

TRANSPORT SECTOR ASSESSMENT

A. Sector Context

1. The Independent State of Papua New Guinea (PNG) is composed of the eastern half of the island of New Guinea plus numerous smaller islands, the larger of which include Bougainville, Manus, New Britain, and New Ireland. Fourteen of the country's 19 provinces are coastal, as is the National Capital District, giving a coastline of over 17,000 kilometers (km) and 17 million hectares of reef-covered waters. The archipelago consists of rugged mountain ranges, fertile upland valleys, coastal plains, and extensive swamps. The population of 7.2 million (2012) lives in widely dispersed pockets, with over 85% living in rural and remote areas and 1 million in the outer islands. The population density ranges from two persons/square kilometer (km²) in the Western Province to 1,500 persons/km² in the National Capital District, with a nationwide average of 15 persons/km².

2. The transport sector in PNG is structured into three subsectors: roads, maritime, and aviation. Infrastructure in all three subsectors has fallen steadily into a state of disrepair in the past two decades. The condition threatens economic development and limits access to markets and social services for much of the population, with resulting high costs for business activities. The condition of the country's transport infrastructure can be explained by (i) PNG's challenging topography and climatic conditions, (ii) long periods of funding constraints to support maintenance requirements, (iii) weak institutional and management capacity, and (iv) the limited number of able local and international private contractors. Road transport is the dominant passenger travel mode; but the inadequate land connections between several of the mainland provinces and the island nature of PNG highlight the important roles of domestic aviation and coastal shipping.

3. The primary government agencies involved in PNG's transport sector are the Department of Transport, the Department of Works (DOW), PNG Ports Corporation Limited (PNGPCL), National Airports Corporation (NAC), Civil Aviation Safety Authority (CASA), PNG Air Services Limited (PNGASL), the National Maritime Safety Authority (NMSA), the National Road Safety Council (NRSC), and the Accident Investigation Commission (AIC).

4. **Roads.** The road network is classified into national, provincial, and district roads. National roads link provincial capitals and the main population centers. Provincial and district roads provide the secondary and tertiary links to the national road network. It is estimated that PNG has an overall road network of around 30,000 km in length, consisting of 8,738 km of national roads and around 22,000 km of provincial and district roads.¹ National roads are classified as good, fair, or poor. The good section consists of 2,610 km and is defined as those roads requiring only regular routine maintenance and drainage cleaning to keep them in good condition. Roads in fair condition, which span 3,861 km, require periodic and specific maintenance to bring them back to good condition. The poor section of the national road network consists of 1,616 km that require reconstruction and/or rehabilitation to bring them back to good condition. In 1998, only 23% of the national road network was sealed, but this increased to 36% in 2010.

5. The Road Asset Management System (RAMS), introduced in 2000 with Asian Development Bank (ADB) technical assistance (TA), identified and incorporated in a database some 16,560 km of the road network (8,738 km of national and 7,822 km of provincial roads).² Around 13,000 km remain unaccounted for. Provinces with the most extensive networks include West New Britain, Central, Madang, and South Highlands. The traffic volumes on the national highways are low, except for the urban centers of Port Moresby and Lae.

¹ Government of Papua New Guinea, Department of Works. 2010. *PNG Road Statistics*. Port Moresby. <http://www.works.gov.pg/media/png-road-statistics.html>

² ADB. 1998. *Technical Assistance to Papua New Guinea for Road Asset Management System*. Manila (TA 3004).

Table 1: Length of National Roads (km)

Location	Sealed	Unsealed	Total
Western	7.06	132.98	140.04
Gulf	71.43	191.18	262.61
Central	370.08	589.45	959.53
National Capital District	78.12	1.10	79.22
Milne Bay	77.64	331.90	409.54
Oro	78.79	234.38	313.17
Southern Highland Province	114.39	615.89	730.28
ENGA	81.87	160.37	242.24
Western Highland Province	234.90	93.27	328.17
Chimbu	63.41	144.97	208.38
Eastern Highland Province	206.56	116.16	322.72
Morobe	316.54	158.19	474.73
Madang	357.34	395.16	752.50
East Sepik	275.22	185.86	461.08
Sandaun	90.54	488.00	578.54
Mamus	36.10	59.51	95.61
New Ireland	214.46	471.67	686.13
East New Britain	148.83	72.44	221.27
West New Britain	269.72	749.16	1,018.88
Northern Solomon Province	55.56	398.26	453.82
Total	3,148.56	5,589.90	8,738.46
Percent	36.03%	63.97%	100.00%

Source: Government of Papua New Guinea, Department of Works. 2010. *Papua New Guinea Road Statistics*. Port Moresby.

6. **Maritime.** Shipping plays an important role in providing access to PNG's dispersed rural population and services to international and coastal traffic. The main commercial port is Lae, which is the gateway for Morobe Province and the Highlands region. It is the most important port for international and domestic trade. Port Moresby, which is the second main port, also handles international cargo and passenger vessels. The large Sepik, Fly, and Ramu river systems provide access to the interior, while many small ports of call around the coast and islands provide the means of access for some communities.

7. In 2000, the ADB approved a \$19.8 million loan to (i) restructure management of the maritime transport sector by establishing an autonomous National Maritime Safety Authority (NMSA); (ii) reconstruct the navigation aids network to an acceptable international maritime standard; (iii) establish a self-reliant hydrographic service; and (iv) in view of the high incidence of vandalism, implement community programs contributing to effective network maintenance. This paved the way for the establishment of the NMSA in 2005 with ADB support.³ The NMSA is responsible for maritime safety, marine pollution control, and corporate governance. Landside operations are overseen by PNG Ports Corporation (PNG Ports), a state-owned entity that is the primary national port facilities provider and the sole authority over all declared ports in the country.

8. Infrastructure in the maritime subsector comprises 23 declared ports and many small wharves, jetties, and landing stages.⁴ Fifteen of the ports are managed directly by PNG Ports: Port Moresby, Lae, Kimbe, Madang, Alotau, Rabaul, Kavieng, Oro Bay, Kieta, Buka, Vaimo, Lorengau, Wewak, Daru, and Aitape. The ports serving Port Moresby, Lae, Madang, Kimbe, and Rabaul carry international and coastal traffic and have a reasonable level of infrastructure. However, Port Moresby and Lae are the only commercially viable ports. Many of the smaller ports are in poor condition, carry very little traffic, provide only basic services for coastal traffic, and are usually unusable during bad weather. The smaller ports operate with cross-subsidies provided under PNG Ports' mandated community service obligations.

³ ADB. 2000. *Report and Recommendation of the President to the Board of Directors: Proposed Loan to Papua New Guinea for the Rehabilitation of the Maritime Navigation Aids System Project*. Manila (Loan 1754).

⁴ Government of Papua New Guinea, Department of National Planning and Monitoring. 2010. *Papua New Guinea Medium Term Development Plan 2011–2015*. Port Moresby.

Some mining and construction companies operate several private ports. PNG's economic regulator, the Independent Consumer and Competition Commission (ICCC), and PNG Ports have entered into a regulatory contract that stipulates a price path for the charging of all essential port services as well as commitments on service levels and future investment. PNG Ports does not undertake stevedoring (loading and unloading), but issues licenses to private companies to carry this out. Licenses are issued for 5 years and are then renewed annually. In Port Moresby, two separate companies handle international and domestic stevedoring. In Lae, three operators share the market and two are engaged in servicing coastal and overseas shipping.

9. The Lae Port, the largest in the country, is centrally located and straddles most Pacific shipping routes. About 50% of PNG exports and 90% of coffee exports are handled through the port. Lae Port has tried to adapt to the demands of increasingly containerized global trade. However, due to financial constraints, land ownership disputes, and a period of economic slowdown, expansion of port facilities has not kept pace with the trend toward containerization and larger ships. Port congestion and delays of 3–5 days have become frequent, resulting in higher costs for both exporters and importers.

10. The coastal shipping routes are poorly equipped with navigational aids, including the route between Port Moresby and Lae. The Fly River and its estuary are an exception, since nav aids are being maintained by private mining and oil companies. Many local companies and community groups operate largely without charts or nav aids and rely on the local knowledge and skills of their ships' masters.

11. **Civil aviation.** PNG has a relatively well-developed system of air services, necessitated by its topography, the isolation of pockets of population, and the difficulties in establishing road access. The country is reasonably well equipped with air transport facilities, with more than 450 airports, airfields, and airstrips, including 21 designated national airports.⁵ Most of the major airports and terminal facilities are owned and operated on behalf of the government by the NAC, while minor airports are owned by the provincial governments. The CASA regulates civil aviation in PNG. Both NAC and CASA were established in 2011 when the commercial operations of the Civil Aviation Authority were devolved from its regulatory function. The rationalization of the functions of these institutions was undertaken with support from ADB under Tranche 1 of the Civil Aviation Development Investment Program.⁶

12. The civil aviation sector derives its funding primarily from Department of Treasury appropriations and a combination of revenues from airport and airspace fees and charges, as well as licensing and regulatory fees. Sufficient and timely funds have been a major constraint in maintaining airport and airways infrastructure and equipment. The Australian Government has been a major bilateral partner in PNG's civil aviation operations. ADB's involvement in the subsector started only in 2009.

13. Government policy encourages competition in air services, but the market is very thin and state-owned Air Niugini holds an effective monopoly over most important routes. Attempts to privatize the airline in the past have not been successful because of its poor financial performance. Financial constraints have likewise affected plans to modernize its fleet of aircraft, more than half of which is being leased. Both turboprop and jet aircraft operate on major routes to provincial capitals, but only turboprop aircraft operate on secondary trunk routes. The rural market is predominantly served by small aircraft as a feeder service. Other air operators in PNG provide charters, surveys, flight training, and industry-specific operations.

⁵ Buka, Chimbu, Daru, Goroka, Gurney, Hoskins, Kavieng, Kerema, Kiunga, Madang, Mendi, Momote, Mount Hagen, Nadzab (Lae), Popondetta, Port Moresby, Tari, Tokua, Vanimo, Wapenamanda, and Wewak.

⁶ ADB. 2009. *Report and Recommendation of the President to the Board of Directors: Proposed Multitranchise Financing Facility to Papua New Guinea for the Civil Aviation Development Investment Program*. Manila

B. Government's Priorities, Policy, and Plans

14. Central to the government's development strategy are inclusive growth, human resource development, and good governance. The objectives were to be addressed through seven expenditure priorities, each with matching development programs: (i) transport infrastructure rehabilitation and maintenance; (ii) promotion of income-earning opportunities; (iii) basic education; (iv) development-oriented informal adult education; (v) primary healthcare; (vi) HIV/AIDS prevention; and (vii) law and justice.

15. To carry this out, broad directions are set out in two documents: (i) the PNG Development Strategic Plan (PNGDSP), 2010–2030, which confirms development priorities and also emphasizes the importance of private sector development, good governance, and gender and development, and (ii) the Medium-Term Development Strategy (MTDS), the five-year rolling development and investment strategy, which seeks to translate the PNGDSP into tangible results.

16. At the sector level, the government's transport policies are spelled out in more detail in the National Transport Development Plan (NTDP) 2006–2010, and in the recently approved National Transport Strategy (NTS) covering the period 2014–2018.⁷ Prior to the current MTDS, 2011–2015, the government's strategy for the transport sector was the rehabilitation and maintenance of existing transport infrastructure rather than the building of new assets. New transport projects could be justified only after the existing transport structure was restored and maintained to an acceptable level and if it could be established that the project would likely yield very high economic and social returns.

17. The sectoral expenditure priorities of the MTDS, 2005–2010, included rehabilitation and maintenance of transport infrastructure such as (i) national, provincial and district roads maintenance, (ii) Highlands highway and Highlands provinces road maintenance, (iii) bridge replacement and rehabilitation, (iv) maritime navigational aids, and (v) airport maintenance. HIV/AIDS prevention was also a priority in relation to infrastructure projects, as increased mobility and interaction were seen as possible risks to the spread of the disease.⁸

18. The MTDS, 2011–2015, continues to give priority to rehabilitation and maintenance of road infrastructure, national ports and associated facilities, and all national and rural airports. In addition, the foundation for further expansion of the national roads network that will link all of PNG will commence during the MTDS period. The planned expansion will be covered by feasibility studies, route identification, road survey and design, and land acquisition.

19. **Roads.** By 2015, the PNGDSP aims to have 10,000 km of national roads, with the construction of 1 of 4 additional economic corridor national roads and 1 of 16 missing link roads. With the rehabilitation and upgrading of 16 national priority roads, 65% of the national roads are targeted to be in good condition by 2015, which more than doubles the rate in 2010 (29% of national roads). Resource requirements for the road subsector for the period 2011–2015 are estimated at K21.4 billion.

20. **Maritime.** The PNGDSP estimates a 25% increase in the number of routes and vessels from 2010 to 2015, necessitating the upgrade of 4 of the declared ports and 10 jetties. This is expected to reduce the international port turnaround time to 2.5 days from 3 days in 2010. Forty-seven small navigational aids are also targeted for rehabilitation and restoration by the end of the 5-year period. Resource requirements for the maritime subsector for 2011–2015 are estimated at K1.4 billion.

21. **Civil aviation.** By 2015, all 21 national airports are targeted to be compliant with international safety and security standards—a 47% improvement from the 15 airports so certified in 2010. Other goals include either rehabilitation, repair or upgrade of: (i) all navigational aids, surveillance and

⁷ Government of Papua New Guinea, Department of Transport. 2013. *National Transport Strategy*. Port Moresby.

⁸ The government recognized that a large number of workers residing away from their home villages may increase the chance of casual or commercial sex, thus putting the workers and their partners at risk of contracting HIV.

communications systems in all national airports; (ii) two regional airports, to allow for larger jets; and (iii) 10 rural airstrips. These programs for the civil aviation subsector are already being implemented with support from ADB.

C. ADB's Support for the Sector

22. **Country operational strategy study, 1999.** The key priority of ADB's strategy in PNG as articulated in the country operational strategy study 1999 was to strengthen governance and public sector management. Key priorities were agriculture and fisheries, infrastructure development with emphasis on the policy framework governing the sector, and on investment in rehabilitation and maintenance rather than on construction of new assets. During this period, two projects were approved: road maintenance and upgrading in 1999 and rehabilitation of the maritime navigation aids system in 2000.⁹ TA was provided to introduce a nationwide road asset management system.¹⁰

23. **Country strategy and program update, 2003–2005.** Inclusive economic growth was the key objective, in addition to improved governance and public sector management. Additional focus areas were human and gender development, private sector development, and environment protection. The emphasis on rehabilitation and maintenance for the infrastructure sector continued during this period, and the community transport project was approved.

24. **Country strategy and program, 2006–2010.** ADB's country strategy and program (CSP) aimed to assist PNG in meeting its MTDS goals. ADB and the government identified strategic priorities aligned with PNG's MTDS and ADB's Pacific strategy. These were (i) public financial management, (ii) private sector development, (iii) the transport sector, and (iv) health and HIV/AIDS. ADB had already started to be deeply involved in the transport sector, with the approval of projects for air and road transport under the multitranche financing facility (MFF) and a project to improve Lae Port.

25. **Country partnership strategy (CPS), 2011–2015.** The CPS was formulated against the backdrop of expected income and revenue flows from an ExxonMobil-led liquefied natural gas (LNG) project and other potential LNG projects. The CPS aimed to help PNG plan and implement a successful transition through the conversion of its resource wealth into inclusive economic growth. The revenue flows from mining and petroleum projects will need to be efficiently and equitably utilized and aligned with development priorities to ensure that this financial wealth is converted to broad-based delivery of basic services.

26. During the CPS period, transport infrastructure support was to account for over 80% of ADB's PNG program. The two ongoing MFFs in the road and air subsectors will continue beyond the CPS period. A stand-alone bridge project was approved in September 2011, and support for the Lae Port Development Project continued, with additional financing approved in November 2011. Technical assistance to improve regulation and sustainability of investments in PNG's road sector was provided in 2012.

27. **Development partner coordination.** ADB is not the largest of PNG's development partners, but strong partnerships between ADB and PNG's key development partners has been a key feature of ADB's strategy and program. ADB participates in International Monetary Fund (IMF) Article IV missions and conducts debt sustainability analysis jointly with the IMF and the World Bank. ADB continues to explore opportunities for collaboration with the Australian Department of Foreign Affairs and Trade and with the Japan International Cooperation Agency in infrastructure development.

28. **Portfolio.** The transport sector has been one of the main areas of ADB support for PNG. From the start of ADB's engagement in the country until 2013, support has reached \$1.9 billion, with close

⁹ Footnote 3; ADB. 1999. *Report and Recommendation of the President to the Board of Directors: Proposed Loan to Papua New Guinea for the Road Maintenance and Upgrading (Sector) Project*. Manila (Loan 1709).

¹⁰ ADB. 1999. *Technical Assistance to Papua New Guinea for the Road Asset Management System in the Provinces*. Manila.

to 58% or \$1.1 billion going to the transportation sector alone. For the period 1999–2013, 73% of ADB's support to PNG totaling \$920.2 million (Table 2), was for the transport sector. The road subsector received 45% of this support and the water subsector 30%. During the same period, a total of 23 loans and 1 grant were approved to finance 8 projects in PNG's transport sector. To date only three projects have been completed and financially closed. These are the (i) Road Maintenance and Upgrading Project, which was rated at project completion report (PCR) partly successful; (ii) Rehabilitation of the Maritime Navigation Aids System Project, whose rating of successful in the PCR was confirmed in the validation report; and (iii) the Community Water Transport Project with a PCR rating of partly successful.

Table 2: ADB Loans and Grants to Papua New Guinea's Transport Sector, 2000–2013

Project Count	Grant/ Loan Number	Project Name	Fund Source	Amount (\$ million)	Date Approved
Air Transport					
1	L2588	Civil Aviation Development Investment Program - Tranche 1	OCR	25.00	1 Dec 2009
	L2589	Civil Aviation Development Investment Program - Tranche 1	ADF	50.00	1 Dec 2009
	L2590	Civil Aviation Development Investment Program - Tranche 1	ADF	20.00	1 Dec 2009
	L3069	Civil Aviation Development Investment Program - Tranche 2	OCR	115.00	25 Nov 2013
	L3070	Civil Aviation Development Investment Program - Tranche 2 (SF)	ADF	15.00	25 Nov 2013
		Subtotal		225.00	
Road Transport					
2	L1709	Road Maintenance and Upgrading (Sector)	OCR	63.00	16 Nov 1999
	L2242	Road Maintenance and Upgrading (Sector) (Supplementary Loans)	OCR	35.00	29 Jun 2006
	L2243	Road Maintenance and Upgrading (Sector) (Supplementary Loans)	ADF	18.00	29 Jun 2006
3	L2496	Highlands Region Road Improvement Investment Program - Tranche 1	ADF	71.20	22 Dec 2008
	L2497	Highlands Region Road Improvement Investment Program - Tranche 1	ADF	28.80	22 Dec 2008
4	L2783	Bridge Replacement for Improved Rural Access Sector	OCR	40.00	28 Sep 2011
	L2784	Bridge Replacement for Improved Rural Access Sector	ADF	50.00	28 Sep 2011
	L3076	Highlands Region Road Improvement Investment Program -Tranche 2 (SF)	ADF	40.00	4 Dec 2013
	L3077	Highlands Region Road Improvement Investment Program -Tranche 2	OCR	69.00	4 Dec 2013
		Subtotal		415.00	
Water Transport					
5	L1754	Rehabilitation of the Maritime Navigation Aids System	OCR	19.80	12 Sep 2000
6	L2079	Community Water Transport	ADF	19.00	25 Mar 2004
	L8211	Community Water Transport	OPEC-FID	4.00	3 Dec 2003
7	L2398	Lae Port Development Project	OCR	60.00	18 Dec 2007
	L2399	Lae Port Development Project	ADF	40.00	18 Dec 2007
	G0102	Lae Port Development Project	Others (HIV/AIDS)	0.75	18 Dec 2007
	L8237	Lae Port Development Project	OPEC-FID	6.00	18 Dec 2007

Project Count	Grant/ Loan Number	Project Name	Fund Source	Amount (\$ million)	Date Approved
	L2803	Lae Port Development (Additional Financing)	OCR	85.00	10 Nov 2011
	L2804	Lae Port Development (Additional Financing)	ADF	4.12	10 Nov 2011
8	L2978	Maritime and Waterways Safety Project (SF)	ADF	41.50	18 Dec 2012
		Subtotal		280.17	
		Total		920.17^a	

ADB = Asian Development Bank, ADF = Asian Development Fund, G = grant, L = loan, OCR = ordinary capital resources, OPEC-FID = Organization of the Petroleum Exporting Countries Fund for International Development, SF = Special Fund.

^a The total includes funds from OPEC Fund for International Development and Cooperation Fund for Fighting HIV/AIDS in Asia and the Pacific Regional Conference.

Source: Asian Development Bank database.

29. For the period 2000–2013, ADB provided three advisory technical assistance (ADTA) grants, totaling \$2.4 million, to the road and water subsectors. In addition, three policy and advisory technical assistance (PATA) grants were given to the road subsector, totaling \$2.1 million. The ADTA grants to the road subsector helped the government (i) develop a road asset management system in the provinces, and (ii) formulate the National Transport Development Plan (2011–2020). The ADTA to the water transport subsector assisted the government in the rehabilitation of the maritime navigation aids system. Three PATA grants to the road subsector were approved in 2009, 2011, and 2013. They sought to help improve road user charges and enable private sector participation in road development, recommend the location and design of major bridges, support better regulation for the road subsector, and improve the sustainability of investments in the subsector. Technical assistance completion reports (TCRs) were prepared for all the ADTA projects and one PATA project. Four were rated successful and one was rated highly successful.

30. Ten project preparatory technical assistance (PPTA) projects totaling \$5.1 million were approved for the same period. The air transport subsector implemented one PPTA which resulted in a multitranche financing facility investment program. The road transport subsector received four PPTA projects for a total of \$2.4 million or 47% of the total value of the approved PPTA projects for the period. The water transport subsector received the same amount of support for project preparation, getting an allocation of 48% or \$2.5 million for five PPTA projects. TCRs were prepared for three of the 10 PPTA projects that did not result in a project: the Road Authority Development, the Southern Road Maintenance and Upgrading, and the Second Community Water Transport Sector. The Road Authority Development was rated successful because its policy recommendations led to the establishment of the National Roads Authority and the creation of a road fund. The Southern Road Maintenance and Upgrading was rated partly successful. Although the government did not pursue the proposed loan the reforms recommended by the TA were subsequently endorsed. The PPTA for the Second Community Water Transport Sector was assessed successful. Inefficient investments that were identified were not pursued while other small viable investments were carried out under the Maritime and Waterways Safety Project.

Table 3: Technical Assistance to the Transport Sector of Papua New Guinea, 2000–2013

TA Number	Technical Assistance Name	Type	Amount (\$'000)	Date Approved
Air Transport				
7263	Civil Aviation Development Investment Program	PP	225.0	8 Apr 2009
	Subtotal		225.0	
Road Transport				
3378	Road Asset Management System in the Provinces	AD	581.0	28 Dec 1999
3716	Road Authority Development	PP	700.0	11 Sep 2001
3717	Southern Road Maintenance and Upgrading	PP	400.0	11 Sep 2001
4945	Highlands Highway (Southern Highlands and Enga Provinces Network) Rehabilitation	PP	500.0	27 Jun 2007
7214	National Transport Development Plan (2001–2020)	AD	700.0	16 Dec 2008
7420	Improving Road User Charges and Private Sector Participation in Road Development	PA	800.0	8 Dec 2009
7594	Bridge Replacement for Improved Rural Access	PP	800.0	3 Sep 2010
7874	Major Bridges Study	PA	800.0	28 Sep 2011
8123	Regulating and Sustaining Road Transport	PA	1,000.0	25 Jul 2012
	Subtotal		6,281.0	
Water Transport				
3615	Community Water–Transport Project	PP	580.0	21 Dec 2000
3619	Rehabilitation of the Maritime Navigation Aids System	AD	800.0	19 Dec 2000
4793	Lae Port Development–Tidal Basin Phase I	PP	900.0	30 May 2006
4793	Lae Port Development–Tidal Basin Phase I (Supplementary)	PP	160.0	8 Jun 2007
7755	Second Community Water Transport Sector	PP	225.0	22 Dec 2010
7869	Maritime and Waterways Safety	PP	600.0	20 Sep 2011
	Subtotal		3,265.0	
	Total		9,771.0	

AD = advisory, PA = policy and advisory, PP = project preparatory, TA = technical assistance.

Source: Asian Development Bank database.

D. Evaluation of ADB's Support

1. Strategic Positioning

31. The strategic positioning of ADB during the evaluation period is assessed *satisfactory*. Transport features strongly in many of ADB's individual country partnership strategies with Pacific countries. The government recognizes the transport sector as one of ADB's top areas of expertise, with ADB being the largest development partner for PNG in this sector, contributing 46% to Australia's 42%. Across all three transport subsectors, ADB support was directed toward areas that form the backbone of the country's growth. In the road subsector, it financed projects for road maintenance and rehabilitation in the Highlands region, which is the country's primary source of national income and export earnings. The Highlands Highway is also the largest contiguous network linking the Highlands provinces with Lae Port. In the air transport subsector, ADB support covers 21 major airports; while in the water subsector, support is directed to the development of Lae Port and water transport in remote communities. ADB's presence can be found in the important road network, ports, and in all major airports in PNG. ADB has also provided TA to influence policy and institutional reforms, development of a road asset management system, and the formulation of the national transport strategy.

32. The use of the MFF documents a longer-term support commitment and provides flexibility in terms of long-term funding for the project, predictability, and the time needed to be effective in pursuing a policy and capacity building agenda for the sector. It comes, however, at a cost. With about 85% of the lending volume for the 2011–2015 strategy period locked in, this freezes the pipeline for an extended period, making it difficult to undertake necessary modifications in sector priorities. In the

light of continual capacity constraints in PNG investment and financing plans, which make it difficult to firm up projects, desired outcomes may be difficult to achieve. Issues that repeatedly come to the fore are the availability of counterpart funding as well as the institutional, technical, and managerial capacity of both government and private contractors. These were highlighted as risks faced by interventions in the transport sector, but in some projects, mechanisms were not put in place to mitigate these challenges. When they are not addressed in project design, the country loses the opportunity to maximize the benefits of the project.

33. ADB has coordinated well with Australia (through Department of Foreign Affairs and Trade) and other main development partners such as the European Union, World Bank, and the United Nations system, including pursuing cofinancing arrangements wherever necessary. There continues to be room for further broadening and deepening of partnerships.

34. The CSP, 2006–2010, broadly outlined intended sector outcomes, such as maintained, improved, and rehabilitated roads; efficient and profitable operations for Lae Port; maintained, improved, and rehabilitated maritime and river transport infrastructure. The results framework for CPS, 2011–2015, targeted sector outcomes that sought more efficient and safer movement of people and goods (i) in the Highlands Region, (ii) through the 21 NAC airports, and (iii) through Lae and other ports and by water transport among remote communities. Some baselines and targets were identified to facilitate monitoring and evaluation, but the individual project designs failed to indicate the extent to which they would advance the sectoral targets

2. Relevance

35. ADB's transport program is *relevant*, given the ongoing projects in all subsectors and the country strategy's focus on maintenance and rehabilitation of infrastructure assets to facilitate movement of commodities and people. The relevance of the transport program relative to ADB's country strategy is significant, given its size relative to the size of the entire ADB program in the country, at about 70%.

36. ADB support was consistent with PNG's needs and mirrored the government's strategic priorities, such as inclusive growth and good governance, as spelled out in the country's MTDS. ADB not only supported projects in areas that form the economic backbone of the country, but also helped the government put in place the institutional and regulatory framework to support all three subsectors.

37. The majority of the projects were designed to achieve inclusive growth and to directly benefit the poorer segments of society in remote areas. However, some design issues were noted in the PCR of the Road Maintenance and Upgrading Project, including the sector loan approach taken. In part, ADB's program had been affected by capacity constraints that made it difficult to ascertain ownership. The government's capacity and willingness to provide counterpart funding and the executing agency's capacity to undertake technical, financial, economic, and safeguard considerations were not adequately assessed. The design also failed to take into account the small pool of qualified local contractors, the remoteness of some areas, and law and order issues. These weaknesses were rectified in the subsequent supplementary loans. The inability to recognize these constraints at the outset was mirrored in the unrealistic scope for a component of the Rehabilitation of the Maritime Navigational Aids System Project.

3. Effectiveness

38. Overall, the program is rated *less than effective*. This is anchored on the observation that while some components of completed projects could have been designed and monitored better, other components, as well as ongoing projects, appear to have contributed effectively to economic development. Achievement, as well as monitoring, of outcomes in completed projects generally fell short. Outside of physical outputs, other performance targets such as savings in travel time and cost, transport safety, and community welfare were also broadly indicated in project documents. However,

these were not operationalized, i.e., broken down into measurable and time-bound indicators that should logically flow from the country strategy to projects. In completed projects for the road subsector, no determination was made of baseline data nor was socioeconomic monitoring and evaluation undertaken, thus making it difficult to assess achievement, as noted in the completion report.¹¹ This was also the case with the maritime subsector. The completion report recognized that there would be a lag before all the perceived benefits were generated in terms of reduced cost of maritime transport, frequency of distribution of goods and services, and increased income opportunities.¹² By the time of this CAPE mission, almost 5 years had elapsed, which should have been sufficient for the benefits to have trickled down. However, there were no indications that the envisaged benefits were being monitored and evaluated. For the Community Water Transport Project, national income data and detailed human development surveys at the village level were not available, which again hinders the assessment of achievement.¹³

39.. **Roads.** The Road Maintenance Upgrading (Sector) project was conceived with five components covering: road upgrading; asset management of national and provincial roads; training; detailed design and construction supervision; and strengthening of project implementation and road maintenance operations.¹⁴ The project's physical outputs fell short of the target of 940 km, with just 291.1 km being completed at project close. As a demonstration of its ownership of the project, the DOW constructed a further 132.3 km using additional government funds, with consultants engaged under the ADB project providing design, procurement, and supervision input to the government-funded component. This brought completed road length to 423.4 km. The ongoing Highlands Region Road Improvement Investment Program (HRRIP)—Tranche 1 appears headed for the same shortfall, with costs having increased threefold.¹⁵ Five years into its projected 6-year implementation, only 115 km will be likely completed out of a targeted 211 km, for an achievement of approximately 55%. On this point, the special efforts made through a Japan Poverty Reduction Fund (JPRF) project to complement the HRRIP must be recognized.¹⁶ To enable approximately 400 residents living adjacent to HRRIP project roads to benefit more directly, the grant included the construction of 80 km of feeder roads and rural infrastructure facilities. The socioeconomic improvements targeted in the HRRIP and the JPRF project are therefore likely achievable.

40. Although neither baseline nor impact studies have been undertaken in the Highlands region, observations of the CAPE team, as well as the results of a beneficiary survey it administered in July 2014, suggest a significant impact on the socioeconomic development of the project areas. Accessibility was greatly improved, with travel times being reduced by 30%–60%, and an increasing number buses operating (which made traveling safer), whereas previously, trucks were the principal means of conveyance. Fares increased by 20%–100% in a few areas, but more residents reported declines—by an average of 20%—in travel costs. Trading activity was also reported to have increased significantly, with produce being brought faster and more easily to markets.

41. The residents also noted that socioeconomic benefits might have been greater if feeder roads had been made part of the rehabilitation/upgrading package, since approximately 25% of the population lives more than 5 km from any road. This corresponds with the residents' development priorities, where feeder roads emerged as the unanimous top priority followed closely by electricity. Farm roads and improved access to schools and to security were equally viewed as the third most important priority. Even though progress was made toward achieving the socioeconomic targets, such

¹¹ ADB. 2013. *Completion Report: Road Maintenance and Upgrading (Sector) Project in Papua New Guinea*. Manila. p. 11.

¹² ADB. 2009. *Completion Report: Rehabilitation of the Maritime Navigation Aids System in Papua New Guinea*. Manila.

¹³ ADB. 2014. *Completion Report: Community Water Transport Project in Papua New Guinea*. Manila.

¹⁴ ADB. 1999. *Report and Recommendation of the President to the Board of Directors: Proposed Loan to Papua New Guinea for the Road Maintenance and Upgrading (Sector) Project*. Manila (Loan 1709); ADB. 2006. *Report and Recommendation of the President to the Board of Directors: Proposed Supplementary Loans to Papua New Guinea for the Road Maintenance and Upgrading (Sector) Project*. Manila (Loans 2242/2243).

¹⁵ ADB. 2009. *Report and Recommendation of the President to the Board of Directors: Proposed Multitranchise Financing Facility to Papua New Guinea for the Highlands Region Road Improvement Investment Program - Tranche 1*. Manila (Loans 2496/2497).

¹⁶ ADB. 2009. *Proposed Grant Assistance to Papua New Guinea for Extending the Socioeconomic Benefits of an Improved Road Network to Roadside Communities*. Manila (Grant 9130).

as livelihood improvement, travel time and cost, trading activity, the physical output of the ADB road project was only 45% of the envisaged target. As such, the cumulative overall impact of ADB interventions in the road subsector is less than satisfactory.

42. **Maritime.** Projects in the maritime subsector met with mixed success.¹⁷ The Rehabilitation of the Maritime Navigation Aids Navigation Aids System substantially achieved its outcomes and outputs, with navigation aids (i) repaired, reconstructed and/or upgraded in 211 sites (exceeding targets), and (ii) still functioning and being maintained.¹⁸ Although the hydrographic infrastructure envisaged at the outset had to be scaled back in view of the lack of technical capacity,¹⁹ the hydrographic database was updated and the implementation of maritime safety measures has significantly reduced groundings of commercial vessels. From seven groundings in 2006, none were reported in 2007 and 2008.²⁰

43. In contrast, the Community Water Transport project was far off from most of its targets. The project had sought to (i) finance a temporary subsidy to catalyze transport services in unserved areas through a Community Water Transport Trust Fund (CWTF); (ii) restore water transport infrastructure; (iii) improve small craft safety; (iv) maximize utilization of water transport through community support services; and (v) implement maritime sector reform. The CWTF, however, showed a financial rate of return far lower than envisioned; at appraisal, the target was 3.0%, but initial earnings were 2.7%, which declined further to 1.3% by 2012. Faced with higher than expected franchise route subsidies, the fund could not support the targeted number of routes without additional support from the government. At appraisal, 28 franchise routes were envisioned to be operational by 2010. By project close in June 2013, however, only two routes were operating. While 40 transport structures (e.g., jetties, piers, wharves) had been targeted for restoration by 2005, by project close only three new jetties were completed—a result of the shift in focus, from restoration of existing facilities to building new ones. With the completion of the Lae Port in late 2014, the project has the potential to catalyze industrial and commercial developments, and promote trade for PNG. Despite this high potential, PNG Ports has expressed concern about revenue growth projections, and proposed a second phase to make the project commercially viable, suggesting that phase 1 design was ineffective.

44. **Civil aviation.** The Civil Aviation Development Investment Program (CADIP, footnote 6) seeks to achieve international safety standards (as mandated by the International Civil Aviation Organisation [ICAO]) for the main airports in PNG. The program is ongoing but running behind schedule, with detailed designs taking longer and costing approximately three times higher than anticipated. For Tranche 1, improvements to five targeted airports remain. The CADIP, however, neglected to simultaneously support CASA in aligning with ICAO requirements. This led to ICAO raising significant safety concerns with CASA's internal procedures on Air Operator Certification during their review in 2013, which has severe implications for the civil aviation sector. For Air Niugini, this could mean difficulties in setting up route-sharing arrangements with other airlines. CASA relayed to the CAPE mission that ICAO does not check/inspect directly the airports' compliance with ICAO standards. What ICAO assesses instead is the capability of CASA to undertake due diligence in its sphere of operations. Thus, any finding detrimental to CASA's capacity invariably calls into question the standards in PNG airports and aircraft.

45. Some institutional and organizational reforms have been achieved, but significant challenges remain. It is recognized that ADB projects helped usher in key reforms to improve institutional and organizational capacity in all three subsectors. ADB support was multi-pronged; aside from rehabilitation, the projects also sought to put in place a system for their sustainable operation and maintenance, under the aegis of autonomous self-financing entities. For the roads subsector, aside

¹⁷ Footnotes 2 and 3.

¹⁸ Footnote 12; ADB. 2009 *Technical Assistance Completion Report: Rehabilitation of the Maritime Navigation Aids System in Papua New Guinea*. Manila; IED. 2011. *Validation Report: Rehabilitation of the Maritime Navigation Aids System in Papua New Guinea*. Manila: ADB.

¹⁹ Footnote 5. Agreement was re-established with the Australian Hydrographic Service to continue their technical support to PNG in this regard.

²⁰ Footnote 2, p. 8.

from the establishment of the Road Asset Management System (RAMS), ADB supported the enactment of two pieces of legislation for setting up a road fund and establishing the National Road Authority (NRA).²¹ Although significant challenges remain in terms of budget allocation and timely adjustments to road user charges, these two pieces of legislation constitute important progress, as do the basic reforms that were put in place in the Southern Region²² and the updates to the National Transport Strategy (NTS).²³

46. The capacity of the construction industry in road infrastructure provision has also shown some improvement, with the base of international contractors increasing from 5 (in 2009) to 12 in 2014, and national contractors increasing to more than 20 from 15 (in 2009).²⁴ More substantive reforms, however, need to be directed toward addressing the enabling environment so as to engender increased public-private partnerships (PPPs). The passage of the PPP Act—developed with ADB support—on August 2014 is a step in the right direction, as it lays down a transparent and predictable process for the PPP project cycle.

47. For the maritime subsector, ADB support led to the establishment of the National Maritime Safety Authority (NMSA), which included a functional hydrographic unit. A maritime safety trust account was initially developed to transition operations of the NMSA, with light dues and an oil pollution levy developed shortly thereafter to more sustainably support operations. Another key feature was the establishment of a community engagement program to tap residents in the project areas for the protection and maintenance of navigation facilities. ADB support was equally instrumental in the civil aviation subsector reforms, with the creation of the NAC, CASA, and the PNG Airport Services Limited (PNGASL). Eventually, these are envisioned to become financially self-sufficient through user charges.

48. Human capacity development remains a work in progress. As a complement to institutional reforms, training measures were identified for the government agencies overseeing the subsectors. For the DOW and the provincial works staff, this has met with limited success, largely because trained staff were either assigned elsewhere or moved to the private sector (footnote 4), thereby obviating opportunities for knowledge transfer. With intended improvements not fully taking root, government agencies faced practically the same dearth in capacities that were identified at the outset. As such, the likelihood of achieving significant improvement in their technical knowhow and skill-set remains patchy. For the maritime sector, training has enabled the NMSA to undertake some important functions such as safety inspections of vessels plying PNG waters and coordination of maritime safety measures. Additional training is needed, however, for the NMSA to assume and fully perform all its responsibilities. Capacity building for CASA—in terms of aligning it with ICAO requirements—has been insufficient. This led to the ICAO raising “significant safety concerns” with CASA in its review in 2013, which has severe implications for the civil aviation subsector.

4. Efficiency

49. The study rates the portfolio *less than efficient*. The weighted average economic internal rate of return (EIRR) ratings for these three small completed transport projects was above 12%. The PCRs showed that the large delays and cost increases that occurred have been offset by updated and increased traffic forecasts. It is difficult to understand how this result was achieved as no determination was made of baseline data for the completed road projects, nor was any socioeconomic monitoring and evaluation undertaken.

²¹ ADB. 2004. *Technical Assistance Completion Report: Road Asset Management in the Provinces in Papua New Guinea*. Manila; ADB. 2011. *Technical Assistance Completion Report: Preparing the Road Authority Development Project in Papua New Guinea*. Manila.

²² ADB. 2007. *Technical Assistance Completion Report: Preparing the Southern Road Maintenance and Upgrading Project in Papua New Guinea*. Manila.

²³ ADB. 2012. *Technical Assistance Completion Report: National Transport Development Plan in Papua New Guinea*. Manila.

²⁴ ADB. 2014. *Technical Assistance Completion Report: Improving Road User Charges and Private Sector Participation in Road Development in Papua New Guinea*. Manila.

50. **Economic return.** At appraisal, all projects had an economic internal rate of return (EIRR) well above the threshold of 12%. For the Road Maintenance and Upgrading Project (RMUP), no EIRR was calculated for the entire project at appraisal. The EIRR was derived for only one sample road (18.2%), which stood as the example required for the sector loan.²⁵ ADB approved the supplementary financing of RMUP to finance additional road sections, with the EIRR estimated at 19%. The PCR recalculated EIRRs for the original and supplementary financing components to measure project achievement. These were reduced, but remained at viable levels of 15.5% (original) and 14.2% (supplementary).

51. For the Community Water Transport project (CWTP), the report and recommendation of the President (RRP) calculated EIRRs by component, with no overall EIRR derived. At appraisal, the EIRRs were estimated at (i) between 13% and 33% for the transport service component for seven routes selected for the economic analysis, and (ii) between 12% and 38% for the 40 piers and jetties planned. The PCR noted that (i) only two franchises were operational during the whole franchise period, at a much-reduced EIRR of 7.5% and 0.8%; (ii) with only three jetties constructed by project close, the EIRR was negative as the facilities could only be used for 2–3 months a year. This was largely due to a design flaw that misjudged water-level distance between the sea and shoals, which could go up to 30 m when going from the dry to rainy season. The Rehabilitation of the Maritime Navigational Aids System project had an estimated EIRR of 25%, but the PCR did not recalculate the EIRR at project close because no data to assess benefits were available. However, the CAPE mission deems it likely that the EIRR at appraisal was not reduced significantly because outputs and outcomes were successfully achieved, with minimum cost overruns.

52. The ongoing Lae Port Project had an initial EIRR of 15.8%, but this was recalculated when ADB approved the supplementary loan in 2011. Although the ADB financing increased by 83%, the estimated EIRR also increased, from 15.8% to 18.7% due to a higher traffic forecast.

Table 4: ADB Transport Projects in Papua New Guinea

Loan Number	Project	EIRR in RRP	EIRR in PCR/ Re-evaluation
1709	Road Maintenance and Upgrading	Not calculated	15.5%
2242/2243	Road Maintenance and Upgrade (Supplementary Financing)	18.8%	14.2%
1754	Rehabilitation of the Maritime Navigation Aids System	25.0%	About 25.0%
2079	Community Water Transport		
	- Intended/implemented routes	13.0%–33.0%	7.5% and 0.8%
	- Pier/jetty construction	12.0%–38.0%	Negative
2803/2804	Lae Port Development (additional financing)	15.8%	18.7%

ADB = Asian Development Bank, EIRR = economic internal rate of return, PCR = project completion report, RRP = report and recommendation of the President.

Source: Asian Development Bank.

53. Generally, several elements have to be properly incorporated into the EIRR, in particular, delays in implementation, cost overruns, and demand forecasts.

54. **Implementation delays.** The RMUP and its supplementary loan had implementation delays of 4.4 years and 2.6 years, respectively. The RMUP was a sector loan, and its implementation was delayed because of (i) lack of road sections that were adequately prepared for implementation from the list of roads provided in the RRP;²⁶ (ii) frequent changes of consultant personnel; (iii) a significant shortfall in

²⁵ There was a requirement for the subproject selection that only those roads with an estimated EIRR >12% were to be included in the project scope.

²⁶ The first road subproject was approved on 27 October 2000, some 12 months after loan signing; 4 road subprojects were approved by ADB in the second half of 2001, though 2 of these were further delayed because of a need to reappraise the subprojects due to design/costing errors; 2 subprojects were approved in the second half of 2002, 1 of which required rescoping (quoted from PCR).

government counterpart funding; (iv) slow procurement procedures on the part of the government, particularly for contracts larger than K10 million;²⁷ (v) poor performance of contractors; (vi) complicated procedures for acquisition of customary owned land; and (vii) security problems in the field. The PCR noted that the executing agency did not yet have the capacity to undertake the technical, financial, economic, and safeguard considerations, and was not yet ready to implement a sector loan.

55. The Rehabilitation of the Maritime Navigational Aids System project was completed about 2.5 years behind schedule, while the CWTP was completed 1.5 years later than originally planned. Reasons for the delays were: (i) slow selection and mobilization of consultants, (ii) weak project designs and unexpected design changes during project implementation, (iii) slow contracting and procurement procedures on the part of government, and (iv) complicated procedures for acquisition of customary-owned land. For example, the project management consultants for CWTP were mobilized with a 3.5-year delay. Other problems were the project design for the jetties and the franchising of routes. The selected routes have not been attractive enough for the private sector and the technical design of the jetties and piers was not suitable. Originally, it was intended that the works would involve rehabilitation of existing piers, pontoons, jetties, landing ramps, and small wharves serving the franchise shipping service routes, but during implementation the government changed to substantial jetty structures, with the technical design flaw described earlier. In the Lae Port Project, the delays in the resettlement program and completion of the detailed design caused a delay in the commencement of construction by about 2 years.

56. The problems of implementation delays noted in completed projects have also been observed in ongoing projects. Tranche 1 of the HRRIP experienced a delay of 1.5 years because of the time required for fielding the design consultants, which set back the overall project. For the Bridge Replacement Project, the approval by the government of the consultant selection was also delayed. For the Marine and Waterways Safety Project, no contract has been awarded so far—more than a year after the loan became effective. CADIP is about 1.5 years behind schedule largely because the project implementation unit lacked experience and the detailed designs took longer than originally planned.

57. The CAPE mission found that all projects had suffered implementation delays. However, for some transport projects, a delay in implementation may not always have a negative economic impact. Traffic demand in PNG has been growing quickly and transport projects serving a growing demand make the respective project even more urgent and more viable. During the time between appraisal and re-appraisal of the Lae Port, traffic has increased by 7.8% compared to the 4% growth assumed at appraisal. Likewise, benefits from ship waiting time have over-proportionally increased due to the exponential ship queuing-impact. These helped offset the implementation delays and cost overruns that could detract from the economic viability of the projects.

58. **Cost overruns.** High construction costs and cost overruns are a pronounced occurrence in PNG. There are several reasons for this:

- (i) The lack of qualified and experienced local contractors resulted in low competition even for smaller contracts. This factor worsened in later years because the huge LNG project has crowded out other investments.
- (ii) The law and order situation and land ownership issues should have been settled before commencement of construction. Those issues were strong deterrents for foreign companies to bid in PNG and caused a high up-front risk premium in the bids of the contractors.
- (iii) The appraisal cost estimates were based on pre-feasibility levels, requiring changes to more expensive designs, which were generally underestimated in unit cost by the consultant engineers. This deficiency affected the RMUP, Lae Port Development Project (the depth of the basin, the embankments and container yards), and Tranche 1 of CADIP. One other important reason for cost overruns in road rehabilitation projects lies

²⁷ For RMUP civil works contracts, a two stage evaluation with pre-qualification was chosen, but this was changed to a single step procedure for RMUP (Supplementary Financing)

in the fact that the roads further deteriorate during the delay period, such that the original cost estimates based on a better initial condition of the road may no longer be valid.

59. The completed projects, except the Lae Port Project, generally remained within the loan envelope, but cost overruns resulted in a substantial reduction in project scope. With the CWTP, because of a conceptual change in the design of the jetties, the cost for the 3 completed jetties was double the appraisal estimates for the intended 40 structures.

60. In the ongoing HRRIP Tranche 1, some road sections were canceled because of cost increases in some sections. The cost for the Laiagam–Porgera and Mendi–Kandep road sections spanning 115 km increased by 200%. As a result, the government is financing 96 km of the road sections in Nipa–Magarima–Ambua and Hiwinda Junction–Korobat. For CADIP, the estimates made under the PPTA were found to be low, as estimates after the final design were about three times higher. The targeted improvement works under Tranche 1 were maintained at five airports.

61. For Lae Port, the cost increased by 90% from \$154 million to \$291 million. Fifty percent of the cost increase was on account of unit price increases, 20% for design changes, and 30% for the deterioration of the dollar–kina exchange rate. The mission was informed that the cost increase was largely due to the need for a breakwater that would help reduce siltation coming from the outflow of the nearby Markham River.

5. Sustainability

62. The transport sector program is assessed *less likely sustainable* based on the assessment of the financial and institutional capacity of the government for operation and maintenance.

63. **Roads.** Lack of sufficient budget provision for maintenance, particularly in the road subsector, has continually been raised in policy dialogues with the government. Commitments were made through loan covenants that budget for maintenance would be increased. Sometimes these eventuated, but never to the needed level, which would then be followed by years of decreasing allocations—defeating the purpose for which they were originally set out. In the recent past, allocations for maintenance even fell to around 10% of what was needed to adequately sustain road operations. Under the RMUP, the government had initially agreed to provide budget allocations for road maintenance of at least K70.0 million, with annual adjustments for inflation. In the subsequent years (2000–2002), the allocation fell to around K12.5 million. In 2013, the amount spent for maintenance was approximately K26.0 million. At that rate, the asset base in the road sector will be constantly dwindling.

64. The Road Fund that became operational in 2005 was intended to collect user charges that could then be used by the NRA for the maintenance of road assets. Currently, this is pegged at a levy of K0.04/liter on domestically refined diesel fuel, resulting in less than sufficient amounts for road maintenance. The Road Fund currently stands at K58 million with the government subsidy, as compared to the requirement of K150 million based on estimates made in an ADB TA on road user charges (footnote 25). Another envisioned scheme was for road users to be charged according to the wear-and-tear they exert on the road system, including a corresponding roadmap for the NRA to implement it. Recommendations have been made for road user charges to be levied on all fuels, annual vehicle registration fees, and penalties for overloading. Some of those recommendations were already approved by the National Executive Council (NEC) in Decision No. 146/2005, but were not implemented. As a result, while 2,300 km of national roads were intended to be overseen by the NRA, it is able to maintain only 1,000 km with the current road fund base.

65. Under the HRRIP-MFF, long-term maintenance contracts were made to be an integral part of the program so that the civil contractors were made responsible for keeping the roads to a specified standard for the remainder of a 10-year contract period and the responsibility for the roads transferred

to NRA and placed under a 10-year maintenance contract once improvement works are completed. In this way, the government is contractually committed to provide the maintenance portion of the contracts, which will assure the mid-term sustainability of those investments. Under the first tranche, two contracts have been awarded and the provision for maintenance in the contracts was around \$500,000 per km for the 10-year maintenance period, which amount is considered rather generous. This contractual commitment for maintenance of the 115 km of project roads is equivalent to 25% of NRA maintenance expenditures in 2013 for the 1,000 km of roads allocated to NRA for maintenance. This pre-commitment without any assured increase in its regular income, may cause NRA to neglect other parts of the network and is equivalent to sanitizing ADB's projects. Other donors (e.g., Australian Agency for International Development) have explicitly refrained from this approach.

66. **Maritime.** For the maritime subsector, the NMSA is entitled to directly collect various maritime levies (around K24.0 million in 2012), including the navais levy, oil spill levy, and regulatory levy. Unlike with the NRA, these levies accrue directly into the budget of NMSA without applying a respective trust fund. The administration cost is around K8.0 million per year, for which NMSA is getting fluctuating amounts of government subsidies to cover mainly salaries in the range of K1.5 million–K2.6 million. Sustainability is therefore much less of a problem for the maritime subsector than it is with the road subsector. However, with the expanding navais network, NMSA will be needing increases from their levy income.

Table 5: National Road Authority/Road Fund and National Maritime Safety Authority
(K million)

Item	2009	2010	2011	2012	2013
NRA/Road Fund					
Road Fund Revenue					
Fuel levy (4T/l of dom.diesel)	16.27	11.82	26.64	20.42	18.41
Other		0.37	0.59	1.25	-
Government subsidy		2.29	1.68	15.00	39.54
Road Fund Revenue Total	16.27	14.48	28.91	36.67	57.95
Road Fund Expenditures					
Maintenance expenditure		16.15	14.17	37.25	49.97
Administration and management			4.48	7.84	6.45
Road Fund Expenditure Total		16.15	18.65	45.08	56.42
Road Fund Funds Excess/Shortfall		(1.67)	10.27	(8.41)	1.53
Estimated maintenance requirement for NRA roads		57.93	75.51	80.75	85.00
Maintenance Shortfall		(41.78)	(61.35)	(43.50)	(35.03)
NMSA					
NMSA Revenue					
Income from levies	15.717	21.039	22.964	21.637	20.047
Sale of charts/other income	1.663	645	956	1.058	998
National government grant	2.630	2.198	1.382	1.703	11.518
NMSA Revenue Total	20.010	23.882	25.302	24.398	32.563
NMSA Expenditures					
Salaries and wages	3.723	3.827	4.799	5.716	7.121
Maintenance – Navais (incl. depreciation)	10.416	10.517	10.519	11.656	11.502
Other operating expenses	7.074	7.616	6.868	6.319	8.079
NMSA Expenditure Total	21.213	21.960	22.186	23.691	26.702
Profit/Loss	(1.203)	1.922	3.116	707	5.861

() = negative, NMSA = National Maritime Safety Authority, NRA = National Road Authority.

Sources: NRA Annual Reports; NMSA Financial Statements (2011–2012 unaudited); Asian Development Bank Independent Evaluation Department.

67. The Lae Port is expected to generate income through terminal operations that are likely to be handled by private sector concessionaires. Sustainability of the Lae Port Project was assessed by the estimated financial initial rate of return (FIRR).

68. The RRP for the project calculated an FIRR of 6.8%, which was slightly above the weighted average cost of capital of 5.1% in 2007. However, the conditions of the financial assessment were ambitious and favorable for an operator, such as: (i) tariffs at Lae Port being increased by 57.3%; and (ii) 50% of the dredging cost of about \$30 million not being included as this was to be shared with Phase 2 of the project that will cover the expansion within the basin.²⁸ In 2011, the RRP for the Supplementary Loan reevaluated the overall project with an updated investment cost and traffic assumptions, and estimated an FIRR of 7.7%,²⁹ which is higher than in the initial assessment despite the higher investment cost. However, the sensitivity analysis showed that a one-year delay in start-up operations (assuming a start-up in 2015), reduces the FIRR to 3.3%, which is below the weighted average cost of capital. The government agrees to review the tariff structure 6 months before project completion and to set a new tariff that reflects the costs.

69. **Aviation.** For the former civil aviation authority and its successor institutions (NCA, CASA, and PNGASL), revenue from charges has been able to cover only 50% of operating and maintenance costs because of the requirement to subsidize loss-making airports. Although the RRP established high FIRRs for the various investment components, this does not secure the sustainability of the agencies involved. The RRP tries to ensure sustainability by setting financial target indicators for improvement of receivables management, regular tariff reviews, and capacity strengthening. In summary, the sustainability of the aviation subsector will largely depend on the preparedness of the government to provide the needed subsidies.

70. **Special accounts.** ADB has tried to solve the perennial maintenance issue through independent financing systems. As stated at the outset, ADB was instrumental in the establishment of the NRA as well as the Road Fund. To feed the road fund, the government was supposed to agree to a set of road user charges that will go directly to the Road Fund as "earmarked" items. In general, "earmarking" budgets of otherwise central budget incomes is an approach that is generally not favored by Treasuries around the world since it reduces their budgetary flexibilities. Although ADB was correct in supporting the setting-up of such structures in the subsector, ADB stopped support before these institutions could become fully fledged. NRA is still not fully equipped, is unable to collect appropriate road user charges, and is only able to oversee less than half of the national roads that it is supposed to maintain. The confusion over responsibilities between DOW and NRA has also not helped the subsector.

71. The Community Water Transport Trust Fund (CWTF) was an innovative measure developed by ADB support that did not fully take off due to tepid interest from the international financial markets. The CWTF's interest earnings were far lower than envisioned—at appraisal, the target was 3.0% but initial earnings were 2.7%, which declined further to 1.3% by 2012. Faced with higher than expected franchise route subsidies, the fund could not support the targeted number of seven route-franchises without additional support from the government. The required subsidy that was initially estimated at \$87,000 per route per year had also ballooned to \$245,000 by that time.³⁰ Although the CWTF was designed as a terminating fund,³¹ the government did not have clear plans on bridging the deficits of the franchised community water transport routes after the termination.

6. Development Impact

72. The impact of ADB's development contribution is rated *partly satisfactory*.

73. **Promote inclusive economic development.** The country strategy documents broadly set out intended outcomes such as more efficient and safer movement of people and cargo on roads, and through national airports and ports, as evidenced by (i) for roads—a reduction in travel time from

²⁸ A uniform tariff increase of 26.7% across all PPCL ports would also secure a pre-tax ROE of 15%, but would increase tariffs at the smaller ports beyond affordability; therefore a Lae specific tariff increase is considered appropriate.

²⁹ This FIRR-increase despite the higher cost is only perceivable with a substantial increase in traffic and the tariff increase.

³⁰ For the route subsidy scheme, the government had to supplement the interest earnings from the Trust Fund to pay the contractual franchise subsidies.

³¹ Termination date is 28 September 2024.

communities to their nearest markets; (ii) for airports—an annual increase in the number of passengers per year; and (iii) for ports—an annual increase in revenue throughput. Ideally, sector outcomes should flow from the country strategy to projects to form a logical convergence. This apparent lack of convergence was apparent in the case of PNG in a few ways: (i) outcomes were not outlined at the outset; (ii) where these were identified in broad strokes, they were not operationalized to make for measurable and time-bound indicators; and (iii) no consistent follow-through was undertaken across different iterations of the country strategy. A key factor hampering assessment of ADB's contribution has been the general lack of baseline data, as well as socioeconomic monitoring and evaluation data. This has made it difficult to draw plausible associations between ADB's cumulative interventions with the achievement of results in the project areas. Although the physical outputs were achieved to some extent, outcomes relating to the development of road and water transport facilities, as well as socioeconomic welfare, were not tracked. Thus, questions remain unanswered. For example, did the road and water transport facilities bring down transport costs and by how much? Did they improve travel turnaround and by how much?

74. Most targets in the second and third strategies, most of which were closely related to ADB support, were not fully achieved, e.g. maintained, rehabilitated, and improved roads (in km) in five Highlands provinces (CSP 2006–2010); maintained, rehabilitated, and improved Lae Port operating efficiently and profitably (CSP 2006–2010); maintained, rehabilitated, and improved maritime and river transport infrastructure in eight coastal provinces (CSP 2006–2010). The targets in the CPS, 2011–2015, are also unlikely to be achieved because of project implementation delays, e.g. 4 million revenue-tons of break bulk throughput in Lae Port by 2015 (2011 baseline: 2.8 million revenue tons), and 116,000 passengers per year through 21 national airports by 2015 (2011 baseline: 100,000).

75. **Improve governance.** Institutional structures anchored on cost recovery and maintenance management, and strengthened regulatory agencies were broadly targeted in the area of governance. ADB support has paved the way for key institutional and organizational reforms that can be built upon for the transport sector. The development of statutory authorities was initiated with the passage of legislation creating, among others, the NRA, the NMSA, the NAC, CASA, PNGASL, and the Accident Investigation Committee. The creation of a trust fund and other operational funds will help anchor the principles of cost recovery and maintenance management in these institutions. ADB's long support in this area—stretching from the CAP 2001 up to the present CPS—underlines the long process of engaging the government and the importance of securing buy-in at the outset. However, further progress, in terms of agencies' budget allocations and timely adjustments to cost-recovery rates, will have to be made in order to more fully embed the reforms. The target, which was implementation of a national system of cost recovery for the roads subsector, with increasing Road Fund contributions to road maintenance (CSP 2006–2010), was not met. NRA's revenues have not increased, and it could maintain only 1,000 km out of 2,300 km of national highways, even with an additional subsidy from the Treasury. However, the target for NMSA to promote compliance with and enforce maritime safety standards (CSP 2006–2010) was generally achieved.

76. **Safeguards for land acquisition, resettlement, and indigenous peoples.** Customary landownership and compensation is a difficult area in PNG and can delay any project for an extended period. Under ADB's projects, additional land requirements have generally been kept at a minimum. For road projects, all efforts are made to stay on the existing alignment to the extent possible, although they are sometimes not the optimal alignments with regard to vulnerability to landslides and road safety. The resettlement under the Lae Port Project followed the ADB guidelines. However, the final solution of cash compensation was not the best option in PNG. The project shows that the issue of informal settlers should have been taken into account in the resettlement plan.

E. Other Evaluation

77. **Gender issues.** In general, gender aspects were addressed in the projects under review, through contract clauses in the civil works contracts that required contractors to ensure work allocations for women during the project (e.g. in the HRRIP, where the percentage of women workers is targeted to

be increased to 30%), and even beyond the project period. In the RMUP, for example, women were included in rural community training programs for road maintenance, and the Rehabilitation of the Maritime Navigation Aids System Project prescribed that 20% of the fees paid to the lighthouse committees should be used for the activities of women's groups.

F. Conclusion

78. **Key findings.** PNG's geography, disproportionate distribution of the population, climatic challenges, capacity constraints, and governance issues present challenges to the delivery of services. The lack of financial resources was a contributory factor to delays in some projects. The government's financial standing is expected to improve with revenues from LNG projects coming on-stream, and measures aligned with the Extractive Industries Transparency Initiative (EITI) principles would go a long way to ensuring the effective management of PNG's natural resource wealth. The LNG revenues, together with appropriate measures, should enable the government to more easily address counterpart financing and its other development needs. While PNG may eventually require less financial support from external partners, it will likely continue to need technical assistance in furthering the reform process.

79. The strategies adopted by the government and ADB for the transport sector have been, for the most part, responsive to the needs of the country. However, ADB's support has failed to be effective and efficient, largely as a result of poorly designed projects, weak government ownership, inadequate agency capacity, and long delays often caused by unnecessarily complicated procedures. To help improve this situation, ADB needs to become more actively engaged in policy dialogue and project monitoring. Thus, this evaluation rated the performance of ADB's transport sector program—which included 8 projects and 17 TA operations—*less than successful*.

Table 6: Overall Rating of Transport Sector Performance

Rating Criteria	Criteria Weight	Assessment	Score	Weighted Average Score
Strategic Positioning	0.1	Satisfactory	2	0.2
Relevance	0.1	Relevant	2	0.2
Efficiency	0.2	Less than efficient	1	0.2
Effectiveness	0.2	Less than effective	1	0.2
Sustainability	0.2	Less likely	1	0.2
Impact	0.2	Less than satisfactory	1	0.2
Overall assessment	1.0	Less than successful		1.2

Overall rating: highly successful/satisfactory= 2.7–3.0; successful = 1.6–2.6; less than successful= 0.8–1.5; unsuccessful = 0.0–0.7.

Source: Asian Development Bank Independent Evaluation Department.

80. **Lessons.** The following were noted:

- (i) **Governance and capacity constraints.** Weak institutional capacity remains apparent. Governance and project management will likely remain dependent on significant external input for the short to medium-term. A sustained and long-term perspective—anchored on training as well as knowledge and skills transfer—is needed to improve sector agencies' capacities. Such will go a long way to improving project design, including the accuracy of cost estimates.
- (ii) **Sustainability.** Cost-recovery principles for operations and maintenance have been set back significantly. Funds collected by agencies are far from optimal levels, which only exacerbates concerns over maintenance and the lack of resources to adequately bridge the deficit. Government must be engaged and efforts in the public financial management (PFM) subsector need progressed to firmly embed the value of ear marked budget systems, among other things, into the agencies' operational frameworks. The ADB approach of adopting 10-year operation and maintenance contracts may have to be revisited. Although it is recognized that the long-term contracts offer local contractors a measure of stability and provide incentives to

upgrade their capabilities, the possibility of the approach inflating costs beyond market rates is also recognized. A delicate balance must be struck between the two.

- (iii) **Public Private Partnership.** ADB support for private sector development paved the way for the enactment of the PPP Act, which is seen as helping guarantee a transparent and a predictable operating environment for business. The establishment of a PPP Centre, including a viable project pipeline, should engender increased private sector participation in infrastructure provision.

81. Building from the findings and lessons noted, this evaluation offers the following suggestions:

- (i) for country strategy and projects need to be linked more closely to ensure a logical convergence in outcomes and outputs, and the same operationalized, monitored and evaluated;
- (ii) follow through must be consistent to ensure that projects build on gains;
- (iii) capacity development must operate on a sustained and long-term basis;
- (iv) revisit the long-term operation and maintenance contracts and put in place mechanisms to guard against cost-inflation; and
- (v) consider making feeder roads part of the rehabilitation or upgrading package for major road projects, so as to benefit more directly residents living adjacent to project roads.