within the site                           |
| 12. Material inventory lists, including quantities and locations available? (If yes, how often are these inventories updated?)                               | No     |   |
| 13. Has the facility produced a separate hazardous substance inventory?  | No     |   |
| 14. Have there ever been any incidents or accidents (e.g. spills, fires, injuries, etc.) involving any of these materials? (If yes, please provide details.) | No     | No records of incidents   |
| 15. How are materials received (e.g. rail, truck, etc.) and stored on site (e.g. drums, tanks, carboys, bays, silos, cisterns, vaults and cylinders)?        | --     | The materials was received by truck, stored on site using drums |

Site Walkover Checklist

| 4) QUESTIONNAIRE WITH EXISTING/ PREVIOUS SITE OWNER OR OCCUPIER (CONTINUED)  |        |   |
|--|--------|---|
|  | Yes/No | Notes   |
| 16. Do you have any underground storage tanks? (If yes, please provide details.)<br>- How many underground storage tanks do you have on site?<br>- What are the tanks constructed of?<br>- What are the contents of these tanks?<br>- Are the pipelines above or below ground?<br>- If the pipelines are below ground, has any leak and integrity testing been performed?<br>- Have there been any spills associated with these tanks? | No     |   |
| 17. Are there any disused underground storage tanks?   | No     |   |
| 18. Do you have regular check for any spillage and monitoring of chemicals handled? (If yes, please provide details.)  | No     |   |
| 19. How are the wastes disposed of?  | --     | Chemical waste collected by the licence collector |
| 20. Have you ever received any notices of violation of environmental regulations or received public complains? (If yes, please provide details.)   | No     |   |
| 21. Have any spills occurred on site? (If yes, please provide details)<br>- When did the spill occur?<br>- What were the substances spilled?<br>- What was the quantity of material spilled?<br>- Did you notify the relevant departments of the spill?<br>- What were the actions taken to clean up the spill?<br>- What were the areas affected?   | No     |   |
| 22. Do you have any records of major renovation of your site or re-arrangement of underground utilities, pipe work/underground tanks? (If yes, please provide details.)  | No     |   |
| 23. Have disused underground tanks been removed or otherwise secured (e.g. concrete, sand, etc.)?  | No     |   |
| 24. Are there any known contaminations on site? (If yes, please provide details.)  | No     |   |
| 25. Has the site ever been remediated? (If yes, please provide details.)   | No     |   |

Site Walkover Checklist

| 5) OBSERVATIONS  |        |   |
|--|--------|---|
|  | Yes/No | Notes   |
| 1. Are chemical storage areas provided with secondary containment (i.e. bund walls and floors)?  | Yes    | Drip tray is used                                   |
| 2. What are the conditions of the bund walls and floors?   | --     | Good condition                                      |
| 3. Are any surface water drains located near to drum storage and unloading areas?  | No     |   |
| 4. Are any solid or liquid waste (other than wastewater) generated at the site? (If yes, please provide details.)  | Yes    | Waste lubricant oil, solvents                       |
| 5. Is there a storage site for the wastes?   | Yes    | Chemical waste storage area in maintenance workshop |
| 6. Is there an on-site landfill?   | No     |   |
| 7. Were any stressed vegetation noted on site during the site reconnaissance? (If yes, please indicate location and approximate size.)   | No     |   |
| 8. Were any stained surfaces noted on-site during the site reconnaissance? (If yes, please provide details.)   | No     |   |
| 9. Are there any potential off-site sources of contamination?  | No     |   |
| 10. Does the site have any equipment which might contain polychlorinated biphenyls (PCBs)?   | No     |   |
| 11. Are there any sumps, effluent pits, interceptors or lagoons on site?   | No     |   |
| 12. Any noticeable odours during site walkover?  | No     |   |
| 13. Are any of the following chemicals used on site: fuels, lubricating oils, hydraulic fluids, cleaning solvents, used chemical solutions, acids, anti-corrosive paints, thinners, coal, ash, oily tanks and bilge sludge, metal wastes, wood preservatives, and polyurethane foam? | Yes    | Lubricating oil, solvent                            |

Site Walkover Checklist

| 1) GENERAL SITE DETAILS  |                                 |
|--|---------------------------------|
| Site Owner/ Client   | Anderson Concrete Ltd. (ARQ-06) |
| Property Address   | Anderson Road                   |
| Person Conducting the Questionnaire (name & position)                                | Jacky Chan and Arnold Lee       |
| Authorised Owner/ Client Representative (if applicable) (name, position & telephone) | David Lee                       |

| 2) ACTIVITIES  |             |
|--|-------------|
| Briefly describe activities carried out on site, including types of products/chemicals/materials handled.<br><b>Obtain a flow schematic if possible.</b> |             |
| Number of employees:   |             |
| - Full-time:   | 71          |
| - Part-time:   | N/A         |
| - Temporary/Seasonal:  | N/A         |
| Maximum no. of people on site at any time:   | 71          |
| Typical hours of operation:  | 0700 - 1900 |
| Number of shifts:  | 2 shifts    |
| Days per week:   | 6 days      |
| Weeks per year:  | 52 weeks    |
| Scheduled plant shut-down:   | June 2016   |
| Detail the main sources of energy at the site:   |             |
| Gas (Yes/No)   | No          |
| Electricity (Yes/No)   | Yes         |
| Coal (Yes/No)  | No          |
| Oil (Yes/No)   | No          |
| Other (Yes/No)   | No          |



**Site Walkover Checklist**

| 3) SITE DESCRIPTION  |  |
|--|--|
| This section is intended to gather information on site setting and environmental receptors on, adjacent or close to the site.  |  |
| What is the total site area:   | 4,148 m <sup>2</sup>   |
| What area of the site is covered by buildings (%):   | 30%  |
| Please list all current and previous owners/occupiers if possible.   | Previous Owner: K. Wah Quarry Ltd.   |
| Is a site plan available? (Yes/No)<br>If yes, please attach.   | No   |
| Are there any other parties on site as tenants or sub-tenants? (Yes/No)<br>If yes, identify those parties.   | No   |
| Describe surrounding land use (residential, industrial, rural, etc.) and identify neighbouring facilities and types of industry.<br><br>North:<br>South:<br>East:<br>West: | KWP Quarry Co. Ltd. Crushing plant and screening plant<br>Quarry site<br>Quarry site<br>K. Wah Concrete Plant  |
| Describe the topography of the area (flat terrain, rolling hills, mountains, by a large body of water, vegetation, etc.).  | Flat terrain, fill materials   |
| State the size and location of the nearest residential communities.  | - Shun Chi Estate, Shun Tin Estate, Shun On Estate, Shun Lee Estate to the west;<br>- Sau Mau Ping Estate and Sau Mau Ping South Estate to the southwest; and<br>- Po Tat Estate to the south. |
| Are there any sensitive habitats nearby, such as nature reserves, parks, wetlands, or sites of special scientific interest?  | No   |

**Site Walkover Checklist**

| 4) QUESTIONNAIRE WITH EXISTING/ PREVIOUS SITE OWNER OR OCCUPIER  |        |  |
|--|--------|--|
|  | Yes/No | Notes  |
| 1. What are the main activities/operations at the above address?   | Yes    | Concrete production plant, equipment maintenance                         |
| 2. How long have you been occupying the site?  | --     | Over 10 years  |
| 3. Were you the first occupant on site? (If yes, what was the usage of the site prior to occupancy.)   | Yes    | Quarry site  |
| 4. Prior to your occupancy, who occupied the site?   | --     | K.Wah Quarry Ltd.  |
| 5. What were the main activities/operations during their occupancy?  | --     | Quarry site  |
| 6. Have there been any major changes in operations carried out at the site in the last 10 years?   | No     |  |
| 7. Have any polluting activities been carried out in the vicinity of the site in the past?   | No     |  |
| 8. To the best of your knowledge, has the site ever been used as a petrol filling station/car service garage?  | No     |  |
| 9. Are there any boreholes/wells or natural springs either on the site or in the surrounding area?   | No     |  |
| 10. Do you have any registered hazardous installations as defined under relevant ordinances? (If yes, please provide details.)                               | Yes    | Chemical waste storage room  |
| 11. Are any chemicals used in your daily operations? (If yes, please provide details.)<br><br>- Where do you store these chemicals?                          | Yes    | Lubricants, grease and solvents<br>Chemical storage room within the site |
| 12. Material inventory lists, including quantities and locations available? (If yes, how often are these inventories updated?)                               | No     |  |
| 13. Has the facility produced a separate hazardous substance inventory?  | No     |  |
| 14. Have there ever been any incidents or accidents (e.g. spills, fires, injuries, etc.) involving any of these materials? (If yes, please provide details.) | No     | No records of incidents  |
| 15. How are materials received (e.g. rail, truck, etc.) and stored on site (e.g. drums, tanks, carboys, bays, silos, cisterns, vaults and cylinders)?        | --     | The materials was received by truck, stored on site using drums          |

Site Walkover Checklist

| 4) QUESTIONNAIRE WITH EXISTING/ PREVIOUS SITE OWNER OR OCCUPIER (CONTINUED)  |        |   |
|--|--------|---|
|  | Yes/No | Notes   |
| 16. Do you have any underground storage tanks? (If yes, please provide details.)<br>- How many underground storage tanks do you have on site?<br>- What are the tanks constructed of?<br>- What are the contents of these tanks?<br>- Are the pipelines above or below ground?<br>- If the pipelines are below ground, has any leak and integrity testing been performed?<br>- Have there been any spills associated with these tanks? | No     |   |
| 17. Are there any disused underground storage tanks?   | No     |   |
| 18. Do you have regular check for any spillage and monitoring of chemicals handled? (If yes, please provide details.)  | No     |   |
| 19. How are the wastes disposed of?  | --     | Chemical waste collected by the licence collector |
| 20. Have you ever received any notices of violation of environmental regulations or received public complains? (If yes, please provide details.)   | No     |   |
| 21. Have any spills occurred on site? (If yes, please provide details)<br>- When did the spill occur?<br>- What were the substances spilled?<br>- What was the quantity of material spilled?<br>- Did you notify the relevant departments of the spill?<br>- What were the actions taken to clean up the spill?<br>- What were the areas affected?   | No     |   |
| 22. Do you have any records of major renovation of your site or re-arrangement of underground utilities, pipe work/underground tanks? (If yes, please provide details.)  | No     |   |
| 23. Have disused underground tanks been removed or otherwise secured (e.g. concrete, sand, etc.)?  | No     |   |
| 24. Are there any known contaminations on site? (If yes, please provide details.)  | No     |   |
| 25. Has the site ever been remediated? (If yes, please provide details.)   | No     |   |

Site Walkover Checklist

| 5) OBSERVATIONS  |        |  |
|--|--------|--|
|  | Yes/No | Notes  |
| 1. Are chemical storage areas provided with secondary containment (i.e. bund walls and floors)?  | Yes    | Drip tray is used  |
| 2. What are the conditions of the bund walls and floors?   | --     | Good condition   |
| 3. Are any surface water drains located near to drum storage and unloading areas?  | No     |  |
| 4. Are any solid or liquid waste (other than wastewater) generated at the site? (If yes, please provide details.)  | Yes    | Waste lubricant oil, solvents                                |
| 5. Is there a storage site for the wastes?   | Yes    | Chemical waste storage area in maintenance workshop (ARQ-07) |
| 6. Is there an on-site landfill?   | No     |  |
| 7. Were any stressed vegetation noted on site during the site reconnaissance? (If yes, please indicate location and approximate size.)   | No     |  |
| 8. Were any stained surfaces noted on-site during the site reconnaissance? (If yes, please provide details.)   | No     |  |
| 9. Are there any potential off-site sources of contamination?  | No     |  |
| 10. Does the site have any equipment which might contain polychlorinated biphenyls (PCBs)?   | No     |  |
| 11. Are there any sumps, effluent pits, interceptors or lagoons on site?   | No     |  |
| 12. Any noticeable odours during site walkover?  | No     |  |
| 13. Are any of the following chemicals used on site: fuels, lubricating oils, hydraulic fluids, cleaning solvents, used chemical solutions, acids, anti-corrosive paints, thinners, coal, ash, oily tanks and bilge sludge, metal wastes, wood preservatives, and polyurethane foam? | Yes    | Lubricating oil, solvent                                     |

Site Walkover Checklist

| 1) GENERAL SITE DETAILS  |                                 |
|--|---------------------------------|
| Site Owner/ Client   | Anderson Concrete Ltd. (ARQ-07) |
| Property Address   | Anderson Road                   |
| Person Conducting the Questionnaire (name & position)                                | Jacky Chan and Arnold Lee       |
| Authorised Owner/ Client Representative (if applicable) (name, position & telephone) | David Lee                       |

| 2) ACTIVITIES  |             |
|--|-------------|
| Briefly describe activities carried out on site, including types of products/chemicals/materials handled.<br><b>Obtain a flow schematic if possible.</b> |             |
| Number of employees:   |             |
| - Full-time:   | 71          |
| - Part-time:   | N/A         |
| - Temporary/Seasonal:  | N/A         |
| Maximum no. of people on site at any time:   | 71          |
| Typical hours of operation:  | 0700 - 1900 |
| Number of shifts:  | 2 shifts    |
| Days per week:   | 6 days      |
| Weeks per year:  | 52 weeks    |
| Scheduled plant shut-down:   | June 2016   |
| Detail the main sources of energy at the site:   |             |
| Gas (Yes/No)   | No          |
| Electricity (Yes/No)   | Yes         |
| Coal (Yes/No)  | No          |
| Oil (Yes/No)   | No          |
| Other (Yes/No)   | No          |

Site Walkover Checklist

| 3) SITE DESCRIPTION  |  |
|--|--|
| This section is intended to gather information on site setting and environmental receptors on, adjacent or close to the site.    |  |
| What is the total site area:   | 2,517m <sup>2</sup>  |
| What area of the site is covered by buildings (%):   | 60%  |
| Please list all current and previous owners/occupiers if possible.   | Previous Owner: K. Wah Quarry Ltd.   |
| Is a site plan available? (Yes/No)<br>If yes, please attach.   | No   |
| Are there any other parties on site as tenants or sub-tenants? (Yes/No)<br>If yes, identify those parties.                       | No   |
| Describe surrounding land use (residential, industrial, rural, etc.) and identify neighbouring facilities and types of industry. |  |
| North:   | Quarry site  |
| South:   | Quarry site  |
| East:  | Quarry site  |
| West:  | Anderson Road  |
| Describe the topography of the area (flat terrain, rolling hills, mountains, by a large body of water, vegetation, etc.).        | Flat terrain, fill materials   |
| State the size and location of the nearest residential communities.  | - Shun Chi Estate, Shun Tin Estate, Shun On Estate, Shun Lee Estate to the west;<br>- Sau Mau Ping Estate and Sau Mau Ping South Estate to the southwest; and<br>- Po Tat Estate to the south. |
| Are there any sensitive habitats nearby, such as nature reserves, parks, wetlands, or sites of special scientific interest?      | No   |

Site Walkover Checklist

| 4) QUESTIONNAIRE WITH EXISTING/ PREVIOUS SITE OWNER OR OCCUPIER  |        |   |
|--|--------|---|
|  | Yes/No | Notes   |
| 1. What are the main activities/operations at the above address?   | Yes    | Site vehicle and equipment maintenance                          |
| 2. How long have you been occupying the site?  | --     | Over 10 years   |
| 3. Were you the first occupant on site? (If yes, what was the usage of the site prior to occupancy.)   | Yes    | Quarry site   |
| 4. Prior to your occupancy, who occupied the site?   | --     | K.Wah Quarry Ltd.   |
| 5. What were the main activities/operations during their occupancy?  | --     | Quarry site   |
| 6. Have there been any major changes in operations carried out at the site in the last 10 years?   | No     |   |
| 7. Have any polluting activities been carried out in the vicinity of the site in the past?   | No     |   |
| 8. To the best of your knowledge, has the site ever been used as a petrol filling station/car service garage?  | No     |   |
| 9. Are there any boreholes/wells or natural springs either on the site or in the surrounding area?   | No     |   |
| 10. Do you have any registered hazardous installations as defined under relevant ordinances? (If yes, please provide details.)                               | Yes    | Chemical waste storage room                                     |
| 11. Are any chemicals used in your daily operations? (If yes, please provide details.)   | Yes    | Lubricants, grease and solvents                                 |
| - Where do you store these chemicals?  |        | Chemical storage area within the workshop                       |
| 12. Material inventory lists, including quantities and locations available? (If yes, how often are these inventories updated?)                               | No     |   |
| 13. Has the facility produced a separate hazardous substance inventory?  | No     |   |
| 14. Have there ever been any incidents or accidents (e.g. spills, fires, injuries, etc.) involving any of these materials? (If yes, please provide details.) | No     | No records of incidents   |
| 15. How are materials received (e.g. rail, truck, etc.) and stored on site (e.g. drums, tanks, carboys, bays, silos, cisterns, vaults and cylinders)?        | --     | The materials was received by truck, stored on site using drums |

Site Walkover Checklist

| 4) QUESTIONNAIRE WITH EXISTING/ PREVIOUS SITE OWNER OR OCCUPIER (CONTINUED)  |        |   |
|--|--------|---|
|  | Yes/No | Notes   |
| 16. Do you have any underground storage tanks? (If yes, please provide details.)<br>- How many underground storage tanks do you have on site?<br>- What are the tanks constructed of?<br>- What are the contents of these tanks?<br>- Are the pipelines above or below ground?<br>- If the pipelines are below ground, has any leak and integrity testing been performed?<br>- Have there been any spills associated with these tanks? | No     |   |
| 17. Are there any disused underground storage tanks?   | No     |   |
| 18. Do you have regular check for any spillage and monitoring of chemicals handled? (If yes, please provide details.)  | No     |   |
| 19. How are the wastes disposed of?  | --     | Chemical waste collected by the licence collector |
| 20. Have you ever received any notices of violation of environmental regulations or received public complains? (If yes, please provide details.)   | No     |   |
| 21. Have any spills occurred on site? (If yes, please provide details)<br>- When did the spill occur?<br>- What were the substances spilled?<br>- What was the quantity of material spilled?<br>- Did you notify the relevant departments of the spill?<br>- What were the actions taken to clean up the spill?<br>- What were the areas affected?   | No     |   |
| 22. Do you have any records of major renovation of your site or re-arrangement of underground utilities, pipe work/underground tanks? (If yes, please provide details.)  | No     |   |
| 23. Have disused underground tanks been removed or otherwise secured (e.g. concrete, sand, etc.)?  | No     |   |
| 24. Are there any known contaminations on site? (If yes, please provide details.)  | No     |   |
| 25. Has the site ever been remediated? (If yes, please provide details.)   | No     |   |

Site Walkover Checklist

| 5) OBSERVATIONS  |        |   |
|--|--------|---|
|  | Yes/No | Notes   |
| 1. Are chemical storage areas provided with secondary containment (i.e. bund walls and floors)?  | Yes    | Drip tray is used                                   |
| 2. What are the conditions of the bund walls and floors?   | --     | Good condition and intact, no oil stain             |
| 3. Are any surface water drains located near to drum storage and unloading areas?  | No     |   |
| 4. Are any solid or liquid waste (other than wastewater) generated at the site? (If yes, please provide details.)  | Yes    | Waste lubricant oil, solvents                       |
| 5. Is there a storage site for the wastes?   | Yes    | Chemical waste storage area in maintenance workshop |
| 6. Is there an on-site landfill?   | No     |   |
| 7. Were any stressed vegetation noted on site during the site reconnaissance? (If yes, please indicate location and approximate size.)   | No     |   |
| 8. Were any stained surfaces noted on-site during the site reconnaissance? (If yes, please provide details.)   | No     |   |
| 9. Are there any potential off-site sources of contamination?  | No     |   |
| 10. Does the site have any equipment which might contain polychlorinated biphenyls (PCBs)?   | No     |   |
| 11. Are there any sumps, effluent pits, interceptors or lagoons on site?   | No     |   |
| 12. Any noticeable odours during site walkover?  | No     |   |
| 13. Are any of the following chemicals used on site: fuels, lubricating oils, hydraulic fluids, cleaning solvents, used chemical solutions, acids, anti-corrosive paints, thinners, coal, ash, oily tanks and bilge sludge, metal wastes, wood preservatives, and polyurethane foam? | Yes    | Lubricating oil, solvent                            |

Site Walkover Checklist

| 1) GENERAL SITE DETAILS  |   |
|--|---|
| Site Owner/ Client   | Pioneer Asphalt Plant (ARQ-08)  |
| Property Address   | Anderson Road   |
| Person Conducting the Questionnaire (name & position)                                | Jacky Chan and Arnold Lee   |
| Authorised Owner/ Client Representative (if applicable) (name, position & telephone) | N/A (No site occupier or other personnel were met during the site survey) |

| 2) ACTIVITIES  |              |
|--|--------------|
| Briefly describe activities carried out on site, including types of products/chemicals/materials handled.<br><b>Obtain a flow schematic if possible.</b> |              |
| Number of employees:   |              |
| - Full-time:   | N/A          |
| - Part-time:   | N/A          |
| - Temporary/Seasonal:  | N/A          |
| Maximum no. of people on site at any time:   | N/A          |
| Typical hours of operation:  | N/A          |
| Number of shifts:  | N/A          |
| Days per week:   | N/A          |
| Weeks per year:  | N/A          |
| Scheduled plant shut-down:   | January 2013 |
| Detail the main sources of energy at the site:   |              |
| Gas (Yes/No)   | No           |
| Electricity (Yes/No)   | Yes          |
| Coal (Yes/No)  | No           |
| Oil (Yes/No)   | Diesel       |
| Other (Yes/No)   | No           |

**Site Walkover Checklist**

| 3) SITE DESCRIPTION  |  |
|--|--|
| This section is intended to gather information on site setting and environmental receptors on, adjacent or close to the site.  |  |
| What is the total site area:   | 8,581 m <sup>2</sup>   |
| What area of the site is covered by buildings (%):   | 45%  |
| Please list all current and previous owners/occupiers if possible.   | Previous Owner: K. Wah Quarry Ltd.   |
| Is a site plan available? (Yes/No)<br>If yes, please attach.   | No   |
| Are there any other parties on site as tenants or sub-tenants? (Yes/No)<br>If yes, identify those parties.   | No   |
| Describe surrounding land use (residential, industrial, rural, etc.) and identify neighbouring facilities and types of industry.<br><br>North:<br>South:<br>East:<br>West: | Quarry site<br>Quarry site<br>Quarry site<br>Anderson Road   |
| Describe the topography of the area (flat terrain, rolling hills, mountains, by a large body of water, vegetation, etc.).  | Flat terrain, fill materials   |
| State the size and location of the nearest residential communities.  | - Shun Chi Estate, Shun Tin Estate, Shun On Estate, Shun Lee Estate to the west;<br>- Sau Mau Ping Estate and Sau Mau Ping South Estate to the southwest; and<br>- Po Tat Estate to the south. |
| Are there any sensitive habitats nearby, such as nature reserves, parks, wetlands, or sites of special scientific interest?  | No   |

**Site Walkover Checklist**

| 4) QUESTIONNAIRE WITH EXISTING/ PREVIOUS SITE OWNER OR OCCUPIER  |        |  |
|--|--------|--|
|  | Yes/No | Notes  |
| 1. What are the main activities/operations at the above address?   | Yes    | Asphalt plant (Abandoned)  |
| 2. How long have you been occupying the site?  | --     |  |
| 3. Were you the first occupant on site? (If yes, what was the usage of the site prior to occupancy.)   | Yes    | Quarry site  |
| 4. Prior to your occupancy, who occupied the site?   | --     | K.Wah Quarry Ltd.  |
| 5. What were the main activities/operations during their occupancy?  | --     | Quarry site  |
| 6. Have there been any major changes in operations carried out at the site in the last 10 years?   | No     |  |
| 7. Have any polluting activities been carried out in the vicinity of the site in the past?   | No     |  |
| 8. To the best of your knowledge, has the site ever been used as a petrol filling station/car service garage?  | --     |  |
| 9. Are there any boreholes/wells or natural springs either on the site or in the surrounding area?   | No     |  |
| 10. Do you have any registered hazardous installations as defined under relevant ordinances? (If yes, please provide details.)                               | Yes    | Chemical waste storage room  |
| 11. Are any chemicals used in your daily operations? (If yes, please provide details.)<br><br>- Where do you store these chemicals?                          | Yes    | Lubricants, grease and solvents<br>Chemical storage area within the site |
| 12. Material inventory lists, including quantities and locations available? (If yes, how often are these inventories updated?)                               | --     |  |
| 13. Has the facility produced a separate hazardous substance inventory?  | --     |  |
| 14. Have there ever been any incidents or accidents (e.g. spills, fires, injuries, etc.) involving any of these materials? (If yes, please provide details.) | No     | No records of incidents (from EPD's record)                              |
| 15. How are materials received (e.g. rail, truck, etc.) and stored on site (e.g. drums, tanks, carboys, bays, silos, cisterns, vaults and cylinders)?        | --     |  |

Site Walkover Checklist

| 4) QUESTIONNAIRE WITH EXISTING/ PREVIOUS SITE OWNER OR OCCUPIER (CONTINUED)  |        |                   |
|--|--------|-------------------|
|  | Yes/No | Notes             |
| 16. Do you have any underground storage tanks? (If yes, please provide details.)<br>- How many underground storage tanks do you have on site?<br>- What are the tanks constructed of?<br>- What are the contents of these tanks?<br>- Are the pipelines above or below ground?<br>- If the pipelines are below ground, has any leak and integrity testing been performed?<br>- Have there been any spills associated with these tanks? | No     |                   |
| 17. Are there any disused underground storage tanks?   | --     |                   |
| 18. Do you have regular check for any spillage and monitoring of chemicals handled? (If yes, please provide details.)  | --     |                   |
| 19. How are the wastes disposed of?  | --     |                   |
| 20. Have you ever received any notices of violation of environmental regulations or received public complains? (If yes, please provide details.)   | --     |                   |
| 21. Have any spills occurred on site? (If yes, please provide details)<br>- When did the spill occur?<br>- What were the substances spilled?<br>- What was the quantity of material spilled?<br>- Did you notify the relevant departments of the spill?<br>- What were the actions taken to clean up the spill?<br>- What were the areas affected?   | No     | From EPD's record |
| 22. Do you have any records of major renovation of your site or re-arrangement of underground utilities, pipe work/underground tanks? (If yes, please provide details.)  | --     |                   |
| 23. Have disused underground tanks been removed or otherwise secured (e.g. concrete, sand, etc.)?  | --     |                   |
| 24. Are there any known contaminations on site? (If yes, please provide details.)  | --     |                   |
| 25. Has the site ever been remediated? (If yes, please provide details.)   | --     |                   |

Site Walkover Checklist

| 5) OBSERVATIONS  |        |   |
|--|--------|---|
|  | Yes/No | Notes                                       |
| 1. Are chemical storage areas provided with secondary containment (i.e. bund walls and floors)?  | Yes    | Drip tray is used                           |
| 2. What are the conditions of the bund walls and floors?   | --     | Have oil stain                              |
| 3. Are any surface water drains located near to drum storage and unloading areas?  | No     |   |
| 4. Are any solid or liquid waste (other than wastewater) generated at the site? (If yes, please provide details.)  | Yes    | Waste lubricant oil, solvents               |
| 5. Is there a storage site for the wastes?   | Yes    | Chemical waste storage area within the site |
| 6. Is there an on-site landfill?   | No     |   |
| 7. Were any stressed vegetation noted on site during the site reconnaissance? (If yes, please indicate location and approximate size.)   | No     |   |
| 8. Were any stained surfaces noted on-site during the site reconnaissance? (If yes, please provide details.)   | No     |   |
| 9. Are there any potential off-site sources of contamination?  | No     |   |
| 10. Does the site have any equipment which might contain polychlorinated biphenyls (PCBs)?   | No     |   |
| 11. Are there any sumps, effluent pits, interceptors or lagoons on site?   | No     |   |
| 12. Any noticeable odours during site walkover?  | No     |   |
| 13. Are any of the following chemicals used on site: fuels, lubricating oils, hydraulic fluids, cleaning solvents, used chemical solutions, acids, anti-corrosive paints, thinners, coal, ash, oily tanks and bilge sludge, metal wastes, wood preservatives, and polyurethane foam? | --     |   |

**Site Walkover Checklist**

| 1) GENERAL SITE DETAILS  |                                 |
|--|---------------------------------|
| Site Owner/ Client   | Anderson Concrete Ltd. (ARQ-09) |
| Property Address   | Anderson Road                   |
| Person Conducting the Questionnaire (name & position)                                | Jacky Chan and Arnold Lee       |
| Authorised Owner/ Client Representative (if applicable) (name, position & telephone) | David Lee                       |

| 2) ACTIVITIES  |     |
|--|-----|
| Briefly describe activities carried out on site, including types of products/chemicals/materials handled.<br><b>Obtain a flow schematic if possible.</b> |     |
| Number of employees:   |     |
| - Full-time:   | N/A |
| - Part-time:   | N/A |
| - Temporary/Seasonal:  | N/A |
| Maximum no. of people on site at any time:   | N/A |
| Typical hours of operation:  | N/A |
| Number of shifts:  | N/A |
| Days per week:   | N/A |
| Weeks per year:  | N/A |
| Scheduled plant shut-down:   | N/A |
| Detail the main sources of energy at the site:   |     |
| Gas (Yes/No)   | N/A |
| Electricity (Yes/No)   | N/A |
| Coal (Yes/No)  | N/A |
| Oil (Yes/No)   | N/A |
| Other (Yes/No)   | N/A |

**Site Walkover Checklist**

| 3) SITE DESCRIPTION  |  |
|--|--|
| This section is intended to gather information on site setting and environmental receptors on, adjacent or close to the site.    |  |
| What is the total site area:   | 12,881 m <sup>2</sup>  |
| What area of the site is covered by buildings (%):   | 0%   |
| Please list all current and previous owners/occupiers if possible.   | Previous Owner: K. Wah Quarry Ltd.   |
| Is a site plan available? (Yes/No)<br>If yes, please attach.   | No   |
| Are there any other parties on site as tenants or sub-tenants? (Yes/No)<br>If yes, identify those parties.                       | No   |
| Describe surrounding land use (residential, industrial, rural, etc.) and identify neighbouring facilities and types of industry. |  |
| North:   | Quarry site  |
| South:   | Anderson Road  |
| East:  | Quarry site  |
| West:  | Quarry site  |
| Describe the topography of the area (flat terrain, rolling hills, mountains, by a large body of water, vegetation, etc.).        | Flat terrain, rock   |
| State the size and location of the nearest residential communities.  | - Shun Chi Estate, Shun Tin Estate, Shun On Estate, Shun Lee Estate to the west;<br>- Sau Mau Ping Estate and Sau Mau Ping South Estate to the southwest; and<br>- Po Tat Estate to the south. |
| Are there any sensitive habitats nearby, such as nature reserves, parks, wetlands, or sites of special scientific interest?      | No   |



Site Walkover Checklist

| 4) QUESTIONNAIRE WITH EXISTING/ PREVIOUS SITE OWNER OR OCCUPIER  |        |                         |
|--|--------|-------------------------|
|  | Yes/No | Notes                   |
| 1. What are the main activities/operations at the above address?   | Yes    | Car park                |
| 2. How long have you been occupying the site?  | --     |                         |
| 3. Were you the first occupant on site? (If yes, what was the usage of the site prior to occupancy.)   | Yes    | Quarry site             |
| 4. Prior to your occupancy, who occupied the site?   | --     | K.Wah Quarry Ltd.       |
| 5. What were the main activities/operations during their occupancy?  | --     | Quarry site             |
| 6. Have there been any major changes in operations carried out at the site in the last 10 years?   | Yes    | Quarry site             |
| 7. Have any polluting activities been carried out in the vicinity of the site in the past?   | No     |                         |
| 8. To the best of your knowledge, has the site ever been used as a petrol filling station/car service garage?  | No     |                         |
| 9. Are there any boreholes/wells or natural springs either on the site or in the surrounding area?   | No     |                         |
| 10. Do you have any registered hazardous installations as defined under relevant ordinances? (If yes, please provide details.)                               | No     |                         |
| 11. Are any chemicals used in your daily operations? (If yes, please provide details.)   | No     |                         |
| - Where do you store these chemicals?  |        |                         |
| 12. Material inventory lists, including quantities and locations available? (If yes, how often are these inventories updated?)                               | No     |                         |
| 13. Has the facility produced a separate hazardous substance inventory?  | No     |                         |
| 14. Have there ever been any incidents or accidents (e.g. spills, fires, injuries, etc.) involving any of these materials? (If yes, please provide details.) | No     | No records of incidents |
| 15. How are materials received (e.g. rail, truck, etc.) and stored on site (e.g. drums, tanks, carboys, bays, silos, cisterns, vaults and cylinders)?        | No     |                         |

Site Walkover Checklist

| 4) QUESTIONNAIRE WITH EXISTING/ PREVIOUS SITE OWNER OR OCCUPIER (CONTINUED)  |        |       |
|--|--------|-------|
|  | Yes/No | Notes |
| 16. Do you have any underground storage tanks? (If yes, please provide details.)<br>- How many underground storage tanks do you have on site?<br>- What are the tanks constructed of?<br>- What are the contents of these tanks?<br>- Are the pipelines above or below ground?<br>- If the pipelines are below ground, has any leak and integrity testing been performed?<br>- Have there been any spills associated with these tanks? | No     |       |
| 17. Are there any disused underground storage tanks?   | No     |       |
| 18. Do you have regular check for any spillage and monitoring of chemicals handled? (If yes, please provide details.)  | No     |       |
| 19. How are the wastes disposed of?  | No     |       |
| 20. Have you ever received any notices of violation of environmental regulations or received public complains? (If yes, please provide details.)   | No     |       |
| 21. Have any spills occurred on site? (If yes, please provide details)<br>- When did the spill occur?<br>- What were the substances spilled?<br>- What was the quantity of material spilled?<br>- Did you notify the relevant departments of the spill?<br>- What were the actions taken to clean up the spill?<br>- What were the areas affected?   | No     |       |
| 22. Do you have any records of major renovation of your site or re-arrangement of underground utilities, pipe work/underground tanks? (If yes, please provide details.)  | No     |       |
| 23. Have disused underground tanks been removed or otherwise secured (e.g. concrete, sand, etc.)?  | No     |       |
| 24. Are there any known contaminations on site? (If yes, please provide details.)  | No     |       |
| 25. Has the site ever been remediated? (If yes, please provide details.)   | No     |       |

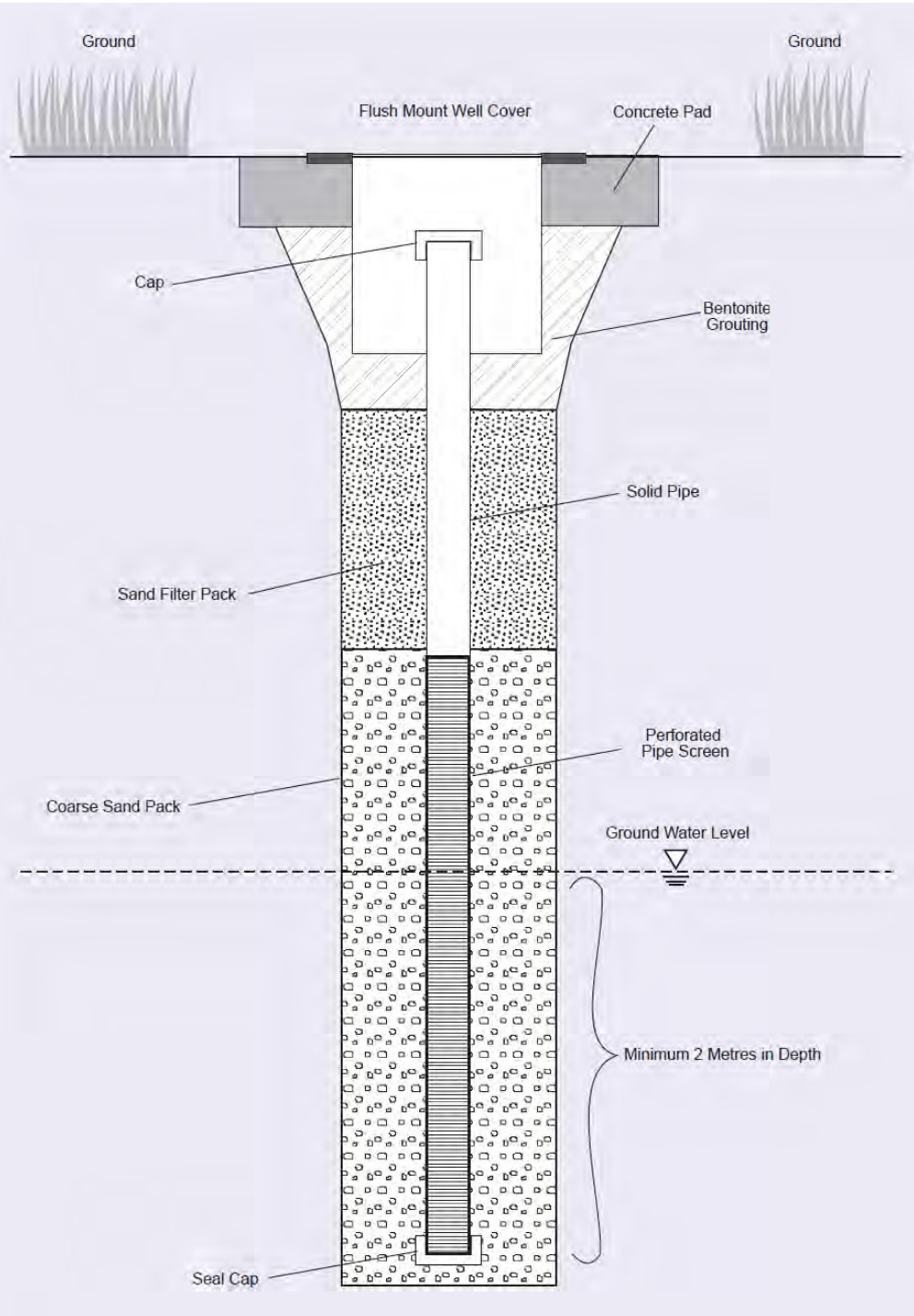
Site Walkover Checklist

| 5) OBSERVATIONS  |        |       |
|--|--------|-------|
|  | Yes/No | Notes |
| 1. Are chemical storage areas provided with secondary containment (i.e. bund walls and floors)?  | N/A    |       |
| 2. What are the conditions of the bund walls and floors?   | N/A    |       |
| 3. Are any surface water drains located near to drum storage and unloading areas?  | No     |       |
| 4. Are any solid or liquid waste (other than wastewater) generated at the site? (If yes, please provide details.)  | N/A    |       |
| 5. Is there a storage site for the wastes?   | No     |       |
| 6. Is there an on-site landfill?   | No     |       |
| 7. Were any stressed vegetation noted on site during the site reconnaissance? (If yes, please indicate location and approximate size.)   | No     |       |
| 8. Were any stained surfaces noted on-site during the site reconnaissance? (If yes, please provide details.)   | No     |       |
| 9. Are there any potential off-site sources of contamination?  | No     |       |
| 10. Does the site have any equipment which might contain polychlorinated biphenyls (PCBs)?   | No     |       |
| 11. Are there any sumps, effluent pits, interceptors or lagoons on site?   | No     |       |
| 12. Any noticeable odours during site walkover?  | No     |       |
| 13. Are any of the following chemicals used on site: fuels, lubricating oils, hydraulic fluids, cleaning solvents, used chemical solutions, acids, anti-corrosive paints, thinners, coal, ash, oily tanks and bilge sludge, metal wastes, wood preservatives, and polyurethane foam? | No     |       |

**Appendix F**

**Groundwater Monitoring Well**

Schematic drawing of groundwater monitoring well



Source: Practice Guide for Investigation and Remediation of Contaminated Land, EPD, Aug. 2011

**Appendix G**

**Risk-Based Remediation Goals Criteria**

**Risk-Based Remediation Goals (RBRGs) for Soil & Soil Saturation Limit**

| Chemical                       | RBRGs for Soil & Soil Saturation Limit |                           |                    |                      |                                      |
|--------------------------------|--|---------------------------|--------------------|----------------------|--------------------------------------|
|                                | Urban Residential (mg/kg)              | Rural Residential (mg/kg) | Industrial (mg/kg) | Public Parks (mg/kg) | Soil Saturation Limit (Csat) (mg/kg) |
| <b>VOCs</b>                    |  |                           |                    |                      |                                      |
| Acetone                        | 9.59E+03                               | 4.26E+03                  | 1.00E+04*          | 1.00E+04*            | ***                                  |
| Benzene                        | 7.04E-01                               | 2.79E-01                  | 9.21E+00           | 4.22E+01             | 3.36E+02                             |
| Ethylbenzene                   | 7.09E+02                               | 2.98E+02                  | 8.24E+03           | 1.00E+04*            | 1.38E+02                             |
| Methyl Tert-Butyl Ether        | 6.88E+00                               | 2.80E+00                  | 7.01E+01           | 5.05E+02             | 2.38E+03                             |
| Toluene                        | 1.44E+03                               | 7.05E+02                  | 1.00E+04*          | 1.00E+04*            | 2.35E+02                             |
| Trichloroethene                | 5.23E-01                               | 2.11E-01                  | 5.68E+00           | 6.94E+01             | 4.88E+02                             |
| Xylenes (total)                | 9.50E+01                               | 3.68E+01                  | 1.23E+03           | 1.00E+04*            | 1.50E+02                             |
| <b>SVOCs</b>                   |  |                           |                    |                      |                                      |
| Acenaphthene                   | 3.51E+03                               | 3.28E+03                  | 1.00E+04*          | 1.00E+04*            | 6.02E+01                             |
| Acenaphthylene                 | 2.34E+03                               | 1.51E+03                  | 1.00E+04*          | 1.00E+04*            | 1.98E+01                             |
| Anthracene                     | 1.00E+04*                              | 1.00E+04*                 | 1.00E+04*          | 1.00E+04*            | 2.56E+00                             |
| Benzo(a)anthracene             | 1.20E+01                               | 1.14E+01                  | 9.18E+01           | 3.83E+01             |                                      |
| Benzo(a)pyrene                 | 1.20E+00                               | 1.14E+00                  | 9.18E+00           | 3.83E+00             |                                      |
| Benzo(b)fluoranthene           | 9.88E+00                               | 1.01E+01                  | 1.78E+01           | 2.04E+01             |                                      |
| Benzo(g,h,i)perylene           | 1.80E+03                               | 1.71E+03                  | 1.00E+04*          | 5.74E+03             |                                      |
| Benzo(k)fluoranthene           | 1.20E+02                               | 1.14E+02                  | 9.18E+02           | 3.83E+02             |                                      |
| Chrysene                       | 8.71E+02                               | 9.19E+02                  | 1.14E+03           | 1.54E+03             |                                      |
| Dibenzo(a,h)anthracene         | 1.20E+00                               | 1.14E+00                  | 9.18E+00           | 3.83E+00             |                                      |
| Fluoranthene                   | 2.40E+03                               | 2.27E+03                  | 1.00E+04*          | 7.62E+03             |                                      |
| Fluorene                       | 2.38E+03                               | 2.25E+03                  | 1.00E+04*          | 7.45E+03             | 5.47E+01                             |
| Indeno(1,2,3-cd)pyrene         | 1.20E+01                               | 1.14E+01                  | 9.18E+01           | 3.83E+01             |                                      |
| Naphthalene                    | 1.82E+02                               | 8.56E+01                  | 4.53E+02           | 9.14E+02             | 1.25E+02                             |
| Phenanthrene                   | 1.00E+04*                              | 1.00E+04*                 | 1.00E+04*          | 1.00E+04*            | 2.80E+01                             |
| Pyrene                         | 1.80E+03                               | 1.71E+03                  | 1.00E+04*          | 5.72E+03             |                                      |
| Hexachlorobenzene              | 2.43E-01                               | 2.20E-01                  | 5.82E-01           | 7.13E-01             |                                      |
| Bis-(2-Ethylhexyl)phthalate    | 3.00E+01                               | 2.80E+01                  | 9.18E+01           | 9.42E+01             |                                      |
| Phenol                         | 1.00E+04*                              | 1.00E+04*                 | 1.00E+04*          | 1.00E+04*            | 7.26E+03                             |
| <b>Metals</b>                  |  |                           |                    |                      |                                      |
| Arsenic                        | 2.21E+01                               | 2.18E+01                  | 1.96E+02           | 7.35E+01             |                                      |
| Cadmium                        | 7.38E+01                               | 7.28E+01                  | 6.53E+02           | 2.45E+02             |                                      |
| Lead                           | 2.58E+02                               | 2.55E+02                  | 2.29E+03           | 8.57E+02             |                                      |
| Copper                         | 2.95E+03                               | 2.91E+03                  | 1.00E+04*          | 9.79E+03             |                                      |
| Manganese                      | 1.00E+04*                              | 1.00E+04*                 | 1.00E+04*          | 1.00E+04*            |                                      |
| Nickel                         | 1.48E+03                               | 1.46E+03                  | 1.00E+04*          | 4.90E+03             |                                      |
| Zinc                           | 1.00E+04*                              | 1.00E+04*                 | 1.00E+04*          | 1.00E+04*            |                                      |
| Mercury                        | 1.10E+01                               | 6.52E+00                  | 3.84E+01           | 4.56E+01             |                                      |
| Chromium III                   | 1.00E+04*                              | 1.00E+04*                 | 1.00E+04*          | 1.00E+04*            |                                      |
| Chromium VI                    | 2.21E+02                               | 2.18E+02                  | 1.96E+03           | 7.35E+02             |                                      |
| <b>PCBs</b>                    |  |                           |                    |                      |                                      |
| PCBs                           | 2.36E-01                               | 2.26E-01                  | 7.48E-01           | 7.56E-01             |                                      |
| <b>Petroleum Carbon Ranges</b> |  |                           |                    |                      |                                      |
| C6-C8                          | 1.41E+03                               | 5.45E+02                  | 1.00E+04*          | 1.00E+04*            | 1.00E+03                             |
| C9-C16                         | 2.24E+03                               | 1.33E+03                  | 1.00E+04*          | 1.00E+04*            | 3.00E+03                             |
| C17-C35                        | 1.00E+04*                              | 1.00E+04*                 | 1.00E+04*          | 1.00E+04*            | 5.00E+03                             |

Note:

\* Indicates a 'ceiling limit' concentration

\*\*\* Indicates that the solubility limit exceeds the 'ceiling limit' therefore the RBRG applies

**Risk-Based Remediation Goals (RBRGs) for Groundwater & Solubility Limit**

| Chemical                       | RBRGs for Groundwater and Solubility Limit |                          |                   |                         |
|--------------------------------|--|--------------------------|-------------------|-------------------------|
|                                | Urban Residential (mg/L)                   | Rural Residential (mg/L) | Industrial (mg/L) | Solubility Limit (mg/L) |
| <b>VOCs</b>                    |  |                          |                   |                         |
| Acetone                        | 1.00E+04*                                  | 1.00E+04*                | 1.00E+04*         | ***                     |
| Benzene                        | 3.86E+00                                   | 1.49E+00                 | 5.40E+01          | 1.75E+03                |
| Ethylbenzene                   | 1.02E+03                                   | 3.91E+02                 | 1.00E+04*         | 1.69E+02                |
| Methyl Tert-Butyl Ether        | 1.53E+02                                   | 6.11E+01                 | 1.81E+03          | ***                     |
| Toluene                        | 5.11E+03                                   | 1.97E+03                 | 1.00E+04*         | 5.26E+02                |
| Trichloroethene                | 1.21E+00                                   | 4.81E-01                 | 1.42E+01          | 1.10E+03                |
| Xylenes (total)                | 1.12E+02                                   | 4.33E+01                 | 1.57E+03          | 1.75E+02                |
| <b>SVOCs</b>                   |  |                          |                   |                         |
| Acenaphthene                   | 1.00E+04*                                  | 7.09E+03                 | 1.00E+04*         | 4.24E+00                |
| Acenaphthylene                 | 1.41E+03                                   | 5.42E+02                 | 1.00E+04*         | 3.93E+00                |
| Anthracene                     | 1.00E+04*                                  | 1.00E+04                 | 1.00E+04*         | 4.34E-02                |
| Benzo(a)anthracene             |  |                          |                   |                         |
| Benzo(a)pyrene                 |  |                          |                   |                         |
| Benzo(b)fluoranthene           | 5.39E-01                                   | 2.03E-01                 | 7.53E+00          | 1.50E-03                |
| Benzo(g,h,i)perylene           |  |                          |                   |                         |
| Benzo(k)fluoranthene           |  |                          |                   |                         |
| Chrysene                       | 5.81E+01                                   | 2.19E+01                 | 8.12E+02          | 1.60E-03                |
| Dibenzo(a,h)anthracene         |  |                          |                   |                         |
| Fluoranthene                   | 1.00E+04*                                  | 1.00E+04*                | 1.00E+04*         | 2.06E-01                |
| Fluorene                       | 1.00E+04*                                  | 1.00E+04*                | 1.00E+04*         | 1.98E+00                |
| Indeno(1,2,3-cd)pyrene         |  |                          |                   |                         |
| Naphthalene                    | 6.17E+01                                   | 2.37E+01                 | 8.62E+02          | 3.10E+01                |
| Phenanthrene                   | 1.00E+04*                                  | 1.00E+04*                | 1.00E+04*         | 1.00E+00                |
| Pyrene                         | 1.00E+04*                                  | 1.00E+04*                | 1.00E+04*         | 1.35E-01                |
| Hexachlorobenzene              | 5.89E-02                                   | 2.34E-02                 | 6.95E-01          | 6.20E+00                |
| Bis-(2-Ethylhexyl)phthalate    |  |                          |                   |                         |
| Phenol                         |  |                          |                   |                         |
| <b>Metals</b>                  |  |                          |                   |                         |
| Arsenic                        |  |                          |                   |                         |
| Cadmium                        |  |                          |                   |                         |
| Lead                           |  |                          |                   |                         |
| Copper                         |  |                          |                   |                         |
| Manganese                      |  |                          |                   |                         |
| Nickel                         |  |                          |                   |                         |
| Zinc                           |  |                          |                   |                         |
| Mercury                        | 4.86E-01                                   | 1.84E-01                 | 6.79E+00          |                         |
| Chromium III                   |  |                          |                   |                         |
| Chromium VI                    |  |                          |                   |                         |
| <b>PCBs</b>                    |  |                          |                   |                         |
| PCBs                           | 4.33E-01                                   | 1.71E-01                 | 5.11E+00          | 3.10E-02                |
| <b>Petroleum Carbon Ranges</b> |  |                          |                   |                         |
| C6-C8                          | 8.22E+01                                   | 3.17E+01                 | 1.15E+03          | 5.23E+00                |
| C9-C16                         | 7.14E+02                                   | 2.76E+02                 | 9.98E+03          | 2.80E+00                |
| C17-C35                        | 1.28E+01                                   | 4.93E+00                 | 1.78E+02          | 2.80E+00                |

Note:

\* Indicates a 'ceiling limit' concentration

\*\*\* Indicates that the solubility limit exceeds the 'ceiling limit' therefore the RBRG applies

**Appendix H**  
**Responses to Comments**

| Comments received: |  | Arup Responses:   |
|--------------------|--|---|
| (1)                | <p><b>From</b> Project Division (1), New Territories East Development Office, CEDD</p> <p><b>Ref :</b> ( ) in NTE-JB 2/0/122-9</p> <p><b>Date:</b> 24 July 2013</p> <p>No comment.</p>   | Noted.  |
| (2)                | <p><b>From</b> Kowloon Section (2), Metro Assessment Group, Environmental Assessment Division, EPD</p> <p><b>Ref :</b> (By Email)</p> <p><b>Date:</b> 13 August 2013</p> <p>From the land contamination point of view, we have no comments on the R-to-C. We have the following comments on the revised draft CAP:</p> <p>(i) Section 2.5.3: the last sentence, please note the CAR/RAP was endorsed by EPD in November 2006.</p> <p>(ii) Section 4.3.1: "Water Waste Policy and Science Group" should read "Water Policy and Science Group".</p> <p>(iii) Appendix E, Site Walkover Checklist:</p> <ul style="list-style-type: none"> <li>- Item 13 under 5) Observations of ARQ-04, ARQ-05, ARQ-06 &amp; ARQ-07:<br/>Please check what is the "Lbricating oil, solvent"; and</li> <li>- Site Description: Some of the contents for the "State the size and location of the nearest residential communities" in the table are not clearly shown.</li> </ul> | <p>The text has been revised accordingly.</p> <p>The text has been revised accordingly.</p> <p>The text should read "Lubricating oil, solvent". The text in ARQ-04, ARQ-05, ARQ-06 &amp; ARQ-07 have been revised accordingly.</p> <p>The said content in ARQ-06 is not shown clearly, and the table for ARQ-06 has been revised accordingly.</p> |