

**ENVIRONMENTAL PROTECTION DEPARTMENT**

**Development of  
Organic Waste Treatment Facilities, Phase 2**

**Project Profile**

**April 2011**

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## **1 PURPOSE OF PROJECT PROFILE**

This project profile is to set out the scope of environmental issues associated with a project of Development of Organic Waste Treatment Facilities (OWTF) Phase 2 at Sha Ling, North District for the application of an Environmental Impact Assessment (EIA) study brief.

## **2 BASIC INFORMATION**

### **2.1 Project Title**

Development of Organic Waste Treatment Facilities, Phase 2

### **2.2 Purpose and Nature of the Project**

#### **Background**

In December 2005, the Administration published “A Policy Framework for the Management of Municipal Solid Waste (2005-2014)” (Policy Framework) which set out, among others, that biodegradable materials (such as food waste) from the commercial and industrial (C&I) establishments could be separated at source for biological treatment to produce useful products.

In 2009, Hong Kong disposed of about 3700 tonnes of organic waste to the landfills each day, of which about 1000 tonnes were from the C&I sources, such as restaurants and food processing industries. The disposal of such biodegradable waste direct to landfills is not sustainable as it leads to depletion of the limited landfill void space, and the formation of landfill gas and leachate that impose long-term environmental burden on the environment.

The Environmental Protection Department commissioned a Pilot Composting Facility at the Kowloon Bay Waste Recycling Centre in 2008 for the collection and processing of source-separated food waste from the C&I establishments. Building on the experience of the Pilot Facility, the Administration plans to develop OWTF in two phases with a total daily treatment capacity of about 500 tonnes of organic waste. The OWTF would adopt biological technologies (composting and anaerobic digestion) to turn the organic waste to useful compost products and biogas for energy recovery.

Phase 1 of OWTF is located in Siu Ho Wan and would treat 200 tonnes of source separated organic waste (mostly food waste) every day. Its EIA was approved under the EIA Ordinance in February 2010. It is anticipated that operation for OWTF Phase 1 will commence in 2014.

### **Purpose and Nature of the Project**

The Director of Environmental Protection proposes to construct and operate Phase 2 of OWTF in Sha Ling, North District. The main purpose of the Project is to adopt proven biological treatment technologies to recover reusable materials and energy, such as compost, heat, electricity and biogas from source-separated organic waste which is currently being disposed of at landfills. The Project is expected to positively contribute to the Hong Kong SAR Government's municipal solid waste management policy.

### **2.3 Name of Project Proponent**

Environmental Protection Department (EPD)

### **2.4 Location and Scale of Project and History of Site**

The Project will be located at Sha Ling in the North District, within the Frontier Closed Area (please see Figure 1). The Site is zoned "Government, Institution or Community" (G/IC) in the approved Fu Tei Au and Sha Ling Outline Zoning Plan No. S/NE-FTA/12 dated October 2010.

The Site with an area of about 2.5 hectare is currently granted to EPD by way of Temporary Government Land Allocation (TGLA) No. TDN 265, and about 1.5 ha of the Site has been developed for livestock waste composting plant, namely Sha Ling Livestock Waste Composting Plant (SLCP). The above composting plant will be decommissioned and replaced by the proposed Organic Waste Treatment Facility Phase 2.

The Project is expected to receive and process approximately 300 tonnes of source-separated organic waste for treatment each day. It is estimated that OWTF Phase 2 would avoid disposal of organic waste at landfills, produce biogas as a source of renewable energy and produce compost for use as fertilizers or soil conditioners. The biogas could be used to generate electricity for internal use by the Project as well as export to the power grid.

## **2.5 Number and Types of Designated Projects to be covered by the Project Profile**

There is only one Designated Project (DP) under this Project Profile. The Project Profile has been prepared in accordance with Annex 1 of the Technical Memorandum on Environmental Impact Assessment Process (EIAO-TM). This Project is classified as DP under Item G4 of Part 1, Schedule 2 of Environmental Impact Assessment Ordinance (EIAO) Cap. 499.

## **2.6 Name and Telephone Number of Contact Person(s)**

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## **3 OUTLINE OF PLANNING AND IMPLEMENTATION PROGRAMME**

### **3.1 Project Planning and Implementation**

The Project Proponent will employ consultancy firms to conduct the overall feasibility and EIA studies.

The Project is planned to be implemented through a Design, Build and Operate (DBO) contract. The Contractor will be selected through a competitive tendering exercise. Under the contract, the Contractor will be responsible for:

- i. detailed design of facilities for waste reception, treatment and recovery of resources
- ii. construction, provision and installation of facilities
- iii. testing and commissioning of equipments and facilities
- iv. operation of facilities
- v. monitoring of operation

### **3.2 Project Programme**

The Project implementation programme is shown as follows:

<b>Key Stage of the Project</b>	<b>Indicative Milestones</b>
Commencement of Feasibility and EIA Studies	2011
Tendering for DBO Contract	2013
Construction of the Project	2014
Commencement of the Operation of the Project	2016

### **3.3 Interfacing with Other Projects**

Based on available information at this stage, there is no Proposed/ Committed Project nearby that is anticipated to interact with OWTF Phase 2.

## **4 MAJOR ELEMENTS OF THE SURROUNDING ENVIRONMENT**

The Site is located at Sha Ling within the Frontier Closed Area and it is zoned “Government, Institution or Community” in the Fu Tei Au and Sha Ling Outline Zoning Plan No. S/NE-FTA/12. The existing environment of the Site and its surrounding were reviewed and the sensitive receivers were identified as follows:

- i) San Uk Ling Holding Centre;
- ii) Rifle Range;
- iii) Police Dog Unit and Force Search Unit Training School;
- iv) Hong Kong Police Force Border District Headquarters;
- v) scattered village houses;
- vi) a Chinese temple;
- vii) fish ponds;
- viii) woodlands and plantations;
- ix) watercourses; and
- x) agricultural lands.

In addition, a Study on “Land Use Planning for the Closed Area – Feasibility Study” was completed by Planning Department in mid 2010. The proposed land use framework by the Study would provide a basis for the preparation of statutory

town plans before the opening up of the existing Closed Area. According to the above Study, there are proposed developments near the Site which will be potential sensitive receivers as follows:

- i) Proposed Man Kam To Development Corridor, with planning intention for hi-tech/creative industries, and cross-boundary trade/logistic uses.
- ii) Proposed Residential Development in Kong Nga Po and Hung Lung Hang, which would be more than 300m away.

The above sensitive receivers are not exhaustive and will be reviewed during the EIA study.

## **5 POSSIBLE IMPACTS ON THE ENVIRONMENT**

### **5.1 General Description of the Project**

The Site is currently occupied by EPD's Sha Ling Livestock Waste Composting Facility. This Site will be made available for the development of OWTF Phase 2. Demolition and removal of the existing above ground structures of the Livestock Waste Composting Facility may be required prior to construction of the Project.

A tentative process flow diagram is shown in Figure 2 for reference only as the process will be subject to review and assessment of this EIA. The operation of the Project will involve four main stages:

- Waste Acceptance and Pre-treatment
- Digestion
- Composting
- Energy Recovery

#### Waste Acceptance and Pre-treatment

Source-separated organic waste will be delivered to the OWTF Phase 2 by enclosed waste collection vehicles (WCVs). All WCVs entering and exiting the facility will be weighed on a weighbridge. The information of weight, waste type and waste producer will be recorded. The organic waste in the WCVs will then be unloaded in a waste reception building. The building will be operated under negative pressure and any air circulating inside will be directed to an odour removal system before being discharged to the open air. All WCVs will be washed before leaving the Site.

The incoming organic waste will pass through pre-treatment process. The process will involve the use of mechanical equipments to separate out unsuitable materials such as plastics, metals or oversized components from the waste. Following this, size reduction will be carried out to produce a homogenous material to facilitate the subsequent treatment processes.

### Digestion

The pre-treated organic waste will be directed to the digesters for anaerobic digestion. The digesters will operate at the temperature range from 30 to 60 °C depending on the design. Each digester may be equipped with mixing devices to maintain suitable conditions for microbiological activities. Depending on the design, the retention time inside the digester will range from about 20 to 45 days to ensure adequate degradation and maximize biogas production.

### Composting

After digestion, the waste material from the digesters will be dewatered to appropriate moisture contents followed by feeding to the composting facilities for processing. The waste material will reside in the composting facilities for about 2 weeks during which it will be regularly aerated to maintain aerobic conditions. After composting, the waste material will become useful stabilized compost.

### Energy Recovery

During anaerobic digestion, biogas with high methane content will be produced. The biogas will be collected for use as renewable energy. The biogas generated from the digester will be treated to remove any particulate matters, hydrogen sulphide and moisture. The treated biogas will be stored in a double membrane gas holder under pressure. Air-tight auxiliary facilities will be provided to transmit and process the biogas, and the gas holders will be protected from over-pressure by a gas flare system that will only be operated under emergency situations. The emission from the flare will be controlled with reference to European Standard.

The biogas will be used to generate electricity and heat through combined heat and power generation equipments. The heat produced will be used internally and the electricity generated will be used on-site and the surplus could be exported to the grid. The biogas may also be further processed to become fuel for heating or



vehicle uses. The options and auxiliary facilities required for biogas processing, utilization and transmission (such as cables or pipelines) will be investigated and assessed in this EIA.

## **5.2 Identification of Key Environmental Issue**

The construction and operation of the Project may give rise to potential environmental impacts.

### **5.2.1 Air Quality**

#### Construction Phase

The main potential air quality impacts would be dust emissions associated with the construction and demolition works and gaseous pollutants due to the operation of diesel-powered construction equipments. The scale of works is expected to be small and the total number of diesel-powered construction plants will be small. Due to the small scale and limited extent of construction activities, adverse air quality impact is not expected with implementation of appropriate dust suppression measures.

#### Operation Phase

Potential air quality impacts may arise from waste reception and pre-treatment process. All these processes will take place inside a building operated under negative pressure. Air circulation in the building will pass through air pollution control equipments which can remove dust, particles and odour before it is discharged from the building. With installation of the air pollution control equipments, no adverse air quality impact is expected from waste reception and pre-treatment.

The anaerobic digestion will take place in air-tight reactors. Discharge of gaseous emissions from the process is not expected. Produced biogas will be stored inside the gas holders before it is utilized for electricity generation, or further processed as fuel gas, subject to the findings and assessment of the feasibility study and this EIA. Air-tight auxiliary facilities will be provided to transmit and process the biogas, and the gas holders will be protected from over-pressure by a gas flare system that will only be operated under emergency situations. The emission from the flare will be controlled with reference to European Standard. Therefore, no adverse air quality impact is expected to arise from their normal operation.

Composting of organic waste materials and treatment of wastewater may emit gaseous pollutants. The composting facilities and wastewater treatment plant will be enclosed inside buildings. Air circulation in the buildings will pass through air pollution control equipments which can remove dust, particles and odour before it is discharged from the buildings. With installation of the air pollution control equipments, no adverse air quality impact is expected from composting of organic waste materials and treatment of wastewater.

Notwithstanding the provision of air quality control equipment, potential air quality impacts, including odour, will be assessed in this EIA.

## **5.2.2 Noise**

### Construction Phase

Powered Mechanical Equipments (PMEs) like generators, excavators, concrete breakers, concrete lorry mixers, and mobile cranes will be used for the construction and demolition works which will be confined inside the site area. The scale of the Project is expected to be small and limited numbers of PMEs will be required. Hence adverse construction noise impacts are not envisaged.

### Operation Phase

The waste reception building will be operated during daytime. Key potential noise sources during the operational phase will include waste unloading machines, shredding machines, conveying belts, metal separators and waste mixers. As all these machineries will be enclosed in a building, no adverse noise impact from these fixed noise sources is expected.

The anaerobic digestion plant will be operated 24 hours a day. The waste inside the digester may be mixed by means of rotating paddles. As the required rotation speed is slow, adverse noise impacts are not envisaged.

The waste delivery will require a relatively small number of vehicle transportation, about 75 vehicle trips each day. The traffic induced by the Project onto the existing roads will be minimal. As a result, adverse traffic noise impact associated with the Project is not anticipated.

### **5.2.3 Water Quality**

#### Construction Phase

The potential sources of water quality impact consist of site surface runoff and drainage; debris, refuse and liquid spillages from general construction activities; and sewage effluent from the construction workforce. The construction of the Project will not require any substantive site formation and only small scale excavation works will be carried out for foundations and utilities installation. With the implementation of good site practice and appropriate mitigation measures, adverse water quality impacts from the construction activities are not anticipated.

#### Operation Phase

Water quality impacts may arise from the discharge of effluents to the drainage, sewerage system and/or water bodies nearby. The operation of the Project is not expected to generate a substantial amount of effluents as the process water will be re-circulated and reused. The surplus wastewater from the process will be treated in a wastewater treatment unit before it is discharged. Discharge standards will follow the Technical Memorandum of Effluents Discharged into Drainage and Sewerage System, Inland and Coastal Water (WPCO-TM) issued under Section 21 of the Water Pollution Control Ordinance (WPCO).

Only a small quantity of domestic sewage is expected to be generated during the operation of the Project as the number of staff will be very small.

There is no public sewer in the vicinity of the Site at present. Yet with provision of appropriate treatment facilities and reusing of process water, adverse water quality impacts are not anticipated.

### **5.2.4 Waste Management**

#### Construction Phase

The construction and demolition activities associated with the Project will result in the following broad categories of waste:

- Construction and demolition (C&D) materials, mainly from the demolition of existing ground slab and facilities;

- Chemical waste, such as batteries and lubricating oils from the maintenance of construction vehicles and equipment; and
- General refuse, including food waste from the on-site work force and the packaging from the construction materials.

C&D materials generated from the construction works will be properly segregated and scrap metals will be recovered for recycling. The amount of C&D waste requiring disposal of at designated sites and the associated potential impacts will be minimal.

The construction activities of the Project are not expected to generate significant amount of chemical waste, and therefore no impact is expected in this respect.

With proper housekeeping measures and refuse collection arrangements in place, no impact is expected to result from refuse generated from the construction phase of the Project.

#### Operation Phase

Chemical waste such as lubricating oils, paints and oil filters from equipment maintenance will be properly collected and disposed of in accordance with Waste Disposal (Chemical Waste) (General) Regulations. Providing the small number of equipment items on site, the quantity of chemical waste to be generated is expected to be small.

General refuse will be collected in enclosed bins and collected by waste collector on a regular basis. Given the small number of staff, the amount of general refuse generated during the operational phase is expected to be small.

The operation of pre-treatment process will sort out unsuitable materials from the received organic waste for further treatment process. The amount of the unsuitable material is expected to be small because waste producers should properly separate out organic waste for collection. The operation of the digestion and composting processes will produce compost as a useful by-product, but not any other solid waste. The compost will be used as fertilizer or soil-conditioners for agricultural, horticultural or landscaping purposes.

#### **5.2.5 Ecology**

The Site is currently used for livestock waste composting plant. Some trees and

vegetation are located within the Site but outside the fence of the existing composting plant. It is anticipated that the Project will be constructed within the footprint of the existing composting plant (i.e. within the existing fenced area) and hence direct impact is unlikely.

There are also woodlands, fish ponds and small watercourses near the Site. However, the construction of the Project will not require any substantive site formation, and only small scale excavation works will be carried out for foundations and utilities installation within the Site. With the implementation of good site practice and appropriate mitigation measures, adverse ecological impacts arising from construction and operation of the Project are not anticipated.

### **5.2.6 Cultural Heritage**

The Site is currently used for livestock waste composting plant, and there is no site of cultural heritage within the proposed Site. Adverse impact is not anticipated from construction and operation of the Project.

### **5.2.7 Landscape and Visual**

The Site has been developed for the use of livestock waste composting plant, which will be demolished and replaced by the proposed Organic Waste Treatment Facility Phase 2. The implementation of the Project will have no further effect on the existing landscape character and visual quality within and around Sha Ling.

As mentioned in S.5.2.5, some trees and vegetation are located within the Site but outside the fence of the existing composting plant. It is anticipated that the Project will be constructed within the footprint of the existing composting plant (i.e. within the existing fence) and hence direct impact to the trees is unlikely.

### **5.2.8 Hazard to Life**

Biogas will be continuously produced within the digesters. It is estimated that a maximum of 5,000 cubic metres of biogas will be stored in gas holding tank on site during the operational phase of the Project. Under normal operating conditions, the biogas will be converted into heat and electricity through the cogeneration equipments, or processed as fuel gas. Final option is subject to the findings and assessments of the feasibility study and this EIA. The Project will be equipped with a flare system to burn any surplus biogas under emergency or abnormal circumstances. While the Project would not be classified as Potentially

Hazardous Installations as the biogas storage capacity would be far below the lower threshold quantity of 15 tonnes for existing flammable gas and town gas installations in Hong Kong, potential hazards from the storage and utilization of the biogas will be assessed in this EIA.

## **6 ENVIRONMENTAL PROTECTION MEASURES TO BE INCORPORATED IN THE DESIGN AND ANY FURTHER ENVIRONMENTAL IMPLICATIONS**

### **6.1 Air Quality**

#### Construction Phase

The potential dust impacts associated with the construction of the Project will be mitigated by the implementation of construction site management practices for dust control. This includes erection of hoardings, watering of exposed soil surfaces, covering of stockpile of dusty material with impervious sheeting.

#### Operation Phase

A detailed air impact assessment will be conducted in the EIA of the Project to determine the degree and extent of impacts from its gaseous emissions during the operational phase. Appropriate emissions control systems will be incorporated in the Project to ensure potential air quality impacts on the Air Sensitive Receivers are minimized. Odour management plan will be prepared to ensure compliance of odour level at the sensitive receivers.

### **6.2 Noise**

#### Construction Phase

The construction noise management measures for the construction and demolition works will be as follows:

- Only well-maintained equipment will be operated on-site and equipment will be serviced regularly during the works;
- Machines and equipment that are in intermittent use will be shut down between work periods or will be throttled down to a minimum;
- Silencers or mufflers on construction equipment will be utilized and will be properly maintained during the works; and

- Mobile noise barriers will be positioned with a few metres of noisy plant items, where necessary.

### Operation Phase

All the waste reception, pre-treatment, digestion and post-treatment activities will be undertaken in enclosed buildings to avoid any potential adverse noise impacts.

The anaerobic digestion plant will be operated 24 hours a day. The waste inside the digester may be mixed by means of rotating paddles. As the required rotation speed is slow, adverse noise impacts are not envisaged.

## **6.3 Water Quality**

### Construction Phase

Appropriate measures will be implemented in accordance with the guidelines stipulated in EPD's Practice Note for Professional Persons on Construction Site Drainage (ProPECC PN 1/94) during the construction and demolition works to properly control site run-off and drainage and to minimize potential water quality impacts.

### Operation Phase

The process water will be re-circulated and reused. The surplus of wastewater from the process and domestic sewage will be treated in a wastewater treatment unit to ensure that any effluent discharge will meet the relevant standards in the WPCO-TM.

## **6.4 Waste Management**

### Construction Phase

To minimize the amount of construction waste, the contractor will be required to adopt good site management practice and have careful design and planning. On-site waste segregation will be implemented to increase the amount of recycling and reuse.

Chemical waste generated during the construction of the Project will be properly stored in accordance with EPD's Code of Practice on the Packaging, Labelling

and Storage of Chemical Wastes before collection for disposal by a licensed Chemical Waste Collector. General refuse generated on-site will be stored in refuse bins and collected by waste collector for disposal on a regular basis.

### Operation Phase

Unrecyclable solid waste such as grits or contaminated plastics sorted out in the pre-treatment process will be disposed of at designated landfill site. General refuse generated on site will be stored in enclosed bins and collected by waste collector on a regular basis.

Arrangements will be made to ensure the compost generated from the Project and any recovered recyclable materials are utilized.

## **6.5 Ecology**

The mitigation measures that are to be implemented to address the impacts on air, noise, waste and water quality will help to alleviate any potential ecological impacts.

## **6.6 Cultural Heritage**

The Site is currently used for livestock waste composting plant, and there is no site of cultural heritage within the proposed site. Hence, adverse impact is not anticipated and specific mitigation measure is considered not required.

## **6.7 Landscape and Visual**

While the Project would replace the existing livestock waste composting plant and adverse landscape/visual impact is not anticipated, the Project will include landscape proposal and aesthetic architectural design to improve its visual quality.

## **6.8 Hazard to Life**

Arrangements and facilities for the storage, processing and flaring of biogas for the Project will be in strict compliance with relevant legislation and guidelines. Assessment of the potential hazards associated with the Project will be conducted in accordance with the EIAO-TM to identify the need of any mitigation measures required.



## **7 USE OF PREVIOUSLY APPROVED EIA REPORTS**

The following approved EIA report will be referred in the Study.

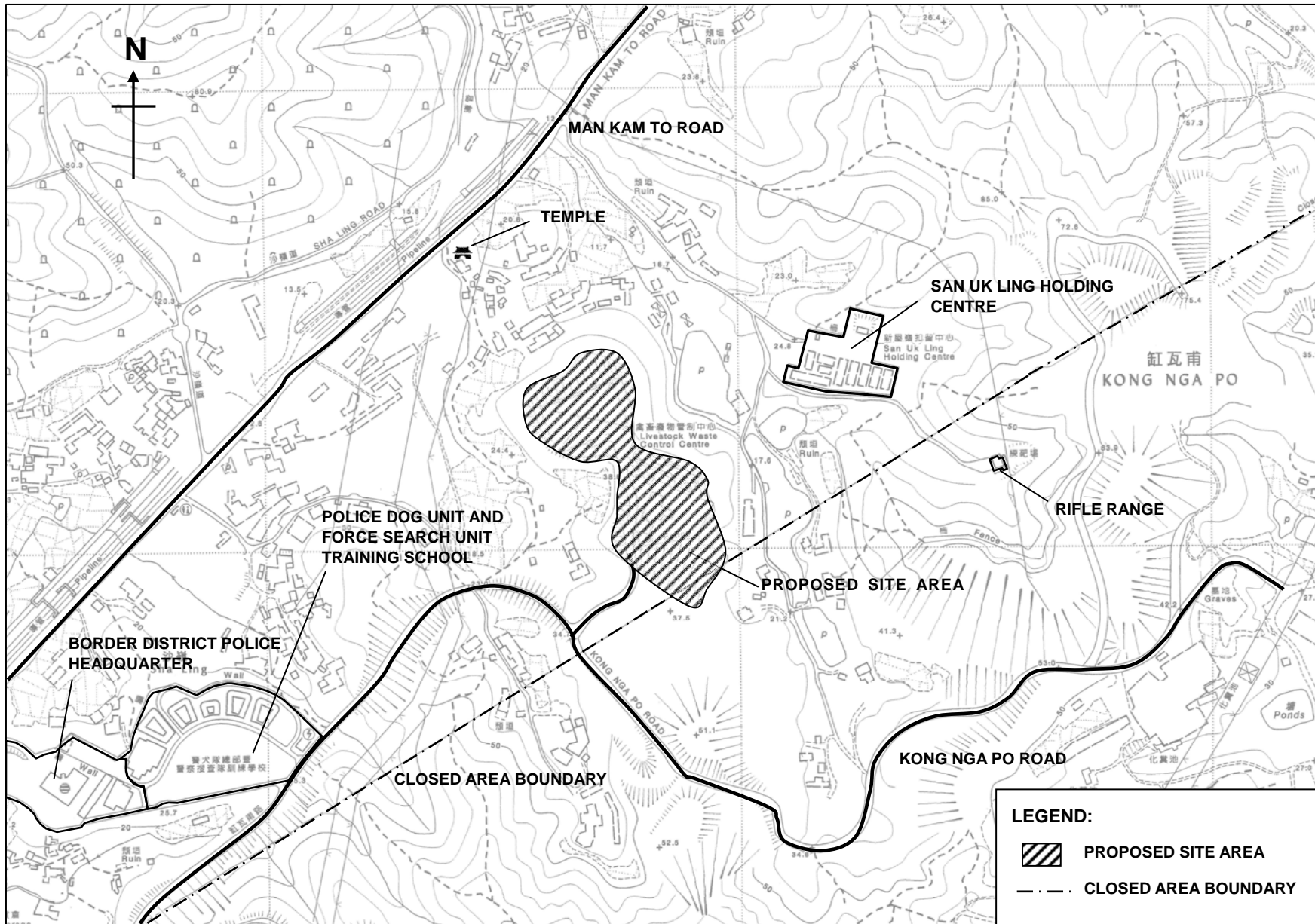
EIA Report for

Organic Waste Treatment Facilities, Phase 1

(EIA Register No. AEIAR-149/2010, approved with conditions on 24 February 2010)

*Environmental Protection Department*

*April 2011*



Environmental Protection Department

PROPOSED ORGANIC WASTE TREATMENT FACILITIES, PHASE 2

SITE LOCATION PLAN

APRIL 2011

FIGURE 1

