Yueqing Chint **150MW** agricultural photovoltaic power generation project

Soil and Water Conservation Monitoring Summary Report

Construction unit: Yueqing Chint Photovoltaic Power Generation Co., Ltd.

Prepared by: Zhejiang Jiantou Environmental Protection Engineering Co., Ltd.

February 2022

乐清正泰150兆瓦农光互补光伏发电项目

水土保持监测总结报告

建设单位：乐清正泰光伏发电有限公司

编制单位：浙江建投环保工程有限公司

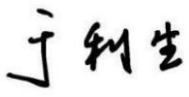
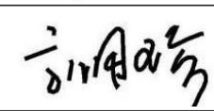
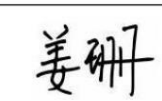
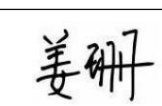
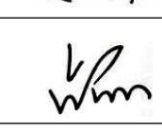
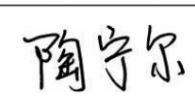
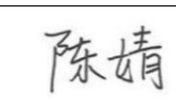
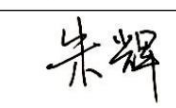
二〇二二年二月

Yueqing Chint 150MW Agricultural Photovoltaic Complementary Power Generation Project

Soil and Water Conservation Monitoring Summary Report

Responsibility Table

Zhejiang Jiantou Environmental Engineering Co., Ltd.

Division of responsibilities	Responsible Person	Position or title	sign
approve:	Yu Lisheng	Chairman	
Approval:	Zhu Song	Deputy General Manager	
Review check:	Fang Pei Zhen	Chief Engineer	
School Core:	Jiang Shan	Senior Engineer	
Project Leader:	Jiang Shan	Senior Engineer	
Written by: Zhan Jing (Chapter 1, 8, Appendix) Engineer			
	Tao Ninger (Chapter 2-5, attached pictures)	Assistant Engineer	
	Chen Jing (Chapter 4-5)	Assistant Engineer	
	Zhu Hui (Chapter 6-7)		

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appendix:

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Attached pictures:

1. Geographical location map of the project

2. Layout of project soil and water conservation monitoring points and layout of soil and water conservation measures

Soil and Water Conservation Monitoring Characteristics Table

<table>
<tr><td colspan="8">Main technical indicators of the main project</td></tr>
<tr><td colspan="2">Project Name</td><td colspan="6">Yueqing Chint 150MW Agricultural Photovoltaic Complementary Power Generation Project</td></tr>
<tr><td colspan="2" rowspan="6">Construction scale</td><td colspan="3" rowspan="6">The total installed capacity of this project is 150MWp.
Polycrystalline silicon photovoltaic cell modules as photovoltaic
Conversion equipment, through the inverter, box transformer
The current is converted to 35kV AC power for access to the field
Power cable system, then booster station through the secondary
After boosting to 110kV, it is input into the high voltage grid.
The design mainly includes solar photovoltaic components,
Booster station, string inverter, box transformer
Devices, collector circuits, etc.</td><td>Construction unit</td><td colspan="2">Yueqing Chint Photovoltaic Power Generation Co., Ltd.</td></tr>
<tr><td>Contact person/contact details</td><td colspan="2">Wang Lin/18868122291</td></tr>
<tr><td>Construction site</td><td colspan="2">Shenglitang North, Chengdong Street, Lecheng Town, Yueqing City
Area construction block</td></tr>
<tr><td>Water system</td><td colspan="2">Oujiang River System</td></tr>
<tr><td>Total project investment (100 million yuan)</td><td colspan="2">15</td></tr>
<tr><td>Total construction period (months)</td><td colspan="2">14</td></tr>
<tr><td colspan="8">Soil and Water Conservation Monitoring Indicators</td></tr>
<tr><td colspan="2">Physical geography type</td><td colspan="3">Wenzhou coastal siltation plain</td><td>Prevention and control standards</td><td colspan="2">Secondary Standard for Construction Projects</td></tr>
<tr><td colspan="2" rowspan="4">monitor content</td><td colspan="2">Monitoring indicators Monitoring methods (facilities) Monitoring indicators</td><td colspan="3"></td><td colspan="2">Monitoring methods (facilities)</td></tr>
<tr><td colspan="2">1. Soil and water erosion situation monitor</td><td colspan="3">Field measurement 2. Field measurement and data analysis of the prevention and control responsibility area</td><td colspan="2"></td></tr>
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ÿt/km²·aÿ</td><td colspan="2">300</td></tr>
<tr><td colspan="3">Actual scope of responsibility for prevention and control ÿhm²ÿ</td><td colspan="2">259.6476</td><td>Allowable soil loss
ÿt/km²·aÿ</td><td colspan="2">500</td></tr>
<tr><td colspan="3">Soil and water conservation investment (10,000 yuan)</td><td colspan="2">1547.61</td><td>Soil and water loss target value
ÿt/km²·aÿ</td><td colspan="2">300</td></tr>
<tr><td rowspan="9">Defend rule Measures Shi</td><td rowspan="2">zone I - photovoltaic group Field control area</td><td>Engineering measures</td><td colspan="6">Recultivated 249.8067hm2</td></tr>
<tr><td>Interim measures</td><td colspan="6">Plastic color striped cloth cover 2000m2</td></tr>
<tr><td rowspan="3">Zone II - Booster Station</td><td>Engineering measures</td><td colspan="6">865m of rainwater pipe network, 10,000m3 of greening soil</td></tr>
<tr><td>Plant control area</td><td colspan="6">Comprehensive greening 0.2002hm2</td></tr>
<tr><td>Temporary measures</td><td colspan="6">Plastic colored strips covering 1000m2, drainage ditch excavation 112m3, sedimentation pond excavation 5m3</td></tr>
<tr><td rowspan="2">Zone III - Collector and road works Control Area</td><td>Plant measures</td><td colspan="6">5.40hm2 of grass planting</td></tr>
<tr><td>Interim measures</td><td colspan="6">Plastic color striped cloth cover 1500m2</td></tr>
<tr><td rowspan="2">Zone IV - Construction Temporary measures and facility prevention district</td><td>Engineering</td><td colspan="6">Recultivate 0.80hm2;</td></tr>
<tr><td>Interim measures</td><td colspan="6">Drainage ditch earthwork excavation 152m3, sedimentation pond earthwork excavation 15m3</td></tr>
</table>

Continued from the table above

monitor in conclusion	Prevention Effect	Classification index	Target value ÿ%ÿ	Reach value ÿ%ÿ	Actual monitoring quantity					
		General Treatment of Soil and Water Loss Reasonableness 95		99.9	Prevention and control measures area ÿhm²ÿ	256.2069	Buildings Hardened surface Product (hm²)	3.4407	Disturbing the land Total area ÿhm²ÿ	259.6476
		Soil loss control Compare	1.7	1.7	Area of responsibility for prevention and control ÿhm²ÿ		259.6476	Total area of soil erosion (hm²)		259.6476
		Muck protection rate	95	99.9	Engineering measures area (hm²)	250.6067		Allowable soil loss (t/km²·a)		500
		Topsoil protection rate	/	/	Plant measure area (hm²)		5.6002	Monitoring soil loss Condition (t/km²·a)		200
		Forest and grass vegetation restoration Rate	95 99.99		Restorable forest and grass vegetation area Volume (hm²)		5.6002	Forest and grass vegetation area ÿhm²ÿ		5.6002
		Forest and grass coverage	22 71.51		Actual blocking temporary earth pile (Stone, slag) quantity (million m³ÿ		6.74	Total temporary soil pile volume (million m³ÿ		6.74
		Evaluation of Soil and Water Conservation Management price			Meet the Standard					
		Overall conclusion			The overall layout of the project's soil and water conservation measures is reasonable, and the main design and approval plan have been completed. The soil and water conservation facilities are generally of qualified quality, and soil and water loss is controlled. Through effective control, the ecological environment in the project area has been improved. After trial operation, the soil and water conservation engineering measures and plant measures are running well. It has strong soil and water conservation function and has achieved the prevention and control objectives of the approved plan.					
Key recommendations					When the project is handed over, the construction unit shall clarify with the operation unit the follow-up maintenance of soil and water conservation facilities. The responsibilities and obligations of soil and water conservation management are to ensure that soil and water conservation facilities can play a continuous, safe and effective role in water conservation. Soil loss prevention and control benefits.					

1. Overview of the construction project and project area

1.1 Project Overview

1.1.1 Geographical location

The project is located in the construction area of Shenglitang North Section, Chengdong Street, Lecheng Town, Yueqing City, Zhejiang Province. The site coordinates are approximately Latitude 28°07ÿ30, longitude 121°01ÿ30 East.

The geographical location of the project is shown in Figure 1.

1.1.2 Main technical indicators

The total installed capacity of this project is 150MWp, using polycrystalline silicon photovoltaic cell modules as photoelectric conversion equipment. The inverter and box transformer convert the current into 35kV AC power and connect it to the power cable system in the field area. After being boosted to 110kV, it is input into the high voltage grid.

The construction content mainly includes solar photovoltaic components, booster stations, string inverters, box transformers, and collector wires. Road, etc.

The project covers an area of 259.6476hm2, of which 1.0009hm2 is permanent land for the booster station; 258.6467hm2, including photovoltaic panel field, road engineering collection lines and construction sites.

The total construction period of the project is 14 months. Construction started in October 2015 and was completed in November 2016.

The project construction unit is Yueqing Chint Photovoltaic Power Generation Co., Ltd.

The total investment of the project is RMB 1.50 billion, of which RMB 135 million is for civil engineering, which will be raised by the construction unit.

The main technical indicators of the project are shown in Table 1-1.

Table **1-1** Main technical indicators of the project

I. Basic Information of the Project				
Project Name		Yueqing Chint 150MW Agricultural Photovoltaic Complementary Power Generation Project		
Construction		The construction area of Shenglitang North Area, Chengdong Street, Lecheng Town, Yueqing City		
Location Construction Unit		Yueqing Chint Photovoltaic Power Generation Co., Ltd.		
Construction scale		The total installed capacity is 150MWp, with a total of 486,000 310Wp polycrystalline silicon photovoltaic modules installed. 110kV booster station and supporting facilities		
Project Nature		New construction projects		
Total Project Investment		Total investment: RMB 1.5 billion (Civil construction investment: RMB 135 million)		
Construction Period		October 2015 ~ November 2016, total construction period 14 months		
II. Project composition and land occupation (unit: hm2)				
		Total leased land	(temporary land occupation)	Indicator characteristics
Photovoltaic site	Photovoltaic modules and supports	251.0067	251.0067	A total of 486,000 310Wp polycrystalline silicon photovoltaic panels were deployed
	Frame foundation			The photovoltaic support foundation adopts prefabricated concrete pipe piles.

	Inverter and box transformer 0.81		0.81	A total of 148 1000kVA box-type transformers and 296 500kW Centralized inverter
	Subtotal 251.8167		251.8167	
110kV booster station		1.0009	1.0009	A 2F production auxiliary building, main transformer, SVG, fire protection Sand box, biochemical treatment pool, accident oil pool, a 2F Living building and outdoor GIS, etc.
Road works		1.43	1.43	The original state of the access road is mud-bound gravel road surface. The process was transformed into an asphalt concrete structure. 2.044km, width 6m. Maintenance road in photovoltaic field Make full use of the existing mud-gravel road.
Total construction		5.40	5.40	35kV cable usage is about 36km
sites of collector		ÿ0.80ÿ	ÿ0.80ÿ	
lines		259.6476	259.6476	

3. Earthwork volume of the project (10,000 **m3)**

Project	Excavation volume Filling volume		debit	Give up
composition:	0.44	0.44		
Photovoltaic site, 110kV		2.05	2.05	
booster station,	6.30	6.30		
collector line,		0.72	0.72	
road engineering subtotal	6.74	9.51	2.77	0

1.1.3 Project Progress

The total construction period of the project is 14 months. It started in October 2015 and was completed at the end of November 2016.

1.1.4 Natural environment

1) Geological earthquake

According to regional geological data, geological structural conditions and analysis of historical earthquakes and modern earthquake activities, there is no area in the project area.

The fault passes through the area, and the historical earthquakes in the area are characterized by small magnitude, weak intensity and low frequency, which makes it a relatively stable area.

According to the China Earthquake Motion Parameter Zoning Map (GB18306-2001) (1/4 million), the peak acceleration of the earthquake motion in the project area

The magnitude is 0.05g (g is the acceleration of gravity), the corresponding basic earthquake intensity is VI, and the design earthquake grouping is the first group.

It is a poor earthquake-resistant area for buildings. The building site category of the site is IV.

The shallow silt thickness of the site is large, the engineering properties of the soil are poor, the soil is under-consolidated, has high water content, low strength, and high pressure.

The site is a fill area, and the fill site will produce large settlement and differential settlement.

According to the design data, the shallow foundation soil of the site generally cannot meet the requirements of the factory building (structure) for the natural foundation.

Artificial foundation and pile foundation treatment are required. The selection of the bearing layer at the end of the pile foundation should be based on the design load and deformation requirements of the single pile.

Depending on the requirements, the pile end bearing layer can be selected from (3) layer of clay and (4) layer of silty clay mixed with gravel.

2) Topography

The landform of the project site is a Wenzhou coastal siltation plain with a relatively flat terrain. The east canal is to the west of the site.

The site is divided into several irregular blocks by the Xigan River and several roads and bridges, and there are river networks and water areas around the site.

The terrain is open and slightly undulating with a small height difference, ranging from 1.50m to 2.64m.

Before construction, most of the project site was coastal mudflats, ponds, etc., and some areas were piled with construction waste.

Garbage, miscellaneous fill, etc. The vegetation in the site is mainly weeds.

In addition, no karst, landslide, mud-rock flow, collapse, ground subsidence, ground fissures or other unfavorable terrain were found within the survey area.

Quality effect.

3) Weather

This area is located in the southeastern coast of Zhejiang and has a mid-subtropical marine monsoon climate with four distinct seasons throughout the year, mild and humid.

There is abundant precipitation, a small temperature difference between winter and summer, and a long frost-free period.

The annual average temperature in the coastal plain area is 17.9ÿ, the extreme maximum temperature is 37.2ÿ (August 4, 2013), and the extreme minimum temperature is

Temperature -5.8ÿ (1973.12.26), ÿ10ÿ active accumulated temperature 5561.7ÿ, annual average sunshine hours 1713.9h, annual frost-free period

258d. The annual average temperature decreases from the coastal plain to the inland mountainous area. The average temperature decreases by 0.55ÿ for every 100m increase in altitude.

The frost-free period is also reduced by 8-9 days. The average annual rainfall is 1556.3 mm, and the amount of precipitation varies depending on the regional topography, monsoon and

Due to the influence of ocean currents, precipitation varies greatly in time and space, and the inter-annual precipitation is unbalanced, with wet and dry seasons alternating.

Frontal rain and typhoon rain. The amount of rainfall is closely related to typhoon activity and the length of the plum rain season. The plum rain season is from April to June.

The precipitation accounts for 36-44% of the annual total, making it the main flood season in the region. The heavy rainfall often causes serious waterlogging disasters.

The second is the typhoon and rainstorm period from July to October, with heavy rainfall and high intensity, accounting for 20-28% of the annual precipitation.

In winter, the prevailing wind is from the north, in summer, the prevailing wind is from the south. Spring and autumn are the monsoon transition periods, with southerly and northerly winds alternating.

now.

4) Hydrology

According to the water environment functional zoning of Yueqing City, the river water functional zone in the area where this project is located is landscape entertainment and agricultural water use.

The target water quality is Class III, which does not belong to the drinking water source protection area. There is no drinking water source intake within its basin.

There are no special restrictions or requirements for the construction of the project.

According to on-site investigation, the east side of this project is the East Canal, with a minimum river width of 160m and a riverbed elevation of -0.25m~-0.65m.

The banks have not been regulated and are natural mud banks. The Xigan River runs through the project area, with a width of 72~150m and natural revetments on both sides.

5) Soil

After on-site investigation, it was found that the site was quite large and the original land type was coastal tidal flats. The site was covered with a large amount of wetland vegetation.

Some areas are filled with miscellaneous soil. The soil composition of this project site is complex, mainly yellow soil, tidal soil, and saline soil.

There is no peeling topsoil in the eyes.

6) Vegetation

The vegetation of Yueqing City belongs to the mid-subtropical vegetation zone in the vegetation division of Zhejiang Province, the southern subtropical evergreen broad-leaved forest of mid-subtropical

Due to long-term deforestation, natural vegetation has been severely damaged. Currently, most of the vegetation is cultivated vegetation or secondary vegetation, mainly Pinus massoniana.

Successional vegetation.

According to historical photo data, the vegetation on this project site is mainly weeds.

1.1.5 Current status of soil and water conservation

1) Current status of soil erosion

The main type of soil erosion in Yueqing City is hydraulic erosion. The total area of soil erosion in the city is 148.57 km2 (light

Severe erosion: 25.53km2, moderate erosion: 74.70km2, strong erosion: 30.44km2, extremely strong erosion: 14.09km2, severe erosion:

Severe erosion (3.81km2), accounting for 10.87% of the city's total land area.

According to the investigation and analysis, the main type of soil and water loss in the project area is hydraulic erosion caused by surface runoff.

The main erosion type is surface erosion, followed by gully erosion. In terms of time, the rainy season from April to June and the typhoon rainstorm season from July to October are the most severe.

Soil erosion is particularly serious.

According to the investigation and analysis, the soil and water conservation in the project area is in good condition.

The soil erosion modulus background value in the project area is 300/km²•a,

The allowable soil loss in the project area is less than 500t/km²•a, which is a slight erosion area, and the status of soil and water conservation is good.

Statistics on soil and water loss area in Yueqing City are shown in Table 1-2.

Table **1-2** Soil and water loss situation at the project site (unit: **km2)**

Administration area	No obvious invasion Eclipse area	Total land area of soil erosion							
		Mild	Moderate	Strong	Extremely Strong	Severe	Subtotal	Proportional Area	
Yueqing City	1218.53	25.53	74.70	30.44		14.09	3.81	148.57	10.87%	1367.10

The second-level standard for construction projects will be determined based on the soil and water loss prevention and control area where the project is located.

2) Hazards of soil and water loss caused by projects

During the construction process, the ground surface is disturbed, vegetation is destroyed, and the original soil and water conservation function is reduced or lost;

On the other hand, the exposed excavation and filling surfaces and a large amount of loose excavated earth formed during the construction process are prone to cause soil and water conservancy.

The loss of land will have a certain impact on the ecological environment.

The possible damages of soil erosion caused by the characteristics of the water and soil erosion are mainly manifested in the following aspects:

1) Disturb the original surface and accelerate soil erosion

The surface vegetation is damaged due to the excavation, causing the bare land to be washed away by rainwater and causing soil and rock

Cut-and-fill operations damage the physical and chemical properties of the soil, reduce soil erosion resistance, reduce soil and water conservation functions, and increase hydraulic erosion intensity.

Increase.

2) Blocking the river channel, affecting flood discharge and drainage

The occurrence of soil erosion may lead to an increase in the amount of sediment that eventually enters the river channel, and a decrease in the flow rate of the river water carrying the sediment.

The sediment gradually settles and accumulates, reducing the cross-section of the water flow. Long-term siltation raises the riverbed. If there is a design rainstorm, the river channel

Poor drainage raises the water level, affects flood discharge, and poses a potential risk of waterlogging.

3) Adverse impact on the surrounding ecological environment

During the construction period, the disturbance of the ground surface reduced its ability to conserve water and block sediment.

In case of heavy rain, it may cause serious soil erosion. If it is not effectively controlled, it will have a great impact on the region.

It causes harm to the ecological environment and damage to the surrounding environment.

1.2 Status of water and soil erosion prevention and control work

The total construction period of the project is 14 months. Construction started in October 2015 and was completed in November 2016.

Photovoltaic Power Generation Co., Ltd. is responsible for the construction. The construction unit is the main body responsible for the prevention and control of soil erosion in the project.

During the process, we attached great importance to the prevention and control of soil and water loss in the project, implemented the "three simultaneous" system of soil and water conservation measures, and effectively

To deal with the soil and water loss that may be caused during the construction of the project.

1.2.1 Preparation and submission of soil and water conservation plan

According to the "Water and Soil Conservation Law of the People's Republic of China" and the "Administrative Measures for the Preparation, Submission and Approval of Water and Soil Conservation Plans for Development and Construction Projects",

According to the provisions of the Regulations on the Administration of Water Resources and Soil Conservation, all construction projects and technological transformation projects that may cause soil erosion must be reported.

Soil and water conservation program.

(1) In January 2021, the construction unit Yueqing Chint Photovoltaic Power Generation Co., Ltd. commissioned Zhejiang Jiantou Environmental Protection Engineering Co., Ltd.

The company (hereinafter referred to as "our company") is responsible for the preparation of soil and water conservation plan for this project.

(2) After accepting the commission, our company completed the Yueqing Chint 150 MW Agricultural Photovoltaic Complementary Power Generation Project in June 2021.

Project Soil and Water Conservation Plan Report" (Draft for Review).

(3) On June 8, 2021, the Wenzhou Water Conservancy Bureau organized the “Yueqing Chint 150 MW Agricultural Photovoltaic Complementary Power Generation Project”

Soil and Water Conservation Plan Report (Draft for Review)" was reviewed by letter and a review opinion was formed. Our company

The plan was modified and improved according to the review opinions and submitted to the "Leqing Zhengtai 150MW Agricultural Photovoltaic Complementary Photovoltaic Power Generation Project Water and Soil

Maintenance Plan Report" (Draft for Approval).

(4) On July 20, 2021, the Wenzhou Municipal Water Resources Bureau issued Document No. Wenshuixuÿ2021ÿ27 to review the "Yueqing Zhengtai 150 trillion

The "Soil and Water Conservation Plan Report for the Wanongguang Complementary Photovoltaic Power Generation Project" (Draft for Approval) was approved.

1.2.2 Soil and Water Conservation Management

1) Organizational leadership

The construction unit is fully responsible for the organization and management of the project construction.

The project legal person responsibility system, recruitment and

In the implementation, water and soil conservation measures are incorporated into the construction and management system of the main project.

Responsible for the construction management of the project, organization of project implementation, and fund payment.

2) Rules and regulations

The construction units and construction units conscientiously implement and implement the principle of "prevention first, protection first, comprehensive planning, comprehensive management,

The soil and water conservation work policy is to "adapt measures to local conditions, highlight key points, scientific management, and focus on benefits".

Through publicity and education, the awareness of soil and water conservation among construction contractors and managers at all levels will be raised.

The system of responsibility has made soil and water conservation one of the contents of project progress and quality assessment.

The determined water and soil conservation measures are required to be implemented and the project quality is strictly controlled. During the construction process, various archives are established and improved.

Accumulate, analyze and compile data, summarize experience, and continuously improve soil and water conservation management.

After the completion of the neutralization project, it will be subject to supervision and inspection by the water administration department and the completion of soil and water conservation facilities will be carried out according to relevant requirements.

Work acceptance.

3) Supervision and management

The construction unit consciously accepts the supervision and inspection of the local water administration department and actively cooperates with the water administration department during the construction process.

The administrative departments in charge communicate and coordinate to ensure the implementation of various soil and water conservation measures.

4) Construction process

(1) Soil and water conservation management during the bidding stage

The water and soil conservation project is a part of the main project and is subject to bidding as a whole.

The provisions on soil and water conservation are scattered in the bidding documents.

The general conditions of the contract stipulate that: "The contractor shall pile up the soil and water conservation measures in an orderly manner in accordance with the approved construction plan.

and handle construction waste to avoid damage to the environment"; "The contractor shall be responsible for the design,

construction, operation, maintenance, management and demolition"; "The contractor shall take effective measures as agreed in the contract to

The slopes should be supported in time, drainage facilities maintained, and soil and water conservation measures taken to avoid soil and water loss hazards caused by construction."

(2) Soil and water conservation management during the construction phase

The construction contract for the soil and water conservation part of the project is signed together with the main project.

The construction unit shall carry out the construction in accordance with the bidding documents and construction contracts, in accordance with the technical specifications and contract requirements, and conscientiously perform

During the project construction, the construction unit followed the approved

According to the design requirements of the restoration plan, temporary prevention and control measures for soil and water conservation should be arranged in a timely manner; temporary drainage ditches should be arranged at the construction site, and plastic colored

Covered with strips of cloth.

(3) Soil and water conservation management by the supervision unit

The soil and water conservation engineering measures are designed and constructed at the same time as the main project, and the supervision is undertaken by the supervision unit of the main project.

The implementation of the supervision unit, supervision system and supervision procedures is basically consistent with the main project.

The Supervision Office took measurement, testing,

The main methods of project construction quality supervision include random inspection, directive documents, process control, on-site supervision, etc.

After the office enters the site, according to the characteristics of the project, a detailed supervision plan and supervision implementation rules for project quality control are prepared.

The local government office proposed to the contractor the procedures and instructions for quality control of all project items through the supervision rules.

All supervisors, contractors' self-inspection personnel and construction personnel should abide by it.

"There should be reports on the construction, measures for construction, explanations on technology, test reports on raw materials, and acceptance reports on hidden works".

Request the construction unit to provide various construction reports in a timely manner, correct problems in a timely manner, and require the parts with unqualified project quality to be

Rework must be done on the spot and the next construction process can only be started after passing acceptance.

(4) Soil and water conservation investment control

The supervision unit shall control the investment based on the bidding documents, construction contracts, project lists, construction drawings and project calculations.

The supervision unit established measurement records and measurement charts to avoid over-counting and mis-counting.

The progress and status of soil and water conservation measures shall be reflected at any time.

The construction unit submits an application, and the supervision unit refers to the unit price of adjacent bidding sections and the local construction project market information price, combined with

The bid price will be submitted to the General Manager's Office for approval after review.

In the review of changes in soil and water conservation measures, the supervision unit, from on-site supervisors to resident supervision engineers, has strict checks at every level.

Each change requires a supervision unit's review opinion transmission sheet, which specifies the change content, reason and unit price application, change basis, etc.

The data, quantity calculation, calculation formula and attachments shall be reviewed one by one, and shall be handled strictly in accordance with the supervision regulations. No skipping of levels is allowed.

Report phenomenon.

1.2.3 Implementation of the "Three Simultaneities" System for Soil and Water Conservation

The "three simultaneous" system of soil and water conservation requires that soil and water conservation and the main project be designed, constructed and put into operation at the same time.

use.

1.2.4 Reporting of Soil and Water Conservation Monitoring Results

During the project construction process, no separate soil and water conservation monitoring was commissioned, and the construction unit conducted the monitoring on its own.

The project was completed in November 2016, and the construction unit monitored the project by itself.

"Quarterly Report Form for Soil and Water Conservation Monitoring of Photovoltaic Complementary Power Generation Project" 5th issue.

In July 2021, during the trial operation period of the project, our company was entrusted by the construction unit to carry out the trial operation of soil and water conservation measures.

Monitoring work during the construction period, and collecting image data, construction reports, supervision reports, remote sensing satellite images during the construction process

In July 2021, the "Soil and Water Conservation Project of Yueqing Chint 150 MW Agricultural Photovoltaic Complementary Power Generation Project" was completed.

In January 2022, the "Yueqing Chint 150 MW Agricultural Photovoltaic Complementary Power Generation Project" was completed.

Two copies of the Soil and Water Conservation Monitoring Quarterly Report, and the Yueqing Chint 150 MW Agricultural Photovoltaic Complementary Power Generation Project in February 2022.

"Summary Report on Soil and Water Conservation Monitoring".

1.2.5 Changes in Soil and Water Conservation

This project started in October 2015 and was completed in November 2016. According to relevant regulations, this project is a supplementary

Soil and water conservation plan, so the plan report is compiled according to the actual situation of the project.

According to the Soil and Water Conservation Management Measures (Zhejiang Water Conservation [2019] No. 3), there will be no major changes in soil and water conservation during the construction process.

1.3 Implementation of monitoring work **1.3.1** Implementation of

soil and water conservation monitoring work

In July 2021, the construction unit commissioned Zhejiang Jiantou Environmental Protection Engineering Co., Ltd. (hereinafter referred to as "our company")

Carry out soil and water conservation monitoring work. After accepting the commission, our company organized relevant technical personnel to enter the site and

Laws, regulations, normative documents and relevant standards, specifications and procedures, in accordance with the requirements of the soil and water conservation plan, combined with the possible

According to the soil erosion areas and characteristics of soil erosion, timely carry out engineering soil and water conservation monitoring.

After the project team was established, it immediately communicated with the construction unit to collect and organize the preliminary information of the project, including the approved water and soil

Keep the plan, design data, construction and supervision reports, remote sensing image data, etc. After analyzing the previous data, the project

The team conducted the first on-site investigation and monitoring on July 15, 2021. The on-site investigation results are shown in Figures 1-1 to 1-4.

Figure **1-1** Drainage ditch in photovoltaic area

Figure **1-2** Current status of photovoltaic area

Figure **1-3** Greening of booster station

Figure **1-4** Drainage network of booster station

After understanding the construction progress and on-site conditions through on-site investigation and monitoring and communicating with the construction unit, the project team

In July 2021, the "Implementation Plan for Soil and Water Conservation Monitoring of the Yueqing Chint 150 MW Agricultural Photovoltaic Complementary Power Generation Project" was completed.

and submitted it to the water administration department.

1.3.2 Monitoring point layout

1) Monitoring focus

The key areas for soil and water conservation monitoring in the project are: (1) greening area (boosting station), and (2) recultivated area (under photovoltaic panels).

2) Principles for the layout of monitoring points

(1) The characteristics of soil and water loss in the project area should be fully reflected.

(2) Reflect the characteristics of engineering construction and project composition.

(3) The monitoring points are relatively stable and meet the requirements for continuous observation.

(4) The number of monitoring points meets the credibility requirements for the evaluation of soil erosion and its prevention and control effectiveness.

(5) Focus on monitoring the implementation progress of soil and water conservation measures, dynamic changes in soil and water loss, and the effectiveness of prevention and control measures.

(6) Taking the soil and water conservation monitoring zones as the basic units, within each basic unit, different disturbance types are formed.

Various monitoring points and monitoring facilities are set up in typical soil and water loss units such as excavation surfaces, filling surfaces and construction platforms.

3) Monitoring point layout

According to the soil and water conservation measures and layout of the approved plan, soil and water loss prediction results, combined with the actual water conservation measures of the project,

Characteristics of soil loss: the project has been completed and no fixed-point monitoring is set up for project monitoring. Survey monitoring is adopted instead.

1.3.3 Monitoring technology methods

The total construction period of the project is 14 months, and construction started in October 2015.

After the soil and water conservation plan report was approved, we went to the site to carry out soil and water conservation monitoring. When our company entered the site for monitoring, the project had been completed.

Considering that this project has been completed, the monitoring is carried out in the form of investigation and monitoring, mainly focusing on the green

Monitor the restoration of cultivation in chemical areas and under photovoltaic panels.

Project implementation status and number of completed soil and water conservation measures, preservation status of soil and water conservation measures,

The project results, the actual land area disturbed by the project, the actual scope of responsibility for soil and water loss prevention and control, and the restoration of the site of temporary construction facilities.

Through on-site investigation, comparison with the approved soil and water conservation plan, and communication with the construction unit and the supervision unit,

Communicate with the project team, review the supervision data during the construction period, collect remote sensing image data during the construction period and the completed soil and water conservation data.

The project volume of supporting measures shall be calculated to evaluate the degree of soil and water loss and the effect of soil and water conservation during the construction period.

The on-site investigation and monitoring situation is detailed in Figures 1-5 to 1-13.

Figure **1-5** Road drainage ditch in the photovoltaic field

Figure **1-6** Road drainage ditch in the photovoltaic field

Figure **1-7** Recultivation of land under photovoltaic panels

Figure **1-8** Recultivation under photovoltaic panels

Figure **1-9** Roads and drainage in the booster station

Figure **1-10** Roads and drainage inside the booster station

Figure **1-11** Greening in the booster station

Figure **1-12** Greening in the booster station

September 2015

March 2016

June 2016

Figure **1-13** Remote sensing images of the project during construction in **October 2017**

1.3.4 Results of the monitoring phase

The total construction period of the project is 14 months. Construction started in October 2015 and was completed at the end of November 2016. During the process, no separate soil and water conservation monitoring was commissioned, and the construction unit conducted the monitoring on its own.

The project was completed in November 2011. The construction period was monitored by the construction unit itself. A total of 150 MW agricultural photovoltaic complementary power plant in Yueqing Zhengtai was completed.

Quarterly Report Form for Soil and Water Conservation Monitoring of Power Generation Projects, 5th issue.

In July 2021, during the trial operation period of the project, our company was entrusted by the construction unit to carry out the trial operation of soil and water conservation measures. Monitoring work during the construction period, and collecting image data, construction reports, supervision reports, remote sensing satellite images during the construction process

In July 2021, the "Soil and Water Conservation Project of Yueqing Chint 150 MW Agricultural Photovoltaic Complementary Power Generation Project" was completed.

In January 2022, the “Yueqing Chint 150 MW Agricultural Photovoltaic Complementary Power Generation Project” was completed.

Two copies of the Soil and Water Conservation Monitoring Quarterly Report, and the Yueqing Chint 150 MW Agricultural Photovoltaic Complementary Power Generation Project in February 2022.

"Summary Report on Soil and Water Conservation Monitoring".

The project monitoring method is investigation monitoring. Through investigation and monitoring, no obvious factors that are unfavorable to soil and water conservation were found.

The project did not cause any hazardous incidents that caused major soil and water loss hazards.

1.3.5 Soil and water conservation monitoring opinions and implementation

When the monitoring unit entered the site to carry out monitoring work, the main project had already started construction, and various soil and water conservation measures were implemented according to the construction period.

The monitoring program was implemented simultaneously and no major soil and water loss problems were found during the monitoring.

1.3.6 Handling of major soil and water loss hazards

Through on-site investigation and communication with the construction unit, supervision unit and water administration department, it was found that no slippage occurred in the project construction.

Disasters of soil erosion such as landslides, mud-rock flows, etc.

2 Monitoring content and methods

Based on the "Regulations on Soil and Water Conservation Monitoring for Production and Construction Projects (Trial)" (Ban Shui Bao [2015] No. 139) and the approval

Based on the soil and water conservation plan, determine the content and methods of soil and water conservation monitoring.

2.1 Monitoring content

The project has been completed and is now open to traffic for trial operation. The monitoring implementation plan mainly targets the trial operation period of the project's soil and water conservation measures.

Carry out soil and water conservation monitoring in various monitoring items.

During the trial operation period, the focus will be on monitoring the effectiveness of soil and water loss prevention and control, and the integrity and operation of the implemented engineering measures.

Monitor the status and construction progress of the plant measures that have been implemented, including the plant types, implementation areas, survival rates and growth conditions.

Monitor the status of vegetation, vegetation coverage (canopy density), etc.; and monitor the evaluation indicators of prevention and control effects and the post-management system.

Test.

2.2 Monitoring methods

2.2.1 Survey monitoring

1. Drawing measurement

According to the "Yueqing Chint 150 MW Agricultural Photovoltaic Complementary Power Generation Project Construction Drawing Design", the project area is measured

and the area occupied by temporary construction facilities, and calculate the land area that may be disturbed by the project during the construction drawing design stage.

2. Satellite photo comparison

By collecting satellite photos during the construction period and comparing them with the construction drawings, the construction process can be verified.

Is there a significant difference between the disturbed land area and the construction drawing design?

3. Consult information

By reviewing the construction log, construction monthly report, supervision log, supervision monthly report, construction management report, and completion acceptance report

The volume of earth taken and discarded can be obtained through reports, and the occupation of production and construction projects can be obtained through consulting the current land use map.

Data on types and quantities of land.

2.2.2 Monitoring and Control Node

The monitoring and control node settings are arranged according to relevant regulations and specifications and project realities.

According to the document "Ban Shui Bao [2015] No. 139" and the actual situation on site, soil and water conservation monitoring work is carried out on a monthly basis.

The monitoring and control nodes are mainly monthly.

2.3 Monitoring frequency

According to the requirements of the document “Ban Shui Bao [2015] No. 139”, the frequency of positioning observation and monitoring is once a month, and the daily rainfall is large.

Additional measurement at 50mm; soil loss area, soil loss amount, and potential soil loss amount are monitored once a month;

The progress of construction projects, factors affecting soil erosion, and the growth of soil and water conservation plants should be monitored and recorded at least once a month.

1 time.

The frequency of soil and water conservation monitoring is detailed in Table 2-2.

Table 2-2 Soil and Water Conservation Monitoring Frequency Table

Monitoring content	Main indicators: soil	Monitoring frequency
Soil and water loss situation	loss, rainfall, vegetation	Once a month, if the daily rainfall is greater than 50 mm, additional measurement will be conducted
Soil and water loss influencing factors	coverage	Once a month
Soil and water conservation	Effect of engineering measures	
engineering measures Soil and water conservation plant measures Vegetation type, canopy density, coverage, etc.		

3 Dynamic monitoring of soil and water loss in key areas

3.1 Monitoring of the scope of responsibility for prevention and control

3.1.1 Scope of responsibility for soil and water conservation

1) Scope of control responsibilities determined by the soil and water conservation plan

The project approved a 259.6476hm² area for soil and water loss prevention and control, including 1.0009hm² of permanent land and 1.0009hm² of temporary land.

The land area is 258.6467hm². See Table 3-1 for details.

Table **3-1** Responsibility scope for soil and water loss prevention in the approved water conservation plan **Unit: hm2**

Prevention and control zones	Project construction area				
	scope		Total permanent land occupation and temporary land occupation		
Zone I - Photovoltaic Module Field Prevention district	Construction scope of photovoltaic power generation area	Photovoltaic support foundation		1.2	1.2
		inverter and box-type transformer		0.81	0.81
		foundation photovoltaic area vacant land		249.0067 249.0067	
	(recultivation) Subtotal		0	251.0167 251.0167	
Area II - Booster Station Prevention Area	Booster Station Construction Scope	Booster	1.0009		1.0009
ÿ Collector lines and road engineering Prevention and control area	Collector lines and road projects account for Area	station collector		5.40	5.40
		line road project		1.43	1.43
	Subtotal		0	6.83	6.83
ÿ Construction temporary facilities Prevention and control area	Construction temporary facilities area	Construction site		0.80	0.80
total			1.0009 258.6467 259.6476		

2) Monitoring results of actual prevention and control responsibility scope

The project soil and water conservation plan is a supplementary report, and the actual scope of responsibility for soil and water loss prevention and control is consistent with the approval.

The scope of responsibility for soil and water loss prevention and control projects is 259.6476hm², including 1.0009hm² of permanent land and 1.0009hm² of temporary land.

The land area is 258.6467hm². See Table 3-2 for details.

Table **3-2** Table of actual soil and water loss prevention and control responsibilities **Unit: hm2**

Prevention and control zones	Project construction area				
	scope		Total permanent land occupation and temporary land occupation		
Zone I - Photovoltaic Module Field Prevention district	Construction scope of photovoltaic power generation area	Photovoltaic support foundation		1.2	1.2
		inverter and box-type transformer		0.81	0.81
		foundation photovoltaic area vacant land		249.0067 249.0067	
	(recultivation) Subtotal		0	251.0167 251.0167	
Area II - Booster Station Prevention Area	Booster Station Construction Scope	Booster	1.0009		1.0009
ÿ Collector lines and road engineering Prevention and control area	Collector lines and road projects account for Area	station collector		5.40	5.40
		line road project		1.43	1.43
	Subtotal		0	6.83	6.83

Prevention and control zones	Project construction area			
	Scope		Total permanent land occupation and temporary land occupation	
IV Temporary construction facilities Prevention and control area	Temporary construction facilities area	Construction site	0.80	0.80
total			1.0009 258.6467 259.6476	

3.1.2 Disturbed land area during construction period

(1) Zone I - Photovoltaic Module Field Monitoring Area

The photovoltaic module field monitoring area includes photovoltaic support foundation, inverter and box transformer and photovoltaic area open space covering an area of 251.0167hm².

According to the later surveying and mapping report of this project, on-site measurement, drawing calculation, and analysis of the construction supervision report during the construction period, The disturbed land area in this region is 251.0167hm².

(2) Zone II - Booster Station Monitoring Area

The monitoring area of the booster station includes the buildings, roads, supporting facilities and green areas within the booster station, covering an area of 1.0009hm2.

According to the later surveying and mapping report of this project, on-site measurement, drawing calculation, and analysis of the construction supervision report during the construction period, The disturbed land area in this area is 1.0009hm².

(3) Zone III - Power collection line and road engineering monitoring area

The monitoring area for the power collection line and road project covers an area of 6.83hm2.

According to the later surveying and mapping report of this project, on-site measurement, drawing calculation, and analysis of the construction supervision report during the construction period, The disturbed land area in this area is 6.83hm².

(4) Zone IV - Temporary construction facility monitoring area

The monitoring area for temporary construction facilities covers an area of 0.80hm2 at the construction site.

According to the later surveying and mapping report of this project, on-site measurement, drawing calculation, and analysis of the construction supervision report during the construction period, The disturbed land area in this area is 0.80hm².

3.2 Monitoring results of soil (stone, material)

According to the approved soil and water conservation plan, the project has no material extraction site.

During the construction process, no soil (stone, material) yard was set up, and the borrower purchased the soil (stone, material) from a legal yard.

3.3 Monitoring results of abandoned soil (rock, slag) **3.3.1**

Abandoned soil in the approved plan

According to the approved soil and water conservation plan, there will be no abandoned soil in the project.

3.3.2 Actual abandonment

After reviewing the construction report, supervision report and on-site investigation, it was found that there was no abandoned party in the project.

3.4 Monitoring results of earthwork volume

The actual excavation volume was 67,400 m3, all of which were general earthwork; the filling volume was 95,100 m3, all of which were general earthwork.

Earthwork: 67,400 m3 of excavation was used for self-use and 27,700 m3 of debit was used for general earthwork, purchased from legal material yards;

There is no discard.

The project was completed in November 2016. In January 2021, the construction unit commissioned Zhejiang Jiantou Environmental Protection Engineering Co., Ltd.

The soil and water conservation plan report of this project is supplemented. Therefore, the earthwork volume of the soil and water conservation plan approved by the project is the actual volume of the project.

The actual amount of earthwork.

According to the "Notice of the Zhejiang Provincial Water Resources Department on Issuing the Measures for the Administration of Soil and Water Conservation in Production and Construction Projects in Zhejiang Province" (Zhejiang

According to the relevant provisions of the Water Conservancy and Hydropower Administration (2019) No. 3, the above changes do not involve location, scale or major changes, so no additional

or modify soil and water conservation plans.

3.5 Topsoil stripping monitoring results

After consulting the construction report and supervision report, and based on the original topographic map and on-site survey, the current situation of the project site is

The reclaimed land area has a surface layer of silt and miscellaneous fill, so the topsoil cannot be stripped off during the construction period.

4 Monitoring results of soil and water loss prevention and control measures

4.1 Monitoring results of engineering measures

4.1.1 Monitoring methods

When soil and water conservation monitoring work is carried out, the main project has been started, and the types, quantity, and Quality is primarily accomplished through the following methods:

1. Conduct on-site measurements and review monthly construction reports and supervision reports;

2. Review the construction report, supervision report, and video materials during the construction period;

3. Review the project handover acceptance report;

4. Check the engineering supervision quality evaluation form.

4.1.2 Implementation and monitoring results

The engineering measures taken include restoration of land to cultivation, rainwater pipe network and greening and covering.

According to the project data and the monitoring results of the later stage of construction: after the implementation of the soil and water conservation engineering measures of the project, it is effective The overall soil and water loss phenomenon in the project area has been improved, and good water and soil conservation effects have been achieved.

The quantities of soil and water conservation engineering measures for each prevention and control zone are shown in Table 4-1.

4.2 Plant measures monitoring results

Vegetative measures are mainly based on field measurements, and the plant measures implemented are comprehensive greening and sowing and planting grass.

The actual greening area is 5.6002hm². The implementation of greening measures will help to gradually increase the proportion of green areas. The water storage and soil conservation capacity of the land. Plant measures have not changed.

This project carried out monitoring of soil and water conservation facilities during the natural recovery period in the later stage of construction. Monitoring method: On-site measurement Determine the vegetation recovery rate and growth status. According to the monitoring results, the water and soil conservation projects implemented during the natural recovery period The operation of the supporting facilities is basically normal and stable. The vegetation growth is generally good, and the soil and water loss in the project area has been improved. Effective control. The engineering quantities of soil and water conservation plant measures in each prevention and control zone are shown in Table 4-1.

4.3 Monitoring results of temporary control measures

Temporary measures mainly adopt on-site measurement and inquiry. Temporary measures mainly include temporary drainage ditches, temporary sinking Temporary protective measures such as sand pools and plastic colored strips and tarpaulin covers have been implemented and have played a good protective effect during the construction period.

The quantities of temporary measures for soil and water conservation in each prevention and control zone are shown in Table 4-1.

Table **4-1** Comparison table of the actual completion and approved plan of the soil and water conservation measures

Control zoning Measure Type Measure Name Unit Plan Approval Actual Completion Increase/Decrease (+/-)						
photovoltaic module field	Engineering measures for reclamation of area I -		hm2	249.8067	249.8067	0
Prevention and control area	Temporary measures: plastic colored strips and cloth covering m2,			2000	2000	0
Zone II - Booster Station Prevention district	Engineering measures	rainwater pipe	m	865	865	0
		network greening and soil covering		0.10	0.10	0
	10,000 m3, plant measures, comprehensive greening hm2, plastic			0.2002	0.2002	0
	Interim measures	colored strips and cloth covering m2,		1000	1000	0
		drainage	m3	112	112	0
		ditch	m3	5	5	0
Zone III - Collector lines and Road engineering prevention area	sedimentation pond, plant measures, sowing and planting grass hm2,			5.40	5.40	0
	temporary measures, plastic colored strips and cloth covering m2,			1500	1500	0
Zone IV - Temporary construction facilities Control area	engineering measures, reclamation of		hm2	0.80	0.80	0
	Interim measures	drainage	m3	152	152	0
		ditch sedimentation pond	m3	15	15	0

4.4 Effects of soil and water conservation measures

4.4.1 Effect of engineering measures

Monitoring and investigation show that the construction site has been basically cleaned and leveled, the land under the photovoltaic panels has been reclaimed, and the current status of the booster station is under construction.

Structures, hardened roads and green areas.

The protective effect of the engineering measures is significant, which not only reduces the water and soil loss caused by the engineering construction, but also plays a role in the main project.

Effective protection.

4.4.2 Effect of plant control measures

According to monitoring, the natural vegetation at the booster station has recovered well and is basically in harmony with the surrounding landscape, which has increased the coverage of surface vegetation.

Wind erosion has been effectively controlled, and soil and water conservation measures have a significant protective effect. See Figure 4-1 and Figure 4-2 for the on-site conditions.

Figure **4-1** Greening in booster station

Figure **4-2** Greening in booster station

4.4.3 Effect of temporary measures

According to monitoring and verification analysis, the construction season should be reasonably arranged during the project construction to avoid construction in strong winds or rainy seasons. Weaving construction, using advanced construction technology to avoid re-disturbance, and strictly controlling the width of construction disturbance have effectively reduced Soil and water loss during construction; control the frequency and scope of disturbance, all of which play a role in controlling and reducing soil and water loss. use.

The construction unit and the construction unit have completed the various soil and water loss prevention measures in the soil and water conservation chapter of the main design. The various water and soil conservation measures have played a good role in water and soil conservation, and the various water and soil erosion areas caused by the construction project have All of them have been effectively managed and improved, and basically met the requirements of soil and water conservation.

5. Soil loss monitoring

5.1 Area of soil erosion

During the construction process, affected by the construction period and natural factors such as rainfall, topography, etc.

The area of soil erosion is also changing dynamically.

Check the construction report, supervision report, construction drawing design, and measure the surface satellite image of construction disturbance at different construction periods

Photos, and the monitoring situation of soil erosion area are shown in Table 5-1.

Table **5-1** Dynamic monitoring table of project soil and water loss area

Time		Soil erosion area				total
		Photovoltaic panel field monitoring area	Booster station Monitoring area	Collector lines and tracks Road Engineering Monitoring Area	Temporary construction facilities Monitoring area	
2015 IV		62.75	1.0009	1.43	0.80	65.9809
2016	ÿ	125.51	1.0009	4.13	0.80	131.4409
	ÿ	188.26	1.0009	5.48	0.80	195.5409
	ÿ 251.0167		1.0009	6.83	0.80	259.6476
	ÿ	251.0167	1.0009	6.83	0.80	259.6476

The area of soil erosion during the construction period is 259.6476hm2, including the photovoltaic module field monitoring area.

251.0167hm2, the booster station monitoring area 1.0009hm2, the collector line and road engineering monitoring area 6.83hm2, the construction temporary

The facility monitoring area is 0.80hm2. During the natural recovery period, the project area is built, hardened and greened, including buildings,

The hardened area no longer produces soil erosion, and the measures to restore cultivation and green the area are gradually taking effect, and soil erosion is basically under control.

The project area is within the allowable soil erosion modulus.

5.2 Soil loss

During the project construction period, the changes in natural factors such as rainfall, original landform and topography, forest and grass coverage, and construction

Due to the influence of disturbance intensity, implementation of soil and water conservation measures, etc., the soil erosion modulus is different in different periods of the project.

5.2.1 Erosion modulus of original landform

The project area is not a national or Zhejiang provincial key soil and water loss prevention and control area.

The type of loss is hydraulic erosion in the southern red soil hilly area, with an allowable soil loss of 500t/km²·a.

The scenic value is 300t/km²·a, which is slight erosion.

5.2.2 Soil loss at each stage

The main project started in October 2015 and was completed in November 2016.

The soil erosion modulus of each disturbed land type during the construction period is based on the on-site monitoring data and is measured on-site.

The method of data analysis, comparative monitoring and other methods, combined with the construction progress, is used to estimate the

Calculated to obtain.

Based on the results of soil loss monitoring at each monitoring point and combined with the rainfall changes in the project area,

The soil erosion modulus of the surface disturbance area represented by the monitoring point is obtained by analyzing and measuring the monitoring results of soil loss.

Combined with the monitoring results of changes in the disturbed surface area in the project area, the amount of soil loss at each stage was finally measured.

The amount of soil loss is calculated using the following formula:

Loss =ÿ erosion unit area × erosion intensity × erosion time

1) Soil loss during construction period

During the construction period, the construction activities disturbed the ground surface, causing damage to vegetation, changing the original landform type, and destroying the original landform.

The ecological balance in the state is affected, resulting in the reduction of soil erosion resistance and causing soil and water loss; in the process of excavation and filling of engineering earthwork

It may cause soil erosion. The above construction behavior causes the soil erosion modulus of the project to increase.

When the construction unit carried out soil and water conservation monitoring, the main project had been completed.

The soil erosion modulus of each disturbed surface type during the construction period was determined by analyzing the reports and image data during the construction period.

The annual average soil erosion modulus of various types of disturbed surfaces during the construction period are shown in Table 5-1, and the area of disturbed areas is shown in Table 5-2.

Table **5-1** Table of average soil erosion modulus of various disturbed surface types during construction period

Monitoring Zone		Monitoring method	Average soil erosion modulus (t/(km²·a))
Zone ÿ-PV panel field prevention and control area	Photovoltaic bracket location	Survey and monitoring	2500
	Inverter and box-type		4800
	photovoltaic area vacant land		650
Zone II - Booster station prevention and control area	(recultivated land)		6200
	buildings and structures roads		4200
	and supporting		2000
Zone III - Collector lines and road engineering protection	facilities greening		3500
Administrative area	project collector		4200
line road project area IV - temporary construction facilities	prevention and control area construction site		1500

Table **5-2** Table of disturbed areas in each monitoring zone during construction period

Monitoring Zone		Monitoring period Construction	Disturbance area (hm²)
Photovoltaic panel field prevention area	Photovoltaic	period Construction	1.20
	support inverter and	period Construction	0.81
	box-type photovoltaic area vacant land	period Construction	249.8067
Booster station prevention area	(recultivated land)	period Construction	0.2779
	building structures roads and	period Construction	0.5228
	supporting facilities	period Construction	0.2002
Prevention and control of power collection lines and road engineering	greening projects	period Construction	5.40
district	collection line road	period Construction	1.43
Temporary construction facility prevention and control area	engineering construction site	period Construction period	0.80

As shown in Table 5-1, during the construction period, with the advancement of the main project and the gradual improvement of soil and water conservation measures, the soil

The erosion modulus is gradually decreasing.

According to Table 5-1 and Table 5-2, the amount of soil erosion during the construction period is calculated to be 789t.

2) Soil loss during the natural recovery period

The main project was completed and accepted at the end of November 2016, and the natural recovery period is from December 2016 to November 2017.

During on-site monitoring, flood control and drainage measures are intact and unobstructed, the survival rate of plant measures is high, and the forest and grass coverage is relatively high.

It has improved the surface's ability to resist erosion, formed a stable ecosystem, and begun to play a role in preventing and controlling soil and water loss.

The soil erosion modulus during the natural recovery period is shown in Table 5-3.

Table **5-3** Table of soil erosion modulus during natural recovery period

Monitoring Zone	Average soil erosion modulus by location monitoring method (t/(km²·a))		
Zone ÿ-PV panel field prevention and control area	Photovoltaic bracket	Survey and monitoring	0
	Inverter and box-type		0
	photovoltaic area vacant land		290
Zone II - Booster station prevention and control area	(recultivation)		0
	building structures roads and		0
	supporting facilities		290
greening project area III - collection line and road engineering defense	Collector line		290
management area	Road Engineering		0
Zone IV - Construction Temporary Facilities Prevention Area	Construction Site		0

According to Table 5-2 and Table 5-3, the predicted amount of soil erosion during the natural recovery period is 12t.

5.3 Potential soil loss from soil (rock, material) and waste (rock, slag)

5.3.1 Potential soil loss at the borrow site

The approved plan did not include a soil borrowing area.

Review the construction report and supervision report, conduct on-site measurements, and communicate with the construction unit and supervision unit.

No borrow yard was set up during the construction process, and the borrower purchased the soil from a legal material yard.

5.3.2 Potential soil loss from waste dumps

After reviewing the construction report, supervision report and on-site investigation, it was found that there was no abandoned party in the project.

5.4 Hazards of Soil and Water Loss

When the commission was accepted, the project had been completed. After on-site monitoring and review of the project construction report and supervision report, Yueqing

During the construction of the 150MW agricultural photovoltaic power generation project in Thailand, no mudslides, landslides or other soil erosion disasters occurred.

Piece.

6 Monitoring results of soil and water loss prevention and control effects

According to the approved plan, the project's water and soil erosion prevention and control targets in the design level year are shown in Table 6-1.

Table 6-1 Table of project soil and water loss prevention and control targets (design level year)

Standards for prevention and control indicators	
Total control degree of soil and water loss	95
(%) Soil loss control ratio	1.7
and soil protection rate (%)	95
Topsoil protection rate (%) Forest	/
and grass vegetation recovery rate (%)	95
Forest and grass coverage rate (%)	22

6.1 Overall control of soil and water loss

Within the scope of the project construction, according to the on-site verification results, the area of soil erosion is 256.6476hm², and the soil erosion control has reached

The target area is 256.6476hm², and the overall soil and water loss control rate is 99.9%, reaching the 95% prevention and control target determined in the approved plan.

For details on the overall degree of soil and water loss control in the project, please see Table 6-2.

Table 6-2 Statistics table of total control degree of soil and water loss in projects

Prevention and control zone period		Soil erosion area ÿhm²ÿ	Area reaching the standard of water and soil loss control (hm²) Degree of water and soil loss control (%)						
			Plant measures Application area	Engineering measures Application area	Permanent buildings Ground hardening area	Subtotal target value		Govemance effectiveness Fruit value	Evaluate result
Zone ÿ-PV panel field protection Administrative area	Year level	251.0167 0 249.8067			1.21	251.0167 95		ÿ95 reached the target	
Zone II - Booster Station Prevention Area 1.0009 0.2002 Design				0	0.8007	1.0009	95	ÿ95 reached the target	
Zone III - Collector lines and roads Road engineering prevention area		6.83	5.4	0	1.43	6.83	95	ÿ95 reached the target	
Zone IV - Temporary construction facilities Prevention and control area		0.8	0	0.8	0	0.8	95	ÿ95 reached the target	
total		259.6476 5.6002 250.6067			3.4407	259.6476 95		ÿ95 reached the target	

6.2 Soil loss control ratio

Through the investigation of the current status of soil and water conservation in the project construction area, various soil and water conservation measures have been implemented to prevent and control soil erosion.

The effect is remarkable. When reaching the design level, the soil erosion modulus in the project area drops to 300t/km2·a, and the soil loss control ratio is 1.7.

6.3 Muck protection rate

There is no waste in the construction project. During the construction period, temporary earth piles are set up for protection, and temporary covering measures are taken.

The temporary piles of earth and stone during the construction period are effectively protected and the soil and water loss are effectively controlled to the designed water level.

The slag interception rate is about 99.9% in normal years, achieving the prevention and control target of 95%.

6.4 Topsoil protection rate

There is no topsoil data in the project area, so the topsoil protection rate is not involved.

6.5 Restoration rate of forest and grass vegetation

Vegetation can be restored in the area where vegetation can be restored after taking measures to conserve soil and water.

The vegetation area is 5.6002hm², the actual forest and grass vegetation restoration area is 5.6002hm², and the forest and grass vegetation restoration rate is 99.99%, reaching

The 95% control target set by the plan.

6.6 Forest and Grass Coverage

As the project is an agricultural photovoltaic complementary project, the photovoltaic area will be reclaimed in the later stage, and the reclaimed area accounts for 96.5% of the total area, which can be greened.

The area is small, so the photovoltaic power generation area is not included in the calculation of forest and grass coverage rate, only the booster station prevention and control area and the collector line and road

The forest and grass coverage rate is calculated in the road engineering prevention and control area. The construction area of the project is 7.8309hm² (excluding the recultivated area).

In the design level year, the forest and grass vegetation area is 5.6002hm². All areas where plant measures can be taken will implement plant measures.

The forest and grass coverage rate in the construction area is 71.51%, reaching the prevention and control target of 22%. The forest and grass coverage rate is detailed in Table 6-3.

Table **6-3** Statistics of forest and grass vegetation recovery rate and forest and grass coverage rate

Prevention and control area	Time	Greening Area (hm²)	Implementing plant measures Area (hm²)	Forest and grass vegetation recovery rate (%)		
				Target value	governance effect value	evaluation results
Zone ÿ-PV panel field prevention and control area	Year	/	/	/	/	/
Zone II - Design water level of booster station		0.2002	0.2002	95	ÿ95	reached the target
Zone III - Collector Line and Road Engineering Prevention Area Average prevention and control area		5.4	5.4	95	ÿ95	reached the target
Zone IV - Total of temporary construction facility prevention and		/	/	/	/	/
control areas		5.6002	5.6002	95	ÿ95	reached the target

6.7 Completion of prevention and control objectives

The compliance status of the six indicators of this project is shown in Table 6-4.

Table **6-4** Status of soil and water loss prevention and control indicators reaching the standards

Serial number	Prevention and control indicators	Soil and water loss prevention effect		
		Control target value	Comprehensive prevention and control goals	assessment
1. Total control degree of soil and water loss (%)		95	99.9	Meet the Standard
2	Soil loss control ratio and soil	1.7	1.7	Meet the Standard
3	protection rate (%)	95	99.9	Meet the Standard
5	Topsoil protection rate (%) 4	/	/	/
Forest and grass vegetation recovery rate (%) Forest		95	99.99	Meet the Standard
6	and grass coverage rate (%)	22	71.51	Meet the Standard

7 Conclusion

7.1 Dynamic changes of soil erosion

The Yueqing Chint 150MW agricultural photovoltaic power generation project started in October 2015 and was completed at the end of November 2016.

The project was put into operation on November 20, 2016 (trial operation period). During the project construction period, there was a

The process changes from strong, moderate to mild and slight. In the early stage of construction, the excavation surface is exposed and the soil erosion intensity is strong.

As mentioned above, the temporary soil pile suffered severe loss, but the construction unit took measures to cover it, which reduced the harm of soil erosion to the surrounding area.

With the backfilling of temporary soil piles, the gradual implementation of soil and water conservation engineering measures and plant measures, the intensity of soil and water loss has turned to mild,

At the end of the construction period, after all the prevention and control measures were implemented, the soil erosion intensity gradually decreased to the level of the soil at the project site.

Background value of soil erosion modulus.

7.1.1 Scope of responsibility for prevention and control

After consulting the construction report, supervision report, and construction drawing design, and combining on-site measurements, Yueqing Chint 150 MHz

The responsibility scope of soil and water loss prevention and control of Wanongguang complementary photovoltaic power generation project is 259.6476hm², of which the permanent land area

1.0009hm², temporary land area 258.6467hm².

The scope of responsibility for soil and water loss prevention and control actually occurred in this project is different from the scope of responsibility for soil and water loss prevention and control in the approved plan

Compared to no change.

7.1.2 Amount of soil and stone taken, and abandoned soil and slag

1) Amount of soil and stone taken

According to the approved soil and water conservation plan, the project has no material extraction site.

There is no soil (stone, material) yard in the construction process. The project debits come from purchases from legal material yards.

2) Amount of abandoned soil

According to the approved soil and water conservation plan, after earth and stone balance, there is no excess volume in the project.

During the actual construction, there was no abandoned material.

7.1.3 Disturbed land area

According to monitoring results, the project has disturbed a total surface area of 259.6476hm², of which permanent land area

1.0009hm², temporary land area 258.6467hm².

7.1.4 Soil loss

The project may cause a total of 801t of soil and water loss. The construction period is the key period for soil and water loss.

The amount of soil and water loss during the period was 789t, accounting for 98.5% of the total. The key area of soil and water loss during the construction period was the photovoltaic area.

7.2 Evaluation of Soil and Water Conservation

Measures **7.2.1** Layout of Soil and Water Conservation Measures System

During the construction period, the construction unit implemented various soil and water conservation measures based on the soil and water conservation chapter in the main design.

During the construction process, the project area adopted engineering measures such as recultivating land, rainwater pipe network, and greening and covering soil, and integrated greening,

Planting measures such as sowing grass, as well as temporary drainage, sand settling, plastic strips and other temporary measures.

Soil conservation measures are basically synchronized with the main project.

After the main project was completed, the preservation rate of soil and water conservation measures was good, the flood control and drainage system was unobstructed, and the soil and water conservation measures were effective.

The system has initially achieved benefits. The soil erosion modulus in the project area has dropped below the background value, and the soil and water loss caused by the project construction has been reduced.

to effective governance.

7.2.2 Quantity of soil and water conservation measures

The project was completed in November 2016. In January 2021, the construction unit commissioned Zhejiang Jiantou Environmental Protection Engineering Co., Ltd.

In July 2021, Wenzhou Water Conservancy Bureau issued a report on the soil and water conservation plan for this project under the title of "Wenshui Xu [2021] 27

Therefore, the soil and water conservation measures of the soil and water conservation plan approved by the project are the soil and water conservation measures actually implemented in the project.

Conservation measures: The project soil and water conservation measures are unchanged compared with the approved design measures.

The actual amount of soil and water conservation measures completed in each prevention and control zone of the project:

Zone I photovoltaic module field prevention and control area:

Engineering measures: recultivate 249.8067hm2;

Temporary measures: Covering 2000m2 with plastic striped cloth.

Zone II booster station prevention and control area:

Engineering measures: 865m of rainwater pipe network, 10,000m3 of greening soil ;

Plant measures: comprehensive greening 0.2002hm2;

Temporary measures: Covering with plastic colored strips 1000m2, excavating 112m3 of drainage ditch, and excavating 5m3 of sedimentation pond.

Zone III - Collector lines and road engineering prevention and control area:

Vegetation measures: sowing and planting grass 5.40hm2;

Temporary measures: Covering with plastic colored strips 1500m2.

Zone IV - Temporary construction facility prevention and control area:

Engineering measures: recultivate 0.80hm2;

Temporary measures: excavation of 152m3 of earth in the drainage ditch and 15m3 of earth in the sedimentation pond.

7.2.3 Suitability of soil and water conservation measures

According to on-site measurements, the survival rate of plant measures implemented in the project is high, and the forest and grass vegetation recovery rate and vegetation coverage are

The coverage has reached or exceeded the prevention and control targets of the approved plan, and the suitability of soil and water conservation measures is good.

7.2.4 Effects of soil and water conservation measures

The water and soil conservation plan approved by the Ministry of Water Resources and Environment has set the following targets for water and soil erosion control: 95% of the total water and soil erosion control rate and 95% of the soil loss rate.

The control ratio is 1.7, the slag protection rate is 95%, the forest and grass vegetation recovery rate is 95%, and the forest and grass coverage rate is 22%.

The goal of soil and water loss prevention and control is to achieve: total soil and water loss control rate of 99.9%, soil loss control ratio of 1.7, slag

The soil protection rate is 99.9%, the forest and grass vegetation recovery rate is 99.99%, and the forest and grass coverage rate is 71.51%.

The targets were reached or exceeded, and the soil and water conservation measures had good effects.

The achievement of the project's soil and water conservation targets is shown in Table 7-1.

Table **7-1** Table of project soil and water conservation control target achievement

Serial number	Index name Total	Target value Actual value		Compliance
1	degree of soil and water loss control (%) Soil loss	95	99.9	Meet the Standard
2	control ratio Muck protection rate	95	99.9	Meet the Standard
3	(%) Topsoil protection rate (%)	1.7 /	1.7 /	Meet the Standard
4	Forest and grass vegetation			Meet the Standard
5	recovery rate (%) Forest and grass coverage	95	99.99	Meet the Standard
6	rate (%)	22	71.51	Meet the Standard

7.2.5 Operation of Soil and Water Conservation Measures

Quality assessment of implemented soil and water conservation projects, agricultural farming and technical measures, flood control and drainage projects, vegetation construction

The assessment results of the engineering and temporary protection projects are both qualified, and the soil and water conservation measures are operating well.

7.3 Problems and Suggestions

(1) Strengthen the operation and maintenance of existing drainage, greening and other water conservation facilities to ensure that they play their due protective role.

effect.

(2) The construction unit shall strictly follow the relevant laws and regulations when carrying out other projects, and continue to implement the "Three Same"

Carry out soil and water conservation work in a timely manner according to the requirement of "timely".

(3) The responsible units should attach great importance to the daily management and maintenance of soil and water conservation facilities to ensure the

Maintain the normal functioning of benefits.

(4) Carry out replanting in areas with poor greening effects, continue to strengthen the management and maintenance of soil and water conservation facilities, and focus on

Strengthen the maintenance of green vegetation to ensure the vegetation coverage rate.

7.4 Summary

The overall layout of the project's soil and water conservation measures is reasonable, and the soil and water conservation measures required by the main project design and the approved plan have been completed.

The prevention and control tasks have been completed, the quality of soil and water conservation facilities is generally qualified, soil and water loss has been effectively controlled, and the ecological environment in the project area has been improved.

to improvement.

After trial operation, the soil and water conservation engineering measures and plant measures are running well, and overall they have strong soil and water conservation.

The function is maintained and the expected effect of soil and water loss prevention and control is achieved.

Annex **1**

温州市水利局文件

温水许〔2021〕27号

温州市水利局关于乐清正泰150兆瓦农光互补光伏发电项目水土保持方案的批复

乐清正泰光伏发电有限公司:

你单位（统一社会信用代码：91330382090982668K）《关于要求审批“乐清正泰150兆瓦农光互补光伏发电项目”的申请报告》及委托浙江建投环保工程有限公司编写的《乐清正泰150兆瓦农光互补光伏发电项目水土保持方案报告书》（报批稿）等材料已收悉。根据《中华人民共和国水土保持法》第二十五条、二十七条、三十二条、四十一条和《浙江省水土保持条例》第十九条、二十条之规定，现批复如下:

一、工程位于乐清市乐成镇城东街道胜利塘北片围区造地区块。建设内容包括光伏组件场、道路工程、集电线路和施工场地。工程占地总面积259.6476hm²，其中永久占地1.0009hm²，临时占地258.6467hm²。工程建设总工期14个月，2015年10月开工，2016

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年11月完工。工程总投资15亿元，其中土建投资为1.35亿元。

项目涉及土石方开挖、填筑，扰动原地表面积259.6476hm^2，建设期间如不采取有效的防治措施，将造成水土流失量 2137t。本工程已完工，建设过程中采取了有效的防治措施，水土流失量得到有效控制。但是编制水土保持方案，进一步做好工程后续水土流失防治工作，对保护项目区生态环境是十分必要的。

二、基本同意水土保持分析与评价

（一）主体工程选址、施工时序、施工布置、施工工艺、方法等基本符合水土保持要求。主体设计中具有水土保持功能工程的评价和界定基本合理。

（二）工程土石方开挖总量6.74万m^3（均为一般土石方）。

（三）工程土石方填筑总量9.51万m^3（均为一般土石方）。

（四）工程土石方借方总量2.77万m^3（均为一般土石方），从合法料场商购。

（五）工程土石方无余方。

三、同意水土流失防治责任范围的界定，面积总计259.6476hm^2，水土流失防治责任者为乐清正泰光伏发电有限公司。

四、基本同意水土流失预测的时段划分、内容、方法及预测结果。

五、同意工程水土流失防治标准执行南方红壤区二级标准。至设计水平年2021年，水土流失治理度达到95%，土壤流失控制比达到1.70，渣土防护率达到95%，林草植被恢复率达到95%，林草覆盖率达到22%，项目区无表土资源，故不涉及表土保护率。

六、同意水土流失防治分区划分为四个区：Ⅰ区为光伏组件

场防治区，II区为升压站防治区，III区为集电线路及道路工程防治区，IV区为施工临时设施防治区。

七、基本同意工程水土保持方案提出的水土流失防治措施体系、水土保持措施总体布局、施工组织设计及进度安排。水土流失防治措施体系如下：

I区：

工程措施：复耕✓；

临时措施：塑料彩条布苫盖✓；

II区：

工程措施：雨水管网✓、绿化覆土✓；

植物措施：综合绿化✓；

临时措施：塑料彩条布苫盖✓、临时排水沟✓、沉沙池；

III区：

植物措施：撒播草籽✓；

临时措施：塑料彩条布苫盖✓；

IV区：

工程措施：复耕✓

临时措施：临时排水沟✓、沉沙池✓。

（以上带✓表示主体工程已设计，其余为水土保持方案新增措施。）

八、基本同意水土监测时段、内容和方法。

九、同意工程水土保持估算总投资1546.97万元，新增水保投资222.09万元，新增投资应纳入工程总投资并确保到位。根据财综〔2014〕8号、浙价费〔2014〕224号及浙政办发〔2015〕107号文件，“对一般性生产建设项目，按照征占用土地面积一次

性计征，收费标准为每平方米 1 元（不足 1 平方米的按 1 平方米计）”，“2015 年 10 月 1 日起，涉企行政事业性收费水土保持补偿费按规定标准的 80%征收”。本项目征占用土地面积 2596476m²，故水土保持补偿费计征面积为 2596476m²，需缴纳水土保持补偿费 2077180.8 元。请乐清正泰光伏发电有限公司收到批复后即时到温州市税务局第一分局足额缴纳水土保持补偿费。

联系人：余正普，联系电话：0577-88523209、18257724900。

十、工程水土保持方案的实施由乐清市水利局按照属地原则负责监督检查，我局负责监管。你单位应依法自主组织水土保持设施验收工作，水土保持设施验收合格后向社会公开，并向我局报备。

温州市水利局水保工作热线：0577-57579793。

十一、本工程涉及其它管理事项的，请报有关部门批准。

十二、请方案编制单位浙江建投环保工程有限公司在批复后将本水保方案上传至全国水土保持信息管理上报系统。

十三、你单位如对本批复决定不服的，可自接到本决定书之日起 60 日内向温州市人民政府申请行政复议；或者在六个月内向鹿城区人民法院提起行政诉讼。

温州市水利局

2021 年 7 月 20 日

抄送：市发展和改革委员会、市综合行政执法局、市税务局第一分局，市水政监察支队，乐清市水利局、乐清市综合行政执法局。

温州市水利局办公室 2021 年 7 月 20 日印发

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附图1 项目地理位置图

N

Ⅲ区-集电线路及道路工程防治区水土流失防治措施

撒播植草　塑料彩条布覆盖

监测点

水土流失防治责任范围线

Ⅰ区-光伏组件场防治区水土流失防治措施

复耕　塑料彩条布覆盖

用地红线

Ⅳ区-施工临时设施防治区水土流失防治措施

复耕　临时排水沟　临时沉沙池

Ⅱ区-升压站防治区水土流失防治措施

雨水管网　绿化覆土

综合绿化　塑料彩条布覆盖

临时排水沟　临时沉沙池

图例：

用地红线

水土流失防治责任范围线

施工场地

监测点

附图2 项目水土保持监测点位布置、水土保持措施布置图