

**For discussion  
12 March 2002**

**Legislative Council Panel on Environmental Affairs**

**Decommissioning of Cheoy Lee Shipyard at Penny's Bay  
Environmental Impact Assessment**

This paper presents the key findings of the Environmental Impact Assessment (EIA) study on the decommissioning of the former Cheoy Lee Shipyard (CLS) at Penny's Bay.

**Objective**

2. The primary objective of the decommissioning project is to return the CLS site to a condition suitable for use by the community. All potentially harmful contaminants at CLS will be thoroughly removed, treated and disposed of in an environmentally acceptable manner. With the implementation of the mitigation measures recommended in the EIA report, the decommissioning project will comply with all environmental standards and legislation.

**Background**

3. CLS was located on the north and eastern shores of Penny's Bay with a site area of about 19 hectares. It commenced operation in 1964 which included boat manufacture, repair and maintenance. The CLS site was returned to Government on voluntary surrender in April 2001 and is required for construction of the necessary infrastructure in support of Hong Kong Disneyland (including the Penny's Bay section of Chok Ko Wan Link Road and Road P2).

4. Under item 17, Part II of Schedule 2 of the EIA Ordinance, the decommissioning of a shipyard is a designated project requiring an environmental permit from the Director of Environmental Protection (DEP). Before an environmental permit can be obtained, an EIA study for the project has to be carried out and approved by DEP. In September 2000 Civil Engineering Department applied to the Environmental Protection Department for an EIA study brief which was issued on 9 November 2000. The EIA study was duly completed in December 2001 and the report was submitted to DEP on 14 December 2001. As a thermal desorption plant (see paragraph 9) is proposed, the decommissioning of CLS is also a designated project under item G4, Part I of Schedule 2 of the EIA Ordinance concerning waste disposal facility.

5. Considering that the report has met the requirements of the prescribed EIA study brief and the Technical Memorandum on Environmental Impact Assessment Process, DEP decided on 9 February 2002 that the EIA report was suitable for public inspection. The public inspection period which commenced on 21 February 2002 will last until 22 March 2002.

### **Scope**

6. The scope of the decommissioning project comprises mainly:
- (a) Demolition of all existing buildings and structures on the CLS site;
  - (b) Excavation of contaminated soil found in CLS;
  - (c) Treatment of contaminated soil partly on-site and partly off-site at To Kau Wan (TKW) (Please refer to **Annex A** for locations of CLS and TKW);
  - (d) Slope improvement works behind CLS;
  - (e) Filling of CLS to a new formation level after decommissioning; and
  - (f) Implementation of appropriate mitigation measures to avoid / minimise any adverse environmental impacts arising from the decommissioning.

## **Land Contamination**

7. The EIA report has fully analysed the conditions of the CLS site and examined all possible environmental impacts. The report has recommended a remediation and clean up plan for the site which is in line with international practice and is very comprehensive and effective.

8. Comprehensive site survey and investigation were carried out from April to November 2001, based on which the nature and extent of contamination in CLS have been estimated. A total of about 87,000 m<sup>3</sup> of soil has been found to contain different types of contaminants. About 65% of the 87,000 m<sup>3</sup> of contaminated soil (about 57,000 m<sup>3</sup>) is contaminated with metals, total petroleum hydrocarbons (TPH) and semi-volatile organic compounds (SVOCs). The remaining 30,000 m<sup>3</sup>, found mainly in the south-eastern portion of the site, is contaminated predominantly with metals and dioxins.

9. The following remediation methods are recommended:

- (a) Soil contaminated with heavy metals only (48,000 m<sup>3</sup>) will be excavated and solidified on-site using cement. Cement solidification is a process in which cement is added to the contaminated soil to immobilise the metal contaminants inside the soil matrix.
- (b) Soil contaminated with TPH, SVOCs and metals (9,000 m<sup>3</sup>) will be excavated and treated off-site at TKW by biopiling, followed by cement solidification to immobilise the remaining metals in the soil. Biopiling is a biodegradation process making use of micro-organisms to disintegrate TPH/SVOCs in the soil.
- (c) Soil contaminated with a combination of dioxins/metals/TPH/SVOCs (30,000 m<sup>3</sup>) will be excavated and treated off-site at TKW first by thermal desorption. A thermal desorption plant will be set up at TKW. Thermal desorption is an enclosed separation process in which indirect heat is applied to the contaminated soil. Upon indirect heating, the contaminants (including dioxins) will be evaporated into gaseous phase, trapped and subsequently condensed for further treatment. About 600 m<sup>3</sup>

of organic oily residue will be generated from the process over a period of one to two years. They will be collected and despatched in batches for incineration at the Chemical Waste Treatment Centre (CWTC) in Tsing Yi. The soil after thermal desorption will be solidified by adding cement to immobilise the remaining metals in the soil.

## **Effectiveness of the Treatment Methods**

### *Cement solidification and biopiling*

10. Cement solidification and biopiling are the most widely used methods to treat metals and TPH/SVOCs respectively. They have been implemented at other contaminated sites in Hong Kong e.g. Kai Tak Airport and North Tsing Yi.

### *Thermal Desorption as Preferred Treatment Method for Dioxins*

11. We have conducted a thorough comparative analysis of potential remediation methods for treating dioxin-contaminated soil based on their effectiveness, implementability, relative cost and overall benefits and disbenefits. The majority of these potential methods are found to be inapplicable or have questionable effectiveness on dioxins. Capping the dioxins in-situ was one such option considered. However, capping does not reduce or remove the toxicity and mobility of the contaminants. A potential environmental risk will remain on site limiting future productive uses. There are also a number of emerging treatment technologies such as solvent extraction, bioremediation, vitrification, etc. However, these are not proven to work in laboratory or field applications on a scale similar to the CLS case.

12. The dioxin treatment technologies which have a proven record of performance and have been used internationally are thermal treatment technologies, namely incineration and thermal desorption. Although incineration is effective in destroying dioxins, direct incineration of all the dioxin-contaminated soil at the existing CWTC is not feasible given the substantial volume of the soil to be treated as compared with the design and capacity of the CWTC. Thermal desorption, on the other hand, is as effective as incineration in achieving the target level of

performance but at a lower cost (around 30% lower). It would also reduce the quantity of soil that needs to be incinerated, therefore lowering the overall treatment cost and minimizing any secondary environmental impacts. Although thermal desorption is new to Hong Kong, the technology has been successfully used to treat a wide range of contaminants including dioxins in a number of overseas decontamination projects (including in the US and Australia) in the last 15 years.

*Selection of TKW for off-site treatment*

13. We have conducted a thorough site search for treatment of the contaminated soil mentioned in paragraphs 9(b) and 9(c) above. The site at TKW in North Lantau is considered the most suitable taking into account its size, proximity to CLS, availability, accessibility and environmental acceptability (i.e. environmentally less sensitive and far away from major residential areas).

14. To avoid any adverse impact on nearby water and fish culture zones, the contaminated soil to be treated at TKW will be transported from CLS to TKW in roll-off trucks with sealable top via a dedicated road access. A route<sup>1</sup> with minimal interface with public roads (as shown in **Annex A**) has been selected.

15. The organic oily residue as the end product of the thermal desorption process will be packaged in drums, labelled and stored in accordance with the Waste Disposal (Chemical Waste) (General) Regulation before collection by a licensed collector for transportation to the CWTC for incineration. Each consignment will be tracked by means of a trip-ticket system and the contractor will notify the Environmental Protection Department for each delivery to the CWTC. The route<sup>2</sup> from TKW to CWTC is shown in **Annex B**.

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<sup>1</sup> The transportation of contaminated soil will be via a temporary haul road at Penny's Bay, passing through Road P2 at Yam O underneath the North Lantau Highway, then a temporary construction access road along the southern side of the Lantau Airport Railway (LAR), and then a section of restricted road within Tsing Ma Control Area passing underneath the LAR, before finally reaching TKW.

<sup>2</sup> The transportation of organic residue from TKW to CWTC will be via the temporary construction road to Yam O, and then along the North Lantau Highway, Kap Shui Mun Bridge, Tsing Ma Bridge, Tsing Yi Road West, and finally along Tsing Yi Road to the CWTC at Southeast Tsing Yi.

## **Air Quality**

16. Air modelling tests conclude that the impact of dust at CLS is very low. Mitigation measures including spraying of water mist and limiting excavation rate will be implemented. Notwithstanding the very low impact, workers handling the contaminated soil will still be required to wear personal protective equipment such as masks / respirators, tyvex cover up, boots and gloves.

17. Air emissions from the treatment facilities at TKW will comply with established standards. The thermal desorption plant to be set up at TKW will be an enclosed type equipped with an air pollution control system to limit dioxin emission. The dioxin-contaminated soil will be stored in enclosed sheds. No personnel would be allowed to enter the control zone of the plant without completing proper safety training and wearing protective apparel, gloves and boots. Masks / respirators would be required when justified by air monitoring results.

## **Waste Management**

18. The Construction and Demolition (C&D) material generated by this project will be reused and recycled on site as far as practicable to minimise the amount of C&D material to be disposed of at public filling areas. The soil after treatment will be clean inert material suitable for use as public fill. The thermal desorption plant at TKW will be decommissioned after completion of the remediation work. No significant waste is expected to arise from the decommissioning of the plant.

## **Water Quality**

19. With the implementation of best site practices and the recommended mitigation measures, no adverse water quality impact is envisaged.

## **Ecological Impact**

20. The potential impact on the restricted / protected plants around CLS and the Rice Fish habitats at Mong Tung Hang Stream (MTHS) will be minimized through controlling construction practices and implementing mitigation measures.

Restricted/protected plants will be fenced off and preserved in situ. Plants directly affected by the works will be transplanted to a suitable receptor site at Tai Tam Country Park. The habitat of the Rice Fish will be recreated at MTHS. Environmentally friendly design will be incorporated in the future drainage channel to encourage recolonisation of the lower stream fauna.

### **Cultural Heritage**

21. Some artifacts of different periods have been identified by the Antiquities and Monuments Office during its survey at CLS from August to November 2001. Preservation measures and rescue works will be carried out before commencement of the decommissioning works to minimize the potential impact on archaeological resources.

### **Environmental Monitoring and Audit (EM&A)**

22. All the recommended mitigation measures will be incorporated into an EM&A programme for implementation. The programme will monitor the effectiveness of the remediation and clean up measures. It will enable appropriate rectification actions to be taken in a timely manner if necessary to reduce impacts at specific areas. An Environmental Project Office has been set up to oversee the cumulative environmental impacts arising from the developments in Penny's Bay and the adjoining areas including the CLS decommissioning project.

### **Public Consultation**

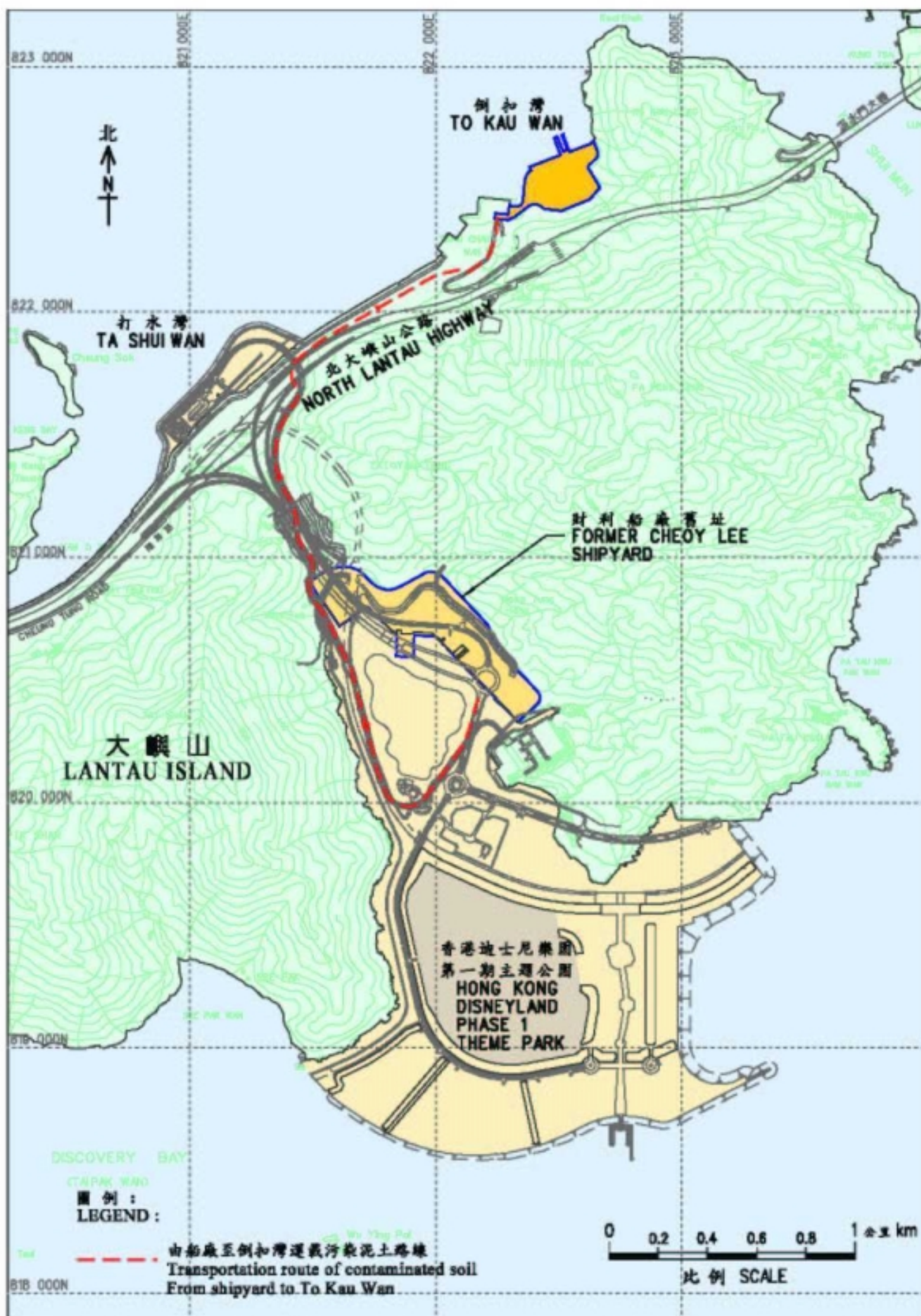
23. Since commencement of the public consultation period, we have briefed the Islands District Council on 25 February 2002. Members generally supported the proposed decommissioning works. The EIA Subcommittee of the Advisory Council on the Environment (ACE) discussed the EIA report on 4 March 2002. Discussion will continue on 18 March 2002. We will brief the Tsuen Wan and Kwai Tsing District Councils on 14 and 21 March 2002 respectively. We will also brief the Economic Services Panel at its meeting on 20 March 2002. The ACE will consider the EIA report on 26 March 2002.

## **Conclusion**

24. The primary objective of the decommissioning project is to return the CLS site to a condition suitable for use by the community. All potentially harmful contaminants at CLS will be thoroughly removed, treated and disposed of in an environmentally acceptable manner. After treatment, the soil will be clean inert material suitable for use as public fill. With the implementation of the mitigation measures recommended in the EIA report, the decommissioning project will comply with all environmental standards and legislation.

Civil Engineering Department  
March 2002





Title  
**附件 甲**  
**Annex A**

**位置圖**  
**Location Plan**

