Environmental Impact Summary Report

for Yunnan Preschool

Education Development and

Experiment Demonstration Project Funded

by the World Bank

Owner: Yunnan Student Financial Assistance Management Center

Drafter: Yunnan New Century Environmental Protection Science Research Institute Co., Ltd.

November 2015

DIRECTORY

Attachment:

Attachment 1: Environmental Impact Assessment Approval for Each Subproject

Attached figures:

Attached Figure 1: Assessment Range of Each Subproject and Distribution Map of Environmental Protection Objects

Attached Figure 2: General Layout Plan of Each Subproject

1 General

1.1 Project Background

The preschool education gets a late and low start in Yunnan Province. Although the enrollment rate of nursery school-age children is increasingly every year, the preschool education still lags far behind the demand of the public as the provincial economic development is developing rapidly. Up to now, it is still a vulnerable part of education of all levels in this province. To solve this problem, Yunnan Student Financial Assistance Management Center plans to apply for World Bank loans to support the construction of the Yunnan Preschool Education Development Experiment Demonstration Project. *This project aims at promoting the reform of the preschool education management and investment system in Yunnan, establishing the effective mechanism of expanding the coverage of good-quality preschool education resources in several effective ways, narrowing the urban-rural gap progressively, further improving the preschool education management level and education & teaching quality, and facilitating the realization of fair education.*

The main construction content of this project is 14 standardized nursery schools and 3 preschool research and teacher training bases. The basic situation is listed in Table 1.1.

Table 1.1 Basic Project Situations

Item	Yunnan Preschool Education Development Experiment Demonstration Project Funded by World Bank		
Client	Yunnan Student Financial Assistance Management Center		
Contact	Li Yezhang	Tel.	0871-65176919
Contact address	Education Department Building at No. 2 Xuefu Road,	Zip code	650223

	Kunming City				
Construction Site	Kunming City (Yunnan Normal University, Kunming College), Dali Prefecture (Weishan County, Yangbi County, Eryuan County), Qujing City (Zhanyi County), Zhaotong City (Zhaotong College, Qiaojia County), Wenshan Prefecture (Xichou County), Honghe Prefecture (Jianshui County)				
Construction Nature	New construction		Industry type and code	Preschool (P8210)	
Floor area	163274.15 m^2	Landscaping area		48982.24 m^2	
Total investment (RMB 10,000)	56784.84	Where: environmental protection investment (RMB 10,000)	468.92	Proportion of environmental protection investment to total investment (%)	0.83

Pursuant to the *List of Classified Management on Environmental Impact Assessment of Construction Project*, it is not necessary for any subproject to entrust a third party to prepare the environmental impact assessment document. For every subproject, the environmental impact registration form has been filled out and the environmental impact assessment approval has been obtained. According to the requirement of World Bank, this project is classified as needing Type B simple environmental impact assessment.

We were entrusted by Yunnan Student Financial Assistance Management Center to perform the environmental impact assessment of this project, summarize the environmental impact of each subproject after field reconnaissance and information collection, and prepare the *Environmental Impact Summary Report for Yunnan Preschool Education Development and Experiment Demonstration Project Funded by World Bank* for the Owner to submit to World Bank for review.

1.2 Basis of compilation

1.2.1 Chinese Laws and Regulations about Environmental Protection

(1) *Environmental Protection Law of the People's Republic of China* (2015.1)

(2) *Environment Impact Assessment Law of the People's Republic of China* (2003.9)

(3) *Water Law of the Peoples Republic of China* (2002.10)

(4) *Land Administration Law of the Peoples Republic of China* (2004.8)

(5) *Law of the People's Republic of China on Water and Soil Conservation* (2011.3)

(6) *Law of the People's Republic of China on the Prevention and Control of Water Pollution* (2008.6)

(7) *Law of the People's Republic of China on Prevention and Control of Environmental Noise Pollution* (1997.3)

(8) *Law of the People's Republic of China on Prevention and Control of Atmospheric Pollution* (2000.9)

(9) *Law of the People's Republic of China on the Prevention and Control of Environmental Pollution by Solid Wastes* (2005.4)

(10) *2011 Guiding Catalogue of Industrial Structure Regulation*, as amended in 2013

(11) *Interim Measures for Public Participation in Environmental Impact Assessment* (No. HF[2006]) (2006.2) issued by former State Environmental Protection Administration

(12) Notice on Strengthening Administration of Environmental Impact Evaluation for Projects Funded by International Financial Institution (HJ[1993] No. 324) issued by State Environmental Protection Administration, etc.

(13) *Yunnan Surface Water Environment Function Division (2010-2020)* (YHF[2014] No. 34) (2014.3)

1.2.2 Chinese Technical Guidelines for Environmental Impact Assessment

(1) *Technical Guidelines for Environmental Impact Assessment. General Principles* (HJ 2.1-2011)

(2) *Technical Guidelines for Environmental Impact Assessment. Atmospheric Environment* (HJ2.2-2008)

(3) *Technical Guidelines for Environmental Impact Assessment. Surface Water Environment* (HJ/T 2.3-93)

(4) *Technical Guidelines for Environmental Impact Assessment. Groundwater Environment* (HJ 610-2011)

(5) *Technical Guidelines for Environmental Impact Assessment. Acoustical Environment* (HJ 2.4-2009)

(6) *Technical Guidelines for Environmental Impact Assessment. Ecological Impact* (HJ 19-2011)

1.2.3 Relevant Regulations of World Bank

(1) *World Bank OP 4.01 (Environmental Assessment);*

(2) *World Bank BP17.50 (Information Disclosure);*

(3) *World Bank GP14.70 (Involving Nongovernmental Organizations in Bank-Supported Activities);*

(4) *General Environmental, Health, and Safety (EHS) Guidelines* of World Bank

1.2.4 Relevant Project Documents

(1) Letter of Authorization;

(2) *Proposal for Yunnan Preschool Education Development Experiment Demonstration Project Funded by World Bank* (draft for approval), Yunnan Design Institute Group (August 2015);

(3) *Phase II Three-Year Action Plan for Yunnan Preschool Education* (2015-2017);

(4) Other relevant files.

1.3 Purpose and Scope of Assessment

1.3.1 Purpose of Assessment

After investigation and evaluation of natural environment, social environment and environmental quality status, the environmental impact range & extent of the construction project was assessed, the alternatives to project documents and environmental assessment schemes were analyzed, and practical environmental protection measures and suggestions were put forward. From a point of view of environmental protection, a definitive conclusion about the feasibility of the project was made. It provides a scientific basis for the design of the project, the decision-making of World Bank, and the project environment management of the Owner.

1.3.2 Scope of Assessment:

(1) Surface water environment

Part of the wastewater generated in each subproject will be used for farmland irrigation after treatment, and the rest will be transmitted to the urban sewage treatment plant. None of it will have a direct hydraulic connection with surrounding surface water bodies. In the view of this, the scope of surface water assessment is not set for any subproject.

(2) Other environmental factors

The external impact of the noise generated by each subproject is concentrated in construction period. The pollution source is construction machinery noise. According to Chinese standard *Technical Guidelines for Environmental Impact Assessment – Acoustical Environment*, the scope of assessment is the area 200m outside the boundary of each subproject.

The external impact of the waste gas generated by each subproject is concentrated in construction period. The pollution source is construction dust. The comparative analysis of similar projects shows that the scope of influence of construction dust is generally the area 100m downwind the pollution source. Therefore, the scope of atmospheric environment assessment is the area 100m outside the boundary of each subproject.

To sum up, the scope of assessment of each subproject was determined to be 200m.

1.4 Executive Standard

1.4.1 Environmental Quality Standard

(1) Ambient Air

The site of each subproject is classified as Class II function area. **Class II criteria in Ambient Air Quality Standard**

(GB3095-2012) shall apply to these sites. For standard values, see Table 1.4-1.

Table 1.4-1 Ambient Air Quality Standard **Unit: μg/Nm^3**

Item	TSP	PM_{10}	$PM_{2.5}$	SO_2	NO_2
Annual average concentration limit	200	70	35	60	40
Daily average concentration limit	300	150	75	150	80
Hourly average concentration limit	-	-	-	500	200

(2) Surface water environment

According to the *Yunnan Surface Water Environment Function Division* (2010-2020), the water function of the old Baoxiang River to the northwest of the Kunming College subproject and the Laoyu River to the northeast of the preschool education research center of Yunnan Normal University is the water for fish protection and agricultural purposes, Class III criteria in *Environmental Quality Standards for Surface Water* (GB3838-2002) shall be executed for these two rivers; the Shujie River in Wuyin Township, Weishan County finally joins the Lancang River, and the executive standard applicable for the Weishan section of the Lancang River (GB3838-2002 Class VI) shall be executed for this river; the main function of the Xueshan River in Yangbi County is Class I drinking water source, and Class II criteria in GB3838-2002 shall be executed for this river; the Fengyu River in Eryuan County finally joins the Cibi Lake, and the executive standard applicable for the Cibi Lake shall be referred to and Class II criteria in GB3838-2002 shall implemented for this river; the surface water body near the nursery school in Zhanyi County is Nanpan River, the main function of this river is industrial and agricultural water, and Class VI criteria in GB3838-2002 shall be executed for this river; the river nearest to the nursery school in Chongxi Town, Zhaotong City is Mashu River and the river nearest to other subprojects in Zhaotong City is Jinsha River, the main function of these rivers are the water for fish protection, industrial water and agricultural water, and Class III criteria in GB3838-2002 shall be executed for them; the Lujiang River in Jianshui County finally joins the Nanpan River, and the executive

standard applicable for the Jianshui section of the Nanpan River shall be referred to and Class VI criteria in GB3838-2002 shall implemented for this river. There is no surface water system near the No. 1 nursery school of Xichou County. For standard values applicable for the above water bodies, see Table 1.4-2.

Table 1.4-2 Surface Water Environment Quality Standard **Unit: mg/L (except pH and fecal coliform)**

Item / Class	pH	COD	BOD_5	Ammonia nitrogen	Total phosphorus	Total nitrogen	Fecal coliform
Class II criteria	6~9	15	3	0.5	0.1	0.5	2000 nos/L
Class III criteria	6~9	20	4	1.0	0.2	1.0	10000 nos/L
Class VI criteria	6~9	30	6	1.5	0.3	1.5	20000 nos/L

(3) Sound environment

The nursery school in Wuyin Township is in the countryside. Class I criteria (55dB(A) in daytime and 45dB(A) at night) in the *Standard of Noise in Acoustical Environment* (GB3096-2008) shall be executed.

The teacher training base and nursery school of Zhaotong College, the No. 1 nursery school of Xichou County and the Qingyuan Nursery School in Jianshui County are located within 35km away from the traffic trunk line. For these areas, the *Notification on the Issues Concerning Environmental Noise in Environmental Impact Assessment for Such Construction Projects as Highways and Railways (Including Light Railway), etc.* (HF [2003] No. 94) issued by State Environmental Protection Administration shall be referred to. As the nursery schools are special sensitive buildings, Class 2 criteria (60dB(A) in daytime and 50dB(A)) at night) in GB3096-2008 shall be executed.

Class 2 criteria in GB3096-2008 shall be executed for all subprojects except the above.

1.4.2 Discharge Standard for Water Pollutants

(1) Emission Standard for Atmospheric Pollutants

1) Construction period

The major pollutant generated by each subproject is raised dust. The unorganized emission limit in the *Comprehensive Emission Standard of Air Pollutants* (GB1-6297-1996) shall be executed. The maximum off-boundary concentration shall be not more than 1.0mg/m^2.

2) Operation period

For the odor pollutants generated by septic tanks and toilets in each subproject, Class II criteria in the *Emission Standards for Odor Pollutants* (GB14554-1993) shall be executed. The unorganized emission monitoring limit of odor concentration shall be 20 (dimensionless).

If there is a canteen in a subproject, the number of cooking ranges is usually 3 to 4 and the cooking ranges are in the middle size. The exhaust gas of oil fume emission shall be in compliance with the *Emission Standard of Cooking Fume* (GB18483-2001), the maximum allowable emission concentration shall be 2.0mg/m^3, and the minimum removal efficiency of cleaning facilities shall be 75%.

(2) Discharge standard for water pollutants

1) Construction period: In the construction period of each subproject, the wastewater will be wholly reclaimed rather than discharged. So, no discharge criteria are set.

2) Operation period: All wastewater generated by each subproject is domestic sewage.

The domestic sewage from the preschool education research center of Yunnan Normal University will be treated at the reclaimed water treatment plant in the campus and used for afforestation not discharged. The reclaimed water shall meet the criteria set for the water for aesthetic environment use in the *Reuse of Urban Recycling Water--Water Quality Standard for Scenic Environment Use* (GB/T 18921-2002). For standard values, see Table 1.4-3.

No urban sewage treatment plant is designed for the nursery school in Wuyin Township, Weishan County, the Qiaojiaying nursery school in Qiaojia County and the nursery school in Chongxi Town, Qiaojia County. The wastewater processed at the sewage treatment facility will be used for irrigation of surrounding farmlands. The water quality shall meet the dry farming criteria in the *Standards for Irrigation Water Quality* (GB5084-2005). For standard values, see Table 1.4-4.

All other subprojects are accessible to local urban sewage treatment plants. The discharged water quality shall meet Class III criteria listed in Table 4, Integrated Wastewater Discharge Standard (GB8978-1996). Ammonia nitrogen and phosphate shall meet Class B criteria listed in Table 1, Wastewater Quality Standards for Discharge to Municipal Sewers (CJ343-2010). For standard values, see Table 1.4-5.

Table 1.4-3 Reuse of Urban Recycling Water--Water Quality Standard for Scenic Environment Use Unit: mg/L

S/N	Item / Index	For aesthetic environment use; for waterscape
1	Basic requirement	No floats or unpleasant smell or odor
2	PH (dimensionless)	6~9
3	Five-day biochemical oxygen demand (BOD_5)≤	6
4	Suspended solids (SS)≤	10
5	Turbidity (NTU)≤	N/A
6	Dissolved oxygen ≥	1.5
7	Total phosphorus (calculated by P)≤	0.5
8	Total nitrogen≤	15
9	Ammonia nitrogen (Calculate by N)≤	5
10	Fecal coliform (number/L)≤	2000
11	Residual chlorine≥	0.05 (the chlorine contact time shall not be shorter than 30min (residual chlorine). There is no such requirement on the non-chlorinated disinfection.)

S/N	Item / Index	For aesthetic environment use; for waterscape
12	Chromaticity ≤	30
13	Petroleum ≤	1.0
14	Anionic surfactant	0.5

Table 1.4-4 Farmland Irrigation Water Quality Criterion Limit Unit: mg/L

Item	pH	COD_{Cr}
Dry farming criteria in GB5084-2005	5.5-8.5	200

Table 1.4-5 Quality Criterion Limit of Water Discharged to Sewage Treatment Plant Unit: mg/L

Item	pH	COD_{Cr}	BOD_5	SS:	Ammonia nitrogen	Animal and vegetable oil	Phosphates (calculated by P)
Class III criteria in GB8978-1996	6-9	500	300	400	-	100	-
CJ343-2010					35		8.0

(3) Noise emission criteria

1) The noise level in the construction period of each subproject shall be no more than 70dB(A) in daytime and 55dB(A) at night in accordance with the *Emission Standard of Environment Noise for Boundary of Construction Site* (GB12523-2011).

2) In the operation period, the noise level in the nursery school in Wuyin Township shall meet Class 1 criteria (≤55dB(A) in daytime and ≤45dB(A) at night) in the *Emission Standard for Industrial Enterprises Noise at Boundary* (GB12348-2008); the noise level in other subprojects shall meet Class 2 criteria (≤60dB(A) in daytime and ≤50dB(A) at night) in GB12348-2008.

1.5 Environmental protection object

Main air and acoustical environment protection objects are listed in Table 1.5-1. The wastewater from 3 subprojects (the Qiaojiaying nursery school in Qiaojia County, the nursery school in Chongxi Town, Qiaojia County and the nursery school in Wuyin Township, Weishan County) cannot flow into urban sewage treatment plants; instead, it is used for irrigation of surrounding farmlands. The surface water bodies closer to these 3 subprojects are selected as the surface water environment protection objects. For details, see Table 1.5-2. The assessment range of each subproject and the situation about environmental protection objects are shown in attached figure 1.

Table 1.5-1 Schedule of Main Air and Acoustical Environment Protection Objects

Item	Protection Object	Direction	Nearest Distance to Project Boundary	Executive Standard
Preschool education research center of Yunnan Normal University	Teaching area in Yunnan Normal University	West	35m	
	Dormitory area in Yunnan Normal University	East	30m	
	Makeshift houses in Songzhi Camp	Southeast	160m	
Teacher training base, nursery school, and special education center of Kunming College	Yunda Zhicheng community	Northwest	30m	
	Teaching area of Kunming College	South	60m	
	Gaoqiao Village	Northwest	30m	
Comprehensive teaching building for education experiment, training and practice base of Zhaotong College	Xuejiaying Village	Northwest	130m	
	Zhangjiaying Village	Southeast	35m	
Nursery school in Baihetan Town, Qiaojia County	Baihetan Town	South	5m	
	Qiaojia No. 3 Middle School	East	20m	

Item	Protection Object	Direction	Nearest Distance to Project Boundary	Executive Standard
Qiaojiaying nursery school in Qiaojia County	Qiaojiaying Village	West	30m	Class 2 in *Standard of Noise in Acoustical Environment* (GB3096-2008) Class II in *Ambient Air Quality Standard* (GB3095-2012)
	Qiaojiaying Primary School	South	Adjacent	
Nursery school in Chongxi Town, Qiaojia County	Chongxi Town	Southeast	5m	
	Primary school of Chongxi Town	Northeast	20m	
Nanzhao Nursery School in Weishan County	Nanzhao Town	West	60m	
Shangjie nursery school in Yangbi County	Junior middle school of Cangshanxi Town	West	Adjacent	
	Dongpang Village	Southeast	Adjacent	
Two nursery schools in Eryuan County	Yuhe Village	West	20m	
Two nursery schools in Zhanyi County	Zhuangjiawan primary school	West	Adjacent	
	Dongwaxu Village	South	80m	
	Zhongmulong Village	Northeast	Adjacent	
	Zhuangjiawan Village	West	90m	
No. 1 nursery school of Xichou County	Public rental housing	West	100m	
	Family planning service station	West	50m	
	Health bureau	Northwest	30m	
	Forest police	North	45m	
	Traffic and transport administration	Northeast	95m	
	Animal health inspection institute	Northeast	140m	
	Court	Northeast	75m	
	Procuratorate	Northeast	135m	

Item	Protection Object	Direction	Nearest Distance to Project Boundary	Executive Standard
	Shangzhai Village	Southeast	10m	
Qingyuan Nursery school in Jianshui County	/	/	/	
Nursery school in Wuyin Township, Weishan County	Shujie Village	North	6m	Class 1 in GB3096-2008; Class II in GB3095-2012

Table 1.5-2 Schedule of Main Surface Water Protection Objects

Item	Protection Object	Direction	Nearest Distance	Executive Standard
Qiaojiaying nursery school in Qiaojia County	Jinsha River	West	2500m	*Environmental Quality Standard on Surface Water* (GB3838-2002) type III
Nursery school in Chongxi Town	Mashu River	East	2500m	
Nursery school in Wuyin Township	Shujie River	East	150m	Class VI in GB3838-2002

Description about main surface water environment protection objects: The domestic wastewater generated by the subprojects not listed in Table 1.5-2 will be reclaimed after being treated at the reclaimed water station, or transmitted to the urban sewage treatment plant, rather than discharged to surrounding water bodies. As those subprojects have no hydraulic connection with surrounding water bodies and are far away from them, they are not listed in Table 1.5-2.

2 Project Description

2.1 Construction scale and content

The construction scale and content of this Project is listed in Table 2.1.

Table 2.1 Schedule of Construction Content

Construction Site	Construction Content	Scale (Number of Persons)		Land Area (mu)	Building Area (m^2)	Environment-related Facilities
		Student	Faculty			
Yunnan Normal University	Preschool education research center	250	15	18.57	10000.00	Septic tank, oil separation tank, toilet
Kunming College	Teacher training base, nursery school, and special education center	720	100	56.00	18366.00	Canteen (exhaust fan), oil separation tank, septic tank, toilet, clinic, campus broadcasting station
Zhaotong College	Teacher training base and nursery school	460	90	20.00	8000.00	Canteen (exhaust fan), oil separation tank, septic tank, toilet, clinic, central air conditioner, campus broadcasting station
Baihetan Town, Qiaojia County	Nursery school that contains 12 classes	360	72	13.67	4320.00	Canteen (exhaust fan), oil separation tank, septic tank, toilet, clinic, campus broadcasting station
Qiaojiaying, Qiaojia County	Nursery school that contains 9 classes	270	54	9.99	3240.00	Canteen (exhaust fan), oil separation tank, septic tank, toilet, clinic, campus broadcasting station
Chongxi Town, Qiaojia County	Nursery school that contains 6 classes	180	36	8.79	2160.00	Canteen (exhaust fan), oil separation tank, septic tank, toilet, clinic, campus broadcasting station
Nanzhao, Weishan County	Nursery school that contains 12 classes	360	72	10.00	3240.00	Canteen (exhaust fan), oil separation tank, septic tank, toilet, clinic, campus broadcasting station
Wuyin Township, Weishan County	Nursery school that contains 9 classes	270	54	11.80	2471.00	Canteen (exhaust fan), oil separation tank, septic tank, toilet, clinic, campus broadcasting station

Construction Site	Construction Content	Scale (Number of Persons)		Land Area (mu)	Building Area (m^2)	Environment-related Facilities
		Student	Faculty			
Yangbi County	Nursery school that contains 12 classes	420	84	16.07	5404.19	Canteen (exhaust fan), oil separation tank, septic tank, toilet, clinic, central air conditioner, campus broadcasting station
Eryuan County	Two nursery schools that contains 12 classes (adjacent)	720	144	24.00	9214.06	Canteen (exhaust fan), oil separation tank, septic tank, toilet, clinic, campus broadcasting station
Zhanyi County	Two nursery schools that contains 12 classes (adjacent)	720	144	20.09	10184.03	Canteen (exhaust fan), oil separation tank, septic tank, toilet, clinic, campus broadcasting station
Xichou County	Nursery school that contains 12 classes	360	72	8.02	3975.00	Canteen (exhaust fan), oil separation tank, septic tank, toilet, clinic, campus broadcasting station
Jianshui County	Nursery school that contains 12 classes	360	72	12.00	5428.30	Canteen (exhaust fan), oil separation tank, septic tank, toilet, clinic, campus broadcasting station
Total		5450	1009	244.91	86002.58	

Notes: ① The construction content of Yunnan Normal University excludes canteen construction because it relies on the canteen in the campus. ② Main function of clinics is to provide first aid service in case of emergency, such as when an infant falls down.

2.2 Compliance to industrial policy

According to the *2011 Guiding Catalogue of Industrial Structure Regulation* (as amended), this Project is a preschool education project as included in the 36th item of "encouraged" category (education, culture, health and sports service industries). That is to say, this Project complies with national industrial policy.

2.3 Water supply and drainage system

(1) Water supply: The water for each subproject is supplied by local water utility.

(2) Water drainage: The oily wastewater from the canteen in the preschool education research center of Yunnan Normal University will be treated at the oil separation tank and other domestic sewage will be treated at the septic tank. After that, the wastewater and sewage are transmitted through the in-campus sewage pipe network to the in-campus reclaimed water station. The domestic sewage from the Qiaojiaying nursery school in Qiaojia County, the nursery school in Chongxi Town, Qiaojia County and the nursery school in Wuyin Township, Weishan County will be treated at the oil separation tank and the septic tank, and the flowing direction of the water discharged from the tank is described in the chapter "Analysis of Alternative Option" here. The oily wastewater from the kitchens in other subprojects will be treated at the oil separation tank, sent with the domestic sewage to the septic tank, discharged into the municipal sewage pipe network, and converged into the urban sewage treatment plant in respective project sites. The water discharge situation is detailed in Table 2.3.

Table 2.3 Water Discharge Summary

Item	Project Document Disposal Method	Water Discharge Direction	Sewage treatment plant Scale	Operation Period of Sewage Treatment Plant	Quality of Water Discharged from Sewage Treatment Plant	Status
Preschool education research center of Yunnan Normal University	Septic tank, oil separation tank	The water is treated at the reclaimed water station in Yunnan Normal	2000m^3/d	2007	Criteria set for the water for aesthetic environment use in the *Reuse of Urban Recycling Water--Water*	Meeting the standard

Item	Project Document Disposal Method	Water Discharge Direction	Sewage treatment plant Scale	Operation Period of Sewage Treatment Plant	Quality of Water Discharged from Sewage Treatment Plant	Status
		University and then used for afforestation and road cleaning in the campus.			*Quality Standard for Scenic Environment Use* (GB/T 18921-2002)	
Teacher training base, nursery school, and special education center of Kunming College	Septic tank, oil separation tank	No. 12 water purification plant	50,000m^3/d	2014	Standard A of the First Class in *Discharge Standard of Pollutants for Municipal Wastewater Treatment Plant* (GB18918-2002)	Meeting the standard
Comprehensive teaching building for education experiment, training and practice base of Zhaotong College	Septic tank, oil separation tank	Urban sewage treatment plant in Zhaoyang District	60,000m^3/d	2008	Standard B of the First Class in *Discharge Standard of Pollutants for Municipal Wastewater Treatment Plant(GB18918-2002)*	Meeting the standard
Nursery school in Baihetan Town, Qiaojia County	Septic tank, oil separation tank	Sewage treatment plant in Qiaojia County	7500m^3/d	2012	Same as above	Meeting the standard
Nanzhao nursery school in Weishan County	Septic tank, oil separation tank	Sewage treatment plant in Weishan County	5000m^3/d	2013	Same as above	Meeting the standard
Shangjie nursery school in Yangbi County	Septic tank, oil separation tank	Sewage treatment plant in Yangbi County	5000m^3/d	2013	Same as above	Meeting the standard

Item	Project Document Disposal Method	Water Discharge Direction	Sewage treatment plant Scale	Operation Period of Sewage Treatment Plant	Quality of Water Discharged from Sewage Treatment Plant	Status
Two nursery schools in Eryuan County	Septic tank, oil separation tank	Sewage treatment plant in Eryuan County	4000m^3/d	2014	Same as above	Meeting the standard
Two nursery schools in Zhanyi County	Septic tank, oil separation tank	Sewage treatment plant in Zhanyi County	20,000m^3/d	2010	Standard A of the First Class in *Discharge Standard of Pollutants for Municipal Wastewater Treatment Plant* (GB18918-2002)	Meeting the standard
No. 1 nursery school of Xichou County	Septic tank, oil separation tank	Sewage treatment plant in Xichou County	3000m^3/d	2013	Same as above	Meeting the standard
Qingyuan Nursery school in Jianshui County	Septic tank, oil separation tank	Sewage treatment plant in Jianshui County	25,000m^3/d	2011	Standard B of the First Class in *Discharge Standard of Pollutants for Municipal Wastewater Treatment Plant(GB18918-2002)*	Meeting the standard
Qiaojiaying nursery school in Qiaojia County	Septic tank, oil separation tank	To be determined (see "Analysis of Alternative Option")	/	/	/	/
Nursery school in Chongxi Town, Qiaojia County	Septic tank, oil separation tank	To be determined (see "Analysis of Alternative Option")	/	/	/	/

Item	Project Document Disposal Method	Water Discharge Direction	Sewage treatment plant Scale	Operation Period of Sewage Treatment Plant	Quality of Water Discharged from Sewage Treatment Plant	Status
Nursery school in Wuyin Township, Weishan County	Septic tank, oil separation tank	To be determined (see "Analysis of Alternative Option")	/	/	/	/

2.4 Solid waste disposal

Most of solid wastes generated by each subproject are domestic wastes. Project documents will be collected and transported to the nearest waste landfill by local environmental sanitation department. The waste disposal situation is detailed in Table 2.4.

Table 2.4 Domestic Waste Disposal Summary

Item	Destination	Treatment Capacity of Waste Landfill	Time of Putting into Operation	Status
Preschool education research center of Yunnan Normal University	Eastern Suburb Kunming Municipal Solid Waste Incineration Power Plant	Maximum scale is daily treatment capacity of 2200t. Currently, daily treatment capacity is 1600t.	2009	Meeting the *Standard for Pollution Control on the Municipal Solid Waste Incineration* (GB18485-2014)
Teacher training base, nursery school, and special education	Eastern Suburb Kunming Municipal Solid Waste	Maximum scale is daily treatment capacity of 2200t. Currently, daily	2009	Same as above

Item	Destination	Treatment Capacity of Waste Landfill	Time of Putting into Operation	Status
center of Kunming College	Incineration Power Plant	treatment capacity is 1600t.		
Comprehensive teaching building for education experiment, training and practice base of Zhaotong College	Sanshantang waste landfill	The capacity is 2,190,000m^3. The service life is 15 years. The daily treatment capacity is 400t. It is a standard and safe landfill.	2006	Meeting the *Standard for Pollution Control on the Landfill Site of Municipal Solid Waste* (GB16889-2008)
Nursery school in Baihetan Town, Qiaojia County	Waste landfill in Qiaojia County	The capacity is 650,000m^3. The service life is 20 years. The daily treatment capacity is 70t. It is a standard and safe landfill.	2007	Same as above
Qiaojiaying nursery school in Qiaojia County	Qiaojiaying waste landfill in Qiaojia County	The capacity is 300,000m^3. The service life is 15 years. The daily treatment capacity is 5t. It is a standard and safe landfill.	2010	Same as above
Nursery school in Chongxi Town, Qiaojia County	Waste landfill in Chongxi Town, Qiaojia County	The capacity is 200,000m^3. The service life is 15 years. The daily treatment capacity is 4t. It is a standard and safe landfill.	2010	Same as above
Nanzhao nursery school in Weishan County	Domestic waste landfill in Weishan County	The capacity is 750,000m^3. The service life is 14 years. The daily	2012	Same as above

Item	Destination	Treatment Capacity of Waste Landfill	Time of Putting into Operation	Status
		treatment capacity is 110t. It is a standard and safe landfill.		
Nursery school in Wuyin Township, Weishan County	Domestic waste landfill in Wuyin Township, Weishan County	The capacity is 50,000m^3. The service life is 20 years. The daily treatment capacity is 2.0t. It is a standard and safe landfill.	2014	Same as above
Shangjie nursery school in Yangbi County	Domestic waste landfill in Yangbi County	The capacity is 494,700m^3. The service life is 18 years. The daily treatment capacity is 60t. It is a standard and safe landfill.	2012	Same as above
Two nursery schools in Eryuan County	Waste landfill in Eryuan County	The capacity is 632,000m^3. The service life is 20 years. The daily treatment capacity is 6t. It is a standard and safe landfill.	2008	Same as above
Two nursery schools in Zhanyi County	Domestic waste incineration power plant in Qujing City	Maximum scale is daily treatment capacity of 800t. Currently, daily treatment capacity is 500t.	2010	Meeting the *Standard for Pollution Control on the Municipal Solid Waste Incineration* (GB18485-2014)
No. 1 nursery school of Xichou	Municipal solid waste landfill	The capacity is 320,000m^3. The	2012	Meeting the *Standard for Pollution*

Item	Destination	Treatment Capacity of Waste Landfill	Time of Putting into Operation	Status
County	in Xichou County	service life is 16 years. The daily treatment capacity is 40t. It is a standard and safe landfill.		*Control on the Landfill Site of Municipal Solid Waste* (GB16889-2008)
Qingyuan Nursery school in Jianshui County	Municipal solid waste landfill in Jianshui County	The capacity is 1,000,000m^3. The service life is 20 years. The daily treatment capacity is 200t. It is a standard and safe landfill.	2006	Same as above

2.5 Energy resources

The electricity for each subproject will be led from local municipal power grid. Available project documents shows that heat supply is not needed, no heat supply facility (e.g., boiler) is provided, and it is planned to use electrical hot water and catering facilities. An alternative energy solution is proposed hereafter.

2.6 Construction camp and material supply

(1) No construction camp will be set for each subproject area in the construction period. Most construction personnel will come from neighboring villages. No food and accommodation will be provided in the project area.

(2) The sand and stone will be supplied by local market and stored together after being purchased. In the storage period, they shall be covered.

(3) Commodity concrete will be used. It is not to mix concrete in the project area.

2.7 Investment and progress

Total project investment is RMB 567,848,400. USD 50,000,000 (equivalent to RMB 310,000,000) will be applied from World Bank. RMB 257,848,400 will be domestic fund. The sources of domestic fund are self-funding, government support, and support from industry administration.

This Project is scheduled to be commenced from 2017. All subprojects will be completed within 5 years and start to run from 2022.

3. Introduction of Natural and Social Environment

3.1 Natural environment

3.1.1 Geographic location

The geographic location of each subproject is illustrated in Figure 3.1-1.

(1) Subprojects in Kunming City

The preschool education research center of Yunnan Normal University is in the west block of the dormitory area in the campus. This block is located in Chenggong District, about 20km southeast of the Kunming urban area. It is an urban built-up area.

The nursery school and special education center of Kunming College are in the northwest of the campus. It belongs to the economic development zone. This zone is on the southeast side of the Kunming urban area. It is an urban built-up area.

(2) Subprojects in Dali Prefecture

1) Weishan County

Nanzhao nursery school is situated at the country seat Nanzhao Town in the southeast of Weishan County.

The nursery school in Wuyin Township is located in the west of Weishan County. It is out of the urban planning scope of county level. There is no urban sewage treatment plant.

2) Yangbi County

Shangjie nursery school is located in the east of Yangbi County.

3) Eryuan County

Two nursery schools are next to each other. They are in the southwest of Eryuan County.

(3) Subprojects in Qujing City

No. 2 nursery school of Zhanyi County is adjacent to Zhuangjiawan nursery school in Zhanyi County. It is located in the urban-rural junction in the south of Zhanyi County.

(4) Subprojects in Zhaotong City

The comprehensive teaching building for education experiment, training and practice base of Zhaotong College is centered in Zhaoyang District, Zhaotong City. Zhaoyang District is the seat of Zhaotong municipal party committee and municipal government.

The nursery school in Baihetan Town is located in the center of Qiaojia County. Qiaojiaying nursery school is located in Qiaojiaying Town in the north of Qiaojia County. Nursery school in Chongxi Town is located in the east of Qiaojia County.

Among them, Qiaojiaying nursery school and nursery school in Chongxi Town are in the non-urban built-up area. There is no urban sewage treatment plant.

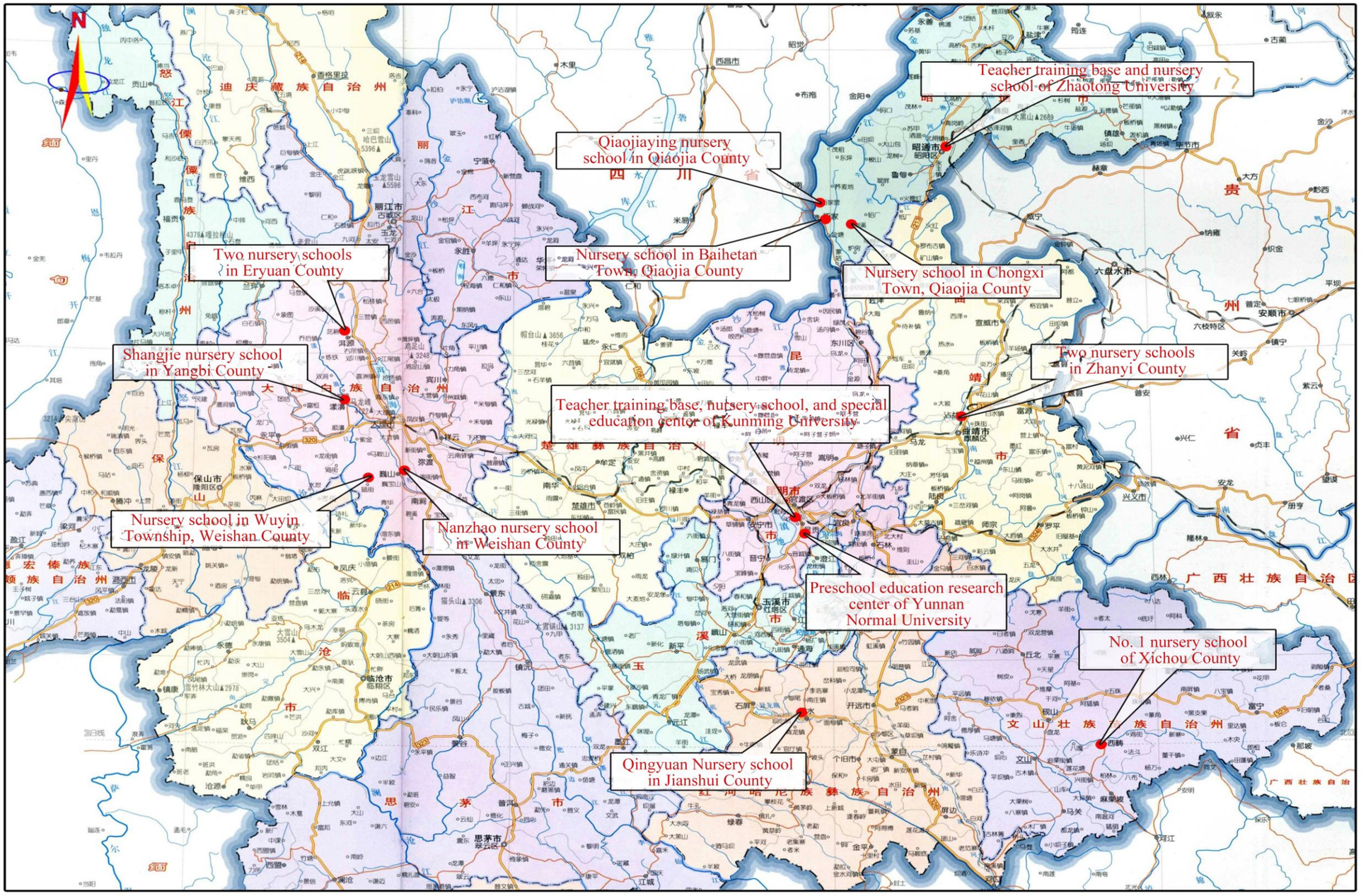


Figure 3.1-1 Geographic Location of Each Subproject

(5) Subprojects in Wenshan Prefecture

No. 1 nursery school of Xichou County is located in the northeast of Xichou County.

(6) Subproject in Honghe Prefecture

Qingyuan nursery school is located in the west of Jianshui County.

3.1.2 Topography and geology

The site survey reveals that the site has good geological conditions for all subprojects except Qingyuan nursery school in Jianshui County where geological conditions are bad. There is a gully to the southwest of this nursery school. The terrain here is uneven, as shown in Figure 3.1-2. Although there are some potential geological hazards, regional geological disasters can be avoided as far as we know after consultation with the Owner. With the subsequent development of this plot, the uneven area near it will be filled and leveled up before September 2017. It is planned to commence the construction of this Project from 2017.

The topographic situation of each subproject is described as follows:

Figure 3.1-2 Site of Qingyuan Nursery School in Jianshui County

(1) Subprojects in Kunming City

Average altitude of Kunming is 1895m. The site of the Yunnan Normal University subproject is flat and about 1922m above sea level. The site of the Kunming College subproject is flat and about 1960m above sea level.

(2) Subprojects in Dali Prefecture

1) Weishan County

Average altitude of Weishan County is 1725m. Nanzhao nursery school and the nursery school in Wuyin Township are far apart from each other. The minimum and maximum altitudes of the land where Nanzhao nursery school is located are 1756m and 1773m respectively, with a height difference of 17m. The land where the nursery school in Wuyin Township is located is low in the east and high in the west and has a height difference of 18m between minimum altitude (1660m) and maximum altitude (1678m).

2) Yangbi County

The terrain undulates largely in Yangbi County. The maximum and minimum altitude is 4122m and 1500m respectively. The site of Shangjie nursery school is flat and has an average altitude of 1585m.

3) Eryuan County

Average altitude of Eryuan County is 2,060m. Two nursery schools are next to each other. The site is flat and has an average altitude of 2,059m.

(3) Subprojects in Qujing City

Average altitude of Zhanyi County is 2,000m. Two nursery schools in Zhanyi County are next to each other. The site is flat and has an average altitude of 1,857m.

(4) Subprojects in Zhaotong City

Average altitude of Zhaoyang District in the center of Zhaotong City is 1950m. The site of the comprehensive teaching building for education experiment, training and practice base of Zhaotong College is flat and has an average altitude of 1954m.

The terrain undulates largely in Qiaojia County. The maximum and minimum altitude is 3,556m and 620m respectively. Average altitude of **the nursery school in Baihetan Town** is 957m. Average altitude of **Qiaojiaying nursery school** is 1441m. Average altitude of **the nursery school in Chongxi Town** is 2430m.

(5) Subprojects in Wenshan Prefecture

Average altitude of Xichou County is 1,473m. The site of No. 1 nursery school of Xichou County is flat and has an average altitude of 1478m.

(6) Subproject in Honghe Prefecture

Average altitude of Jianshui County is 1,315m. Average altitude of Qingyuan nursery school is 1397m.

3.1.3 Hydrology

The wastewater generated by each subproject will not be discharged to any surface water body. This section focuses on discussing the river nearest to each subproject.

(1) Kunming subprojects

The Laoyu River 1500m east of the preschool education research center of Yunnan Normal University finally joins the Dianchi Lake.

The old Baoxiang River 240m northwest of the teacher training base of Kunming College also joins the Dianchi Lake.

(2) Subprojects in Dali Prefecture

There is no river near Nanzhao nursery school in Weishan County.

The Shujie River 150m east of the nursery school in Wuyin Township, Weishan County, which is named after Shujie Village, finally joins the Lancang River.

The Xueshan River 400m west of Shangjie nursery school in Yangbi County finally joins the Lancang River.

The Fengyu River about 400m west of two nursery schools in Eryuan County finally joins the Cibi Lake.

(3) Subprojects in Qujing City

The Nanpan River is about 1.5km northeast of the nursery school in Zhanyi County.

(4) Subprojects in Zhaotong City

There is no river near the comprehensive teaching building for education experiment, training and practice base of Zhaotong College.

The Mashu River about 2.5km east of the nursery school in Chongxi Town, Qiaojia County finally joins the Jinsha River. The Jinsha River is about 2.5km west of Qiaojiaying nursery school and about **3km west of the nursery school in Baihetan Town.**

(5) Subprojects in Wenshan Prefecture

The site investigation shows that there is no river near No. 1 nursery school of Xichou County.

(6) Subproject in Honghe Prefecture

The Lujiang River about 2.5km west of Qingyuan nursery school in Jianshui County finally joins the Nanpan River.

3.1.4 Meteorology

In Yunnan Province, the rainfall is concentrated in the period from May to October. The average annual rainfall of each subproject area is listed in Table 3.1.

Table 3.1 Schedule of Average Annual Rainfall of Each Subproject Area

Item	Location	Average Annual Rainfall (mm)
Preschool education research center of Yunnan Normal University	Kunming City	1000
Teacher training base, nursery school, and special education center of Kunming College	Kunming City	1000
Comprehensive teaching building for education experiment, training and practice base of Zhaotong College	Zhaotong City	760
Nursery school in Baihetan Town, Qiaojia County	Qiaojia County	760
Qiaojiaying nursery school in Qiaojia County	Qiaojia County	760
Nursery school in Chongxi Town, Qiaojia County	Qiaojia County	760
Nanzhao nursery school in Weishan County	Weishan County	800
Nursery school in Wuyin Township, Weishan County	Weishan County	800
Shangjie nursery school in Yangbi County	Yangbi County	1046.5
Two nursery schools in Eryuan County	Eryuan County	732
Two nursery schools in Zhanyi County	Zhanyi County	1002
No. 1 nursery school of Xichou County	Xichou County	1294
Qingyuan Nursery school in Jianshui County	Jianshui County	805

3.1.5 Vegetation

(1) Kunming subprojects

There is no natural vegetation in the sites of two subprojects. The surface vegetation is dominated by weeds. There are relatively few species of plants.

(2) Subprojects in Dali Prefecture

The vegetation in the site of the nursery school in Wuyin Township, Weishan County is dominated by weeds and pear trees. The site of the Nanzhao nursery school in Weishan County has been leveled. The vegetation seen in site survey is the weeds that grew up after leveling. The vegetation in the site of the nursery schools in Yangbi County and Eryuan County is weeds. The weeds are almost the same in species, primarily compositae and leguminosae.

(3) Subprojects in Qujing City

Two nursery schools in Zhanyi County are next to each other. The vegetation in the site is dominated by crabapple and wintersweet.

(4) Subprojects in Zhaotong City

The vegetation in the site of the comprehensive teaching building for education experiment, training and practice base of Zhaotong College is primarily pinus armandii and sabina chinensis and few compositae Artemisia and corn. The vegetation in the site of the nursery school in Baihetan Town, Qiaojia County is primarily bunchgrass and solanacea weeds and few fatsia japonica and eucalyptus. The vegetation in the site of the nursery school in Chongxi Town, Qiaojia County is dominated by corn, summer squash and pumpkin. The vegetation in the site of Qiaojiaying nursery school in Qiaojia County is dominated by corn and fruit trees.

(5) Subprojects in Wenshan Prefecture

The site of No. 1 nursery school of Xichou County has been hardened. There is no surface vegetation.

(6) Subproject in Honghe Prefecture

The vegetation in the site of Qingyuan nursery school in Jianshui County is dominated by weeds, primarily compositae and leguminosae.

The assessment areas of the above subprojects don't fall within natural reserve. There is no scenic spot near the project areas. No rare wild animal and plant included in the protection list is found.

3.1.6 Cultural relics

There is no officially protected monument and site in the assessment scope of each subproject.

3.2 Social environment

This Project is to establish a comprehensive teacher training system based on three universities (Yunnan Normal University, Kunming College and Zhaotong College) and promote the development of the preschool education in the counties and districts where other subprojects are located. The gross enrollment rate of preschool education in the county/district where each subproject is located in 2014 is listed in Table 3.2-1.

Table 3.2-1 Gross Enrollment Rate of Preschool Education in the County/District Where Each Subproject is Located (2014)

Name	Gross Enrollment Rate for Three-Year System (%)	Gross Enrollment Rate for Three-Year System in Urban Areas (%)	Gross Enrollment Rate for Three-Year System in Rural Areas (%)
Weishan County	78.2	106.1	73.8
Yangbi County	33.31	92.5	18.54
Eryuan County	60	66.8	59
Zhanyi County	67.93	71.2	66.66
Xichou County	49.02	55.1	42.94
Qiaojia County	12.48	18.8	2
Jianshui County	64.2	83.47	60.12

The social and economic situation of each subproject area is listed in Table 3.2-2.

Table 3.2-2 Social and Economic Situation of Each Subproject Area

Name	Total Territory Area (km^2)	Population (person)	Percentage of Population of Ethnic Minorities (%)	Total GDP (RMB 10,000)	Percentage of Three Major Industries in GDP (%)			Urban per capita disposable income (yuan)	Rural per capita disposable income (yuan)	Data Term
					Primary industry	Secondary industry	Tertiary industry			
Kunming City	21473	6.626 million	13.8	RMB 371.299 billion	5.1	44.2	50.7	31295	10366	2014
Weishan County	2200	316363	45.5	428009	34.0	34.4	31.6	20751	4928	2013
Yangbi County	1957	105069	68.8	174277	31.0	43.9	25.1	22441	7518	2014
Eryuan County	2614	296194	70.7	484961	34.1	35.7	30.2	23513	7402	2014
Zhanyi County	2910	431,000	6.0	RMB 16 billion	22.0	52.0	26.0	25048	9630	2014
Xichou County	1506	259,700	18.5	251599	35.2	16.8	48.0	19454	6443	2014
Zhaotong City Zhaoyang District	2167	857679	17.0	1876332	12.3	51.1	36.6	19151	5333	2013
Qiaojia County	3245	596,000	4.7	507154	38.9	31.6	29.5	18651	6418	2014

Jianshui County	3789	540,000	40.0	RMB 11.777 billion	23.0	39.5	37.3	23556	9361	2014

3.3 Environmental Quality

3.3.1 Ambient Air

(1) Kunming subprojects

The assessment areas of two subprojects are Class II area according to ambient air quality. The ambient air quality shall meet Class II criteria in the *Ambient Air Quality Standard* (GB3095-2012). According to *2014 Report on the State of Environment of Kunming City*, the number of effective monitoring days is 365 days; the number of days with excellent weather (AQI≤50) is 100, the number of days with good weather (50<AQI≤100) is 254, and the number of lightly-polluted days is 11; the annual particulate matter (PM_{10}) concentration is 70μg/m^3, down 12μg/m^3 compared with the previous year, which is at the second level of annual average air quality value; the annual sulfur dioxide (SO_2) concentration is 20μg/m^3, down 8μg/m^3 compared with the previous year, which is at the second level of annual average air quality value; the annual nitrogen dioxide (NO_2) concentration is 36μg/m^3, down 4μg/m^3 compared with the previous year, which is at the second level of annual average air quality value; The annual particulate matter ($PM_{2.5}$) concentration is 35μg/m^3, down 7μg/m^3 compared with the previous year, which is at the second level of annual average air quality value.

Generally speaking, the air quality of two subprojects in Kunming City meets Class II criteria in GB3095-2012.

(2) Assessment areas of other subprojects

The assessment areas of other subprojects are Class II area according to ambient air quality. The ambient air quality shall meet Class II criteria in the *Ambient Air Quality Standard* (GB3095-2012). According to the daily report of ambient air in main cities of Yunnan Province on August 27, 2015, the air pollutant index (API) of Dali Prefecture is 22, which meets Class I criteria in GB3095-2012; the air pollutant index (API) of Qujing City is 53, which meets Class II criteria in GB3095-2012; the air pollutant index (API) of Zhaotong City is 45, which meets Class I criteria in GB3095-2012; the air pollutant index (API) of Wenshan Prefecture is 62, which meets Class II criteria in GB3095-2012; the air pollutant index (API) of Honghe Prefecture is 29, which meets Class I criteria in GB3095-2012.

Generally speaking, the air quality in the assessment areas of other subprojects meets Class II criteria in GB3095-2012.

3.3.2 Surface water environment

(1) Kunming City

According to *2014 Report on the State of Environment of Kunming City*, the water from the old Baoxiang River is Class VI water and the pollution degree increases significantly. The water from the Laoyu River is Class V water and the pollution degree decreases significantly.

(2) Dali Prefecture

The Shujie River in Weishan County and the Xueshan River in Yangbi County were not monitored by local environmental protection bureau. No water will be discharged from this project, so the water quality of these rivers will not be changed. The Fengyu River in Eryuan County finally joins the Cibi Lake. According to *2014 Report on the State of Environment of Dali Bai Autonomous Prefecture*, the water from the Cibi Lake is Class II water, which is suitable for its water function classification.

(3) Qujing City

The subproject in Zhanyi County is near the cross section of Tiansheng Bridge across the Nanpan River. According to the Monthly Report of Surface Water Environment Quality of Qujing City in July 2015, the cross section of Tiansheng Bridge is characterized by water function classification VI, category III water and good water quality.

(4) Zhaotong City

The main water system in the subproject area is Jinsha River. Local environmental protection bureau didn't set any cross section in the area of this Project to monitor the Jinsha River. No water will be discharged from this project, so the water quality of the Jinsha River will not be changed.

As the nursery school in Chongxi Town, Qiaojia County and the Qiaojiaying nursery school are not in the county seat, they are not in the pollutant receiving range of the sewage treatment plant in Qiaojia County. It is recommended to treat the wastewater generated by the two subprojects and use the treated water for irrigation of surrounding farmlands. The wastewater generated by these projects will not flow into the Mashu River and the Jinsha River because they produce little sewage and are at high altitude, the water in these areas evaporates fast, and the project areas are more than 2.5km away from the Mashu River and the Jinsha River.

(5) Xichou County, Weishan Prefecture

There is no river near the No. 1 nursery school of Xichou County.

(6) Jianshui County, Honghe Prefecture

The Lujiang River is about 2.5km west of Qingyuan nursery school in Jianshui County. The wastewater generated by this subproject will be treated and sent to the sewage treatment plant in Jianshui County. It is known that the Lujiang River was not monitored by local environmental protection bureau. No water will be discharged from this project, so the water quality of this river will not be changed.

3.3.3 Acoustical Environment Quality

The nursery school in Wuyin Township is located in the countryside. Class I criteria in the *Standard of Noise in Acoustical Environment* (GB3096-2008) shall be executed. The Yongshan Road in Zhaoyang District, Zhaotong City and the Pulan

Road in Xichou County are main trunk roads and the extension of Qingyuan Road in Jianshui County is secondary trunk road. Class 4a criteria in GB3096-2008 shall be executed for the area within 35m from the red line of the above roads, and Class 2 criteria in GB3096-2008 shall be executed for the area 35m outside the red line. Class 2 criteria in GB3096-2008 shall be executed for other subprojects.

To grasp the current situation of acoustic environment quality around this Project area, the noise in the site of each subproject and the traffic noise were monitored in the period from August 17 to 21 of 2015. As no class is arranged at night, only the situation in daytime was monitored this time. The noise in each subproject area was monitored once and the monitoring lasted 10min every time. There are 2 traffic noise points: one is at a distance of 1m from the shoulder of Pulan Road near No. 1 nursery school of Xichou County and the other is at a distance of 1m from the shoulder of the extension of Qingyuan Road near the nursery school in Jianshui County, and each of them was continuously monitored for 20min. The monitoring results are listed in Table 3.3.

Table 3.3 Noise Monitoring Results

S/N	monitoring points location	Time	Monitoring Value, Leq dB(A)	Executive Standard dB(A)	Status
1	In the site of the preschool education research center of Yunnan Normal University	2015.8.21	45.2	Class 2: 60 (in daytime)	Meeting the standard
2	In the site of the teacher training base of Kunming College	2014.8.21	47.1		Meeting the standard
3	In the site of the Nanzhao nursery school	2015.8.17	44.1		Meeting the standard
4	In the site of the nursery school in Wuyin Township	2015.8.17	46.6	Class 1: 55 (in daytime)	Meeting the standard
5	In the site of Shangjie nursery school in Yangbi County	2015.8.18	39.3	Class 2: 60 (in daytime)	Meeting the standard
6	In the site of the nursery schools in Eryuan County	2015.8.18	46.5		Meeting the standard
7	In the site of the nursery schools in Zhanyi County	2015.8.17	44.3		Meeting the standard
8	On the southwest boundary of the Zhaotong College subproject	2015.8.18	41.0		Meeting the standard
9	On the northeast boundary of the Zhaotong College subproject near Yongshan Road	2015.8.18	56.7		Meeting the standard
10	In the site of Qiaojiaying nursery school	2015.8.19	42.0		Meeting the standard
11	In the site of the nursery school in Baihetan Town	2015.8.19	38.7		Meeting the standard
12	In the site of the nursery school in Chongxi Town	2015.8.19	55.9		Meeting the standard
13	1m in front of the proposed first row of buildings in No. 1 nursery school of Xichou County near the road	2015.8.18	52.6		Meeting the standard
14	In the site of Qingyuan nursery school in Jianshui County	2015.8.17	40.3		Meeting the standard
15	At a distance of 1m from the shoulder of Xichou County	2015.8.18	66.3	Class 4a: 70 (in daytime)	Meeting the standard

16	At a distance of 1m from the shoulder of the extension of Qingyuan Road in Jianshui County	2015.8.17	53.8		Meeting the standard

The monitoring results show that the noise value monitored from each point meets the applicable acoustic environmental quality standard. This reflects that the acoustic environmental quality in each subproject area is good.

4. Environmental impact assessment

4.1 Environmental Impact Assessment in Construction Period

4.1.1 Atmospheric Environmental Impact Assessment

In the construction period, most of the waste gas is raised dust, vehicle tail gas and finishing-derived waste gas.

1) Raised dust

It is planned to use commodity concrete for each subproject. The main cause of raised dust is handling & stockpiling of construction materials, earth and stone excavation and other processes. It is a product of unorganized emission. The downwind raised dust pollution is especially serious at and around the construction site when a wind blows.

Compared with similar projects, the earth and stone excavation process produces the highest concentration of raised dust (about 20mg/m^3~50mg/m^3). This means a lot of raised dust comes into being during building construction. In particular periods of time, the TSP concentration is 1.4~2.5 times atmospheric environment standard. The coverage of influence of construction dust is a downwind distance of 100m. The raised dust resultant from construction and transport vehicles has a great impact on the area within 30m from both sides of the road, and the TSP concentration can be above 10mg/m^3.

The raised duct generation can be effectively reduced by watering, covering and flooring. The impact on surrounding atmospheric environment can be greatly alleviated by taking the above measures.

2) Vehicle tail gas

The waste gas arising from running of construction machinery and the tail gas arising from transport vehicles are the product of combustion of power fuels (diesel oil and gasoline). They are major air environment pollutants and their main components are CO and NO_X. They are characterized by small generation and intermittent and disperse unorganized emission. The construction site is open

and wide. It is good for dilution and dispersion. The diluted and dispersed tail gas has less impact on the surroundings.

3) Waste gas arising from interior finishing

The interior finishing materials may produce organic waste gas (e.g., formaldehyde) harmful to the human body. The construction unit shall select to use the poisonless and harmless finishing materials**,** and open the doors and windows for long-time ventilation during finishing and within one month after finishing. This is to disperse and dilute the waste gas and further reduce the impact of the finishing-derived waste gas on students and teachers.

4.1.2 Environmental impact assessment of surface water

The wastewater generated in the construction period is predominantly construction wastewater and domestic sewage produced by construction personnel.

(1) Construction wastewater

Most of construction wastewater is generated in the main structure construction and finishing stage of each subproject. It is primarily the wastewater produced by washing of mechanical equipment and vehicles. It contains a large quantity of suspended matters like sediments and cement. All construction wastewater will be treated at the sedimentation tank and then used as the water for dust suppression at the construction site and the water for construction. As the wastewater will not be discharged, it won't impose an effect on surrounding surface water environment.

(2) Domestic sewage produced by construction personnel

It is not intended to build a construction camp for all subprojects. Construction personnel will not eat and live at the construction site. In average, 30 construction personnel will serve each subproject. Most of them will come from nearby villages. Little water will be consumed by construction personnel on site, and the majority of it will be used to wash hands and faces. The water consumption is calculated as 10L/person•d. The daily water consumption of construction personnel is $0.3m^3$/d. The pollutants producing coefficient is 0.8. The wastewater generation is $0.24m^3$/d. Main sewage pollutants are sediments and suspended matters. They will be recycled after being treated with construction wastewater. As the wastewater will not be discharged,

it won’t impose an effect on surrounding surface water environment.

4.1.3 Environmental impact assessment

4.1.3.1 Construction noise source intensity

Main noise sources and their intensity in the construction stage of each subproject are almost the same. For details, see Table 4.1-1.

Table 4.1-1 Main Noise Sources in Construction Stage

Construction stage	Noise Source	Noise Level, dB(A)	Construction stage	Noise intensity	Noise ,dB(A)
Earthwork and stonework construction	Excavator	87	Installation stage	Electric drill	100
	Loader	90		Electric saw	105
	Bulldozer	90		Cutter	100
	heavy-duty truck	90		Multi-function carpenter's plane	90
Pile driving	Hydrostatic pile driver	90		Angle grinder	110
Floor and structure construction Work Stage	Concrete mixer truck	80			
	Concrete delivery pump	90			
	Vibrator	95			
	Cutter	100			

4.1.3.2 Noise prediction and evaluation

From Table 4.1-1, we can see that the greatest impact of each subproject on surrounding acoustic environment happens in the earthwork and stonework construction stage and pile driving stage. This evaluation lays emphasis on analysis of acoustic environment impact in the earthwork and stonework construction stage and pile driving stage.

(1) Noise prediction model

The construction machinery noise at each site in the construction period can be basically treated as point sound source. The noise value at different distance from the noise source in the construction period can be estimated in the noise transmission and attenuation mode of point sound source. Then, the analytical evaluation of the impact of construction noise on sensitive points can be made. The prediction model is

described as follows:

$$L_A(r)=L_A(r_0)-A_{div}$$

Where: $A_{div}=20\lg(r/r_0)$

Where: $L_A(r)$—Sound pressure level in prediction point, dB(A);

$L_A(r_0)$—Noise source intensity, dB(A)

A_{div}—Geometric divergence attenuation, dB(A);

r—Distance from prediction point to noise source, m;

r_0—Distance from reference position to noise source, m.

By comparing with the reference sound level obtained from investigation of similar projects, the predicted noise value of different types of construction machinery at different distance can be calculated.

(2) Noise impact analysis

1) Noise from a single kind of construction machinery

Based on the noise value of single construction machine under full-load operating condition listed in Table 4.1-1, the noise impact prediction results of main construction machinery at different distance were calculated when the machines are running under full load condition in the construction period . For the calculation results, see Table 4.1-2.

Table 4.1-2 Noise Prediction Results of Main Construction Machinery

Unit: dB(A)

S/N	Distance to construction point (m) / Machinery type	5	10	20	40	50	80	100	150	200	290
1	Excavator	87	81	75	69	67	63	61	57	55	52
2	Loader	90	84	78	72	70	66	64	60	58	55
3	Bulldozer	90	84	78	72	70	66	64	60	58	55
4	heavy-duty truck	90	84	78	72	70	66	64	60	58	55
5	Hydrostatic pile driver	80	74	68	62	60	56	54	50	48	45

Note: The noise level at a distance of 5m is measured value.

From the above table, we can know that relevant standard limits specified in the *Emission Standard of Environment Noise for Boundary of Construction Site* (GB12523-2011) can be reached if the construction point of machinery is 50m away

in daytime and 290m away at night.

2) Noise from several kinds of construction machinery

Based on the noise value of single construction machine under full-load operating conditions listed in Table 7-1, the noise impact prediction values of several kinds of construction machinery at different distance was calculated when running under full load condition in the construction period. For the calculation results, see Table 4.1-3.

Table 4.1-3 Noise Prediction Results of Main Construction Machinery

Unit: dB(A)

S/N	Distance to construction point (m) / Machinery type	5	50	100	200	400	560	600
1	Simultaneous construction of several kinds of machinery	96	76	70	64	58	55	54

The noise level at a distance of 5m is calculated based on measured noise of a single kind of construction machinery.

From the above table, we can know that relevant standard limits specified in the *Emission Standard of Environment Noise for Boundary of Construction Site* (GB12523-2011) can be reached if the construction point of machinery is 100m away in daytime and 560m away at night when several kinds of construction machinery are working simultaneously.

3) Noise in sensitive point

The environmental protection objects in the assessment scope of each subproject are listed in Table 1.5-1 of Section 1.5.2. The night construction of each subproject has no impact on surrounding acoustic environment. The protection objects within 100m from the noise source in each subproject are greatly affected by daytime construction. The Owner shall strictly implement the noise control measures in the construction period and neighboring residents shall be notified in advance. Due to small scale of each subproject, the duration of noise impact during construction is limited. At the end of construction period of each subproject, the impact will disappear.

4.1.4 Impact Assessment of Solid Wastes

The earth and stone will be balanced on the spot during construction of each subproject. So, no waste earth and stone will be produced. Solid wastes generated in the construction period may predominantly be construction wastes, domestic wastes from construction personnel and feces from latrine pit.

(1) Construction wastes

For each subproject, construction wastes (primarily, reinforcements and color still tiles) are the product of construction. Most of them can be recycled. Construction wastes will be collected together and stored in the designated place. Recyclable wastes will be reused or sold to waste stations. Unrecyclable wastes will be disposed as required by local department of housing and urban-rural development. The investigation finds that how to dispose the construction wastes has been determined for all subprojects except two nursery schools in Zhanyi County, two nursery schools in Eryuan County and No. 1 nursery school of Xichou County. For details, see Table 4.1-4.

Table 4.1-4 Construction Waste Disposal Summary

S/N	Item	Destination of Construction Waste
1	Preschool education research center of Yunnan Normal University	Miaojiaying absorption yard in Kunming City
2	Teacher training base, nursery school, and special education center of Kunming College	Resourceful disposal base of construction waste in Kunming City
3	Comprehensive teaching building for education experiment, training and practice base of Zhaotong College	Backfilling of depression in the campus of Zhaotong College
4	Nursery school in Baihetan Town, Qiaojia County	Absorption yard in Liujiawayao, Qiaojia County
5	Qiaojiaying nursery school in Qiaojia County	Absorption yard in Damuchang, Qiaojiaying, Qiaojia County
6	Nursery school in Chongxi Town, Qiaojia County	Absorption yard in Jiangjiagou, Chongxi, Qiaojia
7	Nanzhao nursery school in Weishan County	Nanzhao construction waste treatment station in Weishan County

S/N	Item	Destination of Construction Waste
8	Nursery school in Wuyin Township, Weishan County	Nanzhao construction waste treatment station in Weishan County
9	Qingyuan Nursery school in Jianshui County	Construction waste treatment station in Jianshui County
10	Shangjie nursery school in Yangbi County	Construction waste landfill in Baiyidi, Jinniu Village, Cangshanxi Town, Yangbi County
11	Two nursery schools in Zhanyi County	The construction unit has to handle the legal formalities at local department of housing and urban-rural development. After that, the wastes can be collected and transported to the place designated by this department.
12	Two nursery schools in Eryuan County	The construction unit has to handle the legal formalities at local department of housing and urban-rural development. After that, the wastes can be collected and transported to the place designated by this department.
13	No. 1 nursery school of Xichou County	The construction unit has to handle the legal formalities at local department of housing and urban-rural development. After that, the wastes can be collected and transported to the place designated by this department.

(2) Domestic wastes

If 30 construction personnel serve each subproject and daily generation of domestic wastes is 0.2kg per person, total daily generation of domestic wastes is approximately 6kg. The domestic wastes will be collected and transported by the environmental sanitation department.

(3) Feces from latrine pit

If daily feces generation per person is 0.25kg, daily generation of feces from latrine pit in each subproject is 7.5kg. The feces may be shoveled by local environmental sanitation department, or the nearby villagers may be entrusted to shovel the feces as farmyard manure.

In the construction period, the impact of solid construction wastes can be greatly reduced by strengthening the management on construction personnel and process, standardizing the stockpiling and disposal of solid wastes, taking proper measures to

dispose the generated solid wastes, and preventing rainwash during worksite excavation and earth and stone storage in the rainy season.

4.1.5 Impact assessment of water and soil loss

The site has good geological conditions for all subprojects except Qingyuan nursery school in Jianshui County. It is unclear about water and soil loss. In this report, we take Qingyuan nursery school in Jianshui County for example to analyze. The geological conditions of this site are relative bad. In the rainy season, this site is prone to water and soil loss which may damage local ecological environment. As far as we know after consultation with the Owner, with the subsequent development of this plot, the uneven area near it will be filled and leveled up before September 2017. It is planned to commence the construction of this Project from 2017. Therefore, the impact of water and soil loss can be greatly reduced.

During construction, water and soil conservation measures shall be implemented depending on actual situation. Detailed measures are discussed in the environmental management plan. If the countermeasures against water and soil loss proposed in the water conservation plan are strictly implemented, the additional water and soil loss in connection with the construction of the Works can be minimized.

4.2 Environmental Impact Assessment in Operation Period

4.2.1 Atmospheric Environmental Impact Assessment

The types of waste gases in the operation period of each subproject are almost the same. Most of them are exhaust gas derived from oil fume, waste gas generated by fuel combustion in canteens, vehicle tail gas, and odor given off in septic tanks and toilets.

(1) Exhaust gas derived from oil fume

Except the preschool education research center of Yunnan Normal University where there is no canteen**,** 3 to 4 cooking ranges will be provided in each canteen for all other subprojects. The exhaust gas derived from oil fume may exert some impact on ambient air because it cannot reach the limit value of less than 2.0 mg/m^3 specified in the *Emission Standard of Cooking Fume* (GB18483-2001) before

treatment.

Oil and smoke cleaners will be installed in the kitchens in the canteens to reduce the oil smoke emission concentration. The treatment efficiency of oil and smoke cleaners shall be no less than 75%. After purification, the oil smoke emission concentration shall drop to below 2.0mg/m^3 as specified in the *Emission Standard of Cooking Fume* (GB18483-2001).

Each subproject is still in the pre-feasibility study stage. The positions of kitchens and exhaust funnels have not been determined. Proper measures will be addressed in the environmental management plan here.

(2) Waste gas generated by fuel combustion in canteens

Depending on actual situation of Yunnan, the energy source used in canteens is primarily gas or electricity. If electricity is used, no waste gas will be generated. Main component of gas is CO. The gas combustion will produce CO_2. It does no harm to ambient air and human body.

(3) Vehicle tail gas

The ground parking lot in each subproject adopts the open layout. Such layout provides good ventilation effect. The parking lot is only open to the faculty working in the school. The waste gas generation is small and the emission concentration is low. After atmospheric diffusion and natural dilution, the impact of waste gas on surrounding atmospheric environment will get smaller.

(4) Odor given off in septic tanks and toilets

The underground septic tank will be built in the green area of each subproject to treat domestic waste water. In this way, odor can hardly be given off. Domestic wastes will be temporarily stored in rubbish bins and cleaned up every day, so there is almost no odor.

Enclosed toilets will be provided for each subproject. Such toilets produce little odor. We will analyze the toilet layout in Chapter 5 “Alternative Solution”. The layout can be adjusted to further reduce the effect of odor.

Generally speaking, the impact of the waste gas generated by each subproject on external environment is tolerable.

4.2.2 Environmental impact assessment of surface water

4.2.2.1 Check computation of wastewater source intensity

The type of wastewater generated by each subproject is the same. Most of it is domestic sewage (including oily wastewater from canteens). According to local standard of Yunnan Province – *Water Consumption Quota* (DB53/T168-2013), the water demand of each subproject in cities and counties was calculated on the basis of water consumption quota for preschool education (30L/person·d). This quota includes the water for canteens. The coefficient was estimated to 30% of total quota, namely 9L /(person·d). The water consumption of Qiaojiaying nursery school, the nursery school in Chongxi Town and the nursery school in Wuyin Township in the rural area is less than that of the urban area. In this report, the aforesaid water consumption quota decreases by 20% to 24L / (person·d). The water discharge coefficient takes 0.8. The check computation of wastewater generation is listed in Table 4.2-1.

Table 4.2-1 Schedule of Wastewater Generation of Each Subproject

S/N	Name		Quota (L/person·d)	Calculation Base		Water Consumption (m3/d)	Water Discharge Coefficient	Discharge Capacity (m^3/d)
1	Preschool education research center of Yunnan Normal University	Domestic sewage	21	265	People	5.6	0.8	4.5
		Oily wastewater	9	265	People	2.4	0.8	1.9
2	Teacher training base, nursery school, and special education center of Kunming College	Domestic sewage	21	820	People	17.2	0.8	13.8
		Oily wastewater	9	820	People	7.4	0.8	5.9
3	Comprehensive teaching building for education experiment, training and practice base of Zhaotong College	Domestic sewage	21	550	People	11.6	0.8	9.2
		Oily wastewater	9	550	People	5.0	0.8	4.0
4	Nursery school in Baihetan Town, Qiaojia	Domestic sewage	21	432	People	9.1	0.8	7.3

S/N	Name		Quota (L/person·d)	Calculation Base		Water Consumption (m3/d)	Water Discharge Coefficient	Discharge Capacity (m^3/d)
	County	Oily wastewater	9	432	People	3.9	0.8	3.1
5	Qiaojiaying nursery school in Qiaojia County	Domestic sewage	17	324	People	5.5	0.8	4.4
		Oily wastewater	7	324	People	2.3	0.8	1.8
6	Nursery school in Chongxi Town, Qiaojia County	Domestic sewage	17	216	People	3.7	0.8	2.9
		Oily wastewater	7	216	People	1.5	0.8	1.2
7	Nanzhao nursery school in Weishan County	Domestic sewage	21	432	People	9.1	0.8	7.3
		Oily wastewater	9	432	People	3.9	0.8	3.1
8	Nursery school in Wuyin Township, Weishan County	Domestic sewage	17	324	People	5.5	0.8	4.4
		Oily wastewater	7	324	People	2.3	0.8	1.8
9	Shangjie nursery school in Yangbi County	Domestic sewage	21	504	People	10.6	0.8	8.5
		Oily wastewater	9	504	People	4.5	0.8	3.6
10	Two nursery schools in Eryuan County	Domestic sewage	21	864	People	18.1	0.8	14.5
		Oily wastewater	9	864	People	7.8	0.8	6.2
11	Two nursery schools in Zhanyi County	Domestic sewage	21	864	People	18.1	0.8	14.5
		Oily wastewater	9	864	People	7.8	0.8	6.2
12	No. 1 nursery school of Xichou County	Domestic sewage	21	432	People	9.1	0.8	7.3
		Oily wastewater	9	432	People	3.9	0.8	3.1
13	Qingyuan Nursery school in Jianshui County	Domestic sewage	21	432	People	9.1	0.8	7.3
		Oily wastewater	9	432	People	3.9	0.8	3.1

S/N	Name	Quota (L/person·d)	Calculation Base		Water Consumption (m3/d)	Water Discharge Coefficient	Discharge Capacity (m^3/d)
Total					188.9		150.9

4.2.2.2 Water balance analysis

The domestic sewage from the preschool education research center of Yunnan Normal University will be treated at the oil separation tank and septic tank first and then the reclaimed water station in Yunnan Normal University. The treated water will be used for afforestation in the campus, rather than discharged. The domestic sewage generated by other subprojects will be treated at the oil separation tank and septic tank and discharged into local urban sewage treatment plant, or treated in other ways. Water balance is shown in Figure 4.2.

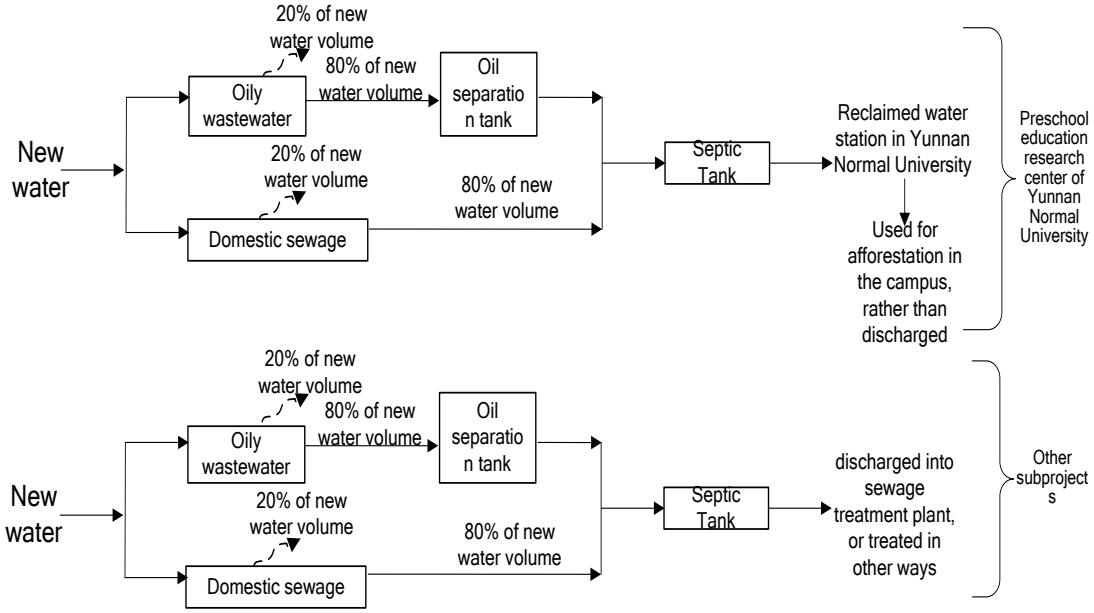


Figure 4.2 Water Balance Chart of the Project

4.2.2.3 Wastewater pollutant summary

(1) Discharged water quality criteria and water discharge direction

For all subprojects, there are three ways of water discharge: ① The oily wastewater from the canteen in the preschool education research center of Yunnan Normal University will be treated at the oil separation tank and other domestic sewage will be treated at the septic tank. After reaching the requirement on

the quality of the water flowing to the in-campus reclaimed water station, the wastewater and sewage will be transmitted through the in-campus sewage pipe network to the in-campus reclaimed water station. ② The oily wastewater from the kitchens in the canteens in the Qiaojiaying nursery school in Qiaojia County, the nursery school in Chongxi Town, Qiaojia County and the nursery school in Wuyin Township, Weishan County will be treated at the oil separation tank, sent with the domestic sewage to the septic tank, and used for used for farmland irrigation. The analysis is detailed below. ③ The oily wastewater from the kitchens in other subprojects will be treated at the oil separation tank, sent with other domestic sewage to the septic tank, discharged into the municipal sewage pipe network, and converged into the urban sewage treatment plant in respective project sites. See Table 4.2-2 for more details.

Table 4.2-2 Water Discharge

S/N	Item	Wastewater Treatment Method	Applicable Discharge Criteria	Water Discharge Direction
1	Preschool education research center of Yunnan Normal University	Oil separation tank and septic tank	Requirement on the quality of the water flowing to the reclaimed water station in Yunnan Normal University	Recycled after being treated at the reclaimed water station in Yunnan Normal University, rather than discharged
2	Teacher training base, nursery school, and special education center of Kunming College	Oil separation tank and septic tank	Class III criteria listed in Table 4, *Integrated Wastewater Discharge Standard*	Municipal Wastewater Treatment Plant
3	Comprehensive teaching building for education experiment, training and practice base of Zhaotong College			
4	Nursery school in Baihetan Town, Qiaojia County			
5	Nanzhao nursery school in Weishan County			

S/N	Item	Wastewater Treatment Method	Applicable Discharge Criteria	Water Discharge Direction
6	Shangjie nursery school in Yangbi County			
7	Two nursery schools in Eryuan County			
8	Two nursery schools in Zhanyi County			
9	No. 1 nursery school of Xichou County			
10	Qingyuan Nursery school in Jianshui County			
11	Nursery school in Wuyin Township, Weishan County	Oil separation tank and septic tank	Dry farming criteria in the *Standards for Irrigation Water Quality*	Used for farmland irrigation
12	Qiaojiaying nursery school in Qiaojia County			
13	Nursery school in Chongxi Town, Qiaojia County			

(2) Wastewater pollutant generation concentration

In the period from September 22 to 23 of 2015, the quality of the domestic water in Daiwen Village, Yuxi City was monitored by Yunnan Kecheng Environmental Monitoring Co., Ltd. CODcr is 87mg/L and ammonia nitrogen concentration is 20mg/L. Qiaojiaying nursery school, the nursery school in Chongxi Town and the nursery school in Wuyin Township mentioned in this report are in the rural area. For domestic sewage quality, the monitoring data of Daiwen Village can be referred to. Other subprojects are in the urban area. The generated domestic sewage concentration is comparable to the urban domestic sewage concentration of Yunnan, namely: CODcr 300mg/L, BOD_5 200mg/L, ammonia nitrogen 30mg/L, SS200mg/L, animal and vegetable oil 80mg/L.

(3) Treatment efficiency of oil separation tank and septic tank

The treatment efficiency of oil separation tank is often 25%. To know the removal capacity of septic tanks, field test was performed on 13 septic tanks in Wuxi City according to the *Pollution Load Model Study of Taihu Lake Basin* compiled by Ding Xunjing, et al, and the concentration at the inlet and outlet of septic tanks was monitored synchronously. The removal efficiency of septic tank is CODcr30% and

$BOD_5$32%, and the SS removal rate is usually 50%.

(4) Wastewater pollutant discharge concentration prediction

The pollutant discharge concentration was calculated from the pollutant treatment efficiency of oil separation tank and septic tank and the pollutant generation concentration The calculation formula is: discharge concentration = generation concentration x (100%-treatment efficiency). The discharge volume listed in Table 4.2-3 was calculated from discharge concentration and wastewater volume. The wastewater generation and discharge situation of each subproject is listed in Table 4.2-3.

Table 4.2-3 Wastewater Generation and Discharge Situation of Each Subproject

Source	Wastewater Volume (m^3/a)	Pollutant	Generation		Discharge Prediction			Standard Value (mg/L)	Status
			Concentration (mg/L)	Volume Produced (t/a)	Concentration (mg/L)	Volume Reduced (t/a)	Discharge Volume (t/a)		
Preschool education research center of Yunnan Normal University	1749	CODcr	300	0.52	210	0.52	0	/	/
		SS:	200	0.35	100	0.35	0	/	/
		BOD_5	200	0.35	136	0.35	0	/	/
		Ammonia nitrogen	30	0.05	30	0.05	0	/	/
		Animal and vegetable oil	80	0.14	60	0.14	0	/	/
Teacher training base of Kunming College, etc.	5412	CODcr	300	1.62	210	0.48	1.14	500	Meeting the standard
		SS:	200	1.08	100	0.54	0.54	400	Meeting the standard
		BOD_5	200	1.08	136	0.34	0.74	300	Meeting the standard
		Ammonia nitrogen	30	0.16	30	0	0.16	35	Meeting the standard
		Animal and vegetable oil	80	0.43	60	0.11	0.32	100	Meeting the standard
Comprehensive teaching building for educatio	3630	CODcr	300	1.09	210	0.33	0.76	500	Meeting the standard
		SS:	200	0.73	100	0.37	0.36	400	Meeting the standard

Source	Wastewater Volume (m^3/a)	Pollutant	Generation		Discharge Prediction			Standard Value (mg/L)	Status
			Concentration (mg/L)	Volume Produced (t/a)	Concentration (mg/L)	Volume Reduced (t/a)	Discharge Volume (t/a)		
n experiment, training and practice base of Zhaotong College		BOD_5	200	0.73	136	0.24	0.49	300	Meeting the standard
		Ammonia nitrogen	30	0.11	30	0	0.11	35	Meeting the standard
		Animal and vegetable oil	80	0.29	60	0.07	0.22	100	Meeting the standard
Nursery school in Baihetan Town, Qiaojia County	2851.2	CODcr	300	0.86	210	0.26	0.60	500	Meeting the standard
		SS:	200	0.57	100	0.28	0.29	400	Meeting the standard
		BOD_5	200	0.57	136	0.18	0.39	300	Meeting the standard
		Ammonia nitrogen	30	0.09	30	0	0.09	35	Meeting the standard
		Animal and vegetable oil	80	0.23	60	0.06	0.17	100	Meeting the standard
Qiaojiaying nursery school in Qiaojia County	1710.7	CODcr	87	0.15	61	0.04	0.10	200	Meeting the standard
		Ammonia nitrogen	20	0.03	20	0	0.03	/	/
Nursery	114	CODcr	87	0.10	61	0.03	0.07	200	Meeting

Source	Wastewater Volume (m^3/a)	Pollutant	Generation		Discharge Prediction			Standard Value (mg/L)	Status
			Concentration (mg/L)	Volume Produced (t/a)	Concentration (mg/L)	Volume Reduced (t/a)	Discharge Volume (t/a)		
school in Chongxi Town, Qiaojia County	0.5								the standard
		Ammonia nitrogen	20	0.02	20	0	0.02	/	/
Nanzhao nursery school in Weishan County	2851.2	CODcr	300	0.86	210	0.26	0.60	500	Meeting the standard
		SS:	200	0.57	100	0.28	0.29	400	Meeting the standard
		BOD_5	200	0.57	136	0.18	0.39	300	Meeting the standard
		Ammonia nitrogen	30	0.09	30	0	0.09	35	Meeting the standard
		Animal and vegetable oil	80	0.23	60	0.06	0.17	100	Meeting the standard
Nursery school in Wuyin Township, Weishan County	1710.7	CODcr	87	0.15	61	0.04	0.10	200	Meeting the standard
		Ammonia nitrogen	20	0.03	20	0	0.03	/	/
Shangjie nursery school in Yangbi County	3326.4	CODcr	300	1.00	210	0.30	0.70	500	Meeting the standard
		SS:	200	0.67	100	0.34	0.33	400	Meeting the standard

Source	Wastewater Volume (m^3/a)	Pollutant	Generation		Discharge Prediction			Standard Value (mg/L)	Status
			Concentration (mg/L)	Volume Produced (t/a)	Concentration (mg/L)	Volume Reduced (t/a)	Discharge Volume (t/a)		
		BOD_5	200	0.67	136	0.22	0.45	300	Meeting the standard
		Ammonia nitrogen	30	0.10	30	0	0.10	35	Meeting the standard
		Animal and vegetable oil	80	0.27	60	0.07	0.20	100	Meeting the standard
Two nursery schools in Eryuan County	5702.4	CODcr	300	1.71	210	0.51	1.20	500	Meeting the standard
		SS:	200	1.14	100	0.57	0.57	400	Meeting the standard
		BOD_5	200	1.14	136	0.36	0.78	300	Meeting the standard
		Ammonia nitrogen	30	0.17	30	0	0.17	35	Meeting the standard
		Animal and vegetable oil	80	0.46	60	0.12	0.34	100	Meeting the standard
Two nursery schools in Zhanyi County	5702.4	CODcr	300	1.71	210	0.51	1.20	500	Meeting the standard
		SS:	200	1.14	100	0.57	0.57	400	Meeting the standard
		BOD_5	200	1.14	136	0.36	0.78	300	Meeting the

Source	Wastewater Volume (m^3/a)	Pollutant	Generation		Discharge Prediction			Standard Value (mg/L)	Status
			Concentration (mg/L)	Volume Produced (t/a)	Concentration (mg/L)	Volume Reduced (t/a)	Discharge Volume (t/a)		
									standard
		Ammonia nitrogen	30	0.17	30	0	0.17	35	Meeting the standard
		Animal and vegetable oil	80	0.46	60	0.12	0.34	100	Meeting the standard
No. 1 nursery school of Xichou County	2851.2	CODcr	300	0.86	210	0.26	0.60	500	Meeting the standard
		SS:	200	0.57	100	0.28	0.29	400	Meeting the standard
		BOD_5	200	0.57	136	0.18	0.39	300	Meeting the standard
		Ammonia nitrogen	30	0.09	30	0	0.09	35	Meeting the standard
		Animal and vegetable oil	80	0.23	60	0.06	0.17	100	Meeting the standard
Qingyuan Nursery school in Jianshui County	2851.2	CODcr	300	0.86	210	0.26	0.60	500	Meeting the standard
		SS:	200	0.57	100	0.28	0.29	400	Meeting the standard
		BOD_5	200	0.57	136	0.18	0.39	300	Meeting the standard
		Ammo	30	0.09	30	0	0.09	35	Meeting

Source	Wastewater Volume (m^3/a)	Pollutant	Generation		Discharge Prediction			Standard Value (mg/L)	Status
			Concentration (mg/L)	Volume Produced (t/a)	Concentration (mg/L)	Volume Reduced (t/a)	Discharge Volume (t/a)		
		nia nitrogen							the standard
		Animal and vegetable oil	80	0.23	60	0.06	0.17	100	Meeting the standard

4.2.2.4 Environmental impact analysis of surface water

The impact on each type and plot was made based on water drainage scheme.

(1) Reclaimed water recycling

The domestic sewage from the preschool education research center of Yunnan Normal University will be treated at the reclaimed water treatment plant in the campus. The reclaimed water station is 850m northwest of this project. The sewage and reclaimed water pipe network has been distributed in the campus. The pipe network is ready for connecting pipes.

The main process composition of this reclaimed water station is pretreatment (catchpit, bar screen, regulating tank, sewage lift pump, water distribution well, rotational sand processor, etc.) + main treatment (SBR + coagulation sedimentation + sand filter + continuous micro-filtration system, etc.) + post treatment (deodorizing, sterilization and preservation (hypochlorite addition)).

The domestic sewage generated by this project will be treated at the oil separation tank and septic tank, discharged into the regulating tank in the reclaimed water station, and mixed with other domestic sewage in the campus to the extent that the requirement on quality of the water flowing to the reclaimed water station in Yunnan Normal University is met. This reclaimed water station was put into

operation from 2007 and is running stably. The water discharged from this station can meet the criteria set for the water for aesthetic environment use in the *Reuse of Urban Recycling Water--Water Quality Standard for Scenic Environment Use* (GB/T 18921-2002) and will be finally used for afforestation in the campus.

The wastewater generation of this project is 6.4m^3/d, the current scale of the reclaimed water station is 2000m^3/d, and all wastewater produced by this project can be received.

Therefore, it is feasible to rely on the reclaimed water station in Yunnan Normal University. The treated water has no impact on surface water environment.

(2) Transmission to urban sewage treatment plant

According to Table 4.2-2, the surface water impact of each project accessible to urban sewage treatment plant was analyzed.

1) Teacher training base, nursery school, and special education center of Kunming College

The wastewater from the teacher training base, nursery school, and special education center of Kunming College will be treated at the oil separation tank and septic tank. After meeting Class III criteria listed in Table 4, *Integrated Wastewater Discharge Standard* (GB8978-1996), the treated water will be sent to No. 12 water purification plant in Kunming City.

No. 12 water purification plant in Kunming City is at the junction of Anshi Road, Xiaopu Road and Baoxiang River in Gaoqiao Village in economic development zone. It was put into use in 2014. Main function is to collect and treat the sewage from all enterprises and communities in the economic development zone. The MSBR (internal circulate-sequencing batch airlift reactor) + cloth media filter + ultraviolet disinfection process is adopted. At present, this plant is running stably. The water discharged from this plant can meet Criteria A of the First Class *in Discharge Standard of Pollutants for Municipal Wastewater Treatment Plant*. Current treatment capacity is 50,000 m^3/d. After this project is completed, maximum water discharge volume is 19.7m^3/d and this allows receiving all wastewater produced by this project. At the same time, the water discharge pipe network in Kunming College will be used. Therefore, it is feasible to discharge the sewage from this project into the sewage treatment plant.

2) Comprehensive teaching building for education experiment, training and practice base of Zhaotong College

The wastewater from the comprehensive teaching building for education experiment, training and practice base of Zhaotong College will be treated at the oil separation tank and septic tank. After meeting Class III criteria listed in Table 4, *Integrated Wastewater Discharge Standard* (GB8978-1996), the treated water will be sent to the central urban sewage treatment plant in Zhaotong City.

This plant was put into use in December 2006. Main function is to treat the domestic sewage from the downtown of Zhaotong City. At present, this plant is running stably. The water discharged from this plant can meet Criteria B of the First Class *in Discharge Standard of Pollutants for Municipal Wastewater Treatment Plant*. Current treatment capacity is 60,000 m^3/d. After this project is completed, maximum water discharge volume is 13.2m^3/d and this allows receiving all wastewater produced by this project. At the same time, the water discharge pipe network in Zhaotong College will be used. Therefore, it is feasible to discharge the sewage from this project into the sewage treatment plant.

3) Nursery school in Baihetan Town, Qiaojia County

The wastewater from the nursery school in Baihetan Town, Qiaojia County will be treated at the oil separation tank and septic tank. After meeting Class III criteria listed in Table 4, *Integrated Wastewater Discharge Standard* (GB8978-1996), the treated water will be sent to the sewage treatment plant in Qiaojia County.

The nursery school in Baihetan Town, Qiaojia County is located in Baihetan Town. Main function is to treat the domestic sewage from Baihetan Town. At present, this plant is running stably. The water discharged from this plant can meet Criteria B of the First Class *in Discharge Standard of Pollutants for Municipal Wastewater Treatment Plant*. Recent treatment capacity is 7,500 m^3/d. After this project is completed, maximum water discharge volume is 10.4m^3/d and this allows receiving all wastewater produced by this project. At the same time, the water discharge pipe network distributed on surrounding roads will be used. Therefore, it is feasible to discharge the sewage from this project into the sewage treatment plant.

4) Nanzhao nursery school in Weishan County

The wastewater from the Nanzhao nursery school in Weishan County will be treated at the oil separation tank and septic tank. After meeting Class III criteria listed in Table 4, *Integrated Wastewater Discharge Standard* (GB8978-1996), the treated water will be sent to the sewage treatment plant in Weishan County.

This plant is located on the northeast corner of the junction between the Caiyang River and Xihe River in Nanzhao Town. It was put into use in July 2013. Main

function is to treat the domestic sewage from Weishan County. The ICEAS process is adopted. At present, this plant is running stably. The water discharged from this plant can meet Criteria B of the First Class *in Discharge Standard of Pollutants for Municipal Wastewater Treatment Plant*. Current treatment capacity is 5,000 m^3/d. After this project is completed, maximum water discharge volume is 10.4m^3/d and this allows receiving all wastewater produced by this project. At the same time, the water discharge pipe network distributed on surrounding roads will be used. Therefore, it is feasible to discharge the sewage from this project into the sewage treatment plant.

5) Shangjie nursery school in Yangbi County

The wastewater from Shangjie nursery school in Yangbi County will be treated at the oil separation tank and septic tank. After meeting Class III criteria listed in Table 4, *Integrated Wastewater Discharge Standard* (GB8978-1996), the treated water will be sent to the sewage treatment plant in Yangbi County.

This plant is located in Shijia Village at the urban-rural junction of Cangshanxi Town. It was put into use in December 2013. Main function is to treat the domestic sewage from Yangbi County. At present, this plant is running stably. The water discharged from this plant can meet Criteria B of the First Class *in Discharge Standard of Pollutants for Municipal Wastewater Treatment Plant* (GB18918-2002). The treatment capacity is 5,000 m^3/d. After this project is completed, maximum water discharge volume is 12.1m^3/d and this allows receiving all wastewater produced by this project. At the same time, the water discharge pipe network distributed on surrounding roads will be used. Therefore, it is feasible to discharge the sewage from this project into the sewage treatment plant.

6) Two nursery schools in Eryuan County

The wastewater from two nursery schools in Eryuan County will be treated at the oil separation tank and septic tank. After meeting Class III criteria listed in Table 4, *Integrated Wastewater Discharge Standard* (GB8978-1996), the treated water will be sent to the sewage treatment plant in Eryuan County.

This plant is located on the south side of Tengfei Road. It was put into use in

June 2004. Main function is to treat the domestic sewage from Eryuan County. The SBR(ICEAS) activated sludge process is adopted. At present, this plant is running stably. The water discharged from this plant can meet Criteria B of the First Class *in Discharge Standard of Pollutants for Municipal Wastewater Treatment Plant*. Current treatment capacity is 4,000 m^3/d. After this project is completed, maximum water discharge volume is 20.7m^3/d and this allows receiving all wastewater produced by this project. At the same time, the water discharge pipe network distributed on surrounding roads will be used. Therefore, it is feasible to discharge the sewage from this project into the sewage treatment plant.

7) Two nursery schools in Zhanyi County

The wastewater from two nursery schools in Zhanyi County will be treated at the oil separation tank and septic tank. After meeting Class III criteria listed in Table 4, *Integrated Wastewater Discharge Standard* (GB8978-1996), the treated water will be sent to the sewage treatment plant in Zhanyi County.

This plant is located in Xiping Town. It was put into use in June 2010. Main function is to treat the domestic sewage from Zhanyi County. The CASS process is adopted. At present, this plant is running stably. The water discharged from this plant can meet Criteria A of the First Class *in Discharge Standard of Pollutants for Municipal Wastewater Treatment Plant*. Current treatment capacity is 20,000 m^3/d. After this project is completed, maximum water discharge volume is 20.7m^3/d and this allows receiving all wastewater produced by this project. At the same time, the water discharge pipe network distributed on surrounding roads will be used. Therefore, it is feasible to discharge the sewage from this project into the sewage treatment plant.

8) No. 1 nursery school of Xichou County

The wastewater from No. 1 nursery school of Xichou County will be treated at the oil separation tank and septic tank. After meeting Class III criteria listed in Table 4, *Integrated Wastewater Discharge Standard* (GB8978-1996), the treated water will be sent to the sewage treatment plant in Xichou County.

This plant is located in Yindong natural village, Xiabawei, Xisa Town. It was put

into use in November 2013. Main function is to treat the domestic sewage from Xichou County. The ICEAS process is adopted. At present, this plant is running stably. The water discharged from this plant can meet Criteria A of the First Class *in Discharge Standard of Pollutants for Municipal Wastewater Treatment Plant*. Current treatment capacity is 3,000 m^3/d. After this project is completed, maximum water discharge volume is 10.4m^3/d and this allows receiving all wastewater produced by this project. At the same time, the water discharge pipe network distributed on surrounding roads will be used. Therefore, it is feasible to discharge the sewage from this project into the sewage treatment plant.

9) Qingyuan Nursery school in Jianshui County

The wastewater from Qingyuan Nursery school in Jianshui County will be treated at the oil separation tank and septic tank. After meeting Class III criteria listed in Table 4, *Integrated Wastewater Discharge Standard* (GB8978-1996), the treated water will be sent to the sewage treatment plant in Jianshui County.

This plant is located in Dongzhoujia Village. It was put into use in November 2011. Main function is to treat the domestic sewage from Jianshui County. The A2/O process is adopted. At present, this plant is running stably. The water discharged from this plant can meet Criteria B of the First Class *in Discharge Standard of Pollutants for Municipal Wastewater Treatment Plant*. Current treatment capacity is 25,000 m^3/d. After this project is completed, maximum water discharge volume is 10.4m^3/d and this allows receiving all wastewater produced by this project. At the same time, the water discharge pipe network distributed on surrounding roads will be used. Therefore, it is feasible to discharge the sewage from this project into the sewage treatment plant.

For the above subprojects, the domestic sewage has little impact on surrounding surface water environment after reasonable treatment.

(3) Use for irrigation of surrounding farmlands

3 subprojects (the Qiaojiaying nursery school in Qiaojia County, the nursery school in Chongxi Town, Qiaojia County and the nursery school in Wuyin Township, Weishan County) are in the rural area. There is no sewage treatment plant in the areas

of these subprojects. No treatment method is given in the project document. Specific treatment methods are described in the chapter "Analysis of Alternative Option" here.

4.2.3 Acoustic environmental impact assessment

(1) Equipment noise

The noise source intensity of equipment (e.g., air conditioners and exhaust fans) during running is about 80dB(A). The *Emission Standard for Industrial Enterprises Noise at Boundary* (GB12348-2008) can be met on the boundary of each subproject by means of indoor arrangement of equipment, use of sound-proof walls and low-noise equipment and distance attenuation. The construction of each subproject will not change the acoustic environment function of the project area, but have a little impact on surrounding acoustic environment.

(2) Traffic noise

The vehicles running in each subproject area is usually cars. The peak time for vehicles to pass in and out is the commuter time for teachers. This period of time is short. After taking a series of measures (e.g., strengthening the school traffic management, setting the tooting control criteria and putting the distance attenuation into effect), only a little impact on the surroundings may be left.

(3) Broadcasting noise

The broadcasting noise is mainly the noise generated by the broadcasting and loudspeaking equipment in the school. The noise will be generated when the bells sound to prompt students that it is time for exercises or class or the class is over. The noise is intermittent and the noise source intensity is 80~100 dB(A). As the generation time of broadcasting noise is short, the impact on the surroundings is tolerable provided that the nursery school enhances the management, a green belt is built to block the transmission of noise and the noise is reduced under the effect of distance attenuation.

Generally speaking, the daily noise produced by each subproject can meet the emission criteria by selection of proper equipment, implementation of sound insulation measures and distance attenuation. The subprojects have little impact on external environment.

4.2.4 Impact Assessment of Solid Wastes

Some solid wastes will be generated in the operation period of each subproject. Most of them are domestic wastes (including kitchen wastes), waste oil from oil separation tanks and medical wastes.

(1) Domestic wastes (including kitchen wastes)

In the view of the fact that no one will stay at the site of each subproject at night, the generation of domestic wastes is calculated as 0.5kg/person•d, inclusive of kitchen wastes (20%). The generation of domestic wastes and kitchen wastes in the operation period of each subproject is listed in Table 4.2-4. A qualified agency will be entrusted to recycle the kitchen wastes in Kunming City. For other subprojects, the domestic wastes (including kitchen wastes) will be collected together and then regularly transported by the entrusted environment sanitation department in each project area. The destination of domestic wastes produced by each subproject is listed in Table 2.4 in Section 2.4 of this report. It is known that each waste disposal unit is running stably and can receive the domestic wastes produced by each subproject.

Table 4.2-4 Schedule of Generation of Domestic Wastes (including Kitchen Wastes)

Item	Number of People	Generation of Domestic Wastes (t/a)	Generation of Kitchen Wastes (t/a)
Preschool education research center of Yunnan Normal University	265	29.2	7.3
Teacher training base, nursery school, and special education center of Kunming College	820	90.2	22.6
Comprehensive teaching building for education experiment, training and practice base of Zhaotong College	550	60.5	15.1
Nursery school in Baihetan Town, Qiaojia County	432	47.5	11.9
Qiaojiaying nursery school in Qiaojia County	324	35.6	8.9
Nursery school in Chongxi Town, Qiaojia County	216	23.8	5.9

Item	Number of People	Generation of Domestic Wastes (t/a)	Generation of Kitchen Wastes (t/a)
Nanzhao nursery school in Weishan County	432	47.5	11.9
Nursery school in Wuyin Township, Weishan County	324	35.6	8.9
Shangjie nursery school in Yangbi County	432	47.5	11.9
Two nursery schools in Eryuan County	864	95.0	23.8
Two nursery schools in Zhanyi County	864	95.0	23.8
No. 1 nursery school of Xichou County	432	47.5	11.9
Qingyuan Nursery school in Jianshui County	432	47.5	11.9

(2) Waste oil from oil separation tank

The waste oil generation was calculated on the basis of animal and vegetable oil removal rate and impurity content (20%). The waste oil generation of each subproject is listed in Table 4.2-5. A qualified agency will be entrusted to recycle the waste oil.

Table 4.2-5 Schedule of Generation of Waste Oil from Oil Separation Tank

Item	Animal and Vegetable Oil Removal Amount (t/a)	Waste Oil Generation (t/a)
Preschool education research center of Yunnan Normal University	0.18	0.23
Teacher training base, nursery school, and special education center of Kunming College	0.15	0.19
Comprehensive teaching building for education experiment, training and practice base of Zhaotong College	0.10	0.13
Nursery school in Baihetan Town, Qiaojia County	0.08	0.10
Qiaojiaying nursery school in Qiaojia County	0.06	0.08
Nursery school in Chongxi Town, Qiaojia County	0.04	0.05
Nanzhao nursery school in Weishan County	0.08	0.10

Item	Animal and Vegetable Oil Removal Amount (t/a)	Waste Oil Generation (t/a)
Nursery school in Wuyin Township, Weishan County	0.06	0.08
Shangjie nursery school in Yangbi County	0.08	0.10
Two nursery schools in Eryuan County	0.16	0.20
Two nursery schools in Zhanyi County	0.16	0.20
No. 1 nursery school of Xichou County	0.08	0.10
Qingyuan Nursery school in Jianshui County	0.08	0.10

(3) Medical wastes

A small-size emergency medical service room will be set for each subproject. It will produce a small amount of medical wastes. These wastes will be *disposed with those produced by local county hospital or rural health centers.*

Generally speaking, there is only a little impact on the surroundings on the premise that the project management is strengthened and the above solid wastes are disposed in strict accordance with relevant regulations.

4.2.5 Ecological Environment Impact Assessment

The site survey shows that there is no primitive ecological environment in the proposed site of each subproject. After subprojects are completed, the ground exposed during construction will be covered by buildings, hardened roads and vegetation.

4.2.6 Analysis of impact of external environment on each subproject

The Yongshan Road in Zhaoyang District, Zhaotong City and the Pulan Road in Xichou County are main trunk roads and the extension of Qingyuan Road in Jianshui County is secondary trunk road. This section focus on analyzing the impact of the traffic noise originating from these roads on the teacher training base and nursery school of Zhaotong College, the No. 1 nursery school of Xichou County and the Qingyuan Nursery school in Jianshui County.

From the noise monitoring results given in Table 3.3-1, we can know that:

(1) The daytime noise value of the northeast boundary of the comprehensive

teaching building for education experiment, training and practice base of Zhaotong College near Yongshan Road is 56.7dB(A). This value can reach Class 2 criteria in the *Standard of Noise in Acoustical Environment* (GB3096-2008).

(2) The daytime noise value at a distance of 1m in front of the proposed first row of buildings in No. 1 nursery school of Xichou County near Pulan Road is 52.6dB(A). This value can reach Class 2 criteria in the *Standard of Noise in Acoustical Environment* (GB3096-2008).

(3)T he daytime noise value at a distance of 1m from the shoulder of the extension of Qingyuan Road in Jianshui County is 53.8dB(A). This value can reach Class 2 criteria in the *Standard of Noise in Acoustical Environment* (GB3096-2008). Qingyuan nursery school is about 10m away from this monitoring point in the direction opposite to the road shoulder. Its acoustic environment quality can reach the same criteria.

Generally speaking, the impact of traffic noise on the above three nursery schools is small and all can reach Class 2 criteria in the *Standard of Noise in Acoustical Environment* (GB3096-2008). This indicates that the impact of ambient traffic noise on these projects is tolerable.

5 Analysis of Alternative Option

5.1 Analysis of Option With and Without this Project

According to the *Phase II Three-Year Action Plan for Yunnan Preschool Education (2015-2017)*, the gross enrollment rate for three-year preschool education system is expected to reach 70% in the whole province in 2017; about 70% of nursery schools are official and inclusive nursery schools; at least one provincial-level first-class demonstration nursery school will be built in each county, city and district every year. In contrast, the average enrollment rate of three-year system based nursery schools in Yunnan is only 59% in 2014. From Table 3.2-1 "Gross Enrollment Rate of Preschool Education in the County/District Where Each Subproject is Located" in Section 3.2 of this report, we can see that only Weishan achieves the expected gross enrollment rate for three-year preschool education system (70%). So, it is urgent for Yunnan to develop the preschool education. The delegation of World Bank has decided to establish a preschool education development experiment demonstration project in Yunnan after field investigation. Without this project, the construction of nursery schools may be hampered or delayed in some counties/townships for financial difficulty.

On one hand, it has decided to try different sustainable rural preschool education service modes in Weishan County, Dali Bai Autonomous Prefecture. On the other hand, it is planned to boost the development of preschool education with the involvement of Kunming College, Yunnan Normal University and Zhaotong College. This will improve the performance of the pre-job teacher training program. Nursery schools will be built in Kunming College and Zhaotong College to not only offer the preschool education services to nearby neighborhoods, but also operate as the teaching and research bases for teacher candidates and one's own faculty.

The implementation of the Yunnan Preschool Education Development Experiment Demonstration Project can achieve the purpose of speeding up the development of preschool education in Yunnan and fully increasing the gross

enrollment rate for three-year preschool education system in each area affected by this Project.

Subject to project documents, the land use and planning situation of each subproject is listed in Table 5.1.

Table 5.1 Schedule of Main Conditions for Construction of this Project

Item	Land	Planning
Preschool education research center of Yunnan Normal University	Existing land in the campus	Construction land planning permit (CXGJDG[2006] No. 021) The plan has to be readjusted. Applying for this permit is in progress.
Teacher training base, nursery school, and special education center of Kunming College	Existing land in the campus	Construction land planning permit (DZ No. 53010201400236) Opinions on site selection of construction project (XZ No. 530101201000049) The plan has to be readjusted. Applying for this permit is in progress.
Comprehensive teaching building for education experiment, training and practice base of Zhaotong College	Existing land in the campus (YGTZY[2005] No. 142)	(ZZF[2006] No. 18) issued by the People's Government of Zhaotong City The plan has to be readjusted. Applying for this permit is in progress.
Nanzhao nursery school in Weishan County	WZF[2014] No. 61 issued by the People's Government of Weishan County	Construction land planning permit (DZ No. 2014023) Opinions on site selection of construction project (X No. 2014025)
Nursery school in Wuyin Township, Weishan County	WZF[2014] No. 62 issued by the People's Government of Weishan County	Construction land planning permit (DZ No. 2014024) Opinions on site selection of construction project (X No. 2014026)
Shangjie nursery school in Yangbi	YZF[2014] No. 16 issued by the People's Government of Yangbi	Construction land planning permit (DZ No. 532930201500032)

Item	Land	Planning
County	County	Opinions on site selection of construction project (XZ No. 32930201500018)
Two nursery schools in Eryuan County	EZH[2014] No. 35 issued by the People's Government of Eryuan County	Construction land planning permit (DZ No. 532930201400021) Opinions on site selection of construction project (XZ No. 32930201400015)
Two nursery schools in Zhanyi County	Zhuangjiawan primary school (QGT[2010] No. 297) 23.1mu for Zhuangjiawan primary school and 30mu for others. Construction land approval (ZYX[2011] GTZ No. 05)	Opinions on initial site selection (ZGCZ[2015] No. 02)
No. 1 nursery school of Xichou County	XZF[2015] No. 58 issued by the People's Government of Xichou County	Construction land planning permit (DZ No. 532623201500036) Opinions on site selection of construction project (XZ No. 532623201500035)
Nursery school in Baihetan Town, Qiaojia County	Construction land approval (QJX[2015] GTZ No. 82)	Construction land planning permit (DZ No. 532123201500041) Opinions on site selection of construction project (XZ No. 532123201500001)
Qiaojiaying nursery school in Qiaojia County	Construction land approval (QJX[2015] GTZ No. 80)	Construction land planning permit (DZ No. 532123201500041) Opinions on site selection of construction project (XZ No. 532123201500040)
Nursery school in Chongxi Town, Qiaojia County	Construction land approval (QJX[2015] GTZ No. 81)	Construction land planning permit (DZ No. 532123201500042) Opinions on site selection of construction project (XZ No. 53212320150002)

Item	Land	Planning
Qingyuan Nursery school in Jianshui County	Completion of survey and boundary definition	In progress

From the above table, we can know that the opinions on site selection of each subproject have been obtained or are being applied for. Appropriate construction conditions are available. The site selection is rational and unique. So, there is no alternative option for project site.

5.2 Different Sewage Treatment Methods of Rural Nursery Schools

There is no sewage treatment plant in the areas of three subprojects (the nursery school in Wuyin Township, Weishan County, the Qiaojiaying nursery school in Qiaojia County, and the nursery school in Chongxi Town, Qiaojia County). The treatment method and discharge direction are not mentioned in the project document. The site survey reveals that these 3 subprojects are surrounded by lots of farmlands and wastewater is not much. So, the proposal is to treat the wastewater at the oil separation tank and septic tank until reaching the dry farming criteria in the *Standards for Irrigation Water Quality* (GB5084-2005) and use the treated water for farmland irrigation rather than discharge it into surface rivers.

The basis of pollutant generation concentration & treatment efficiency, discharge concentration and calculation method is discussed in Section 4.2.3. Based on these data, the calculation results in Table 4.2-3 were obtained. After comparing the data in this table with the dry farming criteria in the *Standards for Irrigation Water Quality* (GB5084-2005), it is concluded that the concentration of major pollutants in the domestic sewage treated at the oil separation tank and septic tank can reach the dry farming criteria in the *Standards for Irrigation Water Quality* (GB5084-2005), meaning that this treatment method is feasible.

5.3 Different Designs of Toilets in Nursery Schools

Here we analyze the advantages and disadvantages of 3 common types of toilets. See Table 5.3.

Table 5.3 Comparison of Toilet Options

Contents	Option 1	Option 2	Option 3
	latrine pit (water-free)	Water-dependent long-groove toilet	Water-dependent single-latrine toilet
Sanitation	Unsanitary, prone to serious breeding of flies and mosquitoes.	Sanitary, prone to breeding of flies and mosquitoes.	Very sanitary
Student health	Very likely to cause infectious diseases.	Likely to cause infectious diseases.	Good for mental and physical health of students
Water conservation	No water is used.	Water consumption	Water consumption
Safety	Some students may not dare to go to there, because it is possible for them to fall down.	Some students may not dare to go to there, because it is possible for them to fall down.	Very safe
Conclusion	There is a serious problem with safety and sanitation. Infeasible.	There is a problem with safety and sanitation. Infeasible.	Safe and sanitary. Feasible.

(1) Toilet option recommended for urban areas

Water is convenient in urban areas. For the sake of mental and physical health and safety of children, Option 3 “water-dependent single-latrine toilet” is recommended.

(2) Toilet option recommended for rural areas

The quality of the wastewater from rural nursery schools can reach the requirement on the quality of the water for farmland irrigation after being treated at the oil separation tank and septic tank. This means the water-dependent single-latrine toilet option is feasible.

The water for three nursery schools will be supplied by local water utilities, so the water sources for them can be guaranteed. We paid a visit to the Wuyin Center School near the site of the nursery school in Wuyin Township, Weishan County and

found that school also used the water-dependent single-latrine toilets. Based on the types of toilets actually used in rural areas, the recommendation is also Option 3.

5.4 Analysis of Alternative Option for Layout Plan

The construction content of each subproject is almost the same. Only Qingyuan Nursery school in Jianshui County is poor in geological conditions. So, layout plan is relatively important. Here we take a typical example to analyze the alternative option for layout plan, which is Qingyuan Nursery school in Jianshui County.

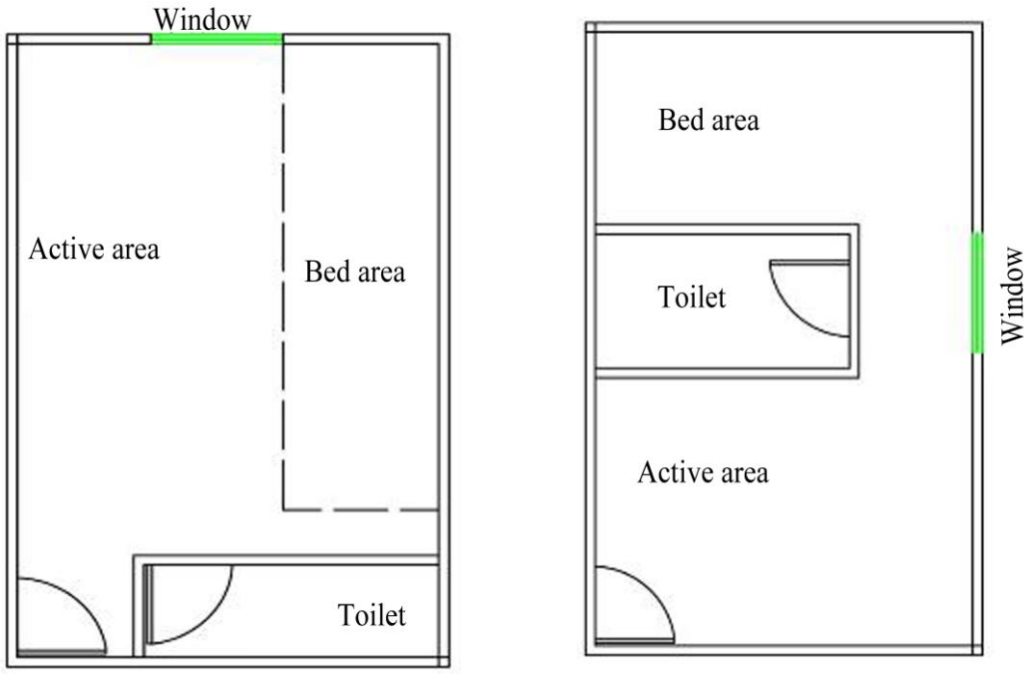
(1) Layout of teaching building

According to the results of geological analysis of the nursery school in Jianshui County in Section 3.1.2, the geological conditions of the southwest side of this site are relative bad. With the subsequent development of this plot, the uneven area near it will be filled and leveled up. As shown in the layout plan of this nursery school, there is a three-floor comprehensive teaching building on the southwest side. To prevent the effect of geological hazards on this school, it is recommended to modify the layout in the later period of design, that is, move the teaching building to the northeast part of this school.

(2) Layout of toilet

The position of toilet is not described in the project document. An appropriate layout will be recommended after comparison of different options.

Currently, two common layouts used for the indoor toilets in nursery schools are shown in Figure 5.4.



Option 1 **Option 2**

Figure 5.4 Layout of Indoor Toilet in Nursery School

Option 1: The toilet door faces the bed area and active area. Although the toilet is an enclosed toilet, odor can still give off when the door is opened and closed. This has an adverse effect on mental and physical health of students and indoor environment.

Option 2: The toilet is arranged in the middle of the building to separate the active area from the rest area. The toilet door faces the window side. It is easy for odor to diffuse out of the window. There is no adverse effect on mental and physical health of students and indoor environment.

Option 2 is recommended in the later design of each subproject.

5.5 Analysis of Alternative Option for Energy

The hot water source used for each subproject is not described in the project document. **As the subprojects are located in the southern part of China, clean energy such as solar energy and electric energy is recommended. Energy shall be saved to reduce the environmental pollution to the project areas.**

6 Public Participation

6.1 Purpose

The fundamental purpose of public participation is to let the residents in the affected areas know more about the project, and listen to the opinions of the residents living in the areas affected by the project, including the opinions of the public on construction of the project, the possible environmental impact brought by construction, and the construction requirements. The opinions of the public will be fed back to the Designer and the Owner in the form of questionnaire. This is to realize the communication among the Designer, the Owner and the public. In this way, the benefits and claims of all walks of society can be fully considered and reflected in environmental impact assessment. The aim is to optimize the project, give full play to the comprehensive benefits of the project and provide a basis for the decision-making department to make decisions.

6.2 Basis

The public participation shall meet relevant requirements specified in *World Bank OP 4.01 (Environmental Assessment)*, domestic standard *Interim Measures for Public Participation in Environmental Impact Assessment* (HF No. [2006]) and the *Working Regulations of Yunnan Provincial Environmental Protection Bureau on Disclosure of Government Information about Environmental Impact Assessment of Construction Project (Interim)* (YHF [2014] No. 62).

6.3 Form

The environmental impact assessment information will be published via information bulletin, newspaper & website, and questionnaire.

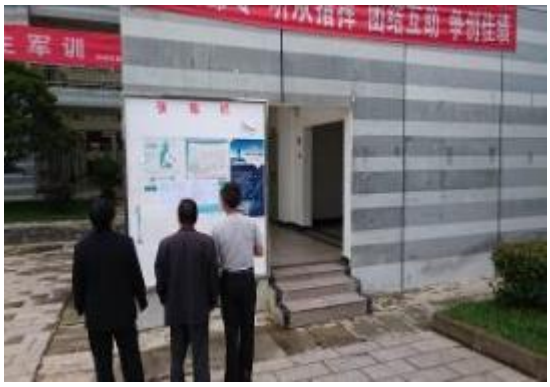
6.3.1 First information bulletin

Within 7 days after determining the environmental impact assessment agency, the Owner published the basic situation of this Project at and near the site of each

subproject in the period from August 17 to August 21 of 2015. This is to notify the public of the name and construction content of this Project; the name and contact information of the Owner and the environmental impact assessment agency; the procedures and main content of assessment; the main points about how to solicit public opinions; and, the main ways for the public to give advices and opinions. For details, see Figure 6.3-1.

Yunnan Normal University

Kunming College



Zhaotong College

Two nursery schools in Zhanyi County

Nursery school in Chongxi Town, Qiaojia County

Qiaojiaying nursery school in Qiaojia County

Nursery school in Baihetan Town, Qiaojia County

Nanzhao nursery school in Weishan County

Nursery school in Wuyin Township, Weishan County

Shangjie nursery school in Yangbi County

Two nursery schools in Eryuan County

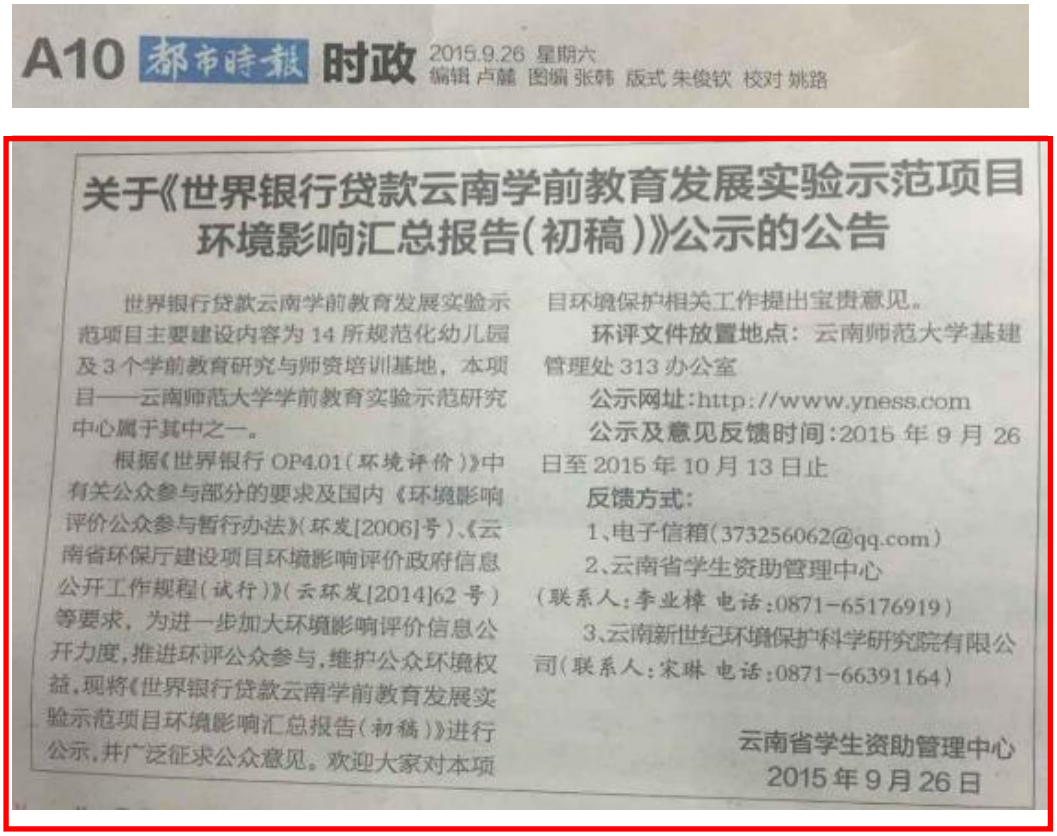
Qingyuan Nursery school in Jianshui County

No. 1 nursery school of Xichou County

Figure 6.3-1 First Information Bulletin

6.3.2 Second Information Bulletin (via newspaper and website, in full text)

After writing of the first draft of this report, the Owner of each subproject published the environmental impact assessment report (first draft) on local newspaper in full text. The screenshot of this information bulletin and the publishing time are shown in Figure 6.3-2.



A10 都市時報 时政 2015.9.26 星期六
编辑 卢麓 图编 张韩 版式 朱俊钦 校对 姚路

关于《世界银行贷款云南学前教育发展实验示范项目环境影响汇总报告（初稿）》公示的公告

世界银行贷款云南学前教育发展实验示范项目主要建设内容为14所规范化幼儿园及3个学前教育研究与师资培训基地，本项目——云南师范大学学前教育实验示范研究中心属于其中之一。

根据《世界银行OP4.01（环境评价）》中有关公众参与部分的要求及国内《环境影响评价公众参与暂行办法》（环发[2006]号）、《云南省环保厅建设项目环境影响评价政府信息公开工作规程（试行）》（云环发[2014]62号）等要求，为进一步加大环境影响评价信息公开力度，推进环评公众参与，维护公众环境权益，现将《世界银行贷款云南学前教育发展实验示范项目环境影响汇总报告（初稿）》进行公示，并广泛征求公众意见。欢迎大家对本项目环境保护相关工作提出宝贵意见。

环评文件放置地点：云南师范大学基建管理处313办公室

公示网址：http://www.yness.com

公示及意见反馈时间：2015年9月26日至2015年10月13日止

反馈方式：

1、电子信箱（373256062@qq.com）

2、云南省学生资助管理中心（联系人：李业棒 电话：0871-65176919）

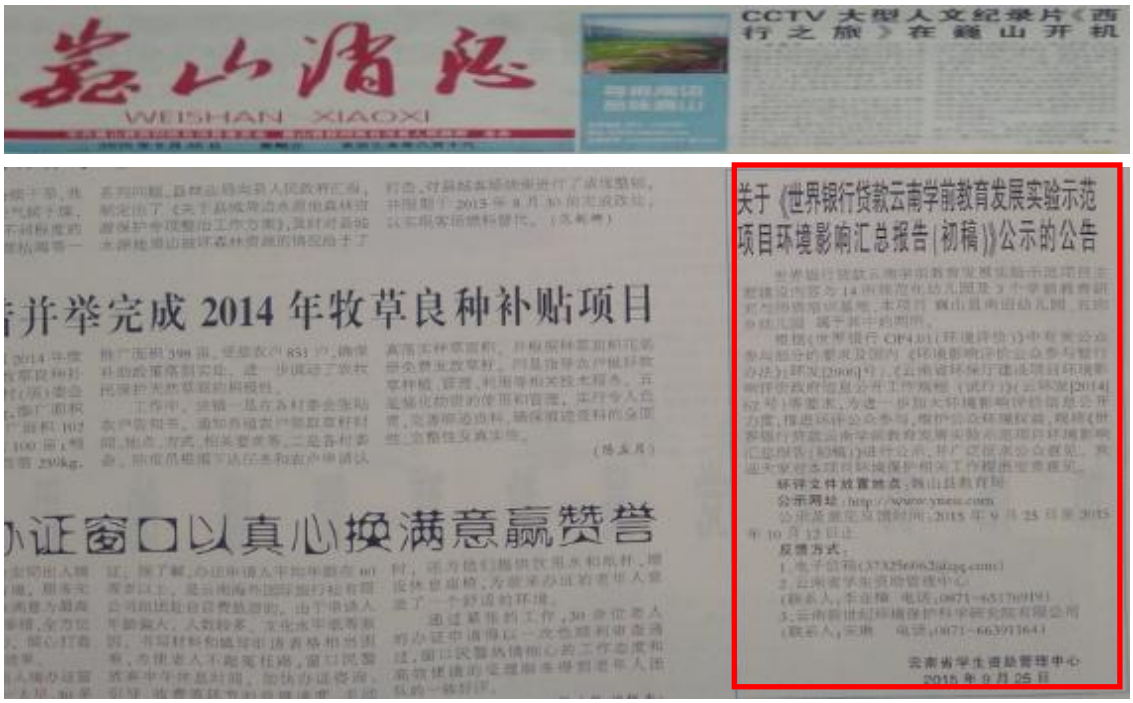
3、云南新世纪环境保护科学研究院有限公司（联系人：宋琳 电话：0871-66391164）

云南省学生资助管理中心
2015年9月26日

Information bulletin about Yunnan Normal University subproject published on newspaper (City Times, September 26 to October 13)

Information bulletin about Kunming College subproject published on newspaper (City Times, September 29 to October 13)

Information bulletins about Zhaotong and Qiaojia subprojects published on newspaper (Zhaotong Daily, September 29 to October 15)



Information bulletin about two nursery schools in Weishan County published on newspaper (Weishan News, September 25 to October 12)

Information bulletin about Shangjie nursery school in Yangbi County published on newspaper (Yangbi Times, September 28 to October 12)

法案件执法检查

生正常生活14件，进行环境综合整治查处
导执行职务5件。
当前，在环境执法司法工作中存在的主要
题是执法权限和执法主体权责不明晰，综
行政执法工作体制机制未建立健全，行政
法与刑事司法未衔接，环境司法鉴定和评
几构少、费用高、周期长等。针对这些问
在下一步的工作中，一是要进一步理顺
法权限，充实执法司法队伍；二是要整合
法资源，建立综合执法工作体制机制；三
要加强协调配合，破解办理环境违法犯罪
中的难题；四是要深入调研，建立并完
行政执法与刑事司法工作衔接机制；五是要
展实战，
生执法培
提高执
司法队
质。
（苏巨池
李博伟）

大理政法

大理州政法委
大理日报社 合办

关于《世界银行贷款云南学前教育发展实验示范项目环境影响汇总报告（初稿）》公示的公告

世界银行贷款云南学前教育发展实验示范项目主要建设内容为14所规范化幼儿园及3个学前教育研究与师资培训基地。洱源县第二幼儿园和洱源县茈碧湖镇幼儿园属于本项目。

根据《世界银行OP4.01（环境评价）》中有关公众参与部分的要求及国内《环境影响评价公众参与暂行办法》（环发[2006]号）、《云南省环保厅建设项目环境影响评价政府信息公开工作规程（试行）》（云环发[2014]62号）等要求，为进一步加大环境影响评价信息公开力度，推进环评公众参与，维护公众环境权益。现将《世界银行贷款云南学前教育发展实验示范项目环境影响汇总报告（初稿）》进行公示，并广泛征求公众意见。欢迎大家对本项目环境保护相关工作提出宝贵意见。

环评文件放置地点：洱源县教育局校舍安全办公室

公示网址：http://www.ynes.com

公示及意见反馈时间：2015年9月27日至2015年10月14日止

反馈方式：

1、电子信箱（373256062@qq.com）

2、云南省学生资助管理中心

联系人：李业锦

电　话：0871-65176919

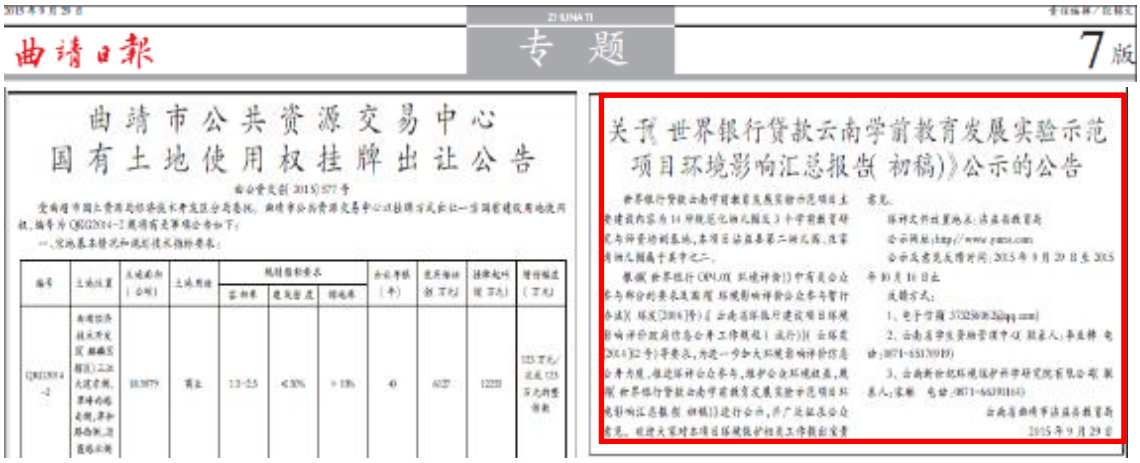
3、云南新世纪环境保护科学研究院有限公司

联系人：宋　琳

电　话：0871-66391164

云南省学生资助管理中心
2015年9月28日

Information bulletin about two nursery schools in Eryuan County published on newspaper (Dali Daily, September 28 to October 14)

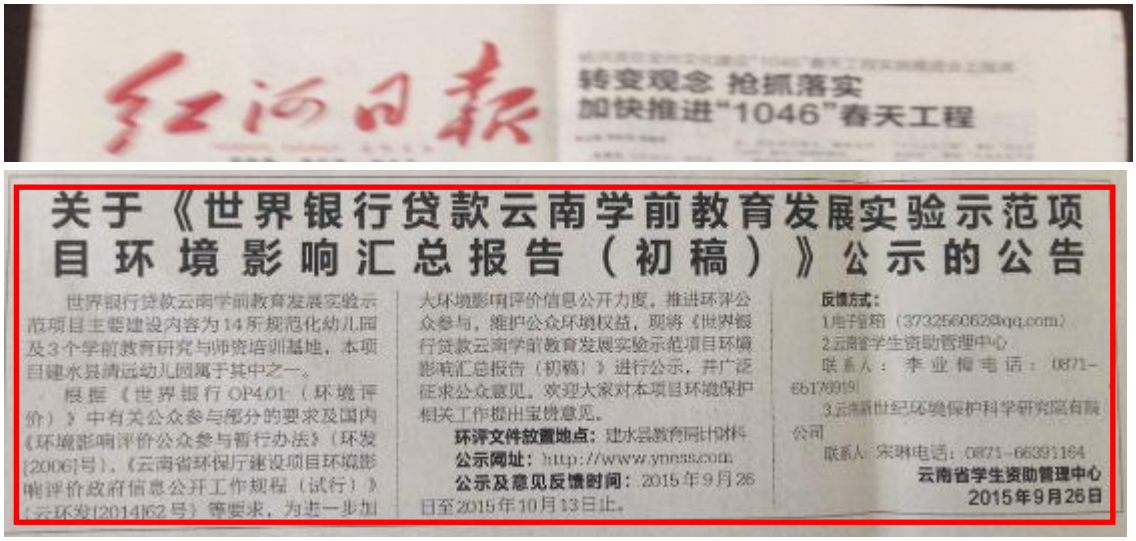


曲靖日报　专题　7版

曲靖市公共资源交易中心
国有土地使用权挂牌出让公告

关于世界银行贷款云南学前教育发展实验示范项目环境影响汇总报告（初稿）》公示的公告

Information bulletin about two nursery schools in Zhanyi County published on newspaper (Qujing Daily, September 29 to October 16)



红河日报

转变观念 抢抓落实
加快推进"1046"春天工程

关于《世界银行贷款云南学前教育发展实验示范项目环境影响汇总报告（初稿）》公示的公告

世界银行贷款云南学前教育发展实验示范项目主要建设内容为14所规范化幼儿园及3个学前教育研究与师资培训基地，本项目建水县清远幼儿园属于其中之一。

根据《世界银行OP4.01（环境评价）》中有关公众参与部分的要求及国内《环境影响评价公众参与暂行办法》（环发[2006]号）、《云南省环保厅建设项目环境影响评价政府信息公开工作规程（试行）》（云环发[2014]62号）等要求，为进一步加大环境影响评价信息公开力度，推进环评公众参与，维护公众环境权益，现将《世界银行贷款云南学前教育发展实验示范项目环境影响汇总报告（初稿）》进行公示，并广泛征求公众意见。欢迎大家对本项目环境保护相关工作提出宝贵意见。

环评文件放置地点：建水县教育局计财科

公示网址：http://www.yness.com

公示及意见反馈时间：2015年9月26日至2015年10月13日止。

反馈方式：

1.电子信箱（373256062@qq.com）

2.云南省学生资助管理中心

联系人：李业樟 电话：0871-65176919

3.云南新世纪环境保护科学研究院有限公司

联系人：宋琳 电话：0871-66391164

云南省学生资助管理中心

2015年9月26日

Information bulletin about Qingyuan nursery school in Jianshui County published on newspaper (Honghe Daily, September 26 to October 13)

文山日报

2015年9月28日
星期一
网址:wsnews.com.cn
邮箱:wsrb777@126.com

关于《世界银行贷款云南学前教育发展实验示范项目环境影响汇总报告（初稿）》公示的公告

世界银行贷款云南学前教育发展实验示范项目主要建设内容为14所规范化幼儿园及3个学前教育研究与师资培训基地，本项目西畴县第一幼儿园属于其中之一。

根据《世界银行OP4.01（环境评价）》中有关公众参与部分的要求及国内《环境影响评价公众参与暂行办法》（环发[2006]号）、《云南省环保厅建设项目环境影响评价政府信息公开工作规程（试行）》（云环发[2014]62号）等要求，为进一步加大环境影响评价信息公开力度，推进环评公众参与，维护公众环境权益，现将《世界银行贷款云南学前教育发展实验示范项目环境影响汇总报告（初稿）》进行公示，并广泛征求公众意见。欢迎大家对本项目环境保护相关工作提出宝贵意见。

环评文件放置地点：西畴县教育局教育股
公示网址：http://www.yness.com
公示及意见反馈时间：2015年9月26日至2015年10月13日止。
反馈方式：
1、电子信箱（373256062@qq.com）
2、云南省学生资助管理中心
（联系人：李业樟 电话：0871-65176919）
3、云南新世纪环境保护科学研究院有限公司
（联系人：宋 琳 电话：0871-66391164）

云南省学生资助管理中心
2015年9月28日

Information bulletin about No. 1 nursery school of Xichou County published on newspaper (Wenshan Daily, September 28 to October 13)

Figure 6.3-2 Information Bulletin about Each Subproject Published on Newspaper

Apart from being published on newspaper, the information bulletin was also published on the website of Yunnan Environmental Science Society (http://www.yness.com/) in full text. The publishing period is from September 28 to October 12 of 2015. The full text published on the website is shown in Figure 6.3-3.

Figure 6.3-3 Publishing on Website

6.3.3 Feedback about two information bulletins

The information bulletin tells the brief situation about environmental impact assessment of the project to the public and safeguards the public's right to know. In the publishing period of the project information, no public feedback was received.

6.3.4 Public participation in the questionnaire survey

After the information bulletin was published on the newspaper and website, the environmental impact assessment agencies and the owner of each subproject organized the public to participate in this Project. This move is to get the opinions and suggestions of the public living near the project site on construction of this Project. The respondents are farmers, teachers, employees of enterprises and institutions, students, self-employed entrepreneurs, etc. The public participation in investigation of each subproject is described in Table 6.3-1.

Table 6.3-1 Summary of Public Participation in Investigation of Each Subproject

S/N	Item	Date of Investigation	Place of Investigation	Number of Questionnaires
1	Two nursery schools in Zhanyi County	2015.10.20~10.21	Zhuangjiawan primary school, Dongwaxu Village, Zhongmulong Village, Zhuangjiawan Village	33
2	Comprehensive teaching building for education experiment, training and practice base of Zhaotong College	2015.10.19~10.20	Xuejiaying Village, Zhangjiaying Village	61
3	No. 1 nursery school of Xichou County	2015.10.19	Shangzhai Village, court, procuratorate, animal health inspection institute, traffic and transport administration, forest police, family planning service station, public rental housing	37
4	Shangjie nursery school in Yangbi County	2015.10.19	Dongpan Village, junior middle school of Cangshanxi Town	31
5	Teacher training base, nursery school, and special education center of Kunming College	2015.10.21~10.22	Gaoqiao Village, Yunda Zhicheng, Kunming College	57
6	Preschool education research center of Yunnan Normal University	2015.10.19~10.22	Yunnan Normal University	47
7	Nursery school in Baihetan Town, Qiaojia County	2015.10.19~10.20	Baihetan Town, Qiaojia No. 3 middle school	31
8	Qiaojiaying nursery school in	2015.10.19~10.20	Qiaojiaying Village,	30

	Qiaojia County		Qiaojiaying primary school	
9	Nursery school in Chongxi Town, Qiaojia County	2015.10.19~10.20	Chongxi Town, primary school of Chongxi Town	23
10	Nursery school in Wuyin Township, Weishan County	2015.10.16~10.18	Shujie Village	30
11	Nanzhao nursery school in Weishan County	2015.10.16~10.17	Nanzhao Town	33
12	Qingyuan Nursery school in Jianshui County	2015.10.17~10.20	Jianshui County (around the nursery school)	30
13	Two nursery schools in Eryuan County	2015.10.20	Eryuan County (around the nursery school)	33
Total	/	/	/	476

From 16:00~16:30, October 20, 2015, the education bureau of Zhanyi County held a symposium about the project at Zhuangjiawan primary school in Zhanyi County to introduce the basic information to the participants and hand out the public questionnaires. On October 21, a random survey was made in Dongwaxu Village, Zhongmulong Village and Zhuangjiawan Village. From 16:00~16:30, October 20, 2015, the education bureau of Eryuan County held a symposium about the project at No. 1 Nursery School of Eryuan County to introduce the basic information to the participants and hand out the public questionnaires. At 15:30~16:00, October 19, 2015, the education bureau of Qiaojia County held a symposium about the project at Qiaojiaying primary school to introduce the basic information to the participants and hand out the public questionnaires. From October 19 to 20, a random survey was made in Qiaojiaying Village. For other subprojects, the public survey was made by household survey or random survey. For site pictures, see Figure 6.3-4.

Two nursery schools in Zhanyi County


Two nursery schools in Eryuan County


Zhaotong College subproject


No. 1 nursery school of Xichou County


Shangjie nursery school in Yangbi County


Kunming College subproject


Yunnan Normal University subproject


Nursery school in Baihetan Town, Qiaojia County


Qiaojiaying nursery school in Qiaojia County

Nursery school in Chongxi Town, Qiaojia County

Figure 6.3-4 Site Picture about Public Survey

6.3.4.1 Statistical Analysis of Public Survey Results

For statistics of basic conditions of respondents, see Table 6.3-2. For statistics of survey results, see Table 6.3-3.

Table 6.3-2 Statistics of Basic Conditions of Respondents

Item		Statistics of Basic Conditions					
Sex		Male	Quantity (Persons)	Proportion (%)	Female	Quantity (Persons)	Proportion (%)
			217	46		259	54
Age	Class	19 - 40			41 - 60		Over 61
	Quantity (Persons)	309			152		15
	Proportion (%)	65			32		3
Education Background	Class	Primary school graduate and blank			Middle School		Bachelor or above
	Quantity (Persons)	62			259		155
	Proportion (%)	13			54		33

Table 6.3-3 Statistics of Survey Results

S/N	Questions	Opinion	Number of Respondents	
			Quantity (Nr.)	Proportion (%)
1	Do you think it is necessary to construct this project?	Necessary	435	91
		Whatever	41	9
		Opposed	0	0
2	Do you think the site selected for this project is appropriate?	Appropriate	476	100
		Inappropriate	0	0
3	What do you think are major environmental issues in the project area? (multi-choice question)	Air pollution	145	30
		Water pollution	121	25
		Noise pollution	223	47
		Solid waste pollution	148	31
		Vegetation deterioration	79	17
		Others	81	17
4	What environmental impacts are most unacceptable to you in the construction process? (multiple choices)	Raised dust	258	54
		Wastewater	161	34
		Mechanical noise and transport noise	333	70
		Construction wastes	236	50
		Vegetation deterioration	78	16
5	What do you think which environmental protection measures should be enhanced during construction? (multiple choices)	Watering for dust suppression	246	52
		Sewage treatment	200	42
		Banning night construction	339	71
		Reasonable disposal of construction wastes	292	61
		Ecological restoration	109	23
		Others	5	1
6	What do you think are major environmental protection issues after the project is put into operation? (multiple choices)	Atmospheric pollution	75	16
		Water pollution	160	34
		Noise pollution	191	40
		Solid waste	113	24
		None	162	34
7	What do you think which environmental protection measures should be enhanced after the project is put into operation?? (multiple choices)	Sewage treatment	193	41
		Treatment of exhaust gas from oil fume	115	24
		Reasonable disposal of domestic wastes	354	74
		Reasonable disposal of noise sources like fans	122	26

S/N	Questions	Opinion	Number of Respondents	
			Quantity (Nr.)	Proportion (%)
		Strengthening greening	274	58
		Others	4	1
8	Other opinions and suggestions about environmental protection	1. Save energy sources, protect ecological environment, guarantee the safety and health, keep harmony between the human and the nature. 2. Plant more trees. 3. During material transportation and waste collection, strengthen the supervision and maintain the environmental sanitation of the roads which vehicles run through. 4. Save electricity and water, and recycle energy resources. 5. Minimize domestic wastes, and sort wastes. 6. Separate rainwater from sewage and discharge it into municipal pipe network.		

From the above statistical results, we can reach the following conclusions:

(1) The investigation shows that 91% of respondents deemed it necessary to construct this Project; 9% didn't matter if this Project is constructed or not; no one opposed the construction of this Project.

(2) 100% of respondents considered that the selected site is reasonable.

(3) As to major environmental issue in the project area, 47%, 31%, 30%, 25% and 17% of respondents considered it to be noise pollution, solid waste pollution, air pollution, water pollution and vegetation deterioration respectively, and 17% considered it to be others but didn't detail it. Therefore, the pollution treatment measures in Section 7.2 shall be implemented strictly during construction, in order to reduce the impact on the surroundings.

(4) As to environmental impacts most unacceptable in the construction process, 70%, 54%, 50%, 34% and 16% of respondents considered it to be mechanical noise and transport noise, raised dust, construction wastes, wastewater and vegetation deterioration respectively. The pollution treatment measures in Section 7.2 can greatly reduce the impact of construction on the surroundings.

(5) As to environmental protection measures which should be enhanced during construction, 71%, 61%, 52%, 42% and 23% of respondents considered it to be

banning night construction, reasonable disposal of construction wastes, watering for dust suppression, wastewater treatment, and ecological restoration respectively; 1% of respondents (5 persons) considered it to be others, among whom 4 wrote "student safety" and 1 didn't detail it. The aforesaid measures are addressed in Section 7.2. The Owner shall strictly implement these measures. To guarantee student safety, enclosures will be provided in the project area to forbid the students from nearby schools and other people to enter during construction.

(6) As to major environmental protection issue after the project is put into operation, 40%, 31%, 24% and 16% of respondents considered it to be noise pollution, water pollution, solid waste pollution and air pollution, and 34% considered it to be pollution-free.

(7) As to environmental protection measure which should be enhanced after the project is put into operation, 74%, 58%, 41%, 26% and 24% of respondents considered it to be reasonable disposal of domestic wastes, strengthening greening, wastewater treatment, reasonable disposal of noise sources like fans, and treatment of exhaust gas of oil fume, respectively; 1% of respondents considered it to be others but didn't detail it. The aforesaid measures are addressed in Section 7.2. The Owner shall strictly implement these measures.

(8) As to other opinions and suggestions about environmental protection, some respondents suggested saving energy sources, protecting ecological environment, guaranteeing the safety and health, and keeping harmony between the human and the nature; planting more trees; during material transportation and waste collection, strengthening the supervision and maintaining the environmental sanitation of the roads which vehicles run through; saving electricity and water, and recycling energy resources; minimizing domestic wastes, and sorting wastes; separating rainwater from sewage and discharging it into municipal pipe network.

6.3.4.2 Description of Adoption of Public Opinions

From the above survey results, we can see that the respondents related to the nursery school in Chongxi Town, Qiaojia County, the Nanzhao nursery school in Weishan County, the Qingyuan nursery school in Jianshui County and two nursery schools in Eryuan County made suggestions on environmental protection. The environmental protection assessment agency and the Owner paid high attention to public opinions. The problems raised in the process of public survey are summarized

in Table 6.3-4.

Table 6.3-4 Adoption of Public Opinions

S/N	Contents	Adopted or Not?	Notes
I. Nursery school in Chongxi Town, Qiaojia County			
1	Save energy sources, protect ecological environment, guarantee the safety and health, keep harmony between the human and the nature.	Adopted	In Section 5.5 "Analysis of Alternative Option for Energy", it specifies that energy resources shall be saved. In Section 7.2 "Ecological Treatment Measures in Construction Period", greening measures are put forward for the purpose of protecting ecological environment.
2	Plant more trees.	Adopted	In Section 7.2 "Ecological Treatment Measures in Construction Period", greening measures are put forward.
II. Nanzhao nursery school in Weishan County			
3	During material transportation and waste collection, strengthen the supervision and maintain the environmental sanitation of the roads which vehicles run through.	Adopted	In Section 7.2, control measures about construction dust and solid wastes are put forward.
III. Qingyuan Nursery school in Jianshui County			
4	Save electricity and water, and recycle energy resources.	Adopted	In Section 5.5 "Analysis of Alternative Option for Energy", it specifies that energy resources shall be saved.
5	Minimize domestic wastes, and sort wastes.	Adopted	In Section 7.2, it specifies that garbage bins shall be provided for sorting and collection of domestic wastes and domestic wastes shall be regularly collected and transported by the environmental sanitation department to local waste landfill.
IV. Two nursery schools in Eryuan County			
6	Separate rainwater from sewage and discharge it into municipal pipe network.	Adopted	The rainwater-sewage separation system is applied to two nursery schools in Eryuan County. The sewage will be discharged into the sewage treatment plant through municipal pipe network.

The Owner promises to implement all environmental protection measures put forward in this environment impact assessment. This shows that the Owner has

attached full importance to public opinions in the period of this assessment and adopted reasonable opinions in a positive attitude.

6.4 Conclusion of Public Participation

After public notification and questionnaire survey & analysis, we can reach the following conclusions:

(1) After two information bulletins were published and the public participated in the questionnaire survey, the result shows that 91% of respondents support the construction of each subproject and no one opposes.

(2) To cope with the environmental issues reflected by the public and meet the requirements of environmental protection during construction of the project, the Owner shall take proper measures in the construction and operation period of each subproject, and manage and control the pollution in strict accordance with all requirements proposed in this report. This is to ensure all pollutants meet the discharge standard and avoid the adverse effect on the life of surrounding residents. Consequently, the concern of the public can be eased.

7 Environmental Management Plan

The environmental management plan aims at providing the basis and foundation for environmental management. The plan is designed to ensure the Owner strictly adheres to environmental protection laws & regulations in the design, construction and operation period and puts into practice all environmental protection measures in the environmental impact assessment report. The eventual purpose is to achieve the win-win situation between development & construction and environmental protection.

7.1 Structuring and Responsibilities of Environmental Management Organization

The environmental protection organization structure consists of management office of projects funded by World Bank, construction unit, and environmental supervision & monitoring units. The responsibilities and manning of each party are

listed in Table 7.1.

Table 7.1 Summary of Environmental Management Mechanism

Work Stage	Interested Party	Environmental Responsibilities	Staffing
Design and preparation:	Project Office	1. Reflect all measures required by environmental impact assessment in the bidding documents. 2. Include the *Environmental Management Plan* in the contract given to the Contractor and the Supervisor. 3. Assign a qualified agency to supervise and monitor the environment. 4. Regularly report the project situation to local environmental protection bureau and other local authorities.	2
	Owner	Actively cooperate with the project office and provide the project information related to environment.	1
	Design Institution	Reflect in the design document the major environmental impacts and desired environmental protection measures in the construction and operation period.	2
	Environmental impact assessment agency	Prepare the environmental impact assessment document according to design document and site survey results.	2
Construction period	Project Office	Monitor the implementation of the environmental mangement plan on site on a regular and irregular basis. Write the report or chapter about implementation of environmental management plan.	1
	Owner	Be responsible for monitoring the activities of construction unit and the Supervisor.	1
	Construction contractor	1. Implement the measures in the construction period as proposed in the *Environmental Management Plan.* 2. Submit the construction organization design, the monthly construction schedule and its implementation to the environmental protection supervisor. 3. Regulate the construction behaviors according to environmental impact assessment requirements, and report the environmetnal protection accidents to the environmental protection supervisor, the Owner and relevant departments. 4. Monitor the noise in the construction period by a simple method.	1
	Engineering Supervisor	1. Supervise the implementation of the measures in the *Environmental Management Plan.* 2. Train the construction personnel for environmental protection knowledge. 3. Supervise daily construction behaviors of construction personnel and implementation of environmental protection measures. Hold an environmental protection supervision meeting regularly. Prepare the monthly supervision report.	1
	Local environmental protection bureau	Regularly check if environmental protection measures are taken during construction.	1

Operation period	Project Office	Monitor the implementation of the environmental management plan on site on a regular and irregular basis. Write the report or chapter about implementation of environmental management plan.	1
	Owner and Operator	Be responsible for preparing the *Report about Evaluation and Monitoring on Implementation of Environmental Management Plan*. Supervise the implementation of environmental protection measures. Carry out regular maintenance of environmental protection facilities.	1
	Environmental monitoring unit	Monitor the environment in the operation period according to environmental impact assessment requirements. Prepare the external supervision and monitoring report and submit it to the project office.	2
	Local environmental protection bureau	Regularly check if there is disorderly discharge of sewage, water discharge beyond the standard, and random dumping of wastes.	2

7.2 Environmental Impact Mitigation Measures

According to this report and relevant Chinese laws/regulations and standards, with reference to the *General Environmental, Health, and Safety (EHS) Guidelines of World Bank*, based on recent experiences in similar domestic and World Bank education projects, environmental impact mitigation measures to be taken in the construction and operation period are set down. For details, see Table 7.2-1.

Table 7.2-1 Schedule of Environmental Impact and Mitigation Measures

Work Stage	Main Negative Impact	Mitigation/Control Measures	Performer	Supervisor	Expense Estimate (RBM 10,000)
Construction period	Construction waste water	1. Desilting basin and drainage ditch shall be built at construction site for each subproject to collect surface runoff and construction wastewater (e.g., muddy water) generated in the construction process. 2. The construction wastewater shall be settled in the sedimentation tank and reused for watering the site to suppress the dust. 3. All types of wastewater shall not be discharged through seepage pit or well, lowland or open ditch, or by overflow. 4. The equipment maintenance shall be strengthened to avoid leakage. 5. The timing for the works that are easy to cause water and soil loss, such as foundation excavation, shall avoid rainy season or rainy days when possible. 6. The sewage discharge in the construction period shall be put under strict management. Water pollution due to disorderly discharge and flowing of sewage is forbidden.	Construction contractor	Supervision organization	48

Work Stage	Main Negative Impact	Mitigation/Control Measures	Performer	Supervisor	Expense Estimate (RBM 10,000)
	Domestic sewage produced by construction personnel	1. Latrine pit shall be built for each subproject and shoveled periodically. 2. The water used by construction personnel for showering and washing shall be settled in the sedimentation tank and reused for watering the site to suppress the dust.	Construction contractor	Supervision organization	16
	Construction dust	1. Temporary fences shall be built at the construction site. The height of fences shall be no less than 2m. In case of heavy wind above Force 4, it is necessary to stop earthwork construction and cover what should be covered. 2. The site of each subproject shall be watered for dust suppression. The dirt scattered on the construction site and ground due to rainwater entrainment and transportation shall be removed timely to reduce the raised dust when the truck is running or a wind blows. 3. The dirt attached to the wheels and chassis of trucks shall be washed away frequently to reduce the quantity of dirt scattered on the ground and road pavement. 4. Construction materials that may cause raised dust pollution, such as cement, shall be covered tightly or sprayed with water or covering agent.	Construction contractor	Supervision organization	30.5

Work Stage	Main Negative Impact	Mitigation/Control Measures	Performer	Supervisor	Expense Estimate (RBM 10,000)
	Waste gas arising from finishing	1. The poisonless and harmless interior finishing materials shall be selected. 2. The vendors of construction materials shall furnish the test report showing the content of hazardous substances. 3. During construction, the construction unit shall neither use benzene, industrial benzene, petroleum benzene, heavy benzene and mixed benzene diluents and solvents, nor use organic solvents to wash construction equipment. Additionally, the construction unit shall strictly observe the *Code for Indoor Environmental Pollution Control Of Civil Building Engineering*. 4. The doors and windows shall be opened for long-time ventilation during finishing and within one month after finishing. This is to disperse and dilute the waste gas**.**	Construction contractor	Supervision organization	40
	Construction machinery noise	1. A reasonable layout of construction site shall be made to ensure the fixed noise sources are relatively concentrated and the topography is taken advantage of. Especially, the running route of heavy-duty trucks shall avoid noise-sensitive areas when possible and can minimize the traffic jam and waiting times. 2. Shields shall be provided around high-noise equipment. 3. Importance shall be attached to type selection of equipment. Low-noise equipment shall be selected. 4. It is forbidden to arrange construction operations that can cause noise pollution in the noon and at night, such as pile driving and cement mixing. 5. Temporary fences shall be erected at the construction site.	Construction contractor	Supervision organization	Included in the construction dust control measure cost.

Work Stage	Main Negative Impact	Mitigation/Control Measures	Performer	Supervisor	Expense Estimate (RBM 10,000)
	Construction solid wastes	1. Before leaving the site, the dirt adhered to the trucks shall be washed away. An inspection station with sufficient cleaning equipment shall be set at the exit. 2. Scrap metals on construction site shall be recovered timely. 3. Garbage bins shall be provided. The wastes in garbage bins shall be collected and transported to the waste landfill by the environmental sanitation station every day. Arbitrary throwing and abandoning is prohibited.	Construction contractor	Supervision organization	17.6
	Ecological treatment	1. Temporary retaining walls and temporary coverings in the building and structure area. 2. Temporary drainage ditches, temporary sedimentation tanks and vehicle cleaning pools in the road hardening area; temporary coverings temporary drainage ditches in green areas (including temporary stock yards). 3. Greening of the project area and planting of suitable local species.	Construction contractor	Supervision organization	80
Operation period	Domestic sewage	1. Each subproject shall ensure rainwater-sewage separation. The wastewater from each subproject can be discharged into municipal pipe network after being treated at the oil separation tank and three-stage septic tank (for the capacity of the septic tank in each subproject, see Table 7.2-2). Wastewater shall be discharged into urban sewage treatment plant first. The wastewater that cannot be discharged into municipal pipe network shall be used for irrigation of surrounding farmlands. 2. Regular maintenance of sewage treatment facilities is required. 3. Standard sewage discharge outlets shall be set and clearly marked.	Operation Organization	Local Environmental Protection Bureau	150

Work Stage	Main Negative Impact	Mitigation/Control Measures	Performer	Supervisor	Expense Estimate (RBM 10,000)
	Exhaust gas of oil fume from kitchens in canteens	Oil and smoke cleaners shall be installed to ensure the oil smoke emission concentration can drop below 2.0mg/m^3 as specified in the *Emission Standard of Cooking Fume*.	Operation Organization	Local Environmental Protection Bureau	34
	Noise from air conditioners and exhaust fans	Low-noise equipment shall be used and provided with acoustic shield and silencers.	Operation Organization	Owner	34
	Traffic noise	The vehicles passing in and out of the site shall be managed. Tooting control signs shall be provided on the roads in the site. Tooting is prohibited.	Operation Organization	Owner	1.6

Work Stage	Main Negative Impact	Mitigation/Control Measures	Performer	Supervisor	Expense Estimate (RBM 10,000)
	Solid waste	1. Garbage bins (recyclable and unrecyclable) shall be provided for sorting and collection of domestic wastes, and domestic wastes shall be regularly collected and transported by the environmental sanitation department to local waste landfill. 2. A qualified agency will be entrusted to recycle the waste oil treated by the oil separation tank. 3. Medical wastes will be disposed with those produced by local county hospital or rural health centers.	Operation Organization	Local Environmental Protection Bureau	16

Table 7.2-2 Capacity of Septic Tank in Each Subproject

S/N	Item	Required Capacity of Three-Stage Septic Tank	Retention Time
1	Preschool education research center of Yunnan Normal University	≥6.4m^3/d	24h
2	Teacher training base, nursery school, and special education center of Kunming College	≥19.7m^3/d	24h
3	Comprehensive teaching building for education experiment, training and practice base of Zhaotong College	≥13.2m^3/d	24h
4	Nanzhao nursery school in Weishan County	≥10.4m^3/d	24h
5	Nursery school in Wuyin Township, Weishan County	≥43.4m^3/d	24h
6	Shangjie nursery school in Yangbi County	≥12.1m^3/d	24h
7	Two nursery schools in Eryuan County	≥20.7m^3/d	24h
8	Two nursery schools in Zhanyi County	≥20.7m^3/d	24h
9	No. 1 nursery school of Xichou County	≥10.4m^3/d	24h
10	Nursery school in Baihetan Town, Qiaojia County	≥10.4m^3/d	24h
11	Qiaojiaying nursery school in Qiaojia County	≥43.4m^3/d	24h
12	Nursery school in Chongxi Town, Qiaojia County	≥28.7m^3/d	24h
13	Qingyuan Nursery school in Jianshui County	≥10.4m^3/d	24h

The wastewater from the nursery school in Wuyin Township, Weishan County, the Qiaojiaying nursery school in Qiaojia County and the nursery school in Chongxi Town, Qiaojia County will be used for irrigation of surrounding farmlands after being

treated at the septic tank. Such a requirement was proposed after environmental impact assessment, that is, the three-stage septic tanks in the 3 subprojects shall be capable of storing the treated water for 7 days because irrigation is not necessary in rainy season.

7.3 Environmental Monitoring Plan

The main impact in construction period is from raised dust and noise. The Employer, the Contractor and the Supervisor can visually inspect or self-test the construction noise. If someone makes a complaint, local monitoring station can be invited to monitor the noise. For the monitoring plan in the operation period, see Table 7.3.

Table 7.3 Environmental Monitoring Plan in Operation Period

Monitoring Element	Pollutant source	monitoring points location	Monitoring factor	Monitoring Frequency	Monitoring Organization	Costs Estimate
Water quality	Domestic sewage	1 discharge outlet of sewage treatment facility in each subproject	pH, COD, BOD_5, SS, ammonia nitrogen, animal and vegetable oil	Once / a 2 d/time, 2 times/d	Monitoring station	5,200 yuan/a

7.4 Environmental Training Plan

To ensure the successful and effective environment management, the staff shall be trained for knowledge and skills. In addition to introducing the importance and significance of this Project to the staff, different trainings shall be given to different posts. For environmental training plan of relevant personnel participating in this Project, see Table 7.4.

Table 7.4 Environmental Training Plan of this Project

Object	Training Details	Number of People	Time (Day)	Expenses (RBM 10,000)
Construction unit and its environmental protector officer and foremen	Mitigation measures in the construction period as proposed in the Environmental Management Plan, and environmental protection and safety post training	1 in each construction section	2	0.3
	Simple monitoring method and control measures (self-test) of construction noise.	1 in each construction section	1	
Supervising engineer	Relevant measures and requirements in the Environmental Management Plan; construction-related environmental protection regulations, construction planning and supervision rules.	1 in each construction section	1	0.2
	Noise monitoring and control techniques	1	1	
Employer/Operator and its environmental management personnel	All of the above, measures in the operation period as proposed in the Environmental Management Plan, operation and maintenance of environmental protection facilities	1	2	0.2
Total		/	7	0.7

7.5 Reporting and Complaint Mechanism

The whole implementation period of subprojects is about 5 years. According to relevant Chinese environmental management regulations for construction projects and the business policies of World Bank, the borrower (the Employer for each subproject) shall prepare the *Report about Evaluation and Monitoring on Implementation of Environmental Management Plan* (usually twice every year). The purpose is to ensure that relevant requirements and measures in all approved environmental management plans can be implemented and problems can be discovered, analyzed and summarized timely. This makes it easy to control the bad effect on subsequent work.

Six major aspects are described as follows:

1. The supervising engineer appointed by the Supervisor in the construction period and the Employer in the operation period will make a detailed record of the implementation of the environmental management plan in the supervision log and monthly report and submit the weekly and monthly report to the management office of projects funded by World Bank.

2. The project office will monitor and record the implementation of the environmental management plan on site on a regular and irregular basis, and incorporate the situation into the semiannual report.

3. In the operation period, the monitoring unit shall timely supervise the implementation of mitigation measures after accepting the entrusted task; monitor the quantitative indexes; and, prepare the external supervision and monitoring report according to the requirements of this section and the contract and submit it to the project office.

4. Upon receipt of an environmental complaint, the external environmental supervisor and the management office of projects funded by World Bank shall inform local environmental protection administration, and when necessary report to the superior departments level by level.

5. The project office shall write the report or chapter about implementation of environmental management plan according to the information and reports mentioned

in the above Item 1 to 4; incorporate this report or chapter into the semiannual implementation progress report, and submit it to World Bank before January 1.

6. The content of the report or chapter about implementation of environmental management plan shall include:

(1) Implementation of environmental management plan: main construction content in this stage, what environmental management trainings are conducted in this stage, implementation of mitigation measures, existing problems & their causes, and next corrective actions;

(2) Environmental monitoring results: Brief explanation of data, description of existing problems and non-compliances, analysis of causes, and suggested corrective actions; when necessary, as well as resident's complaints and solutions;

(3) Overall comment and conclusion on implementation of environmental management plan in this stage, and suggestion and planning about the work of the next half year.