



# Pre-Feasibility Study for Xinyu New District Comprehensive Climate Change and Stormwater Management Project

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Executive Summary

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## i. Executive Summary

### A. Background

1. The Xinyu City Government (XCG) in Jiangxi Province is developing a new district of Gaotie to the north of the existing city to cater for rapidly expanding population and to cultivate business opportunities from a new high speed railway (HSR) and station that are being constructed by the national government. The HSR will pass less than 10 km to the north of Xinyu, a prosperous city of about one-half million.

2. The Cities Development Initiative for Asia (CDIA) is an Asia-wide initiative to support cities in ADB's developing member countries to strengthen links between urban planning and urban infrastructure investments and facilitate preparation of identified projects for financing and implementation. CDIA has elected to support the XCG with regard to a project that will utilize existing lakes in the new district and complement them with urban planning and landscaping to meet multiple objectives. A system of lakes, linking canals and open green space will be designed and implemented to manage stormwater quantity and quality in the new districts and downstream water quality, and to mitigate downstream flooding. Without effective mitigation, the urbanization would degrade water quality and aggravate flooding downstream. Located downstream is the Kongmujiang river – the source of water supply for the entire city – riverine wetlands that are a major recreational asset to the city and provide valued ecosystem habitat, and the main urban center of Xinyu that is already exposed to significant flood risk from the river.

3. In addition to those practical benefits, the project also has substantial environmental and social benefits. A system of parks, reserves and connected green corridors will enhance the urban environment inside the new districts, and protect the river and wetland environments downstream. It will also provide outstanding amenity for recreation and relaxation for residents and visitors to the new city district and attract enterprising businesses.

### B. Flood Management and Stormwater Management

4. The lakes and canals will serve to store local stormwater runoff temporarily during storms and then release water to the receiving river slowly after the flood peak has passed. The temporary storage of runoff also provides the opportunity for treatment of stormwater before release and the project will incorporate many advanced facilities for stormwater treatment. The network of lakes and canals will be designed to mitigate the risk of urban flooding within the new district. In relation to flood risk from the river system, the project will focus on non-structural flood management measures (e.g. early warning system, flood risk mapping, planning for flood emergency response and recovery, raising of risk awareness and preparedness) that will benefit the entire river basin including the existing urban center downstream.

### C. Adaptation to Climate Change

5. The non-structural flood management initiatives and temporary retention of stormwater runoff will be effective measures for adaptation to potential increased flood hazard due to climate change. The open green space and water features within the new urban districts will mitigate the urban 'heat island' effect that is a contributor to global warming.

## D. Social Issues

6. With the exception of a partly-developed industrial zone at the eastern extremity of the new district, the 61 km<sup>2</sup> project area is a highly modified environment with a scattered rural population. For parkland surrounding lakes in the main sub-district of 21 km<sup>2</sup>, approximately 180 ha land will need to be acquired. One of the main impacts on the existing residents would derive from excavation and construction of canals that would formalize the existing natural drainage, connect the lakes and provide connection to river outfalls. It is estimated that about 28 ha more land would have to be acquired for this purpose, and this would affect approximately 127 farmers. Few houses would have to be demolished: a preliminary estimate is 1,220 m<sup>2</sup>. During canal construction, approximately 12.7 ha of adjoining land would have to be occupied temporarily to enable construction activity. According to ADB criteria, the resettlement impacts are assessed as 'significant' and a detailed Resettlement Plan would be required for appraisal. Numerous provisions are essential to minimize adverse impacts on and inconvenience to local farmers during construction. Some of the land to be acquired is classified as basic farmland, an important issue to be resolved as a national law implies that no net loss in area of productive agricultural land should occur.

7. To be consistent with international best management practice in flood risk management, it is recommended that a number of households in the left bank floodplain of the Kongmu River within the new district be relocated to higher ground. Preliminary comparison of limited ground level data with estimated flood levels identified up to about 250 buildings that may be below a flood level of 1% AEP. Not all of these will be dwellings, and further investigations are required to establish which are in locations that should be categorized as high hazard. The number so categorized is expected to be much lower than 250, and the social risks of resettlement then need to be compared with the physical risk of flooding.

## E. Costs and Benefits

8. The new district is considered in three parts, or sub-districts: (1) the central new sub-district of 21 km<sup>2</sup> that is the current focus of development planning near the HSR; (2) another sub-district of 17 km<sup>2</sup> to the south intended for medium-density residential and commercial development to infill between the old city and the new HSR district; and (3) a third sub-district of 23 km<sup>2</sup> to the east of the central new sub-district that contains within it the industrial zone.

9. Costs of project works were estimated in four packages:

- 9.1 Lakes, parks, canals and associated stormwater quality management of the central HSR new sub-district.
- 9.2 Flood management and riparian buffer zone of the Kongmujiang river basin.
- 9.3 Works for stormwater management and mitigation of downstream flooding and water quality in the southern new sub-district.
- 9.4 Works for stormwater management and mitigation of downstream flooding and water quality in the eastern new sub-district and industrial zone.

10. Preliminary cost estimates for packages (1) and (2) above are shown in the table below. The total cost for implementation of these two parcels is an estimated \$247 million. Of this amount, a little over 50% is for landscaping of urban parks and reserves.

Project Component	Cost Estimate	
	US\$	RMB x10 <sup>4</sup>
1. Rehabilitation of Lakes	\$ 20,100,000	12,700
2. Construction of Canals:	\$ 73,100,000	46,100
3. Landscaping of Parkland:	\$ 125,900,000	79,300
4. Flood Risk Management and River Corridor:	\$ 8,200,000	5,200
5. Stormwater Quality Management:	\$ 14,200,000	8,900
6. Urban Pipe Drainage:	\$ 5,800,000	3,600
<b>Total:</b>	<b>\$ 247,300,000</b>	<b>155,800</b>

NOTE: Assumed currency conversion of US\$ = RMB 6.3

11. Estimated costs of package (3) and (4) remain very approximate because detailed sub-district plans were not available. The estimate for package (3) – the southern sub-district – is \$58 million. There is much less role for lakes and canals in stormwater management, but investment in water quality management is of great importance. The estimate for package (4) – the eastern sub-district – is \$6 million, mainly for retrofitting to achieve improved stormwater and water quality management in the industrial zone. At this preliminary stage, the implementation cost of the entire project is therefore estimated at approximately \$311 million.

12. Preliminary estimates for costs of operations and maintenance for all packages are approximately \$10 million per annum.

13. The benefits of the project are discussed in chapter 4. Some are nonmarket benefits, or social benefits. Benefits were quantified with respect to:

- 13.1 downstream flood mitigation, \$0.85 million per annum;
- 13.2 reduction in downstream flood risk attributable to non-structural flood management measures, \$1.65 million per annum;
- 13.3 amenity value of open space in parklands and reserves, \$171 million;
- 13.4 amenity value of proximity to linear parks (greenways) in canal corridors, \$28 million;
- 13.5 stormwater drainage and reduction of urban flooding in the new district, \$21 million per annum;
- 13.6 water quality benefit in terms of retained amenity of Kongmujiang wetlands, \$6.6 million per annum; and
- 13.7 tourism value in new district, \$6.4 million per annum.

## F. Economic and Financial Analysis

14. For purposes of economic and financial analysis, two project options were proposed. Option 1 comprises packages (1) plus (2), the packages for the main central sub-district for which more detailed planning was available, and for non-structural flood risk management. Option 2 comprised all four packages, extending the innovative planning and design to the other two new sub-districts and integrating the mitigation of downstream water quality and flooding.

15. Cost-benefit analysis used a discount cash flow model for an operation period of 20 years. Cost structures of both options were obtained by adding price contingencies (physical contingencies were included in the base costs) and interest during construction to the basic

costs, and by separating costs into local and foreign currencies. With these adjustments, total capital costs rise to \$270 million for option 1, and \$340 million for option 2.

16. An economic internal rate of return (EIRR) of 13.5% was calculated for option 1, and 12.3% for option 2. Financing plans for both options are presented in chapter 5.

17. The affordability of a loan of this order of magnitude to the XCG has been assessed, and no major issues were identified. The city has been enjoying robust growth, and there is no reason to expect that will not continue, founded as it is on new and emerging industries and with extra stimulus anticipated from the advent of the HSR. It is assumed that the Implementing Agency would be the Xinyu High Speed Rail New District Construction and Investment Co. (XHNDIC), an instrument of the XCG. The XHNDIC has recruited well and is gaining valuable project management experience with large projects already under way; however, some strengthening of capacity is recommended to undertake the project management role for this project, particularly for implementation of environmental and social planning and safeguards, and for administration of loan financing and expenditure.

## **G. Report Structure**

18. The first chapter provides an introduction to the project and its objectives, and the structure of the Pre-Feasibility Study (PFS). Key issues addressed by the project are briefly discussed in chapter 2. Appendix I includes extra discussion of key issues for urban development of the new district. Supplementary content is provided in Appendix A (on flood management and hydrology), Appendix B (on urban planning and landscaping), Appendix C (on environmental management), Appendix D (on social development) and Appendix E (on climate change).

19. Chapter 3 formulates the project and its components required to address the key issues and meet project objectives, concluding with a summary of proposals and proposed packaging of works. Appendix H provides an introduction to the modern stormwater treatment techniques advocated in the project to manage urban water quality and the quality of stormwater runoff from the new district. Chapter 4 proceeds to estimate costs and benefits of implementing the project proposals, and chapter 5 presents economic and financial analysis of the project. It considers two project options and proposes financial plans for both. Appendix F provides details of the estimation of costs and benefits, and Appendix G is a more detailed exposition of the financial study.

20. Preliminary arrangements for project development are proposed in chapter 6, and in chapter 7 an assessment of risks to satisfying project objectives is presented with suggestions for their management. Chapter 8 sets out the main steps in the project development process from the PFS to project implementation. For illustration, it assumes that the main source of international lending will be the ADB – although that remains to be determined. Chapter 8 also offers recommendations for the forthcoming Feasibility Study, the next step in the process. Chapter 9 concludes with a review of why the project deserves support, and includes additional recommendations arising from the PFS.