

## 14 Summary of Environmental Outcomes

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### 14.1 General

- 14.1.1.1** This chapter summarises the overall environmental outcomes due to the development of columbarium, crematorium and related facilities at Sandy Ridge Cemetery in accordance with Section 3.4.10.1 of the Environmental Impact Assessment (EIA) Study Brief No.: ESB-271/2014. With the vision to develop the Sandy Ridge Cemetery to provide synergistic one-stop services that include at least a funeral parlour and a visitor service centre, the proposed layout and supporting infrastructure have been designed to achieve optimum public services and, at the same time, to avoid and minimise environmental nuisance that may be caused to the neighbouring areas.
- 14.1.1.2** It is envisioned that this Project will set a new benchmark for the public C&C facilities and services in terms of its functional one-stop services, state-of-the art design incorporating artistic elements of aesthetic appeal where appropriate, greening and landscaping, user-friendly access for visitors and serene surrounding environment.
- 14.1.1.3** Assessment results indicate that, with the implementation of the proposed environmental measures, adverse environmental impacts arising from the Project are not anticipated. In addition, during operational phase, as the crematorium is a Designated Project under Item N.4 of Schedule 2 of TM-EIAO, a separate EIA study would be conducted by the respective project proponent to fulfil all the statutory requirements and procedures under the EIAO and thus the fixed noise impact, chimney emission and odour will be excluded from this Assignment. However, vehicular emission and road traffic noise from its induced traffic is anticipated and therefore have been included in the assessment.
- 14.1.1.4** The following sections summarise the approaches that have been adopted to either avoid or minimise various environmental impacts throughout the design process up to this stage. An impact summary is presented in **Appendix 14.1**.

### 14.2 Population and Environmental Sensitive Areas Protected

#### 14.2.1 Population in the Vicinity

- 14.2.1.1** As discussed in **Section 1**, the average annual numbers of deaths and cremations in the next 20 years (i.e. from 2014 to 2033) are estimated to be about 54,000 and 51,000 respectively. Upon completion of the latest reprovisioning projects of Wo Hop Shek and Cape Collinson Crematoria by late 2015, the total annual capacity of all public

cremators will be increased from 38,000 sessions to 53,000 sessions. This will sufficiently meet the cremation demand only up to around 2024. Hence, there is genuine need to construct a new crematorium at Sandy Ridge Cemetery to address the demand beyond 2024.

- 14.2.1.2** As for columbarium, the supply of public niches is uncertain even after the completion of the Diamond Hill Columbarium extension, and the new public columbarium at Kiu Tau Road in the Wo Hop Shek Cemetery and the Cheung Chau Cemetery extension in 2012 and 2013 providing about 1,500, 43,700 and 1,000 new niches respectively, of which allocation of niches would be largely completed in mid 2015. Hence, there is a need to construct new columbarium facilities. Sandy Ridge has been identified as one of the locations for new columbarium facilities.
- 14.2.1.3** After the implementation of the new columbarium facilities, additional traffic and hence grave sweepers will visit Sandy Ridge, especially during the Ching Ming and Chung Yeung Festivals. According to the latest traffic planning, most of the public would utilise public transport (e.g. buses, public light buses, taxis etc) to access Sandy Ridge via either Man Kam To Road or Lin Ma Hang Road.
- 14.2.1.4** Man Kam To Road is serving as an important link allowing vehicles to commute between HK and Shenzhen via the Man Kam To Boundary Control Point. The majority of those vehicles are heavy goods vehicles. The traffic flow on Man Kam To Road is also heavy during working days and would be less during Ching Ming and Chung Yeung Festivals. In comparison, the existing traffic flow on Lin Ma Hang Road is relatively less than that along Man Kam To Road.
- 14.2.1.5** Hence, the environmental impacts caused by these additional traffic on the neighbouring residential premises such as existing village houses along Man Kam To Road and Lin Ma Hang Road have been duly examined. Some purpose built noise barriers (approximately of 2.5m, 3m and 4m tall for existing receivers and 5m tall for planned receivers) along Sha Ling Road and Lin Ma Hang Road, and low noise surfacing materials at some locations along Lin Ma Hang Road are required to protect these populations to achieve acceptable noise levels. The number of dwellings that are benefited is about 30. The vehicular emissions generated by those vehicles have also been assessed and results indicated that the air quality at the premises of those population would comply with the Air Quality Objectives.
- 14.2.1.6** Besides the population in the neighbouring of Sandy Ridge, the population in the vicinity of the off-site pick-up / drop-off locations have also been taken into consideration. In order to strike a balance among various districts, it is proposed to have off-site pick-up / drop-off locations at MTR Kwu Tung Station, MTR Fanling Station, existing Sheung Shui Landmark North Public Transport Interchange (PTI) and layby at Pak Wo Road near Flora Plaza. The design of these

off-site pick-up / drop-off locations have also ensured that the additional traffic during Ching Ming and Chung Yeung Festivals would need not exceed the capacity of the neighbouring highway infrastructures. Hence, it is not anticipated that those population in the vicinity would be adversely affected.

**14.2.1.7** In addition, a barging point at Siu Lam would be required. The surplus inert C&D materials from the construction of C&C facilities will be transported by barges for the reuse of other concurrent projects. Given that only minor construction works (including tipping halls and new ramps) and 50 veh/hr (i.e. 25veh/hr one-way) construction vehicles would be required for the barging point, it is not anticipated that the population in the vicinity would be adversely affected.

## **14.2.2 Conservation Area and Woodland in Sandy Ridge**

**14.2.2.1** Ecological surveys have identified a number of ecological sensitive areas in the vicinity, including 1) the Yuen Leng Chai Conservation Area on the northern side where a wet woodland is located; and 2) woodland immediate north adjacent to the columbarium. Their ecological values have been assessed to be Very High and High respectively.

**14.2.2.2** The impacts on the affected wet woodland and woodland have been minimised and mitigated as discussed in subsequent sections.

## **14.3 Approaches Adopted to Avoid Environmental Impacts**

**14.3.1.1** Avoidance of environmental impacts has been one of the key considerations throughout the entire project development and design. Given the location of the proposed project, there are a number of ecological sensitive areas and clan graves within the study area. Besides, a number of residential premises, typically village houses along Man Kam To Road and Lin Ma Hang Road. Hence, the following approaches have been adopted to avoid environmental impacts:

- Avoidance of Conservation Area;
- Avoidance of Fish Ponds; and
- Avoidance of Clan Graves.

### **14.3.2 Avoidance of Conservation Area**

**14.3.2.1** According to the ecological assessment results, the Yuen Leng Chai Conservation Area (CA) on the northern side would have an ecological value of Very High. It accommodates a wet woodland in which a number of species have been identified during the surveys.

These species include Common Rat Snake, Two-stripe Grassfrog, Ruby Darter and Small Snakehead, etc.

**14.3.2.2** Given the ecological value of this CA, the design of the proposed columbarium has been proactively adjusted to ensure that there would not be any encroachment on this CA, during both the construction and operational phases. This requires a prudent design on both the temporary and permanent works, as well as the construction methodology.

### **14.3.3 Avoidance of Fish Ponds**

**14.3.3.1** Other than the CA, a number of fish ponds have also been identified in the vicinity of the Project. Although these fish ponds may not have process very high fishery resources, the design has also respected the presence of these fish ponds and hence the design of the proposed columbarium has been proactively adjusted to ensure that there would not be any encroachment on these fish ponds, during both the construction and operational phases. This requires a prudent design on both the temporary and permanent works, as well as the construction methodology.

### **14.3.4 Avoidance of Clan Graves**

**14.3.4.1** As discussed in **Section 2.4**, a total of 4 historic clan graves (G-01, G-02, G-03 and G-06) would need to be removed in the original design (shown as Appendix A in the EIA Study Brief (ESB-271/2014)) to facilitate the site formation for the platform. In order to preserve these clan graves, the current design of the platform and connecting roads have been proactively adjusted to avoid encroachment onto these clan graves (**Figure 2.3**). Hence, these clan graves would not need to be relocated as in the original design.

## **14.4 Approaches Adopted to Minimise Environmental Impacts**

**14.4.1.1** Other than the approaches discussed in **Section 14.3** to avoid environmental impacts on key environmental resources, efforts have also been deployed in the planning and design of C&C Facilities to minimise the environmental impacts. These include the following:

- Optimal use of road network;
- Optimal use of platform configuration;
- Minimisation of Woodland; and
- Minimisation of the the generation of spoil.

## 14.4.2 Optimal Use of Road Network

**14.4.2.1** The surrounding environment around C&C Facilities at Sandy Ridge consists of hilly slopes, grassland and woodland, etc. The existing Sha Ling Road is connected to the Sandy Ridge Cemetery. Hence, using the existing Sha Ling Road with some upgrading works will minimise the impacts during construction and operational phases. The existing Sha Ling Road has provided the connection from Man Kam To Road to Sandy Ridge Cemetery. This Sha Ling Road is currently a one-lane local road with a width of approximately 3.5m. In order to maximise the existing infrastructure and hence avoid generating C&D materials such as spoil material, the current design has slightly shifted the access road alongside of existing Sha Ling Road to the east by a maximum of 15m. This measure has avoided a large amount (about 260,000m<sup>3</sup> of spoil) to be cut on the terrain and avoid additional waste from the cut-fill. This would however encroach onto an area of 0.006ha of woodland located to the east of Sha Ling Road.

## 14.4.3 Optimal Use of Platform Configuration

**14.4.3.1** The original platform for the columbarium would encroach into a total of 2.0ha of woodland and 4 seasonal watercourses that directly feed the wet woodland (see **Figure 2.2b**). The woodland affected is located in close vicinity along the seasonal watercourses leading to the Conservation Area downstream to the north. In order to minimise the extent of direct impact on those woodland and seasonal watercourses as much as practicable, the shape of the platform has been critically examined by taking into account of the latest habitat maps (see **Section 9** on the ecological assessment and the approach to establish the latest habitat map).

**14.4.3.2** According to the latest ecological survey results, the seasonal watercourses and the woodland are located at the southern part of the platform (under the original design) and the habitat to the northern and north-eastern part of the platform (under the original design) is mainly grassland and plantation. The current design has therefore taken this latest information into consideration by shifting part of the platform to the northeast where grassland and plantation are located.

**14.4.3.3** Other than direct impact, the minimisation of indirect impacts has also been considered by increasing the separation distance between the western toe of the slope and the wet woodland. This has been achieved by allowing for a maximum gradient of about 26 degrees for a slope suitable for subsequent plantation and installing a retaining wall of about 6m tall and 100m long at the toe. In addition, a hammer head arrangement instead of the conventional roundabout configuration has been adopted for the end of the Emergency Vehicular Access (EVA).

**14.4.3.4** As a result, the area of woodland that will be affected have been reduced from 2.0ha to 1.0ha, and all of the four seasonal watercourses directly feed into the wet woodland would be avoided.

#### **14.4.4 Minimisation of the Generation of Spoil**

**14.4.4.1** In order to minimise the pressure on fill bank in HK, a stockpile area will be located within the site during construction phase for temporary storage of inert Construction & Demolition (C&D) materials. According to the current design, the construction of site formation and associated road networks including Sha Ling Road and internal road would require fill and cut slopes or upgrading / modification of existing slope features. With the proposed stockpile, out of 894,000m<sup>3</sup> of the inert C&D materials that will be generated, about 46% of these materials will be reused on-site. This will also help to minimise noise and dust nuisance caused by spoil transportation vehicles.

### **14.5 Approaches Adopted to Mitigate Environmental Impacts**

**14.5.1.1** It can be seen that the design of C&C Facilities has adopted the principle to avoid environmental impacts. Where the impacts could not be avoided, efforts have been deployed to minimise the impacts as much as practicable. Notwithstanding this, the EIA has recommended a package of mitigation measures that would be required. The Environmental Mitigation Implementation Schedule in **Appendix 13.1** has clearly stated the details of such mitigation measures, the timeframe and the implementation agents. Some of the key mitigation measures are discussed below.

#### **14.5.2 Tree Compensation**

**14.5.2.1** As discussed in **Section 11**, there will be a certain amount of vegetation clearance and numbers of tree would need to be fell. Based on the tree survey report, approximately 1,300 number of trees will be affected within the works area, out of which approximately 1,100 number of trees will be affected within Sandy Ridge Project boundary, and approximately 200 number of trees will be affected along Lin Ma Hang Road widening. They are mostly tree group at the foothill and roadside trees planting.

**14.5.2.2** Many of the trees affected are landscape species which are often introduced exotic species, with little ecological value and conservation importance, and have been planted for aesthetic appeal and as part of the landscape rehabilitation scheme. Some compensation planting and transplanting of trees will be required only for mitigating landscape and visual impacts. Woodland mix species whips will be proposed along the hillsides for the woodland compensation and off-site compensation is also required.

### 14.5.3 Grassland Reinstatement Plan

**14.5.3.1** As discussed in **Section 9.7**, a significant portion of grassland (approx. 10.4ha) will be lost as part of the work for columbarium. While the platform will be stabilized by cut and filled slopes, some of the cut and filled slopes will be proposed for grassland reinstatement by collecting topsoil or turves from the development area and storing during construction phase. The reinstated grassland, approximately 0.9 ha, will be formed on the slopes once constructed.

### 14.5.4 Flora Survey and Transplantation Plans

**14.5.4.1** As discussed in **Section 9.7**, flora survey such as *A. sinensis*, Bamboo Orchid and Toothed Habenaria will be conducted prior to any vegetation removal. The survey will determine the number and locations of the affected individual of flora species of concern and evaluate the suitability and / or practicality of the transplantation. The plan will be submitted to and approved by EPD prior to construction.

### 14.5.5 Water Quality to Wet Woodland

**14.5.5.1** The proposed platform and supporting structure may collect the surface runoff and groundwater to the wet woodland. The foundation of the proposed platform structure would compose of bore piles of about 0.6m in diameter and the spacing between each pile would be approximately 3.5–5m. As compared to other foundation designs such as D-wall or pipepile walls, the proposed small diameter bore pile system would allow a notional free area of about 87 – 91% for groundwater to pass through. Dusty material from the platform and associated road system will be treated by proper installation of silt traps. In addition, discharge from the platform and associated road system will be controlled by a by-pass drainage system to minimise the high flux from first flush.

### 14.5.6 Provision of Direct Noise Mitigation Measures along Sha Ling Road and Lin Ma Hang Road

**14.5.6.1** For the operational phase, the use of noise barriers and low noise surfacing would be required on some road sections to mitigate the noise generated by the operation of C&C Facilities during Ching Ming Festival and Chung Yeung Festival. As described in **Section 5.6**, results indicated that for existing receivers 2.5m, 3m and 4m high absorptive noise barriers (with 1m of lower portion absorptive) along Sha Ling Road and Lin Ma Hang Road, and low noise surfacing materials along a section of Lin Ma Hang Road would be required. For the planned receivers along Lin Ma Hang Road, additional 5m high absorptive noise barriers (with 1m of lower portion absorptive) and low noise surfacing materials are proposed to be implemented

along Lin Ma Hang Road to alleviate the noise impacts generated from traffic.

## 14.5.7 Implementation of Good Site Practices during Construction Phase

14.5.7.1 For construction phase, the extent of temporary works areas where construction plant would be operating has been reduced to minimise the airborne construction noise impacts, water quality impacts as much as practicable. Mitigation measures that had been considered throughout the design process to minimise the construction noise impacts include:

- Use of quiet plant and working methods;
- Use of temporary noise barriers, and enclosures for relatively static plants etc.; and
- Good site practices such as avoiding surface run-off with high concentration of suspended solid to be discharged in the existing wet woodland area.

14.5.7.2 For construction phase, construction noise assessment has been conducted. All the practicable mitigation measures including use of quiet plant, acoustic mat, movable noise barrier, full enclosure and scheduling of works have already been applied and exhausted on these construction activity. All noise sensitive receivers have been mitigated to within the criterion.

## 14.5.8 Implementation of Environmental Monitoring System during Construction Phase

14.5.8.1 In addition to the mitigation measures as described above (see more details in the Environmental Mitigation Implementation Schedule given in **Appendix 13.1**), a comprehensive environmental monitoring and auditing programme would be implemented to cover various aspects of concern. An independent environmental checker would also be employed to ensure that all the necessary mitigation measures are implemented in a timely and orderly manner.

## 14.5.9 Overall

14.5.9.1 Mitigation measures and good site practices to minimise the environmental impacts were recommended throughout the impact assessments such as noise, water quality, ecology, etc. These measures were consolidated in the Environmental Mitigation Implementation Schedule (see **Appendix 13.1**) which specifies the responsibility, methodology and timing of implementation, such that effective and appropriate implementation of the measures can be assured.