

# **The impact of incomplete forest land remediation projects soil quality and farmland production capacity**

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## **Abstract**

Carrying out the rectification of incomplete forest land can effectively increase the area of construction land or the available area of arable land, ensure the rational use of land resources, and help maintain the stability of the total amount of arable land. This article analyzes the impact of the completion of arable land on the classification of arable land through the implementation of incomplete forest land rectification projects, in order to provide reference for the further expansion of land comprehensive rectification business.

## **Keywords**

**Defective forest land; Comprehensive rectification; Farmland classification; Inefficient garden land.**

## **1. Introduction**

Cultivated land is the most precious resource in China and an important prerequisite and guarantee for food production. As a basic system for protecting cultivated land, the balance of occupation and compensation of cultivated land is of great significance for achieving the goal of dynamic balance of total cultivated land and ensuring national food security. In 2017, the "Opinions of the Central Committee of the Communist Party of China and the State Council on Strengthening the Protection of Cultivated Land and Improving the Balance of Occupation and Compensation" (Zhongfa [2018] No. 4) and the "Notice of the Ministry of Land and Resources on Improving Management Methods and Effectively Implementing the Balance of Occupation and Compensation of Cultivated Land" (Land and Resources Regulations [2017] No. 13) were successively released. The documents pointed out that: to improve the management of the balance of occupation and compensation of cultivated land, establish a new mechanism of occupation and compensation based on quantity and production capacity, and implement the three in one protection of cultivated land quantity, quality, and ecology through the calculation of large accounts; Adhere to the concept of green development, transform the way of supplementing arable land, expand the channels of supplementing arable land, broaden funding channels, and increase investment in supplementing arable land. At present, our province's economy is in a new era of catching up and surpassing, and the dual pressure of rapid economic development and protection of arable land is constantly increasing. Therefore, it is extremely important to achieve a balance between the occupation and compensation of arable land through land consolidation projects. This not only guarantees the red line of 1.8 billion acres of arable land and food security, but also ensures the momentum of our province's catching up and surpassing economic development in the new era. It is an urgent need for the healthy development of our province's economy and society and the improvement of the living standards of rural residents.

## 2. Overview of the project area

The project area is located in Chencang District, Baoji City, at the junction of Chinese Mainland trough - the northern foot of Qinling Mountains, Longshan Branch, Loess Plateau and Weihe Graben. Surrounded by mountains on the south, north, and west sides, the central part is low and open to the east, while the west is high and the east is low. The Wei River passes through the middle from west to east, with terrain including mountains, rivers, and plains. It can be divided into four types: the northern foothills of the southern Qinling Mountains and the western mountains, the eastern Wei River and Qianhe River valley plains, loess plateaus, and hilly and gully areas. Mountains account for 80.2%, while plains account for 19.8%. The highest altitude of the northern foothills of the Qinling Mountains and the southern foothills of the Longshan Mountains within the territory is 2706 meters, and the lowest is 1200 meters; The highest altitude in the areas along the Wei River and Qianhe River is 600 meters, and the lowest altitude is 507 meters. The project area is located near traditional agricultural areas, and the third national land survey did not include cultivated land, which is not within the range of 25 degree slopes or above, is not within the protection range of permanent basic farmland, is not within the protection range of forestry land, and is not within the scope of walnut planting bases in the forestry system; Not within the scope of river channels or flood discharge areas; It also does not fall within the scope of ecological environment protection. By developing land in the project area, the land utilization rate can be significantly improved, the effective cultivated land area can be increased, and the unused land resources in the project area can be fully, reasonably, efficiently and sustainably utilized, developing the rural economy and improving people's lives. The project area implements unified planning for fields, water, roads, forests, and villages, improves the basic conditions of agricultural production, saves water for irrigation, saves water resources, and increases irrigation guarantee rates.

## 3. Analysis of construction conditions

### 3.1. Soil suitability analysis

The project area is located in the mountainous area of Chencang District, with an altitude of 880m to 1100m. There is a large temperature difference between day and night, with an average temperature of 12.1 °C for many years, an annual rainfall of 651mm, and a maximum depth of 70mm in the permafrost layer. The soil is mainly composed of yellow loess developed from loess parent material, and the soil layer thickness is maintained at over 50cm; PH value 6.8-8.5, slightly alkaline; Medium soil texture, soil bulk density 1.1-1.3g/cm<sup>3</sup>, slightly compact; The soil fertility of slopes and terraces is good, while the soil nutrients at steep slopes are at a relatively low level. After the development of wasteland in the project area, measures such as plowing and loosening the tillage layer, applying fertilizer to farmland, and timely irrigation during crop growth can gradually transform the original wasteland into suitable farmland for cultivation.

### 3.2. Analysis of Land Development Potential

The main purpose of land development and consolidation at present is to take "land consolidation and socialist new rural construction" as the theme, and to improve the quality of cultivated land, increase the effective area of cultivated land, enhance the drainage and irrigation capacity of cultivated land, and improve agricultural production and ecological environment through comprehensive management with fields, water, roads, forests, and villages as the main content. The main content of this land development is the development of residual forest land and inefficient gardens. After suitability analysis, it has been determined that residual forest land and inefficient gardens in the project area can be developed into arable land.

### 3.3. Analysis of Land Production Potential

The implementation of surface clearing and land leveling projects in the project area will increase land productivity by 1.5-3 times after development. According to the survey, the average yield of wheat and corn in the developed dryland around the project area can reach over 350kg/mu. With the utilization and improvement of modern facility technology, the promotion of mechanized operations, and sufficient light and heat conditions in the project area, the improved and cultivated land can become high-quality and high-yield basic farmland, with enormous agricultural production potential.

### 3.4. Analysis of Comprehensive Potential for Industrialization

By implementing unified planning of fields, water, and roads within the project area, land leveling, moderate field size, suitable area, connected roads, and good ecological environment of farmland can be achieved, which facilitates small-scale mechanized operations and intensive management. This can greatly enhance disaster resistance, and play a good role in economic and social benefits and demonstration.

The project area has superior natural conditions, vast land, flat terrain, suitable climate, abundant water resources, good infrastructure conditions such as transportation, electricity, and communication, good planting industry foundation, good mechanized operation conditions, high enthusiasm of the masses to engage in agriculture, few constraints on large-scale production, and low labor costs. Corn, wheat and other agricultural products have excellent quality, high yield, good sales, obvious advantages, great potential for agricultural industrialization development, and broad prospects. These all provide good conditions for the implementation of the project.

## 4. Main construction content

### 1) Land leveling project

The project has completed a total of 22951.98m<sup>3</sup> of topsoil stripping, 34014.38m<sup>3</sup> of earthwork excavation and filling balance in the leveling area, and 22951.98m<sup>3</sup> of topsoil backfilling; The soil fertility maintenance project in the cultivation layer includes land tillage of 27.2032 hectares (once deep loosening of 40cm and once tillage of 30cm, calculated at twice the cultivated land area), 40.80 tons of bio organic fertilizer, and 8.16 tons of formula fertilizer; Clear 10201 remaining trees.

### 2) Field road engineering

The project has completed the construction of three new mud stone roads (3m wide) with a total length of 809.30 meters; 6 newly constructed mud stone roads (3.5m wide) with a total length of 2823.04 meters.

### 3) Other projects

The project has completed a total of 204.02 acres of wheat and corn cultivation, and 204.02 acres of plowed land.

## 5. Survey and data analysis

On the basis of data collection, organization, and analysis, combined with project planning and design drawings, completion drawings, land use status maps, and review measurement reports, conduct field supplementary investigations on the project evaluation unit, with a focus on examining the basic infrastructure conditions and crop yields in the project area.

According to the actual plot size, contiguous scale, soil type, land use method, and other division results, the survey and evaluation blocks should be reasonably divided. In principle, the area of each block should not exceed 200 acres. Following the principle of "uniform distribution,

typicality, and representativeness", one survey sample point is set up within each survey evaluation block. The evaluation unit plot corresponding to a sampling point is shown in Table 4-7.

The on-site investigation and evaluation of the farmland quality level for the 2023 Renhe Village and three other villages in Hanjing Town, Pucheng County, and the collection of soil samples will be based on the layout map of the sampling points, and GPS will be used to reach the sampling points. Select representative plots, use tools such as stainless steel soil drills, and randomly select 5-10 points using the "S" method. Mix the soil evenly and leave 1kg of soil sample bags for analysis using the quartering method. The sampling depth is 0-20cm on the surface of the cultivated land. After collecting the samples, seal them in sample bags and label them before sending them back to the testing site in a timely manner.

The survey content includes factors caused by changes in the basic conditions of farmland (such as terrain slope, irrigation water source and irrigation guarantee rate, effective soil layer thickness, drainage conditions, etc.) and values of farmland fertility factors (such as surface soil texture, soil salinization degree, soil organic matter, etc.). Through supplementary field surveys and analysis of internal data, a field survey form for evaluating the quality of farmland in the project area was completed, along with relevant field photos and attribute tables. The surface soil texture and soil organic matter content can be directly obtained from the soil laboratory data at the completion and acceptance of the project to obtain their attribute values. The effective soil layer thickness, soil salinization degree, drainage conditions, terrain slope, irrigation water source, and irrigation guarantee rate all need to refer to the preliminary design standards and completion and acceptance data of the soil remediation project, and combined with on-site investigation, verify their attribute information, and complete the on-site survey form for the evaluation of the quality of newly added farmland in the project area, as well as relevant on-site photos and attribute tables.

## 6. Conclusion

The comprehensive land consolidation across the entire region has brought both challenges and great opportunities to the new era of urban and rural construction land expansion and linkage projects. The strong implementation of the expansion and linkage policy has provided great support for promoting urbanization, ensuring the red line of arable land, assisting poverty alleviation, and achieving rural revitalization. However, it can be seen that certain problems have gradually been exposed during the expansion of the policy of linking construction, and continuous modification and improvement are still needed. In the coming period, we should pay more attention to the introduction of the land development right transfer system and the innovation of the operation mode of linked projects, continuously improve the social security system, adapt to the needs of the times, and more effectively leverage the advantages of adding or reducing linked projects.

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