Environmental Monitoring Report

Semi-annual Report
January 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. 3)

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

January, 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

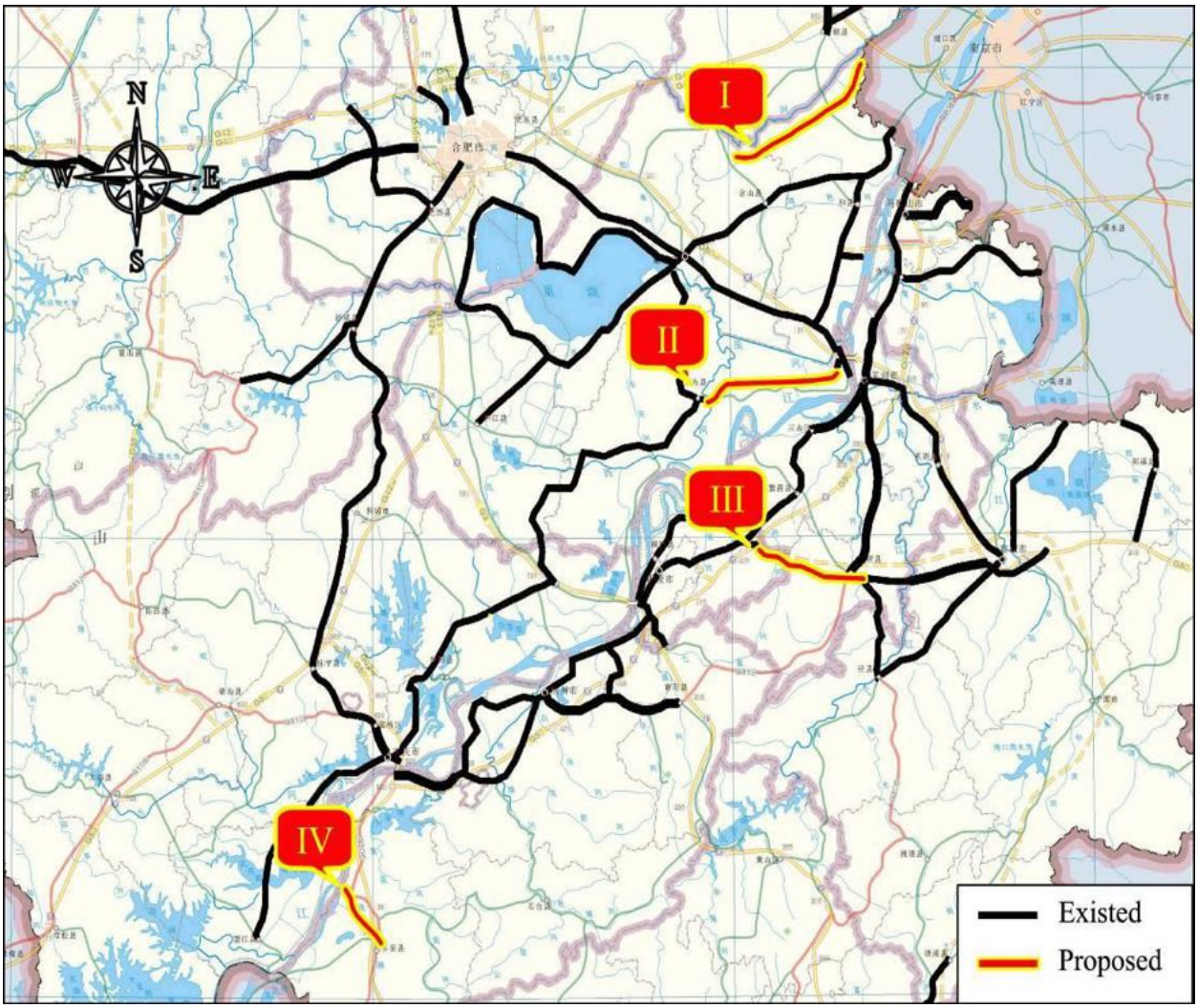

Figure 1: Location map of road subprojects

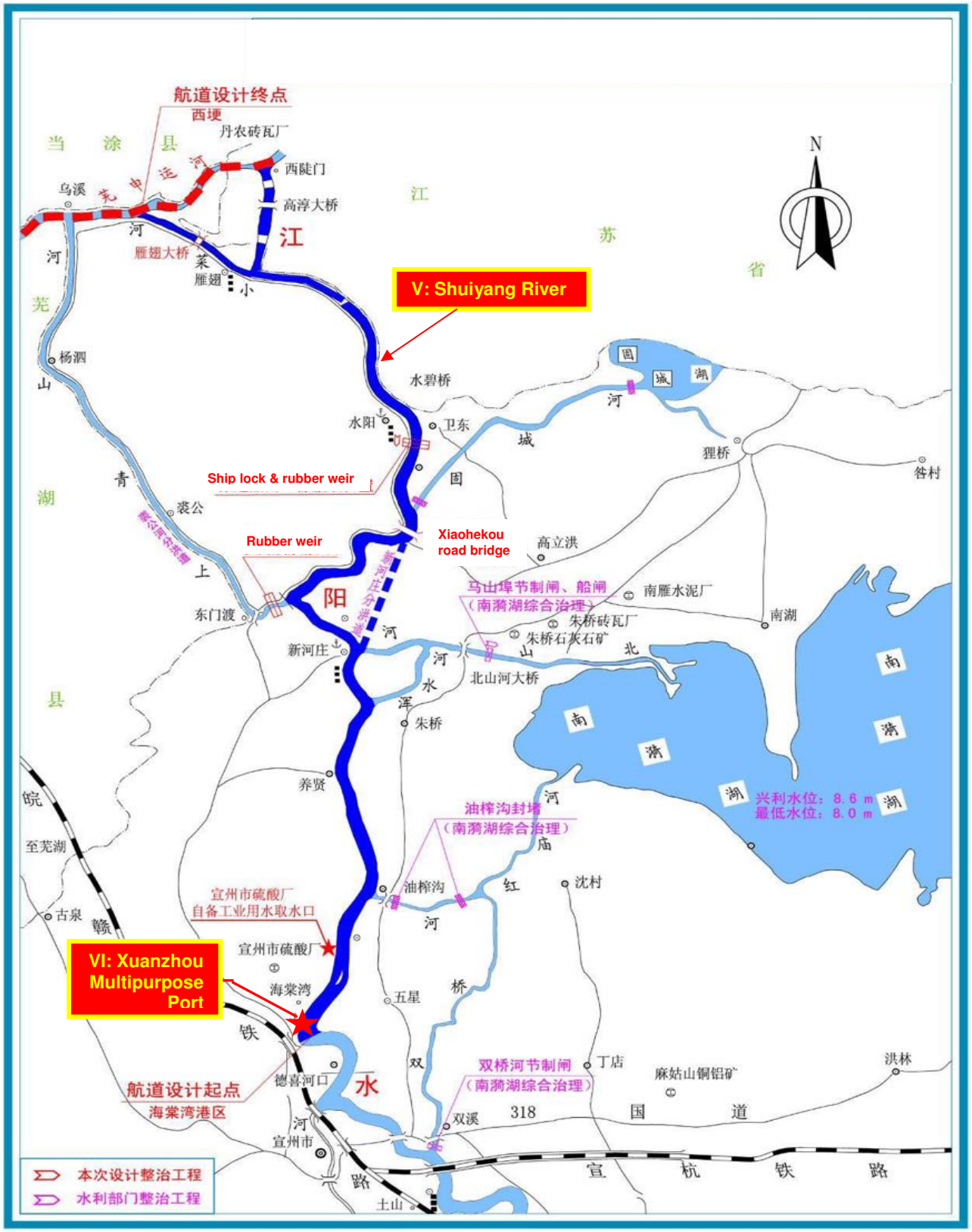

Figure 2: Location map of waterway subprojects

1.2 Purpose of Report

This is the third 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 July to 31 December 2015. 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. 3		
Prepared by	MA Qiqi	Submission date	15 January 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 31 December 2015, 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 31 December 2015)

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 m^3, earth fill 952,900 m^3 (vi) Pavement: asphalt concrete 457,750 m^2 (vii) Road drainage works 24,830 m^3	(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	Will undertake substantial construction mainly on subgrade, bridge and culvert works.

Subproject		Works Content	Implementation Status at the end of Reporting Period	Work Plan for Next 6 Months
		(viii) Total investment CNY617 million[3]	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.	
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 m^3, earth fill 416,800 m^3, protective works 132,000 m^3 (iii) Pavement: asphalt concrete 834,203 m^2 (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) Contract NO1-1: As of 31 December 2015, completed CNY8.51 million worth of works for 90,600 m^3 earth cut, 23,900 m^3 slab stone backfill, 4,300 m^3 gravel fill, 79,600 m^3 soil treatment with lime, and 53,600 m^2 geogrids. (ii) Contract NO1-2: As of 31 December 2015, completed CNY 5.7925 million work of works for 86,000 m^3 earth cut, 20,700 m^3 soft soil excavation, 24,900 m^3 slab stone backfill, 9,100 m^3 gravel backfill, 840 m PHC tubular piles, and 33 pile foundations for the Xi River Bridge.	Key activities will include backfilling with soil and gravel, side ditch and drainage ditch construction, bridge and culvert construction, bridge surface paving and guard rail works.
III	Yimu Higway Kedian to Mujiating Section	(i) Total length 22.36 km (ii) Paving of 695,900 m^2 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 (ii) Contract NO3-1 section: completed 0.4 covered culvert and 4 piling foundations as of 31 December 2015 (iii) Contract NO3-2 section: completed 2.5 covered culverts and 9 piling foundations as of 31 December 2015	Key activities will include backfilling with soil and gravel, side ditch and drainage ditch construction, bridge and culvert construction, bridge surface paving and guard rail works.
IV	G206 Dongliu to Yaodu Section	(i) Total length 16.6 km (ii) Paving of 481,052 m^2 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 80.9% of contract value as of 31 December 2015 consisting of: a) 291.5% completion on desilting of ponds (>100% due to actual quantity > computational quantity) b) 100% completion on haul road construction, clearing of existing road surface, cement piles, subgrade gravel sub-layer, box culverts, access roads, bored piles, collar beams, pier abutments, and capping beams c) Work in progress in decreasing order of % completion include: earth & rock backfill 93.53%, pipe culverts 88.2%, earth cut 80.15%, slab stone concrete retaining walls 74.33%, box girders (T-beam) pre-casting 69.48%, box girders (T-beam) installation 58.23%, bridge surface paving 27.78%, geogrids 25.5%, side ditches & drainage ditches 19.7%, guard rails 13.33% (ii) Contract NO2-2: the contractor is Anhui Road and Port Engineering Co. Ltd. Completed 74.53% of contract value as of 31 December 2015 consisting of: a) 285.13% completion on desilting of ponds (>100% due to actual quantity > computational quantity) and 133.33% completion on pipe culverts b) 100% completion on haul road construction, clearing of existing road surface, and subgrade gravel sub-layer c) Work in progress in decreasing order of % completion include: geogrids 97.56%, collar beams 97.26%, pier abutments 97.26%, capping beams 94.59%, earth & rock backfill 93.67%, earth cut 85.86%, box culverts 85.7%, cement piles 70.33%, box girders (T-beam) pre-casting 40%, box girders (T-beam) installation 32.86%, and slab stone concrete retaining walls 9.66%. d) The following did not commence during the reporting period: side ditches and drainage ditches, access roads, bridge surface paving, and guard rails.	Key activities will include backfilling with soil and gravel, side ditch and drainage ditch construction, bridge and culvert construction, bridge surface paving and guard rail works.
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	The contractor is Liaoning Road and Bridge Construction Group Co. Ltd. As of 31 December 2015, only the Xiaohekou road bridge had commenced construction works, with 10 pile foundations completed, and the completion rate was 19.2%	Complete the construction of the Xiaohekou road bridge and undertake pre-construction preparation for the low-water rubber weirs and the ship lock.

Subproject		Works Content	Implementation Status at the end of Reporting Period	Work Plan for Next 6 Months
		channel at Xiaohekou		
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 31 December 2015, 10 pile foundations were completed and the completion rate was 19.2%.	Undertake berth and approach bridge 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

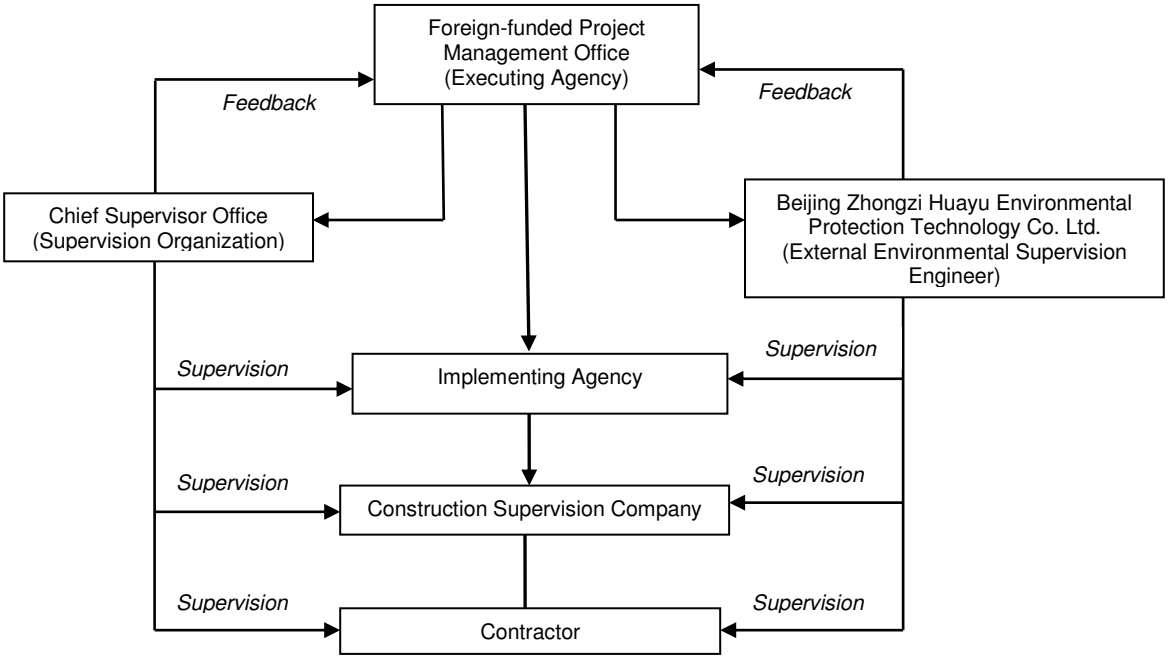

Figure 3: Environmental and construction management hierarchy

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 Section	Wuwei County	Wuwei County Transport Bureau	NO1-1	Anhui Road and Port Engineering Co. Ltd.	Anhui Highway 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			

Subproject		Jurisdiction	Implementing Agency	Contractor		Supervision Organization	
				Contract #	Company	Construction	Environmental
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.		
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 have 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 staffs 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.

Subproject		Environmental Quality Monitoring Organization / Status
II	S319 Erba-Wuwei Section	Wuwei County Environmental Monitoring Station
III	Yimu Higway Kedian to Mujiating Section	Nanling County Environmental Monitoring Station
IV	G206 Dongliu to Yaodu Section	Dongzhi County Environmental Monitoring Station
V	Shuiyang River Waterway Improvement	Subprojects in mobilization stage with limited advance works at the Xiaohekou bridge and the port. Environmental quality monitoring was in the tendering stage.
VI	Xuanzhou Multipurpose Port	

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		XIE Jun		T: 133 9951 2999
External environmental supervision engineer		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
I. S367 Ma'anshan North Passage Road	Implementing Agency: Ma'anshan City Highway Administration Bureau	HE Changsheng		T: 130 1311 7622
II. S319 Erba-Wuwei Section	Implementing Agency: Wuwei County Transport Bureau	ZHOU Xiusheng		T: 138 5652 4957
	Wuhu City Highway Administration Bureau	CHEN Ruisheng		T: 138 5658 0860
	Construction site office	ZHAO Tingting		T: 156 5698 9188
	Command Department	WANG Jun		T: 183 2533 5913
III. Yimu Higway Kedian to Mujiating Section	Implementing Agency: Nanling County Transport Bureau	YANG Yang		T: 189 1202 83792
	Construction site office	HOU Qingran		T: 139 5618 5818
	NO3-1 contractor: Jiangxi Yichun Highway Construction Group Co. Ltd.	BO Liang		T: 138 6685 0044
	NO3-2 contractor: Jiangxi Yichun Highway Construction Group Co. Ltd.	HU Yuezhi		T: 135 7618 8735
IV. G206 Dongliu to Yaodu Section	Implementing Agency: Chizhou City Highway Administration Bureau	WEN Fadong		T: 180 5667 3190 T: 139 5689 8908
	Construction supervision engineer site office: Anhui Zhongxing Engineering Supervision Co. Ltd.	LIU Zhiqiang		T: 186 5665 6676 E: 952648552@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
V. Shuiyang River Waterway Improvement	Subproject management office	LI Jing		T: 188 9533 8390
	Xiaohekou Bridge Chief Supervisor Office	NIU Tianyu		T: 156 5633 0060
VI. Xuanzhou Multipurpose Port	Implementing Agency: Anhui Province Ports and Shipping Construction Investment Group Co. Ltd	CHENG Guozheng		T: 151 7852 0328
	Chief Supervisor Office on site	CHENG Xingliao		T: 156 6555 6839
	Contractor: Anhui Road and Port Engineering Co. Ltd.	XU Chang		T: 170 9570 3327

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.

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.

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.

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.

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.

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.

2.3 Environmental Monitoring Data and Record

Table 8 summarizes the environmental quality monitoring programs for the six subprojects. Environmental quality monitoring for water quality, air quality and noise was undertaken for subprojects II (S319 Erba-Wuwei Section), III (Yimu Highway Kedian to Mujiating Section) and IV (G206 Dongliu to Yaodu Section) in the reporting period. The other three subprojects were in mobilization and advance works stage and no environmental quality monitoring was conducted in the reporting period.

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	5 Monitoring points: 1- near asphalt /cement mixing station 2 - on unpaved haul road near	4 monitoring points: 1- near asphalt /cement mixing station 2 - on unpaved haul road near	4 monitoring points: 1- near asphalt /cement mixing station 2 - on unpaved haul road near	2 monitoring points: 1 – near the Xiaohekou road bridge 2 – 10 m outside the boundary of the	2 monitoring points: 1 – at nearest sensitive receptor to construction activities 2 – at port

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**
		construction site 3 -Taodian Health Clinic 4 - Chuomiaoji	construction site 3 – Yonnan Central Primary School 4 – Boai Hospital 5 – Changba Primary School	construction site 3 – Bowen High School 4 – Wuxia Temple	construction site 3 - Zhazui 4 -Yangjia	construction site	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}					
	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 upstream & 50 m downstream of Dongfeng River bridge	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 downstream of Zhang River bridge 4 & 5 – 50 m upstream & 50 m downstream of Hougang River bridge	6 monitoring points: 1 & 2 – 50 m upstream and 50 m downstream of Xiaohuangni Lake 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	4 monitoring points at each of the 3 dredging sections: 1 – 50 m upstream of dredger 2 – 50 m 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 monitoring points : 1 – 50 m upstream of port structure 2 – 50 m downstream of port structure 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	Not applicable	

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
					respectively		
Monitoring entity		Not decided. Still in mobilization stage in reporting period	Wuwei County Environmental Monitoring Station	Nanling County Environmental Monitoring Station	Dongzhi County Environmental Monitoring Station & ornithologist	Not decided. Still in mobilization and advance works stage in reporting period	
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 chemical oxygen demand (COD). However, construction works for subproject II started on 10 August 2015. Monitoring data showed that COD exceedance had already occurred before works commencement, indicating that the exceedance reflected the ambient condition and was not works related.

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 showed exceedance of ammonium nitrogen (NH_4-N) on 15 October 2015 but compliance on 16 October 2015, indicating that the exceedance was an isolated incident.

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.

Monitoring data showed that the "real time baseline" approach was not undertaken for water quality monitoring at the Xi River bridge construction site in subproject II. Monitoring data also showed that SS levels at the impact station for Quanshui Lake #2 bridge in subproject IV (G206 Dongliu to Yaodu Section) exceeded the ADB standard on 31 August and 14 December 2015, but achieved compliance on the following days.

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_4-N	COD	
				mg/L	mg/L	mg/L	mg/L	mg/L	
II. S319 Erba-Wuwei Section	2015.07.20	Xi River	7.52	18	---	0.034	---	16.1	COD > category II standard for Xi River centralized drinking water source protection zone II
	2015.07.21		7.51	16	---	0.032	---	16.0	
	2015.08.18		7.58	19	---	0.030	---	15.8	
	2015.08.19		7.56	17	---	0.032	---	16.0	
	2015.10.10		7.68	15	---	0.028	---	15.5	
	2015.10.11		7.66	12	---	0.026	---	15.8	
III. Yimu Highway Kedian to Mujiating Section	2015.10.15	Zhang River bridge 50 m upstream	7.58	10	2.1	0.046	0.413	---	Complied with cat. II std.
		Zhang River bridge 50 m downstream	7.86	12	2.8	0.041	0.426	---	Complied with cat. II std.
		Zhang River water intake	7.16	10	2.4	0.042	0.511	---	NH_4-N > cat. II std.
		Hougang River bridge 50 m upstream	7.88	11	2.5	0.045	0.530	---	Complied with cat. IV std.
		Hougang River bridge 50 m downstream	7.20	10	2.2	0.043	0.503	---	Complied with cat. IV std.
		Hougang River water intake	7.23	12	3.0	0.047	0.523	---	Complied with cat. IV std.
	2015.10.16	Zhang River bridge 50 m upstream	7.80	12	2.2	0.045	0.485	---	Complied with cat. II std.
		Zhang River bridge 50 m downstream	7.66	11	2.3	0.046	0.486	---	Complied with cat. II std.
		Zhang River water intake	7.08	10	2.9	0.041	0.440	---	Complied with cat. II std.
		Hougang River bridge 50 m upstream	7.67	13	2.6	0.041	0.523	---	Complied with cat. IV std.
		Hougang River bridge 50 m downstream	7.56	11	2.6	0.045	0.496	---	Complied with cat. IV std.
		Hougang River water intake	7.14	13	2.8	0.045	0.485	---	Complied with cat. IV std.
IV. G206 Dongliu to	2015.08.31	Xiaohuangni Lake bridge 50 m upstream	8.70	61	---	0.03	0.606	5.82	Complied with cat. III std.
		Xiaohuangni Lake bridge 50 m	8.65	58	---	0.04	0.641	5.66	Complied with cat. III std.

Subproject	Monitoring Date	Monitoring Location	Parameters Monitored						Remark
			pH	SS	I_{Mn}	TPH	NH_4-N	COD	
				mg/L	mg/L	mg/L	mg/L	mg/L	
Yaodu Section		downstream							
		Quanshui Lake #1 bridge 50 m upstream	8.70	44	---	0.03	0.624	5.82	Complied with cat. III std.
		Quangshui Lake #1 bridge 50 m downstream	8.82	47	---	0.04	0.600	5.44	Complied with cat. III std.
		Quanshui Lake #2 bridge 50 m upstream	7.94	47	---	0.04	0.501	3.09	Complied with cat. III std.
		QuanshuiLake #2 bridge 50 m downstream	7.56	62	---	0.03	0.718	4.10	Complied with cat. III std. SS downstream >130% of upstream
	2015.09.01	Xiaohuangni Lake bridge 50 m upstream	8.62	52	---	0.04	0.583	5.50	Complied with cat. III std.
		Xiaohuangni Lake bridge 50 m downstream	8.67	55	---	0.04	0.622	5.71	Complied with cat. III std.
		Quanshui Lake #1 bridge 50 m upstream	8.59	56	---	0.04	0.581	5.66	Complied with cat. III std.
		Quangshui Lake #1 bridge 50 m downstream	8.56	53	---	0.03	0.616	5.47	Complied with cat. III std.
		Quanshui Lake #2 bridge 50 m upstream	8.06	52	---	0.04	0.527	3.26	Complied with cat. III std.
		QuanshuiLake #2 bridge 50 m downstream	7.76	46	---	0.04	0.674	4.04	Complied with cat. III std.
	2015.12.14	Xiaohuangni Lake bridge 50 m upstream	8.45	57	---	0.03	0.706	5.74	Complied with cat. III std.
		Xiaohuangni Lake bridge 50 m downstream	7.84	51	---	0.03	0.735	5.92	Complied with cat. III std.
		Quanshui Lake #1 bridge 50 m upstream	8.31	38	---	0.03	0.588	5.02	Complied with cat. III std.
		Quangshui Lake #1 bridge 50 m downstream	7.84	50	---	0.03	0.613	5.39	Complied with cat. III std.
		Quanshui Lake #2 bridge 50 m upstream	8.12	39	---	0.03	0.589	4.89	Complied with cat. III std.
		QuanshuiLake #2 bridge 50 m downstream	7.84	58	---	0.03	0.672	5.22	Complied with cat. III std. SS downstream >130% of upstream
	2015.12.15	Xiaohuangni Lake bridge 50 m upstream	8.27	49	---	0.03	0.714	5.90	Complied with cat. III std.
		Xiaohuangni Lake bridge 50 m downstream	8.02	62	---	0.04	0.663	5.83	Complied with cat. III std.
		Quanshui Lake #1 bridge 50 m upstream	8.11	44	---	0.02	0.642	5.42	Complied with cat. III std.
		Quangshui Lake #1 bridge 50 m downstream	7.93	46	---	0.02	0.529	5.61	Complied with cat. III std.
		Quanshui Lake #2 bridge 50 m upstream	8.18	43	---	0.04	0.544	5.01	Complied with cat. III std.
		QuanshuiLake #2 bridge 50 m downstream	8.09	51	---	0.03	0.704	4.94	Complied with 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 compliance with class II ambient air quality standard for TSP at the monitoring locations on the days of monitoring, except at the downwind locations of the asphalt mixing stations for both contracts in subproject IV (G206 Dongliu to Yaodu Section).

Table 10: Air quality monitoring data for the reporting period

Subproject	Monitoring Date	Monitoring Location	Daily Average TSP (mg/m^3)	Remark
II. S319 Erba-Wuwei Section	20-26 July 2015	Borrow pit	0.165 – 0.180	Complied with GB 3095-1996 class II std.
		Spoil disposal site #1	0.140 – 0.177	Complied with GB 3095-1996 class II std.
		Spoil disposal site #2	0.147 – 0.195	Complied with GB 3095-1996 class II std.
		Spoil disposal site #3	0.155 – 0.168	Complied with GB 3095-1996 class II std.
		Spoil disposal site #4	0.152 – 0.177	Complied with GB 3095-1996 class II std.
		Asphalt mixing station	0.120 – 0.188	Complied with GB 3095-1996 class II std.
		Yonnan Central Primary School	0.172 – 0.183	Complied with GB 3095-1996 class II std.
		Boai Hospital	0.105 – 0.116	Complied with GB 3095-1996 class II std.
		Changba Primary School	0.108 – 0.122	Complied with GB 3095-1996 class II std.

Subproject	Monitoring Date	Monitoring Location	Daily Average TSP (mg/m³)	Remark
	18-24 August 2015	Borrow pit	0.144 – 0.182	Complied with GB 3095-1996 class II std.
		Spoil disposal site #1	0.146 – 0.172	Complied with GB 3095-1996 class II std.
		Spoil disposal site #2	0.150 – 0.189	Complied with GB 3095-1996 class II std.
		Spoil disposal site #3	0.155 – 0.185	Complied with GB 3095-1996 class II std.
		Spoil disposal site #4	0.152 – 0.188	Complied with GB 3095-1996 class II std.
		Asphalt mixing station	0.146 – 0.180	Complied with GB 3095-1996 class II std.
		Yonnan Central Primary School	0.110 – 0.124	Complied with GB 3095-1996 class II std.
		Boai Hospital	0.107 – 0.118	Complied with GB 3095-1996 class II std.
		Changba Primary School	0.116 – 0.125	Complied with GB 3095-1996 class II std.
	12-28 October 2015	Borrow pit	0.158 – 0.188	Complied with GB 3095-1996 class II std.
		Spoil disposal site #1	0.145 – 0.178	Complied with GB 3095-1996 class II std.
		Spoil disposal site #2	0.140 – 0.175	Complied with GB 3095-1996 class II std.
		Spoil disposal site #3	0.152 – 0.181	Complied with GB 3095-1996 class II std.
		Spoil disposal site #4	0.147 – 0.180	Complied with GB 3095-1996 class II std.
		Asphalt mixing station	0.121 – 0.180	Complied with GB 3095-1996 class II std.
		Yonnan Central Primary School	0.118 – 0.123	Complied with GB 3095-1996 class II std.
		Boai Hospital	0.109 – 0.120	Complied with GB 3095-1996 class II std.
		Changba Primary School	0.112 – 0.134	Complied with GB 3095-1996 class II std.
III. Yimu Higway Kedian to Mujiating Section	15-21 October 2015	Bowen High School	0.105 – 0.134	Complied with GB 3095-1996 class II std.
		Contract NO3-1 asphalt mixing station	0.107 – 0.135	Complied with GB 3095-1996 class II std.
		Unpaved haul road	0.106 – 0.131	Complied with GB 3095-1996 class II std.
		Contract NO3-2 asphalt mixing station	0.104 – 0.130	Complied with GB 3095-1996 class II std.
		Wuxia Temple	0.107 – 0.136	Complied with GB 3095-1996 class II std.
IV. G206 Dongliu to Yaodu Section	31 August – 2 September 2015	Zhazui	0.223 – 0.256	Complied with GB 3095-1996 class II std.
		Yangjia	0.183 – 0.262	Complied with GB 3095-1996 class II std.
		Unpaved haul road at Guanshancunzhuang Upper Group	0.123 – 0.135	Complied with GB 3095-1996 class II std.
		Contract NO2-1 asphalt mixing station	0.244 – 0.376	> GB 3095-1996 class II std. on 1 & 2 SEP
		Contract NO2-2 asphalt mixing station	0.186 – 0.287	Complied with GB 3095-1996 class II std.
	14-16 December 2015	Zhazui	0.113 – 0.147	Complied with GB 3095-1996 class II std.
		Yangjia	0.094 – 0.156	Complied with GB 3095-1996 class II std.
		Unpaved haul road at Guanshancunzhuang Upper Group	0.103 – 0.167	Complied with GB 3095-1996 class II std.
		Contract NO2-1 asphalt mixing station upwind	0.194 – 0.238	Complied with GB 3095-1996 class II std.
		Contract NO2-1 asphalt mixing station downwind	0.209 – 0.452	> GB 3095-1996 class II std. on 14 & 16 DEC
		Contract NO2-2 asphalt mixing station upwind	0.144 – 0.203	Complied with GB 3095-1996 class II std.
		Contract NO2-2 asphalt mixing station downwind –	0.211 – 0.335	> GB 3095-1006 class II std. on 14 & 16 DEC
GB 3095-1996 Ambient air quality standards		**Class II**	**0.3**	

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 monitoring complied with the applicable standards.

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	22-24 July 2015	Datan Village	52.1	45.2	Complied with GB 3096-2008 cat. 2 std.
		Wuwei County Economic Development Area	53.7	42.3	Complied with GB 3096-2008 cat. 2 std.
		Yonnan Central Primary School	54.5	41.2	Complied with GB 3096-2008 cat. 2 std.
		Zhangwang Village	53.6	42.3	Complied with GB 3096-2008 cat. 2 std.
		Chenzhuang	52.5	45.0	Complied with GB 3096-2008 cat. 2 std.
		Wuwei Banqiao Primary School	54.6	46.2	Complied with GB 3096-2008 cat. 2 std.
		Hualong Village	54.0	43.3	Complied with GB 3096-2008 cat. 2 std.
		Changba Primary School	54.8	47.1	Complied with GB 3096-2008 cat. 2 std.
		Shazhuang Village	53.3	42.3	Complied with GB 3096-2008 cat. 2 std.
	20-22 August 2015	Datan Village	56.0	44.1	Complied with GB 3096-2008 cat. 2 std.
		Wuwei County Economic Development Area	54.3	42.0	Complied with GB 3096-2008 cat. 2 std.

Subproject	Monitoring Date	Monitoring Location	Noise Level [Leq(dB)A]		Remark
			Day Time	Night Time	
		Yonnan Central Primary School	55.2	43.7	Complied with GB 3096-2008 cat. 2 std.
		Zhangwang Village	53.7	44.5	Complied with GB 3096-2008 cat. 2 std.
		Chenzhuang	54.5	46.8	Complied with GB 3096-2008 cat. 2 std.
		Wuwei Banqiao Primary School	54.8	43.5	Complied with GB 3096-2008 cat. 2 std.
		Hualong Village	51.5	48.5	Complied with GB 3096-2008 cat. 2 std.
		Changba Primary School	57.3	43.7	Complied with GB 3096-2008 cat. 2 std.
		Shazhuang Village	56.0	44.6	Complied with GB 3096-2008 cat. 2 std.
	20-31 October 2015	Datan Village	51.7	46.5	Complied with GB 3096-2008 cat. 2 std.
		Wuwei County Economic Development Area	52.3	48.2	Complied with GB 3096-2008 cat. 2 std.
		Yonnan Central Primary School	54.6	45.5	Complied with GB 3096-2008 cat. 2 std.
		Zhangwang Village	53.3	46.1	Complied with GB 3096-2008 cat. 2 std.
		Chenzhuang	52.8	43.8	Complied with GB 3096-2008 cat. 2 std.
		Wuwei Banqiao Primary School	54.3	47.3	Complied with GB 3096-2008 cat. 2 std.
		Hualong Village	56.6	42.2	Complied with GB 3096-2008 cat. 2 std.
		Changba Primary School	54.4	41.8	Complied with GB 3096-2008 cat. 2 std.
		Shazhuang Village	52.5	42.2	Complied with GB 3096-2008 cat. 2 std.
III. Yimu Higway Kedian to Mujiating Section	15 October 2015	Bowen High School	57.1	42.0	Complied with GB 3096-2008 cat. 2 std.
		Contract NO3-1 asphalt mixing station point A	58.2	45.5	Complied with GB 12523-2011 std.
		Contract NO3-1 asphalt mixing station point B	54.4	46.1	Complied with GB 12523-2011 std.
		Contract NO3-2 asphalt mixing station point A	56.2	47.0	Complied with GB 12523-2011 std.
		Contract NO3-2 asphalt mixing station point B	53.9	46.2	Complied with GB 12523-2011 std.
		Wuxia Temple	55.5	42.3	Complied with GB 3096-2008 cat. 2 std.
	16 October 2015	Bowen High School	58.3	43.9	Complied with GB 3096-2008 cat. 2 std.
		Contract NO3-1 asphalt mixing station point A	56.2	42.5	Complied with GB 12523-2011 std.
		Contract NO3-1 asphalt mixing station point B	54.6	43.6	Complied with GB 12523-2011 std.
		Contract NO3-2 asphalt mixing station point A	57.0	41.8	Complied with GB 12523-2011 std.
		Contract NO3-2 asphalt mixing station point B	59.3	45.7	Complied with GB 12523-2011 std.
		Wuxia Temple	57.7	43.5	Complied with GB 3096-2008 cat. 2 std.
IV. G206 Dongliu to Yaodu Section	1 September 2015	Zhazui	53.5	43.6	Complied with GB 3096-2008 cat. 4a std.
		Yangjia	55.2	44.7	Complied with GB 3096-2008 cat. 2 std.
		Contract NO2-1 asphalt mixing station N boundary	58.9	53.9	Complied with GB 12523-2011 std.
		Contract NO2-1 asphalt mixing station S boundary	60.9	54.3	Complied with GB 12523-2011 std.
		Contract NO2-2 asphalt mixing station W boundary	56.7	47.2	Complied with GB 12523-2011 std.
		Contract NO2-2 asphalt mixing station S boundary	59.6	45.4	Complied with GB 12523-2011 std.
	2 September 2015	Zhazui	56.0	44.6	Complied with GB 3096-2008 cat. 4a std.
		Yangjia	55.1	43.4	Complied with GB 3096-2008 cat. 2 std.
		Contract NO2-1 asphalt mixing station N boundary	62.2	52.5	Complied with GB 12523-2011 std.
		Contract NO2-1 asphalt mixing station S boundary	60.9	54.0	Complied with GB 12523-2011 std.
		Contract NO2-2 asphalt mixing station W boundary	57.7	47.7	Complied with GB 12523-2011 std.
		Contract NO2-2 asphalt mixing station S boundary	58.3	46.9	Complied with GB 12523-2011 std.
	15 December 2015	Zhazui	51.2	42.4	Complied with GB 3096-2008 cat. 4a std.
		Yangjia	50.8	43.5	Complied with GB 3096-2008 cat. 2 std.
		Contract NO2-1 asphalt mixing station N boundary	66.4	54.0	Complied with GB 12523-2011 std.
		Contract NO2-1 asphalt mixing station S boundary	67.1	53.4	Complied with GB 12523-2011 std.
		Contract NO2-2 asphalt mixing station W boundary	60.5	50.7	Complied with GB 12523-2011 std.
		Contract NO2-2 asphalt mixing station S boundary	58.2	46.6	Complied with GB 12523-2011 std.
	16 December 2015	Zhazui	52.3	42.9	Complied with GB 3096-2008 cat. 4a std.
		Yangjia	51.6	44.0	Complied with GB 3096-2008 cat. 2 std.
		Contract NO2-1 asphalt mixing station N boundary	65.8	53.6	Complied with GB 12523-2011 std.
		Contract NO2-1 asphalt mixing station S boundary	67.4	54.3	Complied with GB 12523-2011 std.
		Contract NO2-2 asphalt mixing station W boundary	58.8	45.2	Complied with GB 12523-2011 std.
		Contract NO2-2 asphalt mixing station S boundary	55.3	45.9	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			**70**	**55**	

2.3.4 Ecology

Bird survey report/data for subproject IV G206 Dongliu to Yaodu Section along the lake from chainage K6+000 to K15+000 to be included in EMR No.4.

2.4 Environmental Institutional Capacity Building and Training

Table 12 presents capacity building and training plan and its implementation status. Table 13 presents the seminars and workshops conducted in the reporting period. Photographs for selected seminars and workshops are presented in Appendix II.

Table 12: 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 III Yimu Highway Kedian to Mujiating Section: training conducted on 2015.10.14. 2.Subproject IV G206 Dongliu to Yaodu Section: training conducted on 2015.12.15. 3.Subproject II S319 Erba-Wuwei Section: training conducted on 2015.12.16. 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 5. 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 measures	2 persons from FFPMO, each subproject implementing agency, each contractor and each construction supervision company	3 days	2014-2015	
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	Training for subprojects V & VI conducted on 2015.12.17. 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 5. 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 13: Environmental training seminars and workshops

Topic	Trainer	Attendee		Date
		Organization	No.	
ADB environmental safeguard policy and requirements, environmental management plan, environmental responsibilities, environmental site inspection, environmental quality monitoring and grievance redress mechanism	Alan Y. KWOK, ADB	FFPMO, contractors and supervision staffs	60	2015.08.27
Conducted construction site inspection and identified corrective actions	Alan Y. KWOK, ADB	FFPMO, IA, contractors and supervision staffs	10	2015.08.27
Subproject III Yimu Highway Kedian to Mujiating Section organizational structure, division of labor and responsibilities, requirements for construction supervision, and training on procedures, quality assurance, safety, etc. for the supervision engineers	1.WANG Qiaochu, chief engineer, BZHEPTCL 2.MA Qiqi, environmental engineer, BZHEPTCL 3.LI Shibin, environmental engineer, BZHEPTCL	FFPMO, IA, contractors and supervision staffs	30	2015.10.14
Subproject IV G206 Dongliu to Yaodu Section environmental management training, performing	1.WANG Qiaochu, chief engineer, BZHEPTCL 2.MA Qiqi, environmental engineer, BZHEPTCL	FFPMO, IA, and supervision staffs	10	2015.12.15

Topic	Trainer	Attendee		Date
		Organization	No.	
environmental supervision tasks, issues and problems of concern, compliance with related laws and regulations, and assignment of responsibilities for the organizations	3.LI Shibin, environmental engineer, BZHEPTCL			
Subproject II S319 Erba-Wuwei Section organizational structure, division of labor and responsibilities, requirements for construction supervision, and training on procedures, quality assurance, safety, etc. for the supervision engineers	1.WANG Qiaochu, chief engineer, BZHEPTCL 2.MA Qiqi, environmental engineer, BZHEPTCL 3.ZHANG Xiang, environmental supervision engineer, AHEPESTCL	Subproject management staffs, contractors and supervision staffs	20	2015.12.15
Training workshop for subproject V Shuiyang River Waterway Improvement and subproject 6 Xuanzhou Multipurpose Port: 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 5. Environmental supervision	1.WANG Qiaochu, chief engineer, BZHEPTCL 2.MA Qiqi, environmental engineer, BZHEPTCL 3.LI Shibin, environmental engineer, BZHEPTCL	FFPMO, IA, contractors and supervision staffs	40	2015.12.17
FFPMO 2015 second half comprehensive review and assessment 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	1.CHOU Dongqing, environmental engineer, BZHEPTCL 2.LI Shibin, environmental engineer, BZHEPTCL	FFPMO, IA, contractors and supervision staff	60	Planned for 2016.01.12
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 Shibin, environmental engineer, BZHEPTCL	FFPMO and IA, contractors and supervision staff for subproject I	30	Planned for 2016.01.15
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 14 presents the public consultation plan and implementation status as of 31 December 2015. 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.

Table 14: 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	Conducted once before subproject IV G206 Dongliu to Yaodu Section construction commencement
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 during the construction period
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					

3.2 Project Grievance Records and Resolution

No complaint had been received to date including the reporting period. The grievance redress mechanism (GRM) consists of a 3-step procedure as described below and shown in Figure 4. Table 15 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.

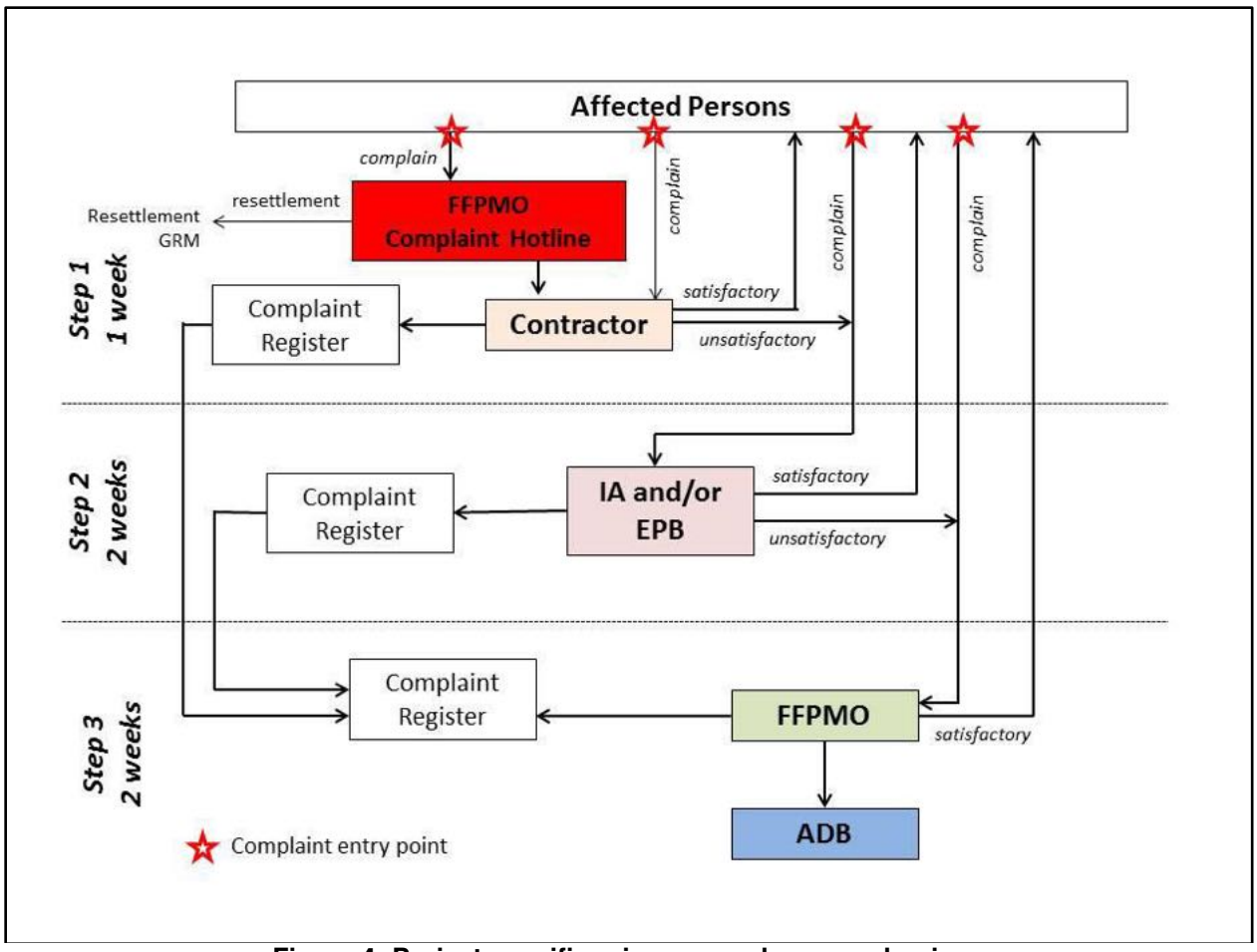

Figure 4: Project specific grievance redress mechanism

Table 15: Complaint hotline numbers and personnel for the grievance redress mechanism

Subproject	Hotline Number	Staff & Organization	Telephone Number
Foreign-funded project management office	0551-63756194	XU Benqing, FFPMO	152 5515 0716
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 COMPLIANCE WITH EMP REQUIREMENTS

Site inspections during the reporting period revealed that most of the EMP requirements were implemented (see Appendix 1). Isolated incidents related to unsatisfactory construction site practices were observed, mainly on site drainage, maintenance of sedimentation tanks and scattering of refuse and construction and demolition wastes. Corrective actions were identified as described below, which will be followed up in the next reporting period. Corrective actions identified in the previous reporting period were observed to be carried out in the reporting period.

4.1 Required Corrective Actions

Environmental issues observed in the previous reporting period and the respective corrective actions taken during this reporting period are shown in Table 16.

Table 16: Follow up actions on environmental issues observed in the last reporting period

Subproject	Environmental Issue observed in the Last Reporting Period and Corrective Action Required	Follow Up Inspection in the Reporting Period	
		Implemented	Description
IV. G206 Dongliu to Yaodu Section	1.Sedimentation tanks in asphalt mixing stations of contracts NO2-1 and NO2-2 needed timely cleaning to prevent overflow.	Yes	Sedimentation tanks cleaned with sludge removed to resume normal and effective operation.
	2.Sizes of sedimentation tanks in asphalt mixing station of contract NO2-2 too small. Suggested to increase size and to install cover and perimeter drainage ditches to prevent rain water from entering the sedimentation tanks causing overflow.	Yes	Sizes increased with installation of cover and perimeter drainage ditch.
	3.Scattering of refuse and construction and demolition wastes were observed on construction sites and temporary sites. Suggested centralized collection and storage locations with timely removal, and to strengthen awareness of workers on environmental management.	Yes	Sufficient refuse bins were provided. Material storage in assigned locations only. ESE during site inspection discussed the issues with workers and construction supervision entity to improve good site practice during routine inspections by the construction supervision entity.
	4.Material stockpiling in the asphalt mixing stations should not be higher than the height of the side boards.	Inadequate rectification	The heights of material stockpiling lowered to below side board heights. Nets were installed on top of side boards to prevent fugitive dust emission. However, material stockpiling in open areas was still observed during site inspection which would need to be rectified.
	5.Strict prohibition on tree felling and destruction of vegetation outside the construction land take areas.	Yes	Warning signs were erected on construction sites and environmental awareness training was provided to the workers.
	6.Discharge of wastewater from the workers into septic tanks	Yes	Septic tanks were installed on construction sites and construction camps to treat wastewater from workers.
	7.Speedy rehabilitation and re-vegetation of spoil disposal sites in contract NO2-1	Yes	Spoil disposal sites in contract NO2-1 were undergoing rehabilitation and re-vegetation.

The following environmental issues described in Table 17 were observed during the reporting period. Corrective actions were proposed and will be followed up in the next reporting period.

Table 17: Environmental issues observed in the reporting period and corrective actions proposed

Subproject	Environmental Issue Observed	Corrective Action Proposed
I. Ma'anshan North Passage Road	Construction phase commenced on 2015.12.20. Only contract NO4-4 had construction activities. The other 3 contracts were still in the mobilization stage. EMP requirements listed here were highlighted to the contractors.	1.Implement all environmental protection measures in strict accordance with EIA recommendations and EMP requirements. 2.Implement environmental quality monitoring as soon as possible in accordance with the environmental monitoring program 3.No night time construction in residential areas. If night time construction is needed, the contractor shall submit application for record and shall post public notice. 4.Strengthen supervision during bridge construction in the dry season to ensure no spillage of slurry into surrounding water body. 5.Install drainage ditches and guard rails along the perimeters of construction sites.
II. S319 Erba-Wuwei Section		1.Materials should be stockpiled in enclosed storage areas and not open stockpiling.
		2.Improve site drainage in asphalt mixing station.

Subproject	Environmental Issue Observed	Corrective Action Proposed
		3.Clean and maintain sedimentation tanks in asphalt mixing station regularly to lower the water level.
		4.Cover open stockpiles in contract NO1-2 section to prevent fugitive dust emission.
	Surface water quality monitoring	5.Monitoring locations on the Xi River during Xi River bridge construction should have one upstream control station and one downstream impact station for SS monitoring according to ADB requirement. 6.Review bridge construction method and effectiveness of the slurry containment pond for the Quanshui River #2 bridge construction since downstream SS levels exceeded upstream SS levels by >130% on two occasions.
III: Yimu Highway Kedian to Mujiating Section		1.Strengthen supervision during bridge construction in the dry season to ensure no spillage of slurry from containment pond into the water body.
		2.Install drainage ditches and guard rails along the construction site boundaries.
IV. G206 Dongliu to Yaodu Section		1.Rehabilitate and stabilize those damaged slopes in contract NO2-1 section.

Subproject	Environmental Issue Observed	Corrective Action Proposed
		2.Clean drainage ditches alongside construction sites to improve site drainage in preparation for the upcoming rainy season.
		3.Clean up and remove construction and demolition wastes near the end section of contract NO2-1.
		4.Clean up and remove packaging materials in the girder construction area in contract NO2-2 section.
	TSP exceedance downwind of asphalt mixing stations for both contracts NO2-1 and NO2-2	5.Review and improve dust suppression measures at the asphalt mixing stations for both contracts.
	Bird survey	6.Conduct bird survey along the lake from chainage K6+000 to K15+000 for two days each in transitional and winter seasons according to the monitoring plan.
V. Shuiyang River Waterway Improvement		1.Prevent oil leakage from machineries.
		2.Provide sufficient refuse bins on construction sites and improve the collection and management of refuse. 3.Implement environmental quality monitoring as soon as practicable.

Subproject	Environmental Issue Observed	Corrective Action Proposed
VI: Xuanzhou Multipurpose Port		1.Strengthen embankment protection to prevent slurry and muddy water from entering into the Shuiyang River. 2.Implement environmental quality monitoring as soon as practicable.

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 Action
Detailed Design Stage					
See Project Specific EMPs		Ensure that the mitigation measures are adopted in detailed design	● APDOT PPMO to appoint ESE	Complied. Beijing Zhongzi Huayu Environmental Protection Technology Co. Ltd. was commissioned as the ESE through open tendering	None
Pre-construction Phase					
Institutional strengthening	-	Lack of environment management capacity within APDOT PPMO	● Appoint one qualified environment specialists to APDOT PPMO. ● Appoint one Environmental Monitoring Station to conduct environment quality monitoring during construction stage. ● ESE to conduct first phase of environment management training for APDOT PPMO staff and environmental specialists. ● ESE to conduct environmental management training for contractors	Complied. Partially complied. 3 EMSs had been commissioned. Complied. Complied	3 subprojects were still in mobilization and advanced works stage. EMSs for these 3 subprojects will be commissioned prior to construction works commencement.
	-	Lack of environment management and monitoring capacity within IA LPMOs	● Each IA establishes LPMO and appoints one qualified environmental specialist to staff ● ESE to conduct initial environment management training for the IA LPMOs. ● ESE to provide follow on training.	Complied Complied Complied	None
EMP update	-	-	● Review mitigation measures defined in the EMP. ● Update as required to reflect detailed design. ● Submit to ADB/PPMO for approval and disclose updated EMP on project website. ● Prepare an environmental compliance monitoring plan to meet the environmental requirements in the EIA and EMP.	Complied No need to update during the reporting period Complied	None
Grievance redress mechanism	Social & environmental	Handling and resolving complaints by	● Establish a GRM, appoint a GRM coordinator within APDOT PPMO, each IA LPMO and each contractor.	Complied	None

	Impact Factor	Potential Impact and/or Issues	Mitigation Measures	Compliance	Corrective Action
		contractors	● Brief and provide training to GRM access points. ● Disclose GRM to affected people before construction begins at the main entrance to each construction site.	Complied Complied	
Tender documents		Environmental and social impacts	Ensure that the construction-related environmental and social mitigation measures are incorporated into the tender documents. This should include a clause to employ a proportion of locally sourced workforce.	Complied	None
Construction traffic	Traffic	Construction vehicles causing traffic congestion	● Plan transport routes for construction vehicles. ● Specify approved routes in the tender documents and forbid vehicles from using other roads especially during peak traffic hours. ● Inform drivers of haulage routes ● Separate construction traffic from pedestrians. Do not allow local villages to walk through construction sites.	Complied Complied Complied Complied	None
Construction Stage					
Construction site good practice	Soil resources	Soil stripping	● Strip topsoil and subsoil and store the soil horizons separately, protecting the top soil for reuse in restoration. ● Stockpiles are not to exceed 2m with side slopes at the natural angle of repose. ● Topsoil to be stored for a long time may be seeded with grass.	Complied Complied Complied	None
	Soil resources	Soil erosion	● Ensure contractors are aware of all soil erosion requirements as set out in the approved Water and Soil Conservation Plans and have developed appropriate method statements and management proposals. ● Where possible, avoid construction during periods of high rainfall. If necessary, construct berms to direct rainwater runoff away from exposed surface. ● Install drainage ditches and sedimentation pits in temporary construction areas to prevent soil erosion and to manage site run-off. ● Stabilise all cut slopes, embankments and other erosion-prone working areas while works are ongoing. Implement permanent stabilisation measures as soon as possible, at least within 30 days. ● Pay close attention to drainage provision and establishment of vegetation cover on backfilled areas to prevent soil erosion.	Complied Basically complied Complied Basically complied Complied	None

	Impact Factor	Potential Impact and/or Issues	Mitigation Measures	Compliance	Corrective Action
	Soil resources	Soil contamination	● Properly store petroleum products, hazardous materials and wastes on an impervious surface and preferably with a tray or bund to contain any leaks. ● Develop spill response plan. Keep a stock of absorbent materials (e.g. sand, earth or commercial products) on site to deal with spillages and train staff in their use. ● If there is a spill, take immediate action to prevent pollution entering drains, 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 any spill events and actions taken in environmental monitoring logs and report to ESE; and ● Remove all construction waste from the site to licensed waste disposal sites.	Complied Not complied Did not occur during the reporting period Did not occur during the reporting period Complied	Each contractor to develop a spill response plan, keep stock of absorbent materials on site and train staff in their use
Construction site good practice	Air quality	Dust (TSP) during construction	●		None
		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.	No such facility in the reporting period No such facility in the reporting period Complied	None
	Air Quality	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 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;	Complied Complied Complied Complied Complied	None

	Impact Factor	Potential Impact and/or Issues	Mitigation Measures	Compliance	Corrective Action
			● Prohibit the burning of waste on site; and	Complied	
			● Vehicles and plant shall be switched off when not in use.	Complied	
	Noise	Noise from powered mechanical equipment and vehicles	● Sensibly schedule construction activities, avoid noisy equipment working concurrently.	Complied	None
			● Specify equipment and machinery that conforms to PRC noise standard GB12523-90 and ensure regular maintenance.	Complied	
			● Select advanced quiet equipment and construction method, and tightly control the use of self-provided generators.	Complied	
			● Comply with local requirements in areas with sensitive receptors very close by, avoiding construction works, particularly noisy activities such as piling and compaction from 2200 to 0600.	Complied	
			● 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.	Complied	
			● Control the speed of bulldozer, excavator, crusher and other heavy plant travelling on site.	Complied	
			● 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 sites at night.	Complied	
			● 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.		
	Natural drainage lines	Control of drainage and flooding on site	● Locate temporary working and storage areas away from drainage lines		None
			● Provide temporary drainage at construction sites	Complied	
			● 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	

	Impact Factor	Potential Impact and/or Issues	Mitigation Measures	Compliance	Corrective Action
	Water Quality	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 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	Basically complied Slurry from piling diverted to settling ponds Complied Not yet necessary in the reporting period Complied Complied	None
		Construction site wastewater discharge	● Provide temporary toilets sufficient for the size of the workforce at canteens, construction camps and major construction sites. ● Septic tanks must be emptied periodically and the contents transported to the Municipal wastewater treatment plant 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 site to treat process water and muddy runoff.	Complied Complied Complied Complied Complied	None
	Solid waste	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	Complied	None

	Impact Factor	Potential Impact and/or Issues	Mitigation Measures	Compliance	Corrective Action
			sites, to create stable landforms; ● Spoil disposal sites must be approved in advance; ● Revegetate spoil disposal sites at the earliest opportunity.	 Complied Not yet occurred in the reporting period	
		Construction site refuse	● Set up centralized domestic and construction waste collection point(s). ● Sort material 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 Complied Complied Complied Complied Complied	None
	Ecology	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 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.	Comply Comply	None
		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.	None found on site in the reporting period None found on site in the reporting period	None
			● 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
		Greening	● Implement the revegetation plans, which may include seeding with grass and planting trees and shrubs.	Not yet occurred in the reporting period	None
	Physical cultural resources	Destruction of cultural relics	● Contractor to comply with PRC's Cultural Relics Protection Law and Cultural Relics Protection Law Implementation Regulations ● If relics are discovered, stop work immediately and protect the site; notify the supervising entities and	Complied None found on site in the reporting period	None

	Impact Factor	Potential Impact and/or Issues	Mitigation Measures	Compliance	Corrective Action
			the local Cultural Relics Bureau; and only start construction after approval by the Cultural Relics Bureau; ● Educate workforce on these procedures.	 Complied	
Health and Safety	Occupational health and safety	Construction site sanitation	● Effectively clean and disinfect the site, including disinfection of toilets and waste disposal sites, and ensure timely removal of solid waste; ● Exterminate rodents on site 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 disinfection.	Complied Complied Complied Complied	None
		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. ● 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	Complied Complied Complied Not yet occurred in reporting period Complied Complied Complied Complied	None

	Impact Factor	Potential Impact and/or Issues	Mitigation Measures	Compliance	Corrective Action
			the chambers for the ship lock	Complied	
			● Provide adequate waste receptacles and ensure regular collection and disposal.	Complied	
			● Ensure that Contractors have adequate worker and third party insurance cover.	Complied	
			● No children (less than 14 years of age) to work on any contract.		
		Food safety	● Provide a secure source for drinking water at the construction camps	Complied	
			● Inspect and supervise food hygiene in canteens on site regularly.	Complied	
			● Canteen workers must have valid health permits.	Complied	None
			● Once food poisoning is discovered, implement effective control measures immediately to prevent it from spreading	None occurred in reporting period	
		Disease prevention and safety awareness	● Construction workers must have physical examination before start working on site.	Complied	
			● Provide annual health checks.	Not yet necessary in reporting period	
			● If infectious disease is found, the patient must be isolated for treatment to prevent the disease from spreading.	Complied	
			● 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.	Complied	
			● Specify the person responsible for health and epidemic prevention responsible for the education and propaganda on food hygiene and disease prevention to raise the awareness of workers.	Complied	None
			● Regularly inspect works to ensure there are no areas of stagnant water that could provide breeding grounds for malaria, encephalitis and dengue fever mosquitoes.	Not on Chinese List	
			● Regularly inspect works to ensure that there are no breeding grounds for the host snail for schistosomiasis	Complied	
			● Provide training to the workforce on disease prevention and safety awareness	Complied	
			● 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	Checks were carried out and no disease was found in reporting	

	Impact Factor	Potential Impact and/or Issues	Mitigation Measures	Compliance	Corrective Action
			disease is found. ● Inform the local Schistosomiasis Prevention and Treatment Office and report the incidence to the local Health Administrative Department	period Complied	
	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	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	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 issues. ● All sites will be made secure, discouraging access by members of the public through fencing or security personnel, as appropriate.	Complied Complied	None
		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 Complied	None
Demobilisation	Site cleanup	Site remediation and restoration	● Contractor to keep a schedule of all temporary land prior land use, and land occupiers ● 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	Complied Complied Complied Complied	None

	Impact Factor	Potential Impact and/or Issues	Mitigation Measures	Compliance	Corrective Action
			the environmental acceptance review on completion. ● Latrines must be removed and the site disinfected and infilled. Sewage sludges may be spread on agricultural land.	 Complied	
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 Complied Complied	None
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	None
		Emergency planning	● Prepare an emergency response plan	Not yet necessary in the reporting period	None

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	Not yet started in the reporting period (should have completed detailed design)	None
	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.	Not yet started in the reporting period (should have completed detailed design)	None
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	Not yet started in the reporting period (should have completed detailed design)	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 document)* c. *Temporary Method for Environmental Management of Soil on Contaminated Sites (consultation document)* d. *Technical Guidelines for Environmental Monitoring of Sites (consultation document)*	Complied Complied Complied Complied Complied Complied	Need to submit all documents, reports and soil monitoring data to ADB for review.

Item	Impact Factor	Potential Impact and/or Issues	Mitigation Measures	Compliance	Corrective Action
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	Complied	None
			● Review the design for scour protection on bridge piers and re-formed channel banks for more frequent, high magnitude flows.	Complied	
			● Provide piped drainage off the bridge	Complied	
	Health and Safety	Promote access for non-motorised transport and pedestrians	● Design must ensure public health and safety.	Complied	None
			● Promote non-motorized traffic with 2m lane for NMT along both carriageways.	Complied	
Xuanzhou Multipurpose Port	Soil resources	Land raising	● Confirm volume of spoil required for land-raising and the capacity of the donor site	Complied	None
	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	Complied	None
			● Select loading / unloading equipment that minimizes the entrainment of fine grained materials	Complied	
			● Include measures such as screening and dust suppression into the design of the facility	Complied	
	Noise	Noisy activities during construction and operation	● Calculate construction noise during typical and noisy activities, and identify further mitigation required to attenuate noise levels	Complied	None
			● 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	Complied	
			● Select plant and equipment with low noise levels.	Complied	
			● Site noisy operational equipment in acoustic housing and away from sensitive receptors	Complied	
			● Design fencing and landscaping around the port perimeter	Complied	
	Solid wastes	Safe disposal of solid wastes arising during operation	● Identify type and volume of different waste streams	Complied	None
			● Make provisions for waste segregation and temporary storage prior to disposal off site	Complied	
			● Identify licensed off-site disposal routes, including re-use, recycling and final disposal to landfill	Complied	
	Water quality	Wastewater discharge	● Review the need to treat wastewater from ships	Complied	
			● Design a small package plant on site to treat domestic wastewater	Complied	
			● Design systems for stormwater drainage, collection and treatment of water used on site eg wash down water and oil separators	Complied	

Item	Impact Factor	Potential Impact and/or Issues	Mitigation Measures	Compliance	Corrective Action
	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	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 the disease Schistosomiasis	● Verify locations where schistosomiasis is present in villages along the Shuiyang River ● Liaise with the local health authorities to develop a suite of mitigation measures to prevent the 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 Complied	None
Conservation of soil and land resources	Soil resources	Loss of land and topsoil and increased risk of erosion	● Minimise permanent and temporary landtake for development. ● Retain/incorporate landscape features of interest in design. ● Maximise reuse of spoil within the construction or adjacent construction works. ● Agree spoil 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 specific bio-engineering functions. ● Design appropriate drainage systems for the dump sites for the dredged spoil to control runoff and sedimentation.	Complied Complied Complied Complied Complied Complied Complied	None
Construction Stage					
Shuiyang River Improvement Works	Water Quality	Turbidity in the Shuiyang River during dredging	● Use cutter suction dredger with dredged material conveyed by pipeline to the spoil disposal site ● Use grab dredger for specific spot works. ● Operate the dredger to avoid over-spill of turbid water ● Ensure correct connection of the pipeline including good seals to prevent leakage of turbid water along the pipeline ● Test the dredger and pipeline for leaks prior to start ● Investigate 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	None

Item	Impact Factor	Potential Impact and/or Issues	Mitigation Measures	Compliance	Corrective Action
		Protection of the drinking water in-take works	• Prior to start of dredging activity, liaise with the relevant Health Administration Bureaux, local EPB, or local township / town to inform 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	Not yet started in the reporting period	None
	Spoil sites	Drainage from the dredged spoil sites	• For the seven pond disposal sites, drawdown the existing water levels in the ponds, to avoid overspilling 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 dump sites, use flocculants to speed up sedimentation • Regularly inspect the drainage channels to check for blockage of the drains and risk of localized flooding • 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 standard, contractor liable in case of non-compliance.	Not yet started in the reporting period	None
	Spoil sites	Spread of disease vector	• Dump the dredged spoil from sections of the channel where schistosomiasis is a risk at specially designated dump 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 in 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 creating 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 in the port area. ● 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 throughout the land raising activities.	Complied Complied Complied Complied Complied	None
	Occupational health & safety	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 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 local Health Administrative Department	Complied Complied Complied Complied Complied Complied Complied Complied Complied	None

Item	Impact Factor	Potential Impact and/or Issues	Mitigation Measures	Compliance	Corrective Action
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 in exceedance of 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	● Ships horns should have a strong directionality and only be sounded for short durations, during the day, and in response to specific requirements ● Avoid unnecessary use of horn near residential areas ● Use lights at night to signal rather than horns.	Not yet started in the reporting period	None
		Navigation safety	● Strictly enforce navigation lanes, temporary waiting and anchorage areas, and manoeuvres to use the ship lock	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 Not yet started in the reporting period	None None
		Solid domestic waste	● Waste streams to be collected, stored and disposed of separately. ● Domestic waste to be segregated using different coloured bins (organic, recyclable, and non-recyclable) and disposed of appropriately ● Hazardous waste eg oily rags, oil contaminated soils, to be stored and disposed of separately	Not yet started in the reporting period	None
		Fisheries	● Ensure that the operating rules for the barrage include consideration of migratory fish so that the barrage could be partially or fully deflated to allow upstream migrations	Not yet started in the reporting period	None
	Rubber barriers	Loss of head	● Ensure co-ordinated management of the two rubber barriers to maintain water levels in the Shuiyang River	Not yet started in the reporting period	None
Xuanzhou Multipurpose Port	Port operations	Air quality	● Attract container freight If possible, avoid loading / unloading of bulk loose material on windy days ● Minimize drop heights and avoid over loading conveyor belts	Not yet started in the reporting period	None

Item	Impact Factor	Potential Impact and/or Issues	Mitigation Measures	Compliance	Corrective Action
			• Adopt dust suppression methods such as water spraying, covering bulk materials with felt, and installing windbreaks around stockpiles • Provide watering facility in coal storage yard and ore storage yard for dust suppression • Plant trees and fences around the site to prevent the dispersion of dust off site		
		Noise	• Direct the ships in and out of the port to avoid the need for ships to use their horns • Maintain mobile and stationery plant according to the manufacturer's instructions • Monitor noise levels during routine and abnormal conditions, and in response to complaints. • Implement further mitigation measures in the event of exceedances of noise standards.	Not yet started in the reporting period	None
		Solid wastes	• Hazardous and non-hazardous waste streams to be collected, stored and disposed of separately . • Domestic waste to be segregated using different coloured bins (organic, recyclable, and non-recyclable) and disposed of regularly in accordance with local EPB instructions • Hazardous waste eg oily rags, oil contaminated soils, to be stored and disposed of separately	Not yet started in the reporting period	None
		Water quality	• Periodic cleaning of the oil separators and silt traps on stormwater drainage systems around the port [CHECK] • Oily wastewater from maintenance sheds and other places to pass through oil separator and mix with domestic sewage. • Periodic maintenance of the small package plant installed within the port precincts, including disposal of sewage sludges to the Municipal wastewater treatment plant • Discharge wastewater treated to Grade III to the sewerage system serving the Xuanzhou Economic and Technological Development Zone	Not yet started in the reporting period	None
		Emergency planning	• Prepare an emergency response plan • Keep oil spillage equipment at the port • Ships wishing to unload flammable, explosives, corrosive, poisonous and dangerous cargo are required to hang the required signal in compliance with the *Regulations for Supervision and Administration for Ships Carrying Dangerous Goods.* • In the event of an emergency, the drinking water in-takes downstream must be closed	Not yet started in the reporting period	None

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

Item	Impact Factor	Potential Impact and/or Issues	Mitigation Measures	Compliance	Corrective Actions
Detailed Design Stage					
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 ● Minimise permanent and temporary land-take. ● Retain/incorporate landscape features of interest in design. ● 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.	Complied Complied Complied Complied Complied Complied Complied Complied Complied	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	None
	Health and safety	Promotion of non-motorized transport, protection of vulnerable road users	● Design must ensure public health and safety. ● 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 Complied	None
	Air emissions	Construction transport emissions	● Specify local materials from licensed providers that minimise transport distance.	Complied	None
	GHG emissions	Energy efficiency	● Consider energy efficient street lighting, such as LEDs or solar-powered lights	Complied	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
Ma'anshan North Corridor	Traffic noise	Protection of sensitive receptors	● Design of low noise road pavement of 191,925 m^2 in front of 34 sensitive points at Dachen, Zhongshan Village, Dayu, Chaomiaoji, Ruiqiao, Weiteng, Dajing, Xucun, Huanghe, Zhoucun, Xiongzhuang, Hanwang, Wangzhengwu, Taodian,	Complied	None

Item	Impact Factor	Potential Impact and/or Issues	Mitigation Measures	Compliance	Corrective Actions
			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.		
	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 Complied	None
	Construction nuisance	Haul roads	● Identify the locations of the 53 km of haul roads to minimise environmental impacts and disturbance of local communities	Complied	None
	Infrastructure	Protection of assets	● Ensure the design for Sima Bridge allows for the upgrading of navigation on the river to Class IV	Complied	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 revegetated after the end of construction.	Complied Complied Complied Not yet started in reporting period	None
	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	Complied Complied Complied	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

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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					
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 ● Minimise permanent and temporary land-take. ● Retain/incorporate landscape features of interest in design. ● 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.	Complied Complied Complied Complied Complied Complied Complied Complied Complied Complied	None
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	None
	Health and safety	Promotion of non-motorized transport, protection of vulnerable road users	● Design must ensure public health and safety. ● Promote non-motorized traffic. ● Ensure barrier-free design for disabled people. ● Where possible, separate vehicles and NMT, and separate cyclists and pedestrians. ● Promote safe crossings for pedestrians	Complied Complied Complied Complied Complied	None
	Air emissions	Construction transport emissions	● Specify local materials from licensed providers that minimise transport distance.	Complied	None
	GHG emissions	Energy efficiency	● Consider energy efficient street lighting, such as LEDs or solar-powered lights	Complied	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 Complied	None
Access	Construction nuisance	Haul roads	● Identify the locations of the haul roads to minimise environmental impacts and disturbance of local communities	Complied	None
Yimu Highway	Traffic noise	Protection of sensitive	● Design of low noise road pavement over 1800 m covering 40500 m^2 at 5 sensitive points - Gutianxincun, Gutian Village, Yafutang,	Complied	None

Item	Impact Factor	Potential Impact and/or Issues	Mitigation Measures	Compliance	Corrective Actions
		receptors	Shanggang Village and Bowen High School. ● 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	
	H&S and community	NMT and pedestrians	● Review the provision for pedestrian crossings over the Class I highway section ● Review pedestrian safety for crossing Wuli intersection. Consider light-controlled crossing (without vehicle turning), overpasses and underpasses.	Complied Complied	None
Construction Stage					
Implementation of noise mitigation measures	Noise	Protection of noise sensitive receptors	● Install noise insulation in 1147 properties ● Lay low noise asphalt	Complied Complied	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

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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 landtake for development. ● Retain/incorporate landscape features of interest in design. ● 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.	Complied Complied Complied Complied Complied Complied Complied Complied	None
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	None
	Health and safety	Promotion of non-motorized transport, protection of vulnerable road users	● Design must ensure public health and safety. ● Promote non-motorized traffic. ● Ensure barrier-free design for disabled people.	Complied Complied Complied	None
	Air emissions	Construction transport emissions	● Specify local materials from licensed providers that minimise transport distance.	Complied	None
	GHG emissions	Energy efficiency	● Consider energy efficient street lighting, such as LEDs or solar-powered lights	Complied	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
S319 Erba-Wuwei Section	Noise	Traffic noise	● Design noise insulation for windows at 700 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,	Not yet started in the reporting period	None

Item	Impact Factor	Potential Impact and/or Issues	Mitigation Measures	Compliance	Corrective actions
			Zhangyu/Hudun, Yangmaozui, Zhangni Village, Lijiatan, Nianxi, Dingwu, Xinjianzhuang, Hexi/Xucun, Xingeng, Fengxu, Weigeng/Changba Village, Lijiaxu, and Liwei.		
	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					
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	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
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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					
Conservation of soil and land resources	Soil resources	Loss of land and topsoil and increased risk of erosion	● Minimise permanent and temporary landtake for development. ● Retain/incorporate landscape features of interest in design. ● 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.	Complied Complied Complied Complied Complied Complied Complied	None
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	None
	Health and safety	Promotion of non-motorized transport, protection of vulnerable road users	● Design must ensure public health and safety. ● Promote non-motorized traffic. ● Ensure barrier-free design for disabled people.	Complied Complied Complied	None
	Air emissions	Construction transport emissions	● Specify local materials from licensed providers that minimise transport distance.		None
	GHG emissions	Energy efficiency	● Consider energy efficient street lighting, such as LEDs or solar-powered lights	Complied	None
Design of bridge crossings	River erosion	Scour of river bed and banks	● Design scour protection for the bridge piers and river banks		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 and the farm dormitory. ● 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 ● Consider the possibility of using the spoil in land contouring to	Complied	None

Item	Impact Factor	Potential Impact and/or Issues	Mitigation Measures	Compliance	Corrective Actions
			attenuate noise		
	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 ● Review the need for lighting in the rural sections	Complied	None
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.	Not yet started in reporting period	None
	Slope Stability	Protection of new cuttings	● Take care during excavations of deep cuttings to avoid creating slope collapse and mass movements. ● Use appropriate techniques to stabilize the slopes, including geo-technical, slope reinforcement and planting options. ● Install drainage to the top of the slope.	Complied Complied Complied	None
	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. ● Avoid noisy activities such as blasting between the main bird nesting season May and June. ● Prohibit blasting in the morning and at night. ● Walkover survey prior to construction by trained wildlife and forestry experts to 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.	Complied Complied Complied Complied Complied Complied Complied Complied	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

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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

Road construction site

Bridge construction site

Environmental protection billboard

Project description billboard

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

Construction sites

Pre-casting yard

Local project management office

Contract NO3-1 project office

Contract NO3-2 project office

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

Safety warning sign on spoil disposal site

Safety warning signs for entering construction sites

Signs designating the 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


Coffer dam at Xiaohuangni Lake bridge construction site


Haul road shortly after watering


Sedimentation pond on construction site

Storage of oil drums on construction site

Wheel washing bay in asphalt mixing station

Drainage ditch in asphalt mixing station

Interception ditch in asphalt mixing station

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

Water sampling at Quanshui Lake

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

Construction sites

Material storage site

Haul road

5.2.6 Representative Photographs for Subproject VI: Xuanzhou Multipurpose Port

Local project management office

Construction site project information billboard

Construction site safety billboard

Access road to port construction site

Construction material stockpiling

Construction site and material stockpiling

5.2.7 Representative Photographs of Meetings, Seminars and Workshops

ADB review meetings

ADB site inspection meeting

Subproject II S319 site training seminar

Subproject II S319 environmental management training

Subproject III Yimu Highway environmental management training

Subproject III Yimu Highway construction commencement training seminar

Subproject IV G206 environmental management training

	
Subproject IV G206 site training seminar	Subproject V Shuiyang River environmental management training