

**KCRC EAST RAIL EXTENSIONS
SHEUNG SHUI TO LOK MA CHAU
CONTRACT LCC-206 CONSTRUCTION OF
TBM LAUNCHING SHAFT DIAPHRAGM WALLS**

WASTE MANAGEMENT PLAN

Issue 3

Our Ref. No.: 021418EN20821D

Prepared by:

Calvin K.F. Sze
(Deputy Environmental Team Leader)

Certified by:

John K.M. Ho
(Environmental Team Leader)

Date:

15 November 2002

CONTENTS

1. Introduction
 - 1.1 Management Structure
 - 1.2 Site Layout
 - 1.3 Work Programme
2. Licence Requirement
 - 2.1 Registration as a Waste Producer
 - 2.2 Dumping Licence to Public Dump
3. Statutory Requirement
4. Waste Management Procedures
 - 4.1 Waste Management Hierarchy
 - 4.2 Storage, Collection and Transport of Waste
 - 4.3 Excess Excavated Material
 - 4.4 Construction and Demolition (C&D) Materials
 - 4.5 Chemical Waste
 - 4.6 Dangerous Goods
 - 4.7 Contaminated Soil
 - 4.8 General Refuse
 - 4.9 Waste from Chemical Toilets
 - 4.10 Recommended Mitigation Measures
5. Corrective Action
6. Preventative Action

APPENDICES:

- | | |
|------------|---|
| Appendix 1 | Management Structure |
| Appendix 2 | Site Layout (with waste storage areas highlighted) |
| Appendix 3 | Tentative Works Programme |
| Appendix 4 | Waste Disposal Quantity Forecast Sheet |
| Appendix 5 | Detailed Sampling Locations for Implementation of the RAP |
| Appendix 6 | Sampling Nomenclature System for Hypothetical Drillhole L-DHX |

1. INTRODUCTION

This Waste Management Plan has been prepared in compliance with the statutory requirement of Environmental Impact Assessment Ordinance (Cap 499) and the contract requirement of the Employer – Kowloon-Canton Railway Corporation.

This Waste Management Plan details the spoil disposal arrangement and procedures of Bachy Soletanche Group Limited (BSGL) to be executed on this Project, and shall be reviewed and amended from time to time subject to any changes in disposal arrangement or comment received from the Employer, EPD or the Engineer during the Project period.

The Project team, including Sub-Contractors, shall be kept informed of the requirements of the current BSGL Waste Management Plan and relevant legislation by Managerial and Supervisory personnel.

All staff, employees and Sub-Contractors will be encouraged to become environmentally aware and suggestions will be welcomed from Staff, Workers, Senior Management and the Engineer and Employer to help minimise and reuse/recycle waste.

Under the contract, the scope of works is to construct the perimeter diaphragm for the Tunnel Boring Machine (TBM) launching shaft. Construction activities include pre-drilling, trial panel works, guide wall and diaphragm wall construction, grouting works and slab preparation.

By far the largest volume of waste to be produced in the execution of the Works will be the surplus excavated material from the excavation of the Diaphragm Walls. This is dealt with in detail in section 4.3.

In brief, there is a large volume of granular material (approx. 18,000 m³) to be excavated from the captioned project. In addition there is a gross bulked excavated volume of approximately 158 m³ of contaminated soil (contaminated with TPH). Potential lead contamination was also identified. To minimise the environmental impact on the local surroundings of the necessary disposal of this material, proper disposal and handling measures should be deployed strictly. Contaminated soil shall be delivered to landfill sites by truck. Meanwhile, necessary mitigation measures should be taken in parallel. Mitigation measures should included suitable covering and sealing to prevent spreading of fugitive dust and discharge of wastewater during delivering.

1.1 Management Structure. See Appendix 1

The contract details of personnel responsible for waste management of the project are included. As appointed by Contractor Representatives of Bachy Soletanche Group Limited (BSGL), Mr. Dick Yiu, the Site Agent, will be in charge of BSGL environmental issues. The duties and responsibility of the key staff are:

1.1.1 Project Manager

The Project Manager bears the main responsibilities for the whole project as follows: -

- Liaison with the Engineer and the Client's project representatives

- Regularly reviews with the status, effectiveness and progress of implementation of various environmental plans
- Monitors and reviews the performance of subcontractors
- Ensures proper and timely responses to complaints and comments about quality, environmental and progress of works and implementation of corrective actions
- Implements solutions to non-conformances and corrective / preventive actions

1.1.2 Site Agent

The Site Agent has the liability stated as follows: -

- To establish and maintain QA and Environmental system on site
- To prepare and develop Quality Plans and Environmental Plans, with assistance of subcontractor, for the Project
- To report to the Project Manager the status, effectiveness and progress of implementation of the Quality Plans and Environmental Plans
- To regularly review with Project Manager about the procedures of the Quality and Environmental plans
- To check and monitor subcontractors' QA and Environmental procedures
- To arrange submission of documents to Engineer

1.1.3 Environmental Working Team

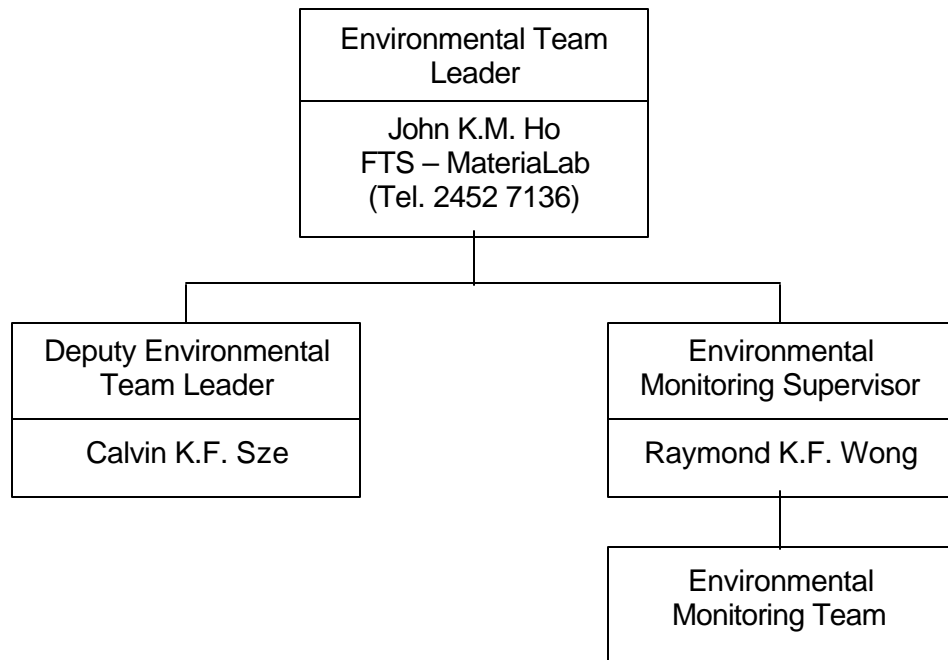
The Environmental Working Team comprising a Site Superintendent and a Foreman bear the main responsibilities for the whole project as follows:

- Ensure works are carried out in accordance with method statement
- Monitor progress and performance of works and report to Construction Manager
- Conduct daily site inspection with regard to waste management issues

1.1.4 Contractor's Environmental Team (CET)

The Contractor's Environmental Team led by Contractor's Environmental Team (ET) Leader and hold a key position on waste management. The organization of the Contractor's Environmental Team is shown in Figure 1.1.

Figure 1.1 Organization Chart of Contractor's Environmental Team



1.1.5 Environmental Team Leader

- Ensuring that the contracts, licences and detailed designs of the Spur Line incorporate the measures recommended in the EIA report;
- Checking that timely implementation of mitigation measures identified in the EIA final report occurs;
- Examining Contractors' rolling works programmes, method statements, licence application and other relevant documentation so as to ensure the best practice would be implemented to generate no unacceptable impacts to the established guidelines/standards;
- Identifying any potential unanticipated or greater than expected impact;
- Formulating any necessary preventative or remedial measures to be actioned for these potential impacts;
- Liaising with the Engineer(s), and Contractors on environmental considerations both regularly and as necessary;
- Implementing the complaints procedures.

1.1.6 Deputy Environmental Team Leader

The role of Deputy Environmental Team Leader is to assist the ET Leader regarding the issues of environmental monitoring and audit works.

1.1.7 Independent Environmental Checker (IEC)

The IEC shall audit the overall waste management programme including the implementation of all environmental mitigation measures and submission required under the Further Environmental Permit.

In addition, the IEC shall be responsible for verifying the environmental acceptability of permanent and temporary works and relevant design plans.

1.1.8 Engineer's Representative (ER(s))

The ER(s) have a key role to play with the waste management, undertaking:

- Site liaison; and
- Ensuring that measures to protect the environment are sufficient, properly and regularly maintained under the Contract.

1.2 Site Layout. See Appendix 2.

1.3 Tentative Works Programme. See Appendix 3.

2. LICENCE REQUIREMENTS

2.1 Registration as a Waste Producer

Under the Waste Disposal (Chemical Waste) (General) Regulation, producers of chemical wastes (including asbestos) must register with the EPD.

There will be waste oils from construction plant and other materials used in the construction. Accordingly we will register as a waste producer.

2.2 Dumping Licence to Public Dump

The Land (Miscellaneous Provisions) Ordinance requires that dumping licences are obtained by individuals or companies who deliver suitable construction wastes to public dumps. The licences are issued by the CED under delegated powers from the Director of Lands. These licences will be applied for as required.

3. STATUTORY REQUIREMENTS

The following legislation and technical circulars relate to the handling, treatment and disposal of wastes in Hong Kong:

- The Waste Disposal Ordinance (Cap 354)
- The Waste Disposal (Chemical Waste) (General) Regulation (Cap 354)
- The Land (Miscellaneous Provisions) Ordinance (Cap 28)
- The Public Health and Municipal Services Ordinance (Cap 132) – Public Cleansing and Prevention of Nuisances (Urban Council) and (Regional Council) By-laws
- Dumping At Sea Ordinance (Cap 466)
- EPD (1999) Guidance Notes for Investigation and Remediation of Contaminated Sites of: Petrol Filling Stations, Boatyards or Car Repair/Dismantling Workshops. Report EPD/TR1/99.
- ProPECC PN 3/94 Practice Note for Professional Persons: Contaminated Land Assessment and Remediation.
- Code of Practice on the Packaging, Labelling and Storage of Chemical Wastes (1992), Environmental Protection Department
- Works Bureau Technical Circular No 5/98, On-site Sorting of Construction Waste on Demolition Site; Works Bureau, HK SAR Government
- Works Bureau Technical Circular No. 21/2002, Trip-ticket System for Disposal of Construction and Demolition Material; Works Bureau, HK SAR Government
- Works Bureau Technical Circular No. 12/2000, Fill Management; Works Bureau, HK SAR Government
- Works Bureau Technical Circular No. 19/2001, Metallic Site Hoardings and Signboards; Works Bureau, HK SAR Government
- Works Bureau Technical Circular No. 12/2002, Specification Facilitating the Use of Recycled Aggregates; Works Bureau, HK SAR Government
- Works Bureau Technical Circular No. 16/1996, Wet Soil in Public Dumps; Works Bureau, HKSAR Government

The Waste Disposal Ordinance (WDO) prohibits the unauthorised disposal of wastes. Construction waste is not directly defined in the WDO but is considered to fall within the category of “Trade Waste”. Under the WDO, wastes can only be disposed of at sites licensed by the EPD.

Under the Waste Disposal (Chemical Waste) (General) Regulation, all producers of chemical wastes (including asbestos) must register with the EPD and treat their wastes, either utilising on-site plant licensed by the EPD, or arranging for a licensed collector to take the wastes to a licensed facility. The regulation also prescribes the storage facilities to be provided on site, including labeling and warning signs, and requires the preparation of written procedures and training to deal with emergencies such as spillages, leakages or accidents arising from the storage of chemical wastes.

The non-inert portion of the Construction and Demolition (C&D) materials should be reused or recycled as far as possible and as the last resort, disposed of at landfills. The inert portion of C&D materials, i.e. public fill, should be reused in earth filling, reclamation or site formation works. Public dumps usually form part of land reclamation schemes operated by the Civil Engineering Department (CED). The Land (Miscellaneous

Provisions) Ordinance requires that dumping licences are obtained by individuals or companies who deliver suitable construction wastes to public dumps. The licences are issued by the CED under delegated powers from the Director of Lands.

The Public Cleansing and Prevention of Nuisances By-Laws provide further controls on the illegal tipping of wastes on unauthorised (unlicensed) sites.

The Dutch List Guidelines states in EPD ProPECC PN 3/94 Contaminated Land Assessment and Remediation used as a general guideline to assess the polluted levels of the potentially contaminated soil.

4. WASTE MANAGEMENT PROCEDURES

4.1 Waste Management Hierarchy

The hierarchy of waste management options is as follows:

- Avoidance and minimisation (not generating waste through changing or improving practices and design and minimising waste by reuse and recycling);
- Reuse of materials, thus avoiding disposal (generally with only limited reprocessing);
- Recovery and recycling, thus avoiding disposal (although reprocessing may be required); and
- Treatment and disposal, according to relevant regulations, guidelines and good practice.

Training and instruction (in the form of Toolbox Talks) of construction workers and staff will be given at the site to increase awareness and draw attention to waste management and other environmental issues and the need to minimise waste generation for both environmental and commercial reasons. This training will be provided monthly by the Section Managers and the Foreman.

4.2 Storage, Collection and Transportation of Waste

Only permitted waste hauliers will be used to collect and transport wastes to the appropriate disposal points. The following measures to minimise adverse environmental impact would be instigated:

- Handle and store wastes in a manner which ensures that they are held securely without loss or leakage, thereby minimising the potential for pollution.
- Use waste hauliers authorised or licensed to collect the specific category of waste. Monitor their performance and ensure materials are handled as required. This will be achieved by ad hoc following of vehicles which leave site by Site Management.
- Trip Tickets System shall be implemented by Site Superintendent for registration and maintaining traceable records of waste disposal comprising excavated spoil, contaminated excavated materials, chemical waste and other waste. This will record vehicle licences; loads carried and time on and off site for each trip leaving site. The records shall be properly kept by the Site Agent.
- Remove wastes in a timely manner (i.e. before the storage areas or containers are full).
- Maintain and clean waste storage areas regularly. The Foreman will review storage areas during his daily site walks.

- Minimise windblown litter and dust during transportation by either covering trucks or transporting wastes in enclosed containers.
- Obtain the necessary waste disposal permits from the appropriate authorities. We anticipate requiring permits in accordance with the following legislation:
 - Waste Disposal Ordinance (Cap 354),
 - Waste Disposal (Chemical Waste) (General) Regulation (Cap 354),
 - Land (Miscellaneous Provisions) Ordinance (Cap 28),Accordingly, registration as Dumping Licence / Admission Ticket to Landfill and Public Filling Area as well as Waste Producer Licence would be applied.
- Monitor that hauliers only dispose of waste at licensed sites. This will be achieved by ad hoc following of vehicles which leave site.
- Develop procedures such as ticketing system to facilitate tracking of loads, particularly for chemical waste, and to ensure that illegal disposal of wastes does not occur; and
- Maintain records of the quantities of wastes generated and disposed for excavated spoil, contaminated excavated materials, chemical waste and other waste. This will record vehicle licences; loads carried and time on and off site for each trip leaving site. The records shall be properly kept by the Site Agent.

4.3 Excess Excavated Material

- The excess excavated materials will be generated from excavation during the diaphragm walls construction. As the nature of construction works, excavated material will not reuse on site.
- The excavation process may also generate contaminated soil, which is detailed in Section 4.7.
- The personnel responsible for the monitoring and management of excavated materials from the construction of diaphragm walls would be Mr. Dick Yiu, the Site Agent.
- Based on the current working programme, the volume of material to be excavated during the construction phase is estimated of the order of 18,000m³. The Waste Disposal Quantify Forecast Sheet is contained in Appendix 4.

- All excavated material (generally good quality granular fill comprising reclamation material) will be temporarily stockpiled on site if space is available. If the material has to be stock piled on site, the stockpile will be covered, sealed or sprayed with water if necessary to prevent dust nuisance. The priority for off-site disposal of excess excavated material shall be as follows:
 1. Transport to other KCRC East Rail sites for reuse;
 2. Transport to other construction sites in Hong Kong SAR for reuse; and
 3. Transport to public filling area.
- Disposal (construction) sites for excess excavated material must be clearly identified with written agreement from the relevant third party. Moreover, assessment of potential environmental impact of such disposal action has to be conducted and the above information has to be submitted to EPD for approval.
- Dewatering of spoil if necessary will be proceeded at spoil pit where wet spoil is undergoing water settling.
- The Contractor shall note that wet soil deposited at public dump may not be suitable for immediate compaction because of their high moisture content. However, direct deposition of such wet soil into filling space below water, or other level agreed by the Project Engineer of the dumping site, will be acceptable. The Contractor shall make resources available and allow his programme for acceptance of wet soil. If suitable filling space is not available, the Contractor shall process or mix the wet soil to make it suitable for use in the permanent work as fill material. Wet soil delivered to the public dump, which in the opinion of the Project Engineer of the dumping site cannot be processed or mixed in a practical manner to make it suitable for use in the permanent work as fill material, shall be disposed of properly by the Contractor in an environmentally acceptable manner as agreed by the Project Engineer.
- We will liaise with other contractors and developers who require fill material during our construction (excavation) period, which will minimise the amount of inert excavated material to be delivered to public filling areas.
- At the time of preparing this Waste Management Plan, all the excess excavated materials is mainly transported to Tuen Mun Area 38 Public Filling Area.
- Material will generally be transported by truck. At the peak excavation period the quantities involved would require 31 trucks per day entering and leaving site. The average would be 16 trucks per day for the period of eight months.
- To mitigate environmental impact from stockpiling of excavated spoil, all stockpiles of aggregate or spoil would be water-sprayed or covered with impervious sheet to minimise wind erosion or wash down during rainy season.

- Estimated quantity of excavated material to be reused in other KCRC East Rail projects and the estimated quantity to be delivered to public filling areas shall be provided subsequently by the KCRC.

4.4 Construction and Demolition (C&D) Materials

C&D materials generated in the project area include concrete slab, bentonite slurry, cement grouts, timber, steel formwork or plastic facing, rubble and steel/metal, scrap, excavated spoil, wrappers, etc.

4.4.1 Construction Waste

- Careful design, planning and good site management shall be maintained to minimise over-ordering and waste of materials such as concrete, bentonite and cement grouts.
- The formwork will be designed to maximise the use of standard timber faced panels so that high reuse levels can be achieved. Alternatives such as steel formwork or plastic facing will be considered for repetitive areas to increase the potential for reuse.
- General construction waste shall be separated into reusable items and materials to be disposed of or recycled. This work will be carried out by the general workforce under the supervision of the foremen and charge hands. It will be conducted at the immediate working area to avoid loss or leakage during handling. For example formwork and timber shall be cleaned for reuse, off-cuts of reinforcement will be sorted into usable lengths and short off cuts stacked for scrap metal.
- Useful materials such as timber, rubble and steel/metal shall be segregated for reuse. Where it is no longer reusable, steel and metal items will be sent as scrap for recycling.
- Segregated materials shall be temporarily stored at designated areas for reuse on site. Steel will be stored at the reinforcement yards, timber at the formwork yard and rubble in a stockpile (either covered or sprayed to control dust). The designated temporary storage location is shown in Site Layout Plan in Appendix 2.
- The Diaphragm walls will be excavated under bentonite slurry. The bentonite will be stored in silos. Used bentonite from the completed panels will be filtered and pumped back into the silos for reuse. The wet solid waste will mix with the in-situ soil prior to be removed to the Public Filling Area. The gross disposal volume of bentonite slurry is about 140m³. The Site Agent will be responsible for the monitoring and management of such waste. We will monitor these works to ensure the correct procedures are followed.
- Any residual materials (such as containers, wrappers or general waste material, etc) shall be collected and placed in skips. These will be transported to the appropriate tips/dumps by licenced waste hauliers (where appropriate).

The dispose of waste at licensed sites by haulier shall be monitored by ad hoc following of vehicles which leave site.

- Inert construction waste such as excavated spoil, bentonite and cement grouts shall be dumped as public fill. Whilst, non-inert construction waste shall be disposed in landfills.

4.4.2 Demolition Waste

- Demolition waste will be generated by the demolition of guide wall or existing roads. The volume of the waste is estimated to be about 500m³. The Site Agent will be responsible for the monitoring and management of the demolition waste. All demolition waste will be disposed off site.
- Useful materials such as steel pipes, reinforcement, shall be collected for recycling as scrap metal. Concrete and rubble shall be segregated for reuse as backfill or for hard standings and site haul roads. This work will be carried out by the general workforce under the supervision of the foremen and charge hands. It will be conducted at the immediate demolition area to avoid loss or leakage during handling.
- Steel scrap materials including steel bars and pipes will be used as far as possible. It is estimated that 120 ton of scrap steel bars and pipes will be generated, of which 20 tons will be reused. The Waste Disposal Quantity Forecast Sheet is contained in Appendix 4.
- Materials containing Asbestos are not anticipated during demolition. However if suspect material is encountered, the following procedure shall be followed:
 - The demolition work shall be stopped immediately.
 - The asbestos containing material and suspect material shall be maintained in good condition to prevent further release of asbestos fibres.
 - A registered asbestos consultant shall be employed to carry out investigation.
 - A registered asbestos laboratory shall be appointed to perform asbestos sampling, identification and measurement.
 - A registered asbestos removal contractor shall be commissioned to carry out the removal work if the presence of asbestos is confirmed.
 - Inert demolition waste such as concrete slab shall be dumped as public fill. Whilst, non-inert demolition waste shall be disposed in landfill.
- Amount of inert and non-inert portion of C&D material and also the quantity that would be reused / recycled, delivered to public filling areas and landfill is summarised in Table 1.

Table 1 Quantity of Inert and Non-inert C&D Materials that would be reused/recycled, delivered to public filling areas and landfill

| | Inert Material | | Non-inert Material | |
|---------------|-------------------|-----------------------|-----------------------|--------------------|
| | Reused / recycled | Public filling | Reused / recycled | Landfill |
| C&D Materials | 0 | 18,638 m ³ | 20 tons (steel scrap) | 258 m ³ |

4.5 Chemical Waste

- For those processes which generate chemical waste, alternatives would be sought to reduce quantities or even eliminate chemical waste, or which produce less dangerous types of chemical waste.
- Chemical waste that is produced, as defined by Schedule 1 of the Waste Disposal (Chemical Waste) (General) Regulation, will be handled in accordance with the Code of Practice on the Packaging, Labeling and Storage of Chemical Waste. The storekeepers shall be responsible for notifying the construction team when any potentially hazardous materials are store on site. They shall draw the attention of users to the disposal requirements on the packaging.
- Chemical wastes will arise principally as a result of maintenance activities. Such wastes (mainly spent lubricants, fuel and grease), estimated to be 8,900L, will be generated throughout the construction period.
- The Contractor shall register with the Environmental Protection Department (EPD) as a chemical waste producer before the generation of chemical wastes.
- The Site Agent and Safety Manager/Officers shall inspect the storage area and its access to ensure it is free from obstruction and is kept dry and clean during the regular daily site walk.
- The site storekeeper, (reporting to the Site Agent and Safety Manager) shall keep and weekly update the inventory of the types and quantities, if any, of chemical waste being stored at site.
- Weekly safety training and toolbox talk shall be provided by the Safety Officer to ensure that all employees understand the hazard symbols and safety precautions in relation to materials being used and chemical wastes generated (if any).
- Safety equipment such as fire extinguishers shall be provided and kept in good condition. First aid equipment shall also be provided and kept near the storage area.

4.5.1 Packaging

- Chemical waste should be packed and held in containers so as to prevent leakage, spillage or escape of the contents under normal conditions of handling, storage and transport.
- The containers for chemical wastes shall be resistant to the contents and be in good physical condition.
- The containers for chemical waste shall be securely closed or sealed, correctly stored and kept clean.
- Separate containers shall be used to hold different types or different sources of chemical wastes.
- About 100mm air space shall be allowed between the top of the container and the level of any liquid contents.
- Drums and jerry cans shall be used as chemical waste containers. The use of any container with a capacity exceeding 450 litres is subject to the approval of the EPD.

4.5.2 Labeling

- Appropriate labels shall be affixed on the sides of each of the containers of chemical waste.
- The information contained on the label shall be accurate and sufficient so as to enable proper and safe handling, storage and transportation of the chemical waste.

4.5.3 Storage

- A storage area located close to the source of waste generation shall be designated for temporary storage of chemical waste.
- The main storage area shall be covered and rigidly enclosed on at least three sides by a wall, partition or fence with a height of not less than two metres or the total height of containers in the stack.
- Adequate ventilation should be allowed and adequate space shall be allowed within the storage area for container handling.
- The storage shall be bunded to retain potential leakage of the capacity to 110 % of the largest container or 20% of the storage capacity.
- The storage area shall be kept clean and dry and secured with an appropriate door/gate and locked at all time.

- A small quantity of chemical waste, not exceeding 50 litres, may be stored at the working area with bunding of sufficient capacity to accommodate 110 % of the volume of the container. The designated temporary storage area is shown in Site Layout Plan in Appendix 2.

4.5.4 Disposal

- Disposal of chemical waste shall be regular and via a licensed waste collector.
- The chemical waste shall be transported to a facility licensed to receive chemical waste.
- A trip ticket/log will be maintained for the removal of chemical wastes from site. Tickets will be issued by the storekeeper for the disposal of material. This will record vehicle licences; loads and types of chemical waste carried and time on and off site for each trip leaving site. The records shall be properly kept by the Site Agent.

4.6 Dangerous Goods

The Contractor will use the compressed gases on site as the sole dangerous goods. The following protocols for dangerous goods management covers those substances in Category 2 (Compressed Gases) only.

4.6.1 License Requirements

As stipulated in the Dangerous Goods(General) Regulation (Cap. 295 sub.leg.B) – Category 2 (Compressed Gases), a dangerous goods storage license should be applied for when:

- (a) the quantity of such compressed gas as listed in the first column of Table in S.74 of sub.leg.B in Cap.295 exceeding that specified in the second column; or
- (b) the total quantity of all gases in the same store is more than 5 cylinders (i.e. 25L)

4.6.2 Handling and Storage

- Only approved cylinders will be used for specific gases, and appropriate colour code will be marked on the cylinders.
- Cylinders will be tested and examined by the Authority every 5 years.

Fire Precautions

- No smoking in the storage area will be allowed.
- No use of naked light and heating equipment in the storage area will be allowed.
- No use of unapproved electrical equipment will be allowed.
- Signs of prohibiting smoking and use of naked lights will be shown in English and Chinese outside the storage area.

- Fire extinguishers will be provided outside the storage area.

General Storage Provisions

- Cylinder will be labelled as prescribed in the Schedule 1 of sub.leg.B in Cap. 295.
- Storage of cylinders with different gases will be segregated.
- Cool area away from direct sunlight and any heat sources will be assigned for storage of cylinders.
- Cylinders will be stored in licensed area with adequate ventilation.
- Only authorised personnel will be allowed to access to storage area and the storage area will be kept lock at night.

4.7 Contaminated Soil

Scrap metal recycling yard in site L of the project area may have been contaminated due to their former usage. In order to avoid or minimise any risks or hazards associated with the area, the project proponent should carry out a site contamination assessment and implement remediation measures to clean up the land if necessary prior to any redevelopment works.

Prior to the commencement of the land contamination site investigation work, the project proponent has to prepare and submit a Contamination Assessment Plan (CAP) to EPD for endorsement. Based on the endorsed CAP, the project proponent should conduct a contamination assessment and compile a Contamination Assessment Report (CAR) to document the findings for approval by the EPD. If the findings confirm that the site is contaminated, a Remediation Action Plan (RAP) should be drawn up. The RAP and CAR may be submitted as a combined report for EPD's approval referencing the corresponding CAP prior to the commencement of clean up work on site.

A Contamination Assessment Plan (CAP) was prepared by Binnie Black & Veatch Hong Kong Limited (BBVHKL) for the land contamination assessment of the KCRC Sheung Shui to Lok Ma Chau Spur Line.

A detailed site investigation was proposed at sites specified in the CAP. At present, access has not been granted to all sites along the alignment and site investigations have been carried out only at those sites where access was granted. The findings of the site investigations conducted to date are presented in this Contamination Assessment Report (CAR).

A Remediation Action Plan (RAP) is also conducted by BBVHKL. This is based on the findings of the CAR and the requirements of EPD with regard to contamination levels for which remediation is considered necessary. The Contractor's Environmental Team Leader shall follow the progress and ensure compliance with the RAP.

Scope of soil investigation works:

- (a) To conduct soil sampling in the scrap metal recycling yard at the sampling points L-DH1, L-DH2, L-DH6 and L-DH7 as shown in Appendix 5.

- (b) To provide a “contamination land” specialist, who shall possess the experience of handling and assessing contaminated soil, for carrying out on-site supervisions during soil sampling and determination of the locations where contaminated soil samples will be collected.
- (c) To provide the services in connection with soil sampling, collection and delivery of soil samples to an HOKLAS accredited laboratory for testing of the samples and to liaise with laboratory personnel during the stage of performing chemical analysis for the samples.
- (d) To carry out the works associated with soil sampling, which shall include, but not be limited to, site clearance, concrete slab breaking and the like.
- (e) To provide site investigation reports for review by the Engineer and the Independent Environmental Checker, subsequent to testing and performing analyses for the soil samples, including plans showing the exact locations where the soil samples are taken.

4.7.1 Sampling Methods

- The aforesaid site investigation shall be carried out in accordance with the RAP prepared by Binnie Black & Veatch Hong Kong Limited (BBV), the Environmental Support Services consultant employed by the Employer, and the specific conditions set out in the Environmental Protection Department (EPD) letter Ref: () in Ax(4) To EP2/G/A/101 dated 21 June 2002 confirming their approval of the Contamination Assessment Plan (CAP) and Remediation Action Plan (RAP) on 21 June 2002 for Site L.
- For each sampling location, except L-DH6 (the mid-point between L-DH1 and L-DH2), samples shall be taken at each radial boundary located at 5m, 7m and 10m from the centre of the location (i.e. the original sampling point) in accordance with the sketch in Appendix 5. Table 1 shows the depths at which samples are to be taken for further testing of potential contamination.
- Soil samples shall be collected by hand augering at each of the sampling point identified on site in accordance with the RAP and the specific conditions set out in the afore-said approved CAP by EPD.
- Sample collection tools shall be thoroughly cleaned and washed with non-phosphate detergent before and between taking soil samples.
- Photo Ionization Detector (PID) readings shall be taken during soil sampling on site. The readings shall be taken within 1.0m of the soil sampling point.
- The weight of soil sample to be collected at each soil sampling point for each type of analysis shall not be less than 0.5 kg. Soil samples shall be handled in an appropriate manner so as to avoid cross contamination.
- The collected soil samples shall be stored at the temperature between 0 to 4°C (but shall not be frozen) in clean containers provided by the laboratory and properly labelled prior to delivery to the laboratory.

- Plastic containers shall be used to store soil samples for which chemical analyses for the metal contents of the soil are to be conducted. Glass containers shall be used to store soil samples for which analysis of the organic contents in the soil is to be conducted.

The following section (4.7.2 to 4.7.8) are extracted from the CAR and RAP.

4.7.2 Sources of Contamination

The result obtained were assessed against the Dutch List Guidelines used in EPDs *ProPECC PN 3/94 Contaminated Land Assessment and Remediation*. This indicative list has been adopted by EPD as a general guideline whereby Dutch level A implied a soil is unpolluted and is used as a background reference value. If Dutch level B is exceeded it is generally considered to indicate that a low level of pollution is present and further assessment should be carried out. Exceedance of Dutch Level C is indicative that remediation should be carried out. EPD considers that soils should be remediated to below Dutch level B.

Laboratory results from borehole samples indicated soil contamination in three boreholes at one site (Site L, drillholes L-DH1, L-DH2 and L-DH3). The contaminants included lead which was detected at above the Dutch B Limit at one drillhole, and TPH which was detected at above Dutch C limits in the surface layers of all three boreholes. The results indicate that both types of contamination are localised in the vertical plane, as elevated levels of TPH were not detected at depth in the drillholes, and lead was not detected at the surface of L-DH3.

4.7.3 Design and Operation of Remediation

In order to verify the assumptions made and to avoid excessive disposal of uncontaminated material further intrusive sampling is proposed, in-situ, using a soil auger or inspection pits to the relevant depth. This sampling should preferably be carried out before commencement of main excavation works. This will enable laboratory results to be obtained prior to excavation of soil and therefore the limits of contamination can be defined. This will minimise the amount of stockpiling necessary on site, and therefore the likelihood of cross contamination, and ultimately, the amount of material to be disposed of to landfill.

As described above, the limit of contamination at the drillholes is assumed to extend to a 5m radius boundary around each borehole location. Further contamination may be present outside this boundary but at present this is unknown. To determine the presence of further contamination, three further soil samples should be taken on this 5m radial boundary (prior to commencement of excavation if possible) to a depth of 1.5m for L-DH1 and to 0.5m for L-DH2. The samples should be tested for TPH to determine the extent of migration of contaminants in the soil. It is also proposed to test on-site for VOC/SVOCs at sites contaminated by TPH, to determine the risk from these associated contaminants. This can be done using a hand held PID meter.

At L-DH1 and L-DH2 the depth of TPH contamination is known and therefore a lower limit for excavation of contaminated material has been proposed which

should enable all contaminated material to be removed. No confirmatory sample is therefore required from the likely base of excavation.

At all sites if exceedance of Dutch Level B is identified in any of the three samples on the boundary around the original sampling location, then excavation, or pre-excavation sampling (to the appropriate depth) should incrementally proceed to a 7m radius in the direction of exceedance. On-site PID readings should be taken and laboratory analysis for TPH, should be repeated. Following this samples should be taken around a 10m radius circle as for the previous circles. Excavation can be stopped when results indicate the extent of all soil contamination above Dutch B level has been defined and excavated. For the purpose of this plan, the 10m radial boundary is considered to be outer limit of potential contamination.

In addition to this circular sampling it is proposed to take one sample from the midpoint between L-DH1 and L-DH2 to identify the potential for contamination at this site and avoid excessive circular sampling. Samples will not be required in the opposite directions from these two drillhole locations as they fall outside the excavation and works boundaries. Any point on the proposed concentric incremental circles which falls outside the boundary of Site L need not be sampled. The sampling locations are shown on Appendix 5. A proposed sampling nomenclature system is shown on Appendix 6.

Whilst there are many methods which can be used to treat and remediate organic contaminants the volumes found at this site are small and localised and therefore it is recommended that the soil be disposed of to landfill. A disposal licence/permit must be sought from EPD prior to disposal to landfill.

If it is necessary to stockpile any material from the site, for example when excavated material is visibly contaminated during the works, the soil should be stored separately from uncontaminated material. Stockpiles should be bunded to prevent cross contamination between contaminated and uncontaminated soils.

In the unlikely event that pre-construction sampling in concentric circles, as described above can not be carried out, an alternative method of handling the potentially contaminated materials is proposed. Once the construction Contractor occupies Site L they should excavate within the 5m radius of each contaminated location and send this material which is assumed to be contaminated immediately to landfill. At this stage four samples should taken by hand, at the limit of excavation, and on-site PID readings taken before samples are sent to a HOKLAS accredited laboratory for testing in line with the above recommendations for the four boundary points.

Following this sampling, excavation should continue for a further two meters (to 7m radius) and three more boundary samples taken at L-DH1 and L-DH2. The material taken from the concentric ring around each contaminated borehole should be stored separately from the previously excavated material in order to prevent cross contamination should the latter material prove to be uncontaminated. This procedure should be repeated at the 10m radius boundary

(for all sampling points that fall within the Site L boundary, or within the boundary of excavation works), and any excavated material stockpile separately.

4.7.4 Site Health and Safety

All personnel who are involved in carrying out the said site investigation works shall comply with the health and safety precautions described below:

- No food and drink shall be consumed whilst conducting the site investigation works on site.
- Direct skin contact with the extracted materials shall be avoided.
- Basic hygiene shall be observed and hand wash basins shall be provided and made accessible to all personnel working for the captioned site investigation works on site.
- Vapour masks and dust masks shall be provided to all personnel working for the soil sampling.
- Plastic gloves shall be provided to all personnel working for the captioned site investigation works to prevent them from direct contact with the contaminated soil.

4.7.5 Procedure for Implementing the RAP

Table 2 summarised the steps which should be followed to carry out the recommendations of the RAP.

Table 2 Steps and Actions to be followed to implement the Recommendations of the RAP

| Step | Action |
|------|---|
| 1 | Take possession of, or gain access to site |
| 2 | Sample at 0.5m and 1.5m depth around L-DH1 at 5.0m, 7.0m and 10.0m radii from the original drillhole location. Number of samples to be taken at L-DH1 is dependent on excavation under LCC-206. (See Appendix 6 for nomenclature system example). |
| 3 | Sample at 0.5m depth around L-DH2 at 5.0m, 7.0m and 10.0m radii from the original drillhole location. (See Appendix 6 for nomenclature system example). |
| 4 | Sample at 0.5m depth at mid point between L-DH1 and L-DH2 (see Appendix 5 for location). |
| 5 | Fill in Chain of Custody form and request TPH analysis in laboratory. |
| 6 | When sampling on site take PID meter readings for VOC/SVOCs. If readings are >10 ppm then request laboratory analysis on Chain of Custody form. |
| 7 | If sampling is carried out at the excavation stage of the construction contract, then excavate the first 5.0m from L-DH1 to 2m depth and dispose of material to landfill. |
| 8 | For L-DH2 excavate to 1.5m depth and dispose of to landfill. |
| 9 | Take samples (including PID readings) at the edge of excavation as proposed above. |
| 10 | Excavation to 7.0m radius and stockpile material on site. Take samples at the edge of excavation and send to laboratory as proposed above. |
| 11 | When stockpiling material taken from the 5.0m to 7.0m excavations, material from around each drillhole should be kept separate to prevent cross contamination. |
| 12 | Excavation to 10.0m radius and stockpile material on site. Take samples at the edge of excavation and send to laboratory as proposed above. |
| 13 | Stockpile the material excavated from 7.0m to 10.0m separately from that taken from the 5.0 to 7.0m excavation. |
| 14 | It is preferable that soil sampling can be carried out in-situ before excavation works commence. Laboratory results can then be obtained before there is any need for stockpiling and the Contractor will know immediately which areas require disposal to landfill and which can be disposed of to public filling areas. |
| 15 | When laboratory results are obtained the extent of contamination will be specified and the laboratory results included in the RAP as an addendum. |

4.7.6 Guidelines for Handling Contaminated Soil

Soil excavation should be carried out using mechanical earth moving equipment wherever possible to avoid contact between site workers and contaminated soils.

Soil already excavated must be stockpiled in accordance with the storage and handling plan submitted by the Contractor. Care must be taken to avoid cross contamination between contaminated and uncontaminated soils.

Soil should be properly covered to avoid dust generation and stored on a bunded hard standing to prevent any contamination of water or runoff. During transport to landfill the contaminated material should be covered to prevent dust generation. If it is necessary to stockpile potentially contaminated material during excavation, the soil should be kept separate from any other excavated material by storing in a covered skip to prevent wetting and runoff. Metal contaminated and TPH contaminated soil should be stored separately to avoid cross contamination and disposal problems in the case that either volume of soil does not meet disposal criteria.

Any excavated materials generated during site clearance, formation and construction of the Spur Line should be handled and disposed of in an appropriate manner in accordance with the recommendations of the EIA. Records of quantities of contaminated soils excavated and disposed of should be kept by the Contractor.

4.7.7 Implementation Programme and Potential Further Works

Prior to disposal, a disposal licence/permit must be sought from EPD for the disposal of contaminated soil to landfill. The Contractor is responsible for obtaining the licence.

The contaminated soil should be excavated and disposed of as soon as possible after the possession of the site by the Contractor.

If contaminated soils are identified at any other site during site investigation or construction works, the contaminants present and extent of contamination should be determined through phased excavation around the contaminated location, and sampling and laboratory analysis in a manner similar to the detailed for Site L. A remediation or excavation method should be proposed and approval sought from EPD before works are carried out.

Adjacent to Site L, to the south-west, other areas of the metal recycling yard are suspected to have surface contamination. These areas of the site are expected to be covered with fill material and used as works areas (hence their non-inclusion in the CAP). If this proposal changes and any excavation or surface material removal is undertaken then hotspot sampling should be undertaken, at the suspected contaminated areas.

4.7.8 Conclusion

The lead detected at Site L presents a low risk to humans, surface waters and groundwater due to its low mobility in soils and relatively low toxicity to humans when found in such low concentrations. Lead contamination was also detected well below the soil surface thus decreasing the human exposure risk. The risk from this contaminant is therefore negligible, provided excavation is not carried out to depths greater than 2.5m within this area of the site.

The TPH contamination also found in hotspots at Site L is also considered to present a low risk to humans at the site provided PPE is used and appropriate precautions are used during construction. Precautions which should be considered include sampling at any area which has visible TPH contamination, carrying out VOC/SVOC testing on-site and following guidelines which prevent humans from coming into contact with the soil.

Notwithstanding, EPD policy requires that any site with an exceedance of Dutch Level B should be remediated if material is to be re-used on site.

4.8 General Refuse

- General refuse will be generated largely by food service activities for site workers. Bins will be provided for containment prior to disposal of such waste.
- Aluminium cans and glass bottles are often recovered from the waste stream by individual collectors if they are segregated or easily accessible, so separate labelled bins for their deposit will be provided wherever feasible.
- Office wastes will be reduced through recycling of paper if volumes are large enough to warrant collection. Participation in a local collection scheme would be considered if one is available.
- About 156m³ of domestic debris is estimated to be generated on-site throughout the construction period.
- We will encourage environmental awareness and try to reduce waste by:
 - a) reducing the number of photo copies to a minimum
 - b) by copying on both sides of paper for internal documents and external documents where appropriate.
- General refuse generated on-site shall be stored in enclosed bins or compaction units separate from construction and chemical wastes.
- A reputable waste collector will be employed by the contractor to remove general refuse from the site, separately from construction and chemical wastes, on a daily or every second day basis to minimise odour, pest and litter impacts. No burning of refuse on site will be permitted.
- The general foreman will inspect and manage the site condition with respect to the general refuse on-site during the daily site walk.

4.9 Waste from Chemical Toilets

Portable chemical toilets were stored in a self-contained area. Toilet wastes shall be collected by waste-collector in regular base.

4.10 Recommended Mitigation Measures

Mitigation measures recommended from the EIA Report shall be fully implemented. The relevant recommendations are summarised as follows:

Tunnelling Waste and Excavated Materials

- At most locations excavated material will be exported, and disposed of off site due to programming constraints. In some places however, the material generated can be used in place of imported fill, hence reducing both the amount of material to be disposed of off site, and the amount to be imported for works. At Lok Ma Chau station most of the material generated is expected

to be unsuitable and therefore will require off-site disposal. At this location most of the materials needed for construction should be imported.

- Effective from 1 July 1999, the Contractor must comply with the trip-ticket system for the disposal of Construction and Demolition (C&D) material (Works Bureau Technical Circular (WBTC) No. 21/2002. At the current time CED has agreed to receive uncontaminated material, such as the tunnel spoil, to public filling areas. Preliminary discussions have indicated the most likely location is Tseung Kwan O Area 137 and/or Tuen Mun Area 38.
- Confirmation has to be sought from the Public Filling Committee (PFC) and EPD regarding the availability of public filling facilities or a landfill, for inert C&D waste and non-inert C&D waste respectively.
- The Contractor shall produce a Construction and Demolition Material Disposal Delivery Form (the Form) for each and every vehicular trip transporting construction and demolition (C&D) material, i.e. public fill or C&D waste, off site. The Contractor shall complete the Form in duplicate except for the Time of Departure.
- Prior to the vehicle leaving the Site, the Contractor shall present to the site supervisory staff the completed Form. The site supervisory staff shall retain a copy of the Form and return the original to the Contractor. The Form shall be carried on board the vehicle at all times throughout the vehicular trip.
- For each vehicular trip, the Contractor shall obtain a receipt from the operator of the public filling facility or the landfill. The Contractor shall submit the original receipt to the Engineer's Representative within 5 working days of the vehicular trip. Late return without any acceptable reason might be regarded as non-compliance by the Engineer's Representative.
- The Contractor acknowledges and shall permit the Engineer Representative to request and obtain information from the operator of the Designated Disposal Tip verifying the receipt and the accuracy of the information on that receipt.
- All C&D material shall become the property of the Contractor when it is removed from the Site. The Contract should make provision that the Contractor will deliver material to the designated locations as agreed with CED.
- The Contractor will be required to complete the relevant details on a standard form and submit the form for stamping and collection by site supervisory staff and submit to Engineer Representative the receipt issued by the operator of the public filling facility / landfill after the disposal of the C&D material. Details to be included on the standard form and the receipt is included in the WBTC No. 21/2002.
- In order to make maximum use of suitable fill materials available, it is proposed to use suitable material from other projects, which would otherwise go to public filling areas, in the station site formation. This ensures beneficial

use of otherwise waste materials. Potential impacts from dust during the filling process are fully addressed in the Air Chapter of the EIA report.

- The route for material generated from the works will be directly to Fanling Highway and at the time of writing the most probable destination as agreed with CED is Tseung Kwan O Area 137 and/or Tuen Mun Area 38 public filling areas. As the traffic will be directed along a major highway, the overall impact on traffic is however, expected to be small.

Site Clearance Waste/Demolition Waste

- All construction wastes should be sorted on site into inert and non-inert components. Non inert materials (wood, glass and plastic) should be recycled and reused wherever possible and disposed of to landfill only as a last resort, whilst inert materials (soil, rubble, sand, rock, brick and concrete) should be separated and disposed of at public filling areas operated by CED. Steel and other metals should be recovered from demolition waste and recycled as far as practicably possible.
- The identification of final disposal sites for spoil created by the construction works should be considered during the detailed design stage of the Project. Disposal of Construction and Demolition (C&D) waste with not more than 30% inert material is likely to be to NENT Landfill but could be to any of Hong Kong's three strategic landfills.
- In order to avoid dust or odour impacts, any vehicle leaving a works area carrying C&D waste or public fill should have their load covered. Vehicles should be routed as far as possible to avoid sensitive receivers in the area.
- Concrete is the main material likely to be used in the construction of the tunnel portals, viaduct section, foundations, stations and associated works. Of the volume of wet concrete supplied, it is assumed that approximately 3-5% of the concrete used will be lost to waste. Dry concrete waste will be sorted out from the other wastes and recycled for reuse or sorted for disposal at a public filling area, e.g. Tseung Kwan O Area 137 and/or Tuen Mun Area 38, as agreed with CED. Shotcrete is expected to be used for slope stabilisation works. There may be some surplus or rejected shotcrete. The use of precast concrete segments for the tunnel lining and viaduct segments will significantly minimise the expected concrete waste.

General Works Waste

- Reusable steel shutters should be used as a preferred alternative to formwork and falsework where possible.
- Site fencing may be necessary to separate the construction works from the public and to reduce construction nuisance such as noise to nearby sensitive receivers. In this case metal fencing or building panels to provide site fencing should be used. Timber hoarding is prohibited. Building panels are cement structures with a lightweight concrete core. The material provides good sound

and thermal insulation, as well as being both waterproof and fire resistant. These panels are easily recycled and reduce wastage of metals.

Chemical Waste

- Where the construction processes produce chemical waste, the Contractor must register with EPD as a Chemical Waste Producer. Wastes classified as chemical wastes are listed in the *Waste Disposal (Chemical Waste) (General) Regulation*. These wastes are subject to stringent disposal routes. EPD requires information on the particulars of the waste generation processes including the types of waste produced, their location, quantities and generation rates. A nominated contact person must be registered with EPD.
- Storage, handling, transport and disposal of chemical waste should be arranged in accordance with the “*Code of Practice on the Packaging Labelling and Storage of Chemical Wastes*” published by EPD. Chemical waste should be collected by a licensed collector.
- The major chemical waste types arising from the construction sites are likely to be oils, lubricants, paints and solvents. Oil waste may be in the form of raw waste, or as sundries such as spent oil filters, or materials used to absorb oil leaks. Various storage and disposal measures are recommended in the Code of Practice to minimise impacts from these chemical sources.
- Hard standing impermeable surfaces draining via oil interceptors should be provided in works area compounds. Interceptors should be regularly emptied to prevent release of oil and grease into the surface water drainage system after accidental spillages. The interceptor should have a bypass to prevent flushing during periods of heavy rain. Oil and fuel bunkers should be bunded and/or enclosed on 3 sides to prevent discharge due to accidental spillages or unintentional discharge from tanks. Bunding should be of sufficient capacity to accommodate 110% of the volume of the largest container or 20% of the total volume of waste, whichever is greatest. Waste collected from any grease traps should be collected and disposed of by a licensed contractor.
- Any construction plant which is likely to leak oil, should have absorbent inert material e.g. sand, placed beneath it. This material should be replaced on a regular basis and the contaminated material stored in a designated, secure place. Such relatively inert material is suitable for landfill disposal and can be disposed of via the normal waste stream.
- Lubricants and waste oils are likely to be generated during the maintenance of vehicles and mechanical equipment. Used lubricants should be collected and stored in individual containers which are fully labelled in English and Chinese and stored in a designated secure place. If possible, such waste should be sent to oil recycling companies, and the empty oil drums collected by appropriate companies for reuse or refill. The Centre of Environmental Technology operates a Waste Exchange Scheme which can assist in finding receivers or buyers for chemical wastes.

- Oil and lubricant wastes are classified as chemical wastes, and if not recycled, should be treated at the Chemical Waste Treatment Centre, Tsing Yi, or other sites licensed for the disposal of waste oil. A trip ticket system operates to control the movement of such chemical waste, and tickets have to be produced upon the request of EPD.
- Some paints and solvents are classified as chemical waste and, if used on site, will be subject to the stringent requirements of the *Waste Disposal (Chemical Waste) (General) Regulation*. Empty paint cans should be recycled or collected as waste. Any dry paint waste should be swept up and collected in containers for disposal.
- No lubricants, oils, solvents or paint products should be allowed to discharge into water courses, either by direct discharge, or as contaminants carried in surface water runoff from the construction site. Storage areas should have adequate ventilation and be covered to prevent rain entering.
- Some bentonite will be used to support the cutting face during maintenance of the TBM. Whilst the recommendations of *ProPECCM PN 1/94 Construction Site Drainage* should be followed wherever possible for handling and disposal it will not be possible to re-use the bentonite slurry as it will be extracted along with rock waste when tunnelling resumes following each intervention period. In this case, the bentonite will be mixed with rock and drained as usual before sending to the final disposal site.

Aqueous Wastes

- Requirements designed to protect against surface runoff include the use of sediment traps, settlement ponds, special drainage channels and bunding. Discharges from concrete works will be high in suspended solids and pH. These washings must be settled in a sedimentation pit, and possibly treated to reduce pH before discharge. Oil interceptors should be used where oily wastes are present, and must have a bypass for ease of disposal of oily wastes. Landtake under stockpiles or open working areas must be minimised wherever practicable and the stockpiles should be fenced and bunded to reduce erosion and sediment release. Runoff from the stockpiles should be collected in sediment traps. Solids accumulated in the sand traps, settlement tanks, manholes, and stream beds must be cleared out regularly and disposed of accordingly in order to maintain an effective system.
- Tunnel spoil is expected to be high in moisture content on excavation. Measures will be taken on site to reduce the moisture content and to remove any chemical additives which may have contaminated the water. De-watering of the spoil will also minimise nuisance and pollution in transit to public filling areas.
- All discharged waters, including sewage and site runoff, should comply with the appropriate standards in the *Technical Memorandum on Effluents Discharged into Drainage and Sewerage Systems, Inland and Coastal Waters*, prior to discharge. Advice on the handling and disposal of

construction site discharges, including site runoff and contaminated wastewater, is provided in the *ProPECC Paper (PN 1/94), Construction Site Drainage*.

Wheel Wash Waste

- All vehicles leaving any of the works areas must pass through a wheelwash at the site access/exit. If, at any time, further entry/exit points are created, similar facilities must be provided. The wheelwash must be regularly cleaned to remove sediment, a process which may produce a large volume of wastewater. To prevent excess sedimentation, and minimise possible contamination of locate streams and water courses, these wastewater should be directed into settlement ponds as far as practicable. The wastewater can then be reused on site. The maintenance of the wheelwash will be the responsibility of the Contractor undertaking the site formation works.
- If the waste water contains a significant amount of oil and grease from vehicles, areas of sand for absorbing oily wash water should be set up by contractors. Liaison with the Food and Environmental Hygiene Department (FEHD) is essential for correct disposal.

Sewage

- Sewage is characterised by high BOD and suspended solids, is enriched with nutrients and has high bacteriological counts. Domestic sewage generated from any additional site toilets, washing facilities and any temporary canteen provided for construction workers should be collected separately and disposed of or appropriately treated to comply with Government requirements. It is the responsibility of the contractor to ensure that sewage disposal complies with the standards set out in the *Technical Memorandum on Effluents Discharged into Drainage and Sewerage Systems, Inland and Coastal Waters*. Sewage impacts and appropriate mitigation measures are dealt with in the Water Impact Assessment Chapter.

Municipal/Domestic Waste

- Solid and liquid wastes will be generated by the construction workers during the clearance/construction period. The quantity of municipal waste generated is estimated to be 1.10kg/employee/day (EPD, 1998). A temporary refuse collection station should be set up by the Contractor. Municipal waste should be collected regularly in black refuse bags and delivered to an approved Refuse Transfer Station or landfill as required.
- Provision and collection of skips for different types of recyclable waste is the responsibility of the contractor. Arrangements should be made directly with the recycling companies, for example, the paper merchants, to collect the waste as required.

5. CORRECTIVE ACTIONS

Waste management audit would be achieved via monthly site inspection by Contractor's Environmental Team and daily site walk by foreman. In case of any non-compliance in respect of the waste management procedures, the following procedure would be followed:

1. The Construction Team would immediately notify the persons held responsible for not adopting the appropriate measures.
2. The Construction Team would report the incident to the Site Management.
3. The Construction Team would propose and carry out mitigation measures in a timely manner.
4. The Site Management would evaluate the effectiveness of the mitigation measures, and insist on further mitigation measure if non-compliance still exists.

Once the mitigation measure is satisfactorily implemented, the non-compliance event would be closed and the event would be recorded. The construction team will be informed of measures to prevent reoccurrence of the non-compliance where possible.

Tables 5.1 and 5.2 show the Event Contingency Plan for Complaint and Non-Compliance.

Table 5.1 Event Contingency Plan for Complaint

| Step | Day | Action | Contractor/ CET | KCRC | ER | IEC |
|------|-----|--|--------------------|------|--------|--------|
| 1 | 1 | Party receiving complaint shall create a new complaint record. If the Contractor receives a complaint, the Contractor shall pass the information to the ER, KCRC and IEC. | ■ | ■ | ■ | |
| 2 | 1 | ER forward the complaint to Contractor/CET if that is not already received by the Contractor. | | ■ | | |
| 3 | 2 | Within 1 working day after the receipt of the Notification of Complaint, provide ER relevant works site information, e.g. types and locations of construction works. | ■ | | □ | |
| 4 | 2 | Investigate the complaint to determine its validity, and to assess whether the source of the problem is due to the works activities. Report the validity of the complaint to KCRC and ER. | | | | ■ □ |
| 5 | 2 | If complaint is valid and due to works, ER shall notify the Contractor. If complaint is invalid or not due to works, Go to Step 11. | | | ■ | |
| 6 | 2 | Propose mitigation measures to ER within 1 working day of the receipt of the Notification. | ■ | | □ | |
| 7 | 2 | Review and agree with the proposed mitigation measures and make recommendations where necessary. | | | ■ □ | ■ □ |
| 8 | 2 | Implement the mitigation measures once they have been agreed. | ■ | | | |
| 9 | 4 | Audit the implementation of the proposed mitigation measures on site within 2 working days after the measures have been agreed. | | | ■ □ | ■ □ |
| 10 | - | Undertake additional monitoring to verify the situation where necessary. | ■ | | | |
| 11 | 4 | Report the investigation results and subsequent actions taken to ER within 2 working days after the implementation of mitigation measures. | ■ | | □ | |
| 12 | 5 | Respond to the complainant within 2 working day after receiving the investigation report. | | ■ | | |
| 13 | 25 | If no further comments or complaints are received from the complainant within 20 working days after responding to the complainant, close the complaint record. If the complainant has further comments or complaints on the same issue, notify other parties on the same day and go to step 2. | | ■ | ■ □ | |

■ Action party

□ Enter comments/proposals into the appropriate exceedance record in WREMS where applicable.

CET – Contractor's Environmental Team.

IEC – Independent Environmental Checker.

KCRC – Designated personnel at KCRC.

ER – Engineer's Representative

Table 5.2 Event Contingency Plan for Non-Compliance

| Step | Day | Action | Contractor/ CET | ER | IEC |
|------|-----|--|--------------------|--------|--------|
| 1 | 1 | Create a new non-compliance record within 1 working day after making an observation during a site audit accompanied by ER. Send a Notice of Non-Compliance (NNC) to the ER and KCRC via email. The NNC will include the observations and the reasons for non-compliance. | | | ■ |
| 2 | 1 | Confirm receipt of NNC to IEC and forward NNC to Contractor. | | ■ | |
| 3 | 2 | Propose corrective actions within 1 working day after the receipt of the NNC. | ■ | □ | |
| 4 | 2 | Review and agree with the proposed corrective actions and make additional recommendations as required. | | ■ □ | ■ □ |
| 5 | 2 | Implement the proposed corrective action once they have been agreed. | ■ | | |
| 6 | 3 | Audit the implementation of the corrective actions on site within 1 working day after the actions have been implemented. | | ■ □ | |
| 7 | - | Check the implementation of the corrective actions at the next site audit. Close the non-compliance record if the implementation of the corrective actions is satisfactory. | | | ■ □ |
| 8 | - | Propose preventive actions within 3 working days after the closure of the non-compliance record. | ■ | □ | |

■ Action party

□ Enter comments/proposals into the appropriate exceedance record in WREMS where applicable.

CET – Contractor’s Environmental Team.

IEC – Independent Environmental Checker.

KCRC – Designated personnel at KCRC.

ER – Engineer’s Representative

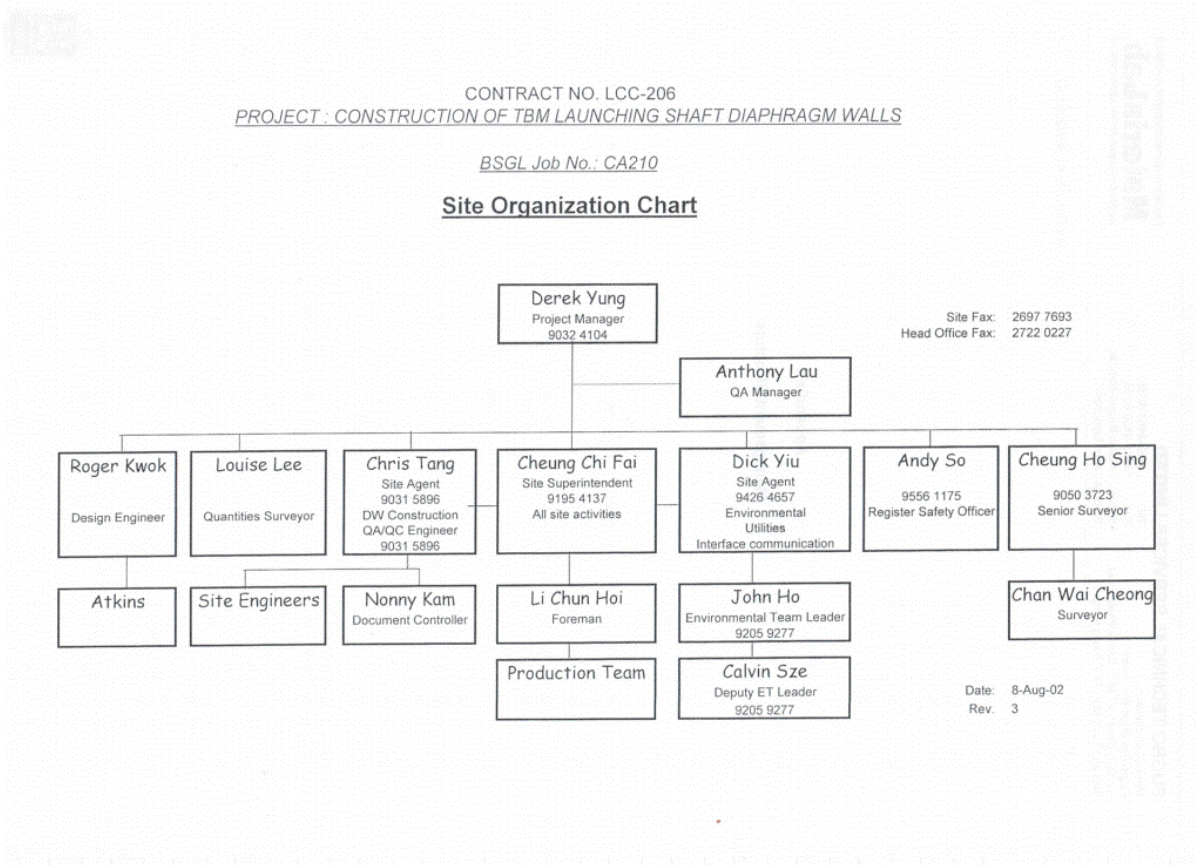
6. PREVENTATIVE ACTION

In order to ensure that waste mitigation measures are effectively implemented, the following preventive actions are to be adopted:

- The Construction Team will be directly responsible for Waste and Environmental management and will report directly to site management.
- The Site Management will supervise the Construction Team to record the waste production levels and make proper written records.
- The Site Management will arrange monthly meetings to review the progress of waste management works at site.
- The Site Management will carry out monthly and ad hoc site walks to observe and report the waste production and handling carried out by the Construction Team.
- The Site Management and Construction Team will remind all workers and Sub-Contractors of the importance of proper waste management measures.

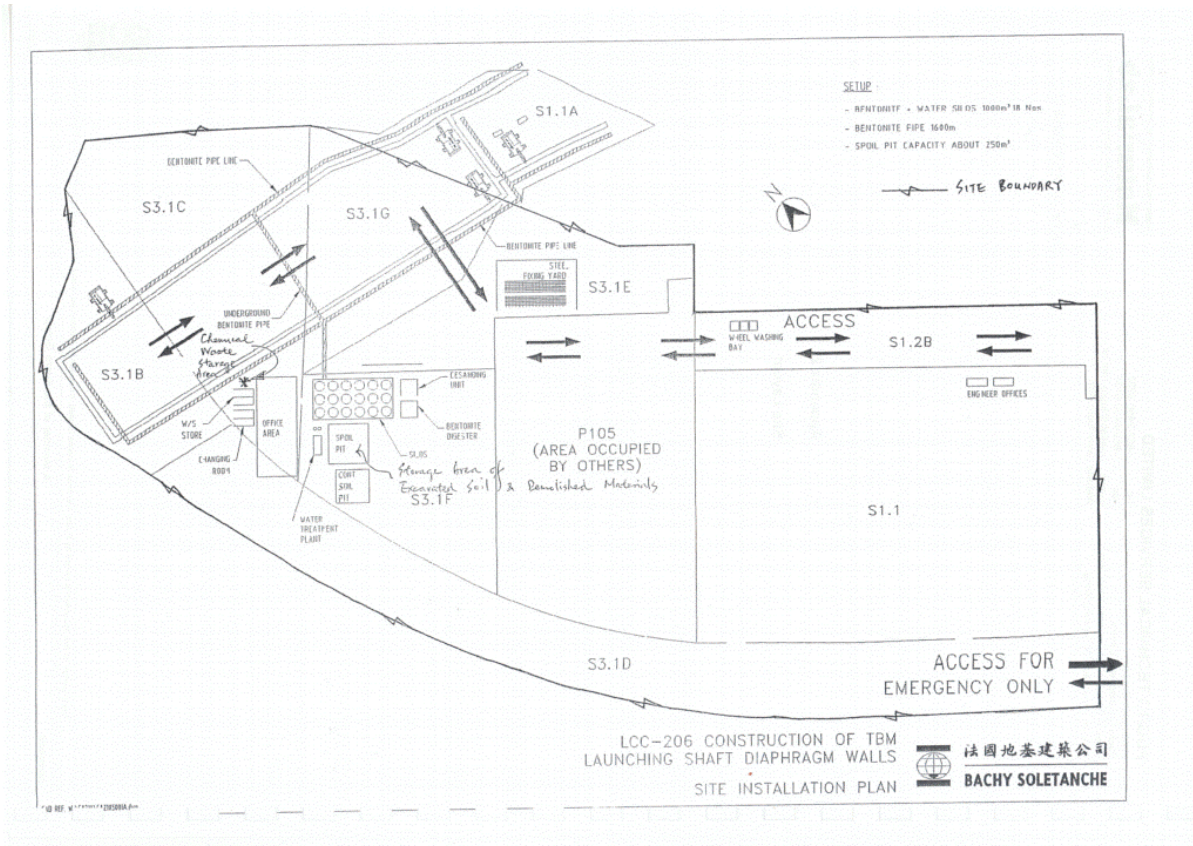
Appendix 1

Management Structure



Appendix 2

Site Layout



Appendix 3
Tentative Works Programme

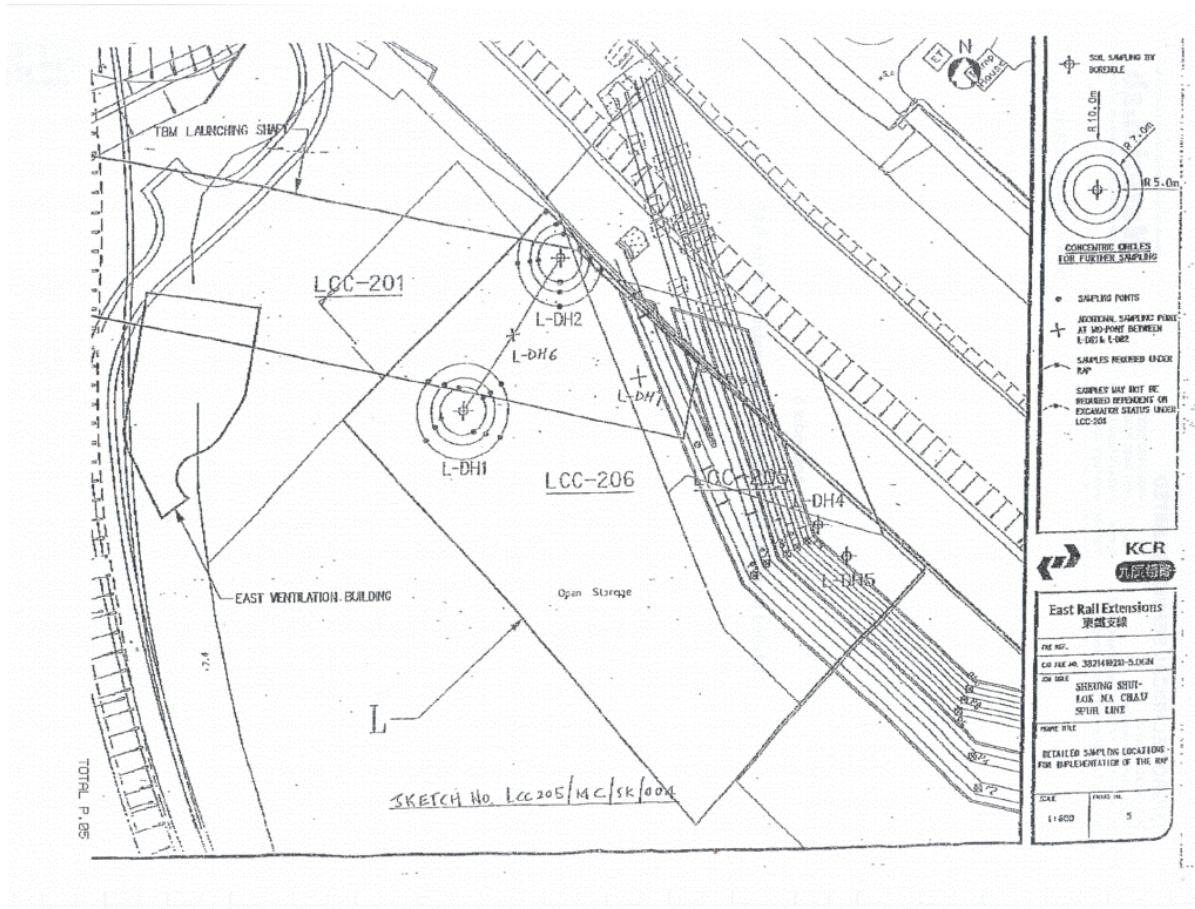
| LCC206 Preliminary Programme Division of Works by Cost Centre | | | |
|---|--|--------|----------------------------|
| Act ID | Description | Wk Dbr | Early Start / Early Finish |
| 1300 | Contract Award | 0 | 16JUN02 * |
| 1000 | Submit bond, guarantee and undertakings | 0 | 08JUL02 * |
| 1010 | Proof of Professional Indemnity Insurance | 0 | 08JUL02 * |
| 1020 | Submit Works and 3 Months Rolling | 0 | 08JUL02 * |
| 1030 | Submit Environmental Plan, Manual and | 0 | 08JUL02 * |
| 1040 | Apply to EPD for Further Enviro Permit | 0 | 08JUL02 * |
| 1050 | Submit Condition Survey Reports | 0 | 08JUL02 * |
| 1060 | Complete Engineer's Offices | 0 | 08JUL02 * |
| 1070 | Submit Quality, Health/Safety and MS Plans | 0 | 23AUG02 * |
| 1090 | Engineers Review of Program, Health/Safety | 0 | 20SEP02 * |
| 1090 | Complete works for Key Date 3 | 0 | 31OCT02 * |
| 1100 | Complete Safety Audit | 0 | 31DEC02 * |
| 1110 | Complete Key Date 4 | 0 | 10JAN03 * |
| 1130 | Proof of Professional indemnity insurance | 0 | 10JAN03 * |
| 1120 | Substantial completion of Key Date 6 | 0 | 28FEB03 * |
| 1310 | Site Access S3.1B | 0 | 24JUN02 * |
| 1320 | Site Access S3.1C | 0 | 24JUN02 * |
| 1330 | Site Access S3.1G | 0 | 05JUL02 * |
| 1340 | Site Access S1.1A (1) | 0 | 05JUL02 * |
| 1350 | Site Access S1.1A (2) | 0 | 31DEC02 |
| 1500 | Prepare Condition Survey | 6d | 24JUN02 * 30JUN02 |
| 1510 | Setup Engineer's Offices | 6d | 24JUN02 * 30JUN02 |
| 1520 | Hoarding | 12d | 24JUN02 * 06JUL02 |
| 2000 | Submit MS, Installation, Baselines | 0 | 13JUL02 * |
| 2010 | Submit Monthly Report, Predrill 15% | 0 | 31AUG02 * |
| 2020 | Submit Monthly Report, Predrill 30% | 0 | 30SEP02 * |
| 2030 | Submit Monthly Report, Predrill 60% | 0 | 30NOV02 * |
| 2040 | Submit Monthly Report, Predrill 100% | 0 | 31JAN03 * |
| 2050 | Submit Monthly Report | 0 | 15FEB03 * |
| 2060 | Predrilling S1.1A (1) | 10d | 05JUL02 * 17JUL02 |
| 2070 | Predrilling S3.1B | 15d | 18JUL02 * 04AUG02 |
| 2090 | Predrilling S3.1C & G | 25d | 05AUG02 * 04SEP02 |
| 2090 | Predrilling S1.1A (2) | 2d | 02JAN03 * 04JAN03 |
| 3000 | Approve Dwall MS, Complete Trial Panel | 0 | 31JUL02 * |
| 3010 | S1.1A(1) DWalls 40% | 0 | 31AUG02 * |
| 3020 | S1.1A (1) DWalls & Slab 100% | 0 | 30SEP02 * |
| 3030 | S3.1B DWalls 60% | 0 | 30SEP02 * |
| 3040 | S3.1B 100% | 0 | 31OCT02 * |
| 3050 | Launch Shaft DWalls 90% | 0 | 30NOV02 * |
| 3060 | Launch Shaft DWalls 100% | 0 | 31DEC02 * |
| 3070 | Substantial Completion all DWalls and Slab | 0 | 15FEB03 * |
| 3100 | Mobilisation and Bentonite Setup | 9d | 24JUN02 * 04JUL02 |
| 3110 | Construct Trial Panel | 3d | 03JUL02 * 07JUL02 |
| 3120 | S1.1A(1) Founding Level Approval | 5d | 15JUL02 * 20JUL02 |
| 3130 | Construct S1.1A(1) DWalls | 42d | 18JUL02 * 06SEP02 |
| 3140 | Construct Slab | 18d | 06SEP02 * 27SEP02 |
| 3150 | S3.1B Founding Level Approval | 5d | 20JUL02 * 09AUG02 |
| 3160 | Construct S3.1B DWalls | 77d | 31JUL02 * 30OCT02 |
| 3170 | S3.1C & G Founding Level Approval | 5d | 04SEP02 * 10SEP02 |
| 3180 | Construct S3.1C & G DWalls | 95d | 09SEP02 * 31DEC02 |
| 3190 | S1.1A (2) Founding Level Approval | 1d | 04JAN03 * 05JAN03 |
| 3200 | Construct S1.1A (2) DWalls | 18d | 06JAN03 * 26JAN03 |
| 3210 | Construct Slab S1.1A (2) | 14d | 27JAN03 * 12FEB03 |
| 4010 | Submit Dewatering Plan | 0 | 31OCT02 * |
| 4020 | Engineers Approval of Dewatering Plan | 0 | 30NOV02 * |
| 4030 | Complete test, Submit all data and reports | 0 | 10JAN03 * |
| 4040 | Substantial completion of Key Date 6 | 0 | 28FEB03 * |
| 5010 | Commence Grouting Works | 0 | 31JAN03 * |
| 5020 | Substantial completion of Key Date 6 | 0 | 28FEB03 * |

Start date 23APR02
 Finish date 28FEB03
 Data date 23APR02
 Run date 18MAY02
 Page number 1A
 © Primavera Systems, Inc.

Early bar
 Progress bar
 Critical bar
 Summary bar
 Start milestone point
 Finish milestone point

Appendix 5

Detailed Sampling Locations for Implementation of the RAP



Appendix 6

Sampling Nomenclature System for Hypothetical Drillhole L-DHX

