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## 1 INTRODUCTION

### 1.1 Project Background

- 1.1.1.1 The Government plans to develop Yuen Long South Development Area (YLS DA) which is a mega-scale and complex development aiming to provide land to transform the degraded brownfield land to developable land contributing to meet the territory's medium to long-term need for housing development. The YLS DA is proposed to accommodate a population of approximately 101,200 persons and generate about 13,630 employment opportunities on full development.
- 1.1.1.2 The purpose of the Project is to provide sewage treatment to the sewage collected from the YLS DA and other developments in the North West New Territories (NWNT).
- 1.1.1.3 The Civil Engineering and Development Department (CEDD) commenced Agreement, namely the Agreement No. CE 35/2012 (CE) "Planning and Engineering Study for Housing Sites in Yuen Long South – Investigation" in 2012, to formulate the detailed development proposals for the YLS DA. This Study recommends that the sewage generated from the YLS DA will be discharged to separate new sewage treatment work, namely the Yuen Long South Effluent Polishing Plant (YLSEPP) which is located to the southern end of the YLS DA.
- 1.1.1.4 The above study recommended preliminary treatment capacity, treatment level and discharge arrangement of YLSEPP taking into account the constraints for discharge to North Western Waters and Deep Bay. Further reviews of flow projection, treatment level, treated effluent discharge and sludge treatment scheme shall be carried out to formulate the preliminary design of YLSEPP to cater for the sewage collected from the new developments within the YLS DA and other developments in the NWNT to support the medium and long-term housing and economic needs of the NWNT.
- 1.1.1.5 AECOM Asia Co Ltd. was commissioned by Drainage Services Department (DSD) on 27 March 2020 to carry out this Assignment for the investigation for YLSEPP. Site location plan of the YLSEPP is shown in [Figure 1.1](#).

### 1.2 Designated Projects under EIAO

- 1.2.1.1 A Project Profile (No. PP-576/2019) was submitted to the Environmental Protection Department (EPD) on 1 February 2019 for application for an Environmental Impact Assessment (EIA) Study Brief under section 5(1)(a) of the Environmental Impact Assessment Ordinance (EIAO) and the EIA Study Brief No. ESB-313/2019 for the Project was issued on 15 March 2019 under the EIAO.
- 1.2.1.2 The Project comprise the following elements which are classified as Designated Projects (DPs) under per Schedule 2, Part I of the EIAO. The DPs elements of this Project is summarized in **Table 1.1**.

**Table 1.1 Schedule 2 Designated Projects in this Project**

Schedule 2 Designated Project		Designated Project Element under the Project
Item F.1, Part I	Sewage treatment works with an installed capacity of more than 15,000 m <sup>3</sup> /day.	The proposed treatment capacity of YLSEPP would be 65,000 m <sup>3</sup> /day.

<b>Schedule 2 Designated Project</b>		<b>Designated Project Element under the Project</b>
Item F.4, Part I	An activity for reuse of treated sewage effluent from a treatment plant	Reuse of some portion of treated effluent inside the YLSEPP for chemical preparation, water supplement to deodorisation units and cleaning of treatment equipment

### **1.3 Purpose of this Executive Summary**

- 1.3.1.1 This Executive Summary (ES) summarizes the findings, recommendations and conclusions of the EIA Report for the Project.

## 2 PROJECT DESCRIPTION

### 2.1 Purpose and Scope of Project

2.1.1.1 The purposes and objectives of the Project is to provide sewage treatment to the sewage collected from the YLS DA and other developments in the North West New Territories (NWNT).

2.1.1.2 YLS DA has reserved about 4.6 hectares of land for the proposed YLSEPP, the location of which is shown in [Figure 1.1](#). According to the YLS DA's Revised Recommended Outline Development Plan (RODP), YLSEPP is located at the southern tip of YLS DA. It is bound by Ma Shan (Kung Um Shan) and Tai Lam Country Park at its south west. There will be a planned reedbed and green belt to its north, and planned government and institutional land use to its east side.

2.1.1.3 The Scope of this Project would only cover the construction of YLSEPP of which the associated supporting structures, including the upstream sewage pumping station, rising main for raw sewage, water reclamation facilities, its associated pumping facilities and rising main for reclaimed water (as shown in [Figure 1.1](#)), are out of the study brief of this EIA study. For avoidance of doubt, the site formation works of the YLSEPP site (including land OU3.3 and G3.1) are also not covered in the scope of this Project and the environmental impact of such works should be duly reviewed in the separate EIA Report: AEIAR-215/2017- Housing Sites in Yuen Long South.

2.1.1.4 The pre-treated food waste collected in YLSEPP would be transported by EPD for subsequent co-digestion with sewage sludge. As such, no food waste pre-treatment would be carried out in YLSEPP. YLSEPP's treated tertiary effluent will be discharge to Yuen Long Nullah in the interim. In the ultimate scenario, it is planned that there will be Water Reclamation Facilities and reedbed (to be constructed by others) adjacent to YLSEPP. YLSEPP's treated tertiary effluent would be supplied to the Water Reclamation Facilities (planned to be co-located with YLSEPP at land OU3.3) to produce reclaimed water and discharged to the reedbed for river revitalization. Part of the effluent would also be reused within YLSEPP for plant operation. An emergency discharge pipe will be constructed within the proposed YLSEPP boundary and connected to the underground section of the Yuen Long Nullah (as shown in [Figure 1.1](#)) for emergency effluent discharge to Yuen Long Nullah.

2.1.1.5 The proposed works of the Project comprise:

- 1) Construction of a sewage treatment plant with a maximum capacity of Average Dry Weather Flow (ADWF) up to 65,000 m<sup>3</sup>/day;
- 2) Construction of sludge treatment facilities for treating sludge generated from YLS EPP and other nearby sewage treatment works;
- 3) Construction of facilities for receiving and co-digesting pre-treated food or organic wastes;
- 4) Construction of effluent discharge pipe for the purpose of emergency discharge; and
- 5) Associated ancillary works.

### 2.2 Need and Benefits of the Project

2.2.1.1 The Government plans to develop YLS DA which is a mega-scale and complex development aiming to provide land to transform the degraded brownfield land to developable land contributing to meet the territory's medium to long-term need for housing development.

- 2.2.1.2 Having considered the new developments in YLS DA, HSK/HT NDA, Yuen Long Area 13 &14 and the associated population growth, the projected ADWF will reach approximately 65,000 m<sup>3</sup>/day at YLSEPP in Year 2038. Considering the sensitive nature of the Deep Bay, it is desired to build an Effluent Polishing Plant to treat the effluent to high quality to minimize pollutant discharge to Deep Bay.
- 2.2.1.3 Upon the completion of YLSEPP, YLSEPP will provide enough treatment capacity for the sewage generated from YLS DA and its surrounding areas including HSK/HT NDA and Yuen Long Area 13 &14. With sufficient treatment capacity and high effluent quality, there are opportunities to handle sewage from future developments within YLSEPP catchment.
- 2.2.1.4 YLSEPP will give higher treatment efficiency and cost effectiveness as well as improve the living environment of its surrounding areas. With the enhancement of odour management of the YLSEPP (covering all odorous facilities and installation of deodorization units), odour nuisance to the surrounding area would be effectively controlled and minimized.
- 2.2.1.5 It is planned that there will be a Water Reclamation Facility adjacent to YLSEPP where YLSEPP's tertiary effluent will be further treated as Reclaimed Water to meet flushing demand in YLS DA, HSK/HT NDA and the surrounding new development areas. In addition, there is future opportunity that YLSEPP's tertiary effluent, would provide a clean water source to revitalize the Yuen Long Nullah. Such high quality flow would improve the scenic appearance of Yuen Long Nullah and would enhance the ecological value to the nearby community. In addition, the surplus treated effluent to Yuen Long Nullah could also serve as a back-up water for periodic flushing of the Yuen Long Nullah Barrage under the Yuen long Nullah Barrage Scheme.
- 2.2.1.6 As a sustainability consideration, co-digestion of organic wastes with sewage sludge within YLSEPP will be adopted to enhance energy recovery from the anaerobic digestion process. Additional facilities for organic wastes co-digestion, including reception facilities, digesters and dewatering facilities, will be located within the YLSEPP's footprint.

## **2.3 Consideration of Alternative Design and Layout**

### **2.3.1 Sewage Treatment**

- 2.3.1.1 The treatment option evaluation section mainly focuses on the biological treatment processes as this is the critical part in YLSEPP layouts.
- 2.3.1.2 A preliminary review of potential biological treatment processes, including proven treatment processes, market availability, overseas and local experiences and the emerging treatment process, have been conducted. Two major options of biological treatment process for the YLSEPP were considered, including:

- Conventional Activated Sludge (CAS)
- Compacted-type technologies

- 2.3.1.3 In considering the footprint for various biological treatment options, CAS will involve a considerably larger volume of excavation works and higher construction period. Thus, compacted-type technologies were recommended.

### **2.3.2 Sludge Treatment**

- 2.3.2.1 Sludge cake generated from YLSEPP's treatment of sewage sludge and organic waste will be delivered to the Sludge Treatment Facility (STF) in Tuen Mun for incineration. Prior to conveyance to the STF, the following handling options are considered:

- Dewatering with prior anaerobic digestion including organic waste co-digestion
- Direct dewatering without digestion

2.3.2.2 Anaerobic digestion is recommended with the environmental benefits of reducing the volume of sludge and food waste to be disposed of at STF, and allow energy recovery from biogas generation for utilization within YLSEPP. Also, the organic contents in digested sludge would be much lower so as to minimize the odour level in the downstream dewatering and offsite disposal process.

2.3.2.3 As a sustainability consideration, co-digestion of organic wastes with sewage sludge within YLSEPP is recommended to enhance biogas generation and, hence, increase the generation of renewable energy for plant internal usage. Additional facilities for organic wastes co-digestion, including reception facilities, digesters and dewatering process, will be located within the YLSEPP's footprint.

### 2.3.3 Consideration of Layout Options

2.3.3.1 For developing of YLSEPP's internal layout, considerations of numerous engineering constraints and environmental factors have been made as below:

- The locations, size and arrangement on new treatment facility is bounded by recommended treatment options. Thus, compacted size treatment facility is provided in the layout.
- In green building consideration, energy recovery from biogas is recommended. Thus, chimneys from CHP is required in YLSEPP.
- The required treatment capacity of 65,000 m<sup>3</sup>/day would determine the size of treatment units and likewise would determine the amount of odour emission and the requirement on deodorization units to cater the odour nuisance due to sewage treatment process.
- Odour emission rates to be treated by deodorization units are determined by the surface area of the treatment facilities, the air exchange flow rate and the odour emission strength according to odour generation sources such as sewage and sludge tanks. Compacted treatment facilities would assist in reducing the odour emissions with smaller tank sizes.
- Odour extraction rates will be appropriately provided for man-access areas with higher air exchange rates and for non-man-access odour enclosures with lower air exchange rates to reduce the size of the deodorization units necessary to treat the extracted foul air.
- Foul air is treated as close to the emission source as possible with decentralized deodorization units to reduce the footprint required for odour extraction ductwork and to provide optimal deodorization treatment technology for the various types of odour sources.
- The layout of different treatment units is determined with due considerations of not only the process requirements, but also environmental factors, e.g. most of the air emission sources as well as deodorization units are located with as much setback from the site boundary as possible to provide maximum distance between the air emission sources and the sensitive receivers.
- The scale and size of above-ground structures are determined by striking a balance between the plant's hydraulics and visual impacts to the surroundings.

#### Consideration of Locations for the New Treatment Facilities

2.3.3.2 The locations of new treatment facilities are bounded by the inlet sewage pipes and effluent outfall at the northern and south-eastern sides, respectively. In order to minimize the scale of construction, sewage inlet works would be located at the north side of YLSEPP to minimise the distance of the incoming sewage rising mains and the effluent outfall would be located close to the existing Yuen Long Nullah. As such, the locations of new facilities are designed with inlet works at the north, primary and biological unit in the middle and tertiary treatment units at the south of YLSEPP. In addition, all the construction works and new facilities would be within the site boundary. The new treatment facilities arrangement is then designed under these boundary conditions.

### Avoidance and Reducing Environmental Impacts from Design and Layout

2.3.3.3 In order to avoid and minimize environmental impacts in terms of air quality, noise, water quality, ecological, landscape and visual aspect, the following major design and layout will be adopted in YLSEPP:

- All the treatment units will be covered and ventilated via deodorization units. Thus, odour impact would be minimized.
- All the treatment facilities and building will be ventilated with silencers at louvers. Thus, fixed noise impact would then be minimized.
- A set of design measures will be installed to avoid and minimize the chance on emergency discharge
- All the treatment units and buildings are designed with due considerations on minimizing the building heights by such means as adopting equipment that requires low headroom. This is to ensure all the aboveground structures would not be excessively bulky so as to minimize the visual impacts

## **2.4 Construction Methods and Sequences of Works**

### **2.4.1 Consideration of Site Formation Works**

2.4.1.1 The environmental implication of site formation work for both land OU3.3 and G3.1 are covered in the EIA report no. AEIAR-215/2017 – Housing Sites in Yuen Long South. As such, the consideration of alternative site formation method is not included in this EIA report.

2.4.1.2 However, it is noted that the site formation level for the land G3.1 as shown in the EIA report no. AEIAR-215/2017 (i.e. 31.0 mPD) will be changed to suit the latest proposed site formation level of YLSEPP. Thus, an environmental review should be conducted by others (e.g. CEDD) to assess the environmental impact resulted from this change.

### **2.4.2 Consideration of Foundation Methods**

2.4.2.1 The foundation options are highly dependent on the ground conditions. According to the available ground information, the site is generally overlaid by fill, alluvium clay, completely decomposed granite (CDG) and slightly/moderately decomposed granite (S/MDG). In considering the geotechnical feasibility, the following foundation methods have been considered:-

- Pre-bored socketed steel H piles (for heavy-duty structures only)
- Percussive piles
- Shallow foundation (for light-duty structures)

2.4.2.2 Since the proposed boundary of YLSEPP is currently located within private land lots with numerous existing private structures, the area assessable for ground investigation works is limited. As such, the technical feasibility of different foundation options should be further reviewed at a later project stage when more ground information can be gathered.

#### Light-duty Structures

2.4.2.3 Piling foundation and shallow foundation are both the feasible foundation options for light-duty structures in YLSEPP. In order to minimize the disturbance to adjacent environment in terms of noise and vibration, shallow foundation is adopted for light-duty structure to reduce the environmental implication of the project during construction stage.

#### Heavy-duty Structures

2.4.2.4 Based on the existing drilling record of ground investigation work, it is considered that both percussive pile and bored pile are the feasible foundation options for heavy-duty structures within YLSEPP. However, since the stiffness of underground soil is undesirable for

percussive pile, it is not the preferable option due to anticipated long pile length leading to low economic efficiency. Meanwhile, the tentative bed rock level is at about 20m below ground level which allows the adoption of pre-bored socketed steel H piles for heavy-duty buildings. Therefore, subject to the detailed design of YLSEPP, bored pile would be the likely foundation options for those heavy structures in YLSEPP.

- 2.4.2.5 In addition, it is recognised that there are existing graves located at the south-western side of YLSEPP. With this consideration, application of percussive piling will be avoided as far as practicable to minimize the disturbance to existing structures and prevent potential public complaint during Project's construction stage. Bored pile remains the preferable foundation option for heavy-duty structures in YLSEPP since it would generate less vibration and disturbance to the adjacent area. However, it should also be noted that bored pile has its demerits of requiring a comparatively longer construction period as well as generating much higher volume of excavated materials to be disposed which would generate other environmental impacts.

## **2.5 Construction Programme**

- 2.5.1.1 The Project construction works are anticipated to commence in early 2028 with completion of the Project by 2032.

### **3 KEY FINDINGS OF THE ENVIRONMENTAL IMPACT ASSESSMENT**

#### **3.1 Air Quality Impact**

- 3.1.1.1 The potential air quality impacts from the construction works of the YLSEPP would mainly be related to the construction dust from the excavation works for substructure (substructures defined as the underground structures), piling works, road paving works, construction for substructures and superstructures works.. With the implementation of mitigation measures specified in the Air Pollution Control (Construction Dust) Regulation, good site practices, regular watering and EM&A programme, no adverse dust impact at ASRs is anticipated due to the construction activities of the Project.
- 3.1.1.2 Flue gas emission would be emitted from the stacks of CHP and boiler in the YLSEPP. Cumulative air quality impact arising from YLSEPP operation, the vehicular emissions from the open roads within the 500m assessment area has been assessed for operation of YLSEPP. The assessment results conclude that the predicted cumulative 19<sup>th</sup> highest 1-hour average and annual average NO<sub>2</sub>, the 10<sup>th</sup> highest daily and annual average RSP, the 19<sup>th</sup> highest daily and annual average FSP, 10-min average and daily average SO<sub>2</sub>, and the maximum 1-hour and the maximum 8-hour average CO at representative ASRs would comply with the corresponding new AQOs. The predicted maximum 1-hour average and annual average HCl, maximum 1-hour average and annual average HF, maximum 1-hour average methane, maximum 30-minute average and annual average formaldehyde would comply with the corresponding international standards. No adverse air quality impact is anticipated arising from the flue gas emission associated with the operation of YLSEPP.
- 3.1.1.3 All odour sources in YLSEPP are fully enclosed. The potential odour emission from the sewage treatment facilities, sludge treatment facilities and organic waste co-digestion facilities would all be treated in the deodourizers before discharge into atmosphere. With implementation of the best-available deodourizers in the market with 95% odour removal efficiency, locating deodourizer exhaust away from ASRs as far as practicable, the assessment results show that the predicted Project-alone 5-second average odour concentration at the representative ASRs within the Study Area would be below 1 OU.
- 3.1.1.4 Considering the cumulative odour impact due to the Project and the retained chicken farm, the predicted cumulative odour concentrations at all planned ASRs would comply with the EIAO-TM criterion of 5 OU. No adverse residual odour impact would be expected at the planned ASRs.
- 3.1.1.5 Cumulative odour exceedances to the EIAO-TM criterion of 5 OU are predicted at two existing representative ASRs, YAE01 and YAE02, and nearby village houses for a short duration of time during operation phase of the Project. The frequency of exceedance in odour concentrations at ASRs within the exceedance zone is up to 0.51% of the time in a year. During the time of exceedance, the proposed YLSEPP would contribute less than 0.45 OU/m<sup>3</sup>, while the major odour contribution would be from the retained existing chicken farm. Nonetheless, the Project will support the YLS DA and bring about a net improvement in cumulative odour impact at the YLS DA area. Despite the predicted odour exceedance at some existing ASRs, the cumulative odour impacts during the exceedance period will be substantially improved compared to that of existing condition without removal of the five livestock farms. With the removal of the five livestock farms in YLS DA, an overall reduction in odour impacts at all the ASRs within YLS DA would be anticipated.
- 3.1.1.6 It is therefore concluded that there is no adverse residual odour impact arising from the Project.

#### **3.2 Noise Impact**

- 3.2.1.1 The assessment for the potential construction noise impact from construction of the proposed YLSEPP and its cumulative impact with concurrent projects have been conducted. The predicted construction noise levels at the representative NSRs would

comply with the noise criteria stipulated in EIAO-TM with the adoption of temporary movable noise barrier, noise insulating fabric, ventilated acoustic enclosure and quiet powered mechanical equipment. No adverse construction noise impact arising from the Project, as well as cumulative construction noise impact from the concurrent projects, would be anticipated. Good site practices are also recommended to further minimize the potential construction noise impacts.

- 3.2.1.2 The fixed noise impact associated with the operation of the YLSEPP has been assessed based on the plant design information provided by the Project Engineer at the time of the assessment. Based on the current design in which fixed plants will be located inside reinforced concrete buildings, and installing acoustic louvres for ventilation fans, the predicted fixed plant noise levels at the representative NSRs would comply with noise criteria stipulated in EIAO-TM. No adverse fixed noise impact due to the operation of the YLSEPP would be anticipated.

### **3.3 Water Quality Impact**

- 3.3.1.1 Minor water quality impact would be associated with land-based construction works. Water quality impact may result from wastewater generated from the general construction activities, construction site runoff, construction works near inland watercourses, sewage effluent from workforce and accidental chemical spillage. The potential impact could be mitigated and controlled by implementing the recommended mitigation measures. No adverse water quality impact from construction works for the YLSEPP is anticipated. No adverse residual water quality impact is expected.

- 3.3.1.2 During the operation phase, the proposed YLSEPP will be designed to achieve treatment capacity of 65,000 m<sup>3</sup>/day in ADWF and up to tertiary level treatment standard to enable further treatment as reclaimed water in the Reclaimed Water Facility for non-potable uses within HSK/HT NDA, YLS DA and the surrounding areas. Part of the treated effluent would be used within YLSEPP for plant operation and part of treated effluent would be discharged to adjacent reedbed for river revitalization. However, the proposed water reclamation facility and reedbed are included under CEDD's D&C consultancy for YLS DA Stage 2 Works and Stage 3 Works respectively,, all the treated effluent would be discharged to Yuen Long Nullah in the interim.

- 3.3.1.3 Contingency measures such as standby unit for all major equipment and back-up power for dual power supply would be provided for the proposed YLSEPP to prevent emergency situation as far as practicable. An Emergency Response Plan will be formulated prior to commissioning of YLSEPP to minimize the impact of emergency discharges and facilitate subsequent management of the emergency.

- 3.3.1.4 Other water quality impacts associated with the operation phase are identified as surface runoff from paved areas and accidental spillage. It is expected that these potential impacts can be prevented by adopting recommended mitigation measures.

### **3.4 Waste Management Implication**

- 3.4.1.1 Waste management implications associated with the construction and operation of the Project were identified and assessed. Waste types generated by the construction activities of the Project would include C&D materials (from excavation and construction works for the proposed YLSEPP), general refuse (from construction workforce) and chemical waste (from maintenance of construction plant and equipment). Provided that these wastes are handled, transported and reuse/disposed of using approved methods and that the recommended good site practices are strictly followed, adverse environmental impacts during construction phase would not be anticipated.

- 3.4.1.2 Reduction measures have been recommended to minimise the amount of materials generated in the Project. Approximately 268,100 m<sup>3</sup> of inert materials and 20,900 m<sup>3</sup> of non-inert materials would be generated during the construction phase of the Project.

52,900 m<sup>3</sup> of inert material would be reused on site while the remaining 215,200 m<sup>3</sup> of surplus C&D inert material would be recycled or transported to Public Fill Reception Facilities (PFRFs) for beneficial reuse in other projects. Non-inert waste would be recycled as far as possible before disposed of to landfill. Opportunities in minimisation of generation and maximisation of reuse would be continually investigated during the detailed design and construction phases. The other materials that cannot be reused or recycled would be disposed of to designated outlets.

- 3.4.1.3 During operation, the main waste types to be generated would be grit and screenings, dewatered sludge, chemical waste and general refuse. The grit and screenings would be compacted and properly stored in a covered container prior being disposed of at landfill on a daily basis. The transportation and disposal of the grit and screenings would be managed and controlled by a reputable waste collector. The dewatered sludge would be disposed of to the Sludge Treatment Facility (STF). Provided proper handling procedures and disposal method are adopted, adverse environmental impacts would not be anticipated during the operation phase.

### **3.5 Land Contamination**

- 3.5.1.1 A site appraisal, including the review of the YLS EIA Study, further desktop review and site walkover, was conducted from August 2020 to September 2021 to identify any potentially contaminating land uses within the proposed YLSEPP site. Based on the site appraisal findings, 23 potentially contaminated sites are located within the proposed YLSEPP site.

- 3.5.1.2 Similar to the recommendation in the YLS DA EIA Study, as the potentially contaminated sites were inaccessible and still in operation, and there could be changes in site operation or changes in land use within the proposed YLSEPP site prior to development which may cause potential land contamination issues, site re-appraisal for the potentially contaminated sites within the proposed YLSEPP site should be conducted once site access is available (e.g. after land resumption) in order to identify the need for SI for any additional hotspots as a result of on-going land contaminating activities. In addition, re-appraisal would be required for the other remaining areas of the proposed YLSEPP site to assess the latest site situation in order to address any change in land use that may give rise to potential land contamination issues. The further works including site re-appraisal for the whole proposed YLSEPP site, associated SI works, any necessary remediation works and submission of supplementary CAP / CAR / RAP / RR are recommended to be carried out when site access is available (e.g. after land resumption) but prior to commencement of any construction or development works at the identified contaminated sites, and would follow the relevant Guidance Manual, Guidance Note and Practice Guide.

- 3.5.1.3 With the implementation of the recommended further works for the Project, any soil / groundwater contamination would be identified and properly treated prior to the construction works. No insurmountable land contamination impacts to the Project are therefore anticipated.

### **3.6 Ecology (Terrestrial and Aquatic)**

- 3.6.1.1 The Ecological Impact Assessment was conducted in accordance with the criteria and guidelines as stated in the requirements given in Clause 3.4.9 and Appendix G of the EIA Study Brief, as well as Annexes 8 and 16 of the EIAO-TM.

- 3.6.1.2 A literature review and 6-month ecological field surveys have been conducted. A total of eleven habitat types, including developed area/wasteland, plantation, grassland, shrubland, mixed woodland, village/orchard, agricultural land, marsh, pond, modified watercourse and natural watercourse were recorded within the 500 m assessment area from recent surveys, with developed area/wasteland, and small areas of shrubland and modified watercourse recorded within the Project site. The ecological values of habitats within the Project site are low.

- 3.6.1.3 The Project site of YLS EPP is restricted within developed land which would be formed under a separate agreement of YLS DA prior to the commencement of construction works for this Project, and no encroachment into any sites of conservation importance is anticipated. As such, no direct impact on natural habitats and sites of conservation importance is anticipated. Similarly, no species of conservation importance or fauna of particular concern (i.e. ardeids, waterbirds, wetland-dependent birds and reedbed-associated birds) and their dependent habitats was recorded within the Project site, thus no direct impact is expected. Species of conservation importance that recorded in close proximity of the Project site, such as Luofushan Joint-fir, Japanese Pipistrelle and Greater Coucal, are species that are more tolerant of human disturbance and are well-adapted and commonly found in or close to disturbed urban areas. Thus, indirect impact on these species is anticipated to be minor.
- 3.6.1.4 Though indirect impacts, in the form of construction disturbance and water quality reduction, are anticipated, the ecological impact from these indirect impacts is expected to be minor and low and no mitigation measures are required. Precautionary measures and enhancement opportunities to further minimise any potential environmental impacts and to promote the ecological value of the Project are recommended.
- 3.6.1.5 Ecological monitoring is not required as no significant construction and operational phase ecological impacts are anticipated.

### **3.7 Landscape and Visual Impact**

- 3.7.1.1 Landscape and visual impacts assessment has been assessed in accordance with the criteria and guidelines as stated in Annexes 10 and 18 of the EIAO-TM and the Environmental Impact Assessment Ordinance (EIAO) Guidance Note No. 8/2010 on “Preparation of Landscape and Visual Impact Assessment under the Environmental Impact Assessment Ordinance”, as well as Section 3.4.9 and Appendix Q1 of the EIA study brief.
- 3.7.1.2 The Project will inevitably result in some landscape and visual impacts during construction and operation phases. These impacts have been minimized through minimization of works areas, and incorporation of sensitive and aesthetically pleasing design of aboveground structures and appropriate landscape and visual treatments for the project.
- Landscape Impacts
- 3.7.1.3 Within the assessment area, 10 Landscape Resources (LRs) and 5 Landscape Character Areas (LCAs) are identified.
- 3.7.1.4 Based on the broad-brush tree estimate with approximately 402 nos. of trees surveyed, total 402 trees in 9 tree groups (no trees of particular interests and potential tree of particular interest) that within the project boundary and would be potentially affected. There is no OVT in accordance with DEVB TC(W) No. 5/2020 identified within the project boundary. The dominant tree species include *Macaranga tanarius*, *Ficus microcarpa*, *Ficus hispida*, *Sterculia lanceolata*, *Schefflera heptaphylla*, *Ficus benjamina*, *Celtis sinensis*, *Microcos nervosa*, *Sapium discolor*, *Melia azedarach* and *Leucaena leucocephala*. They are generally of heavy-standard to mature size. All tree species in tree groups surveyed are common in Hong Kong and without specific conservation interest, in which 10 nos. of the surveyed trees are undesirable tree species *Leucaena leucocephala*.
- 3.7.1.5 Under the proposed scheme for the Project, opportunities for tree compensation within the Project boundary has been fully explored and incorporated in the proposed mitigation measures as much as practicable. Compensatory tree planting in heavy standard size is proposed On-Site and along roadside flat areas. Within the project boundary, a minimum of 405 heavy standard trees will be proposed On-Site. Mix of native tree species will be proposed in reference to Guiding Principles on Use of Native Plant Species in Public Works Projects promulgated by DEVB to improve the vegetation diversity, enhance ecological value and re-creation of vegetation habitat particular for areas adjoining the hillside area.

## Visual Impacts

- 3.7.1.6 There are 7 types of Key Visually Sensitive Receiver (VSR) Types identified in the Visual Envelopes of the Project, which are Residential VSRs, Planned Residential VSRs, Occupational VSR, Planned Occupational VSR, Recreational VSR, Planned Recreational VSR and Travelling VSR.
- 3.7.1.7 Appropriate landscape and visual mitigation measures are proposed during construction phase, including Preservation of Existing Vegetation, Minimize Disturbance on Watercourses, Management of Construction Activities and Facilities, Reinstatement of Temporarily Disturbed Landscape Areas, Control of Night-time Lighting Glare and Erection of Decorative Screen Hoarding, and during operation phase, including Compensatory Tree Planting for Loss of Existing Trees, Roadside and Amenity Planting, Sensitive and Aesthetically Pleasing Design of Aboveground Structures, Enhancement of Landscape Buffer, Provision of Green Roof and Control of Night-time Lighting Glare, to alleviate the potential impacts. Regarding mitigated visual impact, it is predicted that there would be slight to moderate residual impact on most of the VSRs during construction, and would be insubstantial to slight on day 1 of operation and be further reduced to insubstantial when the proposed tree planting becomes mature in year 10 of operation.
- 3.7.1.8 As a whole, the residual landscape and visual impacts of the proposed Project is considered acceptable with the proposed mitigation measures implemented during construction and operation phases.

## 3.8 Hazard to Life

- 3.8.1.1 A quantitative hazard assessment was conducted to evaluate the biogas risk to existing, committed and planned off-site population due to operation of the organic wastes co-digestion facility at the proposed YLSEPP.
- 3.8.1.2 The assessment findings revealed that both the individual and societal risk levels would meet relevant requirements stipulated in the Hong Kong Risk Guidelines (HKRG), i.e. the off-site individual risk level is far below  $1 \times 10^{-5}$  per year and the societal risk falls into the "Acceptable" region. Therefore, the biogas risk associated with the operation of the proposed YLSEPP is considered acceptable.

## **4 ENVIRONMENTAL MONITORING AND AUDIT (EM&A)**

- 4.1.1.1 Environmental Monitoring and Audit (EM&A) requirements for air quality, noise, water quality, waste management, land contamination, ecological (terrestrial and aquatic), and landscape and visual impacts as well as hazard to life have been recommended, with regular site inspection and audits during construction phase to ensure that the recommended mitigation measures are properly implemented. The EM&A requirements are specified and detailed in the EM&A Manual.

## **5 CONCLUSION**

- 5.1.1.1 The findings of the EIA provided information on the nature and extent of the environmental impacts likely to arise from the construction and operation of the Project. The EIA has, where appropriate, identified mitigation measures to ensure compliance with environmental legislation and standards.
- 5.1.1.2 Overall, the EIA concluded that the Project would comply with the requirements of the EIA Study Brief and EIAO-TM with the implementation of the proposed mitigation measures during construction and operational phases of the Project. The schedule of implementation of the proposed mitigation measures has been provided in the EIA Report. An EM&A programme has also been recommended to check the effectiveness of the proposed mitigation measures.

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# Figure