



CASE STUDY

JTC Corporation | CleanTech Park

Seeing the Forest for Its Trees

When JTC Corporation was tasked to transform a secondary forest into an eco-business park, it chose to take a less conventional approach to minimise the ecological impact of its development on the greenfield site. The result: an innovative and sustainable business park where natural and cultural heritage thrive.

The Challenge

In 2007, JTC, Singapore's lead government agency for industrial infrastructure development, was vested with the responsibility of transforming a 50-hectare plot of secondary forest into an eco-business park, the CleanTech Park (CTP).

The challenges posed for the development were formidable: firstly, JTC had to contend with the "incumbents" of the greenfield site that included decades-old native trees, as well as a thriving population of birds and butterflies. A second challenge was the unusual terrain: the plot sank almost 20 metres towards the centre, resulting in the accumulation of stormwater. A third challenge was the presence of two "dragon kilns", Thow Kwang Kiln and Guan Huat

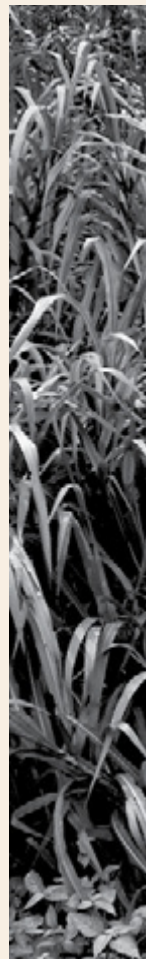
Kiln. Built in the 1940s and 1950s respectively, these bore particular cultural significance as they represented the last of mass pottery production in Singapore.

Conventionally speaking, the project could have been a straightforward, native land-to-industrial park conversion: send in the bulldozers, flatten the land and build the park from scratch. However, this would have harmed the site's biodiversity, disrupted its eco-system, and destroyed the area's rich cultural heritage.

JTC was determined to embrace the challenges by treating the site's original features as assets, rather than limitations. They were set on harmonising two seemingly-uncompromising roles of conservation and development.



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It was difficult to imagine how this swamp could be part of a high-tech business park.





The Solution

JTC's first step was to develop a multi-layered "green and blue" master plan. The green master plan adopted the principle of conservation of elements that pre-existed on the site, such as the trees, terrain, and its biodiversity.

With the help of consultants and National Parks Board (NParks), a pre-development assessment of the land was conducted, to identify and retain greenery which would support the biodiversity in the woodlands, such as the Fishtail Palm, Malayan Banyan, Wild Cinnamon and Simpoh Ayer. The grassland was then densely replanted

with shrubs and trees recommended by an ecologist, to create a freshwater swamp forest to support wildlife such as dragonflies, butterflies and birds. About 21% of the area's native trees were retained during the construction of the business park. These decades-old giants, along with newly planted fruit trees like figs and other dense vegetation, created a wildlife corridor to provide food and shelter for small animals thriving in the area.

JTC observed a strict minimal land-cut principle to further protect the environment and its inhabitants.



01 Plants like the Simpoh Ayer were retained in CTP, which now attracts birds such as this long-tailed parakeet.

02 & 03 JTC planners worked hard to incorporate this *Artocarpus heterophyllus* (jackfruit) tree into CTP's landscape.

04 The JEG has managed to attract butterfly species such as the Common Birdwing, which is classified as "vulnerable" in the Singapore Red Data Book 2008.



For example, taking the undulating terrain into account, the planners explored several road layouts, before adopting the ring road concept to minimise cut-and-fill and infrastructure cost, as well as maximise green coverage.

Significantly, 10%, or five hectares, of the land was dedicated as a green zone, now known as the Jurong Eco-Garden (JEG). The garden was further developed to meld with the two dragon kilns in CTP, and two art sculptures were commissioned to celebrate the garden's cultural heritage.

After finalising the green layer of the master plan, JTC moved on to the "blue." Instead of filling up the existing pond, the planners adapted the "Active, Beautiful and Clean" or ABC Waters Programme Design Guidelines set by PUB, Singapore's national water agency, and leveraged the park's concave terrain as a natural water collection basin to retain and reuse rainwater. With this estate hydrology plan, runoff is slowed down along the slopes of the business park and retained at several intermediary detention ponds, before finally marshalled into a natural cleansing biotope, which operates as the main cleansing element.

05 "Sculpted Maze", one of the two artworks commissioned by JTC, was created from the clay that was fired from the nearby Thow Kwang Dragon Kiln.

06 Swales help slow down rainwater runoff at the CTP.

“ JTC has successfully created a natural, vista-wide storm water management system... About 65% of the rainwater runoff is retained and re-used at the garden. ”





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The Outcome

With the aim to promote innovation and entrepreneurship in sustainability, CTP is poised to be a “living laboratory” for the test-bedding of green technologies and policies such as electric mobility and recycling. Yet, beyond planning for energy and cost efficiencies, JTC was convinced that the ecological impact of urban development should also be minimised. JTC’s holistic approach in the building of CTP has achieved its vision in more ways than one.

The establishment of the JEG has allowed the park to have two facades—an urban front, as well as a green one. The tree retention and replanting initiatives have resulted in vibrant habitats that sustain a diverse range of wildlife, with a current count of 46 bird, 46 butterfly and 21 dragonfly species, of which seven are considered species of conservation interest.

JTC has successfully created a natural, vista-wide storm water management system for the estate. About 65% of the rainwater runoff is retained and reused at the garden. Rainwater collected and passed through biotopes is combined with greywater from surrounding buildings and recycled.

This has helped to reduce the need for CTP to use potable water for gardening and toilet flushing.

CTP appeals not only to the working population within the estate, but also to the bigger community. JEG is open to more than 13 schools and almost 3,000 students, non-governmental organisations and interest groups. For example, Republic Polytechnic students have used JEG to test-bed their floating wetland prototypes, before deploying them at Pulau Ubin. Students from the nearby Nanyang Technological University and National Institution of Education visit the eco-garden frequently as part of their curriculum. Nature photographers and interest groups are now a common sight, while art and heritage enthusiasts are regular visitors to the art installations and the dragon kilns. Recognised for its far-sightedness in design and planning and strong commitment on sustainability, CTP received the first ever Platinum Award under the New Parks category, from the Building and Construction Authority (BCA) in 2011 for the creation of a civic landscape through innovative and sustainable development. ○

01 The freshwater swamp in JEG not only collects rainwater for use within CTP, but is a scenic spot for the public to enjoy.

02 An aerial image of CleanTech Park, with the Jurong Eco-Garden above it.