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The World Bank

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Report No.: 74405-CN

INTERNATIONAL BANK FOR RECONSTRUCTION AND DEVELOPMENT

PROJECT APPRAISAL DOCUMENT

ON A

PROPOSED LOAN

IN THE AMOUNT OF US\$ 150 MILLION

TO THE

PEOPLE'S REPUBLIC OF CHINA

FOR A

LIAONING COASTAL ECONOMIC ZONE

URBAN INFRASTRUCTURE AND ENVIRONMENTAL MANAGEMENT PROJECT

February 8, 2013

China and Mongolia Sustainable Development Unit
Sustainable Development Department
East Asia and Pacific Region

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CURRENCY EQUIVALENTS

(Exchange Rate Effective November 20, 2012)

Currency Unit = RMB
RMB 6.25 = US\$1

FISCAL YEAR
January 1 – December 31

ABBREVIATIONS AND ACRONYMS

BRT	Bus Rapid Transit
CLG	City Leading Group
CPS	Country Partnership Strategy
CQ	Selection Based on Consultant Qualifications
DA	Designated Account
EA	Environmental Assessment
EIA	Environmental Impact Assessment
EIRR	Economic Internal Rate of Return
EMP	Environmental Management Plan
GDP	Gross Domestic Product
GoC	Government of China
FFUPO	Foreign Funds Utilization Project Office
FIRR	Financial Internal Rate of Return
FM	Financial Management
FMS	Financial Management Specialist
IBRD	International Bank for Reconstruction and Development
ICB	International Competitive Bidding
LCZDP	Liaoning Coastal Zone Development Plan
LDRC	Liaoning Provincial Development and Reform Commission
LEPB	Liaoning Provincial Environmental Protection Bureau
LIBOR	London inter-bank offered rate
LMC1	Liaoning Medium Cities Infrastructure Project (Urban Transport)
LMC2	Second Liaoning Medium Cities Infrastructure Project (Urban Environment)
LMC3	Liaoning Third Medium Cities Infrastructure Project (Urban Energy)

LPAO	Liaoning Provincial Audit Office
LPCD	Liaoning Provincial Construction Department
LPIB	Liaoning Provincial Finance Bureau
LPLG	Liaoning Provincial Leading Group
LPMO	Liaoning Project Management Office
MBD	Chinese Model Bidding Document
MFB	Municipal Finance Bureau
MOC	Ministry of Construction
MOF	Ministry of Finance
MRT	Mass Rail Transit
NCB	National Competitive Bidding
NDRC	National Development and Reform Commission
NMT	Non-Motorized Transport
NPV	Net Present Value
OM	Operational Manual
O&M	Operation and Maintenance
OP/BP	Operational Policy/Bank Procedure
ORAF	Operational Risk Assessment Framework
PAD	Project Appraisal Document
PIU	Project Implementation Unit
PMO	Project Management Office
QBS	Quality Based Consultant Selection
QCBS	Quality and Cost Based Consultant Selection
RAP	Resettlement Action Plan
RFP	Resettlement Framework Policy
RMB	Renminbi (Chinese Yuan)
SBD	Standard Bidding Document
SOE	State-owned enterprise
UDIC	Urban Development Investment Corporations

Regional Vice President:	Axel van Trotsenburg, EAPVP
Country Director:	Klaus Rohland, EACCF
Sector Director:	John A. Roome, EASSD
Sector Manager:	Mark R. Lundell, EASCS
Task Team Leader:	Paul Procee, EASCS

CHINA
Liaoning Coastal Economic Zone
Urban Infrastructure and Environmental Management Project

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PAD DATA SHEET

**China: Liaoning Coastal Economic Zone Urban Infrastructure
and Environmental Management Project (P126611)**

Basic Information							
Project ID	Lending Instrument		EA Category		Team Leader		
P126611	Specific Investment Loan		B - Partial Assessment		Paul Procee		
Project Implementation Start Date			Project Implementation End Date				
28-Mar-2013			30-Sep-2018				
Expected Effectiveness Date			Expected Closing Date				
02-Sep-2013			30-Sep-2018				
Joint IFC							
No							
Sector Manager		Sector Director		Country Director		Regional Vice President	
Mark R. Lundell		John A. Roome		Klaus Rohland		Axel van Trotsenburg	
Borrower: People's Republic of China							
Responsible Agency: Liaoning Provincial Development and Reform Commission							
Contact:		Mr. Teng Da		Title:		PMO Director	
Telephone No.:		(86-24) 2385-1807		Email:		td56789@163.com; yaoleiyeah@hotmail.com	
Project Financing Data(US\$M)							
<input checked="" type="checkbox"/>	Loan	<input type="checkbox"/>	Grant	<input type="checkbox"/>	Other		
<input type="checkbox"/>	Credit	<input type="checkbox"/>	Guarantee				
For Loans/Credits/Others							
Total Project Cost (US\$M):		339.50					
Total Bank Financing (US\$M):		150.00					
Financing Source				Amount(US\$M)			
Borrower				189.50			
International Bank for Reconstruction and Development				150.00			
Total				339.50			
Expected Disbursements (in USD Million)							
Fiscal Year	2014	2015	2016	2017	2018	2019	0000
Annual	5.00	20.00	25.00	40.00	45.00	15.00	0.00
Cumulative	5.00	25.00	50.00	90.00	135.00	150.00	0.00

Project Development Objective(s)			
The proposed Project Development Objective (PDO) is to improve the efficiency of urban transport and address water scarcity issues in selected cities in Liaoning Province.			
Components			
Component Name	Cost (USD Millions)		
Improving Urban Transport Systems	107.80		
Improving Urban Wastewater Treatment and Reclamation	40.55		
Project Management and Capacity Building	1.65		
Compliance			
Policy			
Does the project depart from the CAS in content or in other significant respects?	Yes []	No [X]	
Does the project require any waivers of Bank policies?	Yes []	No [X]	
Have these been approved by Bank management?	Yes []	No [X]	
Is approval for any policy waiver sought from the Board?	Yes []	No [X]	
Does the project meet the Regional criteria for readiness for implementation?	Yes [X]	No []	
Safeguard Policies Triggered by the Project	Yes	No	
Environmental Assessment OP/BP 4.01	X		
Natural Habitats OP/BP 4.04		X	
Forests OP/BP 4.36		X	
Pest Management OP 4.09		X	
Physical Cultural Resources OP/BP 4.11		X	
Indigenous Peoples OP/BP 4.10		X	
Involuntary Resettlement OP/BP 4.12	X		
Safety of Dams OP/BP 4.37		X	
Projects on International Waterways OP/BP 7.50		X	
Projects in Disputed Areas OP/BP 7.60		X	
Legal Covenants			
Name	Recurrent	Due Date	Frequency
Progress Reports	X		Yearly
Description of Covenant			
The Liaoning Province, through the PMO, shall monitor and evaluate the progress of the Project and prepare semi-annual Project Progress Reports on the basis of indicators agreed with the Bank and set forth in the Operational Manual. Each such Report shall cover the period of one calendar semester, and shall be furnished to the Borrower not later than Feb 15 and Aug 15 each year, starting on Feb 15, 2014.			

Name	Recurrent	Due Date	Frequency
Annual Implementation Plan	X		Yearly
Description of Covenant			
The Liaoning Province, through the PMO, shall furnish to the Bank for approval, an initial work and budget plan covering the first eighteen months of Project implementation; and an annual implementation plan by December 15 each year, beginning on December 15, 2014.			
Name	Recurrent	Due Date	Frequency
Independent Audits	X		Yearly
Description of Covenant			
The Liaoning Province and PMO shall have its Financial Statements audited in accordance with the provisions of Section 5.09 (b) of the General Conditions applicable to IBRD Loans. Each audit of the Financial Statements shall cover the period of one fiscal year of the Borrower. The audited Financial Statements for each such period shall be furnished to the Bank not later than six months after the end of such period.			
Name	Recurrent	Due Date	Frequency
Operation and Maintenance Plan	X		Yearly
Description of Covenant			
The Liaoning Province, through the PMO, upon completion of selected Project activities (as these are programmed and set forth in the Operational Manual), cause each of the relevant Project Cities to prepare and furnish to the Bank (and continue to do so by January 31 of each calendar year thereafter), an annual operation and maintenance plan for project financed assets.			
Conditions			
Name			Type
Subsidiary Loan Agreements			Disbursement
Description of Condition			
The Liaoning Province, through the PMO, shall cause each Project City to relend the portions of the proceeds of the Loan to its Respective Project Company so that each such Project Company carries out its Respective Part of the Project. Such transfer of loan proceeds shall be made through a subsidiary loan agreement to be entered into between the Project City concerned and its Respective Project Company.			
Name			Type
Disbursement for Goods			Disbursement
Description of Condition			
No disbursement under Category (3) "Goods" (Section IV, Schedule 2, Loan Agreement) shall be made until all three Subsidiary Loan Agreements have been entered between each of the relevant Project Cities and their respective Project Companies.			
Team Composition			
Bank Staff			
Name	Title	Specialization	Unit
Chongwu Sun	Senior Environmental Specialist	Senior Environmental Specialist	EASCS
Yan Zong	Transport Specialist	Transport Specialist	EASCS
Huiying Guo	Program Assistant	Program Assistant	EACCF
Jian Xie	Senior Environmental Specialist	Economic Analysis	ECSN

Zhefu Liu	Senior Social Development Specialist	Senior Social Development Specialist	EASCS		
Paul Procee	Lead Urban Specialist	Team Lead	EASCS		
Haixia Li	Senior Financial Management Specialist	Senior Financial Management Specialist	EASFM		
Alejandro Alcala Gerez	Senior Counsel	Senior Counsel	LEGES		
Guoping Yu	Procurement Specialist	Procurement Specialist	EASR2		
Gang Qin	Water & Sanitation Specialist	Water Sanitation Specialist	EASCS		
Vivian Argueta-Bernal	Consultant	Urban Specialist	EASCS		
Non Bank Staff					
Name	Title	Office Phone	City		
Hongye Fan	Transport Consultant		Beijing		
Olga Kaganova	Asset Management Specialist		Washington D.C.		
Christopher Sall	Climate Change Specialist		Ho Chi Min City		
Locations					
Country	First Administrative Division	Location	Planned	Actual	Comments
China	Liaoning	Liaoning Sheng		X	The project cities are: Donggang, Kuandian, Lingyuan, Longcheng, Panjin and Suizhong.
Institutional Data					
Sector Board					
Urban Development					
Sectors / Climate Change					
Sector (Maximum 5 and total % must equal 100)					
Major Sector	Sector	%	Adaptation Co-benefits %	Mitigation Co-benefits %	
Transportation	Urban Transport	70	10	20	
Water, sanitation and flood protection	General water, sanitation and flood protection sector	30	30	20	
Total			100		
<input type="checkbox"/> I certify that there is no Adaptation and Mitigation Climate Change Co-benefits information applicable to this project.					
Themes					
Theme (Maximum 5 and total % must equal 100)					
Major theme	Theme				%

Urban development	City-wide Infrastructure and Service Delivery	100
Total		100

I. STRATEGIC CONTEXT

A. Country Context

1. China's cities are growing at a rate and scale never seen before. About 380 million people have moved from rural to urban areas over the last two decades; and another 300 million people are expected to migrate by 2025. While urbanization will drive growth and raise living standards, it also brings tremendous environmental and service delivery challenges. Rapid urbanization has dramatically transformed China's socio-economic structure and has posed tremendous challenges to policymakers and practitioners, especially in secondary cities and lagging regions, to keep pace with demand, especially for basic urban services.

2. In the past decades, China's economic development rate has also been very high, with GDP growing at an average annual rate of 9 to 12%, leading to a rapid growth in demand for basic services such as water supply, sanitation and transport, as well as a rapid increase in consumption of natural resources and increased pollution. The economic growth will continue and increasingly be concentrated in the cities.

3. The economic growth of cities, the fast population growth due to migration from rural areas, and the rising per capita water consumption are resulting in an exponential increase of water consumption by cities. Water shortage, water pollution, and flooding are constraining growth and affecting public health and welfare. The per capita availability of natural fresh water is only a quarter of the world average. Northern China is already a water scarce region, and China as a whole will soon join the group of water stressed countries. China's leadership is well aware of the worsening water shortage situation and is determined to transform China into a water-saving society through policy and institutional reforms.

4. Motorization as part of the urbanization and economic development process is also starting to cause urban road congestion and worsening urban air quality. These problems affect all urban residents, but the lower-income groups who rely on buses and non-motorized transport (NMT) suffer a disproportionately higher share of the problems, in the form of lower mobility, higher accident rates (especially for non-motorized traffic), and poorer air quality. In recent years, the national and local governments have made significant effort to alleviate traffic congestion and vehicle pollution by promoting public transport and cleaner transport modes. Key actions at the local level include heavy investment in mass rail transit (MRT) in the largest cities, increasing government financial support to bus transport, development of bus rapid transit (BRT), public transit fare subsidies, bus priority schemes, adoption of better vehicle emission standards, and cleaner bus fuels.

B. Sectoral and Institutional Context

5. Liaoning Province is located in Northeast China and has a total population of about 43.7 million people according to the 2010 Census. With a GDP for 2011 of RMB2.20 trillion (ca. US\$348 billion) it is the 7th largest provincial economy in China. The per capita GDP in Liaoning is RMB41,782 (ca. US\$6,172). In 2008, Liaoning's tertiary industry accounted for 34.5% of the total GDP. In the future, Liaoning will continue its efforts to restructure large and

medium-sized state enterprises. Meanwhile, the province will concentrate in developing its four pillar industries – petrochemicals, metallurgy, machinery and electronics.

6. The Liaoning Coastal Zone Development Plan (LCZDP) was launched in 2009 by the Government of China (GoC) with support from the Liaoning Provincial Government to help with the economic revitalization of cities and the region and create a gateway to the Northeast of China and surrounding countries. The Liaoning coastal zone, comprising of the Bohai Bay Area and the Yellow Sea Coast, has the city of Dalian as its anchor and hub for development. The comprehensive strategy intends to guide the development process around urban and economic clusters and help protect valuable ecosystems and create livable cities with better public services to attract people and investments. A department within the Liaoning Provincial Development and Reform Commission (LDRC) was created to oversee and guide the LCZDP implementation process.

7. The LCZDP is in line with China's 12th Five Year Plan (2011-2015) of inclusive growth and balanced rural and urban development, which emphasizes city and town development as a means to provide a higher standard of living to rural immigrants without exacerbating environmental and other problems affecting large cities. The strategy also advocates for a shift of focus from infrastructure-based to a “people-centered” development. The LCZDP further focuses on environment protection, creating incentives for clean production, promoting energy conservation and emission reductions, and intensifying pollution control.

8. A key challenge for the development of the Liaoning coastal zone will be to coordinate and integrate plans of different cities and balance competing demands for urban expansion, infrastructure, financial investments, economic growth, industries, agriculture, and natural resources, while minimizing pollution and ensuring the valuable ecosystems and natural resources are protected and do not become a constraint for future growth and development. The planning capacity of local authorities is often very weak and mostly a top-down process with little interaction with local stakeholders and understanding of actual demands and investment needs and priorities.

9. The urbanization rate in the selected counties and cities is still relatively low as shown in the Table 1. As a result, these cities are likely to continue to grow considerably in the coming decades. Furthermore, the GDP per capita varies considerably among cities, ranging from RMB14,176 (US\$2,250) in Suizhong County to RMB66,546 (US\$10,560) in Panjin City. The planned rapid industrialization and urbanization rates will be putting increased pressure on existing infrastructure of medium-sized cities in the coastal zone of Liaoning. In order to sustain economic growth, attract more private investments, and service a growing urban population, construction and rehabilitation of basic infrastructure and improvement of urban transport systems is a priority, but this needs to be carefully balanced with more efficient use of land and natural resources.

10. Liaoning Province is already facing serious problems with water pollution and water scarcity issues that might limit future development. The average availability of water resource per person in the province is 820 m³, which is one third of the national average. Except for a few areas in the East, most of the province experiences severe water scarcity. The water supply in Liaoning relies on dams and groundwater extraction. Years of over-exploration of groundwater

has caused many serious problems in the province such as a falling groundwater table, sinking surfaces and cave-ins, seawater intrusion, and secondary salinification of the coastal area. Most river basins also suffer from the problems of water pollution and under-served water and wastewater infrastructures. The runoff of the rivers is too low to provide sufficient dilution times and self-purification capability to the wastewater discharged. This poses an additional challenge to pollution control in these rivers and innovative approaches to tackle water scarcity and pollution are required to reduce the problems.

Table 1. Basic Population and GDP Data of Project Cities

City/county Name	Total Population	Urban Population	Urbanization rate	GDP (RMB million)	GDP per capita (RMB)
Donggang City ¹	608,000	111,000	18.3%	33,760	55,526
Kuandian County	435,000	91,000	20.9%	14,184	32,607
Longcheng District ³	180,000	60,000	33.3%	4,441	24,672
Lingyuan City ¹	650,000	129,000	19.8%	13,390	20,600
Panjin City ²	1,392,000	918,000	65.9%	92,632	66,546
Suizhong County	636,000	95,000	14.9%	9,096	14,176

Note: ¹ County-level City, ² Prefecture-Level City, ³ District of Chaoyang (Prefecture-Level) City

Source: Liaoning Statistical Yearbook 2011, China Statistics Press.

11. The exploitation rate of groundwater in Liaoning province has exceeded 95 percent, creating ecological problems such as seawater encroachment, and in February this year the Provincial Government implemented the toughest regulations yet to address excessive exploitation of groundwater. It banned all new groundwater drilling projects and set a target of cutting the extraction quantity by more than 1.2 billion m³ by 2015. Companies are required to look for alternative sources of water, including reusing, recycling and reclaiming water.

12. Cities in the coastal zone of Liaoning are investing heavily in new road infrastructure, especially in proposed new development zones, while many of the existing urban infrastructure especially in the old urban areas, need urgent rehabilitation and upgrading. Increased traffic and congestion is starting to become a serious problem in some cities due to the rapid increase in motorization rates, deficient road infrastructure, irrational use of road infrastructure, and deficient public and non-motorized transport systems.

13. This project will support the LCZDP, the GoC, through the National Development and Reform Commission (NDRC) and Ministry of Finance (MOF) to address a few critical water and transport issues that are hampering long-term development of the Liaoning Coastal Zone and will also help reduce environmental impacts as a result of rapid development and urbanization of the region. Donggang City, Kuandian County, Longcheng District, Lingyuan City, Panjin City and Suizhong County (hereafter “Project Cities”) are strategically located near the Liaoning coast and form an integral part of the economic cluster development and transport axis that is being proposed in the LCZDP. This project will foster an integrated approach to transport planning, combining infrastructure investments with traffic management improvements, better public transport services, and integrated transport and land use planning. The medium-sized cities along the coast in Liaoning are uniquely positioned to make decisions today that might

greatly improve the livability and transport services offered in these cities in the future. The water related subprojects in Lingyuan and Suizhong were selected to provide good examples of integrated investments to address critical water pollution and scarcity issues. The subproject in Suizhong will address the challenges the city is facing with water pollution and poor drainage due to encroachment of existing canals, siltation and reduced hydraulic flows.

14. Besides ensuring that each subproject complies with government regional and local plans and addresses critical urban transport and water issues, the Project Cities and subprojects were selected based on the following criteria: (i) strong justification based on detailed analysis of current and future demands (ii) cost-effectiveness and economic and financial returns; (iii) overall environmental and social benefits to the city; and (iv) the long-term sustainability both from a financial as well as operational point of view. The project includes a number of innovative approaches in terms of water reclamation, road designs that prioritize NMT and public transport, and the inclusion of the preparation of an asset management framework to ensure long term sustainability of project financed facilities.

C. Higher Level Objectives to which the Project attributes

15. The new World Bank-China Country Partnership Strategy (CPS) for fiscal years (FYs) 2013-2016 (Report No. 67566-CN) was discussed by the Board of Executive Directors on November 6, 2012, and is aligned with the challenges and priorities outlined in China's 12th Five-Year Plan. The CPS is also informed by the recent joint study – *China 2030: Building a Modern, Harmonious, and Creative Society (China 2030)* – prepared by the World Bank and the Development Research Center of the State Council.¹ Consistent with China's priorities, the CPS focuses on three main themes: green growth; inclusive development; and mutually beneficial relations with the world. Bank Group support to China is designed to play a catalytic role through innovation and demonstration. In addition, the Bank's Group's engagement with China contributes to the Bank's global knowledge and helps China share its development experiences with the rest of the world.

16. The proposed project is consistent with the new CPS 2013-2016 and will support all three main areas of engagement. The main area of focus will be supporting greener growth, by helping participating cities to enhance urban environmental services; promote low-carbon urban transport; and demonstrate measures to reduce pollution. In addition, the project will promote more inclusive development by enhancing services and opportunities in secondary cities in Liaoning and access and transport connectivity in less developed areas of the province. Innovative designs in terms of transport infrastructure and water reclamation will benefit the Bank's global knowledge and these experiences will be shared with the rest of the world.

¹ World Bank and Development Research Center of the State Council (2012): Conference version at www.worldbank.org/cn, final version forthcoming.

II. PROJECT DEVELOPMENT OBJECTIVES

A. PDO

17. The proposed Project Development Objective (PDO) is to improve the efficiency of urban transport and address water scarcity issues in selected cities in Liaoning Province.

18. The particular emphasis is on (i) improving wastewater treatment and water reclamation to reduce pollution and foster more efficient use of scarce water resources; and (ii) providing better public transport services in selected cities and improving transport flows along rehabilitated and new roads.

B. Project Beneficiaries

19. Beneficiaries of the project include residents and businesses that directly and indirectly benefit from access to rehabilitated and newly constructed urban roads, expanded and improved wastewater collection and treatment systems, and reduced water pollution and flood risks in project cities.

20. Other beneficiaries of the project are the local governments of each project city and the implementing agencies, including: (i) Chaoyang West New Industrial Zone Construction and Investment Company, Ltd; (ii) Donggang Municipal Administration Department; (iii) Kuandian Rural-Urban Real Estate Construction and Development Company under the Housing and Rural-Urban Construction Bureau; (iv) Lingyuan Municipal Administration Department (Component 1); (v) Lingyuan Emergency Water Supply Construction Administration Department (Component 2); (vi) Panjin Public Transport Company, Ltd; and, (vii) Suizhong Municipal Infrastructure Management Department. The industries in the industrial zone of Lingyuan will also directly benefit from the project.

C. PDO Level Results Indicators

21. The key results expected from the proposed project will be measured through the following outcome indicators:

- (a) Percentage of people walking and biking satisfied with new and improved facilities on selected roads in Chaoyang, Donggang, Kuandian and Lingyuan.
- (b) Percentage increase of riders satisfied with public transport services on selected routes in Panjin.
- (c) Percentage of reclaimed wastewater used in the new industrial park in Lingyuan.
- (d) Urban area benefitting from improved drainage system in Suizhong.
- (e) Project Beneficiaries (disaggregated by gender).

III. PROJECT DESCRIPTION

A. Project Components

22. The proposed Bank supported project will have three components and seven sub-projects.

23. **Component 1: Improving urban transport systems.** This component will invest a total of US\$ 250.1 million, of which US\$ 107.8 million is an IBRD loan, in improving public transport systems and fostering transit oriented development along selected public transport corridors by integrating land use and transport planning. The Project will finance new urban roads and rehabilitation of existing roads, and ensure the engineering designs incorporate traffic management and traffic calming features and include facilities that promote cleaner alternative modes of transport, such as bicycling and walking. The designs were also adapted based on the function and typology of streets within the urban area, such as neighborhood streets, local access roads, major urban thoroughfares, public transport corridors, and roads servicing industrial zones. Furthermore, all road designs include necessary underground urban utilities, traffic signs and management systems, landscaping, street furniture, and other ancillary facilities, and the acquisition of road maintenance equipment. In Panjin, the project will acquire buses and improve bus depots to support the overall improvement of public bus transport services provided by the Panjin Public Transport Company.

24. The streets and urban roads were selected based on the following criteria: (i) the quality of the infrastructure and importance of the road as major public transport corridor, and current and future traffic demand, (ii) importance as access to major regional transport systems (high speed rails), and (iii) the demonstration opportunity to design and implement streets that create more livable, safe and sustainable neighborhoods. Both transport agencies and traffic management authorities have participated in the selection, design, and preparation of the project. The technical assistance component will complement the infrastructure investments and provide support to the development of comprehensive traffic management plans for each.

25. In both Longcheng District in Chaoyang City and in Donggang City, the sub-project investments are focused on the development of new areas that are connected to major regional and urban public transit systems. Designs and land use plans are being adapted to improve access and incentivize the use non-motorized transport and the bus transport systems. In Kuandian and Lingyuan City, the sub-projects will support the rehabilitation of critical roads and local streets within the urban transport network and improve pedestrian, biking and public transport facilities.

26. Specific investments in these four sub-projects include construction, rehabilitation and possible realignment of roads and streets in urban areas; investment in bus lanes, stations and other related facilities; traffic signs and management equipment; sidewalks and other pedestrian amenities; bicycle lanes, parking and other facilities; landscaping, bollards and street furniture; road maintenance equipment, and basic urban service pipelines, including drainage, wastewater, communication and electricity infrastructure.

27. In Panjin City, the sub-project will finance the improvement of the local bus transport system, and investments include the acquisition of new buses, the construction of bus depots, bus maintenance and complementary facilities, and bus operation systems.

28. **Component 2: Improving urban wastewater treatment and reclamation.** This component will invest a total of US\$ 87.7 million, of which US\$ 40.6 million is an IBRD loan, in wastewater treatment facilities and water reclamation systems, while also separating sewage and drainage networks in selected cities. The main objective is to rationalize the use of scarce water resources, reduce groundwater abstraction, and reduce water pollution. Investments include the construction of new and rehabilitation of existing wastewater plants, separation of sewage and drainage networks, and replacement of groundwater supply systems by water reclamation systems. Sub-project investments include:

- (a) *Wastewater treatment and reclamation and drainage in Lingyuan City*, including the installation of separate stormwater and municipal sewerage collection pipelines, improvement of the wastewater treatment plants, and construction of reclaimed wastewater distribution system, which will be connected to the Industrial Park in Lingyuan City;
- (b) *Wastewater and drainage in Suizhong County* include investments to separate the city sewerage and storm water networks and the rehabilitation of east and west drainage canals and retention pond for the collection of storm water within the city area of Suizhong. A small rubber dam will be built to maintain the proper water levels in the canal during dry seasons.

29. **Component 3: Project Management and Capacity Building.** This component is closely linked to the infrastructure investments under components 1 and 2 and will help increase impacts and sustainability of investments, as well as build the capacity of the local staff and officials involved in delivering water and urban transport in participating cities. This component will be fully financed by the IBRD Loan, with an allocation of US\$ 1.65 million. During project preparation, the team worked closely with Provincial and local authorities and identified technical assistance needs and topics that are common to the project cities and will help increase long-term impacts of the project. The identified and agreed areas of technical assistance support to be financed by the project, include:

- (a) Building the capacity of *local transport management* agencies and support them in preparing or revising urban transport investment and management plans, focusing on promoting public transport, pedestrian, bicycles and overall traffic safety;
- (b) Developing comprehensive *capital investment and asset management plans* for local implementing agencies to ensure long-term sustainability of project investments; and,
- (c) Supporting *project management and supervision*, including consultancy services and training in: technical supervision, procurement and financial management; contract supervision; environmental management plans, and resettlement action plans.

B. Project Financing

Lending Instrument

30. The Project will be financed through an IBRD Specific Investment Loan (SIL) in the amount of US\$150 million. The Bank Loans will be on standard IBRD terms for a LIBOR-based US Dollar denominated, commitment-linked variable spread loan (VSL) based on six-month LIBOR plus an additional variable spread. Repayment period is 30 years inclusive of 5-year grace period.

Project Cost and Financing

31. The estimated cost of the project is about US\$339.5 million. The funding sources for the project include a World Bank loan of US\$ 150 million, about 45% of the total costs, with the remaining balance mobilized by the cities and provincial government.

Table 2. Project Cost and Financing Plan by Component

<i>By Components</i>	Total		IBRD	Local
	RMB million	US\$ million	US\$ Million	US\$ Million
Component 1: Improving Urban Transport Systems				
1.a. Donggang: Transit oriented development	395.44	63.27	24.72	38.55
1.b. Kuandian: Urban road rehabilitation	409.51	65.52	24.72	40.80
1.c. Lingyuan: Urban road rehabilitation	208.24	33.32	17.31	16.01
1.d. Longcheng: Transit oriented development	357.20	57.15	22.25	34.90
1.e. Panjin: Public transport improvement	192.90	30.86	18.80	12.06
Component 2: Improving urban wastewater treatment and reclamation				
2.a. Lingyuan: Wastewater treatment and collection	273.21	43.71	20.77	22.94
2.b. Suizhong: Wastewater and drainage network	274.83	43.97	19.78	24.19
Component 3: Project Management and Capacity Building				
3.a. Technical Assistance and Capacity Building	3.13	0.50	0.50	0
3.b. Project Management Costs	7.19	1.15	1.15	0
Total Project Costs	2,121.65	339.46	150.00	189.45

C. Lessons Learned and Reflected in the Project Design

32. During the preparation of the project several missions and workshops were organized to share knowledge and ensure good practices and lessons learned from other cities and projects were incorporated in the design of this project. Lessons learned from the recent Bank reports on experiences with small and medium town development in China and low-carbon cities provided interesting lessons for this project. The team also looked at the implementation of other Bank projects in Liaoning Province to look for ways to improve the implementation of this project. We hereby highlight some of the key lessons that were incorporated into design of this project:

- (a) *Investment subprojects consistent with the planned infrastructure network.* During preparation and appraisal, special attention was paid to ensure that the proposed

subprojects are consistent with each town's current medium-term plans for developing the infrastructure network, as well as the related basic infrastructure.

- (b) *Appropriate urban road designs.* Overly optimistic forecasts for economic and population growth often result in overdesign of infrastructure facilities and eventual over capacity. The Bank team requested more detailed traffic surveys, demand projections and carefully reviewed the urban road designs based on function of the road and the adjacent land uses. Alternative designs were considered to accommodate the necessary traffic of vehicles, pedestrians, and bicycles, focus shifted towards rehabilitation of existing roads that need to be better designed to accommodate existing traffic and reduce risks of accidents due to conflict between different modes of transport.
- (c) *Improved traffic management.* Since the development objective is to improve urban transport systems, the improvements on road infrastructure were analyzed as part of overall urban transport and traffic management plans. Traffic calming, public transport priority, and pedestrian and bicycle facilities were integrated into the road designs. During project implementation, further training and technical assistance will be provided to improve traffic management and safety in selected cities.
- (d) Special attention has also been given to determining *availability of adequate counterpart funds*. Small towns often face particular difficulty in ensuring adequate counterpart funds. Small towns with weak financial capacity were screened out by the Provincial Finance Bureau in the early stages of project preparation, and some others still included that might face challenges raising the necessary counterpart funds.
- (e) *Institutional framework.* The institutional framework was simplified compared to other projects in Liaoning, with a single project management office at the provincial level and project implementation units (PIUs) in the different cities. The Liaoning Project Management Office (LPMO) will be responsible for procurement, with support of an agent, while PIUs will participate in technical aspects of the procurement process, sign the contracts, and supervise construction. The Liaoning Provincial Finance Bureau (LPFB) is streamlining disbursement procedures and exploring opportunities to reduce the complexity of the disbursement process and consider direct payment of contractors.

IV. IMPLEMENTATION

A. Institutional and Implementation Arrangements

33. **Provincial Level.** A Provincial Project Leading Group (PLG) has been established and chaired by the Provincial Vice-Governor responsible for the Provincial Development and Reform Commission (PDRC) and includes representatives from the provincial LPFB, Transportation Bureau (TB), Water Resources Bureau (WRB) and Environmental Protection Agency (EPA), and other agencies and institutes as appropriate. The PPLG should also include the chair of each of the local PLGs. The major responsibilities of the PPLG are to provide coordination, policy-level support, and guidance on strategic issues; oversee timely

implementation of the project; supervise the technical assistance and capacity building component; and share lessons learned between participating cities and Liaoning Province.

34. The Liaoning Foreign Fund Utilization Project Office, established under the Liaoning Provincial Development and Reform Commission (LDRC) will be the LPMO. The LPMO is responsible for the financial management of the project under the guidance and support of LPFB. LPFB is responsible for managing the project Designated Account (DA). Together with the LDRC, LPFB will provide support and advice to the LPMO and project cities on financial matters. The LPMO, with support from consultants, will be responsible for overall supervision of the project, focusing on technical and project management aspects, advisory services to the project cities and PIUs, quality insurance and control, and consolidation of monitoring, reporting and due diligence requirements. The LPMO will be managing the project and immediately flag any issues on timely implementation according to the policies and procedures agreed for this project. The LPMO has selected a procurement agent to assist with the preparation of bidding documents and managing the overall bidding process. The LPMO will prepare semi-annual progress reports and coordinate the monitoring and evaluation of the project. A Project Management and Contract Supervision team of consultants will support the LPMO in carrying out these functions and provide advice to the cities and local PIUs on contract and safeguard supervision.

35. **Local level.** At the local level, City Leading Groups (CLGs) have been established in each of the participating cities, co-chaired by the local Vice Mayor overseeing the local implementing agency. The CLGs follow the same structure as the PLG at the provincial levels; their role and responsibilities are also similar. The CLGs include representatives from relevant local agencies such as the City DRCs, Finance Bureaus, Environmental Protection Bureaus, Water Resource Agencies, and relevant investment companies. At the local level, the project will be implemented by responsible local line agencies or affiliated companies, namely:

- (a) *Donggang City*: Donggang Municipal Administration Department;
- (b) *Kuandian County*: Kuandian Rural-Urban Real Estate Construction and Development Company, Ltd.
- (c) *Lingyuan City*: Lingyuan Municipal Administration Department (Component 1);
- (d) *Lingyuan City*: Lingyuan Emergency Water Supply and Administration Department (Component 2);
- (e) *Longcheng District*: Chaoyang West New Industrial Zone Construction and Investment Company, Ltd;
- (f) *Panjin City*: Panjin Public Transport Company, Ltd; and,
- (g) *Suizhong City*: Suizhong Municipal Administration Department.

36. **Construction Supervision.** The technical supervision of subprojects and contracts will be done by the PIUs with support from local engineers and safeguard specialists. The PIUs will monitor contract implementation progress according to agreed milestones, evaluate subproject impacts and prepare monitoring reports. The LPMO will hire a consultancy firm to support the team on different project management and supervision tasks. Local supervision will be carried

out by local consultants who will perform periodic on-site supervision and provide construction supervision reports.

B. Results Monitoring and Evaluation

37. The result-based monitoring and evaluation system (M&E) has been agreed and will be established under the project, implemented by the LPMO and the local implementing agencies, to monitor and evaluate the project implementation progress, and analyze project results towards achieving the project objectives under each component. With regard to resettlement, an experienced monitoring institute, independent of the LPMO and the project agencies, will be contracted to monitor the resettlement activities; its report will be reviewed by the Bank twice a year.

38. The LPMO already has existing project management procedures for the other World Bank projects it manages. These procedures will be tailored and used by the participating cities to manage the project and monitor physical and financial progress. The LPMO will consolidate site specific monitoring reports and the overall progress on financial, procurement and disbursement, review withdrawal/disbursement requests. PIU staff will be directly responsible to input data on the project, which will be consolidated by the LPMO at the provincial level and reflected in the semi-annual progress reports and other reports required during project implementation.

39. **Monitoring and Evaluation System (MES).** A MES will be established to monitor project outputs and evaluate project outcomes. The system will include a database of *overall project outcome indicators* to measure the achievement of the overall project objectives, and the changes in performance, behavior, or status of resources for target beneficiaries in the project area. The *intermediate outcome indicators* for each subcomponent (that contribute to the final outcomes) with baseline values and target values (see Annex 1 for detailed key indicators) will be reported to monitor progress towards achieving the targets of key outcome. The indicators will be presented in the semi-annual progress reports. These reports will be kept up-to-date and provided as needed for project supervision by the Bank.

C. Sustainability

40. To ensure long term sustainability, careful technical and economic analysis was conducted during preparation to ensure the necessary resources and capacity will be available to build, maintain, and operate project investments. Under the TA component, the project will also help selected cities to develop infrastructure investments and management plans, which will help the relevant local agencies to identify investment needs and maintenance and operation requirements, as well as to plan for adequate staffing and budget allocations.

41. As mentioned before, the subproject designs are based on best available information regarding current and future demand projections and, as part of the preparation review process, a number of subprojects were cancelled or designs considerably revised. Road designs and width were optimized to accommodate the demand for current and future traffic. This has reduced the costs of investments, resettlement, and the future operations of both transport and water facilities.

42. The emphasis on cleaner and more efficient transport modes will also improve environmental sustainability, while the reuse of water will help reduce pressures on existing water sources and help improve the water environment quality and reduce resource constraints for development in the future.

V. KEY RISKS AND MITIGATION MEASURES

A. Risk Ratings Summary Table

Stakeholder Risk	Substantial
Implementing Agency Risk	
- Capacity	Substantial
- Governance	Substantial
Project Risk	
- Design	Moderate
- Social and Environmental	Moderate
- Program and Donor	Low
- Delivery Monitoring and Sustainability	Moderate
Overall Implementation Risk	Substantial

B. Overall Risk Rating Explanation

43. The overall implementation risk is substantial, and a number of risks were identified during project preparation that might hamper the implementation of this project.

44. **Project management capacity.** The LPMO in Liaoning has experience managing Bank projects, but has limited staff, project management capacity and technical expertise to supervise this project. This is especially a challenge since the LPMO already manages many other projects involving multiple cities throughout Liaoning Province. The main concern relates to the lack of capacity of the LPMO and PIUs to effectively supervise contracts, monitor implementation, identify issues at an early stage, prepare necessary documentation, and systematically prepare progress and other reports. A team of consultants will be hired to support the LPMO with project management and contract supervision and provide advisory services to the PIUs. This will help strengthen the capacity of the LPMO, but the setup will continue to be challenging and not eliminate the risks of implementation delays and improper practices as a result of working in six cities with inexperienced PIUs and limited capacity of the LPMO.

45. **Changing priorities at the local level.** Besides the lack of capacity at the local level, a major risk is related to changes in leadership and policies over time at the local level. While the selected investments are fully endorsed by the local governments and leaders, there is still a substantial risk that investment priorities might change overtime, which would require adjustment of the loan and reappraisal of subprojects. During project preparation efforts were made to

establish a good relationship with local authorities, including mayors and deputy mayors from each city, and to ensure their clear commitment to the respective subproject.

46. **Overall environmental and social benefits.** The Environmental Assessment included a thorough analysis of the potential environmental and social impacts of the project. Measures were identified to avoid, minimize, mitigate, and compensate the potential adverse impacts. Overall, the project is expected to be beneficial to society and the environment. Nevertheless, the possibility exists that potential (cumulative) impacts of economic growth and other investments in the region may jeopardize the environmental benefits of this project, especially with regard to the environmental impacts and protection of natural resources. Furthermore, the lack of adequate local financing may affect the cities' ability to compensate affected people in a timely manner.

47. **Financial sustainability and local counterpart funding.** During project preparation the unbalanced expenditure in project cities on infrastructure construction compared to maintenance became apparent. In some cases, expenditures in construction exceed by a hundred times the funds allocated for maintenance and all cities face problems with the lack of appropriate funding for operation and maintenance (O&M). This poses a risk to the long-term sustainability of the project financed infrastructure and facilities, which is critical for full achievement of the PDO and for sustaining the project benefits in the long term. In response, the size of investments has been reduced, based on more realistic demand forecasts, and an asset management component has been added to the project to help cities improve O&M practices.

48. **Local counterpart funding.** Furthermore, a review of the finances for each city – including revenue sources, expenditure allocations, debt structures, and the role of Urban Development Investment Corporations (UDICs) and land value – has shown the different levels of financial capacity among cities. While some cities have demonstrated strong capacity to provide counterpart funds from their fiscal revenue alone, other cities are in a more difficult situation and are relying on different and more uncertain funding sources such as commercial loans and expected land sale revenues. Therefore a potential risk of the project is that the latter group will experience difficulties in providing counterpart funds during project implementation.

49. **Quality of detailed designs.** The quality of the Feasibility Study Reports varied considerably and some needed very intensive involvement of the Bank team to ensure alignment with the overall objective of the project, proper justification of investments, technical quality, and evaluation of alternatives. In addition, the final designs require a more in-depth analysis of the local physical and geological conditions and incorporation of the innovative approaches agreed during project preparation. If these issues are not properly addressed in the designs there are considerable risks of delays in project implementation due to delays in procurement and processing of variations during construction.

VI. APPRAISAL SUMMARY

A. Economic and Financial Analyses

50. The main economic benefits of the project include: transport cost savings; productivity increases due to reduced travel time; energy savings and associated pollution reduction due to

improved road condition and transport efficiency; avoided economic loss from drainage improvement and flood control; increases in amenity and land values due to environmental and traffic condition improvement; avoided flood damages due to river channel rehabilitation; and avoided environmental health and traffic accidents. The economic costs of the project are capital investments costs and operation and maintenance (O&M) costs, including social, resettlement and environmental mitigation costs incurred by the investments.

51. The costs of the different project subprojects were given, but the data to estimate benefits was either unavailable or very difficult to obtain. Therefore, a mix of cost-benefit, cost-effectiveness, and qualitative analysis were used and a social cost-benefit analysis was used to estimate the benefits. Public funds cover the project costs while the benefits are shared by both individuals and society. The economic analysis ascertained that the social benefits were positive; and that the present value of benefits exceeds the present value of costs.

52. Cost-benefit analysis was used to evaluate the economic viability of the four urban road rehabilitation and/or development subprojects in Kuandian County, Donggang City, Longcheng District, and Lingyuan City; the public transport investments in Panjin City; and the river channel rehabilitation and sewerage collection subproject in Suizhong County. Cost-effectiveness analysis was applied to the wastewater treatment and reclamation subproject in Lingyuan City.

53. The results of the cost-benefit analyses show that all of these components are economically viable. The economic internal rate of return (EIRR) of the four road construction and upgrading subprojects are 17.78% (Longcheng), 11.86% (Donggang), 14.59% (Lingyuan), and 17.97% (Kuandian), respectively. The EIRR of the other two subprojects are 15.30% (Panjin), and 10.65% (Suizhong), respectively. Sensitivity analyses were conducted for each subproject. The sensitivity analysis, assuming a 10% decrease in economic benefit and/or a 10% increase in total costs, shows that the investments are economically robust for all subprojects except Suizhong.

54. The subproject of wastewater reclamation and drainage in Lingyuan City aims to achieve the wastewater reclamation and reuse targets set in the local government's development plan. The targets are based on the importance of water reuse to local environment, industrial development, and living standard improvements. Since quantifying and monetizing the health benefits of the wastewater treatment is very challenging, cost-effectiveness analysis (CEA) was used to select the least-cost design option to achieve the targets.

55. Given the objectives of the proposed project and the variety of benefits it produces, the population in the project areas is expected to benefit significantly from the set of investments.

B. Technical

56. All investment components and feasibility studies have been prepared by Liaoning-based design institutes. During project preparation, the Bank team and consultants conducted several reviews of the feasibility studies and designs, and shared experiences and best practices on urban transport management and water management in cities. This served as a platform to discuss introduction of modern design concepts and improving the efficiencies of transport and water

systems. Project designs are technically sound, represent appropriate cost-effective alternatives, and are based on sound engineering practices.

57. Aligned with the 12th Five-Year-Plan for more balanced, innovative, greener and comprehensive outcomes of the infrastructure investment, the feasibility studies have focused on transport service improvements tailored to the different needs of the people, instead of the traditional top-down supply driven, civil works only approach. The project will improve the performance and sustainability of urban transport systems. The transport experts have paid attention to the road designs to ensure they are based on actual traffic demand assessments and realistic demand projections, transport problem evaluations, and analysis of alternatives using different transport modes, to produce viable, cost effective solutions that minimize land acquisition requirements and other social disruptions. Furthermore, the team also looked into the overall operation and maintenance of road facilities and optimized the designs to reduce costs. Great attention has been paid to prioritize pedestrian, bicycle, and public transport modes and creating streets that are safer and with less conflict between different modes. The project will further assist the cities in developing or improving integrated traffic management plans to improve overall efficiencies and optimize the use of roads in the city. Holistic traffic engineering design was considered throughout the planning, and critical Chinese engineering design standards and international guidelines were followed.

58. The project financed urban roads in Donggang City, Kuandian County, Longcheng District and Lingyuan City were ranked based on the required level of service within the city and the designs were adapted to ensure the required level of service could be met in the most cost-effective way. In most cases, focus has been given to specific areas of the city (Donggang City, Longcheng District, and Lingyuan City) or to improving unpaved and poorly maintained roads with relatively high levels of pedestrian and vehicle traffic within the urban core of the city (Kuandian County and Lingyuan City). Close attention was paid to the design of roads and intersections to ensure the highest levels of safety and to ensure the improvements would benefit traffic flows of all modes of transport. All roads include designated bike lanes and sidewalks and some roads include designated lanes for public buses and emergency vehicles. While further optimization can be achieved, this would require revising city-wide traffic management plans, which will be initiated through the technical assistance component of this project.

59. For the improvement of public transport systems in Panjin, during preparation a detailed analysis was conducted to assess current and future passenger demand, select priority routes, optimize bus related infrastructure (bus lanes, types of stations, terminals), select adequate vehicle technologies, and understand overall schedule and operation of the bus system. Investments were fully integrated into the overall public transport systems and ensure full support of decision makers and operators.

60. The water component includes the rehabilitation of drainage and wastewater systems and the reclamation of wastewater. During preparation, methods and procedures were used to ensure hydraulic designs of storm drainage systems were realistic and to evaluate current and future rainfall and runoff magnitude, pavement drainage and runoff, structure design, and storm drain piping. The project integrates structural and non-structural measures to improve water quality, improve water flows, and reduce flood risks. Procedures for the design of alternatives to retain

water or increase runoff were also considered. As much as possible, the design institute used existing hydrological data and surveys to come up with realistic runoff and wastewater demands. A detailed analysis of the costs of using reclaimed water compared to existing groundwater extraction was conducted.

C. Financial Management

61. The Bank loan proceeds, including overseeing the Designated Account (DA), will be managed by LPFB. A financial management capacity assessment has been conducted by the Bank and actions to strengthen the project's financial management capacity have been agreed with the LPMO and PIUs. The financial management (FM) assessment has concluded that with the implementation of these proposed actions, the financial management arrangements will satisfy the Bank's minimum requirements under OP/BP 10.02. Annex 3 of the PAD provides additional information on financial management.

D. Procurement

62. The LPMO will organize, lead, and coordinate procurement activities for the whole project and provide guidance to the seven PIUs in the project cities on all procurement related aspects. The capacity assessment of the LPMO and different PIUs has been conducted by reviewing the project organization structure and functions, past experience of implementing agencies, staff skills, quality and adequacy of supporting and control systems, and the legal and regulatory aspects. The LPMO and all the seven PIUs have been legally established with at least one designated procurement staff in each one. While the LPMO and the PIUs in Donggang and Panjin have experience with Bank-financed or other international financial institution financed projects, the remaining project cities, PIUs, and their staff do not have adequate experience with Bank projects and procurement procedures.

63. To build the capacity of the PIU staff, the LPMO will regularly organize training activities during project implementation. In addition, project procurement staff will attend procurement training courses organized periodically by the Bank or other institutions acceptable to the Bank. Furthermore, procurement activities under the project will be guided by the project procurement manual, as part of the Operational Manual (OM), which has been completed and was reviewed by the Bank.

64. The initial procurement plan describing procurement activities to be undertaken for the whole project has been prepared by the LPMO, with input from the PIUs. The first procurement plan has been approved by the Bank. Subsequently, the procurement plan will be updated annually or as required to reflect actual project implementation needs and submitted to the Bank for review.

E. Social (including Safeguards)

65. The project has significant social benefits, as it supports the development and economic growth along the coastal area of Liaoning province and promotes the development of infrastructure in second-tier cities in order to improve the quality of life and the environment. The public consultation and participation process during project preparation enabled the project

to incorporate a number of the public concerns and demands in the designs and reduce the number of people affected by land acquisition and resettlement.

66. A Resettlement Action Plan (RAP) has been prepared for each subproject. In addition, a consolidated RAP was prepared to introduce the key resettlement information and a Resettlement Policy Framework (RPF) was prepared for linked projects in Donggang City and Longcheng District in Chaoyang City. The RAPs and RPF provide details on resettlement policy procedures and requirements that will have to be followed during project implementation, including compensation rates, mitigation measures to restore incomes, and institutional and monitoring arrangements. The specific subproject RAPs were disclosed in municipal libraries and local newspapers between October 2 and 16, 2012 (see table below for details) and submitted to the World Bank Infoshop on October 23, 2012.

Table 3. Disclosure Dates and Place of Resettlement Action Plans

Resettlement Action Plan	Disclosure Date	Media
Donggang RAP	October 12,2012	Donggang, China (中国东港) (Internet)
	October 12,2012	Donggang Communication (东港通讯) (Newspaper)
Chaoyang RAP	October 12,2012	Chaoyang Daily (朝阳日报) (Newspaper)
Lingyuan RAP	October 15,2012	Lingyuan City Newspaper (凌源市报) (Newspaper)
Panjin RAP	October 13,2012	Panjin Government Net (盘锦政府网) (Internet)
	October 16,2012	Panjin Daily (盘锦日报) (Newspaper)
Suizhong RAP	October 12,2012	Huludao Daily (葫芦岛日报) (Newspaper)

67. **Gender Analysis.** The Social Assessment included a gender analysis in Donggang and Suizhong. Hohai University with support from local agencies, conducted a disaggregated gender analysis in affected villages/communities, listened to women’s expectations, and collected ideas and recommendation that are being incorporated in the designs of subprojects. Gender disaggregated information was also collected and used in the RAPs to ensure that women’s interests will be safeguarded during resettlement implementation. The gender impacts will continue to be monitored during project implementation as part of the social monitoring by the entire project team, including: PMO, PIUs, Hohai University and the Bank project team.

68. **Land acquisition.** The subprojects will affect eleven townships and residential committees, eighteen villages and communities, and one state-owned farming factory. The project will require the permanent acquisition of 77.9 ha of collective land, including 22.4 ha of paddy land, 20.8 hectares of dry land, and 14.8 ha of orchard land, 19.3 ha of housing lots, and 0.6 ha of other land.

69. **Housing demolition.** The project will require the relocation of almost 49,600 m² of private houses, including almost 27,200 m² of concrete and brick houses, 2,300 m² of brick houses, 17,000 m² of brick and wood houses, and 1,106 square m² of simple houses. As a result, 556 households and 1,997 people will have to be resettled due to this project.

70. **Participation strategy.** Focus group discussions and key informant interviews have been used to consult with potentially affected persons and obtain views and preferences regarding resettlement impacts and mitigation measures, including land compensation and social security programs. These views and preferences have been taken into account during RAP preparation and the majority of potentially affected persons agree that the resettlement and rehabilitation measures planned under the RAP will be adequate to address and mitigate any adverse impacts.

71. The affected villages are to play a key role in determining and implementing their livelihood restoration programs. For example, after land compensation amounts are calculated, each community will determine how land compensation can best be used to improve, or at least restore, local income-earning potential.

72. The project entity will set up procedures to supervise land compensation use. Both internal and independent monitoring of the resettlement program would be conducted regularly during project implementation.

73. **Consultation.** The project contracted Hohai University to conduct the census and social survey, the social impact analysis and public consultation. This has contributed significantly to the preparation of the RAPs. Villages and farmer groups have also been consulted and participated in the resettlement planning process and the preparation of the project. Their feedback has been incorporated into the RAPs and the consultation session concluded that the resettlement and rehabilitation measures planned under the RAPs are adequate to address and mitigate any project impacts on land acquisition.

74. **Institutional arrangements.** A resettlement office will be established under the Liaoning PMO to supervise the resettlement implementation. A resettlement office will also be created under each PIU and ensure timely implementation of the approved RAPs. In Longcheng District, a village level resettlement office will also be established to support the PIU and local resettlement office. The project city land and resources bureaus will be responsible for the land acquisition approval. Hohai University was involved in the very early stages of project preparation and has extensive experience preparing RAPs for Bank projects. It will be contracted to serve as the independent monitoring agency of the resettlement program. The project will be monitored and the living standards of the project-affected people will be evaluated over the course of project implementation. The monitoring results will be regularly reported twice a year and, if needed, remedial actions will be devised.

75. **Linked projects.** The Bank loan will improve the road infrastructure in Longcheng District and Donggang city, these roads are part of larger urban upgrading programs supported by the government, and, therefore, these programs are linked to our project. The respective project cities agreed to follow the Bank social safeguards policies and a Resettlement Policy Framework (RPF) was prepared to guide those linked resettlement activities.

F. Environment (including Safeguards)

76. Based on environmental screening, the Bank policy OP 4.01 Environmental Assessment is triggered, as the proposed project components, Component 1 – road network and public transport improvement – and Component 2 – wastewater collection, drainage improvement and water

reclamations – will have some environmental, safety and health impacts during construction and operation. The project is a Category B project per the Bank’s OP 4.01 Environmental Assessment, as the environmental impacts identified and assessed are measurable and manageable, and none of them are unprecedented.

77. An Environmental Impact Assessment (EIA) was carried out for each of the subprojects in accordance with China’s national policies and regulations. Based on the EIAs, an environmental management plan (EMP) was prepared, summarizing the key environmental impacts and presenting the agreed mitigation measures, environmental monitoring system, institutional arrangement and capacity building development program. The documents have been prepared based on the Chinese legal and policy framework for environmental management, as well as applicable Bank safeguard policies and Bank group’s Environment, Health and Safety Guidelines.

78. **Environmental benefits.** The proposed project will foster more efficient and less polluting transport systems by reducing congestion, improving public transport systems, and pedestrian and biking facilities in project cities. The project will also introduce cleaner bus technologies, which will benefit local air quality. Water related investments will help increase the volume of wastewater collection and reduce water pollution. Wastewater reclamation will reduce the pressures on groundwater exploitation. Finally, the subproject in Suizhong will help reduce flood and health risks along the urban canals

79. **Public consultations and information disclosure.** Public consultations have been carried out during the EA process, including: public consultations, targeted surveys, focus group discussions, public meetings with key stakeholders, and interviews with project affected persons. Recommendations raised during these consultations have been incorporated in the EIA and EMP. Furthermore, feedback and concerns raised during public consultations have been addressed and discussed with affected people, and documented in the EA and EMP. The EIA documents and other project related documents have been disclosed locally through websites, local newspapers (see Table 4 below) and other means following national and Bank policies and procedures. The consolidated EMP was published on the website of the Environmental Science Research Institute of Liaoning Province and in the Shenyang Daily on September 20, 2012. All relevant documents were disclosed through the Bank’s InfoShop on October 12, 2012.

Table 4. Disclosure of EIAs

Area	Time for Information disclosure			Newspaper and website
	Newspaper	Online		
		First	Second	
Donggang City	May 14, 2012	May 10, 2012	July 2, 2012	Donggang Daily Telegraph http://www.donggang.gov.cn/
Kuandian County	July 5 2012	August 2, 2012	September 5, 2012	Kuandian Daily http://zhengwu.lnkd.gov.cn/
Panjin City	July 10 ,2012	July 11, 2012	August 24,2012	Panjin Daily http://www.lncom.cn/pjs/
Longcheng District	June 19, 2012	July 30, 2012	September 3, 2012	Chaoyang Daily http://www.longcheng.nen.com.cn/

Area	Time for Information disclosure			Newspaper and website
	Newspaper	Online		
		First	Second	
Lingyuan City	May 28, 2012	August 6, 2012	September 7, 2012	Lingyuan Daily http://lingyuan.nen.com.cn
Suizhong County		July 10, 2012	August 20, 2012	http://www.suizhong.gov.cn/

Annex 1: Results Framework and Monitoring

CHINA: Liaoning Coastal Economic Zone Urban Infrastructure and Environmental Management Project

Project Development Objectives

PDO Statement

The proposed Project Development Objective (PDO) is to improve the urban transport systems and address water scarcity issues in selected cities in Liaoning Province.

Project Development Objective Indicators

Indicator Name	Core	Unit of Measure	Baseline	Cumulative Target Values					Frequency	Data Source/ Methodology	Responsibility for Data Collection
				2014	2015	2016	2017	2018			
PO-1. Percentage of people walking and biking satisfied with new and improved facilities on selected roads in Chaoyang, Donggang, Kuandian and Lingyuan.	<input type="checkbox"/>	Percentage	45	-	-	50	-	70	Twice At mid-term and completion of project	Actual data collected and monitored	Local traffic authorities, PIUs and PMO
PO-2. Percentage increase of riders satisfied with public transport services on selected routes (1, 30, 31, 32 & 33) in Panjin	<input type="checkbox"/>	Number	35	-	-	50	-	60	Once every year	Actual data collected and monitored	PIU (Panjin Bus Company) and PMO
PO-3. Percentage of reclaimed wastewater used in the industrial park.	<input type="checkbox"/>	Percentage	0	-	-	35	45	60	Once a year	Actual data collected and monitored	Local water company, PIU and PMO
PO-4. Urban area benefitting from improved drainage system in Suizhong	<input type="checkbox"/>	Percentage	0	-	-	25	50	75	Once a year	Actual data collected and monitored	Local water company, PIU and PMO
PO-5. Project Beneficiaries (disaggregate by male/female)	<input type="checkbox"/>	Number	0	-	-	50,000	150,000	340,000	Once a year	Actual data collected and monitored	PIUs and PMO

Intermediate Results Indicators											
Indicator Name	Core	Unit of Measure	Baseline	Cumulative Target Values					Frequency	Data Source/ Methodology	Responsibility for Data Collection
				2014	2015	2016	2017	2018			
IO-1.1. Length of new and rehabilitated streets with improved public transport and NMT in Chaoyang, Donggang, Kuandian and Lingyuan.	<input type="checkbox"/>	Kilometers	0	-	-	20	40	52	Once a year	Actual data collected and monitored	County transportation bureau, PIUs and PMO
IO-1.2. Increase in number of passengers per year on selected bus routes in Panjin (1, 30, 31, 32 & 33)	<input type="checkbox"/>	Number	4,300	-	-	4,800	4,900	5,100	Once a year	Actual data collected and monitored	County transportation bureau, PIUs and PMO
IO-1.3. Percentage increase of Annual Road Maintenance budget in participating cities	<input type="checkbox"/>	Percentage	8%	-	-	10%	11%	15%	Once a year	Actual data collected and monitored	Country transportation bureau, PIUs and PMO
IO-2.1 Number of industries connected to reclaimed water system in Lingyuan	<input type="checkbox"/>	Number	0	-	-	6	12	20	Once a year	Actual data collected and monitored	Local water bureau, PIUs and PMO
IO-2.2 Length of drainage pipes completed in Suizhong	<input type="checkbox"/>	km	0	-	15	30	60	76	Once a year	Actual data collected and monitored	PIU and PMO
IO3.1. Number of staff training days in project financed training and TA activities	<input type="checkbox"/>	Number	60	140	220	300	380	460	Once a year	Actual data collected and monitored	PIUs and PMO
IO.3.2. Number of revised local traffic management plans and capital investment plans	<input type="checkbox"/>	Number	0	-	-	1	2	3	Once a Year	Actual data collected and monitored	PMO/line implementation agencies

Annex 2: Detailed Project Description

CHINA: Liaoning Coastal Economic Zone Urban Infrastructure and Environmental Management Project

1. The Project Development Objective (PDO) is to improve the efficiency of urban transport and address water scarcity issues in selected cities in Liaoning Province. The particular emphasis is to (i) provide better public transport services in selected cities and improving urban traffic flows along rehabilitated and new roads; and (ii) improve wastewater treatment and water reclamation to reduce pollution and foster more efficient use of scarce water resources.

2. To achieve this objective, the project is divided into 3 different components: (i) improving urban transport systems, (ii) improving wastewater treatment, drainage and water reclamation, and (iii) technical assistance activities. A more detailed description of each of the project components and subprojects is provided in the following paragraphs.

Component 1: Improving urban transport systems (Total: US\$ 250.1 million, IBRD Loan: US\$ 107.8 million)

3. This component will invest in improving urban transport systems and fostering transit oriented development along selected public transport corridors. These corridors were selected by each city, based on the current and future demand on the selected roads, the poor quality of existing infrastructure, improved access to regional transport systems such as trains and high speed rails, and the opportunity to demonstrate innovative local street designs based on integrated land use and transport plans at a neighborhood scale. The designs of the roads have been adapted based on the overall road network plan, the function of each road, and the expected transport volumes over time. Priority was given to public and non-motorized transport, and road space was reallocated to provide walking, transit, and bicycling facilities, public open space, green cover and appropriate stormwater drainage. The designs reduced and minimized the width of roads, while ensuring the required safe and cost-effective operation of motor vehicles, buses, bicyclists and pedestrians. Overall, the transport component include the rehabilitation or construction of roads, improvement of pilot public transport system, two bus depots, and road maintenance equipment. The total road length is 52.4 km (see details below). This component includes the sub-project investments described in the following paragraphs.

4. **Subproject 1a. Urban transit oriented development in Donggang County.** Donggang city currently has over 135,000 inhabitants and is expected to grow to 300,000 by 2020. As part of its Master Plan, the city is planning an expansion of the urban area towards the high-speed railway station to the north of the city, planned to be finished in 2013. The main project investments are related to the construction of a comprehensive road network for this new area. The width of roads the roads was reduced, while safe and cost-effective operation of motor vehicles, buses, bicyclists and pedestrians was ensured. Consideration was given to use bus system to guide the new development in this area, improve existing traffic flows, recent trends and mode choice, and implications for future traffic volumes. Special attention was given to the design of intersections to simplify traffic patterns and create right-angled intersection for more

direct and safer pedestrian crossings. All designs include detailed designs for segregate and safe bikelanes and sidewalks.

5. The project financed investments include six roads with a total length of 7.0km including the Zhanqian Avenue, which is the main access road to the train station and includes segregate buslanes to ensure rapid public transport access to the downtown area; Gaotie Avenue (40m wide) and Haiguan North Road (30m wide) are arterial roads that will provide access to the expansion area and divert traffic from the expansion zone; Henger Road (36m wide) and Hengsan Road (30m wide) are both secondary access roads to the new development zone and priority will be given to bicyclists and pedestrians on these roads; and Hengy Road (18m wide) is actually a local street, with high priority to bicyclist and pedestrians, and includes traffic calming features to increase safety for local residents.

6. As part of the asset management training that will be implemented under Component 3, Donggang will prepare an asset management plan and is planning to procure road maintenance equipment. The project will also provide support to the city, through TA activities to improve the local traffic management plan and optimize the use of road space, minimize traffic conflicts and increase road safety for all users, especially bicyclists and pedestrians.

7. **Subproject 1b. Urban road rehabilitation in Kuandian County.** Kuandian County currently has over 435 thousand inhabitants of which 91,000 are non-farming, according to the Liaoning Statistical Yearbook 2011. The current conditions of the road infrastructure are very poor and many roads are not paved and need urgent upgrading. As part of the 12th 5-year Plan, the project will assist the city in improving and establish comprehensive road network that will ensure better flow of traffic, bicycles and pedestrians. The project will reduce traffic conflicts and improve traffic safety and provide appropriate facilities for walking and biking. The project will promote urban development and lay the foundation for local economic development of Kuandian and promote cleaner transport systems.

8. Project investments were carefully selected and combine improvements to major arterial roads, rehabilitation of secondary access roads, creation of a comprehensive network of local streets within a neighborhood, and rehabilitation of a pedestrian street in the downtown area. A total of 27 existing roads within the urban area will be rehabilitated and improved, totaling 20.8km. The designs of the different roads were adapted and width reduced to respond to actual demands and improve the quality of pedestrian and biking facilities.

9. To improve the road maintenance practices within the urban area, the project will support the transport bureau to improve management of existing roads and carefully plan for future investments and ensure their maintenance. Kuandian will participate in the asset management training activities, under Component 3. Kuandian is also planning to procure road maintenance equipment after defining a more detailed plan. Finally, the project will support Kuandian in improving its local transport management plan and optimize the use of road space, minimize traffic conflicts and increase road safety for all users, especially bicyclists and pedestrians.

10. **Subproject 1c. Urban road rehabilitation in Lingyuan City.** Lingyuan is the largest county level city in Liaoning Province with a population of 650 thousand inhabitants, of which approximately 130 thousand live in the urban area. The urban road infrastructure has improved

over the last years, but some important links within the city and to major regional roads are missing. As a result, increasing traffic volumes are diverted to existing roads and start creating traffic conflicts and increasing congestion. Different from many of the recent urban roads that are very wide, focusing on motor vehicles, the designs under this project provide for adequate and safe allocation of walking, transit, and bicycling facilities, public open space, green cover, lighting, and appropriate sewage and stormwater drainage networks. The designs reduced and minimized the width of roads based on existing and projected traffic volumes.

11. Three roads were selected within the urban area of Lingyuan City with a total length of 7.0km to be rehabilitated with support from this project: (i) East Binhe Road, (ii) Wenyi Road, and (iii) Wuliu Da Road. East Binhe Road is a major north-south arterial road along the east bank of Lin River, which, despite its location and importance, is currently unpaved and in very poor condition. The project will finance the improvement of 4.4 km of this road. As a result of the careful review of designs based on local demands and mode choice, the width of the road was reduced to 26m by reducing traffic lanes while ensuring adequate bus transit, walking and biking facilities. Major north-south traffic flows will be directed to West Binhe Road, which already has adequate facilities to cope with current and future traffic demand. Both Wenyi Road (1.6km) and Wuliu Da Road (1.0km) were selected as they are important access to the city. The rehabilitation and improvement of these roads include the construction of two bridges over the Lin River, which will help divert some traffic from the downtown area of the city. In both cases, the road width was minimized to 30m and provides for segregated bus lanes and non-motorized transport facilities.

12. Lingyuan has also agreed to further strengthen its overall traffic and urban transport management plan to optimize traffic flows, reduce traffic conflicts and provide for safe and adequate infrastructure for bus transit, biking and walking facilities. The project will support the city to improve its plan while also strengthen its road asset management capacity. The city is planned to purchase road maintenance vehicles and equipment as part of the capacity building process.

13. **Subproject 1d. Urban transit oriented development in Longcheng Urban District.** Longcheng District is part of the Chaoyang City with a population of approximately half a million people. Longcheng District is situated to the west of the city and is still largely a rural county with a total population of 180,000, of which only 60,000 live in the urban area of Chaoyang. The district is rapidly urbanizing and the city is planning major investments in new development areas within the urban boundaries. The selection of the District was based on its strategic location close to major bus routes and the opportunity for smart urban land and transport development and includes a comprehensive network of roads that would connect the mixed development to major public transport systems and ensure accessibility by non-motorized transport. Beyond the major arterial access roads with segregate bus lanes, investments include neighborhood roads that prioritize bicyclists and pedestrians and include traffic calming features to create a sense of community and improve safety. Detailed analysis of current and expected traffic volumes was conducted and the width of the roads were minimized, while ensuring safe and cost-effective operation of motor vehicles, buses, bicyclists and pedestrians.

14. As a result, the twelve project financed roads with a total length of 17.7km, will require 372.5 m² of land, which can be used for real estate development by the District. Investments in Longcheng District include three main arterial roads that provide direct access to the new development area, namely Wenhua Road, Zhongxing Street and Anlingda Street and rainwater pump station and their ancillary works: roads, bridges, rainwater, sewage, lighting, signs and markings, garbage bin, traffic signals, bus stop kiosks. Four secondary roads and their ancillary works of Liugangxi Road, Liufang Road, Liunan Road and Yangliu Road: roads, bridges, rainwater, sewage, lighting, signs and markings, intersection canalized, garbage bin, litter bins, traffic signals, safety fence, bus stop kiosks. Five secondary roads of Road No.1 , No.2, No.3,No.4,No.5 and their ancillary works: roads, rainwater, sewage, lighting, greening, signs and markings, garbage bin, traffic signals, harbour stops.

15. Longcheng District will also participate in the road asset management training activities and the project will allocate funding for the procurement of road maintenance equipment once the plan is finalized. Furthermore, the project's technical assistance activities will assist the District to improve its local traffic management plan and optimize the use of road space, minimize traffic conflicts and increase road safety for all users, especially bicyclists and pedestrians.

16. **Subproject 1e. Public transport improvement in Panjin City.** Panjin is the largest city participating in this project with close to 1 million people living in the urban area. Over recent years, the Bank has provided support to Panjin City to improve its public transport facilities and system, and provide cleaner transport alternatives. It has a consolidated urban public transport system that is managed by the Panjin Public Transport Company under the Panjin City Government. The current system is not optimized and many buses are very poorly maintained with high risks of braking down and posing risks to its users. Based on a recent Bank financed study to support Panjin City and recommend actions to improve the public transport system, four priority issues were identified: (i) bus network improvement, (ii) investment on bus fleets, (iii) investment on bus maintenance depot and parking facilities, and (iv) strengthening bus operation and management.

17. Based on the priorities identified and detailed forecasting of public transport demand, the project will support Panjin Public Transport Company in improving the quality of bus infrastructure and services along major bus transit lines between Shuangtaizi District and Xinglongtai District that connect important transit terminals, a railway station and a key high school and college. The city is upgrading the public transport related infrastructure and facilities along these corridors and improving the overall operation of the bus system. The Bank loan will finance the purchase of 150 new buses to operate these routes. A careful comparison between LNG and diesel buses was conducted, showing this cleaner alternative technology can be cost-effective option for Panjin. To ensure the adequate maintenance of these new LNG buses and improve maintenance of the existing bus fleet, the project will finance the construction of two bus maintenance depots, located in Shuangtaizi District and Xinglongtai District. The location of these depots was carefully assessed to ensure easy access and minimize environmental impacts.

18. The overall investment, depreciation, operation and maintenance costs of new equipment and facilities have been carefully reviewed to ensure the Panjin Public Transport Company has

the necessary revenue from ticket sales and government transfers to maintain the depots and buses. The depots are expected to lower maintenance and servicing costs due to preventive maintenance practices and dedicated parking. The improved access to the depots will actually greatly reduce deadhead trips and fuel consumption as well as completely eliminate street side parking of buses.

19. The project financed asset management training program will support the Company in developing a more detailed inventory of all facilities and equipment, the operation and maintenance costs, as well as plan ahead for the replacement of critical facilities and equipment.

Component 2: Improving urban wastewater treatment and reclamation (Total: US\$ 87.7 million, IBRD Loan: US\$ 40.6 million)

20. This component will finance investments in wastewater treatment facilities and water reclamation systems, while also separating sewage and drainage networks in selected cities. The main objective is to rationalize the use of scarce water resources, reduce groundwater abstraction, and reduce water pollution. Investments include the construction of new and rehabilitation of existing wastewater plants, separate sewage and drainage networks, and replacement of groundwater supply systems by water reclamation supply systems.

21. **Subproject 2a. Wastewater treatment and reclamation and drainage in Lingyuan City.** This subcomponent include the construction of sewerage collection and drainage system, rehabilitation of the wastewater treatment plant and building of water reclamation network, described in more detail in the next paragraphs.

22. *Sewerage Collection and Storm Drainage Networks.* A wastewater treatment plant (WWTP) in Lingyuan City and started operation in 2009 with a total capacity of 50,000m³/day. It currently only receives about 23,000m³/day, mostly due to the incomplete sewage network which does not serves many areas, including the new industrial park. The project will support investment that will help increase the volume of wastewater to be treated at the WWTP by separating and expanding the sewage and drainage network. After completion of sewerage collection networks the influent of Lingyuan WWTP is projected to be 46,000 m³/day, and treated municipal wastewater will be used by selected industries in a new industrial park. A total of 37.1km of storm drainage network and 49.9 km of sewerage collection pipelines will be installed with support from the project, as well as 30.7km of a reclaimed wastewater network, including a pump station that will connect the WWTP to the industrial park, with an overall capacity of 30,000m³/day.

23. According to the design, the quality of tertiary treatment effluent shall comply with Class 1A standard, as outlined in Table 2.1. Based on available information, the current water consumption of the industrial park is 16,000 m³/day (domestic water 1,700 m³/day), and is expected to increase to 91,400m³/day in the future, of which 66,200 m³/day can be supplied by municipal reclaimed water. Currently both industrial and domestic water are supplied by groundwater. However the abstraction of groundwater by industries is being banned by provincial and local authorities.

24. An assessment of the operation and management of Lingyuan WWTP, including institutional and legal arrangements, operational costs and budgets, technical capacity, maintenance procedures, and tariffs collection. The Lingyuan WWTP is currently operated by a private company, but the municipality plans to resume the operation by itself in 2013.

Table 2.1. Class 1A WWTP Discharge Standard (National Code GB18918-2002) compared to Industrial Water Quality requirements

No.	Description	Unit	Effluent Standard	Reclaimed water quality
1	pH		7.1	6.5-8.5
2	Suspended Solids (SS)	mg/l	10	-
3	Turbidity	NTU	5	5
4	Chromaticity	Degree	30	30
5	Biochemical oxygen demand (BOD)	mg/l	10	10
6	Chemical oxygen demand (COD)	mg/l	50	60
7	Iron	mg/l	0.3	0.3
8	Manganese	mg/l	0.1	0.1
9	Chloride ion	mg/l	146.1	250
10	Silica (SiO ₂)	mg/l	25	30
11	Total hardness (CaCO ₃)	mg/l	235	450
12	Total alkalinity (CaCO ₃)	mg/l	235	350
13	Sulfate	mg/l	150	250
14	Ammonia Nitrogen (N)	mg/l	5	10
15	Total Phosphorus (P)	mg/l	0.5	1
16	Solubility total solid	mg/l	900	1,000
17	Petroleum	mg/l	1	1
18	Anionic surfactant	mg/l	0.5	0.5
19	Residual chlorine	mg/l	0.1	0.05
20	Fecal coliform bacteria	mg/l	1,000	2,000
21	Sulfate	mg/l	-	250
22	Total dissolved solids	mg/l	-	1,000
23	Residual chlorine	mg/l	-	0.05

25. Major industries in the industrial park and facing future restrictions on groundwater abstraction already committed to the use of reclaimed wastewater, as long as it complies with the norms shown in Table 2.1 below. The committed volume of reclaimed wastewater is a little over 16,000 m³/day with a proposed tariff of RMB2.8/m³. Based on the financial assessment, cost-recovery is feasible starting at a tariff of RMB1.1/ m³, but a higher tariff would help reduce the local government's subsidy of about 80% of the WWTP's operating costs.

26. A thorough mass balance analysis of the entire wastewater reclamation system has been made to ensure long term sustainability. It is envisaged that, with proper management to the

system e.g., chemical dosing and water quality monitoring, the risk of corrosion and scaling of the entire system can be minimized.

27. For the safety of the industrial water system within the industrial park, the current industrial water source will be kept as a back-up in case of any emergency or problems with the quality and volume of reclaimed water from the Lingyuan WWTP.

28. **Subproject 2b. Wastewater and Drainage in Suizhong City.** This subcomponent will finance sewerage collection and storm drainage networks and the rehabilitation of a drainage canal in the city of Suizhong.

29. *Wastewater Collection and Storm Drainage Networks.* The wastewater collection and storm drainage networks in Suizhong City are incomplete. Currently the municipal wastewater and stormwater is discharged into a canal which crosses the city, resulting in the deterioration of water quality and increasing flood risks. Indiscriminate dumping of solid waste into the canal is further hampering water flow and increasing flood risks.

30. The current volume of domestic sewage discharge into the canal is 12,000 to 18,000 m³ per day. The Suizhong WWTP was built in 2009 and is located downstream of the canal with a total capacity of 30,000m³/day. During periods of heavy rain the combined wastewater and stormwater flows exceed the WWTP capacity and much of the untreated wastewater is discharged directly into the Liugu River and ends up polluting the Bohai Sea.

31. To address these problems the project will support Suizhong City in rehabilitating its wastewater collection and storm drainage systems. Around 37.1km of storm drainage pipelines and 38.8km of sewerage collection pipelines will be installed. After completion, the municipal sewerage will be collected separately and conveyed to the Suizhong WWTP at a volume of around 29,300m³/day. Stormwater will be collected and discharged separately into the canal. As a result, pollution loads to the river and Bohai Sea will be reduced.

32. *Canal Rehabilitation.* During the installation of wastewater collection systems and storm drainage networks, the project will also support the rehabilitation of the canal to improve the environmental condition of the areas alongside the canal and ensure it can function of carrying floods in order to alleviate the risk of street flooding when it rains.

33. In total, 6.6km canal will be rehabilitated through widening, deepening, dredging, greening and side protection. The volume of a pond (Beidakeng) which connects east and west branch of the canal will be increased from current 5,650 to 16,750 m³, which enables better flood balancing than before. The width of the canal after rehabilitation will ranges from 6 to 16 meters. A 16 meter wide and 2.5 meters high rubber dam will be built to maintain the proper water level for scenic purpose.

34. A waste management action plan will be implemented by the Suizhong City to ensure the canal is maintained and waste is properly disposed. After completion, the environment alongside the canal will be greatly improved and benefits the local residents.

Component 3: Project Management and Capacity Building (Total IBRD Loan: US\$ 1.65 million).

35. During project preparation, the team worked closely with Provincial and local authorities and identified these needs to provide technical assistance to identify studies that can increase project impacts in the long-term and benefit the region as a whole. The preliminary list of studies and assistance considered for financing under this project include:

36. Building the capacity of *local transport investment and management* agencies and support them in preparing or revising urban transport investment and management plans, focusing on promoting public transport, transport planning and investment, pedestrian, bicycles and overall traffic safety, and road maintenance;

37. Developing comprehensive *capital investment and asset management plans* for local implementing agencies to ensure long-term sustainability of project investments. And,

38. Supporting *project management and supervision*, including consultancy services and training in: technical supervision, procurement and financial management; contract supervision; environmental management plans and resettlement action plans.

Annex 3: Implementation Arrangements

CHINA: Liaoning Coastal Economic Zone Urban Infrastructure and Environmental Management Project

Project Institutional and Implementation Arrangements

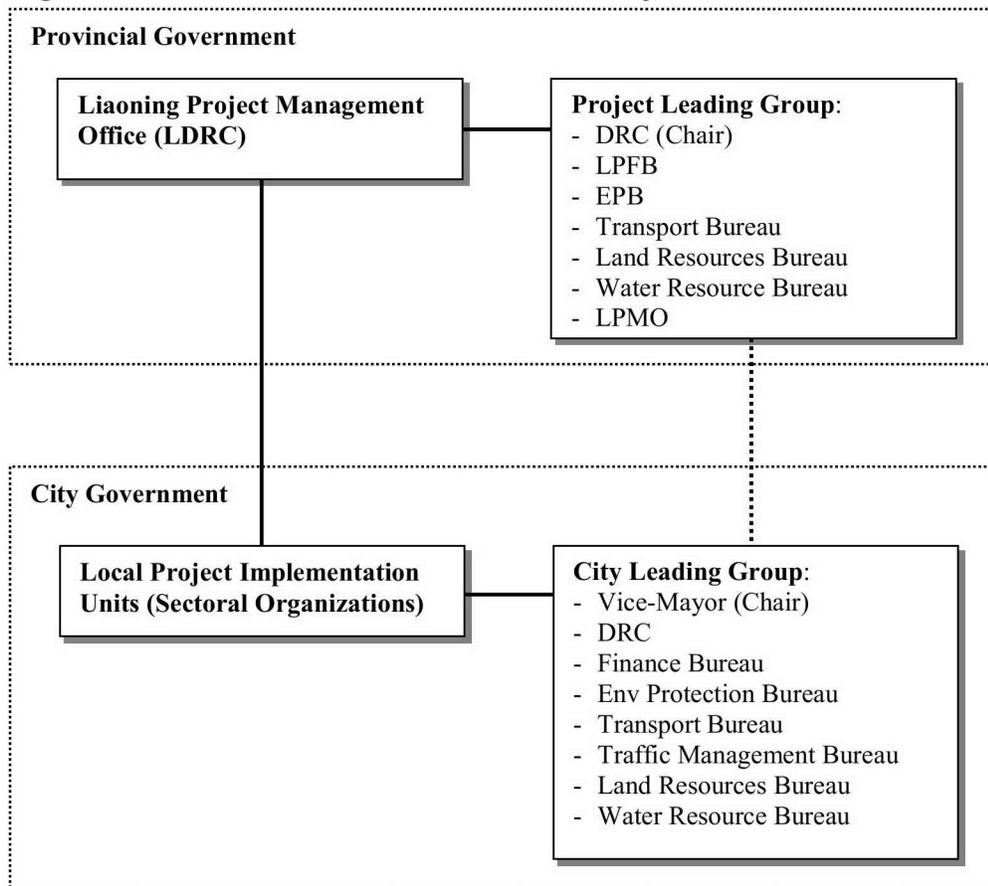
Project administration mechanisms

1. The Project's institutional framework basically follows the framework established for the Liaoning Third Medium Cities Infrastructure Project (LMC3), which is managed by the same Project Management Office (PMO) as this Project.
2. A Provincial Project Leading Group (PLG) has been established and chaired by the Provincial Vice-Governor responsible for the Provincial Development and Reform Commission (PDRC) and includes representatives from the LPFB, Transportation Bureau (TB), Water Resources Bureau (WRB) and Environmental Protection Agency (EPA) and other agencies and institutes as appropriate. The PPLG should also include the chair of each of the local PLGs. The major responsibilities of the PPLG are to provide coordination, policy-level support and provide guidance on strategic issues, oversee timely implementation of the project, supervise the technical assistance and capacity building component and sharing of lessons learned between participating cities and Liaoning Province.
3. The Liaoning Foreign Fund Utilization Project Office, established under the Liaoning Provincial Development and Reform Commission (LDRC) will be the Liaoning Project Management Office (LPMO). The LPFB is responsible for the financial management of the Project and managing the project designated account (DA). Together with the LDRC, it will provide support and advice to the LPMO and project cities on financial matters. The LPMO, with support from consultants, will be responsible for overall supervision of the project, focusing on technical and project management aspects, advisory to cities and PIUs, quality insurance and control, consolidation of monitoring, reporting and due diligence requirements. The LPMO will be managing the project and immediately flag any issues on timely implementation according the policies and procedures agreed for this project. The LPMO has selected a Procurement Agent to assist with the preparation of bidding documents and managing the overall bidding process. The LPMO will prepare semi-annual Progress Reports and coordinate the monitoring and evaluation of the project. A Project Management and Contract Supervision team of consultants will support the LPMO in carrying out these functions and provide advice to the cities and local PIUs on contract and safeguard supervision.
4. At the local level, City Leading Groups (CLGs) have been established in each of the participating cities, co-chaired by the local Vice Mayor overseeing the local implementing agency. The CLGs follow the same structure as the PLG at the provincial levels their role and responsibilities are also similar. The CLGs include representatives from relevant local agencies such as the City DRCs, Finance Bureaus, Environmental Protection Bureaus, Water Resource Agencies, Water Resources Agencies and relevant investment companies. At the local level, the

project will be implemented by responsible local line agencies or affiliated companies, which are all 100% government owned:

- (a) *Donggang City*: Donggang Municipal Administration Department;
- (b) *Kuandian County*: Kuandian Rural-Urban Real Estate Construction and Development Company, Ltd.
- (c) *Lingyuan City*: Lingyuan Municipal Administration Department (Component 1);
- (d) *Lingyuan City*: Lingyuan Emergency Water Supply and Administration Department (Component 2);
- (e) *Longcheng District*: Chaoyang West New Industrial Zone Construction and Investment Company, Ltd;
- (f) *Panjin City*: Panjin Public Transport Company, Ltd; and,
- (g) *Suizhong City*: Suizhong Municipal Administration Department.

Figure 3.1. Institutional Framework of the Project



5. **Construction Supervision.** The technical supervision of subprojects and contracts will be done by the PIUs with support from local engineers and safeguard specialists. The PIUs will prepare as and monitoring and evaluation of impacts. The LPMO will hire a consultancy firm to

support the team on different project management and supervision tasks. Local supervision will be carried out by local consultants who will perform periodic on-site supervision and provide construction supervision reports.

6. A comprehensive Operational Manual (OM) was adopted for the Project with detailed description of the project's institutional framework, and consolidating the information regarding the policies, procedures, roles and responsibilities of relevant stakeholders and organizations regarding: financial management and disbursements, procurement, contract management and supervision, environmental management and monitoring, resettlement and land acquisition, monitoring system and evaluation of the project.

Financial Management, Disbursements and Procurement

Financial Management

7. The FM capacity assessment identified the following principal risks: a) the financial staffs at the PIUs do not have experience with Bank-financed project; b) timely contribution of counterpart funds is critical to the project since it accounts for approximately 60% of total project cost.

8. Mitigation measures, to address the above risks, which have been agreed to include: a) a detailed section on Financial Management procedures in the OM; b) related guidelines and FM/disbursement training will be provided to the PIUs and the project FMS will also look to provide ad hoc training to the PIUs during project implementation; c) counterpart funds will be confirmed by amount and source and various departments should include a budget line for this project into their annual budgets to secure the project counterpart funding to cover, at least, the first year of project implementation.

9. Overall, the residual financial management risk after mitigating measure for the project is assessed as *Moderate*.

10. **Budget.** The annual project implementation plan, including the funding budget and the resources, will be prepared by the LPMO and PIUs. The budget for counterpart funds committed by local government will be reviewed and approved by local People's Congress and be included in their sectoral budget. Based on the approved budget and implementation progress, the related finance bureau will provide government appropriations to the project. Budget variance analysis will be conducted on semi-annual basis by the PIUs and necessary actions will be taken to make sure project could be implemented as planned. The Bank will work with the LPMO and PIUs through supervising project budgeting system to enhance their budget preparation and execution during project implementation.

11. **Funds Flow.** The Bank loan proceeds will flow from the Bank into project DA to be set up at and managed by LPFB. LPFB will be directly responsible for the management, maintenance and reconciliation of the DA activities. Supporting documents required for Bank disbursements will be prepared and submitted by the PIUs through CFB and MFB for review and verification before sending to LPFB for further disbursement processing.

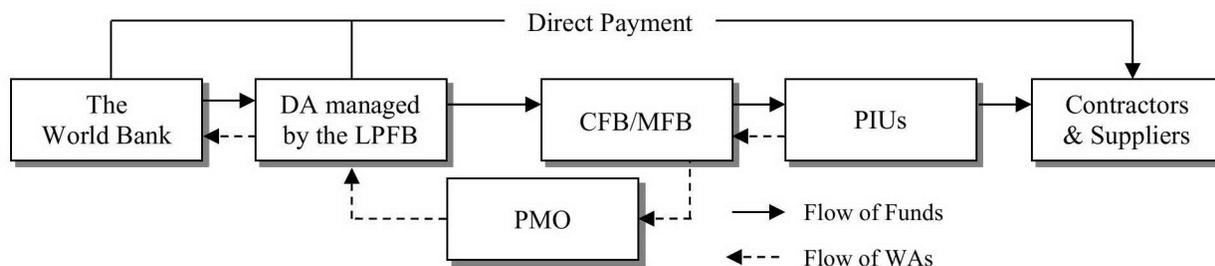


Figure 3.2. Flow of Funds

12. **Accounting and Reporting.** The administration, accounting and reporting of the project will be set up in accordance with Circular #13: “Accounting Regulations for World Bank-financed Projects” issued in January 2000 by MOF.

13. The LPMO and PIUs will be managing, monitoring and maintaining the project accounting records for project activities they execute. Original supporting documents will be retained by the LPMO and PIUs. The LPMO will work together with LPFB to prepare the project consolidated financial statements. The unaudited semi-annual project interim financial reports (IFRs) (format and content) in accordance with the aforementioned Circular #13 agreed with MOF) will be prepared and furnished to the Bank by the LPMO no later than 60 days following each semester (the due dates will be September 1st and March 1st), in form and substance satisfactory to the Bank as agreed during appraisal and confirmed at negotiations.

14. **Internal Control.** The related accounting policy, procedures and regulations were issued by MOF to uniformly align the financial management and disbursement requirements for the Bank financed projects.

15. Audit Liaoning Provincial Audit Offices (LPAO) has been identified as the auditors for the project. Annual audit report will be issued by LPAO. The annual audit report of project financial statements will be due to the Bank within 6 months after the end of each calendar year. Following the World Bank’s formal receipt of the audited financial statements from the borrower, the World Bank will make them available to the public in accordance with the World Bank Policy on Access to Information.

Disbursements

16. Four disbursement methods: advance, reimbursement, direct payment and special commitment are all available for the project. Supporting documents required for Bank disbursement under different disbursement methods will be documented in the Disbursement Letter issued by the Bank.

17. The project will have a DA. The DA in US dollar will be opened at a commercial bank acceptable to the Bank and will be managed by LPFB. The ceiling of the DA will be determined and documented in the Disbursement Letter.

18. The Bank loan would be disbursed against eligible expenditures (taxes inclusive) as in the table on the next page.

19. Retroactive financing will apply for payments made prior to the date of the Loan Agreement, but on or after January 1, 2013, to an aggregate amount not to exceed US\$10 million equivalent.

Table 3.1. Project Disbursement Table

Category	Amount of the Loan Allocated (expressed in USD)	Percentage of Expenditures to be financed (inclusive of Taxes)
(1) Works under Component 1 of the Project:		
(a) Transport Subproject in Donggang City	22,741,000	61%
(b) Transport Subproject in Kuandian County	13,297,800	59%
(c) Transport Subproject in Lingyuan City	21,569,400	57%
(d) Transport Subproject in Longcheng City	19,856,400	67%
(e) Transport Subproject in Panjin City	2,435,000	45%
(2) Works under Component 2 of the Project:		
(a) Water Subproject in Lingyuan City	19,926,200	59%
(b) Water Subproject in Suizhong County	18,731,600	65%
(3) Goods under Component 1 and 2 of the Project	29,417,600	100%
(4) Consultants' services and training under the Project	1,650,000	100%
(5) Front-end Fee	375,000	100%
(6) Interest Rate Cap or Interest Rate Collar premium	0	
TOTAL AMOUNT	150,000,000	

Procurement

20. **Mitigation Measures for Procurement Risks.** The procurement capacity assessment concluded that the procurement risk is rated as moderate. The LPMO and all the 7 PIUs have adequate experience and capacity to carry out procurement. However, some PIUs lack Bank project experience and may be weak in procurement and in keeping procurement records. Measures to enhance their procurement capacity, further strengthen the LPMO and the PIUs' procurement management for the project and to mitigate the potential procurement risks have been agreed as follows:

- (a) Procurement agent with procurement experience in projects financed by the Bank or other multilateral financing institutions will be hired by the LPMO to assist the LPMO and the PIUs in procurement of goods, works and non-consulting services by ICB and NCB. The procurement agent has been contracted.
- (b) A consulting firm with project management experience in projects financed by the Bank or other multilateral financing institutions will be also hired by the LPMO to assist the LPMO and the PIU in providing project management and technical support, such as reviewing bidding documents, including designs, technical

specifications and bill of quantities (BOQ) etc.; monitoring the contract management, including progress, quality, variations and other contract issues, and providing guidance and consulting services for financial management and procurement related issues.

- (c) The LPMO and PIUs will send their procurement staff and other key staff to attend workshops on procurement and contract management under Bank-financed projects, including procurement of goods, works and non-consulting services, as well as selection and employment of consultants.
- (d) The Bank procurement specialist will provide procurement trainings to the LPMO and all the PIUs before the appraisal, and will continue to do so during preparation and implementation of the project.
- (e) A procurement management manual has been prepared, and was reviewed and cleared by the Bank prior to negotiations. The manual will provide guidance to all implementing agencies on how to carry out the procurement under the project.

21. Procurement for the project will be carried out in accordance with the World Bank's "Guidelines: Procurement of Goods, Works and Non-Consulting Services under IBRD Loans and IDA Credits & Grants" dated January 2011; and "Guidelines: Selection and Employment of Consultants Services under IBRD Loans and IDA Credits & Grants by World Bank Borrowers" dated January 2011, and the provisions stipulated in the legal agreement.

22. **Frequency of Procurement Supervision.** In addition to the prior review supervision to be carried out by Bank offices, Bank procurement supervision missions will conduct field visits to carry out annual post review of procurement actions. The post review sampling ratio will be one out of five contracts.

23. **Procurement Plan.** The LPMO has developed an acceptable Procurement Plan for those activities to be procured by the LPMO and the PIUs for the whole project following the Bank template. It will be available in the LPMO, and will also be available in the Project's database and in the Bank's external website during project implementation. The Procurement Plan will be updated, reviewed and agreed with the Bank annually, or as required, to reflect actual project implementation needs.

24. **Procurement and Selection Methods and Prior Review Thresholds.** Table 3.2 indicates the procurement and selection methods and prior review thresholds for goods, non-consulting services, works, and consulting services to be procured by the LPMO and the PIUs under the project.

25. **Advance Contracting and Retroactive Financing.** At this stage, only the project management contract is planned to commence prior to the effectiveness date and subject to retroactive financing. Therefore, it was agreed that payments made on or after January 1, 2013, and up to an aggregate amount of US\$10,000,000 are eligible for retroactive financing. All advance contracting contracts are subject to Bank's prior review. Payments will be made only for contracts procured in accordance with applicable Bank procurement procedures.

Table 3.2. Procurement Table

Expenditure Category	Contract Value (US\$)	Procurement Method	Bank Prior Review
Goods/IT Systems and Non-Consulting Services	>= 3 million	ICB	All ICB contracts
	< 3 million	NCB Remarks: Where goods are not normally available from within China, the method of procurement will be ICB even if the contract value is less than USD 3 million.	First 2 NCB goods contracts by each PIU irrespective of value and all contracts >= USD 3 million.
	< 100 K	Shopping	None
	N/A	DC	All DC contracts
Works/ Supply & Installation	>=25 million	ICB	All ICB contracts
	< 25 million	NCB	First 2 NCB works contracts by each PIU irrespective of value and all contracts >= USD 15 million.
	< 200 K	Shopping	None
	N/A	DC	All DC contracts
Consultants	>= 300,000	QCBS, QBS	Firms: First contract for each selection method and all contracts >=USD 300 K; Firms: All SSS contracts; Individual Consultant: Only in Exceptional Cases; SSS for individual consultant: >=USD 20 K
	< 300,000	QCBS, QBS, CQS	
	N/A	SSS	
	N/A	IC	

Notes: ICB: International Competitive Bidding
 NCB: National Competitive Bidding
 DC: Direct Contracting
 QCBS: Quality- and Cost-Based Selection
 QBS: Quality-Based Selection
 CQS: Selection Based on the Consultants' Qualifications
 SSS: Single Source Selection
 IC: Individual Consultant selection procedure
 NA: Not Applicable

Environment (including safeguards)

26. Based on environmental screening, the Bank policy OP 4.01 Environmental Assessment is triggered, as among proposed project components, Component 1 – road network and public transport improvement and Component 2 – wastewater collection, drainage improvement and water reclamations will have some environmental, safety and health impacts during construction and operation. The project is a Category B project as per the Bank's OP 4.01 Environmental Assessment, as the environmental impacts identified and assessed are measurable and manageable, and none of them are unprecedented.

27. An Environmental Impact Assessment (EIA) was carried out for each of the proposed project components in accordance with China's national policy and regulations. Based on the

EIAs, an environmental management plan (EMP) was prepared to summarize the key environmental impacts, to determine the mitigation measures and environmental monitoring program and necessary institutional arrangement as well as capacity building development. The documents have been prepared on the basis of Chinese legal and policy framework for environmental protection, master plans and environmental plans as well as applicable Bank safeguard policies and Bank group's Environment, Health and Safety Guidelines.

28. **Environmental Benefits:** The proposed project will improve road network and public transport systems in the project cities/counties, and to increase/improve wastewater collection and drainage systems. Furthermore, the proposed project will improve water reuse and increase wastewater treatment efficiency.

29. **Impact Assessment:** The project consists of two major categories of engineering: (1) construction, widening and rehabilitation of urban roads and improvement of public transport facilities; and (2) construction and extension of municipal water supply, wastewater collection and drainage, including industrial recycling water works. The proposed construction activities would cause urban road occupation and city traffic disruption, which may bring residents inevitable inconvenience, including potential safety issues. During construction phase, construction machines and transportation vehicles will create emissions, airborne dust and noise problem.

30. **Environment Management Plan (EMP):** An environmental management plan (EMP) has been developed. The EMP includes policies basis and applicable environmental standards, environmental management system, key environmental impacts, mitigation measures, Environmental Codes of Practice (ECOPs), monitoring plans, institutional arrangements, capacity building and estimated costs for the mitigation measures and monitoring programs for both the construction and operation phases.

31. There were three ECOPs included in the EMP covering the design, construction and operational phases, i. e., generic environmental management in the construction phase; special environmental management during construction phase (related to the sensitive points) and the specific environment management measures during the operational phase (related to the sensitive points). Please see the details in the EMP that was disclosed through Bank's InfoShop.

32. The EMP also includes environmental monitoring programs for both construction and operation phases. The parameters to be monitored include noise, dust, and water quality. To ensure the strict and efficient implementation of the mitigation measures proposed, including environmental obligations during construction, a program of monitoring activities has been developed as part of the EMP. The project progress reports furnished by the LPMO will include a section for EMP implementation and related environmental monitoring reports.

33. **Public Consultations and Information Disclosure.** Public consultations have been carried out during the EA process. The technique used for the public consultations include surveys using public opinion questionnaires, focused group discussions, public meetings with key stakeholders and interviews with some project affected persons. The issues raised during these consultations have been incorporated in the EIA and EMP. Furthermore, feedbacks to the concerns collected in public consultation have been provided to the concerned groups and

documented in the EA and EMP. The EIA/EMP documents and other project related documents have been disclosed locally through various means (e.g., websites, newspapers, etc.), as required by national and Bank's policies. The EMP has been disclosed through the World Bank InfoShop on October 12, 2012.

Social (including Safeguards)

34. **Social Assessment.** As required by the Bank and the Liaoning PMO, the owners of the subprojects conducted a social assessment, including households, entities and commercial stores affected by land acquisition, temporary land occupation and house demolition in the project area. The assessment was done between October and November 2011 and March and April 2012. A socioeconomic survey was also conducted in the districts, townships and villages/communities affected by the project as a result of land acquisition or housing demolition. The surveys were the result of extensive consultations with residents, organizations and companies.

35. **Gender Analysis.** The Social Assessment included a gender analysis in Donggang and Suizhong. Hohai University with support from local agencies, conducted a disaggregated gender analysis in affected villages/communities, listened to women's expectations, and collected ideas and recommendation that is being incorporated in the designs of subprojects. Gender disaggregated information was also collected and used in the RAPs to ensure that women's interests will be safeguarded during resettlement implementation. The team will continue monitoring gender impacts during project implementation.

36. **Affected people.** According to the social assessment, people will be affected in any of the following ways: (i) their standard of living is adversely affected; (ii) their houses, land (including housing land acquisition, farm land and grassland), and other fixed and non-fixed assets are adversely affected, or their land is occupied temporarily or permanently; (iii) they have the right to use, either temporarily or permanently, productive resources that are adversely affected; or (iv) their business, occupations, and working or living areas are adversely affected.

37. During preparation, the designs were changed and adapted to minimize adverse impacts from land acquisition and housing demolition. Properties of those adversely affected will be compensated for a replacement cost as defined in the RAPs, and assistance will be offered so that they have sufficient opportunities to restore or exceed their former standard of living. A Resettlement Policy Framework (RPF) was prepared to guide resettlement activities in the linked resettlement subprojects in Donggang City and Chaoyang City.

38. The project will impact 7,364 persons. According to the surveys, a total of 1,662 households with 6,794 persons will be permanently affected, including 1,233 households with 4,666 persons affected by land acquisition, 556 households with 1,997 persons affected by HD, and 204 households with 681 persons affected by both land acquisition and HD, 77 businesses and other entities with 812 persons. The Project affects 175 households with 570 persons temporarily (temporary land occupation).

Table 3.3. Households and People Affected by Resettlement in Participating Cities

		Impacts on Residents					Total
		Permanent Impacts			Temporary land occupation	Impacts on businesses and other entities	
		Land Acquisition	Housing Demolition	Both LA and HD			
Component 1: Improving Urban Transport Systems							
Donggang City	Households	425	90	6	-	6	515
	People	1,257	261	20	-	55	1,553
Lingyuan City	Households	317	184	24	-	49	526
	People	1,703	839	111	-	595	3,026
Longcheng District	Households	363	172	122	-	19	432
	People	1,321	571	396	-	150	1,646
Kuandian County	Households	0	0	0	-	-	0
	People	0	0	0	-	-	0
Panjin City	Households	45	0	0	-	-	45
	People	121	0	0	-	-	121
Component 2: Improving urban wastewater treatment and reclamation							
Lingyuan City	Households	31	0	0	175	-	206
	People	110	0	0	570	-	680
Suizhong County	Households	52	110	52	-	3	113
	People	154	326	154	-	12	338
Total	Households	1,233	556	204	175	77	1,837
	People	4,666	1,997	681	570	812	7,364

39. **Land acquisition.** The subprojects will affect eleven townships and residential committees, eighteen villages and communities, and one state-owned farming factory. The project will require the permanent acquisition of 77.9 ha of collective land, including 22.4 ha of paddy land, 20.8 hectares of dry land, and 14.8 ha of orchard land, 19.3 ha of housing lots, and 0.6 ha of other land.

40. **Housing demolition.** The project will require the relocation of almost 49,600 m² of private houses, including almost 27,200 m² of concrete and brick houses, 2,300 m² of brick houses, 17,000 m² of brick and wood houses, and 1,106 square m² of simple houses. As a result, 556 households and 1,997 people will have to be resettled due to this project.

41. **Institutional arrangements.** Hohai University was involved in the very early stages of project preparation and has extensive experience preparing RAPs for Bank projects. During implementation, the Liaoning PMO will coordinate the resettlement activities and hire a consultant to support the supervision and monitoring of the implementation of the RAP

according to the agreed policies and procedures. A resettlement office will be established under each PIU and ensure timely implementation of the approved RAP. In Longcheng District, a village level resettlement office will also be established to support the PIU and local resettlement office. The project city land and resources bureaus will be responsible for the land acquisition approval. The RAPs should be completed prior to contract signature.

42. **Acquisition of collective land and resettlement.** The principles of compensation and resettlement, compensation rates, procedures and supervision mechanism for land acquisition of the Project are based mainly on the land Administration law of the PRC, the Decision of the State Council on Deepening the Reform and Rigidly Enforcing land Administration(SC [2004] No.28), the Guidelines on Improving Compensation and Resettlement Systems for land Acquisition(MLR [2004] No.238), the Notice on Issuing the Measures for the Acquisition and Appraisal of Houses on State-owned land (HC [2011] No.77), the Measures of Liaoning Province for the Implementation of the land Administration law of the PRC, the Notice of the General Office of the Liaoning Provincial Government on the Implementation of Location-based Composite land Prices for land Acquisition (LPGO [2010] No.2), and the applicable policies of the project cities and districts/counties. The policies for different subprojects will be described here respectively:

- In acquiring land, compensation should be made according to the original purposes of the land acquired; acquired land is divided into collective farmland, collective construction land and collective unused land.
- Compensation fees for land acquisition will be paid directly to the affected villages or households. The AHs may attend local labor employment training voluntarily and freely after receiving compensation. Eligible persons may also participate in the endowment insurance for LEFs voluntarily.
- The compensation rates for land acquisition will be based on the Notice of the General Office of the Liaoning Provincial Government on the Implementation of Location-based Composite land Prices for land Acquisition (LPGO [2010] No.2) and the Notice on Publishing the List of Location-based land Prices for land Acquisition of Liaoning Province (LLRD [2010] No.16).

43. Compensation rates for acquisition of rural collective land. According to the land Administration law of the PRC, the Guidelines on Improving Compensation and Resettlement Systems for land Acquisition, the Measures of Liaoning Province for the Implementation of the land Administration law of the PRC, the Notice of the General Office of the Liaoning Provincial Government on the Implementation of Location-based Composite land Prices for land Acquisition (LPGO [2010] No.2), and other applicable policies and regulations, the location-based composite land price rates for land acquisition of Liaoning Province apply to the Project, and are the sum of compensation fees and resettlement subsidies for ordinary farmland (see Table 3.4).

Table 3.4. Compensation rates for acquisition of collective land

Subproject	Area No.	Rate (RMB/mu)	Compensation for young crops (RMB/mu-year)	Housing land (RMB/mu)
Lingyuan and Lingyuan Subproject	Tier I	50,000	1,200	50,000
Chaoyang Subproject	Tier III	55,000	1,200	55,000
Donggang Subproject	Tier I	60,000	1,000	60,000
	Tier II	40,000	1,000	40,000
Suizhong Subproject	Tier I	50,000	N/A	50,000

44. **Funding sources and disbursement.** The sources of resettlement funds of the Subproject are fiscal appropriations of the municipal/county governments and domestic bank loans. During project implementation, the owner of each subproject or the finance department will pay resettlement funds to the government departments responsible for land, house demolition and resettlement, and then to be disbursed to the APs according to the compensation policies and rates specified in the RAPs.

Table 3.5. Project and Resettlement Cost by Subproject

<i>By Components</i>	Project Cost*		Resettlement Costs	
	US\$ million	RMB million	RMB million	% of total
Component 1: Improving Urban Transport Systems				
1.b. Donggang: Transit oriented development	65.52	409.51	103.01	25.2%
1.d. Lingyuan: Urban road rehabilitation	57.15	357.2	62.89	17.6%
1.a. Longcheng: Transit oriented development	63.27	395.44	113.76	28.8%
1.c. Kuandian: Urban road rehabilitation	33.32	208.24	0	0.0%
1.e. Panjin: Public transport improvement	30.86	192.9	8.54	4.4%
Component 2: Improving Urban Wastewater Treatment and Reclamation				
2.a. Lingyuan: Wastewater treatment and collection	43.71	273.21	2.27	0.8%
2.b. Suizhong: Wastewater and drainage network	43.97	274.83	47.13	17.1%
Total Costs	339.46	2,121.65	337.6	15.9%

Annex 4: Operational Risk Assessment Framework (ORAF)

CHINA: Liaoning Coastal Economic Zone Urban Infrastructure and Environmental Management Project

Stage: Board

Project Stakeholder Risks									
Stakeholder Risk	Rating	Substantial							
<p>Description:</p> <p>The Project is aligned with the National and Provincial Plan to support the economic development, promote efficient use of natural resources and reducing pollution in the region. There is strong commitment from the Provincial and Local Governments to the project as is reflected in the strategic documents and the local teams have incorporated changes requested by the Bank team to foster integrated urban transport and land use planning and improved and more efficient wastewater management.</p> <p>Public perception of this project in the country, and particularly among local stakeholders, is expected to be positive because of the beneficial impacts expected.</p> <p>Based on recent project experiences in Liaoning involving multiple cities, is the risk of changing priorities due to political changes at the local level. The PMO and PDRC have little capacity to guide changes at the local level or ensure compliance to agreed scope and procedures.</p>	<p>Risk Management:</p> <p>The PMO and task team agreed to continue organizing regular meetings to discuss investments and ensure they are fully aligned with local and provincial strategies and any changes are detected at an early stage.</p> <p>The agreed training and capacity building of provincial and local staff and design institutes will ensure support to the project's investments and understand their overall impacts and support.</p> <p>The social assessment has helped inform the design of some of the components and improved</p> <p>The team has reduced the number of subprojects and components, the technical capacity of the PMO is being strengthened with additional consultants, financial management procedures are being streamlined and better guarantees are provided for counterpart funds, and regular meetings are held with local decision makers to ensure political commitment and anticipate potential changes of priorities.</p>								
	Resp: Client	Stage: Implementation	Recurrent: <input checked="" type="checkbox"/>	Due Date:	Frequency: Yearly	Status: In Progress			
Implementing Agency (IA) Risks (including Fiduciary Risks)									
Capacity	Rating	Substantial							
<p>Description:</p> <p>The Liaoning Project Management Office (LPMO) has extensive experience managing Bank funded projects in the province, and</p>	<p>Risk Management:</p> <p>Despite the LPMO's extensive experience, the team agreed to hire a consultant to strengthen the capacity of the LPMO, especially on technical aspects of contract supervision. During project implementation the team will provide training and capacity building activities to strengthen the LPMO and cities' capacity in project management and supervision and closely supervise the project.</p>								

understands Bank Procurement, Financial Management, Safeguard, Disbursements and monitoring requirements. However, the LPMO lacks the staffing and technical expertise to provide adequate support to cities. Only a few cities have experience with Bank funded projects and all need to develop and strengthen their project management and contract supervision capacity. Specific capacity risks include: (i) Limited experience in doing Bank procurement and supervising contracts; (ii) Lack of understanding of the Bank's safeguards procedures and lack of resources for compensation of affected people (see section 4.2) (iii) Weak financial management capacity and complex disbursement procedures, resulting in inefficient flow of funds (v) Possible counterpart funding shortages and delays (60% of total project costs).	Resp: Client	Stage: Implementation	Recurrent: <input checked="" type="checkbox"/>	Due Date:	Frequency: Yearly	Status: In Progress
	Risk Management: The task team and the LPFB have extensively discussed ways to simplify disbursement and agreed that the Province will explore opportunities to reduce steps and possibly directly pay contractors. The LPFB is also setting up an automated disbursement system to expedite processing of payments and monitor and address any delays.					
	Resp: Client	Stage: Preparation	Recurrent: <input type="checkbox"/>	Due Date: 28-Jan-2013	Frequency:	Status: Completed
	Risk Management: The task team and PFB area will work closely with county governments to ensure commitment and confirming the funding source and amount of the counterpart funds available, including for resettlement and land acquisition (as was done during preparation). The PFB and Bank team will review the yearly budget plans of cities to ensure necessary resources are available.					
Governance		Rating	Substantial			
Description: As mentioned before, the institutional framework is adequate, but technical capacity and leveraging capacity at provincial level are weak. The local capacity is weak and potential changes of priorities or lack of interest in this relatively small project could delay implementation and hamper quality control. The cities are relatively independent and coordination at the regional level and with the Province will be challenging.	Risk Management: Aligned with other Bank projects in Liaoning, a Project Leading Group (PLG) has been established, co-chaired by the Provincial DRC and LPFB. At the local level, City Leading Groups (CLGs) have been created, chaired by Vice-Mayors, involving all relevant agencies and to coordinate activities at the local level and ensure commitment to agreed investment proposals. Regular meetings will be held with PMO and the leading groups to coordinate activities during project implementation.					
	Resp: Client	Stage: Implementation	Recurrent: <input checked="" type="checkbox"/>	Due Date:	Frequency: Yearly	Status: In Progress
Project Risks						
Design		Rating	Moderate			
Description: The project has been simplified and includes investments in two sectors: urban transport and water, addressing specific issues of improved urban transport and water pollution and scarcity. Long term sustainability and operational expenditures have been taken into account	Risk Management: The task team will continue providing close support and training to the local teams and design institutes to ensure innovative approaches are effectively incorporated into the final designs and long-term operation and maintenance aspects are considered.					
	Resp: Bank	Stage: Implementation	Recurrent: <input checked="" type="checkbox"/>	Due Date:	Frequency: Yearly	Status: In Progress

<p>project preparation, the transport projects have been designed to ensure integrated traffic management, priority for pedestrians, biking and public transport is a challenge in the project, and close support in the Appraisal of the investment plans is required. The water reclamation sub-projects are also relatively new in the region and will require incentives to change the current practice of extracting groundwater to using reclaimed water by private companies. The main design risks are related to unforeseen geological conditions, which might require changes in design and result in contract variations.</p>						
<p>Social and Environmental</p>	<p>Rating</p>	<p>Moderate</p>				
<p>Description: The LPMO has extensive experience managing the environmental and social safeguards of projects. The main risks relates to the lack of understanding by PIUs of their role and responsibilities regarding project’s safeguards supervision. The potential (cumulative) impacts of economic growth and other investments in the region may jeopardize or eclipse (some of) the environmental benefits of this project, especially related to environmental impacts and natural resource protection. Lack of adequate local financing to compensate affected people might delay the resettlement process and, therefore, is a major risk for timely project implementation.</p>	<p>Risk Management: The LPMO will hire experienced consultants to support the Appraisal of the EA, EMP, Social Assessment and the RAP to ensure they follow Bank procedures. The Bank’s safeguards specialists will closely supervise and provide training as needed to the LPMO and local staff to clarify procedures, roles and responsibilities and address any issues as they arise.</p>					
	<p>Resp: Client</p>	<p>Stage: Implementation</p>	<p>Recurrent: <input checked="" type="checkbox"/></p>	<p>Due Date:</p>	<p>Frequency: Yearly</p>	<p>Status: In Progress</p>
<p>Program and Donor</p>	<p>Rating</p>	<p>Low</p>				
<p>Description: No other donors are involved in the project.</p>	<p>Risk Management:</p>					
	<p>Resp:</p>	<p>Stage:</p>	<p>Recurrent: <input type="checkbox"/></p>	<p>Due Date:</p>	<p>Frequency:</p>	<p>Status:</p>
<p>Delivery Monitoring and Sustainability</p>	<p>Rating</p>	<p>Moderate</p>				
<p>Description: Monitoring: Lack of simple and adequate indicators and procedures to monitor the impact</p>	<p>Risk Management: M&E. Training has been provided to the PMO on the M&E process and required surveys, a monitoring system has been agreed to ensure the quality and accuracy of data monitoring and evaluating outcomes. The Bank team will closely monitor the project indicators during implementation.</p>					

<p>of the project is a constant challenge. Data collection and processing systems need to be in place and monitoring should start as early as possible to ensure the baseline and future impacts are monitored.</p> <p>Sustainability: Lack of counterpart funding or changing political priorities that will divert attention and resources away from this project.</p>	Resp: Client	Stage: Implementation	Recurrent: <input checked="" type="checkbox"/>	Due Date:	Frequency: Yearly	Status: In Progress
	<p>Risk Management:</p> <p>Sustainability. The project designs have been thoroughly reviewed based on the demand and management capacity of each city. Capital investments and asset management planning is one of the main focal areas of the capacity building activities under Component 3 of the project for participating agencies under this project.</p>					
	Resp: Client	Stage: Implementation	Recurrent: <input checked="" type="checkbox"/>	Due Date:	Frequency: Yearly	Status: In Progress
Overall Risk						
Implementation Risk Rating: Substantial						
<p>Description:</p> <p>The main potential risks during implementation are: (i) Project management capacity limited technical and supervision capacity of the LPMO to manage the implementation of the project in 5 different cities (besides other projects the LPMO is already managing), coupled with the city's low capacity and limited knowledge of Bank policies and procedures; (iii) Environmental and Social. Potential (cumulative) impacts of economic growth and other investments in the region may jeopardize or eclipse the environmental benefits of this project, especially related to environmental impacts and natural resource protection. Lack of adequate local financing to compensate affected people might delay resettlement process and the project; (iv) Financial sustainability: lack of funding could lead to inadequate O&M of the project financed infrastructure and facilities, which is critical for full achievement of the PDO and for sustaining the project benefits in the long term. Based on the Task Team's evaluations the overall risk should be rated as substantial.</p>						

Annex 5: Implementation Support Plan

CHINA: Liaoning Coastal Economic Zone Urban Infrastructure and Environmental Management Project

Strategy and Approach for Implementation Support

1. The strategy for implementation support (IS) has been developed based on the nature of the project and its risk profile. It will aim at making implementation support to the client more flexible and efficient, and will focus on implementation of the risk mitigation measures defined in the ORAF.
2. **Technical assistance and supervision.** World Bank technical experts and consultants will support the LPMO and cities in the review of technical designs, Terms of Reference and assist in capacity building activities. The specialist will share best practices and experiences from other projects and ensure investments are cost-effective, based on realistic demands and take into account the long-term operation and maintenance costs and the capacity of the borrower to
3. **Procurement.** During the initial stages of project implementation the task team will provide training to member of the LPMO, PIUs and Procurement commitment, as well as staff from the consultant responsible for procurement. The task team will also review procurement document and provide timely feedback and guidance on the relevant Bank Procurement policies and procedures. The task team will monitor procurement progress against the procurement plan. In addition to the prior review supervision to be carried out by Bank offices, Bank procurement supervision missions will conduct field visits to carry out annual post review of procurement actions. The post review sampling ratio will be one out of five contracts.
4. **Financial management.** The supervision strategy for this project is based on its FM risk rating, which will be evaluated on regular basis by the FMS in line with the World Bank's Financial Management Practice, and in consultation with relevant task team leader. Financial management specialists will join WB supervision missions to review the implementation of the Financial Management Manual. These specialists would also provide technical support to project implementing agencies and help provide timely resolution to potential financial management issues. Training will be also provided by the Bank before the commencement of project implementation.
5. **Environmental and Social Safeguards.** The Bank team will supervise the implementation of the agreed Environmental Management Plan and the RAP, ensure that the responsibilities are clearly defined and understood by the different agencies and the contractor, and provide guidance to the LPMO and PIUs on how to address any issues. Training will be provided in the early stages of project implementation to ensure all agencies are aware of their role and responsibilities and overall reporting requirements.

6. **Anti-Corruption.** The Bank team will supervise the implementation of the agreed Governance and Accountability Framework, and provide guidance in resolving any issues identified.

7. **Other Issues.** Sector level risks, such as electricity tariff, will be addressed at the portfolio level through policy dialogue with the government and PLN. However, as they are closely related to PLN's financial viability, the team will monitor them during project implementation

Implementation Support Plan

8. Most of the Bank team members will be based in the Beijing country office and other country offices in the region to ensure timely, efficient and effective implementation support to the client. Formal supervision and field visits will be carried out semi-annually. Detailed inputs from the Bank team are outlined in the paragraphs below.

9. **Technical inputs.** Technical experts and engineers will review technical designs, terms of reference of bid documents to ensure fair competition through proper technical specifications and fair assessment of the technical aspects of bids. During construction and commissioning, technical supervision is required to ensure technical contractual obligations are met. The team's experts will conduct site visits on a semi-annual basis throughout project implementation. The technical experts will also be involved in training activities to ensure proper operation and maintenance systems are in place, investments are integrated in urban and regional development plans and operation of facilities is optimized and efficient. Outcome indicators will be critically reviewed.

10. **Fiduciary requirements and inputs.** Training will be provided by the Bank's financial management specialist and procurement specialist before the commencement of project implementation. The team will also help LPMO and PIUs identify capacity building needs to strengthen its financial management capacity and to improve procurement management efficiency. The automated disbursement system that is being prepared by the LPFB will be reviewed to ensure Bank procedures are adequately integrated. Both the financial management and the procurement specialist will be based in the country office to provide timely support. Formal supervision of financial arrangement will be carried out semi-annually, while procurement supervision will be carried out on a timely basis as required by the client.

11. **Safeguards.** The task team will include an environment specialist and a social specialist to assist the LPMO and PIUs comply with the agreed EMP and RAP, and provide advice on unforeseen impacts. The specialists will also organize training on environment and social supervision, monitoring and reporting. On the social side, supervision will focus on the implementation of the agreed RAP, which includes detailed land acquisition and resettlement procedures. Field visits be conducted on a semi-annual basis and both the social and environmental specialist are based in the country office.

12. **Counterpart funding.** A public finance specialist will regularly review the financial status of cities and PIUs to verify compliance of financial covenants and ensure the necessary

counterpart funding is available. This exercise will be combined with supervision missions on an annual basis.

13. **Project management assistance.** A team assistant, based in the country office will provide day to day administrative support to the team, collect and archive relevant documentation and coordinate communication between client and Bank team members.

Table 5.1. Main focus in terms of implementation support

Time	Focus	Skills Needed	Resource Estimate (Staff Weeks)
First 12 months	Technical supervision, design review and advisory on road subprojects	Urban road engineer	5
	Technical supervision, design review and training on urban transport subprojects	Urban transport specialist	4
	Technical supervision, design review and training on water subprojects	Water and sanitation engineer	3
	Financial management training and supervision	Financial Management Specialist	1-2
	Procurement training, review and supervision	Procurement Specialists	4
	Environmental training and supervision	Environmental Specialist	4
	Social/Resettlement training and supervision	Social/Resettlement Specialist	4
	Task management and supervision	Team leader	6
	Public finance review and training	Public Finance Specialist	2
	Capital Investment and Asset Management training	Urban service management specialist	4
Project administration and coordination	Team assistant	6	
12-48 months	Technical supervision, design review and advisory on road subprojects	Urban road engineer	15
	Technical supervision, design review and training on urban transport subprojects	Urban transport specialist	12
	Technical supervision, design review and training on water subprojects	Water and sanitation engineer	10
	Financial management training and supervision	Financial Management Specialist	3-5
	Procurement training, review and supervision	Procurement Specialists	12
	Environmental training and supervision	Environmental Specialist	10
	Social/Resettlement training and supervision	Social/Resettlement Specialist	10
	Project management and supervision	Task Team Leader	18
	Public finance review and training	Public Finance Specialist	6
Capital Investment and Asset Management	Urban service management	12	

	training	specialist	
	Project administration and coordination	Team assistant	18

Table 5.2. Staff Skills Mix Required on an Annual Basis

Skills Needed	Number of Staff Weeks	Number of Trips	Comments
Team Leader	6	2	
Urban transport specialist	4	2	
Urban road engineer	5	2	
Water and Sanitation Engineer	3	2	
Financial Management Specialist	1-2	1-2	
Procurement Specialist	4	2	
Environmental Specialist	3	2	
Social specialist	3	1	
Municipal finance specialist	1	1	
Urban service management specialist	3	1	
Team assistant	6	1	

Annex 6. Economic and Financial Analysis

CHINA: Liaoning Coastal Economic Zone Urban Infrastructure and Environmental Management Project

Economic Benefits and Costs Identified

1. The project will bring various economic benefits to populations in and beyond the project areas in Liaoning Province. The economic benefits and costs of the project were identified and quantified to the extent possible.
2. **Economic Benefits.** The main identified economic benefits of the project include: savings in travel time and cost and increase in productivity due to improved road conditions in project areas; avoided life and economic loss from traffic accidents due to improved transportation conditions; energy savings and associated pollution reduction due to improved road conditions; increases in amenity and land values associated with improved transportation conditions and environment; avoided economic loss from flood due to river channel rehabilitation; and better public health and quality of life due to improved drainage, sewerage and sanitation systems. In addition, it is expected that the project will have a positive demonstrative effect on other cities across Liaoning Province.
3. **Economic Costs.** The project's economic costs are capital investment, including associated social and resettlement compensation and environmental prevention and mitigation costs, and operation and maintenance (O&M) costs. The details of the economic benefits and costs are provided in the discussion of each component below.

Valuation Methods Used

4. Economic costs and benefits of each component, except for the Lingyuan water reclamation component, were identified and quantified as much as possible. The cost-benefit analysis is used to examine the economic viability of the investments.
5. Different valuation methods were used to quantify and monetize various types of economic benefits, including the productivity change approach (e.g.: the increase of productivity and savings in travel time and costs as a result of improved roads) and hedonic methods (e.g.: land value increases due to transportation development and environmental enhancement). Sensitivity analysis was also conducted to test the robustness of the results of the cost-benefit analyses.
6. For wastewater reclamation and drainage in Lingyuan City, the economic benefits such as economic value of water reclaimed and reused, better health and quality of life and better water environment are difficult to quantify and monetize as the investments are usually too modest in size to establish causal links between them and health and water and environmental improvements. Given the importance of water reclamation and environmental improvement in a

water scarcity region, the cost-effectiveness analysis was carried out to select the least cost option for achieving the development target of the local government.

Economic Analysis by Subproject

7. The seven subprojects fall into four groups: urban road development, public transit system development, river channel rehabilitation and wastewater reclamation. Their economic analysis is summarized below by category.

Component 1. Urban road rehabilitation and development

8. This category includes four road components in Donggang City, Kuandian County, Longcheng District in Chaoyang City, and Lingyuan City. Cost-benefit analysis is conducted for each of them, using similar valuation methods. A detailed description of economic analysis of the urban road rehabilitation in Kuandian County is presented below as an example. The results of other three subprojects are summarized in a table at the end of this section.

Urban road rehabilitation and development in Kuandian County.

9. The road rehabilitation subproject in Kuandian County consists of the construction and rehabilitation streets, including a pedestrian street, in the downtown area of Kuandian County Seat. The objectives of the subproject are to improve the urban road network layout, improve regional traffic conditions, smooth urban traffic arteries, but also lay a solid foundation for the future urban and regional growth of the county. The investment includes activities of road construction and rehabilitation, bridge construction, sewage and drainage system along streets, street and traffic safety equipment, etc.

10. **Economic benefits.** The main economic benefits of this subproject include savings in transport time and transport costs, avoided loss of life and economic costs due to reduced traffic accidents, and increases in the value of the land and properties along to the roads due to transport and environmental improvement.

11. A cost-benefit analysis was applied to this subproject. The project duration is 23 years, including a 3 year construction period and 20 years of operation. The analysis quantified such benefits as time and transport costs saved, cost saving due to reduced traffic congestion, avoided life and economic losses due to reduced traffic accidents, and increases in the value of the lands along the roads due to improved public accessibility and environmental condition.

12. Saving in travel cost was estimated based on the change in productivity of vehicles and passengers. According to an analytical model developed by Shanghai Municipal Planning Design Research Institution, the vehicle operation costs are related to vehicle size and average traveling speed. It was estimated that in “non-project scenario”, the operation cost is RMB1.62 per car; while in “project scenario”, the operation cost is lowered to RMB1.42 per vehicle. It was projected that 9,522 cars per day on average would use the road system of 20.75 km built or improved by the project. It would save the travel cost RMB14.42 million a year on average.

13. Saving in cargo transportation time and saving in passenger travel time were also measured separately. For saving in cargo transportation, the traveling time saved after project completed was estimated for different types of vehicles. The estimated saving in reduced cargo transportation time is RMB696,700 a year on average. For saving in passenger traveling time, passengers' value of time was measured on local GDP per capita, which is RMB5.15 per hour. The estimated saving in passenger time is RMB7.07 million a year on average.

14. The new roads constructed by the project will cut short the total distance of the pass-through traffic by one kilometer. This will also generate additional transport saving for cargo at RMB 5.63 million per year. It is estimated that completion of the road would lead to an increase in the value of the undeveloped land along new roads. The total area of undeveloped land affected by the project would be those within the width of 20 meters along the constructed roads, which result in a total of 1,459.7 μ (or 97.3 hectares).

15. Using the past and current prices of representative land parcels in the similar road projects in recent years in Kuandian, it is estimated that the average land price will increase from RMB 350,000 per μ to RMB 450,000 per μ due to improved transport and environmental conditions. Therefore, during the twenty years of the project operation period after the completion of the road construction, the land value increase would be about RMB145.97 million in total, or an annual value of RMB14.6 million for ten years under the assumption that these lands will be developed in ten years.

Table 6.1. Summary of Cost-Benefit Analysis in Kuandian County.

Benefit/Cost (10 thousand RMB)	Present Value (at 8%)	Year				
		2013	2016	2022	2028	2035
Benefits						
Land value increase	77.8	0.0	14.6	14.6	0.0	0.0
Saving in traveling cost	125.3	0.0	14.4	14.4	14.4	14.4
Saving in traveling time for passengers	61.5	0.0	7.1	7.1	7.1	7.1
Saving in traveling time for goods	6.1	0.0	0.7	0.7	0.7	0.7
Saving due to shortening travel distance	48.9	0.0	5.6	5.6	5.6	5.6
Total benefit	319.5	0.0	42.4	42.4	27.8	27.8
Cost						
Capital Investment	157.6	60.2	0.0	0.0	0.0	-94.3
Operating & Maintenance	15.4	0.0	0.4	0.4	0.4	5.7
Total cost	173.0	60.2	0.4	0.4	0.4	-88.6
Net economic flows	146.5	-60.2	42.0	42.0	27.4	116.4
EIRR	17.79%					
B/C ratio	1.85					

16. *Economic costs.* Economic costs of this subproject consist of capital investment cost and Q&M cost. It is estimated that total capital cost of this subproject amounts to RMB157.6 million

in present value terms. The O&M cost is estimated at RMB15.4 million at present value after subtracting residual value of RMB5.7 million at the end of the project.

17. *Results of the cost-benefit analysis.* The aggregated results of the analysis are summarized in the table below. It shows that the economic internal rate of return (EIRR) of the road investment is 17.97%, its net present value (NPV) is RMB146.5 million (US\$22.5 million) and benefit-cost ratio (BCR) is 1.85.

18. Sensitivity analysis was carried out assuming a 10% increase in total costs and a 10% decrease in total benefits. Under these assumptions the investment will still provide an EIRR of 14.1% and NPV of RMB97.2 million with a BCR of 1.51. Therefore, the investment in this subproject of road rehabilitation in Kuandian County is economically feasible and the results are quite robust.

Summary of economic analyses of other road subprojects

19. Cost-benefit analysis was employed for the other three road subprojects in Chaoyang, Lingyuan, and Donggang Counties. As shown in the table below, the results of the analyses indicate that all of the four subprojects are economically feasible. Sensitivity analyses further showed that the four proposed investments have acceptable rates of returns even under the assumption of a 10% increase in total costs and a 10% reduction in total benefits.

Table 6.2. Cost-Benefit Results for Urban Road Subprojects in Selected Cities

Subprojects	Total Costs (million RMB)	NPV (million RMB)	EIRR	BCR	Sensitivity Analysis ¹
Road development in Chaoyang	393.3	283.2	17.78%	1.84	14.01%
Road development in Lingyuan	155.7	155.7	14.59%	1.54	11.24%
Road development in Donggang	359.3	125.9	11.86%	1.41	9.52%

Note: ¹ EIRR under the assumption of 10% cost increase and 10% benefit reduction.

Public transit system improvement in Panjin City

20. The public transport subproject in Panjin City includes the procurement of 150 buses and construction of two bus depots for upgrading existing bus fleet, increase of existing bus line capacity, and launch of new bus lines. The objectives of this subproject are to improve the public transit system, improve traffic management and enhance living quality of local residents in the county. The project duration is 12 years, including two investment years of 2013 and 2018 and a ten-year life of buses for public transport. The cost-benefit analysis of this subproject was conducted.

21. *Economic benefits.* The main economic benefits of this public transport improvement subproject include benefits for bus passengers and non-bus passengers, as well as environmental benefits attributable to improved air quality and reduced carbon emissions.

22. The benefits for bus passengers are mainly measured by the passengers' willingness to pay (WTP) for the service of the improved public transit system. Because there was no survey on WTP conducted for this project, in this analysis the passengers' average WTP value was proximately estimated using average transportation cost for local residents if they didn't have a choice of public transport services. Using the results of a study in Harbin in 2006 , the average transportation cost adjusted by relative consumption level for Panjin residents is RMB2.66 for an average travel distance of 4.6km in Panjin City. Taking into account the natural and induced growth of ridership, the accumulative benefit for bus passengers is RMB 49.01 million during the period of 2013-2023.

23. The benefits for non-bus passengers take into account reduced traffic time and savings in fuel and tire wearing out due to improved traffic condition. By introducing improved public transit system, buses are supposed to attract increasing amount of passengers, thus reduce traffic congestion and improve overall transportation condition. The cost savings on fuel consumption and tires are not quantified due to lack of data. The benefits of reduced traffic time for non-bus passengers are insignificant because increases in bus ridership are estimated to have minimal influence on the overall traffic situation in Panjin.

24. The environmental improvement benefit mainly comes from reduction of carbon emission. The economic cost per ton of CO2 emission was assumed at RMB52.0 (equivalent to the 6.5 euro carbon trading price in 2010), the emission reduction will bring profit of RMB1, 285.2 per year per bus. Assuming driving 300 km per day and comparing the carbon emission for diesel vehicles and LNG vehicles, the amount of reduced carbon emission will be 2.47 ton per year per bus on average. Therefore, the total economic benefit of environmental improvement will be RMB1.2 million.

Table 6.3. Cost-Benefit Analysis of Public Transport Subproject in Panjin City.

Benefit/Cost (10 thousand RMB)	Present Value (at 8%)	2013	2014	2015	2016	2018	2023
Benefits							
for Bus Passengers	49011.20	0.00	5405.15	6187.57	7162.04	8378.21	10182.39
for Non-Bus Passengers	--	--	--	--	--	--	--
Environmental Improvement	119.77	0.00	19.28	19.28	19.28	19.28	19.28
Subtotal benefit	49130.97	0.00	5424.42	6206.84	7181.32	8397.49	10201.67
Cost							
Capital Investment	17299.29	16022.03	0.00	0.00	0.00	3352.35	0.00
Operating & Maintenance	25290.19	0.00	3796.37	3851.44	3909.28	4205.14	5189.38
Subtotal cost	42589.48	16022.03	3796.37	3851.44	3909.28	7557.49	5189.38
Net economic flows	6541.49	-16022.03	1628.06	2355.40	3272.04	839.99	5012.29
EIRR	15.30%						
B/C ratio	1.15						

25. *Economic costs.* Economic costs of this subproject consist of capital investment cost and O&M cost. It was estimated that total capital cost of this subproject amounts to RMB173 million in present value terms and the present value of O&M cost at RMB252.9 million. In total, the cost of the Panjin City subproject in present value terms is estimated at RMB425.9 million. This amount is less than the estimate of the present value of benefits.

26. *Results of the cost-benefit analysis.* The final results of the analysis are summarized in the table below. It shows that the EIRR of the road investment is 15.30%, its net present value (NPV) is RMB65.41 million (US\$10.38 million) and benefit-cost ratio (BCR) is 1.15.

27. Sensitivity analysis was carried out assuming a 10% increase in total costs and a 10% decrease in total benefits. Under these assumptions the investment will still provide an EIRR of 4.95%. Therefore, the investment is economically feasible and the results are quite robust.

River channel rehabilitation and sewerage subproject in Suizhong County

28. The Suizhong subproject includes the rehabilitation of the drainage canals and retention pond and the separation of sewage and storm drainage systems in the downtown area of the county seat to reduce the water contamination, protect from water backlogging and flooding, and improve the health and quality of living of the local population.

29. *Economic benefits.* The main economic benefits of this subproject include avoided economic losses from flood control; savings in wastewater and rainwater treatment costs; improvement in natural environment, public health and quality of living of the local population; and increases in the value of the land and properties in the local area. Compared with the “no project” scenario, this subproject would have considerable benefits although some of them are difficult to quantify in monetary terms.

30. A cost-benefit analysis of the Suizhong wastewater treatment and drainage subproject was conducted. The project duration is 20 years, including 5-year construction and 18 years of operation to reflect the nature and length of drainage system rehabilitation. In the cost-benefit analysis of the investment, the benefits in terms of avoided economic loss from water logging and floods and increases in the value of the land were included and calculated, as well as the cost saving of wastewater and excess rainwater treatment in the downstream municipal wastewater treatment plant due to the completion of the fully separated collection system for wastewater and storm water.

31. Historical data of the economic losses caused by flood in Suizhong, including the loss of agriculture and livestock, property damages, casualties, and the affected population, was reported in the annual statistical reports. It was estimated that the total loss from floods in 2005- 2011 is RMB 167.5 million, which is RMB23.9 million on average per year. The benefits of avoided loss from floods are brought by both this project and the previous efforts of the government. Under a conservative estimation of the project in total investments related to flood and water logging control, the economic benefit brought by this project accounts for 40% of the total flood control benefits. It was estimated that the project would avoid an economic loss of RMB 11.9 million in the first year of the full operation (i.e., 2018).

32. According to local land planning, there would be 3,319 mu (221 hectares) of vacant land in the project area which is ready for future urban development. Without the project the average land value is RMB 0.8 million per mu. The completion of the project would lead to an increase in land value to RMB 1.5 million per mu. The total of the land value would be about RMB2.32 billion. Assuming the land will be gradually developed in the project period of 40 years, the annual average of the total increased land value is estimated to be 58.1 million. As this project is attributed to 48% of the total increase in land value in the project area and the rest should go to other efforts already done by the government, the annual economic benefit of land value increase would be RMB 27.9 million. The project also contributes to water environmental improvement in the low reach of the rivers by increasing the wastewater treatment efficiency. Such a benefit was represented by the cost saving in wastewater treatment costs through completion of wastewater collection network and separation of rain drainage from sewerage system along the rivers. The estimated saving is about 8.2 million each year.

33. *Economic costs.* The costs of the subproject consist of capital investment costs and O&M costs. Total estimated capital investment amounts to RMB216.76 million in present value terms. The O&M cost is estimated at RMB56.15 million per year.

34. *Results of the cost-benefit analysis.* The aggregated results of the analysis are summarized in the table below. It shows that the economic internal rate of return (EIRR) of the subproject is 10.65%, its net present value (NPV) is RMB59.74million and benefit-cost ratio (BCR) is 1.22.

Table 6.4. Cost-Benefit Analysis of River Rehabilitation and Sewerage Subproject in Suizhong County.

Benefit/Cost (Million RMB)	Net Present Value (at 8%)	2013	2016	2018	2020	2025	2030	2037
Benefits								
Flood Controls Benefits	91.54	0.00	0.00	11.85	12.33	13.61	15.02	17.26
Savings in Wastewater Treatment Cost	48.11	0.00	0.00	8.20	8.20	8.20	8.20	8.20
Land Value Increase	186.32	0.00	0.00	27.88	27.88	27.88	27.88	27.88
Subtotal	332.65	0.00	0.00	47.93	48.41	49.69	51.11	53.34
Costs								
Capital Investment	216.76	54.29	54.29	0.00	0.00	0.00	0.00	0.00
Operating & Maintenance	56.15	0.00	0.00	8.40	8.40	8.40	8.40	8.40
Subtotal	272.91	54.29	54.29	8.40	8.40	8.40	8.40	8.40
Net economic flows	59.74	(54.29)	(54.29)	39.53	40.01	41.29	42.71	44.94
EIRR	10.65%							
B/C ratio	1.22							

Wastewater reclamation and drainage in Lingyuan City

35. The main objective of this subproject is to meet industrial water demands by extending the sewage and drainage network and supplying the reclaimed water in the city, especially a new industrial development area. This subproject includes the installation of separate storm water and municipal sewerage collection pipelines, improvement on the wastewater treatment plants and construction of reclaimed wastewater distribution system, which will be connected to the Industrial Park in Lingyuan City. The estimated total investment of this subproject would amount to RMB 263.9 million.

36. Lingyuan City is located in a water scarce region in west Liaoning province. To meet its increasing water demand, the city is determined to save water and reclaim wastewater for industrial use. The proposed investment subproject would help reduce the demand for raw water from and environmental pressures on local aqua-system especially groundwater and contribute to improving the natural environment and in the living quality of local residents. The subproject would assist Lingyuan City to meet its water saving and reclamation targets that have been set by local government. The development targets are based on their importance to water conservation, natural environmental protection, and the quality of life of local residents. Due to the difficulty in quantifying and monetizing the economic benefits of the subproject, the cost-effectiveness analysis (CEA) was used to ensure the selection of the least-cost design options to achieve the development targets.

Table 6.5. Cost Effectiveness Analysis for Wastewater Reclamation and Drainage Subproject in Lingyuan City.

Subproject components	Criteria	Alternative 1	Alternative 2
Sewage networks	Materials	Fiberglass Reinforced Plastic Pipe (FRPP)	HDPE double wall corrugated pipe
	Capital Investment	RMB 34.6 million	RMB 37.3 million
Interception trunk	Materials	Reinforced concrete pipe	Reinforced concrete pipe
	Capital Investment	RMB 21.8 million	RMB 21.8 million
Drainage networks	Materials	Reinforced concrete pipe	Reinforced concrete pipe
	Capital Investment	RMB 53.8 million	RMB 53.8 million
Reclaimed water distribution pipeline networks	Materials	≤300mmPE pipe	≤300mmPE pipe
	Materials	>300mm ductile iron pipe	>300mm ductile iron pipe
	Materials	high water level pond lifting pump station	high water level pond lifting pump station
	Capital Investment	RMB 38.7 million	RMB 37.2 million
	Annual O&M	RMB 3.5 million	RMB 3.9 million
Water transfer route in the industrial park	Route	Different routes	
	Capital Investment	RMB 66.4 million	RMB 76.8
Total	Total investment	RMB 263.9 million	RMB 278.9 million

37. *Cost-effective analysis.* In the proposed wastewater reclamation project, pipeline construction takes a major proportion of total investment. Two alternative options, of which the route and material of pipelines are different, were identified. They were analyzed and compared to ensure the selection of the least cost option. Table 16 summarizes the result of the comparison. As shown in the table, the alternative 1 would cost and was therefore recommended.

Local Public Finance and Counterpart Financing

38. The sources of revenue, expected expenditures, debt structure, and the role of UDICs in each project city have been analyzed to assess the financial capacity of each city. Based on the analysis, Donggang City, Longcheng District and Panjin City will be able to finance the project through the general governmental budget. Kuandian County, Suizhong County and Lingyuan City will rely on different sources, including loans and leasing of land and might encounter more difficulties to provide necessary funds. Table 17 summarizes the revenue, expenditures and expected counterpart funds by project city.

39. **UDICs.** Two UDICs are involved in the implementation of this project, namely: Kuandian Rural and Urban Real Estate Co. Ltd. and Lingyuan Infrastructure Investment Co. Ltd. The Kuandian Rural and Urban Real Estate Co. Ltd is part of the Kuandian Urban and Rural Construction Bureau, while the Lingyuan Infrastructure Investment Co. Ltd is part of the State-owned Property Management Bureau. These UDICs are fully funded and managed by the respective local governments.

40. Both UDICs will mobilize financing for new infrastructure financing and carry out construction of this infrastructure. Neither will be responsible for the operation of these new infrastructure assets, which will be handed-over to local government agencies. The UDICs will act on behalf of the respective local governments to borrow funds from banks. The debt incurred by these companies will be part of the overall government debt, and the repayment for the debt will be largely covered by revenue from land sales and long-term leases.

41. **Expenditure on infrastructure construction and maintenance.** The Expenditures of infrastructure construction and maintenance in the project cities are quite unbalanced. Some cities/counties invest 100 times what they spend in maintenance in construction (see table 5 below) The Bank Team was informed that a small budget is distributed into maintenance from the City Maintenance and Construction Tax and land revenue which are the two main sources of the infrastructure financing. There seems to be no special fund for the infrastructure maintenance in the project cities and counties.

42. **The procedure of investment plans.** Every year, government agencies present the required budget for capital investments, and operation and maintenance of assets is presented to the People's Committee of each project city. After obtaining the Committee's approval, the financial bureau will allocate funds, within the overall government budget, to each agency for investments, operation and maintenance. The final investment plan will, therefore, depend on the budget received and not necessarily guarantee that maintenance requirements are met. Future

maintenance costs are also often not considered during the investment planning process of new infrastructure.

Table 6.6. Simplified table of Municipal Finance (in RMB Million)

	2013	2014	2015
Donggang			
Total Revenue	5,915	6,837	7,780
Total Expenditure	5,080	5,887	6,832
Counterpart fund	140	83	7
Counterpart fund as % of Revenues	2.4	1.2	0.1
Kuandian			
Total Revenue	3,262	3,659	4,113
Total Expenditure	3,798	4,636	5,666
Counterpart fund	65	35	35
Counterpart fund as % of Revenues	1.2	0.9	0.8
Lingyuan			
Total Revenue	3,286	3,670	4,050
Total Expenditure	3,119	3,435	3,810
Counterpart fund	94	94	94
Counterpart fund as % of Revenues	2.8	2.6	2.3
Longcheng/Chaoyang			
Total Revenue	1,118	1,453	1,889
Total Expenditure	1,500	1,800	2,200
Counterpart fund	85	83	63
Counterpart fund as % of Revenues	7.6	5.7	3.3
Panjin			
Total Revenue	28,240	33,900	41,000
Total Expenditure	31,185	36,290	43,700
Counterpart fund	30	30	30
Counterpart fund as % of Revenues	0.1	0.1	0.1
Suizhong			
Total Revenue	6,342	7,846	9,833
Total Expenditure	6,325	7,793	9,659
Counterpart fund	60	100	100
Counterpart fund as % of Revenues	0.9	1.3	1.0

43. **Counterpart Funds Resources and Allocation.** Counterpart funds in project cities will come from the regular government budget, land sales and lease revenues, bank loans, or a combination of the three. Donggang City, Panjin City, and Longcheng District informed plan to raise the necessary counterpart funds from their existing fiscal revenues, whereas Kuandian County, Suizhong County and Lingyuan City plan to use a combination of all three sources.

However, there are risk and uncertainties involved in getting access to additional loans and the revenue that can be obtained from land sales and long-term leases, which will depend on the supply and demand for land in the local and regional market, prices being paid for land in the vicinity and state of the regional and national economy. It is expected that with current urbanization rates and planned infrastructure improvements, land values will increase considerably. However, most of the increase in land value will come as a result of the project completion and be able to finance the project. Finally, land is provided by UDICs as a guarantee of (other) loans and the revenues from land sales and leases will help repay these loans. It is, therefore, very uncertain in how these revenues will cover eminent counterpart fund needs.

