ENVIRONMENTAL PROTECTION DEPARTMENT

Development of
Organic Resources Recovery Centre (Phase 3)

Project Profile

June 2017

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1 BASIC INFORMATION

1.1 Project Title

Development of Organic Resources Recovery Centre (Phase 3) (hereinafter referred to as "the Project").

1.2 Purpose and Nature of the Project

Background

Hong Kong disposed of about 3,920 tonnes of organic waste at landfills each day in 2015, which comprises food waste, yard waste and other organic waste generated from the domestic, commercial and industrial (C&I) sectors. The current practice of landfilling of organic waste is not sustainable as it depletes the limited landfill capacity, generates landfill gas and leachate that will impose long term burden to the environment, and squanders the useful organic contents.

In December 2005, the Government promulgated "A Policy Framework for the Management of Municipal Solid Waste in Hong Kong (2005-2014)", that sets out, amongst others, the initiative of treating source-separated organic waste (mainly food waste) from C&I establishments by biological technologies.

The Environmental Protection Department (EPD) commissioned a pilot composting facility at Kowloon Bay Waste Recycling Centre in 2008 for the collection and processing of source-separated food waste from the C&I establishments. It is capable to provide local experience for preparing the development of Organic Resources Recovery Centres (ORRCs)[1].

In May 2013, the Environment Bureau (ENB) published "Blueprint for Sustainable Use of Resources 2013-2022", it articulates the strategy on waste management. In February 2014, the ENB further unveiled "Food Waste & Yard Waste Plan for Hong Kong 2014-2022" which addresses organic waste specifically and outlines the target of reducing food waste disposal at landfills

[1] This footnote is for English version only. The ORRCs were previously known as "Organic Waste Treatment Facilities (OWTFs)". The English name of the facility is amended to tally with its Chinese name "有機資源回收中心" and to better reflect the nature of the facility which is essentially for resource recovery purposes.

by 40% by 2022 using 2011 as the base year. It is envisaged the need to build a network of around 5 to 6 ORRCs with a total recycling capacity of about 1,300 - 1,500 tonnes per day. The first phase of ORRCs, ORRC (Phase 1), is located at Siu Ho Wan in North Lantau for treating source-separated organic waste generated from the C&I sectors at a capacity of 200 tpd. The facility is expected to become operational in 2017. The second phase of ORRCs, ORRC (Phase 2), is located at Sha Ling in the North District, which comprises a daily treatment capacity of 300 tonnes. The tenders were invited in December 2016. A site in Shek Kong has been earmarked for the development of the third phase of ORRCs, ORRC (Phase 3).

Purpose and Nature of the Project

The Director of Environmental Protection proposes to construct and operate the ORRC (Phase 3) in Shek Kong, Yuen Long. The main purpose of the Project is to adopt proven treatment technologies to recover reusable materials and energy 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.

1.3 Name of Project Proponent

Environmental Protection Department (EPD)

1.4 Location and Scale of Project and History of Site

The Project will be located at Shek Kong, Yuen Long (Figure 1), occupying an area of about 1.86 hectares. The Site is zoned "Industrial (Group D)" in the approved Shek Kong Outline Zoning Plan No. S/YL-SK/9.

The Site is mainly Government land. The domestic and non-domestic structures such as the vehicle repair workshop within the site will be cleared and replaced by the proposed ORRC (Phase 3).

The Project is expected to receive and process approximately 300 tonnes of source-separated organic waste for treatment each day. It is estimated that the Project would avoid disposal of organic waste at landfills and recover reusable materials and energy.

1.5 Number and Types of Designated Projects to be Covered by the 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 Designated Project (DP) under Item G4 of Part I, Schedule 2 of Environmental Impact Assessment Ordinance (EIAO) Cap. 499.

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2 OUTLINE OF PLANNING AND IMPLEMENTATION PROGRAMME

2.1 Project Planning and Implementation

The Project Proponent will employ consultancy firms to conduct the overall Environmental Impact Assessment and Engineering Feasibility Study (EIA and EFS). The procurement options of the Project will be assessed and shall include different forms of Public-Private-Partnership (PPP) approach in addition to the Design-Build-Operate (DBO) form of contract. The final option is subjected to the findings and assessment. 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 equipment and facilities
iv. Operation of facilities
v. Monitoring of operation

2.2 Project Programme

The Project implementation programme is shown as follows:

Key Stage of the Project	Indicative Milestones
Commencement of EIA and EFS	2018
Tendering for Contract	2022
Construction of the Project	2023
Commencement of the Operation of the Project	2026

2.3 Interfacing with Other Projects

Interaction with broader programme requirements or other proposed/committed projects (all of which are subject to confirmation by the relevant project proponents) that will be considered in this EIA include:

i. Upgrading of Remaining Sections of Kam Tin Road and Lam Kam Road
ii. Implementation of Water Intelligent Network (WIN), Remaining District Metering Areas and Pressure Management Areas in Yuen Long and Sheung Shui & Fanling Major Supply Zones

3 POSSIBLE IMPACTS ON THE ENVIRONMENT

3.1 General Description of the Project

The Site is currently occupied by some domestic and non-domestic structures such as the vehicle repair workshop. It will be made available for the development of ORRC (Phase 3) subject to the clearance of these structures.

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

i. Waste acceptance and pre-treatment
ii. Treatment
iii. Energy recovery

Waste Acceptance and Pre-treatment

Source-separated organic waste will be delivered to the ORRC (Phase 3) 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 and/or optical equipment 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.

Treatment

To allow flexibility for the future operators, the facilities will be designed and constructed to accommodate a variety of suitable and proven organic waste treatment technologies which will be identified during the feasibility study stage. The environmental acceptability of the Project will be assessed in the EIA taking account of the identified treatment technologies. The following sections provide a brief account of some typical examples of organic waste treatment technologies including anaerobic digestion and aerobic composting.

For anaerobic digestion, the pre-treated organic waste will be directed to the digesters for treatment. The digesters will operate at the temperature range from 30 to 60^{o}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 digesters will range from about 20 to 45 days to ensure adequate degradation and maximize biogas production.

For aerobic composting, the waste material 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.

Other treatment technologies such as conversion to solid biofuel by mechanical sorting and drying; conversion to liquid biofuel by thermochemical/biochemical/mechanical process; conversion to animal feed/fish feed by sorting and sterilization; and conversion to fibre through lactic acid fermentation process, polymerization and acid melt spinning will be considered during the feasibility study stage. The environmental acceptability will be assessed in accordance with the EIAO-TM requirements.

Energy Recovery

During treatment process, biogas with high methane content may be produced. The biogas will be collected for use as renewable energy. The biogas generated from the reactors 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 equipment. 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.

3.2 Identification of Key Environmental Issue

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

3.2.1 Air Quality

Construction Phase

The major 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 equipment. The potential air quality impacts will be assessed and appropriate dust suppression measures will be proposed to minimize the impact.

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 equipment which can remove dust, particles and odour before it is discharged from the building. With installation of the air pollution control equipment, no adverse air quality impact is expected from waste reception and pre-treatment.

Anaerobic treatment process will take place in air-tight reactors so that discharge of gaseous emissions 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 for heating or vehicle uses, subject to the findings and assessment of the EIA and EFS. 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.

Other treatment processes of organic waste and wastewater will be enclosed inside buildings. Air circulation in the buildings will pass through air pollution control equipment which can remove dust, particles and odour before it is discharged from the buildings. With installation of the air pollution control equipment, no adverse air quality impact is expected from treatment of organic waste and treatment of wastewater.

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

3.2.2 Noise

Construction Phase

Powered Mechanical Equipment (PME) 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 potential construction noise impacts will be assessed and appropriate mitigation measures will be proposed to minimize the impact.

Operation Phase

The waste reception building will be operated during daytime. Key potential noise sources during the operation 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 treatment plant will be operated 24 hours a day. The waste inside the reactors may be mixed by means of rotating paddles. As the required rotation speed is slow, adverse noise impacts are not envisaged.

The Site is currently served by a section of Lam Kam Road. The estimated traffic volume generated by the Project is about 75 vehicle trips per day, which is unlikely to cause adverse traffic noise impact.

3.2.3 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. Potential impact may also arised from re-alignment of stream within the Project Site. The potential water quality impacts will be assessed, good site practice and appropriate mitigation measures will be proposed to minimize the impacts.

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. 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 Systems, Inland and Coastal Waters (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 re-circulation of process water, adverse water quality impacts are not anticipated.

3.2.4 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 arrangement in place, no impact is expected to result from refuse generated from the construction phase of the Project.

Land contamination is not expected in the undeveloped area covered by natural vegetation. Whilst, there is potential for land contamination caused by the existing licensee of a vehicle repair workshop. The land contamination issue and associated impact will be assessed in this EIA.

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. With the implementation of good practices and response procedures for contamination prevention, adverse impacts will be minimal.

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 operation 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 treatment processes will produce useful by-product, the amount of solid waste generated is expected to be small.

3.2.5 Ecology

There are stream and vegetated area located within the Site, construction activities may result in habitat loss. There is Conservation Area adjoining the Site. The potential ecological impacts arising from construction and operation of the Project will be assessed and appropriate mitigation measures will be proposed to minimize the impact.

3.2.6 Cultural Heritage

The Site is currently occupied by some domestic and non-domestic structures, and there is no site of cultural heritage within the proposed Site. Adverse impact is not anticipated from construction and operation of the Project.

3.2.7 Landscape and Visual

Trees and vegetation within the Project site may be removed during construction period. Potential landscape and visual impacts may arise from disturbance to the existing landscape of the site.

The superstructure of ORRC (Phase 3) may generate landscape and visual impacts. By adopting proper mitigation measures such as dedicated landscape design to match with the existing environment, the residual landscape and visual impact would be minimal as anticipated.

3.2.8 Hazard to Life

Biogas will be continuously produced in the treatment process. 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 equipment, or processed as fuel gas. Final option is subject to the findings and assessments of the EIA and EFS. 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.

4 MAJOR ELEMENTS OF THE SURROUNDING ENVIRONMENT

The Site is located at Shek Kong of the Yuen Long District, it is zoned "Industrial (Group D)" in the approved Shek Kong Outline Zoning Plan No. S/YL-SK/9. The Site is mainly Government land. There are squatters and vegetated area existed in the site. The existing environment of the Site and its surrounding were reviewed and the sensitive receivers were identified as follows:

Type	Sensitive Receiver
Residential Developments	Domestic structures Wong Chuk Yuen Shek Kong Village
Places of Worship	Monastery
Water Bodies	Streams
Areas of Conservation Value	Trees and plantations Kadoorie Farm Agricultural Research Centre Lam Tsuen Country Park Conservation Area

No planned sensitive receivers are identified within the study area. Notwithstanding, the identified sensitive receivers are not exhaustive and will be reviewed during the EIA study.

5 ENVIRONMENTAL PROTECTION MEASURES TO BE INCORPORATED IN THE DESIGN AND ANY FURTHER ENVIRONMENTAL IMPLICATIONS

5.1 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 quality impact assessment will be conducted in the EIA of the Project to determine the degree and extent of impacts arising 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.

5.2 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 within a few metres of noisy plant items, where necessary.

Operation Phase

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

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

5.3 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.

Proper design will also be applied to optimize the layout and minimize the footprint with a view to avoid sensitive parts of the natural environment as far as practicable.

Operation Phase

The process water will be re-circulated and the surplus 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.

5.4 Waste Management

Construction Phase

To minimize the amount of construction waste, the contractor will be required to adopt good site management practice and perform 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.

The potential of land contamination will be assessed and remediation measures if necessary will be carried out in accordance with existing guidelines and practices.

Operation Phase

Chemical waste will be properly collected and disposed of in accordance with Waste Disposal (Chemical Waste) (General) Regulations. Good practices and response procedures for contamination prevention will be implemented.

Non-recyclable 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 by-product generated from the Project and any recovered recyclable materials are utilized.

5.5 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. Proper design will also be applied to avoid sensitive parts of the natural environment as far as practicable.

Nevertheless, the ecological impact shall be assessed in accordance with the requirements of the EIA Study Brief and the EIAO-TM to identify the need of any mitigation measures in the EIA study.

5.6 Cultural Heritage

The Site is currently occupied by some domestic and non-domestic structures, 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.

5.7 Landscape and Visual

Proper design will be applied to avoid vegetated areas and protect/retain existing trees as far as practicable. A tree survey shall be carried out to ascertain the landscape resources and landscape character areas.

The Project will include landscape proposal and aesthetic architectural design to

improve its visual quality.

5.8 Hazard to Life

Arrangements and facilities for the storage, processing and flaring of biogas for the Project will be in strict compliance with relevant legislations 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.

5.9 Possible Severity, Distribution and Duration of Environmental Effects and Further Implications

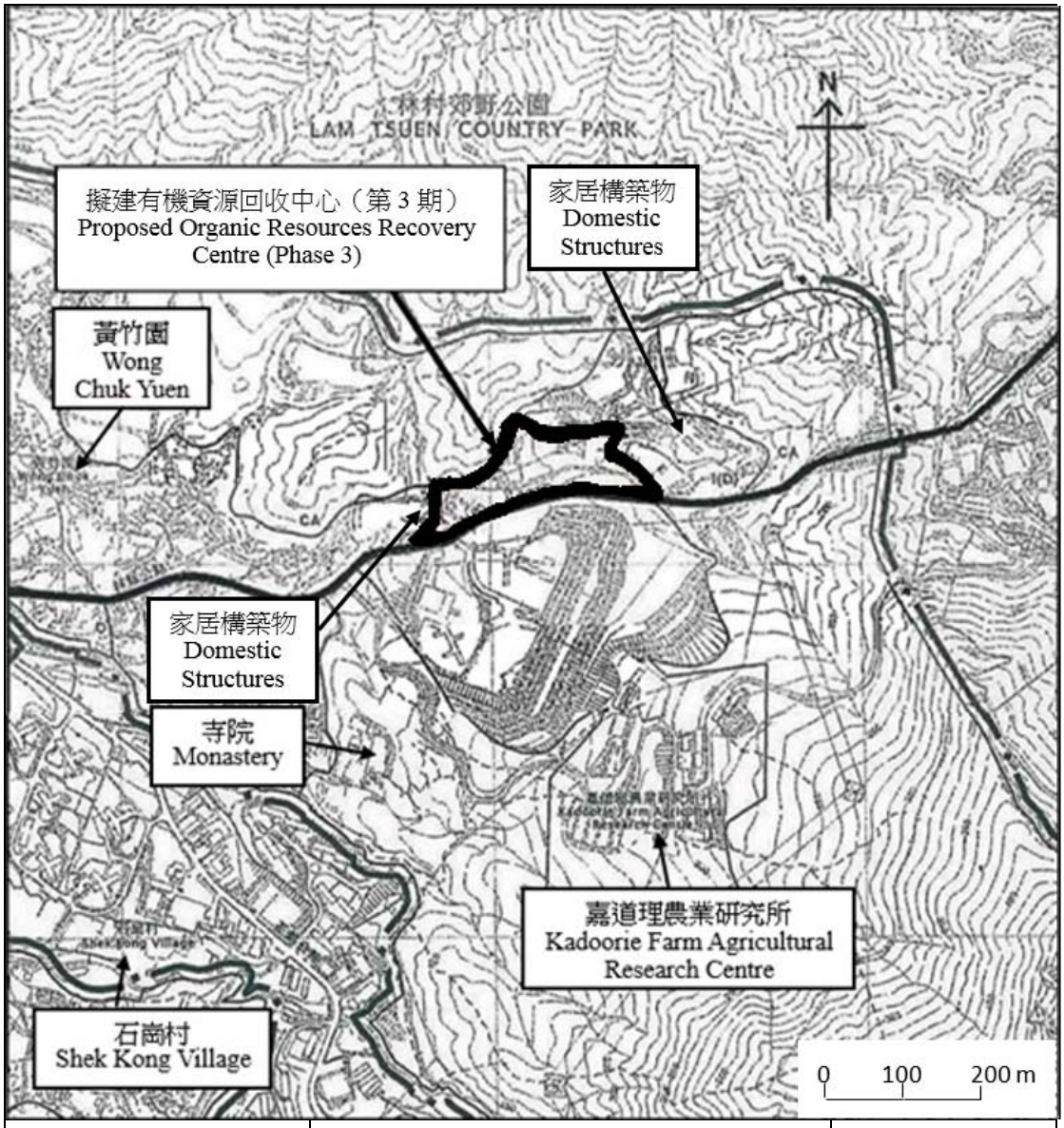
Subject to the findings of assessments, effective control and mitigation measures will be proposed to minimize the impacts to acceptable level. The possible severity, distribution and duration of environmental effects such as beneficial and adverse effects; short and long term effects; secondary and induced effects; cumulative effects and transboundary effects from committed projects, will be considered and addressed in this EIA, where applicable. The key results from public consultation should also be documented in this EIA.

6 USE OF PREVIOUSLY APPROVED EIA REPORTS

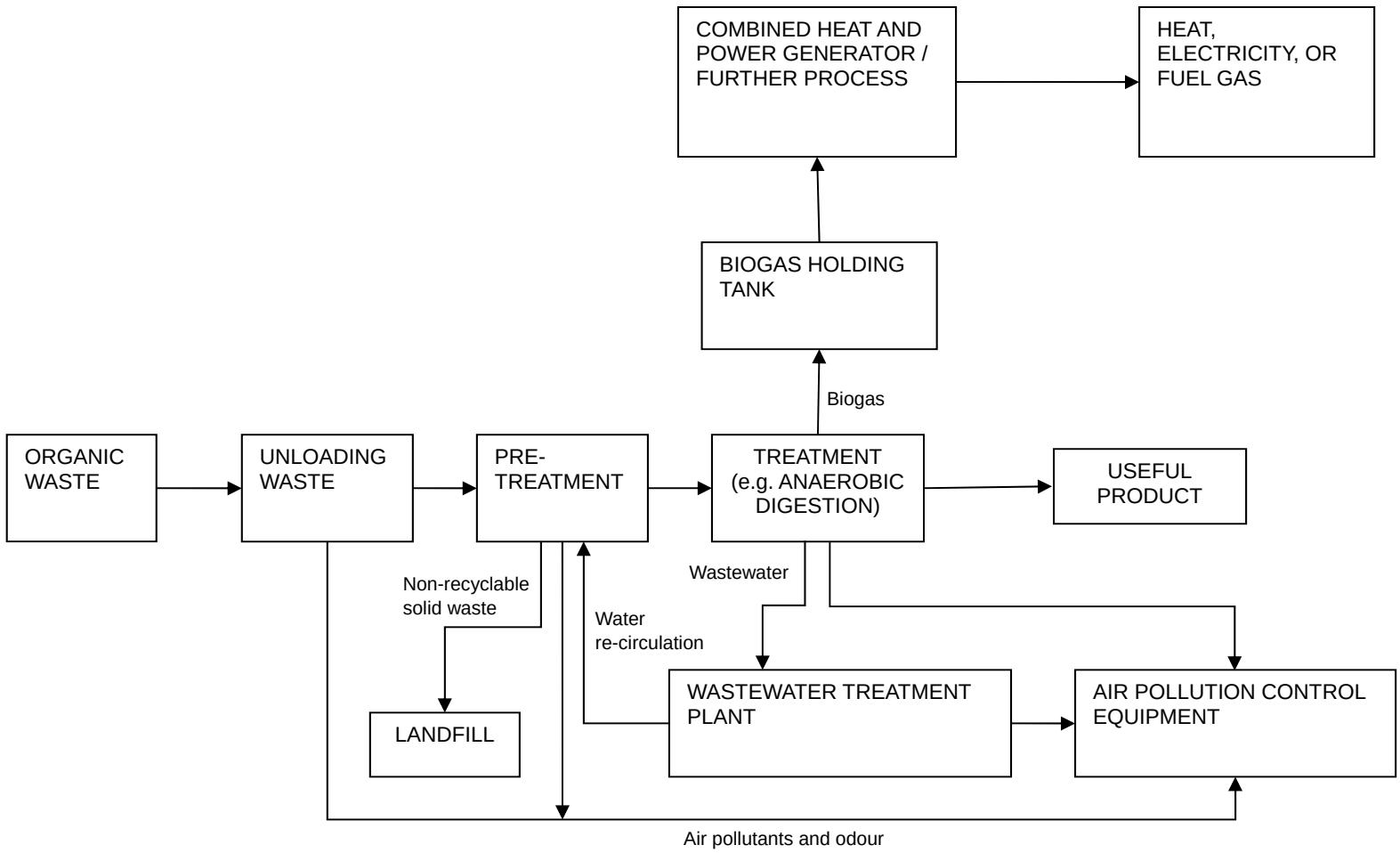
The following approved EIA reports will be referred in the Study.

i. EIA Report for Organic Waste Treatment Facilities, Phase I
(EIA Register No. AEIAR-149/2010, approved with conditions on 24 February 2010)

ii. EIA Report for Development of Organic Waste Treatment Facilities, Phase 2
(EIA Register No. AEIAR-180/2013, approved without conditions on 3 December 2013)



Environmental Protection Department	**PROPOSED RESOURCES RECOVERY CENTRE (PHASE 3), SITE LOCATION PLAN**	**JUNE 2017**
		FIGURE 1



Environmental Protection Department	PROPOSED TREATMENT PROCESS TENTATIVE PROCESS FLOW DIAGRAM	JUNE 2017 FIGURE 2