

The Impact of Land Remediation Project Implementation on Soil Quality

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Abstract

Land consolidation projects are one of the main ways to ensure that the area of cultivated land does not decrease and increase grain production capacity, and are also an important means to improve and improve the quality of cultivated land at present. The quality of cultivated land is directly related to the development of the local economy and the vital interests of farmers in the project location. Therefore, it is of great practical significance to study and judge soil quality. This article takes land consolidation projects as an example, analyzes the quality of cultivated land after the completion of the project area through the implementation of land consolidation projects, in order to provide some reference for the quality evaluation of cultivated land in land consolidation projects in China.

Keywords

Land Remediation; Balance Items between Occupation and Compensation; Taiyuan District; Quality of Cultivated Land.

1. Introduction

Land consolidation is one of the main ways to achieve non reduction in arable land area, and is also an important measure to effectively improve and improve the quality of arable land. On February 13, 2014, the former Ministry of Land and Resources issued the "Notice on Strengthening Control and Implementing the strictest Farmland Protection System" (Guotu Zifa [2014] No. 18), which clearly stated the need to strictly implement the farmland protection system and ensure that the total amount of arable land in China does not decrease and the quality of arable land does not decline by implementing land remediation projects based on the balance of occupation and compensation. In the past ten years, China has carried out a large number of land consolidation projects nationwide to improve the quantity and quality of cultivated land, which has provided strong support for the effective implementation of the Dynamic equilibrium of the total amount of cultivated land and the preferential policies, and promoted the local economic development while improving the infrastructure in the project implementation area. In particular, since 2018, the implementation focus of land remediation projects has gradually shifted to the improvement of new cultivated land capacity, forming a new land remediation model integrating the improvement of cultivated land quality, quantity and capacity. Grading and grading the quality of cultivated land is conducive to the further improvement and effective implementation of the cultivated land protection system. This article takes a land consolidation project as an example, and analyzes the quality of cultivated land after the project area is completed through the implementation of the land consolidation project, providing reference for the evaluation and evaluation of cultivated land quality in land consolidation projects.

2. Basic Overview of the Project Area

The project area is located in Baoji, Shaanxi Province, with geographical coordinates ranging from $34^{\circ} 51' 10''$ to $34^{\circ} 56' 29''$ north latitude, East diameter $107^{\circ} 04' 31''$ Up to $107^{\circ} 12' 09''$. The project area is a natural grassland with loess as the main soil layer, with a thickness of 80-250 meters. The soil is nutrient poor, has a loose structure, low cohesion, and poor corrosion resistance. The project area belongs to the hilly and gully area of the Weibei Loess Plateau, consisting of ridges, gullies, and gullies, with a north-south trend. The terrain is high in the north and low in the south. Its texture is loose, with poor adhesion and weak corrosion resistance. The water system is closely related to geological structure, Distributed in a dendritic pattern. The climate condition in the study area belongs to the warm temperate continental semi humid and semi-arid monsoon type, with annual Sunshine duration of 2120 h, wind speed of 1.6 m/s, and maximum frozen soil depth of 50 cm. The average annual precipitation in the project area is 641.1 mm, with a frost free period of 197 days. The regional microclimate characteristics are very obvious. The soil has a pH of 7-8, is loose, has good water permeability and air permeability, and has a strong ability to store water and retain moisture. The cultivation layer in the project area has organic matter and soil nutrients that meet the requirements for crop growth, but with high yield requirements, soil fertility is generally not high, nitrogen is insufficient, and phosphorus deficiency is severe.

3. Infrastructure Conditions

The project area is unused land, far from the village, and some areas have roads with a accessibility of less than 50%. The road sections in conditional areas are mainly plain soil roads, with varying widths and uneven road surfaces, which can only meet the needs of small agricultural machinery and are not conducive to crop planting and project management after project implementation and implementation. After the project is completed, it can be directly cultivated with a high utilization rate. The project village is connected to rural roads, and the transportation is convenient. Vehicles of all sizes and mechanical equipment can directly enter the construction site.

The surface water resources near the project area are relatively abundant. The reserve of water resources can ensure human and animal drinking water and crop irrigation, but due to the lack of supporting water conservancy facilities in the project area, the crop yield is not high. The project area plans to choose surface water sources as irrigation water sources. By constructing pumping stations and burying low-pressure water pipelines near rivers and reservoirs, the cultivated land after the project implementation will be transformed into irrigated land.

At present, the village has completed the rural power grid transformation, and there are currently 10KV high-voltage lines and 380V lines passing through the area. High and low voltage power networks have been connected to the vicinity of the plot, which can meet the power needs of project construction and agricultural production. The power supply in the project area is sufficient, and the power facilities in the village group are relatively complete. The surrounding areas of the project area are farmland, which can be easily irrigated through wells and canals around the village. The current water source is sufficient, and the irrigation and drainage facilities are relatively complete, which can meet the water demand for crop growth in the area. The land improvement and later operation management in the project area do not involve electricity issues, therefore, the power facilities can basically meet the current demand for electricity in agricultural production, daily life, and later development.

According to the Regulations on Grading of Agricultural Land Quality (GB/T 28407-2012), the cultivated land quality of the newly increased cultivated land after the implementation of the land improvement project is evaluated by using the "multi factor comprehensive evaluation

method", "Comparative law of adjacent plots" and "standard sample land amendment method". A supplementary field survey will be conducted on the project evaluation unit by combining project planning and design drawings, as-built drawings, land use status maps, and review survey reports, with a focus on examining basic infrastructure conditions and crop yields in the project area. The project area belongs to the Loess Plateau area - Weibei Longdong Loess Dryland area, and the influencing factors of cultivated land quality are mainly the attribute values of effective soil layer thickness, soil profile configuration, soil salinization degree, Soil organic matter content, drainage conditions, terrain slope, irrigation assurance rate, irrigation water source and other factors. The sources of data collection are as follows: Qianyang County's 2016 annual update and evaluation of cultivated land quality is uniformly deployed by Qianyang County according to the provincial department, Based on the current situation of land use in 2016, an updated evaluation was conducted on the changes in cultivated land quality and other categories from 2015 to 2016. It is the latest available information on cultivated land quality evaluation results, mainly including evaluation reports, data tables, updated data packages, 2016 grade databases, relevant maps, and other achievements.

4. Engineering Construction Content

Land leveling project: The planning and design of this project is based on the requirements of terraced field construction, and the original messy and narrow plot of land will be trimmed and leveled. The width of the field shall not be less than 10 m, the width of individual plots shall not be less than 8 m due to topographic reasons, the elevation difference of the ridge shall be controlled at about 3 m, and the slope of the field along the Contour line shall be controlled at 1/1000-1/800, so that the soil on the field surface is stable and the benefits of water and soil conservation are obvious.

Irrigation engineering: In order to save water and maintain soil and water conservation, this design adopts underground PVC pipes and water outlet piles for irrigation technology. This not only effectively saves water resources, but also enables rational allocation and use of water resources, intensifies and saves water use, effectively utilizes the economic and social benefits of water resources, and reduces soil erosion to a certain extent.

Forest network project: the project is planned to plant *Platycladus orientalis* along both sides of the field road and the inside of the field ridge, and plant Pioneer species (small crested flower) on the slope surface. Plant roots can enhance the stability of soil aggregates and soil Shear strength, and reduce soil collapse; The rapid growth of avant-garde herbs can effectively reduce the erosion of precipitation and surface runoff, play a role in controlling soil erosion on exposed slopes, and ultimately achieve the goal of ecological restoration and soil conservation.

By transforming wasteland into terraced fields, while ensuring the adaptability of horizontal terraced fields to machine tillage and irrigation, as well as the solidity and stability of the ridges, the implementation of land leveling, irrigation, and forest network projects can achieve the goal of increasing the area and improving the quality of cultivated land, as well as controlling local soil erosion and improving the local ecological environment. Through project implementation, production roads have been constructed within the project area, greatly facilitating agricultural production. Through the implementation of this project, agricultural production conditions will be greatly improved, effectively increasing the quantity and quality of arable land, significantly improving land productivity, and significantly improving the ecological environment.

The total scale of the land development project area is 67.5313 hm², all of which are for the development of other grasslands. After the development is completed, an additional land area of 63.8306 hm² can be added, with a new cultivated land rate of 94.52%. Through the comprehensive arrangement of water and soil conservation engineering measures in the construction area, the original water and soil loss is basically controlled, the degree of water

and soil loss control of the project reaches more than 80%, and the water and soil conservation facilities damaged by the project construction are restored to more than 90%.

5. Evaluation Results and Analysis

The newly added arable land area in the project area is 63.8306 hm², including 60.9761 hm² of irrigated land and 2.8545 hm² of dry land. Through calculation, it can be concluded that the national natural grade, national utilization grade, and national economic grade of irrigated land in the project area are Grade 10, Grade 7, and comprehensively considered as Grade 10.

The land development project has greatly improved the agricultural production conditions, significantly increased land productivity, rapidly increased economic income, effectively curbed soil erosion, and significantly improved the ecological environment in the project area through land leveling, water conservancy facilities, roads, and other supporting engineering construction. 15736 Protection forest will be planted in the project area according to the demand, and large trees and economic trees in the project area will be protected, and brick retaining walls will be built to protect the original trees. After evaluating the quality of newly added farmland, the quality of farmland in the project area has improved compared to the surrounding farmland. It is expected that the national level utilization level of irrigated land can reach 10, making it a high-level farmland within the entire county.

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