Draft Fanling/Sheung Shui Extension Area Outline Zoning Plan No. S/FSSE/1

Representation No. R3378
Town Planning Board
26 June 2023

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Presentation outline

1. Prologue
2. Irreplaceable natural and cultural endowment
3. Extensive and lingering harms of the proposed housing development
4. Epilogue

1. Prologue

Objection to the proposed development

- Diametrically opposite land uses: Extreme ends of an artificial-to-natural spectrum
- Exceptionally high-density and high-rise housing project
- Intruding into a rural, bucolic and natural area with exceptionally high ecological, environmental, landscape and historical values
- Evidently a mismatch or inappropriate use
- Such incompatibility and incongruity are invariably avoided in enlightened jurisdictions

1. Prologue

Extensive on-site and off-site impacts of the development

- Loss of an invaluable and irreplaceable community heritage
- Massive decimation of high-calibre nature in the construction stage
- Continued decline of remnant-degraded nature in the operation stage
- Collateral spillover damage to “protected” nature in adjacent sub-areas 2-4

Two-pronged approach of the presentation

- Explain the precious natural-cum-cultural endowment of the site (2.1 to 2.9)
- Prognosis of extensive and lingering harms mainly on trees (3.1 to 3.9)

2. Irreplaceable natural and cultural endowment

2.1. Valuable natural-cum-cultural landscape

2.2. Unique historical heritage landscape

2.3. Living national treasure Chinese Swamp Cypress and other endangered trees

2.4. Unimpeded and high-quality rootable soil for meritorious tree growth

2.5. Habitat connectivity of ecological green corridors

2.6. Stepping-stone site for wildlife movement

2.7. Effective cool island effect suppressing heat island effect

2.8. Essential ecosystem service of air pollution mitigation

2.9. Alternative lands with lower ecological and landscape values

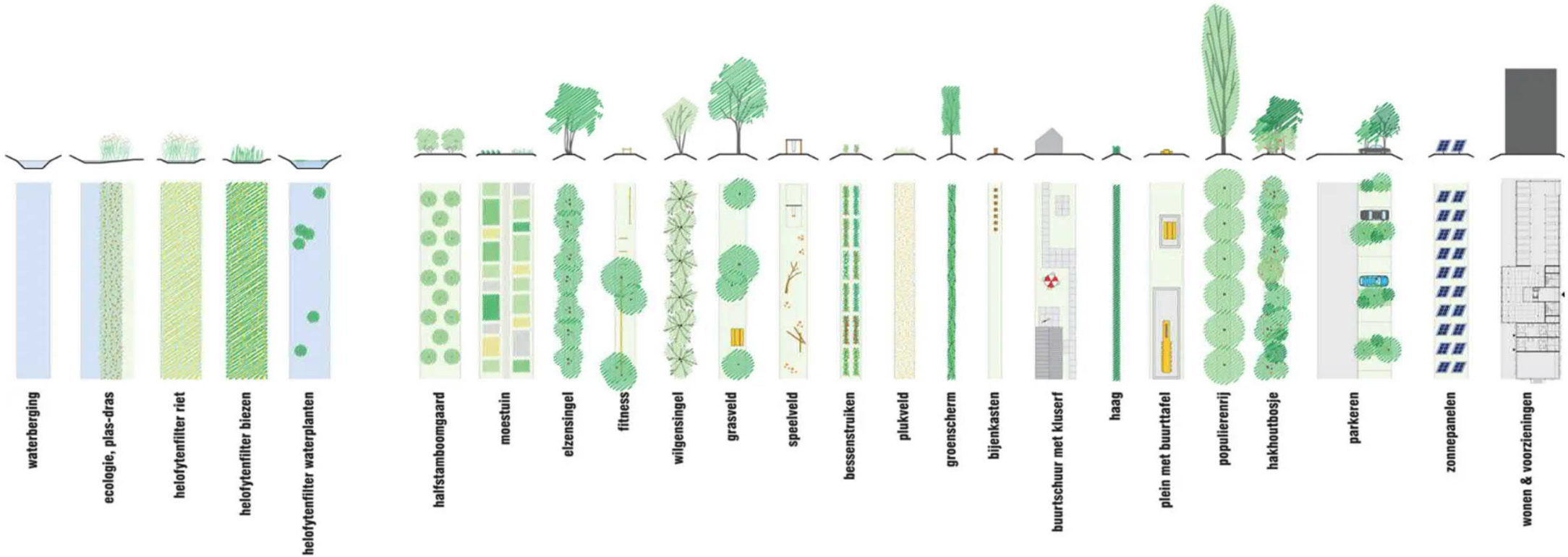
2.1. Valuable natural-cum-cultural landscape

Intimate blending of natural and cultural landscapes

- Product of over a century of synergistic interactions between humans and nature
- Original farmland transformed into the present mature hybrid ecosystem
- Preserved original natural features, enhanced by modified habitats and biota
- Land conversion process respected the original terrain with undulations and rolling configuration
- Original, modified and cultivated vegetation composed of diverse growth forms: herbs, shrubs, climbers, small trees, large trees, isolated trees, tree rows, woodland patches and woodland strips
- Populated by a combination of native, exotic and naturalized species

Lesson: Preserve the natural-cum-cultural beauty of the highest order

Natural to artificial ecosystem spectrum



2.1. Valuable natural-cum-cultural landscape

Varied drainage conditions: well-drained, moderately well-drained, poorly drained, and waterlogging; streams, ponds, freshwater marsh

- Surprisingly diverse permutations of hydrological scenarios
- Assorted assemblage of slopes: flat, gentle, relatively steep
- Varied slope positions and aspects in relation to compass direction and seasonal solar angle
- Combination of multiple factors to generate many permutations of ecological conditions to support equally diverse biological communities
- Comprehensive range of microhabitats furnishes an exceptionally high carrying capacity to support a rich species diversity of flora and fauna

Lesson: The whole spectrum of microhabitats spreading in sub-areas 1-4 should be protected to maintain ecological integrity

High-order natural-cum-cultural beauty and heritage landscape

2.2. Unique historical heritage landscape

Meticulous professional high-quality site care over a century

- A superior verdant, rustic and historical landscape
- Consistently maintained and guarded against human intrusions
- Largest collection of potential OVTs at one site in Hong Kong
- Finest turf and the most attractive arboreal and parkland landscape in the territory
- A historical-cultural landscape with a long history of continued excellence is rare in the tropical realm
- In most enlightened jurisdictions, such a meritorious site would be designated as a cultural heritage and shielded against on-site or nearby development
- Please do not damage it now and regret its demise later (e.g., attempt to re-create the Tiger Balm Garden)

Lesson: Keep the sterling outcome of a century of labour of love and professional groundsmanship

A century of sterling professional care: Vegetation-soil-water trilogy

2.2. Unique historical heritage landscape

Enumerated 84 Trees of Particular Interest (TPI) in sub-area 1 alone

- Some >1000 mm trunk diameter
- Some >100 years of age
- Well qualified as potential OVTs
- A ready-made arboretum
- Can raise the number of OVT in Hong Kong by over 10%
- Especially essential due to continued and alarming loss of OVTs in Hong Kong

Lesson: Designate selected TPIs as OVTs to enhance protection and appreciation

Potential heritage trees (OVTs) in the golf courses

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CrossMark

Legacy effect of trees in the heritage landscape of a peri-urban golf course

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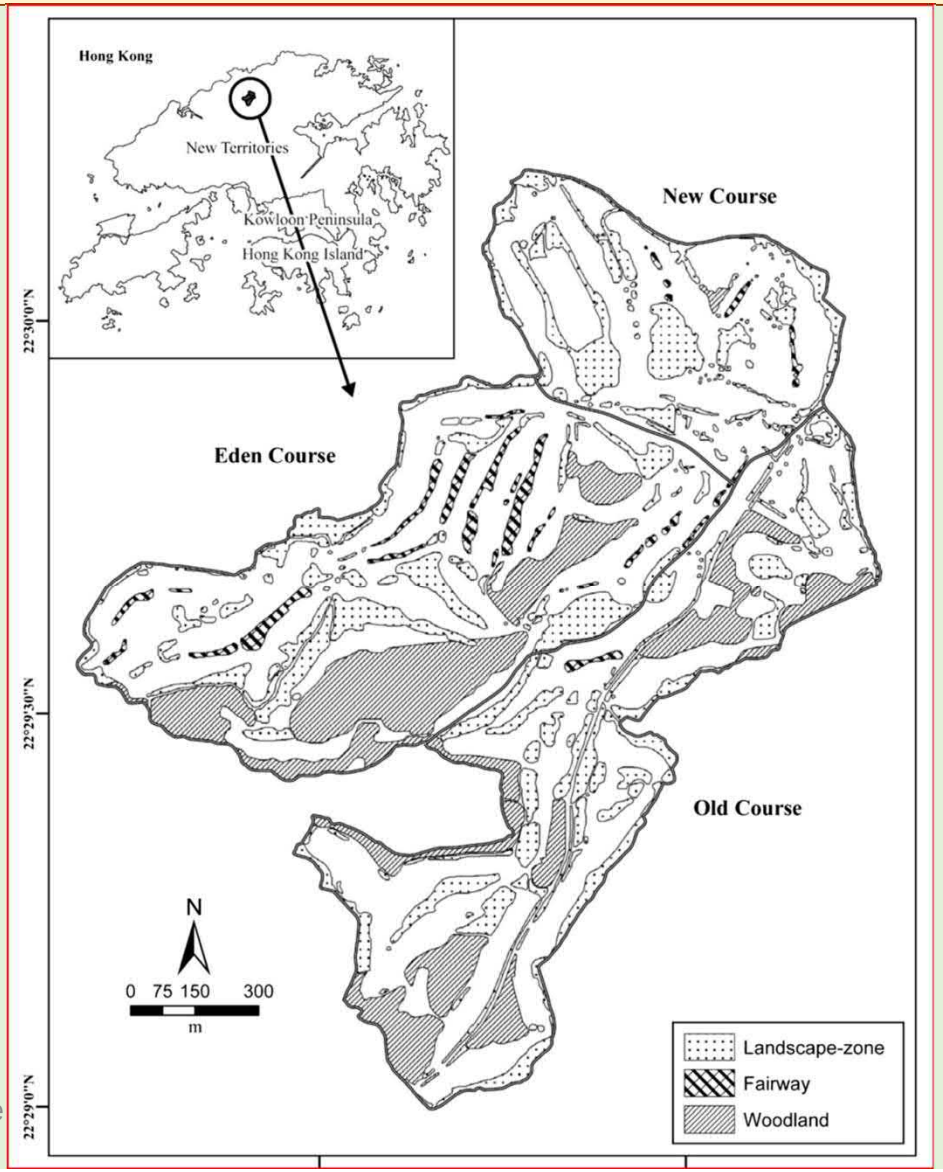
Published online: 28 April 2016

Abstract Negative environmental impacts of golf courses have received more attention than positive ecological contributions. We studied the mature tree communities and their legacy effect in a historical urban-fringe golf-course site in Hong Kong covering 170-ha with well-managed natural-cum-cultural landscape. Some 44.3 % of the site is covered mainly by large trees forming a mature peri-urban forest. The 94 species in 35 families offer a high species diversity exceeding local secondary and climax fengshui woodlands with notable rare and protected species. Tree species composition, richness and legacy effects brought by anthropogenic and natural factors were investigated by three habitats with varying naturalness and three golf courses with different age. Landscape zone is remarkably heterogeneous versus other microhabitats (fairway and woodland) and the heterogeneity of tree communities amongst the three courses is relatively weak. Synergistic operation of natural regeneration (natural legacy effect) and anthropogenic management (anthropogenic legacy effect) has fostered diversity accumulation. On the one hand, temporal changes in landscape fashion through a century and variations in site management have driven and maintained species diversity. On the other hand, the founder effect of inherited and cultivated species, as well as successful invasion and establishment of native species, have imposed floristic imprint and inertia on woodland habitat. The findings suggested that urban golf courses can serve as potential hotspots for biodiversity conservation within urban ecosystems.

Keywords Golf course ecology · Legacy effect · Founder effect · Natural-cum-cultural heritage landscape · Urban ecosystems

Course



89 potential heritage trees (OVTs) identified by field survey in the Old Course

Table 3.1.1. Species distribution of the 89 HTs identified in the Old Course.

Latin name	Common name	Chinese name	Botanical family	Quantity
Adenanthera microsperma	Red Sandalwood	海紅豆	Mimosaceae	1
Aquilaria sinensis	Incense Tree	土沈香	Thymelaeaceae	13
Artocarpus hypargyreus	Silver-back Artocarpus	白桂木	Moraceae	1
Bombax ceiba	Red Kapok Tree	木棉	Bombacaceae	1
Canarium tramdenum	Black Olive	烏欖	Burseraceae	1
Casuarina equisetifolia	Horsetail Tree	木麻黃	Casuarinaceae	1
Celtis sinensis	Chinese Hackberry	朴樹	Ulmaceae	2
Cinnamomum camphora	Camphor Tree	樟	Lauraceae	10
Cinnamomum parthenoxylon	Yellow Camphor Tree	黃樟	Lauraceae	2
Delonix regia	Flame of the Forest	鳳凰木	Caesalpiniaceae	2
Dimocarpus longan	Longan	龍眼	Sapindaceae	1
Eucalyptus citriodora	Lemon-scented Gum	檸檬桉	Myrtaceae	6
Ficus microcarpa	Chinese Banyan	細葉榕	Moraceae	7
Ficus virens	Big-leaved Fig	大葉榕	Moraceae	1
Fraxinus griffithii	Formosa Ash	光蠟樹	Oleaceae	2
Glochidion hirsutum	Thick-leaved Abacus Plant	厚葉算盤子	Euphorbiaceae	1
Glochidion lanceolarium	Large-leaved Abacus Plant	艾膠算盤子	Euphorbiaceae	1
Glyptostrobus pensilis	Water Pine	水松	Taxodiaceae	33
Keteleeria fortunei	Fortune's Keteleeria	油杉	Pinaceae	1
Pterocarpus indicus	Burmese Rosewood	紫檀	Fabaceae	2
Total				89

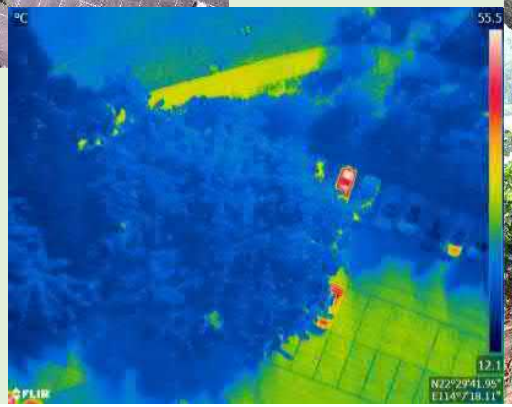
HT001: Burmese Rosewood (Pterocarpus indicus)

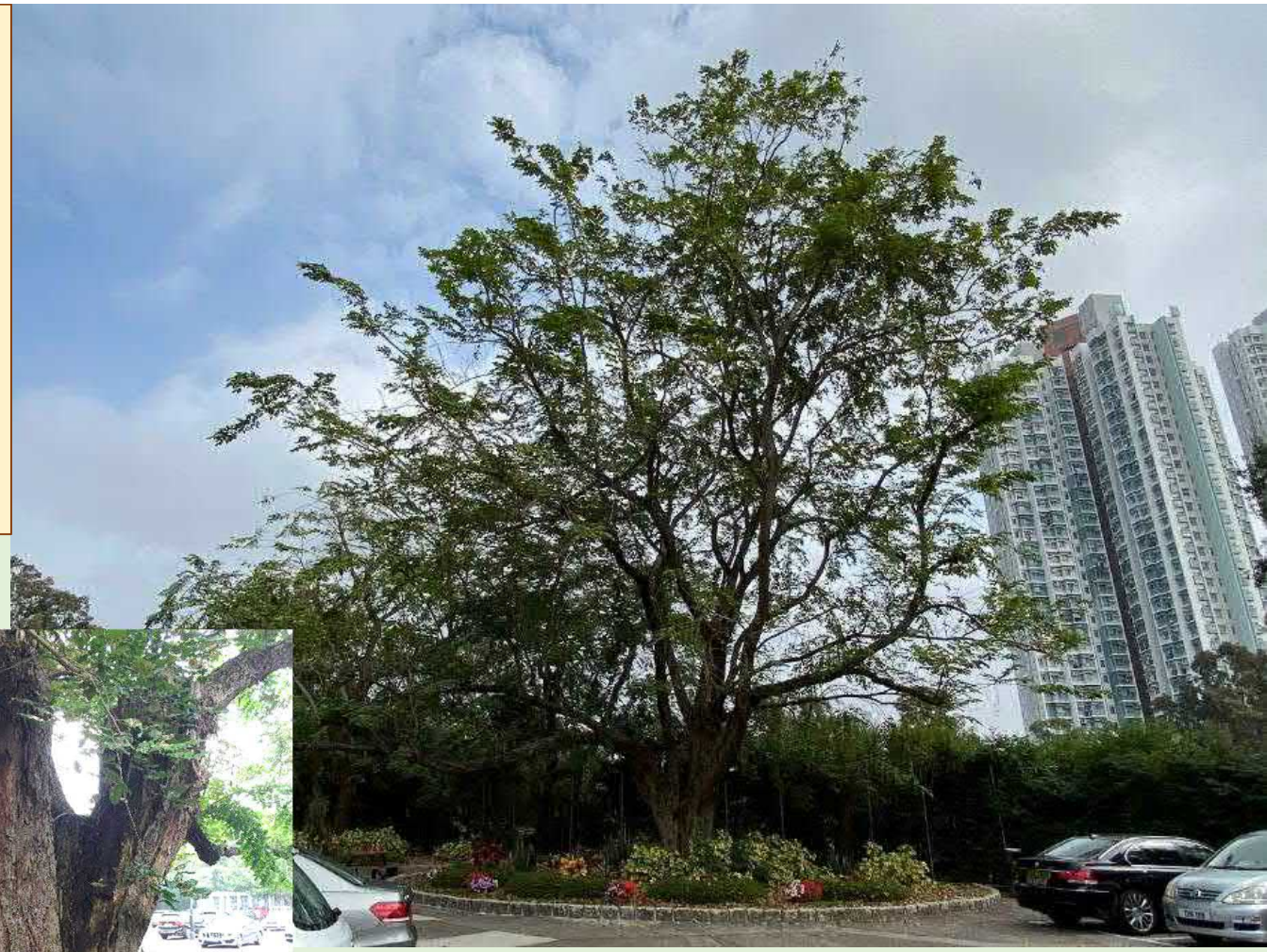
Height: 16.7 m

DBH: 1.30 m

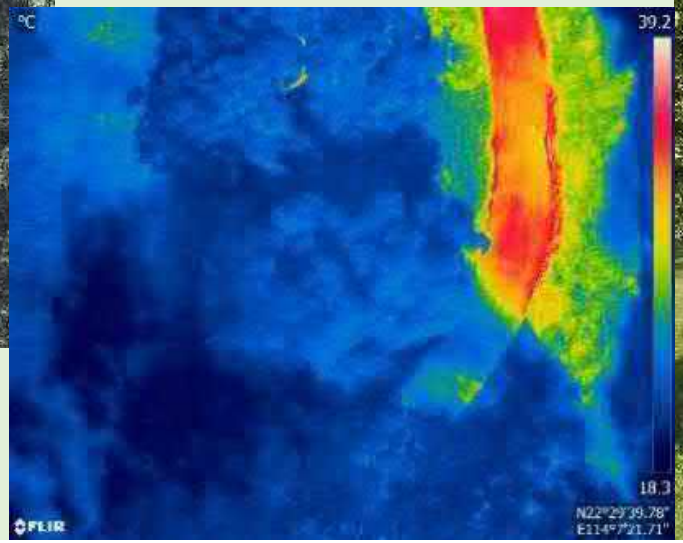
Crown spread: 21.9 m

Estimated age: 110 years

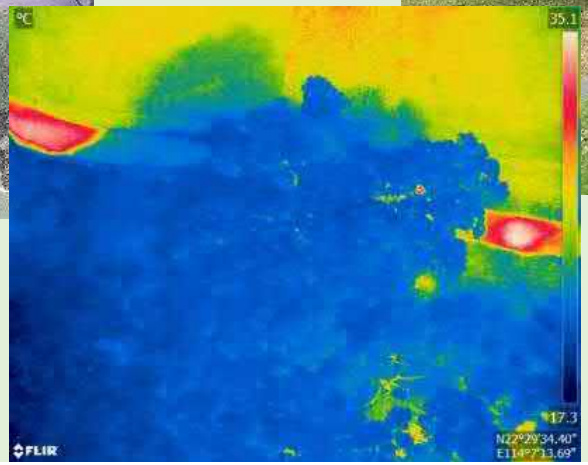


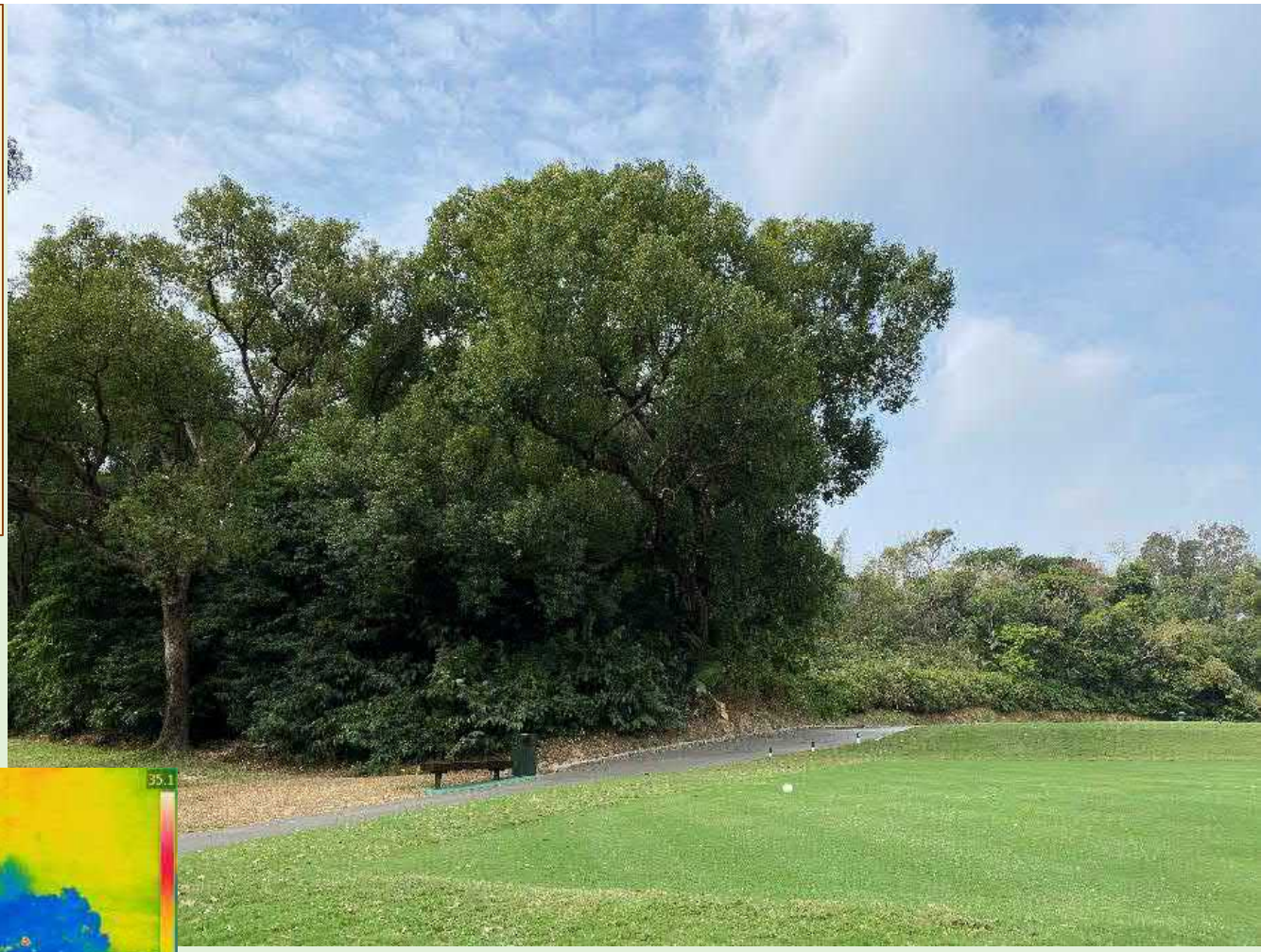


HT004: Incense Tree
(Aquilaria sinensis)
Height: 10.6 m
DBH: 0.39m
Crown spread: 7.4 m
Estimated age: 75 years

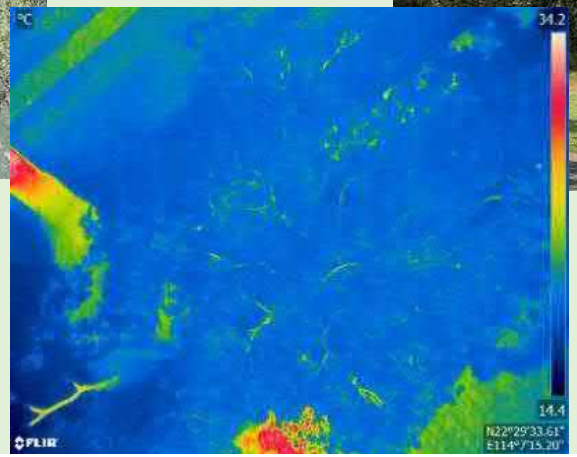


HT008: Camphor Tree
(Cinnamomum camphora)
Height: 14.9 m
DBH: 1.23 m
Crown spread: 17.9 m
Estimated age: 135 years

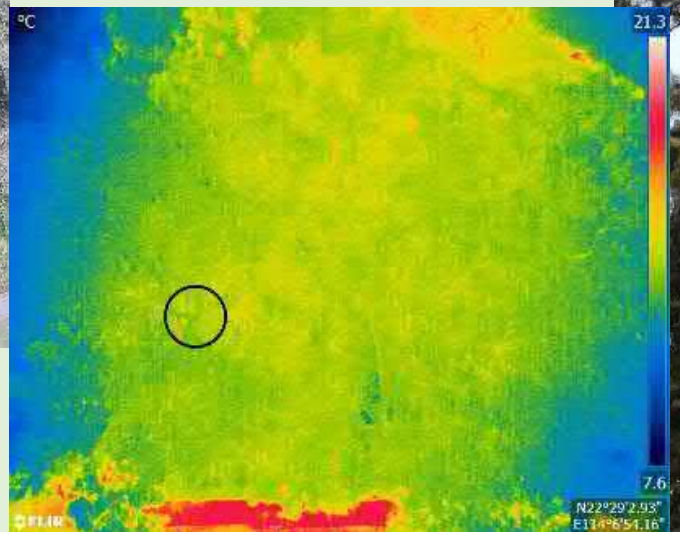




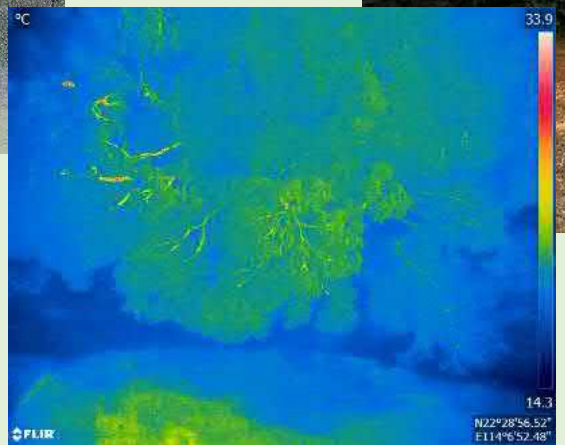
HT010: Red Sandalwood
(Adenanthera microsperma)
Height: 19.2 m
DBH: 0.82 m
Crown spread: 21.0 m
Estimated age: 75 years

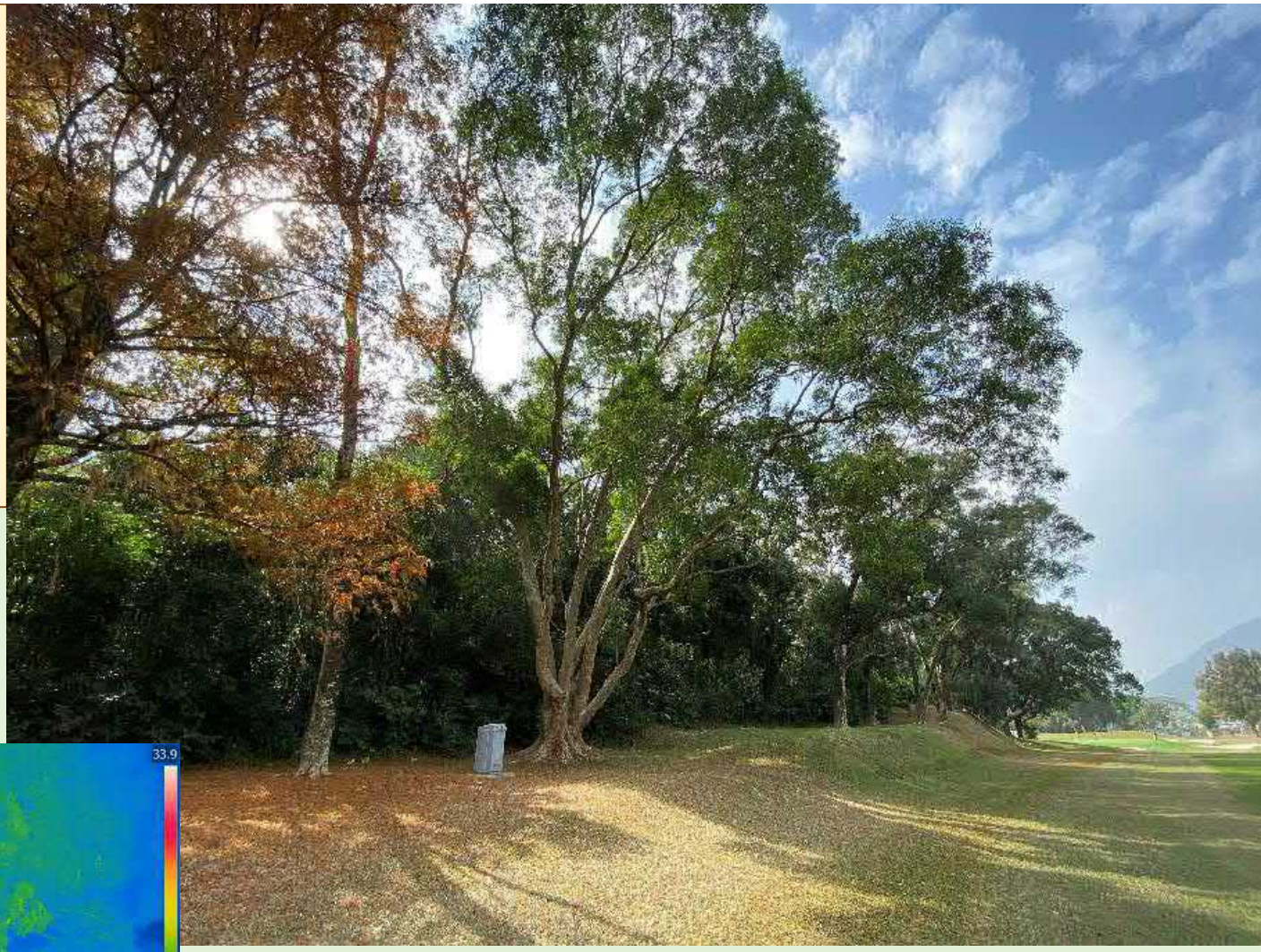


HT024: Chinese Swamp Cypress (Glyptostrobus pensilis)
Height: 21.1 m
DBH: 0.83 m
Crown spread: 7.0 m
Estimated age: 210 years

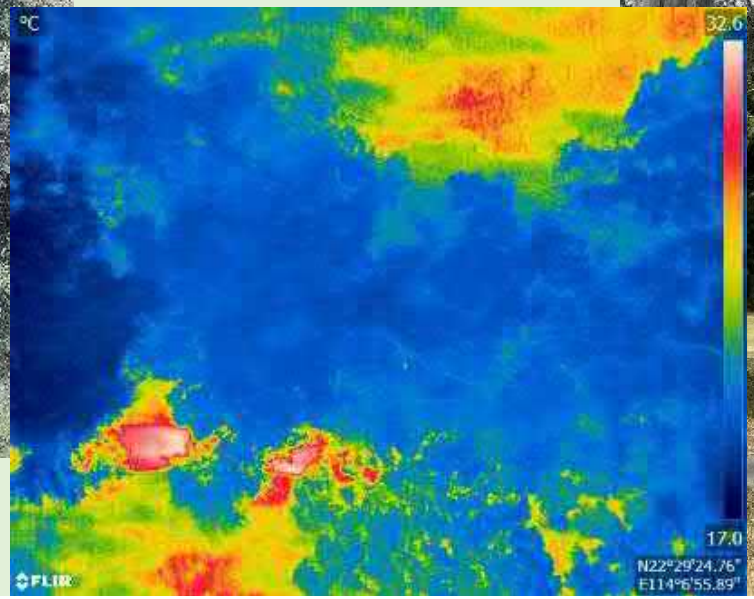


HT053: Formosa Ash
(Fraxinus griffithii)
Height: 16.8 m
DBH: 1.11 m
Crown spread: 16.0 m
Estimated age: 150 years

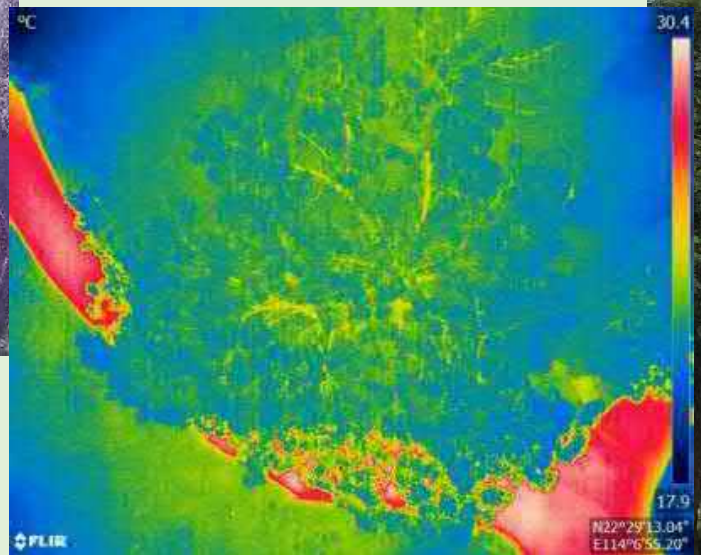




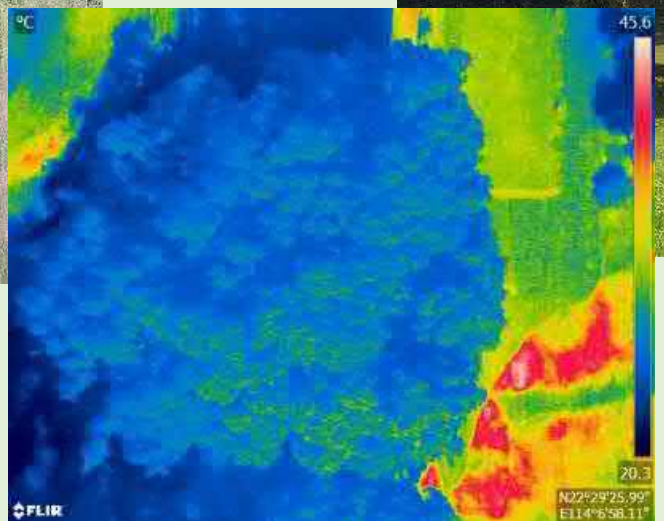
HT061: Lemon-scented Gum
(Eucalyptus citriodora)
Height: 27.2 m
DBH: 0.81 m
Crown spread: 13.0 m
Estimated age: 115 years



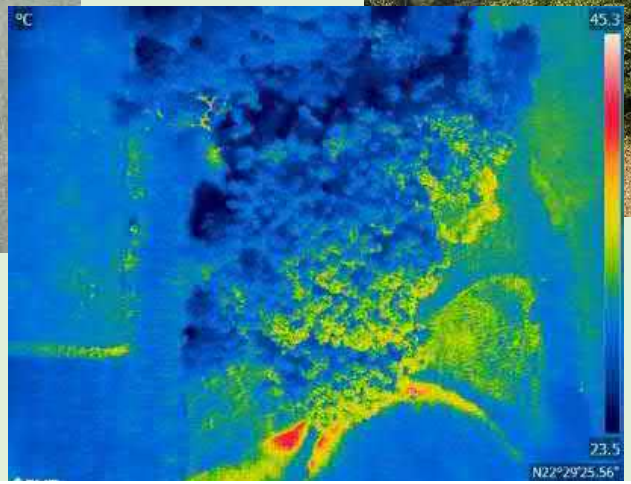
HT067: Red Kapok Tree
(Bombax ceiba)
Height: 21.6 m
DBH: 0.72 m
Crown spread: 16.3 m
Estimated age: 80 years



HT070: Chinese Banyan
(Ficus microcarpa)
Height: 21.3 m
DBH: 2.53 m
Crown spread: 27.1 m
Estimated age: 190 years



HT073: Black Olive
(Canarium tramdenum)
Height: 15.2 m
DBH: 0.73 m
Crown spread: 11.2 m
Estimated age: 70 years



2.3. Living national treasure Chinese Swamp Cypress and other endangered trees

38 internationally endangered Glyptostrobus pensilis (Chinese Swamp Cypress or Water Pine) trees growing naturally (wild) at the site

- Extremely rare conifer species: IUCN Red List of Threatened Species, rated critically endangered, number decreasing, could become extinction in the wild
- Could be considered China's botanical equivalent of the Giant Panda
- One of the largest collection of spontaneously reproduced and reproducing subpopulation of the species in the world
- Unthinkable to contemplate development in its vicinity that may threaten its survival in an extremely rare remnant natural habitat
- If the impacts cannot be ascertained at this juncture, the precautionary principle should be adopted

38 Chinese Swamp Cypress dwelling at the natural freshwater swamp

IUCN Red List: Critically endangered species with decreasing population

Threats

Agriculture & aquaculture

- Annual & perennial non-timber crops

Energy production & mining

- Renewable energy

Biological resource use

- Logging & wood harvesting
- Fishing & harvesting aquatic resources

Natural system modifications

- Dams & water management/use

Glyptostrobus pensilis, Chinese Swamp Cypress

Amendment version

Assessment by: Thomas, P., Yang, Y., Farjon, A., Nguyen, D. & Liao, W.

NOT EVALUATED	DATA DEFICIENT	LEAST CONCERN	NEAR THREATENED	VULNERABLE	ENDANGERED	CRITICALLY ENDANGERED	EXTINCT IN THE WILD	EXTINCT
NE	DD	LC	NT	VU	EN	CR	EW	EX

POPULATION TREND

Decreasing

NUMBER OF MATURE INDIVIDUALS

100-249

Extremely rare natural regeneration of Chinese Swamp Cypress at the site

2.3. Living national treasure Chinese Swamp Cypress and other endngered trees

Demands extra precautions to ensure their survival

- Little room to accommodate or tolerate mistakes
- The entire Old Course site is the catchment that collects surface water and replenishes the groundwater feeding into the wetland ecosystem
- Nature is interconnected, particularly the water cycle components
- Should not artificially or arbitrarily demarcate the catchment and say that sub-area 1 is less important or unimportant to the swamp hydrology
- Sub-areas 1-3 should be designated as the buffer zone to shield sub-area 4 core (the swamp) from harm (international nature conservation practice)
- Any contamination or reduction of water supply will jeopardize the wetland's survival and threaten the prized trees

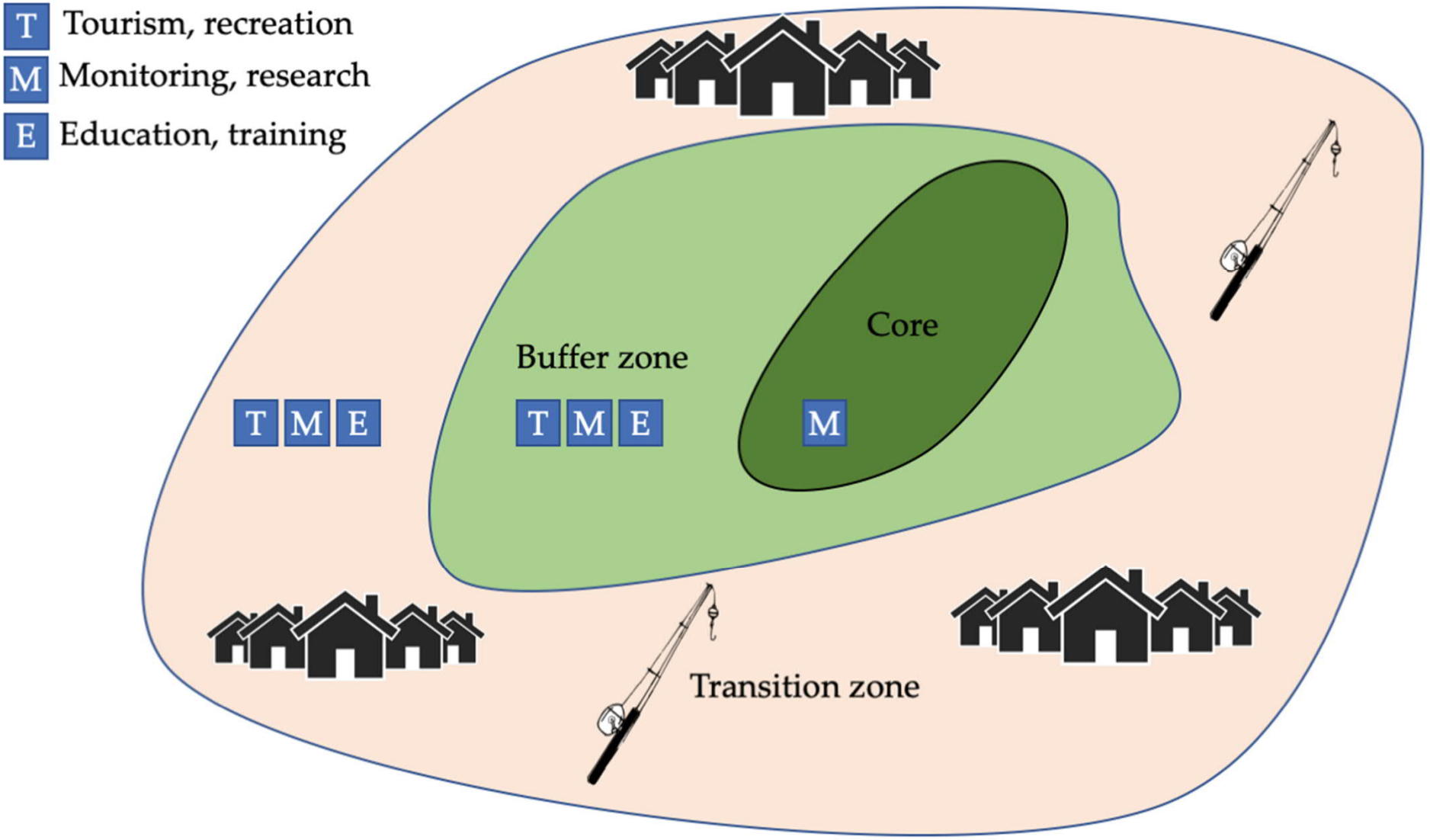
2.3. Living national treasure Chinese Swamp Cypress and other endngered trees

Other places will be delighted and fortunate to have one or a few trees

- The site has 38 trees clustered in a nature-conservation hotspot
- Hong Kong should be proud to host and protect this national and international botanical treasure
- Governments, including China, are called upon to spare no effort to protect this species to prevent its extinction
- Hong Kong's international obligation to protect proactively the swamp as a nature reserve and establish an adequate buffer zone around it
- Another internationally and nationally protected species, Aquilaria sinensis (Incense Tree), is also well represented at the site

Lesson: Should forthwith designate the swamp as a nature reserve, sub-areas 1-3 as buffer zone, and the trees as OVTs

Nature reserve zonation principle: Buffer zone around the core



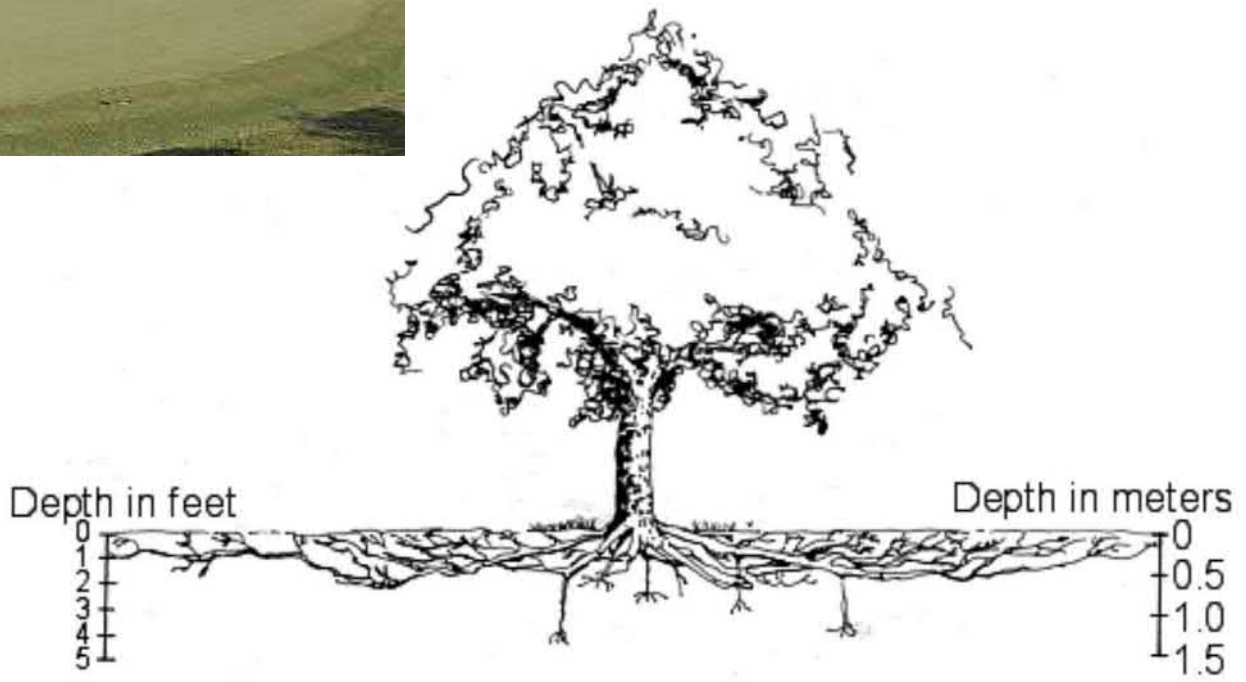
2.4. Unimpeded and high-quality rootable soil for meritorious tree growth

Nearly natural undulating topography retaining the original natural soils with a largely undisturbed soil profile and hydrology

- Retains a natural and enabling landform-soil-water trilogy
- High-quality and unimpeded rootable soil and a natural groundwater regime have allowed the trees to spread out their roots to the maximum biological potential
- Sprawling and free-ranging root architecture nurtures outstanding trees that can attain their biological potential dimensions, form and vigour
- The pivotal conditions to nurture and sustain champion-calibre trees

Lesson: Avoid disturbing any component of the trilogy to ensure sustained tree excellence

Unimpeded root spread in the natural soils of the golf course conducive to nurturing heritage trees



2.5. Habitat connectivity of ecological green corridors

Linear site configuration, with permeating linear and curvilinear woodland strips and intervening turf strips

- Complex green mosaic with exceptionally high spatial connectivity
- Animals can move along the greenways offered by the wooded corridors, streams, and turf belts
- The theory of island biogeography, widely adopted in protected area design and management, stipulates that larger and well-connected habitats can harbour more diverse and populous biotic communities

Lesson: This critical but neglected ecosystem function should be protected by preserving the integrity of spatial connectivity

Ecological corridors or greenways provide essential passages for wildlife movement

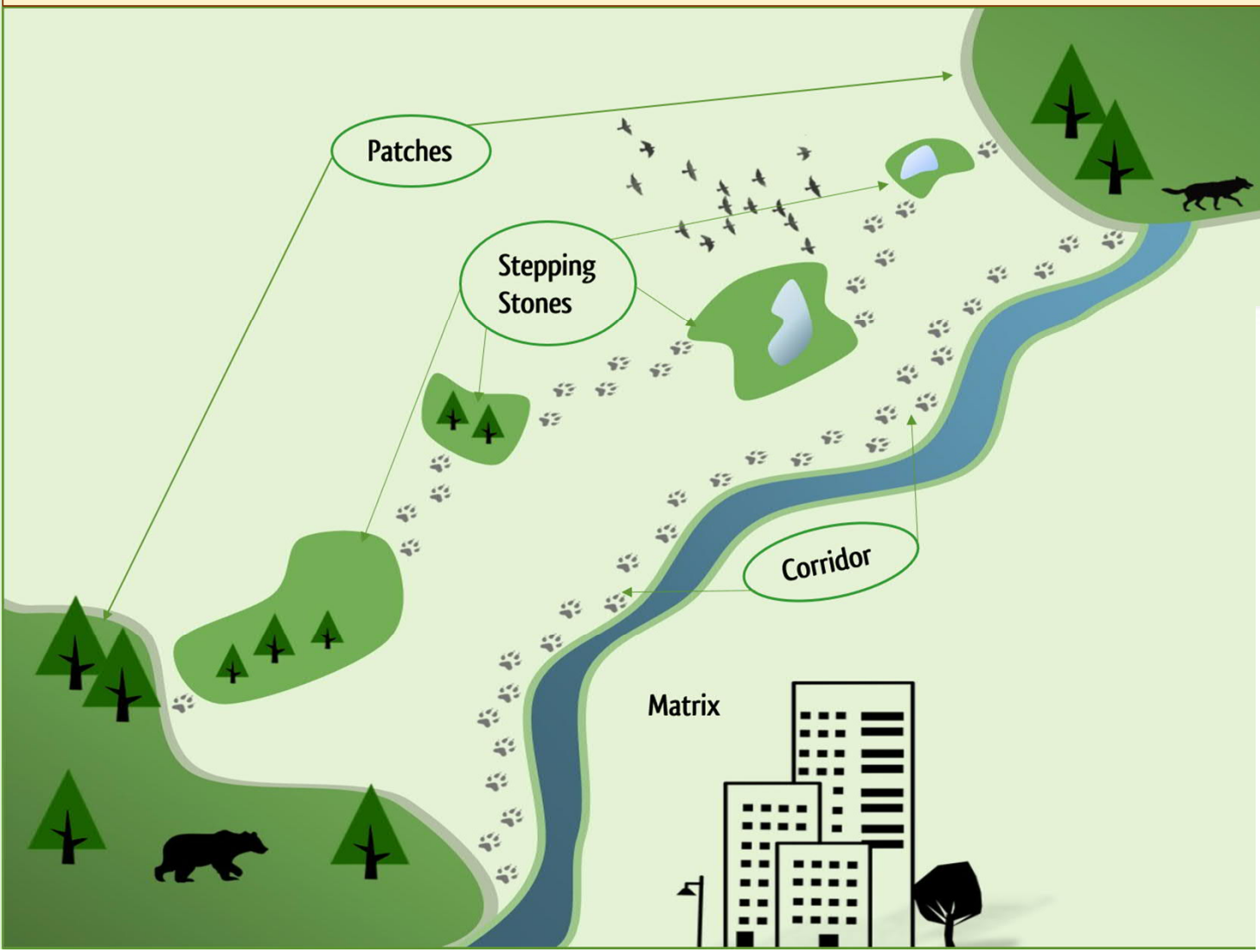
2.6. Stepping-stone site for wildlife movement

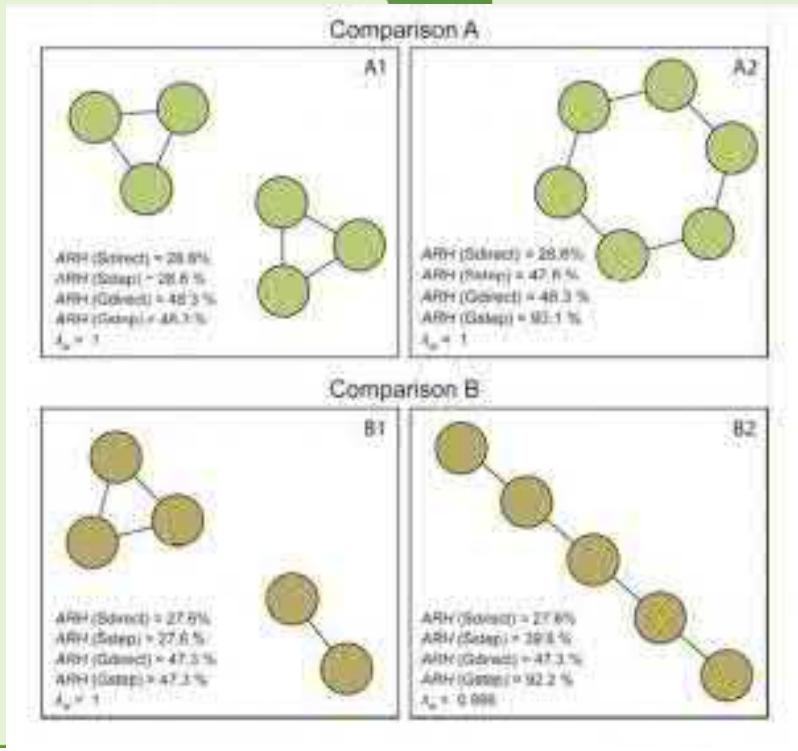
Wildlife survival and reproduction require connectivity of suitable habitats

- In urbanized or developed landscapes, the connections are widely broken by habitat fragmentation
- Greenways and blueways left or created in urbanized areas provide pertinent alternative routes
- Unfortunately, such passages are often not available
- Wildlife have to rely on isolated but suitable stepping-stone sites

Lesson: Maintain the site's essential stepping-stone service to wildlife in this part of northern New Territories

Stepping-stone habitats are crucial for wildlife survival and reproduction in fragmented urban landscape





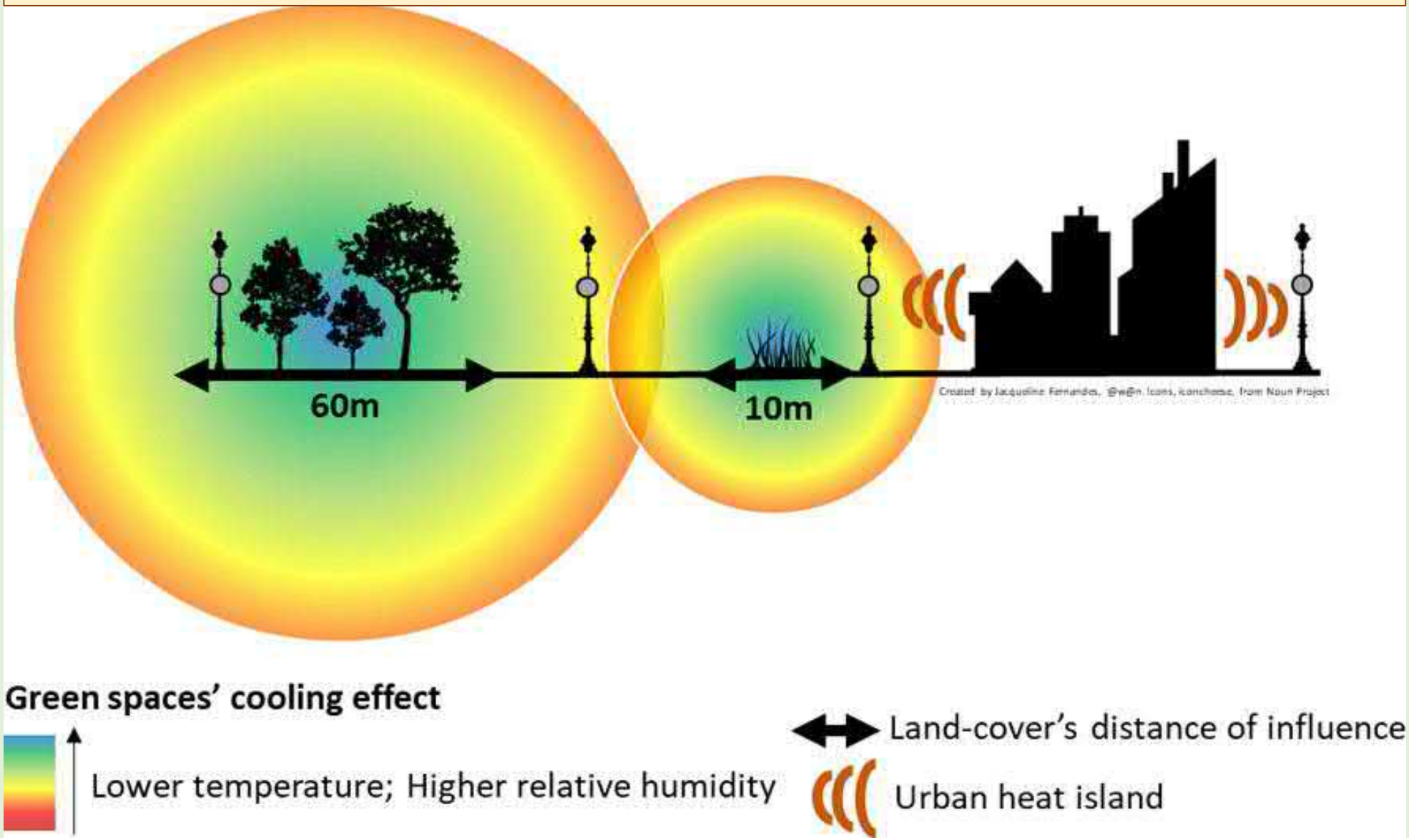
2.7. Effective cool island effect suppressing heat island effect

Climate change has raised air temperature in many places, accentuated by the urban heat island effect in cities

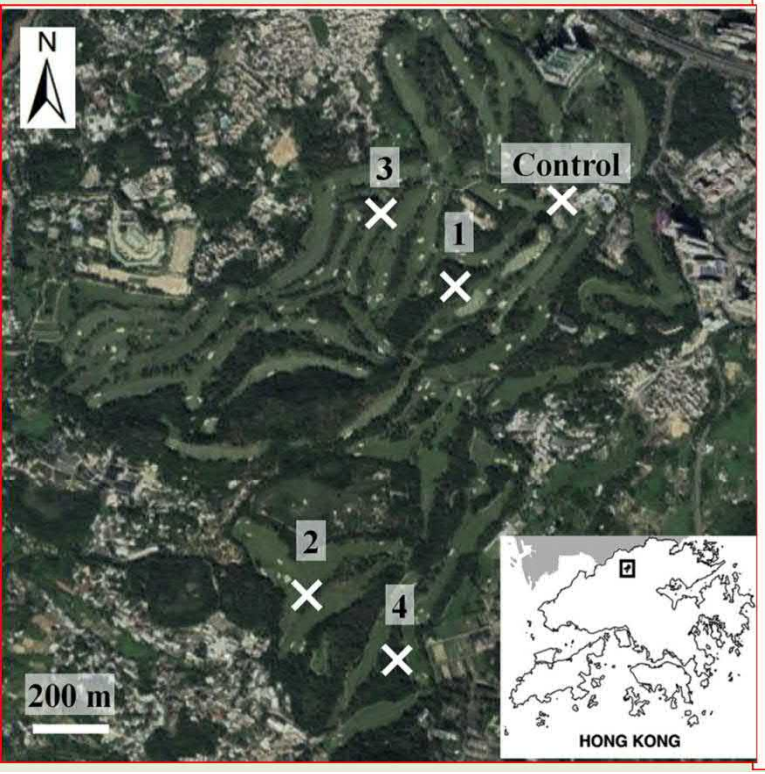
- Green sites with high and complex vegetation cover and water bodies provide essential cool island effect to ameliorate heat stress
- Cooling is attributed to vegetatioin evapotranspiration and shading
- Cooling service is fueled by clean, free, sustainable and renewable solar energy
- Cooling at the green site can spill over to surrounding areas
- Cooling can reduce air-conditioning electricity consumption, with upstream benefits: reducing fossil-fuel combustion, green house gas emission, and air pollutant generation

Lesson: Keep the site's extensive and mature vegetation, unsealed soil and water bodies can sustain the cooling function

On-site and spillover cool island effect offered by green space



Cool island effect offered by different tree covers



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journal homepage: http://www.elsevier.com/locate/buildenv

Seasonal and meteorological effects on the cooling magnitude of trees in subtropical climate

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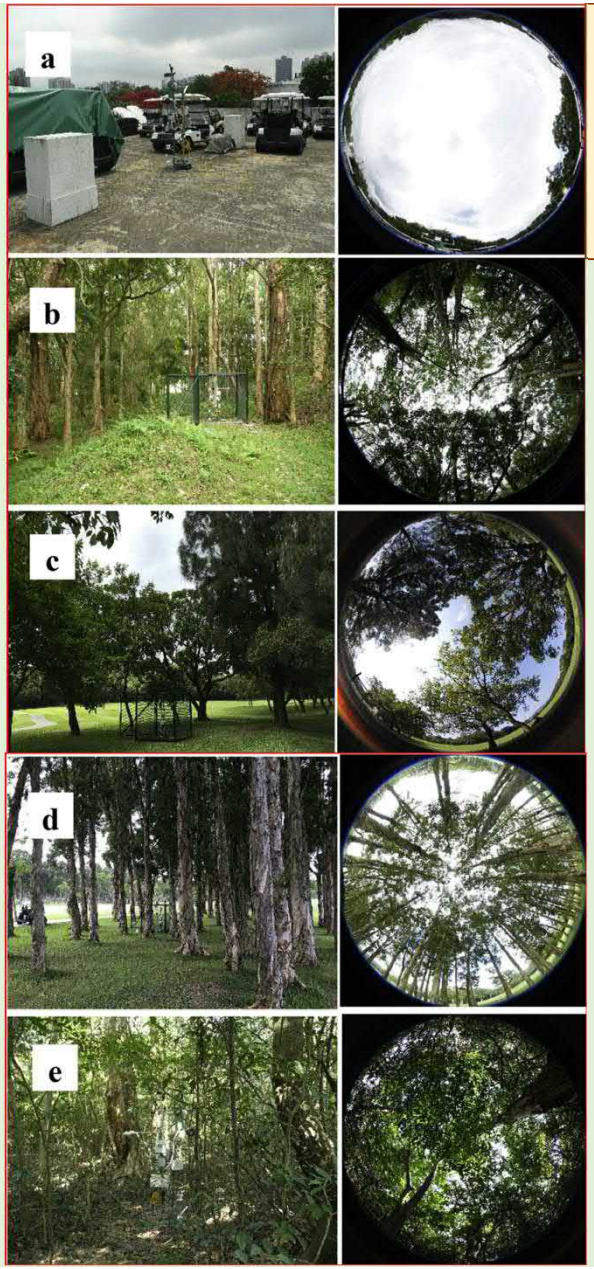
ARTICLE INFO

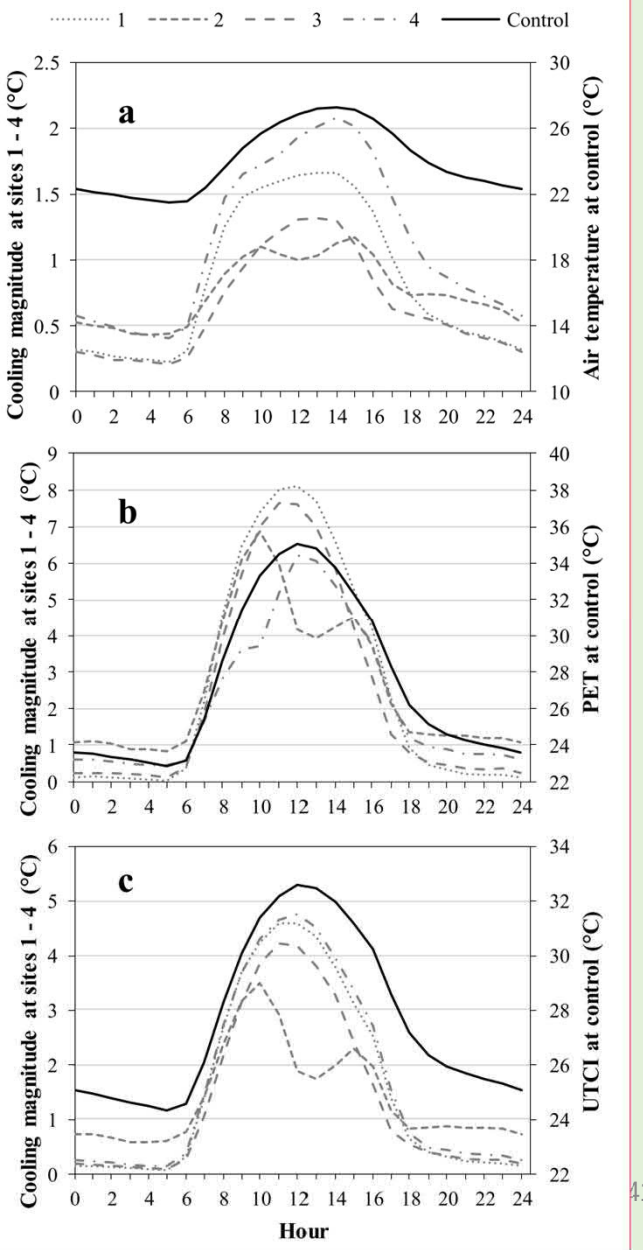
Keywords:
Cooling effect
Peri-urban woodland
Tree shading
Physiological equivalent temperature
Universal thermal climate index

ABSTRACT

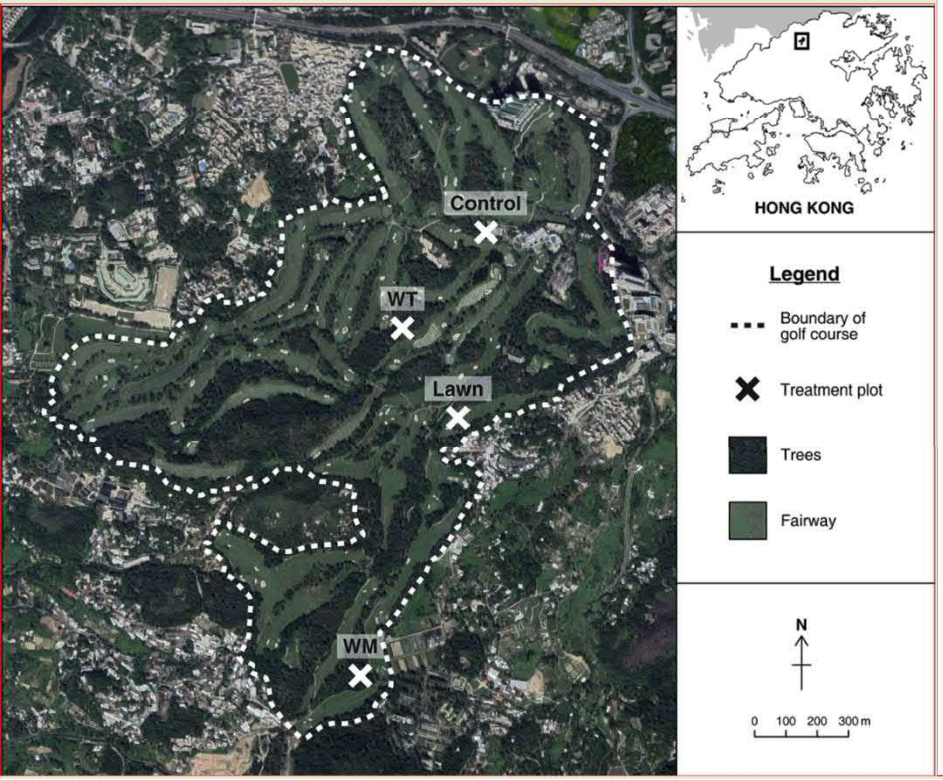
The cooling effect of trees is one of the most important ecosystem services offered by natural components in cities. However, the large variations in cooling magnitudes reported in different studies call for deeper understanding of the underlying mechanisms. This study investigated the seasonal and meteorological effects on the cooling magnitude of trees in the humid subtropical climate. The meteorological conditions at four peri-urban woodland sites and a rooftop control site were continuously monitored for one year. The annual mean (±SD) cooling magnitudes were 0.9 ± 0.5, 2.5 ± 1.4 and 1.6 ± 0.8 °C in air temperature (Ta), physiological equivalent temperature (PET) and universal thermal climate index (UTCI) respectively with notable seasonal and diurnal variations. The daily total incoming shortwave radiation (S_in) explained 24.7, 39.2 and 35.7% of the variability in cooling magnitudes in Ta, PET and UTCI respectively. For every 1 MJ/m^2 increase in S_in in a day, the daily mean cooling magnitude increased by 0.03, 0.16 and 0.08 °C in Ta, PET and UTCI respectively. The cooling magnitude measured in Ta could increase by 0.05 °C for every 1 °C rise in background Ta. The monthly mean interception of S_in was generally over 80% with an annual mean of 82.3%, which allowed the cooling benefit of trees to extend to the transitional season. Future studies are suggested to conduct a continuous measurement for at least 24 h under sunny and cloudy conditions in both hot and cold seasons with a ground-level control site to capture a more complete picture of the fluctuations in cooling magnitude.

Cool island effect offered by different tree covers





Cool island effect offered by natural and plantation woodlands



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Original article

Microclimatic resilience of subtropical woodlands and urban-forest benefits

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ARTICLE INFO

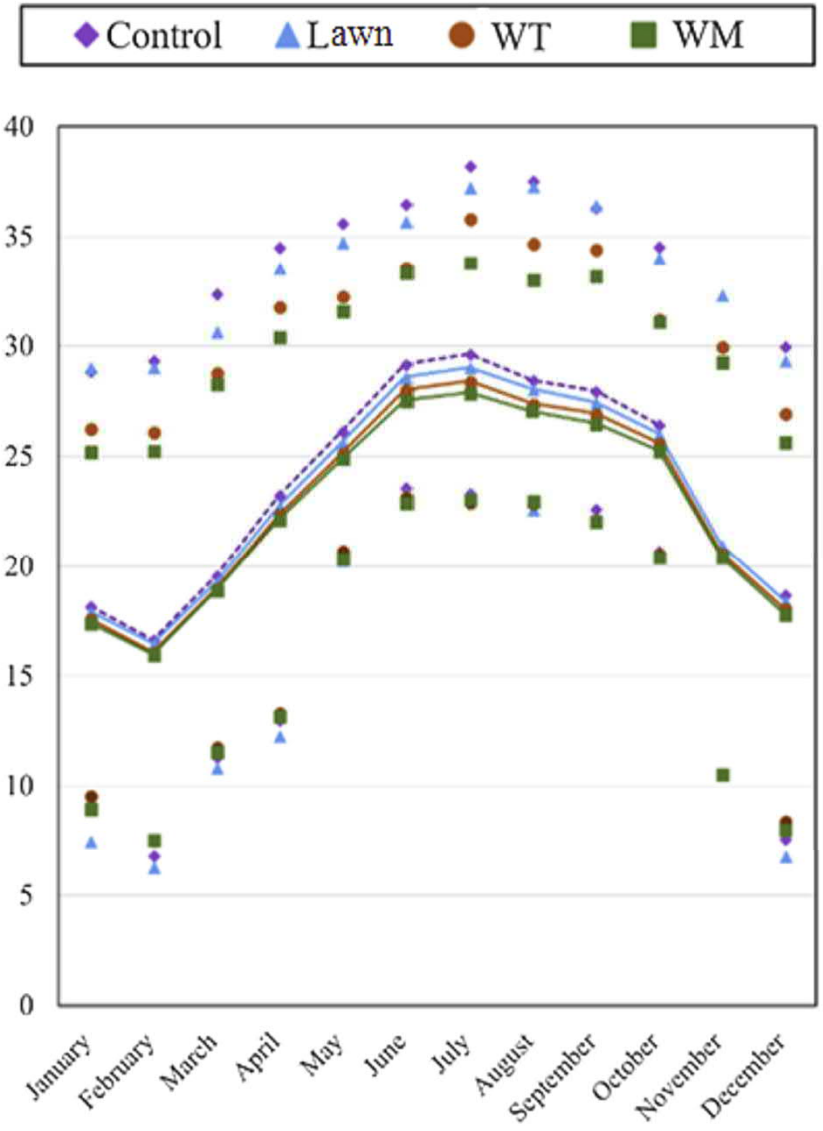
Handling Editor: Peter Duinker

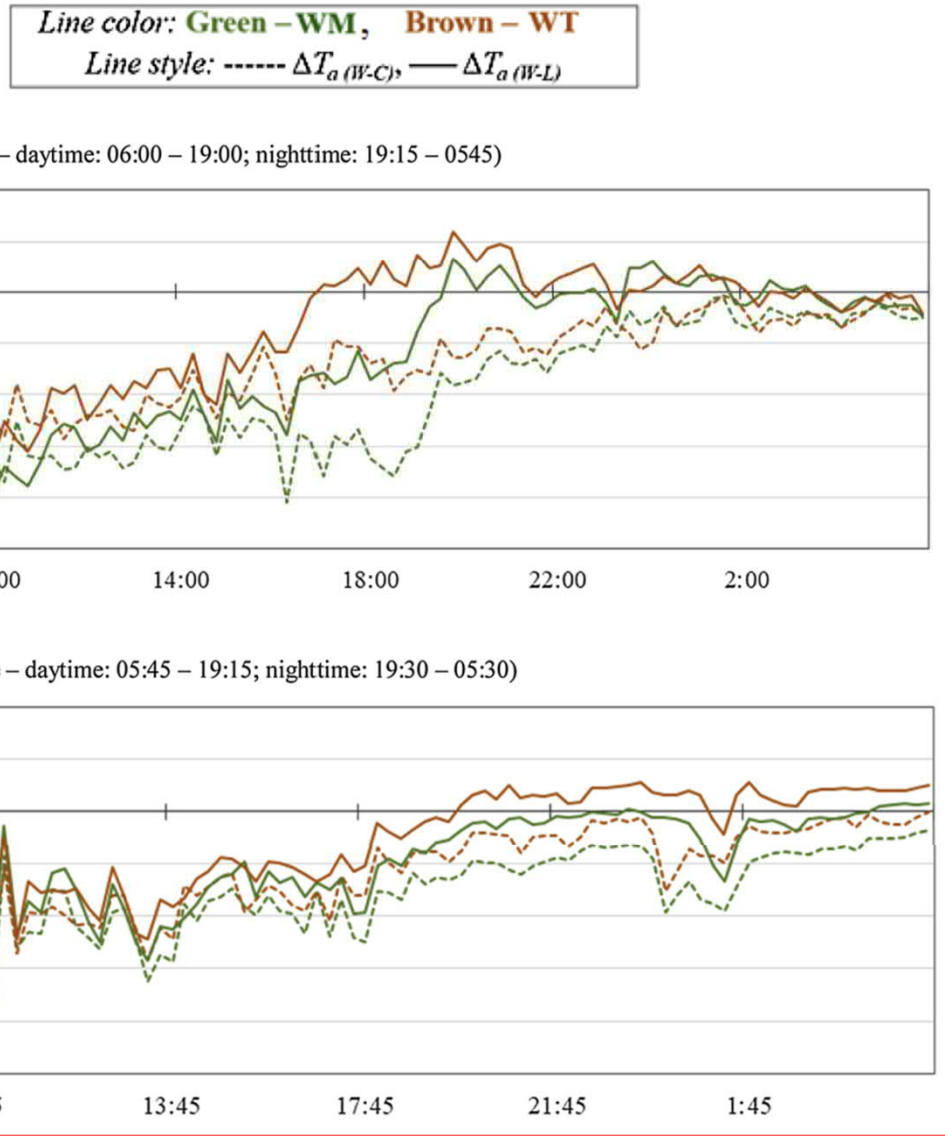
Keywords:
Climate change resilience
Summer cooling amplification
Urban green infrastructure
Urban woodland benefits
Urban heat island mitigation
Woodland microclimate regulation

ABSTRACT

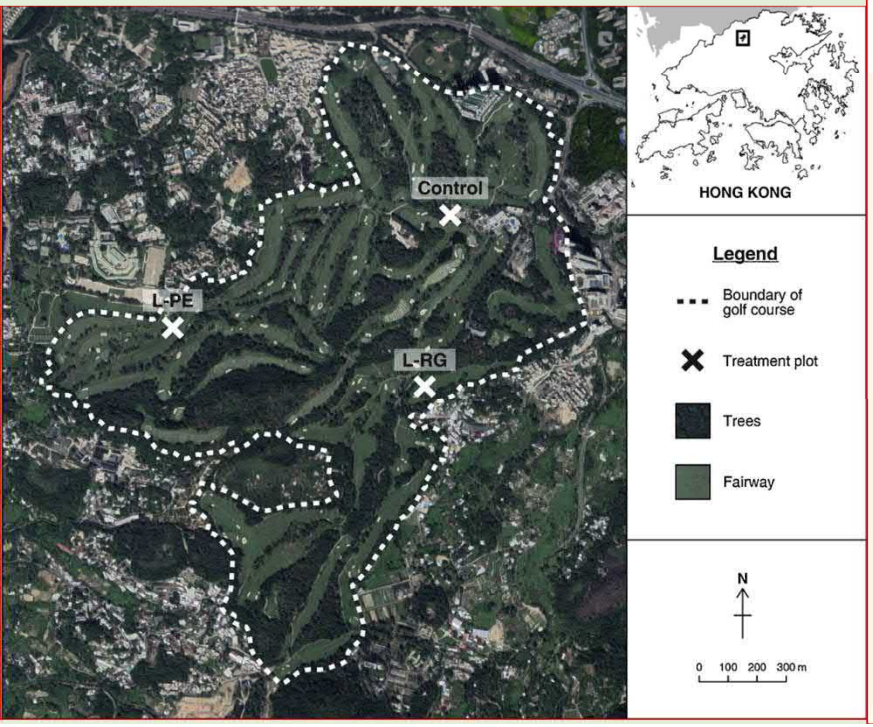
With compact development mode and subtropical climate, urban Hong Kong suffers from the urban heat island exacerbated by climate change. In recent years, record-high summer air temperatures (T_a) and heat stress were recorded, which discourage outdoor exercise and nature-based enjoyment. The thermal overload could be mitigated by urban woodlands that bring effective cooling through evapotranspiration and shading by diverse species composition, growth forms and biomass structure. This study measured microclimatic parameters over 12 months at four experimental plots in a peri-urban golf course, including simple woodland with limited species and single-layer structure, complex woodland with diverse species and multiple-tier structure, unshaded lawn, and bare-concrete serving as control. Woodland cooling was most prominent on summer and sunny days, and weaker in winter and cloudy conditions. Daytime T_a in woodlands was cooler, whereas nighttime warming was observed mainly at the simple woodland. Despite seasonal variations of cooling strengths, T_a was consistently suppressed on cloudy day vis-a-vis sunny day. On summer sunny day, concrete and lawn plots registered scorching air and surface temperatures (T_s), whereas woodland plots demonstrated summer cooling amplification with maximum −4.1 °C T_a depression versus concrete and −3.9 °C versus lawn. Comprehensive evaluations and comparisons were made between the magnitude and variations of the woodland cooling effect in different seasons and weather conditions. The benefits and feasibility of creating urban woodland patches in Hong Kong to improve urban climate and thermal comfort were discussed.

Cool island effect offered by natural and plantation woodlands





Cool island effect offered by blue space (water body)



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Influence of blue infrastructure on lawn thermal microclimate in a subtropical green space

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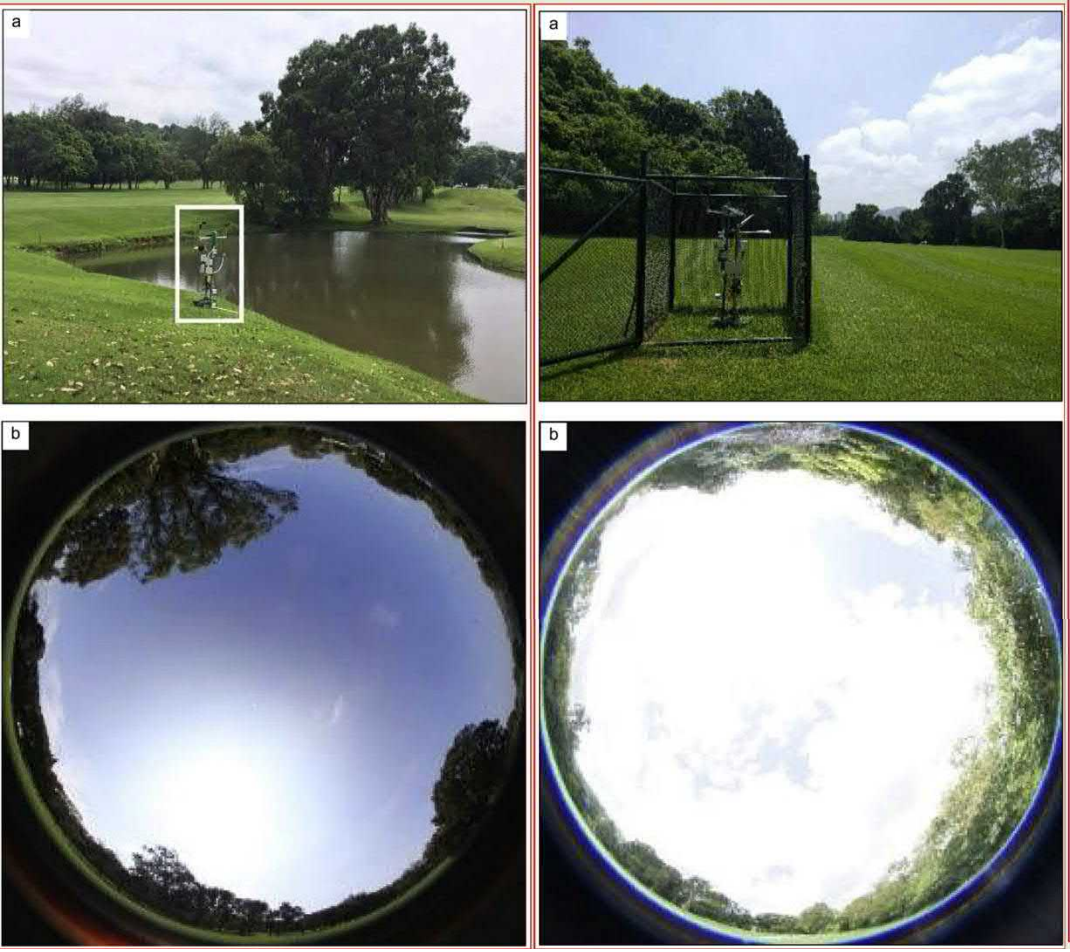
ARTICLE INFO

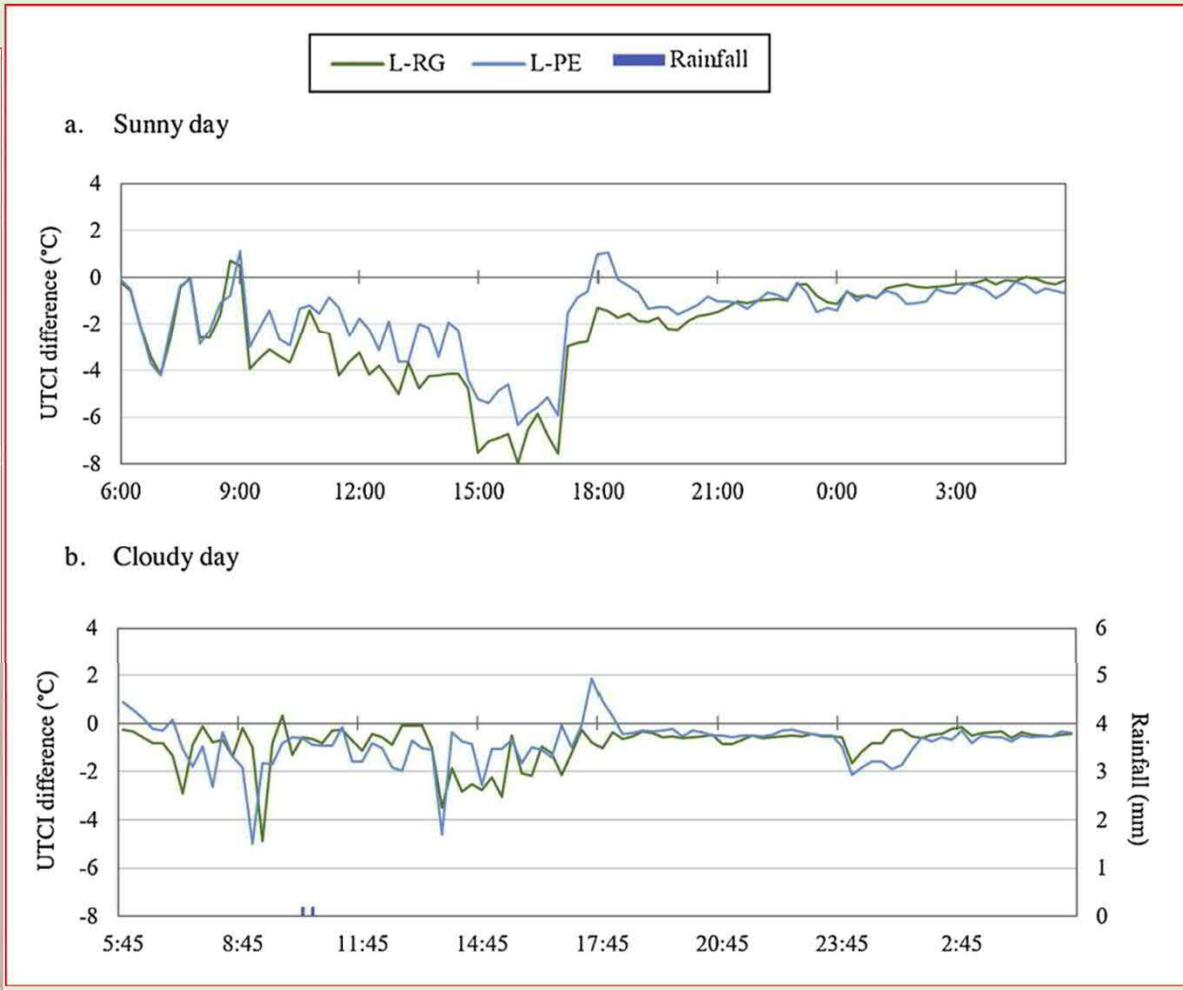
Keywords:
Pond microclimate
Waterbody cooling effect
Blue infrastructure
Urban heat island
Universal thermal climate index
Thermal comfort

ABSTRACT

Thermal modifications by a 1.5 m deep pond on adjacent lawn microclimate on sunny, cloudy, overcast and rainy summer days were investigated in subtropical Hong Kong. Microclimatic parameters at a pondside lawn were monitored and compared to an open lawn and a concrete rooftop (Control), with focus on Universal Thermal Climate Index (UTCI) to investigate thermal comfort. The cooling capability of the studied pond has been ascertained – pondside lawn registered the lowest air temperatures (T_a) in most weather conditions, and mean T_a of sunny daytime at pondside lawn was 0.7 °C cooler than open lawn. Compared to Control, UTCI calculations indicated hotter mean daytime conditions at pondside lawn (−2.3 °C) than open lawn (−3.5 °C) on sunny day. Despite the pond's ability to lower T_a, the lack of pondside tree shading created worse human heat-stress scenarios than open lawn. Cloudy day displayed lower heat-stress levels, but pondside lawn still recorded the highest frequency of strong heat stress (83.6%). To synergistically resolve the thermal-stress problems and transform pond-induced microclimatic cooling into physiological cooling for humans, deeper and more dynamic waterbodies could be incorporated alongside pondside tree shading and natural surfaces in urban park design.

Cool island effect offered by blue space (water body)





2.8. Essential ecosystem service of air pollution mitigation

Vegetation can clean the air

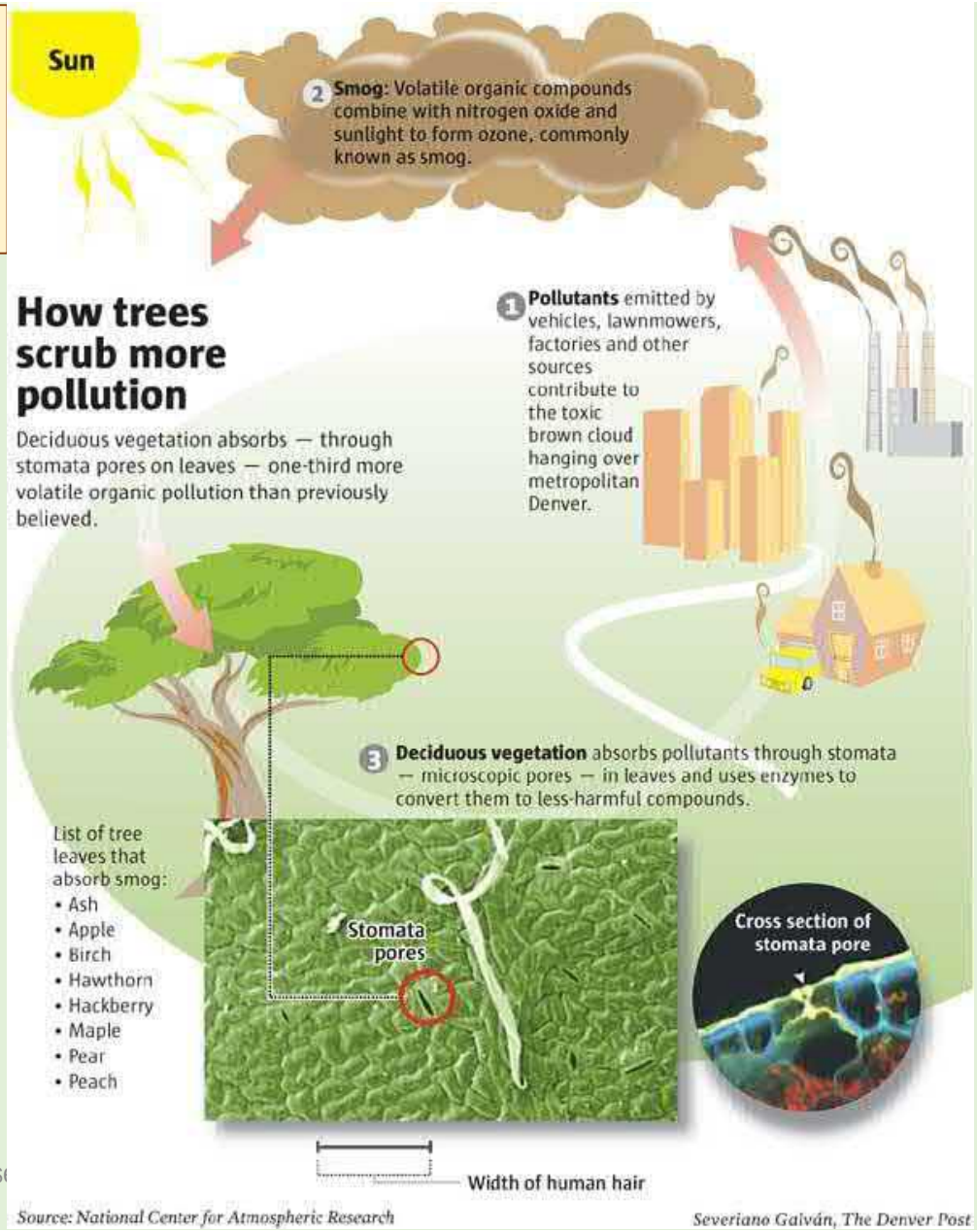
- Absorbing gaseous pollutant
- Filter particulate matter
- Foster deposition of particulate pollutants

The large and continuous green site

- Exceptionally high tree cover and healthy trees
- Substantial capacity to capture and mitigate air pollution

Lesson: Preserve the site's pertinent air-cleaning natural service and benefits to surrounding areas

Trees can effectively remove gaseous and particulate air pollutants



2.9. Alternative lands with lower ecological and landscape values

Proposed housing occupies merely about 8 ha for 33,600 residents

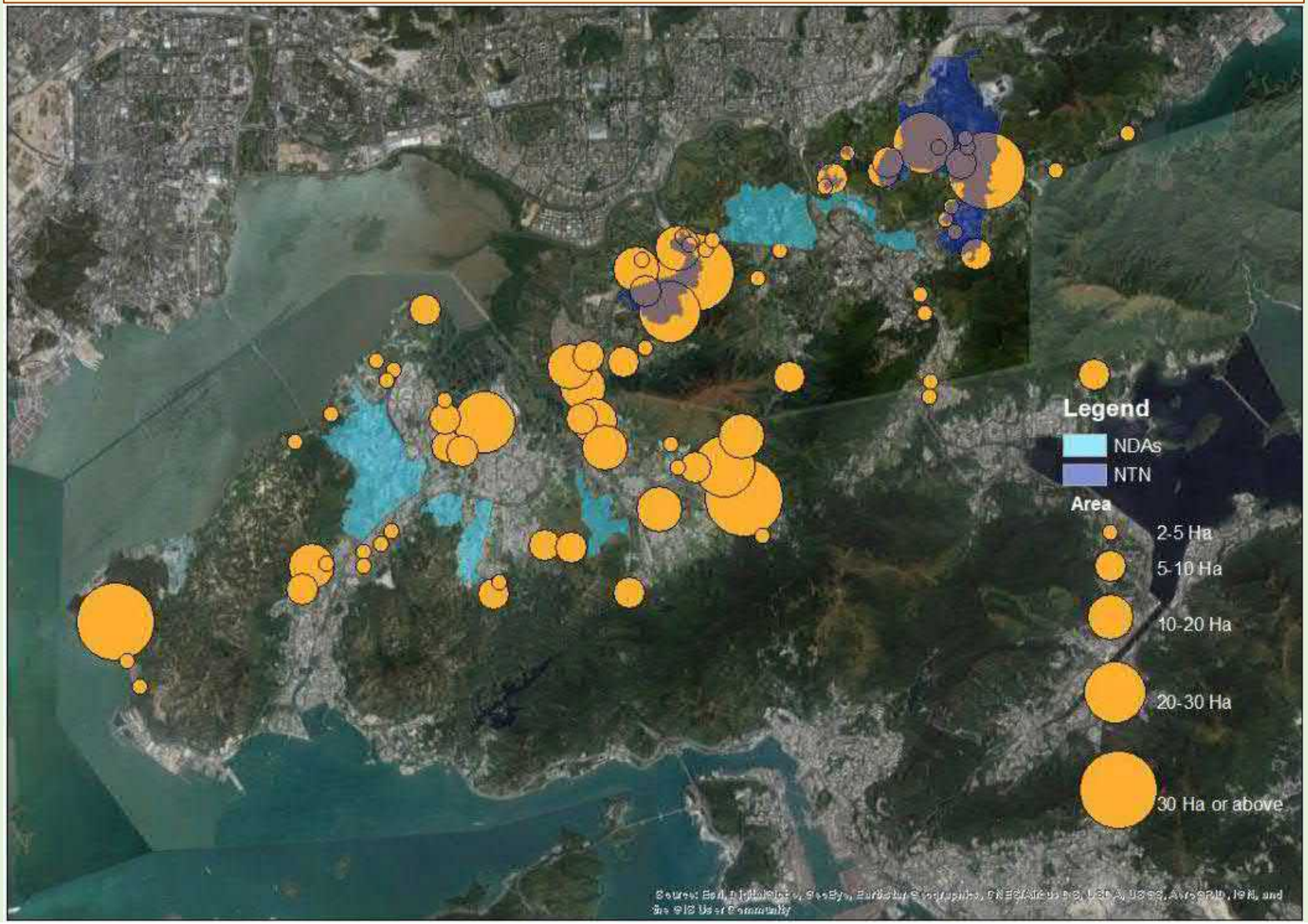
- Equivalent to 0.4% of the brownfield stock reckoned to be about 2000 ha
- Equivalent to 0.027% of nearby Northern Metropolis with 30,000 ha land area
- Equivalent to 1.44% of the Northern Metropolis projected population of 2.5 million
- This proposal predated the Northern Metropolis plan: Overtaken by recent events

Excessive proposed population density of 4200 per ha

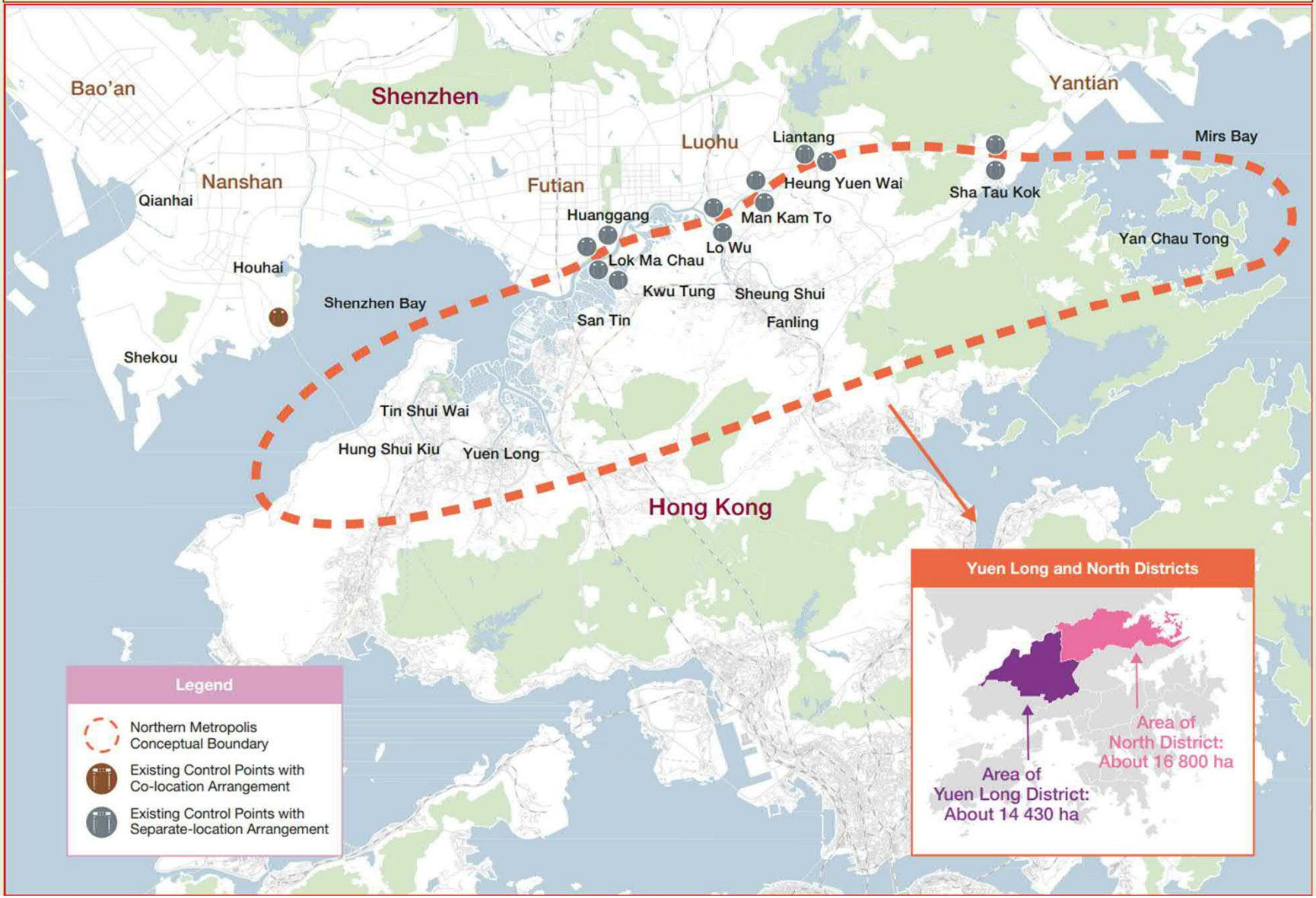
- Versus the average of Hong Kong's public housing at 2000 per ha
- Excessive ecological footprint and pressure on the environment
- Impacts on residents' physical and mental health and quality of life

Lesson: The housing project can be shifted to ecologically less sensitive areas

Alternative housing sites: Brownfields



Alternative housing sites: Northern Metropolis



3. Extensive and lingering harms of the proposed housing development

3.1. Excessive tree removal

3.2. Harmful tree transplanting

3.3. Root damage and loss due to widespread grade change

3.4. Soil sealing impacts on trees

3.5. Soil compaction impacts on trees

3.6. Soil contamination impacts on trees

3.7. Building foundation impacts on trees

3.8. Utility trenching impacts on trees

3.9. Impacts of proximal and densely packed high-rise building

3.1. Excessive tree removal

Comprehensive tree survey: over 1400 trees in sub-area 1, including

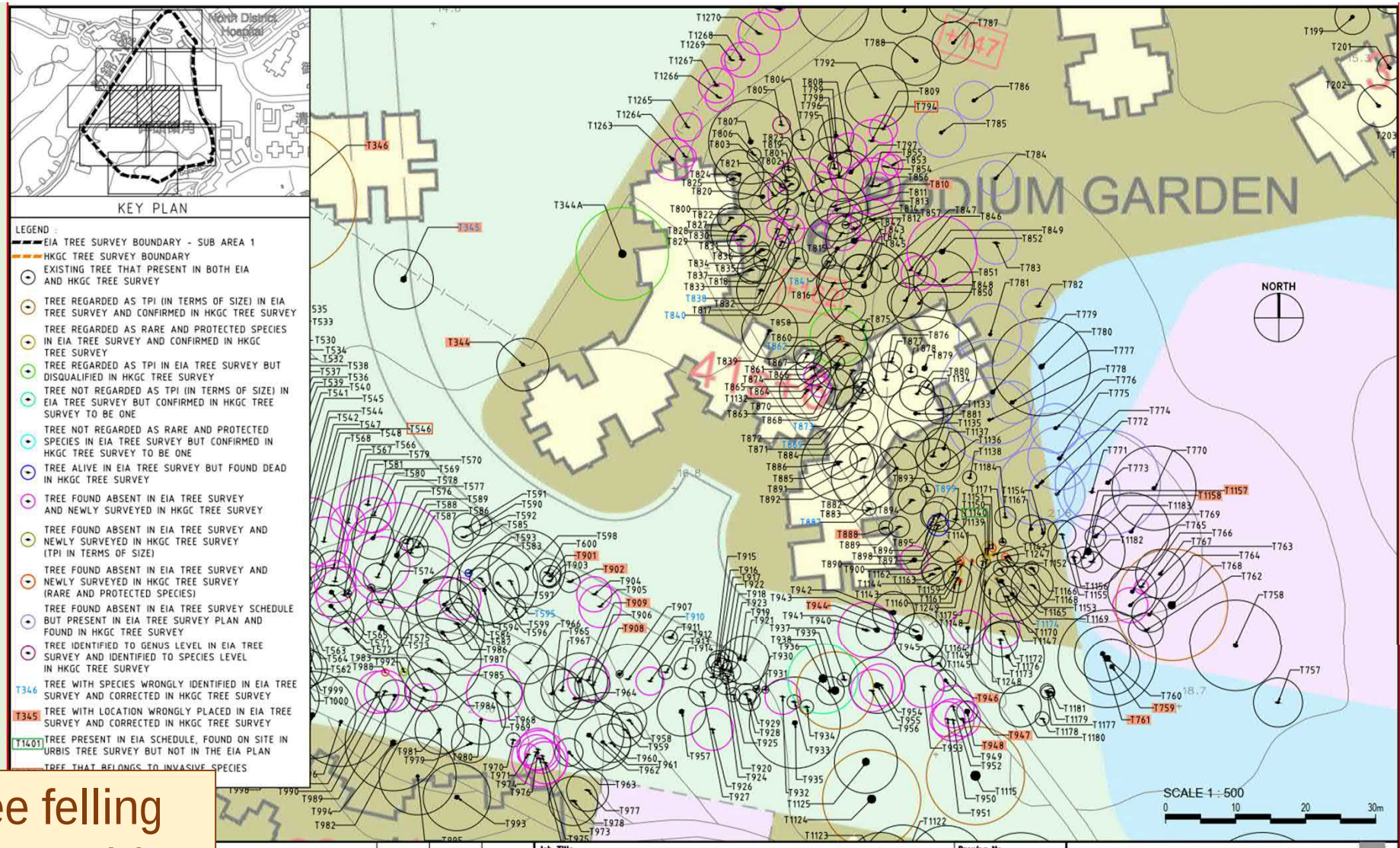
- 59 trees of rare or protected species
- 84 Trees of Particular Interest (TPIs) which are potential OVTs
- 143 trees with high amenity value

The EIA proposed to fell 76% of the trees in the site, including

- Most TPIs
- Some trees >1000 mm trunk diameter
- Some trees >100 years old
- Extensive woodland parcels with many mature native trees

Fundamental questions: Is a site with so many valuable trees suitable for housing development? Isn't it cut out for a park instead?

Consequence: Destruction of a first-rate treescape with heritage trees



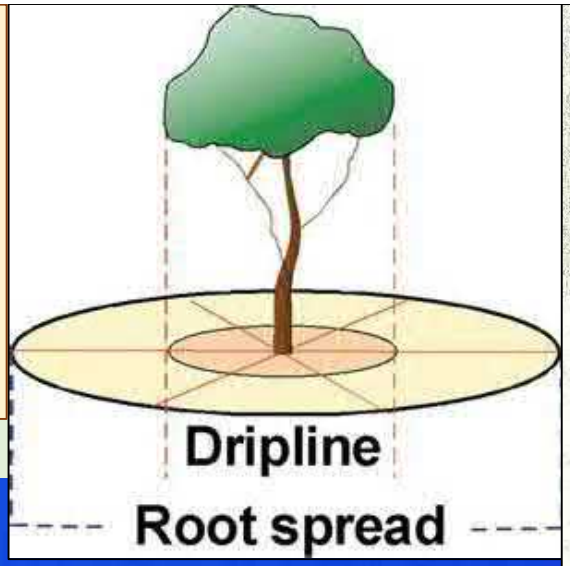
Extensive tree felling due to conflicts with building footprints

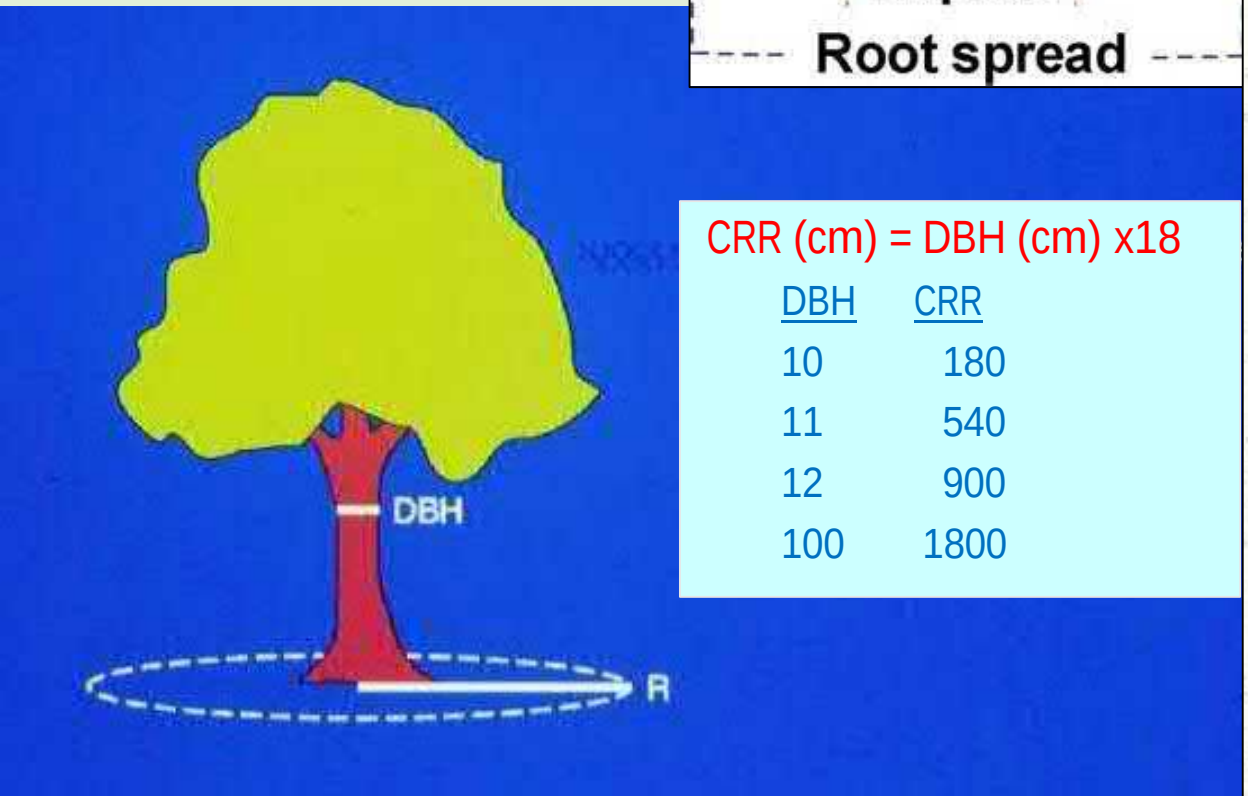
3.2. Harmful tree transplanting

The EIA proposes transplanting several dozen large “natural” trees

- Notoriously difficult and costly to transplant a large tree
- No experience transplanting large “natural” trees (“a very different animal”)
- The species may not tolerate transplanting
- Retain a sufficiently large undisturbed root ball
- Construct a rigid container to protect the retained roots
- Conduct phased root pruning extending over not less than two years
- Find a suitable route to construct a road with a firm bed to transfer the transplanted tree from donor to recipient site
- Find suitable land patches to operate a heavy-duty crane to lift and lower the transplanted tree
- Keep the tree weakened by transplant shock in acceptable health
- Consequence: Transplanted large “natural” trees may not survive the brutally excessive root loss

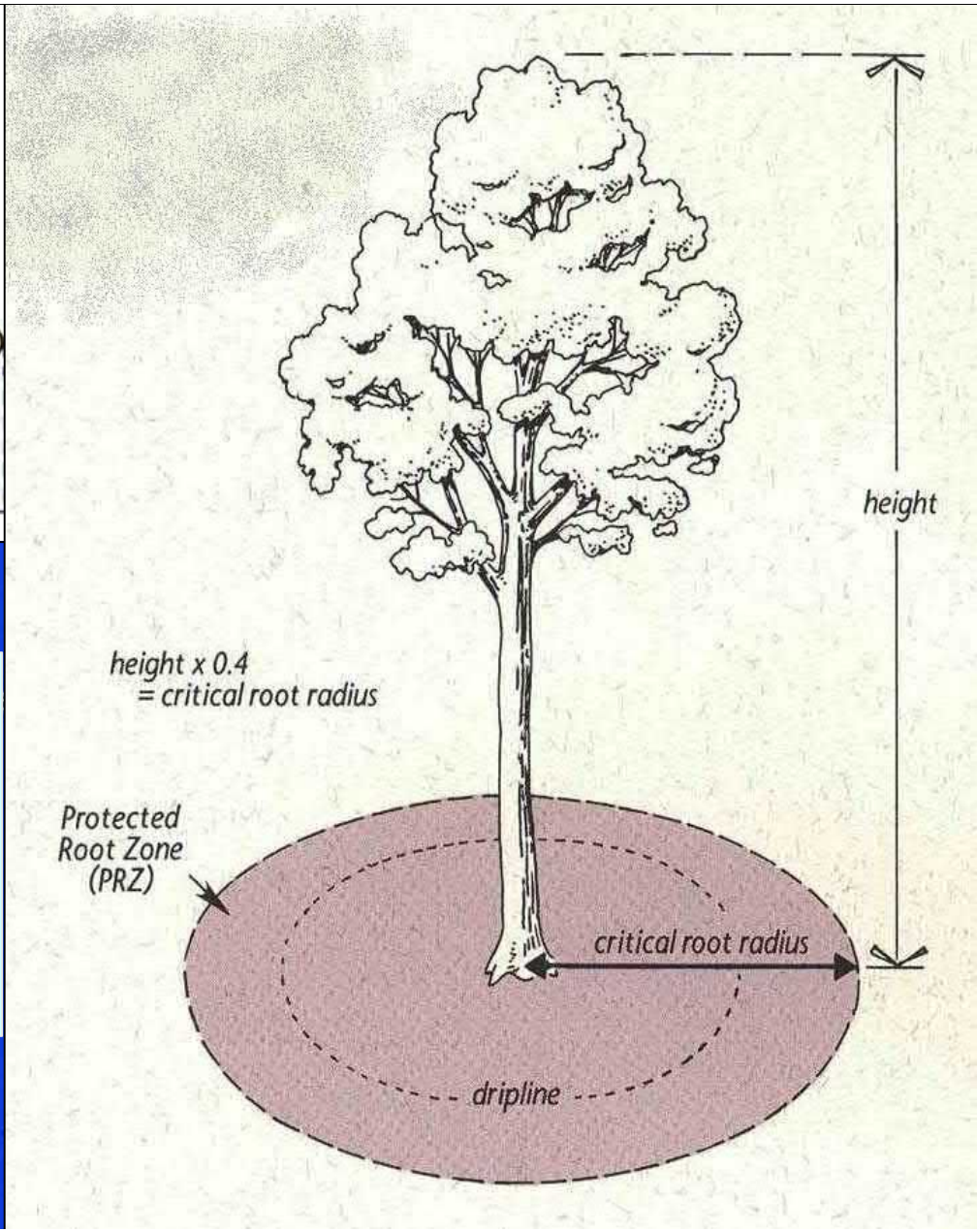
Transplanting large trees: Root protection zone defined by the Critical Root Radius (CRR)





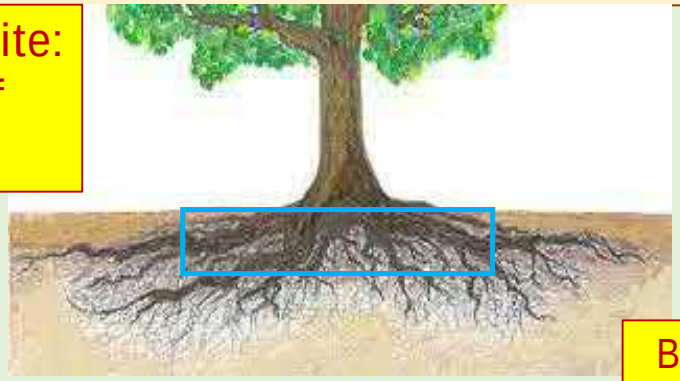
CRR (cm) = DBH (cm) x18

DBH	CRR
10	180
11	540
12	900
100	1800



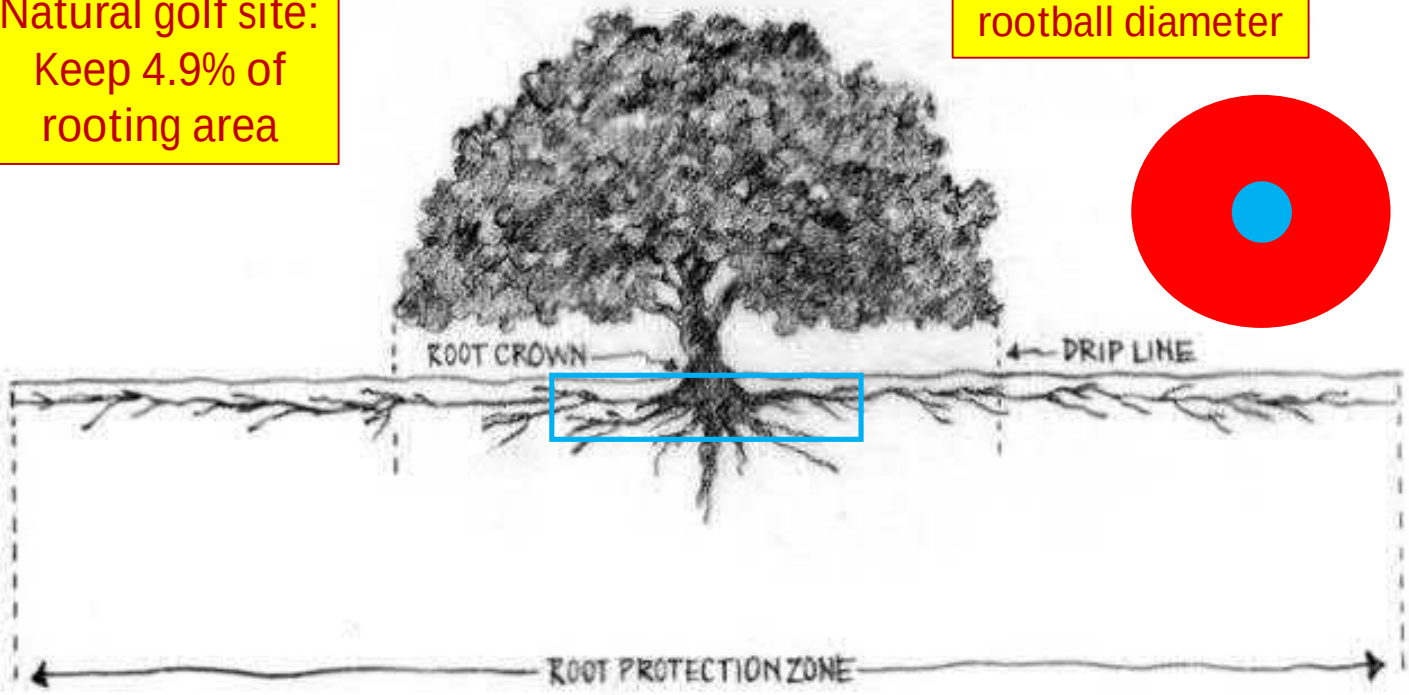
Transplanting large “natural” trees with broad root spread may kill them!

Cramped urban site: Keep 23.4% of rooting area



Both sites: trunk diameter x 8 = rootball diameter

Natural golf site: Keep 4.9% of rooting area



3.2. Harmful tree transplanting

Many trees in the site grow in close proximity with intimately intertwined and grafted root systems

- Forming a subterranean network of interconnected roots
- Taking the root ball of one tree can gravely harm adjacent companion trees
- Transplanting one tree may harm or kill adjoining trees
- Technically not feasible to transplant a group of trees in one large container
- Massive collateral damage to neighbour trees of transplanted tree

Consequence: Both the transplanted tree and neighbour trees will decline and may die in due course

Intertwined root network of neighbour trees: Collateral damage in transplanting

Intertwined roots of proximal trees

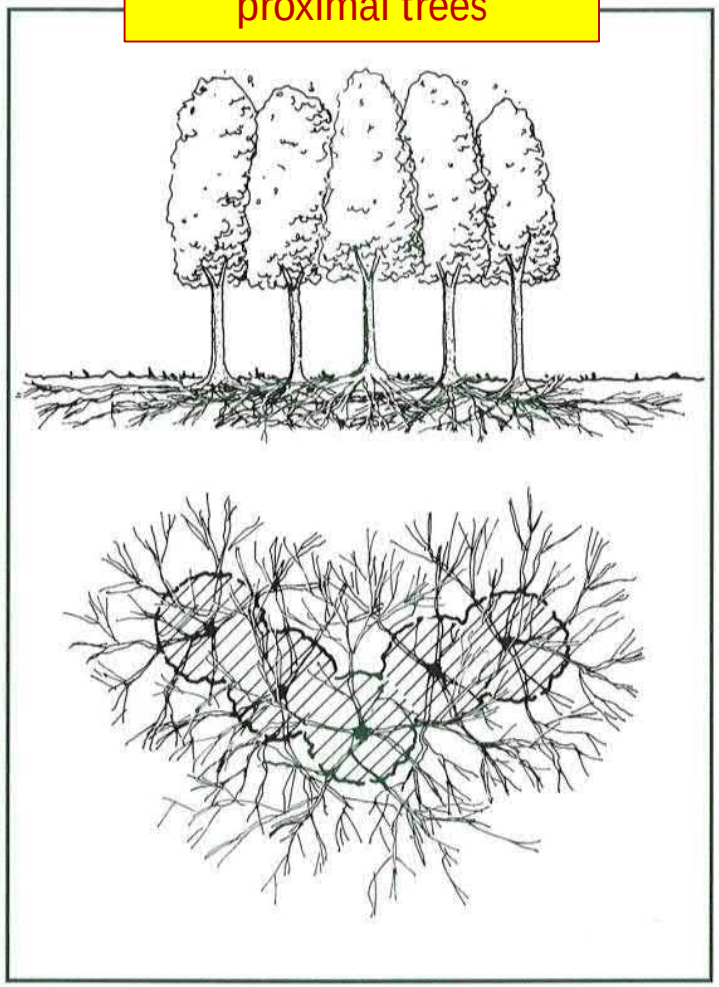
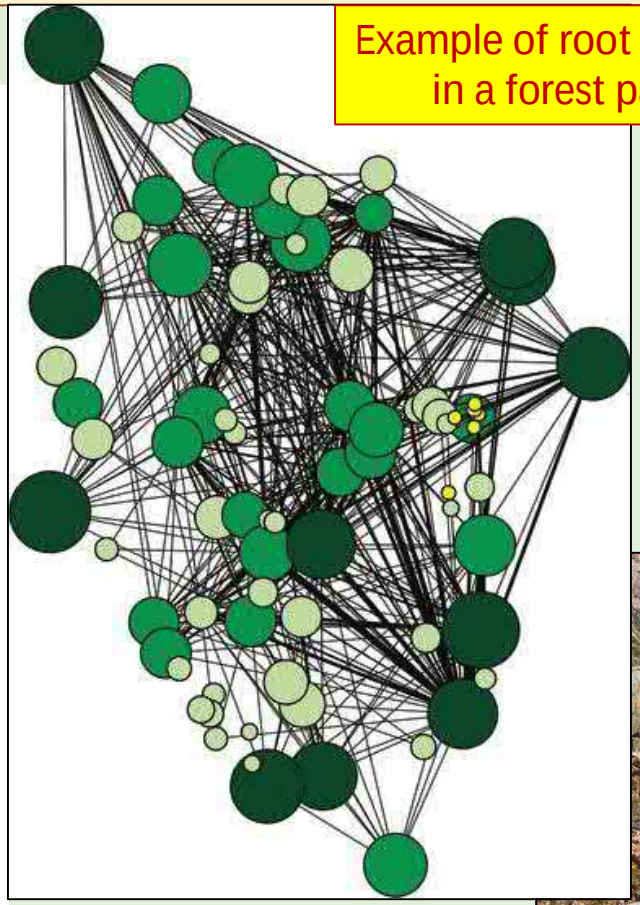
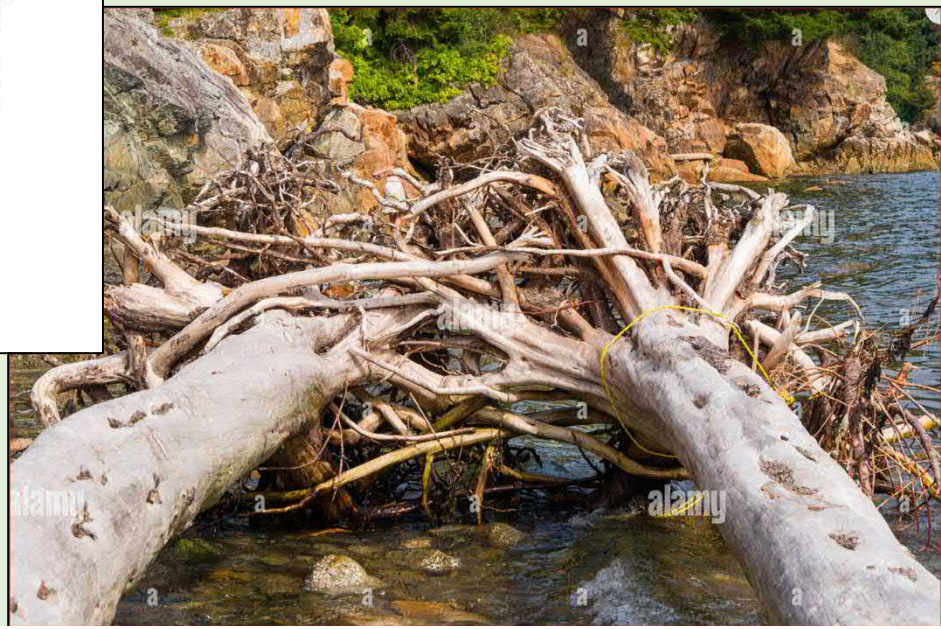


FIGURE 2.5 In forest settings, root systems of individual trees overlap and intertwine, forming a dense mat of roots.

Example of root network in a forest patch



Taking the root ball of one tree will unavoidably damage neighbour trees



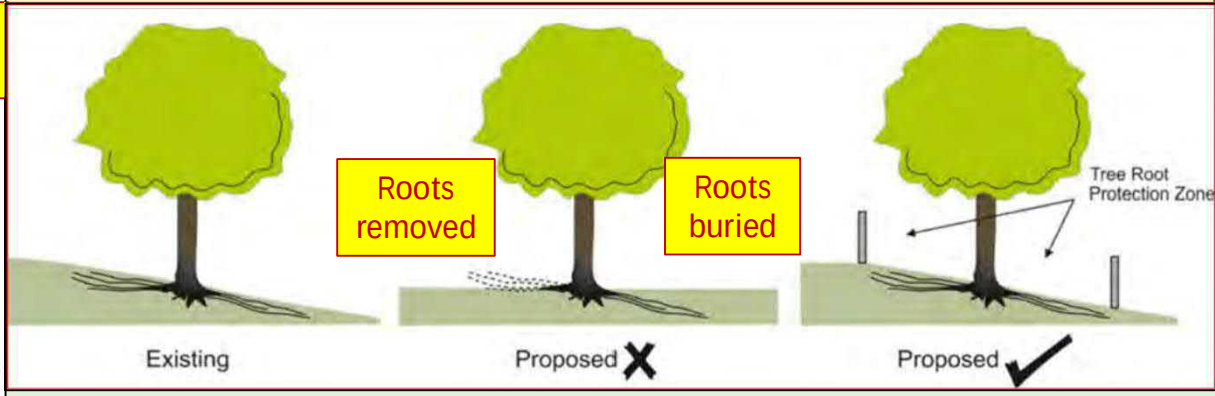
3.3. Root damage and loss due to widespread grade change

The development requires extensive site formation due to the undulating and sloping site topography

- Extensive cut and fill to form multiple flat platforms at different levels
- Most areas will suffer from grade changes (raising or lowering the original land level)
- Grade changes are notorious in harming or killing existing trees
- Grade lowering removes soil and roots
- Grade raising buries soil and roots to curtail air and water supply

Extensive land formation by cut and fill to create building platforms: Grade changes impose massive damages on retained trees

Unavoidable cut and fill earthwork



Cut damage

Fill damage

3.3. Root damage and loss due to widespread grade change

The EIA does not include an acceptable assessment of grade change impacts on trees, reckoned to be massive and extremely destructive

- Most trees will be weakened and gravely harmed by extensive grade changes
- Proposed tree retention will be largely nullified by substantial grade-change and other construction damages

Consequence: Tantamount to a massive tree felling exercise to be spread agonizingly over an extended duration rather than in one go (delayed and hidden tree loss)

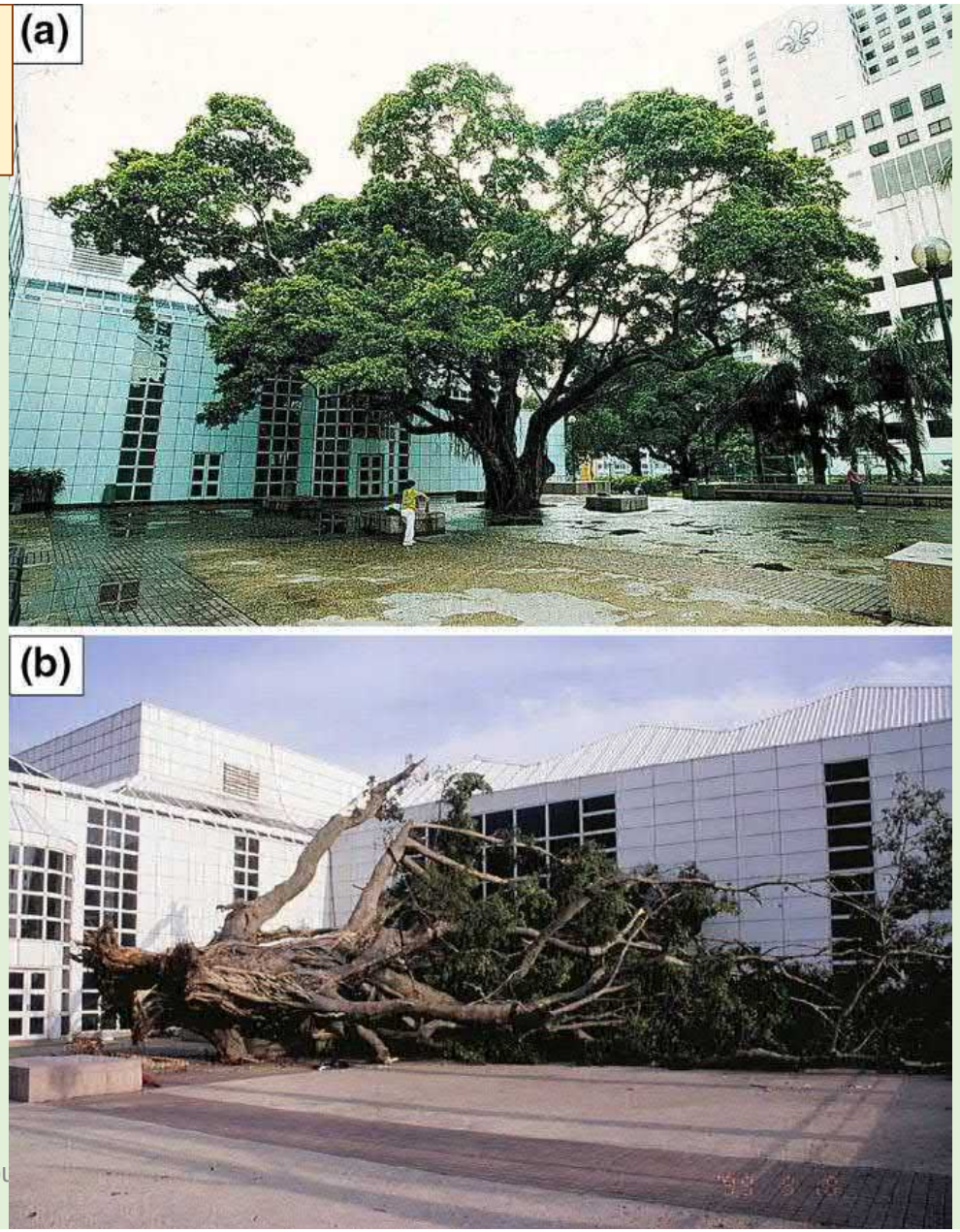
3.4. Soil sealing impacts on trees

Extensive footprints of buildings, access roads, emergency vehicle access and most open spaces will be sealed by impermeable pour concrete or sparingly permeable unit pavers

- The exceptionally high development density entails an exceptionally high sealing proportion to impair trees
- Depriving trees of natural rainwater supply to induce water deficit
- Irrigation water can only be applied to small unsealed areas
- Existing trees accustomed to adequate water supply for decades may fail to adapt to a stressful water-deficient regime
- Nutrients in fallen leaves cannot return to the soil by nutrient cycling

Consequence: Extensive tree decline during and after construction

Soil sealing by pour concrete eventually killed the preserved champion tree



CY Jim: Fanling Golf Cou

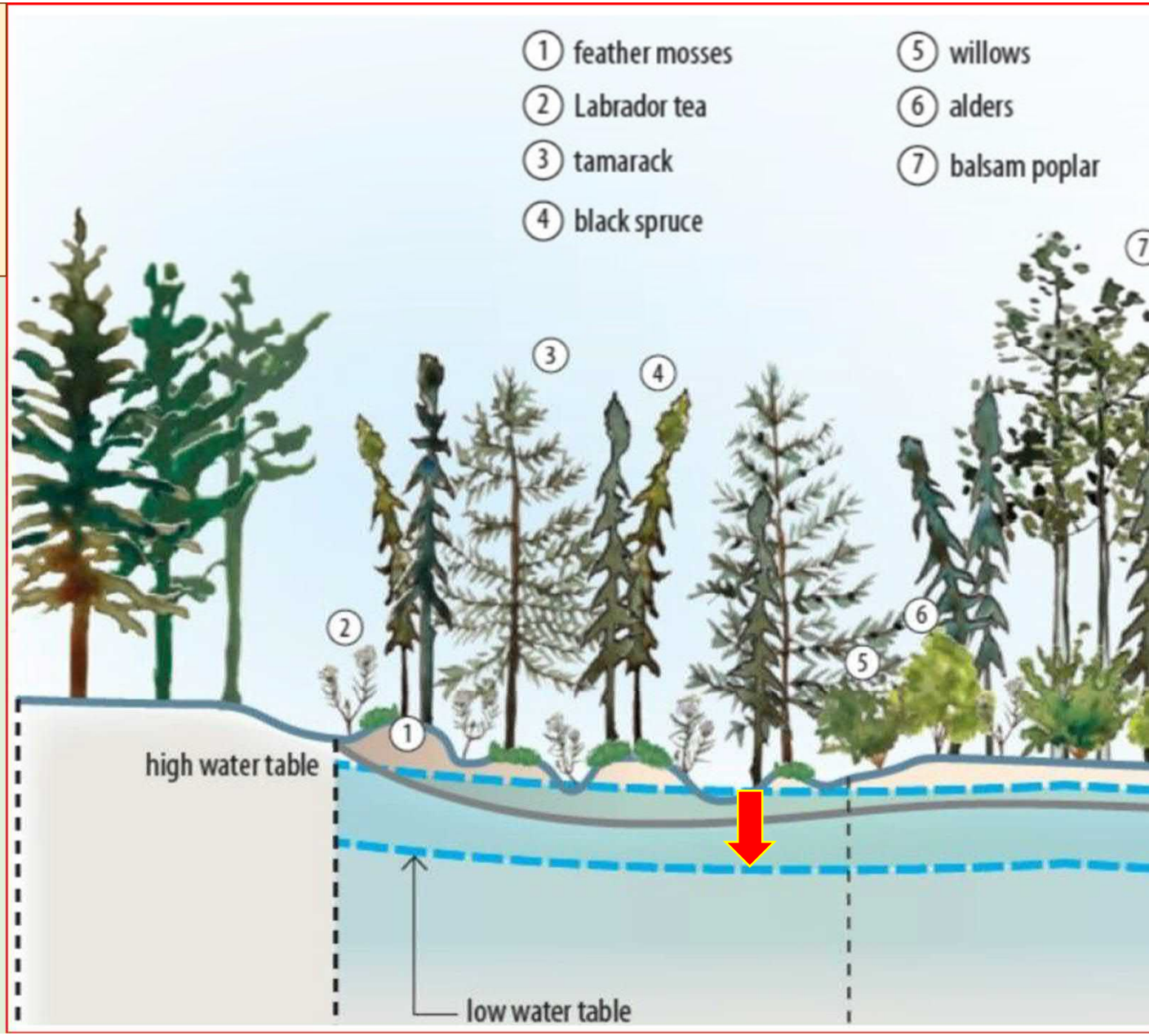
3.4. Soil sealing impacts on trees

Extensive sealing drastically reduces rainwater infiltration into the soil

- Groundwater replenishment considerably curtailed at sub-area 1
- Lower the local groundwater table progressively
- Draw down the groundwater table level at the nearby Chinese Swamp Cypress site
- May alter the direction, flow rate and volume of groundwater flows to jeopardize tree survival at the swamp
- Groundwater lowering and shortage particularly acute in the dry season

Consequence: Gradual drying up of the swamp, even if only seasonal, will bring catastrophic decline or demise of the internationally endangered species

Local drop in the groundwater table can dry up the inland wetland and kill the Chinese Swamp Cypress



3.5. Soil compaction impacts on trees

The soil in development sites is often heavily compacted

- Using heavy construction machinery
- Piling and storage of construction materials
- Frequent movement of heavy trucks
- Engineering requirement in installing subbase and subgrade of roadbeds and paved areas

Impacts on trees

- Collapse and loss of soil pores, increase in packing density
- Reduce water infiltration, storage and drainage
- Reduce ingress of air and egress of carbon dioxide
- Depress tree growth and health

Consequence: The trees cannot adapt to the compacted soil, leading to prolonged and irreversible decline

The soil is commonly compacted heavily in construction sites to harm trees

3.6. Soil contamination impacts on trees

- During construction stage
  - Harmful construction solids and liquid wastes find their way into the soil
  - Carried by running water to enter the soil
  - Alkaline and cementitious materials particularly harmful
  - Proposed exceptionally high-density development means an exceptionally high chance of soil contamination
- During operation stage
  - With 33,600 residents and associate commercial and other on-site activities
  - Plenty of harmful synthetic materials may pollute the soil in the long run
  - The pollutants may join the groundwater and migrate to the swamp site to jeopardize the protected trees

Consequence: Pollution of the swamp harming the growth of the endangered Chinese Swamp Cypress

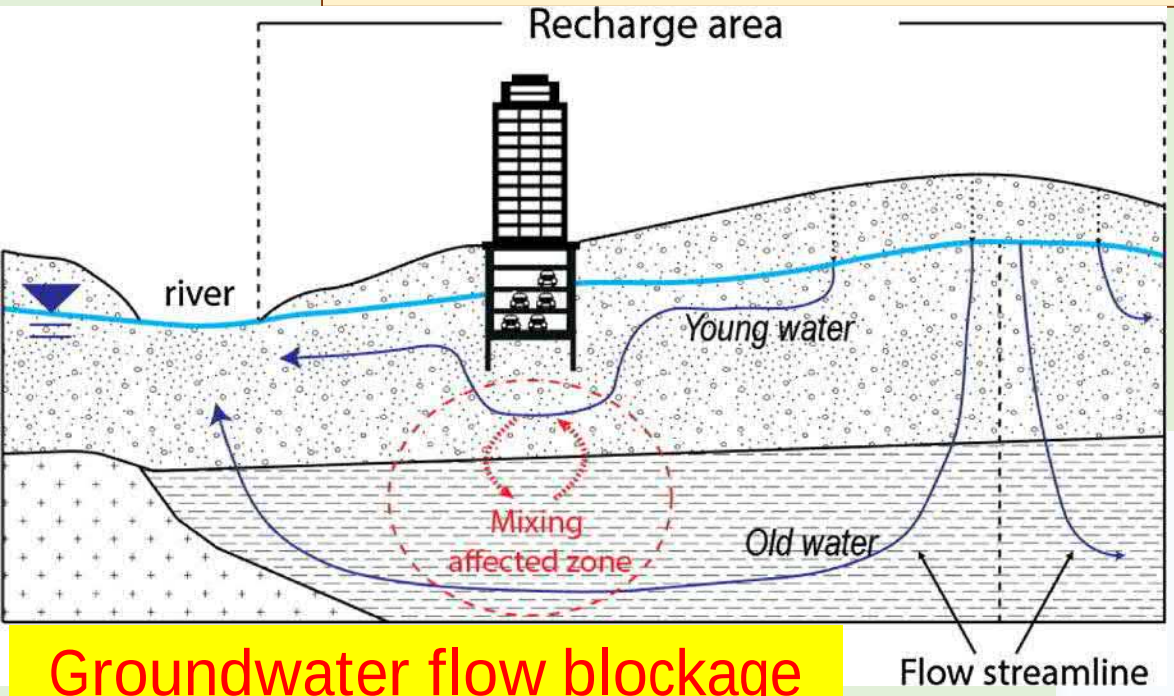
Construction sites can generate solid waste and wastewater harmful to soil, trees, surface water and groundwater

3.7. Building foundation impacts on trees

- Construction of buildings and roads demand installation of foundations
  - The 12 closely positioned buildings demand piling and excavation to construct their foundations
  - The access roads and emergency vehicle access and paved areas require subbase and subgrade installation
  - Trees conflicting with these areas have to be felled or transplanted
  - Groundwater flow can be blocked or diverted by substantial building foundation structures
  - Groundwater temperature could be raised by urban development

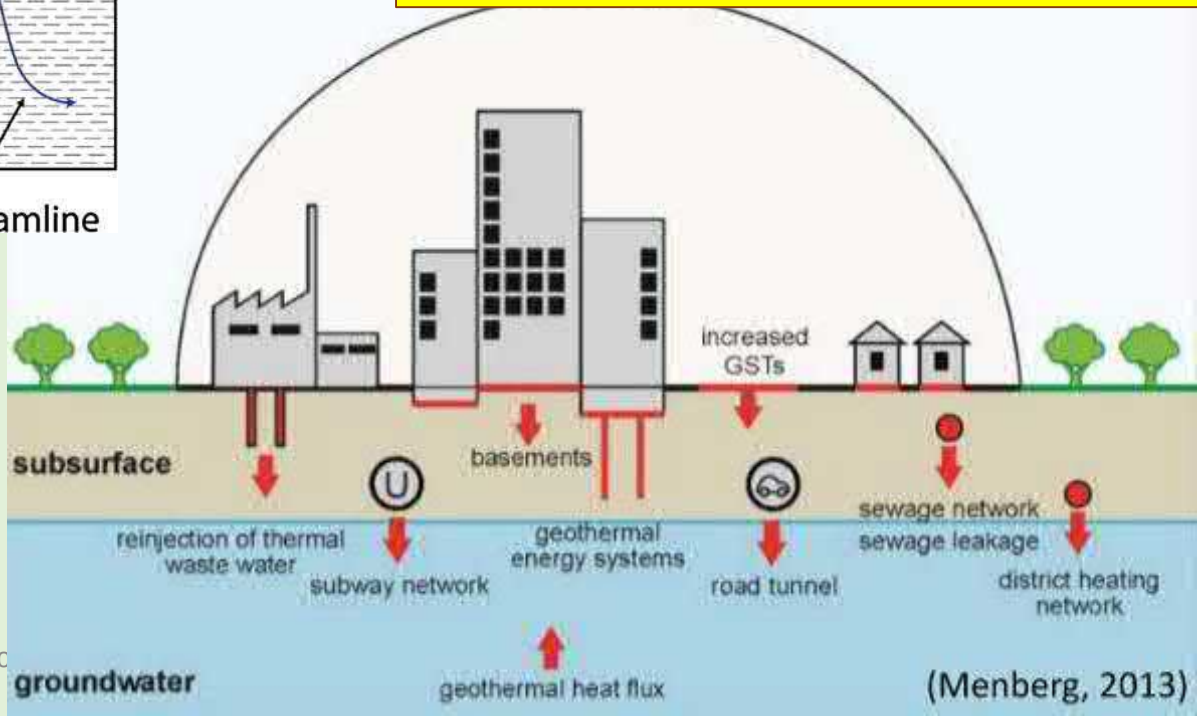
Consequence: Groundwater supply to the swamp site could be permanently trimmed to harm the prized trees

Massive foundation work for high-rise housing blocks



Groundwater flow blockage and diversion

Underground urban heat island effect



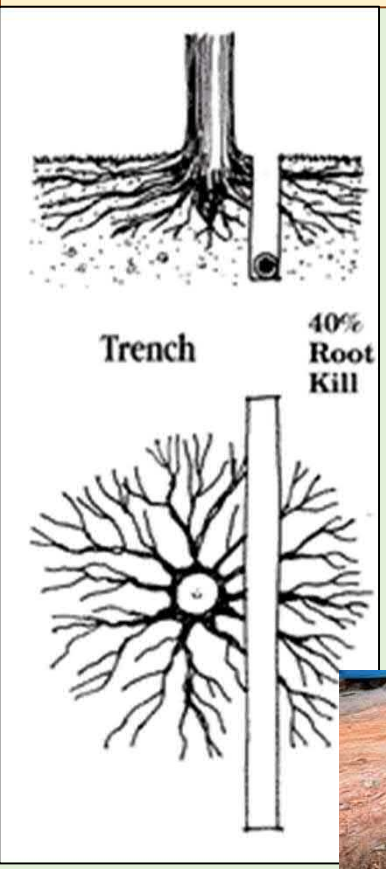
3.8. Utility trenching impacts on trees

Densely packed buildings require a dense network of buried utilities in limited inter-building space (potable water, flushing sea water, sewage, town gas, electricity, telephone, optical fibre, etc.)

- Many trenches will have to be opened literally throughout the site to install underground utilities
- Subsequent frequent road openings are needed to repair or replace them
- High probability of conflicts between trenching and trees, imposing root severance

Consequence: Decline of affected trees in the long run due to root injuries, reduced root system, root decay and compromised anchorage

Utility trenching is extremely damaging to tree roots



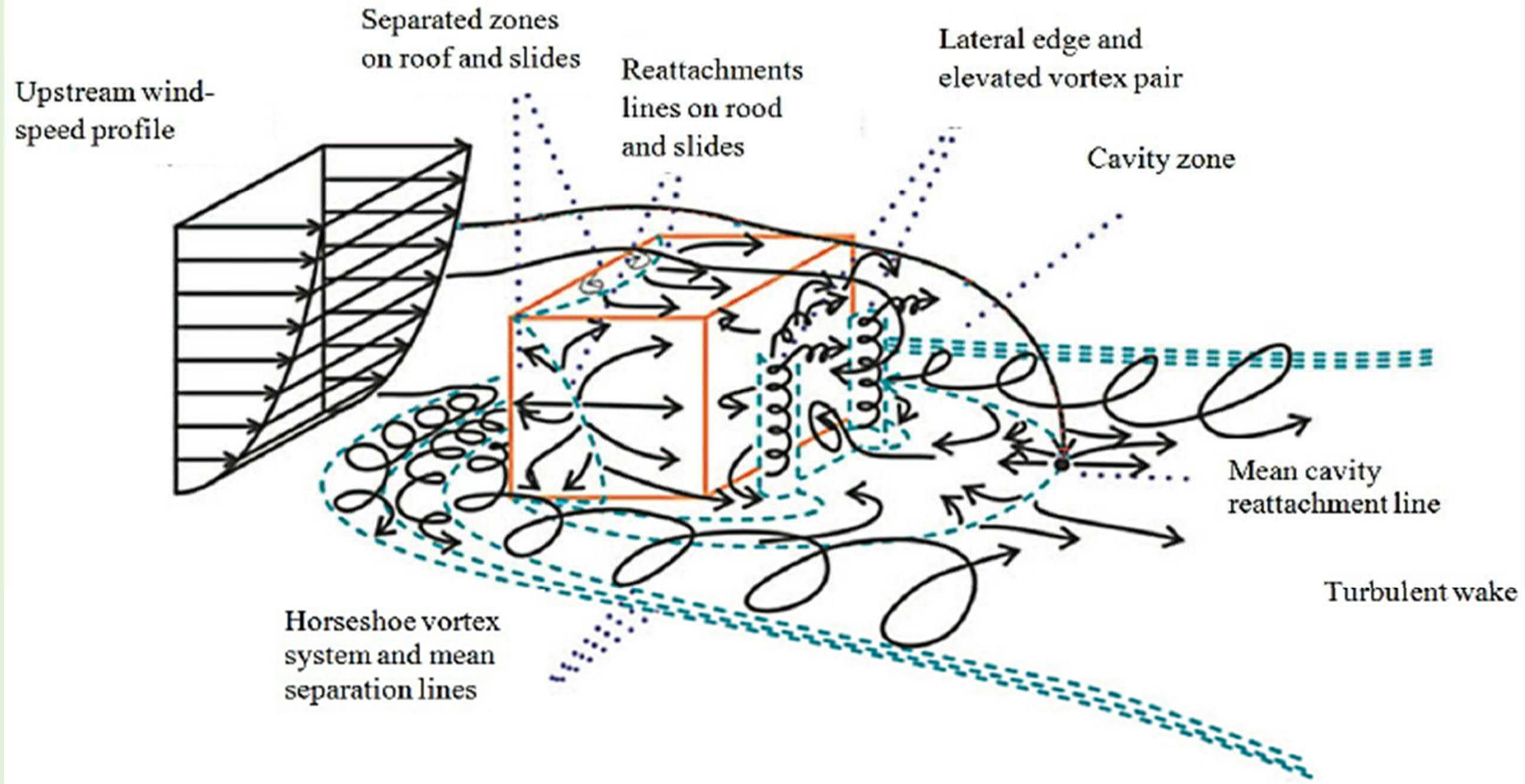
Example of high-density underground utility networks

3.9 Impacts of proximal and densely packed high-rise buildings

With 11 high-rise buildings situated close to each other, the wind flow pattern, including turbulence, will be significantly altered

- Funnelled wind may harm trees at sub-area 1 and beyond
- Increased wind velocity can drive up the transpiration rate in the long run to induce water deficit and tree decline
- In times of strong wind, particularly typhoon, strong funnelled wind can break, uproot or topple trees

Wind and turbulence around a high-rise building



3.9 Impacts of proximal and densely packed high-rise buildings

Closely juxtaposed tasll buildings situated close to trees can induce other negative impacts

- Cast a heavy shade to suppress photosynthesis and dampen tree growth and health
- Shading effect varies notably between seasons
- Buildings and paved surface absorbing solar heat can re-emit infrared radiation to raise the heat load of proximal trees and trigger water stress
- Trees situated too close to buildings demand frequent pruning to improve solar access and ventilation

Consequence: Continued decline of existing and newly planted trees

Shading impacts of high-rise buildings on adjacent and inter-building interstitial spaces

4. Epilogue

Based on objective ground-truth and science, the site is unsuitable for housing development from the following dimensions:

- Retrospective: Accumulation of over a century of natural-cum-cultural "wealth"
- Prospective: Long-term natural services of cool island, clean air, clean water, pastoral landscape, amenity space, and climate-change adaptation
- Community asset: A treasure trove of high-quality inherited, conserved, enhanced, emulated, and created nature
- Ecological quality: A biodiversity hotspot amidst a pauperized landscape
- Incompatible land use: Housing development, whatever the precautions, will ruin this cherished gem
- Candidate for conservation: A site naturally destined for conservation for generations to come, to be assiduously guarded against even indirect impacts

4. Epilogue

This representation is categorically not an opposition to finding land to resolve Hong Kong's chronic housing shortage problem

- Quite the opposite, I whole-heartedly support and admire the resolve of the administration to find solutions
- However, a community should make the best use of its limited resources
- The site has all the innate traits for a nature park rather than a public housing estate
- A ready-made green open space to serve the community in perpetuity, which is extremely short of open spaces, especially high-quality and naturalistic ones
- Please refrain from squandering this community treasure and then install elsewhere a new urban park with lesser nature at a high monetary and time cost

Solution: A landuse swap by shifting a site zoned for urban park in a nearby new development area to housing use; shifting this site with proposed housing zoning to golf course retention or nature park use (a win-win resolution!)

We have the choice!

End of presentation

Questions and comments are welcome