DIPLOMA THESIS

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MASTER OF LANDSCAPE ARCHITECTURE AND GARDEN DESIGN

ECOLOGICAL RESTORATION OF THE YELLOW RIVER BANK IN THE GUBAIDU SCENIC AREA IN ZHENGZHOU

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Abstract

Zhengzhou Gubaidu Scenic Area is located in the Zhengzhou section of the Yellow River, and the study area was selected as the riverbank area of the Gubaidu Scenic Area. The area has a deep historical and cultural background, while the current situation of the study area is complex. Taking the middle and lower reaches of the Yellow River basin and the South-North Water Diversion Project through the Yellow River as the background, this study analyzes the study area in depth from three scales and summarizes the values and conflicts of the area. At present, the main problems of the area are ecological degradation, reduction of biodiversity, single scenery, chaotic landscape structure, risk of flooding, and the need to maintain the original scenic spots. Based on the analysis, this study planned and designed the water system, barge, topography, plant groups, and road network structure of the study area from four scales to achieve the goal of ecological restoration of the site and the creation of a beautiful Yellow River riparian zone landscape, which enriches the species habitat and thus enhances the biodiversity.

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1 Introduction

1.1 Purpose and Motivation

The Yellow River is the fifth longest river in the world, the second longest river in China, and also the mother river in the hearts of Chinese people. Chinese civilization originated on the banks of the Yellow River, and its waters have nurtured the Chinese nation. From west to east, the Yellow River spans half of China. The Yellow River occupies a very important position in terms of national development, history and culture, spiritual support, ecological protection, and landscape development. Furthermore, the Yellow River crosses my hometown of Zhengzhou City, Henan Province, and I grew up on the banks of the Yellow River, so I have deep feelings for it. However, after 2000, along with the rapid economic development, the lack of unified planning and management of the Yellow River basin, the misuse of the Yellow River resources, the disorderly development of the Yellow River banks, and the incongruity of the supporting environmental protection measures and methods with the economic development, have led to the deterioration of the ecological environment along the Yellow River banks, the reduction of wetland areas, and serious soil erosion in the middle and lower reaches. In recent years, people are aware of these problems and have started to take active remedial measures for the Yellow River, and the attention to the ecological environment of the Yellow River basin has greatly increased.

For this project, I selected a relatively typical stretch of riverbank in the Zhengzhou section of the Yellow River. The study area is lightly exploited and currently semi-naturalized, with many artificial elements in and around the site. In this project, I try to clarify the complex environment of the site through an in-depth analysis of the three scales of the site and renew the site from the overall layout to the detailed design with an ecological restoration as the core concept. To enhance the ecological quality of the site and create a sustainable ecological and cultural landscape.

This thesis is mainly divided into three parts, the first is an in-depth analysis of the site from three scales, and through the analysis summarizes values and conflicts of the site, to lay a good foundation for the subsequent planning and design. The second part determines the general direction of planning based on the preliminary analysis and goes to find case materials of relevant aspects according to that direction, discusses the cases, and summarizes the methods and experiences that can be used on this project. Based on this information, the specific planning level for this site is determined. Third, select a small representative site in the study area for in-depth design.

1.2 Goals

1.2.1 Creating a Sustainable Yellow River Riparian Area

(1) Rich and diverse plant species at all levels of height

(2) Creation of biological habitats.

(3) Has a resilient river bank area that can be partially flooded.

(4) Can retain water and soil.

1.2.2 Creating an attractive Yellow River Riparian Area

(1) Beautiful plant landscape, with the scenery in all seasons.

(2) Diverse landscapes, including wetlands, grass slopes, dense forests, etc.

(3) Highlight the landscape of the Yellow River and increase the possibility of contact with the water of the Yellow River.

1.2.3 Creating a Humane Yellow River Riparian Area

(1) Retain and update the activity program with reasonable density in some areas.

(2) Tour paths for different experiences.

(3) Increase humanized facilities and signage systems. (Figure 1-1)

Figure 1-1. Vision

2 Background

2.1Yellow River Introduction

2.1.1 Overall Introduction

The study area is located in the riparian zone of the Yellow River in China. The Yellow River, a large river located in the northern region of China, is one of the longest rivers in the world and

the second longest river in China. The total length of the Yellow River is about 5,464 kilometers. The Yueguzonglie Basin at the northern foot of Bayankala Mountain flows from west to east through Qinghai, Sichuan, Gansu, Ningxia, Inner Mongolia, Shanxi, Shaanxi, Henan and Shandong provinces (autonomous regions), and finally flows into the Bohai Sea. The precipitation in the basin is small, and dry land agriculture is the mainstay. Winter is dry and spring is dry, and precipitation is concentrated in summer, autumn, July and August. The middle and upper reaches of the Yellow River are dominated by mountains, while the middle and lower reaches are dominated by plains and hills. Because the middle section of the river flows through the Loess Plateau of China, it carries a large amount of sediment, so it is also known as the river with the highest sediment content in the world. But in Chinese history, the diversion of the lower reaches of the Yellow River has had a huge impact on human civilization.

The Yellow River is the most important birthplace of Chinese civilization, and the Chinese call it the "Mother River". Every year, 1.6 billion tons of sediment are carried, of which 1.2 billion tons flow into the sea, and the remaining 400 million tons remain in the lower reaches of the Yellow River for many years, forming alluvial plains that are conducive to planting. （Figure 2-1）

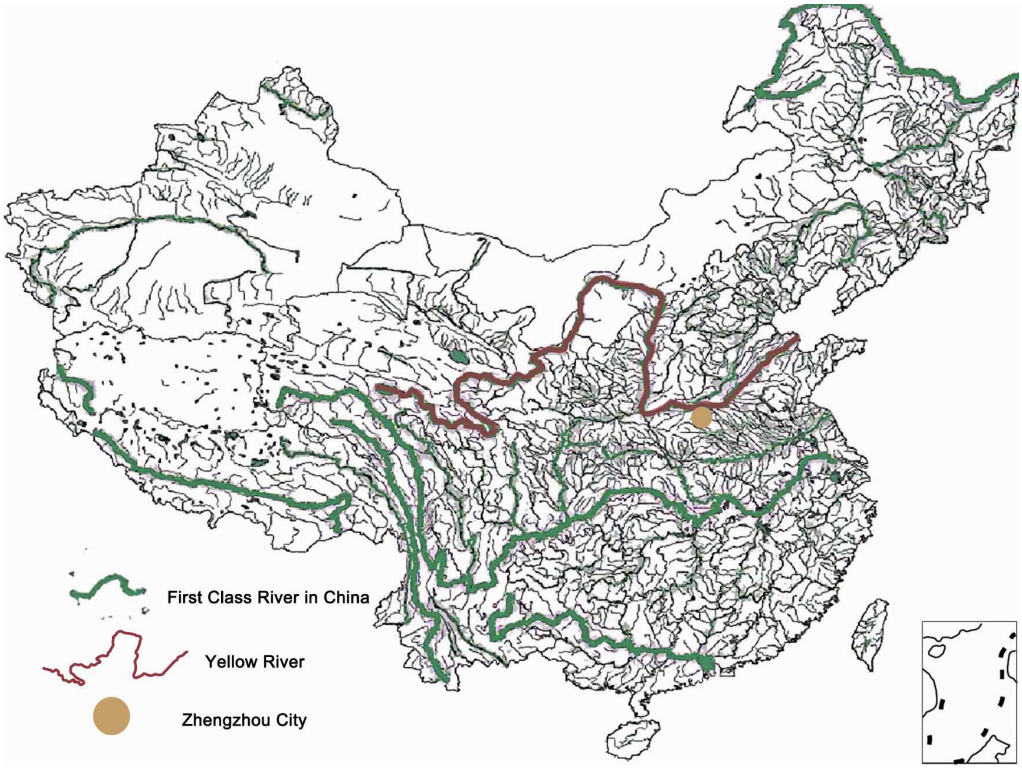

Figure 2-1. Map of Chinese water systems

2.1.2 Yellow River Main Stream Sub-basin Characteristics

Yellow River Basin from west to east across the Qinghai-Tibet Plateau, Inner Mongolia Plateau, Loess Plateau and the Huang-Huai-hai Plain four geomorphic units. The topography of the

Yellow River Basin is high in the west and low in the east. The western part of the river source area's average elevation is 4000m above sea level, by a series of high mountains, perennial snow, glacial landform development. The central area is between 1000-2000m above sea level, with yellow landforms and severe soil erosion. The eastern part mainly consists of the alluvial plain of the Yellow River. The upstream and midstream dividing point of the Yellow River is Hekou town in Inner Mongolia; the midstream and low stream dividing point is Taohuayu in Henan Province. The study area is located near the middle and lower reaches dividing point, 24 km to the west of Taohuayu in a straight line distance.

（1）Upper Yellow River

The river is 3472 km long from its source to Hekou town in Toketo County, Inner Mongolia Autonomous Region. Both sides of the river are mountainous and grassy plateaus, with altitudes above 3,000 meters and peaks exceeding 4,000 meters, and the river is 's-shaped. The source section of the river is 400 kilometers long with twists and turns, many lakes, grasslands and swamps on both sides of the river, clear and stable water flow, low water consumption, high water production, and many lakes. The climate is highland cold, fish in the Central Asian plateau region, few species, and rich resources. Fish resources have not been exploited for a long time. The upstream area of the Yellow River accounts for about 60% of the total water production of the Yellow River and is the main source of the Yellow River runoff area. The rainfall in the upstream area is characterized by large area, long duration, and low intensity, with clear water, stable runoff, and low sand content. Therefore, the main management strategy for the upper reaches is to strengthen the construction of water-capture capacity.

（2）Middle Yellow River

The middle reaches of the Yellow River are from Hekou Town to Taohuayu in Zhengzhou City, Henan Province. The Yellow River turns southward from Hekou Town to Yumenkou, flying southward for 725 kilometers, and the water surface drops 607 meters. The rolling yellow current, galloping endlessly, divides the Loess Plateau into two halves, forming a canyon-shaped river. After the Yellow River came out of the canyon, the river suddenly opened up and the water flow was gentle. From Yumenkou to Tongguan, the river is 125 kilometers long and has a drop of 52 meters. The channel of the river channel is obvious, the beach surface is wide, and the beach area is 600 square kilometers. The beach surface is 0.5 to 2.0 meters above the water surface. The erosion and siltation of this section of the river change drastically, and the mainstream swings frequently. Then the Yellow River turns eastward for 356 kilometers to Taohuayu in Zhengzhou City, Henan Province, with a drop of 231 meters. The middle reaches of the Yellow River flow through the Loess Plateau region, and the tributaries bring in a large amount of sediment, accounting for more than 90% of the total Yellow River sediment volume,

making the Yellow River the river with the largest sediment content in the world, causing great harm to the lower stream, and is the key section to eradicating water damage. Moreover, heavy rains occur frequently in some areas of the middle reaches, with high intensity and short duration. Once floods form, the floods will contain a large amount of sediment. Therefore, the main control strategy for the middle reaches of the Yellow River is to strengthen soil and water conservation. The study area is located in this section but also has the characteristics of the lower section.

（3）Lower Yellow River

The lower reaches of the Yellow River is the section of the Yellow River below Tahuayu in Zhengzhou, Henan Province. This section of the river is 786 km long, with a total drop of 93.6 m in the lower reaches. The lower river crosses the North China Plain, and the vast majority of the river section is bounded by embankments. The general distance between banks is 5 to 14 km, and the widest is 20 km. The river is wide and shallow, with many sandbars in the center of the river, scattered water flow, violent changes in siltation, and wandering mainstream, which is typical of a wandering river. Due to the constraints of the water flow by the critical levee sections and high beach cliffs, the river channel forms several nodes, which have a certain control role on the river potential. In addition, a large amount of sediment siltation brought by the middle reaches of the Yellow River, the river channel is raised year by year, and the riverbed is 3 to 5 meters above the ground level of the backwaters, creating an average of 25 to 30 square kilometers of net land each year. The lower reaches of the river have been silted up for a long time to form the world-famous "hanging river on the ground". The main management strategy for this section of the river is to promote wetland protection and ecological management. （Figure 2-2, 2-3）

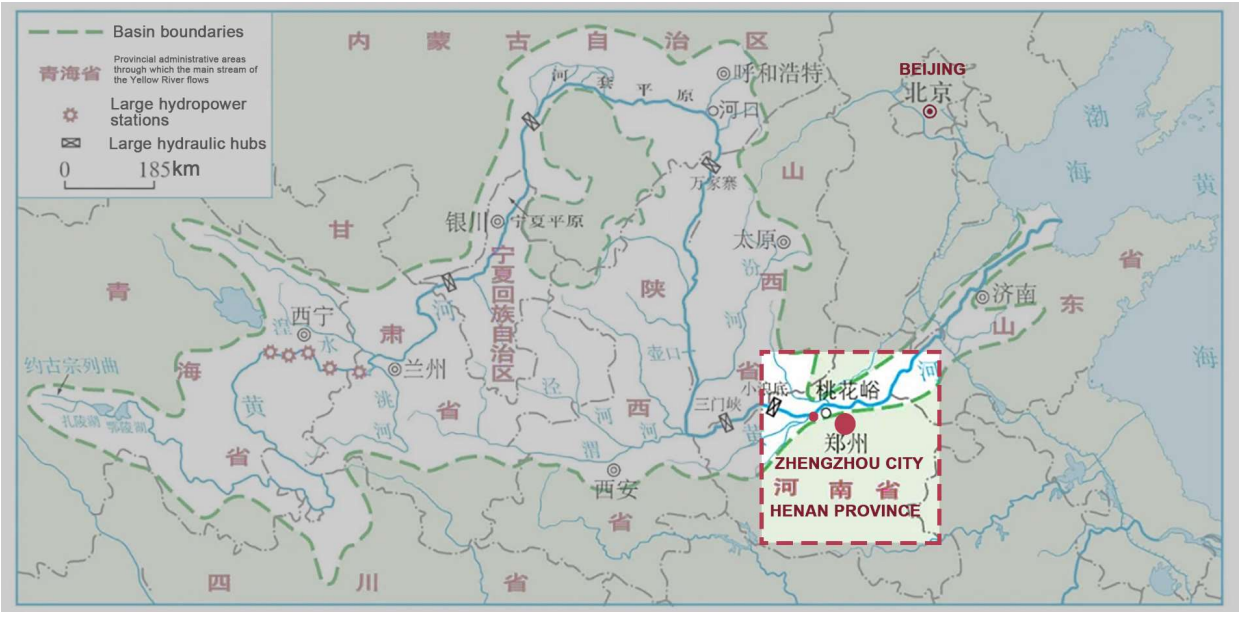

Figure 2-2. Map of the Yellow River Basin about the administrative regions of China

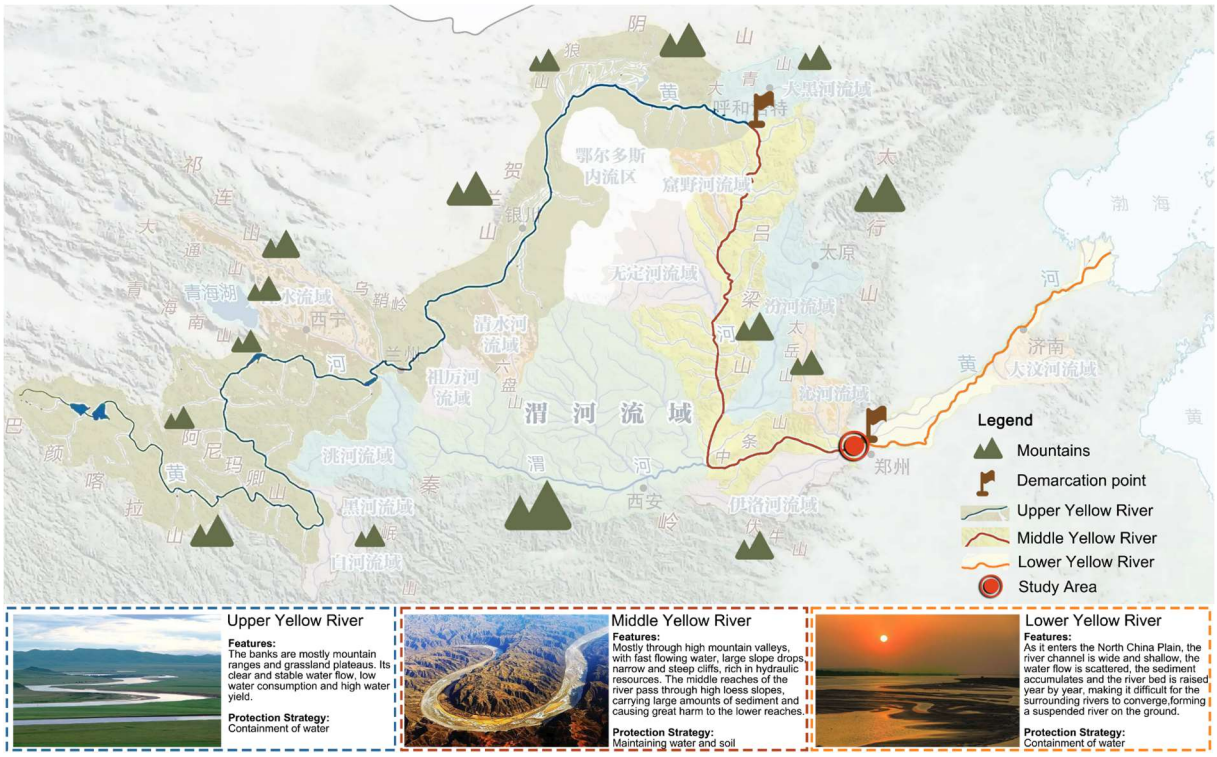

Figure 2-3. Map of the Yellow River Basin about the topography of China

2.2 Policies About the Yellow River in China

2.2.1 National Level

In September 2019, General Secretary Xi Jinping hosted a symposium on ecological protection and high-quality development of the Yellow River Basin in Zhengzhou, Henan Province, and delivered an important speech, focusing on the overall development of the country and pointing out that the Yellow River Basin has a very important status in China's economic and social development and ecological security. He profoundly clarified the significance of the ecological protection and high-quality development of the Yellow River basin and made a major deployment to strengthen the management and protection of the Yellow River and promote the high-quality development of the Yellow River basin. As a result, the State Council of the CPC Central Committee issued the "Yellow River Basin Ecological Protection and High-Quality Development Planning Outline", which emphasizes the Yellow River management focuses on five aspects: first, strengthen ecological environmental protection; second, ensure the long-term stability of the Yellow River; third, promote the economical and intensive use of water resources; fourth, promote the high-quality development of the Yellow River Basin; fifth, protect, inherit and promote the Yellow River culture.

2.2.2 City Level

In October 2022, Zhengzhou Municipal People's Government announced the "Zhengzhou City Territorial Spatial Master Plan (2021-2035)". In the ecological protection space section of the plan, the Yellow River and Song Mountain are taken as the ecological base, and several river ecological corridors and ecological green centers are linked, to build a "one belt, one zone, multiple corridors and ten centers" of the whole area ecosystem protection pattern. The "one belt" is to strictly protect the northern Yellow River ecological and cultural protection belt, and to build the national Yellow River basin ecological protection demonstration area. （Figure 2-4）

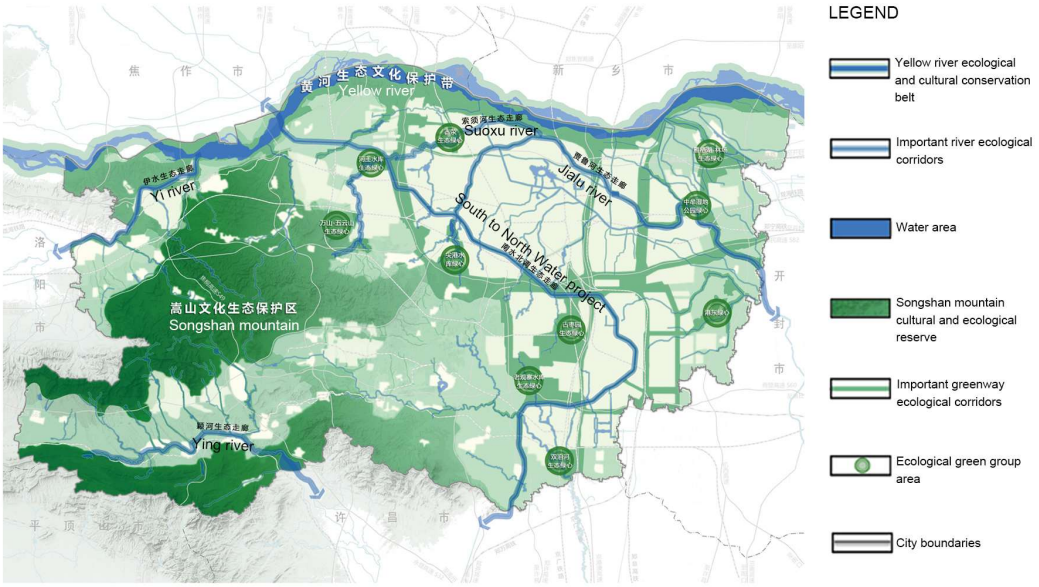

Figure 2-4. Zhengzhou Ecosystem Protection Plan (2021-2035)

2.3 South-North Water Diversion Project in China

Since the South-to-North Water Diversion Project through the Yellow River is within the study area, a brief introduction to the South-to-North Water Diversion Project in China is provided. The South-to-North Water Transfer Project mainly solves the water shortage problem in the northern part of China, especially in the Huang-Huaihai Sea basin. There are three water transfer lines: the Eastern, Central and Western lines, which are connected to the Yangtze River, Yellow River, Huai River, and Hai River, forming a general layout of "four horizontal and three vertical" to facilitate the rational allocation of China's water resources from north to south and from east to west.

2.3.1 East Line Project

The South-to-North Water Diversion East Line Project is planned to divert water from the Yangtze River main stream near Yangzhou, Jiangsu Province, and use the Beijing-Hangzhou

Grand Canal and its parallel rivers to deliver water via Jiangsu, Shandong, and Hebei provinces. The main water supply objectives are to solve urban and industrial water supply along the water transfer line and in the Jiaodong area, to improve agricultural water supply conditions in the Huaibei area, and to provide ecological and agricultural water when needed in the north. This line is currently open to water.

2.3.2 Midline Project

The Midline Project of South-to-North Water Diversion refers to diverting water from the east bank of Danjiangkou Reservoir in the middle and upper reaches of the Hanjiang River, the largest tributary of the Yangtze River, excavating channels along the Tangbai River Basin and the western edge of the Huang-Huaihai Plain, and crossing the Yellow River through a tunnel in Wangcun, Xingyang City, Henan Province (where the study area is located), go north along the west side of the Beijing-Guangzhou Railway, and flow to the water delivery project of Tuancheng Lake in the Summer Palace in Beijing. The water supply area is mainly the center west of the Tangbai River Plain and the Huang-Huaihai Plain, with a total water supply area of about 155,000 square kilometers. The project focuses on four provinces and cities in Henan, Hebei, Tianjin, and Beijing, with more than 20 large and medium-sized cities along the route to provide water for living and production. It also takes into account the ecological environment and agricultural water in the areas along the route. The total length of the main channel of the middle line is 1,267 kilometers. At present, the first phase of the project has been opened to water.

2.3.3 West Line Project

South-to-North Water Diversion West Line Project (the project is in the preliminary demonstration stage and is an unbuilt project) is a long-distance water transfer project from the Yalong River, Dadu River, and other Yangtze River systems in the upper reaches of the Yangtze River in Sichuan to the upper reaches of the Yellow River in Qinghai, Gansu, Ningxia, Mongolia, Shaanxi and Jin, which is a major strategic project to supplement the shortage of water resources in the upper reaches of the Yellow River, solve the water shortage in the northwest of China's drought and promote the management and development of the Yellow River. （Figure 2-5）

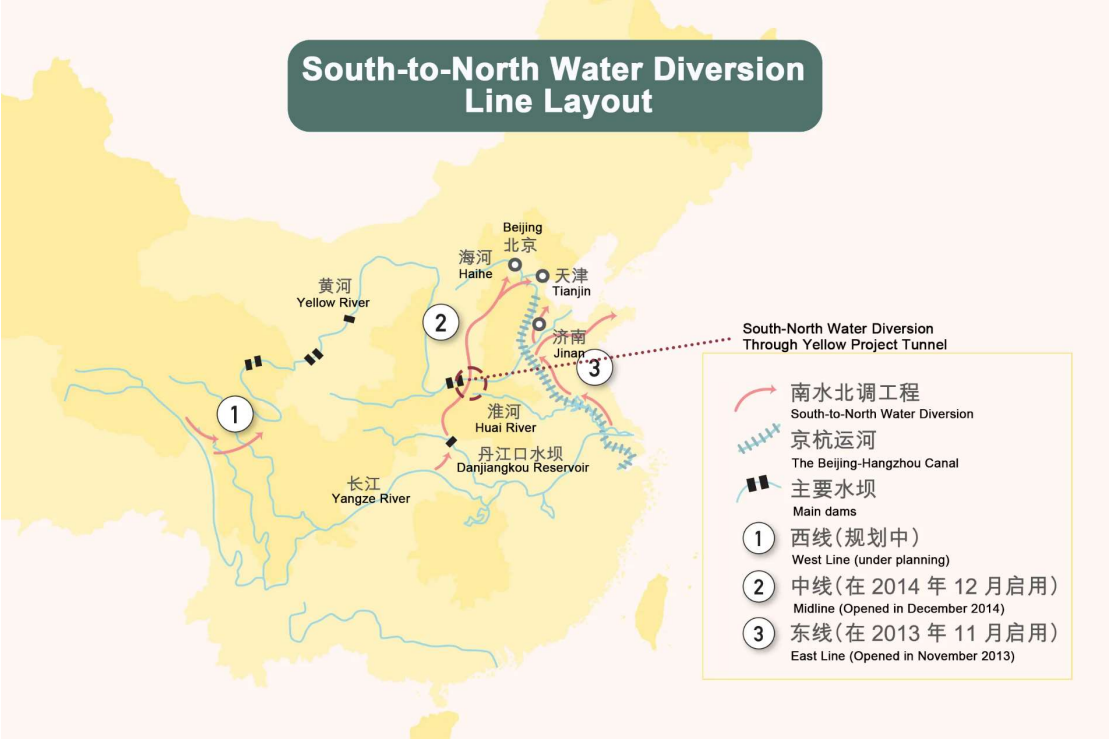

Figure 2-5. South-North Water Diversion Project Layout

3 Study Area Analysis

3.1 Macro Scale

3.1.1 Location in China

The study area is located in Zhengzhou City, Henan Province, China. Zhengzhou City is the capital of Henan Province, which is located in the central part of China. Henan is known as "the heart of nine states and the thoroughfare of ten provinces", and is an important comprehensive transportation hub and information flow center for people and logistics in China. Due to its geographical location in China, Henan Province has been the core area of many dynasties and civilizations since ancient times and is rich in history and culture with many sites.

The topography of Henan Province is north to south, taking up the eastern link to the west, and the terrain is high in the west and low in the east. The north, west, and south are distributed by Taihang Mountains, Funiu Mountains, Tongbai Mountains, and Dabie Mountains along the provincial boundary in a semi-ring shape; the middle and east are the Huang-Huaihai Alluvial Plain; the southwest is the Nanyang Basin. The Yellow River crosses Henan Province from west to east. At the same time, Henan is located in the combination of open coastal areas and the central and western regions and is the middle zone of China's economic development from east to west in a stepwise manner. （Figure 3-1）

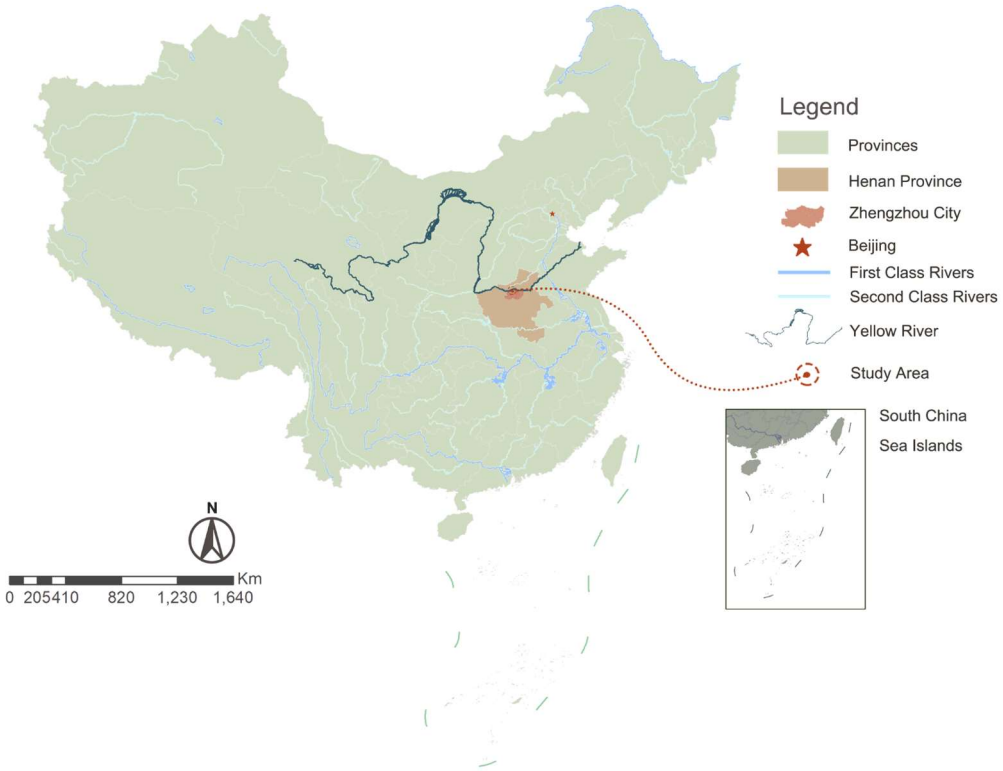

Figure 3-1. Location in China

3.1.2 City Context

Zhengzhou City is located in the north-central part of Henan Province, where the middle and lower reaches of the Yellow River divide, and the dividing point, Taohuayu, is in the north of Zhengzhou. The study area is located in the northwestern part of Zhengzhou city. It is under the jurisdiction of Xingyang City, a prefecture-level city under Zhengzhou City. It borders Zhengzhou city to the east, the ancient capital of Luoyang to the west, the Zhongyue Songshan to the south, and the Yellow River to the north. The study area is 47km away from the CBD of Zhengzhou City, 41km away from the old CBD of Zhengzhou City, and 17km away from the city center of Xingyang.

（1） Traffic Conditions

Zhengzhou is a national transportation hub of both public, railway, air, and mail, and has formed a transportation network consisting of 3 modes of transportation: railroad, highway, and air. Therefore, Zhengzhou city has convenient transportation and a dense road network. Although the study area belongs to the suburban area, it still has convenient transportation. There is one national road and two provincial roads close to the study area. The outskirts of the study area is a large scenic area, called Gubaidu, which visitors from within Henan Province mostly choose to drive to by private car. In terms of public transportation, there are currently four train stations in Zhengzhou City, and the closest train station to downtown Xingyang and the study area is Zhengzhou West Station. Several bus lines can reach downtown Xingyang, and once you arrive in downtown Xingyang, you can take the exclusive bus line Tour 1 and Xingyang Tour 1 to the Gubaidu scenic area.

（2） Terrain Conditions

The study area is located in the Yellow River Loess Hills gully area in the west of Xingyang City. Xingyang City is in the transition zone between the plain of east Henan and the loess hills of west Henan, surrounded by low hills in the south, north, and west, and an open alluvial plain in the middle. In general, it slopes from southwest to northeast, with a large change in slope. The mountains are dominated by steep slopes, isolated peaks, and single faces, with an elevation of 300-700 meters and a relative height of 100 meters. Near the bank of the Yellow River, the mountains have a gentle southern slope and a steep and narrow northern slope, with upright cliffs mostly seen. Based on the morphological characteristics, it is divided into four zones: erosion residual mountain area, loess hilly hillock area, pre-hill flood plain area, and river flood terrace. The study area belongs to the junction area of loess hillock and river flood terrace. the study area which is in the western part of the city is located in the barren hills and bald mountains with sparse vegetation, which is the most serious area of water and soil erosion in the Yellow River Basin of Xingyang City.

Geomorphology affects the distribution of groundwater: river valleys and plains, the topography is low and flat, which is conducive to the infiltration of precipitation and surface water, and the amount of groundwater is abundant. In mountainous and hilly areas, the gullies and valleys are dense and sloping, and the cutting is intense, leading to a large loss of precipitation and a deep burial of groundwater level with large changes in water volume.

（3） Climate Conditions

Xingyang City has a warm temperate continental monsoon climate, with four distinctive seasons: spring is windy and dry; summer is hot and rainy, with water and heat at the same

time; autumn is cool and sunny, with occasional rainy weather; winter is cold and dry, with more wind and less snow. Spring and autumn are relatively short, and the seasonal distribution of precipitation is very uneven, with precipitation concentrated in July, August, and September throughout the year, during which there are often heavy rains.

3.1.3 Summary

The study area is located in the suburbs of Zhengzhou City, on the banks of the Yellow River, near the dividing point of the middle and lower reaches of the Yellow River, and has both midstream as well as downstream characteristics. The area is surrounded by hilly and gully terrain with serious soil erosion problems, which are exacerbated by heavy rainfall in summer. The location is close to the center of Xingyang, and the traffic is relatively easy to reach for those who drive and can also be reached by public transportation. （Figure 3-2）

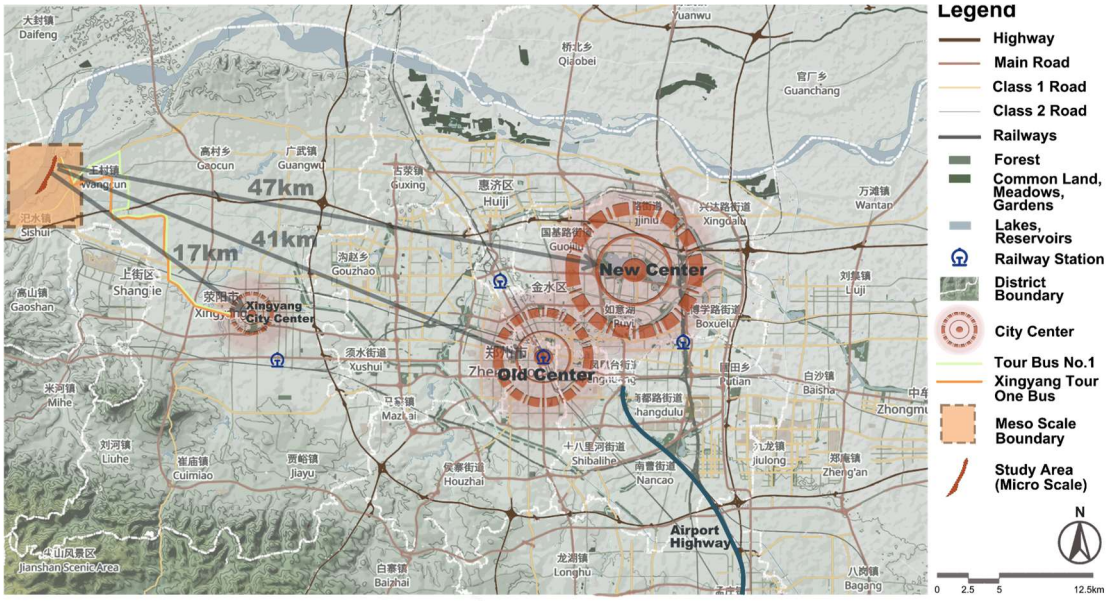

Figure 3-2. Zhengzhou City Context

3.2 Meso Scale

The mesoscale area was defined in the Gubaidu scenic area and several villages around the Gubaidu scenic area, and the main analysis area was the Gubaidu scenic area. The study area is the riparian zone of the Yellow River on the east side of the Gubaidu scenic area, which partially overlaps with the study area because part of the scenic area is located in the riparian zone.

3.2.1 Land Use Context

The land around the scenic area is a large area of farmland, villages, and a small number of village factories. It contains 9 villages, from north to south, namely Lupo Village, Mangou Village, Sicun Village, Houdian Village, Piwang Village, Caomiao Village, Houbaiyang Village, Wangzhuang Village, and Xing Village. Crops are mainly Triticum aestivum, Setaria italica, and Allium fistulosum. In addition, Xingyang City Drinking Water Plant is located in the northeast of the scenic spot, near Township Road 104. （Figure 3-3）

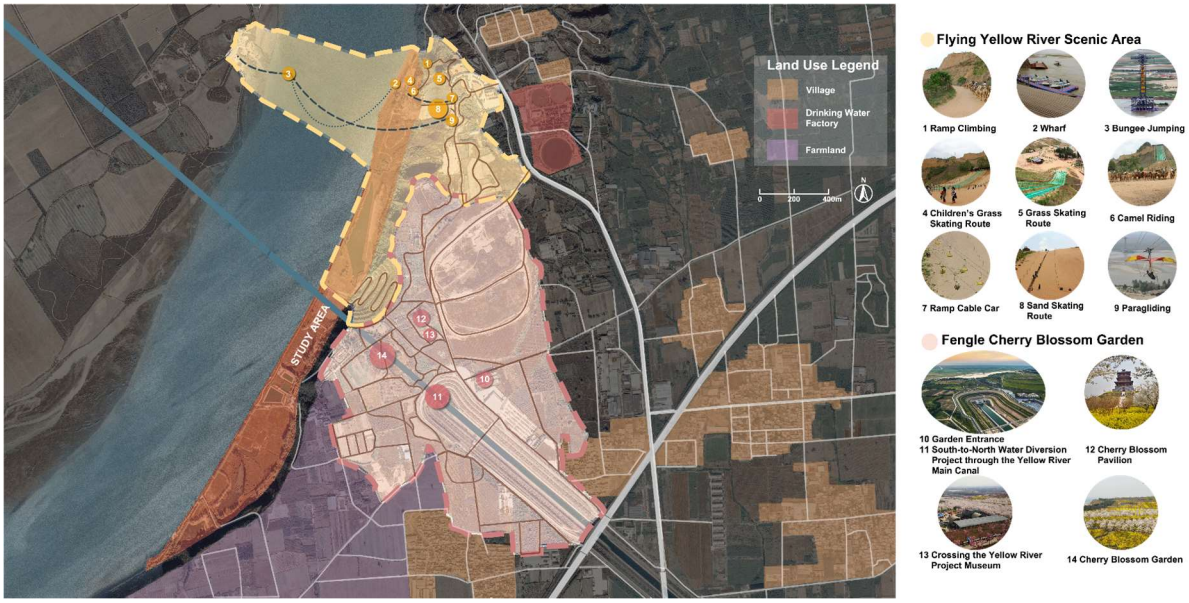

Figure 3-3. Mesoscale Land Use Analysis

3.2.2 Scenic Area Introduction

Gubaidu Tourist Scenic Area is a 5A level tourist attraction in China and is one of the key attractions on the Yellow River tourism line, through which the South-to-North Water Diversion Project passes. With its geographical location and rich historical background, this scenic spot has created a tourist attraction with the advantages of the Yellow River scenery combined with rich activities and amusement projects. Gubaidu scenic area is divided into two parts, the Gubaidu Flying Yellow scenic area and the Fengle Cherry Blossom Garden scenic area, which have different characteristics of landscape and activities.

（1） History Background

Gubaidu is an ancient ferry port with a history of more than 2,000 years on the bank of the Yellow River. It has been through many dynasties, ancient emperors have come here, and poets of the time have written poems in praise of it. The Yellow River turns a corner in Wangcun town of Xingyang, leaving a small bay called Gubaizui. This is the calmest and gentlest section of the Yellow River in Xingyang, which is connected to Fei Long Ding in the east and Hu Jiu Guan in the west, facing the Yellow River and leaning against the rolling hills. The name of

Gubaidu, which translates into English as "old cypress tree", comes from a legend that in ancient times there was an old cypress tree that was tall and shaded by the sun, and it was the place where the King of Han, Liu Bang, took refuge from the rain. Later, this place was turned into a ferry, and it was called "Gubai Ferry".

After this place was opened as a river crossing wharf in 1071 A.D., it became the largest water transportation center leading from Jiangnan to Shaanxi, where merchants and cruise ships flourished and the economy and culture were very prosperous. Due to the smooth water of the river crossing, embarkation and disembarkation were free from the pain of mud and mire. Until the 19th century, the villagers in the nearby villages living on the Yellow River, rely on the boat to support their families, dozens of boats in the village, can transport thousands of people across the river every day. At that time, the number of fish in the Yellow River was also high, and many villagers also depended on fishing for a living. Gubaidu's scenic spot was opened in 2013, and many local villagers also became employees of the scenic spot.

（2） Gubaidu Flying Yellow River Scenic Area

Gubaidu Flying Yellow River scenic area has the desert, the Yellow River, high mountains and oases, and other landscapes, both with the majestic scenery of the Yellow River in the northwest, and the beauty of the scenery of Jiangnan. It has a unique natural landscape and rich humanistic landscape. The natural landscape mainly focuses on the Yellow River and the special landscape of the Yellow River embankment, while the humanistic landscape mainly focuses on the historical heritage of the ancient ferry and the South-North Water Diversion Project related. There are abundant activities in the park, and the main projects include a sand sliding field with the largest drop and longest slide in Asia, a grass sliding field, children's sand sliding field, sheepskin raft rafting, camel riding, Yellow River speedboat, sightseeing cable car, Yellow River Flying Rope, Yellow River aerial bungee jumping, ten miles of golden sand beach, sand motorcycle, grassland scenery ranch, leisure fishing, etc.

（3） Fengle Cherry Blossom Garden Scenic Area

Fengle Cherry Blossom Garden opened in 2017 and the park is themed on cherry blossom viewing. There are more than eighty species of over 120,000 cherry blossom varieties from all over the country in the park. In addition to that, it is also equipped with Brassica rapa, Yulania × soulangeana and other plants. Every spring, thousands of flowers bloom in full bloom, and visitors from all over the province come here in large numbers. In addition to cherry blossom viewing, the park also has the South-North Water Diversion Project through the Yellow River Museum and the Cherry Blossom Pavilion, a pavilion built in the form of an ancient Chinese pavilion, which is both the highest point of the park and can also be climbed to see the whole park scenery and the Yellow River. Part of the trunk canal of the South-North Water Diversion Project through the Yellow River is also in the Fengle Cherry Blossom Garden, facing the main entrance, which is also one of the characteristic landscapes in the garden. The northern part of Fengle Cherry Garden has some unbuilt areas with high terrain, which is currently under planning and will be built in the direction of cherry blossom town in the future. （Figure 3-4）

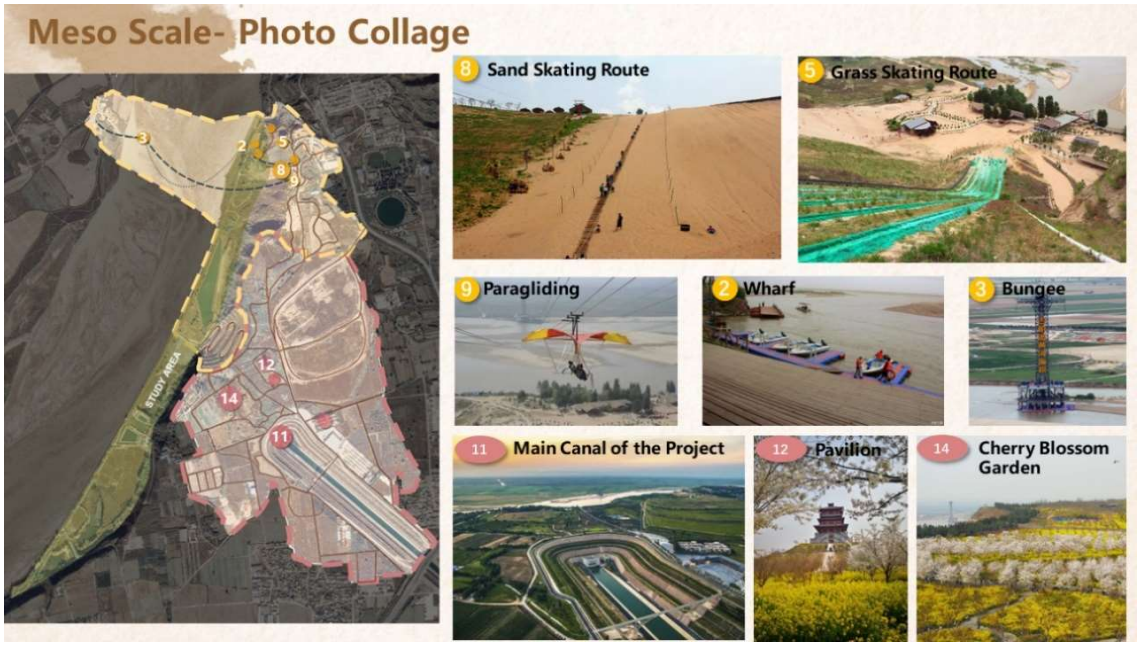

Figure 3-4. Scenic Area Photo Collage

3.2.3 Traffic Analysis

（1）Road System Outside Scenic Area

The external traffic of the scenic spot can be divided into four levels, including one national road: S312, the Yellow River Expressway, two provincial roads: Cherry Blossom Avenue Y140 and S314, many main roads for traffic, and several pedestrian paths. Therefore, the scenic spot is very convenient for visitors who come by car. There are 4 parking lots near the entrance of the two scenic spots, two in the Feihuang scenic spot and one in Fengle cherry blossom garden scenic spot. In terms of public transportation, there are two bus lines directly to the scenic

spot, namely Tour 1 and Xingyang Tour 1. There are five bus stops at the closest locations of the two scenic spots, all located on the east side of the scenic spot, to meet the tourists coming from different directions.

（2） Road System Inside Scenic Area

Within the Gubaidu Flying Yellow River Scenic Area, the main way of access is on foot. The scenic part of the east bank of the Yellow River can be reached on foot, and if you want to reach the other side of the river, you can choose to take a boat or participate in the Yellow River Flying Rope project, and glide through the ropeway to the other side. At the same time, due to the special geomorphology of the yellow hills and gullies on the east bank of the Yellow River, you can choose to participate in special projects: sand skiing or grass skiing, in addition to walking from the slope to the slope.

There are two ways to go sightseeing in the Fengle Cherry Blossom Garden scenic area. One is walking, you can walk among the cherry blossoms and close contact with the sea of flowers. Another is to take the sightseeing tour bus, the tour bus line is circular, the starting point is the entrance of the gate, the north of the South-North Water Diversion Canal, around the cherry blossom building pavilion a circle, the distance is not too long. （Figure 3-5）

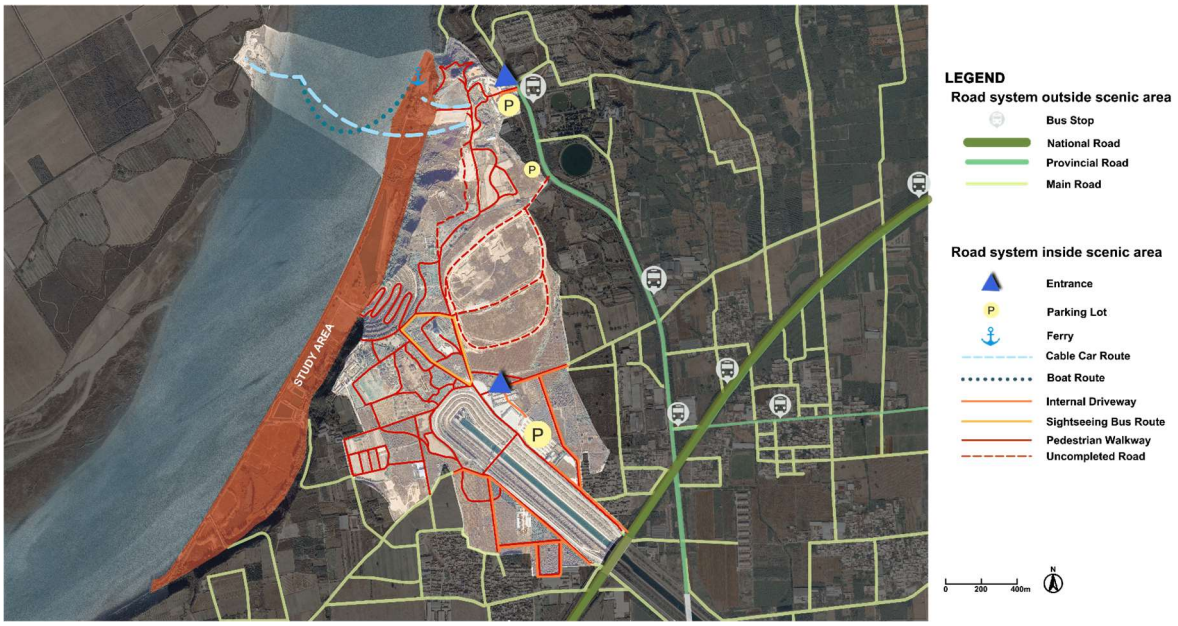

Figure 3-5. Road System Analysis

3.2.4 Topography and Landforms

（1） Loess hills and gullies landform

As the location of this scenic spot belongs to the typical loess hilly gully area, a brief introduction to this particular landform is given. The landform can be divided into four

categories: loess tableland, loess ridge, loess hill, and loess gully.

a. Loess Tableland

Loess tableland is also called loess platform, its top surface is flat and wide, and the edge is inclined 3-5°, surrounded by deep valleys, representing the highest accumulation surface of loess. Loess tableland can be divided into platform loess and broken loess, platform loess refers to the loess developed in the faulted basin; broken loess represents the loess formed by the high terrace of the river, this kind of loess has been divided by the later development of the valley. （Figure 3-6）

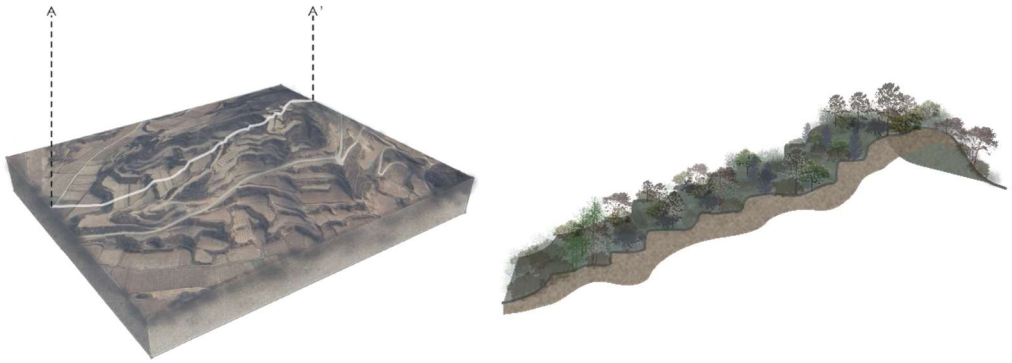

Figure 3-6. Illustrations of Loess Tableland

b. Loess Ridge

Loess ridge is a long strip of loess hilly area. The ridge top tilt of 3-5 ° to 8-10 ° is an inclined ridge, the ridge top flat is a flat ridge, mound and saddle-shaped alternating distribution of the ridge is called mount ridge. Flat ridges are mostly distributed in the periphery of the loess plateau, which is generated by the division of loess tableland into gullies and valleys, also known as broken loess. The ridges are wide and thick, and the length can reach several kilometers to tens of kilometers. （Figure 3-7）

Figure 3-7. Illustrations of Loess Ridge

c. Loess Hill

A Loess hill is a dome or bun-shaped loess mound divided by a gully. The area of the top of the hill is not large, to 3-10 ° to the surrounding slope, and gradually transitions to the slope of 15-35 °. Several hills roughly arranged in a line is a continuous hill, a single hill is called an isolated hill. （Figure 3-8）

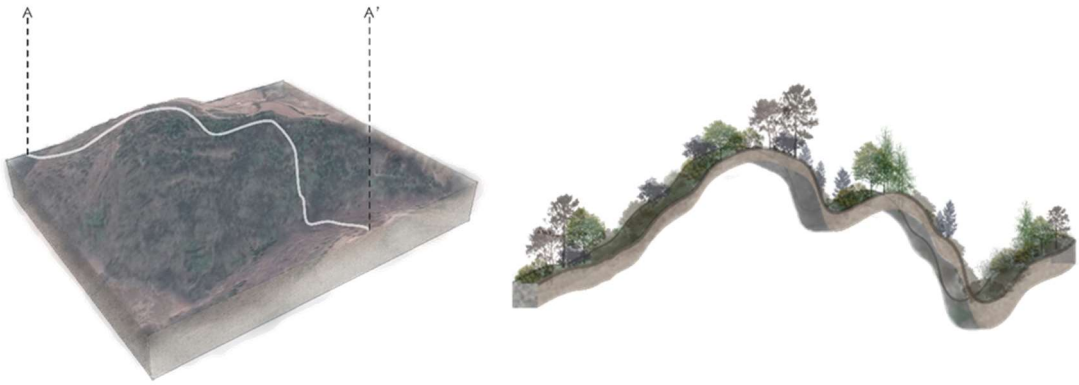

Figure 3-8. Illustrations of Loess Hill

d. Loess Gully

Loess gullies can be divided into two types of landforms: loess gully slopes and valleys. Among them, the gully slope is complex, according to the light classification, it can be divided into the shady slope and sunny slope; according to the slope classification, it can be divided into the gentle slope (0-45°), steep slope (46-75°), and steep can (above 75°), the steeper the slope, the worse the habitat condition. （Figure 3-9）

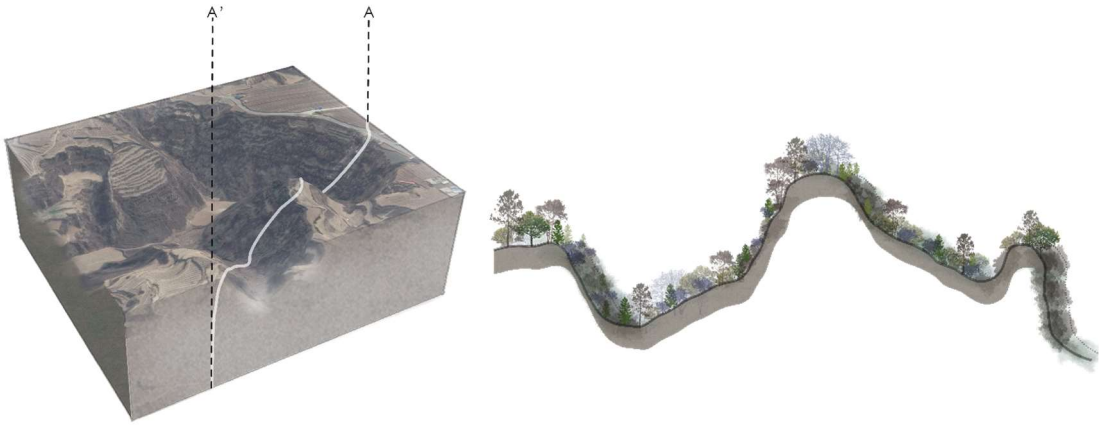

Figure 3-9. Illustrations of Loess Gully

（2）Mesoscale Regional Landforms

According to the above classification description of landform types, the study area and the

surrounding scenic landforms cover three major categories of them. On the whole, the study area and its surrounding steep slopes belong to loess gully landforms. The hills on the north side of the study area belong to loess hill, and the central pedestrian downslope area and the undeveloped cherry blossom town area of the cherry blossom garden scenic spot belong to loess tableland. （Figure 3-10）

Figure 3-10. Loess Gullies, Loess Hills, Loess Tablelands in Study Area

（4） Mesoscale Regional Topography

The scale area as a whole shows the characteristics of high west and low east valley depth. The study area is defined in the western loess gully valley bottom, excluding the water surface, with the lowest point elevation of 101 m and the highest point elevation of 210 m. The terrain in the study area is relatively flat, but the maximum drop of its surrounding steep slopes is 110 meters. （Figure 3-11）

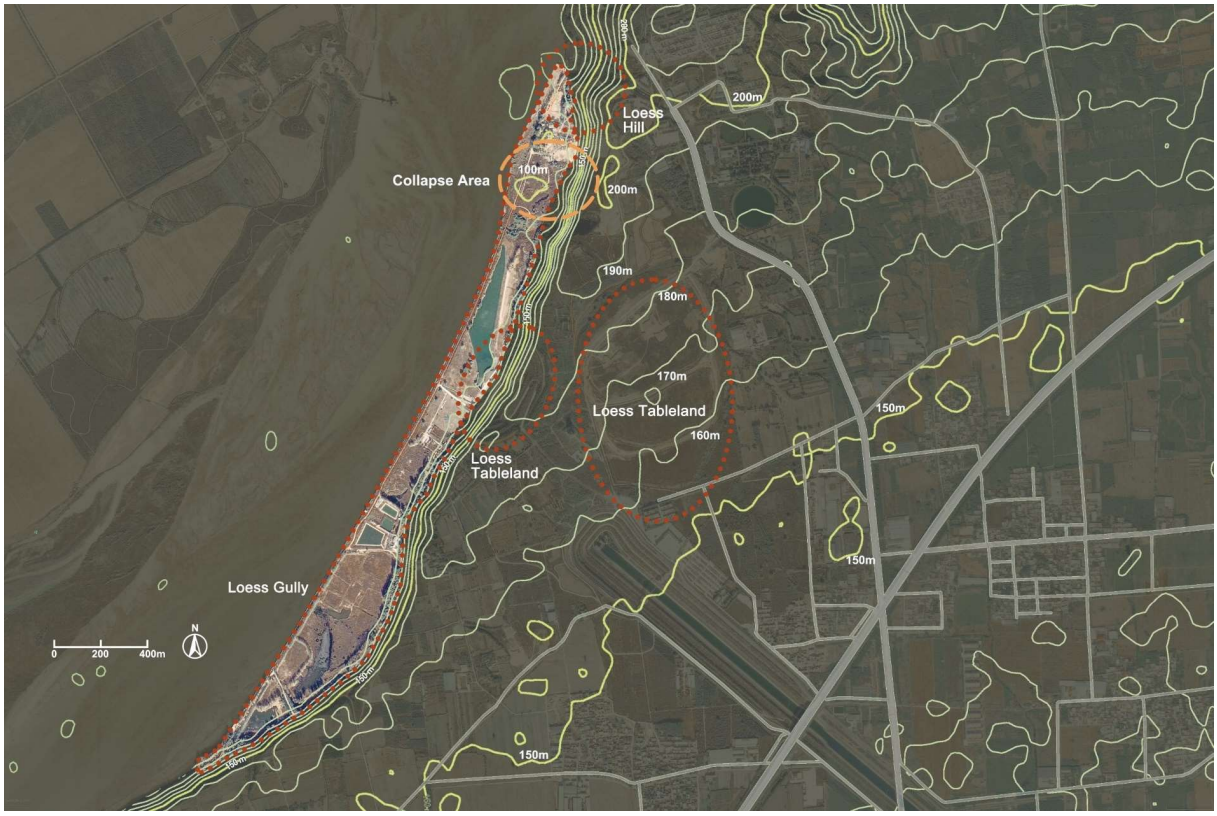

Figure 3-11. Mesoscale Terrain Analysis

(5) Collapse Conditions

There was a collapse near the Flying Yellow River Scenic Area in 2014. The spit that came down from the collapse formed a small peninsula on the banks of the Yellow River, and in recent years the soil that had accumulated on the banks has gradually diminished as the water from the Yellow River washes away. The hillsides exposed as a result of the collapse have also gradually been covered with new vegetation. The terrain on the west bank of the Yellow River is flatter and is dominated by large areas of agricultural land. （Figure 3-12）

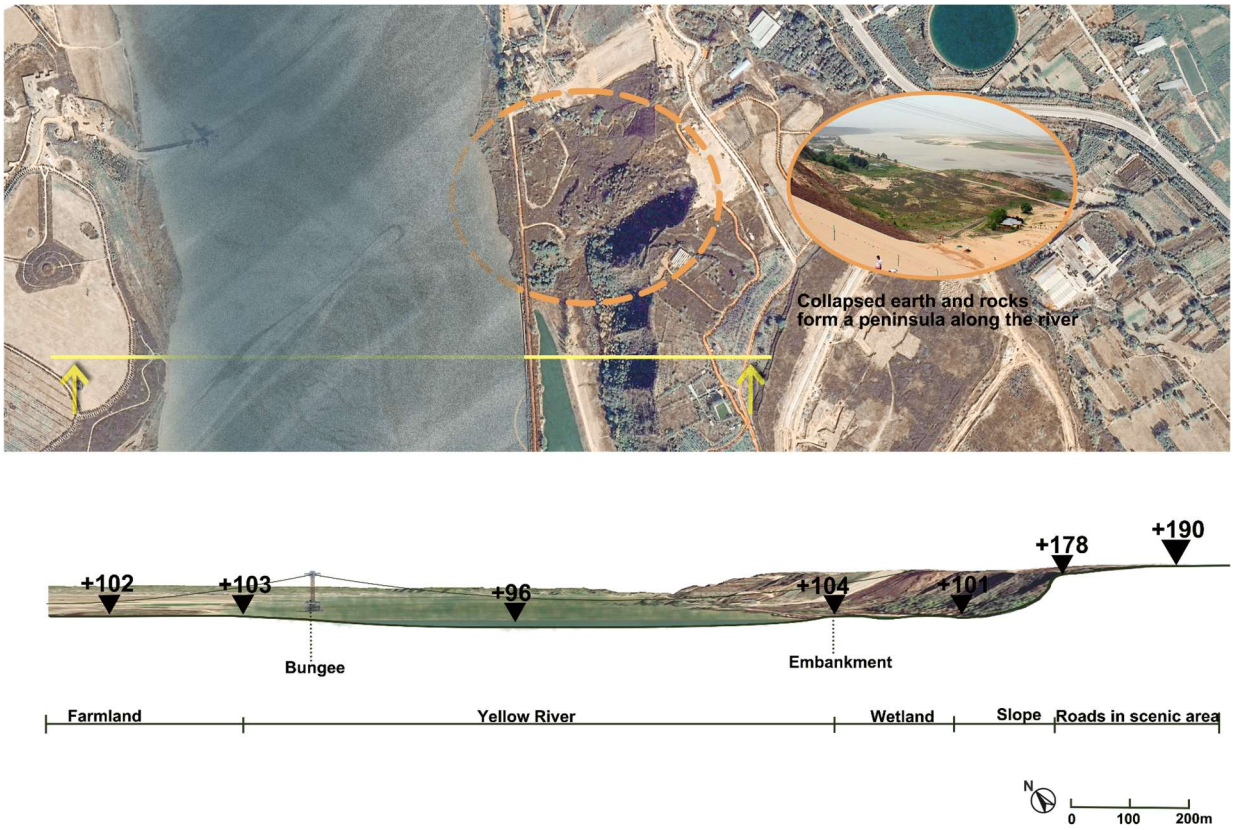

Figure 3-12. Cross River Section and Collapse Condition

3.3 Micro Scale

The small-scale analysis will focus on the study area itself. The study area is a 74-ha strip of riverside with an average width of 200 m and a total length of 3.4 km.

3.3.1 Functional Analysis

The current functions of the study area are relatively simple. The part currently in use is the northern part that overlaps with the scenic area, and the main functions are the scenic experience projects and the collapse area. The part outside the scenic area is mostly barren land, with a small part of the lagoon near the landslide area, which is a subsidiary of the South-

North Water Diversion Project through the Yellow River. There is a natural wetland area in the southernmost part of the study area. In addition, there are three former artificial fish ponds and several small buildings within the study area. The study area is partially bounded by a small patch of forest. （Figure 3-13）

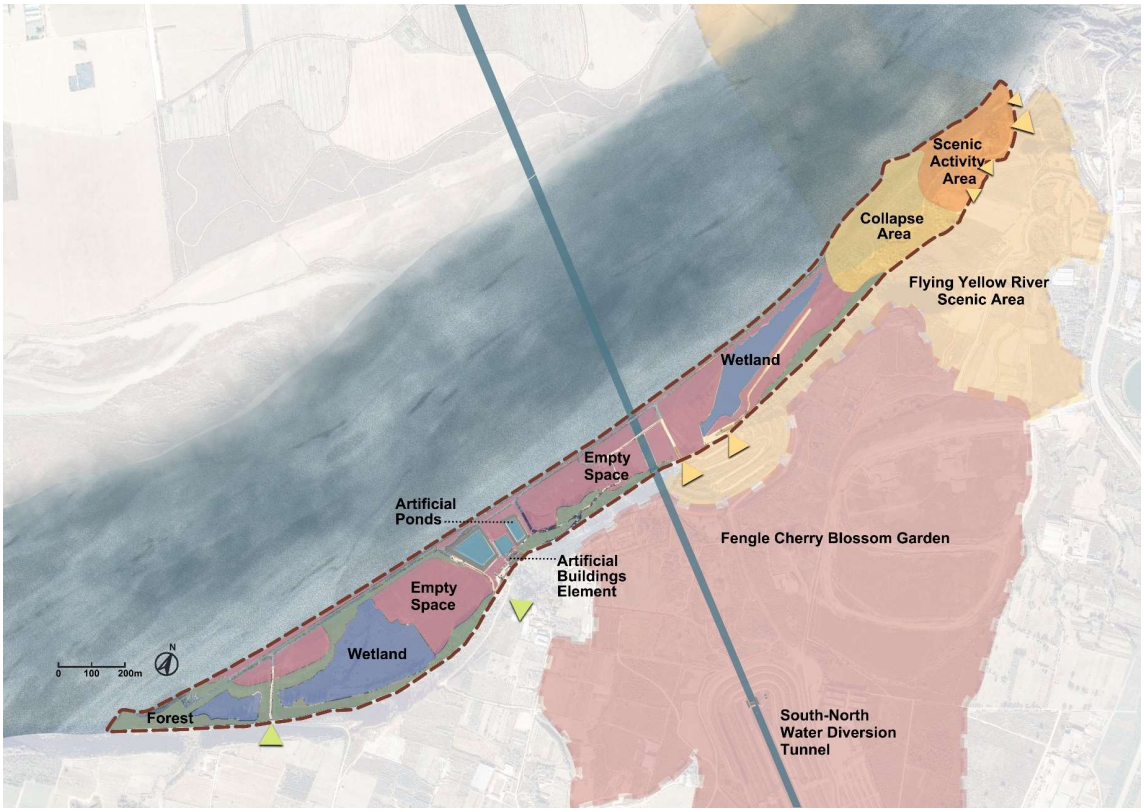

Figure 3-13. Functional Analysis

3.3.2 Traffic System Analysis

Six entrances can be used to enter the study area, with four located within the scenic area and two located outside. However, the entrances outside the scenic area are not open to the public. One can only use the entrances within the scenic area to enter the study area.

The road system within the study area is relatively simple, consisting of two levels. The main road runs along the Yellow River from north to south, with a width of six meters, and is suitable for vehicular traffic. However, currently, only vehicles managed by the scenic area for emergencies or maintenance are allowed to use it, while it is only open to pedestrians for all other situations. The main road is paved with concrete. The secondary roads are narrower than six meters, with varying widths, and have not undergone any artificial repairs. These roads

can only be used by pedestrians, and there are many dead ends. （Figure 3-14）

Figure 3-14. Traffic System Analysis

3.3.3 Topography Analysis

The study area is bordered by steeply sloping areas of loess hills and gullies, but the topography of the study area is relatively flat and without major undulations. The highest point in the study area is within the scenic area at an elevation of 153m, and the lowest point is at 102m which is near the lagoon. （Figure 3-15）

I made 4 sections in different directions to show the study area and its surrounding topography.

Section A is a cross-section of the sand slide, with the orientation looking north, showing the topography within the scenic area.

Section B is a cross-section of the collapse area, looking in a south direction, showing the topography of the collapse area. （Figure 3-16）

Section C is a cross-section of the artificial tableland, with the orientation looking north, showing the topography of this slope and lagoon below.

Section D is a cross-section of the wetland area, looking in a south direction, showing the topography of the unused area and wetland below. （Figure 3-17）

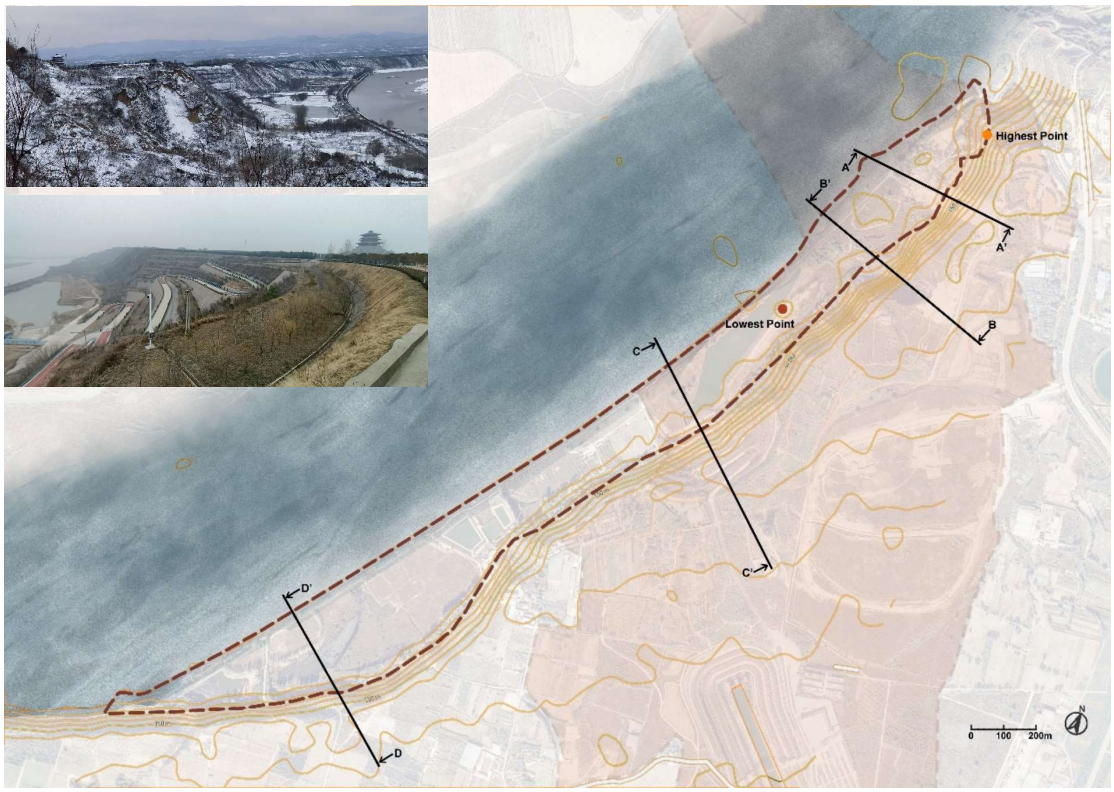

Figure 3-15. Topography Analysis

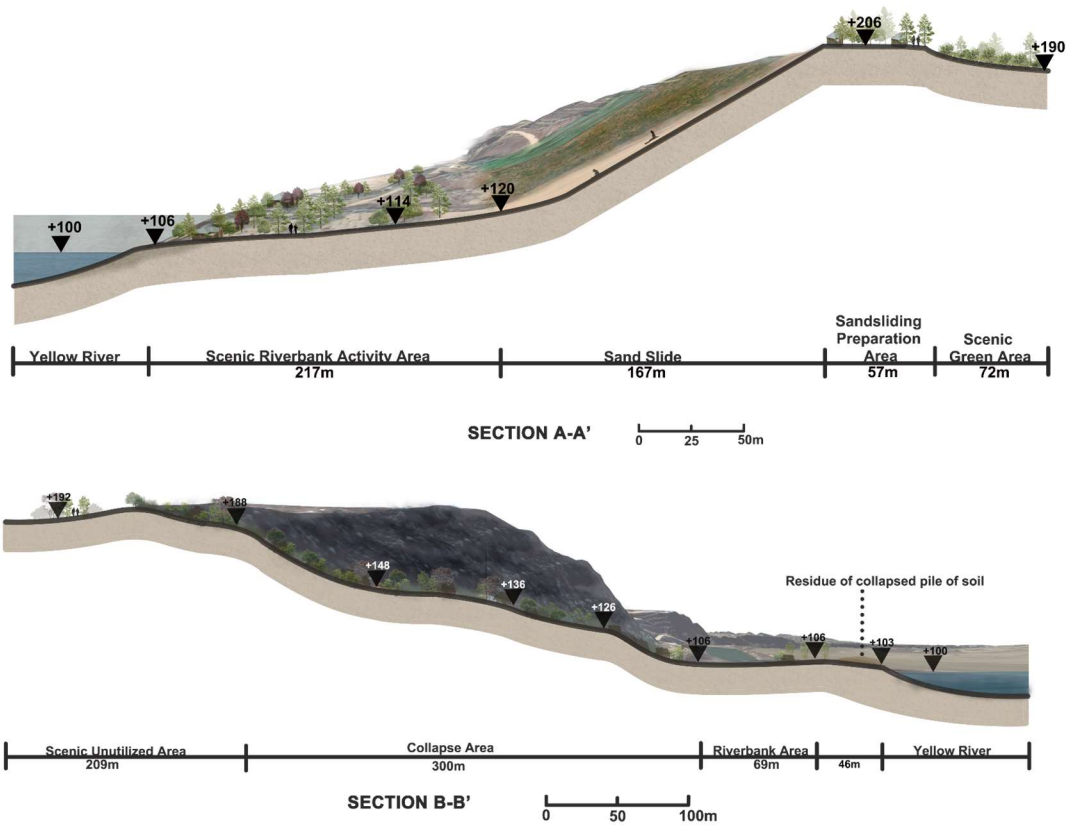

Figure 3-16. Section A&B

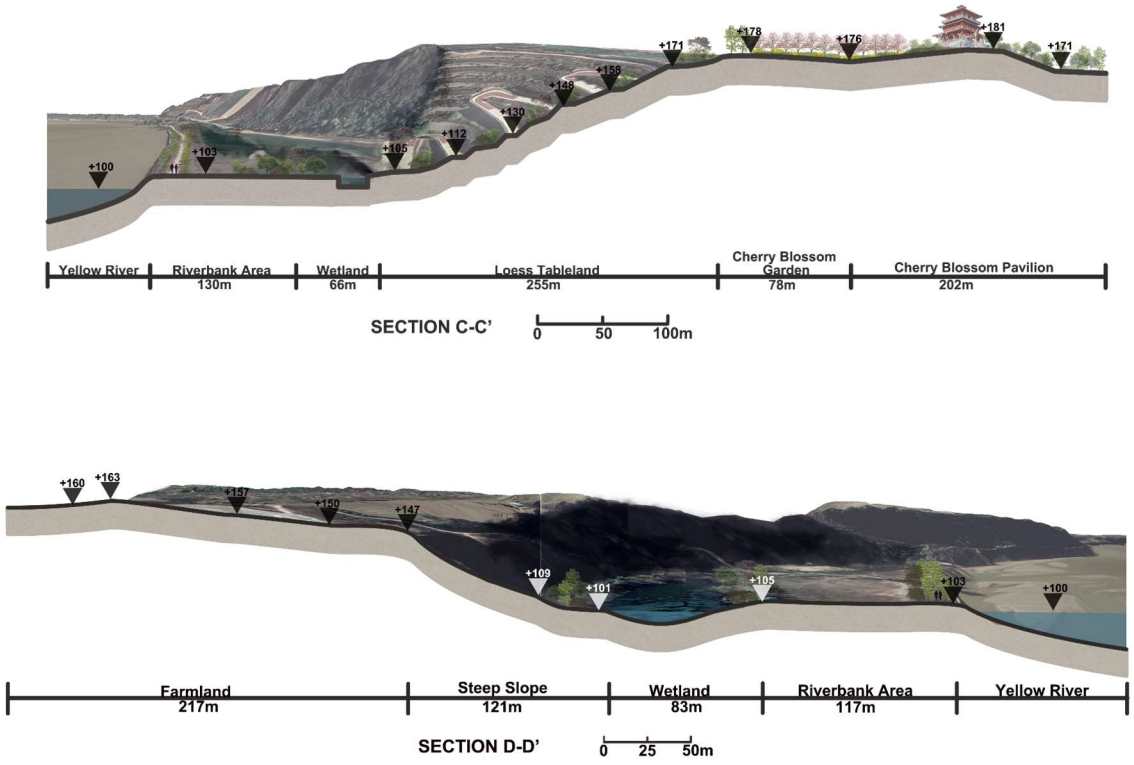

Figure 3-17. Section C&D

3.3.4 Plant Analysis

I divided the current vegetation in the study area into four categories: plants inside the scenic area, plants outside the scenic area, wetland plants, and bare ground. Of these, plants inside and outside the scenic area are further divided into trees, shrubs, and herbs.

Here are plants inside the scenic area.

Trees are Prunus cerasifera, Populus tomentosa 'Atropurpurea', Robinia pseudoacacia, Prunus subg., Cerasus sp., Salix matsudana, Ulmus pumila. Shrubs are Ailanthus altissima, Tamarix chinensis, Vitex negundo. Herbs are Ziziphus jujuba var. spinosa, Digitaria sanguinalis, Humulus scandens, Ipomoea nil, Setaria viridis. Half of them are native plants.

Here are plants outside the scenic area.

Trees are Populus tomentosa, Paulownia elongate, Robinia pseudoacacia, Quercus variabilis, Salix matsudana, Ulmus pumila. Shrubs are Ailanthus altissima, Tamarix chinensis, Ziziphus jujuba var. spinosa, Vitex negundo var. heterophylla. Herbs are Digitaria sanguinalis, Humulus scandens, Artemisia carvifolia, Setaria viridis, Eleusine indica, Xanthium strumarium, Chrysanthemum indicum, Chenopodium album. Most of them are native plants.

Here are wetland plants: Ceratophyllum demersum, Myriophyllum verticillatum, Chenopodium album, Setaria viridis, Typha orientalis, Phragmites australis, Calamagrostis pseudophragmites, Tamarix chinensis. In addition, two plants deserve special mention: Cynanchum riparium, and Corispermum huanghoense, which are endemic to the Yellow River. （Figure 3-18, 3-19）

Figure 3-18. Plants Inside Scenic Area& Wetland Plants

Figure 3-19. Plants Outside Scenic Area

3.4 Summary

3.4.1 Values

Regarding the analysis of the study area in three dimensions, I have summarized four major values: historical and cultural value, landscape value, wildlife resource value, and visual value.

Regarding the historical and cultural value, the study area has a rich historical heritage, which has been described in detail in the mesoscale scenic area introduction and will not be repeated here.

I have subdivided the landscape value into four categories: river landscape, artificial landscape, plantscape, and wetland landscape. The river landscape is distributed throughout the study area from north to south. The artificial landscape is concentrated in the study area's northern and central scenic areas, as well as the ground part of the South-to-North Water Diversion Project. The plantscape is concentrated in the collapse area and the natural wetland area in the south. The wetland landscape is mainly concentrated around the lagoon and in the southern part.

As for the wildlife resource value, I have divided it into bird resources and fish resources. The study area is located at the midline of three bird migration routes in China, and the complex terrain attracts a large number of wintering and migratory birds. Its wetland resources are important wintering and resting places for migratory birds. The winter migratory birds of Zhengzhou Yellow River Wetland are mainly Anatidae, Scolopacidae sp., Gruidae, Ardeidae, and Otididae. National Grade I protected birds include Otis tarda, Ciconia nigra, and Grus monacha. National Grade II protected birds include Grus grus, Grus vipio, Platalea leucorodia, Cygnus cygnus, Cygnus columbianus, etc.

The Zhengzhou section of the Yellow River has a good ecological environment and rich fish resources. The main species are Cyprinus carpio, Triplophysasiluroides, Pseudobagrus ussuriensis, Pelteobaggrus nitidus, Squaliobarbus curriculus, Paramisgurnus dabryanus, Parabramis pekinensis, Rhinogobio nasutus, etc., among which the species of Triplophysasiluroides, Pseudobagrus ussuriensis and Squaliobarbus curriculus have high economic value.

For visual value, I screened some points with beautiful scenery and also relatively well-located and functional in the study area. （Figure 3-20）

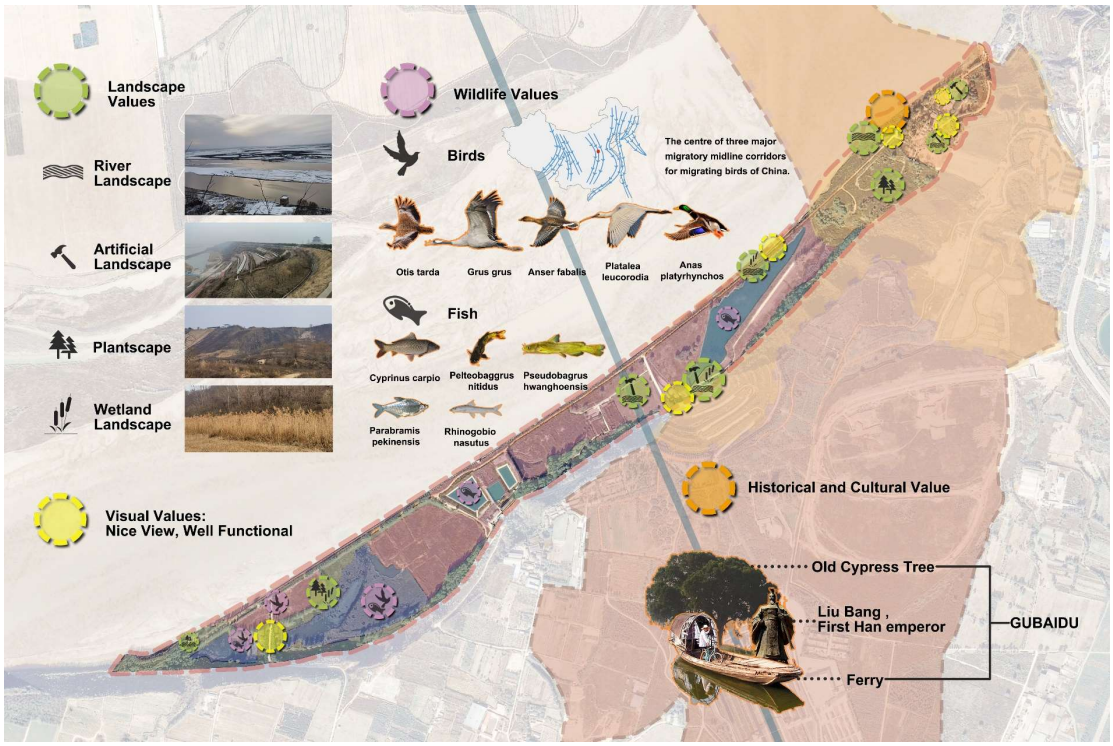

Figure 3-20. Values

3.4.2 Conflicts

I have summarized some conflicts based on the above analysis of all aspects of the study area. In terms of function, the collapsed area has not been repaired or rebuilt so far; there is a large area of land outside the scenic area that is not properly utilized and does not have any value; there are some abandoned man-made buildings in the study area that are not in harmony with the surrounding environment. In terms of transportation, it is unreasonable that the study area can only be accessed from within the scenic area; in terms of the road system, the study area is currently confused with a lot of broken roads. In terms of ecology, the natural wetlands in the study area are scattered, and the ecological benefits are not maximized due to the lack of systematic planning. And the vegetation in the study area is sparse and monotonous,

depressed in winter, and lacking evergreen plants. （Figure 3-21）

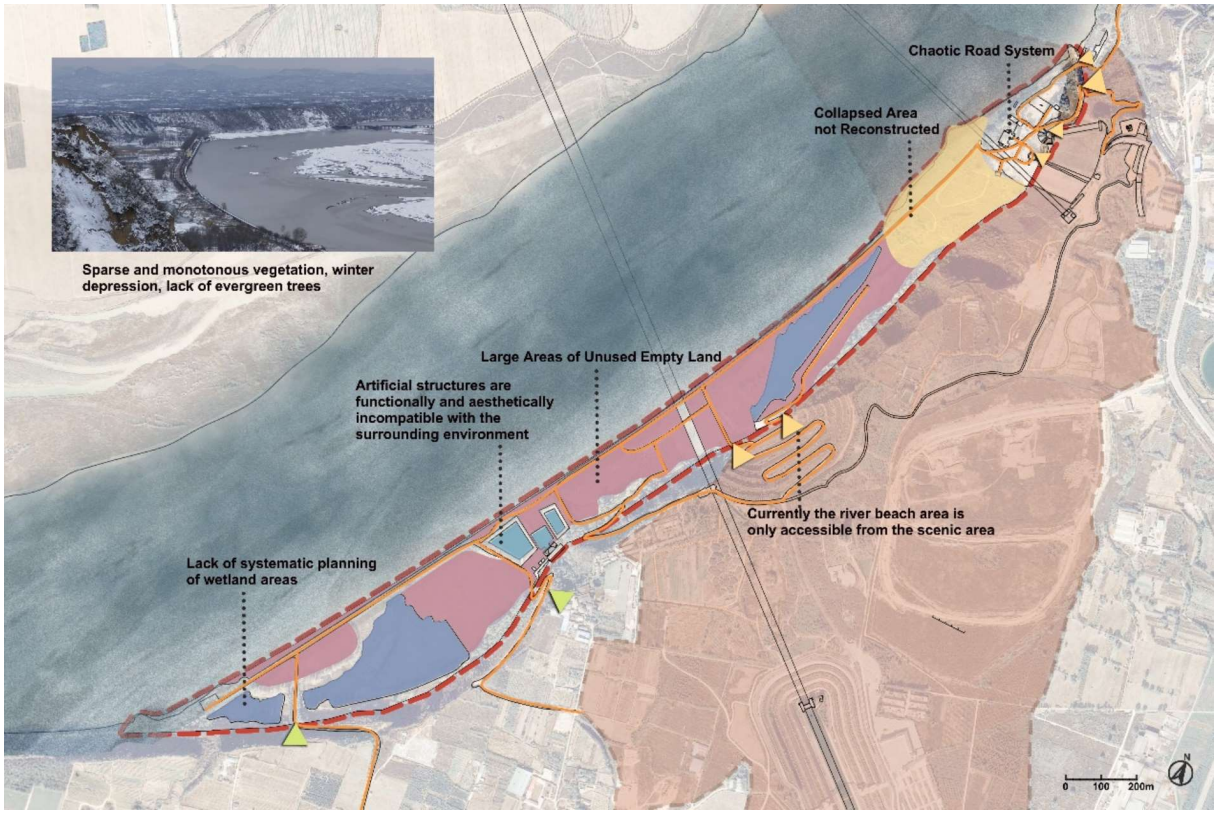

Figure 3-21. Conflicts

4 Systematic Planning

4.1 Strategies

4.1.1 Overall Strategies

(1) Activity Intensity Strategy

To achieve the study goals and to achieve the purpose of ecological restoration of the study area, I divided the study area into three parts concerning the intensity of crowd activity. The first part is the area overlapping with the scenic area in the north. I will retain the current function as a scenic activity program, and this area will be the main gathering area for future visitors. The second part is from the northern part of the lagoon up to the current artificial fish pond. I will use this area as a transition area to the ecological reserve. In this area, tourist activities will be reduced and the functions will be mainly resting, viewing, and science education. The third part is the natural wetland part in the south of the study area. I set this area as a core ecological reserve. In this area, human activities will be reduced to a minimum, and the main function will be the restoration and protection of natural wetlands.

(2) Functional Strategies

Based on the activity intensity strategy, the three major areas were further divided into functionalities.

The first part was further divided into the scenic spot project area and the social entertainment area. The main strategy for the scenic project area is to renovate and maintain it. The main strategy for the social recreation area, i.e., the original collapsed area, is restoration and redesign.

The second part is further divided into a water tour area, an open lawn area, a dense forest landscape area, and a wetland science education area.

The third part will be further divided into dense forest landscape area and wetland ecological protection area. （Figure 4-1）

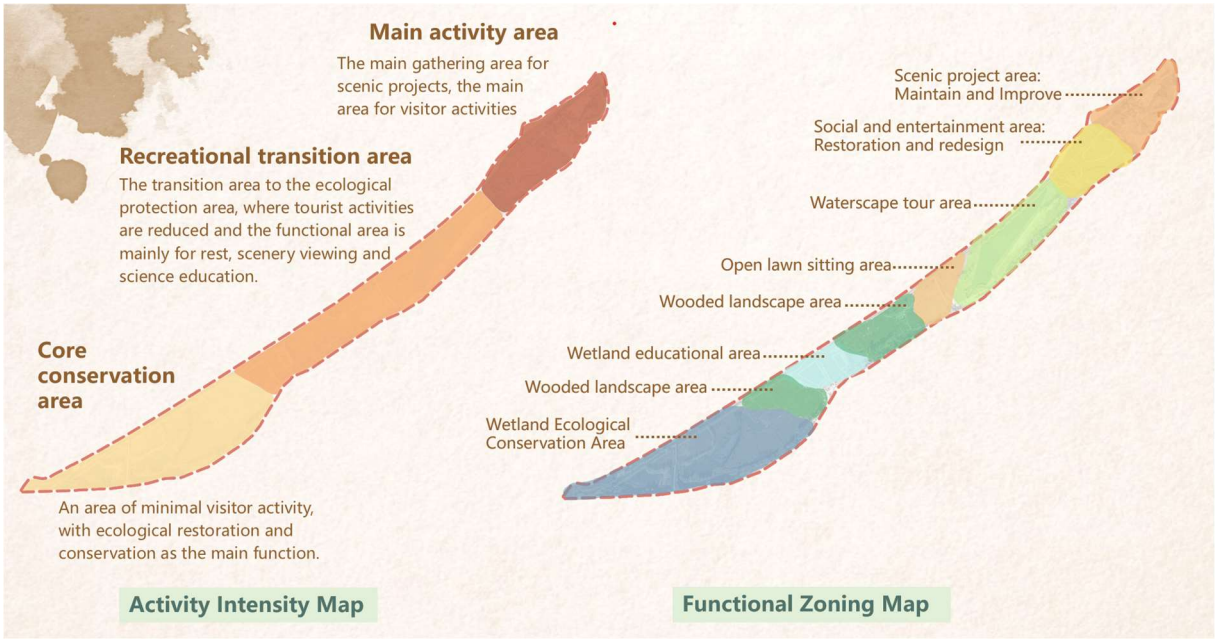

Figure 4-1. Overall Strategies

4.1.2 Ecological Strategies

The ecological strategy will include a planning strategy for water bodies and a vegetation strategy

(1) Water Body Planning Strategies

Based on the current situation and overall strategies of the study area, I will plan four types of water bodies.

Artificial water bodies: A small area of the swimming pool will be set up near the first part of the river bank in the north to realize that visitors can both play and watch the water in summer, to pull in the distance between visitors and the Yellow River, and to enrich the scenic projects and visitors' touring experience.

Natural form lagoon: transform the original artificial barge lagoon into a natural form wetland lagoon, enrich the biodiversity, and restore the ecological environment of the study area through reasonable plant configuration on the bank and in the water.

Ecological science wetland: The original abandoned fish pond in the study area will be de-artificialized and transformed into an ecological science wetland along the original site texture.

Natural wetland: The original natural wetland water body will be rehabilitated to enhance its ecological benefits so that it can regenerate and repair itself in the future.

(2) Vegetation Planning Strategy

Based on the analysis of the current situation of vegetation, the focus is on the areas that are currently exposed without plant growth. According to the relevant reference literature, a reasonable plant configuration will be made for such areas during the planning and design. （Figure 4-2）

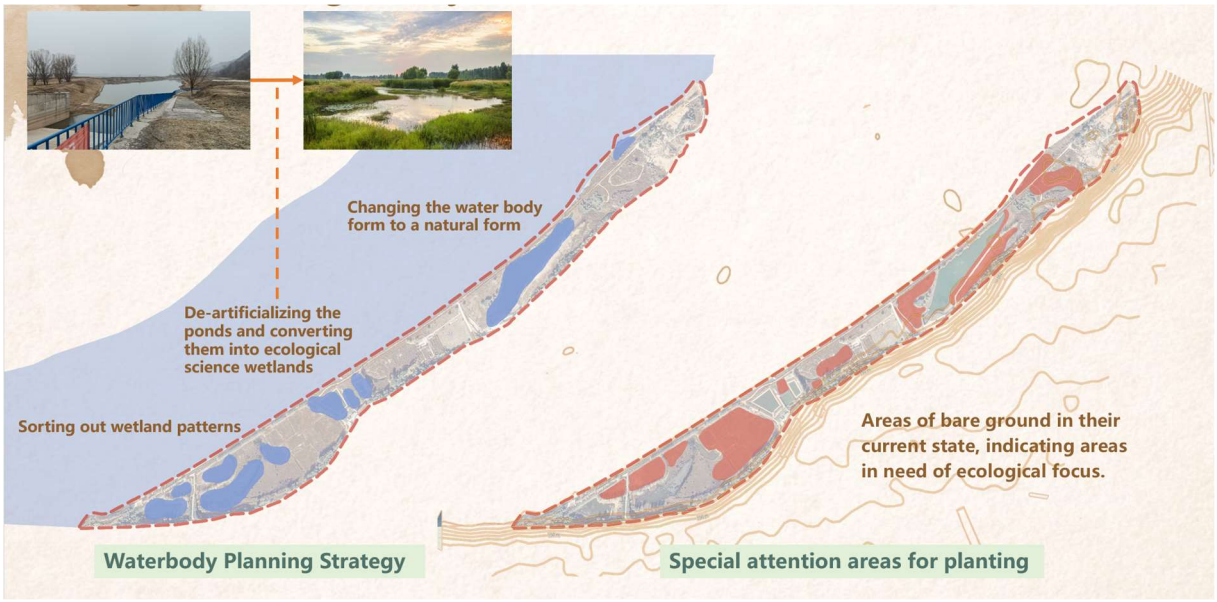

Figure 4-2. Ecological Strategies

4.1.3 Structure Strategies

The structure strategies will include a traffic system strategy and a stopping point strategy.

(1) Traffic System Strategy

As for the entrances, we plan to keep the original two entrances in the scenic area and add two new entrances outside the scenic area. The existing entrances outside the scenic area will be opened, and the relatively northern entrance will be set as the main entrance. A new motor vehicle parking lot will be set up near it.

For the road system, the original road system will be sorted out and added. The roads will be divided into two levels, keeping the main road near the Yellow River and adding a new main road near the slope to form a ring road with the original main road. Secondary roads are arranged by the crowd activity strategy, the most dense in the north and the most sparse in the south. The main road allows bicycle traffic, emergency motorized traffic, and pedestrian traffic. Only pedestrian traffic is allowed on the secondary roads.

(2) Stopping Point Strategy

The site is divided into four categories: recreation, relaxation, water, and vegetation. （Figure 4-3）

Figure 4-3. Structure Strategies

4.2 Case Studies

I choose the Weiliu Wetland Park designed by Yifang Ecoscape Studio as a case study and get some inspiration from it.

4.2.1 Existing Conditions and Issues

Wei River is the biggest tributary of the Yellow River and the “mother river” of both Xi’an and Xianyang City. But as the urbanization progress of these two cities, the once natural riparian areas of Wei River have gradually been replaced by concrete dykes and decorative greenery

planting. The constant degradation of the wild riverside landscape has also contributed to the loss of the sense of belonging, for the people who have lived in this rural area for generations. Weiliu Wetland Park was constructed on a section of Wei River's riparian zone outside of Xianyang City, which was one of the few naturally flooded river sections that remained. It is approximately 3200m long and 470m wide, with a total area of 125ha.

The project site had several major issues: The floodplain of the Wei River immediately upstream had been replaced by engineered concrete dykes, which put more flood pressure on the site. The adjacent area downstream had also been urbanized but with decorative planting, causing a major loss of local habitat and biodiversity. There were several roughly dug ditches across the site carrying stormwater run-off (and sometimes leaked sewage) from the city to the river, which has polluted not only the river itself but also the riparian aquatic environment (local sampling showed riparian water quality worse than Class V of the National Surface Water Standards). （Figure 4-4）

Figure 4-4. Existing Conditions and Issues

4.2.2 Overall Strategies

To solve the issues described above, the project's comprehensive restoration and reconstruction of the local riparian ecosystem was the main goal. A plan was developed to create urban Green Infrastructure through a series of strategies including adaptive flood control, stormwater management, water quality improvement, wastewater reuse, and biodiversity restoration, which would transform the site into an urban park that provides multiple values on the environment and people. （Figure 4-5）

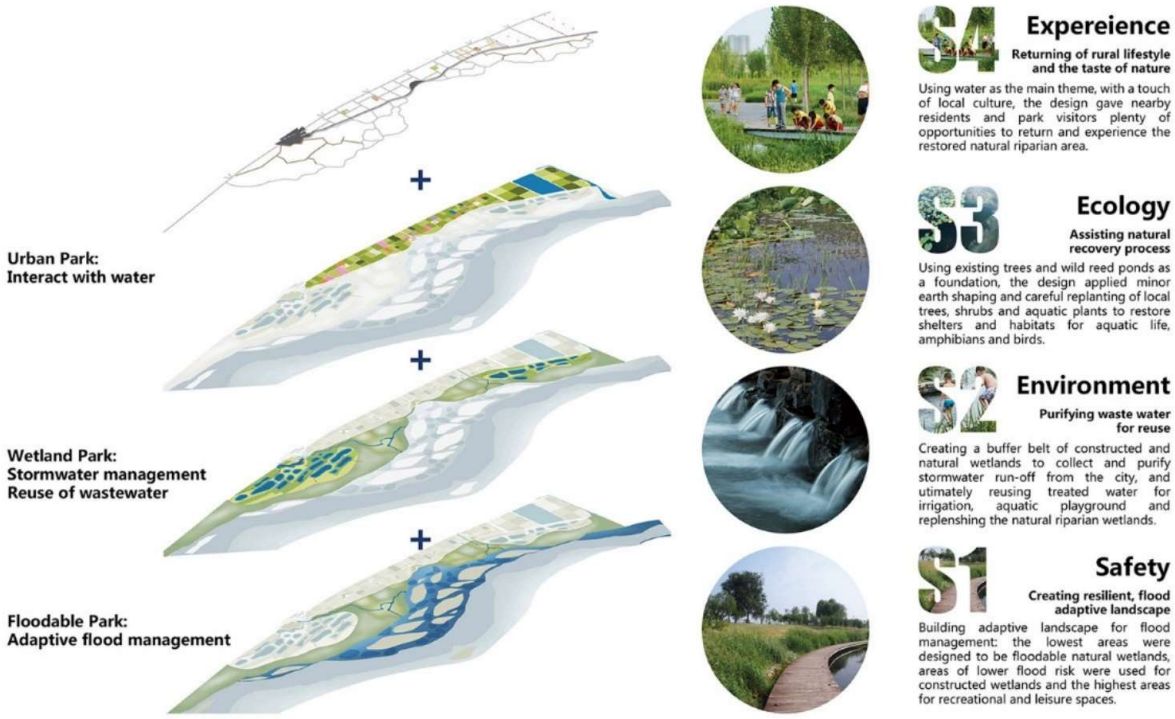

Figure 4-5. Strategies

Wei River has also suffered from increasing pressure from flooding, which is the project's priority. To restore the resilience of flood retention and utilize riparian spaces, an adaptive landscape was created based on the existing topography: the lowest areas were designed to be floodable natural wetlands, areas of lower flood risk were used for constructed wetlands, and the highest areas on site were designated for recreational and leisure spaces. Bioengineering techniques were used on all flood control dykes inside the park except the outer dyke along the northern boundary (designed for one-hundred-year flood events). Techniques such as willow mattress revetment, riprap, gabions, and grassed slopes were used for flood protection, biodiversity restoration, and habitat protection. （Figure 4-6）

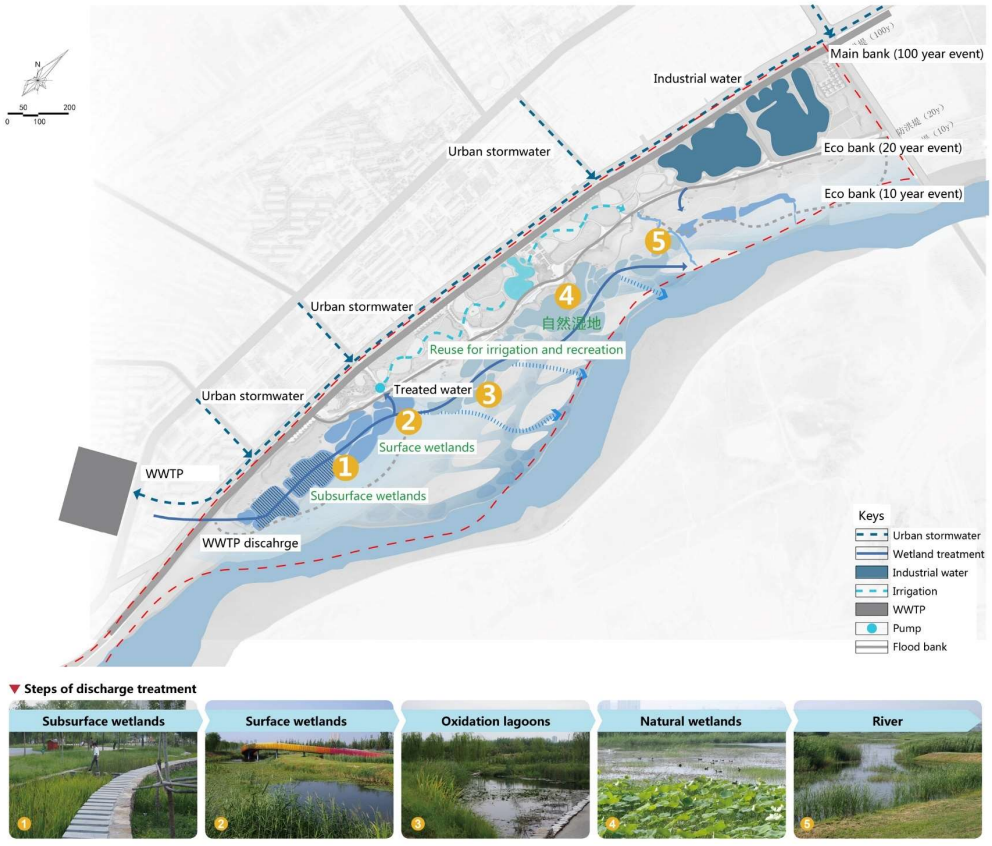

Figure 4-6. Water Management Map

In terms of ecological restoration of the site, the key to a successful habitat restoration is utilizing nature's regenerative power. After removing most of the ongoing human disturbances such as rubbish dumping and sand dredging, the project set its goal on recreating a diverse local habitat. Using existing trees and wild reed ponds as a foundation, the design applied minor earth shaping and careful replanting of local trees, shrubs, and aquatic plants to restore shelters and habitats for aquatic life, amphibians, and birds. （Figure 4-7）

Figure 4-7. Master Plan of Weiliu Wetland Park

4.2.3 Inspirations

The site has a similar scale to the study area and faces similar ecological problems in some aspects, such as the severe degradation of the natural habitat system of the river, and both are exposed to flood risks. In the design process of this case, I summarized the following inspirations:

(1) Summarize and classify the existing problems of the site, propose targeted design strategies for each type of problem, and display them in layers.

(2) Let nature do the work. A good ecological restorative design is to assist nature to restore its power and reshape the ecological wetland of the river bank through micro-topography adjustment.

(3) Different water forms have different functions. Rich water form helps biodiversity restoration.

4.3 Conceptual Plan

4.3.1 Master Plan (1:5000)

Based on the site analysis and strategies, I conducted the conceptual design.

The planned study area has four entrances, two inside the scenic area and two outside the scenic area. The parking lot for the entrances within the scenic area uses the original scenic parking lot, and for the entrances outside the scenic area, a new parking lot is set up at the one more to the north. The main path is a loop with a width of 6 meters and made of stabilized gravel, with a new part of the main path at the bottom of the slope. The secondary paths are interspersed and are made of wood with a width of 3 meters.

To enhance the connection between people and water, I have used various forms of water bodies: artificial pools, natural lagoons, science wetlands, and natural wetlands. These water bodies are spread throughout the area from north to south, which not only allows visitors to see water everywhere but also provides diverse habitats for aquatic plants and animals and helps restore the ecological environment of the site. At the same time, a variety of ways to interact with the water, such as beaches, viewing platforms, bridges, etc. The distance between visitors and the water is sometimes close and sometimes far, creating a rich touring experience.

At the same time, the combination of dense forest, lawn, tree-lined paths, wetlands, and other plant space changes to enhance the connection between human and natural landscape, and can provide a variety of migratory birds with more habitat options. （Figure 4-8）

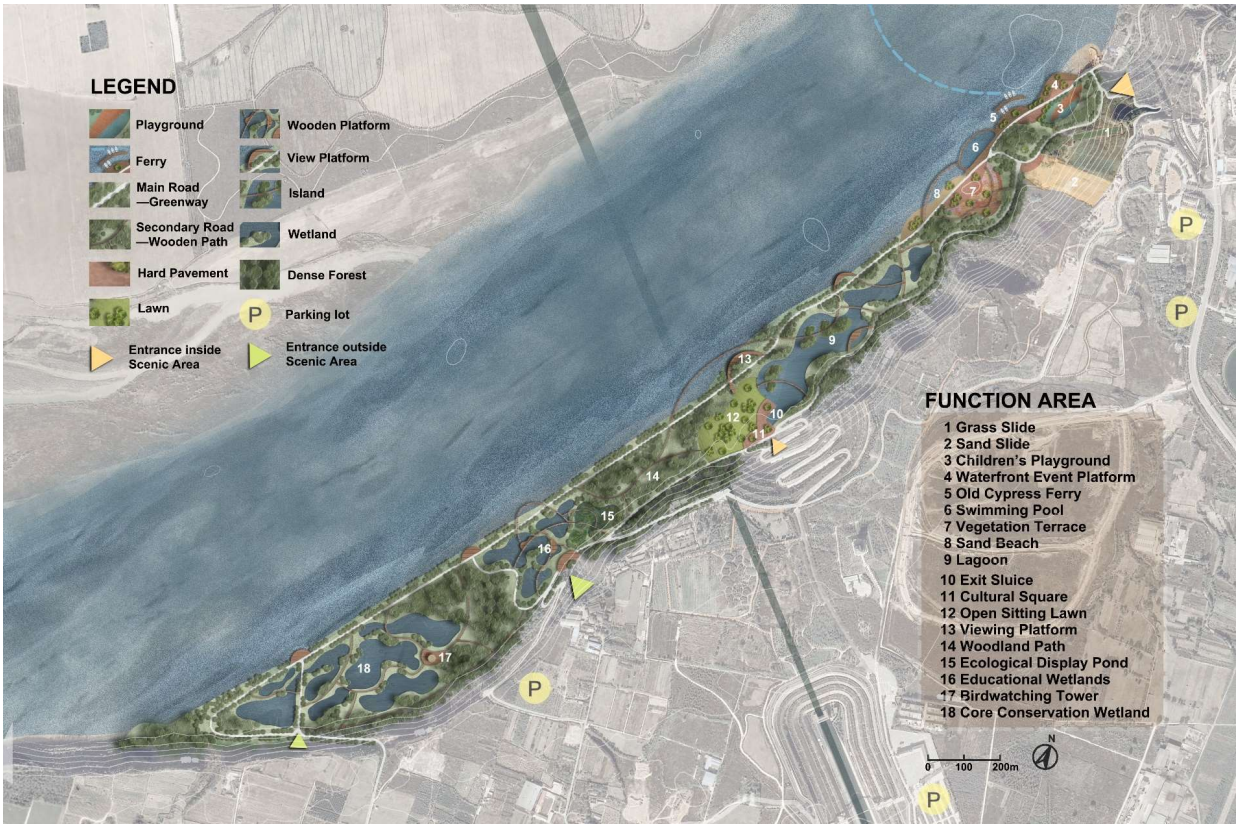

Figure 4-8. Master Plan (1:5000)

4.3.2 Ecological Plan (1:2000)

To show the function of each area and ecological measures more clearly, I enlarged the drawing to 1:2000 (based on the poster of 70cm*100cm).

The northern part of the study area is the main activity area for visitors, and the main functional areas are the children's playground, waterfront terrace plaza, old cypress ferry, sand and grass sliding field bottom platform, swimming pool, planting terrace, sandy beach, lagoon, Yellow River culture plaza, and open sitting lawn.

For different functions, I designed a variety of ecological barges to enrich visitors' waterfront tour experience. They are wooden platforms combined with ferry barges, beach barges, and viewing wooden platforms combined with natural barges and natural barges.

For the original collapse area in the study area, planting terraces are designed to stabilize the soil layer and mitigate soil erosion.

In the south of the study area, ecological restoration and science education are the main functions, and the main functional areas are forest landscape, ecological science education wetland, bird watching tower, and core protection natural wetland. In this area, the density of paths is reduced and the bird-watching tower in the core protected area is only open during part of the year. （Figure 4-9,4-10）

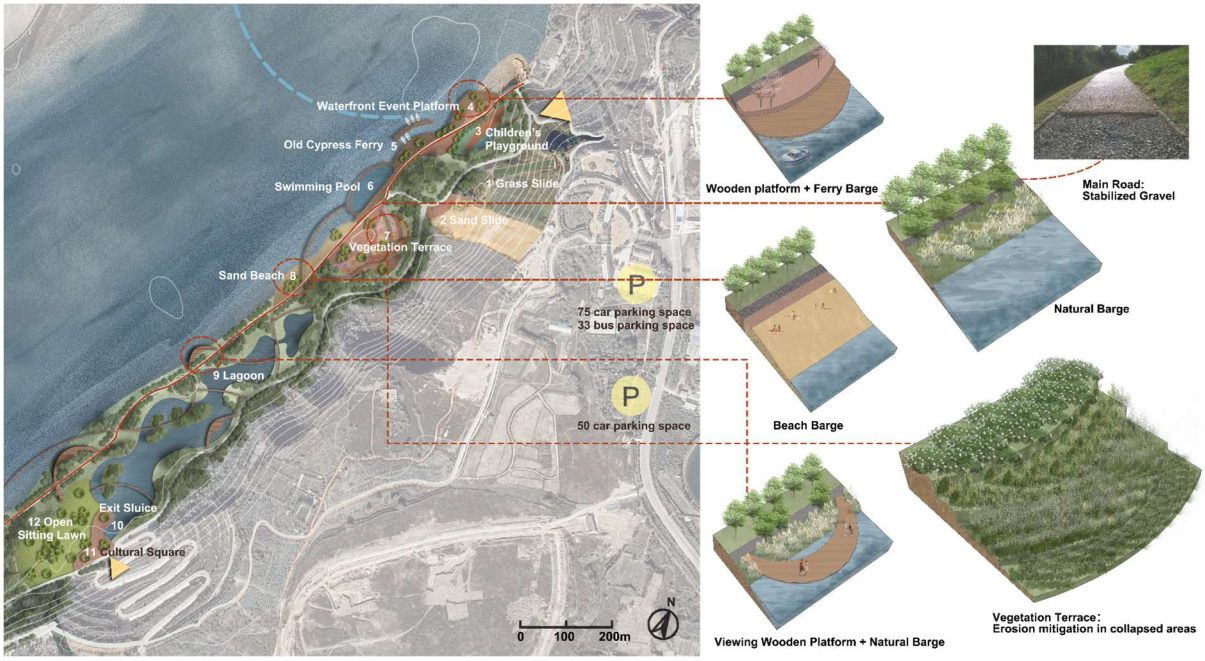

Figure 4-9. North Part Ecological Plan (1:2000)

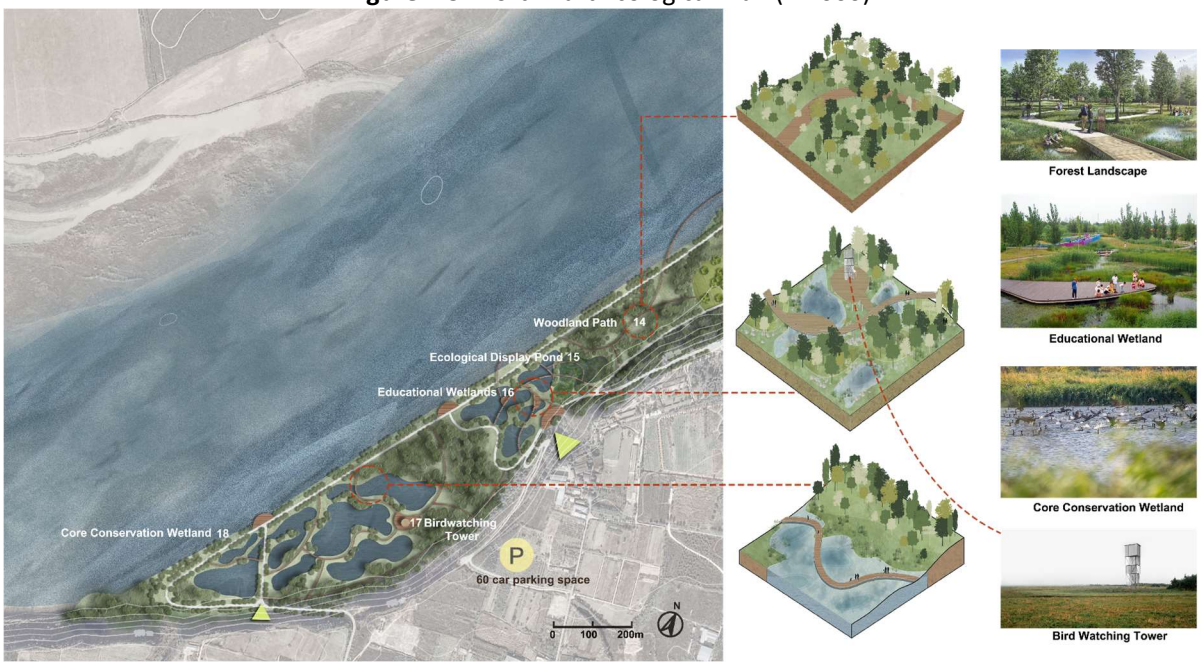

Figure 4-10. South Part Ecological Plan (1:2000)

4.3.3 Flooding Adaptive Strategies

The frequent occurrence of heavy rainfall and floods caused by climate change has become a global problem, and the flood pressure on the Yellow River has been increasing in recent years.

To restore the natural storage function of the river bank and rationalize the use of the river bank space while ensuring the flood safety of the river, the design takes advantage of the original terrain conditions to build a resilient landscape that can adapt to different flood levels.

Under the conditions of a 20-year frequency flood, the main transportation system of the park can function normally, and the beach and natural barge near the river bank will be submerged, but all the viewing platforms are above the water's surface.

Under the conditions of a 50-year frequency flood, most of the water bodies in the park will be submerged, and the main road near the Yellow River will be completely submerged except for the northern part of the lagoon and then northward. The main road near the slope, the northern visitor program area, and part of the viewing platform will be preserved.

Under the conditions of a 100-year frequency flood, most of the park would be submerged. The children's playground, sand and grass slides, plant terraces, and the main road near the slope in the northern visitor program area will be above the water. （Figure 4-11,4-12）

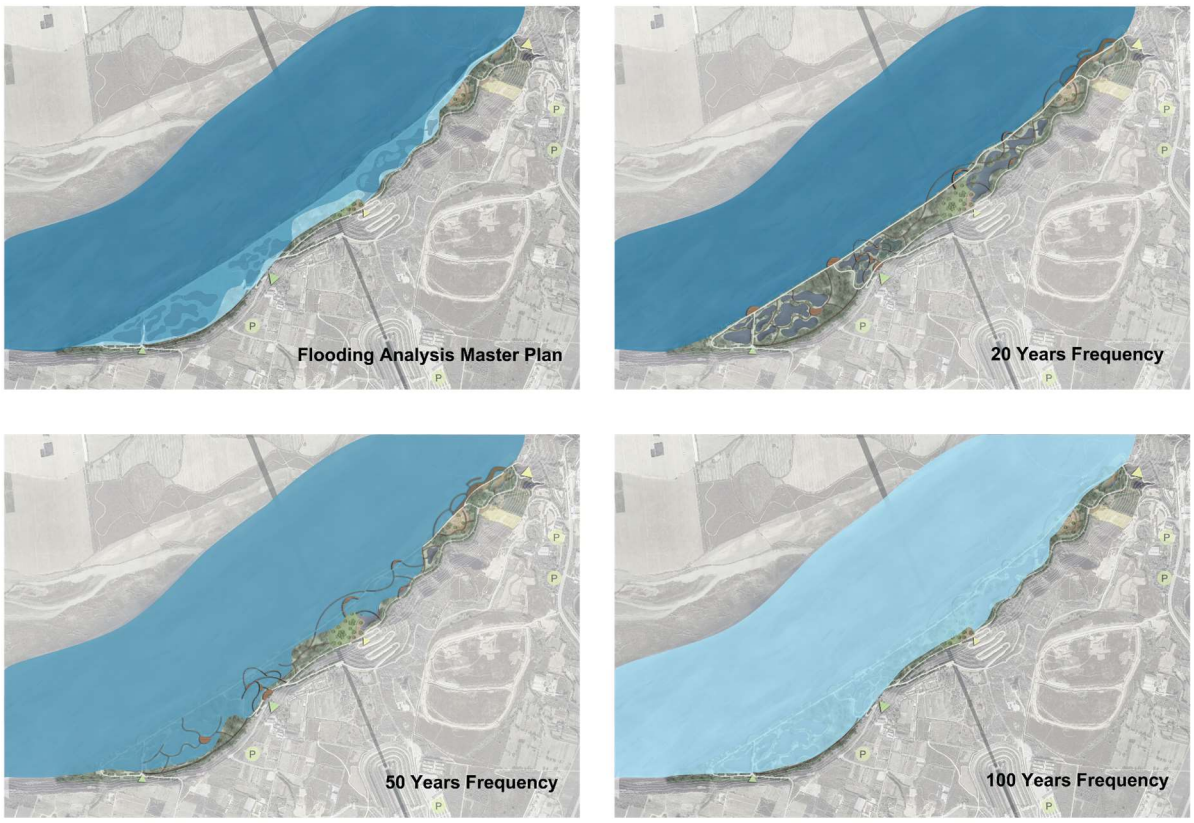

Figure 4-11. Flooding Analysis Plan

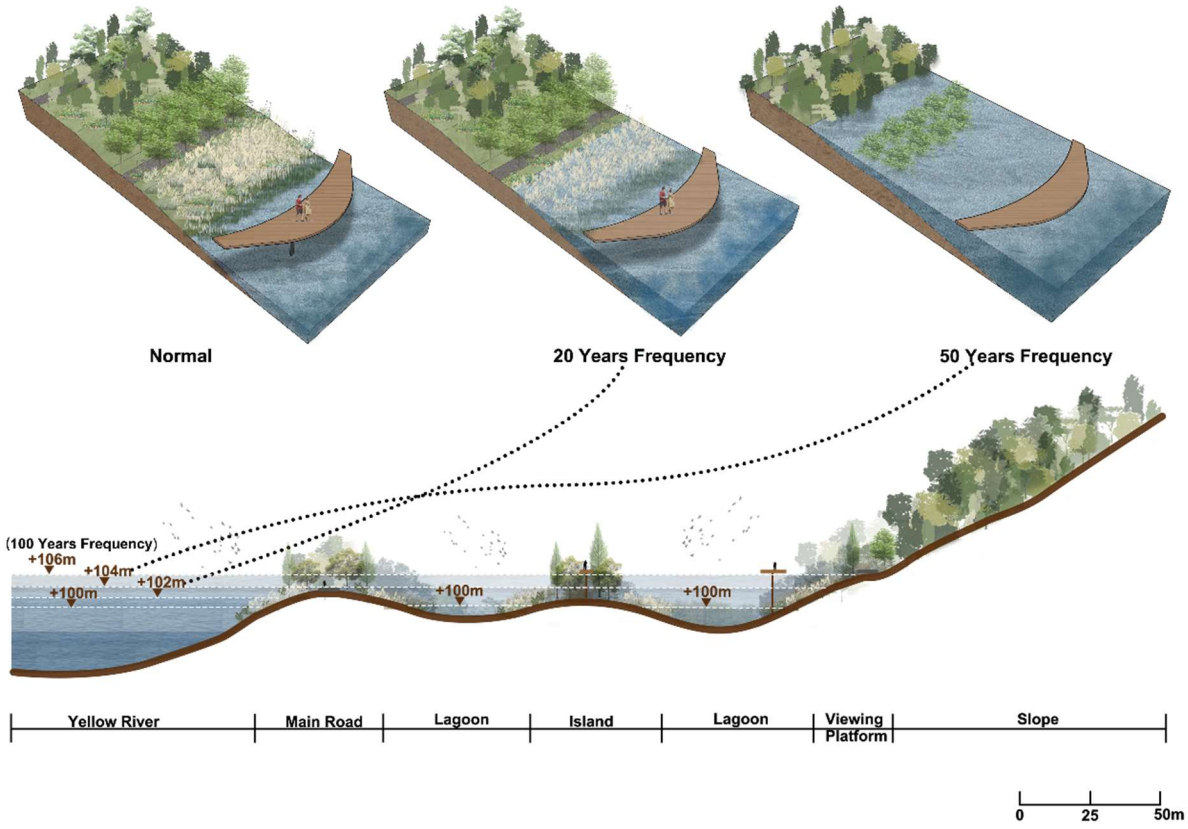

Figure 4-12. Flooding Adaptive Sections

5 Partial Design

5.1 Highlight Area Design

5.1.1 Master Plan (1:500)

The northern entrance and the visitor project area were selected for detailed design. There are four main parts: the small entrance square, the children's playground area, the waterfront terrace plaza, and the old cypress tree ferry.

The entrance square is divided into two levels according to the topography, the upper level is connected to the main road and there are two shallow ponds in the middle, one of which is surrounded by a flower bed and the other is a planting pond with trees in the middle. The upper small square is made of brick. The height difference between the lower square and the upper square is one meter. And the material of the lower square is wood, connecting to the secondary path that leads to the children's activity area.

The children's activity area is further divided into three small parts. The northern part is a micro-topography activity area to satisfy children's interest in climbing. The middle part is the main part, the main part is a sandbox with height difference, and the edge of the sandbox is

placed with different curvature of the slide and climbing frame. There are small children's activity devices, a trampoline, a wooden pole formation, and other activities in the sandbox. Seats are set up around the sandpit for parents to rest, and the area is surrounded by a hedge to ensure the safety of children's activities. The area is made of rubber. To the south, the area is divided into table games and activities. In the center, multi-functional devices are placed for parents and children to rest and also for some board games. The surrounding area is also bounded by seating and planting pools. The three children's spaces are connected by an elevated corten steel landscape corridor. At times, they are hidden in the dense forest, and at times they can look out over the Yellow River, thus enriching the visitor's experience.

The waterfront Terrace Plaza is divided into three main levels. The upper space near the main road is mainly planting ponds and landscape pavilions. The middle level is an exhibition space. Landscape walls with seating and planting ponds are installed. In the transition area between the second layer and the lowest layer, there is a flower field terrace and a relaxation area on the grass slope of the strip, providing people with a variety of resting options, and the flower field can enrich the color of the scenery. The lowest level is the river viewing platform. Visitors can enjoy the magnificent scenery of the Yellow River at this level.

The main function of the old cypress ferry is to carry tourists to the other side of the river. At the same time, cypress trees will be planted in the planting pond along the shore, to awaken people's memory of the prosperity of the old cypress ferry in history. （Figure 5-1）

Figure 5-1. Highlight Area Mater Plan (1:500)

The section shows the topographic changes in the area and how the topography is integrated into the design. （Figure 5-2）

Figure 5-2. Highlight Area Section

5.1.2 Plants Concept (1:500)

When selecting plants for the area, the planting species were divided into four categories: roadside or street trees, landscape plants, dense forests, and flower ponds. The plants were selected in conjunction with the design and ecology, and most of the plants selected were native species. The application of each plant is indicated on the map.

Trees: Populus tomentosa, Prunus cerasifera ‘Atropurpurea', Robinia pseudoacacia, Prunus subg., Cerasus sp., Salix matsudana, Chionanthus retusus, Prunus sibirica, Ulmus pumila, Quercus variabilis, Melia azedarach, Pyrus betulifolia, Diospyros kaki, Catalpa bungee, Prunus davidiana.

Shrubs: Tamarix chinensis, Vitex negundo var. heterophylla, Ziziphus jujuba var. spinosa, Caragana sinica, Punica granatum, Lespedeza bicolor, Hibiscus syriacus, Rosa multiflora, Cotinus coggygria, Forsythia suspensa.

Figure 5-3. Plants Concept (1:500)

Herbs: Muhlenbergia capillaris, Leucanthemum maximum, Viola philippica, Canna warscewiezii, Chrysanthemum indicum, Medicago sativa, Astragalus laxmannii, Hemerocallis hybrida, Oxalis corymbose. （Figure 5-3）

5.2 Design Refinement of Key Parts

The children's playground area and the waterfront terrace plaza are further refined in design. The contour line in the figure is 0.5m height difference, and the interval is 102m to 110m.

The main paving materials used for the waterfront terrace are wood panels and 30*60cm bricks. The main road is made of stabilized gravel and the children's area is made of rubber, bark, and concrete. The landscape corridor is made of corten steel.

The specific name of each tree is also indicated on the plan. （Figure 5-4）

Figure 5-4. Design Refinement Plan (1:250)

I made two visualizations to better show what the design looks like and how the terrain is integrated with the design. One is the flower field and the other is the sandbox. （Figure 5-5）

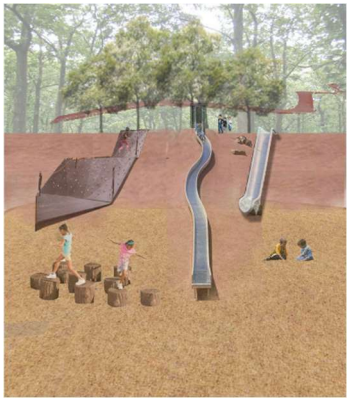

Figure 5-5. Visualizations

The technical detail of the project is selected from the staircase part of the landscape corridor in the children's playground, which is made of corten steel. （Figure 5-6）

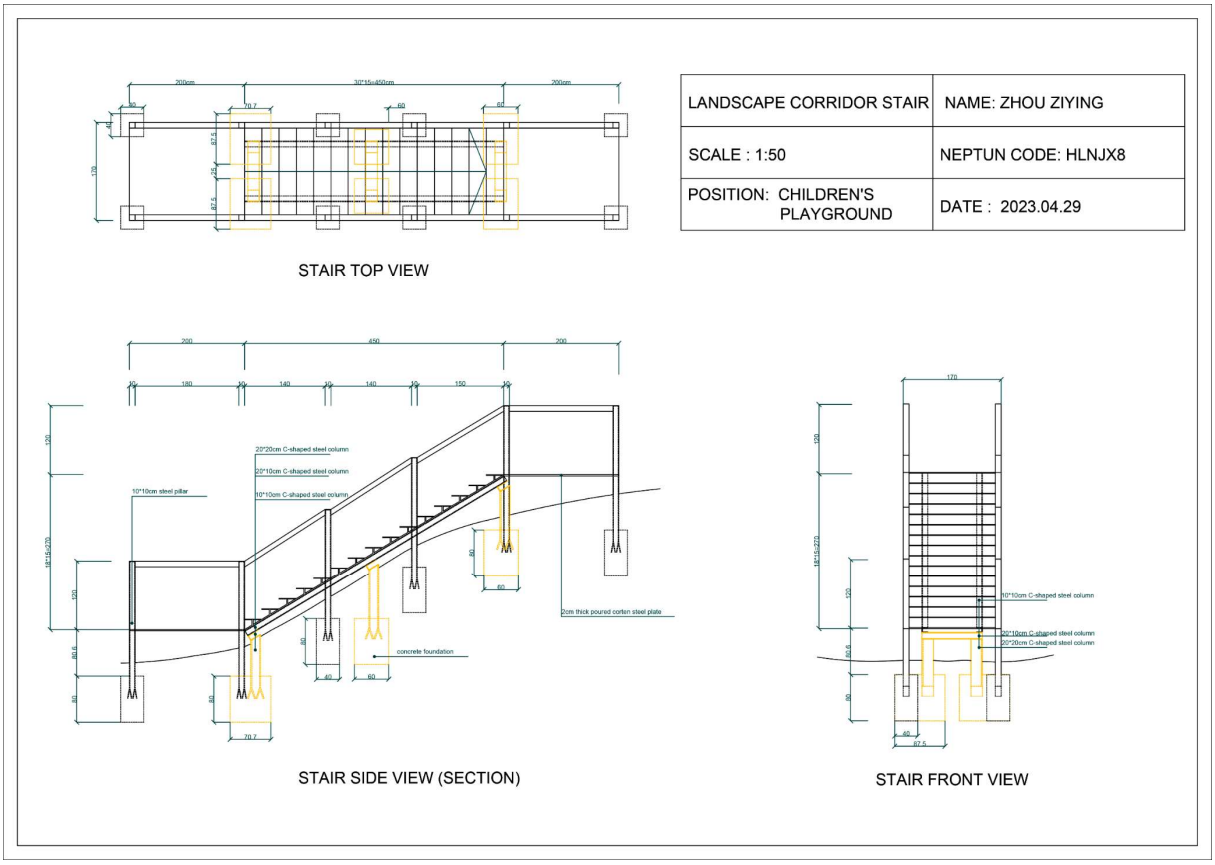

Figure 5-6. Technical Detail (1:50)

6 Summary

This study takes the riverbank area of the Gubaidu Scenic Area in the Zhengzhou section of the Yellow River as the study object. In the context of the middle and lower reaches of the Yellow River basin and the South-to-North Water Diversion Project, the study area is analyzed in depth from three scales, and the values and conflicts of the area are summarized. The main problems of the study area were found to be ecological degradation, reduction of biodiversity, single scenery, chaotic landscape structure, risk of flooding, and the need to maintain the original scenic spots. Based on the current situation, the study area was planned and designed on four scales with the goal of ecological restoration and creating a beautiful and rich visitation experience, and the main conclusions are as follows:

(1) Adjust the site structure to reduce the density of visitor activities from north to south. The original scenic project area was updated and adapted in the northernmost section, and a core ecological conservation area was set up at the southernmost end.

(2) Reorganize and integrate the water bodies, de-artificialize them, and reduce the hard barges except for the necessary areas.

(3) Improve the resilience of the site through barges of different forms and elevation differences to cope with possible future flooding and to enrich the interaction between visitors and the Yellow River.

(4) Create a core wetland complex to enrich species' habitat and also serve the function of science education

(5) The design fits the original topography and minimizes the modification of the topography.

(6) The design mostly uses native plants or plant combinations that can stabilize the soil layer to enhance the ecological environment of the site, enrich species diversity and solve the current problem of more bare land.

(7) Few hard pavement materials are used, mostly permeable pavement, and a large area of a wooden deck is used.

The design achieves the goal of ecological restoration and creates a beautiful and rich landscape for the area to visit. The design is also meaningful for the ecological restoration of the middle and lower reaches of the Yellow River basin, the Yellow River touring experience, and the creation of the Yellow River wetland landscape. The shortcoming of this paper is that there is not enough research on enhancing soil stability in the loess hilly gully area, and the proposed strategy type is relatively single, which will be studied in depth in future research.

List of Figures

References

Bibliography

1. XU Enkai, ZHOU Ziying, HU Yongge, TIAN Guohang. Model and Strategy of Ecological Restoration and Plant Landscape Construction in Loess Hilly and Gully Region: A Case Study of the Area Along the Yellow River in Zhengzhou City. *Landscape Architecture* 2022; 29（5）：75-81.

Website

INT-01 Yellow River Baidu Encyclopedia
https://baike.baidu.com/item/%E9%BB%84%E6%B2%B3/5394?fr=aladdin#2_2
INT-02 Yellow River Basin Baidu Encyclopedia
https://baike.baidu.com/item/%E9%BB%84%E6%B2%B3%E6%B5%81%E5%9F%9F/7576659?fr=aladdin
INT-03 Yellow River Basin Ecological Protection and High-Quality Development Official Website
http://hh.hnr.cn/hhstbh/page/1/20
INT-04 South-to-North Water Diversion Baidu Encyclopedia
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INT-07 AutoZone Outdoor Sports Forum
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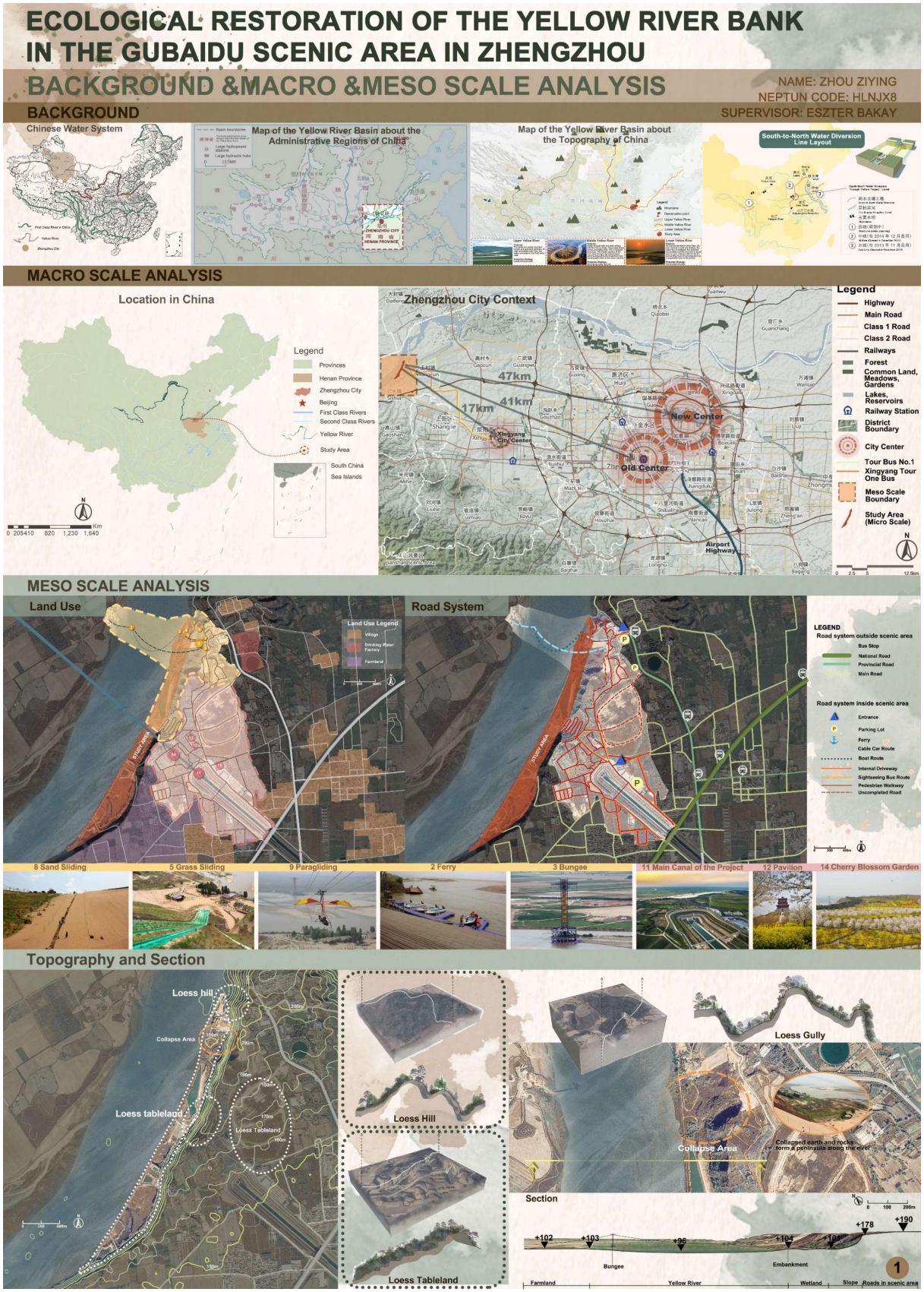
INT-08 Weiliu Wetland Park Landzine
https://landezine.com/weiliu-wetland-park-by-yifang-ecoscape/

Posters


ECOLOGICAL RESTORATION OF THE YELLOW RIVER BANK IN THE GUBAIDU SCENIC AREA IN ZHENGZHOU
BACKGROUND &MACRO &MESO SCALE ANALYSIS
NAME: ZHOU ZIYING
NEPTUN CODE: HLNJX8
SUPERVISOR: ESZTER BAKAY
BACKGROUND
Chinese Water System
Map of the Yellow River Basin about the Administrative Regions of China
Map of the Yellow River Basin about the Topography of China
South-to-North Water Diversion Line Layout
MACRO SCALE ANALYSIS
Location in China
Legend
Provinces
Henan Province
Zhengzhou City
Beijing
First Class Rivers
Second Class Rivers
Yellow River
Study Area
South China Sea Islands
Zhengzhou City Context
47km
41km
17km
New Center
Old Center
Xingyang City Center
Airport Highway
Legend
Highway
Main Road
Class 1 Road
Class 2 Road
Railways
Forest
Common Land, Meadows, Gardens
Lakes, Reservoirs
Railway Station
District Boundary
City Center
Tour Bus No.1
Xingyang Tour One Bus
Meso Scale Boundary
Study Area (Micro Scale)
MESO SCALE ANALYSIS
Land Use
Land Use Legend
Village
Drinking Water Factory
Farmland
Road System
LEGEND
Road system outside scenic area
Bus Stop
National Road
Provincial Road
Main Road
Road system inside scenic area
Entrance
Parking Lot
Ferry
Cable Car Route
Boat Route
Internal Driveway
Sightseeing Bus Route
Pedestrian Walkway
Uncompleted Road
8 Sand Sliding
5 Grass Sliding
9 Paragliding
2 Ferry
3 Bungee
11 Main Canal of the Project
12 Pavilion
14 Cherry Blossom Garden
Topography and Section
Loess hill
Collapse Area
Loess tableland
Loess Tableland
Loess Hill
Loess Tableland
Loess Gully
Collapse Area
Collapsed earth and rocks form a peninsula along the river
Section
+102
+103
+96
+104
+178
+190
Bungee
Embankment
Farmland
Yellow River
Wetland
Slope
Roads in scenic area
1

ECOLOGICAL RESTORATION OF THE YELLOW RIVER BANK IN THE GUBAIDU SCENIC AREA IN ZHENGZHOU

MICRO SCALE ANALYSIS

NAME: ZHOU ZIYING
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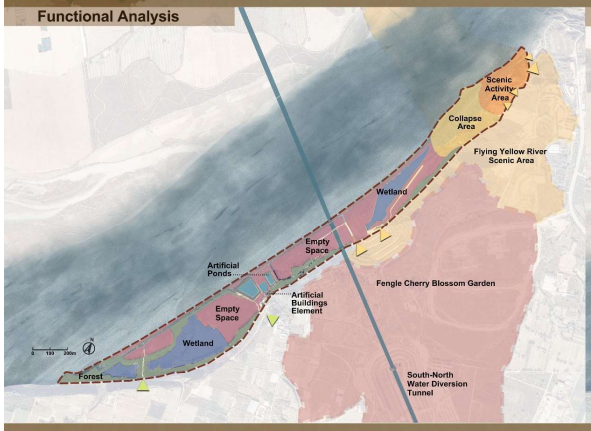
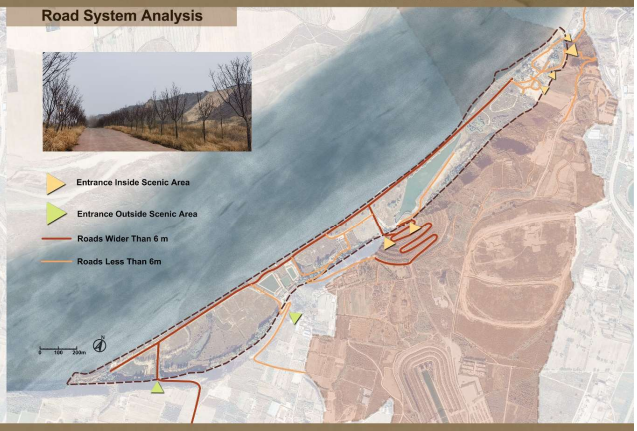
STRUCTURE ANALYSIS

Functional Analysis

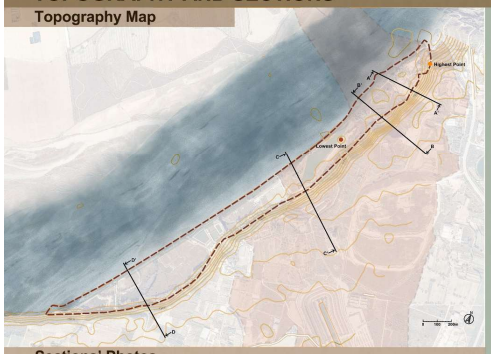


Road System Analysis



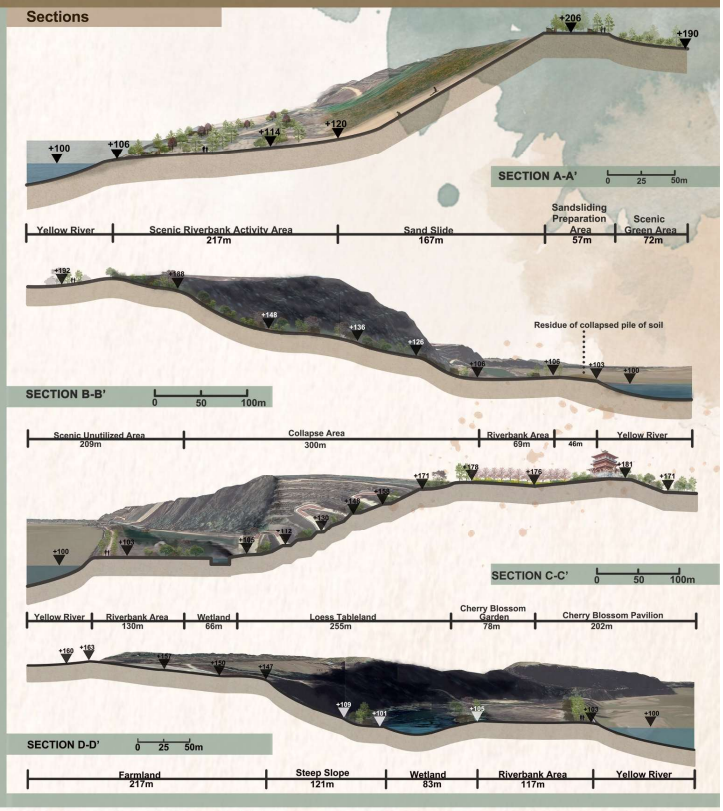
TOPOGRAPHY AND SECTIONS

Topography Map



Sections' Photos

Sections



PLANTS ANALYSIS

BARE LAND

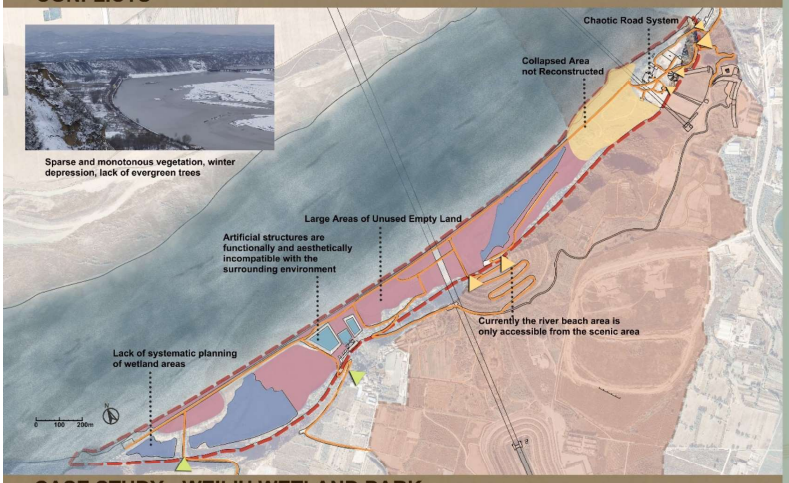
ECOLOGICAL RESTORATION OF THE YELLOW RIVER BANK IN THE GUBAIDU SCENIC AREA IN ZHENGZHOU

VALUES &CONFLICTS &STRATEGIES

NAME: ZHOU ZIYING
NEPTUN CODE: HLNJX8
SUPERVISOR: ESZTER BAKAY

VALUES

CONFLICTS

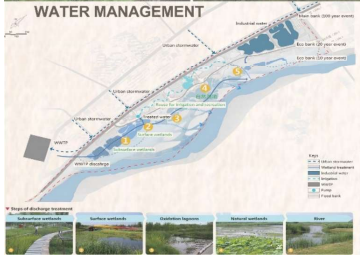


CASE STUDY --WEILIU WETLAND PARK

EXISTING CONDITION

OVERALL STRATEGIES

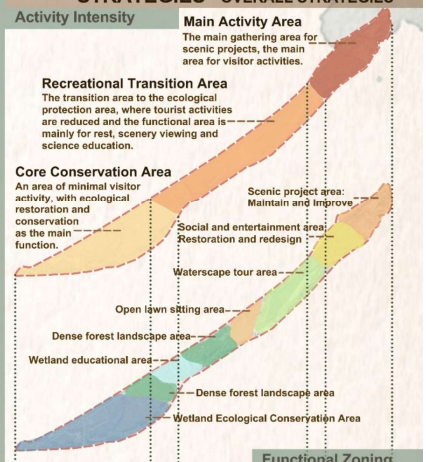
WATER MANAGEMENT



MASTER PLAN

STRATEGIES—OVERALL STRATEGIES

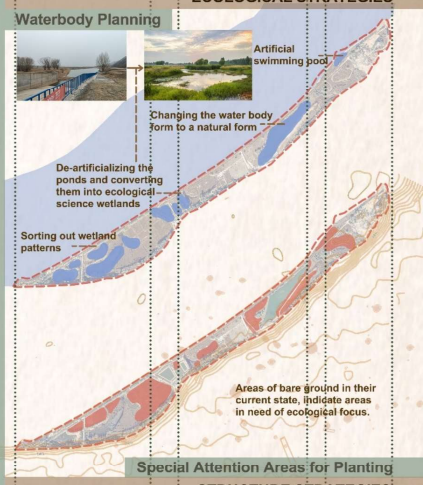
Activity Intensity



Functional Zoning

ECOLOGICAL STRATEGIES

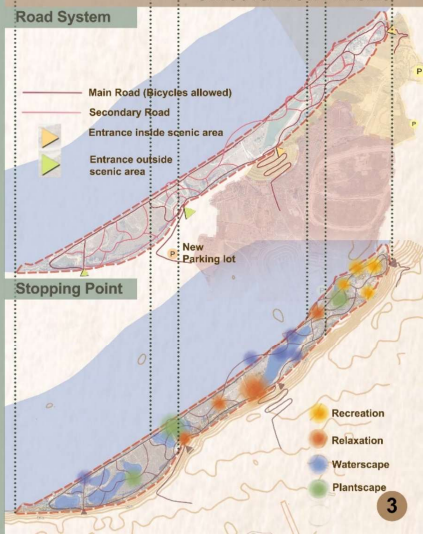
Waterbody Planning



Special Attention Areas for Planting

STRUCTURE STRATEGIES

Road System

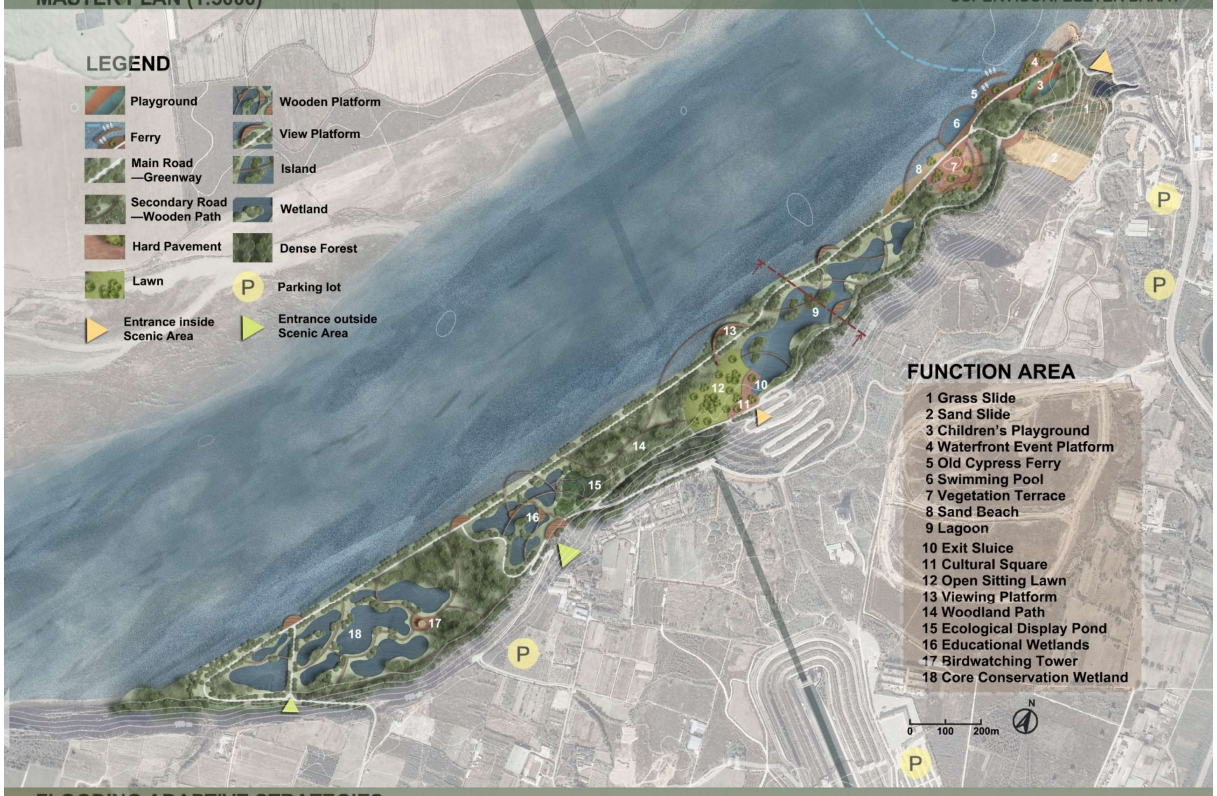


ECOLOGICAL RESTORATION OF THE YELLOW RIVER BANK IN THE GUBAIDU SCENIC AREA IN ZHENGZHOU

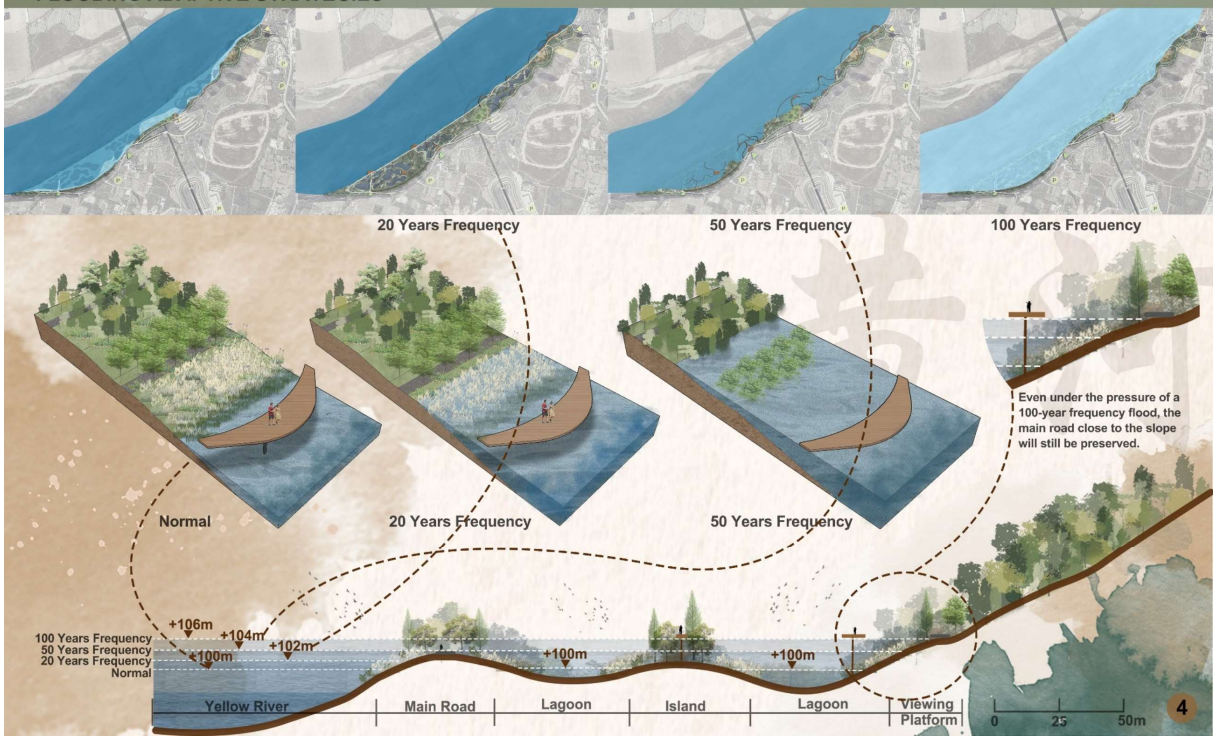
SYSTEMATIC PLANNING

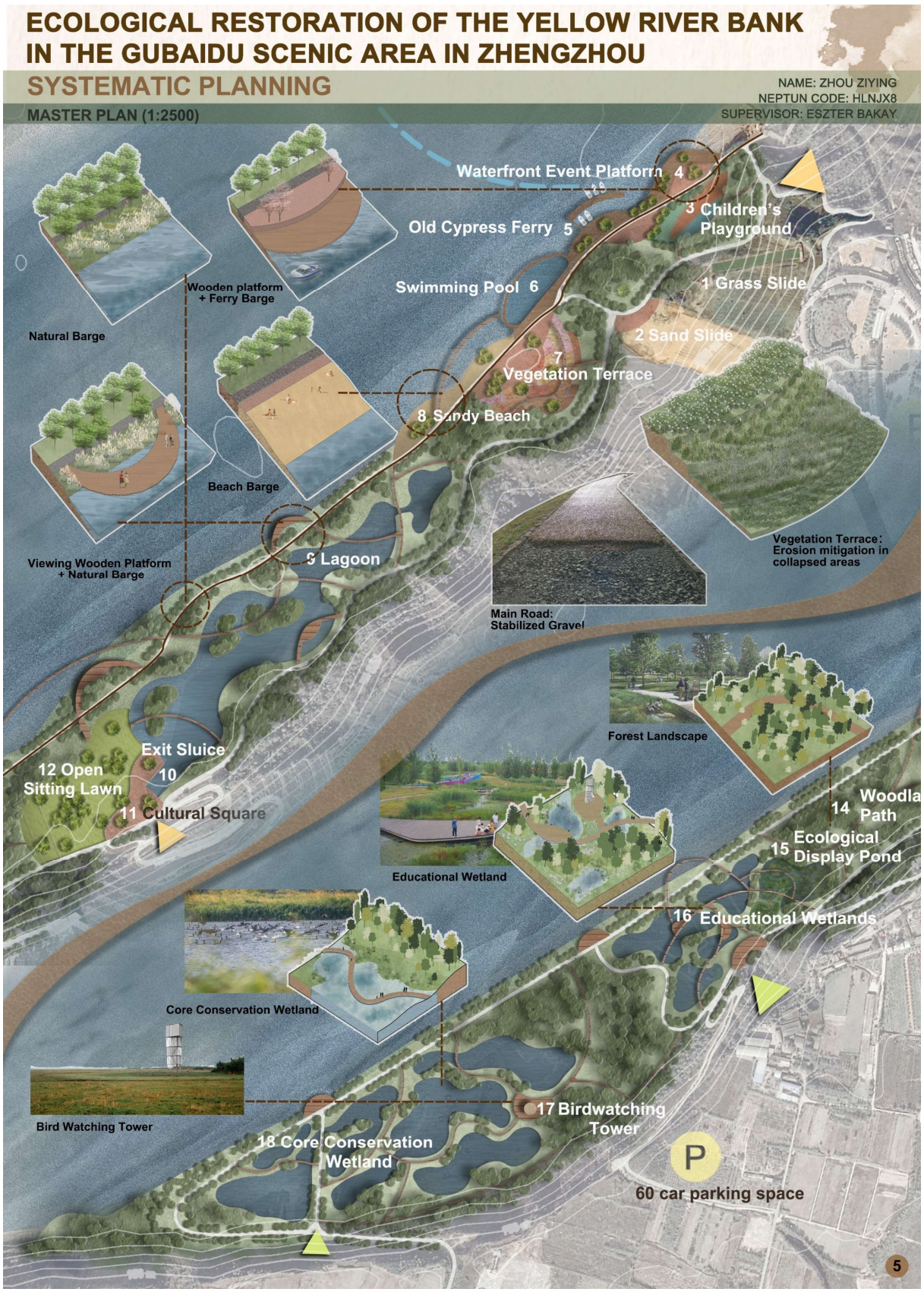
NAME: ZHOU ZIYING
NEPTUN CODE: HLNJX8
SUPERVISOR: ESZTER BAKAY

MASTER PLAN (1:5000)



FLOODING ADAPTIVE STRATEGIES



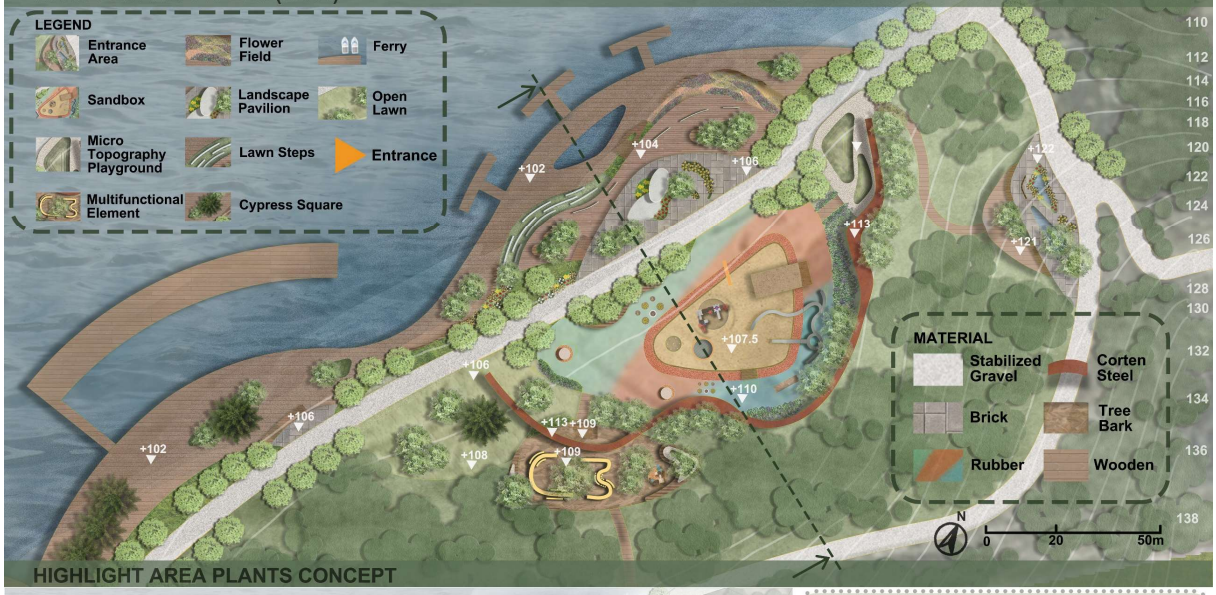

ECOLOGICAL RESTORATION OF THE YELLOW RIVER BANK
IN THE GUBAIDU SCENIC AREA IN ZHENGZHOU
SYSTEMATIC PLANNING
NAME: ZHOU ZIYING
NEPTUN CODE: HLNJX8
SUPERVISOR: ESZTER BAKAY
MASTER PLAN (1:2500)
Waterfront Event Platform 4
3 Children's Playground
Old Cypress Ferry 5
Swimming Pool 6
1 Grass Slide
2 Sand Slide
7 Vegetation Terrace
8 Sandy Beach
Wooden platform + Ferry Barge
Natural Barge
Beach Barge
Viewing Wooden Platform + Natural Barge
9 Lagoon
Vegetation Terrace: Erosion mitigation in collapsed areas
Main Road: Stabilized Gravel
Forest Landscape
Exit Sluice
10
12 Open Sitting Lawn
11 Cultural Square
14 Woodla Path
15 Ecological Display Pond
Educational Wetland
16 Educational Wetlands
Core Conservation Wetland
Bird Watching Tower
17 Birdwatching Tower
18 Core Conservation Wetland
P
60 car parking space
5

ECOLOGICAL RESTORATION OF THE YELLOW RIVER BANK IN THE GUBAIDU SCENIC AREA IN ZHENGZHOU

PARTIAL DESIGN

NAME: ZHOU ZIYING
NEPTUN CODE: HLNJX8
SUPERVISOR: ESZTER BAKAY

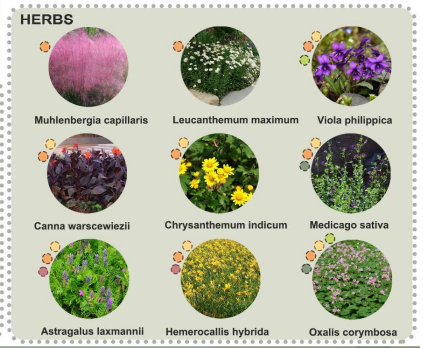
HIGHLIGHT AREA PLAN (1:500)



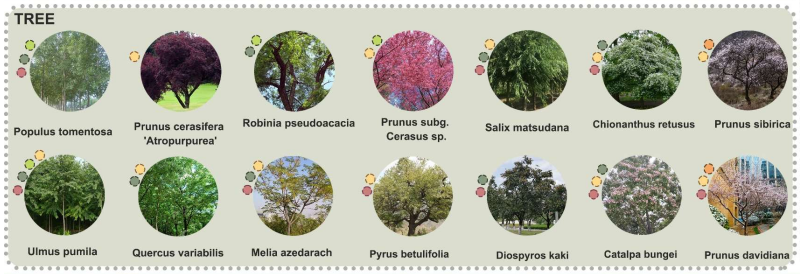
HIGHLIGHT AREA PLANTS CONCEPT

SHRUBS

HERBS



TREE



SECTION

ECOLOGICAL RESTORATION OF THE YELLOW RIVER BANK IN THE GUBAIDU SCENIC AREA IN ZHENGZHOU

DESIGN REFINEMENT OF KEY PART

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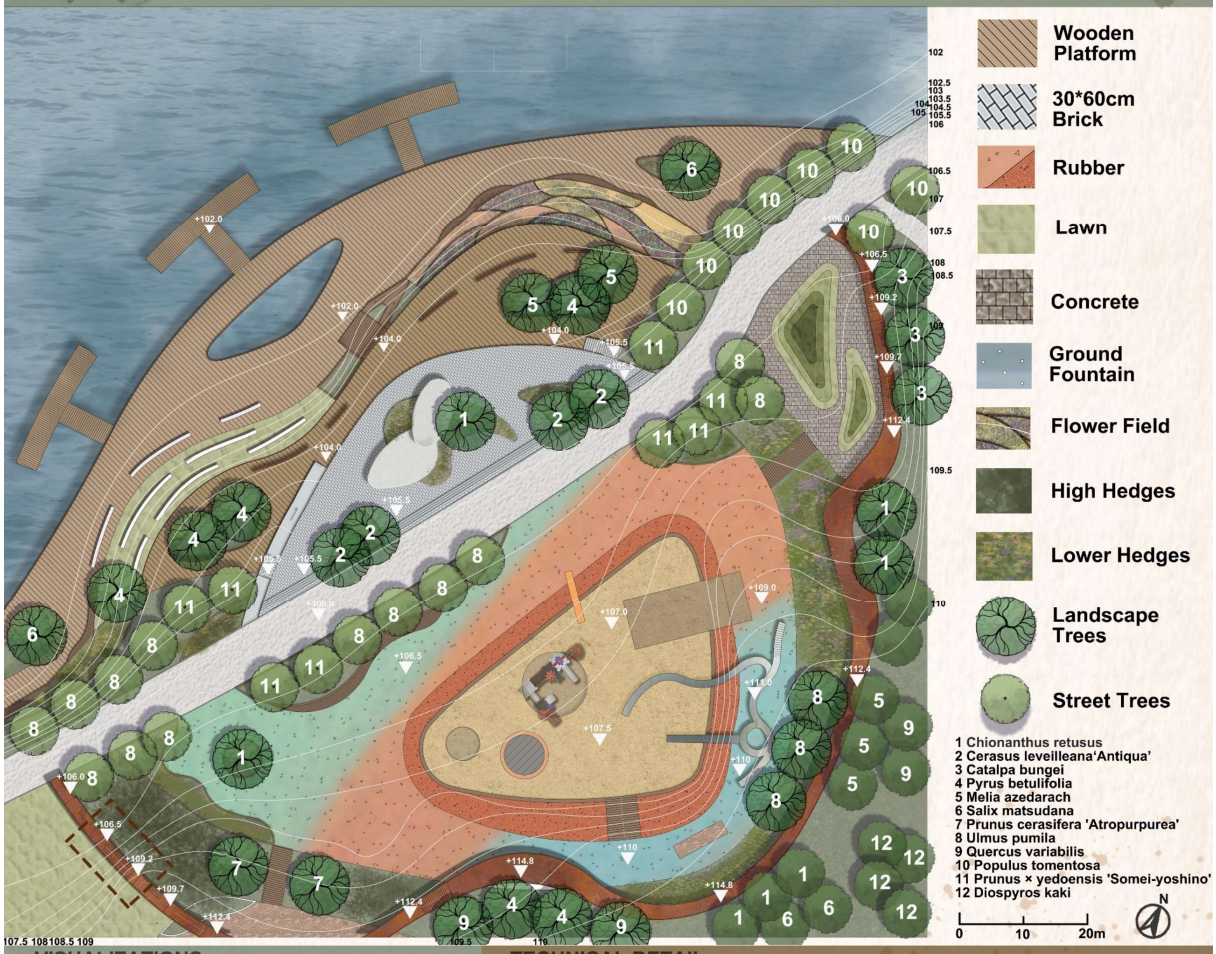
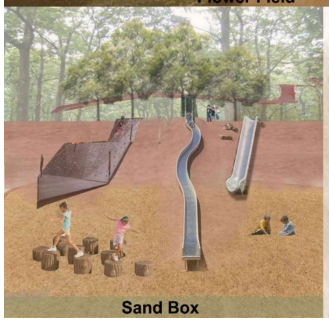
NEPTUN CODE: HLNJX8
SUPERVISOR: ESZTER BAKAY

DESIGN REFINEMENT PLAN



VISUALIZATIONS

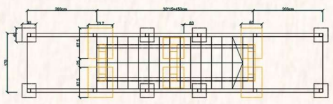
Flower Field



Sand Box

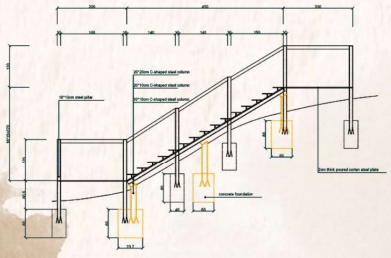
The visualizations choos flower field to show the terrain of the waterfront terrace plaza and sand box to show the terrain of the main activity area for visitors.

TECHNICAL DETAIL



STAIR TOP VIEW

LANDSCAPE CORRIDOR STAIR	NAME: ZHOU ZIYING
SCALE : 1:50	NEPTUN CODE: HLNJX8
POSITION: CHILDREN'S PLAYGROUND	DATE : 2023.04.29



STAIR SIDE VIEW (SECTION)

STAIR FRONT VIEW

Annex

Declaration on authenticity and intellectual property management

DECLARATION

on authenticity and public assess of ~~final essay/thesis~~/mater's thesis/~~portfolio~~[1]

Student's name: Zhou Ziying

Student's Neptun ID: HLNJX8

Title of the document: Ecological Restoration of the Yellow River Bank in Gubaidu Scenic Area in Zhengzhou

Year of publication: 2023

Department: GARDEN AND OPENSPACE DESIGN

I declare that the submitted final ~~essay/thesis~~/master's thesis/~~portfolio~~[2] is my own, original individual creation. Any parts taken from an another author's work are clearly marked, and listed in the table of contents.

If the statements above are not true, I acknowledge that the Final examination board excludes me from participation in the final exam, and I am only allowed to take final exam if I submit another final essay/thesis/master's thesis/portfolio.

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Place and date: Budapest, 2023 year 05 month 02 day

Zhou Ziying
Student's signature

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[2]Please select the one that applies, and delete the other types.

Statement on consultation practices

STATEMENT ON CONSULTATION PRACTICES

As a supervisor of Zhou Ziying (Student's name) HLNJX8 (Student's NEPTUN ID), I here declare that the ~~final essay/thesis~~/master's thesis/~~portfolio~~[1] has been reviewed by me, the student was informed about the requirements of literary sources management and its legal and ethical rules.

I recommend/don't recommend[2] the final essay/thesis/master's thesis/portfolio to be defended in a final exam.

The document contains state secrets or professional secrets: yes no*[3]

Place and date: Budapest, 2023 year 05 month 02 day

Internal supervisor

[1] Please select applicable and delete non-applicable.
[2] Please underline applicable.
[3] Please underline applicable.