



Benefit analysis of land consolidation in Zhidan County of Yan'an City

Lirong He^{1,2,3,4, *}, Na Wang^{1,2,3,4}

¹ Shaanxi Provincial Land Engineering Construction Group Co., Ltd;

² Institute of Land Engineering and Technology, Shaanxi Provincial Land Engineering Construction Group Co., Ltd., Xi'an 710075, China;

³ Key Laboratory of Degraded and Unused Land Consolidation Engineering, the Ministry of Land and Resources, Xi'an 710075, China;

⁴ Shanxi Provincial Land Engineering Construction Group Co., Ltd, Xi'an 710075, China.

*Corresponding author e-mail: 156144982@qq.com

Abstract: The land consolidation projects in Zhidan County mainly focus on the wasteland and other woodlands in the Development Zone, which improves the regional ecological environment and enhances the ability to resist natural disasters. Through the implementation of land development and consolidation projects, the number of cultivated land in the area has increased, and the contradiction between land ecological construction and cultivated land demand has been effectively alleviated. After the implementation of the project, the standard of cultivated land in the project area has been improved, the growth conditions of crops have been adjusted, and the guarantee has been provided for maintaining the balance of cultivated land occupation and compensation and ensuring the safety of food production.

Keywords: Land use; benefit analysis; earthwork calculation; Zhidan County.

1. Introduction

With the development of economy and society, the scale of urban construction land in Zhidan County of Yan'an City will continue to expand, and the infrastructure construction is also in full swing. At the same time, the total amount of cultivated land in Zhidan County is decreasing, which has seriously affected the sustainable and stable development of social economy in the project area^[1]. According to the state's statutory goal of maintaining the dynamic balance of the total amount of cultivated land in each

province, municipality directly under the central government and autonomous region, and the policy requirement of "balance of occupation and compensation" for cultivated land occupied by construction, Zhidan County has formulated a series of policies to encourage land development and consolidation^[2].

In order to increase the area of cultivated land, improve the quality of cultivated land, improve the conditions of agricultural production, strengthen farmland protection, control soil erosion, adjust the structure of agricultural production and improve the way of land use, promote agricultural income, promote rural economic development, and improve the rural living environment^[3]. In order to effectively implement the spirit of the Party Central Committee and the State Council on vigorously carrying out rural land consolidation, implement the strictest farmland protection system and the strictest land saving system, and promote the construction of new countryside and the overall development of urban and rural areas^[4], Zhidan County Natural Resources Bureau has carried out land development and consolidation planning, and submitted it to Yan'an City Natural Resources Bureau for the record, Increase the area of cultivated land^[5].

2. Natural condition

2.1 Location analysis

The project area is located in Chengguan village, Baoan Town, between $109^{\circ}11'36''\sim 109^{\circ}11'39''\text{E}$, $37^{\circ}21'23''\sim 37^{\circ}21'30''\text{N}$ It covers an area of about 9 hm^2 , covering natural grassland and other grasslands.

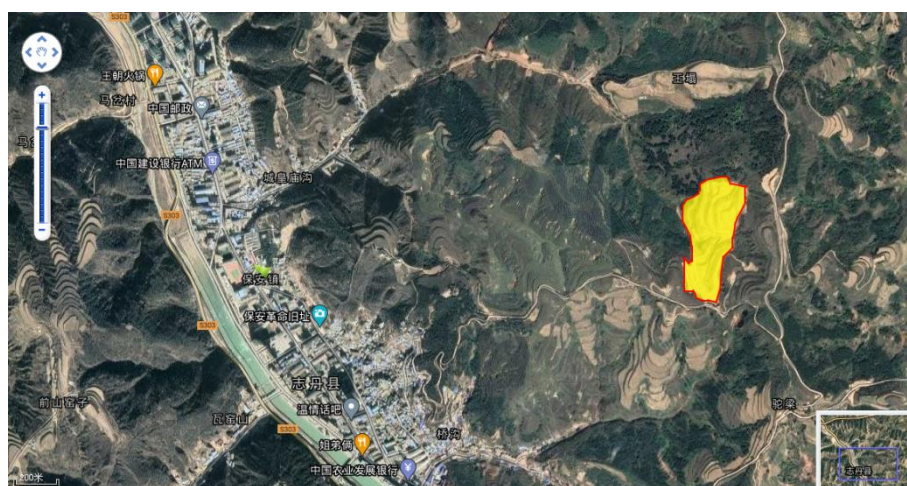


Fig. 1 Location of the project area

The project area is located in the northeast of Baoan Town, Zhidan County, which belongs to valley landform, and is composed of gully land and gullies composed of mountain ridges and hills. The channel width varies from 10 m to 40 m, and the gradient is from 1% to 10%. The terrain at the bottom of the gully in the project area

is relatively gentle, and the slope gradient on both sides of the gully is relatively large, and the soil is loess soil suitable for planting crops.

2.2 Climatic conditions

The climate of the project area is warm temperate and cool, and it is in the transition zone from semi-arid and semi humid climate to arid climate, with typical continental monsoon climate characteristics. Winter is long, cold and dry, spring is long, dry and windy, and there are cold wave cooling weather, summer is short and high temperature, drought and flood alternate, autumn is cool and humid, four seasons climate change is distinct. The annual average temperature is 7.8 °C, the average maximum temperature is 37.4 °C, and the average minimum temperature is - 28 °C. It belongs to the low temperature area of Yan'an City. The annual average sunshine hours are 2313.1 hours, the annual precipitation is 524.5mm, the average frost free period is 142 days, and the crops are ripe once a year.

2.3 Soil and geological conditions

The main soil type in the project area is loessial soil, with physical clay content of 25% - 30%, clay content of 10% - 15%, and coarse sand particles, accounting for about 60%; The content of organic matter is less than 1%, the trace element K is rich, and the trace elements such as N and P are deficient.

Due to the influence of climate types and the complex topography, the vegetation in the project area is scattered and the community is monotonous. On the shady slopes of some hills, there are sparse shrub plants such as tarantula and Hippophae rhamnoides; There are a small amount of duri, elm and apricot on the sunny slope; There are scattered Populus simonii on both sides of the gully.

The project area is a branch of the Yellow River Zhouhe River originated from yinmapo, Zhoujiazui, Jingbian County, and enters the county from dabiagou in shunning Township, and flows into Luohe River at Chuankou, Yongning Town. It flows through five towns of shunning, Zhouhe, Bao'an, Shuanghe and Yongning. The area of the basin is 1112km², with a length of 57km. The river bed is 100m wide, the river gradient is gentle, with an average ratio drop of 3.6%, and the river channel is wide. The maximum flow rate is 9.23m³/s, and the minimum flow rate is 0.078m³/s. The county hydrological station measured that the maximum peak discharge of Zhouhe river is 2610m³/s and the minimum flow is 0.004m³/s. The first ice is October 21, with an average of October 31, the earliest November 12, the average November 25, the average thawing March 26, the latest April 26, the longest of 109 days, an average of 85 days, the shortest 71 days, and the perennial ice age of more than 60 days. The main tributaries are dingcha ditch, Fuma ditch, baowa ditch, Zhifang ditch, suncha ditch, Mazi ditch, tuduntai ditch, kangjiagou, etc. The main river channel is from the top to the Tun Bay, and between the lower reaches of kangjiagou, and there is a

whole platform on both sides. Because the river is flat and flat, it is gravel river bed, and there is no fixed channel. The river water is inverted to brush the platform of both sides, especially in the section from Liuping to Chuankou. The annual erosion modulus is 12000t/hm², and the annual sediment transport is 13.34 million tons.

Most of the water quality in the project area has good sensory properties, with transparency greater than 30.0cm, pH value between 8.24-8.7, total hardness of 251-451, and total ion amount below 1500mg / L. Surface water resources meet the irrigation water quality standards.

The project area is a part of the Ordos platform depression. The area is mainly composed of Mesozoic sedimentary rock series. On the Mesozoic strata and Cenozoic Tertiary red soil layer, there is a deep Quaternary loess rock series. The bedrock outcrop occurs in deep valleys or mountain areas that have been strongly eroded. The surface is mostly covered by Quaternary upper Pleistocene Aeolian Loess, Holocene alluvial proluvial loess like soil and loose strata, and some sections are exposed to the sand, gravel and sandy shale of the Triassic system. The main gullies in the basin are seriously eroded and no rocks are exposed.

The main natural disasters affecting agricultural production in the project area are drought and hail, followed by frost, rainstorm and dry hot wind. According to the statistics of meteorological department, the annual average drought in the project area is 2.92 times, frost is 0.5 times, rainstorm is 3 times, hail is 2 times. It can be seen that rainstorm, drought and hail have high frequency and large damage area, and the loss of agricultural production is the most serious. Frost and dry hot wind disasters have limitations, and the threat to agriculture is relatively small.

3. Analysis on the current situation of land use

3.1 Analysis on the current situation of land use

a) Land ownership

The land in the project area is owned by the local village collective and contracted by the villagers. The area of land management right has been decomposed to each household and registered.

b) Land use structure

According to the relevant regulations of the second national land survey regulations (tdt1014-2007), the total land area of the project area is 9.3262hm², the construction scale is 9.3262hm², and the land occupation is natural grassland and other grassland.

c) Land use degree

The land use degree of the project area is evaluated by the following indicators:

1) Land reclamation rate, that is, the ratio of cultivated land area to the total land area of the project area, reflects the degree of land development and planting development.

There is no cultivated land in the project area, and the land reclamation rate is 0.

2) Land use rate, that is, the ratio of the land area used to the land area in the project area, reflects the degree of land use. There is no cultivated land in the project area, and the land utilization rate is 0.

3) The multiple cropping rate of cultivated land is the ratio of the total sown area of crops to the cultivated land area. There is no cultivated land in the project area, so the multiple cropping rate of cultivated land is 0.

d) Land quality

According to the survey, when the profile depth is 0-20cm, the soil organic matter content is 0.35%, total nitrogen content is 0.028%, total phosphorus content is 0.15%, total potassium content is 1.7%, and pH value is 8.5; When the profile depth is 20-40cm, the soil organic matter content is 0.31%, the total nitrogen content is 0.018%, the total phosphorus content is 0.13%, the total potassium content is 1.82%, and the pH value is 8.5. The soil is slightly alkaline, the nitrogen and phosphorus elements are seriously lacking, and the potassium element is relatively rich.

3.2 Earthwork calculation

The soil layer in the project area is deep, and the land is flat without topsoil stripping. The earthwork for ridge construction is pushed from adjacent fields (from high to low, foundation clearing to downstream fields, and filling earthwork to upstream fields), and the earthwork movement is calculated separately without repeated calculation^[6]. The Irregular Triangulation Method in South CASS7.1 software is used to calculate the earthwork leveling quantity in the field. In this method, the triangulation network is constructed by using the measured broken points and characteristic points of the terrain. The earthwork in the calculation area is calculated by the triangular prism method according to the design elevation. Finally, the earthwork quantity of filling and excavation in the calculation area is accumulated, and the boundary of filling and excavation is drawn. This method directly uses the original data as grid nodes, and does not change the original data and accuracy. Triangulation method can be very suitable for complex and irregular terrain, so as to better express the real landform characteristics. So it can be used for earthwork calculation of land leveling^[7].

The construction scale of the project area is 9.3262hm² (139.89 mu), the newly increased cultivated land is 8.9394hm², the ratio of newly increased cultivated land is 95.85%, and the engineering grade is grade IV.

The specific contents of the land leveling project are: 8.9394hm² of dam land and terrace, 245305m³ of earth excavation, 241838m³ of earth backfill, and 2535.29m of newly built ridge.

4. Benefit analysis

4.1 Social benefit analysis

After the implementation of the project, the standard of cultivated land in the project area has been improved, and the net increase of cultivated land area is 8.9394hm², which plays a great role in maintaining the balance of cultivated land occupation and compensation and ensuring the safety of food production^[8].

The social benefit calculation index of the project is as follows:

a) The area of new cultivated land and the rate of new cultivated land. At present, the most important purpose of land development and renovation is to increase the area of effective cultivated land and improve the quality of cultivated land. Therefore, the amount of new cultivated land is an important indicator to reflect the social benefits and impact of the project at this stage^[9].

4.2 Ecological benefit analysis

a) A reasonable and good ecological model has been formed, which improves the ecological environment

The project measures mainly include wasteland and other woodlands in the Development Zone, which improves the ecological environment of the area and enhances the ability to resist natural disasters. It not only makes the cultivated land effectively protected, regulates the growth conditions of crops, but also provides guarantee for the development of ecological agriculture in the project area.

b) The amount of cultivated land has been increased and the results of converting farmland to forest have been consolidated

Through the implementation of the land development and consolidation project, the number of cultivated land in the project area has increased, which is to stabilize the cultivated land area and alleviate the contradiction between the land ecological construction and the demand of cultivated land.

4.3 Economic benefit analysis

Corn is the main crop planted in the farmland of the project area before the project implementation, and the main crop of the farmland after the implementation of the project is also corn. Before the implementation of the project, there is no cultivated land in the project area. After the implementation of the project, 8.9394hm² of cultivated land is added. The cultivated land area of the project area reaches 8.9394hm², the planting area of crops increases and the grain yield increases accordingly. The main crops in the project area are corn, which is 2.2 yuan / kg according to the current purchase price, 300 yuan per mu cost after land consolidation and 700kg per mu.

The implementation of land consolidation of the project has greatly improved the quality of cultivated land in the project area, and 8.9394hm² farmland with stable

yield and high yield has been built. According to the planting proportion, planting area, unit price and cost, the annual net output value of the project area can be calculated as 166300 yuan.

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