Environmental Monitoring Report

Semi-annual Report
July 2016

PRC: Anhui Intermodal Sustainable Transport Project

Prepared by Beijing Zhongzi Huayu Environmental Protection Technology Co. Ltd. for the People's Republic of China and the Asian Development Bank.

ADB Loan No. 3112-PRC: Anhui Intermodal Sustainable Transport Development Project

SEMI-ANNUAL ENVIRONMENTAL MONITORING REPORT

(No. 4)

Prepared by: Beijing Zhongzi Huayu Environmental Protection Technology Co. Ltd.

July, 2016

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1 INTRODUCTION

1.1 Description of the Project

This project consists of four road subprojects (I-IV) and two waterway subprojects (V and VI) as shown in Table 1. Figure 1 shows the locations of the road subprojects and Figure 2 shows the locations of the waterway subprojects. Project cost has been estimated at $634.1 million, with $200 million funded by ADB and the remaining $434.1 million funded by counterpart. Of the $200 million ADB funding, $150 million will be applied to the road subprojects and the remaining $50 million will be applied to the waterways subprojects.

Table 1: Composition of subprojects

Subproject No.	Subproject Title	Jurisdiction	Subproject Description
I	S367 Ma'anshan North Passage Road	Hanshan County, He County	Upgrade 46.874 km from class IV to class II
II	S319 Erba-Wuwei Section	Wuwei County	Total 36.37 km from class II to class I consisting of 31.6 km upgrading and 4.76 km new road construction
III	Yimu Higway Kedian to Mujiating Section	Nanling County	Upgrade 22.36 km from class II to class I
IV	G206 Dongliu to Yaodu Section	Dongzhi County	Construct a new 16.58 km class I highway section
V	Shuiyang River Waterway Improvement	Xuancheng City	Widen, dredge, and provide bend realignment and bank protection for 43.9 km of the channel. Build and install two low-water rubber weirs. Construct one ship lock. Build a new road bridge over the channel at Xiaohekou
VI	Xuanzhou Multipurpose Port	Xuancheng City	Construct 4 1000 dwt berths totaling 295 m in length and 20 m in width, with a throughput of 1.5 million t/a

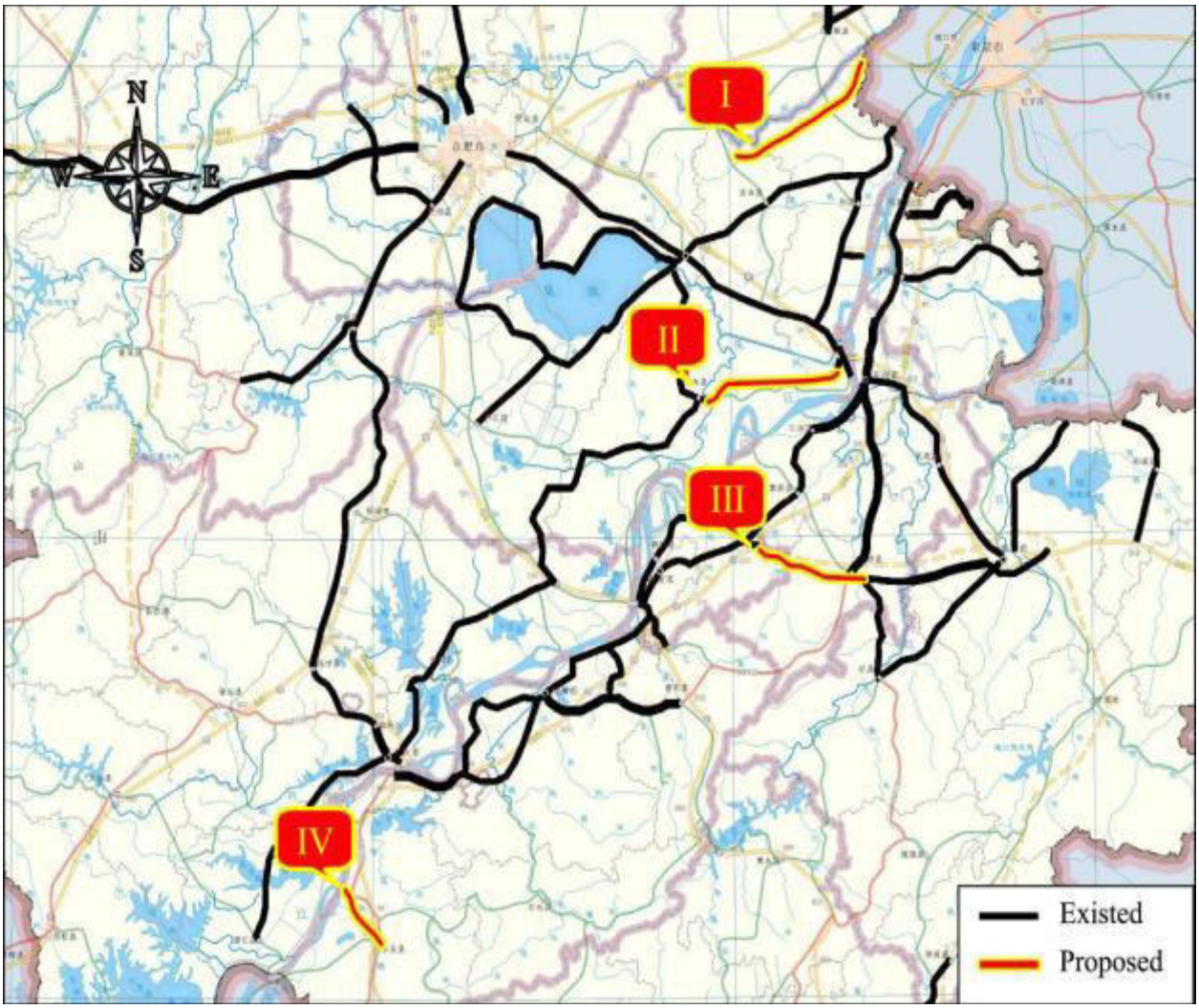


Figure 1: Location map of road subprojects

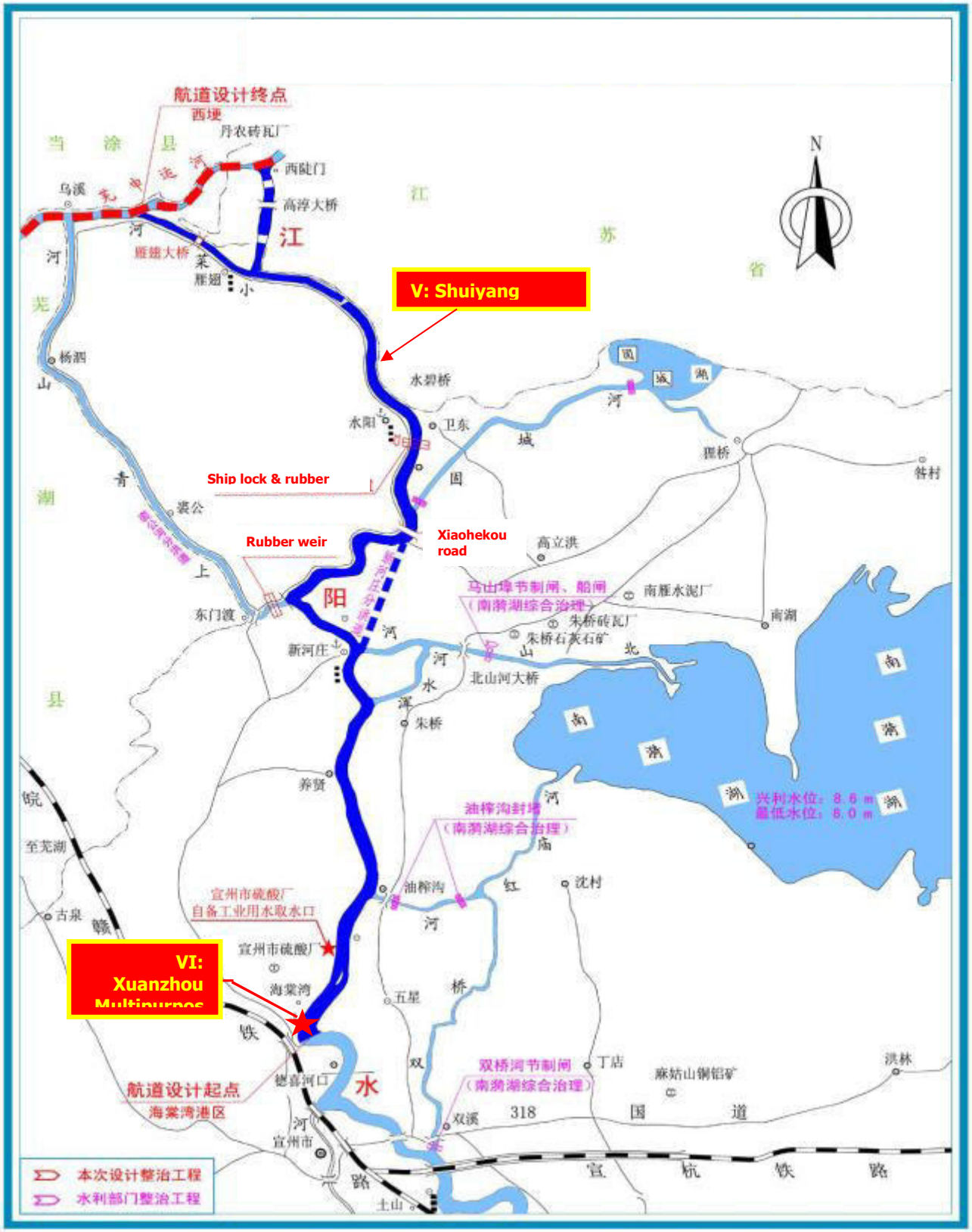


Figure 2: Location map of waterway subprojects

1.2 Purpose of Report

This is the fourth Environmental Monitoring Report for the project, as required by ADB and its loan covenants to be submitted semi-annually. It covers the 6-month period from 1 January to 1 July 2016. The purpose of the report is to document the environmental protection and environmental supervision activities carried out during the reporting period for determining whether the Environmental Management Plan (EMP) and environmental protection measures recommended in the approved domestic Environmental Impact Reports were implemented effectively to avoid, minimize or mitigate adverse environmental impacts.

This report was prepared by the Beijing Zhongzi Huayu Environmental Protection Technology Co. Ltd, who is the external environmental supervision engineer (ESE) for the project. The report has been approved by the Foreign-funded Project Management Office (FFPMO) of the Anhui Province Department of Transport (Table 2).

Table 2: Preparation, review and approval of the Environmental Monitoring Report

Report title	ADB Loan No. 3112-PRC: Anhui Intermodal Sustainable Transport Development Project – Semi-annual Environmental Monitoring Report No. 4		
Prepared by	WANG Qiaochu MA Qiqi CHEN Ying LI Shuaibin	Submission date	30 July 2016
Reviewed by	Foreign-funded Project Management Office, Anhui Province Department of Transport	Review frequency	Every 6 months
Approved by	Foreign-funded Project Management Office, Anhui Province Department of Transport	Version	Draft

1.3 Project Progress

As of 30 July 2016, all six subprojects had commenced construction. Table 3 shows the construction commencement dates of the subprojects and Table 4 shows the progress of these subprojects.

Table 3: Construction commencement dates of the subprojects

Subproject		Construction Commencement Date
I	S367 Ma'anshan North Passage Road	20 December 2015
II	S319 Erba-Wuwei Section	10 August 2015
III	Yimu Higway Kedian to Mujiating Section	18 December 2015
IV	G206 Dongliu to Yaodu Section	24 September 2014
V	Shuiyang River Waterway Improvement	28 November 2015
VI	Xuanzhou Multipurpose Port	28 November 2015

Table 4: Progress of subprojects (up till 30 June 2016)

Subproject		Works Content	Implementation Status at the end of Reporting Period	Work Plan for Next 6 Months
I	S367 Ma'anshan North Passage Road	(i) Total length 46.874 km (ii) Design large and medium size bridges for 1/100 flood return period (iii) Design subgrade, small bridges and culverts for 1/50 flood return period (iv) Construct 1 large bridge, 4 medium size bridges and 5 small bridges, 176 culverts, 97 at grade intersections and 1 maintenance workshop (v) Subgrade: earth cut 149,600 m3, earth fill 952,900 m3 (vi) Pavement: asphalt concrete 457,750 m2 (vii) Road drainage works 24,830 m3 (viii) Total investment CNY617 million3	(i) 4 contractors: a) Contract NO4-1: Anhui Road and Port Engineering Co. Ltd. Construction chainage from K0+158 to K9+417.292. b) Contract NO4-2: Anhui New Road Construction Engineering Group Co. Ltd. Construction chainage from K9+417.292 to K21+876. c) Contract NO4-3: China Railway No. 15 Bureau Group Co. Ltd. Construction chainage from K21+876 to K37+455 d) Contract NO4-4: Jiangxi Road Bridge and Tunnel Engineering Co. Ltd. Construction chainage from K37+455 to K46+553.2 (ii) As of 31 December 2015, only Contract NO4-4 (Simahe Bridge) had mobilized into the construction camp for commencing construction. The other 3 contracts were still in the pre-construction preparation stage and had not commenced construction.	Will undertake substantial construction mainly on subgrade, bridge and culvert works.
II	S319 Erba-Wuwei Section	(i) Total length 36.37 km, with 4.76 km new road construction and 31.6 km existing road upgrade (ii) Subgrade: earth cut 94,700 m3, earth fill 416,800 m3, protective works 132,000 m3 (iii) Pavement: asphalt concrete 834,203 m2 (iv) One 866-m bridge and 85 culverts (v) 61 at grade crossings, 2 separate intersections, and 5 pedestrian foot bridges (vi) Total investment CNY 899 million	(i) The contractor for Contract NO1-1r is Anhui Road and Port Engineering Co, Ltd, and the contractor for both Contract NO1-2 and Contract NO1-3 is Liaoning Road and Bridge Construction Co. Ltd. (ii) Contract NO1-1: Completed 16.94% of contract value as of 30 June consisting of: 100% completion on subbase water stability construction from K5+000 to K18+000 on the left pavement and from K16+600 to K16+900. 100% completion on rubble backfill and gravel filling from K12+500 to K18+000 on the right pavement, and 3% completion on lime soil engineering. (iii) Contract NO1-2: Completed 20.18% of contract value as of 30 June consisting of : 20km slope excavation, 20km base backfill, 14.5km roadbed lime soil, 11.7km water stability subbase and 10.9km water stability lower subbase.	Key activities will include subgrade construction, water stability construction, bridge engineering and guardrail construction.

Subproject		Works Content	Implementation Status at the end of Reporting Period	Work Plan for Next 6 Months
			(iv) Contract NO1-3: Completed 17.82% of contract value as of 30 June consisting of: 125 bridge piles, 27 collar beams, 4 caps, 35 pier columns, 3 capping beams， 51m culverts. 22240m PHC pipe piles, 44415m³subgrade earth cut, 30999m³silt, 12339m³gravel backfill	
III	Yimu Higway Kedian to Mujiating Section	(i) Total length 22.36 km (ii) Paving of 695,900 m2 with asphalt concrete (iii) 11 bridges totaling 515.28 m, consisting of 2 large bridges and 9 medium size and small bridges (iv) 65 culverts (v)28 at grade intersections (vi) Total investment CNY 777 million	(i) The contractor for both contracts NO3-1 and NO3-2 is Jiangxi Yichun Road Construction Group Co. Ltd. Completed 10% of contract value as of 30 June, 2016. (ii) Contract NO3-1 section: completed 58 pile foundations, 4 culverts and 5.79% earth cutting. (iii) Contract NO3-2 section: completed 30 bridge piles, 2 bridge caps, 43 culvert foundations, 39 culvert walls, 2 bridge caps and 43.14% earth cutting.	Constructions of subgrade earthwork fill, bridge bored pile, caps, pier columns, improvement, precast of prestress T-beam and culvets, etc.
IV	G206 Dongliu to Yaodu Section	(i) Total length 16.6 km (ii) Paving of 481,052 m2 with asphalt concrete (iii) 8 bridges totaling 507.8 m, consisting of 2 large bridges and 6 medium size bridges (iv) 39 culverts (v)12 at grade intersections and 1 flyover (vi) Total investment CNY 646 million	(i) Contract NO2-1: the contractor is Anhui Highway and Bridge Engineering Co. Ltd. Completed 91.99% of contract value as of 30 June 2016 consisting of: a) 100% completion on cement-mixed columns, pipe culverts, box girders, roads, bored piles, caps (binders), pier columns (abutment body), capping beams, box girders pre-casting, box girders installation, bridge deck guardrails and earthwork excavation. b) 94.49% completion on earthwork filling (including backfill, replacement and abutment), 83.33% completion on approach slap. (ii) Contract NO2-2: the contractor is Anhui Road and Port Engineering Co. Ltd. Completed 88.76% of contract value as of 30 June 2016 consisting of: a) 100% completion on the following projects: earthwork excavation, earthwork filling (including backfill, replacement and abutment), cement-mixed columns,	Key activities will include: complete the construction of subgrade, undertake pavement construction and drainage facility，undertake the construction of test section and other constructions including asphalt paving and traffic safety construction.

Subproject		Works Content	Implementation Status at the end of Reporting Period	Work Plan for Next 6 Months
			pipe culverts, box girders, roads, bored piles, caps (binders), pier columns (abutment body), capping beams, box girders pre-casting. b) 99.81% completion on earthwork filling (including backfill, replacement and abutment), 72.35% completion on cement-mixed columns, 94.29% completion on box girders pre-casting, and 69.01% completion on bridge deck guardrails. c) During the reporting period, the construction of approach slap hasn't been initiated. (iii) Contract NO2-3:the contractor is Shandong Yellow River Engineering Group Co. Ltd. The following preparation work has been completed: water mixing station and the construction of storage bin , and drawings review has been completed.	
V	Shuiyang River Waterway Improvement	(i) Total length 43.9 km with channel widening, dredging, bend realignment and bank protection. (ii) Construct and install 2 low-water rubber weirs (iii) Construct 1 ship lock (iv) Construct 1 road bridge over the channel at Xiaohekou	The contractor is Liaoning Road and Bridge Construction Group Co. Ltd. As of 30 June 2016, the work has progressed as follows: 51% cement mixing pile, 100% pile foundation, binders, pier columns (abutment body) and capping beams. 67% caps and 40% T-beam pre-casting.	Complete the construction of the Xiaohekou bridge caps, T-beam pre-casting and road surface construction. Undertake pre-construction preparation for low water-level rubber dam and ship lock.
VI	Xuanzhou Multipurpose Port	(i) Construct 4 1000-ton berths totaling 295 m in length and 20 m in width. (ii) Construct 3 approach bridges for motor vehicles.	The contractor is Anhui Road and Port Engineering Co. Ltd. As of 30 June 2016, 20% of contract value has been completed, consisting of: 57% clear watch, 75% land bored piles, 96% water bored piles, 25% cast-in-place C30 concrete pile cap, 25% cast-in-place C30 concrete frame column and 30% approach bridge.	Undertake berth, approach bridge, and road surface construction

2 IMPLEMENTATION OF THE EMP

2.1 Roles and Responsibilities for EMP and Monitoring Implementation

Environmental management during the construction of these subprojects followed the environmental management hierarchy shown in Figure 3. Table 5 shows the organization of implementing agencies, contractors and supervision organizations for the subprojects

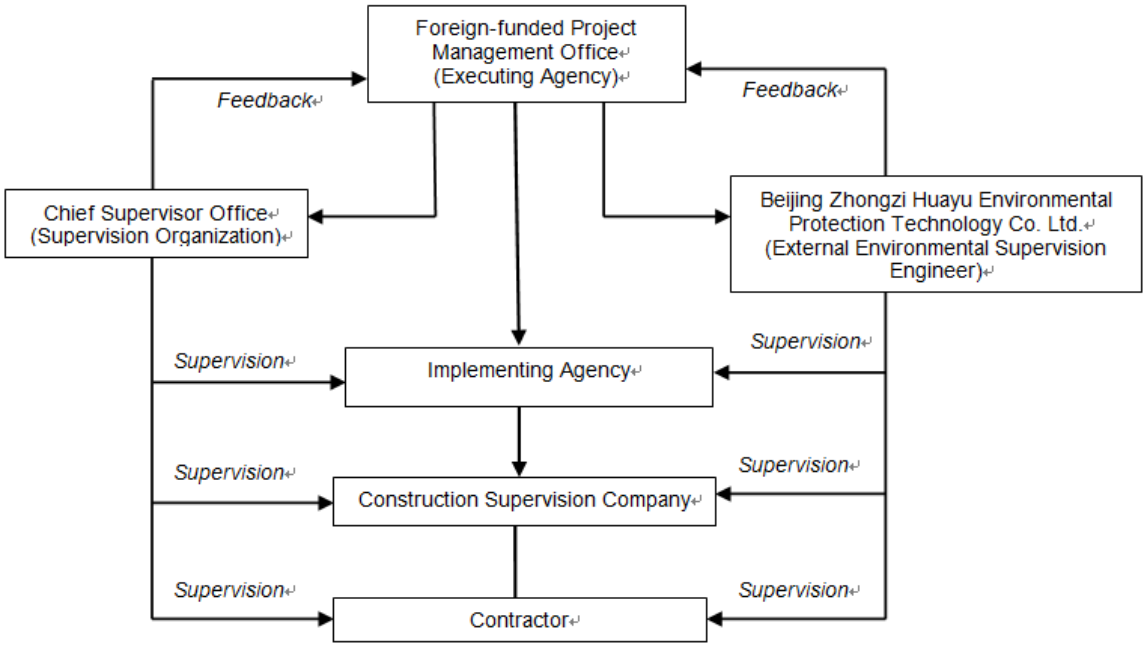


Figure 3: Environmental and construction management hierarchy

Table 5: Implementing agencies, contractors and supervision organizations for the subprojects

Subproject		Jurisdiction	Implementing Agency	Contractor		Supervision Organization	
				Contract #	Company	Construction	Environmental
I	S367 Ma'anshan North Passage Road	Hanshan County, He County	Ma'anshan City Highway Administration Bureau	NO4-1	Anhui Road and Port Engineering Co. Ltd.	Anhui High Class Road Engineering Supervision Co. Ltd.	Beijing Zhongzi Huayu Environmental Protection Technology Co. Ltd.
				NO4-2	Anhui New Road Construction Engineering Group Co. Ltd.		
				NO4-3	China Railway No. 15 Bureau Group Co. Ltd.		
				NO4-4	Jiangxi Road Bridge and Tunnel Engineering Co. Ltd.		
II	S319 Erba-	Wuwei	Wuwei	NO1-1	Anhui Road and	Anhui Highway	

Subproject		Jurisdiction	Implementing Agency	Contractor		Supervision Organization	
				Contract #	Company	Construction	Environmental
	Wuwei Section	County	County Transport Bureau		Port Engineering Co. Ltd.	Engineering Supervision Co. Ltd.	
				NO1-2	Liaoning Road and Bridge Construction Group Co. Ltd.	Anhui High Class Road Engineering Supervision Co. Ltd.	
				NO1-3			
III	Yimu Higway Kedian to Mujiating Section	Nanling County	Nanling County Transport Bureau	NO3-1	Jiangxi Yichun Highway Construction Group Co. Ltd.	Jiangsu Huaning Engineering Consulting Supervision Co. Ltd.	
				NO3-2			
IV	G206 Dongliu to Yaodu Section	Dongzhi County	Chizhou City Highway Administration Bureau	NO2-1	Anhui Highway and Bridge Engineering Co. Ltd.	Anhui Zhongxing Engineering Supervision Co. Ltd.	
				NO2-2	Anhui Road and Port Engineering Co. Ltd.		
				NO2-3	Shandong Yellow River Engineering Group Co.Ltd.		
V	Shuiyang River Waterway Improvement	Xuancheng City	Anhui Province Ports and Shipping Construction Investment Group Co. Ltd	---	Liaoning Road and Bridge Construction Group Co. Ltd.	Anhui Kexing Transport Engineering Construction Supervision Co. Ltd.	
VI	Xuanzhou Multipurpose Port			---	Anhui Road and Port Engineering Co. Ltd.	Anhui Zhongxing Engineering Supervision Co. Ltd.	
Note: The Jiangsu Suke Construction Project Management Co. Ltd. provides overall construction supervision over subprojects V and VI.							

Executing Agency. The Anhui Province Department of Transport has assigned its Foreign-funded Project Management Office (FFPMO) to be the executing agency for the project. FFPMO is responsible for the overall project implementation and compliance with loan covenants and environmental management plan (including the environmental monitoring program). Specific duties include overall coordination and supervision, management of purchasing and financial matters, and institutional strengthening.

FFPMO has established an Environmental Protection Leading Group, with the FFPMO director as the group leader and other department heads as deputy group leaders and members. The duties of the Environmental Protection Leading Group include:

(a) Implement national and Anhui provincial environmental laws, regulations, policies and guidelines

(b) Organize and implement environmental protection training for the staff
(c) Confirm the environmental quality monitoring organization
(d) Regularly inspect the status of environmental protection during construction, and supervise the implementation of environmental protection measures by contractors
(e) Coordinate with local environmental protection and water resource bureaus to undertake supervision and management activities
(f) Coordinate with ADB and submit quarter progress reports and semi-annual environmental monitoring reports to ADB

Implementing Agency. There are five implementing agencies as shown in Table 5 above. Each implementing agency has appointed one environmental staff to undertake the following activities:
(a) Supervise contractors during construction to ensure compliance with the environmental management plan
(b) Direct regular site inspections
(c) Coordinate environmental quality monitoring so that it is consistent with the approved monitoring plan
(d) Act as the local entry point for the grievance redress mechanism
(e) Submit contractors' quarterly inspection reports to the FFPMO and provincial and local environmental authorities for review and confirmation

Construction Supervision Engineer. Construction supervision on the subprojects has been undertaken by the organizations listed in Table 5 above, responsible for supervising the quality, progress, investment and safety of construction works. The construction supervision engineers had established site offices consisting of the following: project manager, chief engineer, engineering department, quality testing department, laboratory, materials department, and finance department etc. The waterway and port subprojects have a two-tier construction supervision arrangement as shown in Table 5 above, with an overall supervision office overseeing subprojects V and VI as the first tier, and two construction supervision engineers for the two subprojects as the second tier.

External Environmental Supervision Engineer. The external environmental supervision engineer (ESE) is Beijing Zhongzi Huayu Environmental Protection Technology Co. Ltd., commissioned by FFPMO through open tendering. The ESE is responsible for environmental supervision of all the subprojects. The ESE had established an Environmental Supervision Project Department for this project, composed on a chief environmental consultant, environmental supervision engineers and supervisors with relevant professional and vocational qualifications and experiences. The chief environmental consultant is a Ministry of Environmental Protection (MEP) certified environmental impact assessment engineer and has overall responsibility for the environmental supervision of the whole project, with independent decisions on environmental supervision activities. Other site supervision staff have education and experience in environmental protection or related fields, and have obtained vocational certification for undertaking environmental supervision on construction sites. They are responsible for conducting site inspections to ensure that the contractors carry out environmental protection measures in accordance with the EMP and recommendations in the approved domestic environmental impact reports.

The ESE reports directly to FFPMO and the environmental specialists in Anhui Environmental Protection Department. The ESE has the following duties:

(a) Implement national and Anhui provincial environmental laws, regulations, policies and guidelines.
(b) Support project preparation, including EMP revisions.
(c) Support environmental capacity building and training.
(d) Organize and supervise the implementation of environmental protection measures and related requirements in the EMP, the domestic environmental impact reports and the soil and water conservation reports.
(e) Organize the daily management of environmental protection works, conduct regular (once per month for each subproject) and ad hoc (when environmental problems are found on site) site inspections on contractors' environmental protection performance and provide instructions when required, and supervise the implementation of various environmental protection measures.
(f) Identify environmental related problems during subproject implementation and formulate necessary corrective actions and action plan.
(g) Provide input to the quarterly progress report and the semi-annual environmental monitoring report.
(h) Prepare documents and reports related to environmental supervision.

Contractor. The contractors for various subprojects are listed in Table 5 above. The contractors had established site offices consisting of various departments on engineering technology, planning and contracts, quality assurance, finance, materials and equipment, general office, and safety and environmental protection, etc. The contractors' environmental protection departments have the following duties:

(a) Implement national and Anhui provincial environmental laws, regulations, policies and guidelines.
(b) Assign dedicated environmental staff and environmental responsibilities in various sections within the construction sites, strengthen the management of environmental protection.
(c) Establish a management system and filing system for environmental protection, and implement various environmental protection measures and related requirements in the EMP, the domestic environmental impact reports and the soil and water conservation reports throughout the construction stage.
(d) Cooperate with ESE supervision for implementing environmental protection measures during construction.
(e) Report to ESE regularly on the implementation status of environmental protection measures.
(f) Coordinate and cooperate with the Environmental Monitoring Stations during their environmental quality monitoring on the construction sites, and take responsibility for the environmental quality conditions within the impact areas of the construction sites.
(g) Strictly comply with the construction management system, ensure that construction activities are confined within the red line areas.

Environmental Quality Monitoring. Table 6 shows the status of environmental quality monitoring arrangements for the subprojects. Three Environmental Monitoring Stations (EMS) had been commissioned by FFPMO and environmental quality monitoring was undertaken on

three subprojects in the reporting period. The other three subprojects were in early construction preparation and mobilization stage where the process of selecting relevant EMSs was ongoing.

Table 6: Arrangements for environmental quality monitoring of the subprojects

Subproject		Environmental Quality Monitoring Organization / Status
I	S367 Ma'anshan North Passage Road	Construction still in mobilization stage. Environmental quality monitoring did not commence.
II	S319 Erba-Wuwei Section	Wuwei County Environmental Monitoring Station
III	Yimu Higway Kedian to Mujiating Section	Heifei Yuchi Testing Co. Ltd
IV	G206 Dongliu to Yaodu Section	Dongzhi County Environmental Monitoring Station
V	Shuiyang River Waterway Improvement	Hefei Haizheng Environmental Testing Co.Ltd
VI	Xuanzhou Multipurpose Port	Hefei Haizheng Environmental Testing Co.Ltd

Table 7 provides the names and contact information of individuals who are responsible for environment, health and safety of the subprojects.

Table 7: Project and subproject staffs responsible for environment, health and safety

Subproject	Name of Organization	Name of EHS Staff		Telephone (T) / Email (E)
Foreign-funded Project Management Office		WU Fei	Director	T: 138 5695 1610
		HONG Congsheng		T: 159 0569 0995 T: (551) 6375 6191
Chief Supervisor Office		WANG Zhengming		T: 136 1551 6701
External environmental supervision organ		QIU Dongqing	Vice Manager	T: 138 0100 6238 E: 978599837@qq.com
		WANG Qiaochu	Chief Engineer	T: 152 1095 4356 E: 175960016@qq.com
		LI Shibin	Environmental Engineer	T: 185 1360 0440 E: 191168456@qq.com
		MA Qiqi	Environmental Engineer	T: 177 1065 2761 E: 1206213026@qq.com
		CHEN Ying	Environmental Engineer	T: 186 1811 3512 E: 326840068@qq.com
I. S367 Ma'anshan North Passage Road	Implementing Agency: Ma'anshan City Highway Administration Bureau	XIA Song	General Supervisor	T: 189 5555 9280
		WANG Lin	Environmental Supervisor	T: 133 6555 9561 E: S367xmb@126.com
	NO.4-1 Contractor: Anhui Road and Port Engineering Co, Ltd,	WANG Quanwen	General Supervisor	T:138 6618 5378
		ZHAO Zhiqiang	Environmental Supervisor	T: 132 0565 7959

Subproject	Name of Organization	Name of EHS Staff		Telephone (T) / Email (E)
	NO.4-2 Contractor: Anhui New Road Construction and Engineering Co. Ltd.	WANG Zhuangfei	General Supervisor	T: 138 0558 1699
		WANG Banghe	Environmental Supervisor	T: 186 5558 9085
	NO.4-3 Contractor: China Railway 15th Bureau Group Co. Ltd.	LIN Xinwei	General Supervisor	T: 138 0532 9308
		ZHU Yanxiang	Environmental Supervisor	T: 151 5706 4039
	NO.4-4 Contractor: Jiangxisheng Luqiao Tunnel Engineering Co. Ltd.	DENG Binsheng	General Supervisor	T: 130 0402 6066
		LI Guofu	Environmental Supervisor	T: 150 5685 6223
II. S319 Erba-Wuwei Section	Implementing Agency: Wuwei County Transport Bureau	ZHAO Qiancheng	General Supervisor	T: 138 5652 4957
		ZHOU Xiusheng	Environmental Supervisor	T: 138 5652 4957 E: 1427539517@qq.com
	NO.1-1 Contractor: Anhui Road and Port Engineering Co, Ltd,	CHEN Ruisheng	General Supervisor	
		GAO Xingchao	Environmental Supervisor	T: 187 6782 3803
	NO.1-2 Contractor: Liaoning Road and Bridge Engineering Co. Ltd.	PAN Mingbao	General Supervisor	T: 180 0553 3888 E: 1650133469@qq.com
		CHEN Tieli	Environmental Supervisor	T: 152 5562 1666 E: 865793130@qq.com
	NO.1-3 Contractor: Liaoning Road and Bridge Engineering Co. Ltd.	LI Yao	General Supervisor	T: 152 5688 0001
		NIE Shifang	Environmental Supervisor	T: 186 3571 4105 E: 791104738@qq.com
III. Yimu Higway Kedian to Mujiating Section	Implementing Agency: Nanling County Transport Bureau	HOU Qingran	General Supervisor	T: 139 5618 5858
		YANG Yang	Environmental Supervisor	T: 189 1028 3792 E: 82778911@qq.com
	NO3-1 contractor: Jiangxi Yichun Highway Construction Group Co. Ltd.	Manager ZHAO	General Supervisor	T: 177 7529 9892
		BU Liang	Environmental Supervisor	T: 138 6685 0044
	NO3-2 contractor: Jiangxi Yichun Highway Construction Group Co. Ltd.	Manager WANG	General Supervisor	T: 153 8532 1357
		Manager LI	Environmental Supervisor	T: 158 5553 9005

Subproject	Name of Organization	Name of EHS Staff			Telephone (T) / Email (E)
IV. G206 Dongliu to Yaodu Section	Implementing Agency: Chizhou City Highway Administration Bureau	WEN Fadong			T: 180 5667 3190/139 5689 8908 E: 1076422965@qq.com
		Engineer YE			T: 182 5661 6161 E: 821300546@qq.com
	NO2-1 contractor: Anhui Highway and Bridge Engineering Co. Ltd.	ZHOU Jianfeng			T: 189 0569 5098
	NO2-2 contractor: Anhui Road and Port Engineering Co. Ltd.	SUN Pengzhi			T: 156 5668 7090
		Engineer WANG			T: 136 3712 6166
V. Shuiyang River Waterway Improvement	Implementing Agency: Anhui Provincial Port and Shipping Construction Investment Group CO. Ltd.	ZHANG Yingqiu	Supervisor of the Directorate		T: 188 9533 8390
		XIAO Xihua	Proj-ect offic-e	General Supervisor	T: 186 5513 6833
		CHENG Guozheng		Environme-ntal Supervisor	T: 151 7852 0328 E: 799788608@qq.com
	Contractor: Liaoning Road and Bridge Engineering Co. Ltd.	WANG Xiangguo	General Supervisor		T: 138 4052 2323
		WANG Yan	Environme-ntal Supervisor		T: 156 5633 0068 E: 168898880@qq.com
VI. Xuanzhou Multipurpose Port	Implementing Agency: Anhui Province Ports and Shipping Construction Investment Group Co. Ltd	ZHANG Yingqiu XIAO Xihua	Supervisor of the Directorate		T: 188 9533 8390
		XIAO Xihua	Proj-ect offic-e	General Supervisor	T: 186 5513 6833
		CHENG Guozheng		Environme-ntal Supervisor	T: 151 7852 0328 E: 799788608@qq.com
	Contractor: Anhui Road and Port Engineering Co. Ltd.	DING Wei	General Supervisor		T: 139 0565 4787
		CHEN cheng	Environmental Supervisor		T: 153 7516 1991

2.2 Environmental Mitigation Measures

Compliance with the EMP on implementation of mitigation measures is presented in Appendix I. Key mitigation measures for the subprojects are highlighted below. Representative photographs of construction sites and activities, and environmental mitigation measure are shown in Appendix II.

Air Quality. Sheltered compartments were constructed for material storage in asphalt and cement mixing stations and pre-casting yards, and workers were provided with goggles. Trucks

transporting materials were equipped with side boards and tarpaulin. Materials were not allowed to be stacked higher than the side boards and were covered by tarpaulin during transport. The mixing stations and pre-casting yards were sited in areas with no air quality sensitive receptors within 300 m.

Each contract had at least one water truck for spraying water to suppress dust in unpaved areas and haul roads at least three times per days and more frequent during dry weather and windy days. In each contract, precipitator was installed in mixing stations.

It happens that within the construction site of Project G206 (subproject IV), materials in transport vehicles were piled too high, or not covered. Compliance did improve after a reminder but further observation is required. Yimu Higway (Subproject III) installed a guard net along the excavated section of road-side slopes to prevent soil erosion. Xiaohekou Bridge (Subproject V) and Xuanzhou Port (Subproject VI) installed fences and grid guards along residential areas to prevent dirt produced by construction vehicles.

Water Quality. Construction camps, stockpiling areas, asphalt and cement mixing stations, and pre-casting yards were sited away from water bodies (e.g. Xiaohuangni Lake and Quanshui Lake in subproject IV: G206 Dongliu to Yaodu Section). Asphalt and cement mixing stations were equipped with septic tanks and multi-chamber sedimentation tanks to treat wastewater and process water respectively. The process water after sedimentation was reused on site for dust suppression. Construction camps were equipped with septic tanks to treat wastewater from workers. The septic tanks were regularly maintained with sludge removal by licensed service providers. Bridge construction sites were surrounded by steel hoardings or berms. Mud ponds were constructed to contain slurry generated during bridge construction. Boats were inspected for oil leakage prior to deployment for bridge construction. Drainage ditches and sedimentation tanks were constructed in subgrade works areas for intercepting and treating muddy runoff. The ESE, during site inspections, did not observe equipment cleaning and waste storage and disposal near water bodies that might cause water pollution.

During the reporting period, the pre-casting and installation work of the piling foundations and superstructure of G206 (Subproject IV) Xiaohuangni Lake bridge and Quanshuihu bridge projects were completed on time in April, avoiding the upcoming raining and flood season in mid-to-late May. Wheel washing equipment has been installed at the exit of the construction camp of Xuanzhou Multipurpose Port project and S319 project (Subproject II) to prevent construction vehicles from carrying muddy or dusty substances onto urban roads. During the construction of piling foundations for bridges for contract NO1-3 section of project S319, steal confferdam has been installed to prevent mud and wastewater produced by piling foundation construction from entering watercourses to pollute waterbody. During Xiaohekou bridge construction, confferdam has been built to protect watercourses; and during Xuanzhou Multipurpose Port construction (Subproject VI), sandbags were used to prevent muddy and dusty substances from entering the waterbody.

Noise. Low noise powered mechanical equipment were deployed subject to availability. Asphalt and cement mixing stations were sited in areas with no noise sensitive receptors within 300 m. Excavated spoil and backfill materials were transported during day time on existing roads and avoiding densely populated areas. No noisy construction works such as piling or blasting was carried out at night. Night time construction noise was strictly controlled. Temporary noise barriers were sited near sensitive places during the implementation of each contract, thus to avoid annoying residents living nearby.

Solid Waste. Solid wastes such as refuse, construction and demolition (C&D) waste, packaging materials etc. generated during construction were transported off site regularly. Sufficient garbage bins were provided on construction sites and asphalt and cement mixing stations for collection of refuse. C&D waste and excavated spoil were stored at spoil disposal sites. Those suitable for reuse were used for road compaction and haul road construction.
In the construction sites of sub-projects, refuses and C&D waste such as packaging materials were not collected in time and proper regulations in terms of waste collection were also absent. Currently, construction sites of each section were cleaned up and trashcans were deployed to collect refuses. Ample trashcans were deployed in each construction site of sub-projects to collect refuses and regulations were strengthened. All wastes were sent to urban garbage landfills in time.

Ecology. Top soils were stripped, removed off site and stored prior to construction in subgrade and temporary works areas. Training was provided for the workers prior to construction on protection of trees and wildlife. Signs on protection of vegetation and wildlife, and prohibition of hunting were erected on construction sites and construction camps. Signs on prevention of forest fire were also erected in areas with abundance of trees, with training on forest fire prevention provided for the workers as well. According monitoring work was done subject to requirements imposed by the environmental regulation plan. (G206 (subproject IV) monitored aves.)

During the reporting period, in Yimu Highway Project (subproject III), geotechnical cloth was covered on bare side slopes to avoid potential water and soil loss caused by rain. The small amount of trees influenced by the roadway excavation were transplanted and details could be found in Attachment III. In G206, three spoil disposal sites were out of service in NO2-2 Section and entered into a flatting and recovering period. One of the spoil disposal site was already flattened by topsoil collected during early layered excavation and sown with green bristlegrass. After the construction, the spoil disposal site will be reclaimed and then be used as vegetable fields. During the construction of Quanshuihu Bridge in NO2-2 Section, a spoil disposal occupied the tree place. Spoils were originally put beside the trees, and now they had been moved to the spoil disposal sites. All the sites had been approved by the government with according paperwork. Now the spoil disposal was removed. In Xuanzhou Port Project (subproject VI), seeds were sown on the side slopes to avoid potential water and soil loss during the excavation.

Community. A bill board was erected at the entrance to each construction site listing information on the contractor, construction supervision entity and complaint hotline etc. Intercepting ditches and sedimentation tanks were constructed on both sides of subgrade works areas to prevent muddy runoff into nearby farmland. Strict speed control was imposed on

construction vehicles. Warning and safety signs were erected for alerting road users near the construction sites. No night time noisy construction works was allowed in populated areas.

In Shuiyang River Project and Xuanzhou Comprehensive Port Project (subproject V and VI), fences and warning signs were erected on either side of construction detours, to prevent construction vehicles and muddy runoff into nearby farmland during construction. Temporary barriers were sited in front of residence, to avoid disturbance. Complaint hotlines and complaint boxes were deployed at each entrance of construction road and site.

2.3 Environmental Monitoring Data and Record

Table 8 summarizes the environmental quality monitoring programs for all the subprojects. Subproject I (S367 Northern Passage of Ma'anshan Section) was still calling for tenders. So no concrete monitoring work was undertaken for this subproject.) Environmental quality monitoring for water quality, air quality and noise was undertaken for other subprojects. According to the ADB environmental monitoring plan, monitoring of birds was undertaken for subproject IV (G206) and monitoring for soil quality in the dockyard was undertaken for subproject V (Shuiyang River channel regulation).

Table 8: Environmental quality monitoring programs for the subprojects

Monitoring Specifics		**Subprojects**					
		I. S367 Ma'anshan North Passage Road	**II. S319 Erba-Wuwei Section**	**III. Yimu Higway Kedian to Mujiating Section**	**IV. G206 Dongliu to Yaodu Section**	**V. Shuiyang River Waterway Improvement**	**VI. Xuanzhou Multipurpose Port**
Air quality	Parameter	Daily average TSP					
	Location	4 monitoring points: 1- near asphalt /cement mixing station 2 - on unpaved haul road near construction site 3 -Taodian Health Clinic 4 - Chuomiaoji	5 Monitoring points: 1- near asphalt /cement mixing station 2 - on unpaved haul road near construction site 3 – Yonnan Central Primary School 4 – Boai Hospital 5 – Changba Primary School	4 monitoring points: 1- near asphalt /cement mixing station 2 - on unpaved haul road near construction site 3 – Bowen High School 4 – Wuxia Temple	4 monitoring points: 1- near asphalt /cement mixing station 2 - on unpaved haul road near construction site 3 - Zhazui 4 -Yangjia	2 monitoring points: 1 – near the Xiaohekou road bridge 2 – 10 m outside the boundary of the construction site	2 monitoring points: 1 – at nearest sensitive receptor to construction activities 2 – at port construction site 10 m from the cement batching plant
	Frequency	Preconstruction stage: at least 3 consecutive days Construction stage: at least 3 consecutive days every 3 months					
Noise	Parameter	L_{Aeq}					

Monitoring Specifics		Subprojects					
		I. S367 Ma'anshan North Passage Road	**II. S319 Erba-Wuwei Section**	**III. Yimu Higway Kedian to Mujiating Section**	**IV. G206 Dongliu to Yaodu Section**	**V. Shuiyang River Waterway Improvement**	**VI. Xuanzhou Multipurpose Port**
	Location	5 monitoring points: 1 - near asphalt /cement mixing station 2 – Taodian Health Clinic 3 – Gaozhu Primary School 4 – Baozhuang Primary School 5 - Chuomiaoji	7 monitoring points: 1 – near asphalt/ cement mixing station 2 & 3 - outside the boundary walls of asphalt/ cement mixing station 4 – Yonnan Central Primary School 5 – Boai Hospital 6 – Changba Primary School 7 – Hualong Village	5 monitoring points: 1 – near asphalt/ cement mixing station 2 & 3 - outside the boundary walls of asphalt/ cement mixing station 4 – Bowen Highe School 5 – Wuxia Temple	4 monitoring points: 1 & 2- outside the boundary walls of asphalt/ cement mixing station 3 - Zhazui 4 -Yangjia	At 3 locations with multiple monitoring points at each location: 1) at each of 3 dredging sections, with 1 point near the embankment and 1 point at the nearest sensitive receptor 2) at the nearest sensitive receptors to each dredged sediment disposal site 3) 1 point near Xiaohekou bridge and 1 point at nearst sensitive receptor	2 monitoring points: 1 – 5 m outside construction site boundary 2 – at the nearest sensitive receptor
	Frequency	Preconstruction stage: continual monitoring for 2 consecutive days. Construction stage: at least 2 consecutive days every 3 months				1 day time and 1 night time monitoring every 3 months	
Water quality	Parameter	pH, SS, I_{Mn}, total petroleum hydrocarbon, NH_4-N, COD					
	Location	4 monitoring points: 1 & 2 – 50 m upstream & 50 m downstream of Sima River bridge 3 & 4 – 50 m	2 monitoring points: 1 & 2 – 50 m upstream and 50 m downstream of the Xi River bridge	5 monitoring points: 1 – Zhang River water intake location 2 & 3 – 50 m upstream & 50 m	6 monitoring points: 1 & 2 – 50 m upstream and 50 m downstream of Xiaohuangni Lake bridge	4 monitoring points at each of the 3 dredging sections: 1 – 50 m upstream of dredger 2 – 50 m	3 monitoring points : 1 – 50 m upstream of port structure 2 – 50 m downstream of port structure

Monitoring Specifics		Subprojects					
		I. S367 Ma'anshan North Passage Road	**II. S319 Erba-Wuwei Section**	**III. Yimu Higway Kedian to Mujiating Section**	**IV. G206 Dongliu to Yaodu Section**	**V. Shuiyang River Waterway Improvement**	**VI. Xuanzhou Multipurpose Port**
		upstream & 50 m downstream of Dongfeng River bridge		downstream of Zhang River bridge 4 & 5 – 50 m upstream & 50 m downstream of Hougang River bridge	3 & 4 – 50 m upstream & 50 m downstream of Quanshui Lake #1 bridge 5 & 6 – 50 m upstream & 50 m downstream of Quanshui Lake #2 bridge	downstream of dredger 3 – 100 m downstream of dredger 4 – 200 m downstream of dredger 1 monitoring point at the discharge point of #5 dredged sediment disposal site (SS monitoring only)	3 – 100 m downstream of port structure
	Frequency	Preconstruction stage: at least 2 consecutive days Construction stage: at least 2 consecutive days every 3 months				At least 2 consecutive days every 3 months during dredging	At least 2 consecutive days every 3 months during construction
Ecology	Parameter	Not applicable			Bird species and abundance	Not applicable	
	Location	Not applicable			Along the lake between chainage K6+000 to K15+000	Not applicable	
	Frequency	Not applicable			2 consecutive days in summer, winter and transitional (either spring or autumn) seasons respectively	Not applicable	
Monitoring entity		Not decided. Still in mobilization stage in reporting	Wuwei County Environmental Monitoring	Nanling County Environmental Monitoring	Dongzhi County Environmental Monitoring Station &	Not decided. Still in mobilization and advance works stage in reporting period	

Monitoring Specifics		Subprojects					
		I. S367 Ma'anshan North Passage Road	**II. S319 Erba-Wuwei Section**	**III. Yimu Higway Kedian to Mujiating Section**	**IV. G206 Dongliu to Yaodu Section**	**V. Shuiyang River Waterway Improvement**	**VI. Xuanzhou Multipurpose Port**
		period	Station	Station	ornithologist		
Supervision entity	Implementing agency	Ma'anshan City Highway Administration Bureau	Wuwei County Transport Bureau	Nanling County Transport Bureau	Chizhou City Highway Administration Bureau	Anhui Province Ports and Shipping Construction Investment Group Co. Ltd	
	ESE	Beijing Zhongzi Huayu Environmental Protection Technology Co. Ltd.					

2.3.1 Surface Water Quality

Table 9 presents the surface water quality monitoring data collected in the reporting period. For subproject II (S319 Erba-Wuwei Section), the road bridge crossing the Xi River (at chainage K36+066) is located within the centralized drinking water source protection zone II, with a designated water quality standard of category II. Water quality monitoring data showed exceedance of ammonia nitrogen (NH_3-N). The exceedance is irrelevant to this project. However, NH_3-N exceedance occurred both in the upstream and downstream, indicating that it was not construction related. And the concentration of suspended solids (SS) in the downstream was >130% of the SS level at the upstream. The SS exceedance reflected that it was caused by the construction. Therefore, steel cofferdam was adopted in the Bridge Section to protect water quality and the effectiveness of the measure could be reflected in the next annual report. It's effective. We use the steel cofferdam to retain industrial sewage, and then pump the wastewater to the settling pond for treatment in time, thus to control the water pollution effectively. The SS concentration would be controlled within the range subject to ADB requirements.

For subproject III (Yimu Highway Kedian to Mujiating Section), the designated water quality standards for Zhang River and Hougang River are category II and category IV respectively. Monitoring data at the Zhang River water intake location (50m in the upstream) showed exceedance of petroleum on 18 May 2016 but compliance on 19 May 2016, Among all the 24 items under monitoring, only one item showed exceedance. Therefore, it is an isolated event which， according to our analysis， is caused by misoperations in the experiment, or statistical errors..

For subproject IV (G260 Dongliu to Yaodu Section), the designated water quality standards for Quanshui Lake and Xiaohuangni River are both category III. Monitoring data at the Bridge No.2 in Quanshui Lake showed the concentration of suspended solids (SS) in the downstream was >130% of the SS level at the upstream but compliance on 19 May 2016, indicating that the exceedance was an isolated incident.

For subproject V (Shuiyang River channel improvement) and subproject VI (Xuanzhou Comprehensive Port), the designated water quality standards in the entrance of the river and at the port are both category III. Monitoring data showed the concentration of NH_3-N at the intake

locations were higher than that required by GB 3828-2002 Environmental Quality Standards for Surface Water. Data showed that the exceedance had already occurred before works commencement both in the upstream and downstream, indicating that the exceedance was not works related. According to analysis, the exceedance was attributed by fertilizers washed off from farmlands along the Shuiyang River by rainwater.

For monitoring potential water quality impacts during bridge construction, ADB adopted a "real time baseline" approach with an upstream "control station" and one or more downstream "impact stations", with the standard that the suspended solids (SS) levels at the impact stations should be ≤130% of the SS level at the control station. When the SS levels at the impact stations are >130% of the SS level at the control station, it is indicative of excessive SS dispersing downstream from the bridge construction site and construction methods shall be reviewed and mitigation measures shall be adopted to reduce SS levels at the impact stations to ≤130% of the SS level at the control station.

Table 9: Surface water quality monitoring data for the reporting period

Subproject	Monitoring Date	Monitoring Location	Parameters Monitored						Remark
			pH	SS	I_{Mn}	TPH	NH_3-N	COD	
				mg/L	mg/L	mg/L	mg/L	mg/L	
II. S319 Erba-Wuwei Section	2016.3.4	XI River bridge 50 m upstream	7.33	15	2.85	0.024	0.85	---	Complied with cat. II std. NH_3-N > cat. III std. SS level in the upstream > 130% of the SS level in the downstream
		XI River bridge 50 m downstream	7.55	27	3.35	0.035	1.55	---	
	2016.3.5	XI River bridge 50 m upstream	7.34	18	2.90	0.026	0.88	---	
		XI River bridge 50 m downstream	7.56	30	3.38	0.038	1.60	---	
	2016.5.23	XI River bridge 50 m upstream	7.12	18	3.06	0.032	1.05	---	Complied with cat. II std. NH_3-N > cat. III std. SS level in the downstream > 130% of the SS level in the upstream
		XI River bridge 50 m downstream	7.43	28	3.85	0.042	1.42	---	
	2016.5.24	XI River bridge 50 m upstream	7.11	20	3.10	0.035	1.08	---	
		XI River bridge 50 m downstream	7.44	26	3.88	0.046	1.46	---	
III. Yimu Highway Kedian to Mujiating	2016.2.24	Zhang River bridge 50 m upstream	6.99	10	0.3	0.04L	0.179	---	Complied with cat. II std.
		Zhang River bridge 50 m downstream	7.07	7	0.1	0.04L	0.172	---	Complied with

Subproject Section	Monitoring Date	Monitoring Location	Parameters Monitored						Remark
			pH	SS	I_{Mn}	TPH	NH_3-N	COD	
				mg/L	mg/L	mg/L	mg/L	mg/L	
									cat. II std.
		Zhang River water intake	7.22	10	0.3	0.04L	0.307	---	Complied with cat. II std.
		Hougang River bridge 50 m upstream	6.99	10	1.0	0.21	0.400	---	Complied with cat. IV std.
		Hougang River bridge 50 m downstream	6.89	11	1.0	0.22	0.400	---	Complied with cat. IV std.
		Hougang River water intake	7.01	8	1.3	0.20	0.477	---	Complied with cat. IV std.
	2016.2.25	Zhang River bridge 50 m upstream	6.89	11	0.1	0.04L	0.167	---	Complied with cat. II std.
		Zhang River bridge 50 m downstream	6.98	8	0.1	0.04L	0.116	---	Complied with cat. II std.
		Zhang River water intake	6.94	10	0.1	0.04L	0.284	---	Complied with cat. II std.
		Hougang River bridge 50 m upstream	6.97	10	1.0	0.17	0.263	---	Complied with cat. IV std.
		Hougang River bridge 50 m downstream	6.95	12	0.8	0.16	0.221	---	Complied with cat. IV std.
		Hougang River water intake	6.83	8	1.2	0.15	0.423	---	Complied with cat. IV std.
	2016.5.18	Zhang River bridge 50 m upstream	6.89	23	3.12	0.04L	0.149	---	Complied with cat. II std.
		Zhang River bridge 50 m downstream	7.05	16	3.01	0.04L	0.184	---	Complied with cat. II std.
		Zhang River water intake	7.18	14	3.09	0.04L	0.166	---	Complied with cat. II std.
		Hougang River bridge 50 m upstream	6.98	25	3.58	0.52	0.208	---	TPH> cat. IV std.
		Hougang River bridge 50 m downstream	6.93	15	3.57	0.39	0.170	---	Complied with cat. IV std.
		Hougang River water intake	7.10	17	3.35	0.30	0.177	---	Complied with cat. IV std.
	2016.5.19	Zhang River bridge 50 m upstream	6.92	26	2.95	0.04L	0.151	---	Complied with cat. II std.
		Zhang River bridge 50 m downstream	6.95	14	3.40	0.04L	0.185	---	Complied with cat. II std.
		Hougang River water intake Hougang River water intake	6.97	16	2.94	0.04L	0.164	---	Complied with cat. II std.

Subproject	Monitoring Date	Monitoring Location	Parameters Monitored						Remark
			pH	SS	I_{Mn}	TPH	NH_3-N	COD	
				mg/L	mg/L	mg/L	mg/L	mg/L	
		Zhang River bridge 50 m upstream	6.98	28	3.34	0.41	0.219	---	Complied with cat. IV std.
		Zhang River bridge 50 m downstream	6.88	15	3.38	0.33	0.167	---	Complied with cat. IV std.
		Hougang River water intake	6.99	19	3.73	0.22	0.180	---	Complied with cat. IV std.
IV. G206 Dongliu to Yaodu Section	2016.03.01	Xiaohuangni Lake bridge 50 m upstream	8.29	51	5.14	0.02	0.634	---	Complied with cat. III std.
		Xiaohuangni Lake bridge 50 m downstream	7.69	43	5.15	0.03	0.705	---	Complied with cat. III std.
		Quanshui Lake #1 bridge 50 m upstream	8.01	56	5.47	0.01	0.626	---	Complied with cat. III std.
		Quanshui Lake #1 bridge 50 m downstream	7.92	53	5.44	0.04	0.663	---	Complied with cat. III std.
		Quanshui Lake #2 bridge 50 m upstream	8.03	52	5.66	0.02	0.546	---	Complied with cat. III std.
		Quanshui Lake #2 bridge 50 m downstream	7.88	49	5.08	0.01	0.712	---	Complied with cat. III std.
	2016.03.02	Xiaohuangni Lake bridge 50 m upstream	8.07	57	5.36	0.04	0.782	---	Complied with cat. III std.
		Xiaohuangni Lake bridge 50 m downstream	7.54	49	4.25	0.02	0.714	---	Complied with cat. III std.
		Quanshui Lake #1 bridge 50 m upstream	8.03	40	5.62	0.01	0.584	---	Complied with cat. III std.
		Quanshui Lake #1 bridge 50 m downstream	7.81	45	5.52	0.03	0.582	---	Complied with cat. III std.
		Quanshui Lake #2 bridge 50 m upstream	8.05	48	4.90	0.02	0.535	---	Complied with cat. III std.
		Quanshui Lake #2 bridge 50 m downstream	7.81	55	5.52	0.02	0.718	---	Complied with cat. III std.
	2016.5.29	Xiaohuangni Lake bridge 50 m upstream	7.95	19	4.95	0.03	0.522	---	Complied with cat. III std.
		Xiaohuangni Lake bridge 50 m downstream	7.57	24	4.46	0.02	0.634	---	Complied with cat. III std.

Subproject	Monitoring Date	Monitoring Location	Parameters Monitored						Remark
			pH	SS	I_{Mn}	TPH	NH_3-N	COD	
				mg/L	mg/L	mg/L	mg/L	mg/L	
		Quanshui Lake #1 bridge 50 m upstream	7.87	22	4.96	0.02	0.496	---	Complied with cat. III std.
		Quanshui Lake #1 bridge 50 m downstream	8.02	27	4.74	0.01	0.621	---	Complied with cat. III std.
		Quanshui Lake #2 bridge 50 m upstream	8.05	23	5.28	0.02	0.546	---	Complied with cat. III std.
		Quanshui Lake #2 bridge 50 m downstream	7.91	31	4.85	0.03	0.656	---	Complied with cat. III std. SS level at the down stream > 130% SS level at the down stream
	2016.5.30	Xiaohuangni Lake bridge 50 m upstream	7.91	21	5.15	0.02	0.570	---	Complied with cat. III std.
		Xiaohuangni Lake bridge 50 m downstream	7.54	25	4.32	0.01	0.618	---	Complied with cat. III std.
		Quanshui Lake #1 bridge 50 m upstream	7.91	34	5.10	0.01	0.508	---	Complied with cat. III std.
		Quanshui Lake #1 bridge 50 m downstream	7.98	30	4.55	0.02	0.574	---	Complied with cat. III std.
		Quanshui Lake #2 bridge 50 m upstream	8.01	22	5.14	0.01	0.585	---	Complied with cat. III std.
		Quanshui Lake #1 bridge 50 m downstream	7.85	19	4.91	0.03	0.667	---	Complied with cat. III std.
V. Shuiyang River channel improvement	2016.3.23	Xiaohekou bridge 50 m upstream	7.14	19	2.62	0.03	1.49	---	Complied with cat. III std. NH_3-N > cat. III std.
		Xiaohekou bridge 50 m downstream	7.06	16	2.68	0.02	1.41	---	Complied with cat. III std. NH_3-N > cat. III std.
	2016.3.24	Xiaohekou bridge 50 m upstream	7.10	18	2.56	0.02	1.43	---	Complied with cat. III std. NH_3-N > cat. III std.

Subproject	Monitoring Date	Monitoring Location	Parameters Monitored						Remark
			pH	SS	I_{Mn}	TPH	NH_3-N	COD	
				mg/L	mg/L	mg/L	mg/L	mg/L	
		Xiaohekou bridge 50 m downstream	7.13	18	2.77	0.03	1.47	---	Complied with cat. III std. NH_3-N > cat. III std.
	2016.5.23	Xiaohekou bridge 50 m upstream	7.12	17	2.73	0.02	1.34	---	Complied with cat. III std. NH_3-N > cat. III std.
		Xiaohekou bridge 50 m downstream	7.21	17	2.85	0.03	1.53	---	Complied with cat. III std. NH_3-N > cat. III std.
	2016.5.24	Xiaohekou bridge 50 m upstream	7.18	18	2.61	0.01	1.39	---	Complied with cat. III std. NH_3-N > cat. III std.
		Xiaohekou bridge 50 m downstream	7.20	15	2.74	0.02	1.44	---	Complied with cat. III std. NH_3-N > cat. III std.
VI. Xuanzhou Comprehensive Port	2016.3.23	port hydraulic structure 50 m upstream	7.04	17	1.59	0.02	2.28	---	Complied with cat. III std. NH_3-N > cat. III std.
		port hydraulic structure 100 m downstream	7.11	15	1.81	0.03	2.31	---	Complied with cat. III std. NH_3-N > cat. III std.
		port hydraulic structure 50 m upstream	7.10	15	1.87	0.03	2.23	---	Complied with cat. III std. NH_3-N > cat. III std.
	2016.3.24	port hydraulic structure 100 m downstream	7.12	16	1.46	0.01	2.21	---	Complied with cat. III std. NH_3-N > cat. III std.
		port hydraulic structure 50 m upstream	7.06	17	1.75	0.02	2.34	---	Complied with cat. III std. NH_3-N > cat. III std.
		port hydraulic structure 100 m downstream	7.18	13	1.79	0.02	2.31	---	Complied with cat. III std. NH_3-N > cat. III

Subproject	Monitoring Date	Monitoring Location	Parameters Monitored						Remark
			pH	SS	I_{Mn}	TPH	NH_3-N	COD	
				mg/L	mg/L	mg/L	mg/L	mg/L	
									std.
	2016.5.23	port hydraulic structure 50 m upstream	7.18	13	1.41	0.01	2.67	---	Complied with cat. III std. NH_3-N > cat. III std.
		port hydraulic structure 100 m downstream	7.14	14	1.98	0.02	2.53	---	Complied with cat. III std. NH_3-N > cat. III std.
		port hydraulic structure 50 m upstream	7.18	16	1.70	0.02	2.49	---	Complied with cat. III std. NH_3-N > cat. III std.
	2016.5.24	port hydraulic structure 100 m downstream	7.07	18	1.57	0.02	2.54	---	Complied with cat. III std. NH_3-N > cat. III std.
		port hydraulic structure 50 m upstream	7.25	16	1.64	0.01	2.68	---	Complied with cat. III std. NH_3-N > cat. III std.
		port hydraulic structure 100 m downstream	7.19	15	1.82	0.02	2.73	---	Complied with cat. III std. NH_3-N > cat. III std.
GB 3828-2002 Environmental quality standards for surface water		Category II	6-9	---	4	0.05	0.5	15	
		Category III	6-9	---	6	0.05	1.0	20	
		Category IV	6-9	---	10	0.5	1.5	30	
ADB project specific standard				Downstream ≤130% upstream					

2.3.2 Air Quality

Table 10 presents the ambient air quality monitoring data collected in the reporting period. Air quality monitoring of total suspended particulates (TSP) showed exceedance in mixing stations for two contracts in subproject IV (G206 Dongliu to Yaodu Section), which was mainly caused by the malfunction of dust removal installation. In future construction, the efficiency of dust removal installation must be improved and watering frequency must be raised, thus to make TSP level in compliance with the standard. Air quality monitoring of total suspended particulates (TSP) and nitrogen dioxide (NO_2) showed compliance with category II. During the reporting

period, asphalt mixing stations were constructed in project II and subproject III. Therefore, the monitoring of NO_2 was added.

Table 10: Air quality monitoring data for the reporting period

Subproject	Monitoring Date	Monitoring Location	Daily Average TSP (mg/m^3)	Average NO_2		Remark
				Daily	Hourly	
II. S319 Erba-Wuwei Section	2016.3.1~3.3（TSP） 2016.3.1~3.7(NO2)	Yonnan Central Primary School	0.100~0.103	---	---	Complied with GB 3095-2012 class II std.
		Boai Hospital	0.104~0.108	---	---	Complied with GB 3095-2012 class II std.
		Changba Primary School	0.105~0.110	---	---	Complied with GB 3095-2012 class II std.
		Unpaved construction road	0.105~0.108	---	---	Complied with GB 3095-2012 class II std.
		Contract NO1-2 mixing station upwind	0.105~0.109	---	---	Complied with GB 3095-2012 class II std.
		Contract NO1-2 mixing station downwind	0.100~0.104	---	---	Complied with GB 3095-2012 class II std.
		Contract NO1-3 concrete mixing station upwind	0.105~0.108	---	---	Complied with GB 3095-2012 class II std.
		Contract NO1-3 concrete mixing station downwind	0.111~0.114	---	---	Complied with GB 3095-2012 class II std.
		Contract NO1-2 asphalt mixing station upwind	0.111~0.116	0.019~0.022	---	Complied with GB 3095-2012 class II std.
		Contract NO1-2 asphalt mixing station side wind	0.108~0.112	0.020~0.025	---	Complied with GB 3095-2012 class II std.
		Contract NO1-2 asphalt mixing station downwind	0.112~0.116	0.023~0.029	---	Complied with GB 3095-2012 class II std.
	2016.5.20~5.22 (TSP) 2016.5.20~5.26 (NO2)	Yonnan Central Primary School	0.100~0.102	---	---	Complied with GB 3095-2012 class II std.
		Boai Hospital	0.103~0.106	---	---	Complied with GB 3095-2012 class II std.
		Changba Primary School	0.104~0.106	---	---	Complied with GB 3095-2012 class II std.
		Unpaved construction road	0.108~0.111	---	---	Complied with GB 3095-2012 class II std.
		Contract NO1-2	0.112~0.117	---	---	Complied with GB

Subproject	Monitoring Date	Monitoring Location	Daily Average TSP (mg/m^3)	Average NO_2		Remark
				Daily	Hourly	
		mixing station upwind				3095-2012 class II std.
		Contract NO1-2 mixing station downwind	0.114~0.116	---	---	Complied with GB 3095-2012 class II std.
		Contract NO1-3 concrete mixing station upwind	0.111~0.113	---	---	Complied with GB 3095-2012 class II std.
		Contract NO1-3 concrete mixing station downwind	0.108~0.113	---	---	Complied with GB 3095-2012 class II std.
		Contract NO1-2 asphalt mixing station upwind	0.110~0.115	0.020~0.025	---	Complied with GB 3095-2012 class II std.
		Contract NO1-2 asphalt mixing station side wind	0.108~0.112	0.022~0.025	---	Complied with GB 3095-2012 class II std.
		Contract NO1-2 asphalt mixing station downwind	0.113~0.116	0.025~0.029	---	Complied with GB 3095-2012 class II std.
III. Yimu Higway Kedian to Mujiating Section	2016.2.23-25（TSP） 2016.2.26-29 (NO2)	Bowen High School	0.137-0.140	0.025-0.027	0.023-0.031	Complied with GB 3095-2012 class II std.
		Contract NO3-1 asphalt mixing station	0.145-0.169	0.030-0.035	0.025-0.040	Complied with GB 3095-2012 class II std.
		Unpaved haul road	0.151-0.173	0.028-0.032	0.025-0.039	Complied with GB 3095-2012 class II std.
		Contract NO3-2 asphalt mixing station	0.142-0.149	0.030-0.035	0.025-0.040	Complied with GB 3095-2012 class II std.
		Wuxia Temple	0.131-0.143	0.023-0.027	0.023-0.030	Complied with GB 3095-2012 class II std.
	2016.5.16-18 (TSP) 2016.5.16-22 (NO2)	Bowen High School	0.11-0.16	0.020-0.023	0.019-0.025	Complied with GB 3095-2012 class II std.
		Contract NO3-1 asphalt mixing station	0.14-0.16	0.021-0.023	0.020-0.024	Complied with GB 3095-2012 class II std.
		Unpaved haul road	0.14-0.17	0.021-0.023	0.020-0.024	Complied with GB 3095-2012 class II std.
		Contract NO3-2 asphalt mixing station	0.12-0.15	0.020-0.022	0.020-0.024	Complied with GB 3095-2012 class II std.
		Wuxia Temple	0.13-0.18	0.020-0.022	0.019-0.024	Complied with GB 3095-2012 class II

Subproject	Monitoring Date	Monitoring Location	Daily Average TSP (mg/m^3)	Average NO_2		Remark
				Daily	Hourly	
						std.
IV. G206 Dongliu to Yaodu Section	2016.2.29-3.2	Zhazui	0.118 – 0.161	---	---	Complied with GB 3095-2012 class II std.
		Yangjia	0.109-0.155	---	---	Complied with GB 3095-2012 class II std.
		Unpaved haul road at Guanshancunzhuang Upper Group	0.124-0.166	---	---	Complied with GB 3095-2012 class II std.
		Contract NO. 2-1 asphalt mixing station upwind	0.188-0.230	---	---	Compiled with GB 3095-2012 class II std.
		Contract NO. 2-1 asphalt mixing station downwind	0.266-0.447	---	---	TSP>GB 3095-2012 class Ⅱ std. on FEB 29 & MAR 2
		Contract NO. 2-2 asphalt mixing station upwind	0.148-0.222	---	---	Compiled with GB 3095-2012 class II std.
		Contract NO. 2-2 asphalt mixing station downwind	0.286-0.417	---	---	TSP>GB 3095-2012 class Ⅱ std. on FEB 29 & MAR 1
	28-30 May 2016	Zhazui	0.125-0.155	---	---	Compiled with GB 3095-2012 class II std.
		Yangjia	0.116-0.129	---	---	Compiled with GB 3095-2012 class II std.
		Unpaved haul road at Guanshancunzhuang Upper Group	0.127-0.160	---	---	Compiled with GB 3095-2012 class II std.
		Contract NO. 2-1 asphalt mixing station upwind	0.222-0.303	---	---	>GB 3095-2012 class Ⅱ std. on MAY 30
		Contract NO. 2-1 asphalt mixing station downwind	0.312-0.466	---	---	>GB 3095-2012 class Ⅱ std. on MAY 28 & 30
		Contract NO. 2-2 asphalt mixing station upwind	0.188-0.256	---	---	Compiled with GB 3095-2012 class II std.
		Contract NO. 2-2 asphalt mixing station downwind	0.352-0.430	---	---	>GB 3095-2012 class Ⅱ std. on MAY 29
V. Shuiyang	March 24 2016	Nearest sensitive spot to the Xiaohekou	0.174	---	---	Compiled with GB 3095-2012 class II

Subproject	Monitoring Date	Monitoring Location	Daily Average TSP (mg/m^3)	Average NO_2		Remark
				Daily	Hourly	
River channel improvement		construction				std.
		10m out of the mixing station bounding wall	0.186	---	---	Compiled with GB 3095-2012 class II std.
	March 25 2016	Nearest sensitive spot to the Xiaohekou construction	0.189	---	---	Compiled with GB 3095-2012 class II std.
		10m out of the mixing station bounding wall	0.201	---	---	Compiled with GB 3095-2012 class II std.
	March 26 2016	Nearest sensitive spot to the Xiaohekou construction	0.181	---	---	Compiled with GB 3095-2012 class II std.
		10m out of the mixing station bounding wall	0.196	---	---	Compiled with GB 3095-2012 class II std.
	May 22 2016	Nearest sensitive spot to the Xiaohekou construction	0.164	---	---	Compiled with GB 3095-2012 class II std.
		10m out of the mixing station bounding wall	0.173	---	---	Compiled with GB 3095-2012 class II std.
	May 23 2016	Nearest sensitive spot to the Xiaohekou construction	0.175	---	---	Compiled with GB 3095-2012 class II std.
		10m out of the mixing station bounding wall	0.182	---	---	Compiled with GB 3095-2012 class II std.
	May 24 2016	Nearest sensitive spot to the Xiaohekou construction	0.178	---	---	Compiled with GB 3095-2012 class II std.
		10m out of the mixing station bounding wall	0.176	---	---	Compiled with GB 3095-2012 class II std.
VI. Xuanzhou wharf	March 24 2016	Nearest vilage to the wharf	0.183	---	---	Compiled with GB 3095-2012 class II std.
		10m out of the	0.194	---	---	Compiled with GB

Subproject	Monitoring Date	Monitoring Location	Daily Average TSP (mg/m^3)	Average NO_2		Remark
				Daily	Hourly	
		mixing station bounding wall				3095-2012 class II std.
	March 25 2016	Nearest vilage to the wharf	0.197	---	---	Compiled with GB 3095-2012 class II std.
		10m out of the mixing station bounding wall	0.207	---	---	Compiled with GB 3095-2012 class II std.
	March 26 2016	Nearest vilage to the wharf	0.181	---	---	Compiled with GB 3095-2012 class II std.
		10m out of the mixing station bounding wall	0.215	---	---	Compiled with GB 3095-2012 class II std.
	May 22 2016	Nearest vilage to the wharf	0.166	---	---	Compiled with GB 3095-2012 class II std.
		10m out of the mixing station bounding wall	0.167	---	---	Compiled with GB 3095-2012 class II std.
	May 23 2016	Nearest vilage to the wharf	0.174	---	---	Compiled with GB 3095-2012 class II std.
		10m out of the mixing station bounding wall	0.184	---	---	Compiled with GB 3095-2012 class II std.
	May 24 2016	Nearest vilage to the wharf	0.162	---	---	Compiled with GB 3095-2012 class II std.
		10m out of the mixing station bounding wall	0.168	---	---	Compiled with GB 3095-2012 class II std.
GB 3095-2012 Ambient air quality standards		**Class II**	**0.3**	**0.08**	**0.2**	**---**

2.3.3 Noise

Table 11 presents the noise monitoring data collected in the reporting period. Noise levels at all the monitoring locations on the days of subproject monitoring complied with the applicable standards except the Subproject Ⅲ (Yimu Higway Kedian to Mujiating Section). The Wuxiasi monitoring point will set acoustic barriers to avoid noise and meet the standard.

Table 11: Noise monitoring data for the reporting period

Subproject	Monitoring Date	Monitoring Location	Noise Level [Leq(dB)A]		Remark
			Day Time	Night Time	
II. S319 Erba-Wuwei Section	2016.3.4	Yonnan Central Primary School	54.6	47.6	Complied with GB 3096-2008 class II std.
		Boai Hospital	55.9	46.9	Complied with GB 3096-2008 class II std.
		Changba Primary School	56.8	43.5	Complied with GB 3096-2008 class II std.
		Hualong Village	57.2	42.6	Complied with GB 3096-2008 class II std.
		Contract No.1-2 water stability mixing station bounding wall 1	58.8	46.9	Complied with GB 12523-2011 std.
		Contract No.1-2 water stability mixing station bounding wall 2	59.1	45.8	Complied with GB 12523-2011 std.
		Contract No.1-2 asphalt mixing station bounding wall 1	57.7	44.9	Complied with GB 12523-2011 std.
		Contract No.1-2 asphalt mixing station bounding wall 2	56.2	45.2	Complied with GB 12523-2011 std.
		Contract No.1-3 mixing station bounding wall 1	58.0	48.5	Complied with GB 12523-2011 std.
		Contract No.1-3 mixing station bounding wall 2	57.4	47.9	Complied with GB 12523-2011 std.
	2016.3.5	Yonnan Central Primary School	53.2	46.8	Complied with GB 3096-2008 class II std.
		Boai Hospital	56.4	46	Complied with GB 3096-2008 class II std.
		Changba Primary School	54.5	44.2	Complied with GB 3096-2008 class II std.
		Hualong Village	55.9	44.5	Complied with GB 3096-2008 class II std.
		Contract No.1-2 water stability mixing station bounding wall 1	58.0	45.4	Complied with GB 12523-2011 std.
		Contract No.1-2 water stability mixing station bounding wall 2	57.3	46.3	Complied with GB 12523-2011 std.
		Contract No.1-2 asphalt mixing station bounding wall 1	55.9	46.0	Complied with GB 12523-2011 std.
		Contract No.1-2 asphalt mixing station bounding wall 2	56.8	47.3	Complied with GB 12523-2011 std.
		Contract No.1-3 mixing station bounding wall 1	57.5	46.8	Complied with GB 12523-2011 std.
		Contract No.1-3 mixing station bounding wall 2	57.0	47.1	Complied with GB 12523-2011 std.
	2016.5.23	Yonnan Central Primary School	55.2	46.5	Complied with GB 3096-2008 class II std.
		Boai Hospital	51.3	44.2	Complied with GB 3096-2008 class II std.
		Changba Primary School	53.7	44.3	Complied with GB 3096-2008

Subproject	Monitoring Date	Monitoring Location	Noise Level [Leq(dB)A]		Remark
			Day Time	Night Time	
					class II std.
		Hualong Village	54.9	42.0	Complied with GB 3096-2008 class II std.
		Contract No.1-2 water stability mixing station bounding wall 1	55.6	44.9	Complied with GB 12523-2011 std.
		Contract No.1-2 water stability mixing station bounding wall 2	57.7	46.5	Complied with GB 12523-2011 std.
		Contract No.1-2 asphalt mixing station bounding wall 1	56.4	45.5	Complied with GB 12523-2011 std.
		Contract No.1-2 asphalt mixing station bounding wall 2	53.6	45.0	Complied with GB 12523-2011 std.
		Contract No.1-3 mixing station bounding wall 1	54.6	46.7	Complied with GB 12523-2011 std.
		Contract No.1-3 mixing station bounding wall 2	54.2	45.8	Complied with GB 12523-2011 std.
	2016.5.24	Yonnan Central Primary School	56.1	45.6	Complied with GB 3096-2008 class II std.
		Boai Hospital	53.6	47.2	Complied with GB 3096-2008 class II std.
		Changba Primary School	55.6	45.2	Complied with GB 3096-2008 class II std.
		Hualong Village	54.8	46.3	Complied with GB 3096-2008 class II std.
		Contract No.1-2 water stability mixing station bounding wall 1	56.7	46.8	Complied with GB 12523-2011 std.
		Contract No.1-2 water stability mixing station bounding wall 2	55.9	45.9	Complied with GB 12523-2011 std.
		Contract No.1-2 asphalt mixing station bounding wall 1	54.8	46.5	Complied with GB 12523-2011 std.
		Contract No.1-2 asphalt mixing station bounding wall 2	53.1	46.1	Complied with GB 12523-2011 std.
		Contract No.1-3 mixing station bounding wall 1	55.1	46.1	Complied with GB 12523-2011 std.
		Contract No.1-3 mixing station bounding wall 2	55.9	45.6	Complied with GB 12523-2011 std.
III. Yimu Higway Kedian to Mujiating Section	2016.2.25	Bowen High School	53	/	Complied with GB 3096-2008 class II std.
		Contract NO. 3-1 asphalt mixing station	56	/	Complied with GB 12523-2011 std.
		Contract NO. 3-2 asphalt mixing station	57	/	Complied with GB 12523-2011 std.
		Wuxia Temple	54	/	Complied with GB 3096-2008 class II std.
	2016.2.26	Bowen High School	54	/	Complied with GB 3096-2008 class II std.
		Contract NO. 3-1 asphalt mixing station	55	/	Complied with GB 12523-2011 std.

Subproject	Monitoring Date	Monitoring Location	Noise Level [Leq(dB)A]		Remark
			Day Time	Night Time	
		Contract NO. 3-2 asphalt mixing station	56	/	Complied with GB 12523-2011 std.
		Wuxia Temple	54	/	Complied with GB 3096-2008 class II std.
	2016.5.17	Bowen High School	59	50	Complied with GB 3096-2008 class II std.
		Contract NO. 3-1 asphalt mixing station	53	/	Complied with GB 12523-2011 std.
		Contract NO. 3-2 asphalt mixing station	53	/	Complied with GB 12523-2011 std.
		Wuxia Temple	62	52	Complied with GB 3096-2008 class II std.
	2016.5.17	Bowen High School	60	49	Complied with GB 3096-2008 class II std.
		Contract NO. 3-1 asphalt mixing station	54	/	Complied with GB 12523-2011 std.
		Contract NO. 3-2 asphalt mixing station	53	/	Complied with GB 12523-2011 std.
		Wuxia Temple	64	52	Complied with GB 3096-2008 class II std.
IV. G206 Dongliu to Yaodu Section	2016.03.01	Zhazui	49.4	41.9	Complied with GB 3096-2008 class II std.
		Yangjia	50.3	42.4	Complied with GB 3096-2008 class II std.
		Contract No. 2-1 asphalt mixing station north course boundary	66.1	54.8	Complied with GB 12523-2011 std.
		Contract No. 2-1 asphalt mixing station south course boundary	65.9	54.3	Complied with GB 12523-2011 std.
		Contract No. 2-2 asphalt mixing station west course boundary	59.8	51.1	Complied with GB 12523-2011 std.
		Contract No. 2-2 asphalt mixing station south course boundary	57.7	49.2	Complied with GB 12523-2011 std.
	2016.03.02	Zhazui	51.5	43.2	Complied with GB 3096-2008 class II std.
		Yangjia	52.0	43.5	Complied with GB 3096-2008 class II std.
		Contract No. 2-1 asphalt mixing station north course boundary	67.0	52.8	Complied with GB 12523-2011 std.
		Contract No. 2-1 asphalt mixing station south course boundary	66.5	54.5	Complied with GB 12523-2011 std.
		Contract No. 2-2 asphalt mixing station west course boundary	59.5	46.8	Complied with GB 12523-2011 std.
		Contract No. 2-2 asphalt mixing station south course boundary	56.0	47.9	Complied with GB 12523-2011 std.
	May 28 2016	Zhazui	47.8	41.1	Complied with GB 3096-2008 class Ⅳ std.
		Yangjia	48.1	43.6	Complied with GB 3096-2008

Subproject	Monitoring Date	Monitoring Location	Noise Level [Leq(dB)A]		Remark
			Day Time	Night Time	
					class II std.
		Contract No. 2-1 asphalt mixing station north course boundary	67.2	53.9	Complied with GB 12523-2011 std.
		Contract No. 2-1 asphalt mixing station south course boundary	62.4	54.6	Complied with GB 12523-2011 std.
		Contract No. 2-2 asphalt mixing station west course boundary	53.7	48.5	Complied with GB 12523-2011 std.
		Contract No. 2-2 asphalt mixing station south course boundary	57.6	52.5	Complied with GB 12523-2011 std.
	May 29 2016	Zhazui	49.0	44.5	Complied with GB 3096-2008 class Ⅳ std.
		Yangjia	50.7	42.7	Complied with GB 3096-2008 class II std.
		Contract No. 2-1 asphalt mixing station north course boundary	66.8	53.6	Complied with GB 12523-2011 std.
		Contract No. 2-1 asphalt mixing station south course boundary	64.7	54.0	Complied with GB 12523-2011 std.
		Contract No. 2-2 asphalt mixing station west course boundary	54.3	46.0	Complied with GB 12523-2011 std.
		Contract No. 2-2 asphalt mixing station south course boundary	58.6	47.7	Complied with GB 12523-2011 std.
V. Shuiyang River channel improvement	March 24 2016	Nearest environment sensitive spot to the Xiaohekou bridge	53.2	44.7	Complied with GB 3096-2008 class II std.
		West of Xiaohekou bridge boundary	60.5	48.2	Complied with GB 12523-2011 std.
		East of Xiaohekou bridge boundary	62.7	48.9	Complied with GB 12523-2011 std.
	March 25 2016	Nearest environment sensitive spot to the Xiaohekou bridge	52.9	45.2	Complied with GB 3096-2008 class II std.
		West of Xiaohekou bridge boundary	61.7	47.5	Complied with GB 12523-2011 std.
		East of Xiaohekou bridge boundary	63.4	48.1	Complied with GB 12523-2011 std.
	May 23 2016	Nearest environment sensitive spot to the Xiaohekou bridge	54.0	45.4	Complied with GB 3096-2008 class II std.
		West of Xiaohekou bridge boundary	61.0	47.4	Complied with GB 12523-2011 std.
		East of Xiaohekou bridge boundary	62.2	48.5	Complied with GB 12523-2011 std.
	May 24 2016	Nearest environment sensitive spot to the Xiaohekou bridge	53.2	45.0	Complied with GB 3096-2008 class II std.
		West of Xiaohekou bridge boundary	61.8	48.1	Complied with GB 12523-2011 std.
		East of Xiaohekou bridge boundary	62.9	48.8	Complied with GB 12523-2011 std.
VI. Xuanzhou	March 24 2016	Nearest vilage to the wharf during construction	52.5	44.7	Complied with GB 3096-2008 class II std.

Subproject	Monitoring Date	Monitoring Location	Noise Level [Leq(dB)A]		Remark
			Day Time	Night Time	
wharf		West boundary of wharf construction	63.1	47.5	Complied with GB 12523-2011 std.
		South boundary of wharf construction	62.7	47.0	Complied with GB 12523-2011 std.
		North boundary of wharf construction	63.4	48.3	Complied with GB 12523-2011 std.
	March 25 2016	Nearest vilage to the wharf during construction	51.3	44.5	Complied with GB 3096-2008 class II std.
		West boundary of wharf construction	60.5	46.8	Complied with GB 12523-2011 std.
		South boundary of wharf construction	60.7	47.2	Complied with GB 12523-2011 std.
		North boundary of wharf construction	61.2	48.0	Complied with GB 12523-2011 std.
	May 23 2016	Nearest vilage to the wharf during construction	52.8	44.5	Complied with GB 3096-2008 class II std.
		West boundary of wharf construction	62.4	48.3	Complied with GB 12523-2011 std.
		South boundary of wharf construction	62.2	47.8	Complied with GB 12523-2011 std.
		North boundary of wharf construction	62.6	48.8	Complied with GB 12523-2011 std.
	May 24 2016	Nearest vilage to the wharf during construction	52.3	44.8	Complied with GB 3096-2008 class II std.
		West boundary of wharf construction	61.6	47.6	Complied with GB 12523-2011 std.
		South boundary of wharf construction	60.5	47.6	Complied with GB 12523-2011 std.
		North boundary of wharf construction	61.7	48.1	Complied with GB 12523-2011 std.
GB 3096-2008 Environmental quality standard for noise		**Category 4a**	**70**	**55**	For within 35 m from road
		Category 2	**60**	**50**	For beyond 35 m from road
GB 12523-2011 Emission standard of environmental noise for boundary of construction site				**55**	

2.3.4 Ecology

During this report, Hefei Changxin Environmental Technology Co., Ltd. was entrusted to carry out a bird monitoring survey for chainage K6+ 000 to K15+000.

According to the seasonal distribution of birds, this survey targets birds in winter. Following three consecutive days' observations of belt transect and sampling points from 3 to 6 of January, 2016 (6:30-10:30 & 4:30-5:30), together with the collection of historical records, 191 bird species have been confirmed around the project location. 19 species are under national

protection, of which 4 are the first grade and 15 are the second grade.For the monitoring report of birds, refer to Appendix 4.

This survey identified 52 species, 28 families and 12 orders of birds, didn't find the first-grade national protected birds, and found 2 kinds of second-grade national protected birds (kestrel and peregrine falcon). Besides, there was one Class 1 Provincial level protected bird species and 14 Class 2 Provincial level protected bird species, major bird families represented were anatidae and anseriformes. There were 32 resident species recorded and 20 migratory bird species (2 summer residents and 18 winter resident species, 61.5% and 38.5% respectively.

According to the "Birds Ecology Monitoring Report of G206 Dongliu to Yaodu Section", the impact on birds is limited.

2.3.5 Soil

Table presents the soil monitoring data of the dockyard of Subproject V (Shuiyang River Waterway Improvement project) during the reported period. During this period, the soil of the dockyard was compiled with GB15618-1995 class III standard. After the removal of the dockyard, the soil is applicable for woodland, not for farmland, vegetable field, tea garden, etc.

Table 12: Soil monitoring data of the dockyard during the reported period

Subproject	Date	Position	Result		GB15618-1995 soil environmental quality standard		Remark
			Item	value	Level 2	Level 3	
V. Shuiyang River Waterway Improvement	2016.03.23	Dockyard N31 °11'13" E118 °47'29"	pH (dimensionless)	6.51	6.5~7.5	>6.5	Complied with GB 15618-1995 class III std.
			As (mg/kg)	28.8	30	40	Complied with GB 15618-1995 class III std.
			Hg (mg/kg)	0.104	0.50	1.5	Complied with GB 15618-1995 class III std.
			Zn (mg/kg)	170	250	500	Complied with GB 15618-1995 class III std.
			Cu (mg/kg)	41.3	100	400	Complied with GB 15618-1995 class III std.
			Pb (mg/kg)	42.6	300	500	Complied with GB 15618-1995 class III std.
			Cd	0.557	0.30	1.0	Complied with GB 15618-

Subproject	Date	Position	Result		GB15618-1995 soil environmental quality standard		Remark
			Item	value	Level 2	Level 3	
			(mg/kg)				1995 class III std.
			Cr (mg/kg)	64.9	200	300	Complied with GB 15618-1995 class III std.
			Asbestos (%)	Not detected	/	/	No relevant standard
			Mineral oil (mg/kg)	19	/	/	No relevant standard

2.4 Environmental Institutional Capacity Building and Training

Table 13 presents capacity building and training plan and its implementation status. Table 14 presents the seminars and workshops conducted in the reporting period. Photographs for selected seminars and workshops are presented in Appendix II.

Table 13: Environmental institutional capacity building and training plan and implementation status

Stage	Training Content	Attendee	Combined Duration	Time	Implementation Status
Subprojects I, II, III, IV					
Construction	Environmental management and related policies	1 to 2 persons from each subproject implementing agency and design institute	30 days	2013-2015	1. Subproject I Ma'anshan North Passage Road section: training conducted by the external environment supervision unit on 2016.01.12. 2. 6 subprojects: training conducted by Professor Liu Lingfeng on 2016.03.08 3. External environment supervision unit and 6 subprojects: training conducted on 2016.04.14.
	1. Environmental Protection Law, regulations and related policies 2. Protection of cultural relics 3. Highway environmental impact assessment & environmental management plan 4. Environmental monitoring methods Environmental supervision	2 persons from each contractor and construction supervision company; 4 persons from design institute	4 days	2013	
	Environmental management emergency response plan and	2 persons from FFPMO, each subproject implementing agency, each	3 days	2014-2015	

Stage	Training Content	Attendee	Combined Duration	Time	Implementation Status
	measures	contractor and each construction supervision company			See Table 13 for details
Operation	Environmental management and related policies	1 person from each subproject implementing agency	15 days	2015-2016	Not yet started.
Subprojects V, VI					
Construction	Environmental management and related policies	1 person each from FFPMO, Anhui Province Ports and Shipping Construction Investment Group Co. Ltd, and design institute	30 days	2014-2015	1. 6 subprojects: training conducted by professor Liu Lingfeng on 2016.03.08. 2. External environment supervision unit and 6 subprojects: training conducted on 2016.04.14. See Table 13 for details.
	1. Environmental Protection Law, regulations and related policies 2. Protection of cultural relics 3. Highway environmental impact assessment & environmental management plan 4. Environmental monitoring methods Environmental supervision	2 persons from each contractor and construction supervision company; 4 persons from design institute	4 days	2014	
	Environmental management emergency response plan and measures	2 persons each from FFPMO, Anhui Province Ports and Shipping Construction Investment Group Co. Ltd, and Xuancheng Port & Navigation Management Bureau	3 days	2014	
Operation	Environmental management and related policies	1 person each from FFPMO, Anhui Province Ports and Shipping Construction Investment Group Co. Ltd, and Xuancheng Port & Navigation Management Bureau	30 days	2015-2016	Not yet started.

Table 14: Environmental training seminars and workshops

Topic	Trainer	Attendee		Date
		Organization	No.	
FFPMO 2015 second half comprehensive review and assessment	1. WANG Qiaochu, chief	FFPMO, IA, contractors	60	2016.01.12

Topic	Trainer	Attendee		Date
		Organization	No.	
workshop: 1. Key environmental problems during construction in second half of 2015 2. Summation on implementation of appropriate environmental protection measures 3. Key issues and focus on future environmental protection	engineer, BZHEPTCL 2. MA Qiqi, environmental engineer, BZHEPTCL 3. LI Shuaibin, environmental engineer, BZHEPTCL	and supervision staffs		
Review and assessment workshop for subproject I: Ma'anshan North Passage Road, description of organizational structure and responsibilities, requirements for supervision organizations	1. CHOU Dongqing, environmental engineer, BZHEPTCL 2. LI Shuaibin, environmental engineer, BZHEPTCL	FFPMO and IA, contractors and supervision staff for subproject I	30	2016.01.15
Implementation of environmental protection measures and environment management during construction period (Introducing the environmental protection plan during the construction period of subprojects, especially the potential major environmental problems and measures accordingly in different construction stages of the subprojects, clarifying the duties of IA, contractors and environmental protection director of different projects)	1. Liu Lingfeng, environmental expert, Shanghai Ship and Shipping Research Institute	FFPMO, IA, contractors and supervision staffs	84	2016.03.08
Implementation of environmental protection measures during construction period and guiding the compiling of semi-annual environmental monitoring report	ADB Environment Specialist	Director's office, PMO and supervision staffs of the 4 road subprojects	13	2016.04
Notes: **ADB** = Asian Development Bank; **AHEPESTCL** = Anhui Huafan Environmental Protection Engineering Science and Technology Co. Ltd.; **BZHEPTCL** = Beijing Zhongzi Huayu Environmental Protection Technology Co. Ltd.; **FFPMO** = Foreign-funded Project Management Office; **IA** = implementing agency				

3. Public Consultation, Disclosure and Grievance Redress Mechanism

3.1 Public Consultation and Information Disclosure

Table 15 presents the public consultation plan and implementation status as of 30 July 2016. Project information and environmental impact assessment findings were disclosed on local city and/or county government web sites. Bill boards were also erected on construction sites and construction camps disclosing project information, environmental and safety measures, and complaint hotline numbers to the communities. Investigations were carried out among surrounding residents of the subprojects during the reported period.

Table 15: Public consultation plan and implementation status

Organizer	Format	No. of Times	Subject	Attendees	Implementation Status
Construction stage					
FFPMO, IAs	Public consultation & site visit	4 times: 1 time before construction commences and 1 time each year during construction	Adjusting of mitigation measures, if necessary; construction impact; comments and suggestions	Residents adjacent to project sites, representatives of social sectors	Interview investigations carried out among surrounding residents of every subproject.
FFPMO, IAs	Expert workshop or press conference	As needed based on public consultation	Comments and suggestions on mitigation measures, public opinions	Experts of various sectors, media	Conducted once to the subprojects during the second half of 2015. The status of 2016 will be illustrated in the next semi-annual report.
Operational stage					
FFPMO, O&M units	Public consultation and site visits	Once in the first year	Effectiveness of mitigation measures, impacts of operation, comments and suggestions	Residents adjacent to project sites, representatives of residents and representatives of social sectors	Not yet started
FFPMO, O&M units	Expert workshop or press conference	As needed based on public consultation	Comments and suggestions on operational impacts, public opinions	Experts of various sectors, media	Not yet started
Notes: **FFPMO** = Foreign-funded project management office; **IA** = implementing agency; **O&M** = operation and maintenance					

2.4 Project Grievance Records and Resolution

No complaint had been received during the reported period since the project benefits the public and is widely supported. The grievance redress mechanism (GRM) consists of a 3-step procedure as described below and shown in Figure 4. Table 16 shows the complaint hotline numbers and personnel responsible for handling complaints.

Step 1: For environmental issues during the construction stage, the affected persons can register their complaints directly with the contractors. Contractors are required to set up a complaint hotline and designate a person in charge of handling complaints, and advertise the hotline number at the main entrance to each construction site. The contractors are required to maintain and update a Complaints Register to document all complaints. The contractors are also required to respond to the complainant in writing within seven calendar days on their proposed solution and how it will be implemented. If the problem is resolved and the complainant is satisfied with the solution, the grievance is considered addressed. The contractors are required to report

complaints received, handled, resolved and unresolved to APDOT PPMO monthly.

Step 2: For environmental issues that cannot be resolved by the contractors, the affected person can take the grievance to the IA LPMOs and local EPBs. On receiving complaints by the IA LPMOs or local EPBs, the party receiving the complaints must notify the other party and document the complaint in writing in a Complaints Register. The IA LPMOs and local EPBs must reply to each complainant in writing within 14 calendar days with the proposed solution and method of implementation. If the issue is resolved and the complainant is satisfied with the solution, the IA LPMOs and local EPBs should document the complaint and resolution process in its Complaint Register, with monthly reporting to APDOT PPMO.

Step 3: If the complainant is not satisfied with the proposed solutions in Step 2, he/she can, upon receiving the reply, take the grievance to the APDOT PPMO complaints center. Upon receiving the complaint, the center must deal with it within 14 calendar days. Once a complaint is documented and put on file, the APDOT PPMO complaints center will immediately notify ADB. After discussing the complaint and potential solutions amongst ADB, APDOT PPMO and the ESE, the complainant and the contractor, APDOT PPMO must propose a resolution strategy within 14 calendar days from when the complaint is registered.

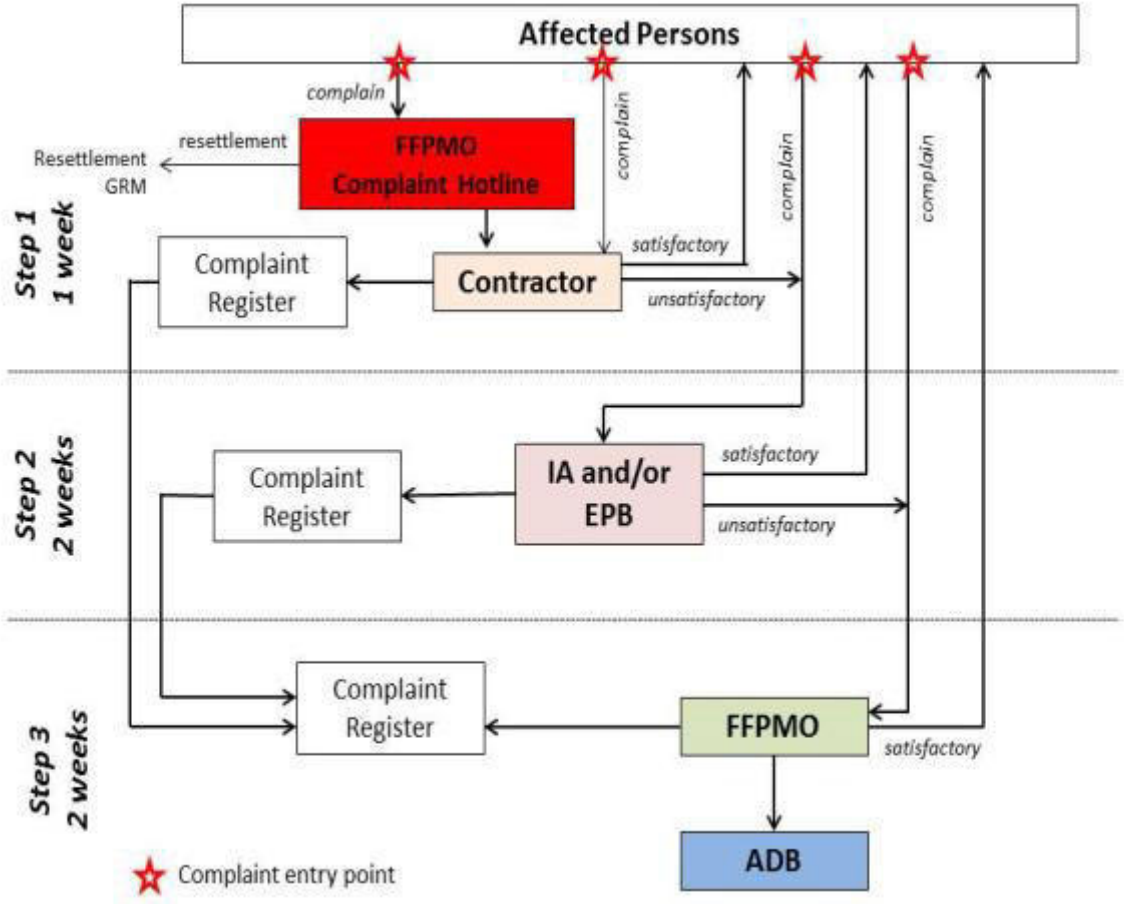


Figure 4: Project specific grievance redress mechanism

Table 16 Complaint hotline numbers and personnel for the grievance redress mechansm

Subproject	Hotline Number	Staff & Organization	Telephone Number
Foreign-funded project management office	0551-63756194	XU Benqing, FFPMO	152 5515 0716
I: S367 Ma'anshan Section North Passage Road	0555-2318082	XIA Song, Ma'anshan City Highway Administration Bureau	189 5555 9280
II: S319 Erba to Wuwei Section	0553-6689898	ZHOU Xiusheng, Wuwei County Transport Bureau	138 5652 4957
		CHEN Ruisheng, Wuhu City Highway Administration Bureau	138 5658 0860
III: Yimu Highway Kedian to Mujiating Section	0553-12369 or 0553-6823455	YANG Yang, Nanling County Transport Bureau	189 1202 83792
IV: G206 Dongliu to Yaodu Section	0566-7026620	WEN Fadong, Chizhou City Highway Administration Bureau	180 5667 3190 or 139 5689 8908
V & VI: Shuiyang River & Xuanzhou Port	0563-3187877	CHENG Guozheng, Anhui Province Ports and Shipping Construction Investment Group Co. Ltd	151 7852 0328

4. REQUIREMENTS COMPLIED WITH EMP

Site inspections during the reporting period have showed that most of the requirements in the EMP (see Appendix 1) have been implemented. The identified environmental problem is littering of wastes from the maintenance of sedimentation tanks as well as construction and demolition. The corrective measures that are described below will be followed up in the next reporting period. The corrective measures that have been identified in the last reporting period have been implemented in this reporting period.

4.1 Necessary Corrective Measures

Environmental problems identified in the last reporting period and the corrective measures implemented in this reporting period are shown in Table 17.

Table 17: Follow-up actions on the environmental problems identified in the last reporting period

Subproject	Environmental problems identified in the last reporting period and necessary corrective measures	Follow-up inspections in the reporting period	
		Implemented	Description
1. Ma'anshan North Passage	Construction started on Decemeber 12th, 2015. Only contract 4-4 started construction. The other three contacts were still in the mobilization stage. The contractors should pay high attention to the EMP requirements listed here.	Yes	1. All of the environment protection measures were implemented strictly in accordance with the EIA suggestions and EMP requirements. 2. The environment quality monitoring followed the environment monitoring plan as much as possible. 3. It was not allowed to continue construction work at night at residential

Subproject	Environmental problems identified in the last reporting period and necessary corrective measures	Follow-up inspections in the reporting period	
		Implemented	Description
			areas. If it was necessary, the contractors should file an application and post a notice. 4. The supervision on the construction of bridges were strengthened in the dry season to ensure no slurry entered the surrounding water bodies. 5. Drainage ditches and guardrails were installed around the construction site.
2. Erba-Wuwei Section of S319	(1) Materials should be stockpiled in closed storage areas and should not be put in the open air.	Yes	Material shacks and 3-side nets were set up for the materials to be put neatly inside the shacks.
	(2) The drainage system in the concrete mixing station should be improved.	Yes	The drainage stystem has been hardened by concrete and is dredged on a regular basis. It is running well at present.
	(3) The sedimentations tanks of the concrete mixing station should be cleaned and maintained regularly to lower the water level.	Yes	Three levels of sedimentation tanks were established at the mixing station. The tanks are cleaned on a regular basis. With the water level dropping to a normal level, the tanks are running very well.
	(4) The material stockpiles of the No.1-2 contract section should be covered to avoid dust emissions.	Yes	The materials of the No.1-2 contract section have been covered by geotextiles.
	(5) According to the ADB's requirements, there should be an upstream control station and a downstream impact station at the monitoring location on the Xihe River during the construction of the Xihe River Bridge, so as to monitor the SS.	Yes	According to the requirements of the ADB, the monitoring organizations have been informed during the monitoring period to monitor the quality of Xihe River at 50 meters upstream and at 50 meters downstream from the construction site of the Xihe River.
3. Kedian-Mujiating Section of Yimu Highway	(1) Supervision should be strengthened in the dry season during the construction of the bridge to ensure that no slurry would flow from the containment ponds into water bodies.	Yes	Supervision has been strengthened during the construction to prevent slurry from flowing into water bodies.
	(2) Drainage ditches and guardrails should be installed along the boundaries of the construction site.	Yes	Drainage ditches and maintenance structures have been set up along the boundaries of the construction site.

Subproject	Environmental problems identified in the last reporting period and necessary corrective measures	Follow-up inspections in the reporting period	
		Implemented	Description
4. Dongliu-Yaodu Section of G206	(1) The damaged side slopes of the No.2-1 contract section should be rehabilitated and stabilized.	Yes	The damaged 3-side nets that cover the side slopes have been repaired and the side slopes are now fully covered.
	(2) The drainage ditches along the construction site should be cleaned to improve the drainage system, so as to be well-prepared for the upcoming rainy season.	Yes	The blocked drainage ditches along the roads have been dredged.
	(3) The construction and demolition wastes from the nearly completed No. 2-1 contract section should be cleaned up and removed.	Yes	The construction wastes have been collected and removed.
	(4) The packaging materials of the grider construction in the No. 2-2 contract section should be cleaned and removed.	Yes	The packaging materials have been removed and trash bins have been put at the construction sites.
	(5) The dust suppression measures for the asphalt mixing station of the two contracts should be reviewed and improved.	Yes	Errors have been identified on the dust catchers on two storage bins of the asphalt mixing station at the No. 2-2 contract section. The dust catchers have been repaired and the other dust catchers are running normally.
	(6) According to the monitoring plan, there should be two 2-day bird researches, one in the transitional season and one in winter, along the lake from chainage K6+000 to K15+000.	Yes	Hefei Changxin Environmental Protection Technology Co. Ltd. has been commissioned for the bird monitoring job, which has started in March, 2016.
	(7) Since the SS level downstream has twice exceeded 130% of the SS level upstream, the construction methods of the bridge and the effectiveness of the slurry containment pond for the Quanshui Lake should be reviewed.	Yes	The installation of pile foundations and upper structures has been completed in March, 2016. The bridge surface paving is now under way without disturbing or polluting the river.
5. Shuiyang River Waterway Improvement	(1) Oil leakage should be prevented.	Yes	The road surface has been hardened to prevent oil leakage. The seepage-proof of the construction machine has been reinforced and the machines at the construction sites have been better managed.
	(2) Enough trash bins should be put at the construction sites to improve the collection and management of refuse. (3) Practical environment monitoring should be implemented as soon as	Yes	There are enough trash bins at the construction sites and the refuse can be disposed in time. Hefei Haizheng has monitored the

Subproject	Environmental problems identified in the last reporting period and necessary corrective measures	Follow-up inspections in the reporting period	
		Implemented	Description
	possible.		environment quality at the small estuary of the Shuiyang River and at the shipyards according to the EMP of the ADB. See section 2.3 for more details.
6. Xuanzhou Multipurpose Port	(1) The embankment should be better protected to prevent slurry or muddy water from flowing into Shuiyang River. (2) Practical environment quality monitoring should be implemented as soon as possible.	Yes	The embankment has been protected by sandbags to prevent slurry or muddy water from flowing into Shuiyang River. Hefei Haizheng Environment Monitoring Co. Ltd. has monitored the environment quality at the Xuanzhou Port according to the EMP.

In the reporting period, the ESE has identified the environment problems listed in Table 18 and informed the contractors to conduct corrective measures. The contractors have adopted appropriate corrective measures and will continue the follow-up work in the next reporting period.

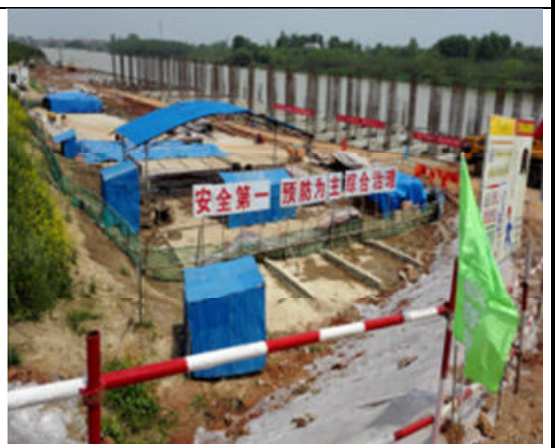
Table 18: Environment problems identified in this reporting period and the improvement

Subproject	Environment problems identified in the reporting period	Improvement
2. Erba-Wuwei Section of S319		
	The land of the mixing station was not smoothed and hardened	Improvement: The land of the mixing station is being hardened and smoothed

Subproject	Environment problems identified in the reporting period	Improvement
		
	The materials loaded on the vehicle exceeded the height limitation and were uncovered	Improvement: The vehicles are covered by geotextiles and do not exceed the height limitation
		
	The drainage ditches were blocked at some place	Improvement: The drainage ditches have been dredged
		
	A little refuse at the bank side was not	Improvement: The refuse at the bank side has been cleaned up

Subproject	Environment problems identified in the reporting period	Improvement
	cleaned up	
3. Kedian-Mujiating Section of the Yimu Highway		
	The surface soil was exposed and uncovered after the side slopes were dug up	Improvement: The surface soil has been covered by geotextiles to avoid being washed off by rain
4. Dongliu-Yaodu Section of G206		
	The drainage ditches along the construction sites should be cleaned up to improve the drainage system	Improvement: The drainage ditches and the sedimentation tanks have been cleaned up
		
	Construction wastes, such as packaging materials, scattered around on the second bridge over the Quanshui Lake of the No. 2-2 section	Improvement: The wastes on the bridge have been removed

Subproject	Environment problems identified in the reporting period	Improvement
	 Materials, such as cement, scattered around the spoil ground of the No. 2-1 section	 Improvement: The wastes have been cleaned away from the spoil ground and grass seeds have been spread
	 The black dust suppression net above the bottom walls of the storage bins of the mixing station of No. 2-2 section was damaged and unstable	 Improvement: The damaged part of the dust suppression net has been repaired and strengthened
5. Shuiyang River Waterway Improvement	 The mud at the side of the small estuary entered the water bodies	 Improvement: The dust at the bank side has been cleaned up

Subproject	Environment problems identified in the reporting period	Improvement
		
	The materials were not covered	Improvement: The materials have been piled neatly and covered
6. Xuanzhou Multipurpose Port		
	The materials were not piled neatly and uncovered	Improvement: The materials have been put neatly into the shacks
		
	The bottoms of the oil tanks were not seepage-proof	Improvement: The oil tanks have been cleaned up

Subproject	Environment problems identified in the reporting period	Improvement
		
	The materials scattered around and the land was not smoothed	Improvement: The land has been smoothed and the materials have been put at one place
		
	The access road was not smoothed and hardened	Improvement: The access road has been smoothed and hardened
		
	The side slopes of the road were	Improvement: The grass seeds have been

Subproject	Environment problems identified in the reporting period	Improvement
	exposed	spread and the land has been covered by plastic sheets to prevent soil erosion
		
	Enclosures should be set up along the road	Improvement: Enclosures have been set up along the road
		
	The land of the mixing station was not smoothed and hardened	Improvement: The land of the mixing station has been smoothed and hardened

5. APPENDICES

5.1 APPENDIX I: STATUS OF EMP COMPLIANCE

Table A.3: Generic Impacts and Mitigation Measures

	Impact Factor	Potential Impact and/or Issues	Mitigation Measures	Compliance	Corrective Measures
Detailed Design Stage					
See Project Specific EMPs		Ensure that the mitigation measures in the detailed design are adopted	● FFPMO of APDOT appoints external environment supervision organizations	Complied. Beijing Zhongzi Huayu Environmental Protection Technology Co. Ltd. was commissioned as the external environment supervision organizations through open tendering	None
Pre-construction Phase					
Institutional strengthening	-	Lack of environment management capacity within FFPMO of APDOT	● Appoint one qualified environment specialists to FFPMO of APDOT. ● Appoint one environmental monitoring station to conduct environment quality monitoring during the construction stage. ● ESE conducts first phase of environment management training for FFPMO staff and environmental experts.	Complied. FFPMO appoints Xu Benqing as the environmental director of the project. Complied. 6 subprojects have been commissioned to environment monitoring organizations. See 2.3 for more details. Complied. By far, ESE has provided the first phase of training for the FFPMO and	3 subprojects are still in the process of mobilization and in the initial stage of construction. The 3 subprojects will be commissioned to environment monitoring stations before the construction.

	Impact Factor	Potential Impact and/or Issues	Mitigation Measures	Compliance	Corrective Measures
			● ESE conducts environmental management training for contractors.	environmental experts. See 3.1 for more details. Complied. By far, ESE has provided training for contractors. See 3.1 for more details.	
	-	Lack of environment management and monitoring capacity within IA LPMOs	Each IA establishes an LPMO and appoints one qualified environment expert to staff. External environment supervision organizations conduct initial environment management training for the IA LPMOs. ESE provides follow-up training.	Complied. Each subproject has established its own PPMO and has been equipped with an environment director. Complied. ESE has conducted training for related personnel of the PPMO. See 3.1 for more details. Complied. ESE is responsible for the follow-up training of each subproject.	None
EMP update	-	-	● Review mitigation measures defined in the EMP. ● Update as required and reflect the updates in the detailed design. ● Submit updates to ADB/PPMO for approval. Publish updated EMP on the website of the project. ● Prepare an environment compliance monitoring plan to meet the environmental requirements in the EIA and EMP.	Complied. No updates during the reporting period. Complied. Complied. ESE has formulated EMP for every subproject according to EMP and EIA.	None

	Impact Factor	Potential Impact and/or Issues	Mitigation Measures	Compliance	Corrective Measures
Grievance redress mechanism (GRM)	Society and environment	Contractors are responsible for handling and resolving the complaints	● Establish a GRM and appoint a GRM coordinator within FFPMO, each IA LPMO and each contractor. ● Provide a brief and basic training about the GRM access points. ● Disclose GRM to affected people at the main entrance to each construction site before construction begins.	Complied. GRM has been set up for each project, including complaint hotlines, complaint mailboxes and project directors. See Section 3.2 for more details. Complied. Trainings related to the GRM have been conducted. Complied. Complaint hotlines and complaint mailboxes have been disclosed to the affected people at the entrance to each subproject.	None
Tender documents		Environmental and social impact	Ensure that all the environmental and social mitigation measures related to the construction have been incorporated into the tender documents, which should include a clause which states the employment of a proportion of local personnel.	Complied. The related requirements have been put into the tender documents.	None
Construction traffic	Traffic	Traffic jam caused by construction vehicles	● Plan transport routes for construction vehicles. ● Specify approved routes in the tender documents and forbid vehicles from using other routes, especially during peak traffic hours.	Complied. Transport routes have been planned for the vehicles. Complied. Complied. The drivers have	None

	Impact Factor	Potential Impact and/or Issues	Mitigation Measures	Compliance	Corrective Measures
			• Inform drivers of the haulage routes. • Separate construction traffic from pedestrians. Local residents are not allowed to walk through construction sites.	been informed of the planned routes. Complied. Warning signs have been set up at the border of the construction sites.	
Construction Stage					
Good practice at the construction sites	Soil resources	Soil stripping	• Strip topsoil from subsoil and store the two kinds of soil separately, protecting the topsoil so that it can be reused after restoration. • Stockpiles cannot be higher than 2 meters with the side slopes at the natural angle of repose. • Topsoil to be stored for a long time can be used to grow grass.	Complied. The topsoil and subsoil from construction have been stored separately. Grass seeds have been spread on the topsoil to avoid soil erosion. Complied. Complied. Grass seeds have been spread on the topsoil to be stored for a long time and the topsoil will be reused after construction.	None
	Soil resource	Soil erosion	• Ensure contractors are aware of all soil erosion requirements in the approved Water and Soil Conservation Plans so as to develop appropriate advice in terms of method and management. • If possible, try not to	Complied. ESE has provided training in conservation of water and soil for the contractors. Complied. All the subprojects	None

	Impact Factor	Potential Impact and/or Issues	Mitigation Measures	Compliance	Corrective Measures
			continue construction during high rainfall period. If necessary, build berms to direct rainwater runoff away from exposed surface. ● Install drainage ditches and sedimentation pits in temporary construction sites to prevent soil erosion and control the runoff. ● Stabilize all the cut slopes, embankments and other erosion-prone construction sites during construction. Try to implement permanent stabilization measures within at least 30 days. ● Pay close attention to drainage facilities and build vegetation covers at the backfilled area to prevent soil erosion.	seldom continue construction during high rainfall periods. To control rainwater runoff, drainage ditches have been set up to prevent soil erosion. Complied. Drainage ditches and sedimentation pits have been set up at the subproject construction sites to prevent soil erosion and control the runoff. Complied. During construction, geotextiles have been put upon the cut side slopes to prevent soil erosion. Complied.	
	Soil resources	Soil pollution	● Properly store the petroleum products, hazardous materials and wastes on an impervious ground, preferably with trays or bunds to contain leaks. ● Set up a response plan for	Complied. Seepage-proofing measures have been used on all the oil tanks at the construction sites; the places where the oil tanks are placed have been hardened and trays have been provided. Complied. Employees have	Each contractor sets up a response plan for leakage, keeps stock of absorbents and trains employees in their use.

	Impact Factor	Potential Impact and/or Issues	Mitigation Measures	Compliance	Corrective Measures
			leakage. Keep stock of absorbent materials (e.g. sand, soil or industrial products) on site to deal with spillage and train employees in their use. ● If there is a leakage, take immediate actions to prevent pollution from flowing into drainage ditches, watercourses, unmade ground or porous surfaces. Do not hose the spillage down or use any detergents. Use oil absorbents and dispose of used absorbents at a licensed waste management facility. ● Record all the leakage incidents and actions in the environmental monitoring logs and report to ESE; and ● Remove all the construction wastes from construction sites to licensed disposal sites.	been trained about response measures for leakage incidents. Complied. Did not occur during the reporting period. Did not occur during the reporting period. Basically complied. All the construction wastes from the construction have been moved to the disposal sites.	
Good practice at construction sites	Air quality	Dust during construction	● Set up fences or shields around dusty activities, such as demolition. Frequently spray water on unpaved areas, backfilled areas and haul roads to suppress dust (at least once	Basically complied. Three-sided nets or dust shields have been set up at material shacks and demolition activities of every subproject. Complied. Watering carts have	

	Impact Factor	Potential Impact and/or Issues	Mitigation Measures	Compliance	Corrective Measures
			every two hours and twice a day in winter； twice per day in winter, once every two hours)	been put at the construction sites for water spraying so as to suppress dust.	None
Construction site good practice	Air quality	Dust (TSP) during construction	● Pay particular attention to dust suppression near sensitive receptors, such as schools, hospitals, residential areas and natural areas; ● Manage stockpile areas to avoid mobilisation of fine material, cover with tarpaulin and/or spray with water; ● Minimise storage time of construction materials and wastes on site by regularly removing them off site; ● Do not overload trucks transporting earth materials on public roads; ● Equip trucks transporting fine grained materials with covers or tarpaulin to cover loads during transport; ● Bulk materials transported by highway should be compacted and the packing height must not exceed the protective guard on the vehicle;	Complied; walls set up and measures taken to prevent dust. Complied; covered. Complied; contractors have received training; regularly removing in place. Complied; overload are prohibited in public roads. Complied; covered. Basically complied. Violations found in a few subprojects and rectified as ESE required. Basically complied; subprojects have been required	None

	Impact Factor	Potential Impact and/or Issues	Mitigation Measures	Compliance	Corrective Measures
			• Install wheel washing equipment or conduct wheel washing manually at each exit of operation area to prevent trucks from carrying muddy or dusty substances onto public roads; • Immediately clean up all muddy or dusty materials on public roads outside the exits of the operation areas; • The main haul roads and access roads should be sealed to prevent raised dust. Unsealed roads should be watered daily; • Plan the transport routes and timing to avoid busy traffic and heavily populated areas; • Harden the main construction roads and sites; • Mud dumping, transport and other construction activities likely to give rise to dust are not permitted during windy weather (level 4 wind); and • Immediately plant vegetation in all temporary landtake areas upon completion of construction to prevent dust and soil erosion.	to install as stated; installation basically completed. Complied; individual appointed in every subproject. Complied; roads regularly watered by sprinkler. Complied Basically complied; basically hardened. Complied; prohibited. No yet occurred in the reporting period	

	Impact Factor	Potential Impact and/or Issues	Mitigation Measures	Compliance	Corrective Measures
		Fumes and PM from asphalt mixing plant, concrete batching plant and other equipment and machinery	• Locate asphalt plants and mixers at least 300m downwind from residential areas and other sensitive receptors. • Enclose these plants and equip them with bag house filter or similar air pollution control equipment. • Minimise drop heights from conveyors, loading shovels, hoppers and other loading or handling equipment and use fine water sprays. • Regularly inspect and certify vehicle and equipment emissions and maintain to a high standard.	Complied Complied Complied Complied	None
		Emissions from vehicles and equipment	• Procurement of new vehicles and plant should take account of low emission alternatives; • All vehicles and plant to be kept in good order and maintained in compliance with the manufacturer's instructions; • Minimise movement of construction traffic around the site; • Impose speed limits of 10 kph on unsurfaced haul	Complied Complied Complied Complied Speed limits imposed on every subproject.	None

	Impact Factor	Potential Impact and/or Issues	Mitigation Measures	Compliance	Corrective Measures
			roads and working areas and 15kph on surfaced roads and working areas; ● Set up speed limit signs on construction sites; ● On road vehicles are to comply with vehicle emissions standards; ● Prohibit the burning of waste on site; ● Vehicles and equipment shall be switched off when not in use.	Complied Complied Complied	
	Air Quality	Noise from powered mechanical equipment and vehicles	● Sensibly schedule construction activities, avoid noisy equipment working concurrently. ● Specify equipment and machinery that conforms to PRC noise standard GB12523-90 and ensure regular maintenance. ● Select advanced quiet equipment and construction method, and tightly control the use of self-provided generators. ● Comply with local requirements in areas with sensitive receptors very close by, avoiding construction works,	Complied Complied Complied Complied Complied, no night time construction.	None

	Impact Factor	Potential Impact and/or Issues	Mitigation Measures	Compliance	Corrective Measures
			particularly noisy activities such as piling and compaction from 22:00 to 06:00. ● If night time construction needed, inform nearby residents beforehand, obtain permission of local government, keep local communities informed through bulletins, avoid using noisy equipment and set up temporary noise barriers. ● Control the speed of bulldozer, excavator, crusher and other heavy plant travelling on site. ● Adopt noise reduction devices and measures for works in proximity to sensitive noise receptors to ensure required standards are maintained. ● Locate sites for rock crushing, concrete mixing and other noisy activities at least 300m away from sensitive noise receptors. ● Minimize the use of whistles and horns, and prohibit the use of horns on construction	Complied, speed limit signs are in place. Complied, temporary noise reduction devices are installed. Complied Complied Complied, communications with sensitive receptors are enhanced; notice will be given in advance; no noisy activities during sensitive periods.	

	Impact Factor	Potential Impact and/or Issues	Mitigation Measures	Compliance	Corrective Measures
			sites at night. ● Maintain regular communication with sensitive receptors such as schools within 200m of the construction sites to avoid noisy activities within sensitive periods, such as examination periods.		
	Noise	Control of drainage and flooding on site	● Locate temporary working and storage areas away from drainage lines ● Provide temporary drainage at construction sites ● Provide pollution control such as oil and silt traps at discharge points where hydrocarbons and aggregate may contaminate runoff ● Take measures to reduce the risk of soil erosion on exposed surfaces prior to the start of the heavy summer rains.	Complied Complied Complied Complied, exposed surfaces are covered by plastic cloth in times of rains.	None
	Natural drainage lines	Management of works in and adjacent to watercourses	● Programme in channel works during the dry season. ● Use coffer dams for construction of bridge foundations for ease of construction in the dry and minimize turbidity in the	Basically complied Complied,slurry from piling diverted to settling ponds	None

	Impact Factor	Potential Impact and/or Issues	Mitigation Measures	Compliance	Corrective Measures
			river. • Construction water is treated via settlement pit prior to re-use or discharge to surface waters • Erect berms or sandbags during bridge foundation works if necessary to contain runoff polluting the rivers. • Avoid locating administrative buildings or storage areas on the floodplain during the summer monsoon season • Maintain adequate flood flow during the rainy season. • All camps, fuel storage, refuelling and maintenance areas to be located at least 200m from watercourses. • Construction materials such as aggregate and cement must be protected from rainfall and runoff to prevent erosion • Scour protection to be provided on the pier footings and on the flood banks on the outside curve of meanders	Complied in every subproject. Complied, sandbags used. Complied Complied Complied in every subproject. Complied, tarpaulin used to cover materials. Complied	
	Water Quality	Discharge of construction site	• Provide temporary toilets sufficient for the size of the	Complied, sufficient toilets	None

	Impact Factor	Potential Impact and/or Issues	Mitigation Measures	Compliance	Corrective Measures
		wastewater	workforce at canteens, construction camps and major construction sites. ● Septic tanks must be emptied periodically and the contents must be transported to urban wastewater treatment plants for treatment or be spread on agricultural land. ● All construction wastewater to be treated to appropriate PRC standard prior to discharge to surface waters. ● Stockpiles should have temporary drainage provisions to minimise run-off. ● Reuse equipment and wheel wash wastewater for dust suppression. ● Install sedimentation tanks on sites to treat process water and muddy runoff.	provided in every subproject. Complied, septic tanks are regularly emptied and transported to urban wastewater treatment plants for treatment or be spread on agricultural land for reuse. Complied, settlement pits used. Complied Complied Complied, sedimentation tanks installed in every subproject camp.	
		Spoil	● Balance cut and fill on construction sites to minimize the amount of spoil to be disposed; ● Ensure that spoil is disposed of carefully at dump sites, to create stable landforms;	Complied Complied Complied, procedures	None

	Impact Factor	Potential Impact and/or Issues	Mitigation Measures	Compliance	Corrective Measures
			• Spoil disposal sites must be approved in advance; • Revegetate spoil disposal sites at the earliest opportunity.	completed ;sites approved. Not yet occurred in the reporting period	
	Solid waste	Refuse in construction sites	• Set up centralized domestic and construction waste collection point(s). • Sort materials on site, for reuse, recycling and disposal. • Identify final disposal routes and approved sites. • Use covered dump truck to remove construction and demolition waste. • Appoint a named individual to manage the waste disposal. • Prohibit the burning of waste on construction sites.	Complied, collection points set up in all sites. Complied, materials sorted. Complied Complied Complied; individual appointed.to every subproject. Complied	None
		Protection of vegetation and restoration of disturbed areas	• Demarcate the construction working area to prevent encroachment and damage to adjacent areas. • Ensure any valuable trees that are being retained are protected with fencing	Complied, closures and signs clearly in place. Complied, trees transplanted,	None

	Impact Factor	Potential Impact and/or Issues	Mitigation Measures	Compliance	Corrective Measures
			and/or put conspicuous markings and warning signs on these trees to prevent workers from inadvertently damaging or destroying them. ● Ensure sufficient aftercare for landscape planting to maximise survival.	with warning signs in place. Complied	
	Ecology	Protected species	● Prohibit any injury to key protected animals, such as the Asiatic toad and turtle. ● If any injured animals are found, report to local wildlife protection department.	Not found in the reporting period Not found in the reporting period	None
		Protected species Greening	● Qualified ecologist will be on site prior to start of construction to check construction sites for protected species and translocate any discovered on site	Complied	None
			● Implement the revegetation plans, which may include seeding with grass and planting trees and shrubs.	Complied; vegetation transplanted during the construction of Gemu Highway.	None
		Destruction of cultural relics	● Contractor to comply with *the Cultural Relics Protection Law* and *Implementation Regulations*	Complied	None

	Impact Factor	Potential Impact and/or Issues	Mitigation Measures	Compliance	Corrective Measures
			on the Cultural Relics Protection Law of the PRC. ● If relics are discovered, stop work immediately and protect the site; notify the supervising entities and the local Cultural Relics Bureau; and only start construction after approval by the Cultural Relics Bureau; ● Educate workforce on these procedures.	Not yet found in the reporting period Complied, workforce educated by ESE.	
	Physical cultural resources	Sanitation in construction sites	● Effectively clean and disinfect the site, including disinfection of toilets and waste disposal sites, and ensure timely removal of solid waste; ● Exterminate rodents on sites at least once every 3 months, and exterminate mosquitoes and flies at least twice each year; ● Provide public toilets in accordance with the requirements of labor management and sanitation departments in the living areas on construction site, ● Appoint designated staff responsible for cleaning and	Complied; regular disinfection and timely waste disposal. Complied; done regularly. Complied Complied	None

	Impact Factor	Potential Impact and/or Issues	Mitigation Measures	Compliance	Corrective Measures
			disinfection.		
Health and Safety	Occupational health and safety	Occupational safety	• Appoint Environment, Health and Safety Officer to develop and implement environmental, health and safety management plan, maintain records concerning health, safety and welfare and regularly report on accidents, incidents and near misses. • Train all construction workers in general health and safety matters and on emergency preparedness and response procedures. • Provide personal protective equipment (hard hats, shoes, eye goggles, respiratory masks, and high visibility vests) to all construction workers and enforce their use. • Provide goggles and respiratory masks to workers doing asphalt road paving. • Provide ear plugs to workers working near noisy powered mechanical equipment (PME), especially during piling of bridge foundations.	Complied, officer appointed to every subproject. Complied Not yet occurred in reporting period Not yet occurred in reporting period. Complied Explosions not occurred during reporting period; thus explosives not involved Complied	None

	Impact Factor	Potential Impact and/or Issues	Mitigation Measures	Compliance	Corrective Measures
			• Ensure safe handling, transport, storage and application of explosives for blasting. • Provide a clean and sufficient supply of fresh, potable water for all camps and work sites. • Provide an adequate number of latrines and other sanitary arrangements at the site and work areas and ensure that they are cleaned and maintained in a hygienic state. • Safe working in confined spaces for foundations such as the ship lock. • Measures to prevent the collapse of walls, such as the chambers for the ship lock • Provide adequate waste receptacles and ensure regular collection and disposal. • Ensure that Contractors have adequate worker and third party insurance cover. • No children (less than 14 years of age) to work on any contract.	Complied; adequate toilets and regular cleaning. Not yet occurred in reporting period Not yet occurred in reporting period Complied; enough receptacles in place. Complied Complied	

	Impact Factor	Potential Impact and/or Issues	Mitigation Measures	Compliance	Corrective Measures
		Food safety	• Provide a secure source for drinking water at the construction camps • Inspect and supervise food hygiene in canteens on sites regularly. • Canteen workers must have valid health permits. • Once food poisoning is discovered, implement effective control measures immediately to prevent it from spreading	Complied Complied, officer appointed to every subproject. Complied Not occurred in reporting period	None
		Disease prevention and safety awareness	• Construction workers must have physical examination before start working on site. • Provide annual health checks. • If infectious disease is found, the patient must be isolated for treatment to prevent the disease from spreading. • Establish health clinic at location where workers are concentrated, which should be equipped with common medical supplies and medication for simple treatment and emergency treatment for accidents. • Specify the person responsible for health and	Complied Not needed during the reporting period. Not found during the reporting period. Complied, basic medical supplies and medicines provided. Once incidents occur, simple treatment and emergency treatment available. Complied, all construction camps of sub projects have	

	Impact Factor	Potential Impact and/or Issues	Mitigation Measures	Compliance	Corrective Measures
			epidemic prevention responsible for the education and propaganda on food hygiene and disease prevention to raise the awareness of workers. ● Regularly inspect works to ensure there are no areas of stagnant water that could provide breeding grounds for malaria, encephalitis and dengue fever mosquitoes. ● Regularly inspect works to ensure that there are no breeding grounds for the host snail for schistosomiasis ● Provide training to the workforce on disease prevention and safety awareness ● Undertake checks every six months for workforce working in areas / tasks with a moderate to high risk of contact with schistosomiasis and medicate if the disease is found. ● Inform the local Schistosomiasis Prevention and Treatment Office and report the incidence to the	responsible persons for health and epidemic prevention and have conducted related trainings for workers. Complied, Checks were carried out and no stagnant water was found. Complied, regular checks conducted at construction sites. Complied, related trainings conducted for workers before entering construction sites. Complied, no diseases found during the reporting period. Complied	None

	Impact Factor	Potential Impact and/or Issues	Mitigation Measures	Compliance	Corrective Measures
			local Health Administrative Department.		
	Community health and safety	Temporary traffic management	A traffic control and operation plan will be prepared together with the local traffic management authority prior to any construction. The plan shall include provisions for identifying preferred haul routes, diverting or scheduling construction traffic to avoid morning and afternoon peak traffic hours, regulating traffic at road crossings with an emphasis on ensuring public safety through clear signs, speed controls and planning in advance.	Complied, preparations made prior to any construction, including preparations for traffic control and implementation plan.	None
		Information disclosure	Residents and businesses will be informed in advance through publicity about the construction activities and provided with the dates and duration of expected disruption.	Complied, notice put up around sites prior to any construction, set up bulletin to brief basic information on projects and residents informed of related construction plans in advance.	None
		Access to construction sites	• Clear signs will be placed at construction sites in view of the public, warning people of potential dangers such as moving vehicles, hazardous materials, excavations and raising awareness on safety	Complied, clear signs placed around all the construction sites to warn people of potential dangers.	None

	Impact Factor	Potential Impact and/or Issues	Mitigation Measures	Compliance	Corrective Measures
			issues. ● All sites will be made secure, discouraging access by members of the public through fencing or security personnel, as appropriate.	Complied, people without project-related duties not allowed to enter into the construction sites to ensure safety.	
		Utility services interruptions	● Assess construction locations in advance for potential disruption to services and identify risks before starting construction. ● If temporary disruption is unavoidable, develop a plan to minimize the disruption in collaboration with relevant local authorities such as power company, water supply company, water bureau (for irrigation canals), and communication company. ● Communicate the dates and duration in advance to all affected people.	Complied, notice on the choice of sites of batchboxes delivered to ESE prior to the launch of any project. And ESE will evaluate the environmental impacts and determine the feasibility of the sites. Complied Complied, effective communications on environmental impacts conducted with all the affected people.	None
Demobilisation	Site cleanup	Site remediation and restoration	● Contractor to keep a schedule of all temporary land prior land use, and land occupiers	Complied All sub projects not yet	None

	Impact Factor	Potential Impact and/or Issues	Mitigation Measures	Compliance	Corrective Measures
			• At the end of construction, all buildings, stockpiles, and litter on temporary land is to be removed. • Temporary land is to be restored to its original land use, unless agreed otherwise with the land occupier. • Borrow pits and spoil disposal sites are to be restored according to the approved plans and will be subject to approval by APEPD / local EPB during the environmental acceptance review on completion. • Latrines must be removed and the site disinfected and infilled. Sewage sludges may be spread on agricultural land.	completed during the reporting period. All sub projects not yet completed during the reporting period. All sub projects not yet completed during the reporting period. All sub projects not yet completed during the reporting period. Toilets and constriction sites currently in use.	
Grievance redress mechanism	Social & environmental	Handling and resolving complaints by contractor, IA LPMOs and APDOT PPMO	• Disclose GRM to affected people before construction begins at the main entrance to each construction site. • Maintain and update a Complaints Register to document all complaints. • Ensure satisfactory resolution of complaints within specified timescales.	Complied, complaints hotlines and mailboxes set up at entrances to all the construction sites. Complied, no complaints received during the reporting period. Complied, no complaints received during the reporting	None

	Impact Factor	Potential Impact and/or Issues	Mitigation Measures	Compliance	Corrective Measures
				period.	
Operational Stage					
Environmental management	Operation activities	EMP	• Prepare an EMP to address potential impacts, mitigation and monitoring needs, and institutional requirements for the operations phase	Not yet necessary in the reporting period.	
		Emergency planning	• Prepare an emergency response plan	Not yet necessary in the reporting period.	

Table A.4: Specific Mitigation Measures for the Shuiyang River Improvement Works and Xuanzhou Port

Item	Impact Factor	Potential Impact and/or Issues	Mitigation Measures	Compliance	Corrective Action
Detailed Design Stage					
Dredging Works on the Shuiyang River	Capital dredging	Volume of spoil to be disposed of and river bank protection	• Confirm the reaches that need to be dredged and the estimates of volumes of dredged spoils • Detailed design for plan form of the new meanders • Detailed design for the bank protection works, including species of plants to be used	Complied, the length of Shuiyang River is 43.9 km, among which 24.6 km needs dredging due to silting and shallow waterways or river bends; the 32.6 km above the gate needs less dredging work than the other 13.25 km-long waterway. Most of the centreline of waterways were placed along the deep waterways and the dredging work includes waterway widening and deepening with the section	None

Item	Impact Factor	Potential Impact and/or Issues	Mitigation Measures	Compliance	Corrective Action
				width of 45 m, water depth of 3.2m, side slope 1:4 to 1:5 and a total of 83.9 earthworks. The mud-dumping areas were centrally placed, and there were four areas in the 32.6km reach. Complied, the total length of protection bank is 13.11km. For those in Carp Beach, Liangshui Village, Xinhe Village and cut-bank in Tao Village, steel mesh gabion protection was placed to ensure the stability of the cut-bank, beachhead and the end of the beach.	
	Land resources	Selection of dredged sludge disposal sites	• Minimise the area of permanent and temporary land-take required • Verify ponds for disposal of dredged sludges and restore to agricultural land.	Complied. The principles for choosing a mud-dumping area are: maintaining the "dynamic balance of farmland" and put the reclamation work of cultivated land first. 1. Taking up less farmlands and choosing the nearest lowlands and bottomlands. 2. Filling ponds and strengthening foundations to satisfy the demands of flood control and to ease the pressure of flood prevention. 3. Far away from cities and towns to prevent mud pollution. 4. In compliance with related requirement and satisfying the construction conditions.	None

Item	Impact Factor	Potential Impact and/or Issues	Mitigation Measures	Compliance	Corrective Action
Design of rubber dams and ship lock	Operational impacts	Fisheries	• Develop operating rules for the two rubber barrages, including description of environmental constraints and environmental mitigation measures such as lowering the barrage in the event of fish migrations	The places of rubber dams and ship locks changed. Under designing currently.	None
Removal of ship building yard	Delay in the construction program for the ship lock and rubber dam	Contaminated land	• Relocate ship building yard from the proposed ship lock site to a new location and conduct an EIR for the relocation and environmental impact to the new site. • Sample the soils and assess the level of soil contamination • On the basis of the results of the contaminated land assessment, develop and implement a remedial action plan • Clean up the site, including the removal of all wastes and litter • Collect and treat or dispose contaminated soils at a designated site to be agreed with the APDOT, WRB and APPSCIG • The following MEP guidelines will be followed: *a. Guidelines for Risk Assessment of Contaminated Sites (consultation document)* *b. Guidelines for Soil Remediation of Contaminated Sites (consultation*	Complied Complied, soil of the shipyards monitored. See Section 2.3 for detailed results. Complied. Complied, all wastes and rubbish cleaned at the sites. Complied, related monitoring conducted. Complied, removal of ship building yards in the design papers followed the principles below and related monitoring plans formulated.	None

Item	Impact Factor	Potential Impact and/or Issues	Mitigation Measures	Compliance	Corrective Action
			document) *c. Temporary Method for Environmental Management of Soil on Contaminated Sites (consultation document)* *d. Technical Guidelines for Environmental Monitoring of Sites (consultation document)*		
Design of Xiaohekou Bridge	Extreme weather events due to climate change	Extended dry season, more frequent high flows due to higher summer rainfall	● Design vertical alignment of Xiaohekou Bridge sufficient to allow for Class IV navigation plus an allowance for increased conveyance of stormwaters due to more frequent extreme weather during wet season ● Review the design for scour protection on bridge piers and re-formed channel banks for more frequent, high magnitude flows. ● Provide piped drainage off the bridge	Complied, vertical alignment of Xiaohekou Bridge designed sufficient to allow for Class IV navigation. Complied, the design on scour protection on bridge piers met the requirements. Not involved during the reporting period.	None
	Health and Safety	Promote access for non-motorised transport and pedestrians	● Design must ensure public health and safety. ● Promote non-motorized traffic with 2m lane for NMT along both carriageways.	Complied, the design of Xiaohekou Bridge met the requirements of public health and safety. Complied	None
Xuanzhou Multipurpose Port	Soil resources	Land raising	● Confirm volume of spoil required for land-raising and the capacity of the donor site	Complied	None

Item	Impact Factor	Potential Impact and/or Issues	Mitigation Measures	Compliance	Corrective Action
	Air quality	Dust	• Design the port layout so the bulk loading facilities are screened by other buildings or permanent fences, and located away from sensitive receptors • Select loading / unloading equipment that minimizes the entrainment of fine grained materials . • Include measures such as screening and dust suppression into the design of the facility	Complied, no residents around the ports in 200m and the layouts met the related requirements. Complied, chosen unloading equipment that minimizes the entrainment of fine grained materials with lowest pollution. Complied	None
	Noise	Noisy activities during construction and operation	• Calculate construction noise during typical and noisy activities, and identify further mitigation required to attenuate noise levels • Plan the layout of the site and the scheduling of construction, so that buildings and other features on site shield sensitive receptors from noise during construction and operation activities • Select plant and equipment with low noise levels. • Site noisy operational equipment in acoustic housing and away from sensitive receptors • Design fencing and landscaping around the port perimeter	Complied, temporary barriers used to mitigate noise in the surroundings for the avoidance of negative effects. Complied, the layout of the site and the scheduling of construction provided in the preliminary design papers. Complied, chosen equipment with low noise levels. Complied, noisy operational equipment used far away from residential area. Basically complied, fencing and landscaping deigned around the port.	None
	Solid wastes	Safe disposal of solid wastes arising during	• Identify type and volume of different waste streams • Make provisions for waste segregation and temporary storage prior to disposal	Complied Complied, related preparations made in the design papers.	None

Item	Impact Factor	Potential Impact and/or Issues	Mitigation Measures	Compliance	Corrective Action
		operation	off site ● Identify licensed off-site disposal routes, including re-use, recycling and final disposal to landfill	Complied, the design papers finalized the disposal sites, transporting routes and disposal methods of solid wastes.	
	Water quality	Wastewater discharge	● Review the need to treat wastewater from ships ● Design a small package plant on site to treat domestic wastewater ● Design systems for stormwater drainage, collection and treatment of water used on site e.g. wash down water and oil separators	Complied, wastewater from ships and construction camps gathered and disposed, and elaborations in the design papers. Complied, wastewater treatment facilities such as three-level sedimentation tank and septic tank designed at the construction camps.	
	construction traffic	Reduce the impact of construction traffic on road network	● Investigate sources and volumes of construction materials required ● Investigate scope of bringing materials to site by river rather than overland by truck	Complied Complied, ways of delivering materials have been set in the planning files.	None
Energy efficiency	Air emissions	Construction transport emissions	● Specify local materials from licensed providers that minimise transport distance or modal shift from road to inland waterway.	Complied,	None
Health and Safety	Community health and safety	Spread of schistosomiasis	● Verify locations where schistosomimasis is present in village along the Shuiyang River ● Liaise with the local health authorities to develop a suite of mitigation measures to prevent the	No patients of the schistosomiasis disease were found during the reporting period	None

Item	Impact Factor	Potential Impact and/or Issues	Mitigation Measures	Compliance	Corrective Action
			spread of infected host snails during dredging and the temporary stockpiling of dredged sediments, to include controls on the width of river bed to be dredged; controls on the disposal of dredged materials and drainage water; and training for the workforce and local communities.	Complied	
Conservation of soil and land resources	Soil resources	Loss of land and topsoil land increased risk of erosion	• Minimise permanent and temporary land-take for development • Retain/Incorporate landscape features of interest in design • Maximise reuse of spoil within the construction or adjacent construction works • Agree soil disposal sites, management and rehabilitation plan with Xuancheng WRB • Detailed design of bank revetment works • Detailed design of soil and water conservation works • Specify vegetation that serves	Complied Complied Complied, requirements for soil reuse have been set in the design Complied, for relevant files, please see Annex VII Complied, for relevant files, please see Annex VII Complied, for relevant files, please see Annex VI Complied, for relevant files, please see Annex V	None

Item	Impact Factor	Potential Impact and/or Issues	Mitigation Measures	Compliance	Corrective Action
			specific bio-engineering functions • Design appropriate drainage systems for the disposal sites for the dredged spoil to control runoff and sedimentation.	Complied, for relevant files, please see Annex V	
Construction stage					
Shuiyang River Improvement Works	Water quality	Turbidity in Shuiyang River during dredging	• Use cutter suction dredger with dredged material conveyed by pipeline to the spoil disposal site • Use grab dredger to for specific spot works • Avoid over-spill of turbid water when operating the dredger • Ensure correct connection of pipelines, including good seals, to prevent leakage of turbid water along the pipeline • Test the dredger and pipelines in terms of leaks prior to start • Check the loss of pressure along the pipeline immediately, and in the event of a leak, stop pumping and take action to clean up the spillage	Not yet started in the reporting period. Currently, only the work of Xiaohekou Bridge has been started	None
		Protection of the drinking water in-take works	• Prior to the start of dredging activity, liaise with relevant Health Administration Bureaux, local EPB, or local township/town to inform	Not yet started in the reporting period	None

Item	Impact Factor	Potential Impact and/or Issues	Mitigation Measures	Compliance	Corrective Action
			them of the works and the programme • Continue to inform the local authorities during the dredging • Provide temporary water in-take works on floating pontoons connected to the main water conveyance pipeline • Close the permanent in-take works and position the floating pontoon at least 600m upstream or 300m downstream of the dredging works • Monitor river water quality during the dredging		
	Spoil sites	Drainage from the dredged spoil sites	• For the seven pond disposal sites, drawdown the existing water levels in the ponds, to avoid over-spilling from the dredger pumping line. • Control the drainage of water from the ponds to avoid discharge of turbid water to canals and drainage channels。 • In the later stages of reclamation of the disposal sites, use flocculants to speed up sedimentation • Regularly inspect the drainage channels to check for blockage of the drains and risk of localized flooding	Not yet started in the reporting period	None

Item	Impact Factor	Potential Impact and/or Issues	Mitigation Measures	Compliance	Corrective Action
			• Rehabilitate and restore spoil disposal sites in accordance with agreed plan (agriculture or woodland). • Conduct project completion audit to confirm that spoil disposal site rehabilitation meets required standards, contractor shall be liable in case of non-compliance.		
	Spoil sites	Spread of disease vector	• Dump the dredged spoil from sections of the channel where schistosomiasis is a risk at specially designated disposal sites (one of the seven ponds). • Contain the site to avoid the spread of the host snail and schistosomes.	Not yet started in the reporting period	None
	Air quality	Odour from the dredged spoil sites	• Undertake the dredging during the winter dry season as low temperatures help reduce generation of bad odour • Locate the dump sites for the dredged spoil at least 100m from sensitive receptors	Not yet started in the reporting period	None
	Noise	Dredging and bank protection works	• Select models of dredger with lower sound power levels • Prohibit dredging and piling at night if possible	Not yet started in the reporting period	None

Item	Impact Factor	Potential Impact and/or Issues	Mitigation Measures	Compliance	Corrective Action
	Bank protection	Soil erosion	• Realign Shuiyang River meanders during low flows • Install bank protection including concrete formations and infill with soil and plants	Not yet started in the reporting period	None
Xuanzhou Multi-purpose Port	Water quality	Turbidity of Shuiyang River	• Programme piling works for the new port during the dry season • Install sheet piling and pile the foundations for the port in the dry to avoid increasing turbidity in the river	Complied。 Complied	None
	Soil resources	Land raising	• Drain the existing pond in the port area prior to land raising. • Excavate spoil from the designated donor site close to the port and use it to raise the land for port area uses. • Install temporary drainage and settlement tanks prior to discharge of storm water off site. • Ensure that the material used in land raising is compacted. • Implement dust suppression measures through land raising activities.	Complied Complied Complied Complied Complied	None
	Occupational health & safety	Awareness of disease prevention and	• Construction workers must have physical examination before they start working on site.	Complied	None

Item	Impact Factor	Potential Impact and/or Issues	Mitigation Measures	Compliance	Corrective Action
		safety	• Provide annual health checks. • If infectious disease is found, the patient must be isolated for treatment to prevent the disease from spreading. • Establish health clinic at location where workers are concentrated, which should be equipped with common medical supplies and medication for simple treatment and emergency treatment for accidents. • Designate people specially responsible for health and epidemic prevention, and responsible for the education and promotion on food hygiene and disease prevention so as to enhance workers' awareness of relevant health issues. • Regular inspections to ensure there are no areas of stagnant water that would be breeding ground for malaria, encephalitis and dengue fever mosquitoes. • Regular inspections to ensure that there is no breeding ground for the host snail for schistosomiasis • Provide training to the workforce on disease prevention and safety awareness • Undertake checks every six months	Complied Not yet started in the reporting period Complied Complied Complied Complied Complied	

Item	Impact Factor	Potential Impact and/or Issues	Mitigation Measures	Compliance	Corrective Action
			for workforce working in areas / tasks with a moderate or high risk of contact with schistosomiasis; medicate if the disease is found. • Inform the local Schistosomiasis Prevention and Treatment Office and report the incidence to the local Health Administrative Department	No relevant diseases were found during the reporting period Complied, No relevant diseases were found during the reporting period	
• Operational stage					
Shipping	Shipping	Waste from ships	• Ships have to be equipped with sufficient storage for sewage and solid waste; • Discharge of wastewater to inland waterways exceeding the standards is prohibited; • Train ships' crews on the correct procedures for the safe disposal of solid waste and wastewaters; • Strengthen inspection of ships in compliance with the relevant standards; and • Wastewater and solid waste from ships can be accepted at the port for collection and treatment.	Not yet started in the reporting period	None
		Noise	• be sounded for short durations, during the day, and in response to specific requirements	Not yet started in the reporting period	None

Item	Impact Factor	Potential Impact and/or Issues	Mitigation Measures	Compliance	Corrective Action
			• Avoid unnecessary use of horn near residential areas • Use lights rather than horns at night to signal		
		Navigation safety	• Strictly follow navigation lanes, temporary waiting areas and anchorage areas, and use ship locks to manoeuvres	Not yet started in the reporting period	None
Shuiyang River Improvement Works	Ship lock	Wastewater	• Discharge of wastewater to Shuiyang Town sewerage system	Not yet started in the reporting period	None
		Solid household waste	• Collect, store and dispose waste streams separately • Segregate household wastes with different coloured bins(organic, recyclable, and non-recyclable) and treat accordingly and appropriately • Separately store and treat hazardous wastes, e.g. oily rags, oil-contaminated soil	Not yet started in the reporting period	None
		Fisheries	• Ensure the rules for the barrage are followed, including the impact on fish migration. The barrage can be partially or fully lowered so as to enable the migration of upstream	Not yet started in the reporting period	None

Item	Impact Factor	Potential Impact and/or Issues	Mitigation Measures	Compliance	Corrective Action
			fishes.		
	Rubber barriers	Loss of water head	• Ensure the coordinated management of the two rubber barriers to maintain the water level of Shuiyang River	Not yet started in the reporting period	None
Xuanzhou Multi-purpose Port	Port operations	Air quality	• Use containers for freight if possible so as to avoid loading/unloading of bulk loose material on windy days. • Minimize drop heights to avoid overloading of delivery belts • Adopt dust-suppression methods such as water spraying, covering bulk materials with felts, and installing windbreaks around stockpiles • Provide watering facility in coal storage sites and ore storage sites for dust suppression. • Plant trees and set up fences around the site to prevent the dispersion of dust off site.	Not yet started in the reporting period	None
		Noise	• Direct the ships in and out of ports to avoid the need for ships to use their horns • Maintain mobile and stationery plant according to the	Not yet started in the reporting period	None

Item	Impact Factor	Potential Impact and/or Issues	Mitigation Measures	Compliance	Corrective Action
			manufacturer's instructions • Monitor noise levels under routine and abnormal conditions, and respond to complaints. • Implement further mitigation measures in the event of exceeding noise standards.		
		Solid wastes	• Collect, store and dispose waste streams separately • Segregate household wastes with different coloured bins(organic, recyclable, and non-recyclable) and treat accordingly and appropriately in accordance with local EPB instructions • Separately store and treat hazardous wastes, e.g. oily rags, oil-contaminated soil	Not yet started in the reporting period	None
		Water quality	• Periodic cleaning of oil separators and silt traps on storm-water drainage systems around the port [CHECK] • Put oily wastewater from maintenance sheds and other places through oil separator and	Not yet started in the reporting period	None

Item	Impact Factor	Potential Impact and/or Issues	Mitigation Measures	Compliance	Corrective Action
			mix it with domestic sewage. • Periodic maintenance of small package plants set within the port areas, including disposal of sewage sludges by the municipal wastewater treatment plant • Discharge wastewater treated with Grade-III procedure to the sewerage system serving the Xuanzhou Economic and Technological Development Zone		
		Emergency planning	• Prepare an emergency plan • Protect oil spillage equipment at the port • Ships wishing to unload flammable, explosives, corrosive, poisonous and dangerous cargos are required to hang the required signals in compliance with the *Regulations for Supervision and Administration for Ships Carrying Dangerous Goods.* • In the event of an emergency, the downstream drinking water in-	Not yet started in the reporting period	None

Item	Impact Factor	Potential Impact and/or Issues	Mitigation Measures	Compliance	Corrective Action
			takes must be shut		

Table A.5：Specific Mitigation Measures for the Improvement Works of Ma'anshan North Passage Road

Items	Impact factors	Potential impacts and/or issues	Mitigation measures	Compliance	Corrective actions
Detailed design stage					
General Highway Design Issues	Land and soil resources	Impact on agriculture from the loss of land, increased risk of topsoil loss and soil erosion	• Fine tune vertical and horizontal alignments • Balance cuts and fills as much as possible • Avoid deep cuts and high embankments to minimise earthworks • Minimise permanent and temporary land-take • Retain/incorporate landscape features of interest in design • Maximise the reuse of spoil within the construction or adjacent construction works. • Reach a consensus with APEPD/ local EPB in terms of spoil disposal sites, management and rehabilitation plan。 • Remove and store topsoil (10-30cm) for restoration work prior to main earthworks. • Specify vegetation that serves specific bio-engineering	Complied Complied Complied Complied Complied Complied Complied Complied, requirements have been specified in planning files Complied, relevant	None

Items	Impact factors	Potential impacts and/or issues	Mitigation measures	Compliance	Corrective actions
			function.	requirements for vegetation have been set in planning files.	
			• Design appropriate drainage systems for slopes to reduce soil erosion.	Complied. Drainage ditches for road-side slopes were designed during the project construction and excavation to prevent soil erosion.	None
	Extreme weather events due to climate change	Road surface cracking due to extreme hot or cold weather, landslide and flooding due to torrential rainfall	• Consider potential impacts from extreme weather events due to climate change in designing road subgrade, pavement, road-side slopes, drainage system, bridges and culverts. • Adopt appropriate protective measures such as vegetation cover, geotextiles, settling basins, permeable paving, infiltration ditches, stepped slopes, riprap, crib walls, retaining walls and intercepting ditches to reduce the speed of surface run-off.	Complied Complied. Relevant protective measures were proposed in the construction design documents. For example, drainage ditches and sedimentation ponds were designed during the road subgrade construction.	None
	Health and safety	Promotion of non-motorized transport,	• Design must ensure public health and safety.	Complied. Public health and safety were fully considered in design documents.	None

Items	Impact factors	Potential impacts and/or issues	Mitigation measures	Compliance	Corrective actions
		protection of vulnerable road users	• Promote non-motorized traffic. • Where possible, separate vehicles and NMT, and separate cyclists and pedestrians. • Promote safe crossings for pedestrians • Promote scheme lighting, where there is a H&S case and it does not cause light pollution in rural areas	Complied. Complied. Complied. Complied. The scheme lighting did not disturb the daily living of nearby residents and cause light pollution during project construction.	
	Air emissions	Construction transport emissions	• Specify local materials from licensed providers that minimise transport distance.	Complied. Design documents specify that construction materials shall be better purchased from qualified local providers to minimise transport distance.	None
	GHG emissions	Energy efficiency	• Consider energy efficient street lighting, such as LEDs or solar-powered lights	Complied. Design documents specify the use of energy efficient street lighting.	None
Design of bridge crossings	River erosion	Scour of river bed and banks	Design scour protection for the bridge piers and river banks	Complied. Scour protective measures for the bridge piers and river banks were designed.	None
Ma'anshan North	Traffic noise	Protection of sensitive	• Design of low noise road pavement of 191,925 m2 in	Complied. Noise mitigation measures for sensitive	None

Items	Impact factors	Potential impacts and/or issues	Mitigation measures	Compliance	Corrective actions
Corridor		receptors	front of 34 sensitive points at Dachen, Zhongshan Village, Dayu, Chaomiaoji, Ruiqiao, Weiteng, Dajing, Xucun, Huanghe, Zhoucun, Xiongzhuang, Hanwang, Wangzhengwu, Taodian, Bazou, Xiaozhuang, Ruicun/Weizhuang, Huangcun, Quanshuikou, Shanwang Village, Xiaolizhuang, Shanghezhuang, Jibaozi, Chenzhanglu, Haiwang Village, Zhongheji, Xiaoyuanzhuang, Gaozuji, Panxiao Village, Baozhuang, Tanzhuang, Dajiangzhuang, Xiaowang Village and Menlianzhuang.	receptors were clearly specified in design documents.	
	Health and Safety and Community	Local communities NMT	• In urban areas, consider replacing the hard shoulder with pavements to separate pedestrians from the traffic. • Town and village authorities to consider lighting in urban areas.	Complied. Relevant requirements of pedestrians and traffic were clearly specified in design documents. Complied.	None
	Construction nuisance	Haul roads	• Identify the locations of the 53 km of haul roads to minimise environmental impacts and	Complied. Haul roads were clearly specified in design documents.	None

Items	Impact factors	Potential impacts and/or issues	Mitigation measures	Compliance	Corrective actions
			disturbance of local communities		
	Infrastructure	Protection of assets	• Ensure the design for Sima Bridge and allow for the upgrading of navigation on the river to Class IV	Complied. Design demands for a Class IV navigation for Sima Bridge.	None
Construction Stage					
Implementation of mitigation measures	Agricultural land	Minimize impact on farmland from land take and haulage	• Minimise disruption outside of approved permanent and temporary land-take areas, install barriers and protective fencing, if appropriate to prevent encroachment on adjacent areas. • Follow procedures for top soil stripping (see general good site practice guidance above) • Use existing field roads as access roads where possible • Temporary land-take areas to be cleared up and re-vegetated after the end of construction.	Complied. Only Sima Bridge started installed with protective fencing to prevent encroachment on adjacent areas during the reporting stage. Complied. Relevant procedures for top soil stripping were followed during road construction. Instances of field roads used as access roads did not occur during the reporting phase. Recovery of temporary land-take areas did not occur since no projects were completed in the reporting period	None

Items	Impact factors	Potential impacts and/or issues	Mitigation measures	Compliance	Corrective actions
	Noise	Protection of noise sensitive receptors	• Lay low noise asphalt during construction • Install noise insulation at the Taodian Health Clinic • Erect warning and no horn signs at 3 schools (Taodian Primary School, Gaozu Primary School and Baozhuang Primary School) and the Taodian Health Clinic	No low noise asphalt was involved during the reporting stage. Not yet started in reporting period. Complied. Warning and no horn signs were erected at Taodian Primary School, Gaozu Primary School and Baozhuang Primary School.	None
Operational Stage					
Road maintenance and safety	Traffic	Road condition	Regularly inspect and maintain the road surface and clean up the drains.	Not yet started in reporting period	None
		Road safety and traffic accidents	Strictly enforce traffic laws to improve road safety and reduce traffic accidents.	Not yet started in reporting period	None

Table A.6: Specific Mitigation Measures for the Improvement Works of Yimu Highway Kedian to Mujiating

Item	Impact Factor	Potential Impact and/or Issues	Mitigation Measures	Compliance	Corrective Actions
Detailed Design Stage					

Item	Impact Factor	Potential Impact and/or Issues	Mitigation Measures	Compliance	Corrective Actions
General Highway Design Issues	Land and soil resources	Loss of land, impact on agriculture, loss of topsoil and increased risk of erosion	• Fine tune vertical and horizontal alignments • Balance cut and fill as far as possible • Avoid deep cuts and high embankments to minimise earthworks	Complied. Complied. Cut and fill were balanced as much as possible during the design process.	None
			• Minimise permanent and temporary land-take. • Retain/incorporate landscape features of interest in design.	Complied. The amount of permanent and temporary land-take areas were specified in design and landscape design was retained.	
			• Maximise reuse of spoil within the construction or adjacent construction works.	Complied. Spoil would be reused or re-vegetated after the end of construction.	
			• Agree spoil disposal sites, management and rehabilitation plan with APEPD / local EPB.	Complied. Spoil disposal sites, rehabilitation, and soil and water conservation plans were all approved by local EPB.	
			• Remove and store topsoil (10-30cm) for restoration works prior to main	Complied. Topsoil restoration and vegetation	

Item	Impact Factor	Potential Impact and/or Issues	Mitigation Measures	Compliance	Corrective Actions
			earthworks. • Specify vegetation that serves specific bio-engineering functions. • Design appropriate drainage systems for slopes to reduce soil erosion.	were specified in design documents. Complied. Drainage ditches for road-side slopes were designed during the project construction and excavation to prevent soil erosion.	
Design of road alignment, road surface, drainage and lighting	Extreme weather events due to climate change	Road surface cracking due to extreme hot or cold weather, landslide and flooding due to torrential rainfall	• Consider potential impacts from extreme weather events due to climate change in designing road subgrade, pavement, road-side slopes, drainage system, bridges and culverts. • Adopt appropriate protective measures such as vegetation cover, geotextiles, settling basins, permeable paving, infiltration ditches, stepped slopes, riprap, crib walls, retaining walls and intercepting ditches to reduce the speed of surface run-off.	Complied Complied .Relevant protective measures were proposed in construction design documents. For example, drainage ditches and sedimentation ponds were designed during the road subgrade construction	None
	Health and safety	Promotion of non-motorized transport, protection of vulnerable road	• Design must ensure public health and safety. • Promote non-motorized traffic.	Complied. Public health and safety were fully considered in design documents. Complied. Barrier-free	None

Item	Impact Factor	Potential Impact and/or Issues	Mitigation Measures	Compliance	Corrective Actions
		users	• Ensure barrier-free design for disabled people. • Where possible, separate vehicles and NMT, and separate cyclists and pedestrians. • Promote safe crossings for pedestrians.	design for disabled people, motor and non-motorized transport design were considered in design documents. Complied.	
	Air emissions	Construction transport emissions	• Specify local materials from licensed providers that minimise transport distance	Design documents specify that construction materials shall be better purchased from qualified local providers to minimise transport distance.	None
	GHG emissions	Energy efficiency	• Consider energy efficient street lighting, such as LEDs or solar-powered lights	Complied. Design documents specify the use of energy efficient street lighting.	None
Design of bridge crossings	River erosion	Scour of river bed and banks	• Design scour protection for the bridge piers and river banks • Zhanghe bridge with piped drainage and discharge to land	Complied. Scour protective measures for the bridge piers and river banks were designed. Complied.	None
Access	Construction nuisance	Haul roads	• Identify the locations of the haul roads to minimise environmental impacts and disturbance of local communities	Complied. The locations of haul roads were basically identified in the design stage.	None
Yimu Highway	Traffic noise	Protection of sensitive	• Design of low noise road pavement over 1800 m covering 40500 m^2 at 5 sensitive	Complied. Laying requirements of low noise	None

Item	Impact Factor	Potential Impact and/or Issues	Mitigation Measures	Compliance	Corrective Actions
		receptors	points - Gutianxincun, Gutian Village, Yafutang, Shanggang Village and Bowen High School.	road pavement in relevant sensitive receptors were specified in design documents.	
			• Design noise insulation for 1147 households in 22 sensitive receptor villages. Jiangcun, Kedian Village, Shangtanghu, Dagang Village, Wangcun, Shuguang Village 1, Shuguang Village 2, Gongyi Village, Meishan Village/Meihua Village, Tudiwan, Tangmuqiao, Huilongdun, Gongshan Town, Gongshan Village, Gaoling Village 1, Gaoling Village 2, Guolong, Haizijia, Haiquan/haijia, Huitouwu, Wuxia Temple and Shuicun Village.	Complied. Detailed design of noise insulation devices in sensitive receptors was specified in design documents.	
	H&S and community	NMT and pedestrians	• Review the provision for pedestrian crossings over the Class I highway section	Complied. Clear provision for pedestrian crossings over the Class I highway section was made in the design.	None
			• Review pedestrian safety for crossing Wuli intersection. Consider light-controlled crossing (without vehicle turning), overpasses and underpasses.	Complied.	
Construction Stage					

Item	Impact Factor	Potential Impact and/or Issues	Mitigation Measures	Compliance	Corrective Actions
Implementation of noise mitigation measures	Noise	Protection of noise sensitive receptors	• Install noise insulation in 1147 properties • Lay low noise asphalt	Installation of noise insulation devices and asphalt roads pavement did not occur during the reporting stage.	None
Operational Stage					
Road maintenance and safety	Traffic	Road condition	Regularly inspect and maintain the road surface and clean up the drains	Not yet started in reporting period	None
		Road safety and traffic accidents	Strictly enforce traffic laws to improve road safety and reduce traffic accidents.	Not yet started in reporting period	None
					.

Table A.7: Specific Mitigation Measures for Improvement Works of S319 Erba to Wuwei

Item	Impact Factor	Potential Impact and/or Issues	Mitigation Measures	Compliance	Corrective actions
Detailed Design Stage					
Conservation of soil and land resources	Soil resources	Loss of land and topsoil and increased risk of erosion	• Minimise permanent and temporary land-take for development. • Retain/incorporate landscape features of interest in design.	Complied. The amount of permanent and temporary land-take areas were specified in design and landscape design was retained. Complied. Spoil would be reused or re-vegetated after	None

Item	Impact Factor	Potential Impact and/or Issues	Mitigation Measures	Compliance	Corrective actions
			• Optimise balance between cut and fill and avoid deep cuts and high embankments to minimise earthworks. • Maximise reuse of spoil within the construction or adjacent construction works. • Agree spoil disposal sites, management and rehabilitation plan with APEPD/local EPB. • Remove and store topsoil (10-30cm) for restoration works prior to main earthworks. • Specify vegetation that serves specific bio-engineering functions. • Design appropriate drainage systems for slopes to reduce soil erosion.	the end of construction. Complied. Spoil disposal sites, rehabilitation, and soil and water conservation plans were all approved by local EPB. Complied. Topsoil restoration and vegetation were specified in design documents. Complied. Drainage ditches for road-side slopes were designed during the project construction and excavation to prevent soil erosion.	
Design of road alignment, road surface, drainage and lighting	Extreme weather events due to climate change	Road surface cracking due to extreme hot or cold weather, landslide and flooding due to torrential rainfall	• Consider potential impacts from extreme weather events due to climate change in designing road subgrade, pavement, road-side slopes, drainage system, bridges and culverts. • Adopt appropriate protective measures such as vegetation cover, geotextiles, settling basins, permeable paving, infiltration ditches, stepped slopes, riprap, crib walls, retaining walls and intercepting ditches to reduce the speed of surface run-off.	Complied Complied. Relevant protective measures were proposed in construction design documents. For example, drainage ditches and sedimentation ponds were designed during the road subgrade construction	None

Item	Impact Factor	Potential Impact and/or Issues	Mitigation Measures	Compliance	Corrective actions
	Health and safety	Promotion of non-motorized transport, protection of vulnerable road users	• Design must ensure public health and safety.	Complied. Public health and safety were fully considered in design documents.	None
			• Promote non-motorized traffic.	Complied. Barrier-free design for disabled people, motor and non-motorized transport design were considered in design documents.	
			• Ensure barrier-free design for disabled people.	Complied.	
	Air emissions	Construction transport emissions	• Specify local materials from licensed providers that minimise transport distance.	Complied. Design documents specify that construction materials shall be better purchased from qualified local providers to minimise transport distance.	None
	GHG emissions	Energy efficiency	• Consider energy efficient street lighting, such as LEDs or solar-powered lights	Complied. Design documents specify the use of energy efficient street lighting.	None
Design of bridge crossings	River erosion	Scour of river bed and banks	• Design scour protection for the bridge piers and river banks	Complied. Scour protective measures for the bridge piers and river banks were designed.	None
S319 Erba-	Noise	Traffic noise	• Design noise insulation for windows at 700	Basically complied. Till	None

Item	Impact Factor	Potential Impact and/or Issues	Mitigation Measures	Compliance	Corrective actions
Wuwei Section			households, two hospitals (the Economic Development Zone Wuwei County Health Centre and Boai Hospital) and 1 school (Banqiao Primary School). The beneficiaries reside in the following villages: Datan Village, Zhangwang Village, Chenzhuang, Xiaozhao, Gaoweiqian, Shangs, Lingjiawan / Dazhen, Huangcun, Jiajiazhuang / Xiaozhang, Linghou / Xiaowang, Wanxu, Tans, Dais/Jiangs, Hualong/Yangs, Wuyi Village, Shazhuang Village, Zhangyu/Hudun, Yangmaozui, Zhangni Village, Lijiatan, Nianxi, Dingwu, Xinjianzhuang, Hexi/Xucun, Xingeng, Fengxu, Weigeng/Changba Village, Lijiaxu, and Liwei.	now, temporary noise barriers have been installed and no soundproof windows yet.	
	Health & safety	Accident risks	• Review the treatment of the edge of the highway and the avenue of trees, and the risk of off-road collisions • Review the need for the removal of the avenue or trees or provision of safety barriers • Develop the design of junctions along the rural section, to improve safety for movements to rural roads • Review the need for lighting in the rural section	Complied Complied Complied Complied	None
Construction Stage					

Item	Impact Factor	Potential Impact and/or Issues	Mitigation Measures	Compliance	Corrective actions
Implementation of noise mitigation measures	Traffic noise	Protection of noise sensitive receptors	• Install noise insulation for properties • Erect warning and no horn signs at the following locations: ■ Wuwei County Economic Development Zone Health Clinic ■ Bo'ai Hospital ■ Yongnan Center Primary School ■ Changba Primary School	Complied. Complied. Temporary noise barriers were installed during the reporting stage, and warning and no horn signs were erected at Wuwei County Economic Development Zone Health Clinic, Bo'ai Hospital and Changba Primary School.	None
Operational Stage					
Road maintenance and safety	Traffic	Road condition	Regularly inspect and maintain the road surface and clean up the drains.	Not yet started in the reporting period	None
		Road safety and traffic accidents	Strictly enforce traffic laws to improve road safety and reduce traffic accidents.	Not yet started in the reporting period	None
.					

Table A.8a: Specific Mitigation Measures for the Improvement Works of G206 Dongliu to Yaodu

Item	Impact Factor	Potential Impact and/or Issues	Mitigation Measures	Compliance	Corrective Actions
Detailed Design Stage					

Item	Impact Factor	Potential Impact and/or Issues	Mitigation Measures	Compliance	Corrective Actions
Conservation of soil and land resources	Soil resources	Loss of land and topsoil and increased risk of erosion	• Minimise permanent and temporary land-take for development.	Complied. Control road subgrade height(<8.0m) and gradient (1:1.5)along the whole line to reduce permanent land-take area; make full use of earth cut in the area to backfill and reduce the area of spoil disposal sites; tender rental resident buildings and reduce construction camp area.	None
			• Retain/incorporate landscape features of interest in design.	No feature landscape was found for retainment.	
			• Optimise balance between cut and fill and avoid deep cuts and high embankments to minimise earthworks.	Complied. The design fully considered the balance between cut and fill in line with local topography and project requirements.	
			• Maximise reuse of spoil within the construction or adjacent construction works.	Complied. Maximise use of cut within the construction or adjacent areas to backfill under the precondition of meeting project requirements,	
			• Agree spoil disposal sites, management and rehabilitation plan with APEPD/local EPB.	Complied. Management and rehabilitation plans of	

Item	Impact Factor	Potential Impact and/or Issues	Mitigation Measures	Compliance	Corrective Actions
				spoil disposal sites were considered and communicated with local EPB during the design stage.	
			• Remove and store topsoil (10-30cm) for restoration works prior to main earthworks.	Complied. The design demands stratified excavation and centralized collection and storage of topsoil for land restoration and vegetation later .	
			• Specify vegetation that serves specific bio-engineering functions.	Complied. Setaria viridis seeds were sprayed on steep side slopes with no imminent construction plans to stabilize the slopes and prevent soil erosion.	
			• Design appropriate drainage systems for slopes to reduce soil erosion.	Complied. According to different features of road-side slopes, various preventions to be adopted, such as motar rubble, rectangle square network grass planting, three-dimensional network grass planting and building of low retaining wall at slope	

Item	Impact Factor	Potential Impact and/or Issues	Mitigation Measures	Compliance	Corrective Actions
				toe.	
Design of road alignment, road surface, drainage and lighting	Extreme weather events due to climate change	Road surface cracking due to extreme hot or cold weather, landslide and flooding due to torrential rainfall	• Consider potential impacts from extreme weather events due to climate change in designing road subgrade, pavement, road-side slopes, drainage system, bridges and culverts.	Complied. Control the road-side height (<8m) and gradient (1:1.5) of road subgrade, adopt three-dimensional grass planting, geograde grass planting and build low retaining wall at slope toe.Build side ditches at both sides of subgrade, stage for heaping debris, intercepting ditches, flood intercepting ditches, surface drainage, medial strip French drains and other engineering measures to prevent soil erosion and falling rocks.	None
			• Adopt appropriate protective measures such as vegetation cover, geotextiles, settling basins, permeable paving, infiltration ditches, stepped slopes, riprap, crib walls, retaining walls and intercepting ditches to reduce the speed of surface run-off.	Complied. Ditto.	
	Health and safety	Promotion of non-motorized transport, protection of vulnerable road	• Design must ensure public health and safety. • Promote non-motorized traffic.	Complied Complied. There are pedestrian walkways+non-motorized lanes of 2.75 m	None

Item	Impact Factor	Potential Impact and/or Issues	Mitigation Measures	Compliance	Corrective Actions
		users	• Ensure barrier-free design for disabled people.	width at both sides of roads. To be confirmed.	
	Air emissions	Construction transport emissions	• Specify local materials from licensed providers that minimise transport distance.	Complied. Choose qualified construction material providers near the project. Construction materials such as building stones and grits are abundant along the highway, and cement and lime are of standard specifications and enjoy convenient transportation.	None
	GHG emissions	Energy efficiency	• Consider energy efficient street lighting, such as LEDs or solar-powered lights	Installation did not occur in the reporting period. Notification for improvement as soon as possible was sent to contractors.	None
Design of bridge crossings	River erosion	Scour of river bed and banks	• Design scour protection for the bridge piers and river banks	Complied	None
G206 Dongliu to Yaodu Section	Noise	Traffic noise	• Design noise insulation for 94 households in the sensitive receptor clusters in Weizhuang, Zhanggang, Liuchun Village	Complied. Above-mentioned households are to be installed with ventilation and noise	None

Item	Impact Factor	Potential Impact and/or Issues	Mitigation Measures	Compliance	Corrective Actions
			and the farm dormitory.	insulation for windows.	
			• Fine tune the vertical and horizontal alignments, to reduce the impacts on land-take, balance cut and fill, reduce the need for extensive slope remediation works, and increase the distance from sensitive receptors	Complied. In line with local topography and project requirements, the design plan fully considered the balance between cut and fill, sensitive receptors protection, and the amount and difficulty of later field operation.	
			• Consider the possibility of using the spoil in land contouring to attenuate noise	Complied. Design specifies that spoil whose soil texture meets engineering requirements should be used for road subrgade construction, side slope protection at later stage and afforestation and other soil rehabilitation.	
	H&S	NMT and pedestrians	• Review the need for pedestrian walkways along this alignment and provision of pedestrian crossings for this dual three lane highway • Review the need to separate cyclists and pedestrians	To be confirmed Complied. There are pedestrian walkways+non-motorized lanes of 2.75 m	None

Item	Impact Factor	Potential Impact and/or Issues	Mitigation Measures	Compliance	Corrective Actions
				width at both sides of roads.	
			• Review the need for lighting in the rural sections	Complied. Street lightings were designed at adjacent rural sections and crossings.	
Construction Stage					
Implementation of mitigation measures	Traffic Noise	Protection of noise sensitive receptors	• Provide noise insulation for windows at 94 households in the sensitive receptor clusters in Weizhuang, Zhanggang, Liuchun Village and the farm dormitory.	In the reporting period, temporary fences were used as noise barriers, and noise insulation for windows were installed near the end of construction.	None
	Slope Stability	Protection of new cuttings	• Take care during excavations of deep cuttings to avoid creating slope collapse and mass movements.	In the reporting period, road subgrade construction was basically completed and no earth excavation was underway.	
			• Use appropriate techniques to stabilize the slopes, including geo-technical, slope reinforcement and planting options.	Complied. Major sections of current slopes at both sides of road were compacted or covered by geotechnic cloth. Setaria viridis seeds were sprayed on steep side slopes with no imminent construction	None

Item	Impact Factor	Potential Impact and/or Issues	Mitigation Measures	Compliance	Corrective Actions
				plans.	
			• Install drainage to the top of the slope.	Complied. Drainage was installed to the top of some steep slopes.	
	Ecology	Protection of natural habitats	• Minimize the construction programme for the sections between K0+000 to K2+300 and K15+000 to K16+580 to reduce impact on ecological features.	Complied. Construction camp and lines avoided above-mentioned sections; isolation belt was set up to strictly control work area during construction; no work was carried out in the morning or at night.	None
			• Avoid noisy activities such as blasting between the main bird nesting season May and June.	Not applicable. In the reporting period, most of the work involved later-stage construction of road subgrade, bridge precasting, and preparation work for road surface construction. No noisy works or blasting was involved.	
			• Prohibit blasting in the morning and at night.	Not applicable, ditto.	
			• Walkover survey prior to construction by trained wildlife and forestry experts to	Complied.	

Item	Impact Factor	Potential Impact and/or Issues	Mitigation Measures	Compliance	Corrective Actions
			confirm works can go ahead. • Identify trees to be preserved and clearly mark them, translocate other trees to new locations, and ensure adequate aftercare • If any protected species are observed along the alignment, take advice from ecologist on appropriate measures for translocation. • Provide environmental training on the importance of protecting habitats and wildlife to construction workforce • Prohibit the collection of timber, non-timber forestry products, hunting, and fishing in the Forestry Reserve by the construction workforce. • Prohibit the setting of fires in the woodland sections of the alignment.	Not applicable. Vegetation along the line are common local species requiring no special protection. Yet to be found. Complied. Relevant training was provided to the construction workforce before entering the site. No above-mentioned phenomenon was spotted in the reporting period and relevant training was provided to workforce before entering the site. Complied.	
Operational Stage					
Road	Traffic	Road condition	Regularly inspect and maintain the road	Not yet started in reporting	None

Item	Impact Factor	Potential Impact and/or Issues	Mitigation Measures	Compliance	Corrective Actions
maintenance and safety			surface and clean up the drains.	period	
		Road safety and traffic accidents	Strictly enforce traffic laws to improve road safety and reduce traffic accidents.	Not yet started in reporting period	None
					.

5.2 APPENDIX II: ADDITIONAL INFORMATION

5.2.1 Representative Photographs for Subproject I: S367 Ma'anshan North Passage Road

Local project management office

Contract NO4-2 project office

Contract NO4-3 project office

Construction billboard

Sedimentation pond

5.2.2 Representative Photographs for Subproject II: S319 Erba-Wuwei Section

Gravel paved road for reducing fugitive dust emission from construction traffic

Section I road construction site

Section II road construction site

	
Section III bridge construction site	Mixing station material stockpiling
	
Installing steel hoardings to protect water bodies in bridge construction	Environmental protection billboard

5.2.3 Representative Photographs for Subproject III: Yimu Highway Kedian to Mujiating Section

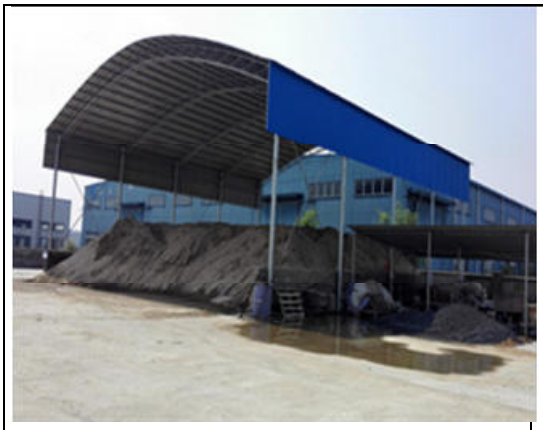
	
Mixing station	Local project management office

Contract NO3-1 project office

Contract NO3-2 project office

Contract NO3-1 construction site and mixing station

Contract NO3-2 construction site and staff dormitory

	
Contract NO3-2 mixing station	Contract NO3-1 staff dormitory

5.2.4 Representative Photographs for Subproject IV: G206 Dongliu to Yaodu Section

	
Contract NO2-1 project office	Contract NO2-2 project office
	

Contract NO2-1 construction camp	Warning sign on no hunting
	
Warning sign on forest fire prevention	AIDS prevention and control poster at construction camp
	
Safety warning signs for entering construction sites	

	
#1 borrow area with slope protection for soil erosion prevention	#2 borrow area with sedimentation pond to contain muddy runoff
	
#3 borrow area	#4 borrow area
	
Top soil storage area on #1 spoil disposal site	Re-vegetated spoil disposal site

	
Site entry/exit point paved with gravel	Compacted access road to reduce fugitive dust emission
	
Compacted subgrade to reduce fugitive dust emission	Road subgrade side slope for soil erosion prevention
	
Haul road shortly after watering	Sedimentation pond on construction site

	
Stair-shaped borrowing in borrow area	Xiaohuangni Lake construction site
	
Mixing station material stockpiling	Meigong Bridge construction site
	
4-chamber sedimentation tank in NO2-1 asphalt mixing station	3-chamber sedimentation tank in NO2-2 asphalt mixing station

	
Water sampling at Xiaohuangni Lake	NO2-2 bridge precasting yard
	
Ambient air quality monitoring at Zhazui	Ambient air quality monitoring at Yangjia
	

Ambient air quality monitoring at asphalt mixing station	Noise monitoring

5.2.5 Representative Photographs for Subproject V: Shuiyang River Waterway Improvement

Construction site notice board

Construction site environmental protection billboard

Construction sites near Xiaohekou bridge location

	
Mixing station precasting yard	Bridge
	
Sedimentation pond at mixing station	Access road to construction site at mixing station

5.2.6 Representative Photographs for Subproject VI: Xuanzhou Multipurpose Port

Local project management office

Project information billboard at construction site

Access road to construction site

Construction camp site

Sedimentation pond at mixing station

Mixing station ground

5.2.7 Representative Photographs of Meetings, Seminars and Workshops

ADB review meetings

FFPMO comprehensive appraisal meeting

FFPMO comprehensive appraisal meeting

Management and training meeting of six subprojects by Liu Lingfeng

Management and training meeting of six subprojects by Xie Jun

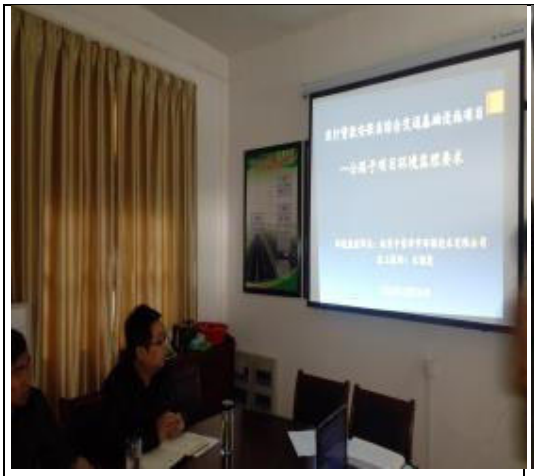
ADB environmental experts training

ADB environmental experts training

Subproject I S367 Ma'anshan North Passage Road environmental management training

Subproject I S367 Ma'anshan North Passage Road site meeting

Subproject I S367 Ma'anshan North Passage Road public consultation



Subproject II S319 environmental management training

Subproject II S319 comphrehensive appraisal meeting

Subproject III Yimu Highway environmental management training

Subproject III Yimu Highway construction commencement training seminar

Subproject III Yimu Highway public consultation

Subproject III Yimu Highway public consultation

Subproject IV G206 environmental management training

Subproject IV G206 site training seminar

Subproject IV G206 public consultation

	
Subproject V Shuiyang River environmental management training	Subproject V Shuiyang River public consultation
	
Subproject VI Xuanzhou Port public consultation	Subproject VI Xuanzhou Port public consultation

5.2.8 Photographs of Grievance Redress Mechanism

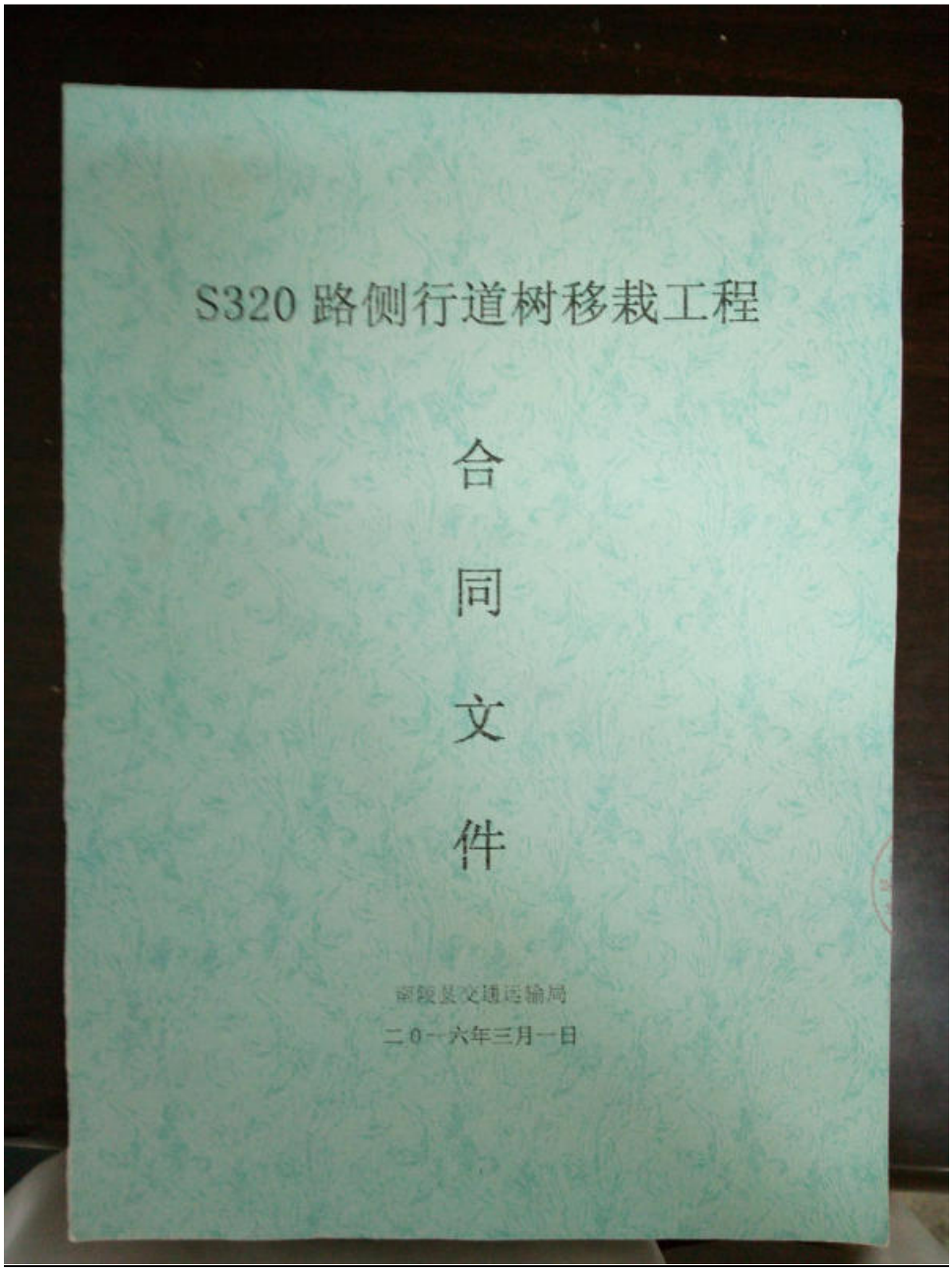
	
Subproject II S319 project complaint hotline	Subproject II S319 project complaint hotline

 Subproject III Yimu Highway project complaint hotline	 Subproject IV G206 project complaint hotline
 Subproject IV G206 project complaint box	 Subproject V Shuiyang River project complaint hotline
 Subproject VI: Xuanzhou Multipurpose Port project complaint hotline	——

5.3 APPENDIX Ⅲ: Related Attachments

AttachementIII: Yimu Highway Trees Translocation Agreement

AttachementIV：Birds monitoring report


S320路侧行道树移栽工程
合
同
文
件
二〇一六年三月一日

合 同 协 议 书

业　主：南陵县交通运输局　　（以下简称“业　主”）
承包人：芜湖景天园林工程有限公司　　（以下简称“承包人”）

鉴于业主为实施S320路侧行道树移栽工程，接受乙方递交的投标文件，经双方协商并签订本合同如下：

第一条　合同标的与宗旨

本合同标的为修建芜湖市南陵县弋牧公路（柯店至牧家亭段）路侧现状香樟行道树移栽至南陵县S320南铜路开发区段的移栽及管理等有关作业，运距10Km以内。

本合同以完成前款标的为目的，约定双方在实现该目的过程中的权利和义务。

第二条　合同标的的确定和解释

前条合同标的范围，由业主提交的工程承包施工范围的书面说明和要求、技术规范和标准等文件、以及参考资料等予以确定和解释。

第三条　承包工期

本合同工程施工的承包期为120天；从开工日期起算，至交工日期止。

本合同工程维护的承包期（即“缺陷责任期”）为24个月，从交工日期起计算。

本合同工程的开工日期，为2016年2月23日，具体以开工报告批准日期为准。

本合同工程的交工日期，为承包人在合同工程实质上完工后，向业主递交工程交工验收所需的全部文件的日期；但在首次交工验收不符合本合同工程质量标准的情况下，交工日期为最后交工验收合格的日期。

本合同工程的竣工日期，按照工程竣工验收符合本合同工程质量标准的日期确定。

第四条　工程承包方式和金额

1、本合同工程承包方式为工程量清单所列的总额价和单价包干；承包人完成本合同工程施工及缺陷修复所需要的一切工作量（包括虽未在第二条所列文件中明确写明，但属于完成合同标的所需要的工作量），以及属于承包人完成工程承包施工及缺陷修复所需支出的全部费用（包括施工临时用地、需交纳的税费等）和利润，均包括在包干总额价或单价中，业主不再另行支付。

2、本合同总价为人民币陆拾柒万贰仟壹佰壹拾叁元柒角贰分（￥672113.72元）。

第五条　工程设计变更

工程设计变更增加或减少工程价格如果工程量清单中未包括适用于变更工程的单价，单价确定按如下原则：

1、本合同段有相似工程项目单价的，由监理工程师和承包人考虑工程项目的差异性，通过适当换算，在7天内确定一个合适的单价或总额价，报业主在15天内审核批准。

2、任何工程细目的施工方法或措施的改变，在完成本合同工程所需的范围内，均属于承包人的义务；非经业主书面同意变更工程单价，不得作为决算的依据。

3、变更工程的单价或总额价均应经业主审核批准。业主审核批准的变更工程的单价或总额价为工程价格增加或减少的最终依据。

除本条约定，以及双方在本合同或其他协议中另有明确约定外，任何其它情况（包括政策变更等）均不再变更工程单价。

第六条　工程价款的支付

工程完工验收合格付至60%，办理完结算并经审计确认后，付至审计确认价的80%，余款（无息）待质保期（2年）满（竣工验收通过后）一次性付清。

第七条　施工要求

（一）、行道树移植

一般规定

1、施工期间的环境保护

(1) 承包人应遵守国家和地方有关环境保护、控制环境污染的规定，采取必要的措施防止施工中的燃料、油、沥青、污水、废料和垃圾等有害物质对河流、湖泊、池塘和水库的污染，防治扬尘、汽油等物质对环境空气的污染，防治噪声对环境的污染，把施工对环境、空气和居民生活的影响减少到法规允许的范围内。

(2) 在居民集中居住区和靠近学校、医院等环境敏感区、噪声大的施工作业，应按监理工程师规定的作业时间施工。

(3) 本规范其它各章对环境保护的具体要求，承包人在施工阶段应予严格遵守。任何因施工造成的环境污染，承包人都有责任采取措施予以防治和消除，并且应保证业主免于承担由于这种污染而产生的一切索赔和罚款。

第十六条　争议解决

为履行本合同而发生争议，双方同意提交当地仲裁委员会进行仲裁。

第十七条　合同文本和生效

本合同正本二份，副本八份，合同双方各执正本一份，副本四份，当正本与副本的内容不一致时，以正本为准。自双方签字盖章之日起生效。

业主单位：

法人代表：

或

其授权代表人：

年　月　日

施工单位：

法人代表：张云龙

或

其授权代表人：

2016 年 3 月 1 日

G206 Dongliu-Yaodu Section Project

Bird Ecological Monitoring Report

Hefei Changxin Environmental Protection Technology Co., Ltd.

March 2016

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Chapter I Objective and Task of Bird Ecological Monitoring

1 Natural Environment

1.1Geographic position

The project is located in Dongzhi County, on the south bank of the Yangtze River, with valley plain. It focuses on monitoring birds in the section between K6+000 and K15+000, with its four boundary points at 30°12'4"-30° 8'5N and 116°58'19"-117° 1'2E, mainly crossing and approaching waterbodies for Little Qili Lake, Little Huangni Lake, Quanshui Lake, Tonghu Lake and Yaodu River.

The project site is composed of alluvial deposit soil from the Yangtze River primarily and alluvial-lacustrine deposits secondarily with the thickness of about 20-25 m, or 34 m locally. Its deposits has an obvious "duel structure", with clay or loam in upper part and sand layer or gravel layer in lower part, presenting a narrow and long zonal distribution under the influence of regional structure and the Yangtze River fluviation. Situated in northern subtropical humid monsoon climate region, it enjoys obvious monsoonal character, four distinctive seasons, warm and humid climate yearly, plentiful rainfall, high humidity, adequate sunshine, hotness and rain in a season and long frost-free season. At the site, the perennial mean air temperature is 16.2°C and the annual change features of air temperature are: winter is cold, summer is warm, spring and autumn are warm, and the autumn temperature is remarkably higher than the spring temperature.

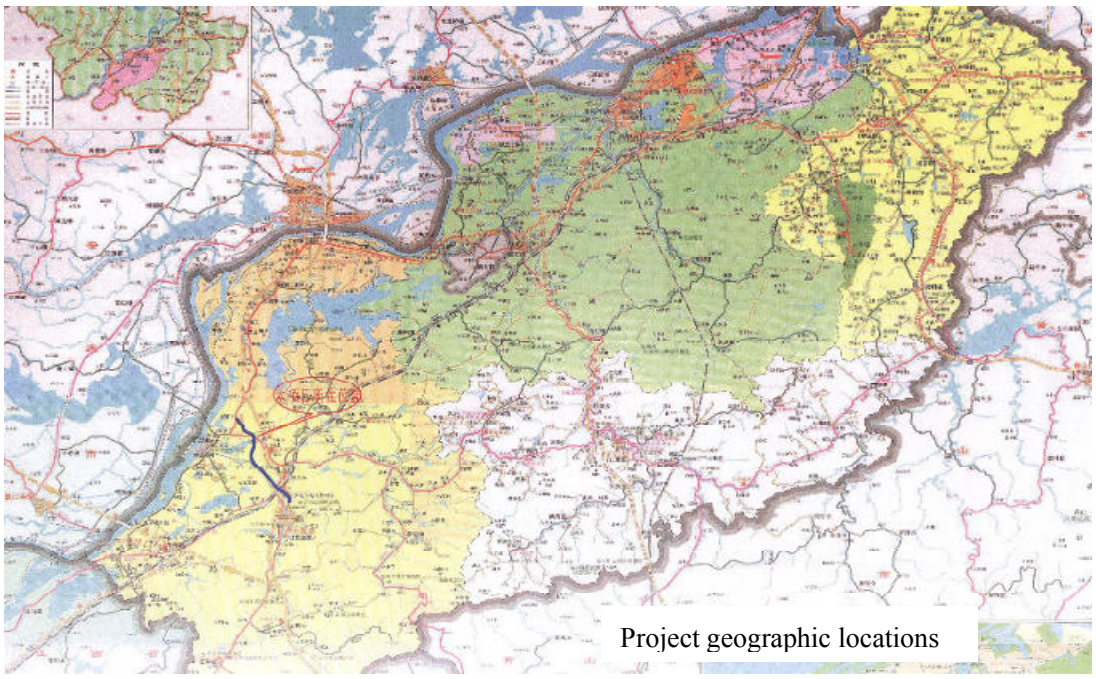


Fig. 1 Project geographic locations

1.2 Landform

The project is located in the northwest of Dongzhi County, mainly monitoring the section in downland lake and plain region, where hills, downland and lakes are cross-distributed, with a height of 200-300 m in high places, 50-100 m in mid-height places and even below 20 m locally. Landform here mainly consists of downland, shallow and flat polder areas, wetland along lakes, etc.

1.3 Climatic characteristics

The proposed project site is situated in northern subtropical humid monsoon climate region, enjoying obvious monsoonal character, four distinctive seasons, warm and humid climate yearly, plentiful rainfall, high humidity, adequate sunshine, hotness and rain in a season and long frost-free season.

At the site, the perennial mean air temperature is 16.2°C and the annual change features of air temperature are: winter is cold, summer is warm, spring and autumn are warm, and the autumn temperature is remarkably higher than the spring temperature.

The proposed project site has concentrated rainfall which changes greatly interannually and annually. Chizhou City has the multi-year average rainfall of 1,500-1,700 mm and the annual rainfall

concentrating in the flood season from May to September, with the flood easily occurring in spring and summer and the drought tending to occurring in hot autumn. Its years of drought and flood respectively account for 62% and 49%, with the great flood in 1996 due to the rainfall of 1,583 mm and the extreme drought in 1978 due to the rainfall of 405 mm.

1.4 Hydrology and drainage

The proposed project is mainly set along Yaodu River valley. Yaodu River, also known as Qianhe River, borders upon Huangpen River system in the northeast, Poyang Lake and Taibai Lake system in Jiangxi Province in the southwest and the Yangtze River in the north. It sources from the west slope of Lianghe Mountain Ridge of Qimen Mountain (elevation 1112 m) in the junction of Qimen County and Dongzhi County and flows northwestward through Makeng and changes northward in Shuanghekou, then westward through Huayuanli and Maple Gorge and changes northwestward in west Dongzhi County which is hereinafter referred to as new Yaodu River, next through Shiyin Hole and other places, out of hilly regions, around Qili Lake and finally into the Yangtze River via Dongliu Gate in the southwest of Dongliu Town. It has a drainage area of 896 km^2 and river length of 71 km.

The project is densely surrounded by lakes all the way, including Qili Lake, Little Qili Lake, Qiuyang Lake, etc., and mainly covers such water systems as Tonghu Lake, Little Huangni Lake, Quanshui Lake and Yaodu River Branch which are small regional lakes and branches and mainly used for flood discharge and farm irrigation.

2 Objective of Bird Monitoring along G206 Dongliu-Yaodu Section Project

The proposed G206 Dongliu-Yaodu Section Project is located in the areas along the middle and lower reaches of the Yangtze River in Anhui Province and in the northwest of Dongzhi County and borders on Little Qili Lake, Little Huangni Lake and Yaodu River. Road construction makes a certain influence on the structures and functions of lakes, lake wetland, forest land, farmland and other ecological systems nearby project. As a result, the Ecological impact of road construction process and put into operation upon completion of road need to be assessed correctly. According to the requirements of *ADB Loan Review Board Memo for Anhui Multimodal Sustainable*

Transportation Project from 24 to 28 August, 2015, a bird monitoring survey is required for the section from K6+000 to K15+000 regarding the G206 Dongliu-Yaodu Section Project.

The major objectives of this bird monitoring are to make clear the main species, quantity, and distribution of birds in lakes, lake wetland, forest land, farmland and other surrounding areas along the project through field survey and collection of historical documentations; to make a description of the activity routines, habit and migration path of key protected birds, including endangered birds and birds n great population quantity; to explain the impact of the construction process of G206 Dongliu-Yaodu Section Project on behaviors and activity modes of birds and the related species and put forward practical and feasible impact mitigation measures.

Chapter II Survey and Assessment Methods

1 Field Survey

1.1 Survey area setting

In accordance with the requirements of *ADB Loan Review Board Memo for Anhui Multimodal Sustainable Transportation Project from 24 to 28 August, 2015*, a bird monitoring survey for the section from K6+000 to K15+000 is implemented from January 3 to 6, 2016, based on the characteristics of trend and surrounding environment of G206 Dongliu-Yaodu Section Project.

The principles of survey area setting are as follows: (1) the survey area should cover foraging and habitat type of typical birds; (2) the survey area should consider the areas with different construction practices, such as bywater bridge construction, subgrade construction, etc.; (3) the survey area should cover the areas where there may be valuable and rare protected birds.

Based on the Memo requirements and the habitat situation of birds along the line, the scope of bird monitoring is chosen in: (1) survey points and survey line transects in polder of Shawan Villiage and Shahe Villiage; (2) survey points survey line transects in Caijiazui beside Little Huangni Lake and Qian Village beside Quanshui Lake; (3) survey points survey line transects in Shiyin Hole.

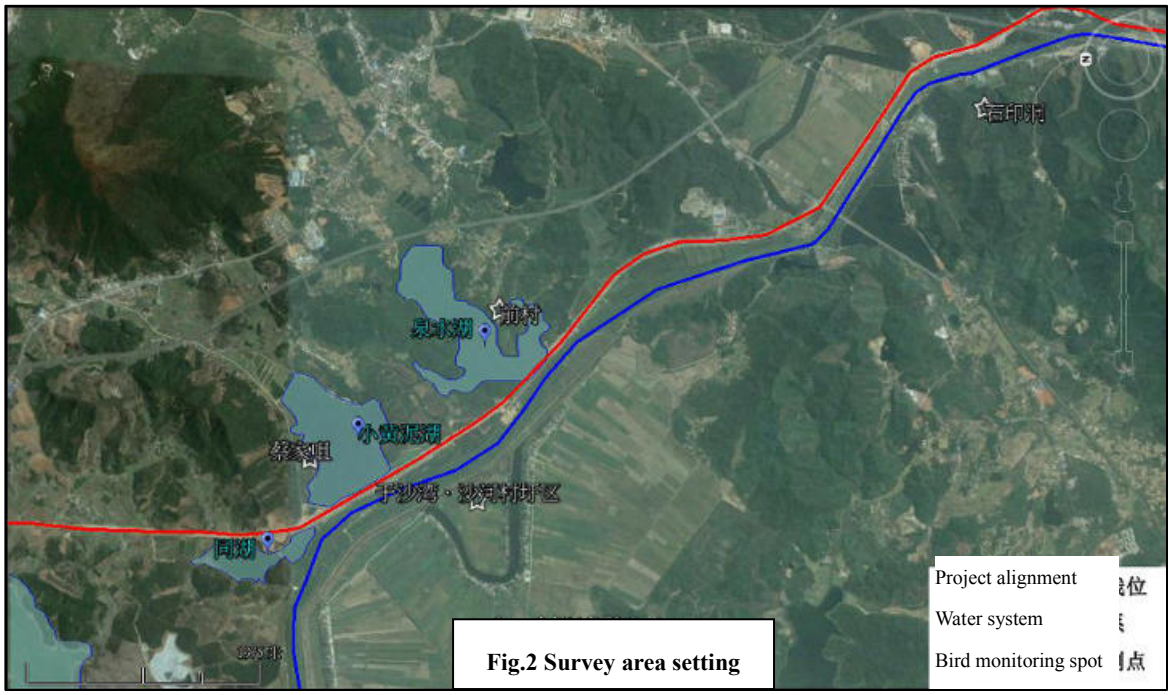


Fig.2 Survey area setting

1.2 Bird field survey methods

According to the environmental characteristics of survey area, the distribution and habitat of birds are divided into four types, including farmland, forest land, lakeshore and riverbank (wetland along the lake) and water surface. By means of the belt transect methods among farmland, forest land, lakeshore and riverbank (wetland along the lake), each survey area is provided with a belt transect according to each habitat type. Set the central line of belt transect while walking along a definite direction at a constant speed and observe with a double telescope and record the species, quantity, activity status and habitat location of birds within a scope of 25 m on both sides of the central line of belt transect. Regarding the water surface habitat, select the several fixed sampling spots on the water surface in the area, adopt the direct counting methods and make an observation with a Swarovski ATS 80 HD single-tube telescope to and then record the species, quantity and activity status of birds observed within a radius of 200 m.

1.3 Survey time

Based on the seasonal bird distribution, the main target of this bird monitoring for winter birds, survey time were selected for January 3 to 6, 2016, continued for 3 days. As for the cluster habit and

activity behavior of winter birds, the early morning (6:30-10:30) and at dusk (4:30-5:30) with higher activity intensity were selected to carry out the observation and survey of belt transects and sampling spots.

2 Document Literature Reference

Refer to the bird-related data in relevant survey areas in the species recourse system in the areas along the middle and lower reaches of the Yangtze River in Anhui, Chizhou Dongzhi region and Anhui Province, combine with the previous survey data of birds in survey areas to supplement the bird resource data in the region.

3 Data Collation and Assessment Methods

3.1 Statistic data processing methods

Berger-Parker dominance index (*I*) measurement is used to divide the quantity grade into dominant species, common species, rare species or occasional species. The calculation formula is $I= n_i/ N$, in which n_i is the number of individuals in each statistical unit and N is the total number of individuals of all species in each statistical unit.

Bird density is calculated according to the formula D = N/LW and D = N/S, in which D is bird density, N is quadrat and number of birds recorded in the quadrat, L is the length of line transect, W is the one-sided width of line transect and S is the counting area measured by sampling point methods. The index of species diversity is calculated by Shannon-Wiener (H) index: $H= -\sum P_i \ln(P_i)$, in which P_i is the probability of individual number of the i kind; the uniformity index is calculated by Pielou index (J): $J = H / H_{max}$, in which H refers to the same meaning as mentioned above; $H_{max} =\ln S$, S refers to the number of species.

3.2 Assessment methods of influence on birds

Apply the professional judgment methods to implement monitoring and brief analysis for the influence of G206 Dongliu-Yaodu Section Project on bird ecological environment. Describe the rule of daily activity, feeding habits and habitat selection of key birds and the migration habit of migrant birds to determine and evaluate the impacts of project construction on birds after obtaining the composition, density and diversity index of birds in each area in the protected zone.

Chapter III Bird Survey Results

1 Specific Composition of Regional Birds

By referring to the previous survey data of birds in the area around the project site and the relevant documentations, we have obtained 191 species of birds in the project area (as seen in Appendix 2), among which 87 species are water birds, accounting for 42.4% of total number of birds.

In terms of species composition, totally 113 species of non-passerine, 78 species of passerine are recorded, accounting for 59.2% and 40.8% of the total species of birds respectively. 191 species of bird are under 17 orders and 48 families. They are arranged in order as below according to the number of species: passeriformes (21 families, 78 species), Charadriiformes (5 families, 26 species), Anseriformes (1 family, 20 species), Ciconiiformes (3 families, 17 species), Gruiformes (3 families, 13 species), Lariformes (2 families, 6 species), Cuculiformes (1 family, 5 species), Falconiformes (1 family, 4 species), Coraciiformes (1 family, 4 species), Piciformes (1 family, 4 species), Podicipediformes (1 family, 3 species), Galliformes (1 family, 3 species), Columbiformes (1 family, 3 species), Pelecaniformes (1 family, 2 species), Strigiformes (1 family, 1 species), Apodiformes (1 family, 1 species), Upupiformes (1 family, 1 species).

Among 191 species of bird in this area, 19 species are national key protected birds, including 4 species are national first class protected animals: Black Stork (*Ciconia nigra*), Oriental White Stork (*Ciconia boyciana*), White Crane (Grus leucogeranus) and White-head Crane (*Grus monacha*); 15 species are national second class protected animals: Horned Grebe (*Podicepsa auritus*), Dalmatian Pelican (*Pelecanus crispus*), Chinese Egret (*Egretta eulophotes*), Eurasian Spoonbill (*Platalea leucorodia*), Little Swan (*Cygnus columbianus*), White-fronted Goose (*Anser albifrons*), Mandarin Duck (*Aix galericulata*), Hen Harrier (*Circus cyaneus*), Common Buzzard (*Buteo buteo*), Kestrel (*Falco tinnunculus*), Peregrine Falcon (*Falco peregrinus*), White-naped Crane (*Grus vipio*), Grey Crane (*Grus grus*), Lesser Coucal (*Centropus bengalensis*) and African Grass Owl (*Tyto capensis*).

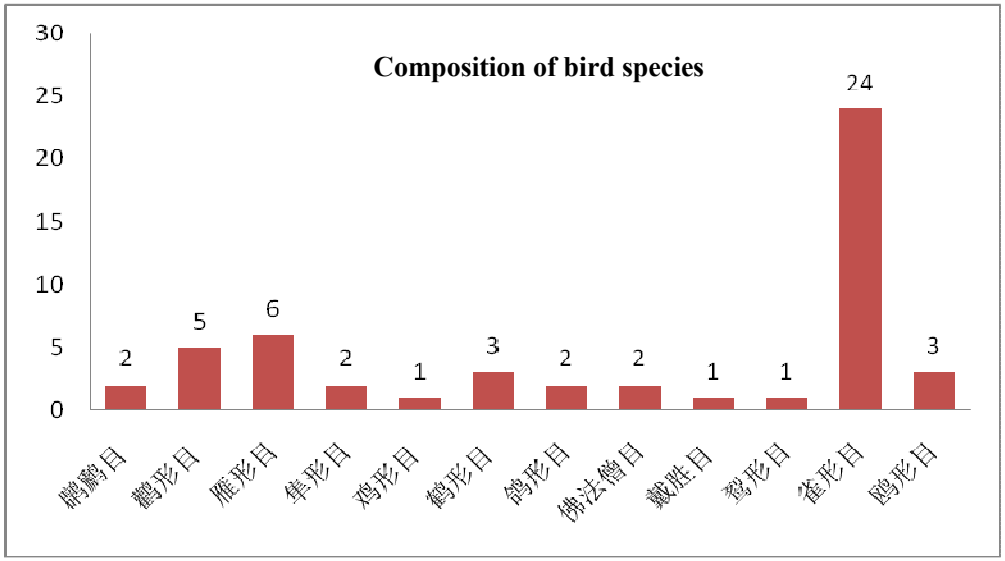
As for the avifaunal composition, 39 species among 191 species of bird are widespread species in the project area, accounting for 20.4% of the total number, thus presenting a characteristic of

transition from oriental realm to palearctic realm.

2 Bird Survey Results

This survey of birds involves 52 species under 12 orders and 28 families, among which there are 24 species under 16 families of Passeriformes, accounting for the largest proportion of 46.2% of the total surveyed birds. The birds are sequenced in order from the most and least birds composition of various orders: Passeriformes (18 families, 24 species), Anseriformes (1 family, 6 species), Ciconiiformes (1 family, 5 species), Gruiformes (1 family, 3 species), Lariformes (2 families, 3 species), Columbiformes (2 family, 2 species), Falconiformes (1 family, 2 species), Coraciiformes (1 family, 2 species), Upupiformes (1 family, 1 species), Piciformes (1 family, 1 species), Galliformes (1 family, 1 species), Upupiformes (1 family, 1 species).

This survey found no national first class protected birds, but covers 2 species of national second class protected birds (Kestrel, Peregrine Falcon), 1 species of Anhui Provincial first class protected birds (Cyanopica Cyana) and 14 species of Anhui Provincial second class protected birds which are mostly Anseriformes Anatidae and Passeriformes.



鹈鹕目	Podicipediformes
鹳形目	Ciconiiformes
雁形目	Anseriformes

隼形目	Falconiformes
鸡形目	Galliformes
鹤形目	Gruiformes
鸽形目	Columbiformes
佛法僧目	Coraciiformes
戴胜目	Upupiformes
䴕行目	Piciformes
雀形目	Passeriformes
鸥形目	Lariformes

Fig. 3. Composition of birds around G206 Dongliu-Yaodu Section Project

2.1 Residence type and floristic characteristics of bird resources

Among 52 species of birds in the survey, the quantity of resident birds and migrant birds respectively accounts for 61.5% and 38.5% of total birds. There are 32 species of resident bird and respectively 2 and 18 species of summer birds and winter birds.

The floral composition of birds according to the survey is: 26 palaearctic species, accounting for 50.0% of the total surveyed birds; 16 and 10 widespread species and oriental species, respectively accounting for 30.8% and 19.2% of the total surveyed birds. As a result, it can be found that the widespread species in this area is the dominant species (as seen in Fig. 5).

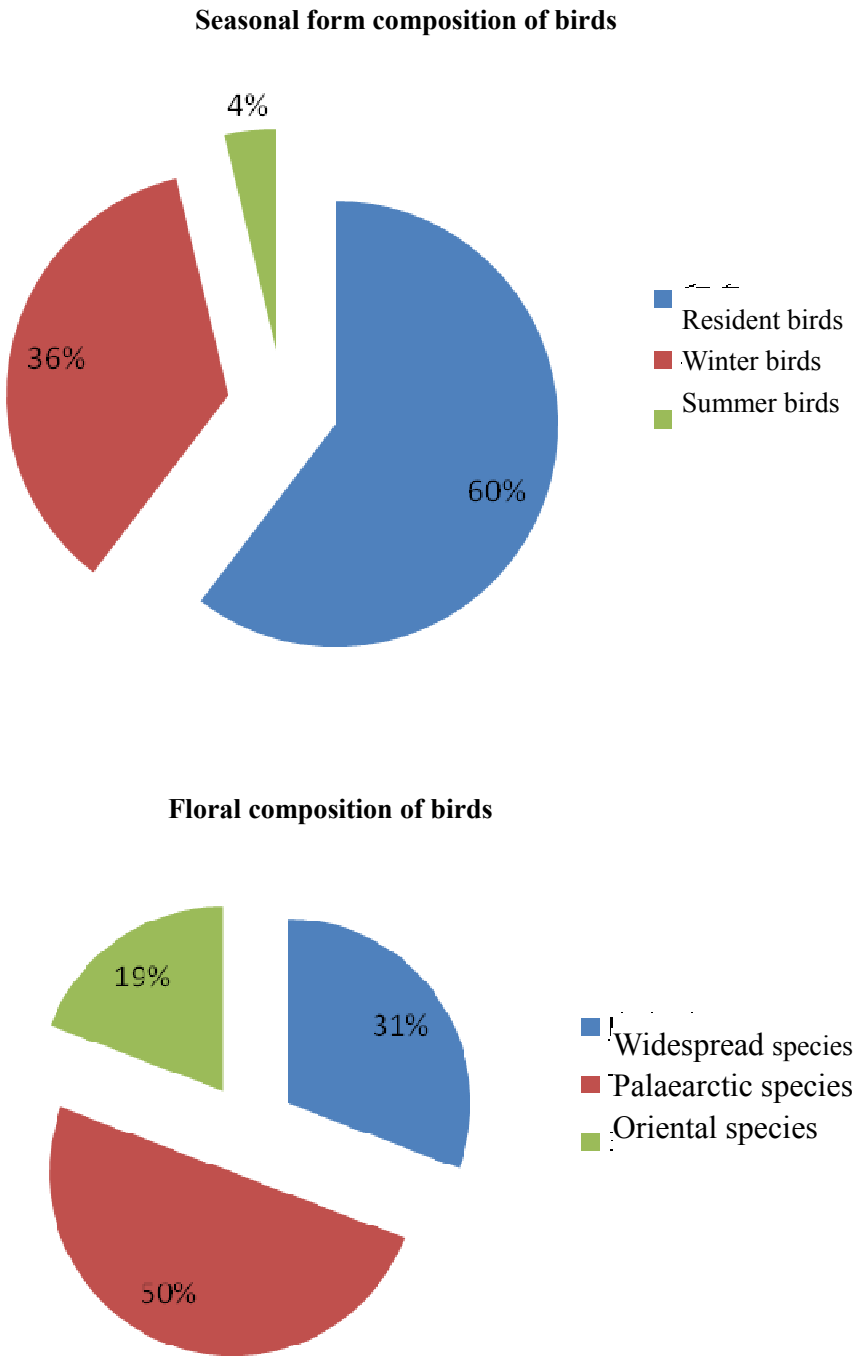


Fig. 4. Seasonal form and floristic characteristics of bird resources in this survey

2.2 Species and quantity of birds in each survey area (habitat)

The periphery of proposed G206 Dongliu-Yaodu Section Project may roughly be divided into four habitat types, including lake water, lakeshore/riverbank, forest land and farmland according to the

major habitat types of birds. Through finishing the observations, we have obtained the species and quantity of birds in each survey spot (habitat) as below:

Table 1 Type and quantity of birds in this survey

Survey area	Habitat type	Species quantity	Quantity of individuals
Polder areas in Shawan Village and Shahe Village	Farmland	15	79
Caijiazui	Lake water	13	65
	Forest land	22	178
	Lakeshore/Riverbank	10	56
Qian Village	Lake water	9	55
	Forest land	15	103
	Lakeshore/Riverbank	14	63
Shiyin Hole	Forest land	14	77

2.3 Bird density and dominant species in each survey area (habitat)

Each habitat type in the peripheral habitat types of the proposed G206 Dongliu-Yaodu Section Project has a unique bird community compositions.

The density and dominant species of birds in four surveyed habitat types are: bird density in the forest land habitat is higher, among which the bird density in Caijiazui forest land habitat is the highest of 6.89 birds/ hm^2 (as seen in Table 2).

Table 2 Bird density in this survey

Survey area	Habitat type	Bird density (bird/hm^2)	Dominant species	Scientific name
Polder areas in Shawan Village and	Farmland	3.12	Long-tailed Shrike/ Ring-necked Pheasant	*Lanius schach/ Phasianus colchicus*

Shahe Village				
Caijiazui	Lake water	2.45	Spot-billed Duck/ Mallards	*Anas poecilorhyncha/ Anas platyrhynchos*
	Forest land	6.89	Sparrow/ Ashy Starling	*Passer montanus/ Sturnus cineraceus*
	Lakeshore/Riverbank	3.47	White Wagtail / Water Rail	*Motacilla alba/ Rallus aquaticus*
Qian Village	Lake water	2.16	Little Grebe	*Tachybaptus ruficollis*
	Forest land	5.75	Yellow-billed Grosbeak	*Eophona migratoria*
	Lakeshore/Riverbank	3.53	Common Moorhen / Water Rail	*Gallinula chloropus/ Rallus aquaticus*
Shiyin Hole	Forest land	4.56	Oriental Turtle Dove	*Streptopelia orientalis*

2.4 Diversity and uniformity of bird community species in each survey area (habitat)

By measuring the diversity and uniformity of bird community species in each survey area or habitat by use of Shannon-Wiener (H) diversity index and Pielou index (J), we have found that Caijiazui forest land habitat has the highest diversity index and Shiyin Hole forest land habitat has the highest uniformity (as seen in Table 3).

Table 3 Bird diversity index and uniformity in this survey

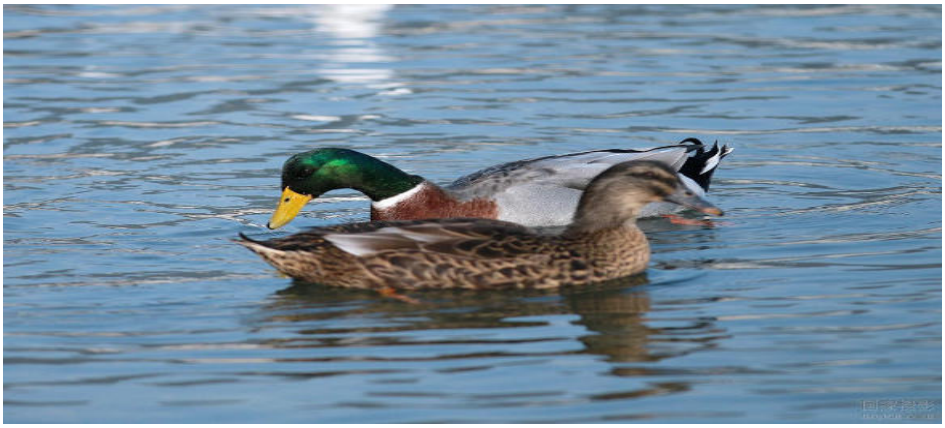
Survey spot	Habitat type	Shannon-Wiener index	Pielou index
Polder areas in Shawan Village and Shahe Village	Farmland	2.273	0.839
Caijiazui	Lake water	2.075	0.809
	Forest land	2.296	0.743

	Lakeshore/Riverbank	2.247	0.976
Qian Village	Lake water	1.880	0.856
	Forest land	2.246	0.829
	Lakeshore/Riverbank	2.118	0.829
Shiyin Hole	Forest land	2.262	0.857

2.5. Introduction of dominant species and key protected birds in all habitats

Key birds inhabiting in farmland habitats are Ring-necked Pheasant, Long-tailed Shrike, Anser Fabalis, etc.; key birds inhabiting in lake and water surface habitats are Spot-billed Duck, Mallards, kestrel and Little Grebe, etc.; key birds inhabiting in forest land habitats are Oriental Turtle Dove, Great Tit and Grey-capped Woodpecker, etc; key birds inhabiting in lakeshore/ bank habitats are Ruddy Shelduck, Common Moorhen and Coot, etc. Ecological habits of these key birds are concluded as follows:

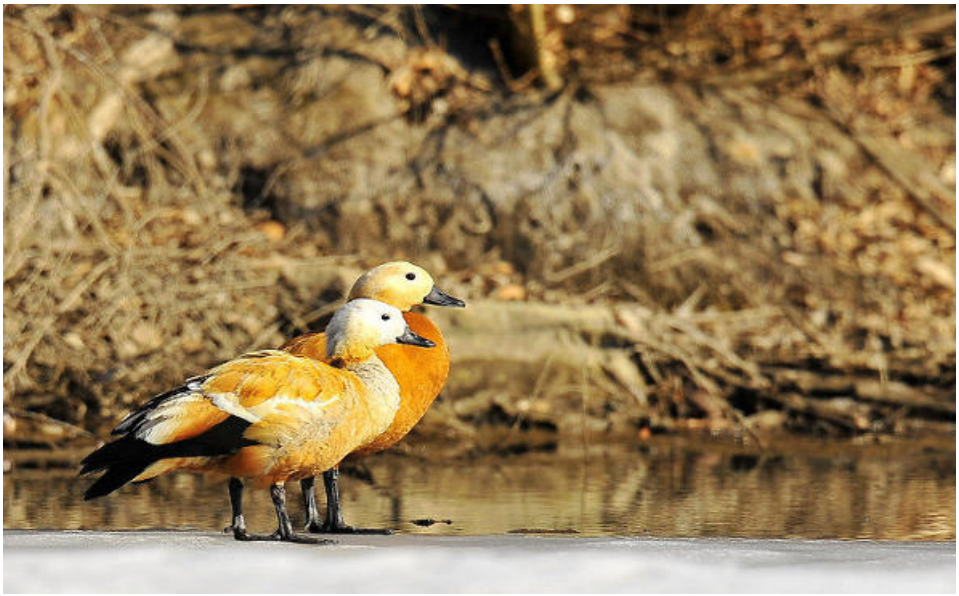
(1) Mallards (*Anas platyrhynchos*)



They are a kind of provincial key protected animal of Anhui Province. In the region of G206 project, part of them are resident birds and part are winter birds. In summer, they principally breed in Northeast China lakes and wetlands; in winter, they migrate to the location of the project in the middle and lower reaches of Yangtze River. In daytime, they mostly gather a colony to inhabit on the lake surface and the niver bank or hide in reeds. Up to the morning and dusk, they fly to the shallow water in farmland and lakes for foraging. They principally live on the vegetable food like leaves, buds, stems, algaes and seeds of wild plants and also eat the animal-based food such as mollusks,

crustaceas and aquatic insects. They also often go to farmland after harvest to forage the cereals scattered on the ground during autumn migration and overwintering.

(2) Ruddy Shelduck (*Tadorna ferruginea*)



They are a kind of principal key protected animal of Anhui Province, which are winter birds in the region of the project. They are widely distributed in the middle and lower reaches of Yangtze River in winter. Most of them are active on broad water surface like lakes, reservoirs and ponds. They principally live on the vegetable plants such as leaves, buds, seeds of aquatic plants, seedlings of crops and cereals and also eat animal-based food such as insects, crustaceans, mollusks, shrimps, frogs, earthworms, froglets and fingerlings. They mostly forage in dusk and early morning, sometimes they also forage in daytime. It is common that pairs or several ones forage scattered grains on the plough of both sides of the river and in shallow water of water side and water surface as well.

(3) Spot-billed Duck (*Anas poecilorhyncha*)

They are a kind of principal key protected animal of Anhui Province, breeding from Northeast, Inner Mongolia, North China, Gansu, Ningxia and Qinghai in the Northwest to Sichuan in our country. They overwinter in the south of Yangtze River, southern Tibet and Taiwan, and part of them stay in zones of the middle and lower reaches of Yangtze River East China, South China all year

round, as well as Taiwan and Yunnan. They chiefly inhabit in inland zones of diverse lakes, reservoirs, rivers, ponds, estuaries, sandbanks and marshland. During migration and winter, they appear in coastal and farmland zones. Except for breeding season, they are usually active in groups and also mix groups with other ducks. When being active, they often make pairs or scatter to small groups to swim on the water surface; they primarily concentrate in sandbeachs on the bank or small islands in water when resting. In the early morning and dusk, they gather a group to fly to nearby farmland, ditches, ponds and wetland for foraging. They chiefly eat the vegetable food. Commonly, their principal food are leaves, tender shoots, stems and roots of aquatic plants, aquatic algaes like Codium and algaes floating on water, grass seeds and cereal seeds. And they also eat the animal-based food like insects and mollusks.

(4) Kestrel (*Falco tinnunculus*)

They are a kind of national II level key protected birds, which are resident birds in the region of the project. Their habitat adaptation is strong. They are commonly seen in mountain forests, low mountains and hills, grassland, wilderness, forest plains, mixed forests with sparse plants in mountains, cultivated land, wilderness shrub grassland, forest edges, glades, open forests, wilderness with growth of sparse trees, river valleys and farmland in the middle and lower reaches of Yangtze River. Kestrels live on small-size vertebrates such as rats, Passeriformes birds, frogs, lizards, squirrels, snakes, and also eat insects like locusts, grasshoppers and crickets.

(5) Common Moorhen (*Gallinula chloropus*)

They are one of the dominant species in lakeshores/riverbank habitat along the project, which are

resident birds in the region of the project with broad distribution and large quantity. They inhabit in fresh water wetland, marshes, lakes, reservoirs, reed ponds, ditches, paddy fields abundant in reeds, aquatic and emerged plants in the middle and lower reaches of Yangtze River. They also emerge in zones of forest edges, ditches on roadsides and lakes and marshes in sparse forests. They are active and forage in daytime, chiefly swimming along the edge of aquatic plants, sometimes they wade to forage along shallow water on water side as well. They principally eat the food such as tender leaves, buds, rhizomes of aquatic plants and aquatic insects, worms, spiders, mollusks, snails and insect larvas. Among them is given priority to with Animal-based food

(6) Anser fabalis (*Alcedo atthis*)

They are a kind of principal key protected animals of Anhui Province, which are winter birds in the region of the project. As large-size wild geese, they are commonly seen as a large-scale colony in the middle and lower reaches of the Yangtze River, and they ordinarily get together with swan geese when inhabiting. They are not easy to be approached for they have alert characteristics. In overwintering in the region, they chiefly live on grain seeds, beans, wheat seedlings, potato, sweet potatoes, buds and leaves of plants and a few of mollusks. They principally forage on land. Usually, they forage in farmland, grassland and marshes near their habitats, sometimes they fly to relatively distant foraging place. Foraging principally occurs in the morning and afternoon. At noon, they chiefly rest in water surface in the lake or on the sandbeach on shoreside.

(7) Coot (*Fulica atra*)

They have no protection level. In the region of the project, part of them are resident birds and most are winter birds. They are widely distributed with large quantity. They inhabit in still waters of large area with aquatic plants. They are good at swimming and can dive to prey on fingerlings and aquatic plants. Their tails hang down and heads swing forward and backward when swimming; they can dive for a long time in face of enemies. They are polyphagia birds, primarily eats the fingerlings, shrimps, aquatic insects, tender leaves, buds, fruits of aquatic plants, rose buds and other various shrub berries and seeds, and algaes such as pondweed, amur foxtail, spirogyra, stonewort, hydrilla, ulothrix and najas marina brittle naiad as well. They explore to forage in soft soil or dead leaves, mainly seeking for invertebrates; their Species of the coarse beaks can tear down plants to eat the seeds, drupes, twigs and leaves, etc.

(8) Oriental Turtle Dove (*Streptopelia orientalis*)

They are included in *Lists of Terrestrial Wildlife under State Protection, which Are Beneficial or of Important Economic and Scientific Value*, which are resident bird in the region of G206 project. They are active in pairs or independently in open farming area, villages, around houses or near small ditches, foraging on the ground. Their food is principally cereal with kernels such as broomcorn, millet, sorghum, and they also eat the some seeds and kerns of camphor trees and newborn spiral shells, etc.

(9) Little Grebe (*Tachybaptus ruficollis*)

Small swimming bird, least concern species, a large number of resident birds exist in the project area. They often haunt singly or as a member of a pair, sometimes in 3-5 or more than 10. They usually forage by chasing into water in the daytime. They mainly feed on various small fishes, besides, some small aquatic invertebrates, such as shrimp, dragonfly larvae, tadpole, crustace, molluscs, and frog, and few aquatic plants like aqua-plant at times.

(10) Grey-capped Woodpecker (*Dendrocopos canicapillus*)

They are Anhui Provincial key protected animals, widely-distributed but less common. Resident birds exist in the G206 project area, mainly inhabiting in mountain lands, broad-leaved forest, mixed coniferous broad leaved forest, coniferous forest in plain, as well as spinney and secondary forest, and even in scattered arbors in the village edge and cultivated land. They often haunt singly or as a member of a pair, and family groups only occur during leaving nest with the young. They often play and forage in the upper part of the tree, and also downed log in the ground and forage in stumps at times.

(11) Long-tailed Shrike (*Lanius schach*)

They are Anhui Provincial key protected animals which are widely distributed in eastern and southern China. Resident birds exist in the G206 project area, breeding from April to July, with cupulate nest made of grass blade, bamboo leaf, twig, fern leaf, and other miscellaneous debris. They are inhabited in open plain and low mountain areas, haunting in countryside, orchard and bush, as well as grassland, bushwood, tea grove, clove forest and other open round. Standing in the low branch, they suddenly fly to catch flying inserts, and also often pounce on locust, beetle, and small birds on the ground.

(12) Ring-necked Pheasant（*Anas poecilorhyncha*）

They are Anhui Provincial key protected animals, and a large number of resident birds exist in the project area, widely distributed along the middle and lower in Yangzi River. They like to stay in hills with sprawling wilderness. In summer breeding season, they can be moved up the hillside.They proliferate and can transfer to high hillside in summer, and move to glassland near the mountain as well as the fields in winter. They feed on granivore, berry, seed, and inserts. They prefer to walk rather than fly for too long. During reproduction, they will simply nest in depressions of the bush or grass, with fallen leaves and withered grass inside.

(13) Great Tit (*Parus major*)

They are Anhui Provincial key protected animals, and resident birds exist in the project area. They

are inhabited in secondary broad-leaved forest, broad-leaved forest, and mixed coniferous broad-leaved forest in areas along the middle and lower of Yangzi River, also access to the woodland and coniferous forest. And which more active and bold nature, less fear of people. agile action, often jumping through branch, or low flying one tree to another with slight while singing. They mainly feed on leaf-beetles, scarab, tussock caterpillar, eucleid caterpillar, geometer caterpillar, culex, flowerfly, ant, bee, pine moth, hopper, stinkbug, ladybug, heuschrecken, etc.

Chapter IV Brief Analysis of Impact of Road Proposed on Birds Resources

This project will cause the existing massive habitats fragmentation in the area along the line, thus increasing the quantity of small plaque and edge of bird habitats, so that most birds and some other species, especially those are sensitive species to edge, which will avoid the roads duo to the decrease of habitat area and quality caused by noise and visual interference, etc. Due to the land occupation, construction, and emission of waste water and residue in the construction process, the environment along the project has changed, which causes the original inhabited birds in the region transfer to another place. Hence, the quantities and kinds of birds along the area will have certain decline in the early project construction.

(1) Impact of project implementation on widespread birds along the line

However, the survey discovers that along the section from Dongliu to Yaodu of G206 project proposed is mostly through farmland, lakeshore and riverside habitats, where have small quantities and kinds of birds, and the dominant species are mainly ring-necked pheasant, Lanius tigrinus, Motacilla alba and other resident birds, most of which are extremely habituated to artificial habitat and disturbance. Therefore, the above dominant species have strong adaptability of habitats, without height selection, so they have more choices for habitats around the project. In addition, as construction is gradually completed, trees and shrubs nearby project are bound to recover, thus providing more suitable habitats for the above birds with wider ecologic niche. Besides, some birds with strong adaptabilities, such as magpie, Lanius schach, Spotted Dove will quickly adapt to the artificial environment-road, and use it.

(2) Impact of project implementation on key protected birds along the project

This survey records 2 kinds of national key protected birds altogether: kestrel and peregrine falcon. They both are small birds of prey, as the top predators in the food chain, which have smaller distribution density, larger domain, smaller distribution population around the project, but wider range of activity. They mainly feed on small rodents, which are mostly located in farmland, water area, and open area in the edge of forest land. The kestrel and peregrine falcon within the project area due to the large range of activities, so they have relatively extensively food sources small birds, rodents, small reptiles and even larger size insects can be as a source of food, .During construction, as long as avoiding interfering their forestlands for reproduction, and the drive effect of high noise work control, this construction will have little impact on kestrel and peregrine falcon.

(3) Impact of project implementation on key regional protected birds

As the middle and lower reaches of Yangtze River (international water bird hot spot region), according to the data record of the location for the project, there exist large-size national level rare and protected water birds such as white-head cranes, white cranes, white storks, Dalmatian Pelican, etc. overwintering in project area, but there is no discovery in this investigation. This possibly because open water area of water bodies near the project such as Quanshui Lake, Xiaohuangni Lake and Tong Lake are relatively small, and fishery breeding exists in all the lake surface fundamentally; reclamation situation is serious along the lake. All these destroy the primitive habitat of the lake. Habitats characteristics have failed to conform to features of above-mentioned large-size birds on habitat selection, leading to no distribution of overwintering population, therefore, it is less likely that implement of G206 project will result in overwintering inhabitation's being affected for large-size rare birds.

(4) Impact on the concentrated habitats of birds

This survey discovers that woodland habitat has higher density of birds, diversity, and uniformity. But there are also fewer kinds and population quantity of non-national, and provincial key protected birds, in addition, the proposed G206 project is mainly through the lake and cultivated land, directly across the woodland is relatively few. Besides, in recent years, agricultural mechanization, rural road

construction and breeding birds in woodland, already have a certain anti-disturbance capabilities on noise, and nesting location itself is within the scope of human activities. Hence, the construction has little disturbance and impact on the area with various birds.

Chapter V Bird Protection Measures and Influence Mitigation Measures in the Area of Planned Road

(1) Block system and mitigation measure for corridor effect

The design and follow-up construction of the planned road G206 from Dongliu to Yaodu should reduce the corridor effect road, and the bridge and temporary facilities should avoid affecting the surrounding river system and hydrology, and try not to change the waterflow direction, or reduce the water-cross section, do not block the water flow, and try to lengthen the bridge to protect the natural vegetation under the bridge and culvert mouth in order to make the bridge and culvert the main passageway for the wildlife during this section, and provide convenient conditions for gene exchange and migration to the fishes, amphibians reptiles related to the birds during this section.

(2) Birds' habitat preservation measures

To reduce the effect of air-borne dust and muck on the surrounding environment during the construction, advanced construction technology should be adopted, such as double-wall steel cofferdams water proof is adopted for the construction of bridge's pier foundation, drill operation is carried out in the cofferdam. The waste residue produced in the construction should be transferred to designate place, and throwing the waste residue at the river way or lake beach is forbidden to prevent the raise of river bed resulting in loss of bird's habitat mudflat. When constructors work at wet land, temporary toilet and garbage can should be set and be disposed regularly by special-signed

person, and the sewage and waste should not be drained into wet land, and the construction materials shall not be discarded or stacked near the water to prevent the damages on birds and their food sources by the pollution and block the water.

(3) Wildlife preservation propaganda and construction management protection measures

The contractors and constructors should get lessons of environment protection and bird diversity preservation before the construction, and it is forbidden that constructors catch and kill bird around the construction site, or damage the vegetation or catch fishes, batrachia in the water which are important food source of bird. And provides that in the more concentrated period of the birds migration (Month 3-4 and 9-11 is the main birds migration time in the project area), the noise reduction shall be increased, and pause the construction that creates strong noise when necessary.

During the night construction, the influence of the light on the raptorial birds at night time should be considered, and the recorded phototaxis birds mainly include ardeidae, corncrake and etc., so, in the construction near water, the necessary shading facilities and lamplight control are suggested to be implemented in order to avoid the lamplight directly projected on water surface and reduce unnecessary lighting time, etc., in addition, can also be reduced the rate of accidentally injure of bird that fly into the construction area due to the lamplight attracting.

(4) Bird habitat recovery measures

After construction, the road should be afforested timely which include road on both sides of the mainline, median strip requires the different greening process, using landscape rebuilding to compensate the original land landscape damaged during the construction of road, so that the wildlife's habitat can be partially regenerated. In the landscape rebuilding, give more consideration to the adaption to local birds on nesting, breeding and foraging except greening tree species selection and collocation, and try to increase the fitness of local animals with the poor adaptability on to the rebuilding landscape.

Appendix 1 List on birds potentially distributed in the project area

Bird Name			Fauna type	Rsidence type	Protection or endangered grade
	Podicipedidae	**Podicipediformes**			
	Grebe	**Podicipedidae**			
1	Little grebe	*Tachybaptus ruficollis*	Widespread species	Resident birds	
2	Great Crested Grebe	*Podiceps cristatus*	Palaearctic species	Resident birds, Winter birds	
3	Grèbe Esclavon	*Podicepsa auritus*	Palaearctic species	Winter birds	Ⅱ
	Pelecaniformes	**Pelecaniformes**			
	pelecanidae	**Pelecanidae**			
4	Dalmatian Pelican	*Pelecanus crispus*	Palaearctic species	Winter birds	Ⅱ, Vulnerable
	Phalacrocoracidae	**Phalacrocoracidae**			
5	Great Cormorant	*Phalacrocorax carbo*	Widespread species	Winter birds	

	Ciconiiformes	**Ciconiiformes**			
	Ardeidae	**Ardeidae**			
6	Heron	*Ardea cinerea*	Widespread species	Resident birds, Winter birds	
7	Purple Heron	*Ardea purpurea*	Widespread species	Summer birds	
8	Great Egret	*Egretta alba*	Widespread species	Winter birds	
9	Intermediate Egret	*Egretta intermedia*	Widespread species	Summer birds	
10	Egret	*Egretta garzetta*	Oriental species	Summer birds, Resident birds	
11	Egretta Eulophotes	*Egretta eulophotes*	Oriental species	Summer birds	Ⅱ, Vulnerable
12	Cattle Egret	*Bubulcus ibis*	Oriental species	Summer birds	
13	Chinese Pond Heron	*Ardeola bacchus*	Oriental species	Summer birds	
14	Striated Heron	*Butorides striatus*	Oriental species	Summer birds	
15	Night Heron	*Nycticorax nycticorax*	Widespread species	Summer birds, Resident birds	
16	Ixobrychus Sinensis	*Ixobrychus sinensis*	Widespread species	Summer birds	
17	Cinnamon Bittern	*Ixobrychus cinnamomeus*	Widespread species	Summer birds	
18	Black Bittern	*Dupetor flavicollis*	Oriental species	Summer birds	
19	Eurasian Bittern	*Botaurus stellaris*	Palaearctic species	Winter birds	
	Ciconiidae	**Ciconiidae**			
20	Black Stork	*Ciconia nigra*	Palaearctic species	Winter birds	Ⅰ

21	Oriental White Stork	*Ciconia boyciana*	Palaearctic species	Winter birds	Ⅰ, Endangered
	Threskiornithidae	**Threskiornithidae**			
22	Eurasian Spoonbill	*Platalea leucorodia*	Palaearctic species	Winter birds	Ⅱ
	Anseriformes	**Anseriformes**			
	Anatidae	**Anatidae**			
23	Cygnet	*Cygnus columbianus*	Palaearctic species	Winter birds	Ⅱ
24	Swan Goose	*Anser cygnoides*	Palaearctic species	Winter birds	Endangered
25	Anser Fabalis Serirostris	*Anser fabalis*	Palaearctic species	Winter birds	
26	Greater White-fronted Goose	*Anser albifrons*	Palaearctic species	Winter birds	Ⅱ
27	Lesser White-fronted Goose	*Anser erythropus*	Palaearctic species	Winter birds	Vulnerable
28	Greylag	*Anser anser*	Palaearctic species	Winter birds	
29	Tadorna Ferruginea	*Tadorna ferruginea*	Palaearctic species	Winter birds	
30	Bergander	*Tadorna tadorna*	Palaearctic species	Winter birds	
31	Mandarin Duck	*Aix galericulata*	Palaearctic species	Winter birds	Ⅱ, Near threatened
32	Eurasian Wigeon	*Anas penelope*	Palaearctic species	Winter birds	
33	Falcated Teal	*Anas falcata*	Palaearctic species	Winter birds	Near threatened
34	Anas strepera	*Anas strepera*	Palaearctic species	Winter birds	
35	Sarcelle élégante	*Anas formosa*	Palaearctic species	Winter birds	Vulnerable
36	Greenwing	*Anas crecca*	Palaearctic species	Winter birds	
37	Mallard	*Anas platyrhynchos*	Palaearctic species	Winter birds,	

				Resident birds	
38	Anas poecilorhyncha	*Anas poecilorhyncha*	Widespread species	Resident birds	
39	Pintail	*Anas acuta*	Palaearctic species	Winter birds	
40	Sarcelle	*Anas querquedula*	Palaearctic species	旅	
41	Shoveller	*Anas clypeata*	Palaearctic species	Winter birds	
42	Tufted Duck	*Aythya fuligula*	Palaearctic species	Winter birds	
	Falconiformes	**Falconiformes**			
	Accipitridae	**Accipitridae**			
43	Hen Harrier	*Circus cyaneus*	Palaearctic species	Winter birds	II
44	Buse Variable	*Buteo buteo*	Palaearctic species	Winter birds	II
	Falconidae	**Falconidae**			
45	Kestrel	*Falco tinnunculus*	Widespread species	Resident birds	II
46	Peregrine Falcon	*Falco peregrinus*	Widespread species	Resident birds	II
	Galliformes	**Galliformes**			
	Phasianidae	**Phasianidae**			
47	Quail	*Coturnix japonica*	Palaearctic species	Resident birds, Winter birds	
48	Chinese Bamboo Partridge	*Bambusicola thoracica*	Palaearctic species	Resident birds	
49	Ring-necked Pheasant	*Phasianus colchicus*	Palaearctic species	Resident birds	
	Gruiformes	**Gruiformes**			
	Turnicidae	**Turnicidae**			
50	Yellow-legged Buttonquail	*Turnix tanki*	Palaearctic species	Winter birds	
	Gruidae	**Gruidae**			

51	White Crane	*Grus leucogeranus*	Palaearctic species	Winter birds	Ⅰ, Critically endangered
52	White-naped Crane	*Grus vipio*	Palaearctic species	Winter birds	Ⅱ, Vulnerable
53	Grey Crane	*Grus grus*	Palaearctic species	Winter birds	Ⅱ
54	White-head Crane	*Grus monacha*	Palaearctic species	Winter birds	Ⅰ, Vulnerable
	Rallidae	**Rallidae**			
55	Slaty-breasted Rail	*Gallirallus striatus*	Oriental species	Summer birds	
56	Water Rail	*Rallus aquaticus*	Widespread species	旅	
57	Brown Crake	*Amaurornis akool*	Oriental species	Summer birds	
58	White-breasted Waterhen	*Amaurornis phoenicurus*	Oriental species	Summer birds	
59	Ruddy-breasted Crake	*Porzana fusca*	Oriental species	Summer birds	
60	Watercock	*Gallicrex cinerea*	Oriental species	Summer birds	
61	Common Moorhen	*Gallinula chloropus*	Oriental species	Resident birds, Summer birds	
62	Coot	*Fulica atra*	Widespread species	Winter birds	
	Charadriiformes	**Charadriiformes**			
	Jacanidae	**Jacanidae**			
63	Pheasant-tailed Jacana	*Hydrophasianus chirurgus*	Oriental species	Summer birds	
	Rostratulidae	**Rostratulidae**			
64	Greater Painted-snipe	*Rostratula benghalensis*	Palaearctic species	Winter birds	
	Recurvirostridae	**Recurvirostridae**			
65	Black-winged Stilt	*Himantopus himantopus*	Widespread species	旅	

66	Pied Avocet	*Recurvirostra avosetta*	Palaearctic species	Winter birds	
	Charadriidae	**Charadriidae**			
67	Northern Lapwing	*Vanellus vanellus*	Palaearctic species	Winter birds	
68	Grey-headed Lapwing	*Vanellus cinereus*	Palaearctic species	Summer birds	
69	Long-billed Plover	*Charadrius placidus*	Palaearctic species	Summer birds, Winter birds	
70	Pluvier Petit-gravelot	*Charadrius dubius*	Palaearctic species	旅、Winter birds	
71	Kentish Plover	*Charadrius alexandrinus*	Palaearctic species	旅、Winter birds	
72	Greater Sand Plover	*Charadrius leschenaultii*	Palaearctic species	旅	
	Scolopacidae	**Scolopacidae**			
73	Pintail Snipe	*Gallinago stenura*	Palaearctic species	旅	
74	Swinhoe's Snipe	*Gallinago megala*	Palaearctic species	旅	
75	Common Snipe	*Gallinago gallinago*	Palaearctic species	旅	
76	Black-tailed Godwit	*Limosa limosa*	Palaearctic species	旅	Near threatened
77	Eurasian Curlew	*Numenius arquata*	Palaearctic species	Winter birds	
78	Eastern Curlew	*Numenius madagascariensis*	Palaearctic species	旅	
79	Spotted Redshank	*Tringa erythropus*	Palaearctic species	Winter birds	
80	Common Redshank	*Tringa totanus*	Palaearctic species	Winter birds	
81	Marsh Sandpiper	*Tringa stagnatills*	Palaearctic species	Winter birds	
82	Common Greenshank	*Tringa nebularia*	Palaearctic	Winter	

			species	birds	
83	Green Sandpiper	*Tringa ochropus*	Palaearctic species	Winter birds	
84	Wood Sandpiper	*Tringa glareola*	Palaearctic species	Passing bird	
85	Chevalier Guignette	*Actitis hypoleucos*	Palaearctic species	Passing bird	
86	Temminck's Stint	*Calidris temminckii*	Palaearctic species	Passing bird	
87	Dunlin	*Calidris alpina*	Palaearctic species	Winter birds	
88	Ruff	*Philomachus pugnax*	Palaearctic species	Passing bird	
	Lariformes	**Lariformes**			
	Laridae	**Laridae**			
89	Black-tailed Gull	*Larus crassirostris*	Palaearctic species	Winter birds	
90	Larus Argentatus	*Larus argentatus*	Palaearctic species	Winter birds	
91	Black-headed Gull	*Larus ridibundus*	Palaearctic species	Winter birds	
92	Saunders' Gull	*Larus saundersi*	Palaearctic species	Winter birds	Vulnerable
	Sternidae	**Sternidae**			
93	Common Tern	*Sterna hirundo*	Widespread species	Summer birds	
94	Whiskered Tern	*Chlidonias hybridus*	Widespread species	Summer birds	
	Columbiformes	**Columbiformes**			
	Columbidae	**Columbidae**			
95	Ental Turtle Dove	*Streptopelia orientalis*	Widespread species	Resident birds	
96	Red Turtle Dove	*Streptopelia tranquebarica*	Oriental species	Summer birds	
97	Spotted Dove	*Streptopelia chinensis*	Oriental species	Resident birds	
	Cuculiformes	**Cuculiformes**			
	Cuculidae	**Cuculidae**			

98	Hawk Cuckoo	*Cuculus sparverioides*	Oriental species	Summer birds	
99	Indian Cuckoo	*Cuculus micropterus*	Widespread species	Summer birds	
100	Himalayan Cuckoo	*Cuculus saturatus*	Widespread species	Summer birds	
101	Koel	*Eudynamys scolopaceus*	Widespread species	Summer birds	
102	Lesser Coucal	*Centropus bengalensis*	Oriental species	Summer birds	II
	Strigiformes	**Strigiformes**			
	Tytonidae	**Tytonidae**			
103	African Grass Owl	*Tyto capensis*	Palaearctic species	Resident birds	II
	Apodiformes	**Apodiformes**			
	Apodidae	**Apodidae**			
104	Pacific Swift	*Apus pacificus*	Oriental species	Summer birds	
	Coraciiformes	**Coraciiformes**			
	Alcedinidae	**Alcedinidae**			
105	Common Kingfisher	*Alcedo atthis*	Widespread species	Resident birds	
106	White-throated Kingfisher	*Halcyon smyrnensis*	Oriental species	Resident birds	
107	Black-capped Kingfisher	*Halcyon pileata*	Oriental species	Resident birds	
108	Ceryle Nudis	*Ceryle rudis*	Oriental species	Summer birds	
	Upupiformes	**Upupiformes**			
	Upupidae	**Upupidae**			
109	Hoopoe	*Eurasian Hoopoe*	Widespread species	Summer birds	
	Piciformes	**Piciformes**			
	Picidae	**Picidae**			
110	Jynx torquilla	*Jynx torquilla*	Widespread species	Passing bird	
111	Grey-capped Woodpecker	*Picoides canicapillus*	Widespread species	Resident birds	

112	Picoides Major	*Picoides major*	Widespread species	Resident birds	
113	Grey-headed Woodpecker	*Picus canus*	Widespread species	Resident birds	
	Passeriformes	**Passeriformes**			
	Alaudidae	**Alaudidae**			
114	Skylark	*Alauda arvensis*	Palaearctic species	Winter birds	
115	Oriental Skylark	*Alauda gulgula*	Oriental species	Summer birds	
	Hirundinidae	**Hirundinidae**			
116	Sand Martin	*Riparia riparia*	Palaearctic species	Summer birds	
117	Barn Swallow	*Hirundo rustica*	Palaearctic species	Summer birds	
118	Red-rumped Swallow	*Hirundo daurica*	Widespread species	Summer birds	
119	Delichon Urbica	*Delichon urbica*	Palaearctic species	旅	
	Motacillidae	**Motacillidae**			
120	Motacilla Alba	*Motacilla alba*	Palaearctic species	Resident birds	
121	Grey Wagtail	*Motacilla cinerea*	Palaearctic species	Summer birds	
122	Olive-backed Pipit	*Anthus hodgsoni*	Palaearctic species	旅	
123	Water Pipit	*Anthus spinoletta*	Widespread species	Winter birds	
	Campephagidae	**Campephagidae**			
124	Swinhoe's Minivet	*Pericrocotus cantonensis*	Oriental species	Summer birds	
	Pycnonotidae	**Pycnonotidae**			
125	Collared Finchbill	*Spizixos semitorques*	Oriental species	Resident birds	
126	Brown-breasted Bulbul	*Pycnonotus xanthorrhous*	Oriental species	Resident birds	
127	Pycnonotus Sinensis	*Pycnonotus sinensis*	Oriental species	Resident birds	

128	Black Bulbul	*Hypsipetes leucocephalus*	Oriental species	Summer birds	
	Laniidae	**Laniidae**			
129	Bull-headed Shrike	*Lanius bucephalus*	Palaearctic species	Summer birds	
130	Brown Shrike	*Lanius cristatus*	Palaearctic species	Summer birds	
131	Long-tailed Shrike	*Lanius schach*	Oriental species	Resident birds	
132	Chinese Grey Shrike	*Lanius sphenocercus*	Palaearctic species	Resident birds	
	Oriolidae	**Oriolidae**			
133	Black-naped Oriole	*Oriolus chinensis*	Widespread species	Summer birds	
	Dicruridae	**Dicruridae**			
134	Black Drongo	*Dicrurus macrocercus*	Oriental species	Summer birds	
135	Ashy Drongo	*Dicrurus leucophaeus*	Oriental species	Summer birds	
	Sturnidae	**Sturnidae**			
136	Crested Myna	*Acridotheres cristatellus*	Oriental species	Resident birds	
137	Black-collared Starling	*Gracupica nigricollis*	Palaearctic species	Summer birds	
138	Red-billed Starling	*Sturnus sericeus*	Oriental species	Summer birds	
139	Ashy starling	*Sturnus cineraceus*	Palaearctic species	Winter birds, Resident birds	
	Corvidae	**Corvidae**			
140	Eurasian Jay	*Garrulus glandarius*	Palaearctic species	Resident birds	
141	Cyanopica Cyana	*Cyanopica cyana*	Palaearctic species	Resident birds	
142	Cissa erythrorhyncha	*Urocissa erythrorhyncha*	Oriental species	Resident birds	
143	Grey Treepie	*Dendrocitta formosae*	Oriental	Summer	

			species	birds	
144	Magpie Robin	*Pica pica*	Palaearctic species	Resident birds	Near threatened
145	Corvus frugilegus	*Corvus frugilegus*	Palaearctic species	Winter birds	
146	Corvus corone	*Corvus corone*	Palaearctic species	Winter birds	
147	Jungle Crow	*Corvus macrorhynchos*	Palaearctic species	Winter birds	
148	Collared Crow	*Corvus torquatus*	Palaearctic species	Winter birds, Resident birds	
	Turdidae	**Turdidae**			
149	Red-flanked Bluetail	*Tarsiger cyanurus*	Palaearctic species	Winter birds	
150	Magpie Robin	*Copsychus saularis*	Oriental species	Summer birds	
151	Daurian Redstart	*Phoenicurus auroreus*	Palaearctic species	Winter birds	
152	Rhyacornis fuliginosus	*Rhyacornis fuliginosus*	Palaearctic species	Winter birds	
153	黑喉石鵖	*Saxicola torquata*	Widespread species	Summer birds	
154	Grey-backed Thrush	*Turdus hortulorum*	Palaearctic species	Winter birds	
155	Japanese Thrush	*Turdus cardis*	Widespread species	Passing bird	
156	Blackbird	*Turdus merula*	Oriental species	Resident birds	
157	Naumann's Thrush	*Turdus eunomus*	Widespread species	Winter birds	
	Monarchinae	**Monarchinae**			
158	Asian Paradise Flycatcher	*Terpsiphone paradisi*	Oriental species	Summer birds	
	Timaliidae	**Timaliidae**			
159	Masked Laughingthrush	*Garrulax perspicillatus*	Oriental species	Resident birds	

160	Moustached Laughingthrush	*Garrulax cineraceus*	Oriental species	Resident birds	
161	Rusty Laughingthrush	*Garrulax poecilorhynchus*	Oriental species	Resident birds	
162	Thrush	*Garrulax canorus*	Palaearctic species	Resident birds	Near threatened
163	Streak-breasted Scimitar Babbler	*Pomatorhinus ruficollis*	Oriental species	Resident birds	
164	Black-streaked Scimitar Babbler	*Pomatorhinus erythrocnemis*			
165	Rufous-capped Babbler	*Stachyris ruficeps*	Oriental species	Resident birds	
166	Red-billed Leiothrix	*Leiothrix lutea*	Oriental species	Resident birds	
	Paradoxornithidae	**Paradoxornithidae**			
167	Vinous-throated Parrotbill	*Paradoxornis webbianus*	Oriental species	Resident birds	
	Cisticolidae	**Cisticolidae**			
168	Zitting Cisticola	*Cisticola juncidis*	Oriental species	Resident birds	
169	Plain Prinia	*Prinia inornata*	Oriental species	Resident birds	
170	Sylviidae	*Sylviidae*			
171	Brown-flanked Bush Warbler	*Cettia fortipes*	Oriental species	Resident birds	
172	Black-browed Reed Warbler	*Acrocephalus bistrigiceps*	Palaearctic species	Summer birds	
173	Pallas's Leaf Warbler	*Phylloscopus proregulus*	Palaearctic species	Winter birds,	
174	Yellow-browed Warbler	*Phylloscopus inornatus*	Oriental species	Passing bird	
	Zosteropidae	**Zosteropidae**			
175	Japanese White-eye	*Zosterops japonicus*	Oriental species	Summer birds	
	Paridae	**Paridae**			
176	Coal Tit	*Parus ater*	Widespread species	Resident birds	
177	Tomtit	*Parus major*	Widespread	Resident	

			species	birds	
	Fringillidae	**Passeridae**			
178	Russet Sparrow	*Passer rutilans*	Widespread species	Resident birds	
179	Sparrow	*Passer montanus*	Widespread species	Resident birds	
	Estrildidae	**Estrildidae**			
180	White-rumped Munia	*Lonchura striata*	Oriental species	Resident birds	
	Fringillidae	**Fringillidae**			

Appendix 2 List of birds recorded in this survey

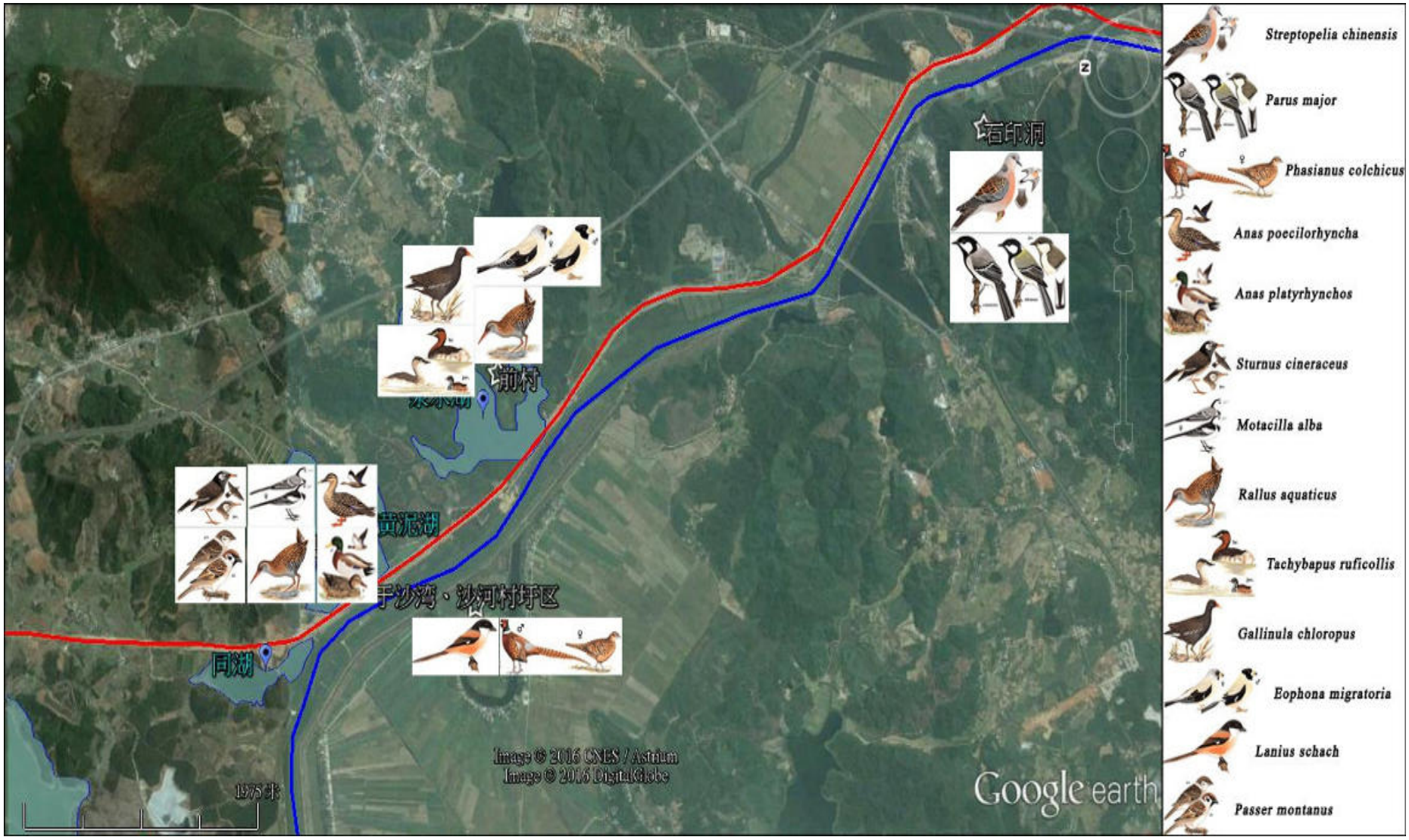
Order	Family	Chinese Name	Latin Name					Population	Fauna type	Residence type	Preservation grade
				Farmland	Forestry	Lakeshore/River bank	Water surface				
Podiciediformes	Podicipedidae	小䴙䴘	*Tachybaptus ruficollis*				□	++	Widespread species	Resident birds	
		凤头䴙䴘	*Podiceps christatus*				□	+	Palaearctic species	Winter birds	
Ciconiiformes	Ardeidae	苍鹭	*Ardea cinerea*			□	□	+	Oriental species	Summer birds	
		夜鹭	*Nyticorax nyticorax*			□	□	+	Widespread species	Resident birds	
		池鹭	*Ardeola bacchus*				□	+	Oriental species	Resident birds	
		绿鹭	*Butorides striatus*			□	□	+	Widespread species	Resident birds	Province Ⅱ
		白鹭	*Egretta garzetta*			□	□	++	Widespread species	Resident birds	Province Ⅱ
Anseriformes	Anatidae	罗纹鸭	*Anas falcata*				□	+	Palaearctic species	Winter birds	Province Ⅱ
		绿头鸭	*Anas platyrhynchos*				□	+	Palaearctic species	Resident birds	Province Ⅱ
		斑嘴鸭	*Anas poecilorhyncha*				□	++	Widespread species	Resident birds	Province Ⅱ
		赤麻鸭	*Tadorna ferruginea*			□	□	+	Palaearctic species	Winter birds	Province Ⅱ
		豆雁	*Anser fabalis*	□		□	□	+	Palaearctic	Winter	Province Ⅱ

									species	birds	
		白额雁	*Anser albifrons*	□		□	□	+	Palaearctic species	Winter birds	Province Ⅱ
Falconiformes	Accipitridae	红隼	*Falco tinnunculus*			□		+	Palaearctic species	Winter birds	State Ⅱ
		游隼	*Falco peregrinus*			□		+	Palaearctic species	Winter birds	State Ⅱ
Galliforms	Phasianidae	环颈雉	*Phasanus colchicus*	□	□	□		+	Palaearctic species	Resident birds	Province Ⅱ
Gruiformes	Rallidae	黑水鸡	*Gallinula chloropus*			□	□	+++	Oriental species	Resident birds	
		普通秧鸡	*Rallus aquqticus*			□	□	+	Widespread species	Resident birds	
		白骨顶	*Fulica atra*				□	+	Widespread species	Winter birds	
Columbiformes	Columbidae	山斑鸠	*Streptopelia orientalis*		□	□		++	Widespread species	Resident birds	
		珠颈斑鸠	*Streptopelia chinensis*	□	□	□		+	Oriental species	Resident birds	
Coraciiformes	Alcedinidae	普通翠鸟	*Alcedo atthis*				□	+	Widespread species	Resident birds	
		斑鱼狗	*Ceryle rudis*				□	+	Oriental species	Resident birds	
Upupiformes	Upupidae	戴胜	*Upupa epops*		□	□		+	Widespread species	Resident birds	Province Ⅱ
鴷形目 Piciformes	Picidae	星头啄木鸟	*Dendrocopos canicapillus*					+	Widespread species	Resident birds	Province Ⅱ
Passeriformes	Alaudidae	云雀	*Alauda arvensis*	□		□		++	Palaearctic	Winter	

									species	birds	
	Motacillidae	白鹡鸰	*Motacilla alba*		□		□	+	Palaearctic species	Resident birds	
		树鹨	*Anthus trivialis*		□	□		+	Palaearctic species	Winter birds	
	Pycnontidae	白头鹎	*Pycnonotus sinensis*	□	□	□	□	+++	Palaearctic species	Resident birds	
	Laniidae	棕背伯劳	*Lanius schach*	□	□			++	Oriental species	Resident birds	Province Ⅱ
	Dicruridae	黑卷尾	*Dicrurus macrocercus*	□	□	□	□	+	Oriental species	Summer birds	
	Sturnidae	灰椋鸟	*Sturnus cineraceus*	□	□			+++	Palaearctic species	Resident birds	
		丝光椋鸟	*Sturnus sericeus*		□			++	Widespread species	Resident birds	
		黑领椋鸟	*Gracupica nigricollis*		□			+	Palaearctic species	Resident birds	
	Corvidae	喜鹊	*Pica pica*	□	□	□		++	Widespread species	Resident birds	
		大嘴乌鸦	*Corvus macrorhynchos*	□	□			+	Palaearctic species	Winter birds	
		灰喜鹊				□		++	Widespread species	Resident birds	Province I
	Timallidae	黑脸噪鹛	*Garrulax perspicilatus*		□			+	Oriental species	Resident birds	
	Turdidae	乌鶇	*Turdus merula*	□	□			+	Oriental species	Resident birds	Province Ⅱ
	Paradoxornithidae	棕头鸦雀	*Paradoxornis*			□		+	Oriental	Resident	

			webbianus						species	birds	
		震旦鸦雀	*Paradoxornis heudei*			□		+	Palaearctic species	Resident birds	
	Sylviidae	大苇莺	*Acrocephalus orientalis*			□		+	Palaearctic species	Passing Migrant	
	Paridae	大山雀	*Parus major*		□			+	Palaearctic species	Resident birds	Province Ⅱ
	Passeridae	麻雀	*Passer domesticus*	□	□	□		+++	Widespread species	Resident birds	
	Fringillidae	黑尾蜡嘴雀	Eophona migratoria	□	□	□		+++	Palaearctic species	Resident	
	Emberizidae	黄喉鹀	*Emberiza elegans*		□	□		++	Palaearctic species	Winter birds	
		田鹀	*Emberiza rustica*	□		□		+	Palaearctic species	Winter birds	
		苇鹀	*Emberiza pallasi*			□		++	Palaearctic species	Winter birds	
	Remizidae	中华攀雀	*Remiz consobrinus*			□		++	Palaearctic species	Winter birds	
Lariformes	Laridae	银鸥	*Larus argentatus*				□	+	Widespread species	Winter birds	
	Sternidae	白额燕鸥	*Sterna albifrons*				□	+	Palaearctic species	Summer birds	
		须浮鸥	*Chlidonias hybrida*				□	+	Palaearctic species	Winter birds	

Appendix 3 Distribution map of dominant birds in this survey



Appendix 4 Diversity map of birds in this survey