

The Preliminary Design Goal of Soil Organic Reconstruction for the Land Remediation Project

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Abstract

Hancheng's rich solar and thermal resources are conducive to the development of agricultural production and can meet the basic requirements of crop diversification. The project area has certain potential in the development of planting crops, but only after the organic reconstruction of the soil can it meet the requirements of crop growth and develop agricultural production.

Keywords

Landform type; Design Principles; Land use status Condition analysis.

1. General Description

1.1. Project Overview

Longting Town, Hancheng City is located in the south of Hancheng City, Shaanxi Province, 27 kilometers away from the city center. It faces Wanrong County of Shanxi Province across the Yellow River to the east, connects with Yangjiazhuang Township in Heyang County to the west, Wangjiawa and Tongjiazhuang Townships in Heyang County to the south, Zhichuan Town and Qiaozixuan Township in the north, and lies between 34°52' north latitude. '47"~35°39'03", between 109°25'68"~110°37'37" east longitude, 20 kilometers long from east to west, 2 kilometers wide from north to south, with a total area of 40 square kilometers. It has jurisdiction over 19 administrative villages, 20 natural villages, and 68 villager groups.

The land reclamation project in Longting Town, Hancheng City mainly aims at the comprehensive renovation of the ecological environment. Through the renovation of the river beaches, they are converted into paddy fields to achieve the purpose of improving the ecological environment and protecting the wetlands.

1.1.1 Project construction scale

The construction scale of the land reclamation project in Longting Township, Hancheng City, is 287.64 hm².

1.1.2 Project Type

The land reclamation project in Longting Township, Hancheng City is a land development project.

1.1.3 Project construction site

The land reclamation project of Longting Township, Hancheng City, is located in the south of Hancheng City, between 110°24'8"~110°26'21" east longitude and 35°19'18"~35°21'48" north latitude. between. The location diagram of the project area.

Location map of the project area of Longting Town, Hancheng City

1.1.4 Landform types in the project area

The project area is a river beach, with open and flat ground, high groundwater level, and mostly sandy silt, which is a suitable land resource for development.

1.1.5 Land ownership status in the project area

The land ownership in the project area is clear and it is state-owned land.

1.2. Project Design Goals, Principles and Basis

1.2.1 Project design goals

In order to better implement the relevant spirit of the Central Province on the protection of cultivated land, implement the basic national policy of "very cherish, rational use of land and practical protection of cultivated land", and ensure the sustainable and steady development of the economy and society of Shaanxi Province, while ensuring the balance of cultivated land occupation and compensation, it is planned to remediate The floodplain of Longting Town, Hancheng City, with ecological environment management as the main goal, the floodplain of the project area will be renovated into rice fields, and the project area will be built into a high-standard, modern wetland agricultural area through the construction of infrastructure in the project area.

1.2.2 Principles of Project Design

Fully implement the basic national policy of "very cherish and rational use of land and practical protection of arable land", and standardize the integration of comprehensive ecological environment management and wetland utilization. Based on the characteristics of the project area and surrounding areas, the design principles are determined as follows:

- (1) Adhere to planning and guidance, and coordinate the construction of large-scale, modern, and high-standard wetland agricultural areas based on the overall land use plan and the comprehensive land remediation plan, and coordinate with relevant plans.
- (2) The construction of the project area follows the principles of unified planning, adaptation to local conditions, reasonable layout, and gradual progress. Build a good soil structure suitable for the growth of target crops such as rice and rape in the project area, increase the area of arable land and improve the quality of arable land.
- (3) Adhere to the equal emphasis on ecological environment, quantity and quality, and promote landscape optimization and good ecology.
- (4) Implement management and protection responsibilities, improve management and protection mechanisms, and give full play to the long-term benefits of project construction.

1.2.3 Project design basis

1.2.3.1 Relevant regulations and policies

- (1) "Land Administration Law of the People's Republic of China"
- (2) "Regulations on the Implementation of the Land Administration Law of the People's Republic of China"
- (3) "Regulations on the Protection of Basic Farmland"
- (4) "Law of the People's Republic of China on Soil and Water Conservation"
- (5) "Environmental Protection Law of the People's Republic of China"
- (6) "Flood Control Law of the People's Republic of China"

- (7) "Farmland Water Conservancy Regulations"
- (8) "Wetland Protection Regulations of Shaanxi Province"
- (9) "Wetland Protection Management Regulations"
- (10) "Regulations of the People's Republic of China on River Management"
- (11) "Notice on Further Strengthening the Management of Land Development and Consolidation" (Guo Tu Zi Fa [2008] No. 176);
- (12) "Interim Measures for the Fund Management of State-invested Land Development and Consolidation Projects" (Guo Tu Zi Fa [2000] No. 282);
- (13) "Management Measures for the Implementation of the Balance of Cultivated Land Occupation and Compensation in the Way of Commitment in Key Construction Projects for Stable Growth" (Guo Tu Zi Gui (2015) 7);
- (14) "Notice on Strengthening Management and Control and Implementing the Most Strict Cultivated Land Protection System" (Guo Tu Zi Fa [2014] No. 18);
- (15) "Notice on Further Strengthening the Work of Land Consolidation, Reclamation and Development" Guo Tu Zi Fa [2008] No. 176;
- (16) "Outline of National Land Use Master Plan (2006-2020)";

1.2.3.2 Relevant industry standards

- (1) "Code for Planning and Design of Land Consolidation Projects" (TD/T 1012-2016);
- (2) "Regulations for the Preparation of Feasibility Study Reports for Major Land Rehabilitation Projects" (TD/T 1037-2013);
- (3) "Regulations for calculation of quantities of land remediation projects" (TD/T 1039-2013);
- (4) "Regulations for Economic Evaluation of Water Conservancy Construction Projects" (SL 72-2013);
- (5) "Code for Design of Irrigation and Drainage Engineering" (GB/50288-99);
- (6) "Technical Specifications for Comprehensive Treatment of Soil and Water Conservation" (GB/T 16453.6-2008);
- (7) "Technical Specifications for Water-saving Irrigation" (GB/T 50363-2006);
- (8) "Technical Specification for Canal Seepage Control Engineering" (GB/T 50600-2010);
- (9) "Farmland Irrigation Water Quality Standard" (GB 5084-2005);
- (10) "Technical Specifications for Pumped Wells" (GB/T 50625-2010);
- (11) "Land Improvement Project Design Report Preparation Regulations" (TD/T 1038-2013);
- (12) "Land Reclamation Quality Control Standard" (TD/T 1036-2013);
- (13) "The Second National Land Survey Technical Regulations" (TD/T 1014-2007);
- (14) "Classification of Water Conservancy and Hydropower Projects and Flood Standards" (SL 252-2000);
- (15) "Classification of Land Use Status" (GB/T 21010-2007);
- (16) "Soil Environmental Quality Standards" (GB 15618-1995);
- (17) "Technical Regulations for Cultivated Land Fertility Investigation and Quality Evaluation" (NY/T 1634-2008);
- (18) "Shaanxi Province Land Development and Consolidation Project Construction Standards" (2010);
- (19) "Budget Quota Standards for Land Development and Consolidation Projects" (Ministry of Finance, Ministry of Land and Resources, 2011);
- (20) "Agricultural Land Grading Regulations" (GB/T 28405-2012);
- (20) "Agricultural Land Quality Classification Regulations" (GB/T 28407-2012);
- (21) "National Classification Standard for Soil Nutrient Content"

1.2.3.3 Relevant basic data

"General Survey Report on Soil Quality of Longting Township, Hancheng City, Occupation and Compensation Balance Project".

2. Project Overview

2.1. Overview of the Project Location

2.1.1 Geography and natural conditions

Hancheng City is located on the west bank of the Yellow River in the northeast corner of the Guanzhong Plain in Shaanxi, 200 kilometers away from the provincial capital of Xi'an, with a jurisdiction area of 1,621 square kilometers and a total population of 500,000. The topography is "seven mountains, one river and two fields".

The terrain of Hancheng is high in the northwest and low in the southeast. The deep mountains in the west are mostly beam-shaped ridges, generally above 900 meters above sea level. Daling at the boundary between Han (cheng) and Huang (long) is 1,783 meters above sea level, which is the highest point in the city; the central shallow mountainous areas are mostly loess hills with an elevation of 600~900 meters. The eastern loess plateau is generally 400-600 meters above sea level. The lower reaches of the river and the Yellow River beaches are mostly below 400 meters above sea level; the Zhichuankou in the south of the city is 357 meters above sea level, which is the lowest land surface in the city. There are landforms such as mountains, plains and beaches in the territory, of which deep mountains and shallow hills account for 69% of the total area.

Hancheng's rich solar and thermal resources are conducive to the development of agricultural production and can meet the basic requirements of crop diversification. According to the meteorological data from the Hejin Meteorological Station near Longting Town, Hancheng City, the average annual rainfall in the project area from 1981 to 2010 was 464.7 mm, which has the characteristics of more showers and high rainfall intensity. The precipitation is mainly concentrated in June to September during the growing season (April-October) precipitation accounts for 90% of annual precipitation.

2.1.2 Socio-economic conditions

(1) Population status

Hancheng has 2 streets and 10 towns: Xincheng Street, Jincheng Street, Longmen Town, Sangshuping Town, Longting Town, Zhichuan Town, Xizhuang Town, Zancun Town, Zhiyang Town, Weidong Town, Banqiao Town, Wangfeng town. At the end of 2015, the total number of households in the city was 129,260, and the total registered population was 398,978, a decrease of 3,628 compared with the end of the previous year. Among them, the agricultural population was 182,924, and the urban population was 21,054. Proportion of women). The birth rate is 9.69‰, the death rate is 4.66‰, and the natural growth rate is 5.03‰.

(2) Local economic conditions

At the end of 2015, Hancheng's annual GDP was 31.13 billion yuan, which was an increase of 10.4% compared to 2014 at comparable prices. The per capita GDP is 78,000 yuan. The proportion of the primary, secondary and tertiary industries is 4.6:74.1:21.3. The added value of the non-public sector of the economy for the year was 17.04 billion yuan, accounting for 54.8% of the GDP, an increase of 1.1 percentage points from 2014. In the whole year, the total fiscal revenue in the region was 301.044 million yuan, an increase of 11.3% over the previous year, of which local fiscal revenue was 187,655 million yuan, an increase of 10.4%; fiscal expenditures were 344,624 million yuan, an increase of 11.9%.

(3) Agricultural production level

In 2015, the total output value of agriculture, forestry, animal husbandry and fishery in Hancheng City was 2,87983 million yuan, an increase of 5.7% over the previous year at comparable prices. Among them, the agricultural output value was 21.19 million yuan, an increase of 7.6%; the forestry output value was 83.81 million yuan, an increase of 42.9%; the animal husbandry output value was 342.59 million yuan, a decrease of 9.3%; the fishery output value was 8.8 million yuan, an increase of 17.1%; the output value of agriculture, forestry, animal husbandry and fishery services was 26071 10,000 yuan, an increase of 3.5%.

The annual grain output was 72,600 tons, basically the same as the previous year. Among them, the output of summer grain was 42,200 tons, an increase of 11.7%; the output of autumn grain was 30,400 tons, a decrease of 13.2%. Fruit output was 121,900 tons, an increase of 4.1%. The total output of vegetables reached 121,300 tons, an increase of 7.4%.

(4) Industrial production level

Hancheng is a traditional industrial city. At present, there are 68 enterprises settled in Hancheng Economic Development Zone, employing more than 30,000 people, forming an annual production of 7 million tons of coal, 35 million tons of coal washing, 10.7 million tons of coke, 7 million tons of steel, and 3 million kilowatts of installed power generation capacity. With a cement production capacity of 3 million tons, Hancheng Economic Development Zone achieved a total industrial output value of 60.4 billion yuan in 2014, making it an important energy and heavy chemical industrial base in western my country.

In 2015, Hancheng's industrial economy developed steadily. In the whole year, all industries realized an added value of 21.35 billion yuan, an increase of 10.3% over the previous year, of which the non-public industries realized an added value of 11.90 billion yuan, an increase of 14.7%.

2.2. Overview of the Project Area

2.2.1 Natural conditions

(1) Project location

The project area is located in the south of Hancheng City (East longitude 110°24'8"~110°26'21", North latitude 35°19'18"~35°21'48"), 27 kilometers away from the city center. It faces Wanrong County of Shanxi Province across the Yellow River in the east, connects with Yangjiazhuang Township in Heyang County in the west, Wangjiawa and Tongjiazhuang Townships in Heyang County in the south, and Zhichuan Town and Qiaozixuan Township in the north. The total area of the project area is 287.64 hm².

(2) Topography

Longting Town is located in the Loess Plateau area, which is the southern gate of Hancheng City. The loess plateau area is 10-20 kilometers wide from east to west, and more than 50 kilometers long from north to south, spreading in a narrow strip on the west bank of the Yellow River. The Yellow River passes through the Hancheng city for 65 kilometers. The river surface below Yumenkou is open and more than 10 kilometers wide. The slope decreases and the flow rate slows down. A large amount of sediment carried by the river is deposited, and the center and side beaches are developed. This section of the river bed is about 160 square meters. Km, of which only 163,280 acres are water surface, 55,009 acres are beaches, and 25,821 acres are old beach mud. The beaches of the Yellow River are open and flat, with high groundwater levels and mostly sandy silt.

(3) Meteorology

Longting Town, Hancheng City, is located in a warm temperate zone and a semi-arid region with a continental monsoon climate. It has the characteristics of abundant light and heat resources, less precipitation, distinct dry and wet seasons, variable climate, and frequent disasters. The average annual rainfall from 1981 to 2010 was 464.7 mm, which was characterized by a lot of

showers and high intensity. The precipitation was mainly concentrated in June to September, and the precipitation in the growing season (April to October) accounted for 90% of the annual precipitation. The multi-year average temperature is 14.1 °C, the highest average temperature in July is 26.7 °C, and the lowest average temperature in January is -0.87 °C. The average annual accumulated temperature of the project area $\geq 0^{\circ}\text{C}$ is 5297.2°C, and the average annual accumulated temperature of $\geq 10^{\circ}\text{C}$ is 4797.1°C; the average annual accumulated temperature of $\geq 0^{\circ}\text{C}$ is 5326.9°C, and the average annual accumulated temperature of $\geq 10^{\circ}\text{C}$ is 4897.6°C; The frost-free period averages 210 days for many years, which can meet the basic requirements of crop diversification.

(4) Hydrology and Hydrogeology

The total amount of self-produced water resources in Hancheng City is 129 million m³, and the total available water resources are 115 million m³. The average total inbound water for many years is 3.933 billion m, and the annual exploitable volume of "380" karst fissure water is 16.94 million m³. The current surface water resources development rate is 27.6%, and there is still development and utilization potential. The shallow groundwater extraction rate in the plain area is 52.9%. The development and utilization rate is relatively high, and the development potential is relatively small.

There are many rivers in Hancheng and abundant groundwater reserves. Most of the rivers are first-level tributaries of the Yellow River, with short flow and small water volume. The flow direction is generally from west to east or from northwest to southeast into the Yellow River.

2.2.2 Socio-economic conditions

Hancheng has 2 streets and 10 towns: Xincheng Street, Jincheng Street, Longmen Town, Sangshuping Town, Longting Town, Zhichuan Town, Xizhuang Town, Zancun Town, Zhiyang Town, Weidong Town, Banqiao Town, Wangfeng town. At the end of 2015, the total number of households in the city was 129,260, with a total registered population of 398,978 people.

At the end of 2015, Hancheng's annual GDP was 31.13 billion yuan, which was an increase of 10.4% compared to 2014 at comparable prices. The proportion of the primary, secondary and tertiary industries is 4.6:74.1:21.3. The added value of the non-public economy in the whole year was 17.04 billion yuan, accounting for 54.8% of the GDP.

2.2.3 Status of land use

(1) Land ownership

The land ownership in the project area is clear and it is state-owned land.

(2) Degree of land use

The project area is currently unused.

3. Analysis of Soil Conditions in the Project Area

Analysis of the soil quality in the project area according to the "General Survey Report on the Soil Quality of the Longting Town Relocation Project in Hancheng City" (referred to as the "General Survey Report"): Longting Town Project in Hancheng City The content of sand and silt in the 0-30 cm soil in the area is relatively high, and the soil texture is sandy loam.

Through the test results of saturated hydraulic conductivity of 0~30 cm soil, it can be seen that the soil quality in the project area of Longting Town, Hancheng City is relatively sandy, with large saturated hydraulic conductivity, direct planting of crops, serious water and fertilizer leakage, and extremely poor water retention. Therefore, it is necessary to construct a suitable soil profile structure through the organic reconstruction of the soil.

According to my country's "Soil Environmental Quality Standards" (GB 15618-2018), the average content of heavy metals such as chromium, nickel, copper, zinc, arsenic, cadmium, and

lead in the soil in the project area of Longting Town, Hancheng City meets the Class II standard, can be used for farmland crop planting. According to my country's soil nutrient classification standards, the exchangeable calcium of 0~30 cm soil in the project area of Longting Town, Hancheng City is in a very rich state, the content of available potassium and available boron is medium, and the organic matter , The content of total nitrogen, available phosphorus, and available silicon is in a state of extreme deficiency, and it is not suitable for direct planting of crops. The nutrient content of the soil profile generally decreases with the increase of soil depth. In summary, the project area has certain potential in developing crops, but the soil must be organically reconstructed to meet the requirements of crop growth and develop agricultural production.

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