



# Lightning Protection Systems

TRACK RECORDS OF ENVIRO PRO GREEN INNOVATIONS (S) PTE LTD





### Tree LPS at Bishopsgate, 2006, 2012, 2013 and 2017

Bishopsgate is a luxury residential area located near to Singapore's Central Business District (CBD). However, Bishopsgate is situated on an elevated area that is prone to lightning strikes. Thus, LPS should be installed to prevent damage of trees located along Bishopsgate.

Following National Parks Board (NParks) regulations, private house owners are needed to ensure that fully matured trees within their residences have to be installed with LPS.

Enviro Pro was engaged by private residential owners to install LPS on trees within their residences. As of May 2017, Enviro Pro installed up to 9 LPS for private owners along Bishopsgate.



*Fagraea  
Fragrans*



*Completed  
grounding  
works with  
inspection  
chamber*



*Qualified rope  
access  
climber*





### Tree LPS at Pulau Ubin, 2013 - 2016

Situated off the north-eastern corner of mainland Singapore, Pulau Ubin is a protected nature reserve, consisting of secondary forest.

Working together with National Parks Board (NParks), Enviro Pro was tasked with installing LPS and carrying out maintenance on the tree LPS for more than 40 systems in the forest.

As Pulau Ubin is situated away from Singapore mainland, great coordination and planning by Enviro Pro aided in the transportation of the materials. The dense secondary forest limited the working area for the installation. However, with experienced and qualified climbers onboard, works were completed dutifully on time.



*Durio  
zibethinus*



*Air terminal*



*Splicer and  
main conductor*



### Tree LPS at the Istana, 2016

The Istana is the official residence and office of the President of Singapore. Despite its location at the heart of the city, the Istana domain is a green lung amid the arteries of metropolitan bustle. Overall management of the extensive grounds is the responsibility of National Parks Board (NParks).

Under termed contract with NParks, Enviro Pro provided LPS services from inspection, minor and major maintenance to full installation of LPS for the various trees in Istana.

More than 30 trees in Istana were serviced by Enviro Pro to ensure that the trees are well protected from lightning strikes.



*Work map of Istana*



*Air terminal*



*Podocarpus rumphii*



### Tree LPS for Heritage Trees around Singapore 2009-2016

Under the Heritage Tree Scheme announced on August 2001, mature trees and trees with botanical, social, historical or cultural value are being classified as heritage tree. These heritage trees are protected and conserved by National Parks Board (NParks).

In an effort to conserve these heritage trees, NParks initiated to install LPS to protect against lightning strikes.

Under contract by NParks, Enviro Pro installed and maintained LPS for heritage trees across the island. Heritage trees have larger crowns, thus, air terminal points have to be carefully selected before the installation of the system.



*Fagraea  
fragrans at  
Lagos Circle*



*Samanea  
Saman at  
Jalan Hang  
Jebat*



*Mangifera  
Caesia at Jalan  
Naung*





### Tree LPS at Singapore Botanic Gardens, 2001 - 2016

The 195 year old Singapore Botanic Gardens is a UNESCO World Heritage Site, and is the world's first and only tropical botanic gardens. Not only does it play a key role in experimentation and promotion of flora, it showcases a wide variety of flora.

The Botanic Gardens houses some of the heritage trees in Singapore which takes decades to mature fully. Under the Heritage Tree Scheme, these trees are protected and conserved by botanists in Singapore.

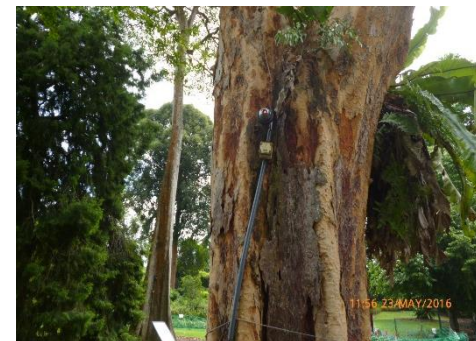
Over the years, Enviro Pro installed and carried out maintenance on the tree LPS under instructions from National Parks Board (NParks) for more than 40 different systems in the area. Strike counters and dummy cameras were installed as well.



*Heritage Tree:  
Copalfera  
officinalis*



*Fagraea  
Fragrans –  
Captured on  
the back of 5  
dollar note*



*Dummy camera  
and strike  
counter*



### Tree LPS at East Coast Parkway, 2015

A beautiful avenue of mature Rain Trees (*Samanea saman*) can be seen along East Coast Parkway, from Changi Airport to the City area.

Flanked by East Coast Park on one side and high-rise housing on the other, the well-landscaped expressway was built and maintained with the conscious intention of giving visitors arriving via Singapore Changi Airport a good first impression of the country.

Under a termed contract by National Parks Board (NParks), Enviro Pro was tasked to install 4 LPS on these trees. Over the course of 2 days, the installation works were completed.



East Coast Parkway



Air Terminal



*Samanea saman*



### Tree LPS at Istana Park, 2011

Istana Park is bounded by Orchard Road, Penang Lane and Buyong Road. It was opened in 1995 to serve as an extension to the main Istana Gate.

The Istana Park is home to a wide diversity of trees species which have varying wood strength and characteristics. Tree LPS has to be installed with caution so as to prevent injuries to the tree.

Under a termed contract by National Parks Board (NParks), Enviro Pro installed tree LPS for 8 additional trees in 2011 and continued to provide maintenance services on the trees with LPS over the years in Istana Park.



*Fagraea  
Fragans*



*Khaya  
grandifolia*



*Yellow  
Flame*





### Tree LPS at Bukit Timah Nature Reserve, 2011

Bukit Timah Nature Reserve is one of the most diverse nature reserve in Singapore which houses 40% of native fauna and flora. Bukit Timah Nature Reserve includes Singapore's highest hill, Bukit Timah Hill and one of the few areas of primary rainforest in the country.

The nature reserve contains trees that are fully matured, with height of up to 45m tall. Lightning Protection System has to be installed to protect these trees.

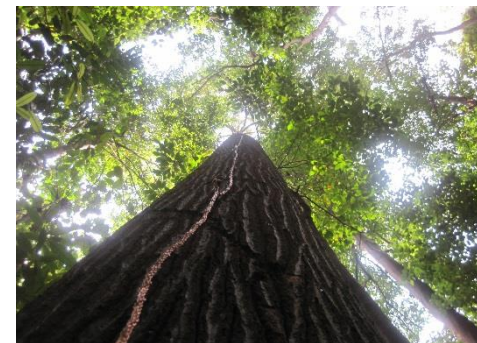
Contracted by National Parks Board (NParks), Enviro Pro carried out installation and maintenance of 13 LPS systems for trees in Bukit Timah Nature Reserve. As the works were carried out in the forest, cluttering of trees and flora limited the working area. Extra care and effort were given to minimize disturbances to the wildlife.



*Bukit Timah  
Nature  
Reserve Trail*



*New  
Installation of  
chamber box  
and  
grounding  
rods*



*Main Conductor*



### Tree LPS at Singapore Island Country Club, 2002, 2003, 2011 & 2012

Singapore Island Country Club is one of the longest and prestigious recreational centre in Singapore. Singapore Island Country Club has 9 different golf courses. The Bukit Course alone contains more than 3,000 fully grown trees with at least 10 varieties.

Located at a slightly elevated ground, the fully grown trees on the golf courses were more susceptible to lightning strikes. These lightning strikes could cause substantial injuries or even death to the trees.

Enviro Pro worked with Singapore Island Country Club to install and maintain approximately 40 LPS systems over a period of time



*Bukit Course*



*Main  
Conductor &  
fasteners*



*Syzygium  
grande*



### Tree LPS at Siloso Beach Resort, Sentosa, 2006

Located on Sentosa Island, Siloso Beach Resort is an eco-resort which prides itself in preserving the natural habitat of its surroundings.

In an attempt to preserve its natural surroundings, Siloso Beach Resort initiated LPS to be installed on a large number of trees in the area.

Engaged by Tamco Systems (S) Pte Ltd, Enviro Pro was tasked to install 31 LPS on trees. The installation works were completed within a month in conjunction with the on-going construction of the resort.



*Siloso Beach Resort*



*Syzygium grande*



*LPS works and ongoing construction works*



## Schedule of Past and Present Contracts

Details of All Relevant Past and All Current Contracts Executed by Tenderer	Total Value of Contract	Date of Completion
Tree LPS for National Parks Board	\$ 2,900.00	December 2000
Tree LPS for National Parks Board	\$ 14,296.00	March 2001
Supply FEC Services Pte Ltd	\$ 150,000.00	2001-2002
Tree LPS at Singapore Island Country Club (SICC)	\$ 197,000.00	March 2002-2003
Supply Hock Cheong Pte Ltd	\$ 35,020.00	December 2003- January 2004
Tree LPS at Sentosa Golf Club	\$18,500.00	August 2004
Tree LPS at Nanyang Technological University	\$ 4,000.00	2004
Tree LPS at Singapore Science Centre	\$ 6,000.00	July 2004
Supply Hock Cheong Pte Ltd	\$ 103,000.00	July 2005
Tree LPS at Bishopgate No 1, Residence	\$ 10,000.00	July 2006
Tree LPS at Cluny Road No 51, Residence	\$ 2,600.00	July 2006
Tree LPS at Siloso Resort, Sentosa	\$ 60,000.00	July 2006
National Parks Board, Singapore Term-Contractor for Tree Lightning Protection Systems for two years	\$ 500,000.00	September 2009 to August 2011
Tree LPS at Istana Park	\$ 13,365.00	January 2011
Tree LPS at Bukit Timah Nature Reserve	\$ 5,775.00	March 2011

Details of All Relevant Past and All Current Contracts Executed by Tenderer	Total Value of Contract	Date of Completion
Tree LPS Install and Maintenance at Istana Park	\$ 1,936.00	November 2011
Tree LPS at Kentridge Park	\$ 15,730.00	February 2011
Tree LPS at Singapore Island Country Club	\$ 46,170.00	March 2011
Tree LPS at Alexandra Hospital	\$ 3,650.00	January 2012
Tree LPS at Singapore Botanic Garden	\$ 62,800.00	April 2012
Tree LPS at Singapore Island Country Club	\$ 12,900.00	May 2012
Tree LPS at Singapore Island Country Club	\$ 40,000.00	June 2012
Tree LPS at Nassim Regency	\$ 2,800.00	August 2012
Tree LPS at Resort World Sentosa	\$ 37,767.50	October 2012
New Installations and Repair Works for LPS for the Singapore Botanic Gardens and other areas under NPARKS	\$400,600.00	January 2014
New Installations and Repair Works for LPS for the Singapore Botanic Gardens and other areas under NPARKS for Two Years	\$460,000.00	February 2017
Tree LPS at Seletar Aerospace Park	\$6,090.00	February 2017
Tree LPS at 2N Bishopsgate	\$5,500.00	May 2017