Greenwood Sanctuary @ Admiralty

A Delightful Eco-Nature Neighbourhood Park

Text by Lydia Ma and Lee Sai Guek
Images as credited

1. The central water retention pond after rain (Photo: Lydia Ma).

The park also serves as a pilot to test out various sustainable features in a tropical climate where temperature is high, rainfall intense, and evaporation fast.

The speed of urbanisation and development worldwide is raising alarms of global environmental deterioration. The restoration of nature seems unable to catch up with its degradation due to the growth of cities. Therefore, unless new developments adopt sustainable solutions, we will soon see more negative effects of urbanisation on the environment.

According to Professor Thompson (2000), "Landscape architecture is a key profession for a world facing an uncertain environmental future."[1] Although sustainable development cannot be achieved by one profession alone, nature-friendly landscape approaches can make significant contributions towards the goal of sustainable development.

Greenwood Sanctuary @ Admiralty is a Housing and Development Board (HDB) neighbourhood park designed with eco-friendly landscape design. The park also serves as a pilot to test out various sustainable features in a tropical climate where temperature is high, rainfall intense, and evaporation fast. What is the role of a small park in a neighbourhood? What lessons can we learn from this park to apply in our efforts for sustainable development? What are suitable landscape approaches to take, in view of the continuing need for development, in order to protect or even reestablish nature in a dense, urban environment like Singapore? The design of this eco-nature park provides some promising answers to these challenging questions.

Objectives and Opportunities

In HDB towns, each neighbourhood is planned with a park to serve a community of around five to six thousand families, providing outdoor space for leisure and recreation. Therefore the main functional design requirement for such a park is to provide a set of standard facilities that includes two playgrounds for different age groups, one elderly and one adult fitness station, a jogging track of approximately 300 metres, shelters, seats, an open lawn, and so on. Apart from facility provision, HDB also places great emphasis on the environmental qualities of a park. The greenery improves the micro-climatic conditions and serves as a green lung for the densely built environment.

Hence, areas for greenery must be maximised, but without compromising the provision of facilities. This means not only providing more greenery in terms of plant quantity but also carefully creating a sustainable environment that is easy to maintain. As part of its drive to advance environmental sustainability, the HDB landscape team took the lead in this park design to create a model for future developments. More eco-friendly approaches in landforming and the design of drainage systems were explored in the park.

Greenwood Sanctuary @ Admiralty is a 1.5-hectare-large park located along Woodlands Drive 62 and Woodlands Drive 73. As residents' demand for more activity space in Woodlands Neighbourhood 6 grew, HDB reviewed its building programme and advanced the building of this park ahead of the surrounding developments. The park may sit

2. Natural drainage instead of concrete drains (Photo: Lydia Ma)

3. Original park condition (Photo: Surbana International Consultants Pte Ltd).

4. Park location (Source: Google Map) (Diagram: Lydia Ma).

at the fringe of a built-up residential development but is really mostly surrounded by open fields.

As the site had been earlier cleared and turfed in anticipation of future development, it was not planted with trees or shrubs, and a periphery drain had been provided to catch excess runoff. The vision for the park was first to increase its water retention capacity by adopting a Water Sensitive Urban Design (WSUD) approach. A unique landscape drainage system was designed to fulfil this. In terms of vegetation and wildlife, HDB set out to enrich the park's biodiversity by introducing more native plant species. In turn, this was expected to attract desirable wildlife, such as butterfly, dragonfly, and bird species.

Landscape Approaches

Restoration and enhancement

The ecological principle behind the landscape design was to respond to site characteristics and design using nature. However, as the original site conditions had been altered and vegetation replaced with turf field, there was little original topography or plant life to work with. Drainage patterns had been changed and a new site level set. Hence, instead of restoring the original site condition, the design approach was to re-create a new landscaped area that would try to mimic the processes of nature.

The resultant site was to have a higher hydrological capacity and richer biodiversity than the turf field. To enhance the site's hydrological capacity, the concept of sustainable water management was adopted, focusing on localised stormwater treatment. The target was to collect 100 percent of the surface runoff for retention and cleansing. To mimic natural drainage, no concrete drains were used. Instead, vegetated swales were introduced.

The designed landform played a key role in directing water flow. A comprehensive swale network was designed to channel runoff to water collection areas. To ensure barrier-free accessibility, the undulating landform was designed around walkways. Footpaths were generally level or gently sloped to create a special spatial experience and to meet the level of the adjacent site. All swales terminated at one of the water retention basins, the latter which were designed with underground water detention tanks. Stormwater flowing into the basins is filtered by sand and grass before reaching the underground storage tank, increasing the water retention capacity of the park. The retained water gradually permeates into the surrounding land. With good water retention throughout the park and ample water supply from the detention tanks, the plants thrive. To date, there is no need for irrigation, even in dry seasons.

The success of the landscape drainage system depended largely on the landform design, which was also carefully considered to balance the cut-and-fill on site, hence eliminating the need to import or export soil. A detailed contour plan was developed to define the shape of the landform, determine the levels, and estimate the amount of cut-and-fill. With a thoughtful grading proposal, the swales, water retention basins, walkways, and activity areas were well integrated into the undulating landforms. The excavated earth was close to the estimate, with only a small excess that was used to slightly increase the height of higher mounds at two locations without affecting the overall drainage system.

The efforts behind the careful topographical design to enhance the hydrological condition improved the water retention capacity of the site. The undulating landforms have resulted in a very pleasant natural landscape and also substantially saved costs by eliminating the construction of extensive concrete drains.

Community and sustainability

The landscape principles guiding the choice and design of amenities for park users were both to ensure easy maintenance as well as instil a spirit of sustainability in the users. Park facilities should be functional, but their design theme and materials can also help to convey a message about sustainable development and eco-friendliness. The landscape furniture, elements, and materials used helped to convey this message. For example, logs from dumping grounds were made into directional signs and recycled rubber mulch was used for the jogging track. Products with recognised green labels as well as recycled materials were used.

To raise park users' understanding and awareness of eco-design concepts, education signboards were provided to give graphical illustrations of plant succession in a forest and show how rainwater was retained and filtered. Other educational boards provided information on the planting theme, importance of forests to the environment, WSUD features, and function of the rubber mulch flooring for water retention, and so on.

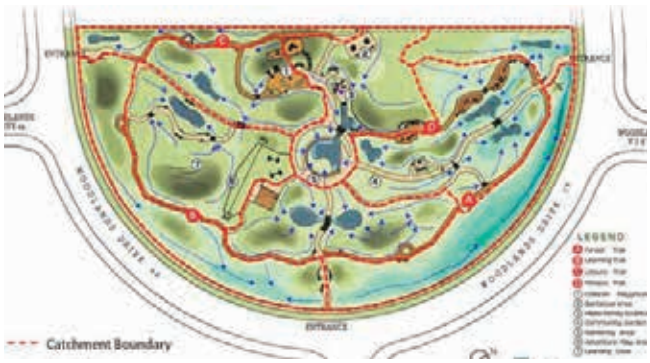
To make the education process fun and interactive, a water pump was used as a feature at the side of the central dry pond facing a community garden. One signboard depicts how rainwater is stored underground and drawn up for irrigation; it provides information on rainwater harvesting and how residents can use the pumped-out water for community gardening. Excess water flows back to the pond.

To foster the community's environmental awareness, easy access and more opportunities to interact with nature were created. The approach was to bring nature closer to residents in an unobtrusive way, allowing users to experience nature as part of their living environment. Once the community has become used to living with nature nearby, it is likely to be more receptive to a more natural park environment within its housing precinct instead of demanding neatly manicured gardens. The site was sculpted to form naturally undulating landforms to create interesting enclosures and open spaces, some of which were integrated with each other and others intentionally separated to form pockets of spaces for more varied activities and enjoyment. In addition, users were offered opportunities to get closer to the water and enjoy the water scenery after rain. Timber crossings were provided where the footpaths ran across the swales to serve as small bridges over the shallow waterway for people to observe the runoff and experience water flowing under their feet towards the ponds.

To optimise space, the circulation layout and facilities were designed in a sensitive manner. The primary circulation effectively connected the main entrances with key activity areas, while the secondary circulation functioned as a looped jogging track with additional facilities. The main

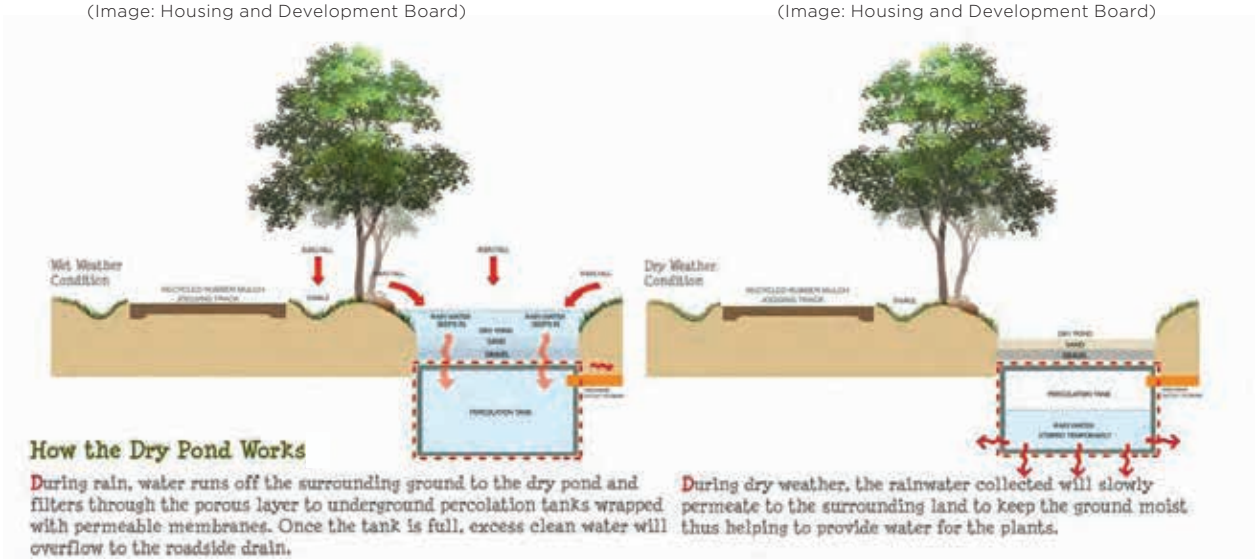
5

The Park Layout
(Image: Housing and Development Board)



6

The Concept Plan of Sub-Catchments and Swale Flow.
(Image: Housing and Development Board)



7

Concept Section of Water Retention Basin Provided on Information Board
(Image: Surbana International Consultants Pte Ltd)

walkways converged into a footpath encircling a green lawn at the centre, a symbolic representation of a forest clearing. Large activity areas were sited close to the loop. To incorporate recreational use in a sustainable way, the activity spaces had to be thoughtfully planned and well integrated with the greenery. Conscious effort was made to provide for the anticipated use of spaces by various communities with enough flexibility. For example, open lawns were provided with simple raised concrete benches or stone boulders to serve as informal seats for occasional large group functions.

Although the park was constructed for the residents in the neighbourhood, it is also meant to reach out to the larger community, including other interest groups and potential users such as students, nature lovers, and WSUD professionals.

With HDB's encouragement, Greenwood Primary School, which is located in the vicinity, has even adopted the park as its additional outdoor classroom. This serves to inculcate the spirit of sustainability in the pupils, in line with the responsible usage of the park as encouraged by HDB. To ensure proper upkeep and management of the park, HDB also shared its eco-design concepts and maintenance requirements with the Town Council, which is supportive and willing to carry out the removal of dead leaves and litter in place of manicure-pruning and pesticide-spraying.

Design and nature

Aesthetically, the landscape design sought to create a delightful place with interesting details and a pleasant ambience. Painstaking and deliberate efforts were spent to make the park look natural. Much attention was placed on the landform and drainage. At the same time, it was important to add points of visual interest and create a variety of spatial experiences.

The WSUD features were carefully integrated with the greenery to create a scenic waterscape. During and after storm events, vegetated swales appear as small rivulets next to the footpath, bringing rainwater to the water retention basins and creating transient ponds. The ponds only appear when sufficient runoff is collected; once the surface water


8


9


10


11


12


13


14


15


16

8. The education signboard provided for public education (Photo: Surbana International Consultants Pte Ltd).

9. The manual pump at the central dry pond area (Photo: Lydia Ma).

10. The vegetated swales appear as shallow earth drains (Photo: Lydia Ma).

11, 15. Dry (Fig. 11) and wet (Fig. 15) water retention basins (Photos: Lydia Ma).

12. A swale crossing with a timber deck above it (Photo: Lydia Ma).

13. The symbolic forest clearing at the centre of the park (Photo: Lydia Ma).

14. The central water retention basin after rain (Photo: Lydia Ma).

16. Hippo sculptures invite children to interact with them (Photo: Lydia Ma).


17


18


19


21


20


22

17. A park for the neighbourhood and various interest groups (Photo: Surbana International Consultants Pte Ltd).

18. Panoramic view of the central dry pond with nearby facilities (Photo: Lydia Ma).

19. Log signage for the Forest Trail and rubber mulch floor finish (Photo: Surbana International Consultants Pte Ltd).

20, 21. Interesting rockscape (Photo: Lydia Ma).

22. Mixture of fast- and slow-growing species with layers of planting (Photo: Lydia Ma).

has percolated through the ground, they turn into "dry ponds". There are 11 basins of different sizes, shapes, and planting for a richer visual enjoyment, and they cater to varied water retention capacity needs. As the water amount and duration of ponding of each pond is not constant, these dynamic water features create a very interesting "changing landscape".

The highlight of the waterscape is the central sandscape feature, which is the largest water retention basin in the park. It is at the centre of the symbolic forest clearing lawn and connects to another small basin to allow larger surface water retention. After a heavy downpour, water at the two basins merges to form a large pond with a timber deck over it. The pond gradually subsides and becomes two smaller ponds. A small leaf-shaped shelter and life-sized pygmy hippopotamus sculptures were provided nearby to add interest. The shelter stands as a sculpture in the landscape, creating an interesting focal point, especially in the evenings when the lights are on. The "hippo" sculptures are a symbolic representation of a healthy eco-system and the harmonious co-existence of human and nature. In addition, they serve as play equipment for children.

To create a lush forest effect, man-made and architectural elements were minimised while more natural materials were preferred. Timber was used for most structures to reflect the theme of—and reinforce the value of—forests, as well as the importance of reafforestation. Granite chips and natural mulch were initially explored as flooring materials for the jogging trails. However, due to considerations of safety, comfort of use, and durability, rubber mulch, a green label material, was eventually selected as it resembled natural mulch and was permeable. Natural stone boulders and rocks from dumping grounds were used as theme elements of the WSUD features and, at the same time, to enhance their view and function. Large stone boulders were used as seats, "adventure steps" to the top of the mounds, as well as decoration, while smaller rocks were used to mark the swale crossing and some swale paths. As a result, an interesting rockscape was created for use and enjoyment.

The park spaces were framed by natural elements instead of man-made structures. Spaces were defined by landforms and layers of planting with a soft canopy of leaves formed by trees of different sizes and species. Where possible, native species were used at all planting layers to mimic natural woodlands. Although the trees require many years to mature, the arrangement and mixture of fast- and slow-growing trees reflect the process of succession in a natural forest. The pioneer non-native fast-growing species like Acacia will first shoot up fast in the initial years to form a simple tree canopy; in subsequent years, the native slow-growing hard woods such as Tembusu and Jelutong will develop to enhance the density of the greenery and gradually replace the fast-growing trees as the dominating species. While the overall planting theme was forestation, the detailed planting concept for the four different zones varied with the design theme, each was designed with a walkway meandering into the landscape as a trail. To create unique spatial experiences, each of the trails is given a theme: "forest", "learning", "leisure", and "fitness". Although the planting proposals for each zone had a different emphasis, the base planting palette for the entire park was native species. Ornamental species were used largely at the leisure zone and places with visual highlight.

The Keys to Success

Greenwood Sanctuary @ Admiralty has successfully achieved its environmental and design objectives and is a step forward in HDB's vision of a sustainable living environment. In fact, the park has been recognised for its eco-friendly design through multiple accolades such as the International Real Estate Federation Singapore Property Award 2012 (under the category of sustainable development), the HDB Design Award 2011, the HDB Innovation Merit Award 2010, and the Inaugural ABC Waters Certificate for Completed Projects. It was also selected by National Parks Board and Building Construction Authority as a pilot project to test the assessment criteria for the Green Mark New Park Category and was one of the first to be awarded the Green Mark Certification. In addition to its balanced design approach and harmonised solutions, its success can also be attributed to many parties and factors.

As a developer, HDB is committed to creating sustainable towns and actively promoting eco-friendly design approaches by rendering professional assistance.

Construction excellence also helped to realise the innovative design proposal. HDB's ideas for stormwater management relied on the landform and grading design that was crucial to the success of the landscape drainage system and required an experienced contractor to carry out the earthworks. The project contractor was proactive and studied the contour plan thoroughly before implementation, enabling the work to be executed according to the plan.

The concept of sustainability was also explained to and accepted by all parties, including the consultant team, contractor team, HDB project management team, Town Council, and the nearby Greenwood Primary School. With their support, good working relationships, and a shared objective, the park was able to turn out as beautifully as planned.

As a pilot success, Greenwood Sanctuary @ Admiralty boosts the confidence of landscape professionals in efforts for a more sustainable environment and provides a good reference for future quality landscape designs. However, reliance on developers or the landscape profession alone cannot ensure long-term environmental sustainability. By learning from this experience, it is hoped that other developers, design professionals, local communities, schools, and property managing agents will share HDB's vision and task to create and maintain a healthy and sustainable living environment. CG