

# Influence of high-efficiency water-saving irrigation measures on the quality of cultivated land in high-standard farmland construction projects

Xiaojiao Chen

Weibei Branch of Shaanxi Provincial Land Engineering Construction Group Co.,Ltd., Xi 'an,  
Shaanxi 710075, China

## Abstract

The annual update evaluation results of arable land quality grades are also the basis for agricultural land grading and evaluation, especially when the revision method is used for agricultural land grading. This paper studies the impact of water conservancy facilities on cultivated land in the construction of high-standard farmland projects, in order to provide some reference for the evaluation of cultivated land quality.

## Keywords

High-standard farmland; arable land classification; evaluation; quality improvement.

## 1. Introduction

In the balance of farmland occupation and supplementation, in order to ensure the area of supplementary farmland and improve the quality of supplementary farmland, a sample survey method can be used to select a certain number of representative sample sites in Shaanxi Province, and according to the agricultural land classification regulations, use the utilization rate as the classification of farmland. Standard, determine the quality of the plot, and investigate the standard grain yield of the plot. On this basis, the conversion factor between each grade is calculated. The establishment of a balance conversion system for cultivated land occupation and compensation is conducive to improving policies and systems related to the balance of cultivated land occupation and compensation, establishing an effective evaluation and supervision mechanism, maintaining the comprehensive production capacity of cultivated land, and effectively ensuring food security..

## 2. Project area overview

The landform characteristics of the project area belong to the Weibei plain area, with open ground, deep soil layers and fertile soil. The soil characteristics are grayish-yellow, and the main soils are pseudo soil and loess soil. The altitude is between 350 and 370m. The climate of the project area is a continental warm temperate semi-arid monsoon climate, with four distinct seasons of cold, warm, dry and wet. The annual average temperature is 13.5°C, the extreme minimum temperature is -17°C, the extreme maximum temperature is 41.9°C, the maximum permafrost depth is 28cm, and the annual average rainfall is 575.82mm. , the rainfall has a strong seasonality, mostly concentrated in July, August and September. The average annual evaporation is 1035.7mm, the sunshine hours are 2154.7h, the monthly average relative humidity is 68.6%, and the average wind speed is 2.6m/s. The total amount of water resources in the project area has averaged 154.3 million m<sup>3</sup> for many years, including 40.29 million m<sup>3</sup> of surface water resources, 121.87 million m<sup>3</sup> of groundwater resources, and 7.86 million m<sup>3</sup> of groundwater and surface water duplication in the whole area.

### 3. Determination of evaluation parameters

#### 3.1. Determination of grading factor index area

The grading factor index area is an area divided according to the principle of dominant factors and the principle of regional differentiation, and is a combination of various factors that determine the natural quality of agricultural land in the area. The annual update of cultivated land quality grades follows the grading factor index area adopted in the supplementation and improvement of cultivated land quality grades in 2010, that is, three levels are divided at the national level and the provincial level. The first-level index area is the Loess Plateau, the national second-level index area is the Fen-Wei Valley, and the Shaanxi provincial-level index area is the Guanzhong Weihe Plain.

#### 3.2. Determination of benchmark crops and designated crops

The benchmark crop is the conversion benchmark of the theoretical standard grain, and is a relatively common main food crop in a certain region. The agricultural land grading work in Shaanxi Province uniformly selects winter wheat as the benchmark crop, and the annual update evaluation of the quality of cultivated land still uses winter wheat as the benchmark crop. The designated crops for the annual update evaluation of cultivated land quality in the project area are consistent with the designated crops determined in the annual update evaluation of cultivated land quality in 2018, which are winter wheat and summer maize.

#### 3.3. Determination of Standard Farming System

The standard farming system is conducive to production or maximizes the production potential of local land under the current socio-economic level, production conditions and technical level, has great development prospects, does not cause ecological damage, can meet social needs, and has been widely used in the local area. farming methods used.

The standard farming system in the project area is "winter wheat-summer maize", and the multiple cropping type is "two crops a year", which is consistent with the standard farming system and multiple cropping type adopted in the 2017 update and evaluation of arable land quality.

### 4. Project data collection

The 2018 county-level arable land quality evaluation results in the project area include text results, database results and data table results. The 2018 land use change survey results confirmed by the Ministry of Economic Affairs of the project area were collected, and the 2018 land use change survey database in the project area was used as the basis for the establishment of the annual update evaluation database for the quality of cultivated land. Collect and sort out the feasibility study, design and completion acceptance data of various types of land consolidation projects, comprehensive agricultural development, and farmland water conservancy construction projects accepted in Lintong District in 2019, as well as project arable land quality assessment data. Focus on investigating the attribute values of factors such as the grading of cultivated land irrigation guarantee rates within the scope of land consolidation and comprehensive agricultural development projects, and further improve the grading factor map of cultivated land.

### 5. Project construction content

Water conservancy measures: 74 new water source wells, 11 old wells repaired, 85 sets of QJ submersible pumps, 85 repaired and newly built wells, 26 km of transmission lines; There are 60 supporting canal buildings; 32km of Φ110 PVC low-pressure pipelines are buried, 1050

outlet spigots are set, 75m of supporting passage casings, 55 gate valve wells and 65 drainage wells. Agricultural measures: Effectively improve soil 0.75 million mu, combine straw returning technology with soil improvement, increase application of organic fertilizer, improve soil quality and increase output rate; build 22km field mechanized road. Forestry measures: Plant a row of road forests on both sides of the field road, with a total length of 22km, and 14,000 trees are planned to be planted.

## 6. Conclusion

The grading factors selected for the Weihe River Plain in Guanzhong where the project area is located include: effective soil layer thickness, surface soil texture, soil salinization degree, soil organic matter content, drainage conditions, terrain slope, irrigation guarantee rate, and irrigation water source. Analyze the impact of high-standard farmland construction in the project area on these grading factors: existing projects have no impact on effective soil layer thickness, surface soil texture, soil salinization, terrain slope and drainage conditions; soil fertility and fertilizer have an impact on soil organic matter, but the impact is small; the supporting facilities of motor-driven wells, open channels and related canal buildings and the construction of high-efficiency water-saving irrigation have an impact on the irrigation guarantee rate and irrigation water sources. There is no change in the irrigation water source; through the rational allocation of irrigation water resources from the original water source and new workover wells, the irrigation guarantee rate in the project area can be improved from general satisfaction to basic satisfaction. Therefore, after the project area has passed the construction of high-standard farmland, the level of cultivated land has been improved.

## References

- [1] WANG Ke,LI Ling,LI Peng. Study on High-standard Farmland Construction Based on Ecological Security and Food Security[J]. Journal of Ecology and Rural Environment, 2021, 37(6): 706-713.
- [2] Li Hejing,Chen Yaheng,Huo Xiliang. Study on Supplement Farmland Grade Evaluation of Coastal Plain in Hebei Province[J]. Journal of Anhui Agricultural Sciences, 2008, 36(18): 7800-7804.
- [3] SUN Li,WU Qifeng,YU Xiaoping. Problems and Countermeasures in Evaluation of Cultivated Land Quality[J]. Modern Agricultural Science and Technology, 2019, (22): 125,130.
- [4] Bian Zhenxing,Yu Miao,Wang Qiubing,et al. Method for quality evaluation of supplementary cultivated land on urban and rural construction land changes[J]. Transactions of the Chinese Society of Agricultural Engineering, 2011, 27(12): 318-323.