MARKET SOUNDING EXERCISE

FOR

DEVELOPMENT OF ORGANIC WASTE PRE-TREATMENT CENTRE (NEW TERRITORIES EAST)

INVITATION TO RESPOND

Environmental Protection Department
Government of Hong Kong Special Administrative Region
May 2022

1 Introduction

1.1 Invitation

The Environmental Protection Department (EPD) wishes to invite parties, who may be interested in "designing, building and operating the Organic Waste Pre-treatment Centre (New Territories East)" (the Project) to share their level of interest as well as corporate profile, experiences, expertise, and ideas on the Project.

1.2 Terminology

Within this document, the following terms have the meanings set out below:

- **Consultant** means Binnies Hong Kong Ltd.
- **EPD** means Environmental Protection Department of the Government of Hong Kong Special Administrative Region.
- **Invitation** means this "Invitation to Respond" document.
- **Marketing Sounding Exercise** (MSE) means the communication of information to and request of response from potential tenderers, prior to the invitation of tender, to gauge the interest of potential tenderers in the Project.
- **OWPC** means Organic Waste Pre-treatment Centre (New Territories East).
- **Project** means designing, building and operating the OWPC.
- **Respondent** means an entity making a response, in any form, to this MSE; and potential Respondent means an entity who has received this Invitation or any entity that has contacted the Consultant regarding this Invitation.
- **Response** means information provided to EPD and/or the Consultant during the MSE.

2 The Market Sounding Exercise

2.1 Purpose

Through the MSE, EPD would like to understand the following from potential tenderers:

- Level of interest in the Project
- Capability to undertake the Project
- Ideas on technologies for pre-treating Hong Kong's source-separated organic (mainly food) wastes for subsequent anaerobic co-digestion with sewage sludge
- Ideas on Project implementation, including plant layout, interfacing arrangements, synergy with the downstream co-digestion facilities, cost-effectiveness, environmental sustainability (e.g., water conservation and energy efficiency)
- Ideas on Project procurement, including the tender process, length of term, risk allocation or sharing, key performance indicators, and payment structure

Organisations having capability and experience in delivering Engineer-Procure-Construct (EPC), Design -Build (DB), Operate & Maintain (O&M) and/or Design-Build-Operate-Maintain (DBOM) projects involving organic (food) waste pre-treatment plants or facilities locally or overseas are encouraged to participate in the MSE.

EPD will consider the relevant information gained through the MSE with a view to optimising the Project procurement and implementation arrangement to both meet the Project objectives and suit good market practice.

This is not a tendering exercise to prequalify, shortlist or select any potential tenderers. All information, views, and ideas of any Respondent will be kept confidential and will not be used for any future tender evaluation exercise. Access to such information will be restricted to authorised personnel, including Consultants' staff, strictly on a need-to-know basis. Potential tenderers that do not respond to the MSE will not be barred from the future tendering exercise.

2.2 Responding to the MSE

Interested potential tenderers are encouraged to respond, as far as practicable, to the market sounding questions listed in **Appendix A** (General Questionnaire) and **Appendix B** (Technology Questionnaire). The submission of any information, data, analysis, or plans/drawings in support of Responses is welcome. Relevant views and suggestions in relation to topics not mentioned in this document are welcome insofar as they will potentially enhance the value for money proposition of the Project for EPD.

Responses to the market sounding questions should be returned before 25 July 2022.

Respondents are encouraged to submit their Responses by electronic means to Miss Vanessa Leung (email address: leungv@binnies.com) from the Consultant. Nevertheless, Responses may be posted to the following address if it is not practicable to do so electronically:

Binnies Hong Kong Ltd
43/F AIA Kowloon Tower, 100 How Ming Street, Kwun Tong,
Hong Kong Special Administrative Region, People's Republic of China
(Attention: Miss Vanessa Leung)

Responses to the questions may be returned ahead of the date nominated above to enable early review. EPD will consider the suggestions and comments received through the MSE and may, in light of that consideration, fine-tune the tender/contractual arrangements. Respondents may be invited to attend meeting(s) with EPD together with the Consultant, to discuss any points made in their submitted responses. Attendance at any such meeting by a Respondent is optional.

Interested potential tenderers or Respondents should check the Project website https://www.epd.gov.hk/epd/english/business_job/business_opp/market-sounding-exercise.html regularly for any updates of the MSE.

In responding to the MSE, a respondent will be deemed to have agreed to all the terms of this Invitation. Respondents and potential Respondents must accept that the Government of the Hong Kong Special Administrative Region (HKSAR) will not be responsible for any costs, expenses or liabilities whatsoever that may be incurred by any Respondent or potential Respondent in responding to this MSE Invitation.

3 Project Overview

3.1 Purpose

Biodegradable organic waste, consisting of mostly food waste from the domestic, commercial, industrial and institutional sectors, constitutes the largest portion of municipal solid waste in Hong Kong. To tackle this, in addition to the existing and committed organic resource recovery facilities (namely, O.PARK1 and O.PARK2) that convert food waste to biogas, the Government of HKSAR has committed to optimising the use of food waste and sewage sludge anaerobic co-digestion technology. Anaerobic co-digestion of sewage sludge and food waste has the potential to improve the overall biogas yield compared to separate treatment of food waste and sewage sludge.

The proposed OWPC is to increase Hong Kong's source-separated food waste (SSFW) *pre-treatment* capability. It will have a capacity to receive and *pre-treat* at least 500 wet-tonnes of SSFW from multiple sources each day. The pre-treated SSFW (referred to as "bio-slurry" in this document) will be conveyed to the adjoining Tai Po Sewage Treatment Works (TPSTW) and/or other sewage treatment works for anaerobic co-digestion with sewage sludge. For the avoidance of doubt, anaerobic co-digestion is **not** part of the Project scope, but the project interfacing issues should be taken into consideration.

3.2 Objectives

In keeping with EPD's mission of "To provide world-class physical infrastructure for the treatment and disposal of waste and wastewater", the key Project objectives include:

- *Versatility* in that the OWPC can effectively process the multiple and varied streams of SSFW arising in Hong Kong to become consistent high-quality (i.e., optimal solid content and low contaminant

level) bio-slurry product(s) with flexibility for co-digestion with sewage sludge in different sewage treatment works.

- *Reliability* in that the OWPC can achieve a high degree of robustness and reliability under the design operating scenarios.
- *Environmental sustainability* in that the proposed scheme is not only environmentally acceptable but also strives to minimise consumption of fresh water and energy.
- *Optimisation of synergy* that the OWPC can achieve with the downstream co-digestion facilities.
- *Compact design* in that the proposed OWPC scheme can be accommodated within site without jeopardising operability or maintainability.
- *Value-for-Money* in that the proposed OWPC scheme represents a cost-effective solution for the desired performance objectives.

3.3 Scope

It is anticipated that the appointed contractor will design, construct and operate (and maintain) the OWPC to produce bio-slurry for the term of the contract.

Further information on the Project is provided for reference in this MSE in **Appendix C.**

3.4 Contract Model and Procurement Timeline

The EPD intends to contract the Project based on the New Engineering Contract 4th release (NEC4) form for Design Build Operate contract. At this stage, it is anticipated that a cost-based commercial (payment) model will be adopted.

The Project will be procured through a single stage open tender arrangement. There will not be a pre-qualification stage.

The current intention is to commence tendering during the fourth quarter of 2023. Contract award is targeted for third quarter of 2024.

4 Expected Capability of the Contractor

Given the nature of the Project, EPD expects the prime contractor (which may be a single entity or a joint venture) will have proven capability (i.e., project experiences, technical or technology resources, and personnel) and a demonstrated record of accomplishments in:

- design and construction of organic waste pre-treatment facilities,
- operation and maintenance of organic waste pre-treatment facilities and
- production of bio-slurry for anaerobic digestion.

Capability in anaerobic digestion of organic waste or sewage sludge is not essential but will be welcome.

5 Enquiry

Potential Respondents may direct any queries to the EPD Consultant's prime contact for this MSE, Mr Andy W.S. Chan at email address chanws@binnies.com or telephone number (+852) 2608 7612.

6 Disclaimer

This Invitation is solely for the purposes of collecting market information and this document is for reference only.

This is not a prequalification process of tenderers. Potential tenderers that have not responded to this MSE will not be barred from tendering for delivery of the Project.

This Invitation does not constitute any offer or solicitation of any offer in connection with the Project described herein. Neither this Invitation nor any activities or Response in connection with the MSE will create any legal obligations or liabilities in any way on the part of the EPD, the Government of Hong Kong Special Administrative Region, or EPD's Consultant; nor will any of those parties under any circumstances be liable to any fees, costs, expenses, loss or damage whatsoever relating to any Respondent, potential Respondent or any party associated with those entities arising out of or in connection with this MSE and Invitation.

No information and material received from the Respondents will be returned.

Any Respondent or potential Respondent is deemed to have acknowledged the above conditions by taking any action whatsoever regarding this Invitation.

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Appendix A
General Questionnaire

A General Questionnaire

A.1 Preamble

Respondents are encouraged to respond to all the market sounding questions listed below, as far as practicable, in relation to the Project. Reponses to the questions should be returned by 25 July 2022.

All information, views, and ideas of any Respondent will be kept confidential and will not be used for any future tender evaluation exercise. Access to such information will be restricted to authorised personnel, including Consultants' staff, strictly on a need-to-know basis.

A.2 Level of Interest and Capability

A.2.1 Identification of the Respondent

Please provide:

(a) Name, in both Chinese (if applicable) and English, of the Respondent

(b) Place and date of incorporation, if the Respondent is a corporation, and the corresponding certified copy of the certificate of incorporation and any certificates of incorporation on change of name

(c) Evidence showing the Respondent's overseas business registration, if applicable

A.2.2 Organizational Information

Please provide:

(a) Brief description of the history and business of the Respondent, including company brochures as well as its business experience in Hong Kong and/or overseas (Note: If the respondent is a member, e.g., a subsidiary of a group of companies, provide also the same of the group)

(b) Name of registered and beneficial immediate, intermediate, and ultimate shareholders of the Respondent

(c) Description of the Respondent's experience and expertise in designing, constructing, operating and/or maintaining organic waste pre-treatment plants or facilities that are of similar nature and/or scale to this Project, if appropriate and preferably using the template shown in *Table 1*.

(d) Description of the Respondent's key personnel in designing, constructing, operating and/or maintaining organic waste pre-treatment plants or facilities that are of similar nature and/or scale to this Project, if appropriate and preferably using the template shown in *Table 2*.

A.2.3 Basis of Participation in The Project

Please provide your comment or view on the following:

(a) For a project such as this, in which of the following areas/roles would you be interested in participating?

(i) Design - Designer / Engineer

(ii) Construction - Main contractor

(iii) Construction – Sub-contractor

(iv) Construction – Supplier of technology systems, plant and equipment

(v) Operation and Maintenance - Operator

(vi) Operation and Maintenance - Maintenance service provider

(vii) Operation and Maintenance - Specialist service provider

(viii) All, or a combination of, the above.

(b) Would your company be able to deliver a project of this size and nature by itself? Or would you need to form a team / joint venture; or would you intend to do so for risk management or other purposes?

(c) What key personnel resources, in terms of area of expertise and length of experience, do you expect to be required to deliver this Project?

(d) Are there any other issues that are critical to your participation in this Project that you can foresee?

A.3 Views Sought

A.3.1 Delivery Model

The proposed OWPC will have an ultimate capacity to receive and pre-treat at least 500 wet-tonnes of source-separated food waste (SSFW) from multiple sources each day. At this stage, it is anticipated to deliver the OWPC in two stages: Phase 1 for 300 wet tonnes per day (tpd) capacity and Phase 2 for another 200 wet-tpd upon instruction by EPD. The pre-treated SSFW (bio-slurry) will be conveyed to the adjoining Tai Po Sewage Treatment Works (TPSTW) and/or other sewage treatment works for anaerobic co-digestion with sewage sludge. For the avoidance of doubt, anaerobic co-digestion is not part of the Project scope, but the project interfacing issues should be taken into consideration.

(a) The EPD wishes to procure the Project using a design-build-operate (DBO) model. Do you have any views on this approach? If so, please elaborate and include a rationale for your views.

(b) Is there any other alternative contract model that you may think would be preferable? If so, please elaborate your rationale.

(c) The EPD intends to adopt the New Engineering Contract 4th release (NEC4) DBO contract form for this Project. Do you have any knowledge and experience in NEC contracts? What is your view to make NEC a success?

A.3.2 Layout Design

The 500 wet-tpd OWPC will be developed on a relatively small site (approximately 1.1 ha) and the SSFW will be delivered in loose bulk or packaged forms in various types of trucks, including box/flatbed trucks carrying bins or pallets, tankers, etc.

(a) Given the above, please provide your views on a facility layout to achieve a compact yet efficient design, with a well-thought-out traffic arrangement. A preliminary layout plan is welcome to illustrate your view.

(b) Use of compact technologies and/or a multi-storey approach to facility layout could reduce the footprint of the facility, but this could also increase operation and maintenance efforts (and costs). What is your approach with respect to optimising land use considering the energy consumption and plant maintainability?

(c) Do you see any savings in capital and/or operations & maintenance costs if the design capacity of the OWPC can be modified slightly to allow more flexibility in the configuration of process equipment and technologies? If so, please elaborate.

A.3.3 Processes / Technologies

The OWPC will need to process (pre-treat) SSFW from multiple sources (i.e., domestic, commercial, industrial and institutional) with different characteristics (in terms of, for example, level and nature of contaminants, water/solids content) to produce bio-slurry product(s) of consistent quality for subsequent anaerobic co-digestion. The SSFW characteristics could also change over time due to socio-economic factors.

(a) What are your views on the most appropriate core technologies to be adopted in the OWPC to process (pre-treat) the SSFW streams? Please refer to section B2 of Appendix B to this MSE Invitation for classification of the pre-treatment technologies.

(b) Please provide your views on operation strategies to process SSFW from different sources and of different packaging, nature and characteristics and delivered at different times of the day.

(c) What is your approach with respect to optimising synergy with the downstream co-digestion facilities in Tai Po Sewage Treatment Works, particularly the interfacing arrangement and bio-slurry conveyance system/scheme?

A.3.4 Uncertainties and Risk Allocation

In addition to the different characteristics of the different SSFW streams, there are inherent uncertainties and variabilities in the characteristics of each stream. The uncertainties could change over time.

(a) EPD anticipates adopting a target cost based commercial model with gain/pain share for the OWPC DBO contract? What is your view on this arrangement considering the uncertainties and variabilities in SSFW characteristics?

(b) Do you see any significant risks that you, as a DBO contractor, would not be able to manage cost-efficiently?

(c) Do you think there is an alternative to the target cost model to better share the risks to maximise value-for-money to the EPD? If so, what do you suggest? Please explain your rationale.

(d) With reference to the preliminary design parameters given in Appendix C, do you think any further design information and/or any survey data would be desirable to minimise the Project delivery risks?

A.3.5 Timing for Implementation of Phase 2

There is uncertainty in the timing for implementing the second phase of OWPC (up to the ultimate design capacity of 500 wet-tpd).

(a) What do you think would be appropriate measures in terms of contractual arrangement (e.g., risk sharing, payment mechanism) to maximise value-for money to the EPD in this respect?

A.3.6 Construction Period

The current intention is to commence tendering during the fourth quarter of 2023. Contract award is targeted for third quarter of 2024. The EPD aims to have the first phase of the OWPC commissioned in 2027.

(a) What do you think would be a realistic design/construction period for the OWPC? That is, how long do you think it would need to commission the first phase of the OWPC after award of the DBO contract? Please provide a preliminary programme of activities to facilitate better understanding of your view.

(b) Do you see any potential issues that could cause delay to the commissioning of the OWPC? What is your approach to achieving the implementation programme as outlined above? What do you think should be done to shorten the time to complete the construction work?

A.3.7 Contract Term

The EPD aims to achieve the optimal total cost of asset ownership for the Project.

(a) What do you think would be an appropriate contract term (i.e., length of the operation period) to maximise value-for-money to the EPD? What key considerations you think should be considered in determining the contract term? Please elaborate on your suggestion and rationale.

A.3.8 Mandatory Requirements

The primary driver for adopting a DBO contract model is for the contractor to integrate the design, construction and operation aspects using its skill and experience to propose its best value-for-money solution to EPD. Nevertheless, there may be situations where EPD (as the client) should specify certain mandatory requirements in the tender/contract to share some risks, to ensure a level playing field for bidders and/or to facilitate the tender evaluation process.

(a) Regarding technology selection, do you think the Client (EPD) should mandate the type(s) of initial, core and/or polishing pre-treatment technologies to be provided under contract? Please elaborate your rationale.

(b) Are there any other mandatory requirements you consider should be best incorporated into the DBO contract? Please elaborate your suggestion and rationale.

(c) What aspects do you consider not preferable to be specified in the scope, specifications, or other contract provisions? Please elaborate your suggestion and rationale.

A.3.9 Promoting Innovations

(a) What do you think may be the most effective means to drive innovation in the procurement process to maximise the value-for-money outcome to the EPD?

(b) What do you think may be the most effective means to drive innovation in the design, construction and/or operation of the OWPC to maximise value-for-money outcome to the EPD?

(c) Do you have any suggestion on any research & development aspects and/or advanced organic waste pre-treatment technologies that can be put in place in the initial phase of OWPC? Do you have any knowledge or experiences on how this can be implemented?

A.3.10 Incentives for Outperformance

(a) What do you think may be the most effective means to incentivise outperformance by the contractor, or to otherwise maximise the value-for-money outcome to the EPD during the operation period?

(b) What key performance indicators do you think should be included in the contract to incentivise outperformance?

A.4 Concluding Questions

(a) Based on the information provided above, how likely will you be participating in the Project (e.g., unlikely, likely, highly likely)? What are or will be the factors that influence your decision to participate?

(b) Do you have other issues that you wish to comment on or make suggestions? If yes, what are they?

(c) Are there any significant information gaps that you consider critical to sound risk management and hence realistic pricing and scheduling?

(d) Is there any other information that you consider critical to the Project but not provided in this MSE document?

(e) Do you agree that we may contact you again if we have follow-up questions?

Table 1 Proforma for Listing Relevant Company Experience

Project Title	Brief Description (See Note 1)	Project Value (HKD) (See Note 2)	A. Contract Commencement date B. Contract Completion date (Original) C. Contract Completion date (Extended) D. Actual / Anticipated Completion date				Contract Duration (months)	Client	Plant Capacity	Capacity of Involvement (see Note 3)	Name of the Entity Involved in the Project (see Note 4)
			A (mm/yyyy)	**B** (mm/yyyy)	**C** (mm/yyyy)	**D** (mm/yyyy)					

Notes:

(1) Please state nature, scope and key features of the contract, e.g., Type of Plant / Equipment Involved and Location.

(2) Please specify value of design and build; and value of operation and maintenance.

(3) Please state whether your company was the main contractor, subcontractor, supplier, or a joint venture participant (to state the % of participation by value of work in case of a joint venture).

(4) Please indicate if you were involved in the project under a different name such as in the case of a subsidiary, sister company or mother company.

(5) Please provide separate sheets if more space is required.

Table 2 Proforma for Listing Key Staff Experience

Position: _____

Qualifications:_____

Length of post-qualification experience (years): _____

Project Title	Brief Description	Location	Project Value (HKD)	Role of Staff	Key Responsibilities	Start of Involvement (mm/yyyy)	End of Involvement (mm/yyyy)	Duration (months)

Notes:

(a) For qualification, please state the academic qualification (e.g. degree) and professional qualification (e.g., membership of professional institutions) if applicable.

(b) Please use a separate sheet for each staff member (e.g., project manager, design/construction manager, operation manager, etc)

(c) Name of the key personnel is not required to be given.

Appendix B
Technology Questionnaire

B Technology Questionnaire

B.1 Preamble

Respondents are encouraged to respond to all the market sounding questions listed below, as far as practicable, in relation to Project. Reponses to the questions should be returned by 25 July 2022.

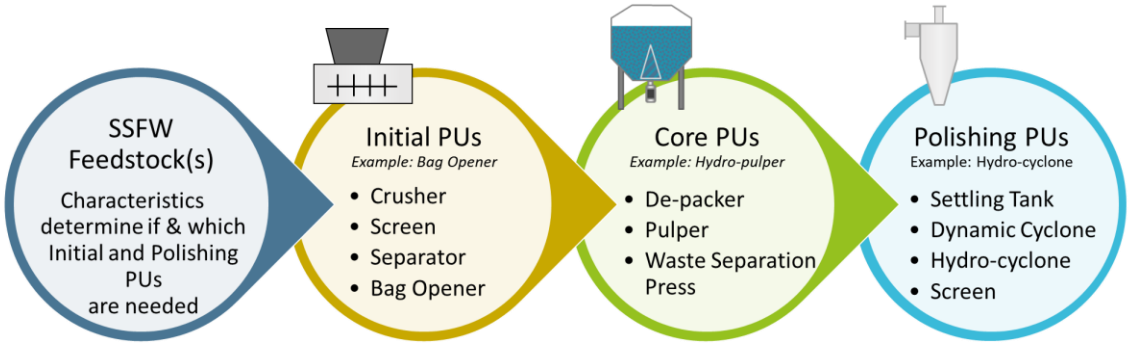
All information, views, and ideas of any Respondent will be kept confidential and will not be used for any future tender evaluation exercise. Access to such information will be restricted to authorised personnel, including Consultants' staff, strictly on a need-to-know basis.

B.2 Technology Classification

For this document, technologies for pre-treating source-separated food waste (SSFW) for subsequent anaerobic digestion are classified into three groups based on their primary function, as illustrated in Exhibit B-1:

- *Initial* Process Unit (PU), to prepare the SSFW feedstock for the next treatment step.
- *Core* PU, to further remove contaminants and mix the SSFW to produce bio-slurry.
- *Polishing* PU, to remove residual contaminants in the bio-slurry to meet quality requirements.

Exhibit B-1 Classification of SSFW Pre-treatment Technologies



Other ancillary mechanical systems in the OWPC would likely include:

- Conveyors
- Crane
- Bunkers
- Hoppers
- Dewatering and/or thickening units

B.3 Information Sought

We welcome you to provide technical information and indicative non-binding budget estimates of your technologies that you believe could be deployed in the proposed OWPC.

To facilitate analysis of the information, please use the proforma sheet (see Table 1) to present your suggestions.

Table 1 Proforma for Technology Systems

Company Name:	
Technology Classification:	Initial / Core / Polishing / Ancillary
Brand Name:	
Model No.	
Description of Technology System	
Design Service Life (years) & Warranty	
Processing Capacity:	Tonne/hour
Key Dimensions:	
Water Consumption:	m^3/hr, m^3/day, m^3/year
Power Consumption:	AC/DC, kVA, kWh, hourly, daily, annual
Capital Budget Estimate:	HKD/USD/Euro/other currency
Operation Staff Requirements:	Number of staff and qualifications
Operation & Maintenance Cost:	HKD/USD/Euro/other currency
Other Information:	
Assumptions: *Level of physical contaminants in incoming SSFW*: [ ] % average / [ ] % maximum Total Solids (TS) content of digestible fraction of SSFW (i.e., after removal of contaminants): [ ]% *TS content of bio-slurry product*: 8% / 15%	

Please use separate sheets, if needed.

Appendix C
Project Information

C Project Information

C.1 Background

Biodegradable organic waste, consisting of mostly food waste, green waste, yard waste and other organic waste generated from household, commercial and industrial sectors, constitutes the largest portion of municipal solid waste (MSW) disposed of in Hong Kong. In February 2014, the Environment Bureau (ENB) unveiled "A Food Waste & Yard Waste Plan for Hong Kong 2014-2022" (the Food Waste & Yard Waste Plan), which was a companion document to "The Hong Kong Blueprint for Sustainable Use of Resources 2013 – 2022" (the Blueprint) for the management of food waste and yard waste in the coming years. Under the Food Waste & Yard Waste Plan, the Administration was planning to build a network of Organic Resources Recovery Centres (ORRCs) in the territory to recycle food waste into renewable energy. The ORRC Phase 1 (also called O·PARK1) in Siu Ho Wan, with a design capacity of 200 tonnes food waste daily, started receiving food waste in July 2018. The ORRC Phase 2 (also called O·PARK 2) is being constructed in Sha Ling of North District, with a daily treatment capacity of 300 tonnes of food waste.

As set out in the Chief Executive's 2020 Policy Address, the Government has committed to optimising the use of food waste and sewage sludge anaerobic co-digestion technology, supplementing the network of ORRCs to expedite the enhancement of the overall food waste treatment capability in Hong Kong. In February 2021, ENB announced the updated version of the Blueprint, namely, "Waste Blueprint for Hong Kong 2035" which sets out the vision of "Zero Landfill" by developing adequate waste-to-energy facilities, including the anaerobic co-digestion of food waste with sewage sludge at sewage treatment works.

The practice of food waste and sewage sludge anaerobic co-digestion appears to be advantageous in comparison to ORRC. The synergy of co-location and co-treatment of different waste types will optimise the utilisation of the existing anaerobic digestion systems of sewage treatment works, with prominent benefits from shared equipment, reduced land requirement, easier handling of feedstock, and a more stable process in general. Moreover, anaerobic co-digestion of sewage sludge and food waste will be able to improve nutrient balance and thus biogas yield in the sewage sludge anaerobic digestion process.

With a view to confirming the technical feasibility and installation requirements of food waste and sewage sludge anaerobic co-digestion, the first Food Waste/Sewage Sludge Anaerobic Co-Digestion Trial Scheme at Tai Po, jointly administered by the Environmental Protection Department (EPD) and the Drainage Services Department (DSD) commenced operation in 2019 at the existing Shuen Wan Leachate Pre-treatment Works (SWLPW) to provide a maximum of 50 tonnes per day (tpd) of pre-treated food waste to the Tai Po Sewage Treatment Works (TPSTW) for co-digestion with sewage sludge.

Separately, the Drainage Services Department (DSD) is looking to map out a blueprint for upgrading the TPSTW. At this stage, it is anticipated that after the demolition of some of the existing facilities in the TPSTW, the vacated space would be available for building the upgraded TPSTW and co-digestion facilities. In view of the co-location synergy and convenient location, it is believed that a full-scale food

waste pre-treatment plant may be developed on land currently occupied by the SWLPW, with the co-digestion facilities inside the upgraded TPSTW.

C.2 Project Scope

The proposed "Organic Waste Pre-treatment Centre (New Territories East)" (OWPC) is a full-scale organic waste (mostly food waste) pre-treatment plant with an ultimate capacity of 500 wet-tpd to receive and pre-treat source-separated food waste (SSFW). The purpose of the proposed OWPC is to increase the Hong Kong's SSFW pre-treatment capability and to enable co-digestion of food waste with sewage sludge. This is to be achieved by transferring the pre-treated SSFW (bio-slurry) to the upgraded TPSTW and / or off-site anaerobic digesters in other STWs for co-digestion with sewage sludge.

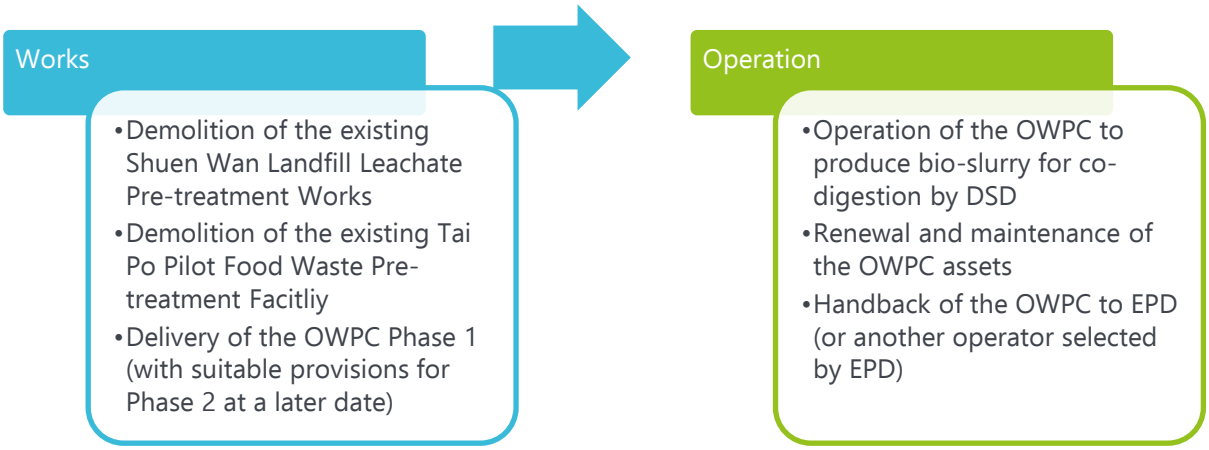
At this stage, it is anticipated to develop the OWPC in two phases:

- Phase 1: 300 wet-tpd capacity
- Phase 2: another 200 wet-tpd, upon instruction by EPD at its sole discretion.

The scope of the contract comprises the following key elements, as illustrated in Exhibit C-1 :

- Works
- Operation (including asset renewal, maintenance and handback)

Exhibit C-1 Contract Scope



The location of the OWPC site is shown in Drawing No. 409988/BIN/DSR/005 and 409988/BIN/DSR/101. An aerial view of OWPC Site is presented below in Exhibit C-2.

Exhibit C-2 Aerial View of OWPC Site

C.3 OWPC Design Requirements

It is anticipated that a compact and fully enclosed OWPC will be required to meet the many site constraints and environmental (e.g., odour) requirements. Specifically, we expect the design requirements to include:

- being able to fit the whole OWPC on the relatively small (1.1 ha) site
- being able to receive 500 wet-tpd of SSFW delivered in different types of trucks
- accommodating a well-thought-out traffic flow
- reducing fugitive odours to an acceptable level with a state-of-the-art odour management system
- adopting a robust process design with high up-time
- capability and capacity to process SSFW collected from multiple sectors with different characteristics
- producing a consistent and high-quality (clean) bio-slurry with a desired total solids content
- a robust and effective conveyance scheme to deliver bio-slurry to the co-digestion facilities in the upgraded TPSTW and/or other STWs
- integration with the surroundings adopting unified aesthetic and landscaping design with the TPSTW

C.4 Source-Separated Food Waste

C.4.1 SSFW Streams and Catchment

The OWPC will receive SSFW from multiple sources in the waste catchment:

- Domestic households
- Commercial premises (e.g., cafes, canteens, restaurants, wet markets, supermarkets, etc)
- Industrial premises (e.g., a variety of beverage and food manufacturing factories)
- Institutional establishments (e.g., smuggled food seized by Customs & Excise Department, Correctional Institutions, hospitals, educational institutions, etc)

The waste catchment will include the SSFW generators in eastern New Territories, but EPD may modify (i.e., expand, shrink, move or otherwise redefine) the catchment to suit its strategic needs.

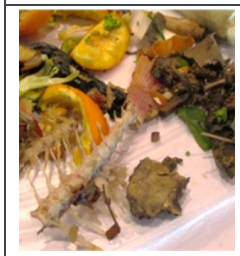
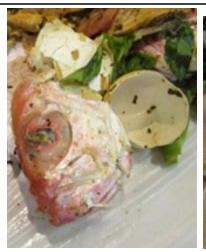
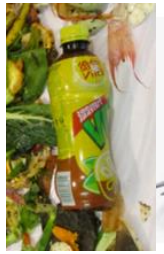
C.4.2 Characteristics

The different SSFW streams (or generators) exhibit different characteristics in terms of level and type of contaminants (non-digestible substances) as well as solids/water content. Typically, the contaminants include some or all the following materials at various proportions:

- Plastics (light, dense, foam polystyrene)
- Metals (ferrous and non-ferrous)
- Rubber
- Textile
- Glass, ceramics, sand, stones
- Large bones, hard seafood shells, eggshells, feathers
- Hard pulps, bark, bamboo, wood
- Composites (e.g., Tetra-pak)

A snapshot of contaminants found in household food waste is shown in Exhibit C-3.

Exhibit C-3 Examples of Some Contaminants found in SSFW

<table>
<tr><td>  </td><td colspan="2">   </td><td>  </td></tr>
<tr><td>Hard Shells</td><td colspan="2">Fruit Peel</td><td>Flour/Dough</td></tr>
<tr><td colspan="2">      </td><td colspan="2">   </td></tr>
<tr><td colspan="2">Wet Market/Cooked Food Market/Wholesale Fish Market
(e.g. shells, bones, organs/intestines)</td><td colspan="2">Canned Food / Frozen Food</td></tr>
<tr><td colspan="4">        </td></tr>
<tr><td colspan="4">Potential Non-food Waste Items
(e.g. plastic bags, disposable face masks, food packaging, plastic cutlery, tetra-packs)</td></tr>
</table>

Note: This is a snapshot of contaminants found in household food waste. It is by no means exhaustive and does not represent the full range of contaminants that may be present in domestic source-separated food waste.

In addition, SSFW may come in special packaging such as expired food in metal cans, glass containers, plastic wrapping or other containers. Frozen meat and liquid food waste are also to be expected.

The level of contamination is variable across different SSFW streams (or sources). Variability is also observed within each SSFW stream and over time. Generally, the level of contamination could range from 5% to more than 40% (by wet weight).

The solids content of the digestible fraction of the SSFW streams are highly variable. It could range from 0% (liquid) to more than 50% (by wet weight), depending on the source and nature of the waste generator.

C.5 Proposed Bio-slurry Quality Requirements

A preliminary proposal for the bio-slurry quality requirements is presented in Exhibit C-4. This may change in future without notice.

Exhibit C-4 Preliminary Proposed Bio-slurry Quality Requirements (subject to change)

NO.	PARAMETER	REQUIREMENT	NOTES
Bio-slurry Quality Requirements			
B1	Total Solids (TS) content of Bio-slurry	At about 8% for pumping to TPSTW	8% is the current working assumption. This may change in future.
		At 15% for export by tankers to off-site digestors	15% is the current working assumption. This may change in future.
B2	Settleable inorganic materials in Bio-slurry	< 2.5 g/L	
B3	Bio-slurry Particle Size	≤ 5mm for heavy inert material (e.g., sand, glass splinters, shells)	
		≤15mm for light material (plastics)	
B4	Bio-slurry Organic Content	Fraction of the digestible organic material transferred from the incoming material to the produced bio-slurry (on dry Volatile Solids basis, w/w%): ≥80%	To ensure that digestible organic material is not unduly lost during the pre-treatment process.
Rejects Quality Requirements			
R1	Total Solids (TS) in rejected materials	TS content of the rejects (other than grit) from the core separation process: ≥ 45%	
		TS content of the removed grit: ≥80%	Grits are small particles (<15mm) and include sand, glass fragments, eggshells, residual metal fragments, fruit pits and seeds, and small hard plastics.

Drawings

-C3

837 700 E

837 750 E

837 800 E

N

835 500 N

835 450 N

835 400 N

RM

RM

RM

RM

6.1

泥路

Track

+7.2

H

+8.5

+8.3

+8.5

+9.6

+10.8

H

11.0

+8.6

+8.6+

+8.5

+8.6

+8.4

渗濾污水預先處理廠

Leachate
Pre-treatment Works

濾水池
Filter Bed

LAGOON NO.1

濾水池
Filter Bed

FLOW
BALANCING
TANK

濾水池
Filter Bed

LAGOON NO.2

TS

TS

T

WT

FRD1000700

3.9

5.9

道路 Road

+6.0

LEGEND:

- PROJECT AREA
- BOX CULVERT
- DRAINAGE RESERVE
- 225 SEWERAGE PIPES
- PASSIVE GAS VENTING TRENCH

Revision	Date	Description		Initial
	Designed	Checked	Drawn	Checked
Initial	DC	WTL	SZ	HCL
Date	09/21	09/21	09/21	09/21

Approved

Contract no.
CE 5/2021 (EP)

Contract title
DEVELOPMENT OF ORGANIC WASTE PRE-TREATMENT CENTRE (NEW TERRITORIES EAST) - FEASIBLITY STUDY

Drawing title
LAYOUT OF EXISTING PROJECT SITE

Drawing no.
409988/BIN/DSR/005

Revision
-

Scale
A1 1 : 250
A3 1 : 500

香港特別行政區政府環境保護署
THE GOVERNMENT OF THE HONG KONG SPECIAL ADMINISTRATIVE REGION ENVIRONMENTAL PROTECTION DEPARTMENT

BINNIES HONG KONG LIMITED
賓尼斯工程顧問有限公司

Plot Date = 11/18/2021

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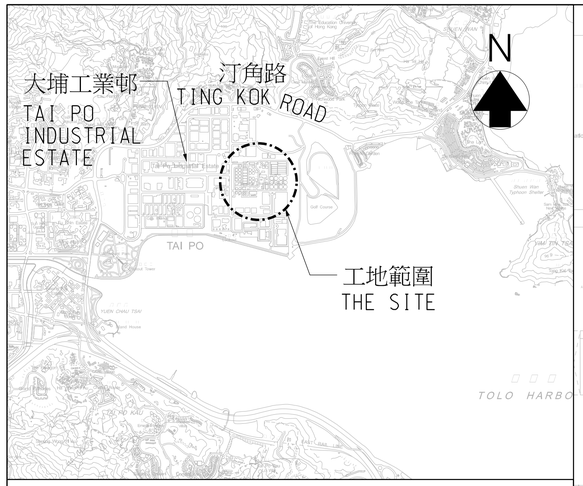

索引圖 KEY PLAN

比例 SCALE A1 1 : 50000
A3 1 : 100000

LEGEND:

PROJECT AREA

Revision	Date	Description		Initial
	Designed	Checked	Drawn	Checked
Initial	MYL	KHL	SZ	MYL
Date	APR2022	APR2022	APR2022	APR2022

Approved

Contract no.

CE 5/2021 (EP)

Contract title

DEVELOPMENT OF ORGANIC WASTE PRE-TREATMENT CENTRE (NEW TERRITORIES EAST) - FEASIBLITY STUDY

Drawing title

PROJECT LOCATION PLAN

Drawing no.

409988/BIN/DSR/101

Revision

-

Scale

A1 1 : 1000
A3 1 : 2000

香港特別行政區政府環境保護署
THE GOVERNMENT OF THE HONG KONG SPECIAL ADMINISTRATIVE REGION ENVIRONMENTAL PROTECTION DEPARTMENT

BINNIES HONG KONG LIMITED
賓尼斯工程顧問有限公司

Plot Date = 2022/4/25

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