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Food and Environmental Hygiene Department

Quotation Contract No.: CPM301_02/14

Mui Wo Lai Chi Yuen Cemetery Extension

Environmental Impact Assessment Executive Summary

March 2017

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1. INTRODUCTION

1.1 Project Background

- 1.1.1 With a growing and aging population in Hong Kong, the numbers of deaths and cremations have been rising gradually year by year, leading to a corresponding increase in the demand for public niches. There is currently no public columbarium facility on Lantau Island. Eligible residents in Lantau Island of Islands District can only choose from public niches in Peng Chau or Lamma Island (in addition to New Territories (NT)/Urban niches) if cremation is adopted, although there are two public cemeteries on the Island, namely, Tai O Cemetery and Lai Chi Yuen Cemetery where only coffin burial or urn burial are available. It is against this background that Members of Islands District Council and Mui Wo Rural Committee strongly requested public niches be provided on Lantau Island to cope with the need of eligible local residents.
- 1.1.2 In this regard, the Food and Environmental Hygiene Department (FEHD) proposed an extension of the Mui Wo Lai Chi Yuen Cemetery (hereafter referred to as "the Project") to construct an elevated platform of around 225m² within the existing Lai Chi Yuen Cemetery boundary to accommodate the outdoor niches and the ancillary facilities including one joss paper burner (with a fresh water tank and a sewage holding tank for supporting its operation) and planters. Also, a site access of 7.5m², which is indispensable for the development, will be constructed just outside the cemetery boundary due to lack of suitable space for accommodating it in the cemetery.
- 1.1.3 The Project is classified as a Designated Project (DP) under Category Q.1 the Project is wholly within an existing country park, Part I in Schedule 2 of the Environmental Impact Assessment Ordinance (EIAO).
- 1.1.4 An application for an Environmental Impact Assessment (EIA) Study Brief under Section 5(1) of the EIAO was made to Environmental Protection Department (EPD) and the EIA Study Brief No. ESB-288/2015 for the Project was issued under the EIAO. AECOM Asia Company Limited was commissioned by Architectural Services Department (ArchSD) as the Consultant to conduct this EIA study for the Project.

1.2 Purpose of this Executive Summary

- 1.2.1 The purpose of this Executive Summary (ES) is to present the summary of the findings, conclusions and recommendations in the EIA Report. This ES contains the following information:
 - Section 2 Purpose, nature, consideration of alternative options for the site location, and construction methods of the Project
 - Section 3 Key findings of environmental impacts
 - Section 4 Environmental monitoring and audit (EM&A) for the Project
 - Section 5 Conclusions

2. PROJECT DESCRIPTION

2.1 Location and Scale of Project

- 2.1.1 The Project site is located on a slope next to the entrance staircase of the existing Lai Chi Yuen Cemetery with a total area of 232.5m². An elevated platform of around 225m² supported by structural columns will be constructed to accommodate some 790 niches (one 46 columns x 10 tiers and one 33 columns x 10 tiers), with internal dimension of each niche being 200mm(W) x 210mm(H) x 410mm(D). All the niches will be in outdoor setting. The ancillary facilities like a joss paper burner (with a fresh water tank and a sewage holding tank for supporting its operation) and planters will be provided as well.
- 2.1.2 A site access of 7.5m² will be constructed just outside the cemetery boundary. The site access area has however been minimized to allow only pedestrian access without compromising the wheelchair access requirement.
- 2.1.3 The location plan and preliminary layout plan of the Project are shown in **Figures 2.1** and **2.2**, respectively.

2.2 The Need and Benefits of the Project

- 2.2.1 Since the 1970s, the Government has been encouraging cremations instead of coffin burials, resulting in a rising demand for columbarium facilities and an upsurge of private columbaria. With a growing and ageing population in Hong Kong, the numbers of deaths and cremations have been rising gradually year by year, leading to a corresponding increase in the demand for public niches.
- 2.2.2 There is currently no public columbarium facility on Lantau Island. Local villagers and residents in Lantau Island of Islands District can only choose from public niches in Peng Chau or Lamma Island (in addition to NT/Urban niches) if cremation is adopted. In view of the great demand of public niches in Mui Wo and Lantau Island at large, the Islands District Council Members and the Mui Wo Rural Committee strongly requested public niches be provided on Lantau island to cope with the need of local villagers and residents.
- 2.2.3 In this regard, FEHD proposed the Project to cope with the need of local villagers and residents in Lantau Island.
- 2.2.4 The Project will help to meet the great public demand for public niches, to relieve the shortage of niches in Hong Kong and to cope with the need of local villagers and residents on Lantau Island.
- 2.2.5 More than 96% project site area is within the existing Lai Chi Yuen Cemetery. Only the access 7.5m² is proposed to be constructed just outside the cemetery boundary due to lack of suitable space for accommodating it in the cemetery. Environmental impacts on surrounding sensitive receivers are minimised.

2.3 Consideration of Alternative Options

New Sites on Lantau Island

2.3.1 In the course of studying the feasibility of columbarium development at Lai Chi Yuen Cemetery, FEHD has explored with the locals the feasibility of building columbarium at a number of alternative sites in Lantau Island, including sites identified in Luk Wu, Wong Lung Hang (2 sites), old Tung Chung Road Cheung Sha Waterworks Ex-quarters, near Tai O Cemetery (2 sites) and helipad at Mui Wo. However, they were all found unsuitable for columbarium development owing to different reasons. After a series of site visits, preliminary feasibility studies and prolonged discussions, the locals insist further exploring the feasibility of developing columbarium at the original Lai Chi Yuen Cemetery site and press FEHD to forge ahead with the Project. The proposed columbarium development in Lai Chi Yuen Cemetery has been fully supported by the local community, the Islands District Council, the Lantau Area Committee and the Mui Wo Rural Committee.

Sites outside Lantau Island

2.3.2 Alternative project sites outside Lantau Island have been considered at the initial stage. However, as Lai Chi Yuen Cemetery site is one of the 12 batch one sites that were announced by the Government on 6 July 2010 when it launched the first public consultation on the review of columbarium policy, the niches to be provided in the Project are targeted for local villagers and residents on Lantau Island. Other sites outside Lantau Island for the Project are thus not applicable.

Extension of Existing Lai Chi Yuen Cemetery

- 2.3.3 The existing Lai Chi Yuen Cemetery site is a developed site with the necessary transport network support.
- 2.3.4 The development of new columbarium at a new or remote site will carry environmental dis-benefits. The impact of such dis-benefits is relatively less significant for development of the existing Lai Chi Yuen Cemetery.
- 2.3.5 Human activities already exist at the current site in Lai Chi Yuen Cemetery and its vicinity. The presence of a new small scale columbarium with minimal ancillary facilities will have insignificant effect on the existing Lai Chi Yuen area.
- 2.3.6 FEHD has once explored a number of development options (see **Figure 2.3**) for the extension of Lai Chi Yuen Cemetery but the Barrier Free Access (BFA) requirement involves substantial encroachment onto the virgin country park area. On the advice of Agriculture, Fisheries and Conservation Department (AFCD) that the columbarium should be built within the cemetery boundary as far as possible, FEHD eventually identified the currently proposed site within the Lai Chi Yuen Cemetery with minimal area outside the cemetery boundary. Owing to the limited footprint of the site and the BFA requirement, terraced platform design was not proposed to avoid the need of bulky ramps connecting the platforms to provide a barrier free access.
- 2.3.7 Extension of the existing Lai Chi Yuen Cemetery is therefore considered the most preferred scenario for the following reasons:
 - a) Provision of new columbarium at the Project site has a much less significant environmental impact in comparison with introducing new columbarium to a new site;
 - b) The Project site is mainly confined to the boundary of the Lai Chi Yuen Cemetery, which is considered compatible use;
 - c) It is the most suitable option for early implementation to meet the great demand for public niches as soon as possible; and
 - d) The footprint is minimized and the layout design is optimized to minimize environmental impacts.

2.4 Construction Methodology

- 2.4.1 The main access to the Site is through the existing single track access road (two ways) connecting to South Lantau Road. No widening is required for this access road.
- 2.4.2 The elevated platform will be constructed by in-situ concrete casting. The area of the proposed barrier-free site access is very small (i.e. around 7.5m²) and the required depth of excavation is expected to be less than 1.5m. The construction can be achieved by simple open cut followed by insitu casting of the reinforced concrete retaining wall/slab. Good site practice will be adopted to minimize the impact on the environment during the construction stage.
- 2.4.3 The outdoor niches will also be formed by in-situ concrete casting, with the niches block modules either in the form of prefabricated stone or precast concrete.

2.5 Works Programme

2.5.1 Construction of the Project will tentatively commence in February 2018 and complete in September 2019.

2.6 Interactions with Other Projects

2.6.1 According to the latest plan, there is no concurrent project to be constructed and operated in the vicinity of the Project.

3. KEY FINDINGS OF THE ENVIRONMENTAL IMPACT ASSESSMENT

3.1 Introduction

- 3.1.1 This EIA Report has provided an assessment of the potential environmental impacts associated with the construction and operation of the Project, based on the engineering design information available at this stage. The assessment has been conducted in accordance with the EIA Study Brief (No. ESB –288/2015) issued for the Project and it covers the following environmental issues:
 - air quality impact
 - noise impact
 - hazard to life
 - water quality impact
 - waste management implications
 - ecological impact
 - landscape and visual impacts

3.2 Air Quality Impact

3.2.1 The air quality assessment was conducted in accordance with the requirements in Annexes 4 and 12 of the Technical Memorandum on Environmental Impact Assessment Process (EIAO-TM) and the requirements in Section 3.4.3 of the EIA Study Brief. Scattered village house located at a distance of approximately 82m to the north of the Project site boundary are the most affected air sensitive receivers within 500m assessment area.

Construction Phase

3.2.2 Fugitive dust from construction activities including site formation, erection of retaining walls and construction of proposed new columbarium and the ancillary facilities would be the major potential construction air quality impact. Since the construction works of the Project would be minor and small scale, dust emission from the construction of the Project would be insignificant. With implementation of the recommended dust suppression measures as stipulated in the *Air Pollution Control (Construction Dust) Regulation*, no adverse air quality impact is anticipated.

Operational Phase

3.2.3 Joss paper burning would be the major potential air quality impact during the operational phase. With the incorporation of flue gas treatment system and the implementation of the good operational practices and administrative mitigation measures, no adverse operational air quality impact is anticipated.

3.3 Noise Impact

3.3.1 The noise impact assessment was conducted in accordance with the requirements set out under Annexes 5 and 13 of the EIAO-TM, and Section 3.4.4 of the EIA Study Brief. Scattered village house located at approximately 82m to the north of the Project site boundary are the most affected noise sensitive receivers (NSRs) within 300m assessment area.

Construction Phase

3.3.2 Potential noise impacts during the construction phase of the Project would be those from the use of Powered Mechanical Equipment (PME) for various construction activities, including site formation and construction of structures for new columbarium. The construction noise impacts on the representative NSRs were assessed. The assessment results indicated that the unmitigated noise levels arising from the construction activities of the Project at the NSRs (58 to 75 dB(A)) would comply with the EIAO-TM construction noise criteria, and therefore no mitigation measure is required during the construction phase. Nonetheless, good site practises are proposed to further minimize the potential construction noise impacts.

Operational Phase

3.3.3 Two water pumps and a joss paper burner would be installed at the Project Site. The joss paper burner would comprise a water scrubber, an electrostatic precipitator and an exhaust fan, which would generate noise during their operation. The total maximum permissible sound power level (Max. SWL) of the proposed fixed plant items were determined by applying standard acoustics principles. No adverse operational noise impact on any of the representative NSRs is anticipated if the water pumps and joss paper burner are so designed as to not exceed the total Max. SWL of 94 dB(A), and free of tonality, impulsiveness and intermittency.

3.4 Hazard to Life

- 3.4.1 A quantitative risk assessment (QRA) has been carried out since the proposed development resides in the Consultation Zone (CZ) of Silvermine Bay Water Treatment Works (SMBWTW), which is a potentially hazardous installation (PHI). The Hazard to Life assessment was conducted in accordance with the requirements in Annex 4 of the EIAO-TM and the requirements in Section 3.4.5 of the EIA Study Brief. The assessment has been conducted to determine the risk associated with the storage, use and transport of chlorine at SMBWTW.
- 3.4.2 The level of individual risk posed by SMBWTW was found to comply with the criterion stipulated in Annex 4 of EIAO-TM. The societal risk level lies in the "As Low As Reasonably Practicable" (ALARP) region for the base case, construction case and operational case scenarios. It was found that the societal risk level had fallen within the ALARP region owing to the background population instead of the population induced by the Project. A Cost-Benefit Analysis (CBA) was carried out to determine if any cost-effective risk mitigation measures could be implemented. Some good practices that could lower the risk for both construction stage and operation stage were also recommended. After implementing all the recommended risk mitigation measures, the overall risk is in compliance with the ALARP principles and Risk Guidelines (Annex 4 of EIAO-TM).

3.5 Water Quality Impact

3.5.1 The water quality assessment was conducted in accordance with the requirements in Annexes 6 and 14 of the EIAO-TM and the requirements in Section 3.4.6 of the EIA Study Brief. Watercourses within the 500 m assessment area of the Project were identified as the water sensitive receivers of the Project.

Construction Phase

3.5.2 The key water quality issue associated with the construction activities of the Project would be the potential release of wastewater from surface works areas and open cut excavation. Minimization of water quality deterioration could be achieved through the implementation of appropriate mitigation measures, such as control of site run-off of different general construction activities. Regular site inspections should be undertaken routinely to inspect the construction activities and works areas to ensure proper implementation of the recommended mitigation measures.

Operational Phase

3.5.3 The potential sources of water quality impacts during the operation of the new columbarium would be the sewage generated from the staff and visitors as well as the runoff from the Project. It is anticipated that the water quality impact associated with the operational phase would be minimal and acceptable if the recommended mitigation measures (such as provision of sanitary facilities) and best management practices are properly implemented.

3.6 Waste Management Implications

3.6.1 The waste management assessment was conducted based on the criteria and guidelines in Annexes 7 and 15 of the EIAO-TM and Section 3.4.7 of the EIA Study Brief.

Construction Phase

- 3.6.2 Construction and demolition (C&D) materials would be generated from site clearance, slope excavation works, construction of site access and retaining walls for the Project construction. In view of the nature and small scale of the Project, the amount of C&D materials to be generated would be limited. The total quantity of C&D materials generated from the works is estimated to be approximately 500 m³, of which approximately 450 m³ would be inert materials (i.e. public fill) and approximately 50 m³ would be non-inert materials (C&D waste). No sediment requiring marine disposal would be generated from the construction of the Project.
- 3.6.3 The C&D materials would be sorted on-site. The inert C&D materials would be re-used on-site as far as possible. It is estimated that approximately 100 m³ of inert C&D materials would be reused on-site as backfill materials. The estimated quantity of inert C&D materials to be disposed of would be approximately 350 m³. Final outlets for the inert C&D materials will be determined according to the availability of public filling reception facilities (PFRF) and are subject to the agreement with CEDD. Non-inert C&D materials generated would be reused and recycled as much as possible before disposing to landfills.
- 3.6.4 Other wastes, including general refuse and chemical waste would also be generated during the construction phase. Provided that these identified wastes are handled, transported and disposed of using the recommended methods and that good site practices are strictly followed, adverse environmental impacts are not anticipated.

Operational Phase

3.6.5 Ash and non-combustible residues generated from joss paper burning, and general refuse would be the key types of waste from the operation of the Project. Given the small size of the proposed joss paper burner, the amount of such residues would be limited. The quantity of general refuse generated by visitors and the staff during the daily operation of the new columbarium is not expected to be substantial. With the implementation of appropriate waste management measures (e.g. storage of ash and non-combustible residues in covered refuse containers, provision of recycling bins), no adverse environmental impact is anticipated.

3.7 Ecological Impact

- 3.7.1 The ecological assessment was conducted following the criteria and guidelines for evaluating and assessing ecological impact in Annexes 8 and 16 of the EIAO-TM respectively, and the requirements in Section 3.4.8 of the EIA Study Brief.
- 3.7.2 Literature review and a 6-month programme of terrestrial and aquatic ecological surveys within the 500 m assessment area of the Project were conducted to establish the ecological baseline of the Project site and its vicinity. Sites of conservation importance identified within the assessment area included only the Lantau South Country Park. Six habitats were identified in the assessment area, including developed area, plantation woodland, natural woodland, shrubland, inactive agricultural land and stream. The Project site falls within the Lantau South Country Park and comprises plantation woodland and natural woodland.

3.7.3 Three flora and four fauna species of conservation importance were recorded within the assessment area during the surveys, with a flora species of conservation importance (*Aquilaria sinensis*) recorded within the Project site.

Construction Phase

- 3.7.4 Ecological impacts associated with the Project would include direct habitat loss of a very small woodland habitat (approximately 0.02ha). An individual of *Aquilaria sinensis* was recorded within the works area. With the implementation of mitigation measures, such as transplantation, erection of hoarding or fencing, and native tree and shrub planting as part of the landscaping proposals, the impact would be minimized.
- 3.7.5 Indirect impacts during construction phase include human disturbance, construction dust and noise, and construction site runoff. With proper implementation of good site practices (e.g. measures to avoid and minimize construction dust, noise and any pollution entering nearby watercourse), no significant adverse ecological impact is anticipated.

Operational Phase

3.7.6 During operational phase, the key potential ecological impacts include increased human activities / disturbance associated with the operation of the Project and hill fire caused by uncontrolled joss paper burning activities. With the implementation of the measures, such as provision of adequate litter bins, a proper joss paper burner, fire-fighting gears and regular patrol during Ching Ming Festival and Chung Yeung Festival, no unacceptable residual impacts is anticipated.

3.8 Landscape and Visual Impacts

3.8.1 The landscape and visual impact assessment was conducted in accordance with the criteria and guidelines in Annexes 10 and 18 of the EIAO-TM and EIAO Guidance Note No. 8/2010 on "Preparation of Landscape and Visual Impact Assessment under the Environmental Impact Assessment Ordinance". Three landscape resources (LRs), one landscape character area (LCA) and three visually sensitive receivers (VSRs) were identified within the assessment area.

Construction Phase

3.8.2 The key impact on existing landscape and visual sensitive receivers during the construction phase would include construction of the elevated platform and temporary works for the in-situ concrete casting, temporary stockpiling etc. With the proposed mitigation measures, which include the preservation of existing trees, compensatory native tree and shrub planting, control of night-time lighting glare, erection of screen hoarding in visually unobtrusive colour, management of construction activities and facilities, reinstatement of temporarily disturbed landscape area, the residual impact would only be slight.

Operational Phase

3.8.3 During the operational phase, the key source of landscape and visual impacts would be limited to the operation of facilities at the Cemetery Extension. With the implementation of mitigation measures, including aesthetically pleasing design of above ground structures, amenity tree and shrub planting and screen planting to soften the structural columns of the elevated platform, the residual impact on the visitors to Lai Chi Yuen Cemetery would remain slight in day 1 and year 10 of the operation.

4. ENVIRONMENTAL MONITORING AND AUDIT

4.1.1 Environmental Monitoring and Audit (EM&A) requirements for air quality, noise, water quality, hazard to life, waste management, ecology and landscape and visual impacts were identified and recommended. The EM&A requirements are specified and detailed in the EM&A Manual. Site inspections/audits were recommended to check the implementation of the recommended mitigation measures during the construction and operational phases.

5. CONCLUSION

- 5.1.1 The EIA Report provides information on the nature and extent of the potential environmental impacts that may arise during the construction and operation of Mui Wo Lai Chi Yuen Cemetery Extension. Mitigation measures have been proposed, where necessary and appropriate, to ensure full compliance with environmental legislation and standards.
- 5.1.2 The EIA Report has concluded that the Project would be environmentally acceptable with no unacceptable residual impacts on the nearby environmentally sensitive receivers and resources with the implementation of the proposed mitigation measures during its construction and operation. The schedule of mitigation measures recommended to be implemented has been provided in the EIA Report and an EM&A programme has been recommended to check the proper implementation of these measures and monitor environmental compliance of the Project.

FIGURES





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CONSIDERED SCHEMES FOR THE EXTENSION OF THE EXISTING CEMETERY