

Environmental Impact Assessment (Draft)

May 2018

PRC: Yunnan Lincang Border Economic Cooperation
Zone Development Project
(Annexes: Appendix 4 – Summary of Water Allocation
of Resources Report)

CURRENCY EQUIVALENTS

(as of 15 May 2018)

Currency Unit	–	yuan (CNY)
CNY1.00	=	\$0.158
\$1.00	=	CNY 6.340

NOTE

In this report, “\$” refers to US dollars.

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Appendix 4:

Summary of Water Allocation of Resources Report

Summary Table of Water Resource Assessment for Construction Project

I. Basic Information	Project Name	Water Supply System in Qingshuihe Port Area, Mengding Town, Gengma County, Lincang Municipality	Project Location	2250m southeast of Bangui Village in Mengding Town, on the sloping field at the north side of the existing China-Myanmar Road: E 98 ° 53'46 ", N 23 ° 30'9" .
	Construction scale	Type I	Sector	Water Resources
	Project Implementing Agency	Lincang Border Economic Cooperation Zone Management Committee	Report Institute and Certificate No.	Lincang Yunting Water Technology Services Co., Ltd. Water Assessment No. 530217093
	Approval Authority	Lincang Municipal Water Affairs Bureau	Water Assessment Approval Authority	Lincang Municipal Water Affairs Bureau
	Water Demand	In Qingshuihe Port Area, the planned annual water intake volume for domestic water consumption is 7.665 million m ³ in the short term, and 22.995m ³ in the long term	Baseline Year	2016
	Feasibility study grade	Grade II	Target Year of the Plan	2020 (short term) 2030 (long term)
II. Control Target	Total water intake control	Short term:7.665 million m ³ ; Long term: 22.995 million m ³	Total actual water intake and consumption	Short Term Plan Year 7.30 million m ³ Long-term Plan 2299.5m ³
III. Water Intake and Consumption Plan	Approved annual water withdrawals	Short term plan year:7.665 million m ³ ; Long term target year: 22.995 million m ³		
	Design maximum water intake flow rate (m ³ /s)	0.73	Design maximum daily water intake volume (m ³ /d)	63000m ³ /d
	Water intake location	Yunjing Reservoir: located at Zhedian Village of	Guarantee Ratio for Water	95%

		Mengding Town, geographic location E99 ° 09'21.95", N23 ° 30'4.13" Intake Location: E98 ° 49'40.1 ", N23 ° 29'17.7".	Consumption (%)	
	Water Consumption Quota after approval	Short term plan year: 21000m ³ /d; long term plan year: 63000m ³ /d	Water recycling rate (%)	80 (construction period)
IV. Water Drainage	Approved annual return flow	Annual wastewater generation during short term plan year and long-term plan year is 4.409 million m ³ and 13.559 million m ³	Discharge of Major Pollutants and Concentrations	Predicted major pollutants from domestic wastewater: BOD5 200mg/l, CODcr 300mg/l, TP 4.51mg/l, NH3-N 24.8mg/l
	Location of drainage	Qingshuihe Gengma Development Zone	Drainage arrangement	Discharge into urban wastewater treatment system for treatment to meet Class IB standard of the Pollutant Discharge Standards for Urban Wastewater Treatment Plant (GB18918-2002), before discharge into pollution discharge outlets of river
V. Water Resource and Water Ecology Protection Measures	Engineering measures	The reservoir will release ecological flow at a rate of 10% of the multi-year average flow, i.e. 0.142m ³ /s (4.372 million m ³), which will be discharged through the preserved outlet at the dam.		
	Water conservation and management measures	Further improve the water supply pipeline network, increase the diameter of water supply main, adopt new-type material, strengthen monitoring and maintenance of the pipelines, reduce pipeline loss rate.		
	Other non-structural measures	Extensive awareness campaigns on water conservation, demonstration of water saving methods, improve residents' awareness in water conservation. Carry out water tariff reform, conduct scientific and proper allocation of water sources, save water consumption		
Reservoir Indicators (Yunjing Reservoir)	Check flood level (m)		922.99	
	Design flood level (m)		922.00	
	Normal water level (m)		919.50	
	Dead water level (m)		871.00	
	Total capacity (10,000 m ³)		2035.2	
	Utilizable storage (10,000 m ³)		1688.1	
	Dead storage (10,000 m ³)		93.4	
Regulation characteristics			Annual regulation	

Short-term plan year Nangun River Water Intake (2020) P=95%, monthly average intake (10,000m ³), in total 7.30 million m ³ (this project)							
January	62	April	60	July	62	October	62
February	56	May	62	August	62	November	60
March	62	June	60	September	60	December	62
Long-term plan year Yunjing Reservoir (2030) P=95%, monthly average intake (10,000m ³), in total 22.955 million m ³ (this project)							
January	195.3	April	189	July	195.3	October	195.3
February	176.4	May	195.3	August	195.3	November	189
March	195.3	June	189	September	189	December	195.3
Current Water Quality				Class II			
Location of water drainage				Gengma County Qingshuihe Development Zone			
Water Quality Target of Drainage				Class □			
River Basin				Nujiang River Basin			

Conclusions and Recommendations

10.1 Conclusions

10.1.1 Water Intake Justification and Feasibility

The development of the water supply system in Qingshuihe Port Area of Mengding Town, Gengma County is to provide domestic water consumption for the planned area of Qingshuihe Port Area. The project complies with water sector policies, watershed planning and water resource integrated utilization plan, the requirements of water functions management. The project will address the domestic water and production water consumptions in Qingshuihe Port Area. The project will contribute to optimized allocation of regional water resources, support regional economic development, facilitate industrial development in Qingshuihe Port Area, improve business attraction capacity of Qingshuihe Port Area, and will contribute to the development of Harmonious Society and the achieving the targets of the 13th FYP.

The site of the proposed water supply system is not high in elevation. Qingshuihe Port Area has complex and varied landform with ravines and gullies criss-cross and dense forest; Qingshuihe River runs through its planned area, the difference between maximum elevation and minimum elevation is around 200m, gradient is large in some

sections. The elevation of WTP water outlet is 680m, the elevation different within the water supply scope is large which basically enables gravity flow all the way, except for some places with higher or lower elevation, in such case water will be supplied with increased or reduced pressure. According to the master plan of Qingshuihe Port Area, this project will address the current issue of no water treatment plan in the area.

The water source for the short term is Nangun River, that for the long-term is Yunjing Reservoir, located 500m downstream of the water intake planned for the short term. Therefore, the natural inflow for the water intake source is calculated as the natural inflow at Yunjing Reservoir. For short-term plan year, P=95% guarantee ratio, natural inflow at the dam is 28.99 million m³, the actual supply to Qingshuihe Port Area will be 7.3 million m³ after deducting ecological water flow.

For the long-term plan year, Yunjing Reservoir, P=95%, natural inflow is 28.99 million m³, downstream river channel ecological and environmental water use is 4.372 million m³, the available water supply volume after deducting ecological flow is 24.618 million m³, the water intake for the WTP in Qingshuihe Port Area is 22.958 million m³. After regulation by reservoir, the water supply can meet the water consumption demand, the water intake and water consumption are rational.

10.1.2 Water Resource Reliability

Reliability of Water Intake: Yunjing Reservoir is planned project, the catchment area is 39.2km², with stable water inflow, during severe dry year P=95%, water inflow is 28.99 million m³, the normal water storage level of the reservoir is 17.814 million m³, utilizable storage is 16.881m³. The reservoir is design for agricultural irrigation mainly, but also provide drinking water for people and animals. The water supply for long-term plan year (2030) is 22.955 million m³, to meet the demands of reservoir storage and water supply, the water intake is rational.

Reliability of Water Quality: according to the requirements of the Design Code for Rural Water Supply Engineering (SL 687-2014), Design Code for Outdoor Water Supply Engineering (GB50013-2006) and the Standards for Drinking Water Quality, Class III water quality can meet water use requirements. According to the testing results of the water samples from intake of Mengding WTP (Nangun River) conducted

by Lincang Branch of Yunnan Provincial Water Environmental Monitoring Center, the current water quality is Class II, which can meet the requirements of WTP water supply. The water quality details are provided in the appendix Water Quality Test Report.

10.1.3 Impact of Water Intake and Drainage and Compensation Measures

(1) Water Intake Impact

According to the above analysis, the water intake of the proposed water supply system in Qingshuihe Port Area will have certain impact on the spatial and temporal distribution of the water resource amount in the catchment area of Yunjing Reservoir, but the impact on the regional climate of the entire watershed is not significant. Drainage measures have been provided at the dam of Yunjing Reservoir, the preserved ecological and environment water is in line with the actual situations. There will be certain impact on the water intaking of the No.3 cascade hydropower station of Nanwa River. The construction of the WTP will require land acquisition, compensation shall be made according to relevant national laws and policies, the affected households are fine with the compensation plan. It is concluded that the project impact on the third party is small; it is in line with actual conditions, and it will effectively address the domestic water consumption needs in the planned area of Qingshuihe Port Area, it will improve the engineering water shortage in the area; the water resource is fully utilized and the allocation of water resource is optimized.

(2) Water Drainage Impact

The drainage of the water supply system in Qingshuihe Port Area mainly includes wastewater during construction and operation. The wastewater during construction period will be treated through the wastewater treatment system and transported to farmland.

The drainage during operation period is mainly domestic wastewater from the water supply area, which will be collected and discharged into the municipal wastewater collection pipeline for treatment at the WWTP, which will not change the water quality and water function of the receiving river section, the impact on water environment is minor.

(3) Compensation Measures

According to actual survey, the water supply system in Qingshuihe Port Area will require land acquisition of 36.6mu, temporary occupation during construction of 192mu. Agreements have been reached between LBECZMC and Mengding Town Government to provide compensation in strict accordance with PRC Land Management Regulation, PRC Management Regulation Implementation Ordinance, Yunnan Provincial Land Management Regulation, Yunnan Provincial Forest Land Management Regulation, and other relevant laws and regulations, to ensure the normal production and living of the affected persons.

10.1.4 Water Resource Protection Measures

The water supply system is to provide domestic water supply for the residents in the planned area of Qingshuihe Port Area. The water quality requirement is high; therefore, proper water resource protection is needed after project completion to ensure quality of the water supply. The water resource protection measures will mainly cover the runoff area of Yunjing Reservoir and the basin downstream the reservoir.

(1) Protection Measures for the Runoff Area of the Reservoir

① According to the water source protection requirements, water source protection zone will be defined to protect the water quality of water source;

② Prepare a water source protection plan for Yunjing Reservoir Water Source Protection Zone, put into implementation after approval by Gengma County Government;

③ Strengthen water and soil conservation at the protection zone to reduce sedimentation due to soil loss and improve the utilization rate and service life of the water source.

④ Carry out greening around the water intake dam, protect the ecological environment of the water source.

(2) Protection Measures for the Downstream of Reservoir

① strengthen water and soil loss control at the downstream to ensure smooth drainage of the river channel;

② Promote ecological water-saving agriculture, reduce non-point source pollution from agriculture;

③ minimize the use of pesticide and fertilizer, promote water-saving irrigation, reduce the content of pesticide and N/P in the return flow, avoid pollution and eutrophication of the reservoir water.

10.1.5 Water Intake and Water Drainage Plan

(1) Water Intake Plan

The water intake source of the water supply system in Qingshuihe Port Area is Nangun River in the short-term plan year, and Yunjing Reservoir in the long-term plan year, the water supply guarantee rate is 95%. Yunjing Reservoir is a proposed reservoir for construction, located at 500m downstream of the water intake for the short-term plan year. After completion of the reservoir construction, the water intake for the project will change to Yunjing Reservoir. The water transmission system will be fully enclosed pipeline to transmit the water to the WTP.

According to the water demand projections, the design daily water supply for the short-term plan year (2020) is 21000m³/d; and that for the long-term plan year is 63000m³/d. Considering the actual conditions of the WTP and other uncertain factors, the design daily water supply of the WTP will be 20,000m³/d for the short-term plan year and 63000m³/d for the long-term plan year. The actual water supply is subject to the water demands by the economic and social development in the area.

(2) Drainage Plan

The drainage system (return water) of the water supply system in Qingshuihe Port Area include drainage during construction and drainage during operation. The wastewater during construction includes domestic wastewater during construction and production wastewater from construction activities; the wastewater during operation includes wastewater from the water supply area of WTP and workers' domestic wastewater.

During operation, the drainage will mainly comes from the domestic wastewater from the water supply area, it will be collected for discharging into the urban wastewater

treatment system of Qingshuihe Port Area, and treated to meet Class IB standard of the Pollutant Discharge Standard of Urban Wastewater Treatment Plant (GB18918-2002) before discharging into Qingshuihe River; the production wastewater during construction period will be treated and transported to the farmland, therefore, the project will not provide drainage outlet.

10.1.6 Feasibility of Water Intake

The water intake source for the project is Nangun River in the short-term plan year, and Yunjing Reservoir in the long-term plan year. Yunjing Reservoir will be located at 500m downstream of the Nangun River water intake, the reservoir is to be constructed. Yunjing Reservoir is designed to provide mainly for agricultural irrigation, while also for the people and animals in the irrigation area. After adjusting the water function, it can be used as the water source of the WTP of Qingshuihe Port Area; the water consumption in Qingshuihe Port Area will be prioritized over that of the irrigation area. Through government negotiations with the water users, the impacts are mitigated or avoided. The water intake of the project will not have significant impact on the total water resource amount in the watershed; the impact on water environment is minor; impacts on the third party are mild. The construction of the project is in line with government industrial policies; the preserved ecological water after implementation of the water intake can meet the ecological water demands. The wastewater from construction period and operation period, after treatment through sedimentation tank and septic tank, will be transported to be used as farmland fertilizer, without discharging into the river; the drainage impact on the surrounding environment and river water is minor. In conclusion, the water intake of the water supply system in Qingshuihe Port Area is feasible.

10.2 Recommendations

(1) Currently, the water quality of Nangun River is Class II, which can meet the water supply requirements. However, human activities are frequent at the upstream area of the reservoir, hence water quality monitoring should be strengthened during future water supply to identify any changes in the water quality and strengthen water source

protection.

(2) For agricultural production at the upstream of the water source, toxic pesticide shall be prohibited, use of pesticide shall be restricted, promote balanced fertilization technique, encourage and guide the farmers in cultivating green food, so as to reduce non-point source pollution to the water source and reservoir. It is suggested the water source management institute should provide awareness campaigns and trainings.

(3) During construction period, the management of the construction workers should be strengthened to avoid disorderly discharging of wastewater.

(4) Carry out proper water and soil conservation in accordance with the approved water and soil conservation plan, and ensure water and soil conservation is conducted in parallel with design and construction of the project facility.

(5) The project implementation agency should discuss and consult with local government, and the institute and individuals affected by land acquisition or temporary land occupation and reach agreement at the earliest and provide adequate compensation.

(6) Carry out water resource protection measures, provide water flow monitoring, water source protection measures, drainage treatment measures, automatic monitoring facility, and supervision and management measures, and integration with non-structural measures, carry out proper measurement and monitoring of the water intake and drainage amount and quality.

In conclusion, after adjusting and design of water supply function and government negotiation, the water resource utilization rate of the natural inflow of the runoff area of Yunjing Reservoir. Yunjing Reservoir will regulate water supply to complete water supply tasks and provide water intake for the water supply system in Qingshuihe Port Area; the water quality and amount can meet the water needs of the water supply area, the water intake volume is basically rational; water intake of the project has little impact on the other water users; the site selection of the water intake is reasonable; the wastewater from water supply area will be treated to meet relevant standard for discharge, no impact will be caused on the water function zone. It is suggested relevant authority approve the water intake of the project implementing agency.