Specialist Consultancy Services for Environmental Impact Assessment (EIA) at Gillman Barracks

National Parks Board
NParks/F/8/2023

Executive Summary

Introduction

The "Specialist Consultancy Services for Environmental Impact Assessment (EIA) at Gillman Barracks (NParks/F/8/2023) ("hereinafter referred as "the EIA Study") was awarded to Jacobs (under the contracting entity of CH2M Hill Singapore Pte Ltd) by the National Parks Board (NParks) on 26 July 2024. The EIA study would give clarity to future developer(s)/ developing agencies on what needs to be considered during detailed planning and refinement of the development plans for Gillman Barracks area.

The "proposed development" refers to the proposed residential developments with supporting facilities at Gillman Barracks. The proposed development area is bounded by Depot Road, Alexandra Road, Telok Blangah Road/ West Coast Highway and Telok Blangah Street 31. The estimated development area is about 40 ha with its indicative boundary of future development area shown in **Figure ES-1** below. Telok Blangah Hill Park (TBHP) is outside of this indicative boundary of future development area and will not be affected by the proposed development works. The land use zoning within the indicative boundary of future development area is consistent with the URA Master Plan 2025.

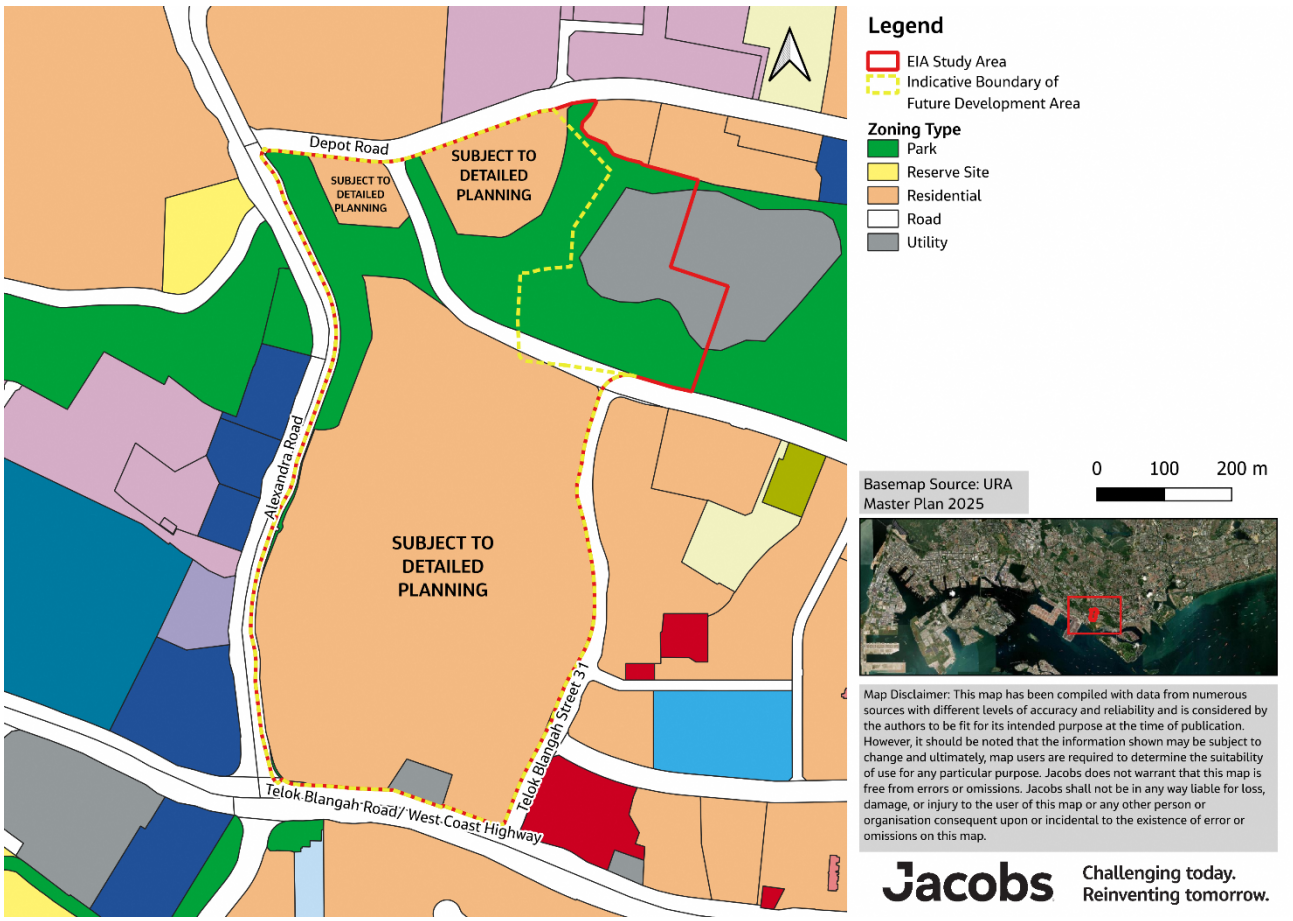


Figure ES-1: EIA Study Area and Indicative Boundary of Future Development Area with URA Master Plan 2025

Environmental Baseline Findings

A baseline study was conducted to establish pre-construction environmental conditions across key aspects, including ecology, geomorphology, hydrology, water quality and ambient noise. These findings provide a reference for assessing potential impacts from the proposed development. A summary of the key results is provided below, with full details in **Sections 4 to 7** of the main EIA Report.

Ecology and Biodiversity

Habitat: The EIA Study Area consists of six terrestrial habitat types and two aquatic habitat types. These include native-dominated secondary forest (9.8%), abandoned-land forest (14.6%), exotic-dominated secondary forest (21.1%), grassland/ scrubland (11.3%), urban vegetation (9.6%), developed land (32.9%); as well as forest stream (0.4%), and concrete drain/ canal (0.2%). The native-dominated secondary forest was assessed as a habitat with high ecological value due to its rarity and high species richness. Abandoned-land forest, exotic-dominated secondary forest and forest stream habitats were assessed to have medium ecological value. The remaining habitats were assessed to be of low ecological value. In addition to supporting a range of flora and fauna species, the habitats at the EIA Study Area also links the surrounding forests of Telok Blangah Hill Park, Labrador Nature Reserve, Berlayar Creek, Kent Ridge Park and Hort Park.

Flora: A total of 293 plant species and species groups from 97 families were recorded in the EIA Study Area, including 156 native (53.0%), 118 exotic (40.5%), 7 cryptogenic (2.4%), 10 unassessed (3.4%) and 2 unidentified species (0.7%). Among the native flora, 22 species (14.1%) are of conservation significance (CS): 2 Critically Endangered species, 7 Endangered and 13 Vulnerable (**Figure ES-2**). Notable CS species include *Ficus sinuata (CR)* and *Antiaris toxicaria (CR)*. In addition, 1,566 trees with girth ≥1 m were mapped and tagged, of which 176 (11.2%) were large specimens with girth or crown spread of at least 3 m.

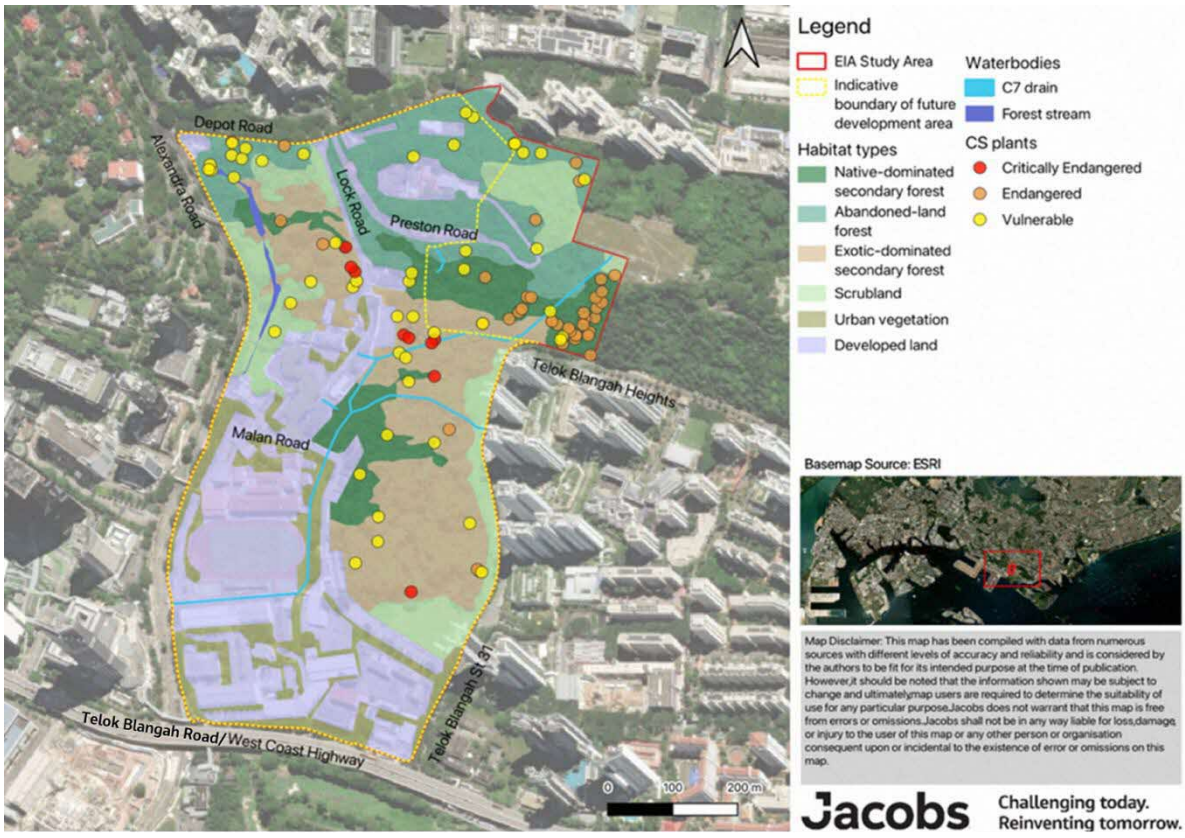


Figure ES-2: Distribution of Flora Species of Conservation Significance

Fauna: A total of 178 faunal species were recorded, including 77 bird, 38 butterfly, 20 aculeate hymenopterans, 12 odonates, 11 reptiles, 9 mammal, 6 amphibian, and 5 fish species. Eleven were of conservation significance (CS species), notably the globally Critically Endangered Straw-headed bulbul (*Pycnonotus zeylanicus*), locally Vulnerable Violet cuckoo (*Chrysococcyx xanthorhynchus*), and the Bamboo bat (*Tylonycteris* sp.). Their distribution is shown in **Figure ES-3**. An additional 72 CS species of probable occurrence were identified, bringing the total number of faunal species of high ecological value to 83 species. No roadkill was recorded along Alexandra Road or Telok Blangah St 31.

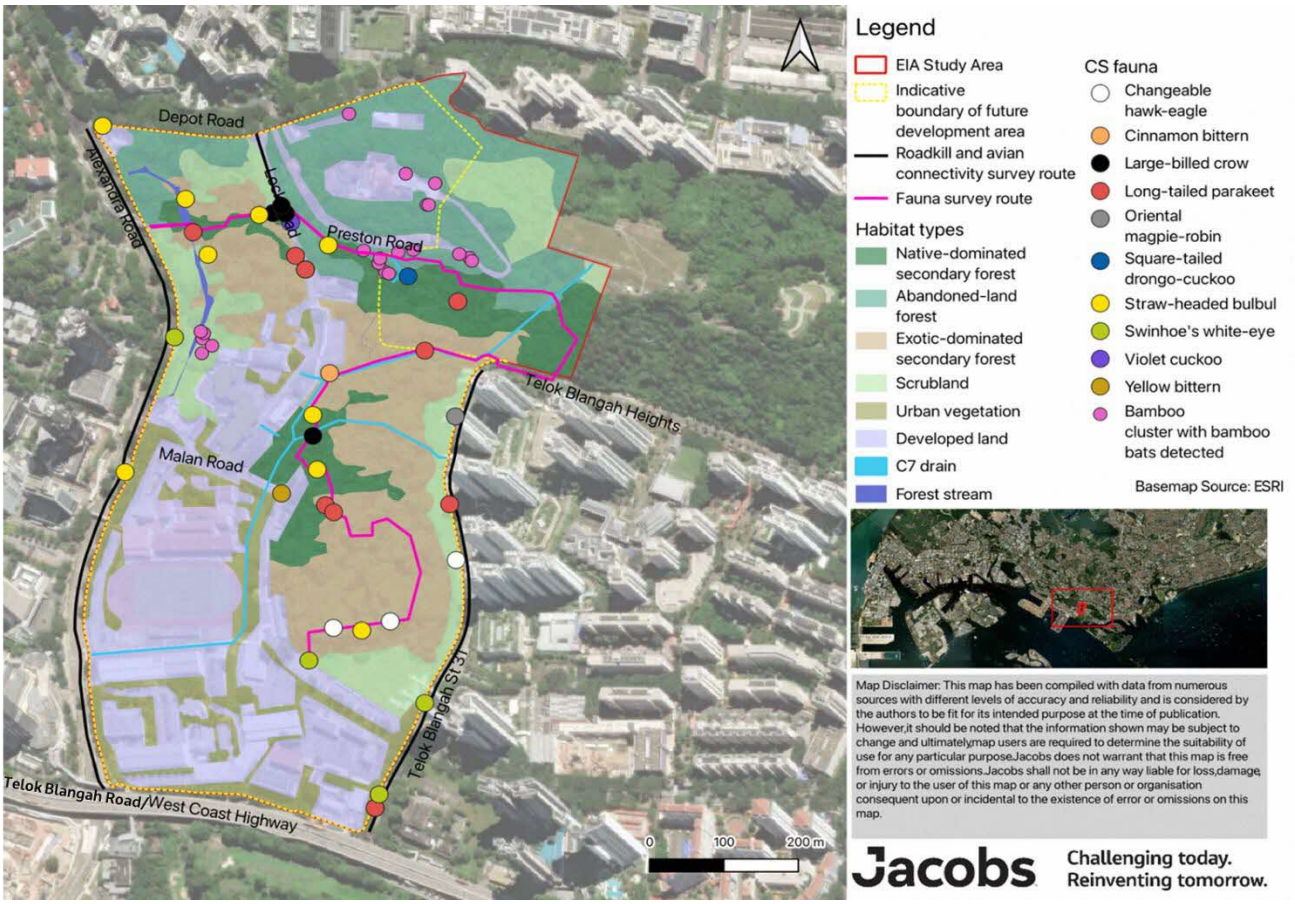


Figure ES-3: Distribution of Faunal Species of Conservation Significance

Geomorphology

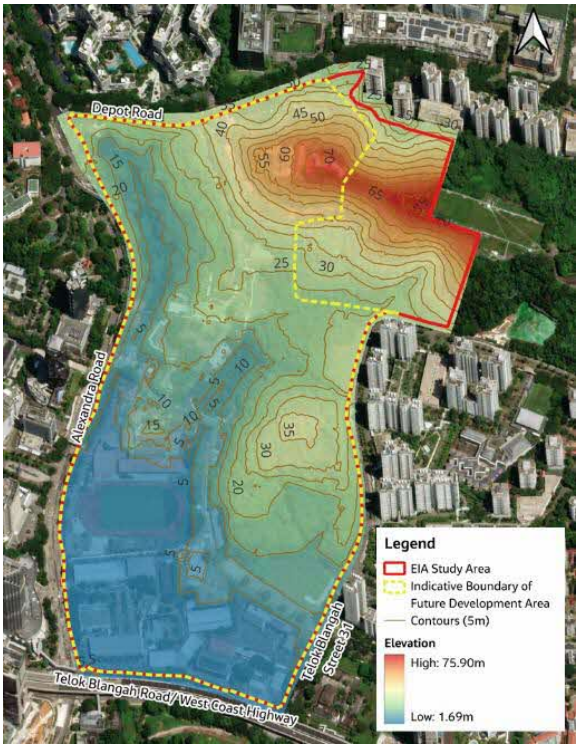


Figure ES-4: Topography of the EIA Study Area

Topography: The EIA Study Area slopes from a high point of about 75.90 m SHD in the northeast to a low of 1.69 m SHD in the southwest.

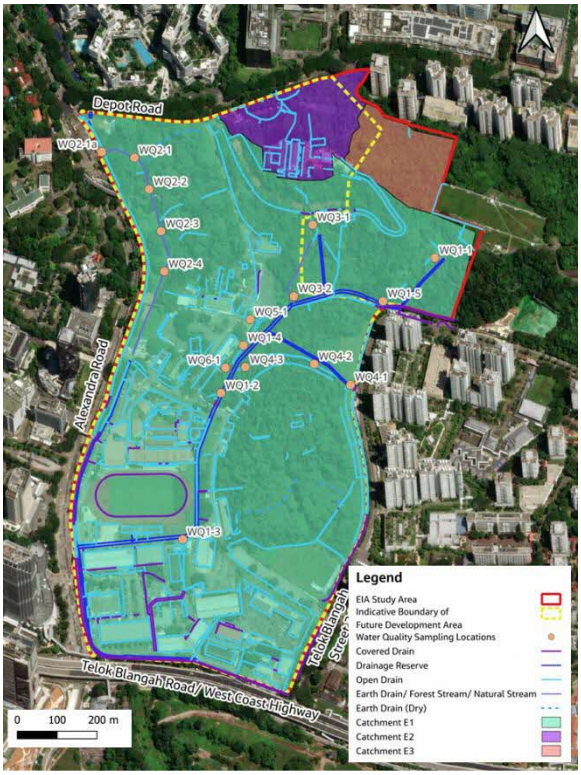
Slope: The EIA Study Area is segmented into zones with slope ranging from flat areas (<2°) to moderately steep (17 – 24°).

Geology: The EIA Study Area contains varied geology, including Boon Lay and Pandan Formations as bedrock, with superficial layers like the Jalan Besar and Rochor Clay Formations.

Soil: The EIA Study Area comprises fill over residual soils and weathered Jurong Formation, with soil depths from 0.5 m to 36 m and highly weathered rock at greater depts. Soil chemistry is slightly acidic to neutral, with low chloride, low sulfate and <1% organic content.

Groundwater: Groundwater was found at depths between 0.30 m and 3.10 m below ground level, with some boreholes recorded with shallow groundwater (<1 m), and others deeper than 2 m.

Hydrology and Water Quality



Hydrology: The EIA Study Area consists of two primary catchments, Pandan and Singapore River, and is divided into three topography-based sub-catchments (E1, E2 and E3). Sub-catchment E1, the largest, covers about 90% of the area in the south and primarily drains toward Berlayar Creek via an outlet along Telok Blangah Road/ West Coast Highway. The northern sub-catchments, E2 and E3, drain instead toward the Singapore River catchment. Overall, runoff and flow accumulation are more pronounced in the south due to variations in elevation and land contours.

Water Quality: Water quality baseline assessment involved sampling six streams, two natural/earth drains (WQ2 and WQ3) and four open drains (WQ1, WQ4, WQ5 and WQ6), across two dry weather and one wet weather events. Several water quality parameters exceeded at least one reference limits in some samples, including pH, dissolved oxygen (DO), biochemical oxygen demand (BOD_5), chemical oxygen demand (COD), total organic carbon (TOC), total alkalinity, nitrate (NO_3-N), ammonia (NH_4-N), phosphate (PO_4-P), total suspended solids (TSS), iron, grease and oil (total), and enterococcus.

Figure ES-5: Catchment Areas and Baseline Water Quality Sampling Locations

Ambient Noise

Baseline ambient noise measurement was conducted within the EIA Study Area and a 150 m buffer to establish existing noise levels for both human and fauna noise sensitive receivers (NSRs) (**Figure ES-6**).

Daytime noise levels at residential and commercial human NSRs (NSR1-NSR6) were generally below National Environment Agency (NEA)'s permissible limits, though short-term evening and night exceedances occurred at several sites due to transient activities.

Fauna NSR (NSR7–NSR10) recorded consistently high noise levels (48.7 – 85.2 dBA), exceeding biological response thresholds across multiple wildlife groups. Daytime levels were highest, driven by traffic and existing fauna activity.

Figure ES-6: Baseline Ambient Noise Measurement Locations

Note: Baseline ambient noise measurement was not conducted at NSR11

Areas of High Ecological Value

Areas of High Ecological Value consists of native-dominated secondary forest and forest stream, which support high species richness, including a concentration of CS flora, large plant specimens including Strangling figs and Bamboo clusters; and stream-dependent fauna such as the nationally Vulnerable Yellow bittern (*Ixobrychus sinensis*) and Cinnamon bittern (*Ixobrychus cinnamomeu)*.

Figure ES-7 shows the extent of the Proposed Retained Area and Area of Habitat Creation. The Proposed Retained Area includes most of the Areas of High Ecological Value; and maintains ecological connectivity through an east–west corridor linking Telok Blangah Hill Park and Hort Park. Within the Area of Habitat Creation, a new 30m-wide green corridor will be established to support fauna movement toward Berlayar Creek, as a compensatory measure. Area of Habitat Creation will focus on establishing a continuous, multilayered native forest structure with edge infill planting, using species found on site and additional bird and butterfly-attracting natives. Further details are provided in **Section 4.5.1.1** of the main EIA Report.

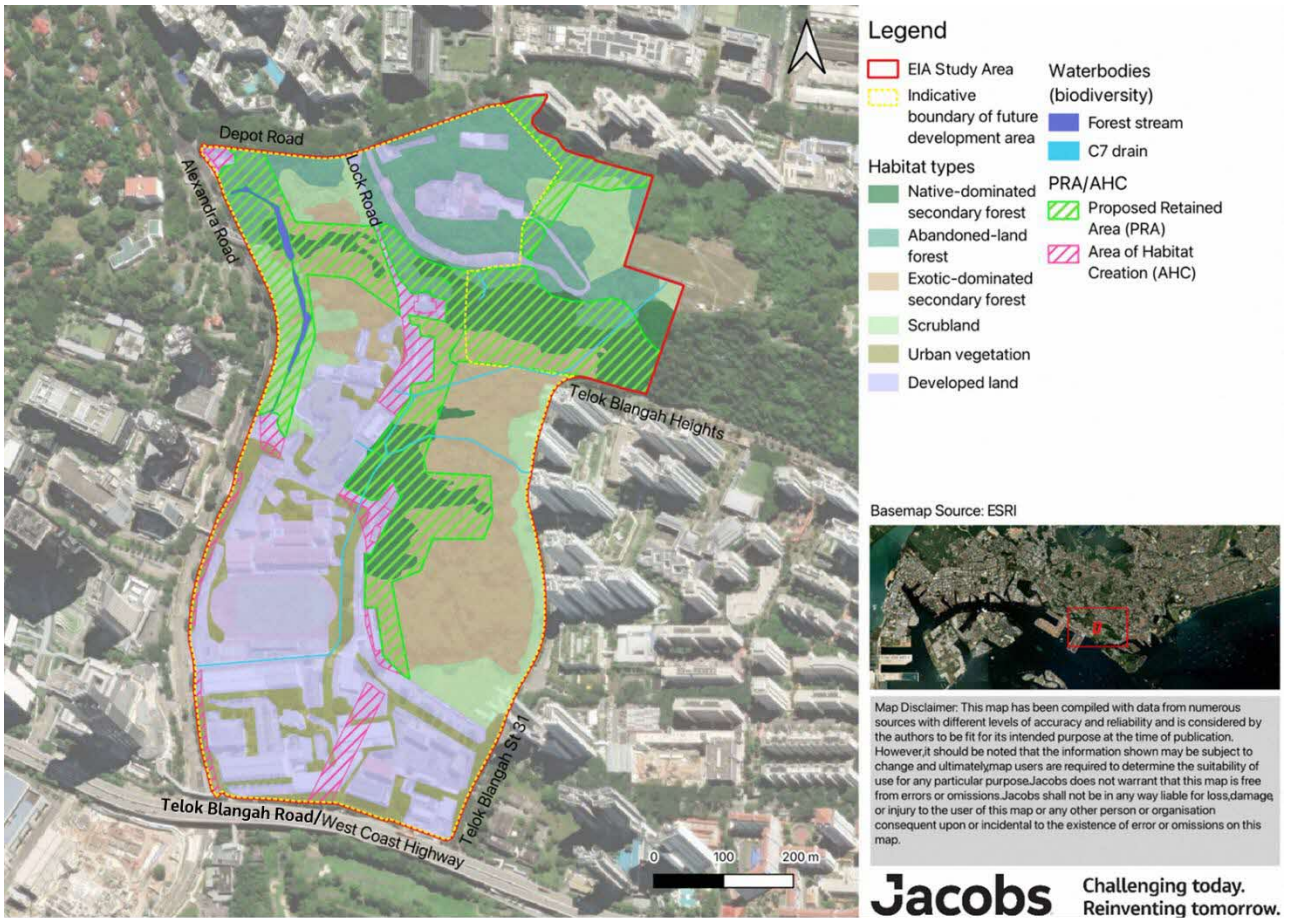


Figure ES-7: Proposed Retained Area and Area of Habitat Creation

Minimum Control Measures

Minimum controls commonly implemented in Singapore for proposed development activities in vegetated areas presented in **Table 4-16 (Biodiversity)**, **Table 5-13 (Sedimentation/ Soil Erosion)**, **Table 6-14 (Water Quality)** and **Section 7.4 (Ambient Noise)** of the main EIA Report are assumed be applied across various stages of the proposed development, i.e., pre-construction, construction and post-construction/ operational phases.

Summary of Impact Assessment

Implementing Singapore's environmental standard practices for minimum controls together with the additional recommended mitigation measures outlined below is expected to reduce the magnitude and duration of potential environmental impacts from the proposed development and guide sensitive planning and construction activities.

Summary of Key Impact Assessment for Habitat, Hydrology, Water Quality and Ambient Noise During Construction and Post-construction/ Operational Phases

Environmental Aspects/ Impact Register	Impact Significance Before Mitigation Measures	Impact Significance After Mitigation Measures (Residual)
Habitat (Construction Phase)		
Loss of Habitat*: Native-dominated secondary forest, Abandoned-land forest, Exotic-dominated secondary forest and Forest stream	**Moderate Negative to Major Negative**	**No Change to Moderate Negative**
Habitat (Post-construction/ Operational Phase)		
Habitat Degradation*: Native-dominated secondary forest	**Moderate Negative**	**Minor Negative**
Changes in Microclimatic Conditions*: Native-dominated secondary forest, Exotic-dominated secondary forest and Forest stream	**Moderate Negative**	**Minor Negative to Moderate Negative**
Introduction of Exotic Species*: Native-dominated secondary forest	**Moderate Negative**	**Moderate Negative**
Key recommended mitigation measures for Habitat: Implementing the Proposed Retained Area and Area of Habitat Creation, conducting regular inspections of adjacent habitats, and enhancing new forest edges through dense landscaping and in-fill planting. Additional measures during the post-construction/ operational phase include installing visitor guideline signage, removing undesirable exotic species, and carrying out ongoing maintenance and habitat enhancement within the Proposed Retained Area. These mitigation measures are expected to minimise habitat impacts as far as practicable, reducing the residual effects to a level ranging from No Change to Moderate Negative. The full list of recommended mitigation measures for habitat is presented in **Section 4.5.1** of the main EIA Report. ***Note:** For brevity, only selected habitat types with pre-mitigation impact significance of Moderate Negative and above are shown. For the full Impact Assessment, please refer to **Section 4.6.1** the main EIA Report, or **Appendix 4I**.		
Flora (Construction Phase)		
Mortality*: *Symplocos adenophylla, Palaquium obovatum, Pittosporum cf. ridleyi, Antiaris toxicaria, Ficus sinuata, Ficus apiocarpa, Geophila herbacea, Sandoricum koetjape, Cissus repens, Horsfieldia polyspherula, Archidendron jiringa, Ficus vasculosa, Endospermum peltatum, Goniophlebium percussum,* and *Macaranga griffithiana*	**Moderate Negative to Minor Negative**	**No change to Major Negative; Not Applicable (N.A.) (salvaged)**
Flora Decline in Plant Health and Survival*: *Litsea cf. castanea, Palaquium obovatum, Geophila herbacea, Endospermum peltatum, Litsea umbrellata, Olea brachiata, Archidendron contortum, Macaranga griffithiana, Ficus sinuata, Archidendron jiringa, Ficus vasculosa, Horsfieldia polyspherula,* and *Pittosporum cf. ridleyi*	**No Change to Moderate Negative; N.A (salvaged)**	**No Change to Moderate Negative**

Environmental Aspects/ Impact Register	Impact Significance Before Mitigation Measures	Impact Significance After Mitigation Measures (Residual)
Fauna (Construction Phase)*		
Loss of/ reduction in habitats and food sources	**Moderate Negative to Major Negative**	**No Change to Major Negative**
Loss/reduction of ecological connectivity for fauna movement	**No Change to Moderate Negative**	**No Change to Moderate Negative**
Accidental injury or mortality	**No Change to Major Negative**	**No Change to Moderate Negative**
Light disturbance	**Minor Negative to Moderate Negative**	**Minor Negative**
Human-wildlife conflict	**No Change to Moderate Negative**	**No Change to Minor Negative**
Fauna (Post-construction/ Operational Phase)*		
Loss of/ reduction in ecological connectivity for faunal movement	**No Change to Moderate Negative**	**No Change to Moderate Negative**
Light disturbance	**Minor Negative to Moderate Negative**	**Minor Negative**
Accidental injury or mortality	**No Change to Moderate Negative**	**No Change to Minor Negative**
Poaching	**No Change to Moderate Negative**	**No Change to Minor Negative**
Human-wildlife conflict	**No Change to Moderate Negative**	**No Change to Minor Negative**
Key recommended mitigation measures for Flora and Fauna: Implementing the Proposed Retained Area and Area of Habitat Creation, transplanting or salvaging flora of conservation significance, and conducting regular site inspections to verify contractor compliance with the Environmental Management and Monitoring Plan (EMMP). Additional measures for Fauna during the Post-construction/ Operational Phase include Incorporating bird-friendly building design, installing visitor guideline signage, and restricting access to the retained forest at night (1900h–0700h). Details are available in **Section 4.5** of the main EIA Report. ***Note:** For brevity, only selected impacts and receptors with pre-mitigation impact significance of Moderate Negative and above are shown. For the full Impact Assessment, please refer to **Sections 4.6.2** and **4.6.3** the main EIA Report, or **Appendix 4J** and **4K**.		
Hydrology (Post-construction/ Operational Phase)		
Change in runoff peak flow	**Major Negative**	**Minor Negative**
Key recommended mitigation measures for Hydrology: Optimising the drainage system to increase storage capacity and maintain runoff within Public Utilities Board (PUB)-acceptable limits, incorporating Active, Beautiful and Clean (ABC) water features and permeable surfaces to enhance infiltration, and implementing construction-phase controls through staged land clearing and minimised ground disturbance. These mitigation measures are expected to minimise the impact to peak flow runoff, reducing the impact to Minor Negative. The full list of recommended mitigation measures for hydrology is presented in **Section 6.6.1** of the main EIA Report.		

Environmental Aspects/ Impact Register	Impact Significance Before Mitigation Measures	Impact Significance After Mitigation Measures (Residual)
Water Quality (Construction Phase)		
Degradation of water quality from surface runoff	**Moderate Negative**	**Minor Negative**
Degradation of water quality from diesel, oil, and other pollutive substances, trade effluent and sewage effluent	**Moderate Negative**	**Slight Negative**
Key recommended mitigation measures for Water Quality: Focus on reducing erosion and sediment generation, capturing and treating sediment-laden runoff before discharge, properly managing and treating trade effluent on-site, and ensuring safe storage, handling, and disposal of pollutive or hazardous substances to prevent accidental leaks. These mitigation measures are expected to minimise the impact on water quality by reducing the impact to Slight Negative/ Minor Negative. The full list of recommended mitigation measures for water quality is presented in **Section 6.6.2** of the main EIA Report.		
Noise (L_{Aeq} 12 hours) – Scenario 1: Demolition Works (Construction Phase)		
Noise emission from construction site to NSR7, NSR8, NSR9 and NSR10	**Moderate Negative**	**Slight Negative to Minor Negative**
Noise (L_{Aeq} 12 hours) – Scenario 2: Pre-construction Works (Construction Phase)		
Noise emission from construction site to NSR7, NSR8, NSR9 and NSR10	**Moderate Negative**	**Slight Negative to Minor Negative**
Noise (L_{Aeq} 12 hours) – Scenario 3: Infrastructure Works (Construction Phase)		
Noise emission from construction site to NSR4, NSR5, NSR7, NSR8, NSR9 and NSR10	**Moderate Negative**	**Slight Negative to Minor Negative**
Noise (L_{Aeq} 12 hours) – Scenario 4: Building Works (Construction Phase)		
Noise emission from construction site to NSR4, NSR5, NSR7, NSR8, NSR9 and NSR10	**Moderate Negative**	**Slight Negative to Minor Negative**
Key recommended mitigation measures for Noise: Key source-control measures include enclosing Powered Mechanical Equipment (PMEs), using noise screens or portable barriers, and adopting quieter construction methods where possible. Installation of noise barriers for specific construction phase at recommended locations presented in **Figure 7-3**, **Figure 7-4** and **Figure 7-5** of **Section 7.5.4** of the main EIA Report. These mitigation measures are expected to minimise the noise impact to the receivers, reducing the impact to Minor/ Slight Negative. The full list of recommended mitigation measures for noise is presented in **Section 7.5** of the main EIA Report.		

Engagement with Nature Groups

A Nature Group engagement session was held on 10 September 2025, during which the baseline findings of the EIA Study were presented. Recommended mitigation measures were discussed, including the extent and configuration of the Proposed Retained Area and Area of Habitat Creation. Key feedback from the engagement was incorporated into the mitigation strategy (refer to **Section 4.5** of the main EIA Report).

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