SUSTAINABILITY & TECHNOLOGY AT JURONG LAKE GARDENS

Call for Proposals

Outline

- Introduction to Jurong Lake Gardens
- Sustainability and Technology Focus Areas
- Challenge Statements
- How to Apply
- Q&A

NATIONAL PARKS
LET'S MAKE SINGAPORE OUR CITY IN NATURE

Jurong Lake Gardens

- Singapore's 3rd National Gardens, and 1st National Gardens in the heartlands
- Part of larger Jurong Lake District
- Phase 1 Lakeside Garden opened since April 2019
- >10 million visitors since opening
- 2nd most visited green space in Singapore
- Phase 2 Chinese Garden, Japanese Garden and North Shore opening in phases from mid-2022 onwards

Key Themes

1. Tropical Horticulture & Garden Artistry

2. Heritage & Culture

3. Sustainability & Technology

Sustainability and Technology Focus Areas

Areas	1 Ecology	2 Food	3 Waste	4 Energy/ outdoor comfort	5 Building material	6 Water	7 Social/ mobility	8 Ops
Projects	1) Habitat restoration 2) Biodiversity surveys 3) Dragonfly rehabilitation	1) Local food production -Edible Show Garden 2) Indoor farming	1) Horticulture Waste-to-energy gasification plant 2) Food waste composting 3) EPDM from Recycled sport shoes	2) Zero-energy buildings @ JLG 3) Solar harvesting (Perovskite GIPV) 4) Gen 2 grid: solid state transformer trial 5) 100% EV ready carparks 6) Active and passive outdoor cooling systems	1) Mass-engineered timber 2) Bamboo veneer lumber 3) NEWSand 4) Recycled plastic in road asphalt 5) Sustainable concrete in footpath construction	1) Rainwater harvesting 2) Landscape water cleansing system (ABC)	1) PMS & autonomous vehicles 2) Therapeutic gardens 3)Multi-generational recreation opportunities 4) Visitor Experience App	1) AR wayfinding + visitor analytics system 2) Smart garden patrol (Video analytic mounted on AV) 3) Park Surveillance Robot 3) Integrated Garden Management System + Environmental Sensors

Food & Waste

1 ECOLOGY

2 FOOD

3 WASTE

4 ENERGY

5 MATERIALS

6 WATER

7 SOCIAL

8 OPERATIONS

Indoor plant factory

- Showcase high tech methods for indoor production

Food Waste Valorisation

- Converting F&B food waste to compost for horticultural use in parks

Waste & Energy

1 ECOLOGY

2 FOOD

3 WASTE

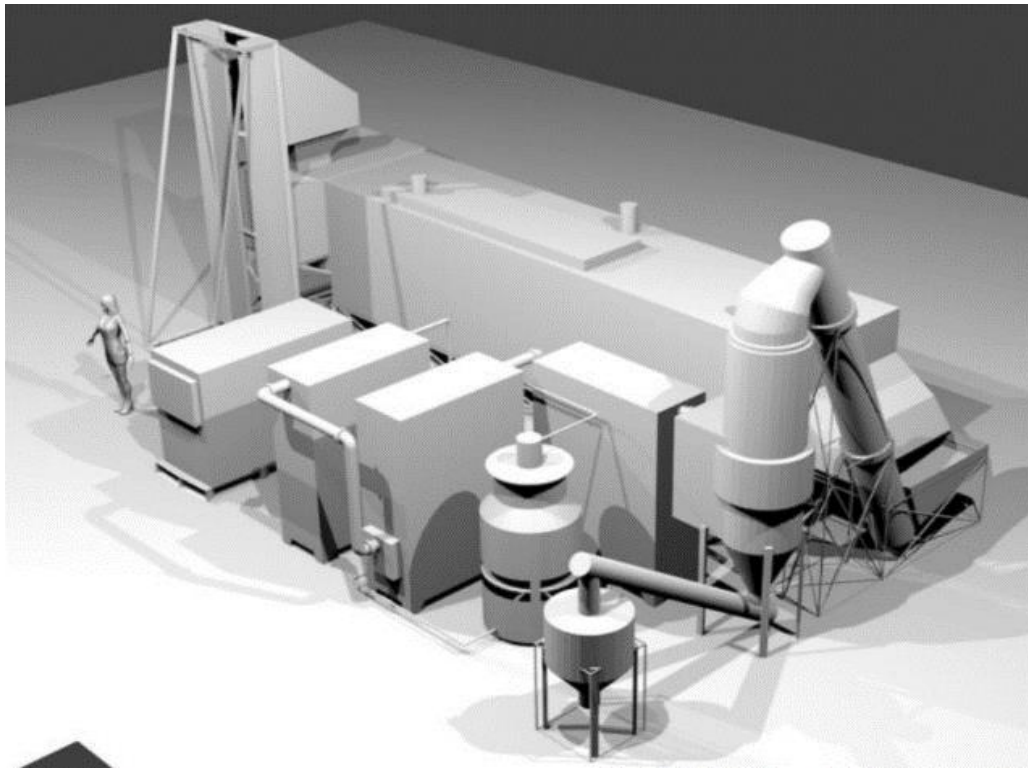
4 ENERGY

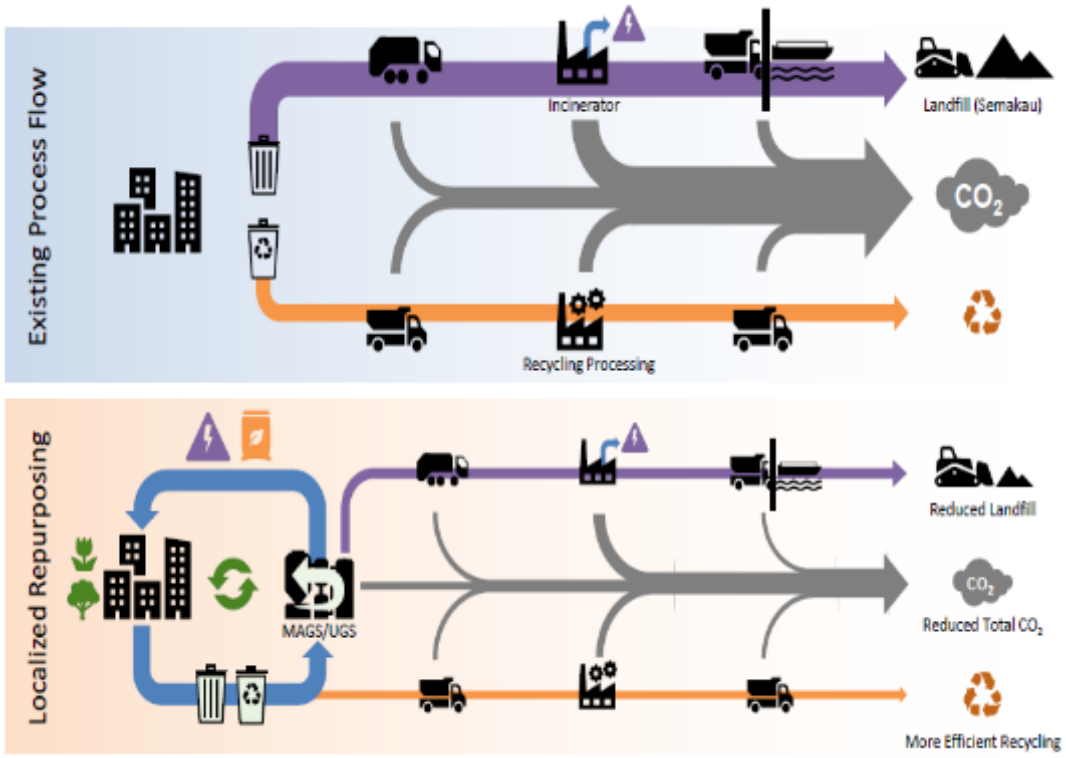
5 MATERIALS

6 WATER

7 SOCIAL

8 OPERATIONS





Horticulture Waste-to-Energy Gasification Plant

- Convert horticulture waste into energy and biochar for horticulture applications
- Syngas is generated during the process and combusted to generate electricity which is then used to power up buildings

Energy

1 ECOLOGY

2 FOOD

3 WASTE

4 ENERGY

5 MATERIALS

6 WATER

7 SOCIAL

8 OPERATIONS

SST and EV Charging

- Maximises available power on site
- Allows for rapid charging of electric vehicles

Perovskite Glass-integrated Photovoltaic (GIPV)

- New solar harvesting material which are comparable to conventional silicon PV

Sustainable Construction Materials

1 ECOLOGY

2 FOOD

3 WASTE

4 ENERGY

5 MATERIALS

6 WATER

7 SOCIAL

8 OPERATIONS

Mass Engineered Timber (MET)

- Pre-fabricated composite structural material which minimises on-site works and finishes required

Bamboo Veneer Lumber

- First composite bamboo with structural strength and a potential alternative to MET

Sustainable Construction Materials

1 ECOLOGY

2 FOOD

3 WASTE

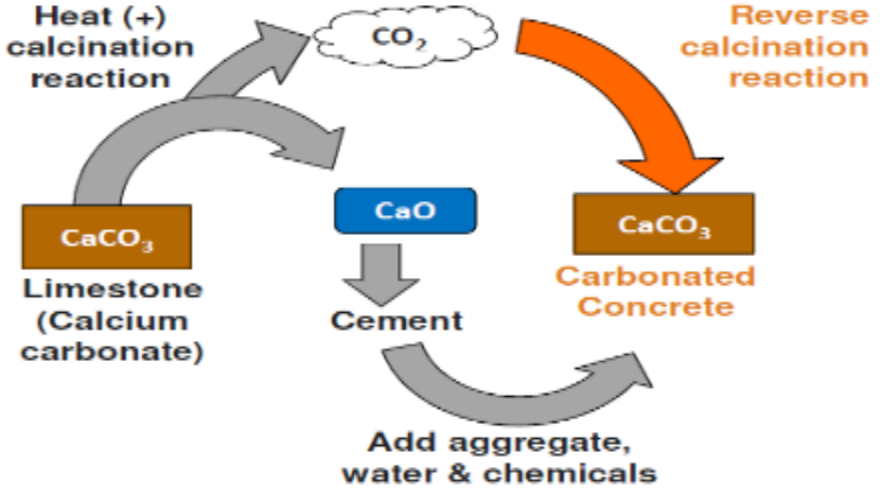
4 ENERGY

5 MATERIALS

6 WATER

7 SOCIAL

8 OPERATIONS



NEWSand

- Incorporation of NEWSand in path construction for sustainability education

Sustainable Concrete for Footpaths

- Sequestration of liquefied CO2 into concrete footpaths

Social & Operations

1 ECOLOGY

2 FOOD

3 WASTE

4 ENERGY

5 MATERIALS

6 WATER

7 SOCIAL

8 OPERATIONS

Autonomous vehicle as on-demand Garden-Mover-System

- Complement standard route Garden Mover System (GMS) consisting of driven buggies
- Increases accessibility to the various attractions within the Gardens

AR Wayfinding App and Visitor Movement Pattern Monitoring

- Wayfinding features to enhance visitors' experiences within the Gardens
- Visitor movement monitoring/position tracking to generate visitor behaviour profile

Operations

1 ECOLOGY

2 FOOD

3 WASTE

4 ENERGY

5 MATERIALS

6 WATER

7 SOCIAL

8 OPERATIONS

Outdoor Comfort/ Cooling Technology Trials

- Trials for outdoor cooling systems to enhance visitor comfort and user experience

Operations

1 ECOLOGY

2 FOOD

3 WASTE

4 ENERGY

5 MATERIALS

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7 SOCIAL

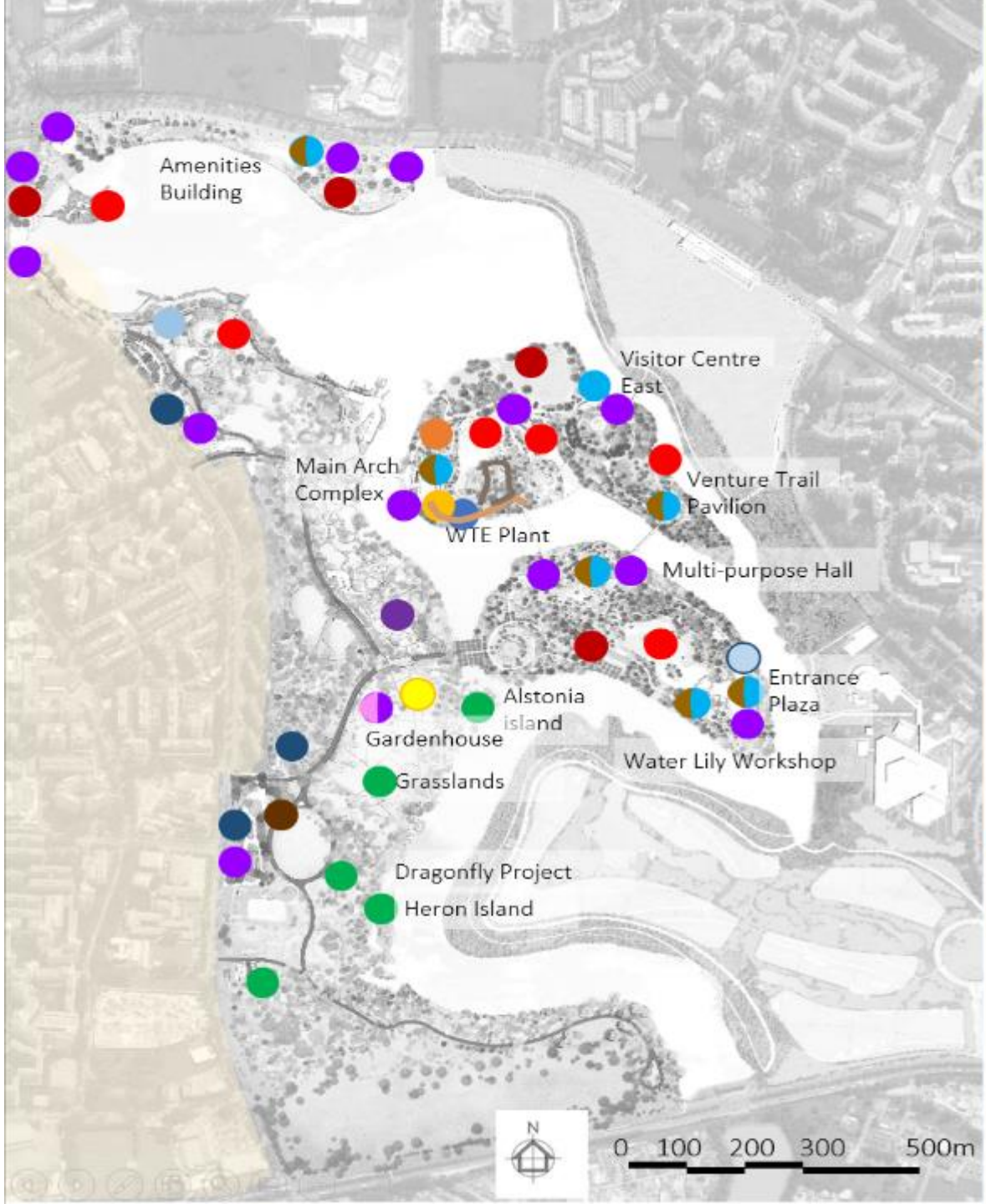
8 OPERATIONS

Autonomous vehicle-based security and FM Monitoring System

- Autonomous patrolling vehicle equipped with cameras capable of carrying out video analytics
- Reduces reliance on security manpower, improves response time to situations

Integrated Management System (IMS)

- Sensor inputs integrated into central monitoring and control system
- Mobile devices able to monitor sensor systems on the go



Ecology & Biodiversity

- Habitat Restoration
- Biodiversity Survey Transact
- Dragonfly Project

Food Sustainability

- Edible Show Garden
- Plant Factory
- Allotment Gardens

Energy & Waste Management

- Waste To Energy Plant
- Zero Energy Buildings
- Solar Peroskite GIPV
- Phononics & Panasonic Outdoor cooling
- Solid state substation & EV parking
- Hydrogen Fuel Trial

Smart Operations

- Integrated Garden Management System
- JLG Mobile App
- Robotic Video Analytic

Water

- Rainwater harvesting
- ABC Features

Building Material

- MET
- Bamboo Pavilion
- NEWSand
- Carboncure
- Plastic Recycling Road

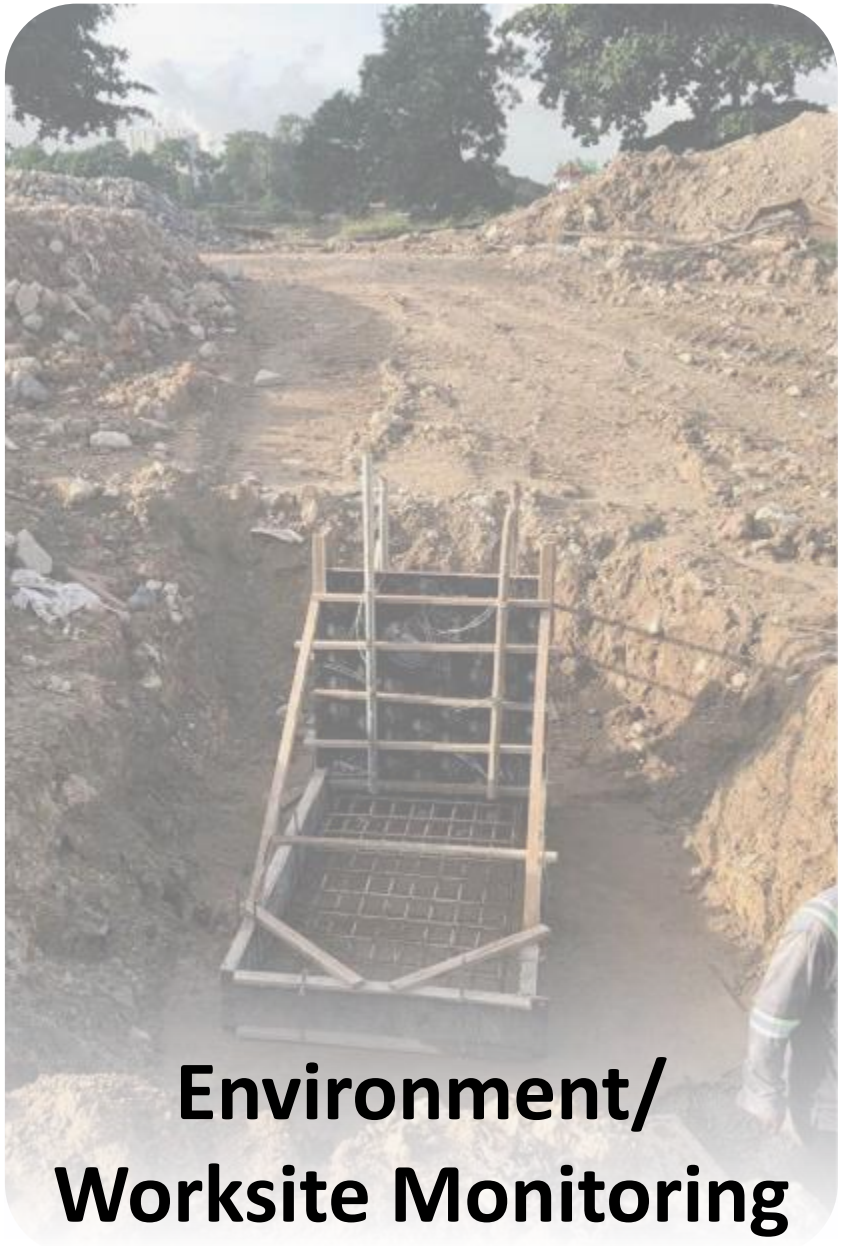
Social/ Mobility

- Therapeutic Gardens
- Visitor Service Smart Kiosk
- People Mover System (AV and On-demand shuttle)

Problem Statement Areas

Greenery Maintenance

Cleansing/ Hardscape Maintenance



Environment/ Worksite Monitoring

Landscape Areas

Flowerbeds

Ponds

Shorelines

Vegetated Swales

Slopes

Event Lawns

Structures & Hardscape

Playground

Pavilions and Shelters

PCN/Cycling Paths

Storage Areas

Water Play

Toilet Blocks

Call For Proposals – Problem Statements

Greenery Maintenance

1. Solutions to *reduce heavy reliance on manpower* while increasing efficiency for works carried out. Examples:

- Maintenance of shrubs including pruning and watering functions
- Identifying weeds and carrying out weeding works

2. Solutions to *improve work safety* through innovative technologies. Examples:

- Maintenance of bioretention swales which are not easily accessible and unsafe for workers
- Maintenance of rooftop planting or vertical walls

3. Solutions to *enhance maintenance standards* through use of technologies. Examples:

- Enhancing drainage of lawn areas by identifying signs of soil compaction and carry out hollow-tining operations

Call For Proposals – Problem Statements

Cleansing/ Hardscape maintenance

1. Solutions to *reduce heavy reliance on manpower* while increasing efficiency. Examples:

- Perform cleansing services like jet washing and leaf blowing
- Cleansing of outdoor play equipment via technologies like UV rays

2. Solutions to *improve work safety* through innovative technologies. Examples:

- Identification of waste along the shorelines and performing cleansing services
- Clearing of algae and waste at water bodies

3. Solutions to *assist Park Managers in operation of the gardens* through technologies. Examples:

- Automated systems like sensors or robots to detect defects through image or video analytics
- Cleaning of nursery tools and performing basic nursery chores

Call For Proposals – Problem Statements

Environment/Worksite monitoring

1. Solutions to *increase efficiency of maintenance and site awareness* through monitoring systems.
   Examples:

- Monitoring system at the Grasslands to identify areas which require urgent maintenance
- Water monitoring systems to monitor water parameters for aquaria and terraria

2. Solutions to *have better awareness of environmental impacts* through mobile monitoring systems:

- Monitoring system for water bodies before water is being channeled into the Jurong Lake
- Monitoring system to better study soil profiles and identify erosion and slippage situations

3. Solutions to *assist in site monitoring works* for better facilitation of worksites.
   Examples:

- Deployment of mobile robots capable of monitoring work processes
- Video analytics function to identify work safety practices (wearing of PPEs etc)

Call For Proposals – Problem Statements

General requirements for solutions proposed

- Suitable for outdoor environment (water and weather proof) and capable of travelling on uneven terrain
- Sustainable in terms of cost, operation and maintenance
- Minimise disruption to existing landscape and adjacent areas
- User friendly and safe for deployment
- Lightweight and transportable for ease of operation
- Able to interface with NParks central monitoring and management system (MAVEN 2)
- Embraces the idea of sustainability

Send in your proposals today!

Launch Date: 3 Sept 2021

Closing Date: 3 Oct 2021

Application link:

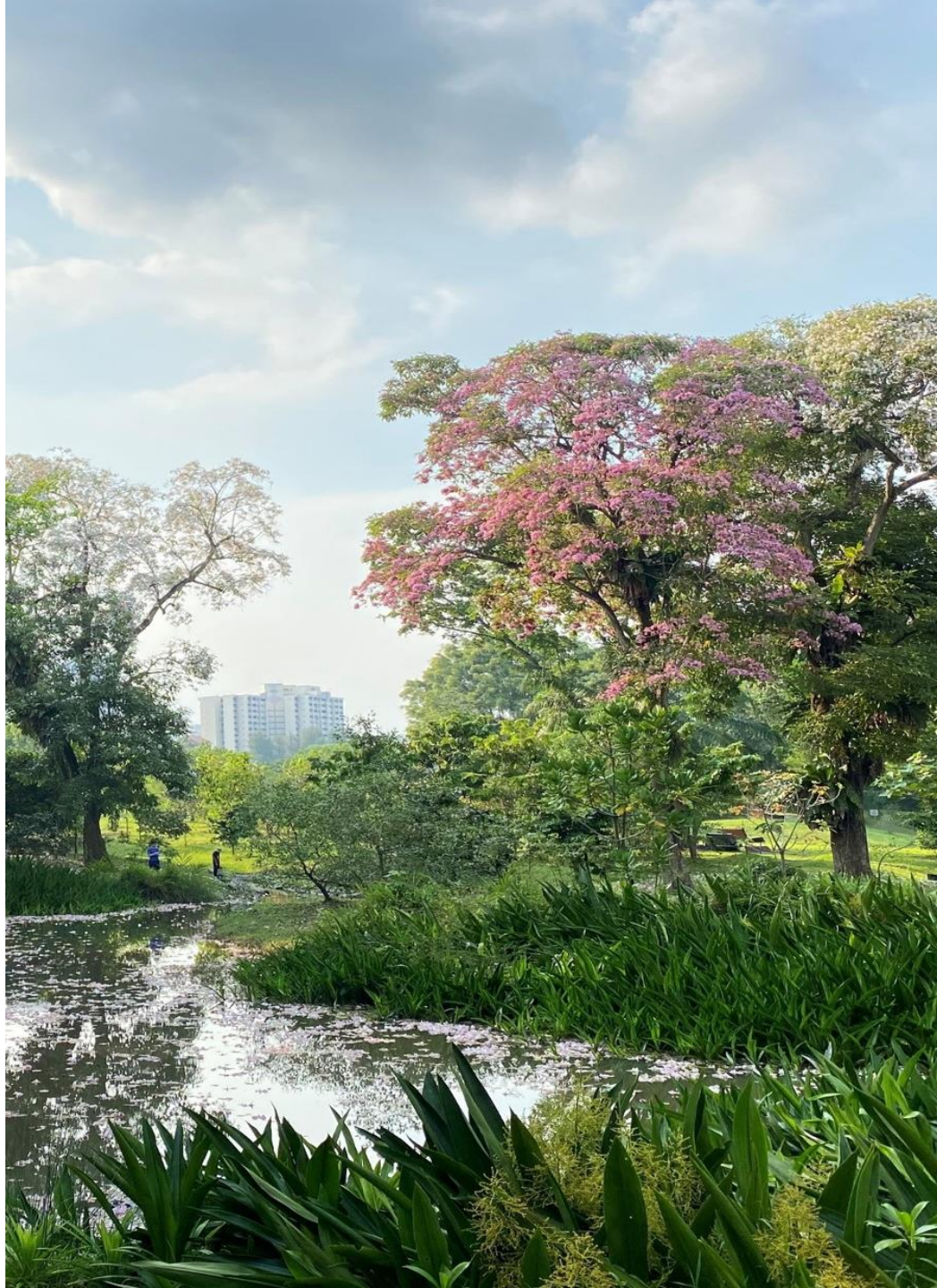
go.gov.sg/be-llf

For more info:

go.gov.sg/jlg-webinar

For further clarification and possible collaboration, you may direct your queries to:

- Mr Ong Chong Ren (Ong_Chong_Ren@nparks.gov.sg)
- Mr Rayner Khoo (Rayner_Khoo@nparks.gov.sg)




Thank You