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Seemly Building Construction Co. Ltd.

Ecological Verification Survey Report – July 2017

Expansion of Research and Residential Facilities for the Swire Institute of Marine Science, The University of Hong Kong at Cape D'Aguilar, Shek O

Ecological Verification Survey

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Ecological Verification Survey for Expansion of Research and Residential Facilities for the Swire Institute of Marine Science, The University of Hong Kong at Cape D'Aguilar, Shek O

1. INTRODUCTION

1.1. Coalition for Research on Ecology and Wildlife Ltd. (CREW) was appointed by Seemly Building Construction Co. Ltd. to conduct a verification survey within the ecological survey extent described in the Project Profile (Register No. PP-548/2017).

1.2. Ecological Survey was conducted by previous third party surveyor in June, July, November and December 2016. From the survey, a total of six plant species of conservation importance were identified. These plant species of conservation importance were listed in the Project Profile, namely *Elaeagnus tutcheri* (香港胡頹子), *Lysimachia mauritiana* (濱海珍珠菜), *Millettia oraria* (香港崖豆藤), *Pavetta hongkongensis* (香港大沙葉), *Pittosporum tobira* (海桐) and *Vitis bryoniifolia* (蘡薁).

1.3. Besides, all trees in the survey context were inspected by previous third-party surveyor in May 2016. From the survey, a total of 15 trees were found to have direct conflict with the proposed construction works and hence need to be felled. They include one *Ficus elastica* (印度橡樹) outside the entrance of Academic Block and 14 trees of common and exotic species at the works area of the Residential Block 2 (**Table 1**). They are in fair to poor status and located within the extension works area but unsuitable for transplantation.

1.4. The purpose of this verification report is to confirm and update the conditions of all trees and plant species of conservation importance by qualified Ecologist. This report complies with Condition 2.4 under the Environmental Permit No. EP-537/2017. This report presents the findings from the field verification survey conducted on 14th July 2017 by following the same transect and cover the same extent as stated in the Project Profile (**Figure 1**).

2. METHODOLOGY

2.1. All plants of conservation importance were recorded by direct observation through active searching. Plant individuals which were hard to approach were identified using a pair of 10 x 42 binoculars. The survey also covered the trees in the survey extent and identified the trees that may be affected by the proposed works

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2.2. Since all plant species of conservation importance identified in the survey are herb, climber, shrub or sapling of small tree species, they are less robust (or more dynamic in population) than mature-sized trees against natural environmental factors, regardless any impact from human disturbance. They also have a shorter life-span or higher turn-over rate. Therefore their estimated quantity and locations were referenced to the Project Profile as a baseline (**Table 2**), while their locations, conditions and patch size (observable changes in large quantity) are more critical to indicate if they had been affected by construction works rather than missing a very few individuals. For example *Lysimachia mauritiana* (濱海珍珠菜) is biennial or perennial with annual-like nature (eFloras, 2017; University of Hawaii, 2017). Their life span is short, usually less than 5 years. Dying of mature individuals and regeneration of young individuals has been both observed at this site previously, where they generally occupy same patch of area (pers. obs.).

3. RESULTS

3.1. Six plant species of conservation importance were observed coinciding with previous findings as presented in the Project Profile and no additional plant species of conservation importance were detected. Natural dynamic in number of individuals was detected in the short-lived *Lysimachia mauritiana* (濱海珍珠菜; **Plate 1**). All patches were observed again at the same area marked in **Figure 1**. However, a few individuals that occurred by then in July 2016 was found disappeared without obvious regeneration of seedlings during present survey a year later (**Plate 2**). Surrounding perennial evergreen *Scaevola taccada* (草海桐) was found dead too, which indicates that the death is probably due to environmental factors (e.g. typhoon, heat stress) rather than the biennial life cycle of *Lysimachia mauritiana* (濱海珍珠菜).

3.2. Details such as size, health, structural condition, etc. of each individual of plant species of conservation importance are listed in **Table 3**.

3.3. As for the trees that were found to have direct conflict with the proposed construction works in the Project Profile, the only *Ficus elastica* tree (印度榕; T1) growing at the Academic Block was poor in form, health, and amenity value as stated in previous Tree Survey Report (**Plate 3**). Observations on the 14 trees at the Residential Block 2 found no felling against natural factors (e.g. typhoon).

3.4. Besides, three other trees of common and exotic species were found close to construction activities from the survey. They included one *Araucaria heterophylla* (異葉南洋杉; T5), one *Casuarina equisetifolia* (木麻黃; T6) at roadside near Residential Block 2; and one *Ficus elastica* (印度榕; TA) at roadside opposite to the lighthouse (**Figure 3**; **Plate 4**). Conditions of these three trees are detailed in **Table 4**. Additional joint site visit was then carried out with the contractor on 11th August 2017. From the finding of the site visit, it is anticipated that these trees would not be affected. To minimize the potential impacts, additional protection measure such as setting up tree protection zone will be provided, as detailed in paragraph 4.4.

3.5. Seedlings and saplings of the exotic and highly invasive tree *Leucaena leucocephala* (銀合歡), herb *Bidens alba* (白花鬼針草) and climber *Mikania micrantha* (薇甘菊) were observed near the Works Area. It is known that soils opening (e.g. due to vegetation clearance during construction phase) results in higher heat stress and loss in soil moisture to the site, and consequently more susceptible to invasion of exotic or undesirable weed species. They should be cleared and removed in whole, including the roots, whenever encountered throughout the construction phase, and packed properly before disposed as waste to prevent regrowth and dispersal of pollens and seeds. Otherwise they can pose irreversible negative impacts to local native plant community and may threaten the survival of plant species of conservation important.

4. CONCLUSIONS & RECOMMENDATIONS

4.1. Locations and conditions of all six plant species of conservation importance are confirmed and updated in this verification survey. All are in good to fair condition. Protection zone will be provided in accordance with Condition 2.6 of the Environmental Permit i.e. the plant species of conservation importance will be fenced off with orange net of at least 1m in height with at least 1.5m setback from peripheral individuals (**Figure 2**). Protection zone for *Lysimachia mauritiana* (濱海珍珠菜) is set in broader scale with suitable growing habitat for them to disperse and regenerate. This also keeps the plant inconspicuous to general public (e.g. hikers and visitors, as shown at the center of the **cover photo**).

4.2. No additional plant species with conservation importance are detected. A patch of *Lysimachia mauritiana* (濱海珍珠菜) occurring by then in July 2016 was found disappeared without obvious regeneration of seedlings during present survey a year later.

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4.3. All plant species of conservation important should be protected, retained *in-situ* and not be disturbed in accordance with Condition 2.5 of the Environmental Permit. In order to better preserve the very rare plant species of conservation importance *Lysimachia mauritiana* (濱海珍珠菜) against unpredictable human or natural disturbance, it is feasible to build up additional assurance colonies by collecting seeds year round and growing them in suitable habitat.

4.4. Besides, three other trees of common and exotic species were found close to construction activities from the survey. They included one *Araucaria heterophylla* (異葉南洋杉; T5), one *Casuarina equisetifolia* (木麻黃; T6) at roadside near Residential Block 2; and one *Ficus elastica* (印度榕; TA) at roadside opposite to the lighthouse (**Figure 3**). Additional joint site visit was then carried out with the contractor on 11th August 2017. From the finding of the site visit, it is anticipated that these trees would not be affected. To minimize the potential impacts, additional protection measure will be provided. These trees should be protected and preserved by fencing off with orange net of at least 1m in height. Such protection zone should be at least 1.5m setback from tree trunks (**Figure 4**). They would be followed up in subsequent monitoring. Works should be been optimized to avoid encroaching into the protection zone as far as possible. Any works inevitably conducted in the protection zone of these three trees (e.g. removing mad-made concrete surface of a path) shall be minimized its impact to the root system and avoid any damage to the anchor roots. On the other hand, the 15 trees applied for felling are awaiting approval by Lands Department.

4.5. To avoid potential negative impacts to local native plant community and survival of plant species of conservation important, exotic and highly invasive tree *Leucaena leucocephala* (銀合歡), herb *Bidens alba* (白花鬼針草) and climber *Mikania micrantha* (薇甘菊) should be cleared and removed in whole, including the roots, whenever encountered throughout the construction phase, and packed properly before disposed as waste to prevent regrowth and dispersal of pollens and seeds.

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University of Hawaii (2017). Native Plants Hawaii. http://nativeplants.hawaii.edu/nursery/huikumaoliola/inventory/view/Lysimachia_mauritiana. Accessed on 15th July 2017.

Figure 1. Ecological survey extent, transect and locations of species of conservation importance (Extracted from the Project Profile).

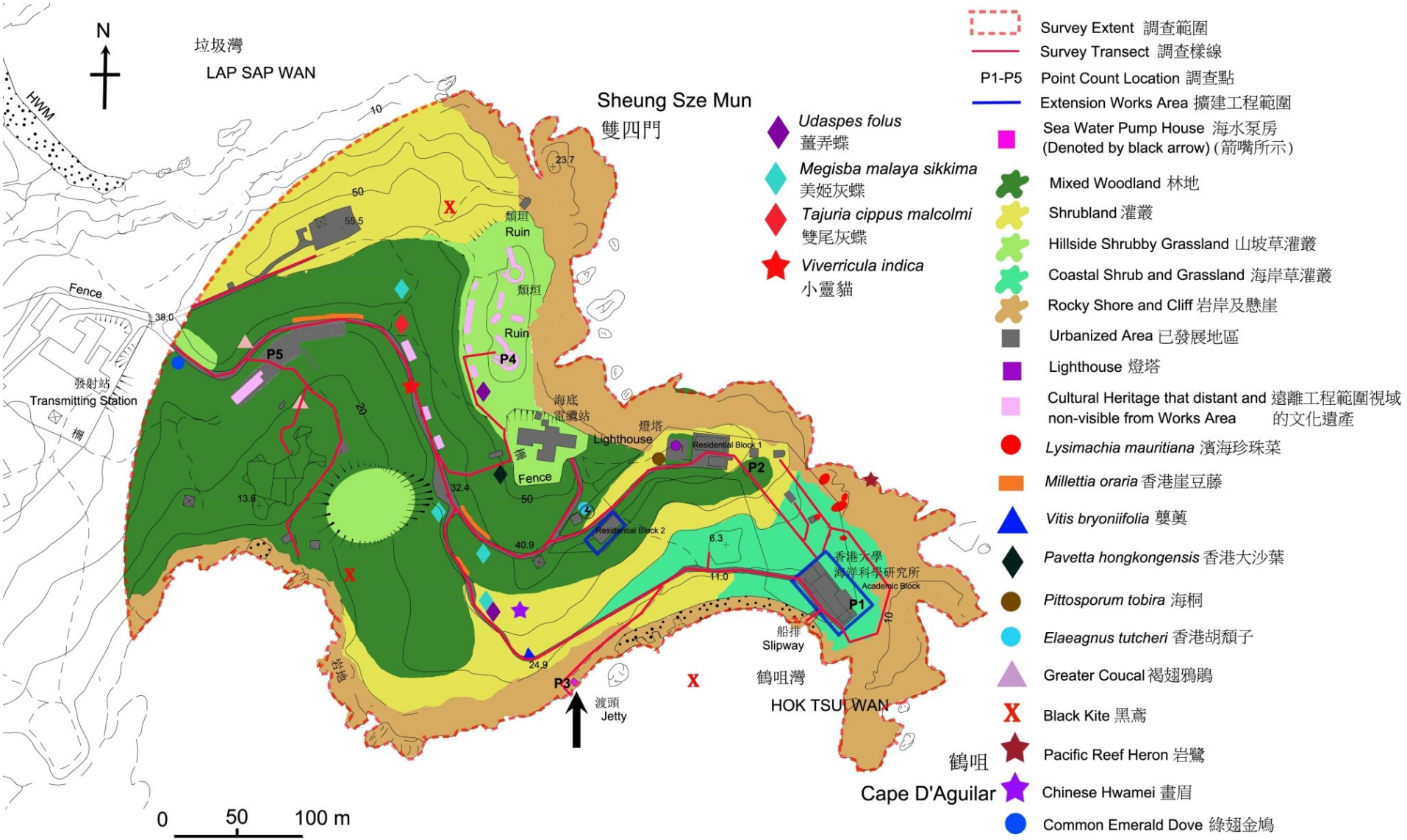


Figure 2. Proposed plant protection zone for the six plant species of conservation importance.

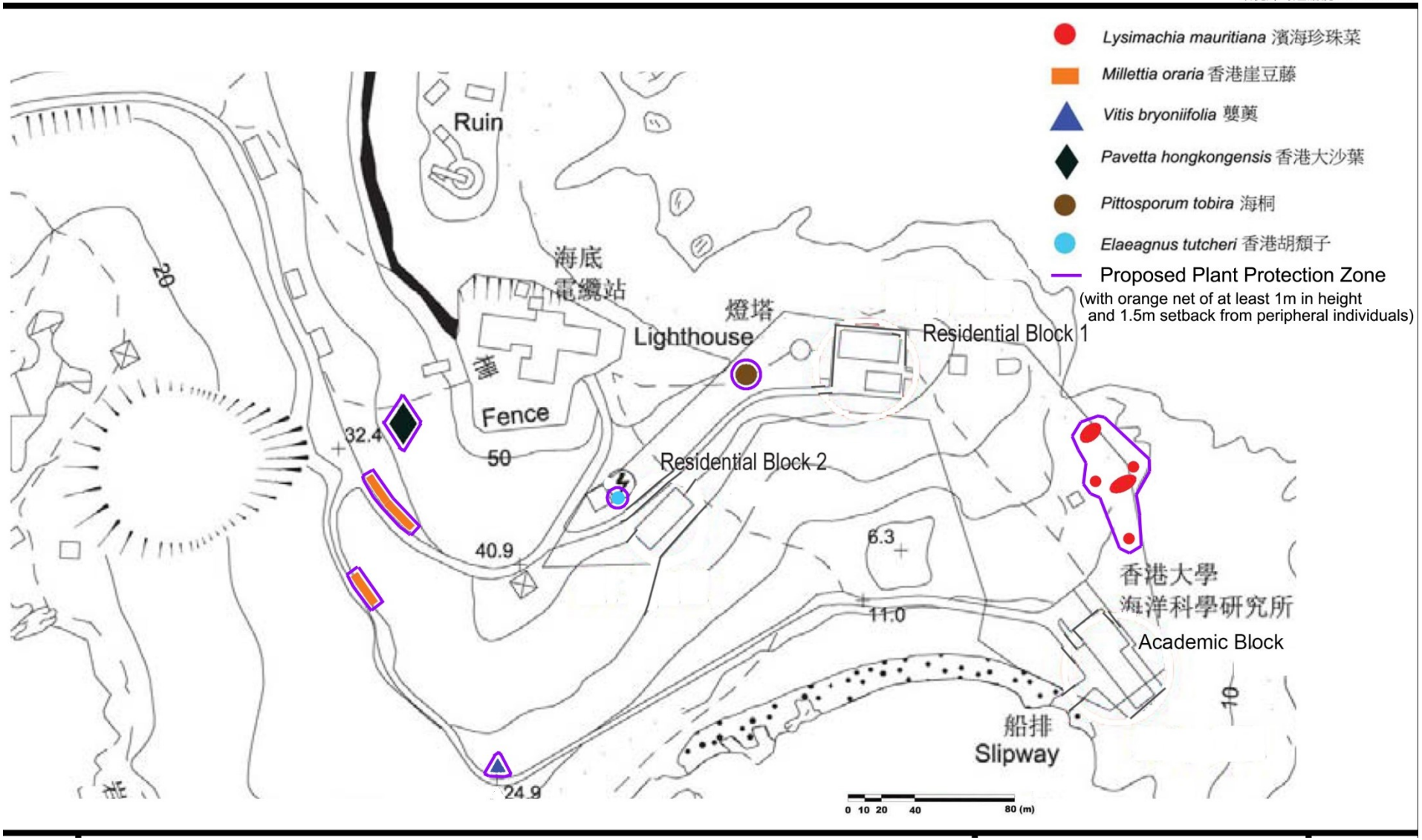


Figure 3. Indicative locations of the three trees of common and exotic species that found to be close to construction activities. They would not be affected due to additional protection measure provided.

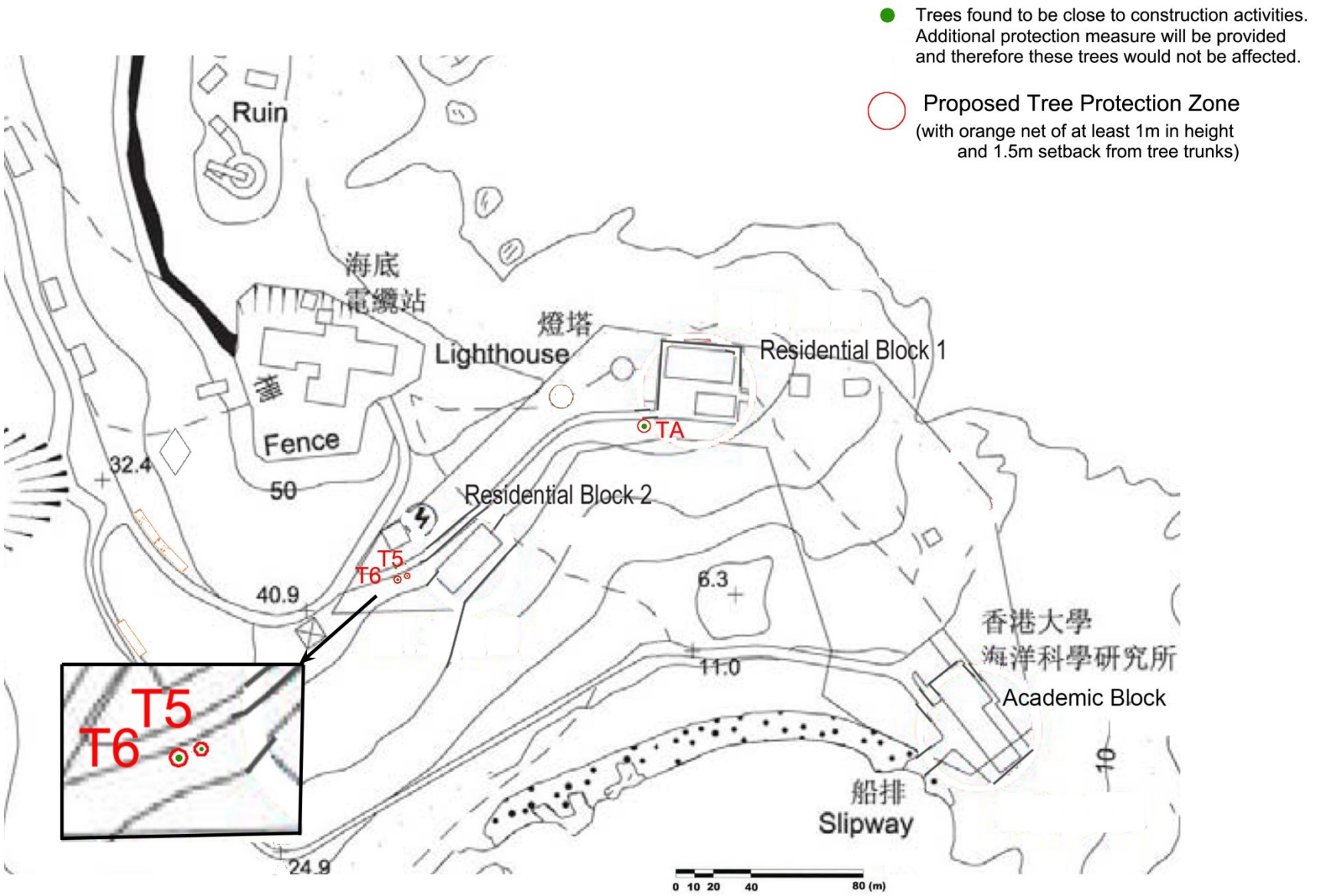
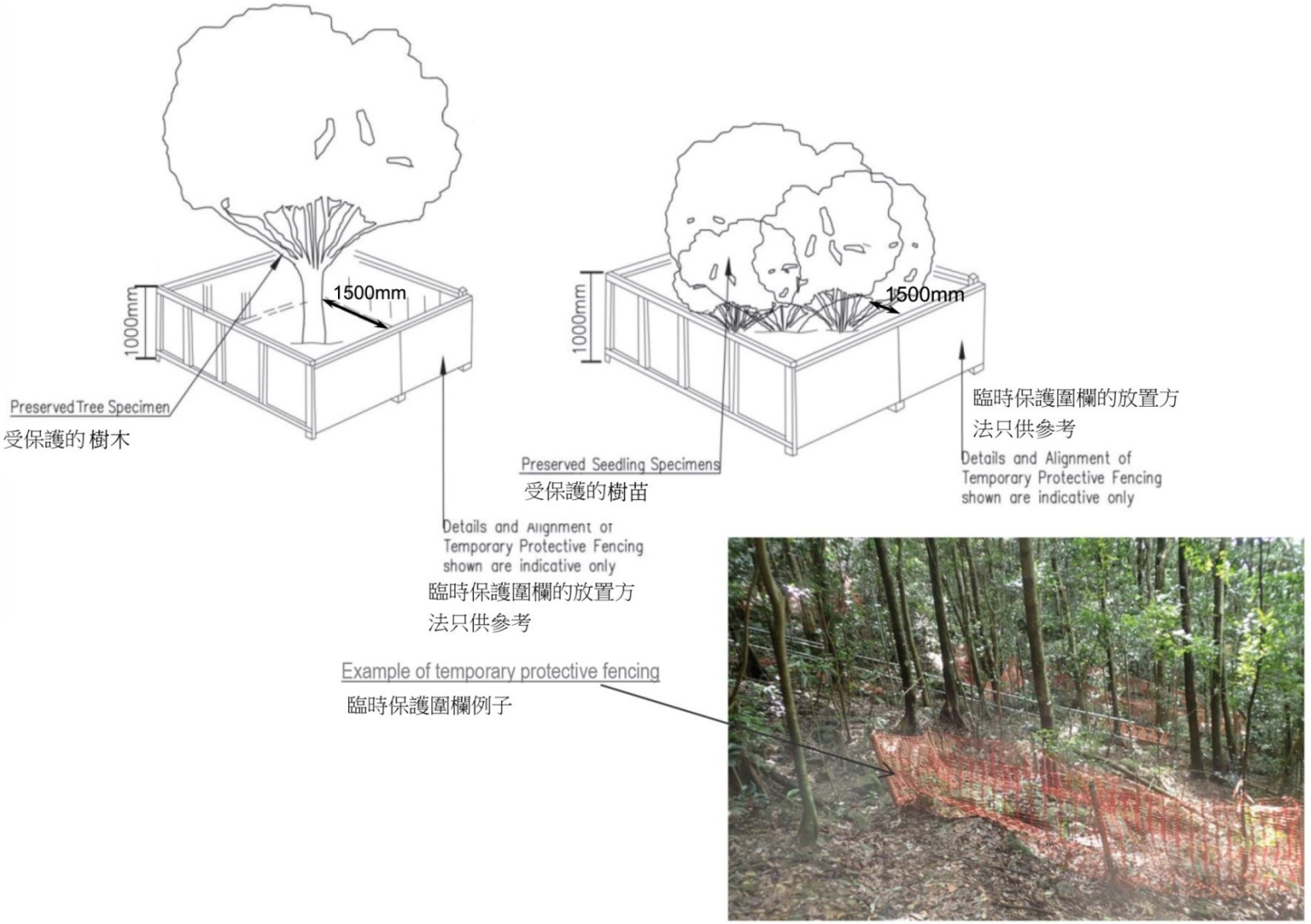


Figure 4. Indicative plan of temporary protective fencing for the three retained trees of common and exotic species. (Prepared based on Figure 4 of Environmental Permit No.: EP-537/2017)



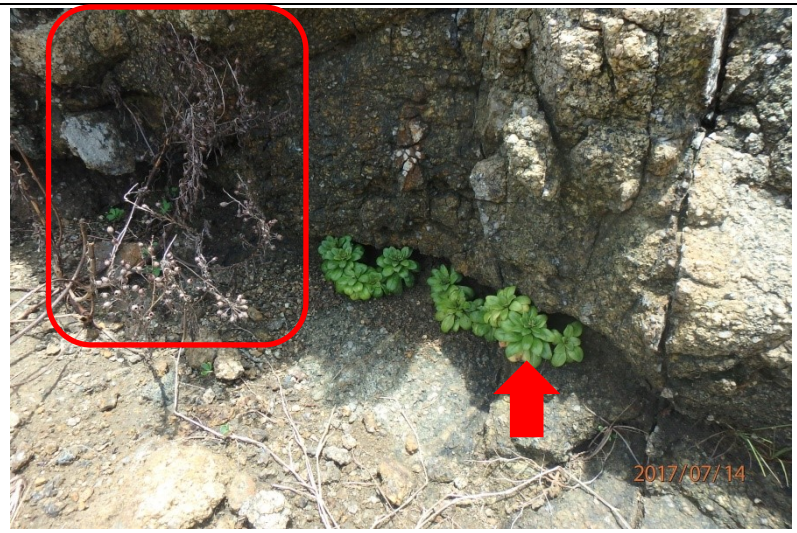
(For Illustrative Purpose)
(僅供說明用途)

Plate 1. Plants species of conservation importance observed.

Lysimachia mauritiana (濱海珍珠菜). Mature individual in flowers and fruits.

Lysimachia mauritiana (濱海珍珠菜) is biennial or perennial with annual-like nature. Leaves become yellow when most fruits are maturing.

This same individual was alive by then in July 2016. It was found dead naturally during this verification survey.



Life span is short for this species (usually < 5 years). Cycle in dying of old (red frame) and regeneration of young individuals (arrow) were happening at the same patch of suitable habitat.

Plate 1 (cont'd). Plants species of conservation importance observed.

	
Pavetta hongkongensis 香港大沙葉	*Millettia oraria* 香港崖豆藤
	
Flower of *Millettia oraria* 香港崖豆藤	*Elaeagnus tutcheri* 香港胡頹子

Plate 1 (cont'd). Plants species of conservation importance observed.

Elaeagnus tutcheri 香港胡頹子

Pittosporum tobira 海桐

Vitis bryoniifolia 蘡薁

Plate 2. The patch of *Lysimachia mauritiana* (濱海珍珠菜) observed at coastal area in July 2016 (top; red frame) was found disappeared without obvious regeneration of seedlings during present survey, which was conducted in July 2017 (bottom). Note the death of perennial evergreen *Scaevola taccada* (草海桐; shrub at the margin of this photo).

Plate 3. The *Ficus elastica* (印度榕; T1) growing at the Academic Block is poor in form, health and amenity value.

Plate 4. Three trees were found to be close to construction activities. Additional protection measure will be provided and therefore these three trees will not be affected. They included *Araucaria heterophylla* (異葉南洋杉; T5, blue arrow), *Casuarina equisetifolia* (木麻黃; T6, red arrow) near Residential Block 2; and *Ficus elastica* (印度榕; TA) at roadside leading to the lighthouse (bottom).

Table 1 Trees applied for felling due to the construction works.

Tag No.	Scientific Name	Chinese Name	DBH(1) (mm)	Spread (m)	Height (m)	Native/ Exotic	Location
T1	*Ficus elastica*	印度橡樹	360	4	9	Exotic	Academic Block
T49	*Macaranga tanarius* 血桐		100	6	3	Native	Residential Block 2
T50			120	4.5	2		
T52			100	5	3		
T55			120	4	1.5		
T56			145	6	4		
T59	*Leucaena leucocephala*	銀合歡	105	6	2	Exotic	
T60	*Macaranga tanarius*	血桐	100	4.5	3	Native	
T62	*Syagrus* sp.	山葵屬	210	5	3	Exotic	
T64	*Macaranga tanarius* 血桐		310	4.5	5	Native	
T65			130	4.5	2		
T66			125	2.5	1.5		
T67			105	4	1.5		
T68			100	4	2.5		
T70			150	5	3		

(1). DBH: Diameter at Breast Height

Table 2 Plant species of conservation importance identified in the Project Profile.

Species	Quantity (Offsite Record)	Growth Form	Total Quantity	Estimated Distance from Academic Block	Commonness & Conservation Status[1]
Elaeagnus tutcheri (香港胡頹子)	1 at margin of mixed woodland	Shrub	1	172m at higher elevation	Rare
Lysimachia mauritiana (濱海珍珠菜)	30 in coastal shrub and grassland	Herb	30	25m for the closest 8 individuals	Very Rare
Millettia oraria (香港崖豆藤)	40 in mixed woodland, growing above a roadside man-made slope	Shrub	40	234m at higher elevation	Rare
Pavetta hongkongensis (香港大沙葉)	2 saplings in mixed woodland	Shrub/Tree	2	240m at higher elevation	Locally common; Cap. 96[2]
Pittosporum tobira (海桐)	10 in shrubland	Shrub/Tree	10	138m at higher elevation	Rare but also cultivated in parks and gardens[3]
Vitis bryoniifolia (蘡薁)	1 in shrubland along roadside	Climber	1	216m at higher elevation	Rare

Reference

(1) Hong Kong Vascular Plants: Distribution and Status (Corlett et al, 2000)

(2) Cap.96: Forests and Countryside Ordinance

(3) Flora of Hong Kong Vol. 2 (AFCD and South China Botanic Garden, 2008)

Table 3. Details of the plant species of conservation importance recorded during the verification survey.

Species name	Chinese name	Growth Form	Height (m)	Crown spread (m)	DBH (mm)	Form	Health & structural condition	Amenity value	Survival rate after transplanting[1]	Recommendation (Retain/Transplant/Fell)	Potentially hazardous	Remarks
Elaeagnus tutcheri	香港胡頹子	Shrub	1.5	2	N/A	Good	Good	Good	Low	Retain	No	In 1 patch
Lysimachia mauritiana	濱海珍珠菜	Herb	0.03-0.25	N/A	N/A	Good	Good	Good	Medium	Retain; transplant only when unpredictable disturbance happened, with no better alternative protection measure	No	Sporadically distributed in coastal area, with most mature individuals growing closest to the Academic Block
Millettia oraria	香港崖豆藤	Shrub	2-3	N/A	N/A	Fair	Good	Good	Low	Retain	No	In 2 patches separated by road
Pavetta hongkongensis	香港大沙葉	Shrub/Tree	2	1	15	Fair	Fair	Good	Low	Retain	No	Sapling
Pavetta hongkongensis	香港大沙葉	Shrub/Tree	0.2	0.4	5	Fair	Fair	Good	Medium	Retain	No	Seedling
Pittosporum tobira	海桐	Shrub/Tree	3	2	N/A	Good	Good	Good	Low	Retain	No	In 1 patch
Vitis bryoniifolia	蘡薁	Climber	1.5	1.5	N/A	Good	Good	Good	Low	Retain	No	In 1 patch

Note:

(1) Survival rate for tree and shrub is assessed as low for seedlings with height above 1m; and medium (50% chance of survive) for sapling 1m at height or below

Survival rate for herb is assessed as medium (50% chance of survive) while that for climber is low

Table 4. Conditions of the three trees identified close to construction activities during the verification survey. Additional protection measure will be provided and therefore these trees will not be affected.

Tree No.	Scientific Name	Chinese Name	Estimated Size			Structural Condition	Form	Health	Amenity Value	Suitability for Transplanting	Conservation Status	Recommendation (Retain/Transplant/Fell)	Potentially hazardous	Remarks
			Height (m)	Trunk DBH (mm)	Spread (m)									
T5	*Araucaria heterophylla*	異葉南洋杉	8	215	3	Good	Fair	Fair	Fair	Low	Nil	Retain	No	Exotic
T6	*Casuarina equisetifolia*	木麻黃	4.5	220	4	Fair	Poor	Poor	Poor	Low	Nil	Retain	No	Exotic, crack and decay on trunk, main branches broken with jagged wounds; weak canopy and sprouting
TA	*Ficus elastica*	印度榕	6	648	7	Good	Fair	Fair	Fair	Low	Nil	Retain	No	Exotic