

BCA-NParks Green Mark for New and Existing Parks 2008–2014 Benchmarking Singapore's Parks

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Images as credited

Despite the ubiquitous presence of trees, not all urban landscapes are sustainable. Poor landscape design, construction, management, and maintenance can all lead to economically and environmentally unsustainable practices.

Singapore's BCA-NParks Green Mark for Parks was developed out of a need to benchmark the sustainability of urban landscapes in relation to their functional purpose (defined by type, quality, and intensity of use), management efficiency (including return on investment, or capital and upkeep relative to use), and environmental footprint. In response to this need, the Centre for Urban Greenery and Ecology (CUGE) under the National Parks Board (NParks) of Singapore worked with the Building and Construction Authority (BCA) of Singapore to customise a framework that has the flexibility to be applied to a great range of urban landscape settings, from nature reserves with high conservation

value to intensively used Central Business District parks.

International urban landscape benchmarking schemes were reviewed to develop the world's first objectively measured, triple-bottom-line framework that assesses social, environmental, and economic sustainability against current best practices. The BCA-NParks Green Mark scheme is based on internationally accepted green building assessment systems, such as LEED (Leadership in Energy and Environmental Design) in the United States, BREEAM (Building Research Establishment Environmental Assessment Methodology) in the United Kingdom, CASBEE (Comprehensive Assessment System for Built Environment Efficiency) in Japan, and Green Star in New Zealand.

The assessment criteria for the BCA-NParks Green Mark for New Parks and Existing Parks

differ slightly but are broadly divided into two categories: Resource Self-Sufficiency and Park Quality. **Resource Self-Sufficiency** benchmarks the urban landscape's resource footprint against best practices in similar urban landscapes. For example, it assesses material resource, water efficiency, and energy efficiency. On the other hand, **Park Quality** objectively assesses areas such as greenery and urban ecology, design for ease of maintenance and accessibility, park development and construction management, as well as deployment of other innovative "green" initiatives.

BCA-NParks Green Mark for Parks provides four levels of certification: Certified, Gold, GoldPLUS, and Platinum. Green Mark Certified urban landscapes are recognised for exceeding the minimum environmental, social, and economic sustainability standards across similar "best fit" landscapes. At the other end of

NEW PARKS		EXISTING PARKS	
PART	PTS	PART	PTS
RESOURCE SELF-SUFFICIENCY	Material Resource	20	Waste and Material Minimisation 20
	Water Efficiency	18	Water Efficiency 10
	Energy Efficiency	12	Energy Efficiency (Bonus for clean or renewable energy: 20 points) 10
PARK QUALITY	Greenery and Urban Ecology	22	Conservation and Heritage 15
	Design for Ease of Maintenance and Accessibility	12	Park Management 40
	Parks Development and Construction Management	16	Other Innovative Sustainability Features 5
	Other Green Initiatives (Bonus Points)	20	
	Total	120	Total

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Assessment Criteria for Green Mark for New and Existing Parks

the scale, Green Mark Platinum landscapes are recognised for having developed world’s best sustainability practices. To date, 22 parks in Singapore have received a Green Mark rating.

Criteria and Assessment

The assessment process includes pre-assessment, actual assessment, site verification, and certification.

Pre-Assessment

Certified assessors will conduct a preliminary assessment with the Park Managers to assist in the preparation of the actual assessment. This step also allows the assessors to advise Park Managers on the required documentation. For new parks, this will generally involve a visual inspection of the proposed park plans.

Actual Assessment

Depending on the size of the landscape

being assessed, the actual assessment may take between one to three days. The assessment team will comprise two or more certified assessors, depending on the size and complexity of the assessed park. The assessment will begin with the Park Manager presenting a summary of how the project satisfies the criteria of Green Mark for Parks. Assessors will verify documentation submitted and clarify any queries with the Park Manager. The assessors will then conduct site assessments prior to discussing the assessment results. They will then provide a report with their recommendation and supporting reasons to BCA and NParks for approval.

Site Verification

For new parks, the assessors will be deployed six months before the completion of the park, to inspect and ensure that the parks’ sustainability features are implemented and the construction activities do

not undermine the sustainability features of the park.

Certification

All BCA-NParks Green Mark for Parks candidates will be notified of their assessment results. A formal acknowledgement and award presentation will take place to confer the accolades to the recipients. Currently this takes place during the annual BCA Awards, generally held in May every year. Representatives of the GoldPLUS and Platinum parks will receive their award on stage from the Guest of Honour.

For more information: www.greenmark.sg

NEW PARKS

2014 BCA-NParks Green Mark for Parks (New Parks) Platinum Award

name Gardens by the Bay

award recipient Gardens by the Bay

location Singapore

completion date 2012

The 101-hectare-large Gardens by the Bay site is a collection of three waterfront gardens, namely Bay South Garden, Bay East Garden, and Bay Central Garden. The assessment site was at Bay South Garden, which is 54 hectares large and comprises the following main components: outdoor-themed gardens, the Cool Dry and Cool Moist Conservatories, the Energy Centre, support facilities, and Supertrees.

Careful planning and consideration were exercised at the project's planning phase. Measures were taken to conserve and minimise the impacts to wildlife associated with the removal of a vegetated island and reconstruction of a pond. They include: first, minimisation of impacts through the careful sequencing of activities associated with reconstruction of the pond and island; second, reduction of impacts to wildlife through the placement of buffer strips; and third, compensation for impacts through replacement of the former habitats.

The original island has been replaced with Nibong island. A number of other islands have been created, all of which

have been planted with mixed wetland species and palm trees to approximate the species replaced, coupled with an extensive freshwater lake system. The lake system comprises the Dragonfly Lake and Kingfisher Lake. The edges of the lakes were designed to allow the growth of plants and invertebrate communities, while marsh areas were constructed and planted with a wide variety of floating, emergent, and submerged species to provide habitats for dragonflies and other wetland fauna.

There is also extensive use of salvaged and environmentally friendly materials, for example, in the brushed concrete footpaths, woodchip footpaths, floor and wall tiles, internal paints, waterproofing system, and Glass Fibre Reinforced Concrete for the boardwalk. The two lakes in the garden have been designed to naturally cleanse the lake water and surface runoff of the garden. This is achieved using terraced filtered beds, man-made islands, bog gardens, aquatic plants, and bioswale weirs at the mouth of the both lakes.

Some 270 pre-existing mature trees that were in good condition and deemed to have a significant remaining lifespan were incorporated into the design and protected in place via in situ conservation. In addition, over 500 trees were relocated and transplanted in the gardens, while more than 100 were either harvested for timber or processed into woodchip to be used on site as mulch for the biomass system.

2. The Dragonfly and Kingfisher lakes in Gardens by the Bay have been designed to naturally cleanse the lake water and surface runoff of the garden (Photo: Gardens by the Bay).

3, 6. The landscape at Gardens by the Bay extensively uses salvaged and environmentally friendly materials (Photo: Gardens by the Bay).

4. The Gardens' iconic Cool Dry and Cool Moist Conservatories and Supertrees (Photo: Gardens by the Bay).

5. Eleven of Gardens by the Bay's Supertrees are embedded with environmentally sustainable functions like photovoltaic cells to harvest solar energy (Photo: Gardens by the Bay).





NEW PARKS

2012 BCA-NParks Green Mark for Parks (New Parks) Platinum Award

name River Safari

award recipient Wildlife Reserves Singapore (Client/ Developer/ Project Manager/ Landscape Consultant)

location Singapore

completion date 2012

collaborators DP Architects Ptd Ltd; Beca Carter Hollings & Ferner (S.E.Asia) Ptd Ltd) (M&E and Structural Engineer); Langdon & Seah Singapore Pte Ltd (Quantity Surveyor); and Prelim Construction Pte Ltd (Main Contractor)

River Safari is a river-themed wildlife attraction situated between the Singapore Zoo and Night Safari. Featuring eight major rivers of the world, River Safari displays flora and fauna from these rivers in a naturalistic landscape.

River Safari is designed and developed with significant sensitivity to the environment. A baseline survey was conducted before development began to determine whether the ecologically important species would be affected. Mitigation measures were taken to minimise the impact of the development. There is also an extensive use of salvaged and environmentally friendly materials for the development.

This park is home to a pair of Giant Pandas. Both animal exhibits use a highly efficient chiller and a number of air-conditioner units that have been rated with four ticks, the highest and most energy-efficient

rating, under National Environment Agency's mandatory energy labelling system. Sun pipes are used extensively in all animal exhibits to reduce the use of artificial lighting.

The Greenbag system is used for the retaining walls along the periphery of water bodies. This soft engineering system provides a solution for erosion control, slope stability, soil retention, bank protection, and earth-retaining wall applications.

River Safari will also be planting more than 13,000 trees and plants, comprising about 110 species, which is more than 10 times the number of plants to be removed from its previously disturbed land. These green zones will support a greater diversity of wildlife, including 21 locally threatened species and the globally threatened straw-headed bulbul.

The overall environmental sustainability efforts focus on minimising the impact of River Safari on natural resources and wildlife species. The conservation and enhancement plan focuses on native species, some of which are threatened, and outlines an action plan to ensure these species find a permanent refuge within the created habitat, so they will eventually migrate to and from the surrounding areas of the Zoo, Night Safari, and Central Catchment Nature Reserve. River Safari will contribute to a contiguous green corridor along the reservoir edge for the safe passage of these animals.

7. River Safari's Amazon River Quest passes through an aviary with Scarlet Ibis (Photo: Wildlife Reserves Singapore).

8, 10. River Safari's Giant Panda Forest, picturing the resident female panda, Jia Jia (Photo: Wildlife Reserves Singapore).

9. The Upper Seletar Reservoir and Wild Amazonia section of River Safari (Photo: Wildlife Reserves Singapore).

11. Squirrel Monkey Forest at River Safari (Photo: Wildlife Reserves Singapore).





NEW PARKS

2011 BCA-NParks Green Mark for Park (New Parks) Platinum Award

name Jurong Eco-Garden (former JTC CleanTech Park Green Core)
award recipient JTC Corporation (Client/ Developer/ Project Manager)
location Singapore
completion date 2013
landscape consultant Atelier Dreiseitl Asia Pte Ltd

The 4.51-hectare-large Jurong Eco-Garden (formerly known as JTC CleanTech Park Green Core) is situated at Jalan Bahar in close proximity to Nanyang Technological University. It was designed to be the heart and lungs of the eco-business park, CleanTech Park, and to be a place for not only the human inhabitants, but also the flora and fauna that make up the unique ecology of the site.

Carefully chosen plant species were selected to create a freshwater swamp forest habitat for people and fauna to thrive in the recreated habitat. The planning and strategic design of the park incorporated a strategy of succession planting, designed to optimise growth by staggering the maturation dates of planted species, and the management for forest trees so as to eventually cover the site.

The Eco-Garden was also designed with the 3Rs, “recycle”, “reuse”, and “reduce”, and water conservation in mind. The park uses recycled, salvaged, and environmentally friendly materials and products throughout. Treated stormwater from the cleansing biotope is used for all of the toilet flushing in all blocks. Educational messages on some of these green features, some using interesting

12. Jurong Eco-Garden is designed to be the heart and lungs of CleanTech Park and a place for not only human inhabitants but also the site's unique flora and fauna (Photo: Atelier Dreiseitl Asia Pte Ltd).

13. Bridge crosses a bioswale along the wildlife corridor at Jurong Eco-Garden (Photo: Atelier Dreiseitl Asia Pte Ltd).

14. Bioswale at Jurong Eco-Garden (Photo: Atelier Dreiseitl Asia Pte Ltd).

15. Labrador Nature Reserve's Berlayer Bridge (Photo: ICN Design International).

interactive modes, are also prominently displayed throughout the park.

The Eco-Garden's strength lies in its efforts to preserve the existing cultural heritage and to recreate and enhance the natural habitats throughout the park's development. Extensive baseline surveys and detailed site analyses were conducted to support to these efforts. In planning for the retention of vegetation, much thought was given to the augmentation of the existing vegetation and habitats, evident in the park's succession planting schemes. To retain the cultural essence and heritage of the site, the existing dragon kilns, the setting of the wooden platform around an existing Ficus tree, and a wooden pavilion on Thow Kwang Pond have been retained.

The other strength of the park is the design of its stormwater management system. The natural topography of the site is retained as much as possible to maintain the site's existing hydrology. As a result, almost 100 percent of the site's potential stormwater discharge is channelled into the main retention pond. Focusing on “active”, “beautiful”, and “clean” water design, features of the ABC Waters Design Guidelines such as swales and cleansing biotopes are extensively used to naturally cleanse the water before its discharge to the stormwater canal.

The park is also designed to be well connected and leverages on its close proximity to existing bus stops and park connectors with the provision of bicycle stands and pedestrian walkways. Jurong Eco-Garden will be served by an electric bus shuttle service, with a pick-up point at Pioneer MRT Station.

16. One of Labrador Nature Reserve's attractions, the Labrador Nature and Coastal Walk connects three trails: Alexandra Garden Trail, Berlayer Creek mangrove trail, and Bukit Chermin Boardwalk (Photo: ICN Design International).

17, 18. Collared Kingfisher and Mudskipper are among the wildlife sighted at Labrador Nature Reserve (Photos: ICN Design International).

EXISTING PARKS

2014 BCA-NParks Green Mark Park (Existing Parks) Gold Award

name Labrador Nature Reserve
award recipient National Parks Board (Client/ Developer)
location Singapore
completion date 1951 (founded)

Labrador Nature Reserve is one of the pilot projects of BCA-NParks Green Mark for Parks. It attained a BCA-NParks Green Mark for Parks (Existing Parks) Certified award in 2008. Since then, significant efforts have been made to improve the sustainability of the park. The nature reserve was reassessed and awarded a BCA-NParks Green Mark for Parks (Existing Parks) Gold Award in 2014. It is located within walking distance from Labrador Park MRT Station, homes, and busy offices and shopping centres.

The park has been conserving its natural surroundings, including habitats for flora and fauna, providing visitors with a tranquil nature escapade from the populated estate. The park's green wastes are minimal and horticultural wastes are reused as signboards and soil barriers for the park. Stormwater and runoff are harvested for the general cleansing of the park and watering of new plants. It has good water conservancy practices after overhauling its water supply system.

The park offers a variety of recreational opportunities, such as bird watching, cycling, guided walks, and fitness stations and playgrounds to the users. The park has very strong natural and cultural heritage. 





19. Firefly Park by Housing and Development Board (Photo: Surbana International Consultants Pte Ltd).

20. Fort Canning Park by National Parks Board (Photo: Nuriman Samsi).

21. Sungei Buloh Wetland Reserve by National Parks Board (Photo "Sungei Buloh Wetland Reserve": Walter Lim on <https://flic.kr/p/aEe6ek> / Licensed under a Creative Commons Attribution 2.0 Generic License).

OTHER AWARDED PARKS

BCA-NParks Green Mark Gold Parks

2013 BCA-NParks Green Mark for Parks (New Parks) Gold Award

- Firefly Park @ Clementi by Housing and Development Board

2008 BCA-NParks Green Mark for Parks (Existing Parks) Gold Award

- Fort Canning Park by National Parks Board
- Sungei Buloh Wetland Reserve by National Parks Board

BCA-NParks Green Mark Certified Parks

2014 BCA-NParks Green Mark for Parks (Existing Parks) Certified

- Kent Ridge Park
- Mount Faber Park
- Telok Blangah Hill Park

2010 BCA-NParks Green Mark for Parks (New Parks) Certified

- Dairy Farm Nature Park by National Parks Board
- Greenwood Sanctuary @ Admiralty by Housing and Development Board

2010 BCA-NParks Green Mark for Parks (Existing Parks) Certified

- Bedok Reservoir Park by National Parks Board
- West Coast Park by National Parks Board
- Japanese Garden (Seiwaen) by JTC Corporation

2009 BCA-NParks Green Mark for Parks (Existing Parks) Certified

- Admiralty Park by National Parks Board
- East Coast Park by National Parks Board
- HortPark by National Parks Board
- Pasir Ris Park by National Parks Board
- Toa Payoh Town Park by National Parks Board
- Yishun Park by National Parks Board

2008 BCA-NParks Green Mark for Parks (Existing Parks) Certified

- Chinese Garden by JTC Corporation