ECONOMIC AND FINANCIAL ANALYSIS

A. Project Context and Investments

1. The Anhui Integrated Sustainable Transport Project is located in Anhui, an inland province of the People's Republic of China (PRC) with a population of 59.7 million. Anhui is characterized by high population density of 430 people per square kilometer, a relatively high level of poverty, and its proximity to the advanced economies of Zhejiang and Shanghai. The PRC government plans to shift some heavy industries from the coast to inland provinces, and this project will support this strategy by extending and improving the road network in congested or newly urbanized areas and providing an inland waterway connection between the new industrial park being developed at Xuancheng City in Anhui Province and the Wushen Canal, which in turn connects to Shanghai.[1]

2. **Highway components.** The project will construct or upgrade 122.4 kilometers (km) of roads, including 83.4 km of rural highways and 39 km of urban roads (Table 1). The S319 highway to be developed under the project will connect Erba and Wuwei counties and replace the current S319 that runs roughly parallel to the new route, but is 10 km longer and congested at its eastern end. The S367 project component is the Ma'anshan Northern Corridor Road that connects with the border of Jiangsu Province at its eastern end, near Nanjing. Built to rural road standards, it is in very poor condition in parts and carries high volumes of heavy goods traffic. The Dongliu–Yaodu project section of G206 is a new national road in an urban area. It will mainly serve local traffic and, for this reason, needs to include lanes for public transport and nonmotorized traffic. The fourth project component involves the S320 Yimu Highway, which is part of an east–west link connecting the G50 expressway near Haitangwan with the G50 in Tongling County to the west. Much of the road is located in a newly urbanized area and will also include public transport and nonmotorized lanes.

Table 1: Highway Investment Program Description

Road No.	Length (km)	Current Class (m)	Current Pavement Condition	Current Speed (kph)	Planned Upgrade (lanes/width)	Planned Speed (kph)	Financial Costs (CNY million)	Economic Cost/km (CNY million)
S319	36.5	2 lanes/ 7.5 m	Fair	60	4 lanes/ 14.8 m	80	903	23.3
S367	46.9	2 lanes/ 6 m	Very Poor	50	2 lanes/ 7.3 m	80	545	9.3–13.1
G206	16.6	2 lanes/ 8 m	Fair	40–55	6 lanes/ 34 m	55–95	724	32.9
S320	22.4	2 lanes/ 9 m	Fair	60	4-6 lanes/ 25.6–16.3 m	75	606	26.6–31.2

km = kilometer, kph = kilometer per hour, m = meter, No. = number.
Sources: Anhui Department of Transport and Asian Development Bank estimates.

3. **Inland waterway components.** The project will upgrade 48 km of the Shuiyang River to restricted class IV navigable waterway standard between Xuancheng City industrial park and the Wushen Canal in Jiangsu Province. This will connect Xuancheng with the high-grade waterway network of the Yangtze River delta and, through it, with Shanghai and Nanjing. The river is currently only navigable during the rainy season and used only by small sand dredging barges. The new channel will allow barges of up to 1,000 dead weight ton (dwt) to and from Xuancheng's industrial park all year round. The project works will be located mainly within

[1] The Wushen Canal is an ancient waterway that branches off from the Yangtze River and provides a connection between the City of Wuhu in Anhui Province and Shanghai.

Anhui. These will include widening and dredging of 43.9 km of the river; construction of two low-water rubber dams, including one with an adjacent ship lock; reconstruction of a low bridge; and construction of an intermodal river port with four 1,000 dwt berths near the new industrial zone at Haitangwan. The project will also finance the channelization of 6 km of a natural river in Jiangsu to be undertaken separately by the Jiangsu provincial government.

B. Traffic Forecasts

1. Highway Components

4. **Traffic baselines.** Traffic baselines were calculated on the basis of (i) 5–10 years of annual records of counting stations, (ii) 5 years of toll gate records for the G35 expressway, (iii) 24-hour traffic counts on selected sections of each road, and (iv) 12-hour origin–destination surveys. The traffic flow on the project roads in 2012 ranged from average annual daily traffic of 2,630 on S367 to 8,500 on S320. This is close to or above the design capacity of the existing roads.

5. **Traffic growth.** Traffic on S319, S367, and S320 grew 13%–16% annually during 2008-2012. Traffic initially dropped on G206 in 2008 following the opening of the parallel G35, but then resumed growth rates similar to those on the three other project routes. Traffic has generally expanded in line with local gross domestic product (GDP) growth, and the historic elasticities are 1 to 1.1 for freight and 0.9 to 1.2 for passenger traffic. To forecast traffic growth, the analysis made the following assumptions: (i) national GDP growth of 7.8% until 2020, falling gradually to 4% by 2035; (ii) GDP growth in Anhui of 20% higher than the national average initially, falling to the national average by 2020; (iii) traffic elasticity in line with historic averages before decreasing to 0.65 by 2027, except for G206, where the ongoing urbanization process is expected to create lasting robust demand. Overall, the normal traffic growth rates were projected to be between 7.7% and 10% from 2012-2020, before falling to 2.6–4.5% by 2030. These projections are conservative when compared with the higher assumptions made for similar PRC interurban road projects.

6. **Generated and diverted traffic.** The project's road improvements will raise demand for trips due to the decline in transport costs that will result. The with-project case used in the analysis forecasts includes an incremental increase of 2%–11% per annum in traffic over the base without-project case. The increment forecasts are specific to each road and traffic category. They are based on the transport costs modeled by Highway Design and Management Model HDM-4 software and assume price elasticities of –0.3 for passengers and –0.2 for goods traffic. Diverted traffic was only considered for S320, which runs parallel to the planned TongNanXuan expressway. A diversion model used showed that the opening of the expressway would reduce passenger traffic by 20% below potential and truck traffic by 10%. Table 2 shows the with-project case traffic forecasts.

Table 2: With-Project Road Forecasts of Average Annual Daily Traffic

Highway	Baseline (Average By Output)			Forecasts			
	2012	*% trucks*	*% buses*	2020	2025	2030	2035
S319 (Erba–Wuwei)	4,960	*34.4%/20.9%*	*5.3%*	11,000	15,070	19,460	22,120
S367 (Ma'anshan)	2,630	*48.3%/37.0%*	*8.9%*	5,830	7,970	10,270	11,680
G206 (Dongliu–Yaodu)	3,740	*40.9%/23.5%*	*12.9%*	6,610	10,460	15,100	18,820
S320 (Yimu)	8,500	*42.2%/25.6%*	*5.1%*	16,250	19,970	24,300	27,620

Note: higher % trucks includes light goods, lower % excludes them.
Sources: Baseline from Anhui Provincial Department of Transport and Asian Development Bank estimates.

2. Inland Waterway Components

7. **Traffic.** The Shuiyang River is used only to transport bulk goods—coal, aggregates, cement, and fertilizer. Downstream of Haitangwan, traffic had been growing at 11% a year until it stagnated in 2007 due to navigational constraints. The cargo flow on the river was only 0.9 million tons in 2012, compared with the up to 80 million tons of annual throughput in the main river ports of Anhui on the Yangtze River. Little traffic exists on the Shuiyang upstream of Haitangwan.

Table 3: Traffic Forecasts
('000 tons)

Cargo	2011	2020	2025	2030	2035
Coal	14	234	600	900	994
Cement	10	1,506	4,000	5,000	5,520
Construction materials	651	1,157	2,000	2,500	2,760
Chemicals	13	199	510	710	783
Non-mineral ore	129	399	850	1,150	1,270
Fertilizer	5	59	150	200	221
Steel products	0	131	350	550	607
Oil products	0	38	100	150	166
Grain	2	39	100	200	221
Others	60	473	1,160	2,360	2,599
Total	**884**	**4,235**	**9,820**	**13,720**	**15,141**

Sources: Anhui Provincial Department of Transport and Asian Development Bank estimates.

8. **Traffic forecast.** Once the river becomes fully navigable by larger ships up to Haitangwan, shippers are expected to quickly increase their use of the waterway by shifting cargo away from road and rail. To predict future growth of traffic, the Anhui Provincial Department of Transport (APDOT) surveyed major producers and consumers of general cargo and carried out origin–destination surveys on the waterway.[2] The major users of the improved waterway are expected to be (i) the construction industry in Anhui, which will increase river bed dredging of sand and aggregates, (ii) cement transporters, particularly those servicing the large Xuangcheng and Nigguo cement plants, which are planning capacity upgrades; and (iii) shippers of coal for power plants. Coal is transported mainly by rail in the PRC, but the waterway has the potential to capture a large share of coal shipments that originate in Nanjing and are destined for power plants along the Shuiyang River. The new industrial park at Haitangwan is expected to generate up to 1.5 million tons of induced demand by 2020 and 2.5 million tons by 2030. This traffic will be served by a new port and its planned capacity extension. Traffic forecasts include a ramp-up period of 8 years. Traffic beyond 2025 was assumed to grow at 2% a year.

Table 4: With-Project Traffic Forecasts for Shuiyang River Waterway (2011–2035)
('000 tons)

Freight Component	2011	2020	2025	2030	2035
Base traffic (without-project case)	884	884	884	884	884
Modal shift from road		981	2,617	2,901	3,235
Modal shift from rail		455	1,213	1,339	1,488
Induced traffic		1,915	5,106	8,596	9,534
Total	**884**	**4,235**	**9,820**	**13,720**	**15,141**

Sources: Anhui Provincial Department of Transport, Asian Development Bank estimates.

[2] Ideally, origin destinations surveys should also have been carried out on the parallel road and rail corridors.

C. Economic Costs and Benefits

9. **Project costs.** The project economic costs are CNY4,284 million ($701 million). This comprises (i) CNY3,519 ($575 million) for the highway component; and (ii) CNY553 million ($90 million) under the project and CNY212 million ($35 million) for the section in Jiangsu to be financed by the provincial government for the inland waterway transport (IWT) component.[3] Works will be implemented over 4 years (2014–2017). Project capital costs include the costs of the highway and IWT works, design, supervision, management, resettlement, land opportunity costs, and environmental mitigation. The economic analysis was conducted in domestic price numeraire, using mid-2012 base year estimates. The evaluation period was 20 years for highways and 30 years for the IWT component to reflect its longer ramp-up period. Financial costs were converted into economic costs by (i) excluding financial charges, taxes, and price contingencies; (ii) using a shadow exchange rate of 1.062, calculated using the PRC's trade balance; and (iii) using a shadow wage rate factor of 0.70 for unskilled labor.

10. **Highway maintenance.** Road degradation was modeled using Highway Design and Management Model HDM-4 software. Maintenance assumptions included (i) routine maintenance and patching in all cases; (ii) seal applied when cracking appears but remains moderate; and (iii) 60 millimeter overlay when the road condition becomes poor, based on the international roughness index measure of 6. The new asphalt concrete surfaces will require more road routine maintenance than current roads but fewer minor repairs and overlays, which are associated with older pavements that are not as strong.

11. **Highway transport benefits.** The highway upgrades will (i) shorten trips by providing better alignments on S319, G206, and S320; or (ii) improve the riding conditions by upgrading the badly damaged road surface, on S367. This will reduce vehicle operating costs. The elements of vehicle operating cost considered in the economic analysis included those for fuel, lubricants, tires, spare parts, labor for maintenance, and crew wages (Table 5). The upgrades will also reduce travel time for passengers because the straighter and wider alignments and the smoother road surfaces the project will provide will increase road capacity and allow higher speeds. The unit value of work-related travel time was estimated to be CNY10–CNY50 ($1.60–$8.20) per hour, with the high values assigned to car passengers and the lower ones to passengers on buses or trucks. The time value of money is inflated in function of GDP per capita. Value of non-working time was estimated to be 25% of work time.

Table 5: Project Road Vehicle Fleet Characteristics and Operating Costs

Economic Unit Costs/Use	Medium Car	Small Bus	Large Bus	Small Truck	Medium Truck	Heavy Truck	Articulated Truck
New vehicle cost (CNY)	100,000	100,000	375,000	150,000	245,000	395,000	590,000
Fuel cost per liter (CNY)	6.7	6.8	6.8	6.8	6.8	6.8	6.8
Cost per new tire (CNY)	290	300	470	350	620	700	700
Maintenance cost, per hour (CNY)	19	19	19	19	19	19	19
Crew costs, per hour (CNY)		19	29	29	29	29	29
Kilometers driven per year	25,000	50,000	70,000	50,000	60,000	70,000	70,000
Hours driven per year	600	1,000	2,000	1,000	1,500	2,500	2,500
Service life (years)	10	10	12	10	10	10	12
Vehicle Operating Costs (CNY per 100 km at IRI 4)	2.27	2.10	3.37	2.63	3.71	5.80	7.68

IRI = international roughness index, km = kilometer.
Source: Asian Development Bank estimates.

[3] The Jiangsu section to be financing separately by the Jiangsu provincial government is considered a project cost for the purpose of the economic analysis.

12. **Inland waterway transport benefits.** The IWT component will reduce the local economy's transport costs in two principal ways. It will allow existing shippers of goods to gradually shift their logistic chains from rail or road to the cheaper IWT. The benefits from shifting from rail to IWT for a typical 300 km distance were estimated to average CNY0.05 per ton-kilometer. The benefit of a shift from road to IWT was put at an average CNY0.42 per ton-kilometer. The IWT component will also attract industries to locate along the waterway. The benefits for the induced traffic that this will generate were valued at half the average benefits for the existing traffic shifting to IWT.

13. **Transport externalities.** The project will reduce carbon dioxide (CO_2) emissions by 652,700 tons from 2013-2035 (Table 6). An estimated 247,200 tons of CO_2 will be emitted because of construction works.[4] The highway upgrades will have mixed effect on emissions—they will be increased by the higher speeds and added traffic that will result, but decline due to less congestion and smoother road surfaces. A net overall reduction in emissions of 137,600 tons was estimated over 20 years. The IWT component will lead to a net reduction in CO_2 emissions of 762,300 tons over 30 years due to the shift from higher-emission road transport to waterway transport. CO_2 emissions were evaluated at a constant $25 per ton.[5] The project will also reduce road crashes by improving highway conditions or shifting traffic away from roads to IWT.[6]

Table 6: Net Project Impact on Carbon Dioxide Emissions

(tons)

Project Component	Construction Impact	Annual Net Operations Impact			
		2020	2025	2030	2035
A. Highway	198,700	450	500	(7,600)	(19,550)
- *S319 (Erba–Wuwei)*	*50,750*	*3,150*	*2,700*	*5,650*	*3,150*
- *S367 (Ma'anshan)*	*14,050*	*(2,600)*	*(1,500)*	*(6,700)*	*(6,500)*
- *G206 (Dongliu–Yaodu)*	*57,850*	*1,450*	*550*	*450*	*(2,700)*
- *S320 (Yimu)*	*76,050*	*(1,550)*	*(1,250)*	*(7,000)*	*(13,500)*
B. Inland Waterway	48,500	(8,100)	(21,250)	(28,250)	(31,250)
Total (A) + (B)	247,200	(7,650)	(20,750)	(35,850)	(50,800)
Total (Construction + Operation)	**(652,700)**				

() = negative.

Source: Asian Development Bank estimates.

D. Cost–Benefit Analysis

14. **Economic rate of return.** The economic internal rate of return (EIRR) of the project's costs and benefits is 16.7%, with a net present value (NPV) of $194.7 million at a discount rate of 12% (Table 7). The EIRRs for the four highway subcomponents ranged from 13.4% to 26.0%. The IWT components have a joint EIRR of 12.8%.

15. **Sensitivity.** The project's EIRR was found to be robust to increases in capital costs of 20%, which produced an EIRR of 14.5%, and to a reduction of benefits by 20%, which reduced the EIRR to 14%. A delay in project implementation of 2 years led to a limited reduction of the EIRR to 15%. The viability of the IWT component is the most sensitive to traffic assumptions. A scenario under which the induced traffic does not materialize and IWT traffic is half what is projected brings the EIRR of the IWT component to 7.9%. Not discounting the economic

[4] This was calculated using the World Bank's ROADEO tool for highway construction. The same average emission factor per cost was then applied to the IWT component.

[5] United Nations, Advisory Group on Climate Change Financing. 2010. *Report of the Secretary-General's High-level Advisory Group on Climate Change Financing*. New York.

[6] Road crashes were valued using the guidelines of the International Road Assessment Program of 70 times GDP per capita for fatalities and 17 times GDP per capita for serious injuries.

benefits of the predicted reduction in CO_2 emissions would raise the EIRR of the IWT component to 17.2%, showing the high environmental value of this component.[7]

Table 7: Cost–Benefit Analysis Summary

($ million)

Year	Capital Costs	O&M	Highways		Inland Waterway		Road Crashes	CO_2 Emissions	Net Benefits
			VOC	Time	Modal shift	Induced Traffic			
2014	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.6
2015	(199.9)	0.0	0.7	(0.1)	0.0	0.0	(0.1)	(2.8)	(202.2)
2016	(291.6)	0.0	(4.2)	(0.6)	0.0	0.0	(0.2)	(2.8)	(299.4)
2017	(36.2)	0.0	15.5	26.5	0.0	0.0	3.1	(0.4)	8.6
2018	2.5	(1.1)	21.6	31.8	1.0	0.6	3.3	0.1	59.9
2019	0.0	(1.2)	18.8	35.7	3.2	1.8	3.7	0.1	62.2
2020	0.0	(1.3)	23.4	40.0	6.1	3.4	4.0	0.3	76.0
2021	0.4	(1.3)	28.6	44.7	8.1	4.6	4.4	0.4	89.9
2022	1.0	(1.3)	30.7	48.4	10.1	5.7	4.7	0.5	99.7
2023	0.5	(3.6)	31.1	52.8	12.2	6.8	5.0	0.6	105.3
2024	3.3	(1.4)	36.9	58.9	14.2	8.0	5.4	0.8	125.9
2025	(0.3)	(1.5)	28.2	64.0	16.2	9.1	5.8	0.8	122.3
2026	(1.9)	(1.5)	32.4	71.0	16.6	10.4	6.1	0.9	133.9
2027	2.3	(1.6)	41.0	79.3	16.9	11.6	6.5	1.1	157.2
2028	0.1	(7.7)	31.6	84.1	17.3	12.9	6.8	1.1	146.3
2029	0.5	(1.7)	36.6	93.9	17.7	14.1	7.2	1.3	169.7
2030	0.0	(1.8)	35.2	99.6	18.0	15.4	7.5	1.3	175.2
2031	1.8	(1.8)	37.6	105.7	18.4	15.7	7.7	1.5	186.7
2032	(1.9)	(1.8)	25.9	108.4	18.8	16.0	7.9	1.4	174.8
2033	(4.2)	(4.1)	30.6	114.5	19.2	16.3	8.1	1.5	182.1
2034	(5.4)	(1.9)	42.4	124.0	19.7	16.7	8.4	1.7	205.6
2035	0.9	(1.9)	62.6	133.3	20.1	17.0	8.6	1.9	242.5
2036	123.4*	(2.0)	60.9	136.1	20.5	17.3	8.8	2.0	366.9
2037	0.0	(2.0)	0.0	0.0	21.0	17.7	0.8	1.5	38.9
2038	0.0	(8.1)	0.0	0.0	21.0	17.7	0.8	1.5	32.9
2039	0.0	(2.1)	0.0	0.0	21.0	17.7	0.8	1.5	38.9
2040	0.0	(2.1)	0.0	0.0	21.0	17.7	0.8	1.6	38.9
2041	0.0	(2.1)	0.0	0.0	21.0	17.7	0.8	1.6	38.9
2042	0.0	(2.1)	0.0	0.0	21.0	17.7	0.8	1.6	38.9
2043	0.0	(4.4)	0.0	0.0	21.0	17.7	0.8	1.7	36.7
2044	0.0	(2.2)	0.0	0.0	21.0	17.7	0.8	1.7	38.9
2045	0.0	(2.2)	0.0	0.0	21.0	17.7	0.8	1.7	38.9
2046	0.0	(2.3)	0.0	0.0	21.0	17.7	0.8	1.8	38.9
2047	18.7	(2.3)	0.0	0.0	21.0	17.7	0.8	1.8	57.7
NPV at 12%	**(377.6)**	**(10.1)**	**147.7**	**304.8**	**60.7**	**42.8**	**26.9**	**(0.6)**	**194.7**

() = negative, CO_2 = carbon dioxide, O&M = operation and maintenance, NPV = net present value, VOC = vehicle operating cost.

Note: Capital costs and operation and maintenance are net values.

The residual value of highways is included as a benefit at end of the 20-year evaluation period.

Source: Asian Development Bank estimates.

E. Financial Analysis

16. The financial analysis and projections for the project were undertaken in accordance with ADB's *Guidelines for the Financial Management and Analysis of Projects.*[8] The project highway upgrades will be implemented and operated by the county-level highway bureaus, which are government agencies of the county governments. None of the roads will be tolled. The inland waterway component will be implemented by the Anhui Provincial Port and Shipping Construction Investment Group (APPSCIG). APPSCIG will also operate the port and the ship

[7] Applying Hotelling's rule that the price of a non-renewable resource (CO_2 budget) should rise at the discount rate.

[8] ADB. 2005. *Guidelines for the Financial Management and Analysis of Projects.* Manila.

lock. The upkeep of the waterway will be the responsibility of the Xuancheng Port and Shipping Administration Bureau. The two revenue-earning outputs—the ship lock and the port—were assessed for financial viability together because they cannot function separately and are managed by the same entity. The financial analysis otherwise focused on confirming the financial capacity of the county governments and APPSCIG.

1. Financial Projections and Analysis—Inland Waterway Components

17. **Revenues.** The ship lock is expected to charge CNY0.8 per dwt for a fully laden vessel and CNY0.6 dwt for an empty vessel, based on prevailing charges on other locks in Anhui. The port will collect various charges, such as fees for pilotage and the use of tugs, harbor dues, quay dues, light dues, and handling dues. On average, it was estimated that they would amount to CNY14 per ton for bulk cargo, CNY22 per ton for general cargo, and CNY21 per ton for chemicals. Charges were assumed to be partly indexed to inflation, i.e., it was assumed that they will be increased every 5 years to bring them into line with past inflation, which is the common practice in the PRC.

18. **Costs.** The ship lock will require only six staff members to operate. The port will employ 76 staff once the port throughput reaches its capacity of 1.5 million tons annually. Labor costs were calculated on the basis of (i) a CNY25,000 base annual cost per worker; (ii) fixed costs representing 95% of initial costs, with variable costs proportional to traffic; and (iii) a real annual increase of 2%. Management and utility costs were assumed to reach 40% of labor costs for the ship lock and 50% for the port. The evaluation also considered repair, asset replacement costs, and residual values.

19. **Financing.** Of the financing for the inland waterway component, 38% will come from a long-term loan from ADB, 36% from local banks, and 27% from the government. ADB's financing for this component is $45 million. The ADB loan will have a 23–year term, including a 5–year grace period, and a London interbank offered rate-based interest rate (with a spread of 0.5%, including a 0.1% maturity premium) and a 0.15% commitment fee. The local bank loan was assumed to have a maturity of 15 years (inclusive of a grace period of 3 years), and an interest rate of 6.55%, based on market terms for similar projects in other provinces. The weighted average cost of capital was calculated to be 1.89%.

Table 8: Inland Waterway Component—Calculation of Weighted Average Cost of Capital

Item	ADB (%)	Commercial Bank (%)	Government (%)
Capital investment (CNY million)	276.0	264.0	190.7
A. Proportion of capital	37.8	36.1	26.1
B. Nominal rate	3.33	6.55	8.00
C. Tax rate	25	25	
D. Nominal rate adjusted for tax shield, **(B) x (1–C)**	2.50	4.91	8.00
E. Inflation rate	1.80	3.50	3.50
F. Real cost adjusted for tax, **(1 + D) ÷ (1 + E) –**	0.69	1.36	4.35
G. Weighted cost of capital, **(A) x (F)**	0.26	0.49	1.13
Weighted Average Cost of Capital	**1.89**		

Source: Asian Development Bank estimates.

20. **Evaluation.** The financial projections indicate that the IWT component is financially viable. It has an estimated financial internal rate of return (FIRR) of 2.49% (Table 9), compared with the weighted average cost of capital of 1.89% (Table 8). Due to the projected slow ramp-up of traffic and the heavy debt burden, cash flows will be lastingly weak—cash internally generated by the port and ship lock revenues will only cover debt service after 20 years of operation. Financial viability was found to be sensitive to adverse movements of capital costs and revenues. An increase by 10% in capital costs or a decrease by 10% in revenues would lower the FIRR to 1.79% and 1.66%, respectively. Financial viability was determined to be robust to a 10% increase in operation and maintenance costs, which produced an FIRR of

2.39%. A worst-case scenario, under which all these adverse impacts occurred simultaneously, would lower the FIRR to 0.89%.

2. Financial Capacity

21. **County governments.** The county governments of Dongzhi, Hanshan, Hexian, Nanling, and Wuwei will provide counterpart financing, service the debt, and ensure the incremental maintenance costs of the upgraded highways. An analysis of the counties' income and expenditure statements shows that all experienced dramatic revenue growth of 30%–40% annually during in the 2007–2011. In 2011, Wuwei's revenues were CNY4.8 billion. Revenues in the other counties were CNY2.5 billion–CNY2.8 billion. Providing counterpart financing will require counties to use 5.7%–8.3% of their 2011 revenues. Debt service and maintenance would at most reach 0.5% of 2011 revenues.

22. **Anhui Provincial Port and Shipping Construction Investment Group.** APPSCIG, established in 2007 and wholly owned by the Anhui government, is mainly an asset holding company that maintains majority interests or full ownership in nine port and waterway companies in the province. The company's assets reached CNY775 million in 2011. Because it has been investing on behalf of the government in long-term projects, its operating cash flows—CNY40.9 million in 2011— are small and its profitability is low. Nonetheless, its debt burden is currently very low (gearing of 0.1), and its debt service cover ratio has remained about 1.2. The project is well within its investment capacity, but debt service could represent a significant share of its cash flows. The government plans to expand APPSCIG quickly through CNY14 billion in investments in 25 new IWT projects during 2013-2018.

Table 9: Inland Waterway Component—Financial Analysis Summary

($ million)

Year	Capital Costs	O&M	Gross revenues	Business Tax	Net Cash Flow
2014	12.6	0.0	0.0	0.0	(12.6)
2015	29.6	0.0	0.0	0.0	(29.6)
2016	32.7	0.0	0.0	0.0	(32.7)
2017	24.7	0.0	0.0	0.0	(24.7)
2018	0.0	0.6	4.1	0.2	3.3
2019	0.0	0.6	4.6	0.3	3.7
2020	0.0	0.7	5.4	0.3	4.4
2021	0.0	0.7	5.6	0.3	4.6
2022	0.0	0.7	5.8	0.3	4.8
2023	2.5	0.7	6.1	0.3	2.5
2024	0.0	0.7	6.4	0.4	5.3
2025	0.0	0.8	7.6	0.4	6.3
2026	0.0	0.8	7.9	0.4	6.6
2027	0.0	0.9	8.3	0.5	6.9
2028	11.1	0.9	8.7	0.5	(3.8)
2029	0.0	0.9	9.1	0.5	7.7
2030	0.0	1.0	10.7	0.6	9.1
2031	0.0	1.0	10.6	0.6	9.0
2032	0.0	1.0	10.6	0.6	8.9
2033	2.5	1.0	10.5	0.6	6.4
2034	0.0	1.1	10.4	0.6	8.8
2035	0.0	1.1	11.5	0.6	9.7
2036	0.0	1.1	11.4	0.6	9.7
2037	0.0	1.1	11.4	0.6	9.6
2038	(18.0)	0.0	0.0	0.0	18.0
NPV at WACC	**84.8**	**13.6**	**126.3**	**6.9**	**20.9 (FIRR = 2.49%)**

() = negative, FIRR = financial internal rate of return, NPV = net present value.
Source: Asian Development Bank estimates.