

# **TURNING BROWNFIELDS INTO AN URBAN PARK**

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THE ECOLOGICAL REGENERATION OF SOUTH LAKE PARK IN TANGSHAN

## PROJECT STATEMENT

Once a symbol of environmental devastation, South Lake Park now stands as a testament to the transformative power of ecological restoration. Situated 1 km south of Tangshan's city center, this 6.3 square kilometers area was formerly a coal-mining subsidence zone used as a dumping ground for urban and industrial waste after the 1976 Tangshan earthquake. After years of dedicated restoration efforts starting in 2008, the South Lake Park has emerged as a diverse and vibrant central urban park by preserving terrains and water systems and restoring habitats. Organizing regional transportation and constructing diverse and energetic hard surface areas, South Lake Park now offers a variety of facilities for visitors. Today, the South Lake Park is renovated as a haven of natural beauty where lush mountains and serene waters coexist harmoniously.

## PROJECT STRATEGIES

The challenges were immense, but the vision was clear: transform the coal-mining subsidence area and restore the ecological balance. The first hurdle was to plan the park construction while avoiding geological disasters. The second was to rebuild the damaged ecological system, tainted by waste and debris since 1976.

The renovation came through three phases of development: the South Lake Scenic Area, the 2016 World Horticultural Expo, and the South Lake Park. Drawing on a thorough analysis and deep understanding of the site's unique characteristics, such as the existing water-land patterns, coal-mining subsidence impact, and transportation infrastructure, the design team masterfully integrated engineering technology with ecological restoration methods. By employing techniques like fly ash recycling, waste landfill treatment, and ecologically suitable revetments for subsidence areas, they successfully rehabilitated the damaged ecosystem, protected biodiversity, and created accessible, safe, and nature-oriented spaces for the community to enjoy.

## MOUNTAIN RESTORATION

The centerpiece of the project, the 52.5-meter-high Wolong Mountain, covering a total area of 279,500 square meters and with a maximum slope of 22.7°, was once a heap of industrial waste, including fly ash from Tangshan City's power plant and construction debris. The restoration process combined geotechnical engineering technology with ecological restoration theory. The on-site fly ash waste was reused as a stacking terrain, mimicking Tangshan's natural mountain features and saving costs. The waste mound was then covered with planting soil for shaping and greening. As the artificial mountain had not experienced a long period of natural settlement with insufficient social compaction, flood management design became crucial, ensuring the safety and stability of the hill. By thoughtfully managing the mountain's watershed, the design team calculated the catchment area and the volume of water it could hold, crafting a plan to construct horizontal and vertical ditches for the mountain's drainage system. They then seamlessly integrated ecological grass ditches and picturesque streams into the landscape to direct rainwater runoff. Drawing inspiration from nature, they designed an imitation mountain spring waterfall to guide the mountain runoff, effectively ensuring its safety and stability.

## WATERBODY RESTORATION

Based on the subsidence impact assessment, the waterbody restoration aims to prevent the revetment's cracking, deformation, and collapse caused by foundation subsidence, deformation, and water erosion. Ingeniously merging gabion technology with resourcefulness, the design team repurposed abandoned plant materials found on-site to weave branch beds. These innovative creations safeguarded the shoreline and stabilized the soil, contributing to the project's overall success. The "living" revetment expanded the contact area between vegetation and water, restoring the natural cycle of the water-land interlaced zone to purify water and provide a richer habitat for organisms. Currently, more than 20 families and over 40 species of emergent, floating, and submerged plants thrive in this area, maintaining the integrity of the wetland ecosystem.

## HABITAT CREATION

The team successfully created wetland biodiversity with an ideal habitat for diverse bird species, other wetland animals, and microorganisms through reasonable water area division, water system connectivity, plant selection and configuration, and artificial interventions. The constructed South Lake Park and its peripheral area, with a water area of 11.5 square kilometers and a greening rate of 65%, now provides a habitat for more than 30 species of fish and nearly 100 species of wild birds.

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## **URBAN OXYGEN BAR**

As the largest urban park in the city, South Lake Park caters to the needs of 3.78 million permanent residents. The design prioritizes the ease of access for residents by establishing numerous connections to the municipal transportation network. Thoughtful planning ensures park entrances and internal pathways are well-distributed and conveniently situated, promoting a welcoming and accessible environment for all visitors. Within the park, visitors can explore two lakeside jogging paths and one mountain jogging path, spanning 9.4 kilometers in total. These winding trails offer a journey through forests, lakes, wetlands, and squares, presenting a rich tapestry of diverse and captivating landscapes to admire along the way. The park features spacious plazas designed to host various public activities, incorporating eco-friendly permeable materials to minimize rainwater runoff. By skillfully dividing functional spaces, the park caters to the needs of both large-scale events and daily leisure activities, ensuring a safe, welcoming, and comfortable environment for all to enjoy.

## **PROJECT OUTCOME**

South Lake Park, once a coal-mining subsidence and wasteland, is now the "green lung" and "oxygen bar" of Tangshan. The project effectively reduced engineering investment and saved costs through innovative technology and waste reuse. The park's transformation improved the living quality of surrounding areas and positively impacted land values. After the development, the land value of the 105 square kilometers area increased by over 100 billion RMB yuan. The ecology-focused development has effectively increased employment opportunities and residents' income, driving the interactive growth of urban sectors such as catering, accommodation, transportation, and entertainment. The social value of ecological development is increasingly evident, showcasing its positive impact on the community. The South Lake Park now stands as a shining example of green transformation for industrial cities. Its success inspires confidence and offers valuable insights for future post-disaster reconstruction and restoration efforts.

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## LOCATION

The site is located 1 kilometer south of downtown Tangshan.

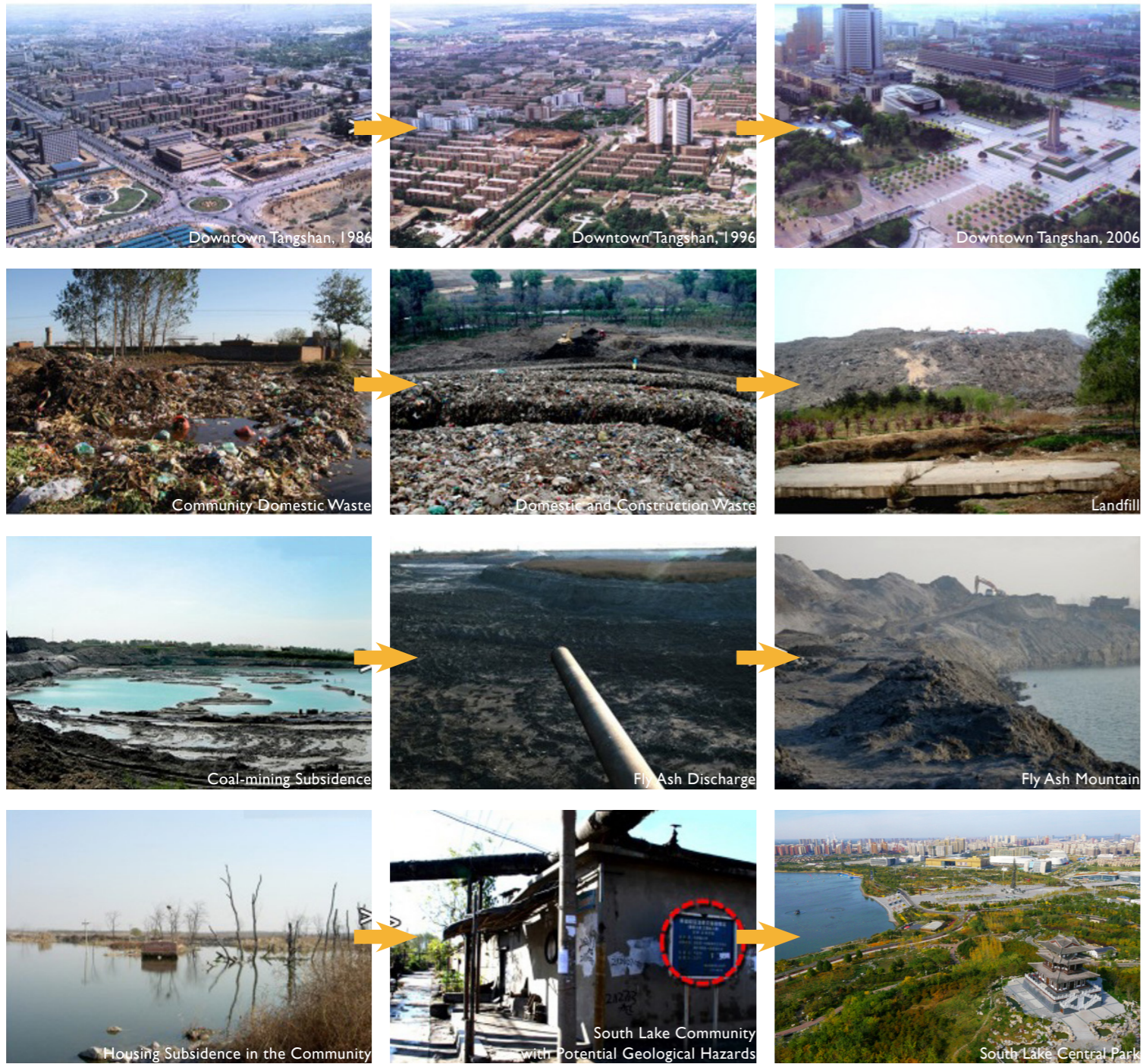
## AREA

6.3 square kilometers

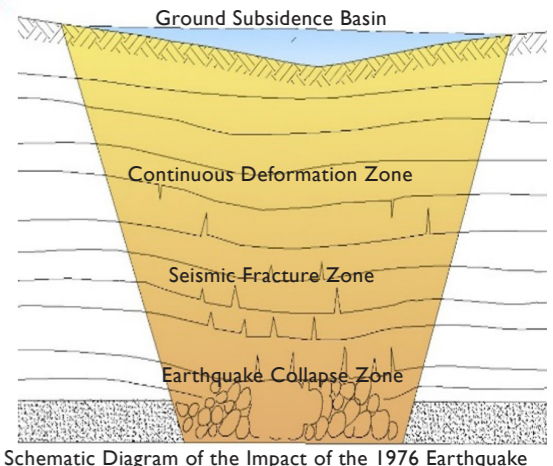
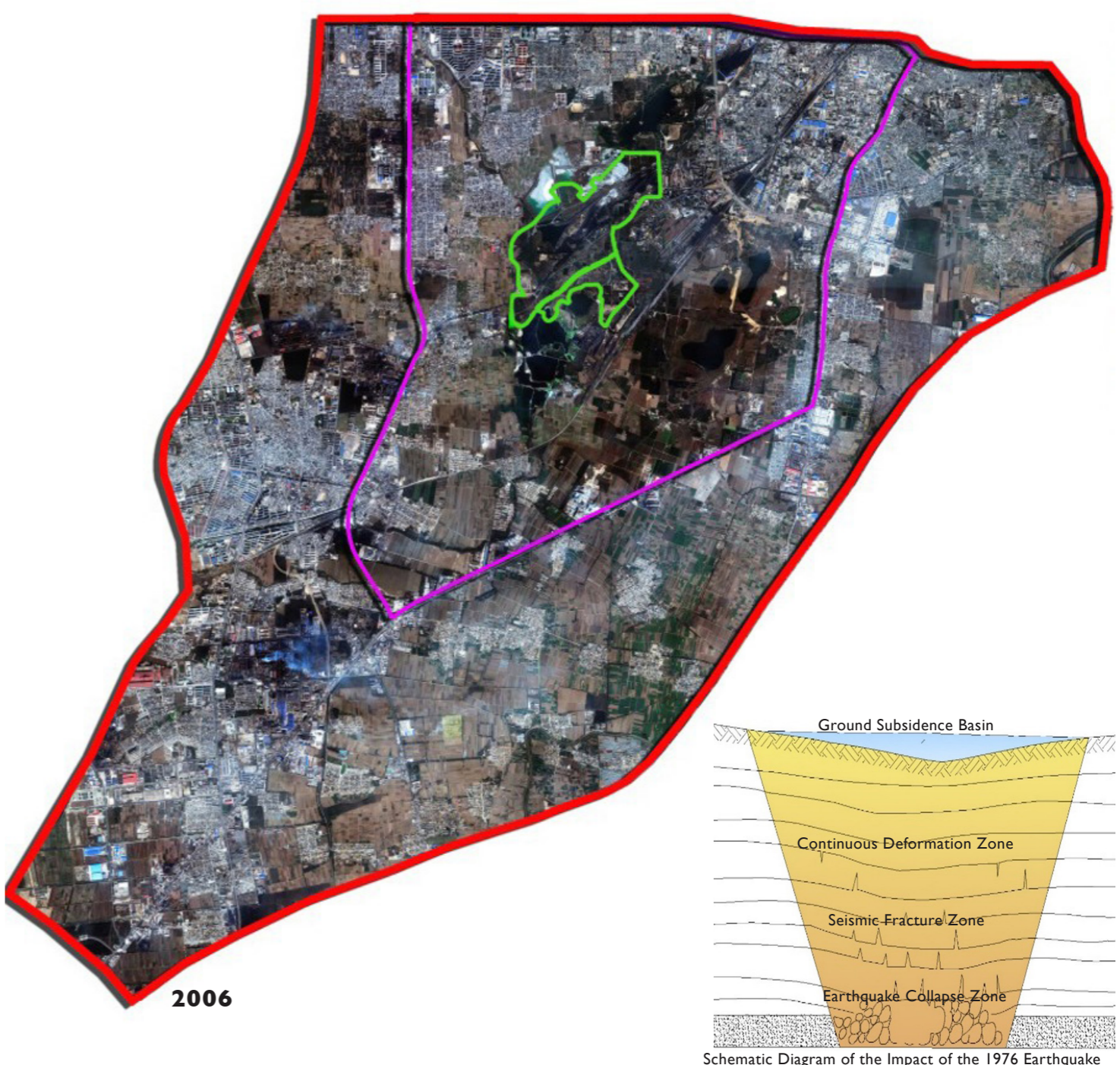


Subsidence Area (South Lake)

**AFTER EARTHQUAKE**



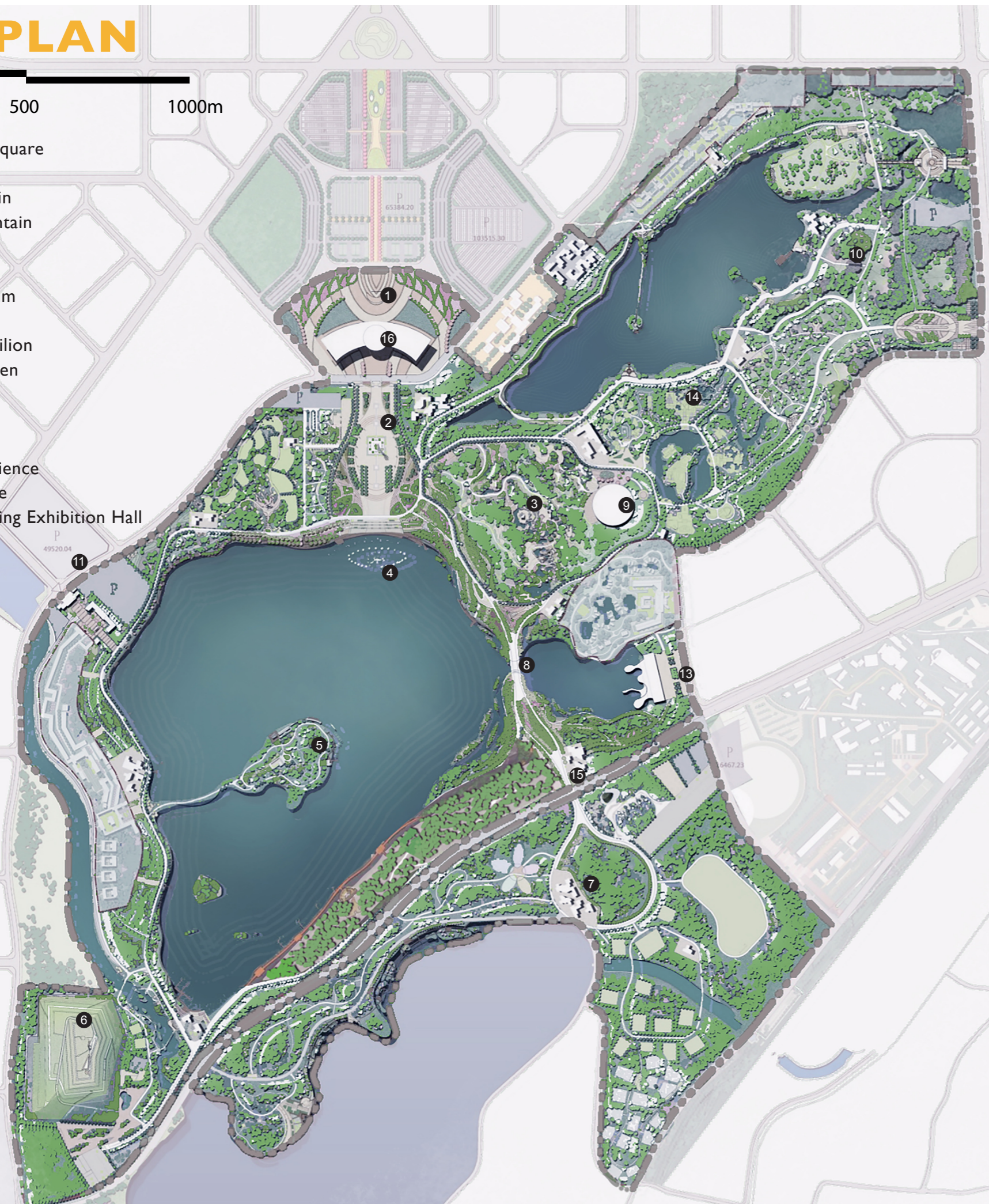
**BEFORE CONSTRUCTION**



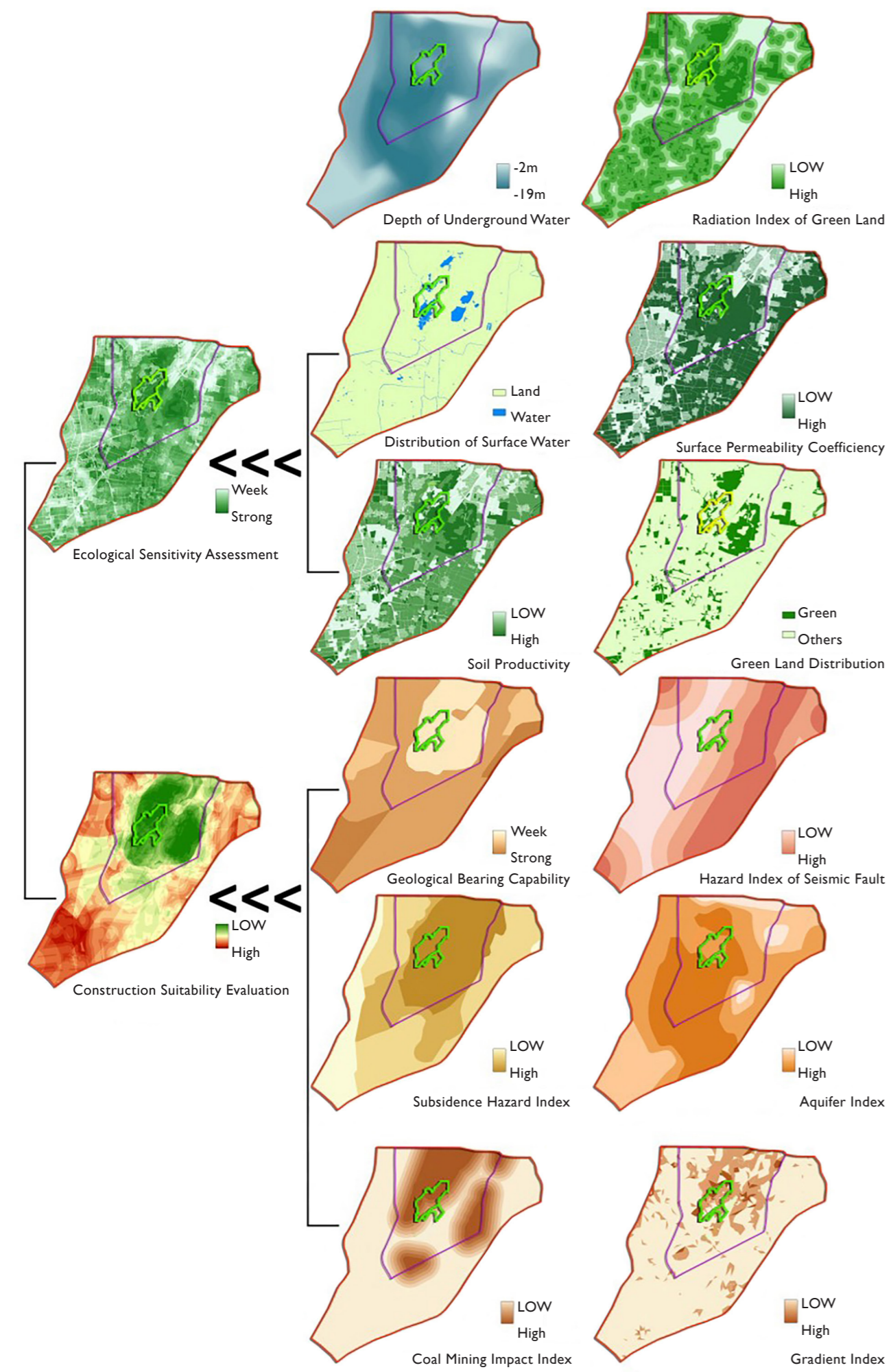
# SITE PLAN

0 100 250 500 1000m

- 1. Main Entrance Square
- 2. Main Square
- 3. Wolong Mountain
- 4. Holograms Fountain
- 5. Central Island
- 6. Landfill
- 7. Botanical Museum
- 8. Flower Dike
- 9. Low-carbon Pavilion
- 10. Botanical Garden
- 11. West Entrance
- 12. East Entrance
- 13. Tourist Centre
- 14. Wetland Experience
- 15. North Entrance
- 16. Tangshan Planning Exhibition Hall



# ECOLOGICAL ANALYSIS



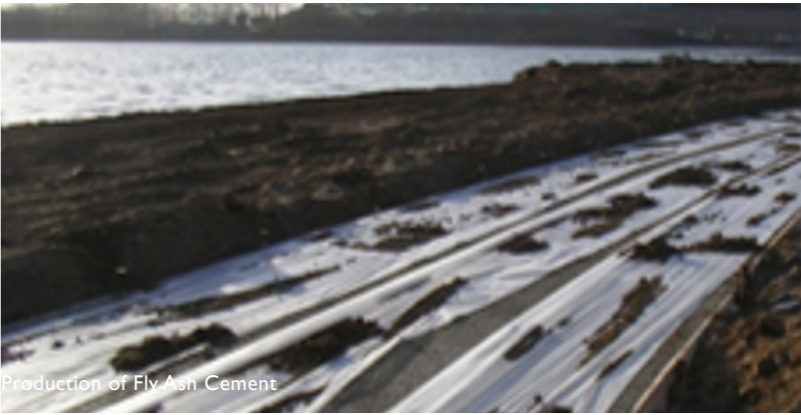
## STEP5 FACILITIES

## STEP4 VENUES

## STEP3 TRAFFIC

## STEP2 PLANTS

## STEP1 RESTORATION



# FLY ASH MOUNTAIN RESTORATION



## RAINWATER UTILIZATION

By imitating the natural mountain springs and waterfalls, the mountain runoff is diverted to ensure the safety of the mountain.

# LANDFILL RESTORATION

## ECOLOGICAL TECHNOLOGY APPLICATION



## LANDFILL REMEDIATION

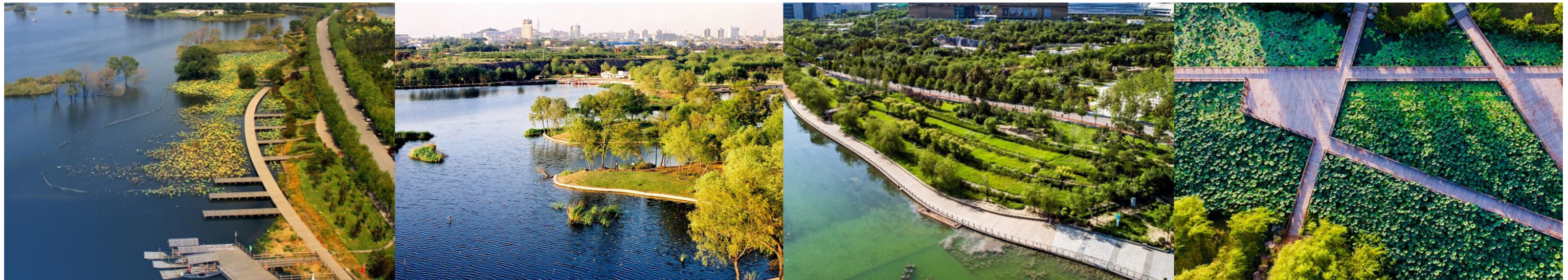


# WATER RESTORATION

The water body restoration utilized branch beds and Gabions to protect the embankment from damage. Wetland biodiversity was achieved through water area division, connectivity, and plant selection, providing an ideal habitat for wetland creatures.



## DIVERSIFIED WETLAND AND REVETMENT



# URBAN OXYGEN BAR



Concave Herbaceous Field



Rain Garden



Reuse of Waste Materials



Low Maintenance Rain-fed Plants

The implementation of a systematic sponge design ensures that rainwater is absorbed within the park and connected to the surrounding area, by utilizing new eco-friendly materials and ecological technology measures, promoting environmental sustainability.

# LAKESIDE GREENWAY

With two lakeside jogging paths and one mountain jogging path, these winding trails offer a journey through forests, lakes, wetlands, and squares, presenting a rich tapestry of diverse and captivating landscapes to admire along the way.



# LANDSCAPE AND PUBLIC SPACES

The use of modern design language connects a variety of landscape styles, resulting in dynamic and lively public spaces.



# SUSTAINABLE OPERATIONS

