



# Environmental Management and Monitoring Plan (EMMP)

*Overall - HDB Central Development*

Submitted to:

**Housing and Development Board (HDB)**

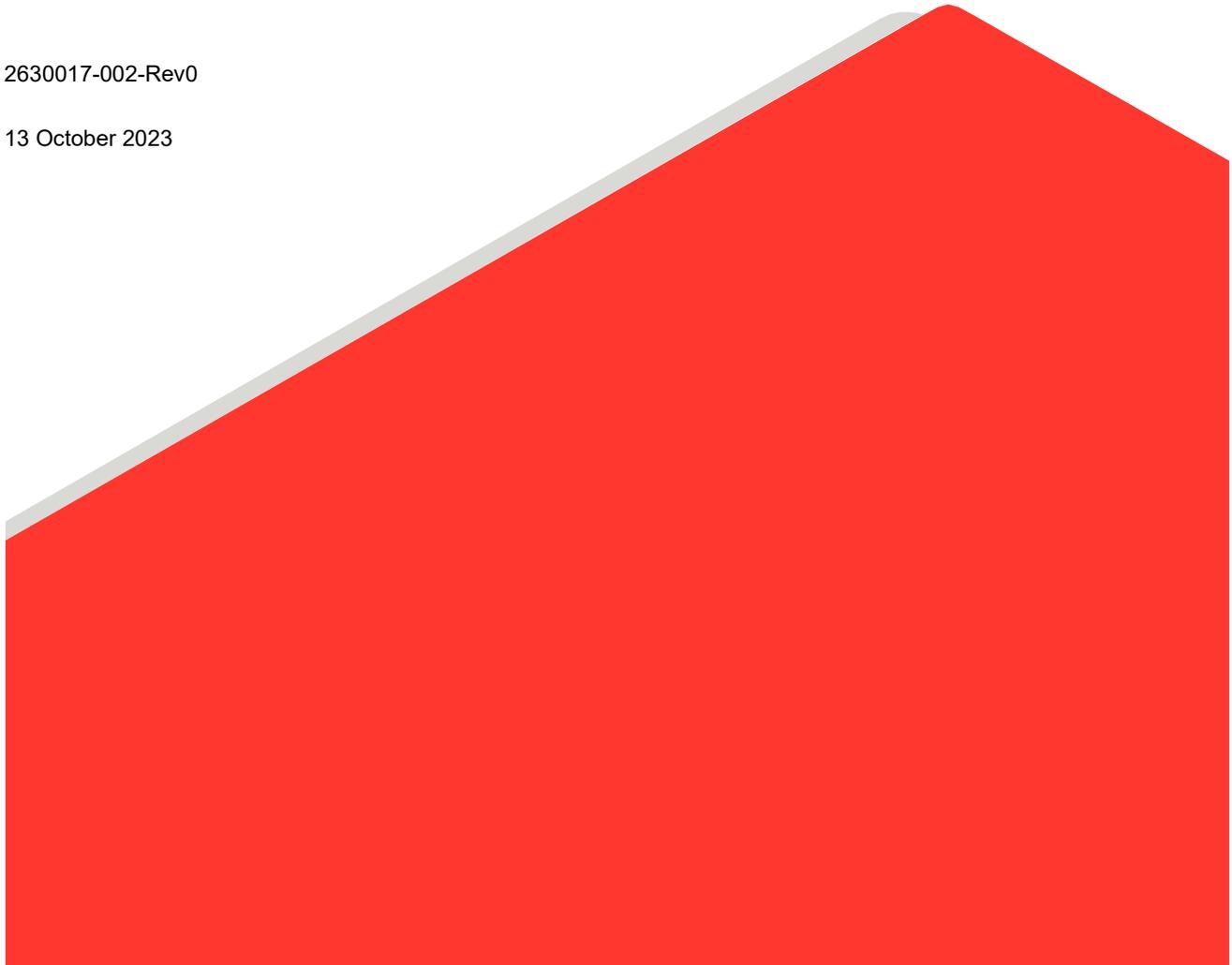
Submitted by:

**WSP Consultancy Pte. Ltd.**

300 Beach Road #05-00 Singapore 199555

2630017-002-Rev0

13 October 2023



## Distribution List

1 Electronic Copy - HDB

1 Electronic Copy - NParks

1 Electronic Copy - WSP

## Record of Issue

Version	Date Submitted	Prepared by	Approved by	Record of changes	Distribution list
0	13 October 2023	Joys Tan Mitesh Kumar Farzeen Khundkar Ng Ying Xuan	Benica Pasaporte	Incorporating comments from HDB and NParks on RevH received 12 October 2023	HDB

# DEFINITIONS

## Units of Measurement

bgs	Below ground surface
dB(A)	A-weighted decibels
ha	Hectare
m	Metre
m <sup>2</sup>	Square metre
m <sup>3</sup>	Cubic metre
mm	Millimetre
cm	Centimetre
km	Kilometre
km/hr	Kilometre per hour
mL	Millilitre
s	Second
mins	Minutes
Leq/ LAeq	Equivalent continuous noise level
PM <sub>2.5</sub>	Particulate matter with diameter ≤ 2.5 micrometres
PM <sub>10</sub>	Particulate matter with diameter ≤ 10 micrometres
ppv	Peak particle velocity

## Acronyms and Abbreviations

ACMV	Air-Conditioning and Mechanical Ventilation
ANZGMV	Australian and New Zealand Guidelines for Fresh and Marine Water Quality
APCP	Air Pollution Control Plan
ASR	Air Sensitive Receptors
BH	Borehole
BIA	Biodiversity Impact Assessment
BOD	Biochemical Oxygen Demand
Bti	Bacillus thuringiensis israelensis
CCNR	Central Catchment Nature Reserve
CCTV	Closed-circuit Television
COP	Code of Practice
COPPC	Code of Practice for Pollution Control
CPG	CPG Consultants Pte. Ltd.
DA	Developing Agency
DIV	Dutch Intervention Value

DO	Dissolved Oxygen
ECP	Erosion Control Plan
ECM	Earth Control Measure
ECO	Environmental Control Officer
EIS	Environmental Impact Study
EMMP	Environmental Management and Monitoring Plan
EPHA	Environmental Public Health Protection Act
EPMA	Environmental Protection and Management Act
ERSS	Earth Retaining Stabilisation Structures
ERP	Emergency Response Plan
ERT	Emergency Response Team
GPS	Global Positioning System
GWP	Global Warming Potential
HDB	Housing and Development Board
HTX	Home Team Science & Technology Agency
IUCN	International Union for the Conservation of Nature
JTC	Jurong Town Corporation
LTA	Land Transport Authority
LOR	Limits of Reporting
LR	Landscape Resource
MEP	Mechanical/ Electrical/ Plumbing
MHA	Ministry of Home Affairs
MRT	Mass Rapid Transit
MSL	Mean Sea Level
MW	Monitoring Well
NEA	National Environmental Agency
NParks	National Parks Board
NSC	North South Corridor
NSR	Noise Sensitive Receptors
OPA	Old Police Academy
PAH	Polycyclic Aromatic Hydrocarbons
PID	Photo-Ionisation Detector
PIE	Pan Island Expressway
PRO	Public Relations Officer
PSI	Pollution Standard Index
PUB	Public Utilities Board
QECP	Qualified Erosion Control Professional

RBS	Rapid Baseline Survey
RTO	Resident Technical Officer
SCDF	Singapore Civil Defence Force
SIDS	Silt Imagery Detection System
Site	Overall EMMP Boundary
SO Rep	Superintending Officer's Representative - CPG's Qualified Person (QP)
SOP	Standard Operating Procedure
SRDB	Singapore Red Data Book
SS	Singapore Standard
Study Area	EIS Study Area
SWL	Static Water Level
TA	Technical Agencies
TDS	Total Dissolved Solids
TEL	Thomson-East Coast MRT Line
TIW	Toxic Industrial Waste
TOC	Total Organic Carbon
TN	Total Nitrogen
TP	Total Phosphorous
TPH	Total Petroleum Hydrocarbons
TPZ	Tree Protection Zone
TSS	Total Suspended Solids
VCO	Vector Control Operator
VCT	Vector Control Technician
VCW	Vector Control Worker
VOC	Volatile Organic Compound
WMC	Wildlife Management Contractor
WMP	Wildlife Management Plan
WRC	Whitley Road Complex

# Table of Contents

<b>1.0 INTRODUCTION .....</b>	<b>10</b>
1.1 Objective .....	10
1.2 Assumptions and Limitations .....	11
1.3 Document Structure .....	11
<b>2.0 PROJECT OVERVIEW .....</b>	<b>12</b>
2.1 Site Activities .....	13
2.1.1 Pre-construction Activities .....	13
2.1.2 Site Clearance and Earthworks .....	14
2.1.3 Establishment of Temporary Worksites .....	16
2.1.4 Building Construction .....	16
<b>3.0 SUMMARY OF RAPID BASELINE SURVEY.....</b>	<b>17</b>
3.1 Flora Findings .....	17
3.2 Fauna Findings .....	18
3.3 Water Quality .....	23
<b>4.0 APPLICABLE LEGISLATION AND STANDARDS.....</b>	<b>24</b>
<b>5.0 EMMP ORGANISATION.....</b>	<b>26</b>
5.1 Organisational Chart .....	26
5.2 Roles and Responsibilities .....	27
5.3 Training and Awareness .....	30
5.3.1 General EMMP Training .....	30
5.3.2 Biodiversity Awareness.....	30
5.3.3 Waste Management.....	30
5.3.4 Vector Control.....	30
<b>6.0 ENVIRONMENTAL MANAGEMENT AND MONITORING PLANS .....</b>	<b>31</b>
6.1 Flora and Fauna Management Plan .....	31
6.1.1 Pre-construction Mitigating Measures .....	31
6.1.2 Construction Mitigating Measures .....	35
6.2 Water Quality Management Plan .....	44
6.2.1 Construction.....	45

6.2.2	Monitoring Requirements.....	48
6.3	Air Quality Management Plan .....	48
6.3.1	Construction.....	50
6.3.2	Air Monitoring.....	51
6.4	Airborne Noise Management Plan .....	52
6.5	Ground-borne Vibration Management Plan .....	54
6.5.1	Vibration Monitoring Requirements .....	54
6.6	Vector Control Management Plan.....	55
6.6.1	Vector Control Monitoring Requirements.....	56
6.7	Waste Management Plan.....	56
6.7.1	Waste Monitoring Requirements .....	58
<b>7.0</b>	<b>ENVIRONMENTAL IMPACT, MITIGATION AND MONITORING REGISTER .....</b>	<b>59</b>
<b>8.0</b>	<b>EMERGENCY RESPONSE PLAN (ERP).....</b>	<b>67</b>
8.1	Emergency Response Organisation .....	67
8.2	Wildlife and Roadkill Response Plan .....	68
8.3	Other Emergencies .....	71
<b>9.0</b>	<b>REPORTING AND REVIEW .....</b>	<b>71</b>
<b>10.0</b>	<b>CONCLUSION.....</b>	<b>72</b>

## TABLES

Table 1:	List of applicable Singapore legislation, regulations, and guidelines .....	24
Table 2:	Recommended Water Quality Management Plan .....	45
Table 3:	Recommended Monitoring Program (Water Quality) .....	48
Table 4:	Recommended Monitoring Program (Air Quality) .....	51
Table 5:	Recommended Monitoring Program (Airborne Noise) .....	53
Table 6:	Recommended Vector Control Monitoring .....	56
Table 7:	Recommended Waste-related Monitoring .....	58
Table 8:	Summary of Environmental Mitigation, Management and Monitoring.....	59
Table 9:	Summary of responsible parties for environmental incidents.....	68

## FIGURES

Figure 1: Map showing the EIS Study Area, the Overall EMMP and Contract 1 and 2 boundaries. ....	12
Figure 2: Site's Conceptual Development Plan .....	13
Figure 3: Stream 1 within the Overall EMMP boundary .....	16
Figure 4: Vegetation map and distribution of plant species of conservation significance within 10-m of the Overall EMMP Boundary .....	18
Figure 5: Location of faunal species of conservation significance from rapid baseline surveys, including camera trapping .....	19
Figure 6: Location of odonate species of conservation significance .....	20
Figure 7: Location of collared threadtail ( <i>Prodasineura collaris</i> ) records from rapid baseline study and EIS....	21
Figure 8: Location of mammalian species of conservation significance .....	22
Figure 9: Number of independent detections of the Eurasian wild boar ( <i>Sus scrofa</i> ) detected by camera traps, and incidental records, with maximum number of individuals observed per independent detection or record. ....	23
Figure 10: Locations of water quality samples .....	24
Figure 11: EMMP Organisational Chart.....	27
Figure 12: Hoarding plan for Contract 1 .....	32
Figure 13: Diagram of wildlife exit point.....	35
Figure 14: Direction of Site clearance – Contract 1 .....	38
Figure 15: Indicative direction of Site clearance – Contract 2 .....	39
Figure 16: Pre-felling fauna inspection conducted by Ecologist to identify active nests, the presence of fauna. ....	40
Figure 17: Pre-felling fauna inspection protocol .....	41
Figure 18: Fauna inspections every two weeks to ensure the integrity of hoarding, and that no fauna entrapments exist on site (e.g., ECM sedimentation ponds, erosion control blankets, tree protection zones, and biodiversity awareness training for site personnel.....	43
Figure 20: Proposed EMMP Air Monitoring Locations .....	51
Figure 21: Proposed EMMP Noise Monitoring Locations.....	54
Figure 22: Proposed EMMP Vibration Monitoring Location .....	55
Figure 23: General Emergency Response Flowchart .....	67
Figure 24: Wildlife Response Plan flowchart (Note that approved WMC needs to be engaged by the Contractor).....	70

**APPENDICES**

**APPENDIX A**

Contractor Management Plans

**APPENDIX B**

List of Recorded Flora Species of Conservation Significance

**APPENDIX C**

List of Recorded Faunal Species, including Species of Conservation Significance

**APPENDIX D**

Faunal Survey Data

**APPENDIX E**

Camera Trap Data

**APPENDIX F**

Guidelines for Tree Protection Zones

**APPENDIX G**

Guidelines for Sapling Harvesting, Tree Transplantation and Tree Maintenance

**APPENDIX H**

Lighting Management Plan

**APPENDIX I**

Wildlife Incident Form

**APPENDIX J**

References

## 1.0 INTRODUCTION

This document provides information about the Environmental Management and Monitoring Plan (EMMP) that is to be implemented for future works at the Housing and Development Board (HDB) development at Toa Payoh West (“HDB Central”/“Site”). The future works are composed of two contracts, Contracts 1 and 2 (“Overall EMMP boundary”). This EMMP has been prepared primarily for Contract 1, while Contract 2 information provided is general and will be updated prior to commencement of any Contract 2 works.

The proposed works include, but are not limited to, civil engineering works such as site clearance, earthworks, road construction, 3-cell box culvert construction, drainage, sewerage works and common services ducts, as well as building works such as foundation, utilities/services laying and superstructure construction.

This EMMP is considered a live document and shall be reviewed regularly and updated with site-specific information and activities. The EMMP details how the recommended mitigation measures prepared as part of the gazetted Environmental Impact Study (EIS) in November 2021 (AECOM, 2021) are to be implemented and specifies recommended monitoring measures to assess the effectiveness of the mitigation measures.

### 1.1 Objective

The EMMP is a systematic approach to mitigate environmental impacts and monitor the implementation of these mitigation measures to ensure that project implementation will not cause any significant adverse impact to the site and the surrounding environment. It is also a useful tool to assess whether the mitigation measures taken are effective to reduce or mitigate the potential impacts caused by this project to minimal and acceptable levels during the construction. The overall objective of the EMMP is to implement mitigation measures based on the significant impacts identified in the EIS for the Site. The specific objectives of this EMMP are to:

- Include implementation procedures, mitigating and/or compensation measures and actions, wildlife shepherding plan/procedures, management plan and monitoring requirements.
- Include a wild boar removal operation plan for wild boars sighted within the Overall EMMP boundary, which may include (but are not limited to) ensuring that the Contractor installs full hoardings before site clearance and engages a wild boar removal contractor to manage the wild boars on site.
- Define a procedure to minimize and control dust, noise, exhaust emissions, fumes, etc. generated at the construction site, and tolerable limits.
- Outline water pollution, construction waste management control and mitigation plans.
- Prepare a list of mitigation measures that shall be developed for all stages of project implementation, such as during pre-construction and construction stages.
- Identify indicators, precautions, construction methods, contingency plans, and provide actions and response time to be undertaken to achieve these.

All contractors and subcontractors shall comply with applicable EMMP requirements. A robust audit programme is required to ensure that this is carried out.

The EMMP shall be submitted and approved by relevant authorities prior to the start of any site clearance, earthworks and infrastructure activities. The EMMP shall include environmental monitoring, which will be conducted by the Contractor. It comprises of compliance inspections for prescribed mitigation measures and ambient environmental data collection, generally requiring sample collection and analysis. Monthly environmental monitoring reports with all monitoring results (compliance and ambient monitoring), identified issues and additional actions taken to mitigate these issues will be prepared and submitted to the relevant

authorities during this phase. Each subsequent monthly monitoring report should reflect on successful or failed follow-up actions until a problem has been effectively mitigated.

## 1.2 Assumptions and Limitations

The mitigating and monitoring measures in this EMMP are based on findings of the EIS that was completed in 2021, and a Rapid Baseline Survey (RBS) (WSP Golder, 2023) that was carried out at the Site in April 2023.

The EMMP relies in whole, or in part, on data and information provided in the EIS, by HDB, by CPG Consultants Pte. Ltd. (“CPG”) (as Superintending Officer Representative (SO Rep), and in coordination with Chuan Lim Construction Pte. Ltd. (“Chuan Lim”), the appointed Main Contractor for Contract 1. These are assumed to be accurate, complete, and reliable at the time of writing. Should the activities differ from the assumptions or should the Contractor make alterations to these assumptions and approaches, the EMMP may need to be updated and NParks will need to review and re-approve the EMMP.

## 1.3 Document Structure

The EMMP is structured as follows:

- Section 1: Introduction to the EMMP -provides the scope, objectives, assumptions and structure.
- Section 2: Project overview including a description of Site activities covered by the EMMP.
- Section 3: Summary of RBS
- Section 4: Applicable Legislation and Standards
- Section 5: EMMP Roles and Responsibilities provides a typical organisational chart of key personnel, as well as key training requirements.
- Section 6: Environmental Management and Monitoring Plans for biodiversity, surface water quality, groundwater, air quality, airborne noise, vibration, vector control and waste management
- Section 7: Environmental Impact, Mitigation and Monitoring Register
- Section 8: Emergency Response Plan provides emergency contacts for environmental incidents, response plans for wildlife, drainage, surface and groundwater, air quality, airborne noise and vibration and fire.
- Section 9: Reporting and Review regular review of the EMMP and reports to be submitted as part of the EMMP monitoring every two weeks.
- Section 10: Conclusion

## 2.0 PROJECT OVERVIEW

The Overall EMMP boundary occupies an area of about 33 hectares (ha) (Figure 1) and comprises two sequential contracts, Contract 1 and Contract 2. Presently, only the boundary of Contract 1 is finalised as the contract will be implemented first. Contract 1 is about 13 ha with an estimated duration of 36 months. Contract 1 activities are expected to include earthworks and site clearance, and infrastructure works for future roads, drainages, sewers, service laying and road-related facilities. This is expected to be followed by detailed soil investigation for building construction of future residential blocks. The rest of the EMMP boundary which is not part of Contract 1 is included as part of Contract 2.

An EIS was completed in 2021, and the EIS Study Area (“Study Area”) is located south of the Central Catchment Nature Reserve (CCNR), and bounded by Mount Pleasant Road in the north, Thomson Road in the east, Pan Island Expressway (PIE) in the south, and Bukit Brown Woods in the west (Figure 1). The Overall EMMP boundary is located in the eastern portion of the EIS Study Area (Figure 1) and is bounded by Mount Pleasant Road in the north, Thomson Road in the east, PIE in the south and Kopi Sua Cemetery in the west.

Most of the EIS Study Area lies within developed areas, with part of it overlapping secondary forest (Bukit Brown Woods) and a stream in the west. At the time of the EIS, it was a mix of wooded cemetery land, forested area, institutional recreational spaces and facilities, and the Mount Pleasant Mass Rapid Transit (MRT) and North South Corridor (NSC) construction areas. Given its close proximity and connection to Bukit Brown Woods and CCNR, the Study Area was identified as ecologically sensitive.

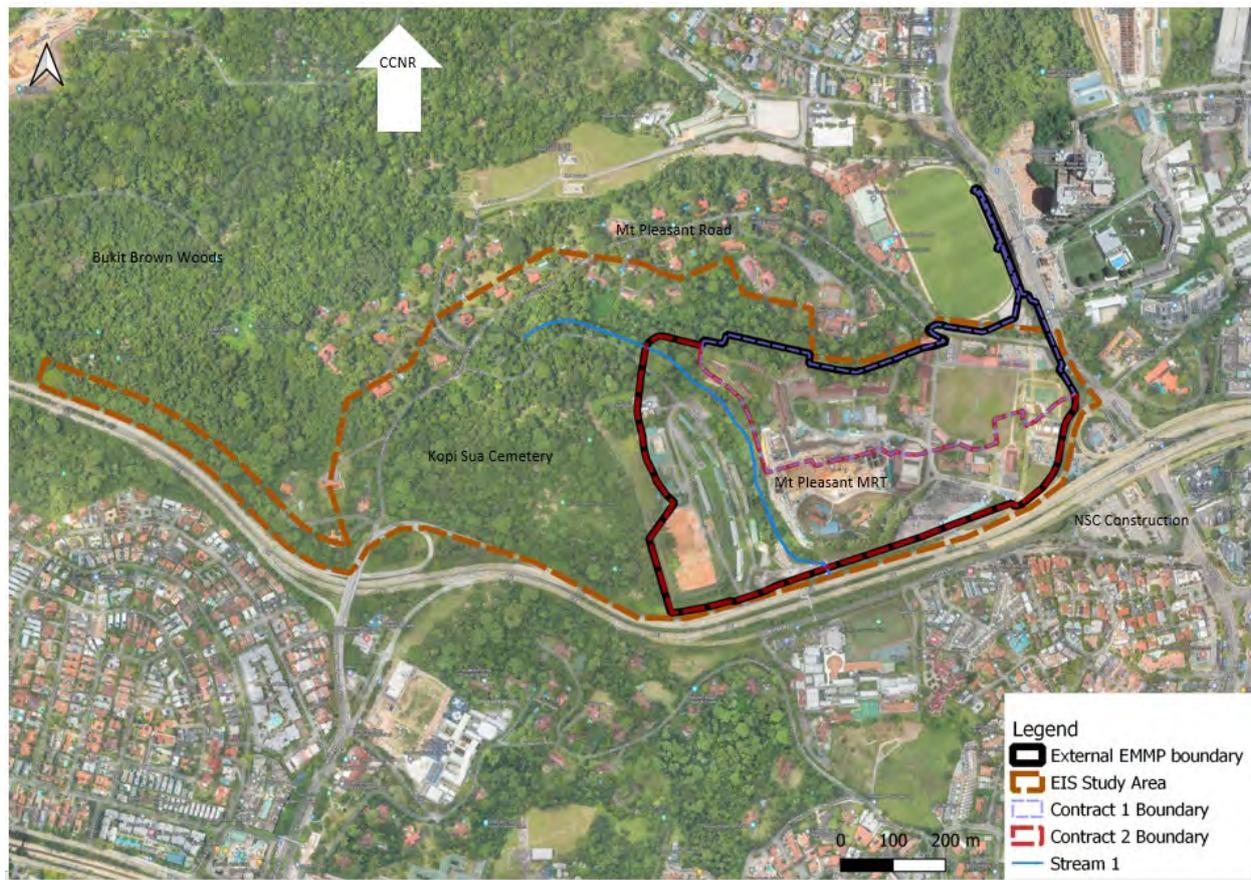


Figure 1: Map showing the EIS Study Area, the Overall EMMP and Contract 1 and 2 boundaries

The new Mount Pleasant MRT station at the Thomson-East Coast MRT Line (TEL) is running through the EMMP boundary in the east-west direction. The construction for the MRT station is complete and it will open along with the completion of the housing estate. HDB Central's conceptual development plan with the indicative boundary of the housing estate is shown in Figure 2. The residential area will be supported by a commercial and social node integrated with the Mount Pleasant TEL station as part of the supporting infrastructure and amenities for the housing development. This includes the recommended indicative road alignment linking to PIE via Onraet Road to minimise potential environmental impacts.



**Figure 2: Site's Conceptual Development Plan**

## 2.1 Site Activities

As existing terrain at the Site is vegetated and undulating, the proposed public housing development would entail civil works such as site clearance (removal of existing trees and vegetation), earthworks cutting/filling to achieve desired platform levels required for the proposed development; construction of roads and drains, sewer works, building works, and utilities/services laying, among others. In general, above-ground project construction works will require an area for site offices, equipment and material storage, and worker's rest areas. The areas designated for these components will also support the construction of the underground components of the Site development. The infrastructure works at the Site are expected from the 4<sup>th</sup> quarter of 2023. These construction works may potentially impact the air quality, noise quality, biodiversity, surface water and groundwater aspects of the environment as assessed in the EIS. The construction phases and activities are described in the following sub-sections.

### 2.1.1 Pre-construction Activities

Pre-construction activities includes road and utility diversion, site clearance, including tree felling, construction of temporary roads and setting up of barriers around cut and cover and laydown areas. Sections of existing

roads, which will be affected by the construction especially for the new road construction, will be either temporarily diverted or access will be restricted to certain parts of the road.

A perimeter road at the northern part of the project boundary will be constructed, with an entry road connecting to Mount Pleasant Road at the north, the existing Onraet Road off PIE from the south-west and Thomson Road from the east. The location of the access road is aligned with the future vehicular road crossing the project area. The existing Denham Road running north to south of the project boundary is anticipated to be closed and a new road running from north to south will be constructed. The road network is anticipated to be constructed in line with the phased handover schedule.

Drainage will also be constructed and utilities which are shallow and likely to cause impedance to cut and cover works will be diverted first, so that there is no disruption in usage of utilities to nearby receptors. Depending on the utility to be diverted, it may involve tree felling, excavation, access road construction and concrete resurfacing works. All road and utility diversion plans are to be submitted for approval by relevant authorities.

Land clearance and tree felling for road works may cause potential noise and dust emissions to nearby human and ecologically sensitive receptors, as well as potential water quality impact to the stream or drains.

### **2.1.2 Site Clearance and Earthworks**

Clearance of trees and vegetation, earthworks, and levelling at the laydown areas and access roads will be required. This will involve large machineries such as excavator, grader, concrete truck, roller, and concrete vibrator, among others. The Contractor's Qualified Erosion Control Professional (QECP) has submitted an Erosion Control Plan (ECP) and approval shall be obtained from the Public Utilities Board (PUB) prior to the start of site clearance and earthworks.

The Contractor shall also map the trees on site and the trees planned to be felled, obtain NParks approval and adhere to a Tree Felling Plan. Regarding fauna, the Contractor is required to follow the specific directions stated in this EMMP with regard to managing wildlife onsite. The following may be required:

- Full and continuous hoarding along the project boundary line to demarcate the project worksite and to control access before starting any works.
- Progressive hoarding with wildlife exits should be implemented to remove any fauna from the site during directional clearance before completely closing the hoarding along the project boundary. The hoarding will be in accordance with the phased handover of the site.
- Directional clearance of the site.
- If wild boars are present within the site hoarding, the contractor shall inform NParks Wildlife Management and shall engage an approved Wildlife Management Contractor (WMC) to prepare and execute a plan for their removal and remove the wild boar safely from the worksite.
- Where trees are recommended to be retained, the contractor should employ a Certified Arborist to map the trees carefully when applying for tree felling approval, to gauge the health, species, size and conservation significance of the tree and the appropriate Tree Protection Zone (TPZ) clearly demarcated around the trees to be retained (see APPENDIX F).
- For plants that are recommended for salvaging based on the RBS at the site (WSP, 2023), this should be done prior to commencing site clearance.
- For all fauna that may be encountered on site, adhere to the wildlife response and rescue plan as part of the EMMP and have an NParks approved WMC ready to be activated, if needed.

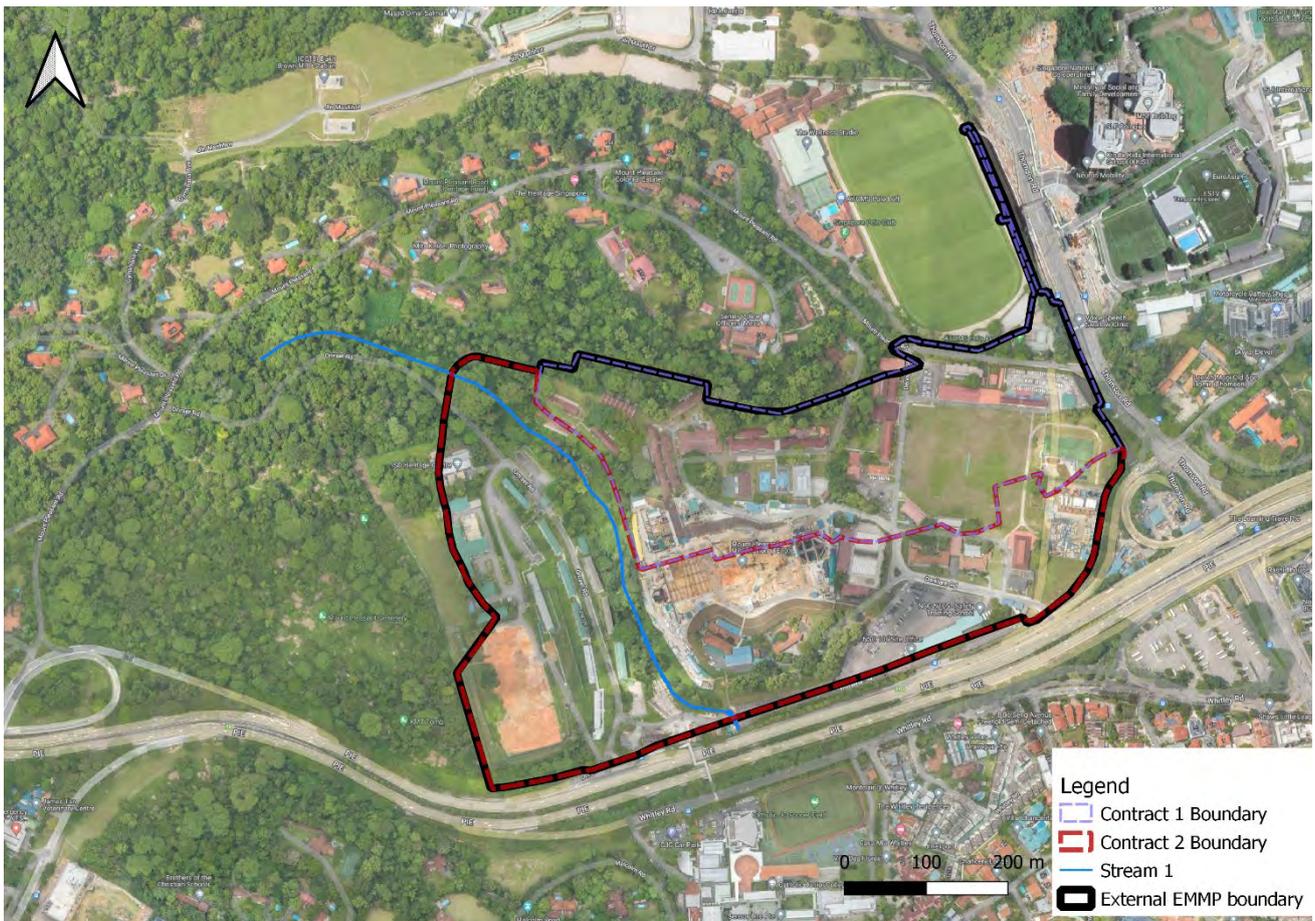
The vegetation clearance process involves the use of heavy machinery for the removal of vegetation and placement of Earth Control Measures (ECM). This is followed by earthworks involving excavation and regrading. As the terrain is sloping down towards the PIE around the proposed slip road, it is expected that soil grading will be carried out to allow for the mobilisation of vehicles and machinery on flat ground.

In addition, it is anticipated that cutting and stabilising of slopes will be needed along the northern boundary, which has higher elevation. In this case, geotechnical engineers will develop Earth Retaining Stabilisation Structures (ERSS) to stabilise the exposed slopes in their engineering design. In addition, ERSS and slope stabilisation measures should be implemented to prevent erosion of soil into the drainage network.

Land clearance works are planned to proceed from east to west, in accordance with the phased handover of the site. Most of the site, especially the eastern part is cleared, or sparsely vegetated, and relatively flat, and minor impact is expected.

Site clearance, earthworks and infrastructure phases include use of heavy machinery for large scale levelling/piling works and excavation, completely changing the topography and hydrology of the site. Subsequently, excavation for basements, foundation works and piling works are expected and will involve the use of heavy machineries. No site investigation works are expected during this stage.

The Contractor is required to submit an Erosion and Sediment Control Plan (ESCP) and, the ECM should be planned in relation to the phased handover of the Site. Stream 1, a habitat identified of high importance within the Site, runs along the western part of the Overall EMMP boundary (Figure 3). A buffer of 12 to 30 m from the stream and Contract 1 boundary is included to ensure the upstream (approximately 30%), which is outside the EMMP boundary, will be preserved fully. The 70% of the stream within the Overall EMMP boundary will be diverted as part of Contract 2.



**Figure 3: Stream 1 within the Overall EMMP boundary**

**2.1.3 Establishment of Temporary Worksites**

Following site clearance, temporary worksite structures will be established, including site offices, toilets, hazardous materials storage area, equipment storage, waste management facilities, and internal temporary roads for movement of vehicles and vehicle parking lot.

The construction works required, operation of machineries and increase in site vehicular traffic for the establishment of temporary worksites may cause potential noise nuisance and dust emission to nearby human and ecologically sensitive receptors, as well as potential water quality impact to the stream or drains.

**2.1.4 Building Construction**

**2.1.4.1 Foundation Works**

Once pre-construction activities are completed, foundation work for substructures including piles and pile caps will be constructed. Reinforcement bars will then be installed to enhance the strength of the concrete pile. Ready-mix concrete will be transported by a concrete truck and poured into boreholes. Hacking may be required should there be excess pile head after bored piling. The pile foundation will then be sealed. Upon completion of foundation works, excavation may be necessary. Any excavated material will be placed in dump trucks and disposed offsite or used in other areas of the Site. Additional site investigation may be required as part of building construction works. The contractor shall ensure proper handling and disposal of construction waste to avoid any potential contamination to nearby water bodies, soil and groundwater.

### 2.1.4.2 Construction of Superstructure and Finishing Works

Following the completion of foundation works, superstructures will be constructed. Superstructure works may include forming working platforms, installation of precast, concrete works. The buildings will be constructed to its desired height using temporary formwork. Ready mix concrete will be transported to the Site for concreting works.

## 3.0 SUMMARY OF RAPID BASELINE SURVEY

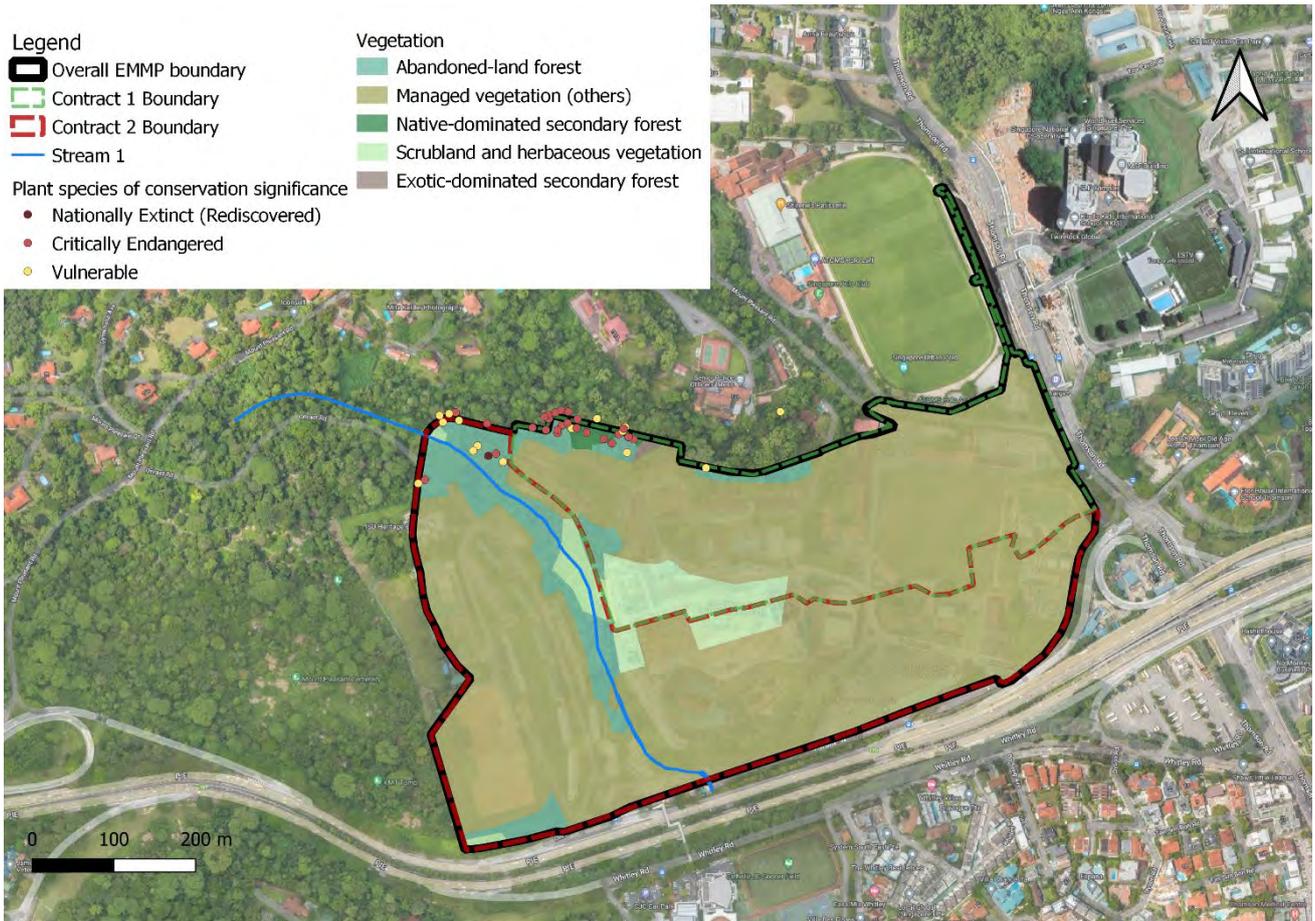
A RBS was carried out between April to May 2023 to verify and update biodiversity and water quality findings from the EIS, and the results are summarised below.

### 3.1 Flora Findings

Flora findings from the rapid baseline verification survey are consistent with that presented in the previous EIS gazetted in 2021. Within the Overall EMMP boundary, there were no significant changes to the forest structure and species composition since the last survey that was carried out between 2019 to 2020. Aside from the Mount Pleasant MRT infrastructure works in the central of the Overall EMMP boundary, the habitat and vegetation type remains largely similar.

The dominant vegetation type is managed vegetation, which made up 91.18% of the Overall EMMP Boundary. Spontaneous vegetation types found within the Overall EMMP boundary include scrubland and herbaceous vegetation (7.01%), exotic-dominated secondary forest (0.16%), abandoned-land forest (0.03%), and native-dominated secondary forest (0.60%). The native-dominated secondary forest occupies a small area in the north-western section of the Overall EMMP boundary. This habitat type is generally dominated by *Macaranga gigantea*. Other species found within this habitat includes *Litsea elliptica*, *Syzygium grande* and *Syzygium lineatum*. Species of conservation significance such as *Piper baccatum* and *Horsfieldia polyspherula* were also found within the native-dominated secondary forest. A stream flows southerly through the western part of the Overall EMMP boundary.

Within 10 m of the Overall EMMP boundary, 12 plant species of conservation significance (40 specimens) were recorded in 2021. All with the exception of one species, *Litsea umbellata*, was located on site within the abandoned-land forest and native-dominated secondary forest. This includes one nationally "Extinct" (Rediscovered), five nationally Critically Endangered species, and five nationally Vulnerable species. The full list of plant species of conservation significance is provided in APPENDIX B.



**Figure 4: Vegetation map and distribution of plant species of conservation significance within 10-m of the Overall EMMP Boundary**

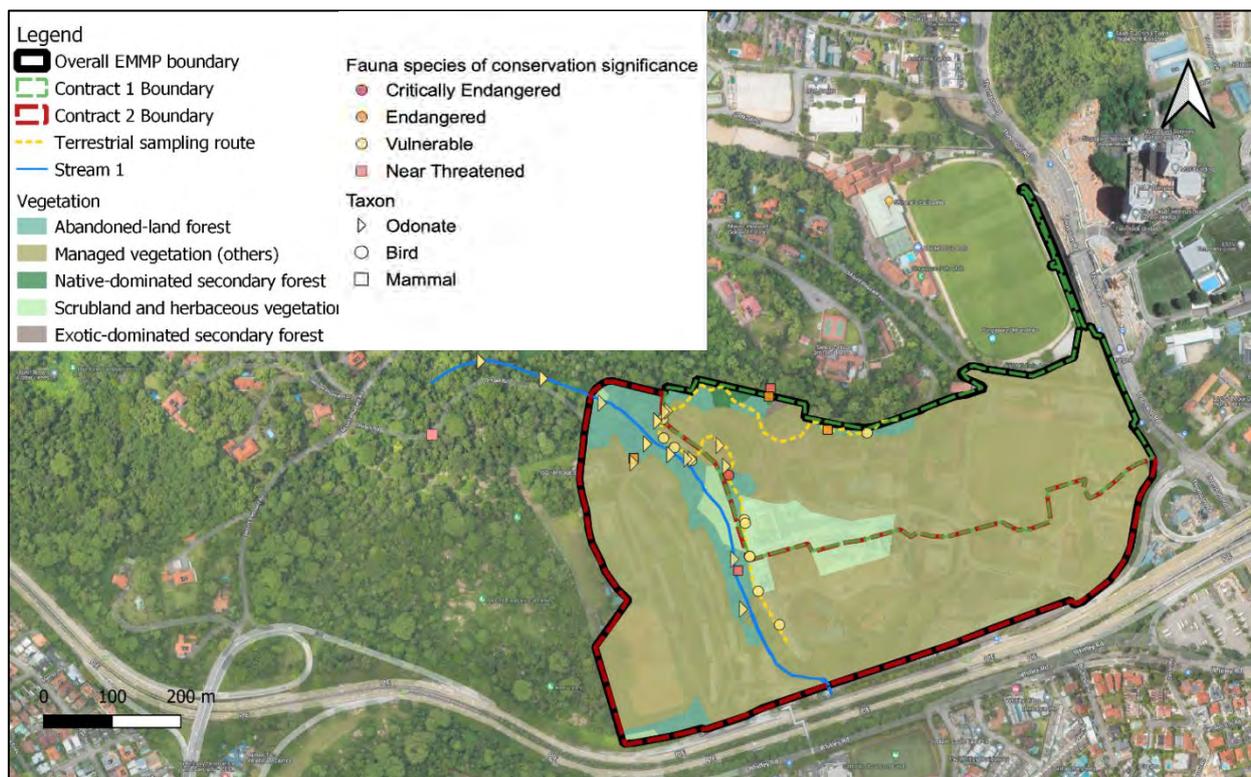
### 3.2 Fauna Findings

Fauna findings from the rapid baseline verification survey confirmed the presence of the key fauna receptors presented in the EIS in 2021. Additionally, 48 new species were recorded. Combining records from both the RBS and EIS, the total number of species within the Overall EMMP boundary amounts to 256, of which 19 are of conservation significance. Species of conservation significance within the Site includes the nationally Vulnerable collared threadtail (*Prodasineura collaris*) and nationally Endangered straw-headed bulbul (*Pycnonotus zeylanicus*). There were four new records of species of conservation significance from the rapid baseline verification survey, comprising the nationally Vulnerable grey sprite (*Pseudagrion pruinosum*), plume-toed swiftlet and zitting cisticola (*Cisticola juncidis*), and the nationally Critically Endangered Sunda pangolin (*Manis javanica*). The full list of species recorded is presented in APPENDIX C and faunal survey data is presented in APPENDIX D.

Key fauna findings are summarised as follows:

- Stream 1, along with its riparian vegetation, continues to be a stronghold for the nationally Vulnerable collared threadtail (*Prodasineura collaris*). It was recorded at almost all aquatic sampling points, except for S1\_01 (upstream) and S1\_07 (downstream) (Figure 7). Similar to what was previously observed during the EIS in 2020, the forested area around S1\_05 (Figure 7) in particular, is a hotspot for the female individuals of the species, which they are dependent on for resti and shelter. These females utilise the stream for breeding. The nationally Vulnerable grey sprite (*Pseudagrion pruinosum*) and the copper-cheeked frog (*Chalcorana labialis*) are new records for the stream (S1\_02) (Figure 6).

- In the forested areas, the globally and nationally Critically Endangered Sunda pangolin (*Manis javanica*) and globally Endangered long-tailed macaque (*Macaca fascicularis*) were recorded within the Overall EMMP Boundary (Figure 8). An individual of the nationally Near Threatened and forest-dependent Sunda colugo (*Galeopterus variegatus*) was encountered outside of the Overall EMMP Boundary (Figure 5). The Eurasian wild boar (*Sus scrofa*) was also detected on all camera traps (APPENDIX E).
  - Sunda pangolin – there were two records of this species on camera traps in the northern part (within Contract 1 boundary) and southern part of the Overall EMMP Boundary (Figure 5). Only one adult individual was recorded on video each time. This species is a new record for the site.
  - Long-tailed macaque – this species was recorded mainly in the northern part of the Overall EMMP Boundary, including the Contract 1 boundary. Up to seven individuals were recorded. A troop of at least seven individuals were observed roosting on site on the edge of the Overall EMMP Boundary on the west.
  - Sunda colugo – while not nationally threatened, this species is a notable finding for the EMMP study, as it is forest-dependent and susceptible to accidental injury/mortality during construction due to its habits. The species was not previously recorded in the EIS. It was recorded west of the Overall EMMP Boundary close to Onraet Road. While not observed within the Overall EMMP Boundary during the RBS, it may be encountered on site.
  - Eurasian wild boar – this species was recorded across the Overall EMMP Boundary (Figure 9). It was not previously recorded during the EIS.



**Figure 5: Location of faunal species of conservation significance from rapid baseline surveys, including camera trapping**

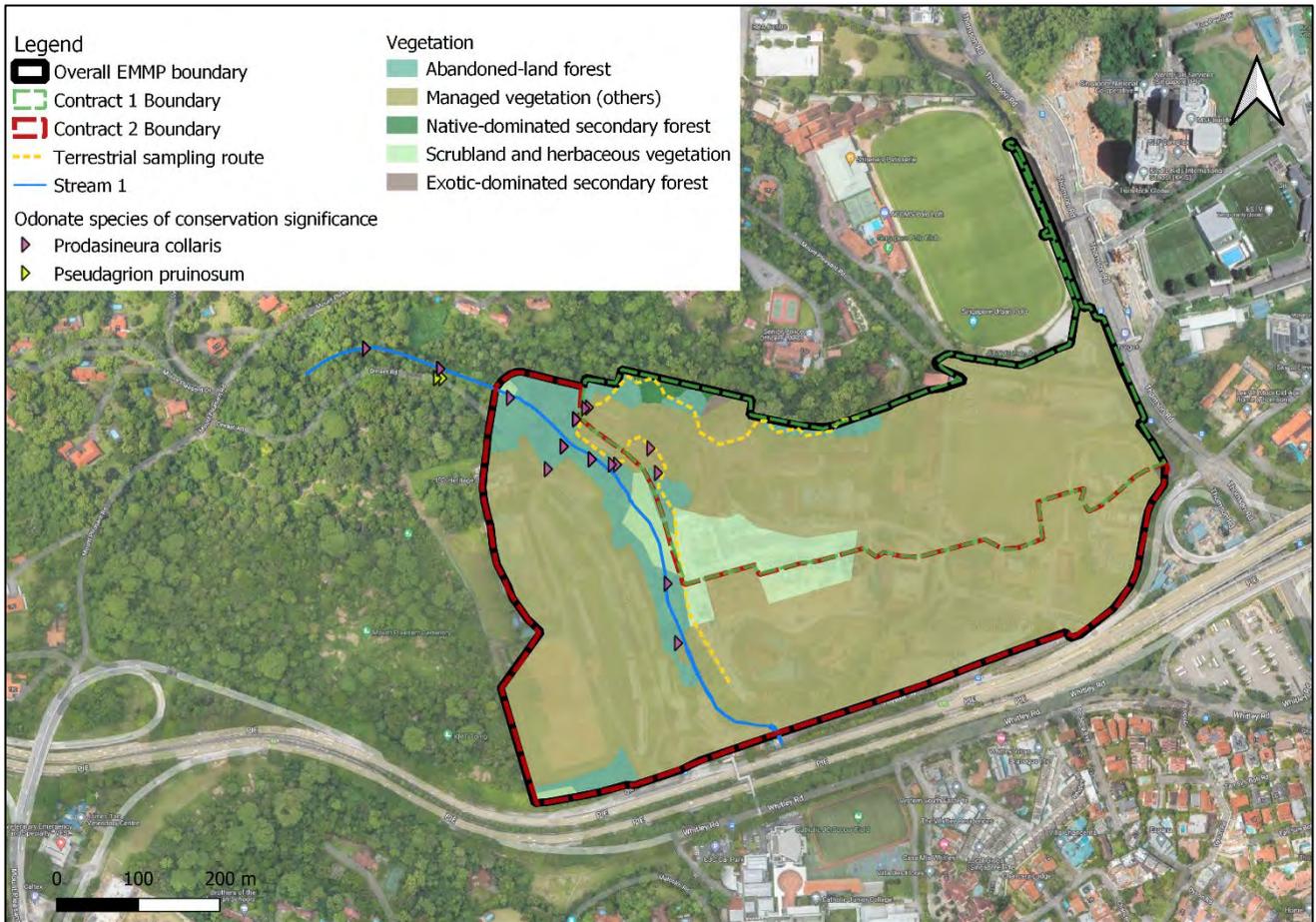
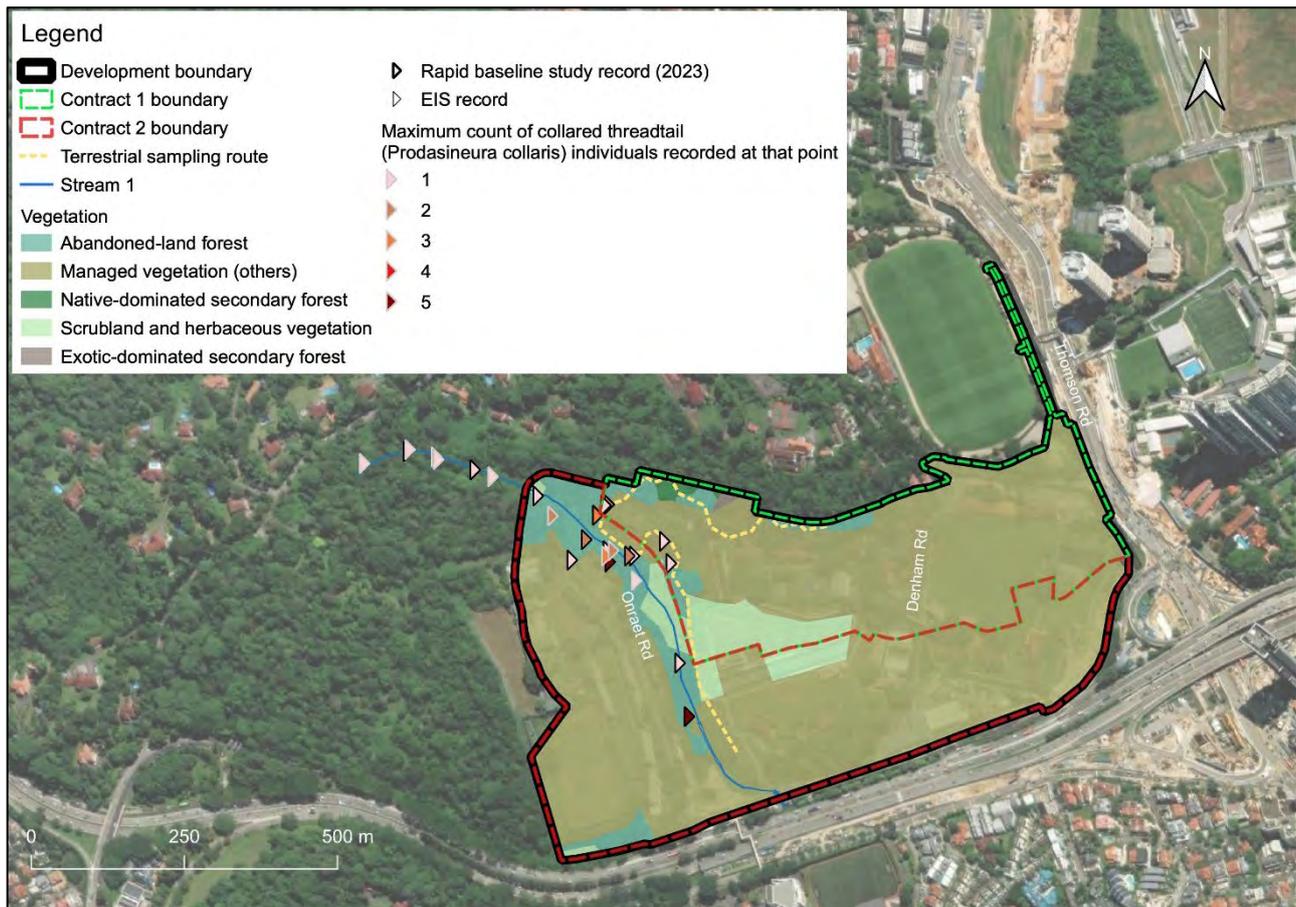


Figure 6: Location of odonate species of conservation significance



**Figure 7: Location of collared threadtail (*Prodasineura collaris*) records from rapid baseline study and EIS**

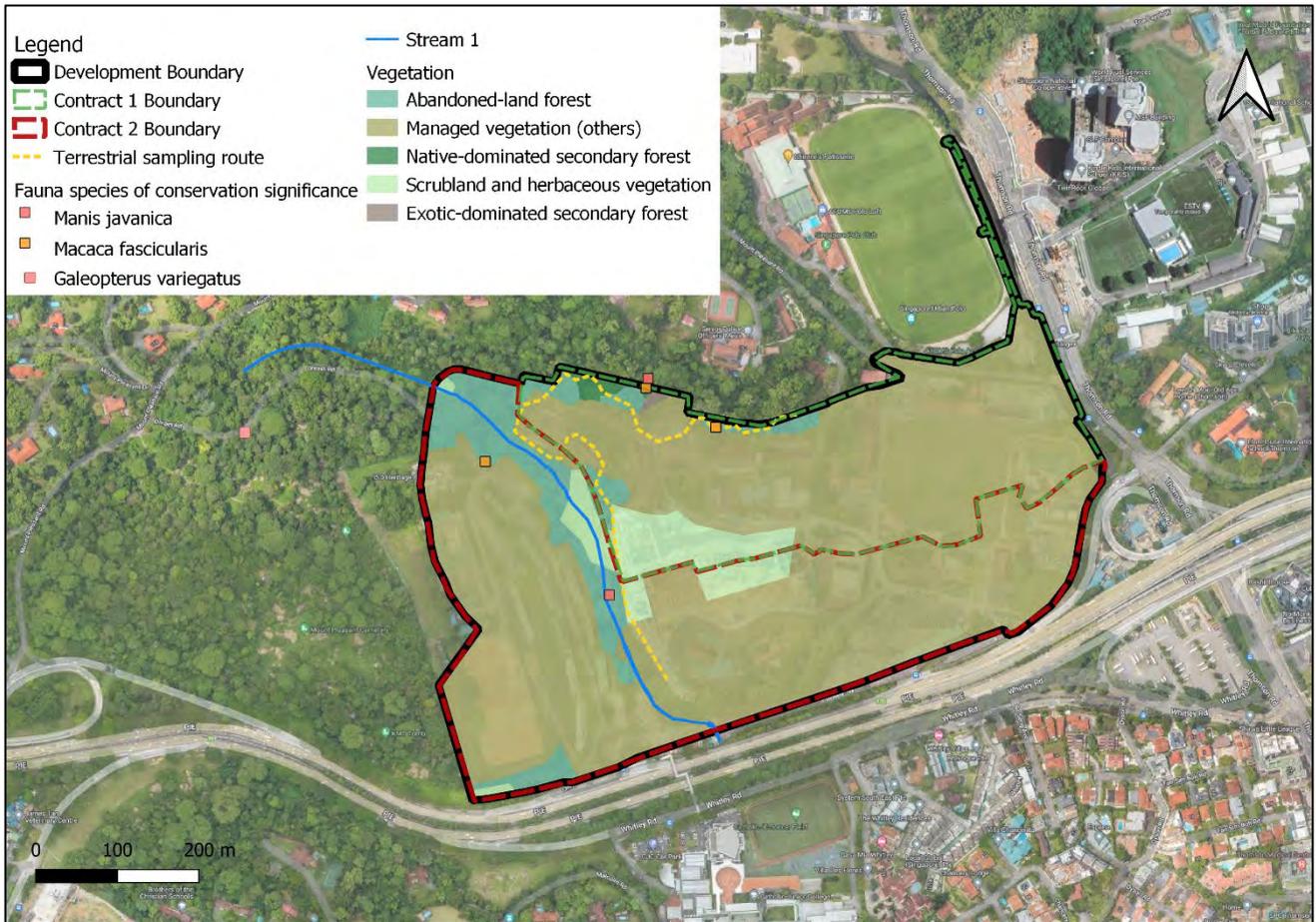
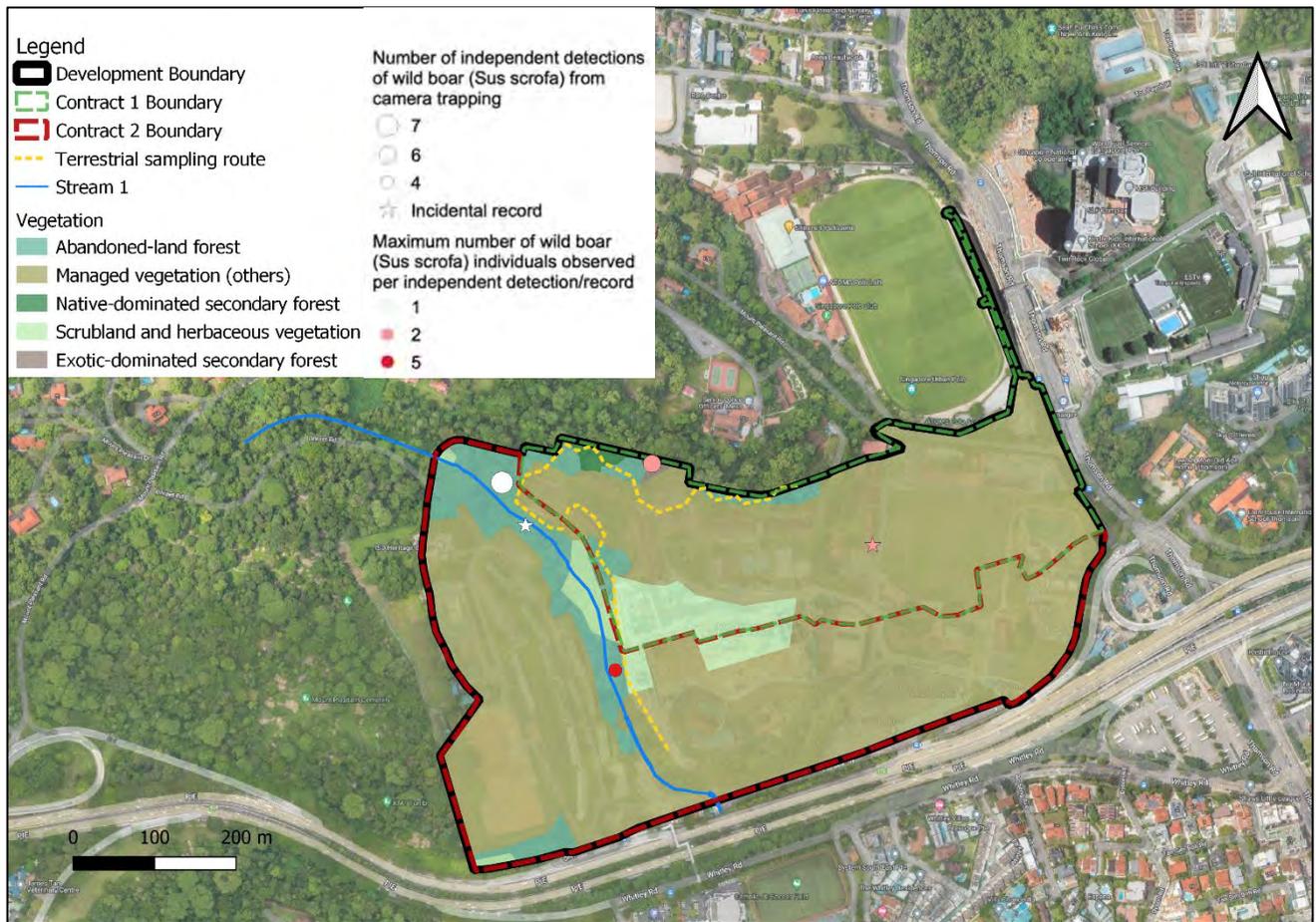


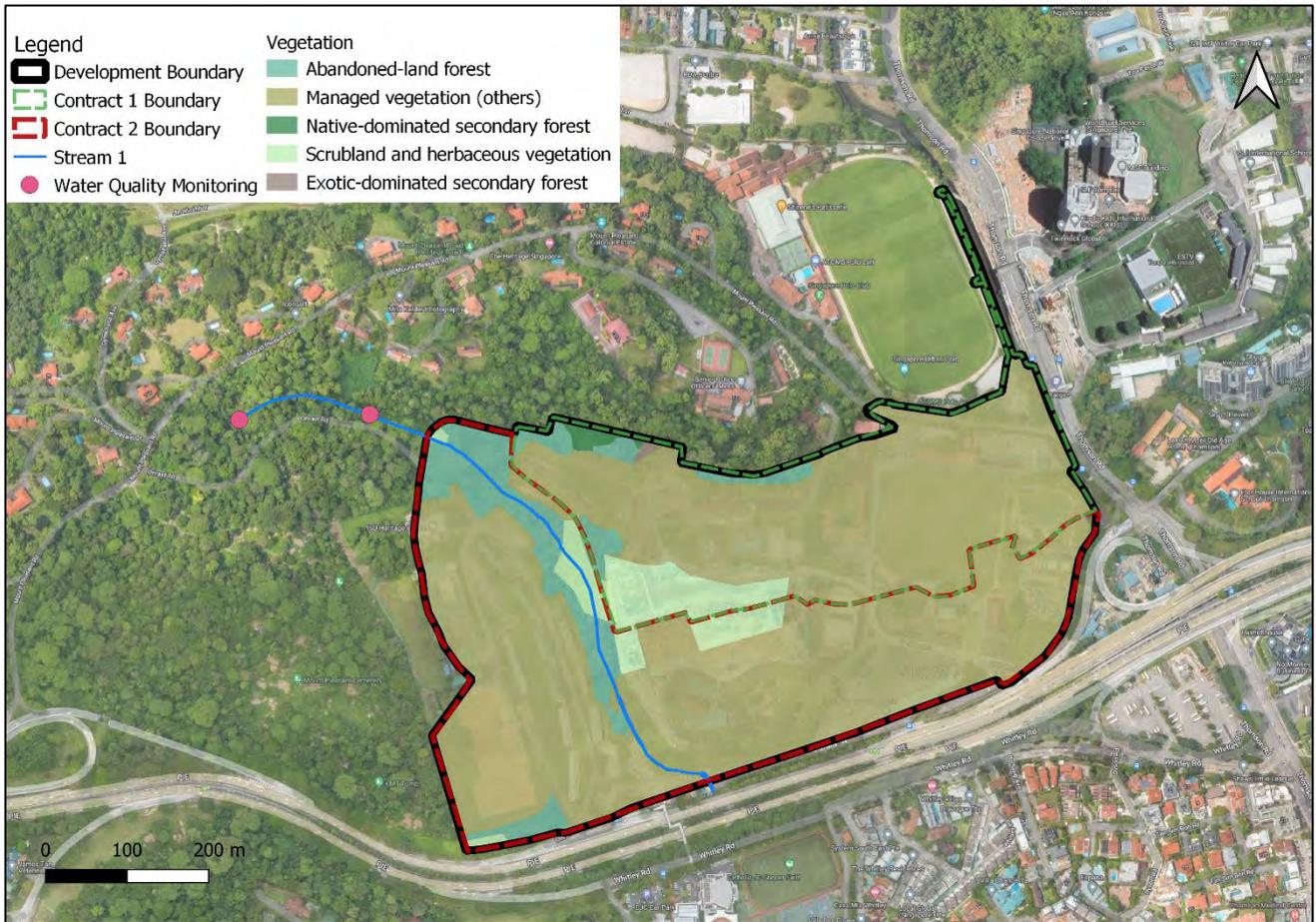
Figure 8: Location of mammalian species of conservation significance



**Figure 9: Number of independent detections of the Eurasian wild boar (*Sus scrofa*) detected by camera traps, and incidental records, with maximum number of individuals observed per independent detection or record.**

### 3.3 Water Quality

Monitoring of water quality was carried out in two locations upstream of Stream 1 by means of in-situ water quality parameters including temperature, pH, conductivity and dissolved oxygen (DO). Water samples were collected and sent for analysis of the NEA Trade Effluent Discharge parameters for uncontrolled watercourse.



**Figure 10: Locations of water quality samples**

The results of water samples at both locations were found to be within NEA allowable limits for uncontrolled watercourse and were found to be suitable for aquatic life.

#### 4.0 APPLICABLE LEGISLATION AND STANDARDS

The legislation and other standards used in the EMMP are listed below:

**Table 1: List of applicable Singapore legislation, regulations, and guidelines**

Parameter	Legislation, Regulations and Guidelines
<b>General</b>	<ul style="list-style-type: none"> <li>■ Environmental Protection and Management Act and Regulations</li> <li>■ Environmental Public Health Act and Regulations</li> <li>■ Code of Practice on Pollution Control SS593:2013</li> </ul>
<b>Biodiversity</b>	<ul style="list-style-type: none"> <li>■ Wildlife Act 2020</li> <li>■ Parks and Trees Act 2005                             <ul style="list-style-type: none"> <li>▪ Parks and Trees Regulations 2006</li> <li>▪ Parks and Trees Preservation Order 1998</li> </ul> </li> </ul>

Parameter	Legislation, Regulations and Guidelines
	<ul style="list-style-type: none"> <li>▪ Parks and Trees (Composition of Offences Regulations) 2006</li> <li>▪ Parks and Trees (Planning Areas) Notifications 2006</li> <li>▪ Parks and Trees (Heritage Road Green Buffers) Order 2006</li> <li>■ NParks Species List (Red Data Book List) Third Edition, 2023</li> <li>■ IUCN Red List of Threatened Species to assess species vulnerability (2021)</li> <li>■ CITES (Convention on International Trade in Endangered Species of Wild Fauna and Flora, also known as the Washington Convention) 1983</li> <li>■ NParks' Biodiversity Impact Assessment (BIA) Guidelines (2021)</li> </ul>
<b>Noise</b>	<ul style="list-style-type: none"> <li>■ Environmental Protection and Management Act 2002, Part VIII Noise Control <ul style="list-style-type: none"> <li>▪ Environmental Protection and Management (Control of Noise at Construction Sites) Regulations 2008</li> <li>▪ Environmental Protection and Management (Boundary Noise Limits for Factory Premises) Regulations 2008</li> </ul> </li> <li>■ Code of Practice on Pollution Control SS593:2013</li> <li>■ Code of Practice for Noise Control on Construction and Demolition Sites SS602:2014</li> </ul>
<b>Surface Water Quality</b>	<ul style="list-style-type: none"> <li>■ Sewerage and Drainage Act 2001 <ul style="list-style-type: none"> <li>▪ Sewerage and Drainage (Surface Water Drainage) Regulations 2007</li> <li>▪ Sewerage and Drainage (Trade Effluent) Regulations Revised 2007</li> </ul> </li> <li>■ Environmental Protection and Management Act 2002, Part V on Water Pollution <ul style="list-style-type: none"> <li>▪ Environmental Protection and Management Act (Trade Effluent) Regulations 2008</li> </ul> </li> <li>■ Code of Practice on Pollution Control (SS593:2013)</li> <li>■ PUB Guidebook on Erosion and Sediment Control at Construction Sites (2018)</li> <li>■ PUB Code of Practice on Surface Water Drainage (2018)</li> <li>■ PUB Handbook on Managing Urban Runoff (2013)</li> </ul>
<b>Air Emissions</b>	<ul style="list-style-type: none"> <li>■ Environmental Protection and Management Act 2002, Part IV on Air Pollution Control <ul style="list-style-type: none"> <li>▪ Environmental Protection and Management (Vehicle Emissions) Regulations 2008</li> <li>▪ Environmental Protection and Management (Prohibition on Use of Open Fires) Order 2008</li> <li>▪ Environmental Protection and Management (Air Impurities) Regulations (Amendment) 2015</li> </ul> </li> </ul>

Parameter	Legislation, Regulations and Guidelines
	<ul style="list-style-type: none"> <li>▪ Environmental Protection and Management (Off-Road Diesel Engine Emissions) Regulations. 2012.</li> <li>▪ NEA Singapore Ambient Air Quality Targets (Long Term Targets)</li> <li>■ Code of Practice on Pollution Control SS593:2013</li> </ul>
<b>Waste Management</b>	<ul style="list-style-type: none"> <li>■ Environmental Protection and Management Act 2002, Part VII on Hazardous Substances <ul style="list-style-type: none"> <li>▪ Environmental Protection and Management (Hazardous Substances) Regulations 2008</li> </ul> </li> <li>■ Environmental Public Health Act <ul style="list-style-type: none"> <li>▪ Environmental Public Health (General Waste Collection) Regulations 2000</li> <li>▪ Environmental Public Health (Toxic Industrial Waste) Regulations 2000</li> </ul> </li> <li>■ Code of Practice on Pollution Control SS593:2013</li> </ul>
<b>Vector Control</b>	<ul style="list-style-type: none"> <li>■ Environmental Public Health Act 2002</li> <li>■ Control of Vectors and Pesticides Act 2002</li> <li>■ NEA Guidelines on Mosquito Prevention in Domestic Rainwater Collection System for Non-Potable Uses</li> </ul>

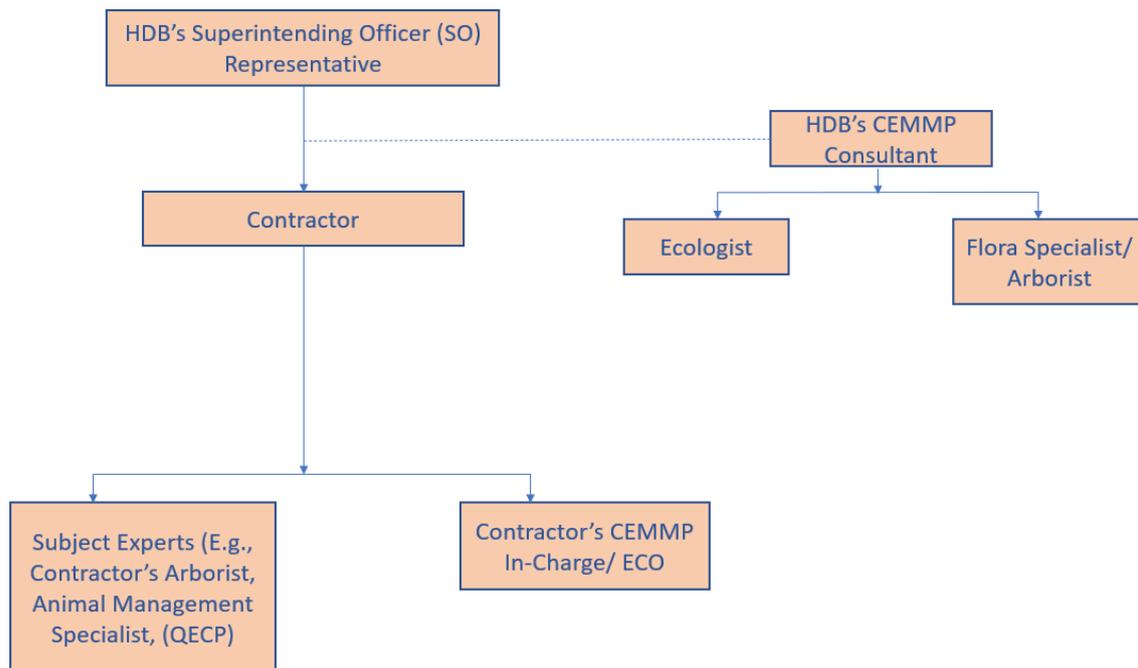
## 5.0 EMMP ORGANISATION

The EMMP is focused on procedures, plans and policies to avoid, minimise or compensate for the impacts identified. These have been identified and controls are documented in each of the sections below.

Furthermore, monitoring and management plans to support these management programs are documented and provided as part of the EMMP.

### 5.1 Organisational Chart

An organisational chart for the implementation of the EMMP is provided below (Figure 11).



**Figure 11: EMMP Organisational Chart**

## 5.2 Roles and Responsibilities

The following section details the roles and responsibilities for the EMMP.

### *Technical Agencies*

Technical Agencies, specifically NParks, may assess and approve the detailed EMMP for the site clearance, earthworks, and infrastructure phase prior to commencement of works and as required during the course of the project.

### *Developing Agency (DA)*

HDB, being the project owner oversees the construction phase of the project in accordance with the design. HDB, in conjunction with the SO Representative (SO Rep), EMMP Consultant and Contractor are required to:

- Ensure resources are available to achieve the requirements of the EMMP.
- Provide leadership in the development and implementation of the EMMP.
- Ensure all environmental incidents and near misses are promptly investigated and reported.
- Resolve any non-compliance issues.
- Record, respond, and action any complaints from members of the public, if any, with inputs from the Technical agencies, if required.
- Reporting to the Technical Agencies regarding implementation of the EMMP.

### *SO Rep*

The SO Rep is responsible for overseeing the construction works undertaken by staff, contractors, and sub-contractors. The SO Rep should ensure that the construction works are performed by the contractors and personnel in accordance with the specification, contractual requirements and EMMP. The SO Rep should also:

- Communicate the requirements of this plan to all staff, contractors and sub-contractors.
- Monitor all staff, contractor's and sub-contractor's compliance with contract specifications and regulatory requirements, including the implementation of the environmental mitigation and monitoring measures and ensure their effectiveness, and other aspects of the environmental audit program.
- Coordinate with the project's Environmental Control Officer (ECO) to monitor and participate in the implementation of the environmental audit program and ensure that the requirements in the environmental audit program are strictly followed.
- Implement measures to reduce impacts where emission/ discharge levels are exceeded.
- Coordinate with the Project Owner for submission of environmental audit reports.
- Carry out complaint investigations.
- Resolve non-compliance issues.
- Promote environmental awareness and responsibility and lead by example.

### **Contractor**

The term Contractor refers to all construction contractors and sub-contractors working onsite at any given time. In addition to reporting to the SO Rep, the Contractor should:

- Work under the relevant contract scope, specifications, and other tender conditions.
- Ensure that the roles of the ECO, Certified Arborist, and Fauna Specialist/s are adequately resourced.
- Participate in the required environmental site audits (via the SO Rep) undertaken by the ECO and undertake any corrective actions, as required
- Provide up-to-date information and advice to the SO Rep, ECO, Certified Arborist, and Fauna Specialist/s regarding any work activities which may contribute to or continuously create adverse environmental conditions, or any changes to the work plan.
- Implement measures to reduce impacts where trigger levels are exceeded for emissions and discharge.

In addition, for site and/or vegetation clearance before the commencement of actual construction, the Contractor shall engage a certified QECP to prepare an ECP and obtain PUB approval. The Contractor shall also map trees on site and trees planned to be felled and obtain NParks approval.

For tree-felling, the Contractor shall map the trees on site and trees planned for removal or retention and obtain NParks approval. The Contractor shall consider the following requirements:

- In an area rich in trees of conservation interest, the contractor should employ a Certified Arborist to map trees carefully when applying for tree felling approval. This is to gauge the health, species, size and conservation significance of the trees and the appropriate TPZ clearly demarcated around the trees to be retained (see APPENDIX F).
- If there are trees that must be transplanted, this should be done prior to commencing site clearance. Regarding fauna, the Contractor is required to follow the specific directions stated in this EMMP with regard to managing wildlife onsite. The Contractor shall have a fauna specialist/ecologist to advise on the Wildlife Management Plan (WMP) and a NParks approved WMC ready to respond to any wildlife on site if needed.

An ECO shall be employed by the Contractor but may not be in any way associated with the Contractor, or the SO Rep. The ECO is responsible for implementing the elements of the environmental monitoring program that fall within their responsibilities as outlined in the Code of Practice for Environmental Control Officers for Specified Premises dated August 2022. He/she should be a registered ECO with NEA and has at least three years' experience in environmental monitoring and auditing works. Resources to implement the environmental monitoring and audit program should be allocated. The ECO's duties include:

- Coordinate with the SO Rep to monitor and participate in the implementation of the environmental audit program, with assistance from the ECO.
- Assist the SO Rep with the resolution of near misses/ incidents, non-compliance issues, and complaint management; and
- Assist the ECO with reporting of monitoring results to the SO Rep.

### ***DA's EMMP Consultant and ECO***

The DA's EMMP Consultant and ECO shall:

- Prepare, submit, and present (if required) to NParks, HDB and other relevant Authorities and obtain approvals on the EMMP from the Regulatory Agencies.
- Liaise and coordinate with the HDB's appointed Contractors within the Project area (tentatively four contractors) and review and develop the Overall EMMP and detailed EMMP for each of the future activities.
- Meet on regular basis, to coordinate and review the implementation of management strategies as outlined in the EMMP.
- Report potential or actual incidents and non-conformances and to propose corrective actions.
- Identify indicators, precautions, construction methods, contingency plans; provide actions and response time to be undertaken to achieve the desired range.
- Prepare, submit, and present monthly EMMP reports throughout the construction works for each of the future activities.
- Conduct briefings and trainings to all the Contractors and subcontractors within the Overall EMMP Boundary on a regular basis and throughout the construction works.
- Review, highlight, recommend measures and provide advice to Agencies'/ public/ interest groups' and feedback on environmental matters.
- Prepare materials and attend, when needed, the briefings/ presentations to stakeholders e.g., Grassroots Leaders, Advisors, other interest groups/ nature group and or organization, etc.
- Assist in engaging the stakeholders and relevant nature groups and/ or organizations to address site specific concerns.
- Institute a management process on any feedback received from stakeholders throughout the construction works and ensure queries are appropriately resolved, investigated, recorded, and compiled in a report.
- Prepare and maintain an Environmental Impact and Mitigation Registry which provides a summary of the project activities, sensitive receptors and potential environmental impacts, mitigation measures, timelines, and residual impacts.
- Carry out site inspection every two weeks and attend progress meetings to provide updates on EMMP.

- Prepare, submit, and present a summary completion report on the environmental mitigation and performance (Close-off EMMP Audit Report). The Close-off EMMP Audit Report is to be prepared for each of the future activities once the works on site is completed.

## 5.3 Training and Awareness

An introduction to the EMMP will be provided to all employees working onsite so that these can be followed, and any corrective actions identified. Training requirements include awareness, understanding of the EMMP and importance of its implementation, and any further training for specific responsibilities. Records of attendance in regular trainings (i.e., every six months) should be maintained for the whole duration of the works.

### 5.3.1 General EMMP Training

A briefing of the overall EMMP structure and requirements should be given to all contractors every six months, including significant impacts, identified receptors, minimum management, and monitoring requirements. Should any triggers be encountered for specific aspects of the EMMP, an EMMP Alert will also be issued to the Site for awareness, compliance and communication of any corrective action and any changes to EMMP requirements. Specific EMMP trainings will also be carried out, as detailed in the succeeding sections.

### 5.3.2 Biodiversity Awareness

The Ecologists shall conduct toolbox briefings to inform site personnel of, but not limited to, the following topics:

- a) Ecological value of the site and its surrounding habitats
- b) Types of fauna present
- c) Biodiversity protection strategies (e.g., Wildlife Response Plan)
- d) Site personnel responsibilities towards biodiversity
- e) Fauna encounters
- f) Prevention of roadkills
- g) Inspection of trees before felling

During the construction, Site briefings will be conducted monthly, or as needed, as works progress. All site personnel shall undergo biodiversity awareness training prior to commencing work on site, and regularly (every six months) throughout the duration of the construction. Documentation of such trainings and briefings shall be maintained.

### 5.3.3 Waste Management

The trainings should be provided monthly, if necessary, in order to ensure all the site personnel are well-trained and able to manage construction wastes accordingly on-site. The topics may include:

- a) Waste management system
- b) Proper disposal of construction waste
- c) Housekeeping especially of food waste

### 5.3.4 Vector Control

The trainings should be provided monthly, if necessary, in order to ensure all the site personnel are well-trained and able to control vectors on-site, in accordance with the hierarchy of vector control as follows:

- a) Source reduction, i.e., eradicate water ponding through proper housekeeping to eliminate potential breeding grounds.
- b) Monitor Dengue situation, i.e., regular screening of worker (temperature checks), quarantine measures, etc.
- c) Deter breeding, i.e., search and destroy efforts, inspections, *Bacillus thuringiensis israelensis* (Bti) application, etc.
- d) Thermal fogging shall not be carried out to prevent unintended impacts to invertebrate fauna residing in the surrounding habitats.
- e) No chemical insecticides, pesticides and rodenticides shall be used for pest control; and
- f) No sticky traps shall be used for pest control.

Environmentally friendly applications such as the use of BTI shall be used to supplement source reduction.

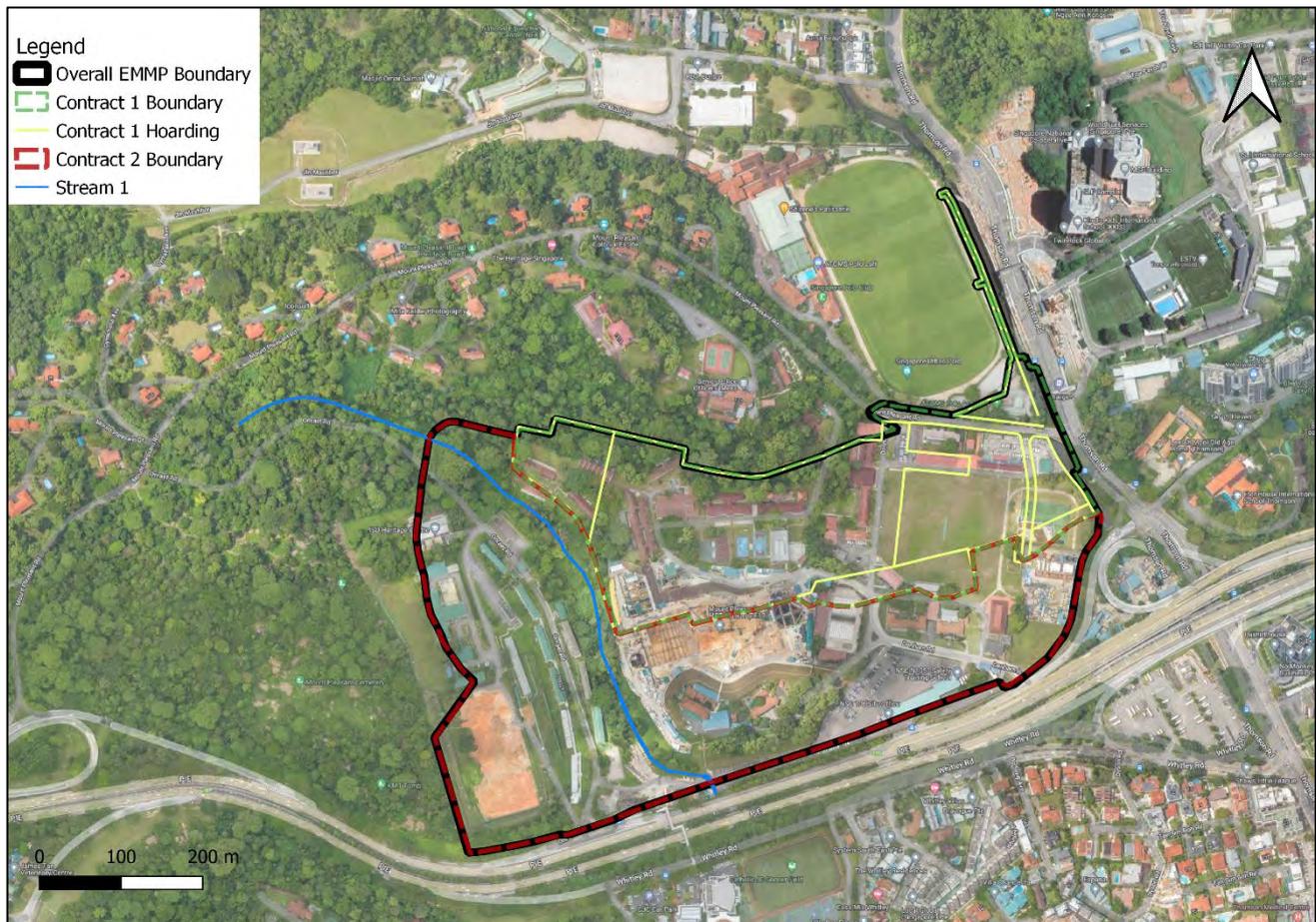
## **6.0 ENVIRONMENTAL MANAGEMENT AND MONITORING PLANS**

Management and monitoring plans are provided for aspects which have moderate to major residual impact significance to ensure that impacts are kept to a minimum as much as practicable during the construction. Mitigating and monitoring measures have been adopted from the EIS EMMP as applicable to the Overall EMMP Boundary.

### **6.1 Flora and Fauna Management Plan**

#### **6.1.1 Pre-construction Mitigating Measures**

Based on the recommendations in the gazetted EIS (2021), HDB plans to conserve the upstream 30% of Stream 1. A 30-m buffer is to be maintained on either side of the stream to preserve forest habitat for the aquatic fauna in Stream 1. The lower part of Stream 1 within the Overall EMMP boundary will eventually be diverted as part of Contract 2. While the stream is not yet diverted, the hoarding of Contract 1 will be erected 12 to 30m away from Stream 1 (Figure 12).



**Figure 12: Hoarding plan for Contract 1**

The following will be carried out to mitigate any potential impacts:

- Provide advice on directional erection of hoarding starting from the eastern part of the Site, and closest to the busiest road, Thomson Road, then westwards towards Onraet Road. The hoarding shall be continuous and complete before any construction work commences to avoid potential roadkills.
- To salvage plants and tree saplings of conservation significance unavoidably affected by the works as described in Section 2.1. The full list of plant species of conservation significance is provided in APPENDIX B. <sup>1</sup> This will be coordinated with NParks and led by a Flora Specialist. As large specimens are more susceptible to transplantation stress, specimens with girth of 0.3 m and above are not recommended for salvaging. A total of five *Sterculia parviflora* specimens and three *Oncosperma horridum* specimen meet this requirement and will not be salvaged. Salvaging works is recommended for the remaining 32 specimens of plant species of conservation significance.
- Ensure TPZ are established, if any.
- Eurasian wild boars were recorded during the RBS described in Section 3.0. Prior to site clearance, camera traps will be deployed by the EMMP consultant to determine presence of Eurasian wild boars trapped within the clearance zone. This is done after installation of hoarding and internal barriers. If wild boars are present, the Contractor shall engage an approved WMC to trap and remove wild pigs in view of workers' safety

<sup>1</sup> Rapid Baseline Survey Report for HDB Development, Central. WSP, June 2023.

concerns. A registry of approved contractors can be found at: <https://www.NParks.gov.sg/avs/animals/animal-related-businesses/animal-management-companies/public-registry-of-certified-animal-management-specialists>.

Prior to the clearance of trees and vegetation for hoarding installation and perimeter drains at this stage, an Ecologist will inspect vegetation to ensure it is free of nests, burrows, or signs of animal dwelling.

#### **6.1.1.1 Tree Protection Zones (TPZs)**

TPZs are to be erected for tree specimens recommended for retention. These specimens could be within the development footprint and/or very close to but are outside the hoarding alignment. TPZs should be established according to the guidelines provided in APPENDIX F. If there are construction activities taking place close to the retained trees owing to unforeseen circumstances (e.g., change in design plans or site access issues), an arborist should propose measures to protect these from being damaged. In addition, the trees along the Heritage Road should be preserved as an entity.

#### **6.1.1.2 Salvaging of Plants and Tree Saplings**

Transplantation of plant specimens should be carried out before any site clearance works. Plans for transplantation should be discussed among the relevant stakeholders, including NParks and the Contractor, before being carried out. The procedure should be supervised and overseen by certified arborists. The arborist shall assist to locate and identify suitable transplant candidates. Guidelines for sapling and tree transplantation are provided in APPENDIX G.

#### **6.1.1.3 Flora**

##### **6.1.1.3.1 Verification and Review of Footprints for Hoarding, Access Roads, and Working Space**

Following the pegging of the hoarding alignment as well as site setting out for areas required for access roads and any working space, the alignment and footprints are to be verified by a Flora Specialist via ground-truthing. This is to be carried out with the aid of a GPS receiver and cross-checked with the development footprint drawings. The Flora Specialist should ensure there is no excessive vegetation and/ or tree removal beyond the hoarding line agreed working space. Where identified plants of conservation significance will be affected, a Flora Specialist should work with the Contractor, to adjust the footprint of the area to be cleared and to avoid the important identified plants as much as possible.

#### **6.1.1.4 Fauna**

##### **6.1.1.4.1 Fauna Management Pre-Site Clearance**

Prior to site clearance, hoarding installation and pre-site clearance camera trap monitoring will take place. The following sub-sections detail the works that will be carried out.

###### **6.1.1.4.1.1 Installation of Perimeter Hoarding and Wildlife Exit Points**

Localised vegetation clearance to provide working space for the installation of the perimeter hoarding/ noise barriers will be carried out by the Contractor. Concurrently, localised vegetation clearance to provide working space for ECM implementation and perimeter drain construction will be carried out by the Contractor. The combined working space required for the perimeter hoarding installation and perimeter drain construction is estimated to be approximately 6-m wide. For such localised vegetation clearance, pre-felling fauna inspections (Section 6.1.2.2.2) will be conducted by an Ecologist prior to the removal of any vegetation.

The Site will be divided into smaller working zones for fauna management during site clearance. Perimeter hoarding installation will begin on the eastern side adjacent to Thomson Road to reduce the risk of fauna straying onto the road during hoarding installation works. The boundary of each site clearance zone is to be installed

with either zinc sheet hoarding, or internal barrier (only if site clearance will happen for the adjacent zone immediately after). Internal barriers will be used to separate the zones to prevent fauna from re-entering areas that have been cleared of vegetation (Figure 12).

To prevent fauna entry into the worksite, the hoarding around the entire worksite should meet the following specifications:

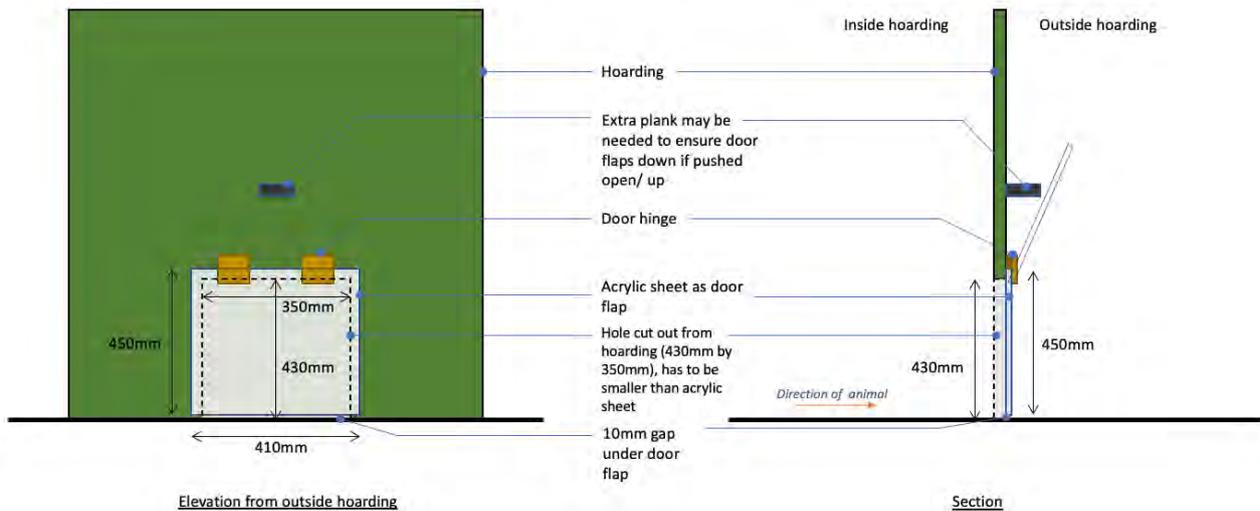
- At least 2.0-m high.
- Based on the proposed contractor hoarding plan, hoarding will be embedded at least 30-cm into the ground to prevent animals from burrowing under the hoarding (APPENDIX A).
- Light-coloured (white is ideal) surface on both sides of the panels except for the side facing the road, so that the hoarding is visually apparent to fauna, reducing the risk of fauna colliding into the hoarding. The side of the panel facing the road can be green.
- Not have any gaps that may allow fauna to pass through.

For each site clearance zone, a wildlife exit point must be installed prior to site clearance. The wildlife exit point allows for the exit of targeted fauna (e.g., Sunda pangolin, common palm civet, snakes) during site clearance, while ensuring that targeted fauna do not re-enter the site, to prevent fauna entrapment, injury and mortality, whilst minimising contact between human and wildlife. An indicative design of the wildlife exit point is shown in Figure 13. The actual location of the wildlife exit points will be determined by the Ecologist onsite and shall be installed at 30-m intervals along the hoarding.

To prevent fauna from re-entering the areas that have been cleared of vegetation, the internal barriers between zones should meet the following specifications (Figure 13):

- At least 1.8-m high.
- Have sufficient counterweight to withstand impact from large animals (e.g., Eurasian wild boar).
- Made of opaque material or covered with an opaque sheet as large animals may attempt to jump over the barrier if they are able to see the other side.
- Not have any gaps that may allow fauna to pass through.

After installation of the hoarding, internal barriers, and wildlife exit points, the Ecologist will inspect the integrity of the structures to ensure it meets the specifications listed above.



**Figure 13: Diagram of wildlife exit point**

#### **6.1.1.4.1.2 Pre-site Clearance Camera Trap Monitoring**

After the installation of perimeter hoarding/ noise barriers and internal barriers are complete, camera traps will be deployed within forested areas of the worksite over a period of at least three full days prior to site clearance. The camera traps will be evenly spaced approximately 50-m apart, at strategic locations with signs of fauna use (e.g., clearings, burrows, nests). The camera traps will be set to capture a 10-s video per trigger with a 10-s quiet period between triggers. The actual locations of the camera traps will be determined by the Ecologist on-site.

Upon retrieving the camera traps, the videos will be processed to determine the species and approximate number of fauna present within the worksite, especially the Eurasian wild boars (*Sus scrofa*). The information will be used to brief the site clearance personnel on fauna encounters to expect and appropriate actions to take during such encounters, as well as for wildlife management. If wild boars are trapped within the site, NParks should be informed. Wild boar removal operation shall be carried out by a certified WMC engaged by the contractor.

#### **6.1.2 Construction Mitigating Measures**

Mitigation measures should focus on careful execution of construction activities to minimise working space, putting control measures in place to prevent fauna from accessing or being trapped within the construction zone, prevention of soil erosion particularly into the streams and reducing disturbances to the adjacent forested areas. The key measures are provided below:

- Tree felling and vegetation clearance activities will also be phased, in the direction starting from the eastern part of the Site, and closest to the busiest road, Thomson Road, then westwards towards Onraet Road so that fauna can move towards the area of refuge, rather than towards Thomson Road or PIE (Figure 14).
- Tree-felling works should be executed outside of peak bird breeding season between March to July, where possible.
- Prior to the clearance trees and vegetation, an Ecologist will inspect vegetation to ensure it is free of nests, burrows, or signs of animal dwelling.

- Regular site inspections for contractor compliance and identify features that may result in fauna mortality and monitor for possible negative impacts to surrounding habitats.
- Toolbox briefing for workers to raise awareness on biodiversity to minimise human-wildlife conflict and ecological impacts.
- Execute Wildlife Response Plan when fauna is found on site.

### **6.1.2.1 Flora**

#### **6.1.2.1.1 Flora and Arboriculture Inspection every two weeks**

The Flora/Arboriculture Specialist is to identify the following during the flora and arboriculture inspections that is to be carried out every two weeks:

- Unauthorised removal of vegetation beyond the worksites, if any.
- Excessive trees and vegetation removal, especially around TPZ.
- Impacts to sensitive habitats as a result of construction activities, e.g., soil erosion and pollution, if any.
- Forest edge effects and recommend appropriate mitigation measures where necessary.
- Exotic fast-growing plants and provide recommendations for removal where necessary.
- Monitor the health plant specimens retained on site, if any.

The extent of the inspections will vary as the project progresses from site clearance to excavation and into the construction phase. During early works, detailed and frequent inspections are effective for management of site clearance. During excavation, it is important to continue the inspections regularly to maintain TPZ and monitor unauthorised removal of vegetation. As the project progresses into building works, it is expected that a flora management plan is more effective, and inspections will be carried out monthly and on an as needed basis.

### **6.1.2.2 Fauna**

#### **6.1.2.2.1 Fauna Management During Site Clearance**

The objective of fauna management during site clearance is to remove target fauna from the worksite before construction works begin to prevent fauna entrapment, injury, and mortality, whilst minimising contact between human and wildlife. Target fauna species include ground-dwelling mammals such as the Eurasian wild boar (*Sus scrofa*) and Sunda pangolin (*Manis javanica*), as well as animals that may be implicated in human-wildlife conflicts (e.g., snakes) during site clearance.

Prior to the start of works, the worksite should be completely hoarded. A visual survey and/or camera trapping will then be conducted to determine if there are Eurasian wild boars trapped within the hoarded areas. If Eurasian wild boars are detected, NParks should be informed, and wild boar removal operations will be conducted by a certified WMC engaged by the Contractor before site clearance commences. After the completion of the operations, site clearance should be conducted in a directional manner from the east to the west of the Site, towards an identified forested wildlife refuge area (i.e., Bukit Brown Woods). The disturbance generated by site clearance activities is expected to encourage the remaining target fauna to move out of the worksite on their own.

The overall sequence is as follows: 1) hoarding installation, with pre-site clearance fauna inspection to be conducted if site clearance is needed; 2) hoarded areas will be surveyed for Eurasian wild boars; 3) wild boar removal operations to be conducted if there are trapped Eurasian wild boars; 4) site clearance to proceed directionally, with pre-site clearance fauna inspections to be conducted prior to felling.

The following sub-sections detail the workflow for site clearance following the installation of perimeter hoarding/noise barriers, internal barriers, and wildlife exit points (Section 6.1.1.4.1.1), and pre-site clearance camera trap monitoring (Section 6.1.1.4.1.2).

#### **6.1.2.2.1.1 Directional Site Clearance**

Site clearance will take place sequentially for each zone, taking into consideration the proposed locations and sequence of construction of the ECM sedimentation tanks (i.e., the area where the ECM sedimentation tank will be constructed will be cleared first to ensure effective containment of runoff during site clearance).

Site clearance will begin furthest from the wildlife exit point for each zone and gradually move towards the wildlife exit point. The general direction of the site clearance is from east to west of the Overall EMMP Boundary (Figure 14; Figure 15). Within the site clearance parcel, site clearance is to be conducted towards the north or north-western part. The disturbance generated from the site clearance activities will encourage fauna within the worksite to move towards forest located northwest of the Overall EMMP Boundary via the wildlife exit points. For the parcels located close to the Mount Pleasant Road, no exit points were proposed as there are no suitable refuge areas. Site clearance is still proposed to be conducted westwards; however, any trapped fauna found on site will need to be rescued (see Wildlife Response Plan in Figure 24). The site clearance for contract 1 and contract 2 is being shown in Figure 14 and Figure 15 respectively. The parcellation shown in site clearance for contract 2 is tentative. For site clearance phase 3 parcel, exit points are not proposed along hoarding closer to the PIE to prevent risk of roadkills.

Throughout the duration of site clearance, one camera trap will be placed at the wildlife exit point of the zone being cleared to monitor exit/entry of fauna. The camera trap will be set to capture a 10-s video per trigger with no quiet period between triggers.

The workflow for pre-felling fauna inspection during site clearance is described in 6.1.2.2.2.

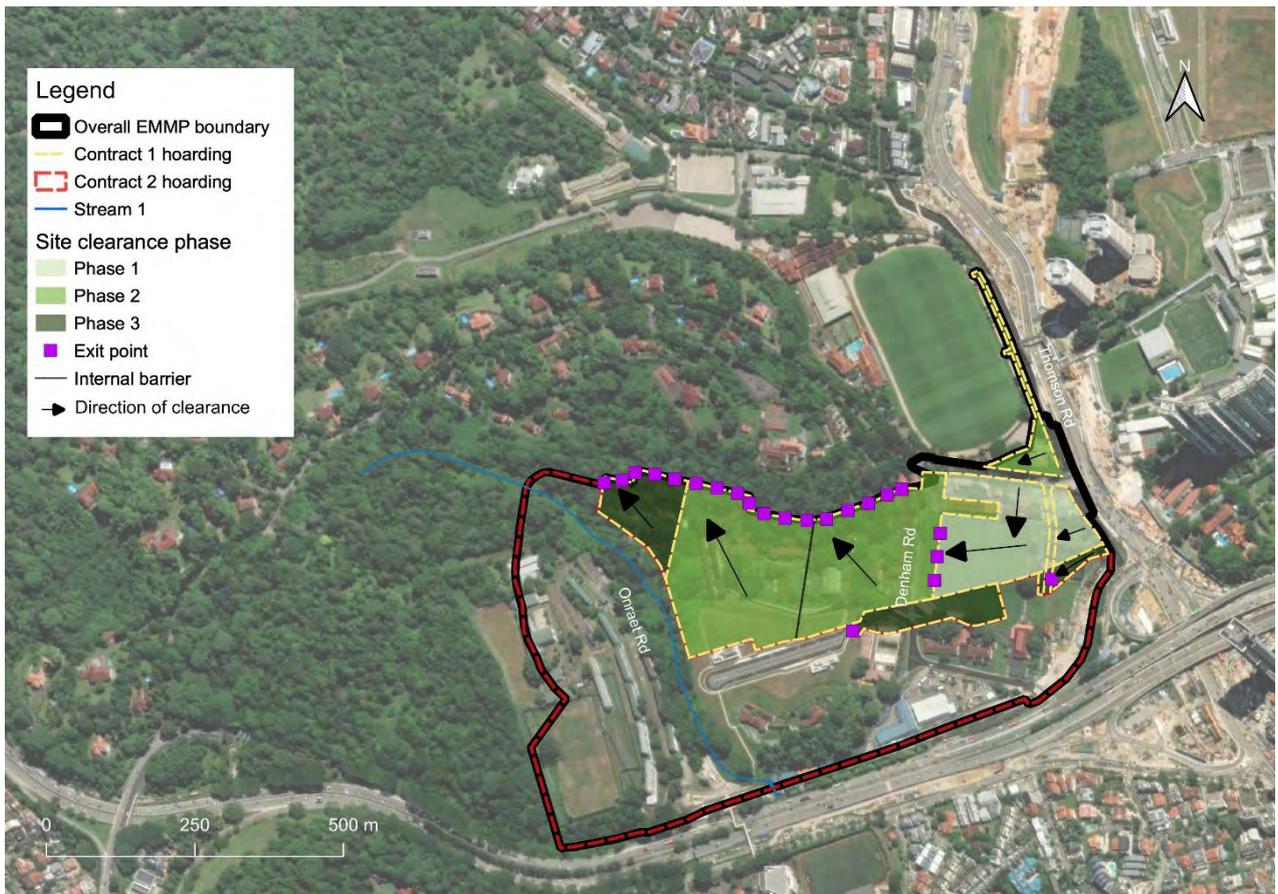
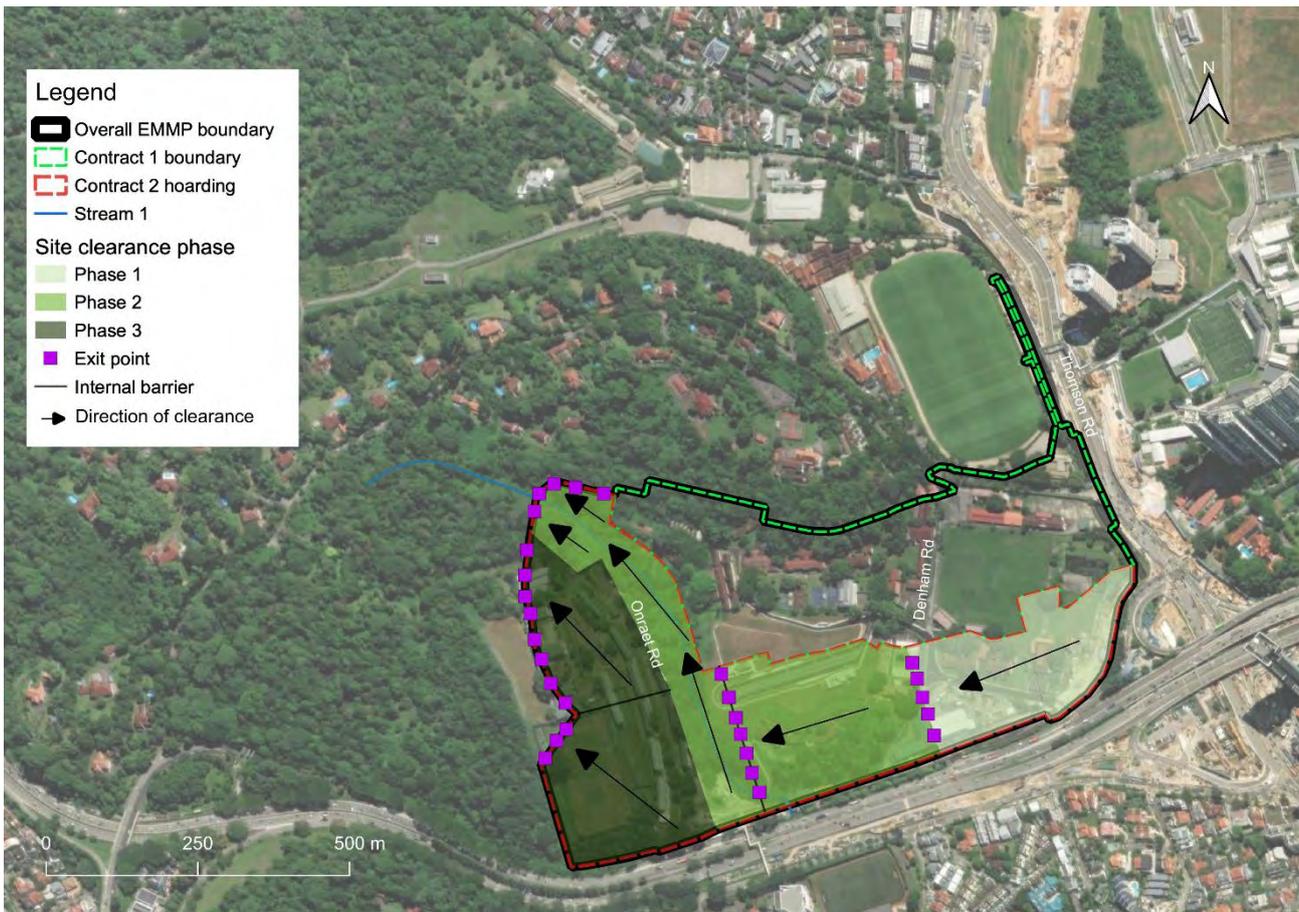


Figure 14: Direction of Site clearance – Contract 1



**Figure 15: Indicative direction of Site clearance – Contract 2**

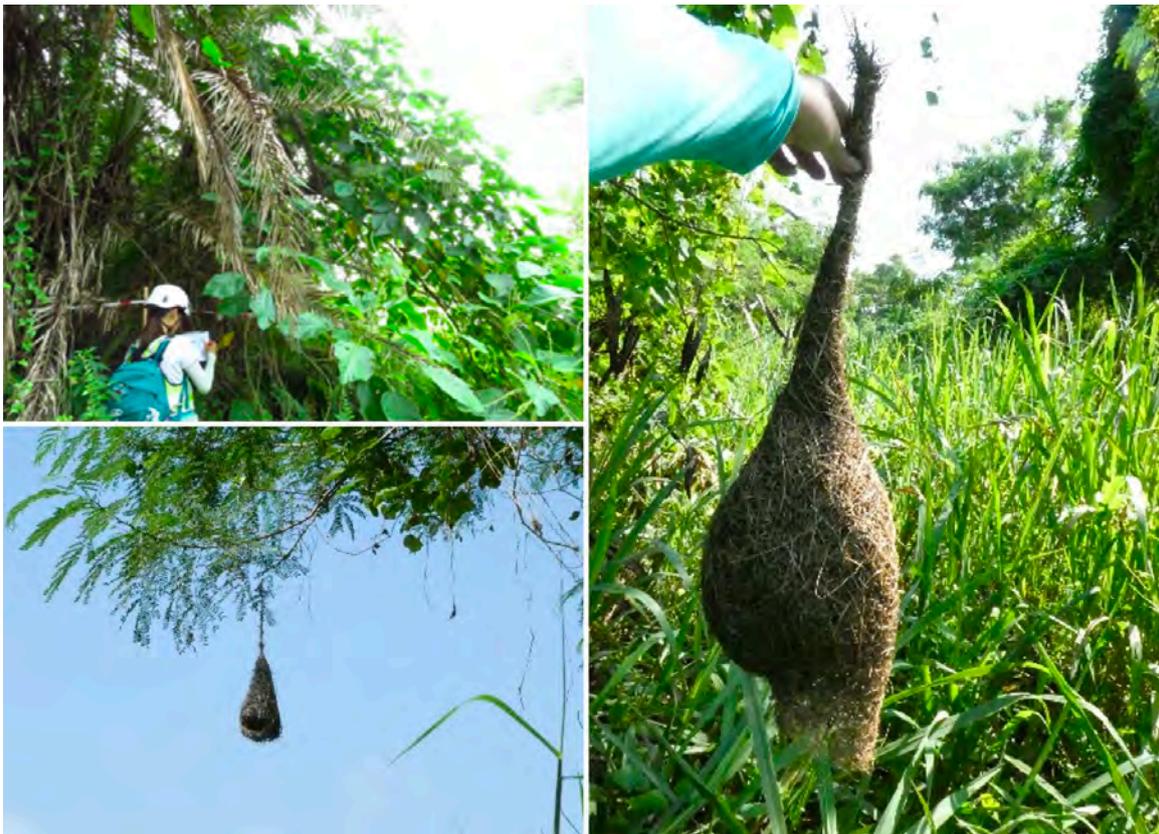
#### 6.1.2.2.2 Pre-felling Fauna Inspection

Clearance of undergrowth will be first conducted prior to felling of trees on site. After completion of undergrowth clearance, each zone shall be left to fallow for three days to encourage arboreal fauna to leave the site. Subsequently clearance of remaining trees within the zone will be carried out. No vegetation clearance can take place within this fallow period of three days. Pre-felling inspections for the undergrowth and remaining trees can be conducted together on the first day of each round of inspection.

- The Ecologist will undertake pre-site clearance fauna inspections for trees and non-tree vegetation to be removed. The pre-site clearance fauna inspection includes the identification and reporting of the following:
  - Active bird nests, including hollows, and other forms of nesting structures utilised by birds.
  - Active mammal nests/burrows/roosts.
  - Other less-mobile animals that are at risk of injury/mortality during tree felling or vegetation removal (e.g., Sunda pangolin).
  - Animals that may be implicated in human-wildlife conflict (e.g., snakes).
- Tree trunks, branches and canopy are to be checked by the Ecologist with binoculars from multiple angles and distances. Any cavities in tree trunks that may be utilised as nesting/roosting structures are to be noted for closer inspection if deemed potentially active. If a nest is potentially identified and activity level is

uncertain, the Ecologist will conduct or supervise the closer investigation of the nest site utilising elevating equipment where required.

- The Ecologist will produce a pre-felling fauna inspection report, indicating any relevant information collected during the inspection, including Tree Tag ID (and/or flora location coordinates if not tagged), animal observations, recommended actions, and photographic evidence.
- Pre-felling fauna inspection is valid for seven days, i.e., if the inspected trees or vegetation are not removed within seven days of the Ecologist's inspection, the inspection will be repeated.
- In the event that animals or active nests are found, the Contractor shall not disturb the animal and allowed them to move away on their own before tree felling or vegetation removal, unless the Ecologist deems it necessary to relocate them.
- Allow nesting birds to fledge and leave the nests on their own before tree felling or vegetation removal. Clearance of undergrowth will first be conducted prior to felling of trees on site. After completion of undergrowth clearance, each zone shall be left to fallow for 3 days to encourage arboreal fauna to leave the site, before clearance of remaining trees within the zone can take place. No vegetation clearance can take place within this fallow period of 3 days.



**Figure 16: Pre-felling fauna inspection conducted by Ecologist to identify active nests, the presence of fauna.**

### CAMPHORA PRE-FELLING FAUNA INSPECTION PROTOCOL

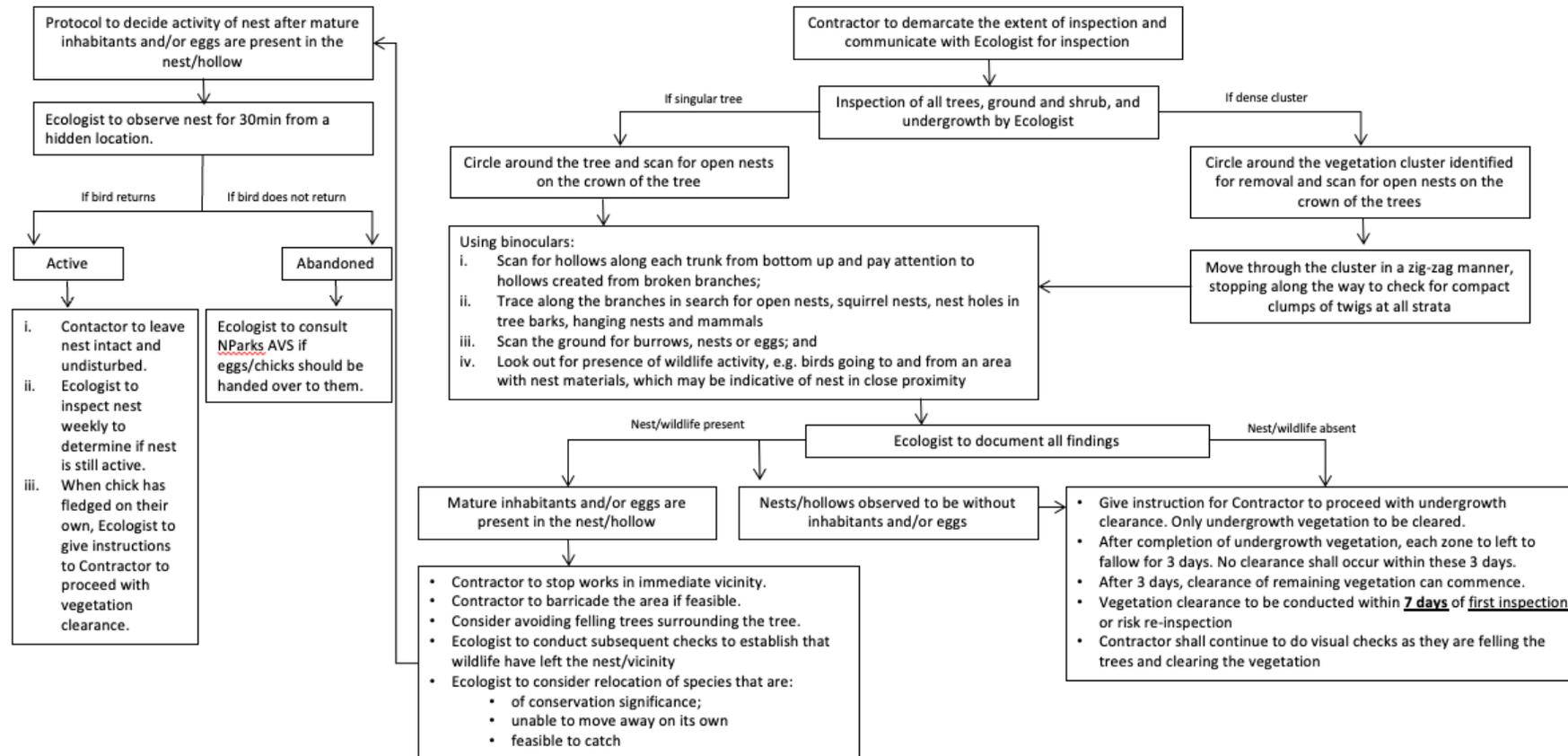


Figure 17: Pre-felling fauna inspection protocol

#### **6.1.2.2.3 Post-site Clearance Fauna Inspection**

After the site clearance have been completed for each zone, the Ecologist will visually inspect the zone for the presence of target fauna. If there are any remaining fauna within the zone, the Ecologist will develop a species-specific method to remove them in consultation with the Contractor and NParks (Section 8.2). If there are no target fauna left within the worksite after it have been completely cleared, the internal barriers segregating the two zones can be removed, and the wildlife exit points can be permanently sealed or removed.

#### **6.1.2.2.4 Fauna Inspection every two weeks**

Fauna inspections will be conducted by the Ecologist within the Contract boundary every two weeks. The following will be noted during the inspections:

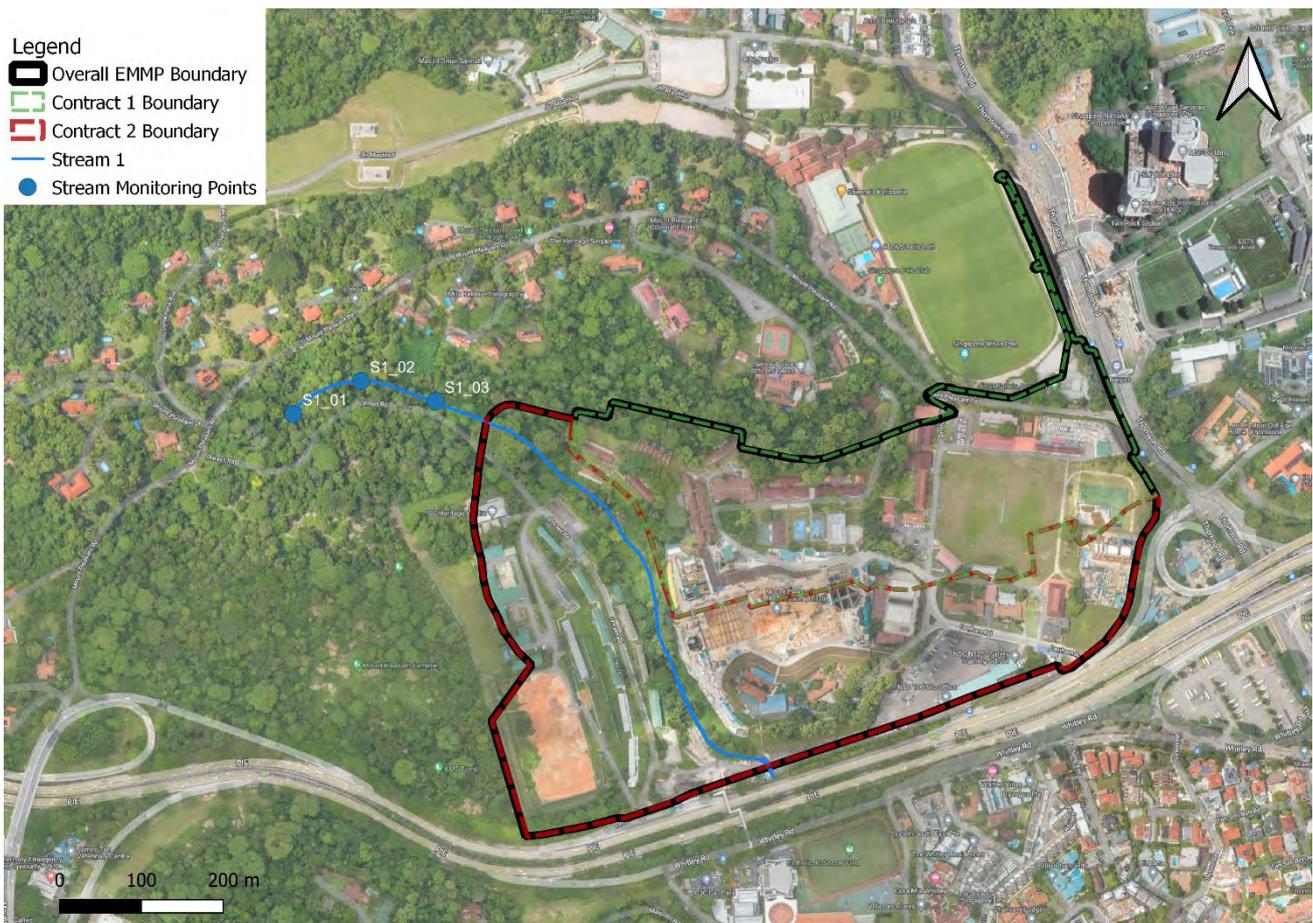
- Presence of trapped/injured/dead fauna.
- Potential fauna entrapments (e.g., ECBs, TPZs, pits, drains, ponds, trenches, tanks).
- Gaps in hoarding that may allow entry of ground-dwelling fauna.
- Improperly disposed/stored food and food packaging.
- Unauthorised discharge or siltation into the upstream portion to be conserved (i.e., outside of the overall EMMP boundary)



**Figure 18: Fauna inspections every two weeks to ensure the integrity of hoarding, and that no fauna entrapments exist on site (e.g., ECM sedimentation ponds, erosion control blankets, tree protection zones, and biodiversity awareness training for site personnel)**

#### **6.1.2.2.5 Monthly Fauna Monitoring**

The fauna monitoring surveys will focus on the conserved stream habitat (i.e., 30% upstream portion of Stream 1) located west of the overall EMMP boundary. The stream habitat was recommended to be conserved in the EIS (AECOM, 2021) due to the presence of a population of collared threadtail, which is nationally Vulnerable. Fauna monitoring surveys comprises diurnal point counts at aquatic sampling points along Stream 1. Surveys will focus on odonates, particularly the two nationally Vulnerable species recorded during the EIS and/ or RBS – collared threadtail (*Prodasineura collaris*) and grey sprite (*Pseudagrion pruinosum*). The grey sprite was a new species recorded during the RBS conducted in 2023. Twenty-minute diurnal visual point count surveys will be conducted at the upstream aquatic sampling points (S1\_01 to S1\_03; Figure 19) between 0900–1600h.



**Figure 19: Monthly Fauna Monitoring Locations**

#### 6.1.2.2.6 Lighting Management Plan (LMP)

Prior to the start of night-time works, an approved LMP by NParks should be in place. The Contractor will provide a works specific LMP for the night works they are planning to undertake. This is to confirm and comply with the timing and implementation of the agreed works and the lighting management measures. Night-time work can only commence after the LMP has been agreed with the EMMP Consultant, and approval to start work from relevant authorities have been obtained. Should there be night works at the western perimeter of the Site along the forested area, higher hoarding (~8-10 meters) will be installed to prevent light spillage into the forested area. Guidelines on LMP is provided in APPENDIX H.

## 6.2 Water Quality Management Plan

Activities that may impact Stream 1 and other discharge location/s are below during the construction phase include the following:

- Land clearing, earthworks and excavation activities.
- Storage and disposal of liquid, solid and hazardous wastes.
- Use and storage of chemical substances, and refuelling activities.

Throughout the duration of the development, the following control measures should be observed to minimise hydrology and water quality impacts during the infrastructure works phase:

### 6.2.1 Construction

**Table 2: Recommended Water Quality Management Plan**

Environmental Parameters	Activity	Specific Recommendations
<b>Waste Generation</b>	Site clearing, earthworks and general construction activities	<ul style="list-style-type: none"> <li>■ Development of a standard operating procedure (SOP) for safe handling, transfer, storage and disposal of wastes.</li> <li>■ Effective ECM and monitoring implemented as recommended in the COP on Surface Water Drainage to ensure that discharge into the stormwater drainage system does not contain total suspended solids (TSS) in concentrations greater than the prescribed limits under the regulations.</li> <li>■ ECM measures include but are not limited to minimisation of formation of bare soil, coverage of all bare/erodible surfaces, slope stability, concrete cut-off drains, silt fences/traps along the perimeter cut-off drain, turbidity curtains for works adjacent to waterbodies, etc.</li> <li>■ Implementation of CCTV including Silt Imagery Detection System (SIDS) at the public drain to monitor the surface run-off discharges from the site.</li> <li>■ Provision of enclosed bins and waste disposal facilities, which are cleared regularly to prevent accumulation. Housekeeping checks will be carried out daily to ensure all litter is cleared from site.</li> <li>■ All wastes will be disposed only in designated waste disposal facilities and appropriately segregated in segregation bins (i.e., general, recyclable waste, toxic waste, etc.); and</li> <li>■ Appropriate disposal of any waste by licensed waste collectors as per regulatory requirements</li> </ul>
<b>Liquid Effluent Generation and Stormwater Run-Off</b>	Wastewater resulting from site clearance, excavation etc.	<ul style="list-style-type: none"> <li>■ A full inventory of all anticipated wastewater streams and volumes should be available before the construction works.</li> <li>■ No unmanaged discharge of wastewater is permitted.</li> <li>■ Reduce, reuse, and recycle hierarchy principle to be applied to wastewater on-site.</li> <li>■ No hazardous liquids to be directed to the settling pond.</li> <li>■ Hazardous wastewater and chemicals are to be stored appropriately and disposed for treatment and disposal off-site by a licensed waste contractor.</li> <li>■ Settling ponds are to be constructed with impervious material and be designed with sufficient capacity to hold volumes of wastewater</li> </ul>

Environmental Parameters	Activity	Specific Recommendations
		<p>produced on-site, as well as allowance for stormwater run-off and potential fire-fighting wastewater.</p> <ul style="list-style-type: none"> <li>■ Temporary storage of sufficient capacity should be provided for overflow situations to ensure that untreated wastewater is not released to waterbodies unless it complies with trade effluent discharge standards.</li> <li>■ A responsible person (e.g., ECO) to be assigned to oversee the efficient operation of the settling ponds and to inspect settling ponds daily to ensure proper functionality.</li> <li>■ Daily records of wastewater and sludge generation.</li> <li>■ Provision of sufficient spill kits and oil-water separators at the site, as needed.</li> <li>■ Ensure there is no unauthorised discharge or siltation into the Stream 1, including upstream portion of Stream 1, that is to be conserved.</li> </ul>
	<p>Storage and disposal of solid, liquid, and toxic wastes</p>	<ul style="list-style-type: none"> <li>■ Provision of portable toilets and on-site septic tank.</li> <li>■ Regular cleaning of the portable toilets and clearing of sewage waste by licensed waste contractors.</li> <li>■ Appropriate location of toilet facilities away from any nearby waterbodies (i.e., at least 30-m away).</li> <li>■ Daily inspection to ensure hygienic conditions.</li> <li>■ ECM Plan to be signed off by a QECP and approved by PUB.</li> <li>■ Effective ECM and monitoring implemented as recommended in the Code of Practice on Surface Water Drainage to ensure that discharge into stormwater drainage system does not contain TSS in concentrations greater than the prescribed limits under the trade effluent limits.</li> <li>■ Implementation of CCTV including a SIDS at the public drain to monitor the surface run-off discharges from the site.</li> <li>■ Runoff within, upstream of, and adjacent to the work site should be effectively drained away without causing flooding in the vicinity.</li> <li>■ Manholes should always be adequately covered and temporarily sealed.</li> <li>■ Protection of stockpiles with erosion blankets (made of organic material without plastic netting to prevent animals from getting trapped in these)</li> </ul>

Environmental Parameters	Activity	Specific Recommendations
		<p>and proper scheduling of the earthworks to reduce the volume of stockpiles to be stored onsite.</p> <ul style="list-style-type: none"> <li>■ All vehicles and plant should be cleaned before leaving the site to ensure no earth, mud, debris, etc., is deposited on roads; and the wastewater shall be treated prior to discharge to the public sewers.</li> <li>■ Appropriate permits for discharge to be obtained from relevant authority prior to discharge. No trade effluent other than that of a nature or type approved by NEA Director-General shall be discharged into any watercourse or land.</li> <li>■ Development of SOP for safe handling, transfer and storage of toxic waste; housekeeping checks daily to ensure all toxic waste is cleared from site.</li> <li>■ Appropriate storage area for toxic waste in accordance with regulatory requirements.</li> <li>■ Appropriate construction material for toxic waste storage containers with leak detection tests conducted periodically.</li> <li>■ Provision of secondary containment for all toxic waste stored in bulk in accordance with the COPPC.</li> <li>■ Preparation of an emergency response plan (ERP), training of the Emergency Response Team (ERT) on ERP requirements.</li> <li>■ Consignment notification/tracking system and transport ERP for transport of toxic waste; and</li> <li>■ Appropriate disposal of toxic waste by licensed waste operator/collector.</li> </ul>
	<p>Stormwater Run-off Generation</p>	<ul style="list-style-type: none"> <li>■ Implementation of approved ECM Plan.</li> <li>■ Adequate drainage, piping and/or channelling of stormwater run-off to be assured through detailed design for capture and treatment before discharge into surface waterbodies.</li> <li>■ Procedures for the inspection and maintenance of stormwater collection, storage, and treatment infrastructure, such as pipes, oil water separation, silt screens, etc.; and</li> <li>■ Procedures for the management of stormwater collection, settling, testing and eventual discharge of 'clean' water to surface waters. This should also include associated measures required to prevent high sediment concentration stormwater drainage to surface water.</li> </ul>

Environmental Parameters	Activity	Specific Recommendations
		<ul style="list-style-type: none"> <li>Runoff within, upstream of, and adjacent to the work site shall be effectively drained away without causing flooding in the vicinity;</li> </ul>

### 6.2.2 Monitoring Requirements

Water quality monitoring at discharge locations will be required, at a minimum, in addition to monitoring at the upstream of Stream 1. The recommended standards/guidelines and parameters for water quality monitoring are as per NEA's Allowable Limits for Trade Effluent Discharge to Sewer/Watercourse/Controlled Watercourse and water quality criteria for aquatic life as per ANZGFMV standard.

**Table 3: Recommended Monitoring Program (Water Quality)**

Test	Parameters	Frequency and Duration
In-Situ	TSS	<p>Online real time monitoring for TSS at the discharge point locations throughout the construction period.</p> <p>Monthly visual monitoring at Stream 1 for siltation, and in-situ measurement of Temperature, pH, Turbidity and TSS, Conductivity, Dissolved Oxygen (DO) should there be visual evidence of siltation</p>

### 6.3 Air Quality Management Plan

The EIS has identified areas and receptors which are potentially impacted by the construction. Mitigating measures are recommended during the construction phase for human health and ecological receptors. The specific activities assessed in the EIS for the construction phase are as follows:

- Earthworks – excavation, loading and unloading of spoil, tipping, stockpiling, soil-stripping, ground levelling, and landscaping using excavators, cranes, etc.
- Construction: Any type of construction activity involving new structures on construction footprint.
- Track out: The transport of dust and dirt from/to the construction site onto the public road network, where it may be deposited and then re-suspended by vehicles due to heavy vehicles leaving the site with dusty materials, which may then spill onto the road, and/or when heavy vehicles transfer dust and dirt onto the road having travelled over muddy ground on site.

Throughout the duration of the development, the following control measures should be observed to minimise dust generation:

- The Contractor should implement their Air Quality Management Plan that includes the following components:
  - An inventory of potential air emissions sources throughout the pre and construction period, including fugitive dust emission sources, timelines, dust control measures and frequency of implementation
  - Site layout indicating the locations and activities where dust is most likely to be generated such as haulage routes, excavation areas, etc.

- The location of the water supply or chemical suppressants for applying to the dust generating areas on site.
- A summary of the air monitoring locations and frequency of monitoring, as well as any trends observed throughout the monitoring period.
- Reporting, notification and management of air quality-related incidents and complaints and corrective actions.
- Daily, weekly, monthly inspection requirements relating to air quality management at the construction site.
- The Plan shall be reviewed at regular intervals during the construction phase to ensure the effectiveness and applicability of the procedures in place.
- General Site Management:
  - Record all dust and air quality complaints, identify root cause, take appropriate measures to reduce emissions in a timely manner, and record the measures taken.
  - Record any emergency air quality-related incidents that cause dust and/or air emissions, and the corrective action taken to resolve the situation.
  - Coordinate with nearby large-scale construction sites (i.e., NSC) to ensure that air quality levels are maintained in the area, especially at the receptors.
  - Plan site layout so that machinery and dust causing activities are located away from receptors, where possible.
  - Erect hoarding around dusty activities and at the contract boundary wherever possible, with boundary screens at least as high as any stockpiles or dust emission sources on site.
  - Assess activities with high potential for dust generation and fully contain these activities, if possible.
  - Keep site fencing, barriers, and scaffolding clean by using wet methods (i.e., water spray).
  - Remove materials that have the potential to produce dust as soon as possible.
  - All stockpiled material should be covered with impermeable sheeting or enclosed to prevent fugitive dust.
  - The construction footprint shall be hoarded on all sides.
  - No concrete batching plant to be located on-site.
  - Road construction is recommended to be completed first and paved before any other construction activities.
  - Implement dust suppression techniques such as water sprays.
  - Re-vegetate earthworks and exposed areas/soil stockpiles to stabilise surfaces as soon as practicable.
  - Only remove the cover in small areas in accordance with work schedule and not large areas at once.

- Vehicle Management:
  - Implement a maximum-speed-limit of 20 km/hr on paved roads and 15 km/hr on unpaved roads and work areas.
  - Ensure all vehicles and engine powered equipment comply with the regulatory requirements in terms of fuel use and maintenance.
  - No idling of vehicles or engines.
- Waste Management:
  - Avoid burning of waste or other materials.
  - Ensure sand and other aggregates are stored in bunded areas and are not allowed to dry out.
  - Ensure bulk cement and other fine powder materials are delivered in enclosed tankers and stored in silos with suitable emission control systems.
  - For smaller supplies of fine power materials ensure bags are sealed after use and stored appropriately to prevent dust.

### 6.3.1 Construction

Particulate matter (PM<sub>10</sub> and PM<sub>2.5</sub>) is expected to be predominant during the construction works due to earth movement and excavation. PM<sub>10</sub> and PM<sub>2.5</sub> are proposed to be monitored for a 7-day continuous period to establish a pre-construction baseline. Routine air quality monitoring is also recommended during the construction phase.

Based on a review of sensitive receptors around the Overall EMMP boundary, a continuous monitoring program as per **Table 4** is proposed to be conducted during construction. Other mitigating measures for construction includes:

- Only use cutting, grinding or sawing equipment with suitable dust suppression techniques such as water sprays or local extraction e.g., local exhaust ventilation system.
- Ensure an adequate water supply for effective dust suppression.
- Minimise drop heights from conveyors, loading shovels, hoppers and use fine water sprays on equipment whenever appropriate.
- For dry spillages, cleaning should be conducted as soon as practicable using wet cleaning methods.
- Undertake regular (daily frequency recommended) on-site and off-site inspections and record results including checks of surfaces such as cars and windowsills within 100-m of contract boundary. Cleaning should be provided if necessary.

The following mitigating measures for track out are recommended:

- Use water-assisted dust sweeper(s) on the access roads, to remove, as necessary, any material tracked out of the site.
- Avoid dry sweeping of large areas.
- Ensure vehicles entering and leaving the site are covered to prevent escape of materials during transport.
- Inspect routes for integrity and repair any deficiencies as soon as practicable.

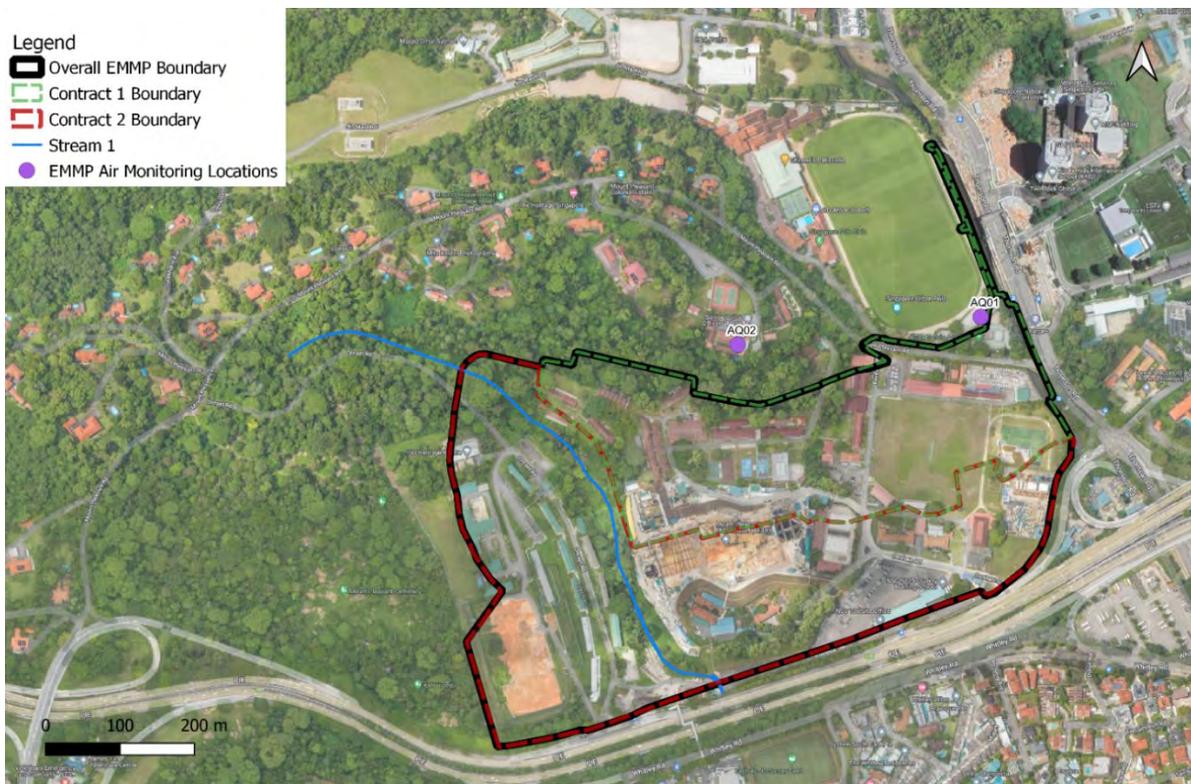
- Record all inspections of haul routes and any subsequent action in a site logbook.
- Implement a wheel washing system (with rumble grids to dislodge accumulated dust and mud prior to leaving the site where reasonably practicable).
- Ensure there is an adequate area of hard surfaced road between the wheel wash facility and the site exit, wherever site size and layout permits.
- Site access gates to be located at least 10-m from receptors where possible.

### 6.3.2 Air Monitoring

Before the start of the construction, the Contractor is recommended to conduct one round of 7-day continuous monitoring. The Contractor may deploy any air quality monitoring equipment available in the local market, subject to the EMMP consultant’s approval.

**Table 4: Recommended Monitoring Program (Air Quality)**

Location	Parameters	Frequency and Duration
<ul style="list-style-type: none"> <li>■ AQ01 - Singapore Polo Club</li> <li>■ AQ02 - 157C Mount Pleasant Road</li> </ul>	PM <sub>10</sub> and PM <sub>2.5</sub>	<ul style="list-style-type: none"> <li>■ Particulate monitoring prior to construction to establish the pre-construction levels.</li> <li>■ Continuous particulate monitoring during the earthworks and infrastructure phase.</li> </ul>



**Figure 20: Proposed EMMP for Air Monitoring Locations**

## 6.4 Airborne Noise Management Plan

In the construction phase, potential impacts include human annoyance and sleep disturbance to the nearest receptors, and disturbance to fauna, including affecting ecological foraging behaviour, Intra-species and inter-species communication. The minimum controls for management of airborne noise from the construction works include:

- Implement a Noise Monitoring and Management Plan that includes noise monitoring requirements, record keeping, stakeholder engagement and procedures for complaint handling.
- Adhering to the prohibited periods for Construction work specified in the Fourth Schedule of the EPM (Control of Noise at Construction Sites) Regulations, and other prohibitions specified in the Third Schedule of the Environment Protection and Management Act.
- No high noise generating activities should be carried out during night works.
- The contractor to identify noise levels of equipment to verify the need for noise barriers and/or enclosures.
- The contractor to keep an inventory of equipment and noise levels and determine options for lower noise generating equipment.
- All machines and equipment that are not in use shall be turned off.
- Adhere to manufacturer specifications on maintenance of machines and equipment.
- Inspect machines and equipment regularly to ensure that these are in optimal working condition at all times.
- Review equipment schedule against work programme regularly to ensure that the number of equipment shall be optimum (i.e., not excessively operating equipment) to reduce noise levels.
- Consider use of silencers or mufflers on construction equipment while facing sensitive receptors.
- Contractor training and toolbox meetings to remind personnel of work practices to keep noise levels at a minimum such as no throwing of metal items and no dropping of materials from height, and no excessive honking, among others.
- Plan the layout of the site by considering using materials and other large structural equipment, and material stockpiles to screen noise.
- Plant known to emit noise strongly in one direction shall, wherever possible, be orientated so that the noise is directed away from the nearby noise sensitive receptors.

Source control mitigation measures are recommended, especially along the western part of the EMMP boundary, including:

- For generators, installation of the manufacturer's acoustic casing.
- For excavator with rock breaker, use of an acoustic shed with adequate ventilation for the machine and bit.
- For earth moving plant such as cranes, engine should be enclosed with manufacturer's enclosure panels, and exhausts to be fitted with silencers.
- All pumps should have acoustic enclosures.
- For piling rigs, provide acoustic dampeners and screen as close to the activity/operation as possible.

Recommendations for noise barrier specifications are provided based on the COP for Noise Control at Construction Sites (SS602:2014), specifications for acoustic shed/ enclosure are given below:

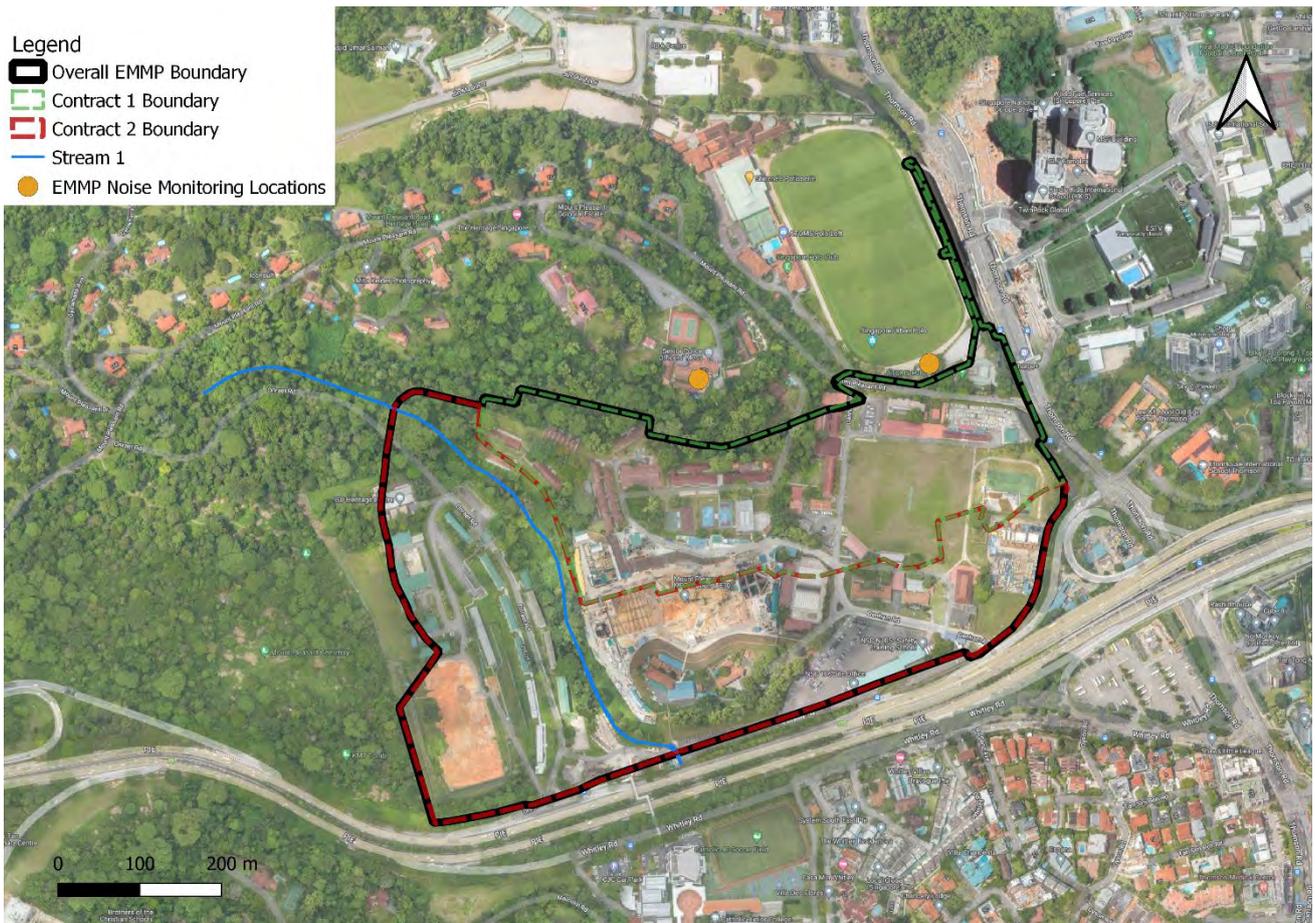
- Cover the machine/equipment as fully as possible, providing adequate sound insulation that noise energy does not readily pass through it.
- Have a sound absorbing material lining such as glass fibre, mineral wool, straw slabs, wood wool slabs can be used, to avoid the build-up of sound energy inside
- Outer cover material made up of brickwork, fibreboard or plasterboard.
- A thickness of at least 25-mm is to be provided in case of high frequency sound, whereas a 12-mm thick lining would suffice for low frequency sound.
- Perforated sheet coverings can be used to protect the inner lining material, especially if it is glass wool or mineral wool-based lining.

#### 6.4.1.1 Noise Monitoring Requirements

Noise monitoring at the locations below (Table 5, Figure 21) is recommended during pre-construction and construction to get accurate information on noise levels during the works. Should there be any elevated noise levels, these should be addressed as per the Noise Control Management Plan by the Contractor.

**Table 5: Recommended Monitoring Program (Airborne Noise)**

Location	Parameters	Frequency and Duration
Monitoring at the following locations: <ul style="list-style-type: none"> <li>■ NQ01 - Singapore Polo Club</li> <li>■ NQ02 - 153 Mount Pleasant Road</li> </ul>	$L_{Aeq}$ (12 hour), $L_{Aeq}$ (1 hour), and $L_{Aeq}$ (5 min)	<ul style="list-style-type: none"> <li>■ 7-day pre-construction baseline</li> <li>■ Continuous noise monitoring for the entire duration of the earthworks and infrastructure phase.</li> <li>■ In the event of a valid complaint, once a month in the area where the complaint is for as long as the particular complaint related construction activity continues.</li> </ul>



**Figure 21: Proposed EMMP Noise Monitoring Locations**

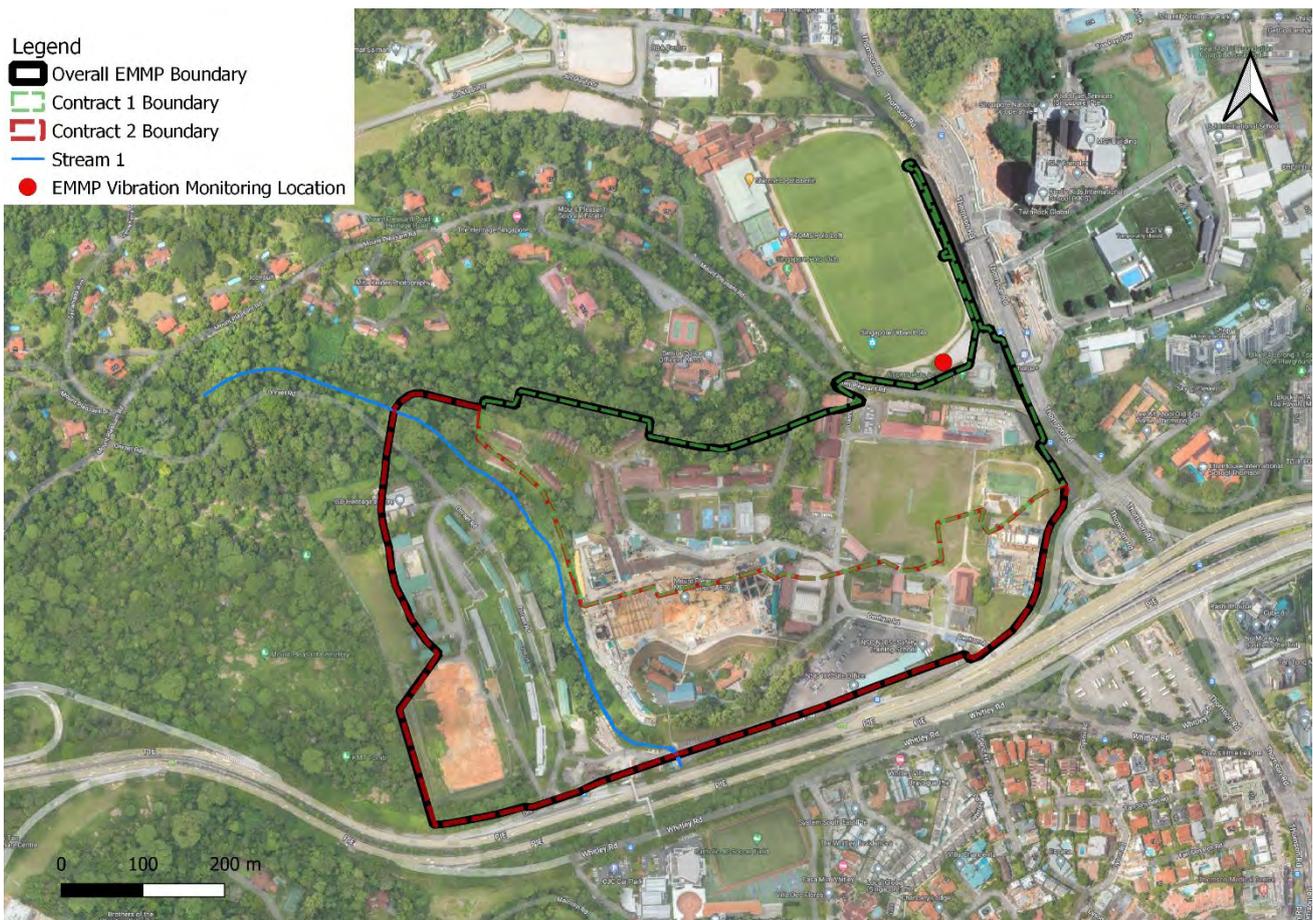
## 6.5 Ground-borne Vibration Management Plan

The following general controls for ground-borne vibration are recommended:

- Implement the Contractor’s Ground-borne Vibration Management Plan.
- Potential vibration generating activities should be carried out only during daytime.
- Should any complaints be received, particularly during piling Works, a 7-day vibration monitoring period is recommended at the receptor, and options to reduce vibration from the activity such as use of smaller weights may be required.

### 6.5.1 Vibration Monitoring Requirements

Continuous monitoring is recommended at the Singapore Polo Club vicinity (Figure 22) to determine any trigger levels during the construction works. This location is assessed as representative of general vibration impact to nearby receptors.



**Figure 22: Proposed EMMP Vibration Monitoring Location**

## 6.6 Vector Control Management Plan

Issues with vector control, typically in waste stores, worker shelters, drains and site offices are commonplace in construction sites. General vector control management measures are recommended as follows:

- Implement the Vector Control Management Plan detailing procedures to control vector at the site, and implementation of an effective vector control plan for mosquitoes, flies, cockroaches, rat and rat fleas.
  - Ensure that the Site's VCO is registered with NEA and the VCT and VCW are licensed or certified.
  - The Contractor is to ensure that the VCO's work is monitored closely, and all inspections, findings and treatment are to be included in the VCO's service report.
- Avoid stagnant water accumulation in all areas at the site, and prompt drainage of any stagnant water in drains, drip trays, road depressions and any containers.
- Use of sloping/pitched roof for all site offices and sheds.
- Inspection for potential mosquito breeding areas should be carried out weekly, including any unused containers, building materials, equipment and machinery, water storage tanks and drums, among others.
  - All breeding and potential breeding locations are to be reported.

- Fogging should only be carried out when there is a mosquito nuisance problem, or when there is any dengue or Zika outbreaks. The Contractor shall seek approval from NEA before fogging is carried out.
  - Monitor any form of water receptacle and clear water daily to prevent mosquitos from breeding.
- Vector surveillance/inspection should be carried out after rainfall.
- Use environmentally friendly methods for vector control and search & destroy operation etc. instead of anti-malaria oil, or chemical larvicides, if available. Bti is a non-specific larvicide and its constant use will result in loss of butterflies and odonates larvae. Bti should only be applied in areas where its inaccessible and typical solutions have not been able to resolve stagnant water.
- Ensure effective housekeeping is carried out in all areas at the site, including:
  - Storage of food in rodent proof storage containers/cabinets with at least 60 cm clearance above ground level
  - Enclose food waste in plastic bags before disposal into waste bins.
  - Food waste to be removed daily and bins to be cleared regularly to prevent fly and rodent infestation.
  - Construction worksite to be kept free of litter; construction wastes shall be disposed promptly into bulk waste containers and the containers shall be emptied daily.
- Vector control and management training to be provided to all contractors every 6 months.

### 6.6.1 Vector Control Monitoring Requirements

**Table 6: Recommended Vector Control Monitoring**

Location	Parameters	Frequency and Duration
Entire Site and any identified receptors outside boundaries with concerns	Inspection of potential mosquito breeding grounds (stagnant water) and rodent burrows	Weekly during construction
	Visual site inspection to ensure proper housekeeping	After rainfall
Entire Site	Any instances of vector breeding locations and corrective actions  Any vector-related diseases	Record as and when encountered

## 6.7 Waste Management Plan

Types of waste expected to be generated at the Site include:

- General non-hazardous wastes such as wastepaper, cans, plastics, refuse from the domestic facilities, empty containers bags, etc.
- Hazardous wastes such contaminated debris, chemical waste and chemical containers, contaminated rags, used spill response equipment, among others.
- Excavated material.

- Electronic wastes.
- Recyclable wastes such as scrap metals, wooden pallets, etc.
- Biomass/horticultural waste from land clearance.

Wastewater discharges including sewage and trade effluent, and spill response requirements are included as part of the Water Quality Management Plan.

#### Classification Of Waste and The License Class Required Class of licence Type of Waste

- i. Class A - Type A: In-organic waste (e.g., construction and renovation debris, tree trunks and branches, furniture disposal, electrical appliances, wooden crates, pallets and other bulky items for disposal) and recyclable waste (excluding food waste).
- ii. Class B - Type B: Organic waste (e.g., food and other putrefied waste from domestic, trade and industrial premises, markets and food centres (excluding used cooking oil).
- iii. Class B.1 - Type B1: Cooking Oil.
- iv. Class C - Type C Sludge from water treatment plants, grease interceptors, water-seal latrines, sewage treatment plants, septic tanks or other types of sewerage systems.

The minimum controls to be implemented for waste management throughout the Construction period includes:

- Implementation of a Waste Management Plan including all the waste categories that will be generated from the Site, with procedures for safe handling, transfer and storage of waste.
- Any surplus excavated material to be diverted from the dumping ground and used as fill, landscaping, erosion control and restoration wherever practicable.
- Scrap metals to be recovered and sent for recycling as scrap.
- An organic waste disposal point shall be designated on the site for the purpose of centralizing site organic wastes for collection by a NEA licensed general waste collector with Class B license.
- General waste to be collected and disposed through an NEA-licensed general waste collector.
- All non-hazardous wastes to be handled and disposed of in accordance with regulatory requirements.
- All hazardous wastes to be handled and disposed by an NEA-licensed toxic waste collector in accordance with EPH (Toxic Industrial Wastes) Regulations.
- All wastes will be disposed only in the designated waste disposal facilities and appropriately segregated.
- Designated waste storage location/s for general and toxic industrial waste (TIW) and ensure that there is physical separation in the storage of non-compatible waste streams.
- Provision of secondary containment for all toxic waste stored in bulk as per the requirements in the COPPC.
- Include provision for emergency response to TIW spills and leaks and appropriate training of ERT to respond to such.
- Provision of enclosed bins and waste disposal facilities cleared up as often as necessary to prevent build-up.
- Daily housekeeping checks and removal of waste from the Site.

## 6.7.1 Waste Monitoring Requirements

**Table 7: Recommended Waste-related Monitoring**

Location	Parameters	Frequency and Duration
Entire Site	Volume of waste diverted and disposed by type, with identification of waste reduction opportunities	Throughout construction
	Volume and type of toxic industrial waste disposed including waste manifests	Register of toxic industrial waste to be updated weekly
	Inspection of waste storage locations	Weekly inspection report

## 7.0 ENVIRONMENTAL IMPACT, MITIGATION AND MONITORING REGISTER

A summary of the impacts, proposed mitigation, and monitoring requirements for each of the identified significant environmental impacts is provided in this section. The register is intended to be used as a checklist for EMMP inspection every two weeks. Depending on the phase of the works, the register/checklist will be classified into earthworks and infrastructure and building mitigation/management and monitoring requirements. Completed checklists will be provided as part of Monthly EMMP reports.

**Table 8: Summary of Environmental Mitigation, Management and Monitoring**

Environmental Issue	Mitigation / Management Measures	Monitoring Requirements	Frequency	Implementation Responsible Party	Inspection Responsible Party	Triggers
<b>Pre-construction</b>						
<b>Flora</b> <ul style="list-style-type: none"> <li>Loss of vegetation/ habitat</li> <li>Habitat pollution and degradation</li> <li>Change in species composition.</li> </ul>	<ul style="list-style-type: none"> <li>Prior to commencement of site works, flora monitoring and management plan should be crafted in consultation with NParks.</li> <li>Verification and review of footprints for hoarding, access roads and soil investigation work.</li> <li>Ensure that the project boundary is clearly identified on engineering drawings and appropriately marked on site.</li> <li>Ensure works should not exceed the approved project footprint and there is no excessive vegetation and/or tree removal.</li> <li>Proper waste disposal guidelines of construction waste and hazardous material should be strictly adhered to, in order to prevent habitat pollution which impedes seedling recruitment.</li> </ul>	Inspection of trees and plant specimens affected by construction works	As needed prior to Site clearance	EMMP Consultant and Contractor	EMMP Consultant	Non-compliance to any of the minimum controls or mitigation measures are observed on-site
<b>Arboriculture</b> <ul style="list-style-type: none"> <li>Loss of vegetation/habitat</li> <li>Habitat pollution and degradation</li> </ul>	<ul style="list-style-type: none"> <li>Prior to commencement of site works, plant transplantation procedures and tree protection protocol, should be crafted in consultation with NParks.</li> <li>Tree Monitoring and Management plan to be implemented by appointed arborist engaged by Contractor.</li> </ul>	Inspection of trees and plant specimens affected by construction works	As needed prior to Site clearance	EMMP Consultant and Contractor	EMMP Consultant	Non-compliance to any of the minimum controls or mitigation measures are observed on-site
<b>Fauna</b> <ul style="list-style-type: none"> <li>Fauna mortality and injury</li> </ul>	<ul style="list-style-type: none"> <li>Prior to the commencement of site works, Wildlife Response Plan, pre-felling procedures, wildlife herding plan and Light Management Plan should be crafted in consultation with NParks.</li> <li>Vegetation clearance will be carried out with initial undergrowth clearance followed by a fallow period and then tree-felling.</li> <li>Pre-felling fauna inspections will be conducted prior to the removal of any vegetation (with seven days validity). Ensure that hoarding, wildlife exit points,</li> </ul>	Visual Inspection	As needed prior to Site clearance	EMMP Consultant and Contractor	EMMP Consultant	Non-compliance to any of the minimum controls or mitigation measures are observed on-site

Environmental Issue	Mitigation / Management Measures	Monitoring Requirements	Frequency	Implementation Responsible Party	Inspection Responsible Party	Triggers
	<p>internal barriers inspection are setup before site clearance works.</p> <ul style="list-style-type: none"> <li>■ Deployment of camera traps for at least three full days prior to site clearance for zones with forested areas within.</li> <li>■ Wild boar removal (if any) shall be carried out by a certified WMC.</li> <li>■ Implementation of a traffic management plan that includes driver awareness training and imposition of speed limits (i.e., 20 km/hr within the site) to prevent possible roadkills.</li> <li>■ Biodiversity Awareness Training to be carried to ensure workforce complies to the fauna response procedures, general housekeeping and understands the ecological value of site.</li> </ul>					
<b>Air Quality</b>	<ul style="list-style-type: none"> <li>■ Implementation of Contractor's Air Quality Management Plan</li> </ul>	Particulate monitoring (PM10 and PM2.5) prior to construction to establish the pre-construction levels.	<ul style="list-style-type: none"> <li>■ 7-day pre-construction baseline</li> </ul>	Contractor	EMMP Consultant	Nil
<b>Noise Emissions</b>	<ul style="list-style-type: none"> <li>■ Implementation of Contractor's Noise Management Plan</li> </ul>	L <sub>Aeq</sub> (12 hour), L <sub>Aeq</sub> (1 hour), and L <sub>Aeq</sub> (5 min)	<ul style="list-style-type: none"> <li>■ 7-day pre-construction baseline</li> </ul>	Contractor	EMMP Consultant	Nil
<b>Construction</b>						
<p><b>Flora</b></p> <ul style="list-style-type: none"> <li>■ <b>Loss of vegetation/habitat</b></li> <li>■ <b>Habitat pollution and degradation</b></li> <li>■ <b>Change in species composition.</b></li> </ul>	<ul style="list-style-type: none"> <li>■ Identify unauthorised removal of vegetation beyond the worksites (within 15-m).</li> <li>■ Identify excessive trees and vegetation removal, especially around TPZ.</li> <li>■ Identify impacts to sensitive habitats as a result of construction activities, e.g., soil erosion and pollution.</li> <li>■ Identify forest edge effects and recommend appropriate mitigation measures where necessary.</li> <li>■ Identify exotic fast-growing plants and provide recommendations for removal where necessary.</li> <li>■ Monitor the health of plant specimens retained on site if any.</li> </ul>	Inspection of trees and plant specimens affected by construction works	<ul style="list-style-type: none"> <li>■ Inspections every two weeks</li> </ul>	EMMP Consultant and Contractor	ECO and EMMP Consultant	

Environmental Issue	Mitigation / Management Measures	Monitoring Requirements	Frequency	Implementation Responsible Party	Inspection Responsible Party	Triggers
<p><b>Fauna</b></p> <ul style="list-style-type: none"> <li>■ Fauna mortality and injury</li> <li>■ Human-wildlife conflicts</li> </ul> <p><b>Disturbances to fauna in adjacent forested areas</b></p>	<ul style="list-style-type: none"> <li>■ Implement Wildlife Response plan, pre-felling procedures, wildlife herding plan and post-site clearance inspections                             <ul style="list-style-type: none"> <li>■ Pre-felling fauna inspection to minimise injury and mortality of fauna as a result of vegetation clearance (that includes undergrowth clearance, fallow period followed by tree felling).</li> <li>■ Pre-felling fauna inspections will be conducted prior to the removal of any vegetation (with 7-days validity)</li> <li>■ Post-site clearance inspections will be conducted after completion of site clearance for each zone.</li> </ul> </li> <li>■ As construction works occur adjacent to a larger forest in the west and north, hoarding that borders these must not have gaps in order to prevent entry of animals. Noise and light measures must be adhered to.</li> <li>■ Wildlife herding plan must be adhered to prior to land clearance to minimise fauna injury and mortality.</li> <li>■ Biodiversity Awareness Training to be carried out ensure workforce complies to the fauna response procedures, general housekeeping and understands the ecological value of site.</li> <li>■ Site inspections to be conducted every two weeks to minimise potential environmental impacts to fauna.</li> </ul>	<p>Visual Inspection</p>	<ul style="list-style-type: none"> <li>■ As needed during Site clearance, site inspection to be conducted every two weeks, monthly for fauna monitoring including at Stream 1 for odonates</li> </ul>	<p>EMMP Consultant and Contractor</p>	<p>ECO and EMMP Consultant</p>	
<p><b>Hydrology</b></p> <ul style="list-style-type: none"> <li>■ Impact to Stream 1</li> </ul>	<ul style="list-style-type: none"> <li>■ As recommended in the EIS, to replace the proposed slip road by constructing a service road along PIE which will link up to existing Onraet Road, so that the upstream of Stream 1 with 12-30m buffer on both sides can be preserved.</li> </ul>	<p>Visual inspection and observation of buffer to Stream 1</p>	<ul style="list-style-type: none"> <li>■ As part of regular site inspection every two weeks</li> </ul>	<p>Contractor</p>	<p>ECO and EMMP Consultant</p>	
<p><b>Water Quality Impact from waste and stormwater run-off</b></p>	<ul style="list-style-type: none"> <li>■ Implementation of Water Quality Management Plan.</li> <li>■ Implementation of the ECM plan prepared by QECP and approved by PUB before the start of any construction work.</li> <li>■ Provision of enclosed bins and waste disposal facilities cleared up regularly.</li> <li>■ All wastes to be disposed only in designated waste disposal facilities and appropriately segregated.</li> </ul>	<p>In-situ:</p> <ul style="list-style-type: none"> <li>■ TSS</li> </ul>	<ul style="list-style-type: none"> <li>■ CCTV including a SIDS at every discharge outlet to monitor the surface run-off discharges from the site.</li> <li>■ Monthly visual monitoring at Stream 1 for</li> </ul>	<p>Contractor</p>	<p>ECO and EMMP Consultant</p>	<p>Exceedances to TSS limits on SIDS Continued visual monitoring daily and laboratory sampling every two weeks should TSS continue to be elevated until results are within acceptable levels.</p>

Environmental Issue	Mitigation / Management Measures	Monitoring Requirements	Frequency	Implementation Responsible Party	Inspection Responsible Party	Triggers
	<ul style="list-style-type: none"> <li>■ Appropriate disposal of waste by licensed waste operator/collector.</li> <li>■ A full inventory of all anticipated wastewater streams and volumes prior to commencement of construction.</li> <li>■ Reduce, reuse, and recycle hierarchy principle to be applied to wastewater on-site.</li> <li>■ Hazardous liquid wastes disposal off-site by a licensed waste contractor.</li> <li>■ Daily records of wastewater and sludge generation.</li> <li>■ Provision of sufficient spill kits and oil-water separators at the site, as needed.</li> <li>■ Ensure there is no unauthorised discharge or siltation into the upstream portion of Stream 1 that is to be conserved.</li> <li>■ Provision of portable toilets and on-site septic tank.</li> <li>■ Regular cleaning of the portable toilets and clearing of sewage waste by licensed waste contractors.</li> <li>■ Appropriate location of toilet facilities away from any nearby waterbodies (i.e., at least 30-m away).</li> <li>■ Daily inspection to ensure hygienic conditions.</li> <li>■ Runoff within, upstream of, and adjacent to the work site shall be effectively drained away without causing flooding in the vicinity.</li> <li>■ Manholes should always be adequately covered.</li> <li>■ Protection of stockpiles with erosion blanket coverage (made of organic material without plastic netting to prevent animals from getting trapped in these) and proper scheduling of the earthworks to reduce the quantity of stockpiles to be stored onsite.</li> <li>■ All vehicles and plant should be cleaned before leaving the site.</li> <li>■ No trade effluent other than that of a nature or type approved by NEA shall be discharged into any watercourse or land.</li> </ul>		<p>siltation, and in-situ measurement of Temperature, pH, Turbidity and TSS, Conductivity, Dissolved Oxygen (DO).</p> <ul style="list-style-type: none"> <li>■ Laboratory analysis every two weeks for trade effluent parameters should elevated TSS be detected.</li> </ul>			

Environmental Issue	Mitigation / Management Measures	Monitoring Requirements	Frequency	Implementation Responsible Party	Inspection Responsible Party	Triggers
<p><b>Air quality impact from dust and emissions from the construction equipment and vehicles</b></p>	<ul style="list-style-type: none"> <li>■ Implementation of Air Quality Management Plan</li> <li>■ Ensure an adequate water supply for effective dust suppression.</li> <li>■ Undertake daily on-site and off-site inspections and record results including checks of surfaces such as cars and windowsills within 100-m of contract boundary.</li> <li>■ Avoid dry sweeping of large areas.</li> <li>■ Ensure vehicles entering and leaving the site are covered to prevent dust generation during transport.</li> <li>■ Inspect roads for integrity and repair any deficiencies as soon as practicable.</li> <li>■ Record all inspections of haul roads and any subsequent action in a logbook.</li> <li>■ Implement a wheel washing system with rumble grids to dislodge accumulated dust and mud prior to leaving the site).</li> <li>■ Ensure there is an adequate area of hard surfaced road between the wheel wash facility and the site exit.</li> <li>■ Site access gates to be located at least 10-m from receptors</li> </ul>	<p>PM<sub>10</sub>, PM<sub>2.5</sub></p>	<ul style="list-style-type: none"> <li>■ Continuous particulate monitoring during the earthworks and infrastructure phase.</li> </ul>	<p>Contractor</p>	<p>ECO and EMMP Consultant</p>	<p>If the monitored parameters exceed Singapore long term air quality targets.</p> <p>If complaints are received due to project activities.</p> <p>Non-compliance to any of the minimum control or mitigation measures are observed on-site.</p>
<p><b>Airborne Noise generation of construction equipment</b></p>	<ul style="list-style-type: none"> <li>■ Implementation of Noise Management Plan</li> <li>■ No high noise generating activities should be carried out during night works.</li> <li>■ Identify noise levels of equipment to verify the need for noise barriers and/or enclosures.</li> <li>■ Keep an inventory of equipment and noise levels and determine options for lower noise generating equipment.</li> <li>■ All machines and equipment that are not in use shall be turned off.</li> <li>■ Adhere to manufacturer specifications on maintenance of machines and equipment.</li> <li>■ Inspect machines and equipment regularly to ensure that these are in optimal working condition at all times.</li> <li>■ Contractor training and toolbox meetings to remind personnel of work practices to keep noise levels at a minimum.</li> <li>■ Plant known with high noise levels to be oriented away from the contract boundary.</li> <li>■ Source control mitigation measures are implemented for onsite plant.</li> </ul>	<p>Leq 12hours, Leq 1hour and Leq 5mins</p>	<ul style="list-style-type: none"> <li>■ Continuous monitoring during the earthworks and infrastructure phase.</li> </ul>	<p>Contractor</p>	<p>ECO and EMMP Consultant</p>	<p>If the monitored parameters exceed applicable noise limits</p> <p>If complaints are received due to project activities.</p> <p>Any non-compliance to any of the minimum control or mitigation measures are observed on-site.</p>

Environmental Issue	Mitigation / Management Measures	Monitoring Requirements	Frequency	Implementation Responsible Party	Inspection Responsible Party	Triggers
<p><b>Ground-borne vibration from construction equipment</b></p>	<ul style="list-style-type: none"> <li>■ Implementation of a Vibration Management Plan</li> <li>■ No vibration generating activities should be carried out during night works.</li> <li>■ If there are justified complaints from the operations, particularly from piling works, contractor may need to consider the use of reduced energy to the driving of the pile, i.e., reduced drop height of the driving weight, or smaller weight.</li> </ul>	<p>Vibration Levels, PPV (mm/s)</p>	<ul style="list-style-type: none"> <li>■ Continuous monitoring during the earthworks and infrastructure phase.</li> </ul>	<p>Contractor</p>	<p>ECO and EMMP Consultant</p>	<p>Monitoring ‘trigger level alert’ and ‘stop work alert’.</p> <p>If complaints are received due to project activities.</p>
<p><b>Vector Control</b></p>	<ul style="list-style-type: none"> <li>■ Implementation of a Vector Management Plan</li> <li>■ Inspection for potential mosquito breeding areas weekly, including any unused containers, building materials, equipment and machinery, water storage tanks and drums, among others.</li> <li>■ Record any potential breeding areas and monitor until eradication.</li> <li>■ Regular monitoring of the adult mosquito population using well-maintained gravitraps or other appropriate devices;</li> <li>■ Eliminate all stagnant water sources.</li> <li>■ Monitor any form of water receptacle and clear water daily to prevent mosquitos from breeding.</li> <li>■ Applying appropriate covers such as concrete paving, or steel plates to prevent puddles from forming.</li> <li>■ Sloping/pitched roof for all site offices, where possible.</li> <li>■ Conduct vector surveillance and eradication operations especially after rainfall.</li> <li>■ Use environmentally friendly methods for vector control and search &amp; destroy operation etc. instead of anti-malaria oil, or chemical larvicides.</li> <li>■ Thermal fogging shall only be carried out when there is high population of adult mosquitoes and/or when there are dengue/zika outbreaks near the construction site in accordance with the COP for ECO. The Contractor shall ensure that approval is obtained from NEA before fogging is carried out on site.</li> </ul>	<ul style="list-style-type: none"> <li>■ Inspection of potential mosquito breeding grounds (stagnant water) and rodent burrows</li> <li>■ Visual site inspection to ensure proper housekeeping.</li> </ul>	<ul style="list-style-type: none"> <li>■ Weekly</li> <li>■ Visual inspection after rainfall</li> </ul>	<p>Contractor</p>	<p>ECO and EMMP Consultant</p>	<p>Missed monitoring and any non-compliance to minimum control or mitigation measures.</p> <p>If complaints are received due to project activities.</p>

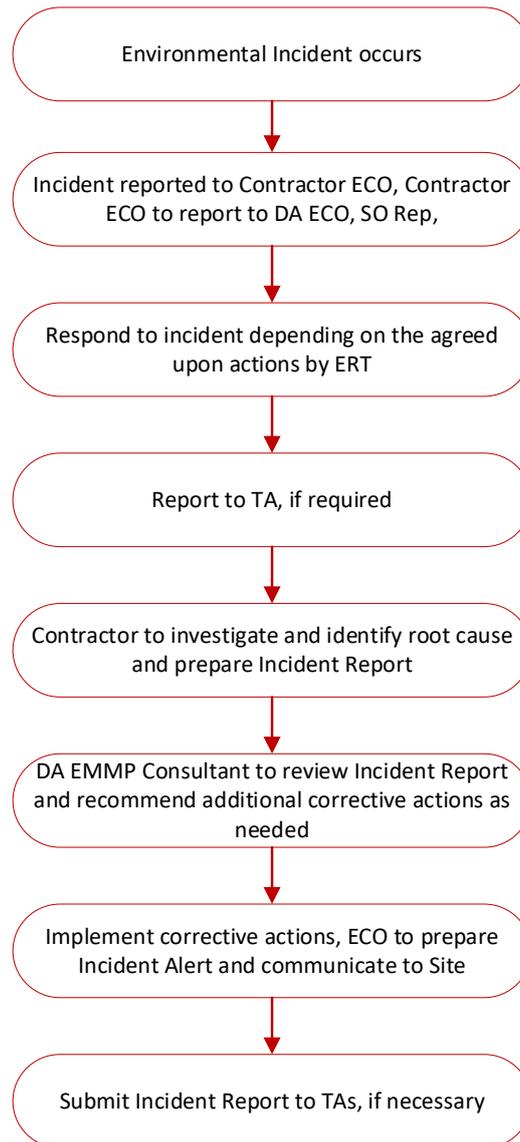
Environmental Issue	Mitigation / Management Measures	Monitoring Requirements	Frequency	Implementation Responsible Party	Inspection Responsible Party	Triggers
	<ul style="list-style-type: none"> <li>■ Ensure effective housekeeping is carried out in all areas at the site, including:                             <ul style="list-style-type: none"> <li>■ Storage of food in rodent proof storage containers/cabinets with at least 60 cm clearance above ground level</li> <li>■ Enclose food waste in plastic bags before disposal into waste bins.</li> <li>■ Food waste to be removed daily and bins to be cleared regularly to prevent fly and rodent infestation.</li> <li>■ Construction worksite to be kept free of litter.</li> <li>■ Construction wastes shall be disposed promptly into bulk waste containers and the containers shall be emptied daily.</li> </ul> </li> <li>■ Treat active burrows with rodenticides until all rats are eradicated and subsequently seal burrows with compacted earth.</li> <li>■ Vector control and management training to be provided to all contractors every 6 months.</li> </ul>					
<p><b>Waste Management (general, recyclable, toxic, excavation spoil, electronic wastes)</b></p>	<ul style="list-style-type: none"> <li>■ Implementation of Waste Management Plan</li> <li>■ Any surplus excavated material to be diverted from the dumping ground and used as fill, landscaping, erosion control and restoration wherever practicable.</li> <li>■ Scrap metals to be recovered and sent for recycling as scrap.</li> <li>■ General waste to be collected and disposed through an NEA-licensed general waste collector.</li> <li>■ All non-hazardous wastes to be handled and disposed of in accordance with regulatory requirements.</li> <li>■ All hazardous wastes to be handled and disposed by an NEA-licensed toxic waste collector in accordance with EPH (Toxic Industrial Wastes) Regulations.</li> <li>■ All wastes will be disposed only in the designated waste disposal facilities and appropriately segregated.</li> <li>■ Designated waste storage location/s for general and toxic industrial waste (TIW) and ensure that there is</li> </ul>	<ul style="list-style-type: none"> <li>■ Volume of waste diverted and disposed by type, with identification of waste reduction opportunities.</li> <li>■ Volume and type of toxic industrial waste disposed including waste manifests.</li> <li>■ Inspection of waste storage locations.</li> </ul>	<ul style="list-style-type: none"> <li>■ Records on waste from construction sites should be properly kept and produced when requested.</li> <li>■ Toxic industrial waste register to be updated weekly.</li> <li>■ Weekly inspection of waste storage locations.</li> </ul>	<p>Contractor</p>	<p>ECO and EMMP Consultant (audit)</p>	<p>Missed monitoring, documentation and any non-compliance to minimum control or mitigation measures.</p> <p>If complaints are received due to project activities.</p>

Environmental Issue	Mitigation / Management Measures	Monitoring Requirements	Frequency	Implementation Responsible Party	Inspection Responsible Party	Triggers
	<p>physical separation in the storage of non-compatible waste streams.</p> <ul style="list-style-type: none"> <li>■ Provision of secondary containment for all toxic waste stored in bulk as per the requirements in the COPPC.</li> <li>■ Include provision for emergency response to TIW spills and leaks and appropriate training of ERT to respond to such.</li> <li>■ Provision of enclosed bins and waste disposal facilities cleared up as often as necessary to prevent build-up.</li> <li>■ Daily housekeeping checks and removal of waste from the Site</li> </ul>					

## 8.0 EMERGENCY RESPONSE PLAN (ERP)

An overall ERP is provided in this section, will be supplemented by the Contractor's site-specific ERP and ERP organisation. The Plan shall include incident response, protocols and parties that need to be inform in an event of an incident, monitoring and management. The immediate response to all incidents will be to make the area safe and undertake measures to prevent further environmental harm. Regular ERP drills will be required in order to ensure that all parties are aware of responsibilities in the event of an emergency.

A general flowchart for emergency response is provided below:



**Figure 23: General Emergency Response Flowchart**

## 8.1 Emergency Response Organisation

**Table 9** lists the responsible parties for reporting, response, and notification in the event of any environmental incident:

**Table 9: Summary of responsible parties for environmental incidents**

Incident	Notification	Responsible Person
<b>All environmental incidents</b>	All environmental-related incidents should be reported by personnel to the Contractor's ECO. The ECO must inform the relevant by means of an incident report form including the nature of the incident. Contractor ECO to report to DA and SO Rep; Subsequent actions to be based on succeeding sections below, to be amended as needed based on Contractor's ERP.	<ul style="list-style-type: none"> <li>All personnel</li> </ul>
<b>Encounter of dead animals</b>	<ul style="list-style-type: none"> <li>Contractor ECO to report to SO Rep and EMMP Ecologist</li> <li>SO Rep to report to DA</li> <li>EMMP Ecologist to report to NParks</li> </ul>	<ul style="list-style-type: none"> <li>As with notification requirement</li> <li>Contractor to contact WMC</li> </ul>
<b>Encounter of injured animals</b>	<ul style="list-style-type: none"> <li>Contractor ECO to report to SO Rep and EMMP Ecologist</li> <li>SO Rep to report to DA</li> <li>EMMP Ecologist to report to NParks</li> </ul>	<ul style="list-style-type: none"> <li>As with notification requirement</li> <li>Contractor to contact WMC</li> </ul>
<b>Fire</b>	<ul style="list-style-type: none"> <li>Fire wardens to report to SO Rep, Singapore Civil Defence Force (SCDF)</li> </ul>	<ul style="list-style-type: none"> <li>As with notification requirement</li> <li>SCDF</li> </ul>
<b>Waste, Chemical/oil spills</b>	<ul style="list-style-type: none"> <li>Contractor ECO to report to SO Rep and EMMP Consultant</li> <li>SO Rep to report to DA</li> </ul>	<ul style="list-style-type: none"> <li>As with notification requirement</li> <li>Dispose to licensed waste contractors</li> </ul>
<b>Water Quality -related</b>	<ul style="list-style-type: none"> <li>Contractor ECO to report to DA, SO Rep and EMMP Consultant; QECP to be involved for any issues relating to ECM.</li> <li>Report to NParks, NEA, PUB, as required</li> </ul>	<ul style="list-style-type: none"> <li>As with notification requirement</li> </ul>
<b>Air Quality, Noise, Vibration-related</b>	<ul style="list-style-type: none"> <li>Contractor ECO to report to DA, SO Rep and EMMP Consultant</li> <li>Report to NParks, NEA, as required</li> </ul>	<ul style="list-style-type: none"> <li>As with notification requirement</li> </ul>

## 8.2 Wildlife and Roadkill Response Plan

The Wildlife Response Plan will be supplied by the Contractor. This plan will only be used in response when a trapped/injured/dead/dangerous animal is encountered around or within the worksite. The objective of the Plan will be to minimise animal injury and mortality by responding appropriately to the different scenarios in Figure 24.

This will be included during the toolbox briefings. All wildlife incidents shall be reported and documented using Wildlife Incident Form (APPENDIX I).

Where species of conservation significance are affected by development, relocation works may be planned. Where fauna is trapped on-site, species-specific methods (e.g., partitioning site, one-way flap doors) shall be formed for removal or translocation, in consultation with NParks.

Where necessary, wildlife management company will be engaged, that is listed under NParks' public register of certified WMC, and approved by NParks to carry out trapping, rescue, processing of Eurasian wild boars (*Sus scrofa*) in accordance with S10 directive.

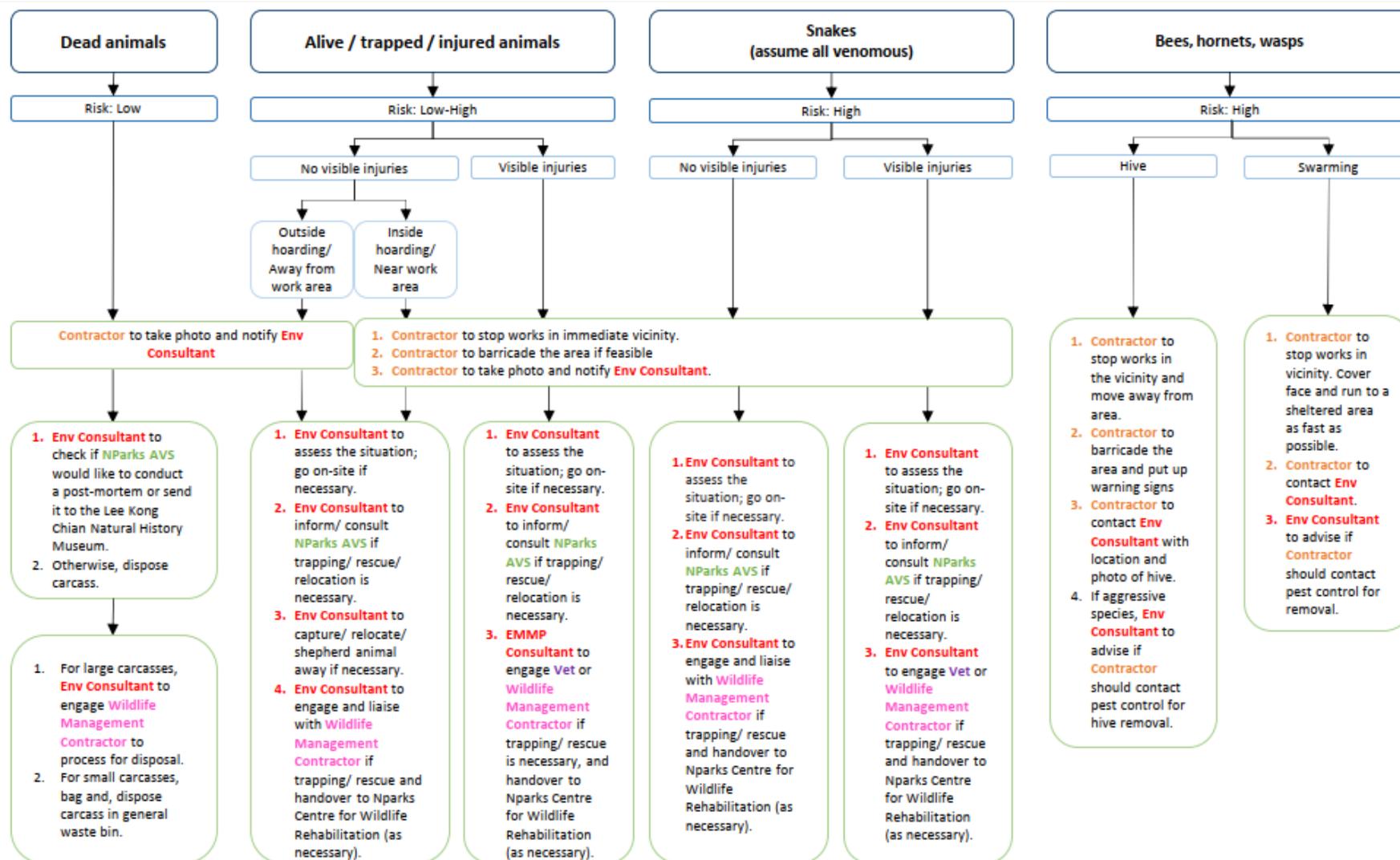


Figure 24: Wildlife Response Plan flowchart (Note that approved WMC needs to be engaged by the Contractor)

### 8.3 Other Emergencies

All other emergencies relating to water quality related incidents (including Spill Response), air quality, noise and vibration-related incidents and notifications will be managed in accordance with Table 9. Incident management will be in accordance with the procedure as outlined by the Contractor. All incidents will be classified and managed in accordance with the ERP. A full site-specific ERP should be provided by the Contractor once information on site utilisation, layout and planning is available.

## 9.0 REPORTING AND REVIEW

The objectives of monitoring and review are as follows:

- To check that all elements of EMMP are in place.
- To check that management plans are implemented.
- To ensure that action plans are carried out.
- To check that procedures are being followed.
- To check for compliance against local laws and regulations.
- To check progress towards objectives and targets.
- Overall environmental performance.

The various proposed management and monitoring plans are live documents which are required to be updated when new information is available, or if the proposed mitigation and monitoring are unsuitable or need to be updated. At a minimum, the EMMP should be reviewed every six months. The required reports and reviews are as follows:

- Prepare, submit, and present (if required) to NParks, HDB and other relevant Authorities and obtain approvals on the EMMP from the Regulatory Agencies
- Liaise and coordinate with HDB's appointed Contractors within the Project area (tentatively four contractors) and review the EMMP.
- To conduct site inspection every two weeks and attend progress meetings to provide updates on the EMMP implementation. Checklists for site inspections every two weeks will be prepared to facilitate reporting and compilation of data throughout the infrastructure works. The checklist serves as a way to provide information on the progress regarding the management strategies outlined in the EMMP, ensuring that work-completion quality is in accordance with the project requirement. A common data repository (i.e., a SharePoint site) will be designated for data storage and sharing.
- Report potential or actual incidents and non-conformances and to propose corrective actions.
- Prepare, submit and present monthly EMMP reports throughout the construction works.
- Review, highlight, recommend measures and provide advice to Agencies'/ public/ interest groups' feedback on environmental matters.
- Prepare materials and attend, when needed, the briefings/ presentations to stakeholders e.g., Grassroots Leaders, Advisors, other interest groups / nature group and or organization, etc.

- Institute a management process on any feedback received from stakeholders throughout the construction works are appropriately resolved, investigated, recorded, and compiled in a report.
- Prepare and maintain an Environmental Impact and Mitigation Registry which provides a summary of the project activities, identified sensitive receptors and potential environmental impacts, mitigation measures, timelines, and the residual impacts.
- Prepare, submit, and present a summary of completion report (close-off EMMP Audit Report) on the environmental mitigation and performance with respect to the desired response range for each of the future activities once the works on the site is completed.

## 10.0 CONCLUSION

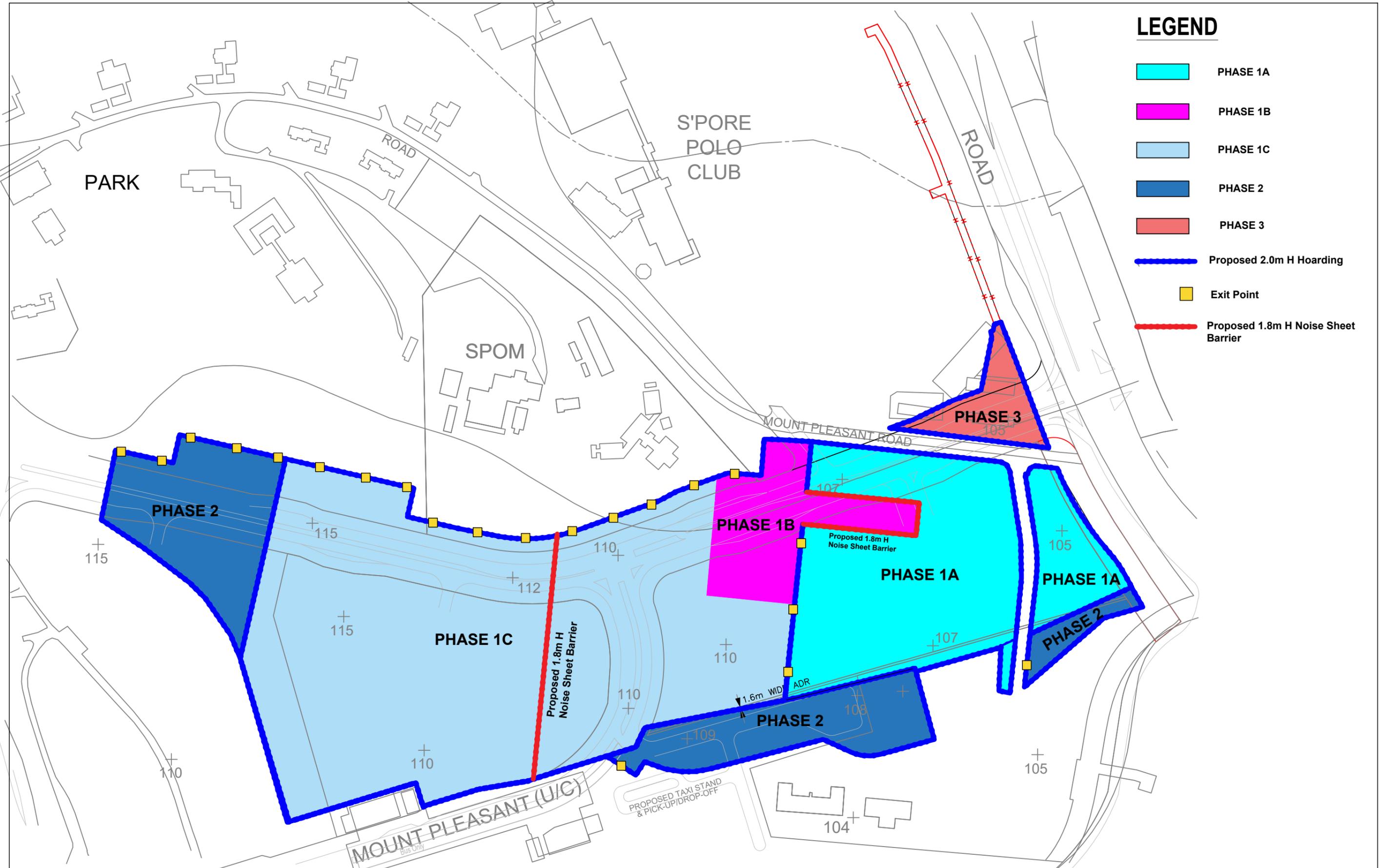
Management and monitoring requirements are provided where there are significant impacts identified from the EIS. The Infrastructure Works Contractor is Chuan Lim Construction Pte Ltd. The construction team is involved with risk assessments during the work planning process to identify the relevant activities, aspects, impacts and management controls during preconstruction and construction. This process includes development of construction documentation including relevant construction packages and construction procedures. The Specific contractor management plans have been included as part of the EMMP.

All contractors and subcontractors shall comply with applicable EMMP management, mitigation, monitoring, and reporting requirements. Inspections will be carried out every two weeks and monthly environmental monitoring reports with all monitoring results (compliance and ambient monitoring), identified issues and additional actions taken to mitigate these problems will be submitted to the Technical Agencies. Each subsequent monthly monitoring report will include trends and report on successful or failed follow-up actions until an issue has been effectively mitigated. Any changes in the EMMP will be communicated to Site personnel for compliance.

**APPENDIX A**

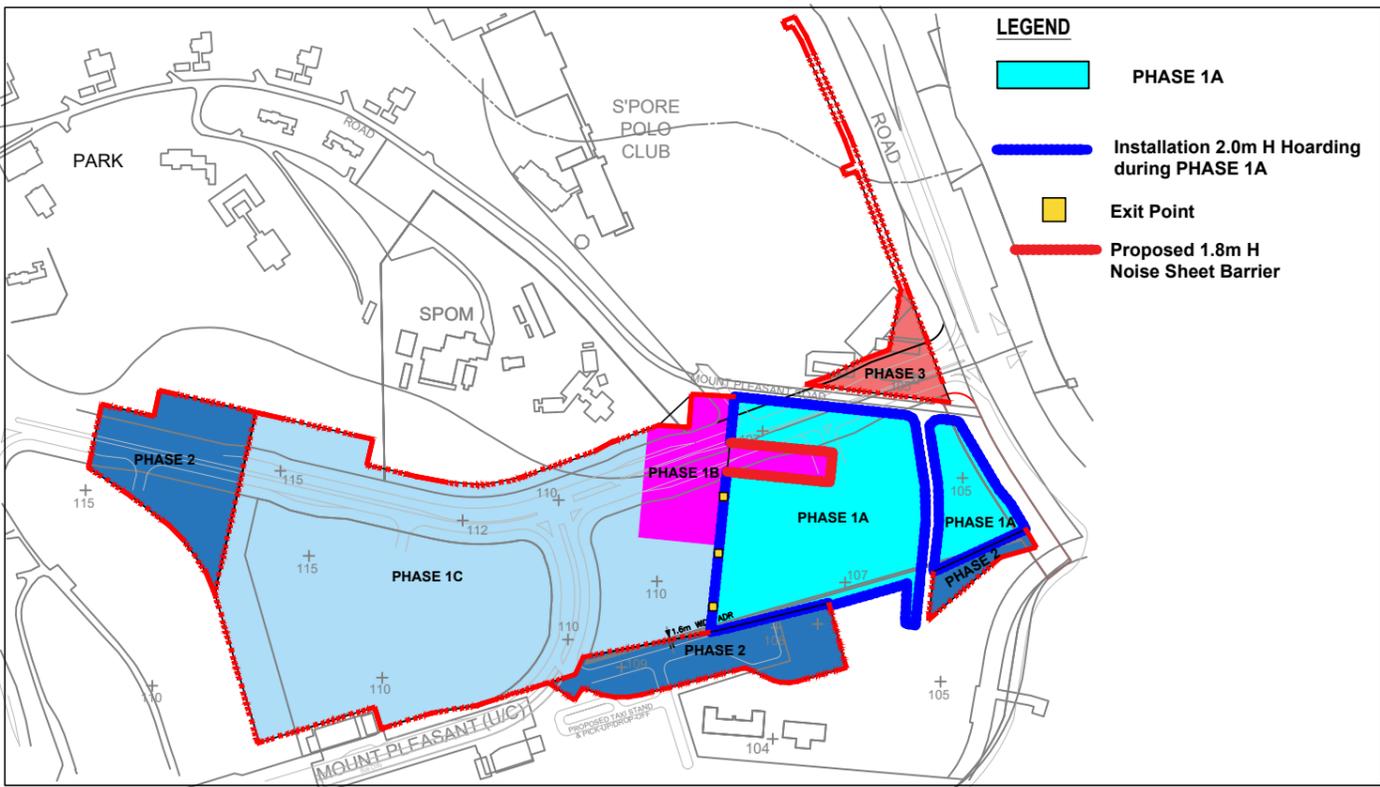
**Contractor Management Plans**

# HOARDING PLAN DETAILS

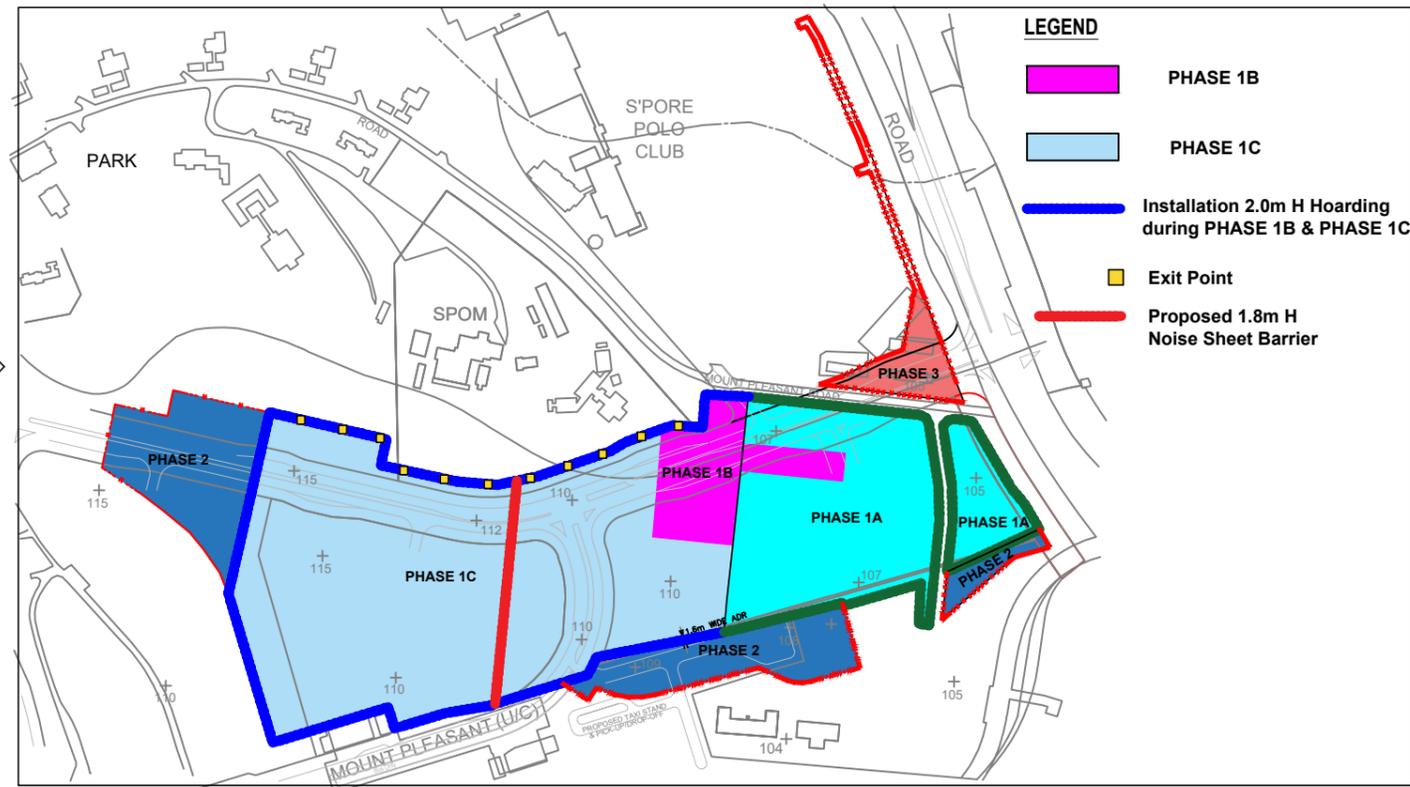


## OVERALL HOARDING PLAN

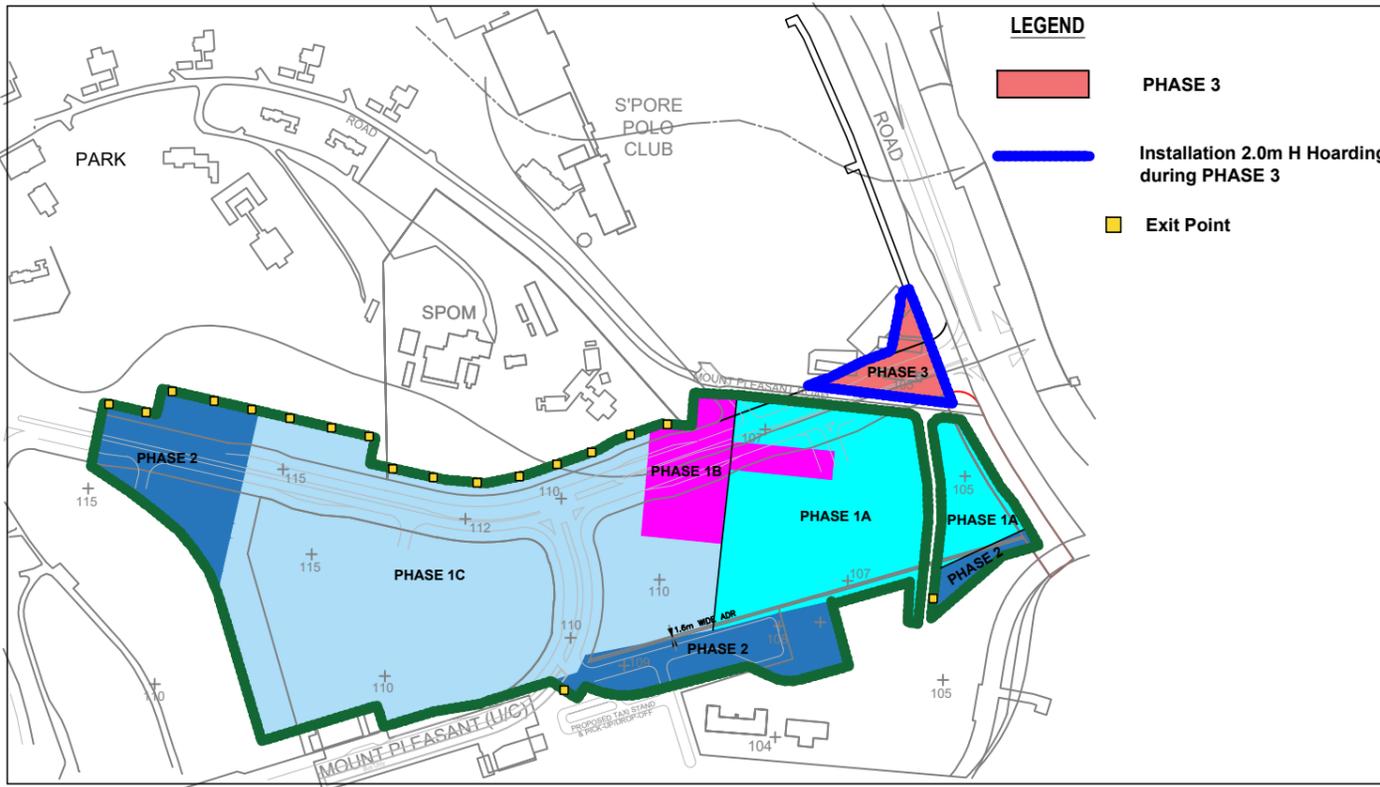
# HOARDING PLAN DURING DIFFERENT PHASES



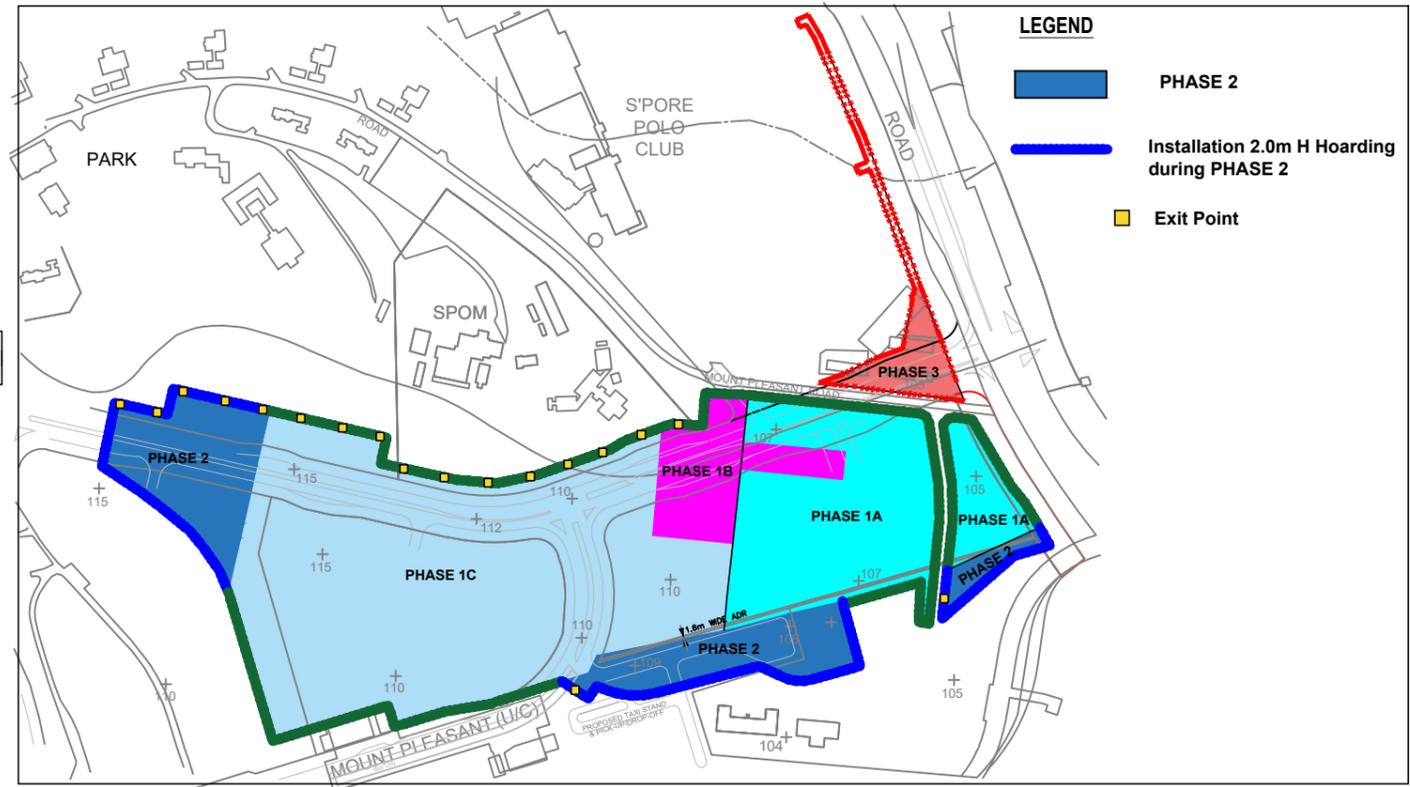
HOARDING PLAN - PHASE 1A



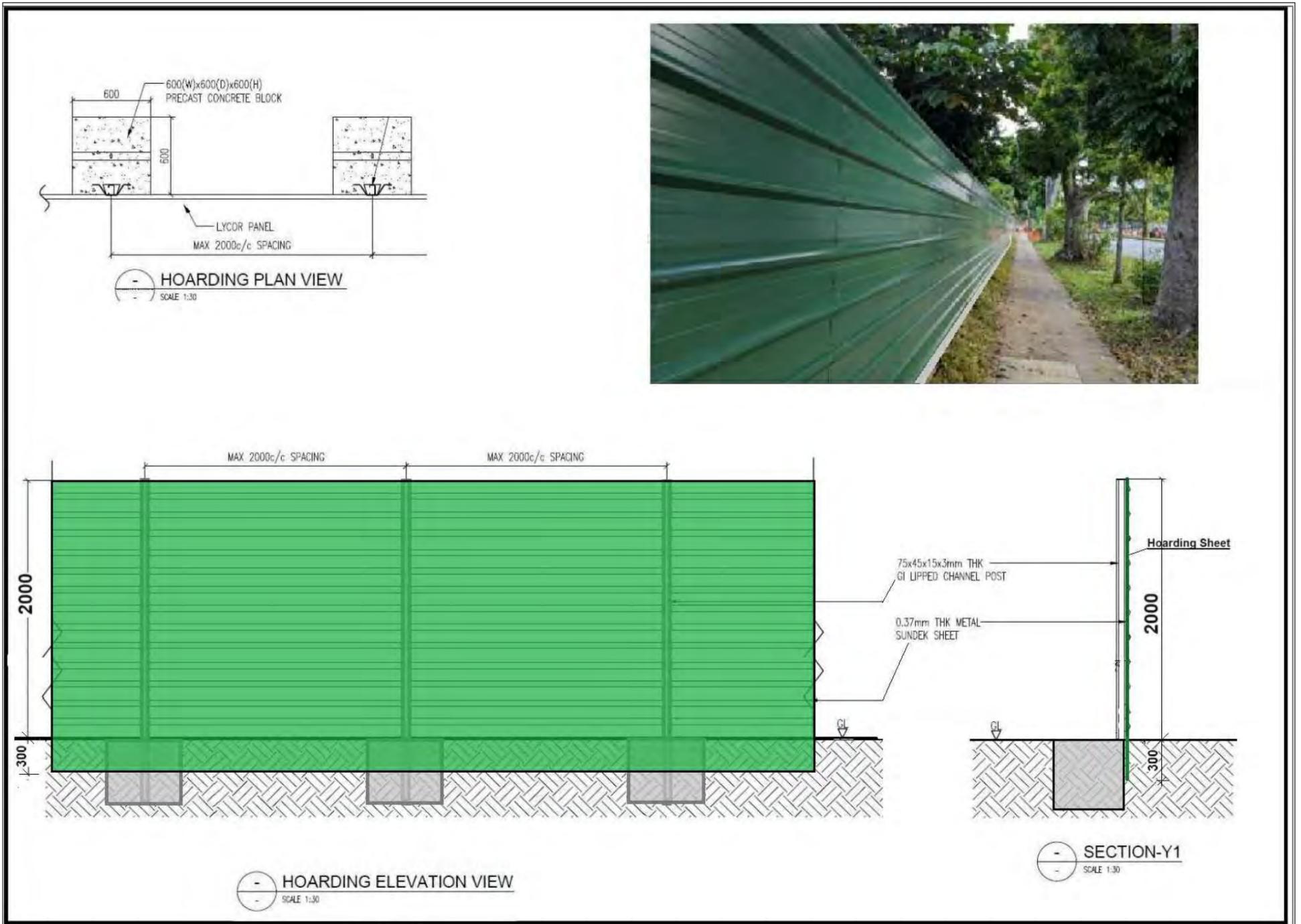
HOARDING PLAN - PHASE 1B & PHASE 1C



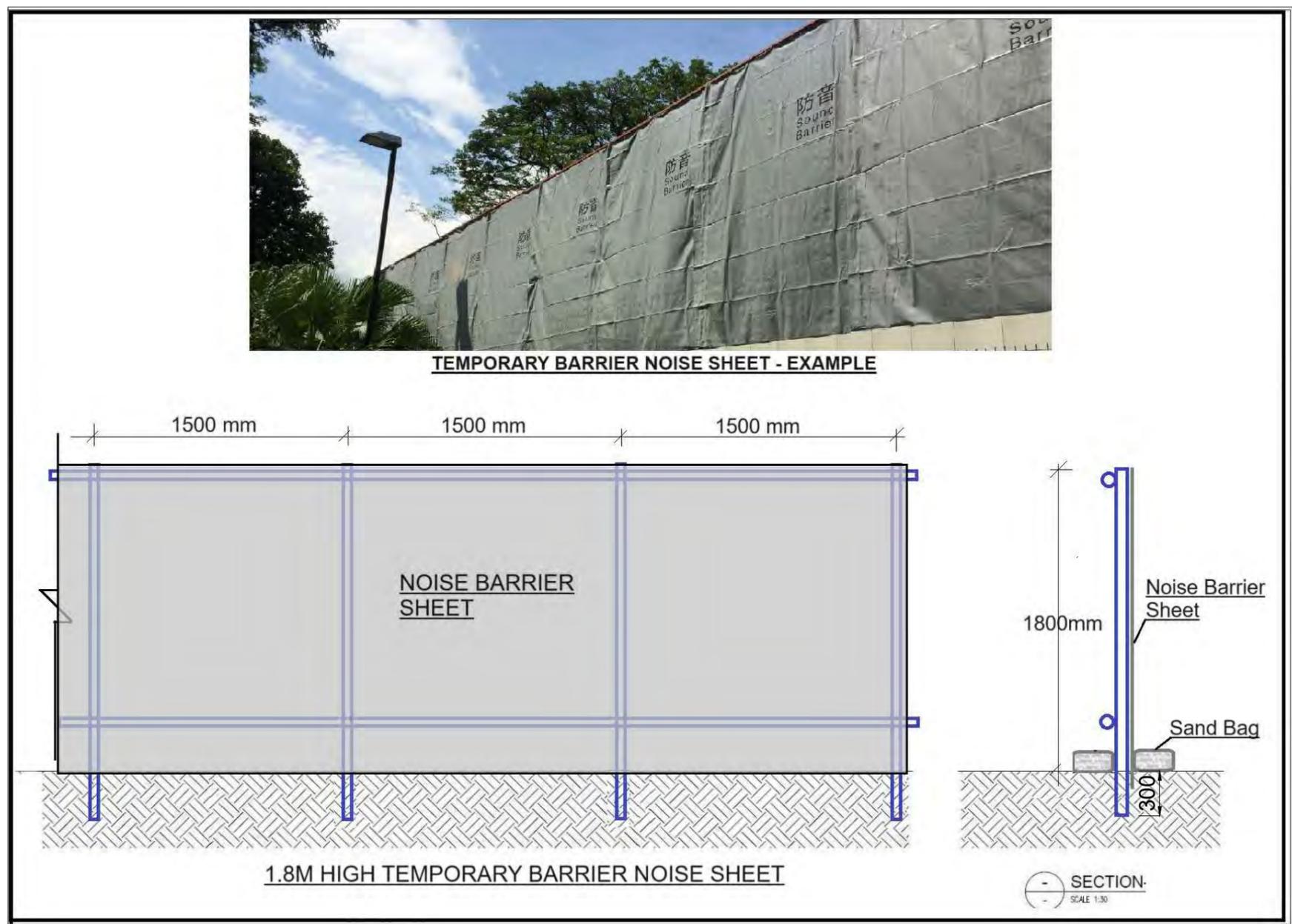
HOARDING PLAN - PHASE 3



HOARDING PLAN - PHASE 2

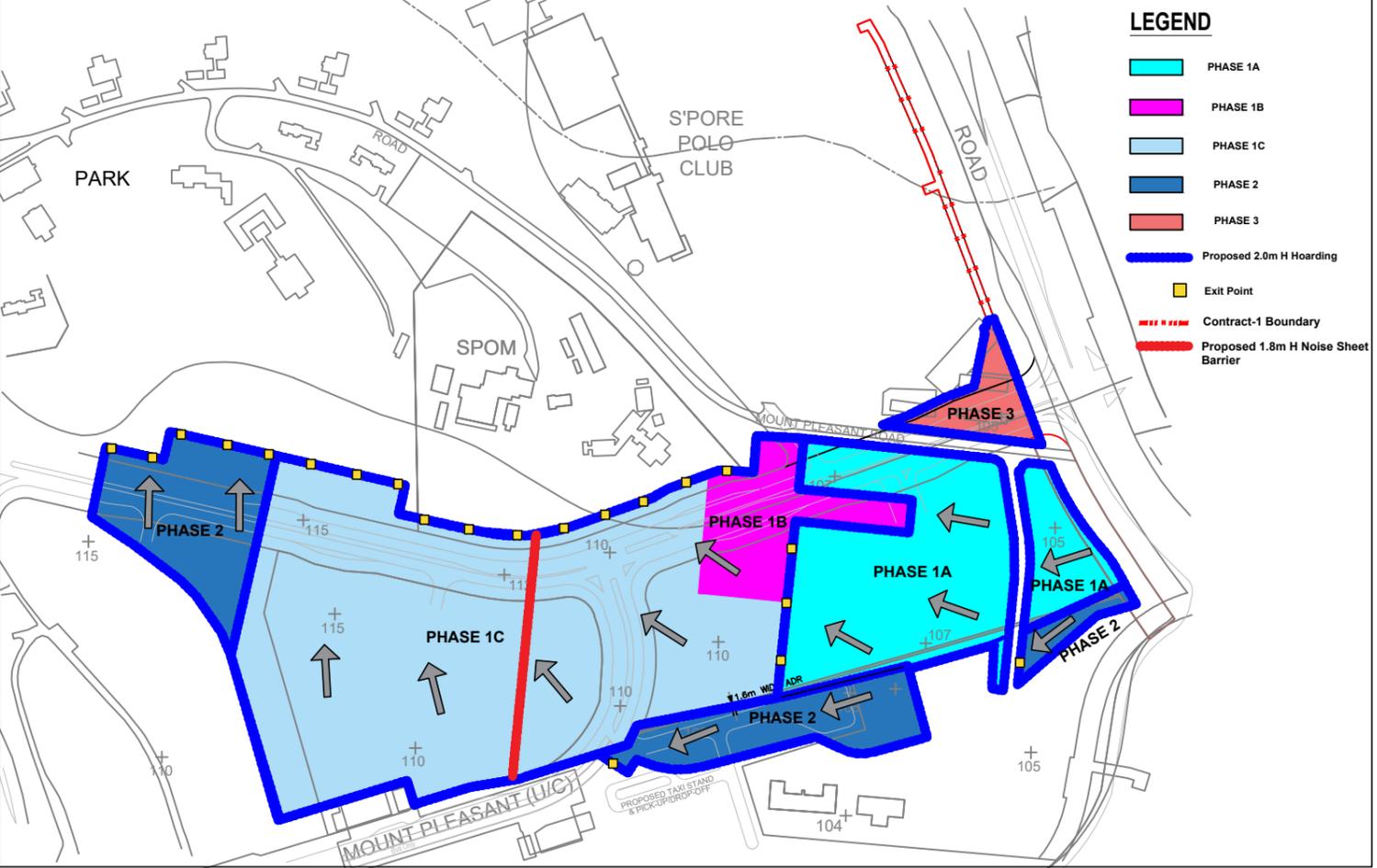


**TYPICAL PERMANENT HOARDING DETAILS**

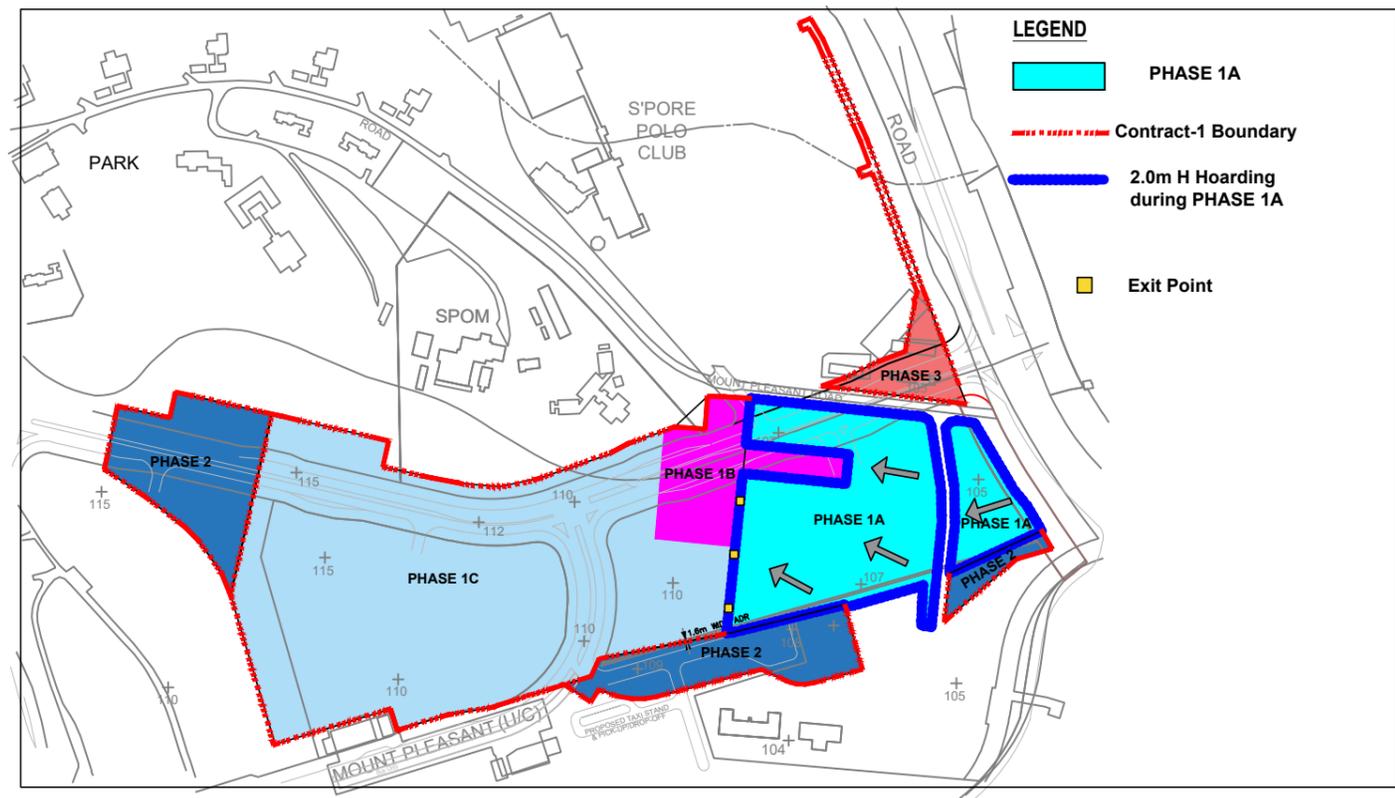


**TYPICAL NOISE BARRIER SHEET BARRIER**

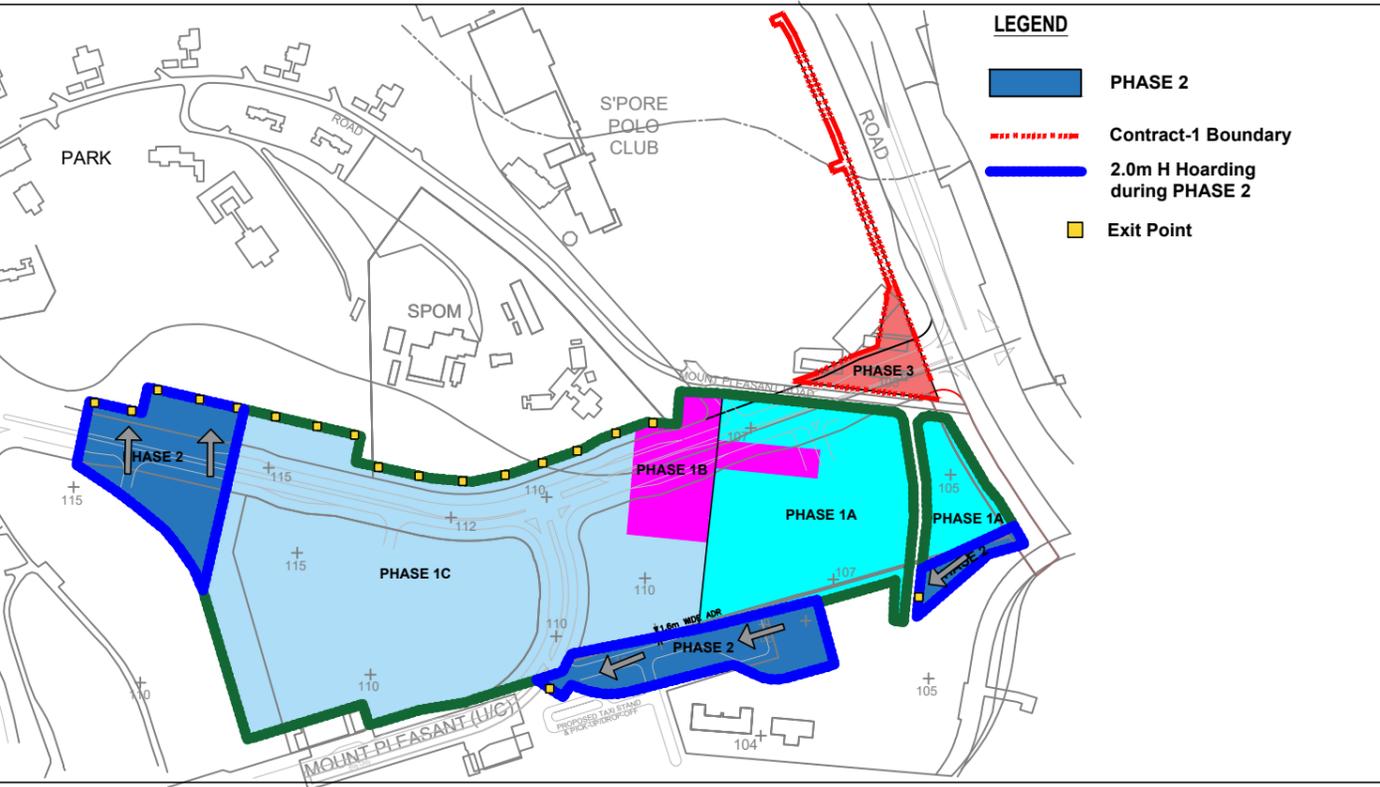
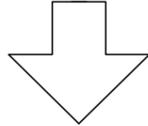
# SITE CLEARANCE / EARTHWORK PLAN



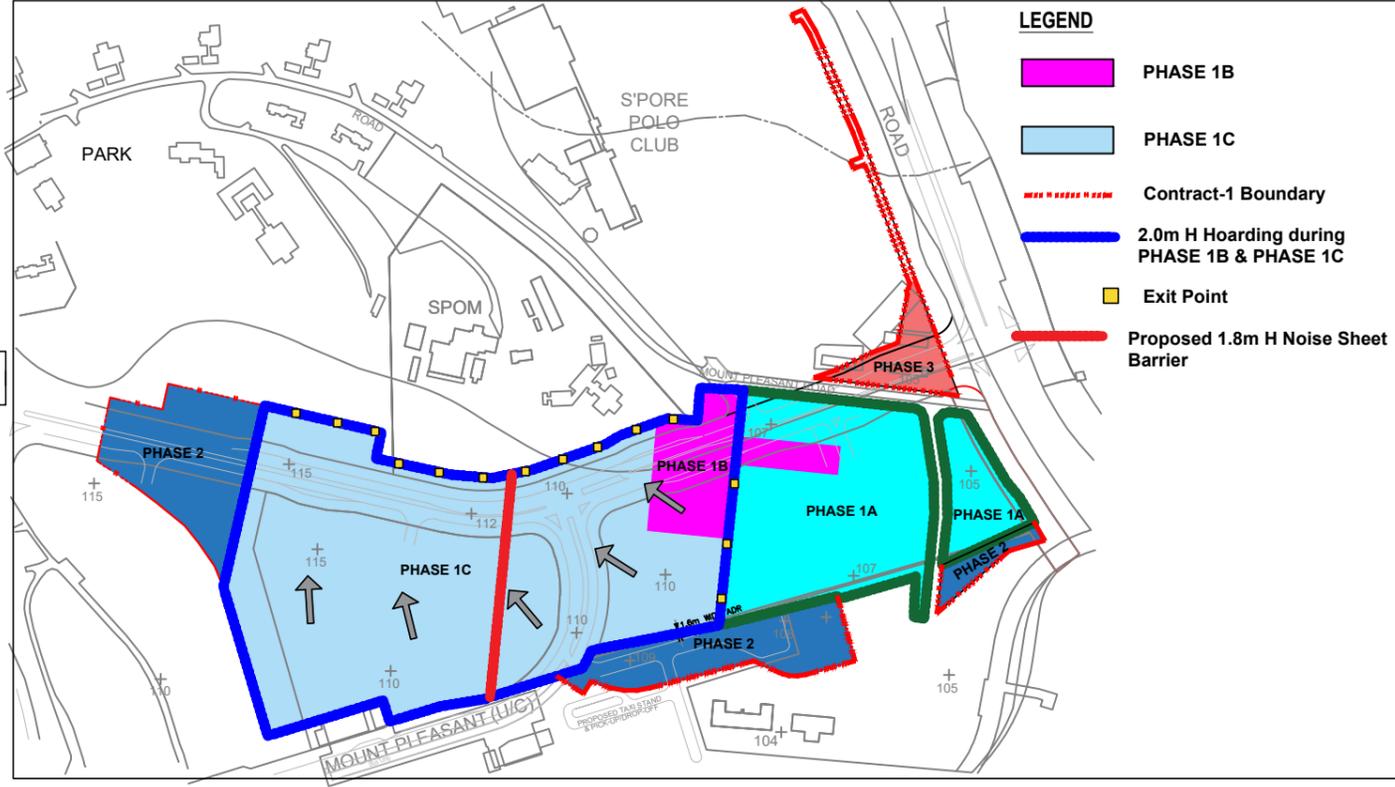
**OVERALL SITE CLERANCE / EARTHWORK PLAN**



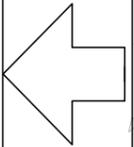
**SITE CLERANCE / EARTHWORK - PHASE 1A**



**SITE CLERANCE / EARTHWORK - PHASE 2**



**SITE CLERANCE / EARTHWORK - PHASE 1B & PHASE 1C**



**APPENDIX B**

**List of Recorded Flora Species of  
Conservation Significance**

**List of flora species of conservation significance within 10-m of development boundary**

Species	Family	Origin	Status (SRDB3)	Habit	Girth (m)	Height (m)	Latitude	Longitude	Location	Recommendation
<i>Connarus semidecandrus</i>	Connaraceae	Native	Critically Endangered	Climber	-	-	1.33101	103.83227	Near development boundary	Suitable transplant candidate
<i>Connarus semidecandrus</i>	Connaraceae	Native	Critically Endangered	Climber	-	-	1.330257	103.83193	Within development boundary	Suitable transplant candidate
<i>Connarus semidecandrus</i>	Connaraceae	Native	Critically Endangered	Climber	-	-	1.330846	103.83413	Near development boundary	Suitable transplant candidate
<i>Connarus semidecandrus</i>	Connaraceae	Native	Critically Endangered	Climber	-	-	1.330766	103.83406	Within Contract 1	Suitable transplant candidate
<i>Connarus semidecandrus</i>	Connaraceae	Native	Critically Endangered	Climber	-	-	1.33071	103.83423	Within Contract 1	Suitable transplant candidate
<i>Connarus semidecandrus</i>	Connaraceae	Native	Critically Endangered	Climber	-	-	1.330664	103.83399	Within Contract 1	Suitable transplant candidate
<i>Connarus semidecandrus</i>	Connaraceae	Native	Critically Endangered	Climber	-	-	1.330836	103.8336	Within Contract 1	Suitable transplant candidate
<i>Connarus semidecandrus</i>	Connaraceae	Native	Critically Endangered	Climber	-	-	1.330934	103.83361	Near development boundary	Suitable transplant candidate
<i>Connarus semidecandrus</i>	Connaraceae	Native	Critically Endangered	Climber	-	-	1.331034	103.83342	Near development boundary	Suitable transplant candidate
<i>Connarus semidecandrus</i>	Connaraceae	Native	Critically Endangered	Climber	-	-	1.330939	103.8333	Near development boundary	Suitable transplant candidate
<i>Connarus semidecandrus</i>	Connaraceae	Native	Critically Endangered	Climber	-	-	1.330886	103.83262	Within development boundary	Suitable transplant candidate
<i>Epicharis cuneata</i>	Meliaceae	Native	Vulnerable	Tree	0.05	2	1.33094	103.83382	Near development boundary	Suitable transplant candidate
<i>Goniophlebium percussum</i>	Polypodiaceae	Native	Vulnerable	Epiphyte	-	-	1.330836	103.8336	Within Contract 1	Suitable transplant candidate
<i>Gynacranthera forbesii</i> var. <i>forbesii</i>	Myristicaceae	Native	Nationally Extinct (Rediscovered)	Tree	0.1	2	1.330525	103.83263	Within development boundary	Suitable transplant candidate
<i>Horsfieldia polyspherula</i> var. <i>polyspherula</i>	Myristicaceae	Native	Vulnerable	Tree	<0.05	1.2	1.33039	103.83502	Within Contract 1	Suitable transplant candidate
<i>Horsfieldia polyspherula</i> var. <i>polyspherula</i>	Myristicaceae	Native	Vulnerable	Tree	<0.05	0.5	1.330799	103.83411	Within Contract 1	Suitable transplant candidate
<i>Piper baccatum</i>	Piperaceae	Native	Critically Endangered	Climber	-	-	1.330785	103.83371	Within Contract 1	Suitable transplant candidate
<i>Piper baccatum</i>	Piperaceae	Native	Critically Endangered	Climber	-	-	1.330836	103.8336	Within Contract 1	Suitable transplant candidate
<i>Piper baccatum</i>	Piperaceae	Native	Critically Endangered	Climber	-	-	1.331006	103.83336	Near development boundary	Suitable transplant candidate
<i>Piper baccatum</i>	Piperaceae	Native	Critically Endangered	Climber	-	-	1.330779	103.83339	Within Contract 1	Suitable transplant candidate
<i>Piper baccatum</i>	Piperaceae	Native	Critically Endangered	Climber	-	-	1.330813	103.83326	Within Contract 1	Suitable transplant candidate
<i>Piper baccatum</i>	Piperaceae	Native	Critically Endangered	Climber	-	-	1.330983	103.83329	Near development boundary	Suitable transplant candidate
<i>Piper baccatum</i>	Piperaceae	Native	Critically Endangered	Climber	-	-	1.33096	103.83324	Near development boundary	Suitable transplant candidate
<i>Piper baccatum</i>	Piperaceae	Native	Critically Endangered	Climber	-	-	1.330839	103.83311	Within Contract 1	Suitable transplant candidate
<i>Sterculia cordata</i>	Malvaceae	Native	Critically Endangered	Tree	0.05	1.7	1.33086	103.83343	Within Contract 1	Suitable transplant candidate

<i>Sterculia cordata</i>	Malvaceae	Native	Critically Endangered	Tree	<0.05	1	1.3308139	103.83339	Within Contract 1	Suitable transplant candidate
<i>Sterculia cordata</i>	Malvaceae	Native	Critically Endangered	Tree	<0.05	0.5	1.330549	103.83271	Within development boundary	Suitable transplant candidate
<i>Sterculia parviflora</i>	Malvaceae	Native	Critically Endangered	Tree	0.6	10	1.3307122	103.8339	Within Contract 1	Not recommended for transplantation
<i>Sterculia parviflora</i>	Malvaceae	Native	Critically Endangered	Tree	1.5	12	1.3308926	103.8335	Within Contract 1	Not recommended for transplantation
<i>Sterculia parviflora</i>	Malvaceae	Native	Critically Endangered	Tree	1	11	1.3310174	103.83351	Near development boundary	Not recommended for transplantation
<i>Sterculia parviflora</i>	Malvaceae	Native	Critically Endangered	Tree	0.4	8	1.3307324	103.83417	Within Contract 1	Not recommended for transplantation
<i>Sterculia parviflora</i>	Malvaceae	Native	Critically Endangered	Tree	0.5	8	1.3307351	103.83417	Within Contract 1	Not recommended for transplantation
<i>Sterculia parviflora</i>	Malvaceae	Native	Critically Endangered	Tree	0.05	3	1.330828	103.83412	Near development boundary	Suitable transplant candidate
<i>Strombosia javanica</i>	Olacaceae	Native	Vulnerable	Tree	<0.05	0.7	1.330975	103.83209	Near development boundary	Suitable transplant candidate
<i>Strombosia javanica</i>	Olacaceae	Native	Vulnerable	Tree	0.1	5	1.330899	103.83213	Within development boundary	Suitable transplant candidate
<i>Strombosia javanica</i>	Olacaceae	Native	Vulnerable	Tree	<0.05	0.7	1.330217	103.83186	Within development boundary	Suitable transplant candidate
<i>Xanthophyllum ellipticum</i>	Polygalaceae	Native	Critically Endangered	Tree	0.05	2.5	1.330664	103.83399	Within Contract 1	Suitable transplant candidate
<i>Oncosperma horridum</i>	Arecaceae	Native	Vulnerable	Tree	1	9	1.3309355	103.83359	Near development boundary	Not recommended for transplantation
<i>Oncosperma horridum</i>	Arecaceae	Native	Vulnerable	Tree	1	3	1.3308101	103.83438	Near development boundary	Not recommended for transplantation
<i>Oncosperma horridum</i>	Arecaceae	Native	Vulnerable	Tree	1	5	1.3308181	103.83426	Near development boundary	Not recommended for transplantation

**Selected photographic records of flora species of conservation significance**



**Figure 1: A *Connarus semidecandrus* specimen found within contract 1 boundary**



**Figure 2: A *Epicharis cuneata* specimen found near the development boundary**



**Figure 3: A *Goniophlebium percussum* specimen found within contract 1 boundary**



**Figure 4: *Gymnacranthera forbesii* var. *forbesii* specimen found within development boundary**



**Figure 5: *Horsfieldia polyspherula* var. *polyspherula* specimen found within contract 1 boundary**



**Figure 6: A *Piper baccatum* specimen found within contract 1 boundary**



**Figure 7: A *Sterculia cordata* specimen found within contract 1 boundary**



**Figure 8: A *Sterculia parviflora* specimen found within contract 1 boundary**



**Figure 9: A *Strombosia javanica* specimen found within development boundary**



**Figure 10: A *Xanthophyllum ellipticum* specimen found within contract 1 boundary**

**APPENDIX C**

**List of Recorded Faunal Species,  
including Species of Conservation  
Significance**

Faunal group	Combined total no. of recorded species		Rapid Baseline Survey total no. of recorded species		EIS (AECOM, 2021) total no. of recorded species	
	All species	CS species	All species	CS species	All species	CS species
Aculeate hymenopterans	40	0	24	0	29	0
Bees	18	0	9	0	13	0
Stinging wasps	22	0	15	0	16	0
Odonates	27	2	23	2	19	1
Dragonflies	20	0	17	0	13	0
Damselflies	7	2	6	2	6	1
Butterflies	61	0	37	0	51	0
Freshwater fish	8	0	7	0	7	0
Freshwater molluscs	1	0	1	0	0	0
Herpetofauna	24	1	16	0	19	1
Amphibians	9	0	7	0	6	0
Reptiles	15	1	9	0	13	1
Birds	77	10	51	6	68	8
Mammals	18	6	7	2	15	4
Non-volant Mammals	10	4	7	2	7	2
Bats	8	2	NA	NA	8	2
<b>Total</b>	<b>256</b>	<b>19</b>	<b>166</b>	<b>10</b>	<b>208</b>	<b>14</b>

No.	Type	Family name	Scientific name	Common name	Global status (IUCN, 2012)	National status (Ascher et al., 2022; Lee, pers comm)	Species of conservation significance	Native status	Recorded Species		Remarks for Rapid Baseline Study
									Rapid Baseline Study	EIS (AECOM, 2021)	
1	Bee	Apidae	<i>Amegilla andrewsi</i>	Andrew's blue-banded digger bee	Not Listed	Least Concern	No	Native	No	Yes	
2	Bee	Apidae	<i>Amegilla korotonensis</i>	NA	Not Listed	Least Concern	No	Native	No	Yes	
3	Bee	Apidae	<i>Apis andreniformis</i>	NA	Not Listed	Least Concern	No	Native	No	Yes	
4	Bee	Apidae	<i>Apis cerana</i>	Eastern honey bee	Not Listed	Least Concern	No	Native	Yes	Yes	
5	Bee	Apidae	<i>Apis dorsata</i>	NA	Not Listed	Least Concern	No	Native	Yes	No	
6	Bee	Apidae	<i>Ceratina unimaculata</i>	NA	Not Listed	Least Concern	No	Native	No	Yes	
7	Bee	Apidae	<i>Heterotrigona itama</i>	Malaysian stingless bee	Not Listed	Least Concern	No	Native	Yes	Yes	
8	Bee	Apidae	<i>Tetragonula sp. nr. laeviceps</i>	NA	Not Listed	Near Threatened	No	Native	No	Yes	
9	Bee	Apidae	<i>Tetragonula valdezi</i>	NA	Not Listed	Least Concern	No	Native	Yes	No	
10	Bee	Apidae	<i>Thyreus himalayensis</i>	NA	Not Listed	Least Concern	No	Native	No	Yes	
11	Bee	Apidae	<i>Xylocopa aestuans</i>	White-cheeked carpenter bee	Not Listed	Least Concern	No	Native	Yes	No	
12	Bee	Apidae	<i>Xylocopa caerulea</i>	NA	Not Listed	Least Concern	No	Native	No	Yes	
13	Bee	Apidae	<i>Xylocopa latipes</i>	Broad-handed carpenter bee	Not Listed	Least Concern	No	Native	Yes	Yes	
14	Bee	Halictidae	<i>Lasioglossum vagans</i>	NA	Not Listed	Least Concern	No	Native	No	Yes	
15	Bee	Halictidae	<i>Lipotriches ceratina</i>	NA	Not Listed	Least Concern	No	Native	Yes	No	
16	Bee	Halictidae	<i>Nomia strigata</i>	Pearly-banded bee	Not Listed	Least Concern	No	Native	Yes	Yes	
17	Bee	Megachilidae	<i>Coelioxys sp.</i>	NA	Not Listed	NA	No	Native	Yes	No	
18	Bee	Megachilidae	<i>Heriades sp.</i>	NA	Not Listed	NA	No	Native	No	Yes	
19	Wasp	Crabronidae	<i>Liris sp.</i>	NA	Not Listed	NA	No	Native	No	Yes	
20	Wasp	Crabronidae	<i>Tachytes modestus</i>	NA	Not Listed	Least Concern	No	Native	Yes	No	

21	Wasp	Crabronidae	<i>Tachytes sp.</i>	NA	Not Listed	NA	No	Native	Yes	No	
22	Wasp	Crabronidae	<i>Trypoxylon sp.</i>	NA	Not Listed	NA	No	Native	Yes	Yes	
23	Wasp	Pompilidae	<i>Auplopus sp.</i>	NA	Not Listed	Least Concern	No	Native	No	Yes	
24	Wasp	Sphecidae	<i>Chalybion bengalense</i>	NA	Not Listed	Least Concern	No	Native	Yes	No	
25	Wasp	Sphecidae	<i>Isodontia diodon</i>	NA	Not Listed	Least Concern	No	Native	No	Yes	
26	Wasp	Vespidae	<i>Antepipona sp. nr. bipustulata</i>	NA	Not Listed	Least Concern	No	Native	Yes	Yes	
27	Wasp	Vespidae	<i>Eumenes aff. punctatus</i>	NA	Not Listed	Least Concern	No	Native	Yes	No	
28	Wasp	Vespidae	<i>Liostenogaster nitidipennis</i>	NA	Not Listed	Near Threatened	No	Native	No	Yes	
29	Wasp	Vespidae	<i>Liostenogaster varipicta</i>	NA	Not Listed	Near Threatened	No	Native	Yes	Yes	
30	Wasp	Vespidae	<i>Parischnogaster mellyi</i>	NA	Not Listed	Least Concern	No	Native	Yes	Yes	Nesting observed
31	Wasp	Vespidae	<i>Parischnogaster nigricans</i>	NA	Not Listed	Least Concern	No	Native	Yes	Yes	
32	Wasp	Vespidae	<i>Rhynchium haemorrhoidale</i>	NA	Not Listed	Least Concern	No	Native	No	Yes	
33	Wasp	Vespidae	<i>Ropalidia erythrospila</i>	NA	Not Listed	Least Concern	No	Native	Yes	Yes	Nesting observed
34	Wasp	Vespidae	<i>Ropalidia jacobsoni</i>	NA	Not Listed	Least Concern	No	Native	Yes	No	
35	Wasp	Vespidae	<i>Ropalidia stigma</i>	NA	Not Listed	Least Concern	No	Native	Yes	Yes	
36	Wasp	Vespidae	<i>Ropalidia sumatrae</i>	NA	Not Listed	Least Concern	No	Native	Yes	Yes	
37	Wasp	Vespidae	<i>Stenodyneriellus guttulatus</i>	NA	Not Listed	Least Concern	No	Native	Yes	Yes	
38	Wasp	Vespidae	<i>Vespa affinis</i>	Lesser banded hornet	Not Listed	Least Concern	No	Native	No	Yes	
39	Wasp	Vespidae	<i>Vespa analis</i>	NA	Not Listed	Least Concern	No	Native	Yes	No	Nesting observed
40	Wasp	Vespidae	<i>Vespa tropica</i>	Greater banded hornet	Not Listed	Least Concern	No	Native	No	Yes	

No.	Type	Family	Scientific Name	Common Name	Global Status (IUCN/CITES)	National Status (NParks, 2022)	Species of Conservation Significance (Yes/No)	Distribution/Rarity (NParks, 2022)	Native status	Recorded species (overall)	Recorded Species		Remarks for Rapid Baseline Study
											Rapid Baseline Study	EIS (AECOM, 2021)	
1	Damselfly	Coenagrionidae	<i>Agriocnemis femina</i>	Variable wisp	Least Concern	Least Concern	No	Widespread and Common	Native	Yes	No	Yes	
2	Damselfly	Coenagrionidae	<i>Archibasis viola</i>	Violet sprite	Least Concern	Least Concern	No	Widespread and Common	Native	Yes	Yes	Yes	Mating observed
3	Damselfly	Coenagrionidae	<i>Ceriagrion cerinorubellum</i>	Ornate coral-tail	Least Concern	Least Concern	No	Widespread and Common	Native	Yes	Yes	Yes	
4	Damselfly	Coenagrionidae	<i>Pseudagrion microcephalum</i>	Blue sprite	Least Concern	Least Concern	No	Widespread and Common	Native	Yes	Yes	Yes	
5	Damselfly	Coenagrionidae	<i>Pseudagrion pruinosum</i>	Grey sprite	Least Concern	Vulnerable	Yes	Restricted but Common	Native	Yes	Yes	No	
6	Damselfly	Platycnemididae	<i>Prodasineura collaris</i>	Collared threadtail	Least Concern	Vulnerable	Yes	Restricted and Uncommon	Native	Yes	Yes	Yes	
7	Damselfly	Platycnemididae	<i>Prodasineura humeralis</i>	Orange-striped threadtail	Not Listed	Least Concern	No	Widespread and Common	Native	Yes	Yes	Yes	
8	Dragonfly	Aeshnidae	<i>Gynacantha sp.</i>	Unidentified duskhawker	NA	NA	NA	NA	Native	Yes	Yes	Yes	
9	Dragonfly	Libellulidae	<i>Agrioptera insignis</i>	Grenadier	Least Concern	Least Concern	No	Widespread and Common	Native	Yes	Yes	Yes	
10	Dragonfly	Libellulidae	<i>Brachydiplax chalybea</i>	Blue dasher	Least Concern	Least Concern	No	Widespread and Common	Native	Yes	No	Yes	
11	Dragonfly	Libellulidae	<i>Cratilla metallica</i>	Dark-tipped forest skimmer	Least Concern	Least Concern	No	Widespread and Common	Native	Yes	No	Yes	
12	Dragonfly	Libellulidae	<i>Crocthemis servilia</i>	Common scarlet	Least Concern	Least Concern	No	Widespread and Common	Native	Yes	Yes	No	
13	Dragonfly	Libellulidae	<i>Lathrecista asiatica</i>	Scarlet grenadier	Least Concern	Least Concern	No	Widespread and Common	Native	Yes	Yes	No	
14	Dragonfly	Libellulidae	<i>Neurothemis fluctuans</i>	Common parasol	Least Concern	Least Concern	No	Widespread and Common	Native	Yes	Yes	Yes	
15	Dragonfly	Libellulidae	<i>Orchithemis pulcherrima</i>	Variable sentinel	Least Concern	Least Concern	No	Widespread and Common	Native	Yes	Yes	Yes	
16	Dragonfly	Libellulidae	<i>Orthetrum chrysis</i>	Spine-tufted skimmer	Least Concern	Least Concern	No	Widespread and Common	Native	Yes	Yes	Yes	
17	Dragonfly	Libellulidae	<i>Orthetrum glaucum</i>	Common blue skimmer	Least Concern	Least Concern	No	Widespread and Common	Native	Yes	Yes	Yes	
18	Dragonfly	Libellulidae	<i>Orthetrum luzonicum</i>	Slender blue skimmer	Least Concern	Least Concern	No	Widespread and Common	Native	Yes	Yes	Yes	
19	Dragonfly	Libellulidae	<i>Orthetrum sabina</i>	Variiegated green skimmer	Least Concern	Least Concern	No	Widespread and Common	Native	Yes	Yes	No	
20	Dragonfly	Libellulidae	<i>Pantala flavescens</i>	Wandering glider	Least Concern	Least Concern	No	Widespread and Common	Native	Yes	Yes	Yes	
21	Dragonfly	Libellulidae	<i>Rhodothemis rufa</i>	Common redbolt	Least Concern	Least Concern	No	Widespread and Common	Native	Yes	Yes	No	
22	Dragonfly	Libellulidae	<i>Rhyothemis phyllis</i>	Yellow-barred flutterer	Least Concern	Least Concern	No	Widespread and Common	Native	Yes	No	Yes	
23	Dragonfly	Libellulidae	<i>Tholymis tillarga</i>	White-barred duskhawk	Least Concern	Least Concern	No	Widespread and Common	Native	Yes	Yes	No	
24	Dragonfly	Libellulidae	<i>Trithemis aurora</i>	Crimson dropwing	Least Concern	Least Concern	No	Widespread and Common	Native	Yes	Yes	No	
25	Dragonfly	Libellulidae	<i>Trithemis festiva</i>	Indigo dropwing	Least Concern	Least Concern	No	Widespread and Common	Native	Yes	Yes	Yes	

26	Dragonfly	Libellulidae	<i>Tyriobapta torrida</i>	Treehugger	Least Concern	Least Concern	No	Widespread and Common	Native	Yes	Yes	Yes	
27	Dragonfly	Synthemistidae	<i>Idionyx yolanda</i>	Shadowdancer	Not Listed	Least Concern	No	Widespread but Uncommon	Native	Yes	Yes	No	Larvae observed

N o.	Family	Scientific Name	Common Name	Global Status (IUCN/CITES)	National Status (NParks, 2023)	Species of Conservation Significance (Yes/No)	Distribution/ Abundance /Rarity (Khew, 2015)	Native status	Record ed species (overall )	Recorded Species		Remarks for Rapid Baseline Study
										Rapid Baseline Study	EIS (AECOM, 2021)	
1	Hesperiidae	<i>Bibasis harisa consobrina</i>	Orange awlet	Not Listed	Least Concern	No	Moderately rare	Resident	Yes	Yes	Yes	Caterpillar observed
2	Hesperiidae	<i>Caltoris cormasa</i>	Full stop swift	Not Listed	Least Concern	No	Moderately rare	Resident	Yes	No	Yes	
3	Hesperiidae	<i>Erionota torus</i>	Torus skipper	Not Listed	Least Concern	No	Moderately rare	Resident	Yes	No	Yes	
4	Hesperiidae	<i>Iambrix salsala salsala</i>	Chestnut bob	Not Listed	Least Concern	No	Common	Resident	Yes	Yes	Yes	
5	Hesperiidae	<i>Pelopidas mathias mathias</i>	Small branded swift	Not Listed	Least Concern	No	Common	Resident	Yes	Yes	Yes	
6	Hesperiidae	<i>Polytremis lubricans lubricans</i>	Contiguous swift	Not Listed	Least Concern	No	Common	Resident	Yes	Yes	No	
7	Hesperiidae	<i>Potanthus omaha omaha</i>	Lesser dart	Not Listed	Least Concern	No	Common	Resident	Yes	Yes	Yes	
8	Hesperiidae	<i>Pyroneura latoia latoia</i>	Yellow vein lancer	Not Listed	Least Concern	No	Moderately common	Resident	Yes	No	Yes	
9	Hesperiidae	<i>Taractrocera archias quinta</i>	Yellow grass dart	Not Listed	Least Concern	No	Moderately common	Resident	Yes	Yes	Yes	
10	Lycaenidae	<i>Anthene lycaenina miya</i>	Pointed ciliate blue	Not Listed	Least Concern	No	Moderately rare	Resident	Yes	No	Yes	
11	Lycaenidae	<i>Arhopala centaurus nakula</i>	Centaur oakblue	Not Listed	Least Concern	No	Moderately common	Resident	Yes	No	Yes	
12	Lycaenidae	<i>Catopyrops ancyra aberrans</i>	Ancyra blue	Not Listed	Least Concern	No	Moderately rare	Resident	Yes	Yes	No	
13	Lycaenidae	<i>Eooxylides tharis distantii</i>	Branded imperial	Not Listed	Least Concern	No	Common	Resident	Yes	Yes	Yes	
14	Lycaenidae	<i>Jamides celeno aelianus</i>	Common caerulean	Not Listed	Least Concern	No	Common	Resident	Yes	No	Yes	
15	Lycaenidae	<i>Megisba malaya sikkima</i>	Malayan	Not Listed	Least Concern	No	Moderately rare	Resident	Yes	No	Yes	
16	Lycaenidae	<i>Miletus biggsii biggsii</i>	Bigg's brownwing	Not Listed	Least Concern	No	Moderately common	Resident	Yes	Yes	No	
17	Lycaenidae	<i>Prosotas dubiosa lumpura</i>	Tailless line blue	Not Listed	Least Concern	No	Common	Resident	Yes	Yes	Yes	
18	Lycaenidae	<i>Rapala iarbus iarbus</i>	Common red flash	Not Listed	Least Concern	No	Moderately common	Resident	Yes	No	Yes	
19	Lycaenidae	<i>Spalgis epius epius</i>	Apefly	Not Listed	Least Concern	No	Moderately common	Resident	Yes	No	Yes	
20	Lycaenidae	<i>Zeltus amasa maximinianus</i>	Fluffy tit	Not Listed	Least Concern	No	Moderately common	NA	Yes	Yes	No	
21	Lycaenidae	<i>Zizeeria maha serica</i>	Pale grass blue	Not Listed	Least Concern	No	Common	Non-native	Yes	No	Yes	
22	Lycaenidae	<i>Zizina otis lampa</i>	Lesser grass blue	Not Listed	Least Concern	No	Common	Resident	Yes	Yes	Yes	

23	Lycaenidae	<i>Zizula hylax pygmaea</i>	Pygmy grass blue	Not Listed	Least Concern	No	Common	Resident	Yes	Yes	Yes	
24	Nymphalidae	<i>Acraea terpsicore</i>	Tawny coster	Not Listed	Least Concern	No	Common	Non-native	Yes	Yes	Yes	
25	Nymphalidae	<i>Amathusia phidippus phidippus</i>	Palm king	Not Listed	Near threatened	No	Moderately rare	Resident	Yes	Yes	No	
26	Nymphalidae	<i>Danaus chrysippus chrysippus</i>	Plain tiger	Not Listed	Least Concern	No	Common	Resident	Yes	Yes	No	
27	Nymphalidae	<i>Doleschallia bisaltide bisaltide</i>	Autumn leaf	Not Listed	Least Concern	No	Common	Resident	Yes	No	Yes	
28	Nymphalidae	<i>Dryas iulia</i>	Julia heliconian	Not Listed	Not Evaluated	No	NA	Resident	Yes	Yes	No	
29	Nymphalidae	<i>Elymnias hypermnestra agina</i>	Common palmfly	Not Listed	Least Concern	No	Common	Resident	Yes	Yes	Yes	
30	Nymphalidae	<i>Elymnias panthera panthera</i>	Tawny palmfly	Not Listed	Near threatened	No	Moderately common	Resident	Yes	No	Yes	
31	Nymphalidae	<i>Euthalia aconthea gurda</i>	Baron	Not Listed	Least Concern	No	Common	Resident	Yes	No	Yes	
32	Nymphalidae	<i>Euthalia monina monina</i>	Malay baron	Not Listed	Least Concern	No	Common	Resident	Yes	No	Yes	
33	Nymphalidae	<i>Faunis canens arcesilas</i>	Common faun	Not Listed	Least Concern	No	Common	Resident	Yes	Yes	Yes	
34	Nymphalidae	<i>Hypolimnas anomala anomala</i>	Malayan eggfly	Not Listed	Least Concern	No	Common	Resident	Yes	Yes	Yes	
35	Nymphalidae	<i>Junonia almana javana</i>	Peacock pansy	Least Concern	Least Concern	No	Common	Resident	Yes	Yes	Yes	
36	Nymphalidae	<i>Junonia hedonia ida</i>	Chocolate pansy	Not Listed	Least Concern	No	Common	Resident	Yes	Yes	Yes	
37	Nymphalidae	<i>Junonia orithya wallacei</i>	Blue pansy	Not Listed	Least Concern	No	Common	Resident	Yes	Yes	No	
38	Nymphalidae	<i>Lasippa tiga siaka</i>	Malayan lascar	Not Listed	Least Concern	No	Common	Resident	Yes	No	Yes	
39	Nymphalidae	<i>Mycalesis mineus macromalayana</i>	Dark brand bush brown	Not Listed	Least Concern	No	Common	Resident	Yes	Yes	Yes	
40	Nymphalidae	<i>Mycalesis perseoides perseoides</i>	Burmese bush brown	Not Listed	Least Concern	No	Common	Resident	Yes	No	Yes	
41	Nymphalidae	<i>Mycalesis perseus cepheus</i>	Dingy bush brown	Not Listed	Least Concern	No	Moderately common	Resident	Yes	No	Yes	
42	Nymphalidae	<i>Mycalesis visala phamis</i>	Long brand bush brown	Not Listed	Near threatened	No	Moderately common	Resident	Yes	Yes	Yes	
43	Nymphalidae	<i>Neptis hylas papaja</i>	Common sailor	Not Listed	Least Concern	No	Moderately common	Resident	Yes	Yes	No	
44	Nymphalidae	<i>Phaedyma columella singa</i>	Short banded sailor	Not Listed	Least Concern	No	Common	Resident	Yes	No	Yes	
45	Nymphalidae	<i>Polyura hebe plautus</i>	Plain nawab	Not Listed	Least Concern	No	Common	Resident	Yes	No	Yes	
46	Nymphalidae	<i>Tanaecia iapis puseda</i>	Horsfield's baron	Not Listed	Least Concern	No	Common	Resident	Yes	Yes	Yes	
47	Nymphalidae	<i>Tanaecia pelea pelea</i>	Malay viscount	Not Listed	Least Concern	No	Common	Resident	Yes	Yes	Yes	
48	Nymphalidae	<i>Vindula dejone erotella</i>	Cruiser	Not Listed	Least Concern	No	Common	Resident	Yes	No	Yes	
49	Nymphalidae	<i>Ypthima baldus newboldi</i>	Common five-ring	Not Listed	Least Concern	No	Common	Resident	Yes	Yes	Yes	
50	Nymphalidae	<i>Ypthima horsfieldii humei</i>	Malayan five-ring	Not Listed	Least Concern	No	Common	Resident	Yes	Yes	Yes	

51	Papilionidae	<i>Chilasa clytia clytia</i>	Common mime	Not Listed	Least Concern	No	Common	Resident	Yes	No	Yes	
52	Papilionidae	<i>Graphium sarpedon luctatus</i>	Common bluebottle	Not Listed	Least Concern	No	Common	Resident	Yes	Yes	Yes	
53	Papilionidae	<i>Pachliopta aristolochiae asteris</i>	Common rose	Not Listed	Near threatened	No	Moderately common	Resident	Yes	Yes	Yes	
54	Papilionidae	<i>Papilio polytes romulus</i>	Common mormon	Not Listed	Least Concern	No	Common	Resident	Yes	Yes	Yes	
55	Pieridae	<i>Appias libythea olferna</i>	Striped albatross	Not Listed	Least Concern	No	Common	Resident	Yes	Yes	Yes	
56	Pieridae	<i>Catopsilia pyranthe pyranthe</i>	Mottled emigrant	Not Listed	Least Concern	No	Common	Resident	Yes	No	Yes	
57	Pieridae	<i>Delias hyparete metarete</i>	Painted jezebel	Not Listed	Least Concern	No	Common	Resident	Yes	Yes	Yes	
58	Pieridae	<i>Eurema hecabe contubernalis</i>	Common grass yellow	Not Listed	Least Concern	No	Common	Resident	Yes	Yes	No	
59	Pieridae	<i>Eurema sari sodalis</i>	Chocolate grass yellow	Not Listed	Least Concern	No	Moderately common	Resident	Yes	Yes	Yes	
60	Pieridae	<i>Eurema simulatrix tecmessa</i>	Forest grass yellow	Not Listed	Near threatened	No	Moderately common	Resident	Yes	No	Yes	
61	Pieridae	<i>Leptosia nina malayana</i>	Psyche	Not Listed	Least Concern	No	Common	Resident	Yes	No	Yes	

No	Family	Scientific Name	Common Name	Global Status (IUCN/CITES)	National Status (Davison et al., 2008; NParks 2023)	Species of Conservation Significance (Yes/No)	Native Status	Recorded Species		Remarks for Rapid Baseline Study
								Rapid Baseline Study	EIS (AECOM, 2021)	
1	Channidae	<i>Channa striata</i>	Common snakehead/aruan	Least Concern	Not Evaluated	No	Native	Yes	Yes	
2	Clariidae	<i>Clarias cf. batrachus</i>	Common walking catfish	Not Listed	Near Threatened	No	Native	Yes	Yes	
3	Cyprinidae	<i>Barbodes rhombeus</i>	Indochinese spotted barb	Least Concern	Not Evaluated	No	Non-native	Yes	Yes	
4	Cyprinidae	<i>Danio albolineatus</i>	Pearl danio	Not Listed	Not Evaluated	No	Non-native	Yes	Yes	
5	Gobiidae	<i>cf. Rhinogobius similis</i>	Barcheek goby	Least Concern	Not Evaluated	No	Non-native	Yes	No	
6	Poeciliidae	<i>Gambusia affinis</i>	Mosquitofish	Least Concern	Not Evaluated	No	Non-native	No	Yes	
7	Poeciliidae	<i>Poecilia reticulata</i>	Guppy	Least Concern	Not Evaluated	No	Non-native	Yes	Yes	
8	Synbranchidae	<i>Monopterus albus</i>	Asian swamp eel	Least Concern	Not Evaluated	No	Native	Yes	Yes	

No.	Family	Scientific Name	Common Name	Global Status (IUCN/CITES)	National Status (Davison et al., 2008)	Species of Conservation Significance (Yes/No)	Native Status	Recorded Species	
								Rapid Baseline Study	EIS (AECOM, 2021)
1	Thiaridae	<i>Melanoides tuberculata</i>	NA	Least Concern	Not Evaluated	No	Native	Yes	No

No.	Type	Family	Scientific Name	Common Name	Global Status (IUCN/CITES)	National Status (NParks, 2022)	Species of Conservation Significance (Yes/No)	Distribution/ Abundance/ Rarity (Baker & Lim, 2012)	Native Status	Recorded Species		Remarks for Rapid Baseline Study
										Rapid Baseline Study	EIS (AECOM, 2021)	
1	Frog	Dicroglossidae	<i>Fejervarya limnocharis</i>	Field frog	Least Concern	Least Concern	No	Widespread and Common	Native	Yes	No	
2	Frog	Dicroglossidae	<i>Limnonectes blythii</i>	Malayan giant frog	Near Threatened	Least Concern	No	Widespread and Common	Native	Yes	Yes	Frogspawn and tadpoles observed
3	Frog	Dicroglossidae	<i>Limnonectes malesianus</i>	Malesian frog	Near Threatened	Near Threatened	No	Restricted but Common	Native	No	Yes	
4	Frog	Eleutherodactylidae	<i>Eleutherodactylus planirostris</i>	Greenhouse frog	Least Concern	Not Evaluated	No	Widespread and Common	Non-native	Yes	Yes	
5	Frog	Ranidae	<i>Chalcorana labialis</i>	Copper-cheeked frog	Least Concern	Least Concern	No	Restricted but Common	Native	Yes	No	Tadpoles observed
6	Frog	Ranidae	<i>Sylvirana quentheri</i>	Guenther's frog	Least Concern	Not Evaluated	No	Widespread but Uncommon	Non-native	Yes	No	
7	Frog	Microhylidae	<i>Microhyla heymonsi</i>	Dark-sided chorus frog	Least Concern	Least Concern	No	Widespread and Common	Native	No	Yes	
8	Frog	Rhacophoridae	<i>Polypedates leucomystax</i>	Four-lined tree frog	Least Concern	Least Concern	No	Widespread and Common	Native	Yes	Yes	
9	Toad	Bufoidea	<i>Duttaphrynus bengalensis</i>	Indian toad	Least Concern	NA	No	Widespread and Common	Non-native	Yes	Yes	

No.	Type	Family	Scientific Name	Common Name	Global Status (IUCN/CITES)	National Status (NParks, 2022)	Species of Conservation Significance (Yes/No)	Distribution/ Abundance/ Rarity (Baker & Lim, 2012)	Native Status	Recorded Species		Remarks for Rapid Baseline Study
										Rapid Baseline Study	EIS (AECOM, 2021)	
1	Non-marine lizard	Agamidae	<i>Bronchocelea cristatella</i>	Green crested lizard	Not Listed	Least Concern	No	Widespread but Uncommon	Native	Yes	Yes	
2	Non-marine lizard	Agamidae	<i>Calotes versicolor</i>	Changeable lizard	Not Listed	Not Evaluated	No	Widespread and Common	Non-native	No	Yes	
3	Non-marine lizard	Agamidae	<i>Draco sumatranus</i>	Sumatran flying dragon	Not Listed	Least Concern	No	Widespread and Common	Native	No	Yes	
4	Non-marine lizard	Gekkonidae	<i>Gehyra mutilata</i>	Four-clawed gecko	Not Listed	Least Concern	No	Widespread and Common	Native	Yes	No	
5	Non-marine lizard	Gekkonidae	<i>Gekko monarchus</i>	Spotted house gecko	Not Listed	Least Concern	No	Widespread and Common	Native	Yes	Yes	

6	Non-marine lizard	Gekkoni dae	<i>Hemidactylus frenatus</i>	Spiny-tailed house gecko	Least Concern	Least Concern	No	Widespread and Common	Native	Yes	Yes	
7	Non-marine lizard	Scincidae	<i>Eutropis multifasciata</i>	Many-lined sun skink	Not Listed	Least Concern	No	Widespread and Common	Native	No	Yes	
8	Non-marine lizard	Scincidae	<i>Lygosoma bowringii</i>	Garden supple skink	Not Listed	Least Concern	No	Widespread and Common	Native	Yes	Yes	
9	Non-marine lizard	Varanidae	<i>Varanus nebulosus</i>	Clouded monitor	Not Listed; CITES protected (Appendix I)	Least Concern	No	Restricted but Common	Native	Yes	Yes	
10	Non-marine lizard	Varanidae	<i>Varanus salvator</i>	Malayan water monitor	Least Concern; CITES protected (Appendix II)	Least Concern	No	Widespread and Common	Native	Yes	Yes	
11	Non-marine snake	Colubridae	<i>Ahaetulla prasina</i>	Oriental whip snake	Least Concern	Least Concern	No	Widespread and Common	Native	No	Yes	
12	Non-marine snake	Colubridae	<i>Chrysopelea paradisi</i>	Paradise gliding snake	Least Concern	Least Concern	No	Widespread and Common	Native	Yes	No	Moult observed
13	Non-marine snake	Colubridae	<i>Dendrelaphis caudolineatus</i>	Striped bronzeback	Least Concern	Least Concern	No	Widespread and Common	Native	No	Yes	
14	Non-marine snake	Colubridae	<i>Dendrelaphis pictus</i>	Painted bronzeback	Least Concern	Least Concern	No	Widespread and Common	Native	Yes	Yes	
15	Non-marine turtle	Trionychidae	<i>Amyda cartilaginea</i>	Asian softshell turtle	Vulnerable; CITES protected (Appendix II)	Vulnerable	Yes	Restricted and Uncommon	Native	No	Yes	

No.	Family	Scientific Name	Common Name	Global Status (IUCN/CITES)	National Status (NParks, 2022)	Species of Conservation Significance (Yes/No)	Distribution/ Abundance/ Rarity (NSS, 2020; Singapore Birds Project, 2023)	Primary Native Status (NSS, 2020; Singapore Birds Project, 2023)	Recorded Species		Remarks for Rapid Baseline Study
									Rapid Baseline Study	EIS (AECOM, 2021)	
1	Accipitridae	<i>Accipiter gularis</i>	Japanese sparrowhawk	Least Concern; CITES protected (Appendix II)	Least Concern	No	Common	Passage migrant	No	Yes	
2	Accipitridae	<i>Accipiter trivirgatus</i>	Crested goshawk	Least Concern; CITES protected (Appendix II)	Near Threatened	No	Uncommon	Resident breeder	No	Yes	
3	Accipitridae	<i>Haliaeetus leucogaster</i>	White-bellied sea eagle	Least Concern; CITES protected (Appendix II)	Least Concern	No	Common	Resident breeder	No	Yes	
4	Accipitridae	<i>Haliastur indus</i>	Brahminy kite	Least Concern; CITES protected (Appendix II)	Least Concern	No	Common	Resident breeder	No	Yes	
5	Accipitridae	<i>Nisaetus cirrhatus</i>	Changeable hawk-eagle	Least Concern; CITES protected (Appendix II)	Vulnerable	Yes	Common	Resident breeder	No	Yes	
6	Aegithinidae	<i>Aegithina tiphia</i>	Common iora	Least Concern	Least Concern	No	Common	Resident breeder	Yes	Yes	
7	Acanthizidae	<i>Gerygone sulphurea</i>	Golden-bellied gerygone	Least Concern	Near Threatened	No	Common	Resident breeder	No	Yes	
8	Alcedinidae	<i>Halcyon smyrnenis</i>	White-throated kingfisher	Least Concern	Least Concern	No	Common	Resident breeder	Yes	Yes	
9	Alcedinidae	<i>Pelargopsis capensis</i>	Stork-billed kingfisher	Least Concern	Least Concern	No	Uncommon	Resident breeder	Yes	Yes	
10	Alcedinidae	<i>Todiramphus chloris</i>	Collared kingfisher	Least Concern	Least Concern	No	Abundant	Resident breeder	Yes	Yes	

11	Apodidae	<i>Aerodramus sp.</i>	Unidentified swiftlet	NA	NA	NA	NA	NA	Yes	Yes	
12	Apodidae	<i>Collocalia affinis</i>	Plume-toed swiftlet	Least Concern	Vulnerable	Yes	Uncommon	Resident breeder	Yes	No	
13	Ardeidae	<i>Ardea purpurea</i>	Purple heron	Least Concern	Endangered	Yes	Uncommon	Resident breeder	No	Yes	
14	Ardeidae	<i>Gorsachius melanolophus</i>	Malayan night heron	Least Concern	Near Threatened	No	Uncommon	Winter visitor	No	Yes	
15	Cacatuidae	<i>Cacatua galerita</i>	Sulphur-crested cockatoo	Least Concern; CITES protected (Appendix II)	NA	No	NA	Introduced	No	Yes	
16	Cacatuidae	<i>Cacatua goffiniana</i>	Tanimbar corella	Near Threatened; CITES protected (Appendix I)	NA	No	Common	Introduced resident breeder	No	Yes	
17	Campephagidae	<i>Lalage nigra</i>	Pied triller	Least Concern	Least Concern	No	Common	Resident breeder	Yes	No	
18	Caprimulgidae	<i>Caprimulgus macrurus</i>	Large-tailed nightjar	Least Concern	Least Concern	No	Common	Resident breeder	Yes	Yes	
19	Cisticolidae	<i>Cisticola juncidis</i>	Zitting cisticola	Least Concern	Vulnerable	Yes	Common	Resident breeder	Yes	No	
20	Cisticolidae	<i>Orthotomus atrogularis</i>	Dark-necked tailorbird	Least Concern	Least Concern	No	Common	Resident breeder	Yes	Yes	
21	Cisticolidae	<i>Orthotomus sericeus</i>	Rufous-tailed tailorbird	Least Concern	Near Threatened	No	Uncommon	Resident breeder	Yes	Yes	
22	Cisticolidae	<i>Orthotomus sutorius</i>	Common tailorbird	Least Concern	Least Concern	No	Common	Resident breeder	Yes	Yes	
23	Columbidae	<i>Chalcophaps indica</i>	Common emerald dove	Least Concern	Least Concern	No	Uncommon	Resident breeder	Yes	Yes	Also recorded on camera trap
24	Columbidae	<i>Ducula bicolor</i>	Pied imperial pigeon	Least Concern	Data Deficient	No	Uncommon	Introduced resident breeder	Yes	No	
25	Columbidae	<i>Geopelia striata</i>	Zebra dove	Least Concern	Least Concern	No	Common	Resident breeder	Yes	No	
26	Columbidae	<i>Spilopelia chinensis</i>	Spotted dove	Least Concern	Least Concern	No	Abundant	Resident breeder	Yes	Yes	
27	Columbidae	<i>Treron vernans</i>	Pink-necked green pigeon	Least Concern	Least Concern	No	Abundant	Resident breeder	Yes	Yes	Also recorded on camera trap
28	Coraciidae	<i>Eurystomus orientalis</i>	Oriental dollarbird	Least Concern	Least Concern	No	Common	Resident breeder	Yes	Yes	
29	Corvidae	<i>Corvus splendens</i>	House crow	Least Concern	NA	No	Common	Introduced resident breeder	No	Yes	
30	Cuculidae	<i>Cacomantis sonneratii</i>	Banded bay cuckoo	Least Concern	Least Concern	No	Uncommon	Resident breeder	No	Yes	
31	Cuculidae	<i>Centropus sinensis</i>	Greater coucal	Least Concern	Near Threatened	No	Uncommon	Resident breeder	Yes	Yes	
32	Cuculidae	<i>Cuculus micropterus</i>	Indian cuckoo	Least Concern	Least Concern	No	Uncommon	Winter visitor	No	Yes	
33	Cuculidae	<i>Eudynamis scolopaceus</i>	Asian koel	Least Concern	Least Concern	No	Common	Resident breeder	Yes	Yes	
34	Dicaeidae	<i>Dicaeum cruentatum</i>	Scarlet-backed flowerpecker	Least Concern	Least Concern	No	Common	Resident breeder	Yes	Yes	
35	Dicruridae	<i>Dicrurus paradiseus</i>	Greater racket-tailed drongo	Least Concern	Least Concern	No	Common	Resident breeder	Yes	Yes	
36	Estrilidae	<i>Lonchura punctulata</i>	Scaly-breasted munia	Least Concern	Least Concern	No	Common	Resident breeder	Yes	No	

37	Hirundinidae	<i>Hirundo rustica</i>	Barn swallow	Least Concern	Near Threatened	No	Abundant	Winter visitor	Yes	No	
38	Hirundinidae	<i>Hirundo tahitica</i>	Pacific swallow	Least Concern	Least Concern	No	Common	Resident breeder	Yes	Yes	
39	Laniidae	<i>Lanius schach</i>	Long-tailed shrike	Least Concern	Least Concern	No	Uncommon	Resident breeder	Yes	No	
40	Laniidae	<i>Lanius tigrinus</i>	Tiger shrike	Least Concern	Near Threatened	No	Common	Winter visitor	No	Yes	
41	Leiotherichidae	<i>Garrulax leucolophus</i>	White-crested laughingthrush	Least Concern	NA	No	Common	Introduced resident breeder	Yes	Yes	Recorded on camera trap
42	Megalaimidae	<i>Psilopogon haemacephalus</i>	Coppersmith barbet	Least Concern	Least Concern	No	Common	Resident breeder	No	Yes	
43	Megalaimidae	<i>Psilopogon lineatus</i>	Lineated barbet	Least Concern	NA	No	Common	Introduced resident breeder	Yes	Yes	
44	Meropidae	<i>Merops viridis</i>	Blue-throated bee-eater	Least Concern	Least Concern	No	Common	Migrant breeder	No	Yes	
45	Muscicapidae	<i>Copsychus malabaricus</i>	White-rumped shama	Least Concern; CITES protected (Appendix II)	Endangered	Yes	Uncommon	Resident breeder	No	Yes	
46	Muscicapidae	<i>Copsychus saularis</i>	Oriental magpie-robin	Least Concern	Vulnerable	Yes	Uncommon	Resident breeder	Yes	Yes	
47	Muscicapidae	<i>Muscicapa dauurica</i>	Asian brown flycatcher	Least Concern	Least Concern	No	Common	Winter visitor	No	Yes	
48	Nectariniidae	<i>Aethopyga siparaja</i>	Crimson sunbird	Least Concern	Least Concern	No	Common	Resident breeder	No	Yes	
49	Nectariniidae	<i>Anthreptes malacensis</i>	Brown-throated sunbird	Least Concern	Least Concern	No	Common	Resident breeder	Yes	Yes	
50	Nectariniidae	<i>Cinnyris jugularis</i>	Olive-backed sunbird	Least Concern	Least Concern	No	Common	Resident breeder	Yes	Yes	
51	Oriolidae	<i>Oriolus chinensis</i>	Black-naped oriole	Least Concern	Least Concern	No	Abundant	Resident breeder	Yes	Yes	
52	Pellorneidae	<i>Malacocincla abbotti</i>	Abbott's babbler	Least Concern	Least Concern	No	Uncommon	Resident breeder	No	Yes	
53	Phasianidae	<i>Gallus gallus</i>	Red junglefowl	Least Concern	Near Threatened	No	Common	Resident breeder	Yes	Yes	Also recorded on camera trap
54	Phylloscopidae	<i>Phylloscopus borealis</i>	Arctic warbler	Least Concern	Least Concern	No	Common	Winter visitor	No	Yes	
55	Picidae	<i>Chrysophlegma miniaceum</i>	Banded woodpecker	Least Concern	Least Concern	No	Common	Resident breeder	Yes	Yes	
56	Picidae	<i>Dinopium javanense</i>	Common flameback	Least Concern	Least Concern	No	Common	Resident breeder	Yes	Yes	
57	Picidae	<i>Micropternus brachyurus</i>	Rufous woodpecker	Least Concern	Least Concern	No	Uncommon	Resident breeder	No	Yes	
58	Picidae	<i>Picus vittatus</i>	Laced woodpecker	Least Concern	Least Concern	No	Common	Resident breeder	No	Yes	
59	Psittaculidae	<i>Loriculus galgulus</i>	Blue-crowned hanging-parrot	Least Concern; CITES protected (Appendix II)	Least Concern	No	Common	Resident breeder	Yes	Yes	
60	Psittaculidae	<i>Psittacula alexandri</i>	Red-breasted parakeet	Near Threatened; CITES protected (Appendix II)	NA	No	Common	Introduced resident breeder	Yes	Yes	
61	Psittaculidae	<i>Psittacula krameri</i>	Rose-ringed parakeet	Least Concern	NA	No	Common	Introduced resident breeder	Yes	Yes	
62	Psittaculidae	<i>Psittacula longicauda</i>	Long-tailed parakeet	Vulnerable; CITES protected (Appendix II)	Near Threatened	Yes	Common	Resident breeder	Yes	Yes	

63	Psittaculidae	<i>Trichoglossus haematodus</i>	Coconut lorikeet	Least Concern; CITES protected (Appendix II)	NA	No	Uncommon	Introduced resident breeder	No	Yes	
64	Pycnonotidae	<i>Pycnonotus brunneus</i>	Asian red-eyed bulbul	Least Concern	Vulnerable	Yes	Uncommon	Resident breeder	No	Yes	
65	Pycnonotidae	<i>Pycnonotus goiavier</i>	Yellow-vented bulbul	Least Concern	Least Concern	No	Abundant	Resident breeder	Yes	Yes	
66	Pycnonotidae	<i>Pycnonotus plumosus</i>	Olive-winged bulbul	Least Concern	Least Concern	No	Common	Resident breeder	Yes	Yes	
67	Pycnonotidae	<i>Pycnonotus zeylanicus</i>	Straw-headed bulbul	Critically Endangered; CITES protected (Appendix I)	Endangered	Yes	Uncommon	Resident breeder	Yes	Yes	
68	Rallidae	<i>Amauornis phoenicurus</i>	White-breasted waterhen	Least Concern	Least Concern	No	Common	Resident breeder	Yes	Yes	Also recorded on camera trap
69	Rallidae	<i>Rallina fasciata</i>	Red-legged crane	Least Concern	Near Threatened	No	Uncommon	Resident breeder	Yes	Yes	
70	Rhipiduridae	<i>Rhipidura javanica</i>	Malaysian pied fantail	Least Concern	Least Concern	No	Common	Resident breeder	Yes	No	
71	Strigidae	<i>Otus lempiji</i>	Sunda scops owl	Least Concern; CITES protected (Appendix II)	Least Concern	No	Common	Resident breeder	Yes	Yes	
72	Sturnidae	<i>Acridotheres javanicus</i>	Javan myna	Vulnerable	NA	No	Abundant	Introduced resident breeder	Yes	Yes	
73	Sturnidae	<i>Aplonis panayensis</i>	Asian glossy starling	Least Concern	Least Concern	No	Abundant	Resident breeder	Yes	Yes	
74	Sturnidae	<i>Gracula religiosa</i>	Common hill myna	Least Concern; CITES protected (Appendix I)	Near Threatened	No	Uncommon	Resident breeder	Yes	Yes	
75	Timaliidae	<i>Mixornis gularis</i>	Pin-striped tit-babbler	Least Concern	Least Concern	No	Common	Resident breeder	Yes	Yes	
76	Turdidae	<i>Turdus obscurus</i>	Eyebrowed thrush	Least Concern	Near Threatened	No	Uncommon	Passage migrant	No	Yes	
77	Zosteropidae	<i>Zosterops simplex</i>	Swinhoe's white-eye	Least Concern	Vulnerable	Yes	Common	Introduced resident breeder	Yes	Yes	

No.	Family	Scientific Name	Common Name	Global Status (IUCN/CITES)	National Status (NParks, 2022)	Species of Conservation Significance (Yes/No)	Distribution/Abundance/Rarity (Baker & Lim, 2012)	Native Status	Recorded Species		Remarks for Rapid Baseline Study
									Rapid Baseline Study	EIS (AECOM, 2021)	
1	Cercopithecidae	<i>Macaca fascicularis</i>	Long-tailed macaque	Vulnerable; CITES protected (Appendix II)	Least Concern	Yes	Widespread and Common	Native	Yes	Yes	Also recorded on camera trap
2	Cynocephalidae	<i>Galeopterus variegatus</i>	Sunda colugo	Least Concern	Near Threatened	No	Restricted but Common	Native	Yes	No	
3	Hystricidae	<i>cf. Hystrix brachyura</i>	Malayan porcupine	Least Concern	Critically Endangered	Yes	Restricted and Rare	Native	No	Yes	
4	Manidae	<i>Manis javanica</i>	Sunda pangolin	Critically Endangered; CITES protected (Appendix I)	Critically Endangered	Yes	Widespread but Rare	Native	Yes	No	Recorded on camera trap
5	Muridae	<i>Rattus tanezumi</i>	Asian house rat	Least Concern	Least Concern	No	Widespread and Common	Native	No	Yes	
6	Muridae	<i>Sundamys annandalei</i>	Annandale's rat	Not Listed	Least Concern	No	Restricted but Common	Native	No	Yes	
7	Sciuridae	<i>Callosciurus notatus</i>	Plantain squirrel	Least Concern	Least Concern	No	Widespread and Common	Native	Yes	Yes	Also recorded on camera trap

8	Suidae	<i>Sus scrofa</i>	Eurasian wild boar	Least Concern	Least Concern	No	Widespread and Common	Native	Yes	No	Also recorded on camera trap
9	Tupaiidae	<i>Tupaia glis</i>	Common treeshrew	Least Concern	Least Concern	No	Widespread and Common	Native	Yes	Yes	Also recorded on camera trap
10	Viverridae	<i>Paradoxurus musangus</i>	Sumatran palm civet	Least Concern	Least Concern	No	Widespread but Uncommon	Native	Yes	Yes	Also recorded on camera trap

No	Family	Scientific Name	Common Name	Global Status (IUCN/CITES)	National Status (NParks, 2022)	Species of Conservation Significance (Yes/No)	Distribution/Abundance/Rarity (Baker & Lim, 2012)	Native Status	Recorded Species	
									Rapid Baseline Study	EIS (AECOM, 2021)
1	Emballonuridae	<i>Family Emballonuridae</i>	Unidentified Emballonuridae	NA	NA	NA	NA	Native	NA	Yes
2	Pteropodidae	<i>Cynopterus brachyotis</i>	Lesser short-nosed fruit bat	Least Concern	Least Concern	No	Widespread and Common	Native	Yes	Yes
3	Pteropodidae	<i>Eonycteris spelaea</i>	Cave nectar bat	Least Concern	Vulnerable	Yes	Widespread but Uncommon	Native	NA	Yes
4	Rhinolophidae	<i>Rhinolophus refulgens</i>	Glossy horseshoe bat	Least Concern	Least Concern	No	Restricted but Common	Native	NA	Yes
5	Vespertilionidae	<i>Myotis muricola</i>	Asian whiskered myotis	Least Concern	Least Concern	No	Widespread and Common	Native	NA	Yes
6	Vespertilionidae	<i>Pipistrellus javanicus</i>	Javan pipistrelle	Least Concern	Least Concern	No	Widespread but Uncommon	Native	NA	Yes
7	Vespertilionidae	<i>Scotophilus kuhlii</i>	Lesser Asian house bat	Least Concern	Least Concern	No	Widespread and Common	Native	NA	Yes
8	Vespertilionidae	<i>Tylonycteris sp.</i>	Unidentified bamboo bat	Least Concern	NA	Yes	NA	Native	NA	Yes

**APPENDIX D**

**Faunal Survey Data**

Date	Cycle	Survey type	Sampling point (aquatic)	Latitude	Longitude	Time (24h)	Scientific name	Common name	Taxon	Species of conservation significance	Quantity	Observation type (seen/heard/caught/scat/others)	Targeted/incidental	Remarks
21-Apr		Others		1.33006697	103.833044	12:20	<i>Sus scrofa</i>	Eurasian wild boar	Mammal	No	1	Seen	Incidental	Piglet
21-Apr		Others		1.330576	103.832753	12:43	<i>Unidentified burrow</i>	Unidentified burrow	NA	NA	1	Seen	Incidental	
21-Apr-23	1	Aquatic point count (PM)	S1_08	1.32791729	103.833994	19:40 - 20:00	<i>Danio albolineatus</i>	Pearl danio	Fish	No	8	Seen	Targeted	
21-Apr-23	1	Aquatic point count (PM)	S1_08	1.32791729	103.833994	19:40 - 20:00	<i>Poecilia reticulata</i>	Guppy	Fish	No	7	Seen	Targeted	
21-Apr-23	1	Aquatic point count (PM)	S1_08	1.32791729	103.833994	19:40 - 20:00	<i>Melanoides tuberculata</i>	NA	Mollusc	No	4	Seen	Targeted	
21-Apr-23	1	Aquatic point count (PM)	S1_08	1.32791729	103.833994	19:40 - 20:00	<i>Limnonectes blythii</i>	Malayan giant frog	Amphibian	No	5	Seen	Targeted	Tadpole
21-Apr-23	1	Aquatic point count (PM)	S1_08	1.32791729	103.833994	19:40 - 20:00	<i>Limnonectes blythii</i>	Malayan giant frog	Amphibian	No	2	Seen	Targeted	
21-Apr-23	1	Aquatic point count (PM)	S1_08	1.32791729	103.833994	19:40 - 20:00	<i>Limnonectes blythii</i>	Malayan giant frog	Amphibian	No	30	Seen	Targeted	Frogspawn
21-Apr-23	1	Aquatic point count (PM)	S1_08	1.32791729	103.833994	19:40 - 20:00	<i>Unidentified Clariidae</i>	Unidentified walking catfish	Fish	NA	1	Seen	Targeted	Baby
21-Apr-23	1	Aquatic point count (PM)	S1_08	1.32791729	103.833994	19:40 - 20:00	<i>Eleutherodactylus planirostris</i>	Greenhouse frog	Amphibian	No	4	Heard	Targeted	
21-Apr-23	1	Aquatic point count (PM)		1.32869904	103.833785	20:03	<i>Rallina fasciata</i>	Red-legged crane	Bird	No	1	Heard	Incidental	
21-Apr-23	1	Aquatic point count (PM)		1.32869904	103.833785	20:03	<i>Polypedates leucomystax</i>	Four-lined tree frog	Amphibian	No	1	Heard	Incidental	
21-Apr-23	1	Aquatic point count (PM)	S1_07	1.328749	103.833655	20:05 - 20:25	<i>Unidentified Clariidae</i>	Unidentified walking catfish	Fish	NA	1	Seen	Targeted	
21-Apr-23	1	Aquatic point count (PM)	S1_07	1.328749	103.833655	20:05 - 20:25	<i>Eleutherodactylus planirostris</i>	Greenhouse frog	Amphibian	No	3	Heard	Targeted	
21-Apr-23	1	Aquatic point count (PM)	S1_07	1.328749	103.833655	20:05 - 20:25	<i>Danio albolineatus</i>	Pearl danio	Fish	No	60	Seen	Targeted	
21-Apr-23	1	Aquatic point count (PM)	S1_07	1.328749	103.833655	20:05 - 20:25	<i>Poecilia reticulata</i>	Guppy	Fish	No	7	Seen	Targeted	

21-Apr-23	1	Aquatic point count (PM)	S1_07	1.328749	103.833655	20:05 - 20:25	<i>Barbodes rhombeus</i>	Indochinese spotted barb	Fish	No	22	Seen	Targeted	
21-Apr-23	1	Aquatic point count (PM)		1.32944101	103.833913	20:28	<i>Chrysopelea paradisi</i>	Paradise gliding snake	Reptile	No	1	Seen	Incidental	Molt left on hoarding
21-Apr-23	1	Aquatic point count (PM)	S1_06	1.329476	103.833352	20:30 - 20:50	<i>Danio albolineatus</i>	Pearl danio	Fish	No	70	Seen	Targeted	
21-Apr-23	1	Aquatic point count (PM)	S1_06	1.329476	103.833352	20:30 - 20:50	<i>Barbodes rhombeus</i>	Indochinese spotted barb	Fish	No	25	Seen	Targeted	
21-Apr-23	1	Aquatic point count (PM)	S1_06	1.329476	103.833352	20:30 - 20:50	<i>Poecilia reticulata</i>	Guppy	Fish	No	35	Seen	Targeted	
21-Apr-23	1	Aquatic point count (PM)	S1_06	1.329476	103.833352	20:30 - 20:50	<i>Melanoides tuberculata</i>	NA	Mollusc	No	5	Seen	Targeted	
21-Apr-23	1	Aquatic point count (PM)	S1_06	1.329476	103.833352	20:30 - 20:50	<i>Clarias batrachus</i>	Common walking catfish	Fish	No	1	Seen	Targeted	
21-Apr-23	1	Aquatic point count (PM)		1.32956799	103.833832	20:53	<i>Paradoxurus musangus</i>	Sumatran palm civet	Mammal	No	1	Seen	Incidental	
21-Apr-23	1	Aquatic point count (PM)		1.33023703	103.829857	20:58	<i>Galeopterus variegatus</i>	Sunda colugo	Mammal	Yes	1	Seen	Incidental	
21-Apr-23	1	Aquatic point count (PM)		1.33093097	103.830576	21:01	<i>Paradoxurus musangus</i>	Sumatran palm civet	Mammal	No	1	Seen	Incidental	
21-Apr-23	1	Aquatic point count (PM)		1.32986002	103.832561	21:05	<i>Macaca fascicularis</i>	Long-tailed macaque	Mammal	Yes	7	Seen	Incidental	Roosting on fence and inside the compound
21-Apr-23	1	Aquatic point count (PM)	S1_05	1.3301139	103.832735	21:10 - 21:30	<i>Barbodes rhombeus</i>	Indochinese spotted barb	Fish	No	29	Seen	Targeted	
21-Apr-23	1	Aquatic point count (PM)	S1_05	1.3301139	103.832735	21:10 - 21:30	<i>Limnonectes blythii</i>	Malayan giant frog	Amphibian	No	2	Seen	Targeted	
21-Apr-23	1	Aquatic point count (PM)	S1_05	1.3301139	103.832735	21:10 - 21:30	<i>Danio albolineatus</i>	Pearl danio	Fish	No	9	Seen	Targeted	
21-Apr-23	1	Aquatic point count (PM)	S1_05	1.3301139	103.832735	21:10 - 21:30	<i>Unidentified Clariidae</i>	Unidentified walking catfish	Fish	NA	1	Seen	Targeted	
21-Apr-23	1	Aquatic point count (PM)	S1_04	1.33065673	103.832144	21:35 - 21:55	<i>Danio albolineatus</i>	Pearl danio	Fish	No	65	Seen	Targeted	
21-Apr-23	1	Aquatic point count (PM)	S1_04	1.33065673	103.832144	21:35 - 21:55	<i>Limnonectes blythii</i>	Malayan giant frog	Amphibian	No	2	Seen	Targeted	
21-Apr-23	1	Aquatic point count (PM)	S1_04	1.33065673	103.832144	21:35 - 21:55	<i>Poecilia reticulata</i>	Guppy	Fish	No	25	Seen	Targeted	

21-Apr-23	1	Aquatic point count (PM)	S1_04	1.33065673	103.832144	21:35 - 21:55	<i>Eleutherodactylus planirostris</i>	Greenhouse frog	Amphibian	No	2	Seen	Targeted	
21-Apr-23	1	Aquatic point count (PM)	S1_04	1.33065673	103.832144	21:35 - 21:55	<i>Barbodes rhombeus</i>	Indochinese spotted barb	Fish	No	15	Seen	Targeted	
21-Apr-23	1	Aquatic point count (PM)	S1_04	1.33065673	103.832144	21:35 - 21:55	<i>Clarias batrachus</i>	Common walking catfish	Fish	No	1	Seen	Targeted	
21-Apr-23	1	Aquatic point count (PM)	S1_04	1.33065673	103.832144	21:35 - 21:55	<i>Monopterus albus</i>	Asian swamp eel	Fish	No	1	Seen	Targeted	
21-Apr-23	1	Aquatic point count (PM)	S1_03	1.33098108	103.831374	22:00 - 22:20	<i>Clarias batrachus</i>	Common walking catfish	Fish	No	1	Seen	Targeted	
21-Apr-23	1	Aquatic point count (PM)	S1_03	1.33098108	103.831374	22:00 - 22:20	<i>Duttaphrynus bengalensis</i>	Bengal toad	Amphibian	No	5	Heard	Targeted	
21-Apr-23	1	Aquatic point count (PM)	S1_03	1.33098108	103.831374	22:00 - 22:20	<i>Barbodes rhombeus</i>	Indochinese spotted barb	Fish	No	35	Seen	Targeted	
21-Apr-23	1	Aquatic point count (PM)	S1_03	1.33098108	103.831374	22:00 - 22:20	<i>Eleutherodactylus planirostris</i>	Greenhouse frog	Amphibian	No	2	Heard	Targeted	
21-Apr-23	1	Aquatic point count (PM)	S1_03	1.33098108	103.831374	22:00 - 22:20	<i>Danio albolineatus</i>	Pearl danio	Fish	No	25	Seen	Targeted	
21-Apr-23	1	Aquatic point count (PM)	S1_03	1.33098108	103.831374	22:00 - 22:20	<i>Poecilia reticulata</i>	Guppy	Fish	No	22	Seen	Targeted	
21-Apr-23	1	Aquatic point count (PM)	S1_02	1.3312086	103.830556	22:25 - 22:45	<i>Danio albolineatus</i>	Pearl danio	Fish	No	90	Seen	Targeted	
21-Apr-23	1	Aquatic point count (PM)	S1_02	1.3312086	103.830556	22:25 - 22:45	<i>Barbodes rhombeus</i>	Indochinese spotted barb	Fish	No	16	Seen	Targeted	
21-Apr-23	1	Aquatic point count (PM)	S1_02	1.3312086	103.830556	22:25 - 22:45	<i>Limnonectes blythii</i>	Malayan giant frog	Amphibian	No	3	Seen	Targeted	One is a tadpole
21-Apr-23	1	Aquatic point count (PM)	S1_02	1.3312086	103.830556	22:25 - 22:45	<i>Monopterus albus</i>	Asian swamp eel	Fish	No	1	Seen	Targeted	
21-Apr-23	1	Aquatic point count (PM)	S1_02	1.3312086	103.830556	22:25 - 22:45	<i>Poecilia reticulata</i>	Guppy	Fish	No	20	Seen	Targeted	
21-Apr-23	1	Aquatic point count (PM)	S1_02	1.3312086	103.830556	22:25 - 22:45	<i>Chalcorana labialis</i>	Copper-cheeked frog	Amphibian	No	1	Seen	Targeted	
21-Apr-23	1	Aquatic point count (PM)	S1_02	1.3312086	103.830556	22:25 - 22:45	<i>Melanoides tuberculata</i>	NA	Mollusc	No	5	Seen	Targeted	
21-Apr-23	1	Aquatic point count (PM)		1.33128704	103.830333	22:49	<i>Chalcorana labialis</i>	Copper-cheeked frog	Amphibian	No	3	Seen	Incidental	Two are tadpoles

21-Apr-23	1	Aquatic point count (PM)		1.3312 2501	103.83 0091	22:55	<i>Monopterus albus</i>	Asian swamp eel	Fish	No	1	Seen	Incidental	
21-Apr-23	1	Aquatic point count (PM)		1.3312 2501	103.83 0091	22:55	<i>Chalcorana labialis</i>	Copper-cheeked frog	Amphibian	No	2	Seen	Incidental	
21-Apr-23	1	Aquatic point count (PM)		1.3312 2501	103.83 0091	22:55	<i>Monopterus albus</i>	Asian swamp eel	Fish	No	1	Seen	Incidental	
21-Apr-23	1	Aquatic point count (PM)	S1_0 1	1.3308 4069	103.82 9811	23:00 - 23:20	<i>Limnonectes blythii</i>	Malayan giant frog	Amphibian	No	3	Seen	Targeted	
21-Apr-23	1	Aquatic point count (PM)	S1_0 1	1.3308 4069	103.82 9811	23:00 - 23:20	<i>Danio albolineatus</i>	Pearl danio	Fish	No	40	Seen	Targeted	
21-Apr-23	1	Aquatic point count (PM)	S1_0 1	1.3308 4069	103.82 9811	23:00 - 23:20	<i>Chalcorana labialis</i>	Copper-cheeked frog	Amphibian	No	10	Seen	Targeted	Tadpoles
21-Apr-23	1	Aquatic point count (PM)	S1_0 1	1.3308 4069	103.82 9811	23:00 - 23:20	<i>Barbodes rhombeus</i>	Indochinese spotted barb	Fish	No	15	Seen	Targeted	
21-Apr-23	1	Aquatic point count (PM)	S1_0 1	1.3308 4069	103.82 9811	23:00 - 23:20	<i>Poecilia reticulata</i>	Guppy	Fish	No	20	Seen	Targeted	
21-Apr-23	1	Aquatic point count (PM)	S1_0 1	1.3308 4069	103.82 9811	23:00 - 23:20	<i>Clarias batrachus</i>	Common walking catfish	Fish	No	1	Seen	Targeted	
24-Apr-23	1	Aquatic point count (AM)	S1_0 8	1.3279 1729	103.83 3994	09:10 - 09:30	<i>Poecilia reticulata</i>	Guppy	Fish	No	7	Seen	Targeted	
24-Apr-23	1	Aquatic point count (AM)	S1_0 8	1.3279 1729	103.83 3994	09:10 - 09:30	<i>Danio albolineatus</i>	Pearl danio	Fish	No	14	Seen	Targeted	
24-Apr-23	1	Aquatic point count (AM)	S1_0 8	1.3279 1729	103.83 3994	09:10 - 09:30	<i>Barbodes rhombeus</i>	Indochinese spotted barb	Fish	No	6	Seen	Targeted	
24-Apr-23	1	Aquatic point count (AM)	S1_0 8	1.3279 1729	103.83 3994	09:10 - 09:30	<i>Limnonectes blythii</i>	Malayan giant frog	Amphibian	No	9	Seen	Targeted	Tadpoles
24-Apr-23	1	Aquatic point count (AM)	S1_0 8	1.3279 1729	103.83 3994	09:10 - 09:30	<i>Melanoides tuberculata</i>	NA	Mollusc	No	2	Seen	Targeted	
24-Apr-23	1	Aquatic point count (AM)	S1_0 8	1.3279 1729	103.83 3994	09:10 - 09:30	<i>Neurothemis fluctuans</i>	Common parasol	Odonata	No	10	Seen	Targeted	
24-Apr-23	1	Aquatic point count (AM)	S1_0 8	1.3279 1729	103.83 3994	09:10 - 09:30	<i>Orchithemis pulcherrima</i>	Variable sentinel	Odonata	No	1	Seen	Targeted	
24-Apr-23	1	Aquatic point count (AM)	S1_0 8	1.3279 1729	103.83 3994	09:10 - 09:30	<i>Trithemis festiva</i>	Indigo dropwing	Odonata	No	2	Seen	Targeted	
24-Apr-23	1	Aquatic point count (AM)	S1_0 8	1.3279 1729	103.83 3994	09:10 - 09:30	<i>Orthetrum luzonicum</i>	Slender blue skimmer	Odonata	No	3	Seen	Targeted	

24-Apr-23	1	Aquatic point count (AM)	S1_08	1.3279 1729	103.83 3994	09:10 - 09:30	<i>Archibasis viola</i>	Violet sprite	Odonata	No	1	Seen	Targeted
24-Apr-23	1	Aquatic point count (AM)	S1_08	1.3279 1729	103.83 3994	09:10 - 09:30	<i>Prodasineura collaris</i>	Collared threadtail	Odonata	Yes	5	Seen	Targeted
24-Apr-23	1	Aquatic point count (AM)	S1_08	1.3279 1729	103.83 3994	09:10 - 09:30	<i>Ceriagrion cerinorubellum</i>	Ornate coral-tail	Odonata	No	1	Seen	Targeted
24-Apr-23	1	Aquatic point count (AM)	S1_08	1.3279 1729	103.83 3994	09:10 - 09:30	<i>Pseudagrion microcephalum</i>	Blue sprite	Odonata	No	2	Seen	Targeted
24-Apr-23	1	Aquatic point count (AM)	S1_08	1.3279 1729	103.83 3994	09:10 - 09:30	<i>Agrionoptera insignis</i>	Grenadier	Odonata	No	1	Seen	Targeted
24-Apr-23	1	Aquatic point count (AM)	S1_08	1.3279 1729	103.83 3994	09:10 - 09:30	<i>Tholymis tillarga</i>	White-barred duskhawk	Odonata	No	1	Seen	Targeted
24-Apr-23	1	Aquatic point count (AM)	S1_08	1.3279 1729	103.83 3994	09:10 - 09:30	<i>Orthetrum chrysis</i>	Spine-tufted skimmer	Odonata	No	1	Seen	Targeted
24-Apr-23	1	Aquatic point count (AM)	S1_07	1.3287 49	103.83 3655	09:35 - 09:55	<i>Barbodes rhombeus</i>	Indochinese spotted barb	Fish	No	14	Seen	Targeted
24-Apr-23	1	Aquatic point count (AM)	S1_07	1.3287 49	103.83 3655	09:35 - 09:55	<i>Danio albolineatus</i>	Pearl danio	Fish	No	18	Seen	Targeted
24-Apr-23	1	Aquatic point count (AM)	S1_07	1.3287 49	103.83 3655	09:35 - 09:55	<i>Poecilia reticulata</i>	Guppy	Fish	No	18	Seen	Targeted
24-Apr-23	1	Aquatic point count (AM)	S1_07	1.3287 49	103.83 3655	09:35 - 09:55	<i>Prodasineura humeralis</i>	Orange-striped threadtail	Odonata	No	2	Seen	Targeted
24-Apr-23	1	Aquatic point count (AM)	S1_07	1.3287 49	103.83 3655	09:35 - 09:55	<i>Tyriobapta torrida</i>	Treehugger	Odonata	No	5	Seen	Targeted
24-Apr-23	1	Aquatic point count (AM)	S1_07	1.3287 49	103.83 3655	09:35 - 09:55	<i>Orthetrum chrysis</i>	Spine-tufted skimmer	Odonata	No	1	Seen	Targeted
24-Apr-23	1	Aquatic point count (AM)	S1_07	1.3287 49	103.83 3655	09:35 - 09:55	<i>Archibasis viola</i>	Violet sprite	Odonata	No	1	Seen	Targeted
24-Apr-23	1	Aquatic point count (AM)	S1_07	1.3287 49	103.83 3655	09:35 - 09:55	<i>Ceriagrion cerinorubellum</i>	Ornate coral-tail	Odonata	No	5	Seen	Targeted
24-Apr-23	1	Aquatic point count (AM)	S1_06	1.3294 76	103.83 3352	10:00 - 10:20	<i>Danio albolineatus</i>	Pearl danio	Fish	No	40	Seen	Targeted
24-Apr-23	1	Aquatic point count (AM)	S1_06	1.3294 76	103.83 3352	10:00 - 10:20	<i>Barbodes rhombeus</i>	Indochinese spotted barb	Fish	No	10	Seen	Targeted
24-Apr-23	1	Aquatic point count (AM)	S1_06	1.3294 76	103.83 3352	10:00 - 10:20	<i>Poecilia reticulata</i>	Guppy	Fish	No	38	Seen	Targeted

24-Apr-23	1	Aquatic point count (AM)	S1_06	1.329476	103.833352	10:00 - 10:20	<i>Melanoides tuberculata</i>	NA	Mollusc	No	1	Seen	Targeted	
24-Apr-23	1	Aquatic point count (AM)	S1_06	1.329476	103.833352	10:00 - 10:20	<i>Limnonectes blythii</i>	Malayan giant frog	Amphibian	No	1	Seen	Targeted	Tadpoles
24-Apr-23	1	Aquatic point count (AM)	S1_06	1.329476	103.833352	10:00 - 10:20	<i>Orchithemis pulcherrima</i>	Variable sentinel	Odonata	No	2	Seen	Targeted	
24-Apr-23	1	Aquatic point count (AM)	S1_06	1.329476	103.833352	10:00 - 10:20	<i>Trithemis aurora</i>	Crimson dropwing	Odonata	No	1	Seen	Targeted	
24-Apr-23	1	Aquatic point count (AM)	S1_06	1.329476	103.833352	10:00 - 10:20	<i>Orthetrum luzonicum</i>	Slender blue skimmer	Odonata	No	1	Seen	Targeted	
24-Apr-23	1	Aquatic point count (AM)	S1_06	1.329476	103.833352	10:00 - 10:20	<i>Ceriatrigon cerinorubellum</i>	Ornate coraltail	Odonata	No	3	Seen	Targeted	
24-Apr-23	1	Aquatic point count (AM)	S1_06	1.329476	103.833352	10:00 - 10:20	<i>Trithemis festiva</i>	Indigo dropwing	Odonata	No	4	Seen	Targeted	
24-Apr-23	1	Aquatic point count (AM)	S1_06	1.329476	103.833352	10:00 - 10:20	<i>Neurothemis fluctuans</i>	Common parasol	Odonata	No	1	Seen	Targeted	
24-Apr-23	1	Aquatic point count (AM)	S1_05	1.3301139	103.832735	10:30 - 10:50	<i>Danio albolineatus</i>	Pearl danio	Fish	No	8	Seen	Targeted	
24-Apr-23	1	Aquatic point count (AM)	S1_05	1.3301139	103.832735	10:30 - 10:50	<i>Poecilia reticulata</i>	Guppy	Fish	No	2	Seen	Targeted	
24-Apr-23	1	Aquatic point count (AM)	S1_05	1.3301139	103.832735	10:30 - 10:50	<i>Barbodes rhombeus</i>	Indochinese spotted barb	Fish	No	3	Seen	Targeted	
24-Apr-23	1	Aquatic point count (AM)	S1_05	1.3301139	103.832735	10:30 - 10:50	<i>Clarias batrachus</i>	Common walking catfish	Fish	No	1	Seen	Targeted	
24-Apr-23	1	Aquatic point count (AM)	S1_05	1.3301139	103.832735	10:30 - 10:50	<i>Prodasineura collaris</i>	Collared threadtail	Odonata	Yes	3	Seen	Targeted	
24-Apr-23	1	Aquatic point count (AM)	S1_04	1.33065673	103.832144	10:55 - 11:15	<i>Barbodes rhombeus</i>	Indochinese spotted barb	Fish	No	7	Seen	Targeted	
24-Apr-23	1	Aquatic point count (AM)	S1_04	1.33065673	103.832144	10:55 - 11:15	<i>Poecilia reticulata</i>	Guppy	Fish	No	23	Seen	Targeted	
24-Apr-23	1	Aquatic point count (AM)	S1_04	1.33065673	103.832144	10:55 - 11:15	<i>Danio albolineatus</i>	Pearl danio	Fish	No	15	Seen	Targeted	
24-Apr-23	1	Aquatic point count (AM)	S1_04	1.33065673	103.832144	10:55 - 11:15	<i>Trithemis aurora</i>	Crimson dropwing	Odonata	No	3	Seen	Targeted	
24-Apr-23	1	Aquatic point count (AM)	S1_04	1.33065673	103.832144	10:55 - 11:15	<i>Limnonectes blythii</i>	Malayan giant frog	Amphibian	No	1	Seen	Targeted	Tadpoles

24-Apr-23	1	Aquatic point count (AM)	S1_04	1.33065673	103.832144	10:55 - 11:15	<i>Prodasineura humeralis</i>	Orange-striped threadtail	Odonata	No	1	Seen	Targeted
24-Apr-23	1	Aquatic point count (AM)	S1_04	1.33065673	103.832144	10:55 - 11:15	<i>Orthetrum luzonicum</i>	Slender blue skimmer	Odonata	No	2	Seen	Targeted
24-Apr-23	1	Aquatic point count (AM)	S1_03	1.33098108	103.831374	11:20 - 11:40	<i>Danio albolineatus</i>	Pearl danio	Fish	No	11	Seen	Targeted
24-Apr-23	1	Aquatic point count (AM)	S1_03	1.33098108	103.831374	11:20 - 11:40	<i>Poecilia reticulata</i>	Guppy	Fish	No	29	Seen	Targeted
24-Apr-23	1	Aquatic point count (AM)	S1_03	1.33098108	103.831374	11:20 - 11:40	<i>Barbodes rhombeus</i>	Indochinese spotted barb	Fish	No	7	Seen	Targeted
24-Apr-23	1	Aquatic point count (AM)	S1_03	1.33098108	103.831374	11:20 - 11:40	<i>Limnonectes blythii</i>	Malayan giant frog	Amphibian	No	1	Seen	Targeted
24-Apr-23	1	Aquatic point count (AM)	S1_03	1.33098108	103.831374	11:20 - 11:40	<i>Pseudagrion pruinosum</i>	Grey sprite	Odonata	Yes	2	Seen	Targeted
24-Apr-23	1	Aquatic point count (AM)	S1_03	1.33098108	103.831374	11:20 - 11:40	<i>Prodasineura collaris</i>	Collared threadtail	Odonata	Yes	3	Seen	Targeted
24-Apr-23	1	Aquatic point count (AM)	S1_03	1.33098108	103.831374	11:20 - 11:40	<i>Melanoides tuberculata</i>	NA	Mollusc	No	1	Seen	Targeted
24-Apr-23	1	Aquatic point count (AM)	S1_03	1.33098108	103.831374	11:20 - 11:40	<i>Prodasineura humeralis</i>	Orange-striped threadtail	Odonata	No	1	Seen	Targeted
24-Apr-23	1	Aquatic point count (AM)	S1_03	1.33098108	103.831374	11:20 - 11:40	<i>Archibasis viola</i>	Violet sprite	Odonata	No	1	Seen	Targeted
24-Apr-23	1	Aquatic point count (AM)	S1_02	1.3312086	103.830556	11:45 - 12:05	<i>Danio albolineatus</i>	Pearl danio	Fish	No	17	Seen	Targeted
24-Apr-23	1	Aquatic point count (AM)	S1_02	1.3312086	103.830556	11:45 - 12:05	<i>Melanoides tuberculata</i>	NA	Mollusc	No	7	Seen	Targeted
24-Apr-23	1	Aquatic point count (AM)	S1_02	1.3312086	103.830556	11:45 - 12:05	<i>Barbodes rhombeus</i>	Indochinese spotted barb	Fish	No	13	Seen	Targeted
24-Apr-23	1	Aquatic point count (AM)	S1_02	1.3312086	103.830556	11:45 - 12:05	<i>Poecilia reticulata</i>	Guppy	Fish	No	5	Seen	Targeted
24-Apr-23	1	Aquatic point count (AM)	S1_02	1.3312086	103.830556	11:45 - 12:05	<i>Prodasineura collaris</i>	Collared threadtail	Odonata	Yes	1	Seen	Targeted
24-Apr-23	1	Aquatic point count (AM)	S1_02	1.3312086	103.830556	11:45 - 12:05	<i>Archibasis viola</i>	Violet sprite	Odonata	No	1	Seen	Targeted
24-Apr-23	1	Aquatic point count (AM)	S1_02	1.3312086	103.830556	11:45 - 12:05	<i>Orthetrum chrysis</i>	Spine-tufted skimmer	Odonata	No	2	Seen	Targeted

24-Apr-23	1	Aquatic point count (AM)	S1_02	1.3312086	103.830556	11:45 - 12:05	<i>Tyriobapta torrida</i>	Treehugger	Odonata	No	4	Seen	Targeted	
24-Apr-23	1	Aquatic point count (AM)	S1_02	1.3312086	103.830556	11:45 - 12:05	<i>Idionyx yolanda</i>	Shadowdancer	Odonata	No	1	Seen	Targeted	Larvae
24-Apr-23	1	Aquatic point count (AM)	S1_01	1.33084069	103.829811	12:10 - 12:30	<i>Chalcorana labialis</i>	Copper-cheeked frog	Amphibian	No	6	Seen	Targeted	Tadpoles
24-Apr-23	1	Aquatic point count (AM)	S1_01	1.33084069	103.829811	12:10 - 12:30	<i>Poecilia reticulata</i>	Guppy	Fish	No	7	Seen	Targeted	
24-Apr-23	1	Aquatic point count (AM)	S1_01	1.33084069	103.829811	12:10 - 12:30	<i>Danio albolineatus</i>	Pearl danio	Fish	No	15	Seen	Targeted	
24-Apr-23	1	Aquatic point count (AM)	S1_01	1.33084069	103.829811	12:10 - 12:30	<i>Barbodes rhombeus</i>	Indochinese spotted barb	Fish	No	2	Seen	Targeted	
24-Apr-23	1	Aquatic point count (AM)	S1_01	1.33084069	103.829811	12:10 - 12:30	<i>Tyriobapta torrida</i>	Treehugger	Odonata	No	4	Seen	Targeted	
24-Apr-23	1	Aquatic point count (AM)	S1_01	1.33084069	103.829811	12:10 - 12:30	<i>Orthetrum chrysis</i>	Spine-tufted skimmer	Odonata	No	1	Seen	Targeted	
25-Apr-23	1	Transect survey (PM BHM)		1.327757	103.834389	19:38	<i>Limnonectes blythii</i>	Malayan giant frog	Amphibian	No	1	Seen	Targeted	
25-Apr-23	1	Transect survey (PM BHM)		1.327757	103.834389	19:38	<i>Unidentified Gekkonidae</i>	Unidentified gecko	Reptile	NA	1	Heard	Targeted	
25-Apr-23	1	Transect survey (PM BHM)		1.327757	103.834389	19:38	<i>Caprimulgus macrurus</i>	Large-tailed nightjar	Bird	No	1	Seen	Targeted	
25-Apr-23	1	Transect survey (PM BHM)		1.32786001	103.834327	19:38	<i>Duttaphrynus bengalensis</i>	Bengal toad	Amphibian	No	1	Seen	Targeted	
25-Apr-23	1	Transect survey (PM BHM)		1.32806302	103.834199	19:46	<i>Eleutherodactylus planirostris</i>	Greenhouse frog	Amphibian	No	1	Seen	Targeted	
25-Apr-23	1	Transect survey (PM BHM)		1.32806302	103.834199	19:46	<i>Fejervarya sp.</i>	NA	Amphibian	NA	1	Seen	Targeted	
25-Apr-23	1	Transect survey (PM BHM)		1.328505	103.834095	19:50	<i>Duttaphrynus bengalensis</i>	Bengal toad	Amphibian	No	1	Seen	Targeted	
25-Apr-23	1	Transect survey (PM BHM)		1.32866601	103.834034	19:52	<i>Polypedates leucomystax</i>	Four-lined tree frog	Amphibian	No	1	Heard	Targeted	
25-Apr-23	1	Transect survey (PM BHM)		1.32887204	103.833995	19:53	<i>Pycnonotus goiavier</i>	Yellow-vented bulbul	Bird	No	1	Seen	Targeted	
25-Apr-23	1	Transect survey (PM BHM)		1.32897698	103.833973	19:54	<i>Dendrelaphis pictus</i>	Painted bronzeback	Reptile	No	1	Seen	Targeted	

25-Apr-23	1	Transect survey (PM BHM)		1.32963002	103.83384	19:57	<i>Eleutherodactylus planirostris</i>	Greenhouse frog	Amphibian	No	1	Seen	Targeted
25-Apr-23	1	Transect survey (PM BHM)		1.32980201	103.833765	20:01	<i>Eleutherodactylus planirostris</i>	Greenhouse frog	Amphibian	No	1	Seen	Targeted
25-Apr-23	1	Transect survey (PM BHM)		1.32983202	103.833804	20:03	<i>Gehyra mutilata</i>	Four-clawed gecko	Reptile	No	1	Seen	Targeted
25-Apr-23	1	Transect survey (PM BHM)		1.32986102	103.833855	20:03	<i>Gekko monarchus</i>	Spotted house gecko	Reptile	No	1	Seen	Targeted
25-Apr-23	1	Transect survey (PM BHM)		1.32996303	103.833309	20:10	Unidentified Pteropodidae	Unidentified fruit bat	Mammal	NA	1	Seen	Targeted
25-Apr-23	1	Transect survey (PM BHM)		1.33017099	103.832986	20:13	<i>Limnonectes blythii</i>	Malayan giant frog	Amphibian	No	1	Seen	Targeted
25-Apr-23	1	Transect survey (PM BHM)		1.33044197	103.832911	20:19	<i>Amauornis phoenicurus</i>	White-breasted waterhen	Bird	No	1	Heard	Targeted
25-Apr-23	1	Transect survey (PM BHM)		1.33057298	103.833032	20:21	<i>Otus lempiji</i>	Sunda scops owl	Bird	No	1	Heard	Targeted
25-Apr-23	1	Transect survey (PM BHM)		1.33057298	103.833032	20:21	<i>Caprimulgus macrurus</i>	Large-tailed nightjar	Bird	No	1	Heard	Targeted
25-Apr-23	1	Transect survey (PM BHM)		1.33075596	103.833262	20:27	<i>Bronchocela cristatella</i>	Green crested lizard	Reptile	No	1	Seen	Targeted
25-Apr-23	1	Transect survey (PM BHM)		1.33093902	103.833393	20:29	<i>Eleutherodactylus planirostris</i>	Greenhouse frog	Amphibian	No	2	Seen	Targeted
25-Apr-23	1	Transect survey (PM BHM)		1.33085101	103.833701	20:38	<i>Eleutherodactylus planirostris</i>	Greenhouse frog	Amphibian	No	1	Seen	Targeted
25-Apr-23	1	Transect survey (PM BHM)		1.33034097	103.834069	20:43	<i>Bronchocela cristatella</i>	Green crested lizard	Reptile	No	1	Seen	Targeted
25-Apr-23	1	Transect survey (PM BHM)		1.33020703	103.834274	20:44	<i>Fejervarya limnocharis</i>	Field frog	Amphibian	No	1	Seen	Targeted
25-Apr-23	1	Transect survey (PM BHM)		1.33083601	103.833599	20:44	<i>Duttaphrynus bengalensis</i>	Bengal toad	Amphibian	No	1	Seen	Targeted
25-Apr-23	1	Transect survey (PM BHM)		1.33021298	103.834451	20:45	<i>Duttaphrynus bengalensis</i>	Bengal toad	Amphibian	No	1	Seen	Targeted
25-Apr-23	1	Transect survey (PM BHM)		1.33021298	103.834451	20:47	Unidentified Pteropodidae	Unidentified fruit bat	Mammal	NA	1	Seen	Targeted
25-Apr-23	1	Transect survey (PM BHM)		1.33021298	103.834451	20:47	<i>Otus lempiji</i>	Sunda scops owl	Bird	No	1	Heard	Targeted

25-Apr-23	1	Transect survey (PM BHM)		1.33024299	103.834599	20:48	<i>Hemidactylus frenatus</i>	Spiny-tailed house gecko	Reptile	No	2	Seen	Targeted	
25-Apr-23	1	Transect survey (PM BHM)		1.33039696	103.834813	20:49	<i>Dendrelaphis pictus</i>	Painted bronzeback	Reptile	No	1	Seen	Targeted	
25-Apr-23	1	Transect survey (PM BHM)		1.33042303	103.835057	20:53	<i>Paradoxurus musangus</i>	Sumatran palm civet	Mammal	No	1	Seen	Targeted	
25-Apr-23	1	Transect survey (PM BHM)		1.33034499	103.83519	20:56	<i>Eleutherodactylus planirostris</i>	Greenhouse frog	Amphibian	No	1	Seen	Targeted	
25-Apr-23	1	Transect survey (PM BHM)		1.330317	103.835264	20:56	<i>Bibasis harisa consobrina</i>	Orange awlet	Butterfly	No	1	Seen	Incidental	
25-Apr-23	1	Transect survey (PM BHM)		1.330317	103.835264	20:56	<i>Gynacantha sp.</i>	Unidentified duskhawker	Odonata	NA	1	Seen	Incidental	
2-May-23	1	Transect survey (AM BHM)		1.32840903	103.834336	7:19	<i>Treron vernans</i>	Pink-necked green pigeon	Bird	No	1	Seen	Targeted	
2-May-23	1	Transect survey (AM BHM)		1.32771299	103.834409	7:19	<i>Acridotheres javanicus</i>	Javan myna	Bird	No	4	Heard	Targeted	
2-May-23	1	Transect survey (AM BHM)		1.32771299	103.834409	7:19	<i>Acridotheres javanicus</i>	Javan myna	Bird	No	5	Heard	Targeted	
2-May-23	1	Transect survey (AM BHM)		1.32771299	103.834409	7:19	<i>Aegithina tiphia</i>	Common iora	Bird	No	1	Heard	Targeted	
2-May-23	1	Transect survey (AM BHM)		1.32771299	103.834409	7:19	<i>Rhipidura javanica</i>	Malaysian pied fantail	Bird	No	1	Seen	Targeted	
2-May-23	1	Transect survey (AM BHM)		1.32771299	103.834409	7:19	<i>Copsychus saularis</i>	Oriental magpie-robin	Bird	Yes	1	Heard	Targeted	
2-May-23	1	Transect survey (AM BHM)		1.32771299	103.834409	7:19	<i>Treron vernans</i>	Pink-necked green pigeon	Bird	No	2	Seen	Targeted	
2-May-23	1	Transect survey (AM BHM)		1.32771299	103.834409	7:19	<i>Pycnonotus goiavier</i>	Yellow-vented bulbul	Bird	No	1	Seen	Targeted	
2-May-23	1	Transect survey (AM BHM)		1.32771299	103.834409	7:19	<i>Treron vernans</i>	Pink-necked green pigeon	Bird	No	2	Heard	Targeted	
2-May-23	1	Transect survey (AM BHM)		1.32771299	103.834409	7:19	<i>Oriolus chinensis</i>	Black-naped oriole	Bird	No	1	Seen	Targeted	
2-May-23	1	Transect survey (AM BHM)		1.32771299	103.834409	7:19	<i>Acridotheres javanicus</i>	Javan myna	Bird	No	1	Seen	Targeted	
2-May-23	1	Transect survey (AM BHM)		1.328146	103.834143	7:20	<i>Todiramphus chloris</i>	Collared kingfisher	Bird	No	1	Seen	Targeted	

2-May-23	1	Transect survey (AM BHM)		1.328146	103.834143	7:20	<i>Halcyon smyrnensis</i>	White-throated kingfisher	Bird	No	1	Heard	Targeted	
2-May-23	1	Transect survey (AM BHM)		1.328146	103.834143	7:20	<i>Treron vernans</i>	Pink-necked green pigeon	Bird	No	1	Seen	Targeted	
2-May-23	1	Transect survey (AM BHM)		1.328146	103.834143	7:20	<i>Hirundo tahitica</i>	Pacific swallow	Bird	No	2	Seen	Targeted	
2-May-23	1	Transect survey (AM BHM)		1.328146	103.834143	7:20	<i>Aplonis panayensis</i>	Asian glossy starling	Bird	No	1	Seen	Targeted	
2-May-23	1	Transect survey (AM BHM)		1.328146	103.834143	7:20	<i>Treron vernans</i>	Pink-necked green pigeon	Bird	No	1	Seen	Targeted	
2-May-23	1	Transect survey (AM BHM)		1.328146	103.834143	7:20	<i>Treron vernans</i>	Pink-necked green pigeon	Bird	No	5	Seen	Targeted	
2-May-23	1	Transect survey (AM BHM)		1.328146	103.834143	7:20	<i>Aplonis panayensis</i>	Asian glossy starling	Bird	No	1	Seen	Targeted	
2-May-23	1	Transect survey (AM BHM)		1.328146	103.834143	7:20	<i>Ducula bicolor</i>	Pied imperial pigeon	Bird	No	2	Seen	Targeted	
2-May-23	1	Transect survey (AM BHM)		1.328146	103.834143	7:20	<i>Treron vernans</i>	Pink-necked green pigeon	Bird	No	1	Seen	Targeted	
2-May-23	1	Transect survey (AM BHM)		1.328146	103.834143	7:20	<i>Acridotheres javanicus</i>	Javan myna	Bird	No	3	Seen	Targeted	
2-May-23	1	Transect survey (AM BHM)		1.328146	103.834143	7:20	<i>Rhipidura javanica</i>	Malaysian pied fantail	Bird	No	5	Seen	Targeted	
2-May-23	1	Transect survey (AM BHM)		1.328146	103.834143	7:20	<i>Pycnonotus goiavier</i>	Yellow-vented bulbul	Bird	No	1	Seen	Targeted	
2-May-23	1	Transect survey (AM BHM)		1.32827802	103.834101	7:25	<i>Loriculus galgulus</i>	Blue-crowned hanging-parrot	Bird	No	1	Seen	Targeted	
2-May-23	1	Transect survey (AM BHM)		1.32827802	103.834101	7:25	<i>Treron vernans</i>	Pink-necked green pigeon	Bird	No	3	Seen	Targeted	
2-May-23	1	Transect survey (AM BHM)		1.32827802	103.834101	7:25	<i>Acridotheres javanicus</i>	Javan myna	Bird	No	2	Seen	Targeted	
2-May-23	1	Transect survey (AM BHM)		1.32827802	103.834101	7:25	<i>Varanus salvator</i>	Malayan water monitor	Reptile	No	1	Seen	Targeted	
2-May-23	1	Transect survey (AM BHM)		1.32827802	103.834101	7:25	<i>Treron vernans</i>	Pink-necked green pigeon	Bird	No	1	Seen	Targeted	
2-May-23	1	Transect survey (AM BHM)		1.32827802	103.834101	7:25	<i>Oriolus chinensis</i>	Black-naped oriole	Bird	No	2	Heard	Targeted	

2-May-23	1	Transect survey (AM BHM)		1.32827802	103.834101	7:25	<i>Lanius schach</i>	Long-tailed shrike	Bird	No	1	Heard	Targeted
2-May-23	1	Transect survey (AM BHM)		1.32827802	103.834101	7:25	<i>Todiramphus chloris</i>	Collared kingfisher	Bird	No	1	Heard	Targeted
2-May-23	1	Transect survey (AM BHM)		1.32861799	103.83402	7:28	<i>Aplonis panayensis</i>	Asian glossy starling	Bird	No	2	Seen	Targeted
2-May-23	1	Transect survey (AM BHM)		1.32861799	103.83402	7:28	<i>Acridotheres javanicus</i>	Javan myna	Bird	No	1	Seen	Targeted
2-May-23	1	Transect survey (AM BHM)		1.32861799	103.83402	7:28	<i>Treron vernans</i>	Pink-necked green pigeon	Bird	No	5	Seen	Targeted
2-May-23	1	Transect survey (AM BHM)		1.32861799	103.83402	7:28	<i>Aplonis panayensis</i>	Asian glossy starling	Bird	No	10	Seen	Targeted
2-May-23	1	Transect survey (AM BHM)		1.32861799	103.83402	7:28	<i>Treron vernans</i>	Pink-necked green pigeon	Bird	No	1	Seen	Targeted
2-May-23	1	Transect survey (AM BHM)		1.32861799	103.83402	7:28	<i>Acridotheres javanicus</i>	Javan myna	Bird	No	2	Seen	Targeted
2-May-23	1	Transect survey (AM BHM)		1.32861799	103.83402	7:28	<i>Psittacula longicauda</i>	Long-tailed parakeet	Bird	Yes	1	Seen	Targeted
2-May-23	1	Transect survey (AM BHM)		1.32861799	103.83402	7:28	<i>Ducula bicolor</i>	Pied imperial pigeon	Bird	No	1	Seen	Targeted
2-May-23	1	Transect survey (AM BHM)		1.32861799	103.83402	7:28	<i>Pycnonotus goiavier</i>	Yellow-vented bulbul	Bird	No	3	Seen	Targeted
2-May-23	1	Transect survey (AM BHM)		1.32861799	103.83402	7:28	<i>Psittacula longicauda</i>	Long-tailed parakeet	Bird	Yes	1	Seen	Targeted
2-May-23	1	Transect survey (AM BHM)		1.32891797	103.834021	7:29	<i>Treron vernans</i>	Pink-necked green pigeon	Bird	No	2	Seen	Targeted
2-May-23	1	Transect survey (AM BHM)		1.32891797	103.834021	7:29	<i>Aplonis panayensis</i>	Asian glossy starling	Bird	No	1	Seen	Targeted
2-May-23	1	Transect survey (AM BHM)		1.32891797	103.834021	7:29	<i>Pycnonotus goiavier</i>	Yellow-vented bulbul	Bird	No	1	Seen	Targeted
2-May-23	1	Transect survey (AM BHM)		1.32891797	103.834021	7:29	<i>Lonchura sp.</i>	Unidentified munia	Bird	NA	3	Seen	Targeted
2-May-23	1	Transect survey (AM BHM)		1.32910699	103.83395	7:30	<i>Treron vernans</i>	Pink-necked green pigeon	Bird	No	2	Seen	Targeted
2-May-23	1	Transect survey (AM BHM)		1.32910699	103.83395	7:30	<i>Collocalia affinis</i>	Plume-toed swiftlet	Bird	Yes	1	Seen	Targeted

2-May-23	1	Transect survey (AM BHM)		1.32910699	103.83395	7:30	<i>Amauornis phoenicurus</i>	White-breasted waterhen	Bird	No	1	Seen	Targeted
2-May-23	1	Transect survey (AM BHM)		1.32910699	103.83395	7:30	<i>Treron vernans</i>	Pink-necked green pigeon	Bird	No	2	Seen	Targeted
2-May-23	1	Transect survey (AM BHM)		1.32936498	103.833886	7:32	<i>Oriolus chinensis</i>	Black-naped oriole	Bird	No	2	Heard	Targeted
2-May-23	1	Transect survey (AM BHM)		1.32936498	103.833886	7:32	<i>Spilopelia chinensis</i>	Spotted dove	Bird	No	1	Heard	Targeted
2-May-23	1	Transect survey (AM BHM)		1.32936498	103.833886	7:32	<i>Treron vernans</i>	Pink-necked green pigeon	Bird	No	1	Seen	Targeted
2-May-23	1	Transect survey (AM BHM)		1.32936498	103.833886	7:32	<i>Psittacula sp.</i>	Unidentified parakeet	Bird	NA	1	Heard	Targeted
2-May-23	1	Transect survey (AM BHM)		1.32966899	103.833743	7:35	<i>Mixornis gularis</i>	Pin-striped tit-babbler	Bird	No	1	Heard	Targeted
2-May-23	1	Transect survey (AM BHM)		1.32966899	103.833743	7:35	<i>Oriolus chinensis</i>	Black-naped oriole	Bird	No	1	Heard	Targeted
2-May-23	1	Transect survey (AM BHM)		1.32966899	103.833743	7:35	<i>Acridotheres javanicus</i>	Javan myna	Bird	No	2	Heard	Targeted
2-May-23	1	Transect survey (AM BHM)		1.32966899	103.833743	7:35	<i>Loriculus galgulus</i>	Blue-crowned hanging-parrot	Bird	No	2	Heard	Targeted
2-May-23	1	Transect survey (AM BHM)		1.32966899	103.833743	7:35	<i>Spilopelia chinensis</i>	Spotted dove	Bird	No	1	Heard	Targeted
2-May-23	1	Transect survey (AM BHM)		1.32966899	103.833743	7:35	<i>Aplonis panayensis</i>	Asian glossy starling	Bird	No	5	Seen	Targeted
2-May-23	1	Transect survey (AM BHM)		1.32966899	103.833743	7:35	<i>Mixornis gularis</i>	Pin-striped tit-babbler	Bird	No	2	Heard	Targeted
2-May-23	1	Transect survey (AM BHM)		1.33008901	103.833442	7:38	<i>Geopelia striata</i>	Zebra dove	Bird	No	1	Seen	Targeted
2-May-23	1	Transect survey (AM BHM)		1.33008901	103.833442	7:38	<i>Spilopelia chinensis</i>	Spotted dove	Bird	No	1	Heard	Targeted
2-May-23	1	Transect survey (AM BHM)		1.33008901	103.833442	7:38	<i>Oriolus chinensis</i>	Black-naped oriole	Bird	No	1	Seen	Targeted
2-May-23	1	Transect survey (AM BHM)		1.33008901	103.833442	7:38	<i>Aplonis panayensis</i>	Asian glossy starling	Bird	No	1	Seen	Targeted
2-May-23	1	Transect survey (AM BHM)		1.33008901	103.833442	7:38	<i>Hirundo rustica</i>	Barn swallow	Bird	No	1	Seen	Targeted

2-May-23	1	Transect survey (AM BHM)		1.33008901	103.833442	7:38	<i>Acridotheres javanicus</i>	Javan myna	Bird	No	6	Seen	Targeted
2-May-23	1	Transect survey (AM BHM)		1.33008901	103.833442	7:38	<i>Treron vernans</i>	Pink-necked green pigeon	Bird	No	1	Seen	Targeted
2-May-23	1	Transect survey (AM BHM)		1.32990302	103.833376	7:40	<i>Acridotheres javanicus</i>	Javan myna	Bird	No	2	Heard	Targeted
2-May-23	1	Transect survey (AM BHM)		1.32990302	103.833376	7:40	<i>Spilopelia chinensis</i>	Spotted dove	Bird	No	1	Heard	Targeted
2-May-23	1	Transect survey (AM BHM)		1.32990302	103.833376	7:40	<i>Geopelia striata</i>	Zebra dove	Bird	No	1	Heard	Targeted
2-May-23	1	Transect survey (AM BHM)		1.32996202	103.833154	7:41	<i>Spilopelia chinensis</i>	Spotted dove	Bird	No	1	Heard	Targeted
2-May-23	1	Transect survey (AM BHM)		1.32996202	103.833154	7:41	<i>Callosciurus notatus</i>	Plantain squirrel	Mammal	No	1	Seen	Targeted
2-May-23	1	Transect survey (AM BHM)		1.32996202	103.833154	7:41	<i>Treron vernans</i>	Pink-necked green pigeon	Bird	No	3	Seen	Targeted
2-May-23	1	Transect survey (AM BHM)		1.32996202	103.833154	7:41	<i>Loriculus galgulus</i>	Blue-crowned hanging-parrot	Bird	No	1	Seen	Targeted
2-May-23	1	Transect survey (AM BHM)		1.33006596	103.833034	7:41	<i>Aplonis panayensis</i>	Asian glossy starling	Bird	No	4	Seen	Targeted
2-May-23	1	Transect survey (AM BHM)		1.33006596	103.833034	7:41	<i>Psittacula krameri</i>	Rose-ringed parakeet	Bird	No	1	Seen	Targeted
2-May-23	1	Transect survey (AM BHM)		1.33006596	103.833034	7:41	<i>Aplonis panayensis</i>	Asian glossy starling	Bird	No	1	Seen	Targeted
2-May-23	1	Transect survey (AM BHM)		1.33006596	103.833034	7:41	<i>Psittacula longicauda</i>	Long-tailed parakeet	Bird	Yes	1	Seen	Targeted
2-May-23	1	Transect survey (AM BHM)		1.33006596	103.833034	7:41	<i>Eurystomus orientalis</i>	Oriental dollarbird	Bird	No	1	Seen	Targeted
2-May-23	1	Transect survey (AM BHM)		1.33016998	103.832931	7:45	<i>Orthotomus atrogularis</i>	Dark-necked tailorbird	Bird	No	1	Heard	Targeted
2-May-23	1	Transect survey (AM BHM)		1.33016998	103.832931	7:45	<i>Spilopelia chinensis</i>	Spotted dove	Bird	No	1	Heard	Targeted
2-May-23	1	Transect survey (AM BHM)		1.33016998	103.832931	7:45	<i>Oriolus chinensis</i>	Black-naped oriole	Bird	No	1	Heard	Targeted
2-May-23	1	Transect survey (AM BHM)		1.33037299	103.832889	7:48	<i>Gallus gallus</i>	Red junglefowl	Bird	No	1	Heard	Targeted

2-May-23	1	Transect survey (AM BHM)		1.3303 7299	103.83 2889	7:48	<i>Aegithina tiphia</i>	Common iora	Bird	No	2	Heard	Targeted	
2-May-23	1	Transect survey (AM BHM)		1.3303 7299	103.83 2889	7:48	<i>Orthotomus sutorius</i>	Common tailorbird	Bird	No	1	Heard	Targeted	
2-May-23	1	Transect survey (AM BHM)		1.3303 7299	103.83 2889	7:48	<i>Orthotomus atrogularis</i>	Dark-necked tailorbird	Bird	No	1	Heard	Targeted	
2-May-23	1	Transect survey (AM BHM)		1.3303 7299	103.83 2889	7:48	<i>Mixornis gularis</i>	Pin-striped tit-babbler	Bird	No	2	Heard	Targeted	
2-May-23	1	Transect survey (AM BHM)		1.3304 4097	103.83 2881	7:49	<i>Loriculus galgulus</i>	Blue-crowned hanging-parrot	Bird	No	1	Seen	Targeted	
2-May-23	1	Transect survey (AM BHM)		1.3304 4097	103.83 2881	7:49	<i>Mixornis gularis</i>	Pin-striped tit-babbler	Bird	No	1	Seen	Targeted	
2-May-23	1	Transect survey (AM BHM)		1.3304 4097	103.83 2881	7:49	<i>Psittacula longicauda</i>	Long-tailed parakeet	Bird	Yes	1	Seen	Targeted	
2-May-23	1	Transect survey (AM BHM)		1.3304 4097	103.83 2881	7:49	<i>Loriculus galgulus</i>	Blue-crowned hanging-parrot	Bird	No	1	Seen	Targeted	
2-May-23	1	Transect survey (AM BHM)		1.3304 4097	103.83 2881	7:59	<i>Hemidactylus frenatus</i>	Spiny-tailed house gecko	Reptile	No	1	Seen	Targeted	
2-May-23	1	Transect survey (AM BHM)		1.3304 4097	103.83 2881	7:59	<i>Cynopterus brachyotis</i>	Lesser short-nosed fruit bat	Mammal	No	4	Seen	Incidental	In abandoned building
2-May-23	1	Transect survey (AM BHM)		1.3304 4097	103.83 2881	7:59	<i>Loriculus galgulus</i>	Blue-crowned hanging-parrot	Bird	No	2	Seen	Targeted	
2-May-23	1	Transect survey (AM BHM)		1.3304 4097	103.83 2881	7:59	<i>Psittacula krameri</i>	Rose-ringed parakeet	Bird	No	1	Seen	Targeted	
2-May-23	1	Transect survey (AM BHM)		1.3307 5596	103.83 3217	8:04	<i>Halcyon smyrnensis</i>	White-throated kingfisher	Bird	No	1	Seen	Targeted	
2-May-23	1	Transect survey (AM BHM)		1.3307 5596	103.83 3217	8:04	<i>Callosciurus notatus</i>	Plantain squirrel	Mammal	No	1	Seen	Targeted	
2-May-23	1	Transect survey (AM BHM)		1.3307 5596	103.83 3217	8:04	<i>Mixornis gularis</i>	Pin-striped tit-babbler	Bird	No	1	Heard	Targeted	
2-May-23	1	Transect survey (AM BHM)		1.3307 5596	103.83 3217	8:04	<i>Eleutherodactylus planirostris</i>	Greenhouse frog	Amphibian	No	1	Seen	Targeted	
2-May-23	1	Transect survey (AM BHM)		1.3307 5596	103.83 3217	8:04	<i>Ducula bicolor</i>	Pied imperial pigeon	Bird	No	1	Heard	Targeted	
2-May-23	1	Transect survey (AM BHM)		1.3307 5596	103.83 3217	8:04	<i>Spilopelia chinensis</i>	Spotted dove	Bird	No	2	Heard	Targeted	

2-May-23	1	Transect survey (AM BHM)		1.33075202	103.833772	8:08	<i>Lalage nigra</i>	Pied triller	Bird	No	1	Heard	Targeted	
2-May-23	1	Transect survey (AM BHM)		1.33075202	103.833772	8:08	<i>Acridotheres javanicus</i>	Javan myna	Bird	No	1	Seen	Targeted	
2-May-23	1	Transect survey (AM BHM)		1.33075202	103.833772	8:08	<i>Oriolus chinensis</i>	Black-naped oriole	Bird	No	1	Heard	Targeted	
2-May-23	1	Transect survey (AM BHM)		1.33075202	103.833772	8:08	<i>Callosciurus notatus</i>	Plantain squirrel	Mammal	No	1	Seen	Targeted	
2-May-23	1	Transect survey (AM BHM)		1.33063601	103.834192	8:12	<i>Bibasis harisa consobrina</i>	Orange awlet	Butterfly	No	1	Seen	Incidental	
2-May-23	1	Transect survey (AM BHM)		1.33018599	103.83422	8:20	<i>Amauornis phoenicurus</i>	White-breasted waterhen	Bird	No	1	Seen	Targeted	
2-May-23	1	Transect survey (AM BHM)		1.33018599	103.83422	8:20	<i>Aplonis panayensis</i>	Asian glossy starling	Bird	No	12	Seen	Targeted	
2-May-23	1	Transect survey (AM BHM)		1.33018599	103.83422	8:20	<i>Treron vernans</i>	Pink-necked green pigeon	Bird	No	2	Seen	Targeted	
2-May-23	1	Transect survey (AM BHM)		1.33018599	103.83422	8:20	<i>Dinopium javanense</i>	Common flameback	Bird	No	2	Seen	Targeted	
2-May-23	1	Transect survey (AM BHM)		1.33018599	103.83422	8:20	<i>Pycnonotus goiavier</i>	Yellow-vented bulbul	Bird	No	1	Seen	Targeted	
2-May-23	1	Transect survey (AM BHM)		1.33018599	103.83422	8:20	<i>Aplonis panayensis</i>	Asian glossy starling	Bird	No	9	Seen	Targeted	
2-May-23	1	Transect survey (AM BHM)		1.33018599	103.83422	8:20	<i>Aerodramus sp.</i>	Unidentified swiftlet	Bird	NA	3	Seen	Targeted	
2-May-23	1	Transect survey (AM BHM)		1.33018599	103.83422	8:20	<i>Oriolus chinensis</i>	Black-naped oriole	Bird	No	1	Heard	Targeted	
2-May-23	1	Transect survey (AM BHM)		1.33024198	103.835102	8:25	<i>Dicrurus paradiseus</i>	Greater racket-tailed drongo	Bird	No	1	Seen	Targeted	
2-May-23	1	Transect survey (AM BHM)		1.33024198	103.835102	8:25	<i>Macaca fascicularis</i>	Long-tailed macaque	Mammal	Yes	2	Heard	Targeted	
2-May-23	1	Transect survey (AM BHM)		1.33015296	103.836177	8:31	<i>Lalage nigra</i>	Pied triller	Bird	No	1	Heard	Targeted	
2-May-23	1	Transect survey (AM BHM)		1.33015296	103.836177	8:31	<i>Oriolus chinensis</i>	Black-naped oriole	Bird	No	4	Heard	Targeted	
2-May-23	1	Transect survey (AM BHM)		1.33015296	103.836177	8:31	<i>Halcyon smyrnensis</i>	White-throated kingfisher	Bird	No	1	Heard	Targeted	

2-May-23	1	Transect survey (AM BHM)		1.33015296	103.836177	8:31	<i>Treron vernans</i>	Pink-necked green pigeon	Bird	No	5	Seen	Targeted	
2-May-23	1	Transect survey (AM BHM)		1.33015296	103.836177	8:31	<i>Aplonis panayensis</i>	Asian glossy starling	Bird	No	2	Seen	Targeted	
2-May-23	1	Transect survey (AM BHM)		1.32960998	103.836872	8:34	<i>Psittacula krameri</i>	Rose-ringed parakeet	Bird	No	1	Seen	Targeted	
2-May-23	1	Transect survey (AM BHM)		1.32960998	103.836872	8:34	<i>Lonchura punctulata</i>	Scaly-breasted munia	Bird	No	1	Seen	Targeted	
8-May-23	2	Aquatic point count (PM)	S1_08	1.32791729	103.833994	19:50 - 20:10	<i>Limnonectes blythii</i>	Malayan giant frog	Amphibian	No	1	Seen	Targeted	
8-May-23	2	Aquatic point count (PM)	S1_08	1.32791729	103.833994	19:50 - 20:10	<i>Eleutherodactylus planirostris</i>	Greenhouse frog	Amphibian	No	2	Heard	Targeted	
8-May-23	2	Aquatic point count (PM)	S1_08	1.32791729	103.833994	19:50 - 20:10	<i>Poecilia reticulata</i>	Guppy	Fish	No	70	Seen	Targeted	
8-May-23	2	Aquatic point count (PM)	S1_08	1.32791729	103.833994	19:50 - 20:10	<i>Danio albolineatus</i>	Pearl danio	Fish	No	120	Seen	Targeted	
8-May-23	2	Aquatic point count (PM)	S1_08	1.32791729	103.833994	19:50 - 20:10	<i>Barbodes rhombeus</i>	Indochinese spotted barb	Fish	No	30	Seen	Targeted	
8-May-23	2	Aquatic point count (PM)	S1_08	1.32791729	103.833994	19:50 - 20:10	<i>Limnonectes blythii</i>	Malayan giant frog	Amphibian	No	7	Seen	Targeted	Tadpoles
8-May-23	2	Aquatic point count (PM)	S1_08	1.32791729	103.833994	19:50 - 20:10	<i>Clarias batrachus</i>	Common walking catfish	Fish	No	1	Seen	Targeted	
8-May-23	2	Aquatic point count (PM)	S1_07	1.328749	103.833655	20:15 - 20:35	<i>Sylvirana guentheri</i>	Guenther's frog	Amphibian	No	1	Heard	Targeted	
8-May-23	2	Aquatic point count (PM)	S1_07	1.328749	103.833655	20:15 - 20:35	<i>Danio albolineatus</i>	Pearl danio	Fish	No	80	Seen	Targeted	
8-May-23	2	Aquatic point count (PM)	S1_07	1.328749	103.833655	20:15 - 20:35	<i>Poecilia reticulata</i>	Guppy	Fish	No	50	Seen	Targeted	
8-May-23	2	Aquatic point count (PM)	S1_07	1.328749	103.833655	20:15 - 20:35	<i>Barbodes rhombeus</i>	Indochinese spotted barb	Fish	No	50	Seen	Targeted	
8-May-23	2	Aquatic point count (PM)	S1_07	1.328749	103.833655	20:15 - 20:35	<i>Clarias batrachus</i>	Common walking catfish	Fish	No	2	Seen	Targeted	
8-May-23	2	Aquatic point count (PM)	S1_07	1.328749	103.833655	20:15 - 20:35	<i>cf. Rhinogobius similis</i>	Barcheek goby	Fish	No	1	Seen	Targeted	
8-May-23	2	Aquatic point count (PM)	S1_06	1.329476	103.833352	20:40 - 21:00	<i>Clarias batrachus</i>	Common walking catfish	Fish	No	4	Seen	Targeted	

8-May-23	2	Aquatic point count (PM)	S1_06	1.329476	103.833352	20:40 - 21:00	<i>Eleutherodactylus planirostris</i>	Greenhouse frog	Amphibian	No	2	Heard	Targeted	
8-May-23	2	Aquatic point count (PM)	S1_06	1.329476	103.833352	20:40 - 21:00	<i>Barbodes rhombeus</i>	Indochinese spotted barb	Fish	No	40	Seen	Targeted	
8-May-23	2	Aquatic point count (PM)	S1_06	1.329476	103.833352	20:40 - 21:00	<i>Danio albolineatus</i>	Pearl danio	Fish	No	100	Seen	Targeted	
8-May-23	2	Aquatic point count (PM)	S1_06	1.329476	103.833352	20:40 - 21:00	<i>Poecilia reticulata</i>	Guppy	Fish	No	50	Seen	Targeted	
8-May-23	2	Aquatic point count (PM)	S1_06	1.329476	103.833352	20:40 - 21:00	<i>Monopterus albus</i>	Asian swamp eel	Fish	No	1	Seen	Targeted	
8-May-23	2	Aquatic point count (PM)	S1_05	1.3301139	103.832735	21:10 - 21:30	<i>Polypedates leucomystax</i>	Four-lined tree frog	Amphibian	No	1	Seen	Targeted	
8-May-23	2	Aquatic point count (PM)	S1_05	1.3301139	103.832735	21:10 - 21:30	<i>Barbodes rhombeus</i>	Indochinese spotted barb	Fish	No	20	Seen	Targeted	
8-May-23	2	Aquatic point count (PM)	S1_05	1.3301139	103.832735	21:10 - 21:30	<i>Danio albolineatus</i>	Pearl danio	Fish	No	30	Seen	Targeted	
8-May-23	2	Aquatic point count (PM)	S1_05	1.3301139	103.832735	21:10 - 21:30	<i>Monopterus albus</i>	Asian swamp eel	Fish	No	1	Seen	Targeted	
8-May-23	2	Aquatic point count (PM)	S1_05	1.3301139	103.832735	21:10 - 21:30	<i>Clarias batrachus</i>	Common walking catfish	Fish	No	2	Seen	Targeted	One juvenile
8-May-23	2	Aquatic point count (PM)	S1_04	1.33065673	103.832144	21:40 - 22:00	<i>Limnonectes blythii</i>	Malayan giant frog	Amphibian	No	1	Seen	Targeted	
8-May-23	2	Aquatic point count (PM)	S1_04	1.33065673	103.832144	21:40 - 22:00	<i>Eleutherodactylus planirostris</i>	Greenhouse frog	Amphibian	No	2	Seen	Targeted	
8-May-23	2	Aquatic point count (PM)	S1_04	1.33065673	103.832144	21:40 - 22:00	<i>Archibasis viola</i>	Violet sprite	Odonata	No	1	Seen	Incidental	
8-May-23	2	Aquatic point count (PM)	S1_04	1.33065673	103.832144	21:40 - 22:00	<i>Clarias batrachus</i>	Common walking catfish	Fish	No	1	Seen	Targeted	
8-May-23	2	Aquatic point count (PM)	S1_04	1.33065673	103.832144	21:40 - 22:00	<i>Danio albolineatus</i>	Pearl danio	Fish	No	150	Seen	Targeted	
8-May-23	2	Aquatic point count (PM)	S1_04	1.33065673	103.832144	21:40 - 22:00	<i>Barbodes rhombeus</i>	Indochinese spotted barb	Fish	No	70	Seen	Targeted	
8-May-23	2	Aquatic point count (PM)	S1_04	1.33065673	103.832144	21:40 - 22:00	<i>Poecilia reticulata</i>	Guppy	Fish	No	100	Seen	Targeted	
8-May-23	2	Aquatic point count (PM)	S1_03	1.33098108	103.831374	22:05 - 22:25	<i>Clarias batrachus</i>	Common walking catfish	Fish	No	5	Seen	Targeted	

8-May-23	2	Aquatic point count (PM)	S1_03	1.33098108	103.831374	22:05 - 22:25	<i>Poecilia reticulata</i>	Guppy	Fish	No	30	Seen	Targeted	
8-May-23	2	Aquatic point count (PM)	S1_03	1.33098108	103.831374	22:05 - 22:25	<i>Barbodes rhombeus</i>	Indochinese spotted barb	Fish	No	50	Seen	Targeted	
8-May-23	2	Aquatic point count (PM)	S1_03	1.33098108	103.831374	22:05 - 22:25	<i>Danio albolineatus</i>	Pearl danio	Fish	No	100	Seen	Targeted	
8-May-23	2	Aquatic point count (PM)		1.33081597	103.83132	22:27	<i>Lygosoma bowringii</i>	Garden supple skink	Reptile	No	1	Seen	Incidental	
8-May-23	2	Aquatic point count (PM)		1.33081597	103.83132	22:27	<i>Dendrelaphis pictus</i>	Painted bronzeback	Reptile	No	1	Seen	Incidental	
8-May-23	2	Aquatic point count (PM)	S1_02	1.3312086	103.830556	22:30 - 22:50	<i>Limnonectes blythii</i>	Malayan giant frog	Amphibian	No	5	Seen	Targeted	
8-May-23	2	Aquatic point count (PM)	S1_02	1.3312086	103.830556	22:30 - 22:50	<i>Chalcorana labialis</i>	Copper-cheeked frog	Amphibian	No	1	Seen	Targeted	
8-May-23	2	Aquatic point count (PM)	S1_02	1.3312086	103.830556	22:30 - 22:50	<i>Channa striata</i>	Common snakehead/aruan	Fish	No	1	Seen	Targeted	
8-May-23	2	Aquatic point count (PM)	S1_02	1.3312086	103.830556	22:30 - 22:50	<i>Clarias batrachus</i>	Common walking catfish	Fish	No	3	Seen	Targeted	
8-May-23	2	Aquatic point count (PM)	S1_02	1.3312086	103.830556	22:30 - 22:50	<i>Danio albolineatus</i>	Pearl danio	Fish	No	50	Seen	Targeted	
8-May-23	2	Aquatic point count (PM)	S1_02	1.3312086	103.830556	22:30 - 22:50	<i>Barbodes rhombeus</i>	Indochinese spotted barb	Fish	No	15	Seen	Targeted	
8-May-23	2	Aquatic point count (PM)	S1_02	1.3312086	103.830556	22:30 - 22:50	<i>Poecilia reticulata</i>	Guppy	Fish	No	25	Seen	Targeted	
8-May-23	2	Aquatic point count (PM)		1.33121696	103.830412	22:53	<i>Monopterus albus</i>	Asian swamp eel	Fish	No	1	Seen	Incidental	
8-May-23	2	Aquatic point count (PM)	S1_01	1.33084069	103.829811	22:55 - 23:15	<i>Limnonectes blythii</i>	Malayan giant frog	Amphibian	No	5	Seen	Targeted	
8-May-23	2	Aquatic point count (PM)	S1_01	1.33084069	103.829811	22:55 - 23:15	<i>Chalcorana labialis</i>	Copper-cheeked frog	Amphibian	No	2	Seen	Targeted	
8-May-23	2	Aquatic point count (PM)	S1_01	1.33084069	103.829811	22:55 - 23:15	<i>Danio albolineatus</i>	Pearl danio	Fish	No	100	Seen	Targeted	
8-May-23	2	Aquatic point count (PM)	S1_01	1.33084069	103.829811	22:55 - 23:15	<i>Chalcorana labialis</i>	Copper-cheeked frog	Amphibian	No	50	Seen	Targeted	Tadpoles
8-May-23	2	Aquatic point count (PM)	S1_01	1.33084069	103.829811	22:55 - 23:15	<i>Poecilia reticulata</i>	Guppy	Fish	No	50	Seen	Targeted	

8-May-23	2	Aquatic point count (PM)	S1_01	1.33084069	103.829811	22:55 - 23:15	<i>Barbodes rhombeus</i>	Indochinese spotted barb	Fish	No	30	Seen	Targeted	
9-May-23	2	Aquatic point count (AM)	S1_08	1.32791729	103.833994	08:40 - 09:00	<i>Trithemis festiva</i>	Indigo dropwing	Odonata	No	3	Seen	Targeted	
9-May-23	2	Aquatic point count (AM)	S1_08	1.32791729	103.833994	08:40 - 09:00	<i>Neurothemis fluctuans</i>	Common parasol	Odonata	No	5	Seen	Targeted	
9-May-23	2	Aquatic point count (AM)	S1_08	1.32791729	103.833994	08:40 - 09:00	<i>Barbodes rhombeus</i>	Indochinese spotted barb	Fish	No	7	Caught/Seen	Targeted	In minnow trap
9-May-23	2	Aquatic point count (AM)	S1_08	1.32791729	103.833994	08:40 - 09:00	<i>Orthetrum chrysis</i>	Spine-tufted skimmer	Odonata	No	1	Seen	Targeted	
9-May-23	2	Aquatic point count (AM)	S1_08	1.32791729	103.833994	08:40 - 09:00	<i>Orchithemis pulcherrima</i>	Variable sentinel	Odonata	No	1	Seen	Targeted	
9-May-23	2	Aquatic point count (AM)	S1_08	1.32791729	103.833994	08:40 - 09:00	<i>Ceriatrigon cerinorubellum</i>	Ornate coraltail	Odonata	No	2	Seen	Targeted	
9-May-23	2	Aquatic point count (AM)	S1_08	1.32791729	103.833994	08:40 - 09:00	<i>Danio albolineatus</i>	Pearl danio	Fish	No	TMT C	Seen	Targeted	
9-May-23	2	Aquatic point count (AM)	S1_08	1.32791729	103.833994	08:40 - 09:00	<i>Barbodes rhombeus</i>	Indochinese spotted barb	Fish	No	TMT C	Seen	Targeted	
9-May-23	2	Aquatic point count (AM)	S1_08	1.32791729	103.833994	08:40 - 09:00	<i>Limnonectes blythii</i>	Malayan giant frog	Amphibian	No	1	Seen	Targeted	
9-May-23	2	Aquatic point count (AM)	S1_08	1.32791729	103.833994	08:40 - 09:00	<i>Limnonectes blythii</i>	Malayan giant frog	Amphibian	No	1	Seen	Targeted	
9-May-23	2	Aquatic point count (AM)	S1_08	1.32791729	103.833994	08:40 - 09:00	<i>Tyriobapta torrida</i>	Treehugger	Odonata	No	1	Seen	Targeted	
9-May-23	2	Aquatic point count (AM)	S1_08	1.32791729	103.833994	08:40 - 09:00	<i>Poecilia reticulata</i>	Guppy	Fish	No	2	Seen	Targeted	
9-May-23	2	Aquatic point count (AM)	S1_08	1.32791729	103.833994	08:40 - 09:00	<i>Prodasineura humeralis</i>	Orange-striped threadtail	Odonata	No	2	Seen	Targeted	
9-May-23	2	Aquatic point count (AM)	S1_08	1.32791729	103.833994	08:40 - 09:00	<i>Pseudagrion microcephalum</i>	Blue sprite	Odonata	No	1	Seen	Targeted	
9-May-23	2	Aquatic point count (AM)	S1_07	1.328749	103.833655	09:05 - 09:25	<i>Limnonectes blythii</i>	Malayan giant frog	Amphibian	No	1	Seen	Targeted	
9-May-23	2	Aquatic point count (AM)	S1_07	1.328749	103.833655	09:05 - 09:25	<i>Barbodes rhombeus</i>	Indochinese spotted barb	Fish	No	12	Caught/Seen	Targeted	In minnow trap
9-May-23	2	Aquatic point count (AM)	S1_07	1.328749	103.833655	09:05 - 09:25	<i>Tyriobapta torrida</i>	Treehugger	Odonata	No	1	Seen	Targeted	

9-May-23	2	Aquatic point count (AM)	S1_07	1.328749	103.833655	09:05 - 09:25	<i>Orthetrum chrysis</i>	Spine-tufted skimmer	Odonata	No	1	Seen	Targeted	
9-May-23	2	Aquatic point count (AM)	S1_07	1.328749	103.833655	09:05 - 09:25	<i>Prodasineura humeralis</i>	Orange-striped threadtail	Odonata	No	1	Seen	Targeted	
9-May-23	2	Aquatic point count (AM)	S1_07	1.328749	103.833655	09:05 - 09:25	<i>Limnonectes blythii</i>	Malayan giant frog	Amphibian	No	1	Seen	Targeted	Tadpole
9-May-23	2	Aquatic point count (AM)	S1_07	1.328749	103.833655	09:05 - 09:25	<i>Barbodes rhombeus</i>	Indochinese spotted barb	Fish	No	TMT C	Seen	Targeted	
9-May-23	2	Aquatic point count (AM)	S1_07	1.328749	103.833655	09:05 - 09:25	<i>Danio albolineatus</i>	Pearl danio	Fish	No	TMT C	Seen	Targeted	
9-May-23	2	Aquatic point count (AM)	S1_07	1.328749	103.833655	09:05 - 09:25	<i>Poecilia reticulata</i>	Guppy	Fish	No	12	Seen	Targeted	
9-May-23	2	Aquatic point count (AM)	S1_07	1.328749	103.833655	09:05 - 09:25	<i>Neurothemis fluctuans</i>	Common parasol	Odonata	No	3	Seen	Targeted	
9-May-23	2	Aquatic point count (AM)	S1_07	1.328749	103.833655	09:05 - 09:25	<i>Sylvirana guentheri</i>	Guenther's frog	Amphibian	No	1	Heard	Targeted	
9-May-23	2	Aquatic point count (AM)	S1_07	1.328749	103.833655	09:05 - 09:25	<i>Ceriatrigon cerinorubellum</i>	Ornate coraltail	Odonata	No	1	Seen	Targeted	
9-May-23	2	Aquatic point count (AM)	S1_06	1.329476	103.833352	09:30 - 09:50	<i>Neurothemis fluctuans</i>	Common parasol	Odonata	No	3	Seen	Targeted	
9-May-23	2	Aquatic point count (AM)	S1_06	1.329476	103.833352	09:30 - 09:50	<i>Trithemis festiva</i>	Indigo dropwing	Odonata	No	1	Seen	Targeted	
9-May-23	2	Aquatic point count (AM)	S1_06	1.329476	103.833352	09:30 - 09:50	<i>Orchithemis pulcherrima</i>	Variable sentinel	Odonata	No	1	Seen	Targeted	
9-May-23	2	Aquatic point count (AM)	S1_06	1.329476	103.833352	09:30 - 09:50	<i>Orthetrum chrysis</i>	Spine-tufted skimmer	Odonata	No	1	Seen	Targeted	
9-May-23	2	Aquatic point count (AM)	S1_06	1.329476	103.833352	09:30 - 09:50	<i>Archibasis viola</i>	Violet sprite	Odonata	No	1	Seen	Targeted	
9-May-23	2	Aquatic point count (AM)	S1_06	1.329476	103.833352	09:30 - 09:50	<i>Clarias batrachus</i>	Common walking catfish	Fish	No	1	Seen	Targeted	
9-May-23	2	Aquatic point count (AM)	S1_06	1.329476	103.833352	09:30 - 09:50	<i>Prodasineura humeralis</i>	Orange-striped threadtail	Odonata	No	2	Seen	Targeted	
9-May-23	2	Aquatic point count (AM)	S1_06	1.329476	103.833352	09:30 - 09:50	<i>Trithemis aurora</i>	Crimson dropwing	Odonata	No	2	Seen	Targeted	
9-May-23	2	Aquatic point count (AM)	S1_06	1.329476	103.833352	09:30 - 09:50	<i>Pseudagrion microcephalum</i>	Blue sprite	Odonata	No	1	Seen	Targeted	

9-May-23	2	Aquatic point count (AM)	S1_06	1.329476	103.833352	09:30 - 09:50	<i>Orthetrum luzonicum</i>	Slender blue skimmer	Odonata	No	1	Seen	Targeted	
9-May-23	2	Aquatic point count (AM)	S1_06	1.329476	103.833352	09:30 - 09:50	<i>Monopterus albus</i>	Asian swamp eel	Fish	No	1	Seen	Targeted	Juvenile
9-May-23	2	Aquatic point count (AM)	S1_06	1.329476	103.833352	09:30 - 09:50	<i>Poecilia reticulata</i>	Guppy	Fish	No	13	Seen	Targeted	
9-May-23	2	Aquatic point count (AM)	S1_06	1.329476	103.833352	09:30 - 09:50	<i>Danio albolineatus</i>	Pearl danio	Fish	No	TMT C	Seen	Targeted	
9-May-23	2	Aquatic point count (AM)	S1_06	1.329476	103.833352	09:30 - 09:50	<i>Barbodes rhombeus</i>	Indochinese spotted barb	Fish	No	TMT C	Seen	Targeted	
9-May-23	2	Aquatic point count (AM)	S1_06	1.329476	103.833352	09:30 - 09:50	<i>Prodasineura humeralis</i>	Orange-striped threadtail	Odonata	No	1	Seen	Targeted	
9-May-23	2	Aquatic point count (AM)		1.32986	103.83256	10:03	<i>Prodasineura collaris</i>	Collared threadtail	Odonata	Yes	1	Seen	Incidental	
9-May-23	2	Aquatic point count (AM)		1.32996	103.83271	10:03	<i>Tyriobapta torrida</i>	Treehugger	Odonata	No	1	Seen	Incidental	
9-May-23	2	Aquatic point count (AM)	S1_05	1.3301139	103.832735	10:10 - 10:30	<i>Orthetrum chrysis</i>	Spine-tufted skimmer	Odonata	No	1	Seen	Targeted	
9-May-23		Aquatic point count (AM)	S1_05	1.3301139	103.832735	10:10 - 10:30	<i>Danio albolineatus</i>	Pearl danio	Fish	No	1	Caught	Targeted	In minnow trap
9-May-23	2	Aquatic point count (AM)	S1_05	1.3301139	103.832735	10:10 - 10:30	<i>Prodasineura collaris</i>	Collared threadtail	Odonata	Yes	2	Seen	Targeted	
9-May-23	2	Aquatic point count (AM)	S1_05	1.3301139	103.832735	10:10 - 10:30	<i>Danio albolineatus</i>	Pearl danio	Fish	No	2	Seen	Targeted	
9-May-23	2	Aquatic point count (AM)	S1_05	1.3301139	103.832735	10:10 - 10:30	<i>Barbodes rhombeus</i>	Indochinese spotted barb	Fish	No	7	Seen	Targeted	
9-May-23	2	Aquatic point count (AM)	S1_04	1.33065673	103.832144	10:35 - 10:55	<i>Trithemis festiva</i>	Indigo dropwing	Odonata	No	1	Seen	Targeted	
9-May-23	2	Aquatic point count (AM)	S1_04	1.33065673	103.832144	10:35 - 10:55	<i>Prodasineura humeralis</i>	Orange-striped threadtail	Odonata	No	1	Seen	Targeted	
9-May-23	2	Aquatic point count (AM)	S1_04	1.33065673	103.832144	10:35 - 10:55	<i>Orthetrum luzonicum</i>	Slender blue skimmer	Odonata	No	1	Seen	Targeted	
9-May-23	2	Aquatic point count (AM)	S1_04	1.33065673	103.832144	10:35 - 10:55	Unidentified Odonata	NA	Odonata	NA	1	Seen	Targeted	
9-May-23	2	Aquatic point count (AM)	S1_04	1.33065673	103.832144	10:35 - 10:55	<i>Neurothemis fluctuans</i>	Common parasol	Odonata	No	2	Seen	Targeted	

9-May-23	2	Aquatic point count (AM)	S1_04	1.33065673	103.832144	10:35 - 10:55	<i>Orthetrum chrysis</i>	Spine-tufted skimmer	Odonata	No	1	Seen	Targeted	
9-May-23	2	Aquatic point count (AM)	S1_04	1.33065673	103.832144	10:35 - 10:55	<i>Barbodes rhombeus</i>	Indochinese spotted barb	Fish	No	1	Seen	Targeted	
9-May-23	2	Aquatic point count (AM)	S1_04	1.33065673	103.832144	10:35 - 10:55	<i>Danio albolineatus</i>	Pearl danio	Fish	No	32	Seen	Targeted	
9-May-23	2	Aquatic point count (AM)	S1_04	1.33065673	103.832144	10:35 - 10:55	<i>Poecilia reticulata</i>	Guppy	Fish	No	47	Seen	Targeted	
9-May-23	2	Aquatic point count (AM)	S1_04	1.33065673	103.832144	10:35 - 10:55	<i>Prodasineura collaris</i>	Collared threadtail	Odonata	Yes	1	Seen	Targeted	
9-May-23	2	Aquatic point count (AM)	S1_03	1.33098108	103.831374	11:00 - 11:20	<i>Trithemis aurora</i>	Crimson dropwing	Odonata	No	1	Seen	Targeted	
9-May-23	2	Aquatic point count (AM)	S1_03	1.33098108	103.831374	11:00 - 11:20	<i>Trithemis festiva</i>	Indigo dropwing	Odonata	No	2	Seen	Targeted	
9-May-23	2	Aquatic point count (AM)	S1_03	1.33098108	103.831374	11:00 - 11:20	<i>Orthetrum luzonicum</i>	Slender blue skimmer	Odonata	No	1	Seen	Targeted	
9-May-23	2	Aquatic point count (AM)	S1_03	1.33098108	103.831374	11:00 - 11:20	<i>Pseudagrion pruinosum</i>	Grey sprite	Odonata	Yes	2	Seen	Targeted	
9-May-23	2	Aquatic point count (AM)	S1_03	1.33098108	103.831374	11:00 - 11:20	<i>Neurothemis fluctuans</i>	Common parasol	Odonata	No	2	Seen	Targeted	
9-May-23	2	Aquatic point count (AM)	S1_03	1.33098108	103.831374	11:00 - 11:20	<i>Prodasineura humeralis</i>	Orange-striped threadtail	Odonata	No	1	Seen	Targeted	
9-May-23	2	Aquatic point count (AM)	S1_03	1.33098108	103.831374	11:00 - 11:20	<i>Prodasineura collaris</i>	Collared threadtail	Odonata	Yes	1	Seen	Targeted	
9-May-23		Aquatic point count (AM)	S1_03	1.33098108	103.831374	11:00 - 11:20	<i>Barbodes rhombeus</i>	Indochinese spotted barb	Fish	No	3	Caught	Targeted	In minnow trap
9-May-23	2	Aquatic point count (AM)	S1_03	1.33098108	103.831374	11:00 - 11:20	<i>Danio albolineatus</i>	Pearl danio	Fish	No	5	Seen	Targeted	
9-May-23	2	Aquatic point count (AM)	S1_03	1.33098108	103.831374	11:00 - 11:20	<i>Poecilia reticulata</i>	Guppy	Fish	No	3	Seen	Targeted	
9-May-23	2	Aquatic point count (AM)	S1_03	1.33098108	103.831374	11:00 - 11:20	<i>Barbodes rhombeus</i>	Indochinese spotted barb	Fish	No	5	Seen	Targeted	
9-May-23	2	Aquatic point count (AM)	S1_03	1.33098108	103.831374	11:00 - 11:20	<i>Barbodes rhombeus</i>	Indochinese spotted barb	Fish	No	TMT C	Seen	Targeted	
9-May-23	2	Aquatic point count (AM)	S1_03	1.33098108	103.831374	11:00 - 11:20	<i>Archibasis viola</i>	Violet sprite	Odonata	No	1	Seen	Targeted	

9-May-23	2	Aquatic point count (AM)	S1_02	1.3312086	103.830556	11:25 - 11:45	<i>Prodasineura humeralis</i>	Orange-striped threadtail	Odonata	No	1	Seen	Targeted	
9-May-23	2	Aquatic point count (AM)	S1_02	1.3312086	103.830556	11:25 - 11:45	<i>Prodasineura collaris</i>	Collared threadtail	Odonata	Yes	1	Seen	Targeted	
9-May-23	2	Aquatic point count (AM)	S1_02	1.3312086	103.830556	11:25 - 11:45	<i>Orthetrum chrysis</i>	Spine-tufted skimmer	Odonata	No	2	Seen	Targeted	
9-May-23	2	Aquatic point count (AM)	S1_02	1.3312086	103.830556	11:25 - 11:45	<i>Archibasis viola</i>	Violet sprite	Odonata	No	2	Seen	Targeted	Mating pair
9-May-23	2	Aquatic point count (AM)	S1_02	1.3312086	103.830556	11:25 - 11:45	<i>Barbodes rhombeus</i>	Indochinese spotted barb	Fish	No	27	Seen	Targeted	
9-May-23	2	Aquatic point count (AM)	S1_02	1.3312086	103.830556	11:25 - 11:45	<i>Danio albolineatus</i>	Pearl danio	Fish	No	15	Seen	Targeted	
9-May-23	2	Aquatic point count (AM)	S1_02	1.3312086	103.830556	11:25 - 11:45	<i>Poecilia reticulata</i>	Guppy	Fish	No	7	Seen	Targeted	
9-May-23	2	Aquatic point count (AM)		1.33111	103.83021	11:48	<i>Tyriobapta torrida</i>	Treehugger	Odonata	No	1	Seen	Incidental	
9-May-23	2	Aquatic point count (AM)	S1_01	1.33084069	103.829811	11:50 - 12:10	<i>Chalcorana labialis</i>	Copper-cheeked frog	Amphibian	No	4	Seen	Targeted	Tadpoles
9-May-23	2	Aquatic point count (AM)	S1_01	1.33084069	103.829811	11:50 - 12:10	<i>Tyriobapta torrida</i>	Treehugger	Odonata	No	1	Seen	Targeted	
9-May-23	2	Aquatic point count (AM)	S1_01	1.33084069	103.829811	11:50 - 12:10	<i>Danio albolineatus</i>	Pearl danio	Fish	No	27	Seen	Targeted	
9-May-23	2	Aquatic point count (AM)	S1_01	1.33084069	103.829811	11:50 - 12:10	<i>Barbodes rhombeus</i>	Indochinese spotted barb	Fish	No	45	Seen	Targeted	
15-May-23	2	Transect survey (AM BHM)		1.33039302	103.83595	7:04	<i>Orthotomus atrogularis</i>	Dark-necked tailorbird	Bird	No	1	Heard	Targeted	
15-May-23	2	Transect survey (AM BHM)		1.33039302	103.83595	7:04	<i>Aegithina tiphia</i>	Common iora	Bird	No	1	Heard	Targeted	
15-May-23	2	Transect survey (AM BHM)		1.33039302	103.83595	7:04	<i>Orthotomus sutorius</i>	Common tailorbird	Bird	No	1	Heard	Targeted	
15-May-23	2	Transect survey (AM BHM)		1.33039302	103.83595	7:04	<i>Eudynamys scolopaceus</i>	Asian koel	Bird	No	1	Heard	Targeted	
15-May-23	2	Transect survey (AM BHM)		1.33039302	103.83595	7:04	<i>Oriolus chinensis</i>	Black-naped oriole	Bird	No	1	Seen	Targeted	
15-May-23	2	Transect survey (AM BHM)		1.33039302	103.83595	7:04	<i>Callosciurus notatus</i>	Plantain squirrel	Mammal	No	2	Seen	Targeted	

15-May-23	2	Transect survey (AM BHM)		1.3303 9302	103.83 595	7:04	<i>Treron vernans</i>	Pink-necked green pigeon	Bird	No	1	Seen	Targeted
15-May-23	2	Transect survey (AM BHM)		1.3302 6796	103.83 5695	7:06	<i>Spilopelia chinensis</i>	Spotted dove	Bird	No	1	Heard	Targeted
15-May-23	2	Transect survey (AM BHM)		1.3302 6796	103.83 5695	7:06	<i>Caprimulgus macrurus</i>	Large-tailed nightjar	Bird	No	1	Seen	Targeted
15-May-23	2	Transect survey (AM BHM)		1.3302 6	103.83 5558	7:07	<i>Loriculus galgulus</i>	Blue-crowned hanging-parrot	Bird	No	2	Heard	Targeted
15-May-23	2	Transect survey (AM BHM)		1.3302 6	103.83 5558	7:07	<i>Copsychus saularis</i>	Oriental magpie-robin	Bird	Yes	1	Seen	Targeted
15-May-23	2	Transect survey (AM BHM)		1.3303 2898	103.83 5261	7:09	<i>Orthotomus sericeus</i>	Rufous-tailed tailorbird	Bird	No	1	Heard	Targeted
15-May-23	2	Transect survey (AM BHM)		1.3303 2898	103.83 5261	7:09	<i>Oriolus chinensis</i>	Black-naped oriole	Bird	No	1	Heard	Targeted
15-May-23	2	Transect survey (AM BHM)		1.3302 1398	103.83 5099	7:12	<i>Dicaeum cruentatum</i>	Scarlet-backed flowerpecker	Bird	No	1	Heard	Targeted
15-May-23	2	Transect survey (AM BHM)		1.3303 2303	103.83 4962	7:13	<i>Dinopium javanense</i>	Common flameback	Bird	No	1	Heard	Targeted
15-May-23	2	Transect survey (AM BHM)		1.3303 2303	103.83 4962	7:13	<i>Acridotheres javanicus</i>	Javan myna	Bird	No	1	Heard	Targeted
15-May-23	2	Transect survey (AM BHM)		1.3303 2303	103.83 4962	7:13	<i>Spilopelia chinensis</i>	Spotted dove	Bird	No	1	Heard	Targeted
15-May-23	2	Transect survey (AM BHM)		1.3303 2303	103.83 4962	7:13	<i>Psittacula alexandri</i>	Red-breasted parakeet	Bird	No	1	Heard	Targeted
15-May-23	2	Transect survey (AM BHM)		1.3303 2303	103.83 4962	7:13	<i>Callosciurus notatus</i>	Plantain squirrel	Mammal	No	1	Seen	Targeted
15-May-23	2	Transect survey (AM BHM)		1.3301 5104	103.83 4519	7:15	<i>Aplonis panayensis</i>	Asian glossy starling	Bird	No	3	Seen	Targeted
15-May-23	2	Transect survey (AM BHM)		1.3301 5104	103.83 4519	7:15	<i>Chrysophlegma miniaceum</i>	Banded woodpecker	Bird	No	3	Seen	Targeted
15-May-23	2	Transect survey (AM BHM)		1.3301 5104	103.83 4519	7:15	<i>Pycnonotus goiavier</i>	Yellow-vented bulbul	Bird	No	1	Seen	Targeted
15-May-23	2	Transect survey (AM BHM)		1.3301 5104	103.83 4519	7:15	<i>Callosciurus notatus</i>	Plantain squirrel	Mammal	No	1	Seen	Targeted
15-May-23	2	Transect survey (AM BHM)		1.3301 5104	103.83 4519	7:16	<i>Todiramphus chloris</i>	Collared kingfisher	Bird	No	1	Seen	Targeted

15-May-23	2	Transect survey (AM BHM)		1.33015104	103.834519	7:16	<i>Treron vernans</i>	Pink-necked green pigeon	Bird	No	3	Seen	Targeted	
15-May-23	2	Transect survey (AM BHM)		1.33015104	103.834519	7:16	<i>Aplonis panayensis</i>	Asian glossy starling	Bird	No	2	Seen	Targeted	
15-May-23	2	Transect survey (AM BHM)		1.33015104	103.834519	7:16	<i>Orthotomus atrogularis</i>	Dark-necked tailorbird	Bird	No	1	Heard	Targeted	
15-May-23	2	Transect survey (AM BHM)		1.33019697	103.834203	7:18	<i>Psilopogon lineatus</i>	Lineated barbet	Bird	No	1	Seen	Targeted	
15-May-23	2	Transect survey (AM BHM)		1.33019697	103.834203	7:18	<i>Treron vernans</i>	Pink-necked green pigeon	Bird	No	3	Seen	Targeted	
15-May-23	2	Transect survey (AM BHM)		1.33019697	103.834203	7:18	<i>Callosciurus notatus</i>	Plantain squirrel	Mammal	No	1	Seen	Targeted	
15-May-23	2	Transect survey (AM BHM)		1.33019697	103.834203	7:18	<i>Aplonis panayensis</i>	Asian glossy starling	Bird	No	10	Seen	Targeted	
15-May-23	2	Transect survey (AM BHM)		1.33019697	103.834203	7:18	<i>Gallus gallus</i>	Red junglefowl	Bird	No	8	Seen	Targeted	
15-May-23	2	Transect survey (AM BHM)		1.33024902	103.834158	7:18	<i>Pycnonotus plumosus</i>	Olive-winged bulbul	Bird	No	1	Heard	Targeted	
15-May-23	2	Transect survey (AM BHM)		1.33056401	103.83403	7:18	<i>Centropus sinensis</i>	Greater coucal	Bird	No	1	Heard	Targeted	
15-May-23	2	Transect survey (AM BHM)		1.33056401	103.83403	7:20	<i>Chalcophaps indica</i>	Common emerald dove	Bird	No	1	Heard	Targeted	
15-May-23	2	Transect survey (AM BHM)		1.33075596	103.833701	7:27	<i>Gallus gallus</i>	Red junglefowl	Bird	No	1	Seen	Targeted	
15-May-23	2	Transect survey (AM BHM)		1.33075596	103.833701	7:27	<i>Loriculus galgulus</i>	Blue-crowned hanging-parrot	Bird	No	1	Heard	Targeted	
15-May-23	2	Transect survey (AM BHM)		1.33075596	103.833701	7:27	<i>Callosciurus notatus</i>	Plantain squirrel	Mammal	No	1	Seen	Targeted	
15-May-23	2	Transect survey (AM BHM)		1.33075596	103.833701	7:27	<i>Psittacula alexandri</i>	Red-breasted parakeet	Bird	No	1	Heard	Targeted	
15-May-23	2	Transect survey (AM BHM)		1.33080499	103.833319	7:30	<i>Acridotheres javanicus</i>	Javan myna	Bird	No	1	Heard	Targeted	
15-May-23	2	Transect survey (AM BHM)		1.33080499	103.833319	7:30	<i>Eurystomus orientalis</i>	Oriental dollarbird	Bird	No	1	Heard	Targeted	
15-May-23	2	Transect survey (AM BHM)		1.33056301	103.83316	7:33	<i>Acridotheres javanicus</i>	Javan myna	Bird	No	1	Seen	Targeted	

15-May-23	2	Transect survey (AM BHM)		1.33056301	103.83316	7:33	<i>Orthotomus atrogularis</i>	Dark-necked tailorbird	Bird	No	1	Heard	Targeted	
15-May-23	2	Transect survey (AM BHM)		1.33056301	103.83316	7:33	<i>Aplonis panayensis</i>	Asian glossy starling	Bird	No	20	Seen	Targeted	
15-May-23	2	Transect survey (AM BHM)		1.33056301	103.83316	7:33	<i>Orthotomus sericeus</i>	Rufous-tailed tailorbird	Bird	No	1	Heard	Targeted	
15-May-23	2	Transect survey (AM BHM)		1.33032002	103.832855	7:37	<i>Aerodramus sp.</i>	Unidentified swiftlet	Bird	NA	1	Seen	Targeted	
15-May-23	2	Transect survey (AM BHM)		1.33032002	103.832855	7:37	<i>Loriculus galgulus</i>	Blue-crowned hanging-parrot	Bird	No	1	Seen	Targeted	
15-May-23	2	Transect survey (AM BHM)		1.33032002	103.832855	7:37	<i>Aegithina tiphia</i>	Common iora	Bird	No	1	Heard	Targeted	
15-May-23	2	Transect survey (AM BHM)		1.33032002	103.832855	7:37	<i>Pycnonotus goiavier</i>	Yellow-vented bulbul	Bird	No	1	Heard	Targeted	
15-May-23	2	Transect survey (AM BHM)		1.33032002	103.832855	7:37	<i>Psilopogon lineatus</i>	Lineated barbet	Bird	No	1	Heard	Targeted	
15-May-23	2	Transect survey (AM BHM)		1.33019102	103.832892	7:40	<i>Zosterops simplex</i>	Swinhoe's white-eye	Bird	Yes	1	Heard	Targeted	
15-May-23	2	Transect survey (AM BHM)		1.33002003	103.833054	7:42	<i>Oriolus chinensis</i>	Black-naped oriole	Bird	No	1	Heard	Targeted	
15-May-23	2	Transect survey (AM BHM)		1.33002003	103.833054	7:42	<i>Hirundo tahitica</i>	Pacific swallow	Bird	No	2	Seen	Targeted	
15-May-23	2	Transect survey (AM BHM)		1.33002003	103.833054	7:42	<i>Dicaeum cruentatum</i>	Scarlet-backed flowerpecker	Bird	No	4	Seen	Targeted	
15-May-23	2	Transect survey (AM BHM)		1.33002003	103.833054	7:42	<i>Callosciurus notatus</i>	Plantain squirrel	Mammal	No	1	Seen	Targeted	
15-May-23	2	Transect survey (AM BHM)		1.32989598	103.833259	7:46	<i>Chalcophaps indica</i>	Common emerald dove	Bird	No	1	Heard	Targeted	
15-May-23	2	Transect survey (AM BHM)		1.32989598	103.833259	7:46	<i>Dicrurus paradiseus</i>	Greater racket-tailed drongo	Bird	No	1	Heard	Targeted	
15-May-23	2	Transect survey (AM BHM)		1.32989598	103.833259	7:46	<i>Eurystomus orientalis</i>	Oriental dollarbird	Bird	No	1	Seen	Targeted	
15-May-23	2	Transect survey (AM BHM)		1.32989598	103.833259	7:46	<i>Psittacula longicauda</i>	Long-tailed parakeet	Bird	Yes	1	Seen	Targeted	
15-May-23	2	Transect survey (AM BHM)		1.330073	103.833425	7:49	<i>Aplonis panayensis</i>	Asian glossy starling	Bird	No	1	Seen	Targeted	

15-May-23	2	Transect survey (AM BHM)		1.330073	103.833425	7:49	<i>Treron vernans</i>	Pink-necked green pigeon	Bird	No	1	Seen	Targeted
15-May-23	2	Transect survey (AM BHM)		1.33010301	103.833582	7:51	<i>Pelargopsis capensis</i>	Stork-billed kingfisher	Bird	No	1	Heard	Targeted
15-May-23	2	Transect survey (AM BHM)		1.33010301	103.833582	7:51	<i>Eleutherodactylus planirostris</i>	Greenhouse frog	Amphibian	No	1	Seen	Targeted
15-May-23	2	Transect survey (AM BHM)		1.33010301	103.833582	7:51	<i>Oriolus chinensis</i>	Black-naped oriole	Bird	No	3	Seen	Targeted
15-May-23	2	Transect survey (AM BHM)		1.33010301	103.833582	7:51	<i>Acridotheres javanicus</i>	Javan myna	Bird	No	2	Seen	Targeted
15-May-23	2	Transect survey (AM BHM)		1.33010301	103.833582	7:51	<i>Anthreptes malacensis</i>	Brown-throated sunbird	Bird	No	1	Heard	Targeted
15-May-23	2	Transect survey (AM BHM)		1.329699	103.833743	7:56	<i>Aegithina tiphia</i>	Common iora	Bird	No	1	Heard	Targeted
15-May-23	2	Transect survey (AM BHM)		1.329699	103.833743	7:56	<i>Pycnonotus zeylanicus</i>	Straw-headed bulbul	Bird	Yes	1	Heard	Targeted
15-May-23	2	Transect survey (AM BHM)		1.329699	103.833743	7:56	<i>Pelargopsis capensis</i>	Stork-billed kingfisher	Bird	No	1	Heard	Targeted
15-May-23	2	Transect survey (AM BHM)		1.32905996	103.833961	8:04	<i>Acridotheres javanicus</i>	Javan myna	Bird	No	6	Seen	Targeted
15-May-23	2	Transect survey (AM BHM)		1.32905996	103.833961	8:04	<i>Geopelia striata</i>	Zebra dove	Bird	No	1	Seen	Targeted
15-May-23	2	Transect survey (AM BHM)		1.32905996	103.833961	8:04	<i>Cisticola juncidis</i>	Zitting cisticola	Bird	Yes	1	Seen	Targeted
15-May-23	2	Transect survey (AM BHM)		1.32905996	103.833961	8:04	<i>Cinnyris jugularis</i>	Olive-backed sunbird	Bird	No	1	Seen	Targeted
15-May-23	2	Transect survey (AM BHM)		1.32905996	103.833961	8:04	<i>Pycnonotus goiavier</i>	Yellow-vented bulbul	Bird	No	1	Seen	Targeted
15-May-23	2	Transect survey (AM BHM)		1.328765	103.834137	8:06	<i>Callosciurus notatus</i>	Plantain squirrel	Mammal	No	2	Seen	Targeted
15-May-23	2	Transect survey (AM BHM)		1.328765	103.834137	8:06	<i>Oriolus chinensis</i>	Black-naped oriole	Bird	No	1	Seen	Targeted
15-May-23	2	Transect survey (AM BHM)		1.328765	103.834137	8:06	<i>Hirundo tahitica</i>	Pacific swallow	Bird	No	2	Seen	Targeted
15-May-23	2	Transect survey (AM BHM)		1.328765	103.834137	8:06	<i>Halcyon smyrnensis</i>	White-throated kingfisher	Bird	No	1	Seen	Targeted

15-May-23	2	Transect survey (AM BHM)		1.328765	103.834137	8:06	<i>Pycnonotus goiavier</i>	Yellow-vented bulbul	Bird	No	1	Seen	Targeted	
15-May-23	2	Transect survey (AM BHM)		1.32842101	103.834065	8:07	<i>Geopelia striata</i>	Zebra dove	Bird	No	1	Seen	Targeted	
15-May-23	2	Transect survey (AM BHM)		1.32842101	103.834065	8:07	<i>Callosciurus notatus</i>	Plantain squirrel	Mammal	No	1	Seen	Targeted	
15-May-23	2	Transect survey (AM BHM)		1.32794903	103.834219	8:10	<i>Varanus salvator</i>	Malayan water monitor	Reptile	No	1	Seen	Targeted	
15-May-23	2	Transect survey (AM BHM)		1.32794903	103.834219	8:10	<i>Aplonis panayensis</i>	Asian glossy starling	Bird	No	6	Seen	Targeted	
15-May-23	2	Transect survey (AM BHM)		1.32794903	103.834219	8:10	<i>Pycnonotus goiavier</i>	Yellow-vented bulbul	Bird	No	1	Seen	Targeted	
15-May-23	2	Transect survey (AM BHM)		1.32794903	103.834219	8:10	<i>Loriculus galgulus</i>	Blue-crowned hanging-parrot	Bird	No	1	Seen	Targeted	
15-May-23	2	Transect survey (AM BHM)		1.32794903	103.834219	8:10	<i>Oriolus chinensis</i>	Black-naped oriole	Bird	No	2	Seen	Targeted	
15-May-23	2	Transect survey (AM BHM)		1.32754996	103.834473	8:12	<i>Anthreptes malacensis</i>	Brown-throated sunbird	Bird	No	1	Seen	Targeted	
15-May-23	2	Transect survey (AM BHM)		1.32754996	103.834473	8:12	<i>Callosciurus notatus</i>	Plantain squirrel	Mammal	No	1	Seen	Targeted	
15-May-23	2	Transect survey (AM BHM)		1.32754996	103.834473	8:12	<i>Chrysophlegma miniaceum</i>	Banded woodpecker	Bird	No	1	Seen	Targeted	
15-May-23	2	Transect survey (OBB)		1.330318	103.835783	8:50	<i>Ropalidia jacobsoni</i>	NA	Aculeata	No	1	Seen	Incidental	
15-May-23	2	Transect survey (OBB)		1.330318	103.835783	8:50	<i>Vespa analis</i>	NA	Aculeata	No	1	Seen	Targeted	Nest
15-May-23	2	Transect survey (OBB)		1.330318	103.835783	8:50	<i>Delias hyparete metarete</i>	Painted jezebel	Butterfly	No	3	Seen	Targeted	
15-May-23	2	Transect survey (OBB)		1.33032102	103.835376	9:02	<i>Liostenogaster varipicta</i>	NA	Aculeata	No	1	Seen	Targeted	
15-May-23	2	Transect survey (OBB)		1.33032102	103.835376	9:03	<i>Elymnias hypermnestra agina</i>	Common palmfly	Butterfly	No	3	Seen	Targeted	
15-May-23	2	Transect survey (OBB)		1.33032102	103.835376	9:03	<i>Mycalesis visala phamis</i>	Long brand bush brown	Butterfly	No	1	Seen	Targeted	
15-May-23	2	Transect survey (OBB)		1.33032102	103.835376	9:03	<i>Ropalidia sumatrae</i>	NA	Aculeata	No	1	Seen	Targeted	

15-May-23	2	Transect survey (OBB)		1.3303 2102	103.83 5376	9:03	<i>Papilio polytes romulus</i>	Common mormon	Butter fly	No	1	Seen	Targeted	
15-May-23	2	Transect survey (OBB)		1.3303 2102	103.83 5376	9:09	<i>Faunis canens arcesilas</i>	Common faun	Butter fly	No	1	Seen	Targeted	
15-May-23	2	Transect survey (OBB)		1.3303 8699	103.83 4672	9:09	<i>Junonia almana javana</i>	Peacock pansy	Butter fly	No	1	Seen	Targeted	
15-May-23	2	Transect survey (OBB)		1.3303 8699	103.83 4672	9:09	<i>Ropalidia sumatrae</i>	NA	Aculeata	No	1	Seen	Targeted	
15-May-23	2	Transect survey (OBB)		1.3303 8699	103.83 4672	9:09	<i>Junonia hedonia ida</i>	Chocolate pansy	Butter fly	No	2	Seen	Targeted	
15-May-23	2	Transect survey (OBB)		1.3303 8699	103.83 4672	9:09	<i>Taractrocera archias quinta</i>	Yellow grass dart	Butter fly	No	4	Seen	Targeted	
15-May-23	2	Transect survey (OBB)		1.3303 8699	103.83 4672	9:09	<i>Zizina otis lampa</i>	Lesser grass blue	Butter fly	No	2	Seen	Targeted	
15-May-23	2	Transect survey (OBB)		1.3303 8699	103.83 4672	9:09	<i>Junonia almana javana</i>	Peacock pansy	Butter fly	No	1	Seen	Targeted	
15-May-23	2	Transect survey (OBB)		1.3303 8699	103.83 4672	9:09	<i>Pelopidas mathias mathias</i>	Small branded swift	Butter fly	No	1	Seen	Targeted	
15-May-23	2	Transect survey (OBB)		1.3303 8699	103.83 4672	9:09	<i>Taractrocera archias quinta</i>	Yellow grass dart	Butter fly	No	1	Seen	Targeted	
15-May-23	2	Transect survey (OBB)		1.3303 8699	103.83 4672	9:09	<i>Orthetrum luzonicum</i>	Slender blue skimmer	Odonata	No	1	Seen	Targeted	
15-May-23	2	Transect survey (OBB)		1.3303 8699	103.83 4672	9:09	<i>Parischnogaster mellyi</i>	NA	Aculeata	No	1	Seen	Targeted	Nests in abandoned building
15-May-23	2	Transect survey (OBB)		1.3303 8699	103.83 4672	9:09	<i>Chalybion bengalense</i>	NA	Aculeata	No	1	Seen	Targeted	
15-May-23	2	Transect survey (OBB)		1.3302 5103	103.83 4291	9:25	<i>Iambrix salsala salsala</i>	Chestnut bob	Butter fly	No	2	Seen	Targeted	
15-May-23	2	Transect survey (OBB)		1.3302 5103	103.83 4291	9:25	<i>Junonia hedonia ida</i>	Chocolate pansy	Butter fly	No	1	Seen	Targeted	
15-May-23	2	Transect survey (OBB)		1.3302 5103	103.83 4291	9:25	<i>Tyriobapta torrida</i>	Treehugger	Odonata	No	3	Seen	Targeted	
15-May-23	2	Transect survey (OBB)		1.3302 5103	103.83 4291	9:25	<i>Papilio polytes romulus</i>	Common mormon	Butter fly	No	2	Seen	Targeted	
15-May-23	2	Transect survey (OBB)		1.3302 5103	103.83 4291	9:25	<i>Parischnogaster nigricans</i>	NA	Aculeata	No	1	Seen	Targeted	

15-May-23	2	Transect survey (OBB)		1.33025103	103.834291	9:25	<i>Ropalidia sumatrae</i>	NA	Aculeata	No	2	Seen	Targeted
15-May-23	2	Transect survey (OBB)		1.33025103	103.834291	9:25	<i>Stenodyneriellus guttulatus</i>	NA	Aculeata	No	1	Seen	Targeted
15-May-23	2	Transect survey (OBB)		1.33025103	103.834291	9:25	<i>Eurema sari sodalis</i>	Chocolate grass yellow	Butterfly	No	1	Seen	Targeted
15-May-23	2	Transect survey (OBB)		1.33075596	103.833788	9:53	<i>Faunis canens arcesilas</i>	Common faun	Butterfly	No	1	Seen	Targeted
15-May-23	2	Transect survey (OBB)		1.33075596	103.833788	9:53	<i>Lasippa sp.</i>	Unidentified lascar	Butterfly	NA	1	Seen	Targeted
15-May-23	2	Transect survey (OBB)		1.33083802	103.833345	9:57	<i>Arhopala sp.</i>	Unidentified oakblue	Butterfly	NA	1	Seen	Targeted
15-May-23	2	Transect survey (OBB)		1.33083802	103.833345	9:57	<i>Eooxylides tharis distanti</i>	Branded imperial	Butterfly	No	1	Seen	Targeted
15-May-23	2	Transect survey (OBB)		1.33052998	103.833077	10:07	<i>Gracula religiosa</i>	Common hill myna	Bird	No	1	Heard	Incidental
15-May-23	2	Transect survey (OBB)		1.33052998	103.833077	10:07	<i>Pachliopta aristolochiae asteris</i>	Common rose	Butterfly	No	1	Seen	Targeted
15-May-23	2	Transect survey (OBB)		1.33052998	103.833077	10:07	<i>Mycalesis sp.</i>	Unidentified bush brown	Butterfly	NA	1	Seen	Targeted
15-May-23	2	Transect survey (OBB)		1.33052998	103.833077	10:07	<i>Eurema sari sodalis</i>	Chocolate grass yellow	Butterfly	No	3	Seen	Targeted
15-May-23	2	Transect survey (OBB)		1.33052998	103.833077	10:07	<i>Iambrix salsala salsala</i>	Chestnut bob	Butterfly	No	1	Seen	Targeted
15-May-23	2	Transect survey (OBB)		1.33052998	103.833077	10:07	<i>Neurothemis fluctuans</i>	Common parasol	Odonata	No	1	Seen	Targeted
15-May-23	2	Transect survey (OBB)		1.33052998	103.833077	10:07	<i>Stenodyneriellus guttulatus</i>	NA	Aculeata	No	1	Seen	Targeted
15-May-23	2	Transect survey (OBB)		1.33052998	103.833077	10:07	<i>Junonia almana javana</i>	Peacock pansy	Butterfly	No	1	Seen	Targeted
15-May-23	2	Transect survey (OBB)		1.33052998	103.833077	10:07	<i>Hypolimnas anomala anomala</i>	Malayan eggfly	Butterfly	No	1	Seen	Targeted
15-May-23	2	Transect survey (OBB)		1.33052998	103.833077	10:07	<i>Elymnias hypermnestra agina</i>	Common palmfly	Butterfly	No	1	Seen	Targeted
15-May-23	2	Transect survey (OBB)		1.33052998	103.833077	10:07	<i>Junonia hedonia ida</i>	Chocolate pansy	Butterfly	No	1	Seen	Targeted

15-May-23	2	Transect survey (OBB)		1.3305 2998	103.83 3077	10:07	<i>Lipotriches ceratina</i>	NA	Aculeata	No	1	Seen	Targeted	
15-May-23	2	Transect survey (OBB)		1.3305 2998	103.83 3077	10:07	<i>Vespa analis</i>	NA	Aculeata	No	1	Seen	Targeted	
15-May-23	2	Transect survey (OBB)		1.3305 5001	103.83 3013	10:11	<i>Orchithemis pulcherrima</i>	Variable sentinel	Odonata	No	1	Seen	Targeted	
15-May-23	2	Transect survey (OBB)		1.3305 5001	103.83 3013	10:11	<i>Parischnogaster mellyi</i>	NA	Aculeata	No	1	Seen	Targeted	5 nests
15-May-23	2	Transect survey (OBB)		1.3305 5001	103.83 3013	10:11	<i>Catopsilia sp.</i>	Unidentified emigrant	Butterfly	NA	1	Seen	Targeted	
15-May-23	2	Transect survey (OBB)		1.3305 5001	103.83 3013	10:11	<i>Dryas iulia</i>	Julia heliconian	Butterfly	No	1	Seen	Targeted	
15-May-23	2	Transect survey (OBB)		1.3305 5001	103.83 3013	10:11	<i>Lasippa sp.</i>	Unidentified lascar	Butterfly	NA	1	Seen	Targeted	
15-May-23	2	Transect survey (OBB)		1.3305 5001	103.83 3013	10:11	<i>Eurema sp.</i>	Unidentified grass yellow	Butterfly	NA	1	Seen	Targeted	
15-May-23	2	Transect survey (OBB)		1.3305 5001	103.83 3013	10:11	<i>Neurothemis fluctuans</i>	Common parasol	Odonata	No	1	Seen	Targeted	
15-May-23	2	Transect survey (OBB)		1.3305 5001	103.83 3013	10:22	<i>Prodasineura collaris</i>	Collared threadtail	Odonata	Yes	2	Seen	Targeted	Hotspot for species
15-May-23	2	Transect survey (OBB)		1.3304 2001	103.83 2871	10:22	<i>Prodasineura collaris</i>	Collared threadtail	Odonata	Yes	4	Seen	Targeted	Hotspot for species
15-May-23	2	Transect survey (OBB)		1.3299 72	103.83 3044	10:39	<i>Eurema sp.</i>	Unidentified grass yellow	Butterfly	NA	1	Seen	Targeted	
15-May-23	2	Transect survey (OBB)		1.3299 72	103.83 3044	10:39	<i>Prodasineura humeralis</i>	Orange-striped threadtail	Odonata	No	1	Seen	Targeted	
15-May-23	2	Transect survey (OBB)		1.3299 72	103.83 3044	10:39	<i>Prodasineura collaris</i>	Collared threadtail	Odonata	Yes	5	Seen	Targeted	
15-May-23	2	Transect survey (OBB)		1.3299 72	103.83 3044	10:39	<i>Tyriobapta torrida</i>	Treehugger	Odonata	No	8	Seen	Targeted	
15-May-23	2	Transect survey (OBB)		1.3299 72	103.83 3044	10:39	<i>Delias hyparete metarete</i>	Painted jezebel	Butterfly	No	1	Seen	Targeted	
15-May-23	2	Transect survey (OBB)		1.3299 72	103.83 3044	10:39	<i>Ropalidia sumatrae</i>	NA	Aculeata	No	1	Seen	Targeted	
15-May-23	2	Transect survey (OBB)		1.3299 72	103.83 3044	10:39	<i>Prodasineura collaris</i>	Collared threadtail	Odonata	Yes	1	Seen	Targeted	

15-May-23	2	Transect survey (OBB)		1.329972	103.833044	10:39	<i>Lasippa sp.</i>	Unidentified lascar	Butter fly	NA	1	Seen	Targeted
15-May-23	2	Transect survey (OBB)		1.32991098	103.833322	11:03	<i>Neurothemis fluctuans</i>	Common parasol	Odonata	No	2	Seen	Targeted
15-May-23	2	Transect survey (OBB)		1.32991098	103.833322	11:03	<i>Eurema sp.</i>	Unidentified grass yellow	Butter fly	NA	2	Seen	Targeted
15-May-23	2	Transect survey (OBB)		1.32991098	103.833322	11:03	<i>Iambrix salsala salsala</i>	Chestnut bob	Butter fly	No	2	Seen	Targeted
15-May-23	2	Transect survey (OBB)		1.32991098	103.833322	11:03	<i>Prodasineura collaris</i>	Collared threadtail	Odonata	Yes	1	Seen	Targeted
15-May-23	2	Transect survey (OBB)		1.32991098	103.833322	11:03	<i>Orthetrum luzonicum</i>	Slender blue skimmer	Odonata	No	4	Seen	Targeted
15-May-23	2	Transect survey (OBB)		1.32991098	103.833322	11:03	<i>Junonia almana javana</i>	Peacock pansy	Butter fly	No	1	Seen	Targeted
15-May-23	2	Transect survey (OBB)		1.33005003	103.833626	11:11	<i>Ropalidia sumatrae</i>	NA	Aculeata	No	2	Seen	Targeted
15-May-23	2	Transect survey (OBB)		1.33005003	103.833626	11:11	<i>Ropalidia stigma</i>	NA	Aculeata	No	1	Seen	Targeted
15-May-23	2	Transect survey (OBB)		1.33005003	103.833626	11:11	<i>Trypoxylon sp.</i>	NA	Aculeata	NA	1	Seen	Targeted
15-May-23	2	Transect survey (OBB)		1.33005003	103.833626	11:11	<i>Tyriobapta torrida</i>	Treehugger	Odonata	No	1	Seen	Targeted
15-May-23	2	Transect survey (OBB)		1.33005003	103.833626	11:11	<i>Mycalesis sp.</i>	Unidentified bush brown	Butter fly	NA	1	Seen	Targeted
15-May-23	2	Transect survey (OBB)		1.32958702	103.833743	11:15	<i>Tholymis tillarga</i>	White-barred duskhawk	Odonata	No	1	Seen	Targeted
15-May-23	2	Transect survey (OBB)		1.32926599	103.833927	11:18	<i>Appias libythea olferna</i>	Striped albatross	Butter fly	No	1	Seen	Targeted
15-May-23	2	Transect survey (OBB)		1.32926599	103.833927	11:18	<i>Ropalidia sumatrae</i>	NA	Aculeata	No	2	Seen	Targeted
15-May-23	2	Transect survey (OBB)		1.32926599	103.833927	11:18	<i>Mycalesis mineus macromalayana</i>	Dark brand bush brown	Butter fly	No	1	Seen	Targeted
15-May-23	2	Transect survey (OBB)		1.32926599	103.833927	11:18	<i>Eurema sp.</i>	Unidentified grass yellow	Butter fly	NA	5	Seen	Targeted
15-May-23	2	Transect survey (OBB)		1.32926599	103.833927	11:18	<i>Trithemis aurora</i>	Crimson dropwing	Odonata	No	1	Seen	Targeted

15-May-23	2	Transect survey (OBB)		1.32926599	103.833927	11:18	<i>Neurothemis fluctuans</i>	Common parasol	Odonata	No	1	Seen	Targeted
15-May-23	2	Transect survey (OBB)		1.32888302	103.834063	11:22	<i>Danaus chrysippus chrysippus</i>	Plain tiger	Butterfly	No	2	Seen	Targeted
15-May-23	2	Transect survey (OBB)		1.32888302	103.834063	11:22	<i>Junonia almana javana</i>	Peacock pansy	Butterfly	No	1	Seen	Targeted
15-May-23	2	Transect survey (OBB)		1.32888302	103.834063	11:22	<i>Acraea terpsicore</i>	Tawny coster	Butterfly	No	2	Seen	Targeted
15-May-23	2	Transect survey (OBB)		1.32888302	103.834063	11:22	<i>Orthetrum glaucum</i>	Common blue skimmer	Odonata	No	2	Seen	Targeted
15-May-23	2	Transect survey (OBB)		1.32888302	103.834063	11:22	<i>Neurothemis fluctuans</i>	Common parasol	Odonata	No	1	Seen	Targeted
15-May-23	2	Transect survey (OBB)		1.32830903	103.834034	11:25	<i>Acraea terpsicore</i>	Tawny coster	Butterfly	No	2	Seen	Targeted
15-May-23	2	Transect survey (OBB)		1.32830903	103.834034	11:25	<i>Xylocopa latipes</i>	Broad-handed carpenter bee	Aculeata	No	1	Seen	Targeted
15-May-23	2	Transect survey (OBB)		1.32830903	103.834034	11:25	<i>Zizula hylax pygmaea</i>	Pygmy grass blue	Butterfly	No	2	Seen	Targeted
15-May-23	2	Transect survey (OBB)		1.32830903	103.834034	11:25	<i>Ducula bicolor</i>	Pied imperial pigeon	Bird	No	3	Seen	incidental
15-May-23	2	Transect survey (OBB)		1.32830903	103.834034	11:25	<i>Eurema sp.</i>	Unidentified grass yellow	Butterfly	NA	2	Seen	Targeted
15-May-23	2	Transect survey (OBB)		1.32830903	103.834034	11:25	<i>Orthetrum sabina</i>	Variegated green skimmer	Odonata	No	1	Seen	Targeted
15-May-23	2	Transect survey (OBB)		1.32767603	103.834396	11:27	<i>Junonia almana javana</i>	Peacock pansy	Butterfly	No	1	Seen	Targeted
15-May-23	2	Transect survey (OBB)		1.32767603	103.834396	11:27	<i>Acraea terpsicore</i>	Tawny coster	Butterfly	No	1	Seen	Targeted
15-May-23	2	Transect survey (OBB)		1.32805598	103.834379	11:32	<i>Crocothemis servilia</i>	Common scarlet	Odonata	No	1	Seen	Targeted
16-May-23	2	Transect survey (PM BHM)		1.32993696	103.836865	19:35	<i>Sus scrofa</i>	Eurasian wild boar	Mammal	No	2	Seen	Incidental
16-May-23	2	Transect survey (PM BHM)		1.330044	103.836128	19:38	<i>Paradoxurus musangus</i>	Sumatran palm civet	Mammal	No	1	Seen	Incidental
16-May-23	2	Transect survey (PM BHM)		1.33024097	103.836169	19:39	<i>Paradoxurus musangus</i>	Sumatran palm civet	Mammal	No	1	Seen	Incidental

16-May-23	2	Transect survey (PM BHM)		1.3303 2597	103.83 5707	19:42	<i>Dendrelaphis pictus</i>	Painted bronzeback	Reptile	No	1	Seen	Targeted	
16-May-23	2	Transect survey (PM BHM)		1.3303 6	103.83 5345	19:47	<i>Duttaphrynus bengalensis</i>	Bengal toad	Amphibian	No	1	Seen	Targeted	
16-May-23	2	Transect survey (PM BHM)		1.3303 6	103.83 5345	19:47	<i>Ropalidia erythrospila</i>	NA	Aculeata	No	1	Seen	incidental	Nest
16-May-23	2	Transect survey (PM BHM)		1.3303 6	103.83 5345	19:48	Unidentified Gekkonidae	Unidentified gecko	Reptile	NA	1	Seen	Targeted	
16-May-23	2	Transect survey (PM BHM)		1.3303 6	103.83 5345	19:48	<i>Eleutherodactylus planirostris</i>	Greenhouse frog	Amphibian	No	1	Heard	Targeted	
16-May-23	2	Transect survey (PM BHM)		1.3303 6301	103.83 5016	19:52	<i>Eleutherodactylus planirostris</i>	Greenhouse frog	Amphibian	No	2	Heard	Targeted	
16-May-23	2	Transect survey (PM BHM)		1.3303 6301	103.83 5016	19:52	<i>Polypedates leucomystax</i>	Four-lined tree frog	Amphibian	No	1	Heard	Targeted	
16-May-23	2	Transect survey (PM BHM)		1.3303 6	103.83 499	19:53	<i>Eleutherodactylus planirostris</i>	Greenhouse frog	Amphibian	No	1	Seen	Targeted	
16-May-23	2	Transect survey (PM BHM)		1.3302 9797	103.83 4594	19:55	<i>Hemidactylus frenatus</i>	Spiny-tailed house gecko	Reptile	No	1	Seen	Targeted	
16-May-23	2	Transect survey (PM BHM)		1.3302 9797	103.83 4594	19:56	<i>Cynopterus brachyotis</i>	Lesser short-nosed fruit bat	Mammal	No	1	Seen	Targeted	
16-May-23	2	Transect survey (PM BHM)		1.3302 2798	103.83 4537	19:57	<i>Hemidactylus frenatus</i>	Spiny-tailed house gecko	Reptile	No	1	Seen	Targeted	
16-May-23	2	Transect survey (PM BHM)		1.3302 2798	103.83 4537	19:57	<i>Gekko monarchus</i>	Spotted house gecko	Reptile	No	1	Seen	Targeted	
16-May-23	2	Transect survey (PM BHM)		1.3301 9596	103.83 4314	19:59	<i>Lygosoma bowringii</i>	Garden supple skink	Reptile	No	1	Seen	Targeted	
16-May-23	2	Transect survey (PM BHM)		1.3303 0803	103.83 42	20:03	<i>Dendrelaphis pictus</i>	Painted bronzeback	Reptile	No	2	Seen	Targeted	
16-May-23	2	Transect survey (PM BHM)		1.3304 1197	103.83 4189	20:05	<i>Cynopterus brachyotis</i>	Lesser short-nosed fruit bat	Mammal	No	1	Seen	Targeted	
16-May-23	2	Transect survey (PM BHM)		1.3306 2696	103.83 3907	20:09	<i>Cynopterus brachyotis</i>	Lesser short-nosed fruit bat	Mammal	No	1	Seen	Targeted	
16-May-23	2	Transect survey (PM BHM)		1.3307 4003	103.83 3755	20:11	<i>Paradoxurus musangus</i>	Sumatran palm civet	Mammal	No	1	Seen	Targeted	
16-May-23	2	Transect survey (PM BHM)		1.3308 0197	103.83 366	20:13	<i>Eleutherodactylus planirostris</i>	Greenhouse frog	Amphibian	No	1	Heard	Targeted	

16-May-23	2	Transect survey (PM BHM)		1.33080197	103.83366	20:13	<i>Polypedates leucomystax</i>	Four-lined tree frog	Amphibian	No	1	Heard	Targeted	
16-May-23	2	Transect survey (PM BHM)		1.33085302	103.833318	20:16	<i>Limnonectes blythii</i>	Malayan giant frog	Amphibian	No	1	Seen	Targeted	
16-May-23	2	Transect survey (PM BHM)		1.33046896	103.832826	20:23	<i>Bronchocela cristatella</i>	Green crested lizard	Reptile	No	1	Seen	Targeted	
16-May-23	2	Transect survey (PM BHM)		1.33022798	103.832792	20:26	<i>Limnonectes blythii</i>	Malayan giant frog	Amphibian	No	2	Seen	Targeted	
16-May-23	2	Transect survey (PM BHM)		1.33023804	103.83347	20:37	<i>Hemidactylus frenatus</i>	Spiny-tailed house gecko	Reptile	No	1	Seen	Targeted	
16-May-23	2	Transect survey (PM BHM)		1.33007602	103.833779	20:39	<i>Duttaphrynus bengalensis</i>	Bengal toad	Amphibian	No	1	Seen	Targeted	
16-May-23	2	Transect survey (PM BHM)		1.32991903	103.833796	20:40	<i>Gekko monarchus</i>	Spotted house gecko	Reptile	No	1	Seen	Targeted	
16-May-23	2	Transect survey (PM BHM)		1.329612	103.833794	20:43	<i>Eleutherodactylus planirostris</i>	Greenhouse frog	Amphibian	No	3	Seen	Targeted	
16-May-23	2	Transect survey (PM BHM)		1.32945701	103.833841	20:45	<i>Eleutherodactylus planirostris</i>	Greenhouse frog	Amphibian	No	1	Seen	Targeted	
16-May-23	2	Transect survey (PM BHM)		1.32922098	103.833972	20:47	<i>Polypedates leucomystax</i>	Four-lined tree frog	Amphibian	No	1	Heard	Targeted	
16-May-23	2	Transect survey (PM BHM)		1.32875696	103.834091	20:50	<i>Dendrelaphis pictus</i>	Painted bronzeback	Reptile	No	2	Seen	Targeted	
16-May-23	2	Transect survey (PM BHM)		1.32858303	103.834032	20:53	<i>Eleutherodactylus planirostris</i>	Greenhouse frog	Amphibian	No	1	Seen	Targeted	
16-May-23	2	Transect survey (PM BHM)		1.32810904	103.834159	20:55	<i>Dendrelaphis pictus</i>	Painted bronzeback	Reptile	No	1	Seen	Targeted	
16-May-23	2	Transect survey (PM BHM)		1.32758098	103.834503	20:58	<i>Polypedates leucomystax</i>	Four-lined tree frog	Amphibian	No	1	Seen	Targeted	
24-May-23	1	Transect survey (OBB)		1.32754996	103.834512	9:07	<i>Junonia almana javana</i>	Peacock pansy	Butterfly	No	1	Seen	Targeted	
24-May-23	1	Transect survey (OBB)		1.32754996	103.834512	9:07	<i>Acraea terpsicore</i>	Tawny coster	Butterfly	No	1	Seen	Targeted	
24-May-23	1	Transect survey (OBB)		1.32754996	103.834512	9:07	<i>Neurothemis fluctuans</i>	Common parasol	Odonata	No	2	Seen	Targeted	
24-May-23	1	Transect survey (OBB)		1.32754996	103.834512	9:07	<i>Orthetrum chrysis</i>	Spine-tufted skimmer	Odonata	No	1	Seen	Targeted	

24-May-23	1	Transect survey (OBB)		1.3275 4996	103.83 4512	9:07	<i>Xylocopa aestuans</i>	White-cheeked carpenter bee	Aculeata	No	1	Seen	Targeted
24-May-23	1	Transect survey (OBB)		1.3275 4996	103.83 4512	9:07	<i>Apis dorsata</i>	NA	Aculeata	No	1	Seen	Targeted
24-May-23	1	Transect survey (OBB)		1.3275 4996	103.83 4512	9:07	<i>Ropalidia sumatrae</i>	NA	Aculeata	No	1	Seen	Targeted
24-May-23	1	Transect survey (OBB)		1.3275 4996	103.83 4512	9:07	<i>Dryas iulia</i>	Julia heliconian	Butterfly	No	1	Seen	Targeted
24-May-23	1	Transect survey (OBB)		1.3275 4996	103.83 4512	9:07	<i>Tetragonula valdezi</i>	NA	Aculeata	No	1	Seen	Targeted
24-May-23	1	Transect survey (OBB)		1.3275 4996	103.83 4512	9:07	<i>cf. Trithemis festiva</i>	Indigo dropwing	Odonata	NA	1	Seen	Targeted
24-May-23	1	Transect survey (OBB)		1.3275 4996	103.83 4512	9:07	<i>Stenodyneriellus guttulatus</i>	NA	Aculeata	No	2	Seen	Targeted
24-May-23	1	Transect survey (OBB)		1.3275 4996	103.83 4512	9:07	<i>Eurema sp.</i>	Unidentified grass yellow	Butterfly	NA	1	Seen	Targeted
24-May-23	1	Transect survey (OBB)		1.3277 5398	103.83 4357	9:17	<i>Appias libythea olferna</i>	Striped albatross	Butterfly	No	1	Seen	Targeted
24-May-23	1	Transect survey (OBB)		1.3277 5398	103.83 4357	9:17	<i>Neurothemis fluctuans</i>	Common parasol	Odonata	No	5	Seen	Targeted
24-May-23	1	Transect survey (OBB)		1.3277 5398	103.83 4357	9:17	<i>Potanthus omaha omaha</i>	Lesser dart	Butterfly	No	1	Seen	Targeted
24-May-23	1	Transect survey (OBB)		1.3277 5398	103.83 4357	9:17	<i>Apis cerana</i>	Eastern honey bee	Aculeata	No	1	Seen	Targeted
24-May-23	1	Transect survey (OBB)		1.3277 5398	103.83 4357	9:17	<i>Apis dorsata</i>	NA	Aculeata	No	4	Seen	Targeted
24-May-23	1	Transect survey (OBB)		1.3277 5398	103.83 4357	9:17	<i>Eurema hecabe contubernalis</i>	Common grass yellow	Butterfly	No	1	Seen	Targeted
24-May-23	1	Transect survey (OBB)		1.3277 5398	103.83 4357	9:17	<i>Junonia almana javana</i>	Peacock pansy	Butterfly	No	1	Seen	Targeted
24-May-23	1	Transect survey (OBB)		1.3281 5698	103.83 4131	9:21	<i>Apis dorsata</i>	NA	Aculeata	No	1	Seen	Targeted
24-May-23	1	Transect survey (OBB)		1.3281 5698	103.83 4131	9:21	<i>Neurothemis fluctuans</i>	Common parasol	Odonata	No	1	Seen	Targeted
24-May-23	1	Transect survey (OBB)		1.3281 5698	103.83 4131	9:21	<i>Polytremis lubricans lubricans</i>	Contiguous swift	Butterfly	No	2	Seen	Targeted

24-May-23	1	Transect survey (OBB)		1.32815698	103.834131	9:21	<i>Unidentified Lycaenidae</i>	NA	Butter fly	NA	1	Seen	Targeted
24-May-23	1	Transect survey (OBB)		1.32815698	103.834131	9:21	<i>Neptis hylas papaja</i>	Common sailor	Butter fly	No	1	Seen	Targeted
24-May-23	1	Transect survey (OBB)		1.32815698	103.834131	9:21	<i>Eurema sp.</i>	Unidentified grass yellow	Butter fly	NA	1	Seen	Targeted
24-May-23	1	Transect survey (OBB)		1.32815698	103.834131	9:21	<i>Prosotas dubiosa lumpura</i>	Tailless line blue	Butter fly	No	1	Seen	Targeted
24-May-23	1	Transect survey (OBB)		1.32815698	103.834131	9:21	<i>Rhodothemis rufa</i>	Common redbolt	Odonata	No	1	Seen	Targeted
24-May-23	1	Transect survey (OBB)		1.32815698	103.834131	9:21	<i>Cisticola juncidis</i>	Zitting cisticola	Bird	Yes	1	Heard	Incidental
24-May-23	1	Transect survey (OBB)		1.32842696	103.834022	9:26	<i>Parischnogaster mellyi</i>	NA	Aculeata	No	8	Seen	Targeted
24-May-23	1	Transect survey (OBB)		1.32842696	103.834022	9:26	<i>Tachytes sp.</i>	NA	Aculeata	NA	1	Seen	Targeted
24-May-23	1	Transect survey (OBB)		1.32842696	103.834022	9:26	<i>Tachytes modestus</i>	NA	Aculeata	No	2	Seen	Targeted
24-May-23	1	Transect survey (OBB)		1.32842696	103.834022	9:26	<i>Neurothemis fluctuans</i>	Common parasol	Odonata	No	1	Seen	Targeted
24-May-23	1	Transect survey (OBB)		1.32858203	103.833879	9:32	<i>Prodasineura collaris</i>	Collared threadtail	Odonata	Yes	1	Seen	Incidental
24-May-23	1	Transect survey (OBB)		1.32858203	103.833879	9:32	<i>Orchithemis pulcherrima</i>	Variable sentinel	Odonata	No	1	Seen	Incidental
24-May-23	1	Transect survey (OBB)		1.32858203	103.833879	9:32	<i>Iambrix salsala salsala</i>	Chestnut bob	Butter fly	No	1	Seen	Incidental
24-May-23	1	Transect survey (OBB)		1.32862302	103.834	9:42	<i>Appias libythea olferna</i>	Striped albatross	Butter fly	No	1	Seen	Targeted
24-May-23	1	Transect survey (OBB)		1.32862302	103.834	9:42	<i>Papilio polytes romulus</i>	Common mormon	Butter fly	No	1	Seen	Targeted
24-May-23	1	Transect survey (OBB)		1.32862302	103.834	9:42	<i>Elymnias hypermnestra agina</i>	Common palmfly	Butter fly	No	1	Seen	Targeted
24-May-23	1	Transect survey (OBB)		1.32862302	103.834	9:42	<i>Dryas iulia</i>	Julia heliconian	Butter fly	No	2	Seen	Targeted
24-May-23	1	Transect survey (OBB)		1.32862302	103.834	9:42	<i>Potanthus omaha omaha</i>	Lesser dart	Butter fly	No	1	Seen	Targeted

24-May-23	1	Transect survey (OBB)		1.3286 2302	103.83 4	9:42	<i>Orthetrum luzonicum</i>	Slender blue skimmer	Odonata	No	1	Seen	Targeted
24-May-23	1	Transect survey (OBB)		1.3286 2302	103.83 4	9:42	Unidentified <i>Lycaenidae</i>	NA	Butterfly	NA	1	Seen	Targeted
24-May-23	1	Transect survey (OBB)		1.3286 2302	103.83 4	9:42	<i>Ropalidia sumatrae</i>	NA	Aculeata	No	1	Seen	Targeted
24-May-23	1	Transect survey (OBB)		1.3286 2302	103.83 4	9:42	<i>Eumenes aff. punctatus</i>	NA	Aculeata	No	1	Seen	Targeted
24-May-23	1	Transect survey (OBB)		1.3289 23	103.83 3966	9:46	<i>Apis dorsata</i>	NA	Aculeata	No	5	Seen	Targeted
24-May-23	1	Transect survey (OBB)		1.3289 23	103.83 3966	9:46	<i>Catopyrops ancyra aberrans</i>	Ancyra blue	Butterfly	No	1	Seen	Targeted
24-May-23	1	Transect survey (OBB)		1.3289 23	103.83 3966	9:46	<i>Potanthus omaha omaha</i>	Lesser dart	Butterfly	No	2	Seen	Targeted
24-May-23	1	Transect survey (OBB)		1.3289 23	103.83 3966	9:46	<i>Junonia almana javana</i>	Peacock pansy	Butterfly	No	2	Seen	Targeted
24-May-23	1	Transect survey (OBB)		1.3289 23	103.83 3966	9:46	<i>Apis cerana</i>	Eastern honey bee	Aculeata	No	1	Seen	Targeted
24-May-23	1	Transect survey (OBB)		1.3289 23	103.83 3966	9:46	<i>Elymnias hypermnestra agina</i>	Common palmfly	Butterfly	No	1	Seen	Targeted
24-May-23	1	Transect survey (OBB)		1.3289 23	103.83 3966	9:46	<i>Coelioxys sp.</i>	NA	Aculeata	NA	1	Seen	Targeted
24-May-23	1	Transect survey (OBB)		1.3289 23	103.83 3966	9:46	<i>Neurothemis fluctuans</i>	Common parasol	Odonata	No	1	Seen	Targeted
24-May-23	1	Transect survey (OBB)		1.3289 23	103.83 3966	9:46	<i>Orthetrum luzonicum</i>	Slender blue skimmer	Odonata	No	1	Seen	Targeted
24-May-23	1	Transect survey (OBB)		1.3289 23	103.83 3966	9:46	<i>Zizula hylax pygmaea</i>	Pygmy grass blue	Butterfly	No	1	Seen	Targeted
24-May-23	1	Transect survey (OBB)		1.3291 0799	103.83 3958	9:50	<i>Eumenes aff. punctatus</i>	NA	Aculeata	No	1	Seen	Targeted
24-May-23	1	Transect survey (OBB)		1.3291 0799	103.83 3958	9:50	<i>Eurema sp.</i>	Unidentified grass yellow	Butterfly	NA	1	Seen	Targeted
24-May-23	1	Transect survey (OBB)		1.3291 0799	103.83 3958	9:50	<i>Neptis hylas papaja</i>	Common sailor	Butterfly	No	1	Seen	Targeted
24-May-23	1	Transect survey (OBB)		1.3291 0799	103.83 3958	9:50	<i>Polytremis lubricans lubricans</i>	Contiguous swift	Butterfly	No	1	Seen	Targeted

24-May-23	1	Transect survey (OBB)		1.3297 4401	103.83 3708	9:55	<i>Amathusia phidippus phidippus</i>	Palm king	Butter fly	No	1	Seen	Targeted
24-May-23	1	Transect survey (OBB)		1.3297 4401	103.83 3708	9:55	<i>Neurothemis fluctuans</i>	Common parasol	Odonata	No	1	Seen	Targeted
24-May-23	1	Transect survey (OBB)		1.3297 4401	103.83 3708	9:55	<i>Mycalesis visala phamis</i>	Long brand bush brown	Butter fly	No	1	Seen	Targeted
24-May-23	1	Transect survey (OBB)		1.3297 4401	103.83 3708	9:55	<i>Orchithemis pulcherrima</i>	Variable sentinel	Odonata	No	1	Seen	Targeted
24-May-23	1	Transect survey (OBB)		1.3298 1802	103.83 3772	10:03	<i>Prodasineura collaris</i>	Collared threadtail	Odonata	Yes	1	Seen	Targeted
24-May-23	1	Transect survey (OBB)		1.3300 9303	103.83 369	10:09	<i>Prodasineura collaris</i>	Collared threadtail	Odonata	Yes	1	Seen	Targeted
24-May-23	1	Transect survey (OBB)		1.3300 9303	103.83 369	10:09	<i>Parischnogaster mellyi</i>	NA	Aculeata	No	5	Seen	Targeted
24-May-23	1	Transect survey (OBB)		1.3300 9303	103.83 369	10:09	<i>Iambrix salsala salsala</i>	Chestnut bob	Butter fly	No	1	Seen	Targeted
24-May-23	1	Transect survey (OBB)		1.3300 9303	103.83 369	10:09	<i>cf. Potanthus omaha omaha</i>	Lesser dart	Butter fly	NA	1	Seen	Targeted
24-May-23	1	Transect survey (OBB)		1.3300 9303	103.83 369	10:09	<i>Tyriobapta torrida</i>	Treehugger	Odonata	No	1	Seen	Targeted
24-May-23	1	Transect survey (OBB)		1.3300 4601	103.83 3397	10:17	<i>Appias libythea olferna</i>	Striped albatross	Butter fly	No	1	Seen	Targeted
24-May-23	1	Transect survey (OBB)		1.3300 4601	103.83 3397	10:17	<i>Junonia hedonia ida</i>	Chocolate pansy	Butter fly	No	1	Seen	Targeted
24-May-23	1	Transect survey (OBB)		1.3300 4601	103.83 3397	10:17	<i>Eurema sp.</i>	Unidentified grass yellow	Butter fly	NA	2	Seen	Targeted
24-May-23	1	Transect survey (OBB)		1.3300 4601	103.83 3397	10:17	<i>Neurothemis fluctuans</i>	Common parasol	Odonata	No	1	Seen	Targeted
24-May-23	1	Transect survey (OBB)		1.3300 4601	103.83 3397	10:17	<i>Elymnias hypermnestra agina</i>	Common palmfly	Butter fly	No	1	Seen	Targeted
24-May-23	1	Transect survey (OBB)		1.3300 4601	103.83 3397	10:17	<i>Lipotriches ceratina</i>	NA	Aculeata	No	1	Seen	Targeted
24-May-23	1	Transect survey (OBB)		1.3300 4601	103.83 3397	10:17	<i>Heterotrigona itama</i>	Malaysian stingless bee	Aculeata	No	1	Seen	Targeted
24-May-23	1	Transect survey (OBB)		1.3300 4601	103.83 3397	10:17	<i>Pelopidas mathias mathias</i>	Small branded swift	Butter fly	No	2	Seen	Targeted

24-May-23	1	Transect survey (OBB)		1.3300 4601	103.83 3397	10:17	<i>Dryas iulia</i>	Julia heliconian	Butter fly	No	1	Seen	Targeted
24-May-23	1	Transect survey (OBB)		1.3300 4601	103.83 3397	10:17	<i>Tanaecia pelea pelea</i>	Malay viscount	Butter fly	No	1	Seen	Targeted
24-May-23	1	Transect survey (OBB)		1.3300 4601	103.83 3397	10:17	<i>Papilio polytes romulus</i>	Common mormon	Butter fly	No	1	Seen	Targeted
24-May-23	1	Transect survey (OBB)		1.3299 7099	103.83 3336	10:21	<i>Iambrix salsala salsala</i>	Chestnut bob	Butter fly	No	1	Seen	Targeted
24-May-23	1	Transect survey (OBB)		1.3299 7099	103.83 3336	10:21	<i>Neurothemis fluctuans</i>	Common parasol	Odonata	No	1	Seen	Targeted
24-May-23	1	Transect survey (OBB)		1.3299 7099	103.83 3336	10:21	<i>Eurema sp.</i>	Unidentified grass yellow	Butter fly	NA	1	Seen	Targeted
24-May-23	1	Transect survey (OBB)		1.3299 7099	103.83 3336	10:21	<i>Lipotriches ceratina</i>	NA	Aculeata	No	1	Seen	Targeted
24-May-23	1	Transect survey (OBB)		1.3299 7099	103.83 3336	10:21	<i>cf. Trithemis festiva</i>	Indigo dropwing	Odonata	NA	1	Seen	Targeted
24-May-23	1	Transect survey (OBB)		1.3299 7099	103.83 3336	10:21	<i>Vespa analis</i>	NA	Aculeata	No	1	Seen	Targeted
24-May-23	1	Transect survey (OBB)		1.3299 7099	103.83 3336	10:21	<i>Delias hyparete metarete</i>	Painted jezebel	Butter fly	No	1	Seen	Targeted
24-May-23	1	Transect survey (OBB)		1.3299 1198	103.83 3265	10:28	<i>Eurema sp.</i>	Unidentified grass yellow	Butter fly	NA	1	Seen	Targeted
24-May-23	1	Transect survey (OBB)		1.3299 1198	103.83 3265	10:28	<i>Orchithemis pulcherrima</i>	Variable sentinel	Odonata	No	1	Seen	Targeted
24-May-23	1	Transect survey (OBB)		1.3299 1198	103.83 3265	10:28	<i>Prodasineura collaris</i>	Collared threadtail	Odonata	Yes	2	Seen	Targeted
24-May-23	1	Transect survey (OBB)		1.3299 1198	103.83 3265	10:28	<i>Archibasis viola</i>	Violet sprite	Odonata	No	1	Seen	Targeted
24-May-23	1	Transect survey (OBB)		1.3302 3301	103.83 2847	10:46	<i>Mycalesis cf. visala phamis</i>	Long brand bush brown	Butter fly	NA	1	Seen	Targeted
24-May-23	1	Transect survey (OBB)		1.3304 1498	103.83 2871	10:48	<i>Prodasineura collaris</i>	Collared threadtail	Odonata	Yes	3	Seen	Targeted
24-May-23	1	Transect survey (OBB)		1.3304 1498	103.83 2871	10:48	<i>Stenodyneriellus guttulatus</i>	NA	Aculeata	No	2	Seen	Targeted
24-May-23	1	Transect survey (OBB)		1.3304 1498	103.83 2871	10:48	<i>Taractrocera archias quinta</i>	Yellow grass dart	Butter fly	No	1	Seen	Targeted

24-May-23	1	Transect survey (OBB)		1.3304 1498	103.83 2871	10:48	<i>Papilio polytes romulus</i>	Common mormon	Butter fly	No	1	Seen	Targeted
24-May-23	1	Transect survey (OBB)		1.3304 1498	103.83 2871	10:48	<i>Eurema sp.</i>	Unidentified grass yellow	Butter fly	NA	1	Seen	Targeted
24-May-23	1	Transect survey (OBB)		1.3304 1498	103.83 2871	10:48	<i>Orthetrum luzonicum</i>	Slender blue skimmer	Odonata	No	1	Seen	Targeted
24-May-23	1	Transect survey (OBB)		1.3305 3903	103.83 2972	10:57	<i>Prodasineura collaris</i>	Collared threadtail	Odonata	Yes	1	Seen	Targeted
24-May-23	1	Transect survey (OBB)		1.3305 3903	103.83 2972	10:57	<i>Lasippa sp.</i>	Unidentified lascar	Butter fly	NA	1	Seen	Targeted
24-May-23	1	Transect survey (OBB)		1.3305 3903	103.83 2972	10:57	<i>Zeltus amasa maximinianus</i>	Fluffy tit	Butter fly	No	1	Seen	Targeted
24-May-23	1	Transect survey (OBB)		1.3305 3903	103.83 2972	10:57	<i>Ropalidia sumatrae</i>	NA	Aculeata	No	1	Seen	Targeted
24-May-23	1	Transect survey (OBB)		1.3305 3903	103.83 2972	10:57	<i>Antepipona sp. nr. bipustulata</i>	NA	Aculeata	No	1	Seen	Targeted
24-May-23	1	Transect survey (OBB)		1.3305 3903	103.83 2972	10:57	<i>Varanus nebulosus</i>	Clouded monitor	Reptile	No	1	Seen	Incidental
24-May-23	1	Transect survey (OBB)		1.3305 2696	103.83 3142	11:01	<i>Junonia almana javana</i>	Peacock pansy	Butter fly	No	2	Seen	Targeted
24-May-23	1	Transect survey (OBB)		1.3305 2696	103.83 3142	11:01	<i>Vespa analis</i>	NA	Aculeata	No	1	Seen	Targeted
24-May-23	1	Transect survey (OBB)		1.3305 2696	103.83 3142	11:01	<i>Neurothemis fluctuans</i>	Common parasol	Odonata	No	1	Seen	Targeted
24-May-23	1	Transect survey (OBB)		1.3305 2696	103.83 3142	11:01	<i>Taractrocera archias quinta</i>	Yellow grass dart	Butter fly	No	1	Seen	Targeted
24-May-23	1	Transect survey (OBB)		1.3305 2696	103.83 3142	11:01	<i>Nomia strigata</i>	Pearly-banded bee	Aculeata	No	1	Seen	Targeted
24-May-23	1	Transect survey (OBB)		1.3305 2696	103.83 3142	11:01	<i>Dryas iulia</i>	Julia heliconian	Butter fly	No	1	Seen	Targeted
24-May-23	1	Transect survey (OBB)		1.3305 2696	103.83 3142	11:01	<i>Junonia hedonia ida</i>	Chocolate pansy	Butter fly	No	1	Seen	Targeted
24-May-23	1	Transect survey (OBB)		1.3305 2696	103.83 3142	11:01	<i>Lipotriches ceratina</i>	NA	Aculeata	No	6	Seen	Targeted
24-May-23	1	Transect survey (OBB)		1.3305 2696	103.83 3142	11:01	<i>Tanaecia pelea pelea</i>	Malay viscount	Butter fly	No	1	Seen	Targeted

24-May-23	1	Transect survey (OBB)		1.3305 2696	103.83 3142	11:01	<i>lambrix salsala salsala</i>	Chestnut bob	Butter fly	No	1	Seen	Targeted
24-May-23	1	Transect survey (OBB)		1.3305 2696	103.83 3142	11:01	<i>Eurema sp.</i>	Unidentified grass yellow	Butter fly	NA	1	Seen	Targeted
24-May-23	1	Transect survey (OBB)		1.3308 0499	103.83 3551	11:10	<i>Junonia hedonia ida</i>	Chocolate pansy	Butter fly	No	1	Seen	Targeted
24-May-23	1	Transect survey (OBB)		1.3308 0499	103.83 3551	11:10	<i>Eurema sari sodalis</i>	Chocolate grass yellow	Butter fly	No	1	Seen	Targeted
24-May-23	1	Transect survey (OBB)		1.3306 2101	103.83 3931	11:14	<i>Tanaecia iapis puseda</i>	Horsfield's baron	Butter fly	No	1	Seen	Targeted
24-May-23	1	Transect survey (OBB)		1.3302 2597	103.83 4278	11:21	<i>Eurema sp.</i>	Unidentified grass yellow	Butter fly	NA	1	Seen	Targeted
24-May-23	1	Transect survey (OBB)		1.3302 2597	103.83 4278	11:21	<i>Mycalesis sp.</i>	Unidentified bush brown	Butter fly	NA	2	Seen	Targeted
24-May-23	1	Transect survey (OBB)		1.3302 2597	103.83 4278	11:21	<i>Ropalidia sumatrae</i>	NA	Aculeata	No	1	Seen	Targeted
24-May-23	1	Transect survey (OBB)		1.3302 2597	103.83 4278	11:21	<i>Taractrocer archias quinta</i>	Yellow grass dart	Butter fly	No	1	Seen	Targeted
24-May-23	1	Transect survey (OBB)		1.3302 2597	103.83 4278	11:21	<i>Junonia orithya wallacei</i>	Blue pansy	Butter fly	No	1	Seen	Targeted
24-May-23	1	Transect survey (OBB)		1.3302 2597	103.83 4278	11:21	<i>Junonia hedonia ida</i>	Chocolate pansy	Butter fly	No	1	Seen	Targeted
24-May-23	1	Transect survey (OBB)		1.3302 2597	103.83 4278	11:21	<i>Elymnias hypermnestra agina</i>	Common palmfly	Butter fly	No	1	Seen	Targeted
24-May-23	1	Transect survey (OBB)		1.3302 9001	103.83 432	11:23	<i>Tyriobapta torrida</i>	Treehugger	Odonata	No	4	Seen	Targeted
24-May-23	1	Transect survey (OBB)		1.3302 9001	103.83 432	11:23	<i>Graphium sarpedon luctatius</i>	Common bluebottle	Butter fly	No	1	Seen	Targeted
24-May-23	1	Transect survey (OBB)		1.3302 9001	103.83 432	11:23	<i>Apis cerana</i>	Eastern honey bee	Aculeata	No	2	Seen	Targeted
24-May-23	1	Transect survey (OBB)		1.3302 9001	103.83 432	11:23	<i>Ropalidia sumatrae</i>	NA	Aculeata	No	1	Seen	Targeted
24-May-23	1	Transect survey (OBB)		1.3302 9001	103.83 432	11:23	<i>Junonia almana javana</i>	Peacock pansy	Butter fly	No	2	Seen	Targeted
24-May-23	1	Transect survey (OBB)		1.3302 9001	103.83 432	11:23	<i>Ypthima baldus newboldi</i>	Common five-ring	Butter fly	No	1	Seen	Targeted

24-May-23	1	Transect survey (OBB)		1.33029001	103.83432	11:23	<i>Ypthima horsfieldii humei</i>	Malayan five-ring	Butter fly	No	1	Seen	Targeted	
24-May-23	1	Transect survey (OBB)		1.33029001	103.83432	11:23	<i>Papilio polytes romulus</i>	Common mormon	Butter fly	No	1	Seen	Targeted	
24-May-23	1	Transect survey (OBB)		1.33029001	103.83432	11:23	<i>Bibasis harisa consobrina</i>	Orange awlet	Butter fly	No	1	Seen	Targeted	Caterpillar
24-May-23	1	Transect survey (OBB)		1.33029001	103.83432	11:23	<i>Appias libythea olferna</i>	Striped albatross	Butter fly	No	1	Seen	Targeted	
24-May-23	1	Transect survey (OBB)		1.33029001	103.83432	11:23	<i>Junonia hedonia ida</i>	Chocolate pansy	Butter fly	No	1	Seen	Targeted	
24-May-23	1	Transect survey (OBB)		1.33029001	103.83432	11:23	<i>Zizula hylax pygmaea</i>	Pygmy grass blue	Butter fly	No	5	Seen	Targeted	
24-May-23	1	Transect survey (OBB)		1.33029001	103.83432	11:23	<i>Chalybion bengalense</i>	NA	Acule ata	No	1	Seen	Targeted	
24-May-23	1	Transect survey (OBB)		1.33018901	103.834529	11:39	<i>Taractrocer archias quinta</i>	Yellow grass dart	Butter fly	No	1	Seen	Targeted	
24-May-23	1	Transect survey (OBB)		1.33018901	103.834529	11:39	<i>Pantala flavescens</i>	Wandering glider	Odon ata	No	1	Seen	Targeted	
24-May-23	1	Transect survey (OBB)		1.33018901	103.834529	11:39	<i>Orthetrum luzonicum</i>	Slender blue skimmer	Odon ata	No	1	Seen	Targeted	
24-May-23	1	Transect survey (OBB)		1.33018901	103.834529	11:39	<i>Pelopidas mathias mathias</i>	Small branded swift	Butter fly	No	1	Seen	Targeted	
24-May-23	1	Transect survey (OBB)		1.33016302	103.834619	11:40	<i>Parischnogaster mellyi</i>	NA	Acule ata	No	1	Seen	Targeted	Nest
24-May-23	1	Transect survey (OBB)		1.33037098	103.83483	11:50	<i>Ropalidia sumatrae</i>	NA	Acule ata	No	2	Seen	Targeted	
24-May-23	1	Transect survey (OBB)		1.33037098	103.83483	11:50	<i>Eurema sp.</i>	Unidentified grass yellow	Butter fly	NA	1	Seen	Targeted	
24-May-23	1	Transect survey (OBB)		1.33037098	103.83483	11:50	<i>Lasippa sp.</i>	Unidentified lascar	Butter fly	NA	1	Seen	Targeted	
24-May-23	1	Transect survey (OBB)		1.330245	103.83511	11:53	<i>Ypthima horsfieldii humei</i>	Malayan five-ring	Butter fly	No	1	Seen	Targeted	
24-May-23	1	Transect survey (OBB)		1.330245	103.83511	11:53	<i>Lathrecista asiatica</i>	Scarlet grenadier	Odon ata	No	1	Seen	Targeted	
24-May-23	1	Transect survey (OBB)		1.330245	103.83511	11:53	<i>Papilio polytes romulus</i>	Common mormon	Butter fly	No	1	Seen	Targeted	

24-May-23	1	Transect survey (OBB)		1.330245	103.835441	12:00	<i>Lasippa sp.</i>	Unidentified lascar	Butter fly	NA	1	Seen	Targeted
24-May-23	1	Transect survey (OBB)		1.330274	103.835596	12:01	<i>Miletus biggsii biggsii</i>	Bigg's brownwing	Butter fly	No	1	Seen	Targeted
24-May-23	1	Transect survey (OBB)		1.330274	103.835596	12:01	<i>Ropalidia stigma</i>	NA	Aculeata	No	1	Seen	Targeted
24-May-23	1	Transect survey (OBB)		1.33037902	103.835919	12:09	<i>Papilio polytes romulus</i>	Common mormon	Butter fly	No	1	Seen	Targeted
24-May-23	1	Transect survey (OBB)		1.33037902	103.835919	12:09	<i>Ropalidia sumatrae</i>	NA	Aculeata	No	1	Seen	Targeted
24-May-23	1	Transect survey (OBB)		1.33037902	103.835919	12:09	<i>Ypthima sp.</i>	Unidentified ring	Butter fly	NA	1	Seen	Targeted
24-May-23	1	Transect survey (OBB)		1.33037902	103.835919	12:09	<i>Xylocopa latipes</i>	Broad-handed carpenter bee	Aculeata	No	1	Seen	Targeted

Stream	Aquatic sampling point	Latitude	Longitude
Stream 1	S1_01	1.330840687	103.8298106
Stream 1	S1_02	1.331208603	103.8305561
Stream 1	S1_03	1.330981076	103.8313743
Stream 1	S1_04	1.33065673	103.832144
Stream 1	S1_05	1.330113905	103.8327347
Stream 1	S1_06	1.329476	103.833352
Stream 1	S1_07	1.328749	103.833655
Stream 1	S1_08	1.327917289	103.8339939

Date	Cycle	Survey type	Direction	Taxa	Time in (h)	Time out (h)	Weather	Remarks
21-Apr-23	1	Aquatic point count (PM)	Downstream to upstream	Herpetofauna, Freshwater aquatic fauna	1930	2325	Fair	
24-Apr-23	1	Aquatic point count (AM)	Downstream to upstream	Odonates, Herpetofauna, Freshwater aquatic fauna	915	1235	Fair	
25-Apr-23	1	Transect survey (PM BHM)	Forward	Birds, Herpetofauna, Non-volant mammals	1938	2112	Fair	
2-May-23	1	Transect survey (AM BHM)	Forward	Birds, Herpetofauna, Non-volant mammals	713	910	Fair	

8-May-23	2	Aquatic point count (PM)	Downstream to upstream	Herpetofauna, Freshwater aquatic fauna	1946	2320	Drizzling	Deployed minnow traps
9-May-23	2	Aquatic point count (AM)	Downstream to upstream	Odonates, Herpetofauna, Freshwater aquatic fauna	838	1215	Fair	Retrieved minnow traps
15-May-23	2	Transect survey (AM BHM)	Reverse	Birds, Herpetofauna, Non-volant mammals	702	847	Fair	
15-May-23	2	Transect survey (OBB)	Reverse	Butterflies, Odonates, Aculeate hymenopterans	850	1147	Fair	
16-May-23	2	Transect survey (PM BHM)	Reverse	Birds, Herpetofauna, Non-volant mammals	1940	2100	Fair	
24-May-23	1	Transect survey (OBB)	Forward	Butterflies, Odonates, Aculeate hymenopterans	907	1210	Fair	Make up survey

**APPENDIX E**

**Camera Trap Data**

Station	SamplingDate	FileModifyDate	Date	Time	FileName	Species	Quantity	Remarks
CT01	20230502	24/4/2023 12:06	24/4/2023	12:06:50	RCNX0011.AVI	Unidentified squirrel_or_treeshrew	1	NA
CT01	20230502	26/4/2023 22:10	26/4/2023	22:10:12	RCNX0012.AVI	Rattus spp.	1	NA
CT01	20230502	29/4/2023 10:59	29/4/2023	10:59:56	RCNX0013.AVI	Gallus gallus	1	NA
CT01	20230502	29/4/2023 11:22	29/4/2023	11:22:04	RCNX0014.AVI	Chalcophaps indica	1	NA
CT01	20230502	2/5/2023 5:43	2/5/2023	5:43:36	RCNX0015.AVI	Unidentified animal	1	NA
CT01	20230524	4/5/2023 9:03	4/5/2023	9:03:20	RCNX0015.AVI	Gallus gallus	1	NA
CT01	20230524	4/5/2023 10:49	4/5/2023	10:49:58	RCNX0018.AVI	Treron vernans	1	NA
CT01	20230524	5/5/2023 15:55	5/5/2023	15:55:12	RCNX0020.AVI	Gallus gallus	2	NA
CT01	20230524	5/5/2023 15:58	5/5/2023	15:58:26	RCNX0021.AVI	Gallus gallus	3	NA
CT01	20230524	5/5/2023 16:03	5/5/2023	16:03:50	RCNX0022.AVI	Gallus gallus	2	NA
CT01	20230524	5/5/2023 16:04	5/5/2023	16:04:48	RCNX0023.AVI	Gallus gallus	1	NA
CT01	20230524	6/5/2023 11:21	6/5/2023	11:21:06	RCNX0024.AVI	Gallus gallus	1	NA
CT01	20230524	7/5/2023 8:17	7/5/2023	8:17:48	RCNX0025.AVI	Gallus gallus	1	NA
CT01	20230524	7/5/2023 10:04	7/5/2023	10:04:32	RCNX0026.AVI	Amaurornis phoenicurus	1	NA
CT01	20230524	7/5/2023 13:50	7/5/2023	13:50:48	RCNX0027.AVI	Gallus gallus	1	NA
CT01	20230524	7/5/2023 14:01	7/5/2023	14:01:48	RCNX0028.AVI	Gallus gallus	1	NA
CT01	20230524	9/5/2023 18:52	9/5/2023	18:52:10	RCNX0031.AVI	Sus scrofa	1	NA
CT01	20230524	10/5/2023 13:50	10/5/2023	13:50:52	RCNX0032.AVI	Gallus gallus	1	NA
CT01	20230524	10/5/2023 17:55	10/5/2023	17:55:12	RCNX0033.AVI	Gallus gallus	2	NA
CT01	20230524	10/5/2023 18:05	10/5/2023	18:05:02	RCNX0034.AVI	Gallus gallus	2	NA
CT01	20230524	10/5/2023 18:13	10/5/2023	18:13:26	RCNX0035.AVI	Gallus gallus	2	NA
CT01	20230524	10/5/2023 18:20	10/5/2023	18:20:24	RCNX0036.AVI	Gallus gallus	2	NA
CT01	20230524	10/5/2023 18:22	10/5/2023	18:22:36	RCNX0037.AVI	Gallus gallus	4	NA
CT01	20230524	12/5/2023 6:55	12/5/2023	6:55:04	RCNX0038.AVI	Sus scrofa	2	NA
CT01	20230524	12/5/2023 6:55	12/5/2023	6:55:46	RCNX0039.AVI	Sus scrofa	2	NA
CT01	20230524	12/5/2023 6:56	12/5/2023	6:56:22	RCNX0040.AVI	Sus scrofa	3	NA
CT01	20230524	12/5/2023 6:56	12/5/2023	6:56:58	RCNX0041.AVI	Sus scrofa	3	NA
CT01	20230524	12/5/2023 6:57	12/5/2023	6:57:26	RCNX0042.AVI	Sus scrofa	3	NA
CT01	20230524	12/5/2023 6:58	12/5/2023	6:58:16	RCNX0043.AVI	Sus scrofa	2	NA
CT01	20230524	12/5/2023 6:58	12/5/2023	6:58:44	RCNX0044.AVI	Sus scrofa	2	NA
CT01	20230524	12/5/2023 6:59	12/5/2023	6:59:14	RCNX0045.AVI	Sus scrofa	2	NA
CT01	20230524	12/5/2023 6:59	12/5/2023	6:59:42	RCNX0046.AVI	Sus scrofa	2	NA
CT01	20230524	12/5/2023 7:00	12/5/2023	7:00:08	RCNX0047.AVI	Sus scrofa	1	NA
CT01	20230524	12/5/2023 7:00	12/5/2023	7:00:36	RCNX0048.AVI	Sus scrofa	1	NA
CT01	20230524	13/5/2023 11:33	13/5/2023	11:33:42	RCNX0049.AVI	Sus scrofa	2	1 piglet
CT01	20230524	13/5/2023 11:34	13/5/2023	11:34:16	RCNX0050.AVI	Sus scrofa	3	2 piglets
CT01	20230524	13/5/2023 11:34	13/5/2023	11:34:46	RCNX0051.AVI	Sus scrofa	2	1 piglet
CT01	20230524	13/5/2023 11:35	13/5/2023	11:35:18	RCNX0052.AVI	Sus scrofa	3	2 piglets
CT01	20230524	13/5/2023 11:35	13/5/2023	11:35:52	RCNX0053.AVI	Sus scrofa	5	3 piglets
CT01	20230524	13/5/2023 11:36	13/5/2023	11:36:28	RCNX0054.AVI	Sus scrofa	3	1 piglet
CT01	20230524	13/5/2023 11:37	13/5/2023	11:37:02	RCNX0055.AVI	Sus scrofa	1	NA
CT01	20230524	13/5/2023 11:37	13/5/2023	11:37:42	RCNX0056.AVI	Sus scrofa	2	1 piglet
CT01	20230524	13/5/2023 11:39	13/5/2023	11:39:02	RCNX0057.AVI	Sus scrofa	3	1 piglet
CT01	20230524	14/5/2023 19:18	14/5/2023	19:18:02	RCNX0058.AVI	Sus scrofa	1	NA
CT01	20230524	16/5/2023 14:06	16/5/2023	14:06:00	RCNX0059.AVI	Gallus gallus	1	NA
CT01	20230524	18/5/2023 18:14	18/5/2023	18:14:24	RCNX0060.AVI	Tupaia glis	1	NA
CT01	20230524	20/5/2023 18:33	20/5/2023	18:33:58	RCNX0061.AVI	Gallus gallus	2	NA
CT01	20230524	22/5/2023 2:37	22/5/2023	2:37:30	RCNX0062.AVI	Manis javanica	1	NA
CT02	20230502	25/4/2023 10:28	25/4/2023	10:28:54	RCNX0012.AVI	Varanus spp.	1	NA
CT02	20230502	25/4/2023 16:54	25/4/2023	16:54:36	RCNX0013.AVI	Sus scrofa	1	NA
CT02	20230502	26/4/2023 9:20	26/4/2023	9:20:18	RCNX0014.AVI	Gallus gallus	1	NA
CT02	20230502	27/4/2023 19:46	27/4/2023	19:46:12	RCNX0015.AVI	Sus scrofa	1	NA
CT02	20230524	10/5/2023 13:35	10/5/2023	13:35:36	RCNX0005.AVI	Unidentified squirrel_or_treeshrew	1	NA
CT02	20230524	15/5/2023 19:21	15/5/2023	19:21:26	RCNX0007.AVI	Sus scrofa	1	NA
CT02	20230524	17/5/2023 15:24	17/5/2023	15:24:34	RCNX0008.AVI	Sus scrofa	1	NA
CT02	20230524	17/5/2023 15:25	17/5/2023	15:25:04	RCNX0009.AVI	Unidentified squirrel_or_treeshrew	1	NA
CT02	20230524	18/5/2023 15:24	18/5/2023	15:24:14	RCNX0010.AVI	Sus scrofa	1	NA
CT02	20230524	18/5/2023 17:35	18/5/2023	17:35:46	RCNX0011.AVI	Sus scrofa	1	NA
CT02	20230524	19/5/2023 11:55	19/5/2023	11:55:32	RCNX0012.AVI	Garrulax leucolophus	2	NA
CT02	20230524	22/5/2023 7:12	22/5/2023	7:12:08	RCNX0013.AVI	Sus scrofa	1	NA

CT03	20230502	21/4/2023 17:10	21/4/2023	17:10:42	RCNX0009.AVI	Gallus gallus	1	NA
CT03	20230502	22/4/2023 17:26	22/4/2023	17:26:50	RCNX0010.AVI	Gallus gallus	1	NA
CT03	20230502	22/4/2023 18:31	22/4/2023	18:31:14	RCNX0011.AVI	Gallus gallus	2	NA
CT03	20230502	22/4/2023 19:33	22/4/2023	19:33:14	RCNX0012.AVI	Sus scrofa	1	NA
CT03	20230502	23/4/2023 17:55	23/4/2023	17:55:36	RCNX0013.AVI	Callosciurus notatus	1	NA
CT03	20230502	25/4/2023 12:23	25/4/2023	12:23:42	RCNX0014.AVI	Gallus gallus	1	NA
CT03	20230502	25/4/2023 16:55	25/4/2023	16:55:44	RCNX0015.AVI	Gallus gallus	1	NA
CT03	20230502	26/4/2023 11:47	26/4/2023	11:47:46	RCNX0016.AVI	Gallus gallus	1	NA
CT03	20230502	26/4/2023 18:14	26/4/2023	18:14:10	RCNX0017.AVI	Callosciurus notatus	1	NA
CT03	20230502	27/4/2023 7:30	27/4/2023	7:30:12	RCNX0018.AVI	Tupaia glis	1	NA
CT03	20230502	27/4/2023 7:55	27/4/2023	7:55:46	RCNX0019.AVI	Gallus gallus	1	NA
CT03	20230502	27/4/2023 12:03	27/4/2023	12:03:44	RCNX0020.AVI	Gallus gallus	2	NA
CT03	20230502	28/4/2023 16:05	28/4/2023	16:05:14	RCNX0021.AVI	Gallus gallus	1	NA
CT03	20230502	29/4/2023 7:25	29/4/2023	7:25:40	RCNX0023.AVI	Gallus gallus	1	NA
CT03	20230502	29/4/2023 7:26	29/4/2023	7:26:28	RCNX0024.AVI	Gallus gallus	2	NA
CT03	20230502	30/4/2023 7:34	30/4/2023	7:34:18	RCNX0025.AVI	Gallus gallus	1	NA
CT03	20230502	30/4/2023 13:36	30/4/2023	13:36:42	RCNX0026.AVI	Gallus gallus	1	NA
CT03	20230502	1/5/2023 5:42	1/5/2023	5:42:46	RCNX0027.AVI	Sus scrofa	1	NA
CT03	20230502	2/5/2023 7:23	2/5/2023	7:23:50	RCNX0028.AVI	Gallus gallus	3	NA
CT03	20230502	2/5/2023 7:49	2/5/2023	7:49:10	RCNX0029.AVI	Tupaia glis	1	NA
CT03	20230524	3/5/2023 8:02	3/5/2023	8:02:20	RCNX0005.AVI	Gallus gallus	2	NA
CT03	20230524	3/5/2023 10:48	3/5/2023	10:48:58	RCNX0006.AVI	Callosciurus notatus	1	NA
CT03	20230524	3/5/2023 14:29	3/5/2023	14:29:00	RCNX0007.AVI	Sus scrofa	2	NA
CT03	20230524	3/5/2023 21:48	3/5/2023	21:48:02	RCNX0008.AVI	Sus scrofa	1	NA
CT03	20230524	4/5/2023 7:08	4/5/2023	7:08:38	RCNX0009.AVI	Gallus gallus	1	NA
CT03	20230524	4/5/2023 7:10	4/5/2023	7:10:04	RCNX0010.AVI	Gallus gallus	1	NA
CT03	20230524	6/5/2023 7:45	6/5/2023	7:45:38	RCNX0011.AVI	Gallus gallus	1	NA
CT03	20230524	6/5/2023 8:50	6/5/2023	8:50:46	RCNX0012.AVI	Gallus gallus	1	NA
CT03	20230524	7/5/2023 9:43	7/5/2023	9:43:02	RCNX0013.AVI	Tupaia glis	1	NA
CT03	20230524	8/5/2023 8:04	8/5/2023	8:04:00	RCNX0014.AVI	Gallus gallus	1	NA
CT03	20230524	9/5/2023 5:54	9/5/2023	5:54:42	RCNX0015.AVI	Manis javanica	1	NA
CT03	20230524	9/5/2023 8:42	9/5/2023	8:42:34	RCNX0016.AVI	Gallus gallus	1	NA
CT03	20230524	9/5/2023 15:55	9/5/2023	15:55:50	RCNX0017.AVI	Gallus gallus	1	NA
CT03	20230524	9/5/2023 18:49	9/5/2023	18:49:38	RCNX0018.AVI	Unidentified squirrel_or_treeshrew	1	NA
CT03	20230524	9/5/2023 23:16	9/5/2023	23:16:26	RCNX0019.AVI	Paradoxurus musangus	1	NA
CT03	20230524	9/5/2023 23:16	9/5/2023	23:16:50	RCNX0020.AVI	Paradoxurus musangus	1	NA
CT03	20230524	10/5/2023 6:45	10/5/2023	6:45:46	RCNX0021.AVI	Unidentified squirrel_or_treeshrew	1	NA
CT03	20230524	10/5/2023 7:26	10/5/2023	7:26:36	RCNX0022.AVI	Callosciurus notatus	1	NA
CT03	20230524	10/5/2023 9:29	10/5/2023	9:29:40	RCNX0023.AVI	Macaca fascicularis	1	NA
CT03	20230524	10/5/2023 9:30	10/5/2023	9:30:30	RCNX0024.AVI	Macaca fascicularis	2	NA
CT03	20230524	10/5/2023 9:33	10/5/2023	9:33:24	RCNX0025.AVI	Macaca fascicularis	1	NA
CT03	20230524	10/5/2023 9:34	10/5/2023	9:34:36	RCNX0026.AVI	Macaca fascicularis	2	NA
CT03	20230524	10/5/2023 9:39	10/5/2023	9:39:54	RCNX0027.AVI	Macaca fascicularis	3	NA
CT03	20230524	10/5/2023 9:40	10/5/2023	9:40:28	RCNX0028.AVI	Macaca fascicularis	2	NA
CT03	20230524	10/5/2023 9:44	10/5/2023	9:44:16	RCNX0029.AVI	Macaca fascicularis	1	NA
CT03	20230524	11/5/2023 15:18	11/5/2023	15:18:32	RCNX0030.AVI	Callosciurus notatus	1	NA
CT03	20230524	12/5/2023 15:08	12/5/2023	15:08:48	RCNX0031.AVI	Callosciurus notatus	1	NA
CT03	20230524	15/5/2023 7:09	15/5/2023	7:09:48	RCNX0033.AVI	Tupaia glis	1	NA
CT03	20230524	17/5/2023 7:18	17/5/2023	7:18:10	RCNX0034.AVI	Gallus gallus	1	NA
CT03	20230524	17/5/2023 11:23	17/5/2023	11:23:58	RCNX0036.AVI	Macaca fascicularis	3	NA
CT03	20230524	17/5/2023 11:26	17/5/2023	11:26:38	RCNX0037.AVI	Macaca fascicularis	1	NA
CT03	20230524	17/5/2023 11:27	17/5/2023	11:27:16	RCNX0038.AVI	Macaca fascicularis	1	NA
CT03	20230524	17/5/2023 11:30	17/5/2023	11:30:06	RCNX0039.AVI	Macaca fascicularis	3	NA
CT03	20230524	17/5/2023 11:30	17/5/2023	11:30:34	RCNX0040.AVI	Macaca fascicularis	1	NA
CT03	20230524	17/5/2023 11:35	17/5/2023	11:35:32	RCNX0041.AVI	Macaca fascicularis	1	NA
CT03	20230524	17/5/2023 11:36	17/5/2023	11:36:10	RCNX0042.AVI	Macaca fascicularis	1	NA
CT03	20230524	17/5/2023 11:36	17/5/2023	11:36:48	RCNX0043.AVI	Macaca fascicularis	1	NA
CT03	20230524	17/5/2023 11:37	17/5/2023	11:37:20	RCNX0044.AVI	Macaca fascicularis	3	NA
CT03	20230524	17/5/2023 11:37	17/5/2023	11:37:50	RCNX0045.AVI	Macaca fascicularis	2	NA
CT03	20230524	17/5/2023 11:38	17/5/2023	11:38:24	RCNX0046.AVI	Macaca fascicularis	3	NA
CT03	20230524	17/5/2023 11:38	17/5/2023	11:38:24	RCNX0046.AVI	Varanus spp.	1	NA

CT03	20230524	17/5/2023 11:40	17/5/2023	11:40:26	RCNX0047.AVI	Macaca fascicularis	1	NA
CT03	20230524	17/5/2023 11:42	17/5/2023	11:42:16	RCNX0048.AVI	Macaca fascicularis	2	NA
CT03	20230524	17/5/2023 11:42	17/5/2023	11:42:46	RCNX0049.AVI	Macaca fascicularis	1	NA
CT03	20230524	17/5/2023 13:36	17/5/2023	13:36:30	RCNX0050.AVI	Gallus gallus	1	NA
CT03	20230524	17/5/2023 14:58	17/5/2023	14:58:40	RCNX0051.AVI	Gallus gallus	1	NA
CT03	20230524	17/5/2023 17:52	17/5/2023	17:52:08	RCNX0052.AVI	Tupaia glis	1	NA
CT03	20230524	17/5/2023 18:09	17/5/2023	18:09:36	RCNX0053.AVI	Tupaia glis	1	NA
CT03	20230524	17/5/2023 18:23	17/5/2023	18:23:28	RCNX0054.AVI	Tupaia glis	1	NA
CT03	20230524	18/5/2023 7:31	18/5/2023	7:31:50	RCNX0056.AVI	Gallus gallus	1	NA
CT03	20230524	18/5/2023 9:49	18/5/2023	9:49:28	RCNX0057.AVI	Garrulax leucolophus	2	NA
CT03	20230524	18/5/2023 11:59	18/5/2023	11:59:28	RCNX0058.AVI	Macaca fascicularis	3	NA
CT03	20230524	18/5/2023 12:19	18/5/2023	12:19:40	RCNX0059.AVI	Macaca fascicularis	5	NA
CT03	20230524	18/5/2023 12:20	18/5/2023	12:20:10	RCNX0060.AVI	Macaca fascicularis	1	NA
CT03	20230524	18/5/2023 12:20	18/5/2023	12:20:38	RCNX0061.AVI	Macaca fascicularis	1	NA
CT03	20230524	20/5/2023 18:05	20/5/2023	18:05:40	RCNX0062.AVI	Sus scrofa	2	NA
CT03	20230524	21/5/2023 9:14	21/5/2023	9:14:34	RCNX0063.AVI	Gallus gallus	3	NA
CT03	20230524	21/5/2023 9:39	21/5/2023	9:39:14	RCNX0064.AVI	Gallus gallus	4	NA
CT03	20230524	21/5/2023 10:02	21/5/2023	10:02:58	RCNX0065.AVI	Tupaia glis	1	NA
CT03	20230524	21/5/2023 21:49	21/5/2023	21:49:20	RCNX0066.AVI	Sus scrofa	1	NA
CT03	20230524	22/5/2023 8:48	22/5/2023	8:48:54	RCNX0067.AVI	Gallus gallus	4	NA
CT03	20230524	22/5/2023 17:18	22/5/2023	17:18:44	RCNX0068.AVI	Callosciurus notatus	1	NA
CT03	20230524	22/5/2023 17:18	22/5/2023	17:18:44	RCNX0068.AVI	Unidentified squirrel_or_treeshrew	1	NA
CT03	20230524	24/5/2023 9:40	24/5/2023	9:40:46	RCNX0069.AVI	Gallus gallus	2	NA

**APPENDIX F**

**Guidelines for Tree Protection  
Zones**

## CONTENT REQUIREMENTS

This document outlines specific measures to protect trees during construction or other site disturbance. The content and scope of the document will vary based on the site, type of construction, tree species, tree location and other factors.

## TREE PROTECTION AND CONSERVATION GUIDELINES

This section outlines the general provisions for tree protection before, during and after construction. Additional measures may be added by the attending arborist on a case-by-case basis.

### PRE-DEMOLITION/PILING/CONSTRUCTION

#### 1. Pre-Construction Meeting

The attending arborist shall attend a pre-construction meeting with the project contractor or construction supervisor to explain the tree protection and monitoring requirements as outlined in this document.

In addition, the project contractor or construction supervisor shall complete the 'VERIFICATION OF TREE PROTECTION CHECKLIST' as attached in Annex A before the onset of the construction.

#### 1.1 Tree Protection Zone

Prior to any site clearing (demolition works), piling works, grading, trenching or other soil disturbance, a tree protection zone (TPZ) must be installed as follows:

- i. Type  
The barriers should be temporary, made of a hard material, 1.8-m tall and firmly installed into the ground.
- ii. Ground protection  
Mulching material (can be compost or woodchips) at 100-mm thick to be laid within the TPZ. If woodchips are used, termicide treatment is necessary to prevent the introduction of harmful termites.

Apply complete fertilizer (N:P:K 15:15:15) upon or together with the application of mulch.

iii. Signage

A readily-visible and waterproof sign shall be installed on all sides of the fencing around each individual protected tree. The size of each sign must be a minimum of 300mm wide and must contain the wording below:



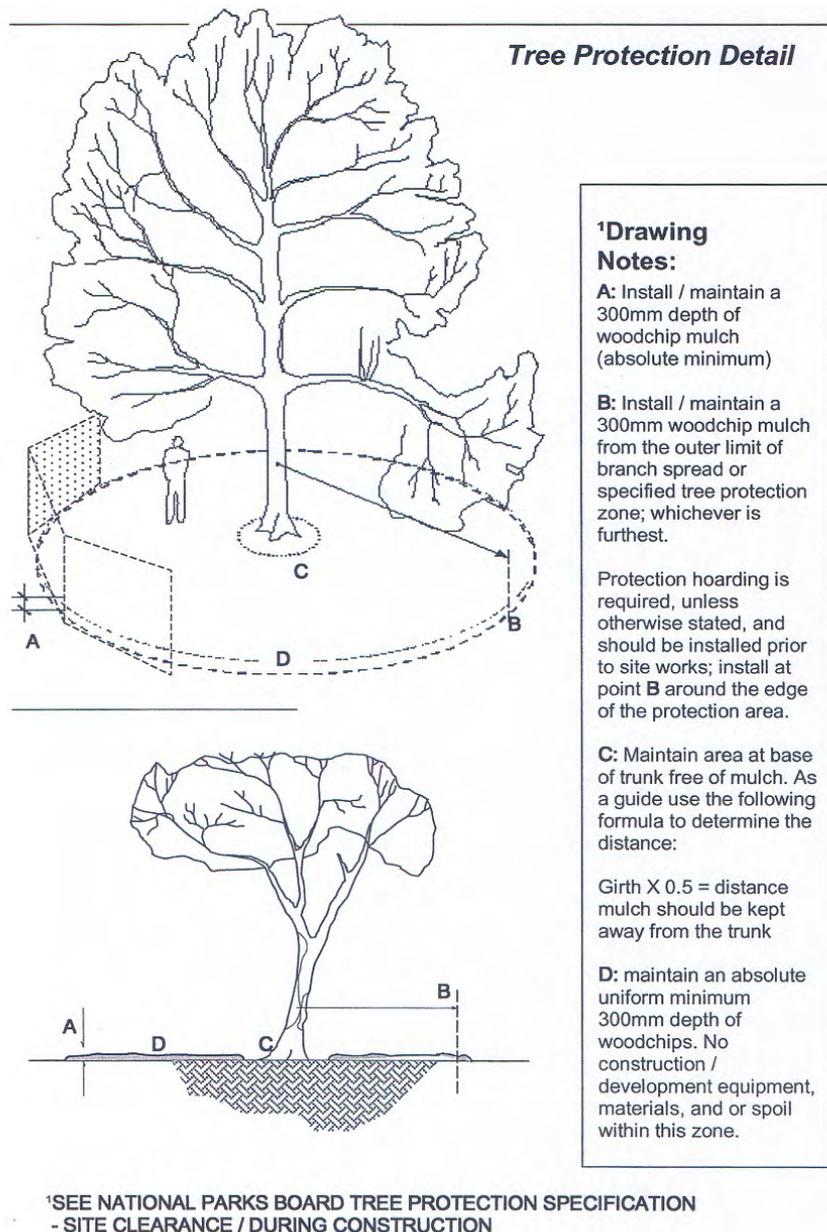
**KEEP OUT!**  
**TREE PROTECTION**  
**ZONE**

Entry prohibited. This fence shall remain in place throughout the entire construction period.

iv. Fencing installation

Installation must be approved by the attending arborists and/or the approved authority prior to construction.

A diagrammatic representation of a proper Tree protection zone is presented below.



## 1.2 Tree pruning and removal

Various trees may need to be pruned away from structures or proposed construction activity. **Construction or contractor personnel shall not attempt pruning or removal.** Consultation and written approval with attending arborist must be obtained prior to pruning.

Removal of trees adjacent to trees that are to be retained requires planning and skilled arboriculture workers. Trees should not be removed by pushing with excavators/heavy machinery or with lumberjack (one cut) methods. Directional felling methods (notch and back-cut) should be deployed during removal of trees.

Removal of trees that extend into branches or roots of protected trees shall not be attempted by the demolition or construction crew, or by grading or other heavy equipment. Before removing tree stumps, the project manager shall seek the advice from the attending arborist determine if roots are entangled with trees that are to remain. If so, these stumps shall have their roots severed before extracting them.

### 1.3 Site Clearance

To avoid lumber jack felling of trees that may severely damage the canopy of conserved trees, it is recommended that qualified (see Point 4.3 Tree Conservation Guidelines) Arboriculture contractors be engage to fell trees adjacent to protected trees to ensure that the trees (when cut) fall away from the protected trees and their associated TPZs.

Contractors carry out tree felling works near assigned TPZs of conserved trees should

- i. Employ directional felling through the use of notch and back cuts
- ii. Deploy cranes to tension trunks in the direction of the drop
- iii. Carry out pruning of canopy branches to remove entangling branches
- iv. If trees to be removed are taller than neighbouring trees to be retained, removal of branches should be carried out in a controlled manner using ropes and cranes to avoid damaging canopy of the lower trees.
- v. To avoid pruning of conserved trees at the proximity unless consultation and approval from attending arborist has been obtained.
- vi. No tree should be removed by pushing with an excavator or heavy machinery.

## DURING DEMOLITION/PILING/CONSTRUCTION

### 2. Tree Protection Zone Restrictions

- No ground disturbance, grading, trenching or other construction activities shall occur within the TPZ except as specified and/or approved by the attending arborist or authority.
- No construction material, debris, machinery (e.g. generators) or other construction waste shall be stored within the TPZ. Weight and presence of these materials increases soil compaction and reduces the area exposed for water infiltration and gaseous exchange.



**Figure 1: Construction material and heavy machinery are prohibited within the TPZ**

- Excavation works within the TPZ are strictly prohibited. Unless otherwise specified by the attending arborist, all work done within the TPZ shall be completed with manual trenching with hand tools or other hand held power tools that will not cause any root/tree damage.

If roots need to be cut, it shall be done using proper equipment (e.g. pruning saw, chain saw) under the supervision of the attending arborist.



**Figure 2: Trial trench by skilled workers using hand tools exposing root architecture**

- Nailing, tying or pasting of materials on trees is prohibited. The tree shall not be used as an anchor for supporting structures during the construction.



**Figure 3: Using tree as anchor may damage its bark.**



**Figure 4: No nails shall be driven into the tree as it promotes infiltration of pests/diseases**

- Phytotoxic materials such as fuels, oils, cement, chemicals, and paint shall be kept away and stored/mixed at least 2.5m from the tree protection zone. Such chemicals can significantly change the cation exchange capacity and pH of the soil, rendering nutrient uptake inefficient and creating an environment too toxic for the roots to grow.

Construction sludge especially from piling works should not be deposited within the TPZ. Such sludge is usually high in clay content and when layered over and within the TPZ could significantly alter the water infiltration and gaseous exchange rates of the root absorption area of the tree.

Canvass sheets/Eco-mat must be laid on the existing soil near the tree in view of soil protection during the demolition, drilling or other construction activities pertaining to concrete structures.



**Figure 5: Construction cement deposited at tree base.**



**Figure 6: Tree showing signs of decline overtime.**

- Lowering the grade around trees can have an immediate and long-term effect on trees.

Typically, most roots are within the top 1m of soil, and most of the fine roots active in water and nutrient absorption are in the top 300mm.

A) Grade changes within the TPZ are not permitted.

B) Grade changes outside the TPZ shall not significantly alter drainage.

C) Grade changes under specifically approved circumstances shall not allow more than 200mm of fill soil or allow more than 150mm of existing soil to be removed from

natural grade, unless mitigated.

D) Grade fills over 200mm or impervious overlay shall incorporate an approved permanent aeration system, permeable material, or other approved mitigation.

E) Grade cuts exceeding 150mm shall incorporate retaining walls or an appropriate transition equivalent.

**No removal of the TPZ will be permitted under any circumstances.**



**Figure 7: Inappropriate installation/maintenance of TPZ during construction.**

## 2.2 Proximity of Heavy machinery/vehicles

Heavy vehicles and machinery (e.g. excavators, piling cranes, 10 wheelers) movement should be limited near TPZs. Temporary access/passageways should be planned to avoid conserved trees.

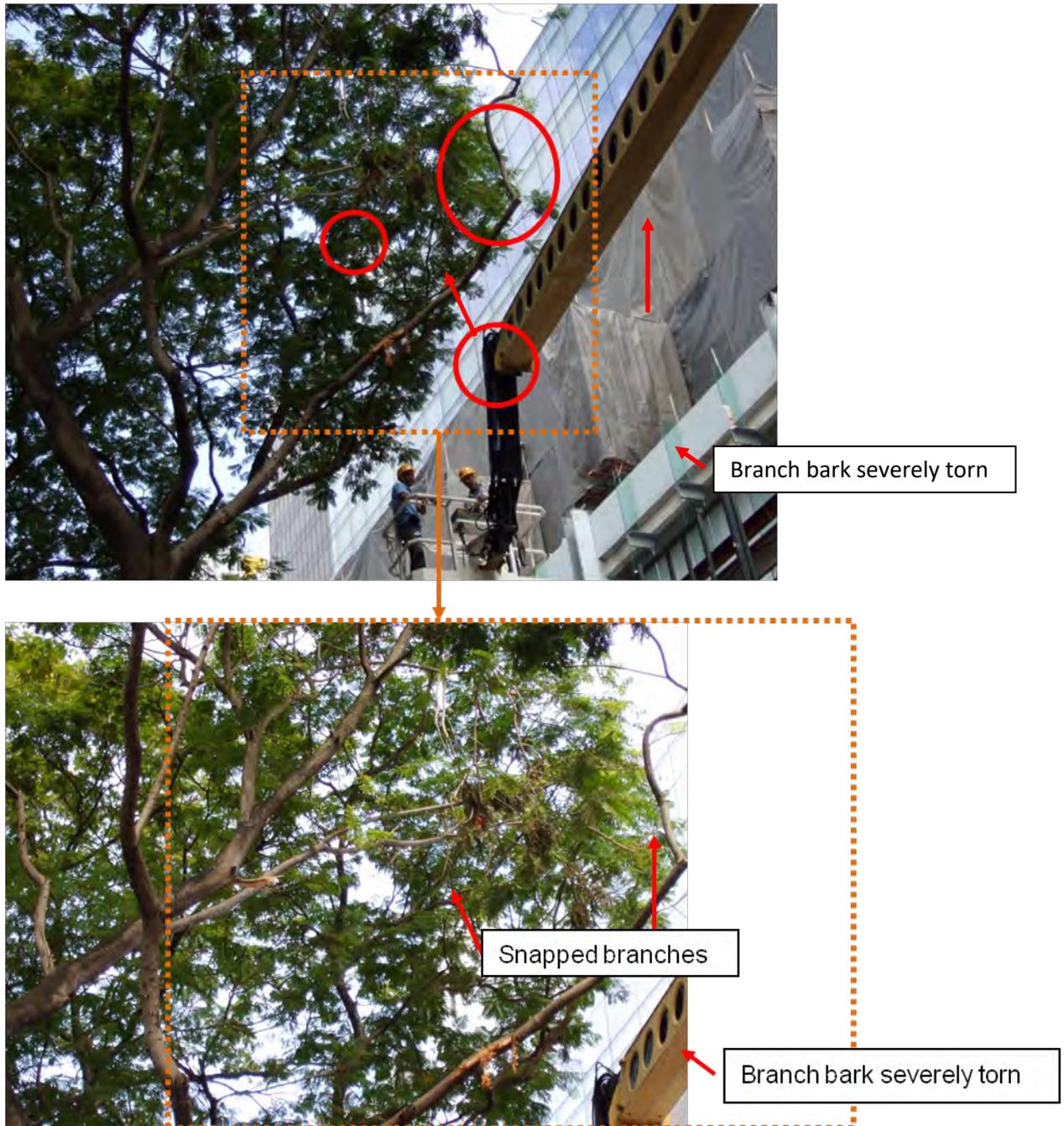


Figure 8: Tree branches were severed due to the negligence of the crane operator.

### 2.3 Drainage Considerations

In the event that water ponding conditions develop in the course of construction due to change in grade/platform levels, construction events or any other unforeseeable factors, the contractor is required to improve drainage around or within the TPZ in consultation with the attending arborist.

### 2.4 Trenching, Excavation and Equipment use

Trenching, excavation or boring within the TPZ shall be limited to activities approved by the architect and/or attending Arborist. Explore alternatives for trenching outside the root zone. Avoid exposing roots during hot, dry weather. Backfill trenches as soon as possible with soil and soak with water the same day. Small roots can die in 10 to 15 minutes and large roots may not survive an hour of exposure. If the trench must be left open all roots must be kept moist by wrapping them in peat moss and burlap.

#### i. Root Severance

No roots greater than 0.2m in diameter shall be cut without approval of the attending Arborist. Tunneling under roots is the approved alternative. Prior to excavation for foundation/footing/walls, or grading or trenching within the TPZ, roots shall be severed cleanly outside the TPZ to the depth of the planned excavation. When roots must be cut, they shall be cut cleanly with a sharp saw to sound wood and flush with the trench site.



**Figure 9: Tunneling under roots.**

ii. Excavation

Any approved excavation, demolition, or extraction of material shall be performed with equipment that is placed outside the TPZ. Hand digging, hydraulic, or pneumatic excavation (e.g. air spading) are permitted methods for excavation within the TPZ.



**Figure 10: Root exploratory works using an air spade. Air spading avoids damage of structural and even feeder roots of the tree.**

iii. Heavy Equipment

Use of backhoes, Ditch-Witches, steel tread tractors or other heavy vehicles within the TPZ is prohibited unless approved by the attending Arborist. If allowed, a protective root buffer is required.

## 2.5 Tree Care

In the course of construction, the following measures may be necessary to reduce the effects of construction stress on protected trees. Quantum, duration and extent to be advised by attending arborist.

### (A) Fertilization

#### **A1 Vertical trenches and Nutrient Sinks**

Create vertical trenching and nutrient sinks. These nutrient sinks should go down to at least 300mm deep and should be filled with high grade compost and 12% Humic acid (dilution 1:100). These sinks will act to reduce construction stress by conditioning the soil, increasing soil microbiological activity and increasing organic matter. At least 24 numbers of vertical trenches / nutrient sinks are required for trees greater than 2m in girth. Vertical trenches for trees under 2m in girth will be determined empirically by the attending arborist and will take into account site conditions, tree species and its pre construction vigor. Top up nutrient sinks every 3 months.

#### **A2 Soil Injection of Biostimulants**

**Mandatory** if TPZ has been infringed into, soil compaction has occurred, tree condition has observed to have declined (indicators: reduction in Live crown ratios, twig die back at canopy and change in leaf colour/size/density)

- **Purpose:** To de-compact soil using a hydraulic pressurized delivery of biostimulants that both hydrates and aerates at the same time. Aim to reduce compaction to less than 400psi in the first 500mm of the soil.
- Mixed bio stimulants – serves 2 functions
  - Decompaction**
  - Humic acid – as soil conditioner and chelating agent (Nutrients are mobilized in forms that the plants can accept), facilitate release of nutrients and reduces leaching. Also improves water holding capacities of soil.
  - Liquid gypsum / Dolomite – soil conditioner, improve soil structure and facilitate release of nutrients in clay soils typical of local conditions.

**To feed and increase soil microbiology to increase tree vigor post damage. Soil microbiology helps nutrient uptake and encourages healthy root growth critical to prevent construction stress.**

- Mollases – High CE for immediate uptake,
- Fish Kelp – Protein source. Organic fertilisers
- Slow release fertilizers (Osmocote)

(B) Watering

- Water supplement during periods of drought.
- Watering duration and extent depends on site conditions and species.
- Watering is carried out until first signs of inundation are observed (i.e. water infiltration observe to slow down significantly).

(C) Myconate treatment

- To trigger and stimulate growth of existing mycorrhizae.

(D) Pesticide treatment

- To control pest (e.g. termites, borers, caterpillars etc) when it occurs.
- Fungicide or bactericide as required or as determined by attending arborist to control microbe pathogens.

(E) Additonal pruning

To be carried out in consultation with the attending Arborist. Trees are living things and may require some form of pruning during the course of the development.

- Crown cleansing- Prune to remove dead branches that may have developed through time.
- Crown lifting- Prune to lift crown to avoid new amenities.
- Crown thinning- Prune to reduce canopy branches and loading.

Structural pruning (including crown reduction) to remove branches that may obstruct new amenities and/or movement of critically necessary equipment may require the planning and standing supervision of the attending arborist.

## 2.6 Engaging Arboriculture Contractors

All arboriculture works should be carried out by skilled and trained arboriculture teams. As such, it is preferred that only Arboriculture contractors which have at least 8 years working

experience and must show previous work experience in developments of similar size or complexity. Arboriculture contractors should meet NParks safety requirements for work at height, LTA's requirements for temporary works along roadsides (where necessary) and have a certified arborist to supervise the pruning/felling/planting works.

All arboriculture workers engaged in tree climbing and chainsaw work shall possess a valid basic tree climbing certification based upon demonstrated competence in the WSQ module conducted by CUGE or an equivalent WSQ approved training organization.

Each Arboriculture crew shall possess the following VALID competences:

Operation of chainsaw for ground work (LS-MT-103E-1)

Chainsaw safety and maintenance (LS-MT-102E-1)

Perform formative pruning of young trees (LS-MT-114E-1)

Provide Arboriculture support on site (LS-MT-116E-1)

Workplace safety and health – operators (ES-WSH-101G-1)

Respond to Emergency (LS-HM-208E-1)

Perform advance rigging and climbing techniques (LS-HM-308S-1)

Perform aerial tree access and aerial rescue skills (LS-HM-204S-1)

Implement and apply appropriate risk and safety management to sector practices (LS-BP-301S-1)

Prepare risk assessment report (LS-HM-406S-1)

Operate and work from an elevated work platform (CUGE-ARB-3501)

## POST-CONSTRUCTION

### 3. Soft Landscaping

Ground works, site preparation and implementation of all landscaping near protected trees must be undertaken carefully.

TPZ barriers can only be removed at this juncture for the purpose. However, when working near trees, cultivation of soils in these areas must be cautiously handled using hand tools. Planting of shrubs shall be at a distance of at least 300mm away from existing root collar.

Avoid changes to ground levels or unnecessary compaction of soils within proximity to existing trees during the course.



Figure 10: New plantings at a minimum distance of 300mm (all round) from root collar

## ANNEX A

### VERIFICATION OF TREE PROTECTION CHECKLIST

Note: The project contractor or construction supervisor shall verify in writing that all **preconstruction** tree preservation conditions have been met as follows:

Submitted by: \_\_\_\_\_

Company/Project: \_\_\_\_\_

Date/Time: \_\_\_\_\_

S/N	Action	Checked (☑)	Remarks
1	Installation of tree fencing around identified trees within/near site (hard material at 1.8m tall)		
2	Tree protection zone (TPZ) dimensions meets specifications (from NParks and/or attending arborist)		
3	Warning signs prominently displayed on all sides of the fencing, including designated tree number		
4	Removal of construction material (ie machinery, debris, tools etc) within TPZ		
5	Mulching of high grade compost of 100mm thick around identified trees		
6	Completion of tree pruning (if necessary) under the supervision/written approval with the attending arborist		
7	Establishment of a tree maintenance schedule according to arborist recommendations (to be submitted to attending arborist)		

Verified by (attending arborist): \_\_\_\_\_

Date/Time: \_\_\_\_\_

**APPENDIX G**

**Guidelines for Sapling  
Harvesting, Tree Transplantation  
and Tree Maintenance**

## CONTENT REQUIREMENTS

This document outlines guidelines for sapling harvesting and tree transplantation prior to construction works, and guidelines to tree maintenance and care for retained trees during construction or other site disturbance. The content and scope of the document will vary based on the site, type of construction, tree species, tree location and other factors.

## SAPLING HARVESTING AND TREE TRANSPLANTING

This section outlines the general guidelines for sapling harvesting and tree transplanting prior to construction. Additional measures may be added by the attending arborist on a case-by-case basis.

### SPECIMEN SELECTION

Prior to site clearance works, any viable saplings and conservation significant trees that are suitable for harvesting shall be identified by the Arborist. Saplings or trees suitable for transplanting should:

- I. Exhibit good physiological health and vigour
- II. Have no structural defects
- III. Have good branch form

As a guidance, the size of the root ball that is to be extracted shall be based on the girth of the saplings or trees to be harvested

Girth (m)	Minimum root ball diameter to extract (m)
<0.1	0.4
0.1–0.2	0.6
0.2–0.3	0.8
0.3–0.4	1.2
0.4–0.5	1.5
>0.5	To be determined by Arborist

Prior to transplanting, dead branches and climbers shall be cleared from the plant and canopy load and spread will be reduced where necessary, in consultation with the Arborist. Manual trenching shall be carried out to determine the shape and size of root ball to be extracted. Where possible, feeder roots shall be retained without cutting. The root ball shall be burlapped with cellophane sheet to reduce desiccation effects. When directed by the Flora specialist or Arborist, leaves of the canopy may also need to be enclosed and covered by cellophane or clear plastic bags. The root ball shall be secured to the trunk to reduce risk of root ball disintegrating. When handling/carrying the plant, care shall be taken not to damage any vegetative parts.

Where trees and vegetation are moved or translocated within the Project area, the Arborist shall review the method statement proposed by the tree transplanting contractor and advise on additional recommendations necessary to ensure the tree's health during transplanting. The transplanting contract shall ensure in their best effort, intact and secured root balls at the point of extraction, during the lifting processes and during the installation at the receiving site. The transplant effort shall be documented for each individual tree to show intact root balls at all the stages mentioned. Transplanted trees shall be managed through adequate watering and monitoring of their health to ensure their long-term survival. Advice shall be sought from the Arborist if the tree exhibit signs of stress, e.g., peeling bark, withered leaves.

## **TREE MAINTENANCE AND CARE**

This section outlines the general guidelines for tree maintenance and care during construction works. Additional measures may be added by the attending arborist on a case-by-case basis.

Where disease outbreaks are identified, the Arborist shall advise measures to manage them. Measures can include using selected insecticides/fungicides to control outbreaks; reduction of stressors (dust, water, etc.). The plant may be removed or quarantined if it poses a threat to surrounding individuals.

Where forest edges are exposed following site clearance and where impacts to vegetation are evident (e.g., vegetation shows signs of drying out), additional watering shall be carried out to improve moisture differentials around forest edges.

The use of herbicides and pesticides shall be minimised. If herbicides or pesticides are used within the Project area, techniques that limit spray or non-target spray drift shall be used. These techniques include but are not limited to: cut and paint techniques and drilling injection. All use of herbicides and pesticides shall be conducted in accordance with the relevant Material Safety Data Sheet (MSDS). Any incidents of off label use, spillage or damage to non-target species shall be reported and investigated.

When the site experiences seven continuous days without rainfall, the Contractor shall carry out additional watering of conserved trees within the TPZs and at the forest edge (up to 10 m) around the development boundary. Post-heavy rainfall, any snapped hanging branches that pose imminent hazards to workers within the site should be removed immediately.

**APPENDIX H**

**Lighting Management Plan**

# Lighting Management Plan During Night-time Construction Works

## PURPOSE

This document outlines guidelines for the selection, placement, installation and operation of all lights during night-time construction works. Its function is to regulate the use of artificial light at night (ALAN) in the construction site in a way that prioritises the safety of staff while minimising the impact of such light on adjacent forested areas and wildlife. In general, lighting should only be deployed (1) when it is needed, (2) where it is needed, (3) in the appropriate light levels for a specific construction task, and (4) with the appropriate wildlife-friendly spectrum.

This document applies to all stages of the Construction Phase. This document also applies to all site personnel and construction activities in their execution of work for the Project.

## SCOPE OF WORKS

Night works are defined as works before and beyond the stipulated working hours of 0800 h to 1800 h.

The permission to work at night must be obtained from the relevant authorities (i.e., NParks) before night-time construction works can be carried out. The Contractor will need to craft and submit their application for works, including a works-specific lighting management plan, to the relevant Authorities for approval. The requirements set out by the authorities, if any, should be adhered to when executing night-time construction works.

## GENERAL MEASURES

Prior to the start of night-time construction works, the Contractor will need to craft a works-specific lighting management plan for the works they are planning to undertake. This is to confirm the timing and implementation of the agreed works and the implementation of the lighting management measures. Night-time construction work can only commence after the lighting management plan has been agreed with the EMMP Consultants, and approval to start work from relevant authorities have been obtained.

The following general management measures will be implemented:

- The Contractor should schedule construction activities such that all works that can be carried out in the day are conducted in the day. Night-time construction works should only take place for works that cannot be conducted in the daytime (e.g., safety-critical works).
  - Night-time construction works should avoid the peak breeding periods for resident birds (March to July).
- The Contractor should prepare a works-specific lighting management plan, which describes (1) site lighting plan, (2) light monitoring plan for the night-time construction works, and (3) the relevant construction method statements. These should be reviewed by the EMMP Consultant before works begin, and when necessary (e.g., when there are major changes to the lighting plan).
- The Contractor should conduct light monitoring prior to night works to establish baseline light levels.

- A dedicated briefing for night works should be conducted for staff involved in the night works before the works begin, to educate staff on safety measures, and wildlife response.
- The EMMP Consultant will be on call, and will be notified immediately should any fauna incidences occur during the night works.

## LIGHTING MANAGEMENT MEASURES

The level of lighting provided should be just sufficient to perform the construction or maintenance task, while still catering for safety and security purposes. There should be no over-provisioning of lighting, excessive light spillage to the surrounding establishments and forested areas should be minimised, to reduce impact to humans, and disturbances to environmentally sensitive receivers. In general, lighting should only be deployed (1) when it is strictly needed; (2) where it is needed; (3) in the appropriate amount for a specific task; and (4) with the appropriate spectrum.

The light levels at the forested area outside the site hoarding should be maintained as close as possible to natural light levels. As such, monitoring of light levels along the hoarding will be required prior to commencement of night works.

The Contractor should incorporate or practice the following measures:

- For lighting equipment, consider:
  - Using warm lighting where possible during construction works after 1800 h (i.e., soft white and warm white light bulbs, preferably at < 2,700 K).
  - Avoid using high UV and broad-spectrum lights (except for safety reasons).
- Minimise light spillage into adjacent sensitive areas, by ensuring the following, when safe to do so:
  - Ensure that lighting is only used where really necessary; worksite to remain dark as much as possible.
  - Ensure that no light sources are directly visible from the forest edge as much as possible.
  - Ensure that lighting used for construction works are pointed away from forested areas and directed downwards as much as possible to prevent any disturbance to wildlife.
  - Ensure that lighting used for construction works are directed/placed such that there is no unintended reflection of light towards the nature areas.
  - If necessary, temporary enclosures / barriers will be erected at the work area to reduce light spillage.
  - An opaque hoarding/screen should be installed at the Project/night works area adjacent to forested areas in order to reduce light spillage and to prevent wildlife from entering the worksite.
  - During indoor construction works, keep windows and doors closed, and/or seal windows or openings, especially those facing forested areas, with acoustic sheets at designated worksites to prevent light spillage out of the building (and provide screening effects to noise generated from the construction works).
  - When doors and/or windows are opened for the safety of workers using welding tools or during other works requiring ventilation (e.g., painting, wallpapering, etc.), it is recommended that tarps be very loosely fitted around openings to reduce artificial light from escaping buildings while still allowing for sufficient air flow.

- Use light attenuating structures and/or materials (e.g., curtains, tarps, blackout coverings, etc.) to cover glass walls as well as windows and doorways in rooms where construction activities are being carried out.
- Ensure temporary lighting equipment is turned off when not in use, when safe to do so, and after the end of night works.
- For emergency situations, such as life safety, construction safety and health hazard, rescue operations and securing the safety of the site and personnel is paramount. All available lights & equipment will be used for rescue operations.
- If possible, restrict outdoor movements by workers to use of designated sanitary facilities (or in the case of an emergency, evacuation from buildings). When workers step outside of buildings, flashlights/headlamps for walking to and from sanitary facilities for safety purposes will be kept pointed towards the ground and away from forested areas.
- Light monitoring will be conducted using a light meter to monitor and document light levels around the worksite once every night during the night works. In areas where light levels exceed that of the baseline light levels, the site lighting plan should be reviewed to reduce light levels.
- If there are any wildlife encounters during night works (e.g., trapped, injured and dead birds by the site lighting), the Wildlife Response Plan should be activated.

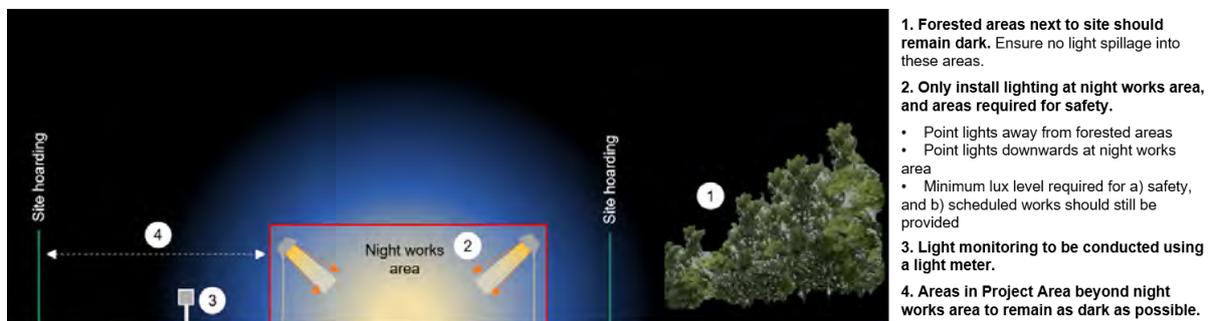


Figure 1 Summary of key lighting management measures within a construction setting.

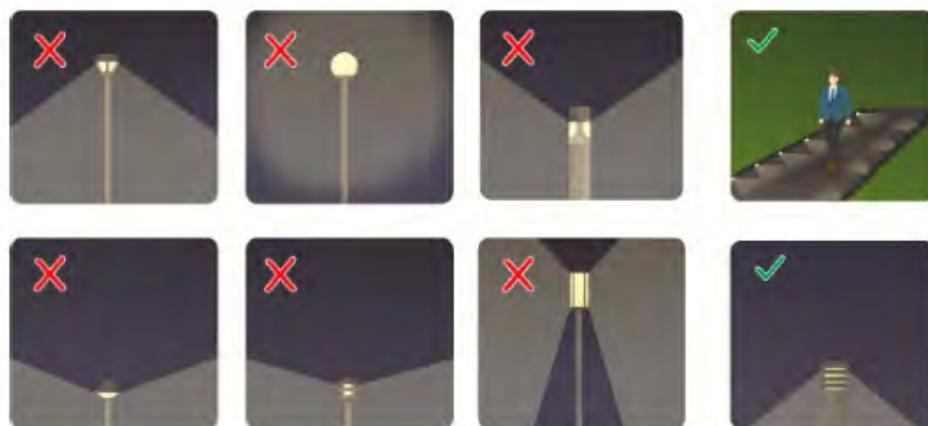


Figure 2 Lighting should be directed to ensure only the intended area is lit (figures adapted from Witherington & Martin 2003).

## SAFETY AND RISK

Risk assessment and standard work procedures will be conducted/developed prior to the start of night works. The Contractor will follow the processes highlighted in the Emergency Response Plan of the Environmental Management and Monitoring Plan.

In case of any wildlife encounters, the Wildlife Response Plan will be adhered to, similar to daytime works.

## REFERENCES

Witherington BE & Martin RE (2003) Understanding, assessing, and resolving light-pollution problems on sea turtle nesting beaches. Florida Marine Research Institute.

**APPENDIX I**

**Wildlife Incident Form**

## WILDLIFE INCIDENT FORM

Date (YYYY/MM/DD):	Time:
Description of Location:	GPS Coordinates:
Wildlife Observed:	Animal Condition: <input type="checkbox"/> Alive <input type="checkbox"/> Killed <input type="checkbox"/> Dead <input type="checkbox"/> Injured Animal Activity: <input type="checkbox"/> Moving <input type="checkbox"/> Resting <input type="checkbox"/> Trapped
Photographs Taken: <input type="checkbox"/> Yes <input type="checkbox"/> No	NParks Notified: <input type="checkbox"/> Yes <input type="checkbox"/> No  Name of NParks Staff Notified: _____
Describe Incident (e.g., activities being carried out; what animal was doing; personnel involved):   	
Actions Taken:   	
Reported by: _____	Reported to: _____
Contact #: _____	Contact #: _____
Remarks:   	

**APPENDIX J**

**References**

- AECOM. November 2021, Environmental Impact Study at Mount Pleasant. Final Report.
- Legislation Division of Attorney General's Chambers of Singapore. Environmental Protection and Management (Chapter 94A). 2018.
- Legislation Division of Attorney General's Chambers of Singapore. Environmental Protection and Management (Air Impurities) Regulations (Amendment). 2015.
- Legislation Division of Attorney General's Chambers of Singapore. Environmental Protection and Management (Off-Road Diesel Engine Emissions) Regulations. 2012.
- Institute of Air Quality Management (IAQM). Guidance on the Assessment of Dust from Demolition and Construction. 2014.
- Legislation Division of Attorney General's Chambers of Singapore. Environmental Protection and Management (Vehicular Emissions) Regulations. 2008.
- National Environment Agency. Code of Practice for Environmental Control Officers (Specified Construction Sites), 5<sup>th</sup> edition, amended June 2022.
- National Environment Agency (NEA). Air Quality Targets. 2019. Retrieved from <https://www.nea.gov.sg/our-services/pollution-control/air-pollution/air-quality>
- National Environment Agency (NEA). Technical Guideline on Boundary Noise Limits for Air Conditioning and Mechanical Ventilation Systems in Non-Industrial Buildings. 2018.
- National Environment Agency (NEA). Technical Guideline for Land Traffic Noise Impact Assessment. 2016.
- ISO 14837:2005 Mechanical vibration - Ground-borne noise and vibration arising from rail systems. International Organization for Standardization. 2005.
- American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE). ASHRAE Handbook HVAC Applications – Noise and Vibration Control.
- NEA (2000) Environmental Public Health (Toxic Industrial Waste) Regulations, <https://sso.agc.gov.sg/SL/EPHA1987-RG11>
- NEA (2008) Environmental Protection and Management (Trade Effluent) Regulations, <https://sso.agc.gov.sg/SL/EPMA1999-RG5>
- NEA (2018) Environmental Protection and Management Act, <https://sso.agc.gov.sg/Act/EPMA1999>
- PHILMINAQ (n.d.) Mitigating Impact from Aquaculture in the Philippines (PHILMINAQ), n.d. Water Quality Criteria and Standards for Freshwater and Marine Aquaculture. <http://aquaculture.asia/files/PMNQ%20WQ%20standard%202.pdf>
- PUB (2001) Sewerage and Drainage Act, <https://sso.agc.gov.sg/Act/SDA1999>
- PUB (2007) Sewerage and Drainage (Surface Water Drainage) Regulations, <https://sso.agc.gov.sg/SL/SDA1999-RG4?DocDate=20070515>
- PUB (2007) Sewerage and Drainage (Trade Effluent) Regulations, <https://sso.agc.gov.sg/SL/SDA1999-RG5?DocDate=20161003>
- PUB (2013) Code of Practice on Surface Water Drainage, [https://www.pub.gov.sg/Documents/COP\\_Final.pdf](https://www.pub.gov.sg/Documents/COP_Final.pdf)

- 
- PUB (2015) Preventing Muddy Waters from the Construction Sites.  
<https://www.pub.gov.sg/Documents/Circular2015Oct28.pdf>
  - PUB (n.d.) Water from Local Catchment.  
<https://www.pub.gov.sg/watersupply/fournationaltaps/localcatchmentwater>
  - Singapore Standard SS593:2013. Code of Practice for Pollution Control (COPPC). 2013
  - Singapore Standard SS602:2014 Code of Practice for Noise Control on Construction and Demolition Sites. 2014.
  - UNECE (1994) Standard Statistical Classification of Surface Freshwater Quality for the Maintenance of Aquatic Life, New York, and Geneva.
  - USEPA (2017) Water Quality Standards Handbook. <https://www.epa.gov/wqs-tech/water-quality-standards-handbook>.
  - URA (Urban Redevelopment Authority) (2019) URA Master Plan 2019. URA, Singapore.  
<https://www.ura.gov.sg/maps/?service=MP>
  - WSP (2023). Inception Report, Rapid Baseline Survey, Provision of Consultancy Services for HDB Development (Central), Reference Number 2630017A-001-Rev1, 22 March 2023.
  - WSP (2023). Rapid Baseline Survey. HDB Central EMMP, Reference Number 2630017-004-RevA, 5 June 2023

**wsp**

**wsp.com**