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# **Sponge City**

Eco-Friendly Urban Water Management: Comprehensive Sustainable Solutions and Drainage System Renovationtion

> Jiangnan- District 鼎城区

Jiangbei- District

Excerpts from Chinese projects Wasser Hannover GmbH, Germany

hou- Area

Wasser Hannover GmbH 2024.FEB.19

Wasser Hannover		德国》	诺威水协
Zentrum für nachhaltiges	德国2	又诺威才	(有限公司
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## Profile of Wasser Hannover GmbH

## **Company Development**

Wasser Hannover GmbH was founded in 2012 as a wholly-owned subsidiary of Wasser Hannover e.V., which was established in 2002 with the goal of providing consulting services for international projects, leveraging the expertise of Wasser Hannover e.V. members. In March 2023, the company's shares were acquired by the management team of Wasser Hannover GmbH. The company continues to collaborate with the partners of Wasser Hannover e.V. as before.

In 2006, through the EU AsiaProEco Project, Wasser Hannover entered the Chinese water management market. Currently, Wasser Hannover GmbH operates three offices in the cities of Hefei, Changsha, and Changde in China. In October 2023, a wholly-owned subsidiary was established in China: Wasser Hannover Design (Changde) Ltd.

Through years of collaboration in China, Wasser Hannover has successfully implemented more than 90 best-practice projects across over 15 cities. It has introduced the concept of the sponge city and has played a significant role in the development of sponge cities in China.

## **Business areas**

Our expertise includes:

- master planning of urban wastewater, stormwater and water systems;

- creating digital models of drainage networks and rivers;

- undertaking analysis and remediation of urban flooding;

- providing integrated ecological management of urban rivers and lakes;

- landscape design;
- ecological treatment;

- improving the efficiency of sewage treatment plants so they consume less energy, and

- managing sludge treatment and stabilization projects.

#### **Design Process**

The company's key strength lies in fostering a culture of cross-disciplinary communication and collaboration. Upon receipt of a commission from the client, all professionals involved are brought together by the Project Director and a thorough examination of all aspects of the project is undertaken in order to fully understand and analyze the commission and to identify potential challenges.

Once the scope of work for each area of expertise is determined, crucial discussions and exchanges of ideas occurs allowing the development of a solution that is perfectly suited to the client. Throughout the process, communication is maintained between the various disciplines, until the final outcome is achieved.

By fostering this iterative and inclusive process, the client can be satisfied that the final solution will be the result of collective expertise and creativity which will deliver optimal outcomes that will meet and even exceed our client's expectations.

## The design teams

Wasser Hannover GmbH employs 18 in-house engineers and operates over a dozen design consultancy firms across Germany. With a workforce exceeding 500 individuals, the company has garnered a well-deserved reputation for its expertise across various specialized fields. These consultancies boast a wealth of experience, having collaborated for many years.

For each project, Wasser Hannover GmbH engages German and Chinese designers and engineers with diverse expertise and from various disciplines. All projects are overseen by experienced managers.





## Project description Wasser Hannover GmbH, Germany

## The basic concept of water system governance and urban drainage system renovation include:

1. Sustainable rainwater management using the principles of a 'sponge city' by enabling storage, infiltration, and purification of water and limiting drainage flows at the source. This reduces pipeline investments by creating open drainage systems thereby optimizing water systems and facilitating urban microclimates.

2. Optimizing the use of drainage systems through digitalization by creating a database to transform the pipe networks and hydraulic systems to reduce river pollution while establishing storage and treatment systems. Hydraulic simulation has proven to guarantee drainage safety and prevent urban waterlogging.

3. Ecological pumping stations (terminal rainwater and sewage separation): By using ecological treatment methods such as filter ponds, pumping stations are transformed from a source of pollution in the mountains to a source of clean water. Pumping stations essentially become the kidneys of the city by treating rainwater and unidentified sewage and making changes to how water is stored and operational processes.

4. Improving the ecological self-purification function of rivers (artificial wetlands). By creating artificial ecological wetlands, it is possible to reduce agricultural and other surface sources of pollution in suburban areas. Also, river cross-sections and flowline design can be employed to optimize the ecological environment of the water system using artificial islands and shallow water areas to provide natural environments for plants and animals.

5. Water system connectivity (ecological corridor):. The innovative concept of a blue-green loop opens up the city's bloodline, ensuring urban safety during floods, reducing pumping station operating costs, establishing an ecological corridor, replenishing water sources, ensuring water quality, optimizing the water system and improving the ecological livability of the city.

6. Enhancing the quality of urban development (people-oriented). Multiple-uses sites, realizing the function of spatial interchange, establishing secondary urban transport systems, increasing and enhancing green spaces, leisure and sports grounds and natural swimming pools within cities, combined with the transformation of shanty towns, thereby optimizing the living environment.

7. Highlighting the unique historical and cultural aspects of a city. By bringing water and water systems back into the city it is possible to understand the vitality and development trajectory of a modern city with flowing water. This allows the flowing water to tell the story of an ancient city such as the Great West Gate and the Old City Wall and to restore memories of historical rivers and streets, thereby highlighting the historical and cultural importance of water.

## Sponge City Practice:

- In 2015, Changde Sponge city applied to the China Planning Institute for technical guidance;
- 11 key model projects were designed and implemented in Changde utilizing institutional procedures and technical training;
- In 2019, Changde approved the concept of Sponge City and participated in the preparation of a master plan for the main pond river in Changsha in 2017;
- Changsha Jingtang Listening City Park was approved in 2021;
- The Hefei Airport Masterplan has been recognized by the China Water Supply and Drainage Association.

In May.2009, Wasser Hannover first coined the term 'Sponge City' in the report on the 'Water City Changde' project. The concept of the Sponge City was illustrated in the report through the following graphic for easier comprehension.



Die versiegelten Flächen der Stadt Durch den Einbau von grünen Flälassen Regenwasser schnell ablaufen nen, wird Wasser verzögert abgeleitet und vorgereinigt

erst wenn die Speicher gefüllt sind kommt es zum Überlauf



## Durch Rückhaltemaßnahmen läuft das Wasser langsamer und gleichmäßiger ab 蓄留措施可以让水缓慢而平稳的流走



## CHANGDE CITY ECOLOGICAL TREATMENT OF WATER SYS-TEM, SECTION: CHUANMATOU

## Project address:

Changde City, H unan Province, China **Project scope:** 

#### гюјест зсоре.

An area of 15 hectares, with a catchment area of 415 hectares **Project commission:** 

Changde, through the Chuanzi River Construction and Development Co.

Design Period: 2009-2012

## **Project Overview**

The project includes comprehensive connectivity of the Chuanzi River, ecological restoration, modification of the existing pumping station and storage pond and construction of a new water storage eco-filter. The renovation measures are connected through public green areas, allowing engineering facilities and landscapes to be seamlessly and holistically integrated.

The pumping station of Chuanmatou collects mixed rainwater and sewage from the catchment area and, depending on the quality and quantity of the incoming water, uses different treatment processes to reduce the amount of water discharged into the sewage treatment plant to the maximum extent possible. This process makes the best use of the ecological filter and sedimentation ponds to treat the sewage and initial rainwater and to reduce the pollution of the river. Moreover, the polluted rainwater and mixed overflow water are purified and used as a recharge source for the river to restore the ecological water system. At the same time, the close integration of the eco-filter and the riverbank landscape, transforms the traditional water treatment facility into a green park in the heart of the city, enhancing land value and the living environment.

#### Project objectives

As an example of the renovation of rainwater pump stations with mixed pipelines in urban diversion systems, this project flexibly combines recent and long-term pipeline network conditions to provide a water treatment facility plan with low operating costs and reduced maintenance technical requirements. It combines engineering technology facilities with landscape design, thereby improving function and appearance.

## **Project focus**

End-of-pipe treatment of combined flow networks, integrated pumping station and storage tank rehabilitation, eco-filters, eco-shorelines, landscape design, river design and hydraulic engineering.



Inflow water quality photos



Outflow water quality photos





Pre-renovation real-scene photos

Chuanzihe Discharge outlet and hard shoreline



蓄水型生态滤池 蓄留过滤渗透



Schematic diagram of the vegetated ditch and infiltration depression system





Entrance fountain water-play plaza



Internal vegetated ditch and depression system



Ecological filter pond and stormwater discharge



Newly constructed connecting river channel and ecological revetment



Ecological floating island and landscape water



## **Project Overview**

This framework plan proposes to establish a blue-green ecological corridor based on three water systems for nearly 100 square kilometers of the Jiangbei area, forming a complete eco-network, with the green network as the framework for urban development and the water network as the blood vessels of the city. In 2008, the concept of a "sponge city" was proposed in this plan.



Optimized water area network

Green network running through the city

## **Project objectives**

This framework plan proposes to establish a blue-green ecological corridor based on the ater syst r near square kilometers of the Jiangbei area, forming a complete eco-network, with the green network as the blood vessels of the city. In 2008, the concept of a "sponge city" was proposed in this plan.

## **Project focus**

Integrated water resources planning, blue-green ecological network, water balance, water ecology and sponge city.



Optimization solutions for a diversion-based pipeline network

Optimization solutions for a combined sewer system



Demonstration diagram of the "Sponge City" concept principles

## CHANGDE CITY: ECOLOGICAL TREATMENT OF THE WATER SYSTEM- SUBPROJECT "MOAT RECONSTRUCTION PROJECT"

## Project Address:

Changde City, Hunan Province, China

## Project scope:

The moat is situated on the southeastern boundary of the historic city of Changde, with a total length of approximately 5.3 km.

## Project commission:

Changde Xicheng New District Investment and Construction Development Co.

## Design period:

2010-2015



## **Project Overview**

The moat, built in the 16th century, became the main sewage channel during the expansion of the historical city. Most of it has been closed off as a covered ditch in the urban area and is partially closed by other buildings, while a few parts remain open. The sediment in the moat is up to one meter thick, leading to hygiene issues and odor pollution, which seriously affect the quality of living of the neighboring residents.

In terms of public space and urban development, a boulevard along the river will be created for visitors and residents, with a slow traffic system separate from the urban road network thereby restoring the prosperity of the old town and creating an urban space with a living atmosphere within the framework of urban development. In terms of hydraulics, a holistic plan for the entire section of the moat and ancillary waters will be developed to create a functional drainage system, a near-natural water body with good water quality and improved flood and salvage control within the city.

## **Project focus**

Landscape integration, public space planning, ecological restoration of the water system, water balance, and assurance of water quality.

## **Project Objectives**

To treat the foul-smelling waters of the moat and to open it as a water body in certain areas supplying good water quality, and to integrate it into the "Water City Changde" system of three bluegreen rings.



Water Treatment and Storage Systems





Newly Constructed River Channel in the Qu Yuan Park Section



Old Ximen Section New Open River Channel and Shantytown Transformation Aerial View Photos



Photos of the Newly Open River Channel in the Old Ximen Section and the Old City Wall

## CHANGDE CITY: ECOLOGICAL TREATMENT OF THE WATER SYSTEM- SUBPROJECT "CHUANZI RIVER EAST"



#### **Project Overview**

The whole area is located in the eastern part of Changde City where there are five stormwater and sewage ports, where untreated mixed stormwater and sewage flow into the river causing increased pollution in the water. The southern side of the system is agricultural land with interlocking waterways, while the northern side of the water system has been developed into a new residential area.

By transforming the five machine ports at the same time and combining them with the riverbank landscape, pollution is reduced in all respects, and ecological filter ponds (sewage treatment facilities) are set up in conjunction with dykes, which at the same time are urban landscape parks with purification functions and multifunctional land-saving. The riverbank is set back to make way for an urban waterfront park with flood storage and to create a secondary transport system for pedestrians and self-propelled vehicles across the river.

The plan realizes comprehensive utilization of rainwater, and carries out seepage purification treatment and regulation and storage for hardened surface rainwater runoff.



real scene of the Chuanzi River before renovation

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## **Project objectives**

To experience nature and water in the city. and that Changde should reassert its individual character as a water city. The Chuanzi river will become an important place that marks the city's identity and will be a great attraction for all residents and visitors.

## Project focus

Treatment of foul-smelling waters in the basin, hydraulic engineering, pumping station renovation, ecological restoration, water quality assurance, and sponge city.







Ecological Filter Pond Park in the Baiziyuan Pumping Station Section



Natural ecological shoreline and waterfront spac



Ecological Filter Pond Park

## COMPREHENSIVE WATER SYSTEM TREATMENT PROJECT IN THE SOUTH OF XINHE RIVER IN CHANGDE CITY



## **Project Overview**

Integration of the water system ecological management project with this project will contribute to conforming the overall framework planning concept of "Water City Changde" thereby transforming the Xinhe River system into an ecologically stable urban inland river. In the future, ships will be able to navigate the river, meeting the expectations of the public. Water quality will be improved through the restoration of the hydraulic and ecological connectivity between the Jian River, the Xin River, and the Chuanzi River.

#### **Project Description**

The Xinhe River was built in the 1970s and was originally used as a flood discharge channel. There are embankments on both sides of the channel, and the water quality in some water areas is poor. The design scope consists of two distinct areas of the mountain, with dense lakes in the south and long and narrow waterways in the north. The water network with many branches in the west is mainly used for agricultural production, especially fish farming which contributes to water pollution. It is not directly connected with water bodies in other urban areas and therefore lacks sufficient water exchange.

According to the characteristics of each section, it was necessary to carry out urban construction and water resources management design. The northern section is an urban sports park, which is mainly used for drainage and storage during heavy rains; the southern section is a recreational natural water area, which is mainly used for storage and initial purification. Water quality has improved through various measures such as pipe network optimization, comprehensive rainwater management, control of agricultural nonpoint source pollution, water body connectivity, and the construction of wetlands. The river channel was widened, and the riverbank now adopts a design close to nature to improve self-purification ability and the ecological value of the water body.

#### **Project Objectives**

Public space planning, landscape integration, water quality assurance, watershed management, hydraulic engineering, ecological restoration and sponge city.



photos of the river channel before renovation



photos of the renovated river channel and riverside park



Schematic diagram of the flow in artificial wetlands and sedimentation tanks







Sunken green space

Sunken sports field



Waterside Revetment Park - Peach Blossom Island



Natural ecological shoreline and waterfront revetment pathway



Natural ecological shoreline on the west bank and Jubao Square

CHANGDE CITY JIANGBEI DISTRICT WATER SYSTEM ECOLOGICAL TREATMENT PROJECT SUB PROJECT "NIGU BRIDGE SECTION RIVER ECOLOGICAL IMPROVEMENT PROJECT"



Changde Economic Construction Invest- 穿紫河

green spaces 2 Ecological filters 3 Creating a surrounding Boulevard 4 Castles 5 Yuanyang Bridge 6 Shore Trails 7 Urban walks / flood levee 8 A concave green square 9 A cruise terminal 10 A garden square 11 Water floor 12 Niguqiao Rainwater Pumping Station / Public Toilet 13 A scenic trail 14 German Street



Photos of the Site Before Renovation



**Project Overview** 

ment Group Co., Ltd. Design Period: 2012-2015

The Niguqiao Pumping Station is now located on the north side of Liuye Avenue (outside the design scope). According to the current vision of Changde, it is planned to rebuild this pumping station to the south side of Liuye Avenue (within the design scope). At present, 250 hectares of rainwater in the entire catchment area of the Nigugiao pumping station is directly discharged into the Chuanzi River without treatment. In the water catchment area of Nugugiao Airport on the north side of Liuye Avenue, a new residential area of 32.4 hectares is planned, of which the designed water area is 5.3 hectares. In this project, the initial rainwater from the entire catchment area of 250 hectares will be piped to the pumping station and then into the bio-filter for treatment. From there, the purified water enters the Chuanzi River. The Shihe River landscape will be closely integrated with the construction of the adjacent development zone. At the same time, this project has carried out an urban construction scheme design for the entire area, including the development zone and determined the development zone as a high-end creative workshop area, adopting open free space for leisure purposes. The various buildings have mixed functions.

Project Site Plan

## **Project Objectives**

Closely integrate necessary urban drainage and water purification civil engineering measures (i.e. pumping station, underground clover pond and ecological filter) with an attractive multi-functional open riverside park. At the same time, the water purification process, and the significance of clean water to the city will be vividly and intuitively displayed. Moreover, the water quality and ecological conditions of the Sugonggiao River and the Chuanzi River will be improved in a sustainable manner, to achieve the goals of the overall planning of "Water City Changde".

## **Project Focus**

Sponge city, landscape integration, water quality assurance, watershed management, pumping station renovation, hydraulic engineering and ecological restoration.



Ecological Filtration Pools and German Street

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water Dete ield, and River





Sunken Green Plaza

Circular Scenic Pathway and Sunken Ecological Tree Pits

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Night View of the Nicole Bridge Section over the Purple River

## CHANGDE CHUANZI RIVER RECONSTRUCTION PROJECT - LOVE ISLAND



#### **Project Overview**

The project encompasses the area adjacent to Qili Bridge on Danyang Road in the west, Liuhe Road in the planning of North Street, Ziyuan Bridge in Ziyuan Road in the east, the waterfront in the south, Sanlu Port, and the confluence of Marriage River and Chuanzi River.

The planning and architectural design of Love Island adopts traditional Southern European Mediterranean style concepts. The urban structure has a friendly atmosphere despite being high density. There are public and open square spaces that can hold large-scale celebrations.

There is also a relatively densely enclosed courtyard space in the building to provide a leisure meeting place; the landscape design of the site is dominated by large rivers and gardens which revolve around the main building - the church, and is open to the Marriage River which is in harmony with the existing river. The natural resources of the water system are closely connected, making it an ideal place for outdoor wedding functions.

Here, the riverside park plays two roles: on the one hand, it will form continuity with other riverside park sections, forming a whole system of slow traffic and bicycle lanes. On the other hand, it also creates a unique outdoor space for a wedding garden.

## **Project Objectives**

It will be designed as an attractive, multi-purpose place with the theme of weddings and love. The design of the building and the public space will be closely linked to provide a variety of options for wedding functions well into the future. At the same time, water purification will continue, and the value of clean water will be reflected in the city through visual design.

## **Project focus**

Architectural design, landscape engineering, comprehensive utilization of rainwater, riverbank design



Sunken Green Space in Riverside Park: Clear Weather



Sunken Green Space in Riverside Park: Rainy Weather



Conceptual Rendering of the Entrance Plaza to Aiqingdao





Conceptual Rendering of Aiqingdao Riverside Sponge Park

## CHANGDE CHUANZI RIVER RECONSTRUCTION PROJECT - GERMAN STREET

#### Project address:

Changde City, Hunan Province, China **Project scope:** 

The design scope extends to the south to the newly planned Liuhe Road, and to the west lies the Niguqiao Revetment Park between Liuye Avenue and Qili Bridge. The land area of the project is more than 20,000 square meters, including the total area of the underground section. The construction area is close to 50,000 square meters

#### Project commission:

Changde Chuanzihe Construction and Development Co., Ltd. **Design Period:** 

2014-2016



Aerial View of the German Street Project

## **Project Overview**

The water system treatment project in Changde City includes re-planning of the urban drainage system, reconstruction of the pumping station, ecological restoration of the revetment of the river, and the construction of facilities in the revetment park. Integrating the overall scheme of Chuanzi River urban drainage, flood control safety, comprehensive utilization of rainwater, water system planning, water treatment and space planning will gradually create the landscape architecture of the Chuanzi Riverbank section.

The German town "Hannover Street" is a continuation of the Chuanzi River reconstruction project. It is located along the Chuanzi River between Liuye Avenue and Qili Bridge. Facilities such as pools are combined into a whole.

Low-slung buildings with alleys and small squares form the urban typology of this historic German Old Town. In addition to the German-style buildings, the inner Hannover Avenue is parallel to Liuye Road and has been designed as a pedestrian street. It connects several small, enclosed urban squares, offering many changes and surprises to visitors who wander through the area.

Its special charm is that it is directly hydrophilic, so you can see the flowing water of the Chuanzi River and the green revetment area to the east.

## **Project Objectives**

The street will exhibit typical German architectural style. Landscape architectural designers were tasked with developing dynamic, contemporary public spaces and squares within the new district "German Strasse". In addition to landscape and architectural design, the comprehensive utilization of rainwater was also considered, and rainwater is discharged after infiltration treatment.

#### **Project focus**

Architectural design, landscape engineering, comprehensive utilization of rainwater and riverbank design.



Site Plan for the German Street Project



Overall Rendering of the German Street Project



Night View of German Street



Building Facade and Ecological Filtration Pools

North Entrance Plaza and Sunken Tree Pits of German Street



Hannover Square and Sunken Green Space

Pedestrian Street District: Building Facades and Drainage System





Pedestrian Street Area and Drainage System with Diverting Grating Trenches



Urban Landscape Trail with Flood Defenses, Surface Drainage Trenches, and Low Seating Walls



## CHANGDE SPONGE CITY SPECIAL DESIGN: CHANGDE ADVANCED TECHNICAL COLLEGE



Real-life Photos of the School Central Water Body, Ecological Shoreline, Water Quality, and Waterside Platform

## **Project Overview**

This project is one of the first batch of cotton city demonstration projects in Changde City. In the 28-hectare park, natural drainage is used instead of traditional drainage schemes, and the drainage direction of the rainwater pipe network is changed from external discharge of the municipal pipe network to the campus as a storage space. In addition, the central inner lake of the landscaped area, and then the overflow of the central inner lake enters the surrounding urban water system. Moreover, a Chinese-style inner courtyard design is combined with the concepts of sponge city construction to create a courtyard rainwater comprehensive management system with Chinese characteristics.

## **Project Objectives**

The existing drainage planning cannot meet the requirements of realizing the concept of sponge city, and the stormwater drainage network must be completely replanned. 95% of the total area will be treated by natural rainwater measures. 50% of the total area needs to be treated by rainwater treatment facilities with a high degree of purification.

#### Project focus

Sponge city, flood control and drainage, model calculation, water balance, landscape integration







Location Map of the Project in the Smart Valley Area



Comprehensive Site Plan for Drainage Scheme



North Square's Water Storage Status in Dry, Light Rain, and Heavy Rain Conditions



Real-life Image of the Rainwater Garden



Real-life Image of the Sunken Green Space



Real-life Image of the Building Atrium



Real-life Image of the Grass Trench



Ecological Parking Lot and Extended Spaces



Real-life Image of the Wetland



Real-life Image of the North Square Sunken Green Space and Storage Area



Real-life Image of the Drainage Kerb

## CHANGDE SPONGE CITY SPECIAL DESIGN - SUBPROJECT "QUYUAN PARK AREA"





Before Renovation: Actual Photos of Qu Yuan Park

## Project Overview

The rainwater from the original Yuan'an Road was directly discharged into the moat and the lake in the park from the three water outlets along the road, causing pollution. The area was divided into three divisions based on the location of the three existing outfalls. Each zone adopts an ecological filter to purify rainwater, and uses different forms of rainwater regulation and storage, namely: a sunken green space, and a rain garden and infiltration pond. Various elements of a sponge city are fully displayed and combined into the overall landscape design of the park incorporating not only clear water, but also hydrophilic. The treated water is slowly discharged into the moat and lake in the park, slowing down the peak runoff and providing clean water.

In addition, this point is an integral part of the whole system. Through the Xinhe-Moat Unicom Project, the Xinhe in the west supplies water to the moat and the lake in the park through pressure pipes in the dry season while in the rainy season, it discharges floods to the Xinhe in reverse.

## **Project Objectives**

Collecting the rainwater from Yuan'an Road adjacent to the park and Jiuchongtian Community into Quyuan Park for treatment, infiltration, and storage, and regulating the three water bodies connected to the lake, moat and Xinhe in the park. In addition, it was necessary to combine the sponge city design with the quality improvement design of the entire park. The facilities in the park are assembled in various forms, becoming a demonstration of a sponge city, turning the urban area into a source of water for rivers.

#### Project focus

Sponge parks, urban forests, water conservation sites and source emission reduction.



Ecological Filtration Pools, Rainwater Garden, and Dry Stream



After the renovation, photos of the water quality and ecological waterfront of the Qu Yuan Park section of the moat

## CHANGDE SPONGE CITY SPECIAL DESIGN - SUBPROJECT "ZILING ROAD RECONSTRUCTION PROJECT"



## **Project Overview**

photo of centralized ecological filtration ponds for road rainwater collection

This project is a completed arterial road located in the city center. The entire water catchment area is about 4.5 hectares. The road rainwater run-off before the renovation was collected through the rainwater outlet of the motorway and connected to the urban rainwater pipe network before being discharged into the surrounding water system from the outlet. Road rainwater is seriously polluted and pollutes the water system. At the same time, there is a lack of available rainwater management space around the road.

Infiltrating and purifying sidewalk rainwater is achieved by adding decentralized facilities such as planting river ditches, replacing marble pavements and permeable pavements. Also, terminal treatment measures (ecological filters) are set up before the rainwater from the motorway is discharged into the water system for regulation, storage, and purification. After the implementation of the project, water accumulation on sidewalks will be eliminated, and water system pollution will be reduced.

This will lead to increase plant diversity, improved landscape experiences for residents, and travel safety.

## **Project Objectives**

Since this project is a renovation project, unnecessary large-scale changes will not be made, and the progress of the project will be combined as much as possible to avoid affecting the construction and project progress. The landscape will focus on selected parts of the design. According to the road design experience, the rainwater treatment capacity of 15 mm is taken as a phased target, while the final target for design and treatment of conditional road sections is still 21 or 28 mm.

## Project focus

Sponge city, urban main road, emission reduction at the source, and landscape integration at the end.



Before the renovation, photo of the section



Before the renovation, photo of the section



Pictorial representation of the urban renovation location for Ziling Road



Pedestrian Walkway Grass Swale and Plant Design



Transformation of Pedestrian Walkway Grass Swales and Sunken Tree Pits



Bicycle Parking Area with Permeable Paving and Retrofitting of Sunken Tree Pits



After the renovation, real-life photos of the section



Real-life photos of grass swales after the transformation



## CHANGDE SPONGE CITY SPECIAL DESIGN - SUBPROJECT "TOBACCO FACTORY INDUSTRIAL ZONE"



## **Project Overview**

The new site of Changde Furong Cigarette Factory is in the south of Changde Avenue, west of Furong Road and north of Yangqiaohe Road.

In the existing technical transformation project of Changde Cigarette Factory, the rainwater drainage can be divided into two areas: the North Area, which accounts for about 60% of the total factory area. This rainwater is connected to the municipal pipe network through the traditional drainage system. The concept of sponge city is not used for purification or storage. The southern area accounts for about 40% of the total plant area. The rainwater is discharged into two large storage ponds with ecological wetlands, which are respectively located on the south and east edges of the plant area. In addition to regulating and storing rainwater, it also has a certain purification effect.

At the edge of the factory area, a nearly closed ring formed by the main canal receives the rainwater inside the factory area. Rainwater can be consumed in different forms here, such as infiltration, evaporation, etc. In the factory area, Zhihe ditches can be set along the road, which can be combined with the ring system on the edge to form a network to retain rainwater.

The water surface of the pond on the south side is used as a storage space, and ecological filters are set up on both sides of the pond to purify the dirty rainwater. The pond will have two flowrestricting outlets to discharge rainwater into the new river.

The warehouse row and unloading area in the middle of the north face are relatively concentrated in buildings, and heavy vehicles come and go frequently, causing serious road pollution. The rainwater in the area is not suitable for infiltration, and no rainwater treatment has been carried out. Therefore, this area is discharged in the traditional way. After passing through a rainwater storage tank, the flow is limited to enter the municipal pipe network.

The parking pads in the factory area must be changed to permeable pavement, such as planting river grids, which will infiltrate underground. Where conditions permit, green roofs shall be created where possible.

#### Project Objectives

eneral Sile Layout Plan of the Tobacco Factory Area

To carry out comprehensive management and utilization of rainwater in line with the concept of sponge city, it is necessary to redesign parts of the drainage system. Mainly in the north area without any integrated rainwater management and utilization measures, the south area should also be adjusted appropriately. The factory is in Xinjian City, where it is easy to implement various sponge city measures, and the designed rainwater treatment capacity is set at 38mm. The output water volume shall not exceed 10 liters/second/ha.

## **Project focus**

Sponge city, black and odorous water treatment, urban renewal, ecological restoration and smart water principles.



Circular Channel Cross-Section Diagram



Circular Water System and Ecological Shoreline









Water Quality and Water-friendly Spaces in Circular Water System





Circular Channel on a Rainy Day

## CHANGDE SPONGE CITY SPECIAL DESIGN: NEW CONSTRUCTION OF CHANGDE JINJIANG HOTEL

## Project address:

Changde City, Hunan Province, China Project scope: Jinjiang Reception Center covers an area of about 28 hectares. Project commission:

Development Bureau

2015





'Real-life Image of the Water Quality and Ecological Shoreline of the Lake

photo of the Lake in the Hotel and Landscape Center



Master Plan for Water System Sponge Measures

## **Project Overview**

As the first batch of sponge city demonstration projects in Changde City, this project will adjust and optimize the rainwater system in a park of about 28 hectares. The drainage system replaces the traditional drainage scheme. The rainwater in the catchment area is collected through decentralized and semi-centralized sponge measures. After regulation, storage, and purification, it will be used as a water supply source for the water system and central lakes in the area, and a natural water circulation system will be established to ensure the water quality and water balance of the water body, exceeding its own water body. When water volume is needed, it will be discharged into Liuye Lake. At the same time, integrating landscape design to improve the quality of space.

## **Project Objectives**

The traditional drainage scheme of the original design was re-planned and designed. Nearly 97% of the runoff of the total area has been purified naturally, and 3% of the rainwater has been discharged through unrestricted flow. 88% of the rainfall runoff is purified through efficient natural measures.

## **Project focus**

Sustainable comprehensive utilization of rainwater, sponge city demonstration, near-natural drainage systems, decentralized/semi-centralized sponge city measures, water quality assurance and landscape integration.



Grass Swale and Open-Curb



Ecological River Channel





Dry Creek





Grass Swale and Shoreline Ecological Wetland



Landscape Waterfront Platform, Aquatic Plants, and Real-life Lake Water Quality

## CHANGDE SPONGE CITY SPECIAL DESIGN — SUBPROJECT "CHANGDE VOCATIONAL COLLEGE OF FINANCE AND ECONOMICS"



#### Project address:

Changde City, Hunan Province, China **Project scope:** 

Divided into two areas, north and south, the southern area covers 16.9 hectares, and the northern area covers 11.5 hectares.

## Project commission:

Housing and Urban-Rural Development Bureau of Hunan Province, China

Design Period: 2017

#### **Project Overview**

Changde is building a science and technology education center "Wisdom Valley", including universities, vocational colleges, scientific research institutes and related institutions. The new campus project of Changde Vocational and Technical College of Finance and Economics (Financial Institute) is part of the Wisdom Valley project. In the original planning and design, the rainwater in the campus is directly discharged through the traditional fast drainage model into the surrounding road main pipes through the pipeline system as soon as possible, so that rainwater does not stay too long inside the system.

This rainwater drainage method will be replaced by the drainage concept under the guidance of the new sponge city concept. In addition, in accordance with the topographical characteristics of the two campuses with water in the south and mountains in the north, different solutions are proposed to arrange the sponge facilities, which perfectly integrate with the landscape. The plants in the sponge facilities are carefully selected, choosing beautiful and flood-resistant herbs or shrubs, not only considering their practical function, but also considering the aesthetic effect. The clean rainwater stored, infiltrated, and purified by the sponge facility replenishes the landscape water body of the campus, and the rainwater beyond the treatment capacity is discharged into the nearby new river, reducing the amount of pollution and runoff entering the river.

## **Project Objectives**

Re-planning and designing rainwater drainage systems in this area so it conforms to the principle of sponge city design. The retention volume of the new zone must be 38 mm. 95% of the area is connected to natural stormwater management elements. The throttling flow in this area shall not exceed 10 liters/(sec\*ha).

## Project focus

Sponge campus, source emission reduction, water quality improvement, urban fishing prevention, and landscape integration.



Stormwater Open Channel and Scenic Pedestrian Bridge



unken Plaza and Floodable Storage Space



Surface Gravel Drainage Ditch and Underground Water Storage System





Surface Rainwater Landscape Detention Pond

Sports Field and Sunken Green Area Detention Space



Entrance Plaza Dry Creek and Recreational Space





Hard Surface Shallow Drainage Trench and Rain Garden



Grass Swale





## COMPREHENSIVE RECONSTRUCTION PROJECT OF YUEYANG SHEPITAO WATER SYSTEM AND STORAGE TANK



#### Project address:

Yueyang City, Hunan Province, China

Project scope:

670 hectares

## Project commission:

Yueyang Urban Management and Administrative Law Enforcement Bureau

Design Period:

2016-2018

## **Project Overview**

The Shepisuo Pumping Station is in the south of the main urban area of Yueyang City. The catchment area extends to the Pipawang Overpass in the north, Pipawang Road in the east, and Nanhuyou Road in the west. The maximum flow rate during heavy rain is 20 m/s.

During periods of heavy rain, sustained infestation occurs periodically in certain parts of the urban area. The water quality of the water bodies in the city, especially the Nanhu Lake in the south, is inferior. The open-air combined sewage ponds lead to strong odorous pollution. The problem is particularly serious in the area where the Snakeskin Confluence Sewage Overflow Tank is located. Here there are odor problems due to silting and health risks due to germs in the combined sewage.

Based on the full analysis and research of its catchment area, with the help of hydrological and water conservancy mathematical simulation, the water quality of urban combined drainage is scientifically, and accurately distinguished, and targeted treatment is carried out. Into the sewage treatment plant, in the rainy season, only high-concentration sewage flows into the sewage treatment plant, and medium-concentration sewage is purified by ecological treatment and discharged into the natural water system while low-concentration water that is harmless to the environment can be directly discharged into natural water systems.

It is composed of a mountain sewage pumping room, a rainwater pumping room, underground concrete sewage retention tank, an underground concrete sewage storage tank, and an ecological filter and deodorization system. The entire engineering facility and the east side embankment reconstruction project are integrated into a whole to carry out landscape design and to provide

functional leisure areas.

## **Project Objectives**

Integrating the necessary urban drainage and water purification civil works (i.e. pumping station, underground storage tank and ecological filter) with an attractive multi-functional open riverside park. At the same time, the water purification process, and the significance of clean water to the city will be vividly and intuitively displayed. Moreover, the water quality and ecological conditions of the Sugongqiao River and the Chuanzi River will be improved in a sustainable manner, to achieve the goals of the overall planning of "Water City Changde".

#### **Project focus**

Sponge city, watershed modeling, pumping station retrofits, hydraulic engineering and landscape integration.



Photos of Water Quality Before Renovation





Ecological Filtration Pond Aerial Corridor





Ecological Parking Lot and Grass Swale

Water Quality at the Outlet of the Ecological Filtration Pond and Landscape Entry to the Lake Tributary



Grass Swale and Sunken Children's Playground Area



Shepitao Pump Station Renovation



Nighttime Photos of the Shepitao Ecological Park



Aerial View Photos of Underground Rainwater Detention Tank, Ground-level Recreational Playground, and South Lake

## FENGXINGLONG QIAOTOU PARK, SANYA CITY, HAINAN PROVINCE RAINWATER, RECLAIMED WATER TREATMENT SYSTEM, LANDSCAPE RIVER WATER QUALITY AND QUANTITY GUARANTEE SYSTEM



## **Project Overview**

Zhongxinglong Qiaotou Park is located on the banks of the Linchun River in Sanya City, close to the city center. It is an important place for the urban image of Sanya City and an important place for citizens and tourists to live and relax in the future. The sponge city design combines the current situation of the surrounding area and fully considers the needs of the Zhongxinglong project itself. This increases the sponge city effect of Zhongxinglong Qiaotou Park on the surrounding communities and integrates the distributed treatment measures (small sponge) and centralized treatment measures (big sponge) of the sponge city. Combined with water resources (rainwater and reclaimed water) utilization and water quality assurance systems, comprehensively considering the measures of infiltration, stagnation, storage, purification, use and drainage of sponge cities, and reducing the impact on the sponge city while meeting the design indicators and requirements of the sponge city. The area can rely on drinking water sources and providing good water quality.

## **Project Objectives**

According to the requirements of sponge city construction and the problems of water resources, water environment and water security faced by Zhongxinglong Ecological Park, a special sponge city system was established to make it a landmark project of sponge city construction in the whole province and the whole country. Providing a place to play and rest.

## **Project focus**

Sponge city, landscape integration, water circulation, reclaimed water reuse and water quality assurance



Water Resource Utilization and Water Resource Protection System



Underground Storage System in the Bridge Area of the Park



Aerial View of the Park



Real-life Photos of Circulating Purified Water - Spring Water Cascading into a Creek





Image of Shoreline Filtration System and Lake Water Quality





Location Map of Filtration System

Real-life Image of Shoreline Filtration System

Wasser Hannover GmbH

## COMPREHENSIVE IMPROVEMENT PLAN OF GUITANG RIVER SYSTEM. CHANGSHA



Project address: Changsha, Hunan Project scope: The total length of the Zhutang River is 25.3 kilometers, and the total area of the basin is 108 square kilometers. Project commission: Zhutang River Basin Development and

Construction Co., Ltd., Changsha City, Hunan Province **Design Period :** 

2017-2019





**Project Overview** 

Botanical Garden Section Planning Layout

The Benguitang River is a very important inland river in the history of Changsha City. It is the inner-city ecological corridor of Changsha City. It runs through the Changsha River and collects water sources to irrigate the surrounding farmland while playing a role in flood drainage. Due to the economic and social development of Changsha City, the Guitang River has gradually become a black and odorous water body due to measures such as artificial expansion and other measures, which have gradually "curved and straightened" the river. Environmental pollution has intensified, and water quality has deteriorated.

This project uses four major models: the hydrodynamic mathematical model of the water system, the water quality model of the water system, the hydrological model of the drainage pipe network, and the hydrological model of the river basin. Special articles on governance, ecological restoration, sponge cities, and multi-disciplinary integration follow six principles: the principle of river basin system, the principle of comprehensive coordination, the principle of harmony between man and nature, the principle of multi-objective integration, and the principle of advanced innovation and the principle of economical application. From landscape and river design, water quality improvement, sponge city and urban planning.

This project integrates multiple disciplines, and comprehensively carried out renovation plans for the Guitang River.

## **Project Objectives**

To adopt the concept of ecological and sustainable sponge city design and comprehensive water resources management, and build a new, benign, green and ecological comprehensive water systems in the basin through the integration of multi-specialties and multiobjectives, avoiding the possibility of traditional drainage methods. To confront problems caused by urban fishing, insufficient water balance, and deterioration of water ecology. With the fundamental purpose of "urban repair" in the river basin, that is, "urban repair and ecological restoration", the construction of sponge cities, the improvement of the current environment of black and odorous water bodies, and the restoration of the original ecological functions of the rivers, it is necessary to create a sponge river basin economic belt along the river.

## **Project focus**

Sponge city, watershed management, urban double repair, comprehensive planning and multi-disciplinary integration.



Schematic Diagram of Ecological Restoration Planning Proposal



River Channel Planning Before the Jingtang Section





River Channel Planning After the Jingtang Section



Real-life Image After the Jingtang Section River Channel Remediation



Real-life Image Before Remediation of the Rain Swallow Lake Section



Real-life Image After Remediation of the Yuyan Lake Section







## URBAN DOUBLE REPAIR AND SPONGE DEMONSTRATION PARK OF JINGTANG SECTION OF GUITANG RIVER, CHANGSHA



Photo of the Eco-Riverbank Park and Commercial Area After Renovation



#### **Project Overview**

The project is in the area north of Xiangzhang Road, south of Laodong Road, east of Xishui Road, and west of Jiali Road, Yuhua District, Changsha City.

Firstly, mathematical models are used for simulation to achieve precise pollution control; secondly, four sets of water treatment systems are creatively designed to achieve systematic pollution control, the most important of which is the interception and drainage of overflow sewage in the surrounding 9.5 square kilometers combined drainage area. Ecological wetland purification system: comprehensive sponge city design and the integration of the concept of urban "double repair" to achieve ecological pollution control. In the design of the river course, the winding shape of the natural river course was boldly restored, reconstruction of the river ecosystem; returning the city to the river, moving the original embankment back and combined the urban road, opened up the connection between the city and the river course, and expanded the passage of the river course flow section, so that the green space of the city and the blue space of the river interweave and overlap, and make full use of them in different time periods.

At the same time, this project also combines the ecological restoration and management project with the park landscape construction to achieve the superposition of functionality and aesthetics in the central area of the city where the space is highly concentrated. The income generated by supporting buildings of the project can also be subsidized as part of the construction and operation costs. To "raise the garden with the garden". In Jingtang Park, citizens can not only go boating in the Dutch-style town, but also experience the traditional life of the traditional Jingtang village of "well in the pond, spring in the well, three ponds connected, and the villages interdependent".

#### **Project Objectives**

The comprehensive improvement plan for the Guitang River Basin integrates multiple elements such as cities, rivers, and green spaces, and reshaped the Guitang River into a river of ecology, culture, wisdom, and life. Establishing four sets of mathematical models (basin hydrology, pipe network hydraulics, river flood control, water quality of water system), and completing the water resources database of the whole basin. The Jingtang Sponge Park watershed is positioned as an urban river beach park, integrating multi-faceted and multi-professional governance ideas and measures to create a typical case of urban inland river ecological governance.

## **Project focus**

Sponge city, black and odorous water treatment, urban renewal, ecological restoration, and smart water principles.



Project Site Plan



Aerial Panoramic View of Riverside Sponge Park

## HEFEI INTERNATIONAL AIRPORT TOWN: COMPREHENSIVE ECOLOGICAL PLANING OF THE WATER SYSTEM



## **Project Overview**

On the west side of Hefei Airport International Town Water Ecosystem Comprehensive Planning Area is the established Hefei Xinqiao International Airport. On the south side are concentrated six major smart manufacturing-related industrial projects that have been implemented..

And on the east side is the Changgang resettlement community. There are no planned construction projects in this area, and it is a newly planned urban area.

Using four mathematical models, six special studies and five special plans, following the concept of ecological and sustainable sponge city design and comprehensive water resources management, a brand new benign, green and ecological basinbased comprehensive water system was created. This avoids problems such as urban in-crowding, insufficient water balance, and water ecological deterioration that may be caused by traditional drainage methods. Also, it creates a model for the development of an international new ecological city.

#### Project Objectives

Through "water security goals, water environment goals, water resources goals, water ecological goals, and water landscape goals", the vision of "ecologically integrated city and symbiosis with water" will be realized, and meteorological rainfall, surface runoff, pipeline systems, and urban rivers will be considered. Reducing and controllinf runoff pollution on rainy days, coordinating the functions of various systems and planning and design standards all improve the city's ability to prevent and reduce disasters, and to build a comprehensive rainwater management system that is compatible with overall urban planning.

#### **Project focus**

Multi-disciplinary integration, multi-topic research, multi-model calculation coupling, watershed research and integrated water resources management





Sponge Measures Special Planning Layout



Planning Layout for Clean Rainwater Pipe Network

Planning Layout and Cross-Section Diagram for Two Lakes Connectivity Channel

## HEFEI INTERNATIONAL AIRPORT TOWN: BAOJIAOSI LAKE ECOLOGICAL RESTORATION PROJECT



## **Project Overview**

Adjacent to Xinqiao Airport, Airport International Town is an integral part of the future core intelligent and logistics industry concentration area, a strategic highland and core fulcrum for airport economic development, and an important place to undertake the industrial transfer and economic radiation of the Yangtze River Delta. Baojiaosi Lake, Baojiao Tributaries, Jiaohu Lake and Jiaohu tributaries are the core water systems in the region. To avoid ecological damage and water pollution to the lake caused by the development of surrounding plots, and to ensure a good water ecological environment and flood control and fishing safety, the Baojiaosi Lake and Baojiaosi tributaries will undergo ecological restoration and water environment quality improvement of Baojiaosi Lake, under the Lake Ecological Restoration Project.

This includes the establishment and refinement of the hydrodynamic model of the drainage pipe network, the hydrological model of the river basin, the water quality model of the reservoir, and the regulation and storage management model of the reservoir, as well as the engineering design of the first phase construction area of the Baojiaosi Lake Ecological Restoration Project of Airport International Town. The construction area of the first phase mainly includes No. 3 Green Corridor, Baojiao Temple Lakeside Park and Changgang Park area, covering an area of about 52 hectares. The project construction includes four sub-projects: the drainage system and interception facilities to ensure the water quality of Baojiaosi Lake, the dam reconstruction of Baojiaosi Lake and the ecological shoreline project of the lake, the No. 3 green corridor project and the water environment treatment of the water catchment area of Changgang Park.

In the project, it is necessary to study the hydrological conditions, formulate reasonable management principles, integrate municipal drainage, sponge city, ecology, and landscape into a whole, and finally realize urban double repair (ecological eco-urban goals for restoration and urban repair).

## **Project Objectives**

Based on the construction needs of the airport international town, combined with the construction sequence and construction requirements of the regional plot development, the system design is carried out for water safety guarantee, water ecological restoration and water landscape construction of the lake water environment of Baojiao Temple. The design goal of Baojiaosi Lake is to achieve Class III water to ensure a good water ecological environment and to ensure the safety of drainage in the area. While improving the water quality of the lake, it is necessary to give full attention to the regulation and storage function of the reservoir, to regulate the water volume to solve the flood control problem, to provide good boundary conditions for the downstream Wangjiangou, and to build a complete ecological water system.

## **Project focus**

Stormwater management, urban landscape parks, ecological restoration, water resource balance, water treatment and water quality assurance.







Aerial Rendering of the Project

## HEFEI WANGJIANGOU UPSTREAM ECOLOGICAL RESTORATION PROJECT

Project address: Hefei City, Anhui Province, China

**Project scope:** The catchment area of the Emerald Lake Basin is 9.31 square kilometers (including 13 outfalls of 7.93 square kilometers, the Emerald Lake Scenic Area of 1.25 square kilometers and the Emerald Park of 0.125 square kilometers), and the lake area is 0.62 square kilometers.



Project commission: Hefei Economic and Before Renovation Technological Development Zone

Design Period: 2019-2021

Hard Lakeshore in the Park Area Water Quality Pollution at the Lake Outlet The Dead Water Zone in the Feicui Lake Before Renovation

#### **Project Overview**

Wangjiangou is in Hefei Economic and Technological Development Zone, with a drainage area of about 27.5 square kilometers. It is the river channel under the Emerald Lake dam. Emerald Lake and its surrounding parks (Eicui Park and Emerald Lake Scenic Area, with an area of about 1.54 square kilometers) are important outdoor public spaces for citizens' leisure and entertainment in Hefei. In Wangjiangou and upstream Emerald Lake, there are problems such as non-point source pollution, rainy season overflow pollution, insufficient water environment capacity, and substandard water quality in rivers and lakes.

Carrying out ecological restoration and sponge city transformation on Emerald Lake and its surrounding parks and exploring a green development path.

Through underground adjustment of storage tanks, ecological filters and wetlands, terminal treatment of Emerald Lake outlets is carried out, and non-point source pollution from municipal drainage and surrounding watersheds is strictly controlled and treated. By combining upstream sewage interception and pipe network improvement and efficiency, significant improvement of water quality in Emerald Lake occurs.

Through the concept of low-impact development and sponge city construction, adopting small-scale distributed sponge measures such as planting ditches, rain gardens, and ecological shorelines to collect, purify and utilize rainwater, minimizes the damage to the original ecosystem during the development process and gradually restores hydrological status and natural features before urban development.

Through ecological water treatment and water cycle design, an ecological system that can self-repair is built, and the impact load brought by urban development on the environment can be used to obtain a return on continuous low maintenance costs with a small investment, saving resources once and for all.

#### **Project Objectives**

By strictly controlling and dealing with non-point source pollution from the drainage system and surrounding watersheds and improving the hydrodynamics of the lake, ensures that the Emerald Lake reaches Class III water quality in a long-term and stable manner, and forms a stable ecological system without impact loads. While ensuring and improving the water quality of the lake, it is necessary to give full attention to the regulation and storage function of the reservoir thereby regulating the water volume to solve the flood control problem, providing good boundary conditions for the downstream Wangjiangou, and building a complete ecological water system. In the project, studying the hydrological conditions, formulating reasonable management principles, integrating municipal drainage, sponge city, ecology and landscape into a whole, finally realizes the goals of an ecological city with double urban repair (ecological restoration, urban repair).

#### **Project focus**

Sponge city, self-circulation of lake water, sustainable ecosystem, model analysis, ecological restoration, terminal treatment and sewage interception project.



Analysis Diagram of Inflow Catchment Areas



Distribution Map of Remediation Measures for Lake Inlet Outfalls









Ecological Filter Pond, Underground Detention Tank and Ecological Treatment Rendering for Outlet No. 12



Ecological Filter Pond, Underground Detention Tank and Ecological Treatment Rendering for Outlet No. 9





Aerial Photos of Construction Site at Outlet No. 9



Foto of biological filter after construction at outlet No.12



Foto of the park above the retention tank after construction at outlet No.9

## HEFEI LUOGANG CENTRAL PARK WATER ECOSYSTEM PLANNING

#### Project address:

Hefei City, Anhui Province, China

## Project scope:

The total area is about 15.3 square kilometers. The research scope is expanded to 47.5 square kilometers to encompass the catchment area of the river channel rainwater pipe network within the project site including 111 square kilometers of the Shiwuli River catchment area.

## Project commission:

Hefei Binhu Science City Management Committee

**Design Period:** 2019-2020

## **Project Overview**

Hefei Central Park, situated between the old city and Binhu New District, is undergoing redevelopment following the closure of Luogang Airport in 2013. As a vital component of Hefei Binhu Science City, it aims to be a modern ecological park and central CBD, symbolizing Hefei's international image and vitality. With diverse businesses including parks, headquarters, research facilities, offices, and residences, it aims to become the world's largest and most ecological central park.

Utilizing sponge city design and integrated water resources management, the project will implement new rainwater drainage, water systems, quality assurance, and urban water landscapes. Through interdisciplinary collaboration in urban drainage, flood control, water conservation, engineering, ecology, landscape, and planning, mathematical models will be established to form an integrated and sustainable basin-based water system. This comprehensive



General Diagram of Ecological Water System

planning approach will unify blue, green, and gray infrastructure, ensuring coordination with urban elements like infrastructure, roads, green spaces, vertical structures, water systems, landscapes, and flood control measures.

## **Project Objectives**

By adopting the concept of ecological and sustainable sponge city design and comprehensive water resources management, and building a new, benign, green and ecological basin water system through the integration of multiple disciplines, multiple special projects, and multiple objectives thereby avoiding the possibility of traditional drainage methods. The problems caused by urban inland fishing, insufficient water balance, and deterioration of water ecology will realize the vision of "ecological integration of the city and symbiosis with water" and create a model for the development of an international new ecological city.

## **Project focus**

Sponge city, lake water system, urban vertical, urban drainage, excessive rainwater discharge, ecological corridor, water quality assurance, water resource balance, comprehensive river improvement, ecological water landscape.







Clean Rainwater Drainage System



Rainwater Drainage System



清洁雨水管



Overall Aerial View - Non-Rainy Season



Overall Aerial View - Rainy Season



Central Park Aerial Photograph

## SPONGE CITY AND MUNICIPAL SPECIAL PLANNING IN NANCHANG, HIGH-SPEED RAILWAY EAST STATION AREA



With the technical support of the HE pipe network hydraulic model and the KOSIM watershed hydrological model, a regional sponge system with "three-stage drainage system plus three-stage sponge purification system" as the basic framework is constructed. Aiming at the status quo of the high-water and low-water water systems in this region, combined with the upper-level planning, the existing land use pipe network and other boundary conditions, the overall planning, and the organic integration of the sponge system with the urban landscape offer a plan for nearby lakes, rivers and surrounding areas. A new model is created for the construction of regional urban water systems.

## **Project Objectives**

Focusing on the topography and landform characteristics of the Ganfu Plain in this area and local climate and hydrology characteristics, based on development trends from a better ecological background to a regional center, guided by the concept of sponge city, focusing on solving safety concerns of fishing in the rainy season and ensuring water quality in the dry season. To solve the problem, a sustainable ecological water system network with local characteristics is created, and forming a water-wading top-level

design for the construction of sponge cities and green ecological portals in the East Railway Station area.

#### Project focus

Top-level design, sponge city, water quality assurance, fishing safety and landscape integration.

Highlight 1: Three-stage drainage system.

Coordinating the elements of the urban water system and constructing a three-level drainage system based on the principle of sponge city including microscopic drainage of clean rainwater pipes, municipal rainwater drainage, green corridors and

rainwater drainage system for urban flooding.

Highlight 2: Three-stage sponge purification system.

According to local conditions, build a multi-stage sponge purification system composed of decentralized, semi-centralized and centralized systems.

Highlight 3: Multifunctional ecological corridor system.

Systematically organize urban blue-green spaces to create a multifunctional ecological corridor system and give full play to the value-added effect of the blue-green network.



Wasser Hannover GmbH

## HEFEI LUOGANG CENTRAL PARK LANDSCAPE GREEN SPACE DESIGN -JINXIU LAKE AREA WATER ECOSYSTEM PROJECT



## **Project Overview**

In 2013, Luogang Airport was successfully transferred to Xingiao and Luogang Airport was officially closed with the area facing redevelopment and re-planning. Luogang area is located in a high-quality modern ecological park and central CBD area, an important part of Hefei Binhu Science City. It is a center of urban vitality, with a new landmark showing the image of Hefei's international metropolitan area, and Hefei's global international stage. The main types of business are parks, headquarters bases, research and development, offices, residences, etc. It is planned to build the world's largest, most modern, and most ecological central park. Jinxiu Lake Park is located at the core of Luogang Central Park.

To ensure the accurate implementation of the regional water ecological planning concept, the exhibition company accepts the main design order.

The overall design water system of Jinxiu Lake Park (including Jinxiu surface drainage runoff optimization, West Lake, East Lake, ecological filters, water purification wetlands and ponds, etc.) have a total area of about 58 hectares, of which the main lake area of Jinxiu Lake around 37 hectares. The water bodies in the area are of various types and crisscrossing between lakes and ponds are inlaid, ditches, where wetlands exist, and rivers are extended. Based on the current low development intensity, the green space basically retains a relatively natural texture. Except for many farmlands, the overall green volume is relatively high. The landscape is highly feasible and has a good ecological background.

The project provides park area rainwater (sponge) design system (including but not limited to vertical design review, rainwater pipe networks, grass planting ditches, rain gardens, ecological filters, etc.) Circulation systems, dephosphorization wetlands, lakeside filters and two special design networks with content and related technical consulting services. Through a series of measures, water security, water environment, water resources, water ecology and water landscape can be reached.

Project address:

Hefei City, Anhui Province, China

## Project scope:

The area is about 3935 mu.

## Project commission:

Pan Asia Landscape Design (Shangli) Co., Ltd., Shangli Urban Construction Design Research Institute (Group) Co., Ltd. (Consortium) **Design Period:** 

2021 - present

#### **Project Objectives**

Ecological Jinxiu Lake area, ecological water system. The core is to build an ecological central park that becomes an important part of the overall natural ecological system of Hefei through a series of ecological measures. Among them, the construction of the ecological system of the water system is the key, creating a highly integrated drainage and water system to ensure the beneficial existence of different water ecological environments, relying on natural work, natural collection, storage, and purification processes to ensure the sustainability of the systems development.

#### **Project focus**

Sponge city, non-point source pollution control, water quality improvement, water resource balance, flood control and fishing and ecological construction.









Aerial view