Executive Summary

AECOM Singapore Pte Ltd (AECOM) was appointed by the Housing & Development Board (HDB) to carry out an Environmental Baseline Study (EBS) for Miltonia Close (hereinafter referred to as "Study Area"). The Study Area is adjacent to Yishun Avenue 1, and has been safeguarded as "Residential", "Park" and "Educational Institution" based on the gazetted Master Plan 2019 (see Figure 1-1). The existing Study Area is characterised by waste woodland vegetation, and its vicinity is predominantly residential developments and/or meant for recreational use. The EBS aimed to provide information on the existing diversity and distribution of flora and fauna and characterise the hydrological conditions within the Study Area, which in turn serves to guide detailed planning for this site.

This report provides the baseline results on the biodiversity, hydrology and water quality studies.

Figure 1-1: Planned Land Use for the Study Area as per URA Master Plan 2019

Biodiversity

The flora baseline survey helped to identify and map the various vegetation types, while the fauna study set out to determine the current faunal diversity and distribution of the site. Both surveys also served to identify species of conservation significance present in the area (refer to Table 1-1 and Table 1-2 for the technical definitions of the conservation status used to derive the conservation significance of the species recorded). These baseline surveys revealed that the Study Area is characterised largely by disturbed vegetation which are widespread and common in other forested areas of Singapore. Because of this, most of the fauna species recorded here are adapted to disturbed habitats and can also be commonly found in other areas of Singapore. The Study Area does not support a particularly high native species richness in a local context and is not considered an ecologically significant site in Singapore. However, there are findings that show that the abandoned-land forest, swampy scrubland, and a bamboo cluster in the young secondary forest are important for both flora and fauna.

Table 1-1: Definition of Each National Conservation Status for Flora (Davison et al., 2008; Chong et al., 2009).

National conservation status	Definition
Vulnerable	More than 250, but fewer than 1,000 mature individuals
Endangered	Fewer than 250 mature individuals
Critically Endangered	Fewer than 50 mature individuals or more than 50, but fewer than 250 mature individuals
Presumed Extinct	Not recorded within the last 30 years

Table 1-2: Definition of Each National and Global Conservation Status for Fauna (Davison et al., 2008; Soh et al., 2019; Jain et al., 2018; IUCN, 2012).

Conservation status	Definition
National	
Vulnerable	More than 250 individuals in total, but fewer than 1,000 mature individuals
Endangered	Fewer than 250 mature individuals
Critically Endangered	Fewer than 250 individuals in total or fewer than 50 mature individuals
Presumed Nationally Extinct	Not recorded within the last 50 years
Global	
Vulnerable	Faces a high risk of extinction in the wild
Endangered	Faces a very high risk of extinction in the wild
Critically Endangered	Faces an extremely high risk of extinction in the wild
Extinct in the Wild	Only survives through cultivation, captivity or as a naturalized population(s) outside its natural range
Extinct	Globally extinct, including those in captivity or through cultivation

The abandoned-land forest and edges of the swampy scrubland supports several flora species of conservation significance, including the nationally critically endangered *Bintangaur laut* (*Calophyllum inophyllum*) and vulnerable *Buas buas* (*Premna serratifolia*) (see Figure 1-2). These coastal species are nationally threatened and are more often found in coastal habitats on the offshore islands of Singapore, such as St. John's Island and Pulau Tekukor. Hence, there is value in exploring ways to conserve coastal-associated species so that they can continue to persist on the mainland, so as to help the native stocks remain genetically diverse. The abandoned-land forest also hosts several large stranglers and trees (see Figure 1-3).

Bamboo bats (*Tylonycteris* spp.) were found during roost emergence surveys at the bamboo cluster in the northern part of the Study Area (see Figure 1-4). This genus of bats may include the nationally critically endangered lesser bamboo bat *(T. fulvida*), which may also be found in other forested areas in Singapore. More details can be found in Section 7 of the report.

Figure 1-2: Vegetation Distribution and Distribution of Flora Species of Conservation Significance in the Study Area

Figure 1-3: Distribution of Large Plant Specimens in the Study Area

Figure 1-4: Distribution of Fauna Species of Conservation Significance in the Study Area

Figure 1-5: Existing Waterbodies in the Study Area

Hydrology and Water Quality

The hydrology and water quality baseline study aimed to identify waterbodies present in the Study Area including their location, water flow conditions and bank characteristics; while the water quality surveys determined the quality of water in these surface water bodies. Based on topographic survey data and site analysis, water catchment areas within the vicinity of the Study Area mainly contribute water to the identified Natural Stream and drains. There is also an abandoned fishpond connecting to the swampy area and slowly discharging to the west of Natural Stream. This fishpond has almost stagnant water during both dry and wet weather. Two concrete roadside drains (Drain 1 and Drain 2) run along the south boundary of the Study Area and collect storm runoff from south of the Study Area (see Figure 1-5). More details can be obtained in Section 8 of the report.

From the results of the hydrological and water quality assessment, it can be inferred that the Natural Stream which was generally perennial (fed from stormwater) with eutrophication conditions, may pose stress to the aquatic life in the Study Area. However, this Natural Stream, which runs through the swampy scrubland, still supports several stream-dependent faunal species, some of which are nationally threatened, such as the critically endangered red-tailed pipe snake (*Cylindrophis ruffus*) and endangered buffy fish owl (*Ketupa ketupu*). The straw-headed bulbul (*Pycnonotus zeylanicus*), which is a globally critically endangered and locally endangered species that was frequently encountered in the targeted field surveys, is also known to be associated to riparian habitats (see Figure 1-4).

Proposed Core Biodiversity Area

Based on the key findings, the proposed core biodiversity area in the Study Area is marked out. This includes the riparian habitats that flank both sides of the stream as they form an integral component of aquatic environments that provide numerous ecological services, such as the provision of food sources and habitats for fauna such as the red-tailed pipe snake (*C. ruffus*) (Kupfer et al., 2003), as well as the maintenance of water quality via the infiltration of surface runoff. The buffer zone is at least 30 m in width to ensure bank stability (Buffler et al., 2005; Jontos, 2004). To preserve the microclimate of the bamboo cluster to minimise disturbance to the bamboo bats, a 30-m buffer of vegetation has also been recommended around bamboo cluster BB_01A.

While flora specimens and flora of conservation significance can be found throughout the abandoned-land forest, it may be unrealistic to retain the abandoned-land forest in its entirety as it comprises a third of the Study Area. Therefore, the portion of this forest patch closest to the stream with a 15-m buffer should be prioritised as the proposed core biodiversity area. This allows for some large trees, stranglers, and individuals of threatened coastal species to be conserved, including the two aforementioned species. The largest strangler on site—a *Ficus microcarpa* with a spread of up to 50 m—will also be retained. A contiguous conservation zone may be achieved by connecting the stream, abandoned-land forest, and northern bamboo cluster habitats, which may preserve a higher habitat quality compared to retaining fragmented forest patches (de Paula et al., 2016). The key findings and the proposed core biodiversity area of this Study Area is shown in Figure 1-6.

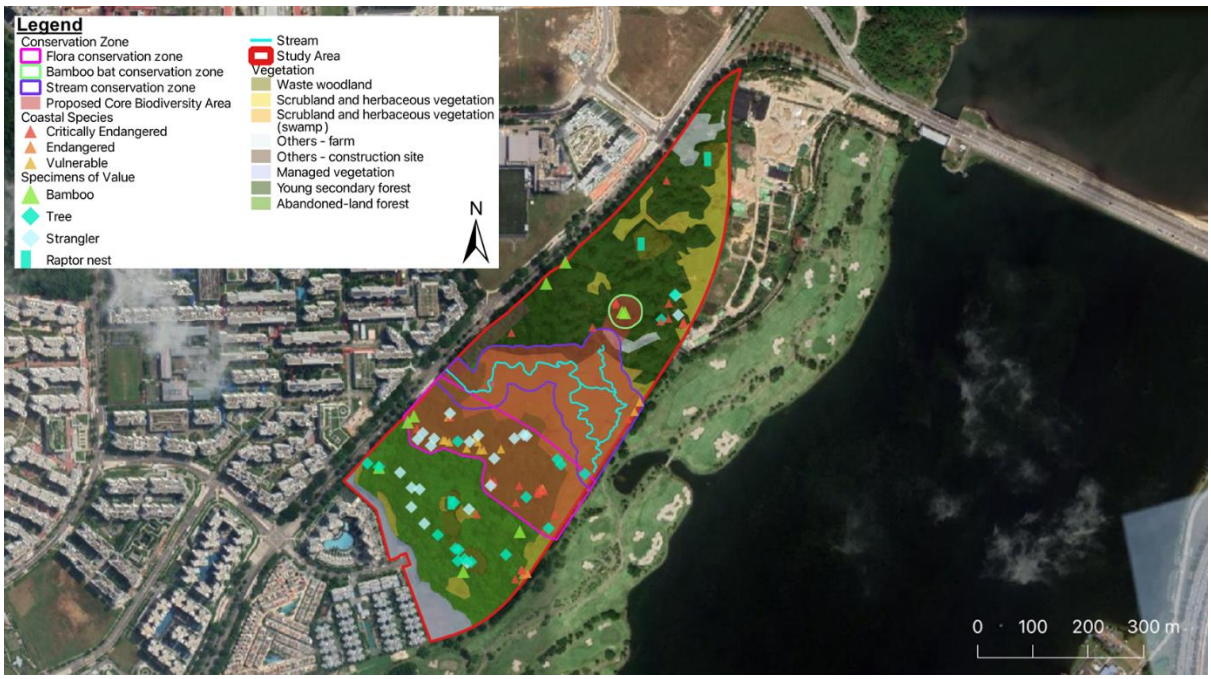

Figure 1-6: Proposed Core Biodiversity Area (highlighted in red)