HIGH-STANDARD FARMLAND AND GREEN MINES
CONVERGENCE CONSTRUCTION

-- PILOT STUDY IN SHIZONG COUNTY, YUNNAN PROVINCE, CHINA

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Youth Forum on Innovative Geospatial Information Applications, Mae Fah Luang University,
Chiang Rai, Thailand and Online, 30 January to 1 February 2024
1. Background
2. Mapping
3. Field Survey
4. Calculating of Total Amount of Soil
5. Engineering and Technical Solutions
6. Information Used in the Project
7. Expected Area of Farmland Reclaimed
In 2022, China imported a total of 146.872 million tons of grain, accounting for 17.6% consumption depends on import.

Chinese President Xi Jinping:
- The rice bowls of the Chinese people must be firmly in our own hands.
- gradually develop all permanent basic cropland into high-standard farmland.
1. Background

The Ministry of Natural Resources:
- Manages the land resources
- Manages the reclamation of the mining area.
- Classified the land quality into 15 grades following “the Classification of Agricultural Land Quality (GB/T 28407-2012)”

The Ministry of Agriculture and Rural Affairs:
- Uses arable land for agricultural production
- Classified the land quality into 10 grades following “the Cultivated Land Quality Grade (GB/T 33469—2016)”
- Taking the responsibility of developing all permanent basic cropland into high-standard farmland, following “General Principles for High-standard Farmland Construction (GB/T 30600-2022)” and “Evaluation Specifications for High-standard Farmland Construction (GB/T 33130-2016)”
DEFINITION OF HIGH-STANDARD FARMLAND

High-standard farmland refers to cultivated land that is flat, concentrated and contiguous, has perfect facilities, fertile soil, good ecology, strong disaster resistance.

The construction of high-standard basic farmland mainly includes:

① Land leveling project:
   - the thickness of the tillage layer >30 cm,
   - the thickness of the effective soil layer >60 cm
   - the field area > 200 mu (13.3 hectares) in the northern plain area
   - the field area > 100 mu (6.67 hectares) in the southern plain area
   - The horizontal terrace rate in hilly >90%.

② Irrigation and drainage projects: Irrigation design guarantee rate >90%.
   - The drainage standard should not be less than once in 10 years.

③ Accessibility: >95% in the plain area, and >80% in the hilly area.

④ ......(more)
INTRODUCTION TO WUYI COAL MINE

Located in Shizong County, Yunnan Province, China.
1. Background

Five research institutions signed a contract with Ronghang Coal Industry Co. Ltd for the research and development of technical solutions for the reclamation of mining area and developing it into high-standard farmland, including:

- Institute of Geographical Sciences and Natural Resources Research, Chinese Academy of Sciences,
- Institute of Environment and Sustainable Development in Agriculture, Chinese Academy of Agricultural Sciences,
- China University of Geosciences
- China Agricultural University
- China Academy of Land Surveying and Planning
DJI Matrice 350 RTK drone collects data, and with DJI software, it can quickly obtain 2D and 3D digital results with a spatial resolution of 10 cm. The key purpose of mapping is for irrigation facilities design.
2. Mapping
2. Mapping
The average altitude above sea level is 2037.18 meters. The relative altitude is less than 260 meters in the 94.2% of reclamation area.

<table>
<thead>
<tr>
<th>Altitude (meters)</th>
<th>Area (square meters)</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>1855-1875</td>
<td>174818</td>
<td>0.2</td>
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<tr>
<td>1875-1895</td>
<td>597814</td>
<td>0.8</td>
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<td>1895-1915</td>
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<tr>
<td>1915-1935</td>
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<tr>
<td>1935-1955</td>
<td>4051997</td>
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<td>2.3</td>
</tr>
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<td>106569</td>
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</tr>
<tr>
<td>2295-2307</td>
<td>24055</td>
<td>0</td>
</tr>
<tr>
<td>Sum</td>
<td>72500139</td>
<td>100</td>
</tr>
</tbody>
</table>
2. Mapping
2. Mapping
3. Field Survey

investigations on soil quantity and quality, water resources, climatic conditions, etc., as well as basic data collection work.
3.1 Climate

- The annual sunshine is 1672.8 hours on average,
- the frost-free period is as long as 244 days, which can meet the heat demand of double cropping in one year.
- The annual precipitation is 1235.57 mm. The precipitation is relatively abundant, which is conducive to the growth of crops in the reclamation process.
3.2 Vegetation

The vegetation coverage rate in the area is average, and the vegetation coverage rate in the local valley section and the upstream valley area is relatively high.
3.3 Soil

1. **Red soil**: the largest distribution in the area.
   - a soil thickness of 0.80~3.0m and
   - a surface organic matter content of 3%-5%.
   - the texture is mostly sandy loam and silty loam,
   - the pH value is between 4.5~5.5,

2. **Yellow-brown soil**: distributed in the high-altitude areas.
   - the content of surface organic matter is generally 3.0%-5.0%.
   - the thickness of the soil layer is generally 0.80~3.5m,
   - the texture is mainly sandy loam to clay,
   - the pH value is between 4.5~5.5.

3. **Purple soil**: the thickness of the soil layer is generally 0.80~2.5m.
3.3 Soil
3.4 Geological Data
4. Calculating of Total Amount of Soil

As there are minimum requirements to thickness of the tillage layer >30 cm, and the thickness of the effective soil layer >60 cm, so the total amount of soil is most key issue to the successful development of the mining area into high standard farmland.
4. Calculating of Total Amount of Soil
4. Calculating of Total Amount of Soil

<table>
<thead>
<tr>
<th>Land use type</th>
<th>DEM (m)</th>
<th>Slope (°)</th>
<th>Thickness of soil layer (m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Forest</td>
<td>DEM&lt;2000</td>
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<td>11</td>
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<tr>
<td></td>
<td>2050&lt;DEM&gt;2000</td>
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<td>5.0</td>
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<tr>
<td></td>
<td>DEM&gt;2050&gt;2000</td>
<td>&gt;25</td>
<td>1.5</td>
</tr>
<tr>
<td></td>
<td></td>
<td>&lt;25</td>
<td>1.0</td>
</tr>
<tr>
<td>Farmland and grassland</td>
<td>DEM&gt;2050&gt;2000</td>
<td></td>
<td>0.5</td>
</tr>
<tr>
<td>Bare land</td>
<td>DEM&gt;2050&gt;2000</td>
<td></td>
<td>0.2</td>
</tr>
<tr>
<td>Water body</td>
<td></td>
<td></td>
<td>0.0</td>
</tr>
</tbody>
</table>

The thickness of effective soil layer is more than 2.19m, fully meets the requirement of high standard farmland.
5. Engineering and Technical Solutions

① **TOP SOIL COLLECTION**

The topsoil and sub-topsoil in the dump area and the open mining area are stripped and collected, and stored in storage.

② **BACKFILLING AND ROLLING LEVELING**

The pit is backfilled, compacted and leveled in layers of 5-8 meters thick to avoid collapse after the pit is backfilled.
TOPSOIL COVERING

On the basis of the pit backfill leveling, the subsoil and top soil are covered in order to maintain the fertility and activity of the soil.
4. **Plot Shaping**

- The fields are square,
- the canals are networked,
- the roads are connected.
5. Engineering and Technical Solutions

5️⃣ IRRIGATION AND DRAINAGE SYSTEM DESIGN

- Irrigation system: Adopt an efficient supplementary water saving irrigation system.
- Drainage system: Based on local meteorological conditions, soil infiltration coefficient, catchment surface and other parameters, design a high-efficiency drainage system suitable for the local area.
According to the results of soil physical and chemical property analysis, physical technology, biotechnology, engineering technology and chemical technology are used to improve the soil.
6. Information Used in the Project

- Climate information
- Soil information
- Vegetation information
- Water resources information
- Topography information, including DEM
- Social information
- Coal mining information
- Governance information
- Geological data
- National and regional policy information
- Drone aerial survey
- Remote sensed data
- 1:10,000 geographic map
Through the construction of landform remodeling, land leveling, soil layer reconstruction, soil fertilization, and high-efficiency water-saving irrigation system.

1. **Wuyi Mining Area**
   Wuyi mining area now is about 5.51km², the planning area is about 9.8km², after reclamation, 1382 hectares of high-standard farmland will be built.

2. **Duck Pond Area**
   Duck pond area is about 30km², after reclamation, 3242 hectares of high-standard farmland will be built.
THANKS FOR YOUR ATTENTION!