Dongguan Central Park Phase 1

Project statement

Dongguan, known as the "factory of the world," aims to become a first-tier Chinese city. Dongguan Central Park, located in the future CBD, revitalizes a polluted, flood-prone site from the Qing Dynasty. The frequently flooding Xinji River enhances the site's beauty but requires flood resilience.

The project is a pioneer amongst cities in the country demonstrating the use of nature-based solutions to rehabilitate and enhance a dilapidated site into an attractive destination boosting economic activity and development through carefully planned short- and long-term strategies.

Guided by flood resilience, the park uses height differences for stormwater storage, diverting the river to create the Xinji River channel and a Central Lake. Normally, water flows downstream through a grit chamber and wetland, while the lake's self-circulating system maintains water quality. During extreme weather, the river overflows into the lake, managing 100-year return period rainfall naturally.

A natural wetland system aids filtration, detention, and circulation, creating habitats for fish, amphibians, and over 20 bird species. Thoughtful plantings offer a flood-resilient, dynamic landscape through seasons, with the metasequoia forest especially attractive in autumn. The nature-inspired playground stimulates children's imagination. At the city's heart, the park's water adds social value, providing community engagement opportunities.

Project narrative and contents

Background and original site issues

Dongguan's ambitions to grow from "factory of the world" to a first-tier city in China conceived Dongguan Central Park, envisioned as an attractive destination where life happens, revitalising the dilapidated site into the city's green heart and a public living room, at its upcoming central business district (CBD) that involves resolving its critical flooding and inefficient stormwater management issues.

With historical roots dating back to the Guangxu era of the Qing Dynasty in 1883, Shuijiantou Village, located in what is now the northern part of Dongguan Central Park, was characterized by weak infrastructure and frequent waterlogging. The Xinji River, running south of the park through four villages and communities, had been facing significant pollution at the worst Class V with sewage directly discharged in it and flood risks due to the village settlements and rising water levels driven by climate change with inlet water level at 3.8.

Relocating the Shuijiantou village, the design of the transformation integrates blue-green infrastructure with public community functions, ensuring urban safety from extreme weather but also restores and enhances the original ecological habitat, fulfilling people's needs for connecting with nature and outdoor activities.

Design strategy and the water story

The project's "Jade Necklace" concept is the blueprint of the park's transformation, a legible, flexible ecological framework for the city, bringing together the park's existing distinctive anchor identities – nature and ecology, science and education, leisure and recreation, and cultural.

Prone to floods interfering with the city's day-to-day, the site needed a transformation with capacity to handle its frequent storm events. The flood mitigation efforts started with the study of the upstream and downstream of the Xinji River to naturalise the concrete embankment to improve the management of surface runoff. The design considered short and long-term strategies for the park. Implementation in this phase focused on the short-term strategy for immediate improvements to pave way for the long-term vision of resilience and holistic flourishing. Hydraulic modelling, analysis and rain event simulations carried out determined the river velocity, informing the design for the river's volume, width and depth, supported by bioengineering, with a sponge city approach to efficiently detain more than 85% surface runoff for flood management.

Project narrative and contents

Making use of the site terrain's height difference, the park's design is integrated with flexible space for stormwater storage. The design diverts the original river course and divides the entire water system in the park into two parts: a river channel and a central lake. Under normal water levels, the incoming water from the upper reaches of the Xinji River flows directly into the downstream after flowing through the grit chamber and ecological wetland, while the water in the Central Lake passes through a self-circulation system that improves quality, drawing the community closer, integrating the beautiful water into the local lifestyle. In extreme weather conditions, the Xinji River overflows into the Central Lake. The river and the lake are connected and share the role of retaining rainwater and regulating rainwater. Rainfall levels within the 100-year return period will be controlled within the ecological core to deal with possible flooding problems in a natural way. The park interweaves blue and green to form a solution for the site's flood resilience simultaneously improving landscape value. A natural wetland system was devised, aiding filtration, detention and circulation. In areas where water has yet to reach the quality for recreation, denser vegetation is used to divert public accessibility to the water. The water source of the Central Lake comes from rainwater collection, and the design of ecological purification communities allows the water quality of the lake to be maintained at a high level all year round, providing the public with a clean water-friendly space.

Augmenting values

Nature-based solutions for flood management have elevated the park's attractiveness whilst bringing additional ecological and social value it brings to the site. With projected flooding in mind, the landscape was designed to provide a fascinating and dynamic experience in the various flood events.

Aiming to bring nature closer to the public, the park's infrastructure for accessibility were also designed for flood resilience. The elevated main bridge connects people to the water and serves as a platform to appreciate the landscape.

The widened riverbank forms ecological wetlands, with micro-topography designed at the riverbed and suitable aquatic plants creating varied landscape communities. This provides natural shelters for fish and amphibians. Bird perches in the wetlands attract more birds that feed on aquatic animals, with over 20 bird species currently observed.

Seasonally changing landscape aesthetic was planned through thoughtful planting selections – red in summer, orange in fall and winter, and pastels in spring, greatly enriching the park experience. The red metasequoia species demonstrates stronger flood resilience and is strategically planted to align with projected flood water levels. This metasequoia forest has become a popular attraction for residents and tourists alike, particularly admired for its breathtaking autumn foliage.

The stone beaches along the lake and the stepping stones across the river are popular, offering children safe opportunities for close contact with nature, fostering their exploration of and love for nature. These nature-based features were also designed as hydraulic infrastructure to protect the riverbank from erosion and retention water level.

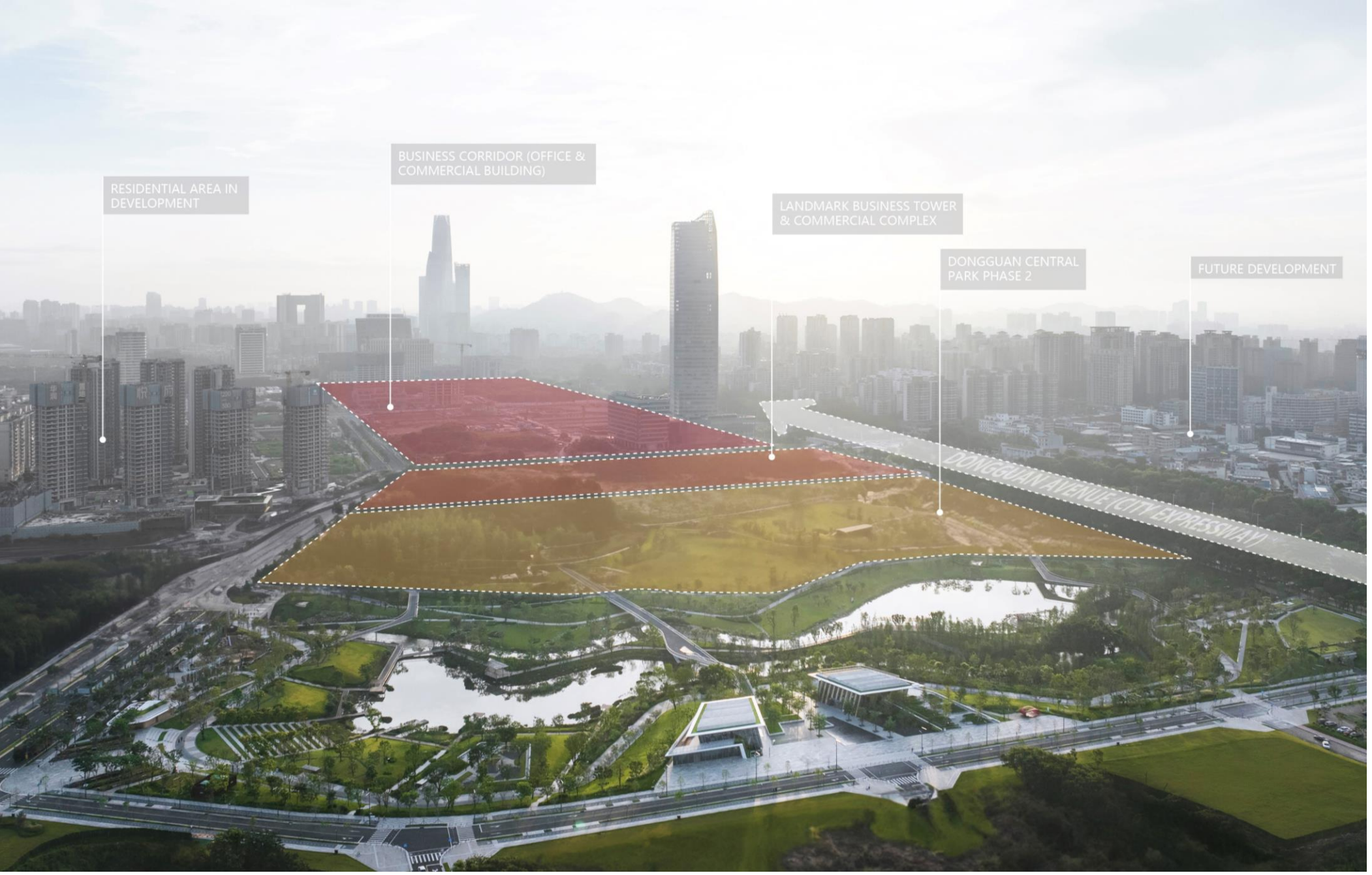
Project narrative and contents

Elevating Dongguan to first-tier

Dongguan Central Park is a lynchpin to attracting new talent and economic development in the city's journey to breakthrough to first tier. The park's creative design approach targets existing site issues, enhancing its natural potential. It is now an attractive destination and has been hosting popular events contributing to revenue. Profit generated enables a holistic and sustainable model to fund the site's upkeep and attractiveness. Situated at a strategic and economically valuable location downtown, the project is a pioneer in China. Through its popularity and success, the park demonstrates the value of nature in urban centres as an attraction, setting in motion a shift towards prioritizing nature and nature-based solutions at the public and government level.

Stormwater resilience is at the centre of the blue-green ecological core for the community, with features such as multi-dimensional circulation paths offering diverse walking experiences, with lakefront grass slopes, stepped plazas, vibrant lawns, natural experience gardens, and fitness corners attracting numerous residents and tourists. Wetland boardwalks, adventure paths, and floating pavilions are also widely popular.

Dongguan Central Park redefines the infrastructure needed for flood mitigation and embraces a new mission: a vibrant downtown park that is both a natural green heart of ecological value and a platform encouraging social activities. Various public activities now take place in the park, as the friendly open spaces encourage people to participate in a more active, experiential, and humanized future, catalysing the growth of Dongguan to put the city's name on the map.



Urban green heart

Dongguan Central Park is a lynchpin to attracting new talent and economic development in the city's journey to breakthrough to a first-tier city. From "factory of the world", it aspires to become a global city.

Its plans for revitalization starts downtown, at its upcoming central business district (CBD), where the city's new urban green heart and public living room is, Dongguan Central Park.

Surrounded by future developments spanning from residential, business to leisure, the park is a new landmark destination of the city, attracting people with its friendly open spaces for work, live and play.

Xinji River's water quality is identified as Class V (lowest) 1

Domestic sewage is discharged directly into the Xinji River 2

Concrete wall is built to prevent flooding 3

The seriously polluted Xinji River 4

Depressed market area in Shuijiantou Village 5

The old buildings with poor condition in Shuijiantou Village 6

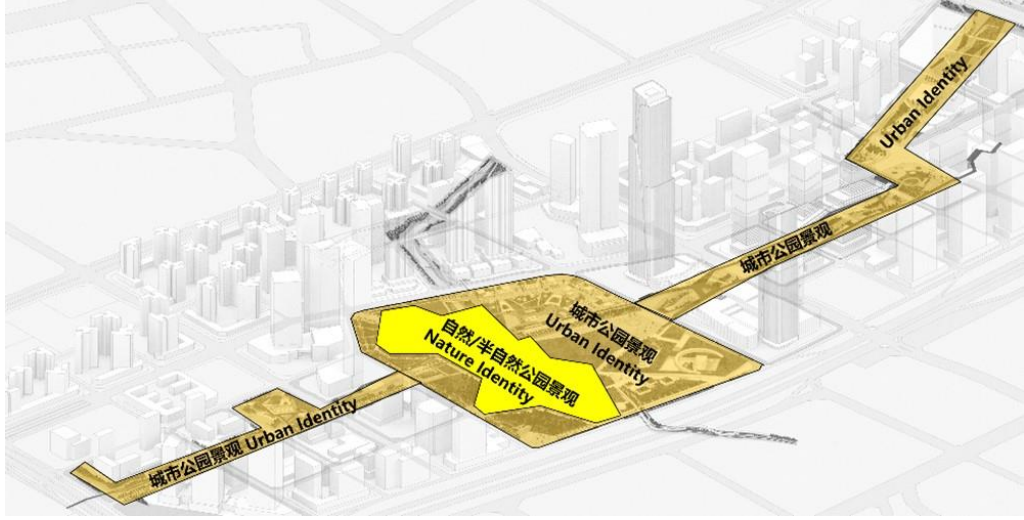
Becoming a global city

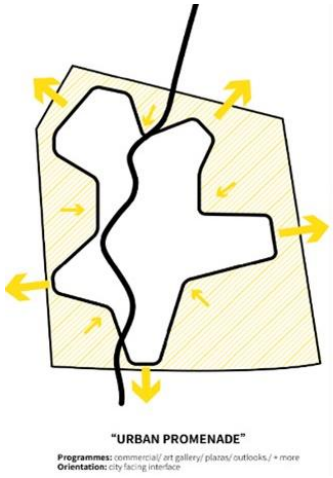
The Xinji River suffered from irresponsible use and frequent flooding and the villages were dilapidated – the site was in a severe need of rehabilitation and revitalization.

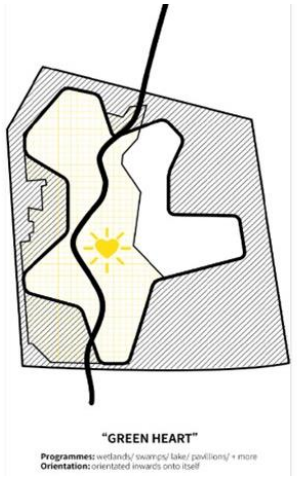
From a dilapidated site to a new, thriving central park

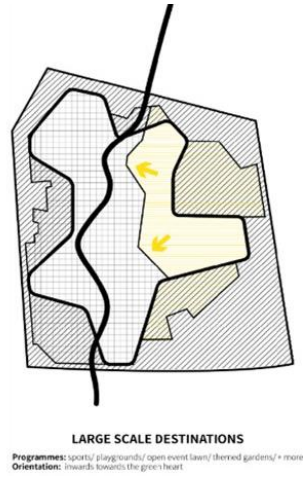
With historical roots dating back to the Guangxu era of the Qing Dynasty in 1883, Shuijiantou Village, located in what is now the northern part of Dongguan Central Park, was characterized by weak infrastructure and frequent waterlogging. The Xinji River, running south of the park through four villages and communities, had been facing significant pollution and flood risks due to the village settlements and rising water levels driven by climate change.

Relocating the Shuijiantou village, the design of the transformation integrates blue-green infrastructure with public community functions, ensuring urban safety from extreme weather but also restores and enhances the original ecological habitat, fulfilling people's needs for connecting with nature and outdoor activities.





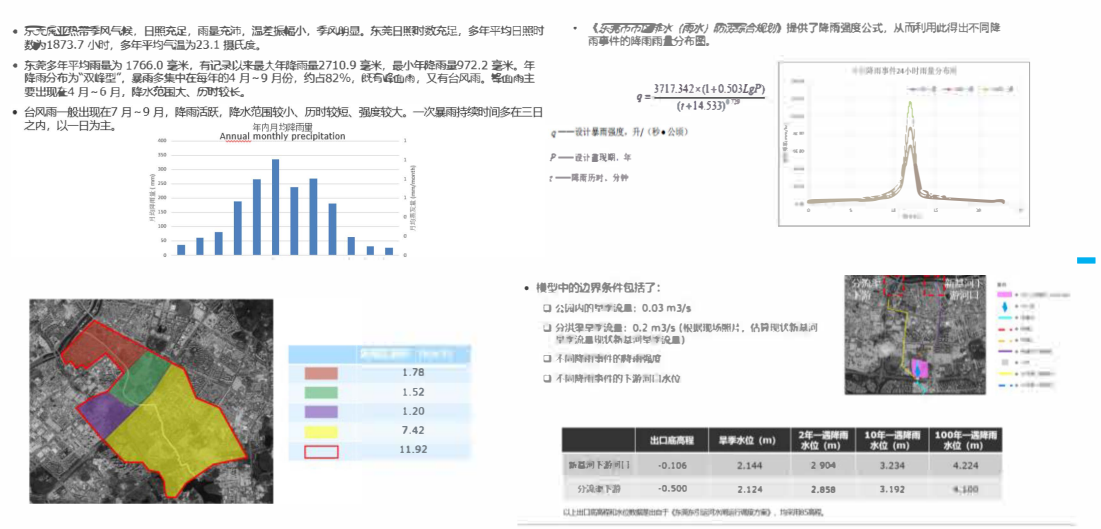




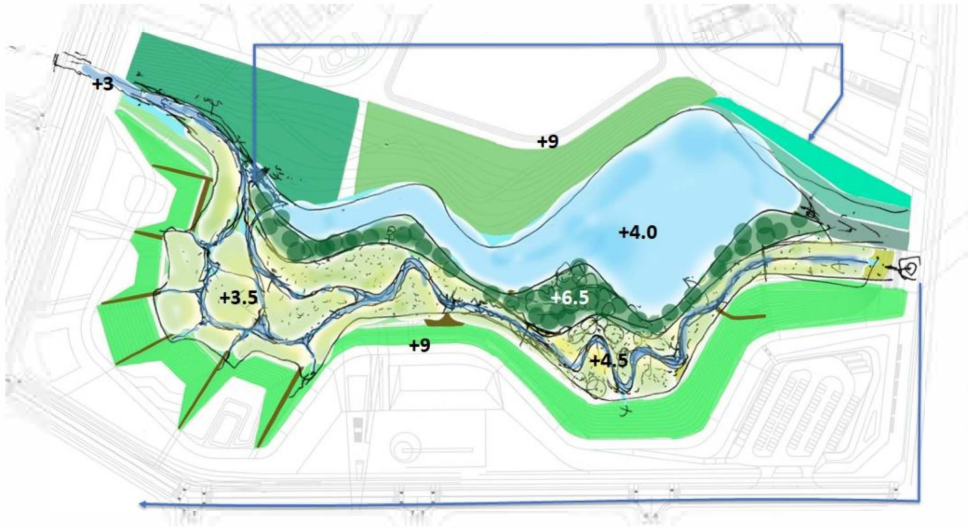
Socially engaging park

Drawing inspiration from the contrasting concepts of 'natural ecology' and 'urban core', they serve as the foundational principles guiding its design process from inception. This approach has delineated a structural framework for the park characterized by a dynamic interplay between juxtaposed elements. Specifically, the overall park layout comprises a dynamic urban ring facing the city interface, harmonized with an inwardly-focused green heart dedicated to natural ecology. Notably, the public area is now situated within the southern part of the ecological green heart, seamlessly integrating wetlands, rivers, lakes, grasslands, woodlands, and various ecological habitats to provide refuge for wildlife.

The park's design encompasses a wide range of programmes leveraging the site's landform. From urban to nature activities, there are loads for visitors to see and play, making it a rich experience for all.



BACKGROUND DATA COLLECTION



DESIGN INTENT AND SKETCH

GUIDANCE

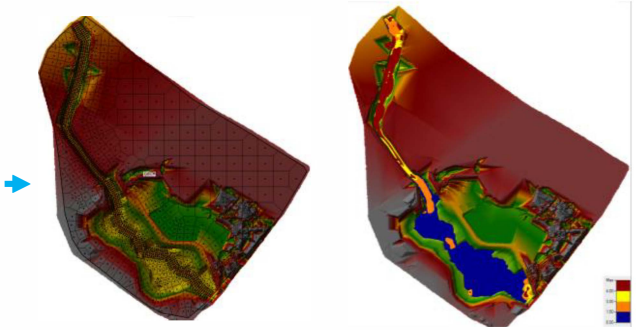
Create MIKE URBAN+(MU+) 1D model

Obtain hydrographic and water level maps under different rainfall events

The HEC-RAS 2D model was used to simulate different rainfall events in the park.

Recommend relevant ecological engineering methods based on the peak flow velocity diagram of a 10-year rainfall event

MODELLING APPROACH



MODEL RESULTS

Hydraulic engineering analysis

Hydraulic modelling and data analysis are used to guide the design and implementation of ecological engineering methods that enhance water quality and manage water flow during rainfall events at Dongguan Central Park. By simulating various scenarios, the process helped design interventions that can handle significant rainfall events, thereby improving the resilience and ecological quality of the site.

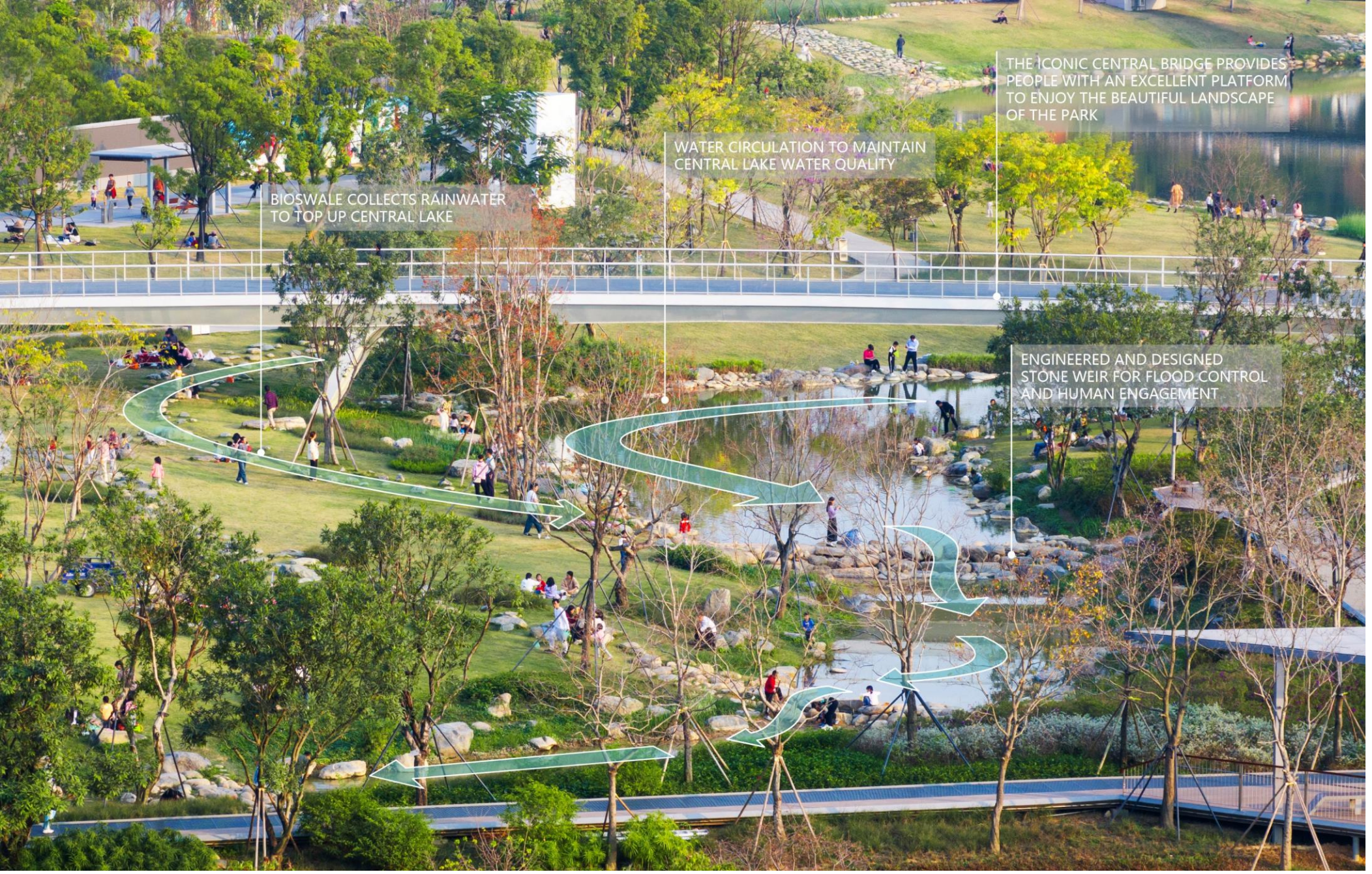
Dongguan's water

Prone to floods interfering with the city's day-to-day, the site needed a transformation with capacity to handle its frequent storm events.

The Central Lake was created out of the Xinji River, contributing additional capacity to detain overflowing stormwater and provide an interactive experience with the beauty of water with the constructed wetland aiding filtration and circulation.

In areas where water has yet to reach the quality for recreation, the short-term strategy uses denser vegetation to divert public accessibility to the water.

Other design features include an elevated boardwalk accessible during raised water levels, bioswales and rock steps that help reduce velocity and detain stormwater, and bioengineered riverbank to protect the water quality.



Central Lake

The water source of the Central Lake comes from rainwater collection.

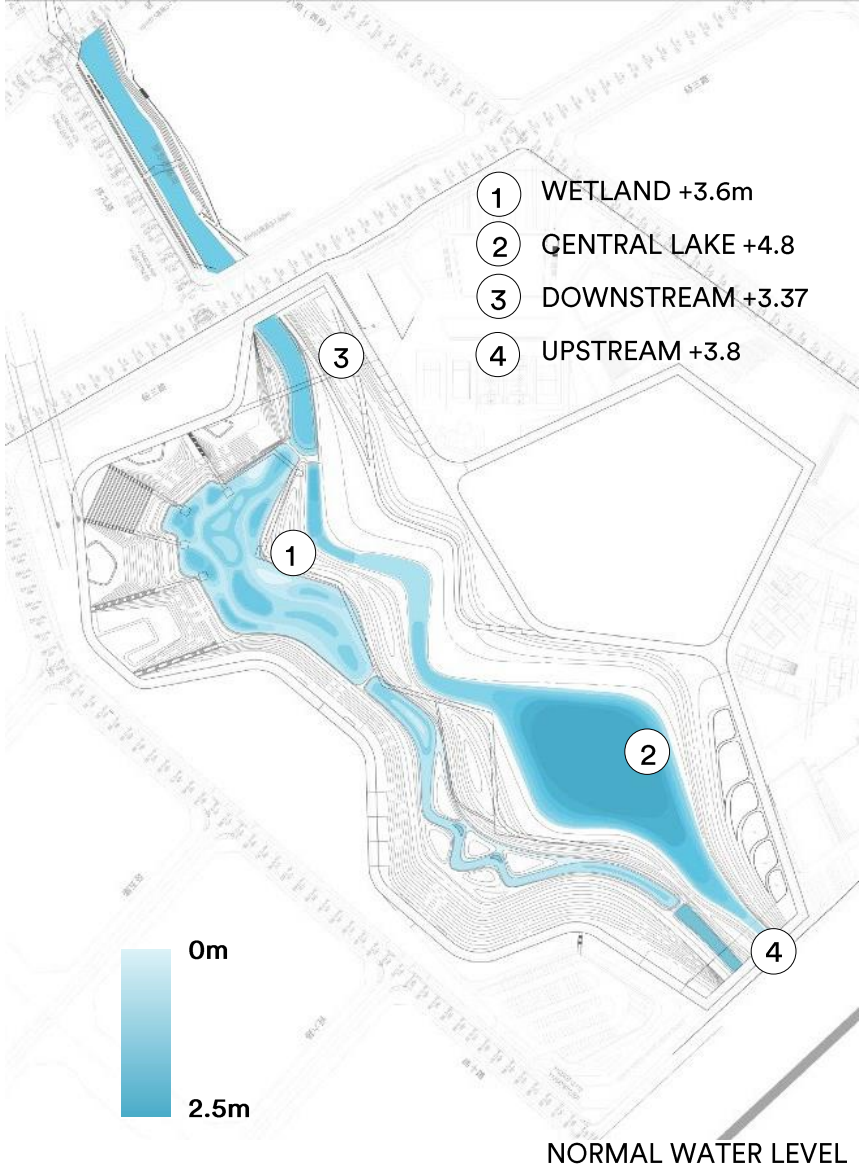
The Central Lake integrates beautifully into the local lifestyle through a self-circulation system featuring a constructed wetland. This system enhances the landscape value and improves water quality via filtration, fostering community engagement. The design of ecological purification communities ensures high water quality year-round, offering the public a clean, water-friendly space.

Aiming to bring nature closer to the public, the park's infrastructure for accessibility were also designed for flood resilience. The elevated central bridge connects people to the water and serves as a platform to appreciate the landscape.

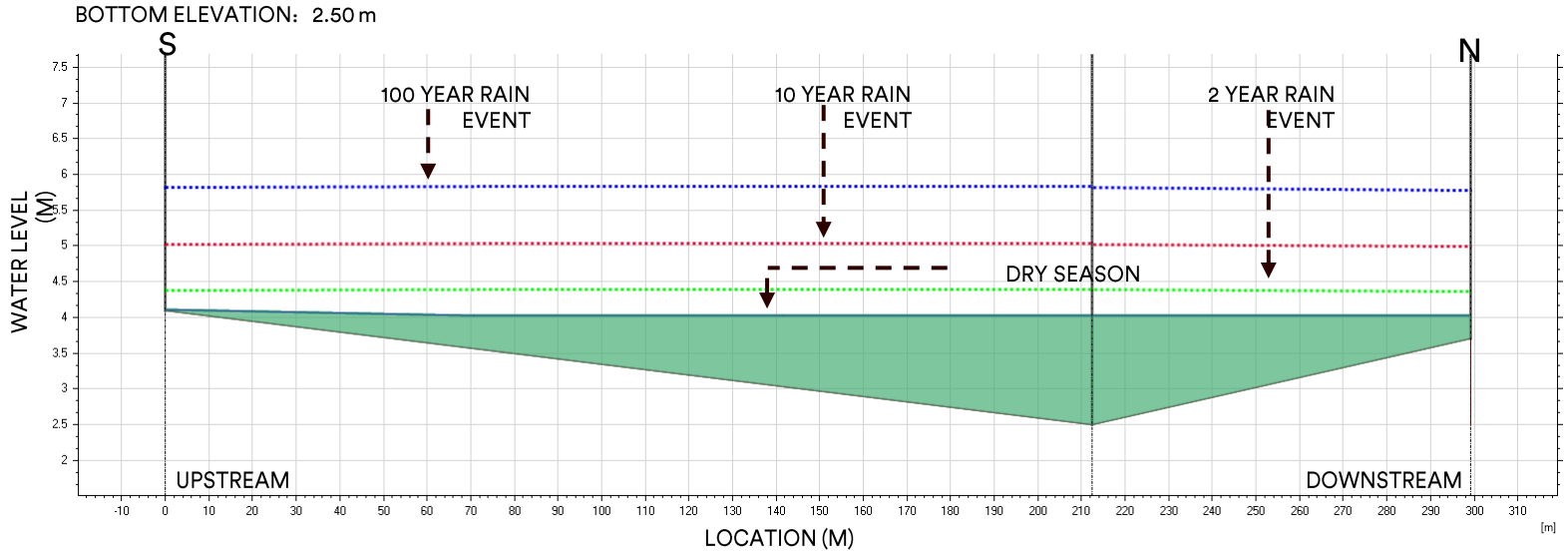
Xinji River

The wetland in Xinji River improves water quality from its upstream, through the filtration by its plantings and is a habitat for aquatic and avian fauna, boosting biodiversity.

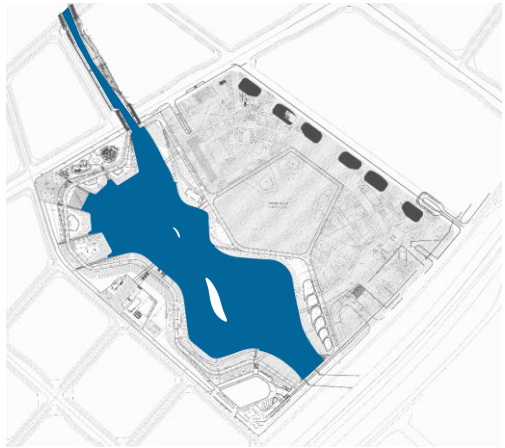
This specific area downstream has higher water quality. The design encourages public interaction through opening accessibility to the water, in the form of elevated boardwalks and platforms along the river.



NORMAL WATER LEVEL

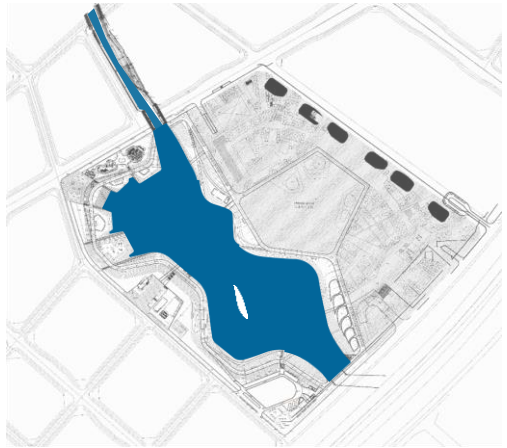


MIKE URBAN MODEL RESULT AT CENTRAL LAKE PART



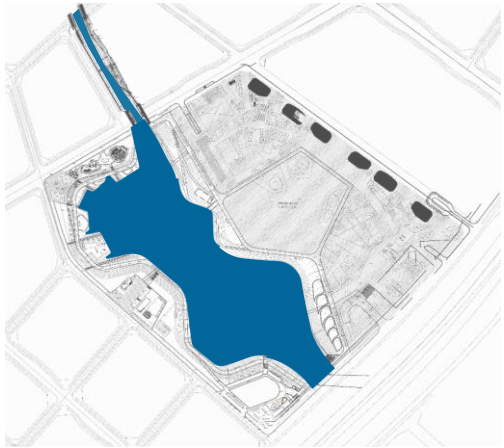
10 YEAR RAIN EVENT

WATER LEVEL +6.4



50 YEAR RAIN EVENT

WATER LEVEL +6.8



100 YEAR RAIN EVENT

WATER LEVEL +7.2

Resilience against major flood events

Through data collected from simulations and hydraulic modelling, the design envisions 10, 50, and 100-year rain events, for flood resilience and mitigation across all regions of the park.

With projected flooding in mind, the landscape was designed to provide a fascinating and dynamic experience in the various flood events.

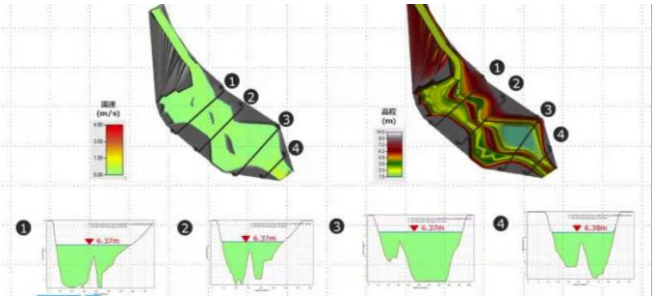
Multifunctional flood prevention measures

Facing frequent flooding as a destination for the people, the design brings multifunctionality to create friendly spaces for socialisation that double as a stormwater detention site during severe rain events. Grass areas on the steps also act as sponges to absorb and increase the stormwater detention capacity.

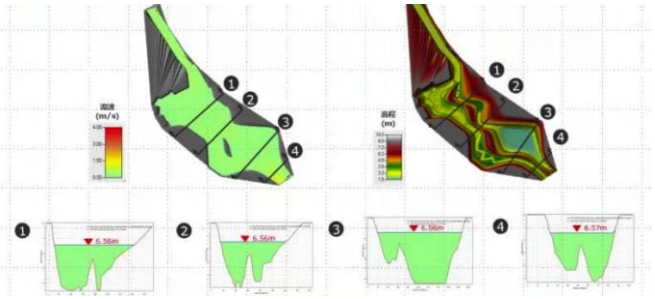
Accessible, rain or shine

With the capacity to detain stormwater up to a 100-year event, the park remains accessible to the community through elevated boardwalks, whilst functioning.

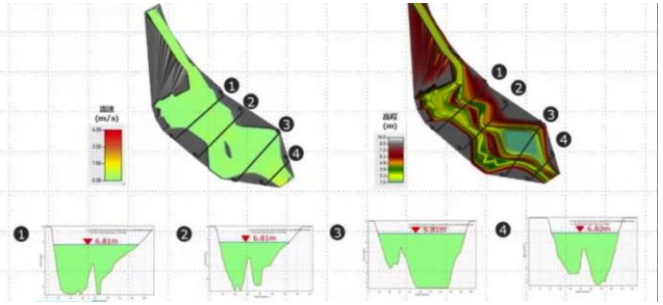
The red metasequoia species demonstrates stronger flood resilience and is strategically planted to align with projected flood water levels.



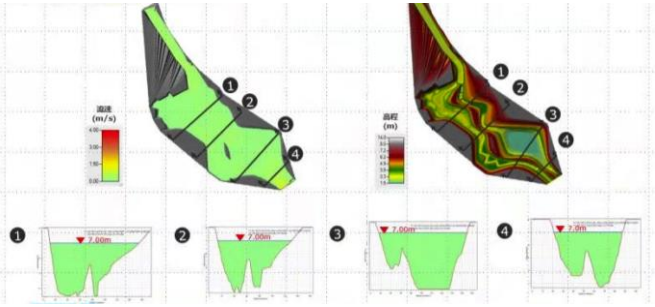
10 YEAR RAIN EVENT VELOCITY



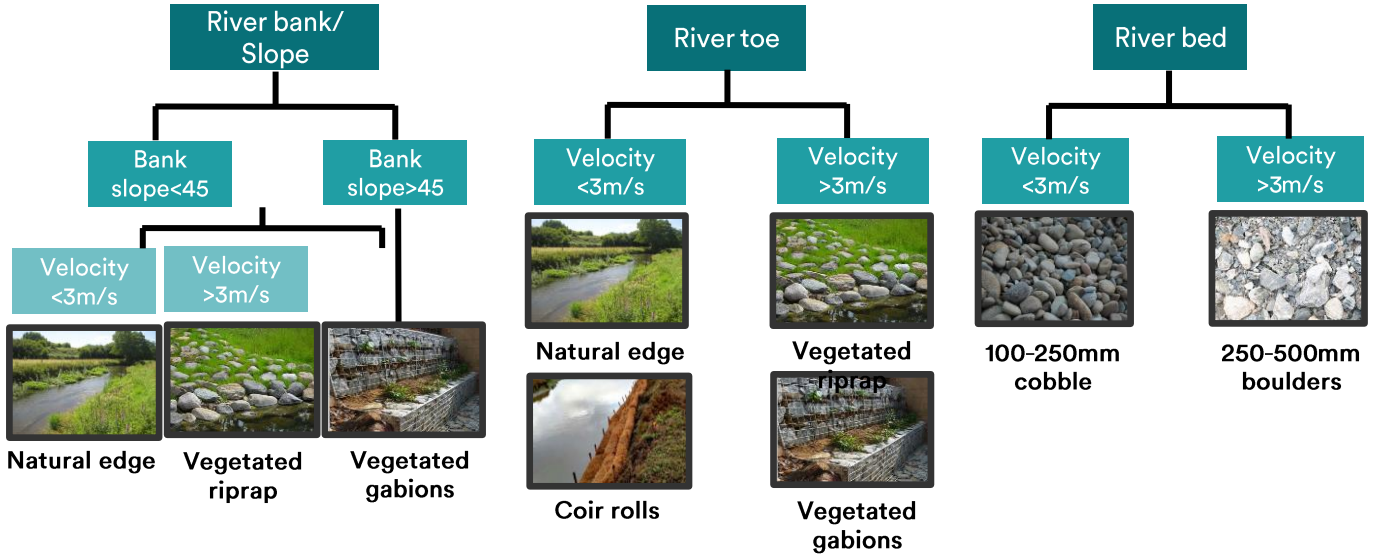
20 YEAR RAIN EVENT VELOCITY



50 YEAR RAIN EVENT VELOCITY



100 YEAR RAIN EVENT VELOCITY



BIOENGINEERING METHODS BASED ON SLOPE AND VELOCITY

CONSTRUCTION METHODS OF NATURAL EDGE

Supported by bioengineering

Understanding water velocity through rain event simulations, it informed the type of nature-based bioengineered solution implemented according to the location in the water body and velocity.

Wildlife, humans in a harmonious landscape

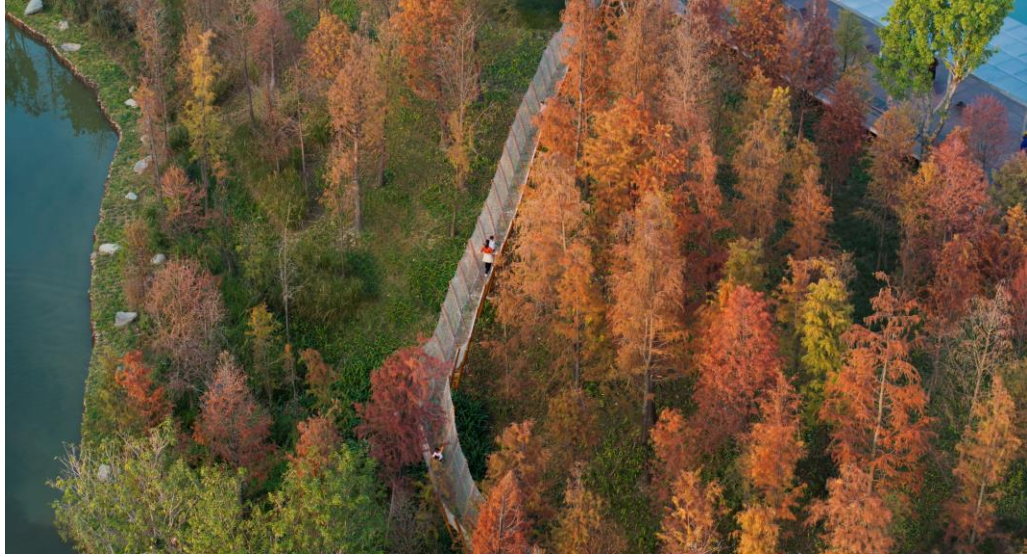
Wildlife habitat and human recreation space coexisting in a resilient landscape

Greater biodiversity

The park is an ecotone where its multi-layered planting and fauna-friendly features allow fauna to rest, creating habitats for terrestrial and aquatic species, enhancing biodiversity within the site. Over 20 aquatic bird species have been spotted within the park.

Popular community attraction

Opened in the spring of 2023, the park was extremely well-received and continues to be widely enjoyed by the folks of Dongguan, providing respite and fun through nature-based activities with close proximity to the city and residential areas. At the intersection of landscape and water, the park is a popular space for amongst the community. The closeness to water and nature the park is a factor rejuvenating those who come to socialise and play. Stone features double as bioengineered features for bank erosion protection.

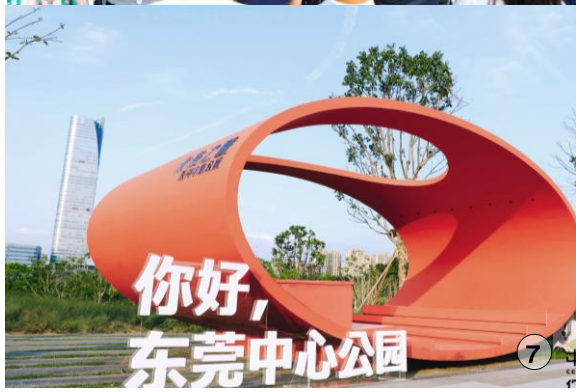


Perennially attractive landscape

Seasonally changing landscape aesthetic was planned through thoughtful planting selections – red in summer, orange in fall and winter, and pastels in spring, greatly enriching the park experience. The red metasequoia species demonstrates stronger flood resilience and is strategically planted to align with projected flood water levels. This metasequoia forest has become a popular attraction for residents and tourists alike, particularly admired for its breathtaking autumn foliage.

Learning through play

As a growing community in Dongguan with many little ones, the park's playground is nature-inspired to stimulate imagination and learning through the tactile sensory experience of natural elements – sand, rock climbing, and water.



Public living room and a central business district pioneer

Accommodating and resolving the site's flooding issues, the design of Dongguan Central Park is simultaneously a place where life happens and a catalyst for Dongguan's transformation into a first-tier city to boost economic activities and development. During dry weather, it is an attractive destination to host popular events contributing to revenue. Profit generated enables a holistic and sustainable model to fund the site's upkeep and attractiveness. Situated on a strategic and economically valuable location downtown, the project is a pioneer in China. Through its popularity and success, the park demonstrates the value of nature in urban centers as an attraction, setting in motion a shift towards prioritizing nature and nature-based solutions at the public and government level.