



# Completion Report

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Project Number: 43141-023  
Loan Numbers: 2588, 2589, and 2590  
September 2016

## Papua New Guinea: Civil Aviation Development Investment Program (Tranche 1)

This document is being disclosed to the public in accordance with ADB's Public Communications Policy 2011.

Asian Development Bank

## CURRENCY EQUIVALENTS

Currency unit – kina (K)

		<b>At Appraisal</b> (7 October 2009)	<b>At Project Completion</b> (23 January 2016)
K1.00	=	\$0.37	\$0.33
\$1.00	=	K2.66	K3.17

## ABBREVIATIONS

ADB	–	Asian Development Bank
AGO	–	Auditor General's Office
ANG	–	Air Niugini
CAA	–	Civil Aviation Authority
CADIP	–	Civil Aviation Development Investment Program
CASA PNG	–	Civil Aviation Safety Authority of Papua New Guinea
DSC	–	design and supervision consultant
EIRR	–	economic internal rate of return
FIRR	–	financial internal rate of return
ICAO	–	International Civil Aviation Organization
ILS	–	instrument landing system
MFF	–	multitranche financing facility
MTDS	–	Medium Term Development Strategy
NAC	–	National Airports Corporation
NTDP	–	National Transport Development Plan
PCR	–	project completion report
PIU	–	project implementation unit
PNG	–	Papua New Guinea
PNGASL	–	Papua New Guinea Air Services Limited

## NOTES

- (i) The fiscal year (FY) of the Government of Papua New Guinea ends on 31 December.
- (ii) In this report, "\$" refers to US dollars.

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## BASIC DATA

### A. Loan Identification

1.	Country	Papua New Guinea
2.	Loan numbers	2588, 2589, and 2590
3.	Project title	Civil Aviation Development Investment Program (Tranche 1)
4.	Borrower	Independent State of Papua New Guinea
5.	Executing agency	National Airports Corporation <sup>1</sup>
6.	Amount of loan	Loan 2588 USD 25,000,000 Loan 2589 SDR 35,523,000 Loan 2590 SDR 12,609,000
7.	Project completion report number	1599

### B. Loan Data

1.	Appraisal	
	– Date started	18 May 2009
	– Date completed	29 May 2009
2.	Loan negotiations	
	– Date started	21 September 2009
	– Date completed	23 September 2009
3.	Date of Board approval	1 December 2009
4.	Date of loan agreement	28 January 2010
5.	Date of loan effectiveness	
	– In loan agreement	28 April 2010
	– Actual	22 March 2010
	– Number of extensions	0
6.	Closing date	
	– In loan agreement	30 June 2013
	– Actual	15 July 2016
	– Number of extensions	2
7.	Terms of loan	
	– Interest rate	Loan 2588 – LIBOR and 0.60% less 0.40%, Loan 2589 – 1% per annum during grace period and 1.5% per annum thereafter, Loan 2590 – 1.6% per annum.
	– Maturity (number of years)	25 years (loan 2588), 32 years (loan 2589 and loan 2590)

<sup>1</sup> The EA was changed from Civil Aviation Authority to National Airport Corporation in 2010.

- Grace period (number of years) 5 years (loan 2588), 8 years (loan 2589 and loan 2590)
- 8. Terms of relending (if any) Not applicable
  - Interest rate
  - Maturity (number of years)
  - Grace period (number of years)
  - Second-step borrower
- 9. Disbursements
  - a. Dates

**Loan 2588**

<b>Initial Disbursement</b>	<b>Final Disbursement</b>	<b>Time Interval</b>
28 May 2010	1 July 2016	73.17 months
<b>Effective Date</b>	<b>Actual Closing Date</b>	<b>Time Interval</b>
22 March 2010	15 July 2016	75.33 months

**Loan 2589**

<b>Initial Disbursement</b>	<b>Final Disbursement</b>	<b>Time Interval</b>
28 May 2010	15 January 2016	67.63 months
<b>Effective Date</b>	<b>Actual Closing Date</b>	<b>Time Interval</b>
22 March 2010	15 July 2016	75.33 months

**Loan 2590**

<b>Initial Disbursement</b>	<b>Final Disbursement</b>	<b>Time Interval</b>
28 May 2010	4 March 2016	60.27 months
<b>Effective Date</b>	<b>Actual Closing Date</b>	<b>Time Interval</b>
22 March 2010	15 July 2016	75.33 months

## b. Amount

\$ million						
Category or Sub-loan	Original Allocatio (a)	Last Revised Allocation	Amount Cancelled	Net Amount Available	Amount Disbursed	Un- disbursed Balance
<b>01 Civil Works</b>	<b>64.00</b>	<b>72.51</b>	-	<b>72.51</b>	<b>72.51</b>	-
Kavieng Airport security fencing	-	2.43	-	2.43	2.43	-
Port Moresby International Airport Domestic apron extension	-	13.46	-	13.46	13.46	-
Airport security fencing – Goroka, Wewak, Hoskins, Gurney	-	13.35	-	13.35	13.35	-
Hoskins Airport Pavement upgrade and terminal building	-	21.09	-	21.09	21.09	-
Mt. Hagen Airport new terminal building	-	22.13	-	22.13	22.13	-
Jacksons Airport maintenance works	-	0.04	-	0.04	0.04	-
<b>01B Civil Works (Revised)</b>	-	<b>1.54</b>	0.08	<b>1.54</b>	<b>1.46</b>	0.08
<b>02 Goods</b>	<b>3.60</b>	<b>4.50</b>	-	<b>4.50</b>	<b>4.50</b>	-
Instrument landing system	-	0.89	-	0.89	0.89	-
Rescue & firefighting vehicles	-	2.75	-	2.75	2.75	-
Survey equipment	-	0.06	-	0.06	0.06	-
Airport aerodrome pavement tools	-	0.12	-	0.12	0.12	-
Plants and equipment for selected airports	-	0.66	-	0.66	0.66	-
Fire protective gear for three airports	-	0.03	-	0.03	0.03	-
<b>02B Goods (Revised)</b>	-	<b>0.55</b>	0.31	<b>0.55</b>	<b>0.25</b>	0.31
Plants/equipment for selected airports	-	0.26	-	0.12	0.12	-
Vacuum sweeper for Port Moresby International Airport	-	0.29	0.29	0.42	0.13	0.29
<b>03A Consulting Services – PIU Support</b>	<b>7.00</b>	<b>2.75</b>	-	<b>2.75</b>	<b>2.75</b>	-
<b>03B Consultancy Services – Design and Supervision</b>	<b>5.10</b>	<b>6.05</b>	-	<b>6.05</b>	<b>6.05</b>	-
DSC-BECA International	-	6.05	-	6.05	6.05	-
<b>03C CS-Survey &amp; Geotech</b>	<b>0.30</b>	<b>0.73</b>	-	<b>0.73</b>	<b>0.73</b>	-
Reimbursement – Geotech & Survey	-	0.73	-	0.73	0.73	-
<b>04 Interest Charges</b>	<b>4.00</b>	<b>1.75</b>	0.30	<b>1.75</b>	<b>1.45</b>	0.30
<b>05 Unallocated</b>	<b>11.00</b>	-	-	-	-	-
<b>Total</b>	<b>95.00</b>	<b>90.39</b>	<b>0.69</b>	<b>90.39</b>	<b>89.70</b>	<b>0.69</b>

DSC = Design Supervision Consultant, PIU = Project Implementation Unit.

<sup>a</sup> ADB portion only

10. Local costs (financed)	Original	Actual
- Amount (\$ million)	17.0	23.6
- Percent of local costs	15.00%	20.70%
- Percent of total cost	85.00%	79.30%

**C. Project Data**

## 1. Project cost (\$ million)

<b>Cost</b>	<b>Appraisal Estimate</b>	<b>Actual</b>
Foreign exchange cost	95.0	89.7
Local currency cost	17.0	23.6
<b>Total</b>	<b>112.0</b>	<b>113.3</b>

## 2. Financing plan (\$ million)

<b>Cost</b>	<b>Appraisal Estimate</b>	<b>Actual</b>
Implementation costs		
Borrower financed	17.0	23.6
ADB financed	95.0	88.2
Other external financing		
<b>Total</b>	<b>112.0</b>	<b>111.8</b>
IDC costs		
Borrower financed	0	0
ADB financed	4.2	1.5
Other external financing	0	0
<b>Total</b>	<b>112.0</b>	<b>113.3</b>

ADB = Asian Development Bank, IDC = interest during construction.

## 3. Cost breakdown by project component (\$ million)

<b>Component</b>	<b>Appraisal Estimate</b>	<b>Actual</b>
<b>Base cost</b>	<b>95.0</b>	<b>87.0</b>
Airport improvements	81.0	77.6
Program support and capacity development	8.8	2.8
Program management	6.3	6.8
<b>Contingencies</b>	<b>11.9</b>	<b>0.0</b>
<b>Base cost including contingencies</b>	<b>108.0</b>	<b>87.2</b>
Interest during construction	4.1	1.5
<b>Total</b>	<b>112.0</b>	<b>89.7</b>



## 4. Project schedule

Item	Appraisal Estimate	Actual
Date of contract with consultants	Q3 2009	28 June 2011
Completion of engineering designs	Q2 2010–Q1 2012	Q4 2012
Civil works contract		
Date of award	Q2 2010	17 May 2012
Completion of work	Q4 2011	Q4 2015

## 5. Project performance report ratings\*

	Ratings	
	Development Objectives	Implementation Progress
<b>Implementation Period</b>		
1 December 2009 to 31 May 2010	S	U
1 June 2010 to 31 December 2011	S	U
1 January 2012 to 30 June 2012	S	U
1 July 2012 to 31 December 2012	S	U
1 January 2013 to 30 June 2013	S	U
1 July 2013 to 31 December 2013	S	S
1 January 2014 to 30 June 2014	S	S
1 July 2014 to 31 December 2014	S	S
1 January 2015 to 30 June 2015	S	S
1 July 2015 to 31 December 2015	S	S

S = satisfactory, U = unsatisfactory.

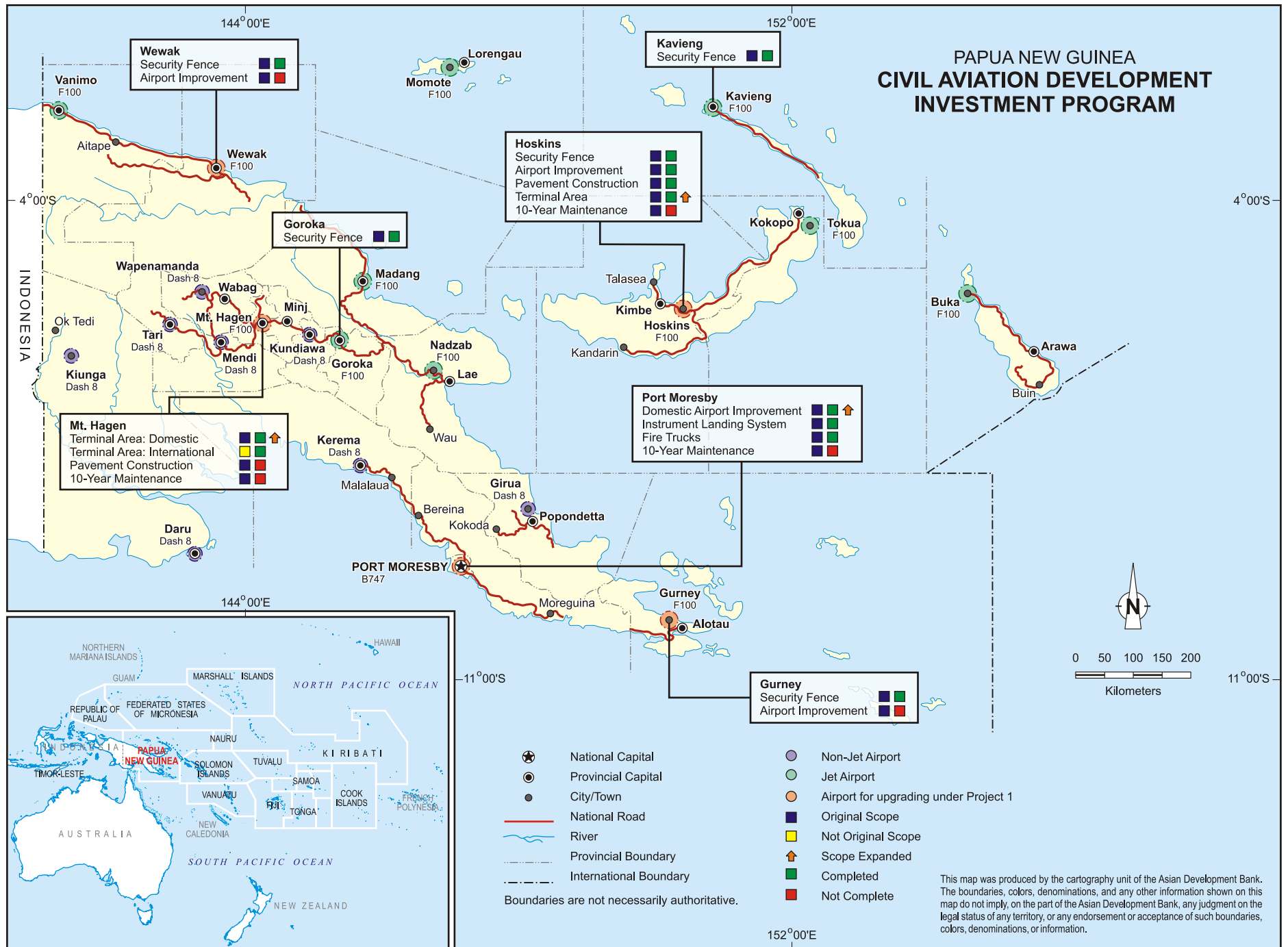
\* This might be different than eOps rating.

## D. Data on Asian Development Bank Missions

Name of Mission	Date	No. of Persons	No. of Person-Days	Specialization of Members*
Fact finding				
Inception review	26 April–07 May 2010	3	36	a,b,c
Project review 1	13–21 February 2011	3	24	a,c,e
Project review 2	31 Oct–04 November 2011	4	16	a,a,b,c
Midterm review	19–28 February 2012	5	28	a,b,c,f,e
Project review 3	27–28 January 2013	4	4	a,b,c,e
Special loan administration	23–27 October 2014	4	16	a,b,c,e
Safeguard review	17–24 April 2014	1	8	g
Safeguard review & capacity building	11–12 & 25–26 June 2015	2	5	e,f
Project review 4	23 Jan–18 February 2015	4	10	a,b,c,e
Project completion review <sup>b</sup>	01 Feb 2016–30 Jun 2016	4	12	a,b,e,g,f

\* a = project officer, b = project/financial analyst, c = head of project administration unit, d = economist, e = project specialist, f = safeguards specialist, g = consultant.

# PAPUA NEW GUINEA CIVIL AVIATION DEVELOPMENT INVESTMENT PROGRAM



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## I. PROJECT DESCRIPTION

1. The project was the first tranche of the Asian Development Bank (ADB)-funded Civil Aviation Development Investment Program (CADIP) multitranche financing facility (MFF) designed to improve compliance with the safety and security standards of the International Civil Aviation Organization (ICAO). It involved (i) designing and supervising airport improvements, and preparing and administering long-term maintenance contracts for nine national airports;<sup>1</sup> and (ii) monitoring the socioeconomic benefits from the operation and maintenance improvements.<sup>2</sup>

2. Papua New Guinea (PNG) has very challenging geographic conditions making the movement of people and goods difficult. This creates total reliance on aviation services for tourism and business, exports and imports, domestic freight, and social cohesion. Civil aviation in PNG is intended to (i) support the socioeconomic development of the country by providing safe, efficient, reliable, sustainable, and affordable aviation services and infrastructure; (ii) give all-weather access to the country and increase the mobility of communities; and (iii) serve important community needs by making noncommercial destinations more accessible. Capacity constraints and deteriorating infrastructure threaten the safety certification of airports and place these socioeconomic objectives at risk.<sup>3</sup> External funding to rehabilitate and upgrade these airports supported the objectives of the government's Medium Term Development Strategy (MTDS) for 2005-2010: economic growth, rural development, poverty reduction, and human resource development.<sup>4</sup>

3. ADB approved an MFF for CADIP on 1 December 2009 for an aggregate of \$480 million equivalent to be provided in four tranches. The investment program aims to establish a sustainable civil aviation network to support economic growth (program impact). It will thus help meet the objectives of the country partnership strategy and country operations business plan of ADB, particularly those for the transport sector.<sup>5</sup> CADIP was to concentrate first on carrying out priority actions to comply with ICAO security and safety standards, and then on increasing the capacity for growth in services. The performance targets and indicators of outputs of Tranche 1 were to be: (i) reformed institutions; (ii) improved infrastructure; and (iii) improved operations.

4. Five airports included in Tranche 1 were the top priorities in the Civil Aviation Authority (CAA)<sup>6</sup>'s strategic plan, serving about 1.5 million people. The country's main airport, located in Port Moresby, has international connections and serves as the hub for all national airports. The airport at Mount Hagen is the major airport in the Highlands region, providing access to the four major provinces (Chimbu, Enga, Southern Highlands, and Western Highlands), which produce much of the coffee and mineral resources upon which the country's economy is largely based. The Hoskins Airport is the major airport for West New Britain and serves an island economy that specializes in palm oil production. Wewak, the provincial capital of East Sepik, is the major town between Madang and Jayapura (Indonesia). It is a coastal economy on the northern side of the mainland specializing in timber and natural resources. Gurney Airport provides connections to Alotau, the provincial capital of Milne Bay Province, and access to tourist destinations along the country's lower-eastern coastline; with a direct scheduled air transport link to Cairns, Australia.

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<sup>1</sup> Port Moresby, Mount Hagen, Hoskins, Wewak, Gurney, Kavieng, and Goroka.

<sup>2</sup> ADB. 2009. *Report and Recommendation of the President to the Board of Directors: Proposed Multitranchise Financing Facility for Papua New Guinea: Civil Aviation Development Investment Program*. Manila.

<sup>3</sup> Civil Aviation Authority. 2008. *Strategic Investment Plan*. Port Moresby.

<sup>4</sup> Government of PNG. 2005. *The Medium-Term Development Strategy, 2005–2010*. Port Moresby.

<sup>5</sup> ADB. 2006. *Country Strategy and Program: Papua New Guinea, 2006–2010*. Manila; and ADB. 2007. *Country Operations Business Plan: Papua New Guinea, 2008–2010*. Manila.

<sup>6</sup> CAA was reformed in 2010 into four separate corporations: Papua New Guinea Air Services Limited (PNGASL) and Civil Aviation Safety Authority of Papua New Guinea (CASA PNG) National Airports Corporation (NAC), who took over the role of EA from CAA. , and , the Papua New Guinea Accident Investigation Commission

## II. EVALUATION OF DESIGN AND IMPLEMENTATION

### A. Relevance of Design and Formulation

5. The project design was *relevant* in helping establish a sustainable civil aviation network to support economic growth and meet the objectives of ADB's country strategy and program, particularly those for the transport sector, and the stated MTDS objectives. The intended outcome was safer, more efficient, and more accessible air transport services through (i) safer and more secure air travel; (ii) better airport facilities; (iii) better-accessible markets, natural resource and mineral sites, and livelihood opportunities; and (iv) reduced costs of air travel. During appraisal, consultations were held with national and provincial governments and the CAA. Project implementation unit (PIU) was set up within CAA to formulate and evaluate the project.

6. At appraisal, the government's transport policies were the MTDS 2005–2010 and the National Transport Development Plan (NTDP) 2006–2010, outlining the overall policies, objectives, and actions that guide the development and operation of the transport sector. The MTDS had seven priorities, including "rehabilitation and maintenance of transport infrastructure". The NTDP's vision for the aviation sector involved (i) competition on and access to domestic routes by foreign airlines as part of the long-term upgrading plan for airports that cater for international flights; (ii) larger aircrafts operating in major national airports; (iii) accessible, safe, reliable, efficient, and affordable air transport; (iv) improved and reasonably priced international services to establish PNG as a gateway between continents; and (v) lower-cost and safer passenger and cargo movements. The NTDP proposed major investments at six national airports (Gurney, Madang, Mount Hagen, Nadzab, Tokua, and Wewak) to promote growth and eventual competition on domestic routes. It also mandated the provision of services to meet CAA's revenue shortfall.

7. To fulfill these priorities, the government endorsed CAA's Long-Term Infrastructure Investment Plan (2010–2030) as its sector plan, which includes certification and rehabilitation of national airports, and upgrade of six major national airports. A key objective of the NTDP 2006–2010 was to reform CAA to become self-sufficient and fund much of the remedial maintenance of airports and airways. The key objectives of CAA's strategic plan are: (i) addressing critical safety and security needs and implementing structural reform (short term); (ii) promoting economic and social development through sustainable aviation infrastructure (medium term); and (iii) realizing an acceptable rate of return on investments (long term).

8. ADB's country operations at appraisal supported the implementation of the MTDS 2005–2010 by focusing on ADB's program for maximum impact in selected priority areas. The transport sector is one of four main strategic areas building on ADB's comparative advantage. CADIP draws on ADB's experience in preparing and implementing small airport improvement projects associated with regional and domestic airport development, particularly where rugged terrain makes air travel an important mode of transport. Since most of the external assistance is directed at capacity development, ADB efforts centered on urgent infrastructure improvements, with targeted assistance to fill gaps in institutional development and support the restructuring of CAA, in coordination with technical assistance from the Government of Australia.

9. The design and monitoring framework in Appendix 1 outlines the performance and achievements of targets and/or indicators.

## B. Project Outputs

10. The three (3) outputs of Project 1 were (i) reformed institutions: sustainable and focused operational units established for airports, air traffic services, property development, and regulatory oversight; (ii) improved infrastructure: (a) airside infrastructure meets safety and security certification requirements, and (b) airside infrastructure and land-side facilities meet future operational and capacity requirements; and (iii) improved operations: (a) equipment for communications navigation and surveillance equipment modernized to meet air traffic management requirements, and (b) fire safety and rescue equipment meets operational requirements.

11. Project 1 concentrated on carrying out actions to comply with ICAO security and safety standards, and then on increasing capacity for growth in services. The project completed security fencing along airport boundaries of 5 airports, namely Goroka, Gurney, Hoskins, Kavieng and Wewak. These were completed 18–42 months later than assumed at appraisal due to start-up delay, where PIU staff had to familiarize themselves with ADB procedures, leading to the delay in recruiting the Design and Supervision Consultant (DSC). The project's realized civil works outputs fell short due to cost overruns exceeding the appraisal estimates. Rehabilitation of airport infrastructure such as runways, taxiways, and aprons was completed only at Port Moresby and Hoskins. Airport improvements at Mount Hagen were limited to a new terminal, which was upgraded to include a separate area for processing international passenger traffic, and associated airside and landside works. The rehabilitation of Hoskins Airport was upgraded to include a larger terminal. Hoskins terminal is not properly designed and inadequate baggage handling and storage areas, and lacked cargo storage and handling facilities. The new terminals at Hoskins and Mount Hagen brought much needed improvements in these areas, but the installation of expensive lift facilities for maintenance purposes on a single floor at Mount Hagen appears unnecessary. All other airport infrastructure rehabilitation works—runways, taxiways, and aprons—planned for Mount Hagen, Wewak, and Gurney did not proceed due to reasons explained in para 15 below.

12. The maintenance programs included in the civil works costs at appraisal largely did not materialize at Port Moresby, Mount Hagen, Hoskins, Wewak, and Gurney. At appraisal, the long-term maintenance contracts were to be an integral component of the investment program. Facilities were to be upgraded and the 10-year maintenance program implemented to a standard specified in the civil works contracts. The maintenance contracts were to be performance-based, with fixed monthly payments contingent upon meeting the performance standards, and defined penalties for underperformance.

13. The purchase of goods proceeded as planned but at a lower cost than appraised, thus cost savings were partially used to buy airport maintenance equipment not planned for at appraisal.<sup>7</sup> It was practical purchasing maintenance equipment due to lack of local supply contractors in the country. The Port Moresby instrument landing system (ILS) was completed in April 2011, two months ahead of the appraisal estimate. The three tenders for firefighting equipment for Port Moresby Airport were received in March 2013, 27 months later than estimated at appraisal.

14. Program support, administration, and capacity development outputs were broadly in line with expectations. Capacity development expenditure at National Airports Corporation (NAC) was disproportionate compared with expenditure at PNG Air Services Limited (PNGASL) and the Civil

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<sup>7</sup> Grass-cutting tractors, civil works tools, and other equipment such as spare parts for runway and building maintenance.

Aviation Safety Authority of PNG (CASA PNG). This is important, as NAC was the executing and implementing agency, and therefore necessary to increase its capacity in implementing the project.

### C. Project Costs

15. At appraisal, \$87.8 million (91.5% of the project cost) was estimated for the civil works components.<sup>8</sup> Actual expenditure on civil works was \$92.0 million, or 80.7% of actual project costs.

**Table 1: Appraisal, Supplementary, and Actual Project Expenditures**

Item	Appraisal (\$ millions) a, b	%	Actual (\$ millions)	%
<b>A. Base Costs</b>				
1 Airport improvements: Port Moresby domestic apron	5.7	5.10%	16.3	14.39%
2 Airport improvements: Mount Hagen, stage 1 <sup>e</sup>	29.9	26.70%	28.3	24.98%
3 Airport Improvements: Hoskins, stage 1 <sup>f</sup>	15.5	13.80%	28.5	25.15%
4 Airport improvements: Wewak, stage 1	10.2	9.10%	-	0.00%
5 Airport improvements: Gurney, stage 1	6.2	5.50%	0	0.00%
6 Airport improvements: Hoskins, security fence	1.7	1.50%	4.5	3.97%
7 Airport improvements: Wewak, security fence	1.7	1.50%	3.4	3.00%
8 Airport improvements: Kavieng, security fence	1.7	1.50%	3.1	2.74%
9 Airport improvements: Gurney, security fence	1.7	1.50%	3.3	2.91%
10 Airport improvements: Goroka, security fence	1.6	1.40%	4.1	3.62%
11 Airport improvements: Port Moresby instrument landing system	1.8	1.60%	1.2	1.06%
12 Airport improvements: Port Moresby fire tenders	3.2	2.90%	2.5	2.21%
Airport maintenance equipment	-	0.00%	1.1	0.97%
13 Program support and capacity development	8.8	7.90%	10.5	9.27%
14 Program administration and other costs (first 3 years)	6.3	5.60%	6.5	5.74%
15 <b>Subtotal (A)</b>	<b>96</b>	<b>85.70%</b>	<b>113.3</b>	<b>100.00%</b>
<b>B. Contingencies</b>	<b>11.9</b>	<b>10.60%</b>	<b>-</b>	<b>0.00%</b>
<b>C. Financing Charges during Implementation<sup>d</sup></b>	<b>4.1</b>	<b>3.70%</b>	<b>-</b>	<b>0.00%</b>
<b>Total (A+B+C)</b>	<b>112</b>	<b>100%</b>	<b>113.3</b>	<b>100.00%</b>
<b>ADB loan</b>	<b>95.2</b>		<b>89.7</b>	<b>79.17%</b>
<b>Government financing</b>	<b>16.8</b>		<b>23.6</b>	<b>20.83%</b>

ADB = Asian Development Bank.

a In 2009 prices.

b Includes taxes and duties (10% of base cost) of \$8.5 million.

c Physical contingencies computed at 10%. Price contingencies computed at an average of 1.9% on foreign exchange costs and 4.0% of local currency costs.

d Includes interest charges.

e Appraisal costs include rehabilitated airport infrastructure works, including runways, taxiways, terminal and aprons; actual costs include only terminal and associated airside and landside works

f Appraisal costs for terminal improvements was \$0.5 million; actual costs include new terminal cost of \$2.4 million.

Note: Numbers may not sum precisely because of rounding.

Sources: Civil Aviation Development Investment Program and Asian Development Bank estimates.

16. The shortfall in realized civil works outputs was a result of higher-than-expected contract costs after detailed engineering design because of a combination of (i) increased scope of works for the Port Moresby domestic apron and Hoskins terminal; (ii) inflation impact on civil works unit

<sup>8</sup> Including contingencies.



costs after a 3-year delay in issuing contracts (9.4%);<sup>9</sup> (iii) foreign exchange impact from devaluation of the kina (11.6%);<sup>10</sup> and (iv) escalation in civil works costs because resource sector projects caused a shortage of contractor capacity, which in turn increased contract rates.<sup>11</sup> Delays in civil works contracting were caused partly by the late recruitment of the DSC, which occurred 15 months after loan effectiveness despite advance recruitment procedures, and partly by lengthy preparations of detailed designs.<sup>12</sup>

17. Goods were purchased at a lower cost than appraised. The Port Moresby ILS was completed at a saving of 34%. The three tenders for firefighting equipment for Port Moresby Airport cost 23% less than appraised.

18. Program support and capacity development costs exceeded appraisal estimates because the Tranche 1 was completed late, involving loan closing extensions of 30 months from June 2013 to December 2015.

19. The ADB loan component of the realized project costs was \$90.4 million, rather than the appraised \$95.0 million, because the government drew down the Asian Development Fund loans in kina, which depreciated during the loan disbursement period. This is compounded by the relationship between the special drawing right and the United States dollar (\$). The government's contribution to project costs rose from \$17.0 million at appraisal to \$23.6 million at completion.

#### **D. Disbursements**

20. Following project approval on 1 December 2009 and effectiveness on 22 March 2010, the first ADB loan disbursement for project activities was two months later, on 28 May 2010. Projected and actual disbursements are compared in Appendix 2; it shows that actual disbursement was delayed by a significant margin until the second loan extension year (2015). The final disbursement was 94.4% of the loan total (i.e. \$89,696,958.31/\$95,000,000).

21. At appraisal, it was assumed that 19% of project disbursement would occur in the first year, 44% by the second year, 84% by the third year, and that all funds would be disbursed by the fourth year. Actual disbursement of the loan funds occurred over seven years; the assumed first-year amount (19%) was not achieved until Year 3 (21%), the second-year amount (44%) not until the second half of Year 4 (55%), and the third-year amount (84%) not until Year 6 (99%).

22. The disbursement schedule at appraisal was unrealistic in its assumptions that (i) the then CAA PIU would promptly prepare detailed engineering designs and contract documents for the civil works; (ii) the recruitment of the DSC would be fast-tracked; (iii) the civil works contracting and mobilizing process would be completed progressively six months after loan effectiveness;<sup>13</sup> and (iv) the scope of the proposed civil works could be accomplished within the proposed budget allocations based on limited detailed engineering design and investigation at appraisal.

<sup>9</sup> Civil works unit cost impact between 2009 values used at appraisal and 2013 contract prices calculated using PNG inflation for local costs and World Bank manufacturers' unit value index (MUV) for foreign costs.

<sup>10</sup> Foreign exchange impact between 2009 US dollar to kina exchange rate used at appraisal and the end of June 2013 contract exchange rate using the PNG ANZ Bank index.

<sup>11</sup> Contractor preference for private sector civil works is influenced by delayed contractor payments under government contracts. Some international contractors do not bid for government civil works contracts for this reason, and contractors that do bid include delayed contract payment costs in their contract bids.

<sup>12</sup> Detailed engineering designs were initially completed within six months of mobilization of the DSC. Final designs and contracting for the Port Moresby domestic apron and fencing civil works occurred 12 months after mobilization. Contracting for the civil works for the Mount Hagen and Hoskins airport terminals occurred two years after mobilization because of the protracted changes to the terminal designs.

<sup>13</sup> The airport security fencing in Hoskins, Wewak, Kavieng, Goroka, and Gurney was assumed to be advertised in the first quarter of 2010 and progressively completed from March to September 2010. The contract for Kavieng was awarded in April 2011, the remainder in August 2012.

23. The ADB eOps<sup>14</sup> project rating in 2011 was *actual problem*, the February 2012 midterm review mission refers to “actual problem”, and the January 2013 review mission refers to “potential problem”. Meetings were held with mail exchanges between NAC and ADB’s PNG Resident Mission (PNRM), and in March 2013 PNRM requested NAC to finalize signing of pending airport contracts to avoid implementation delay. The project was rated *on track* in April 2013 after the award of the Mount Hagen and Hoskins airport contracts. Actions taken by PNRM between 2011 and early 2013 seem not to have been effective in improving the disbursement flow, and remedial actions were limited to a monthly project review meeting with the PIU to set progress targets that were repeatedly missed. From mid-2013, PNRM took determined steps to improve the performance of the project. Regular, almost daily discussions were held, beyond the monthly coordination meetings (refer para 45).

## **E. Project Schedule**

24. Appendix 3 provides a chronology of main events during project implementation. At appraisal, it was estimated that the project would be implemented over 3.5 years. The original closing date was 30 June 2013, which was extended twice, ultimately to 31 December 2015. The project account was kept open until financial closing on 15 July 2016. Appendix 4 compares the time-based appraisal implementation schedule with actual implementation, which shows that project implementation was delayed in all areas except establishment and recruitment of the PIU engineering consultant and procurement of the Port Moresby ILS. Investigation and design work did not begin until 1 year after loan effectiveness. Procurement did not begin until 2 years after loan effectiveness, except for the Port Moresby ILS<sup>15</sup> and the Kavieng airport security fence.

## **F. Implementation Arrangements**

25. NAC<sup>16</sup> was the executing agency responsible for implementing the civil aviation infrastructure works and the institutional capacity building activities under the investment program. A program steering committee (PSC) was established to (i) oversee the implementation of the investment program, (ii) monitor progress, (iii) approve the airports chosen for subsequent projects, and (iv) guide the executing agency and the implementing agencies. A PIU headed by a project director and supported by investment program consultants was responsible for implementing the sector policy and infrastructure components of the investment program. The PIU, fully functioning from November 2009, was staffed with national officers: (i) project director, (ii) deputy project director for policy and administration, (iii) five engineers, (iv) an economist, (v) a finance expert, (vi) an environmentalist, and (vii) a policy officer. The PIU hired all consultants and entered into airport improvement contracts under the investment program.

26. As a result of the actual implementation arrangements, the focus of project outputs and achievements was strongly orientated toward developing the engineering capabilities and resources of the NAC, as these capabilities were largely needed in early implementation of the project. However, less attention was given to the need for more development of NAC’s human resources and expertise in economic, financial, maintenance, and corporate social responsibility. Additionally, capacity development and strengthening across the civil aviation sector including PNGASL and CASA PNG, was not advanced in the manner anticipated at appraisal, and will be attended to in subsequent tranches.

<sup>14</sup> ADB electronic project operations information system.

<sup>15</sup> Investigation and procurement support was largely provided by PNGASL, the agency responsible for operating aircraft navigation aids.

<sup>16</sup> NAC was formerly part of CAA, the executing agency designated at appraisal.



## G. Conditions and Covenants

27. The project loan covenants were assessed as *relevant*, but instances of late compliance and areas of non- or partial compliance were noted, such as delays in providing adequate counterpart funds towards the end of Tranche 1 because of a reduction in PNG budget funds. Compliance with the financial covenants of the project was late, or did not occur, because of the PIU's failure to establish adequate financial accounting from the start of the project. Delays occurred in the establishment of a project website and of a grievance redress mechanism. There was limited compliance with the requirement to produce regular and timely monthly and quarterly project progress reports,<sup>17</sup> and neither a civil works completion assessment report nor a project completion report (PCR) materialized. Quarterly and annual reports were produced but are yet to be posted on the NAC website. Compliance with the requirement to hold quarterly PSC meetings was limited.<sup>18</sup> Appendix 5 presents an overview of compliance with loan covenants.

28. NAC's chief financial officer provided limited oversight of the project financial accounting system, disbursement, records, and production of financial accounts. The PIU appointed a financial management specialist in August 2010 but the specialist stopped work in August 2013 when the contract was not extended. A replacement specialist was appointed on 14 June 2014, at the demand of ADB, and continued until loan closure. A formal project accounting system was not established until April 2013, at ADB's insistence. ADB reviewed audited project accounts for 2010 in October 2011<sup>19</sup> and considered them to have complied with loan agreement requirements, even though they had qualified opinions. Additionally, the CADIP financial accounts for 2011 comprised only of receipts and expenditure statement with reconciliation of cash movement. NAC submitted the 2011 audited project accounts on 24 September 2012. ADB undertook a desk review of the audit report and took steps to assist NAC in addressing issues and weaknesses identified in the report and in strengthening the financial management of the project, and issued a clarification letter in September 2012 on the 2011 audited project accounts.<sup>20</sup> Toward the end of 2013, ADB requested NAC to submit an implementation plan to address the fiduciary risks observed and outlined at a PSC meeting held on 24 April 2013. These fiduciary risks had been identified in the 2011 and 2012 audits,<sup>21</sup> when PNG's Auditor General's Office (AGO) provided qualified opinions. In particular, ADB was concerned about PIU-related expenditures, ledger, PIU staff contracts, PIU asset registers, record of procurement, staff advances, excessive travels, and related expenditures.<sup>22</sup>

29. In May 2014, ADB discussed with AGO the need to conduct a forensic audit of the CADIP accounts and required the following measures to be put in place: (i) establishment of a chart of accounts; (ii) adoption of an accounting system acceptable to ADB; (iii) reengagement of an international financial management specialist; (iv) establishment of a PIU detailed operations budget for 2014, covering recurrent and operating budgets, capital expenditure, and procurement; (v) establishment of a CADIP operation management manual; and (vi) engagement of a tier 1 independent auditing firm to be retained for the entire duration of the MFF. Appendix 6 shows the status of audited project financial statements since 2010 and a summary of the most current audit (2014). FY 2015 audit is completed and submitted to AGO for review in Sep 2016.

<sup>17</sup> Only three quarterly reports were produced during the six years of the project.

<sup>18</sup> Only two PSC meetings were held during the six years of the project, and the minutes produced are not as detailed on project discussions and approvals as expected by the covenants.

<sup>19</sup> Aide-mémoire of the project review mission, 31 October–4 November 2011.

<sup>20</sup> Aide-mémoire of the review mission, 27–28 January 2013.

<sup>21</sup> The 2012 audit revealed similar findings to 2011, indicating that NAC had taken no remedial action after the 2011 audit qualifications, and ADB observations were that the qualified aspects were continuing in 2013.

<sup>22</sup> Letter from ADB's Papua New Guinea Resident Mission to the managing director of NAC, dated 16 May 2014.

30. The 2014 annual project financial statements were submitted to ADB in July 2015 with qualified opinions regarding (i) opening balances, (ii) goods and services tax, (iii) staff advances, and (iv) expenses without valid supporting documents. Lessons learnt were noted and used as guidance when designing implementation arrangements for subsequent tranches.

## **H. Consultant Recruitment and Procurement**

31. International and national consultants were hired for engineering design, civil works supervision, capacity building, advisory services, and studies, recruited through quality- and cost-based selection with an 80:20 ratio, in line with ADB's Guidelines on the Use of Consultants. A DSC firm was hired to provide construction supervision, and individual consultants served as PIU advisors.

32. While advance procurement action was available, utilization of this mode was delayed. The initial core team that prepared project engineering civil works and costings comprised (i) an international airport specialist and deputy project director, mobilized on 17 November 2010; (ii) an international financial management specialist, mobilized on 26 August 2010, and (iii) an international firefighting specialist, mobilized on 27 September 2010, for a five month period. Advance procurement action for the DSC began on 30 March 2010 and the DSC was mobilized in June 2011, 15 months later than assumed at appraisal. The engagement of the DSC, originally until 31 December 2014, was later extended until 30 June 2015. The international environmental and safeguard specialist was recruited on 2 February for one month and hired intermittently for additional input as required. The international airport specialist and deputy project director resigned on 18 January 2012, after just 14 months, by mutual agreement. The international financial management specialist's contract expired on 26 August 2013, was replaced with a lag of nine months on 16 June 2014 for a one-year term, and extended by one year until 16 June 2016.

33. All procurement conformed to ADB's Procurement Guidelines. All contracts over \$3 million for civil works and over \$0.5 million for goods used international competitive bidding. Contracts below these thresholds used national competitive bidding and, as appropriate, minor contracts under \$100,000 were awarded through shopping.

34. Procurement of the Port Moresby ILS proceeded promptly and to plan, with the contract awarded in June 2010 and completed in April 2011. Procurement for the Port Moresby domestic apron extension was protracted: (i) CAA submitting prequalification of contractor documentation under advance procurement action to ADB on 26 June 2009; (ii) NAC issuing calls for Expressions of Interest on 30 July 2009; (iii) NAC submitting a prequalification report to ADB on 9 February 2010; (iv) NAC issuing bid invitation with closing date 11 June 2010; (v) an independent review by ADB later concluding that no contractor listed in NAC's prequalification report qualified; (vi) ADB approving the change in procurement from prequalification to post qualification; (vii) tenders being advertised again on 13 May 2011; (viii) NAC completing bid evaluation and, after protracted NAC board deliberation, submitting the bid evaluation report to ADB for final review in March 2012; and (ix) the contract being awarded in May 2012, (Appendix 4).

35. Procurement of the civil works contract packages for airport improvements was also prolonged. After 15 months of operation, the PIU requested that ADB vary the procurement plan<sup>23</sup> by (i) separating the civil works for Mount Hagen infrastructure improvements and the airport terminal into separate international competitive bidding packages; and (ii) combining the four national competitive bidding tenders for security fencing at Hoskins, Wewak, Gurney, and Goroka

<sup>23</sup> Project review mission of 13–21 February 2011.

into one international competitive bidding package. Following approval of this request, the design work for improvements at Mount Hagen, Hoskins, Wewak, and Gurney proceeded. The design focus of CADIP was on the Mount Hagen terminal and Hoskins airport improvements being the largest procurement packages, including a significant upgrade in the scope of works for Hoskins by adding a larger terminal to complement improvements on the runway apron.<sup>24</sup> Ultimately, the procurement of the airport improvement works (upgrade of runways, taxiways, and aprons) for Mount Hagen, Wewak, and Gurney did not proceed.

36. Procurement for the Mount Hagen terminal proceeded slowly: (i) tenders advertised on 15 February 2012, bid closing on 16 May 2012; (ii) ADB approval of contract on 21 January 2013; (iii) contract signing in April 2013; and (iv) contractor mobilization in June 2013, 4.5 years after loan effectiveness and coinciding with the original loan closing date. In February 2015, NAC requested that ADB approve the extension of the Mount Hagen terminal to provide separate processing facilities for international passengers, which increased the contract price by \$6 million. ADB approved this on 13 March 2015 after evaluating the sub project revised financials and was in accordance with outputs of Tranche 1.

37. Procurement of the Hoskins civil works also proceeded slowly: (i) tenders advertised on 15 February 2012, bid closing on 11 May 2012; (ii) ADB approval of contract on 13 February 2013; (iii) contract signing on 22 April 2013; and (iv) contractor mobilization in June 2013, 4.5 years after loan effectiveness. ADB received a request to increase the Hoskins terminal floor space from 454 square meters to 1,270 square meters in July 2014, which was not approved after evaluating the revised economic appraisal.

38. Procurement of the security fence contract for Hoskins, Wewak, Gurney, and Goroka proceeded more efficiently: (i) submission of tender documents for ADB approval in March 2011; (ii) tenders advertised in April 2011; (iii) ADB approval of contract in February 2012; and (iv) contract awarded and signed in August 2012, 29 months after loan effectiveness.

39. Procurement of the Port Moresby firefighting equipment tenders was initially delayed by the late recruitment of the international firefighting specialist, six months after loan effectiveness. Tenders for the fire trucks were advertised in the third quarter of 2011, some six months after the international firefighting specialist completed his assignment; the equipment contract was signed on 27 April 2012 and delivery was in March 2013.

## **I. Performance of Consultants, Contractors, and Suppliers**

40. The primary focus of the PIU recruitment was on engineering and design resources and while advance procurement action was permitted, recruitment was slow, which affected both procurement and outputs. NAC provided no performance assessment reports on the DSC, but it appears that the performance of the consultants was *satisfactory*. The exception is the initial international financial management specialist, whose contract was not renewed after three years of service because his performance was assessed as being poor.

41. The performance of goods suppliers, who generally delivered the contract at a cost below appraisal and within or earlier than appraisal estimates, was *satisfactory*. The performance of contractors was generally *satisfactory*, although their provision of operational airport terminals fell short of current international operational and security standards. NAC did not review and report on

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<sup>24</sup> Compared with upgrade work as proposed at appraisal.

any supplier or contractor performance. Had it done so, some of the performance issues now revealed might have been rectified more speedily.<sup>25</sup>

## **J. Performance of the Borrower and the Executing Agency**

42. The performance of the government is *partly satisfactory*: (i) untimely provision of CADIP counterpart funds, leading to late payment of contractors and consultants, leading in turn to delays in civil works completion; (ii) failure to confirm the appointment of the current NAC chief executive, who had been acting chief executive for almost three years, causing impediments to NAC restructuring and reform initiatives; (iii) failure to solve NAC board issues created by conflicts between the independent chairman and the then-chief executive, and to provide an official mandate for the board's operation; (iv) failure to allocate government budget funds to NAC to ensure continuing organizational reform, which would have created a more efficient and streamlined agency; and (v) poor progress with community service obligation support to NAC for regional airports.

43. The performance of NAC was *partly satisfactory*. NAC failed to (i) ensure quarterly PSC meetings, and it seems that only two such meetings were held since loan effectiveness; (ii) ensure submission of monthly and quarterly reports to ADB, and lodge annual reports on the CADIP website, only sporadic monthly and only two quarterly reports were submitted; (iii) comply with project financial accounts and audit report requirements, some of which remain outstanding; (iv) provide subproject completion reports and assessment of consultant and contractor performance; (v) prepare a CADIP Tranche 1 PCR; (vi) ensure that the DSC prepares subproject completion reports and performance assessments; and (vii) carry out non-engineering capacity development in the CADIP PIU, at least until recently. Positive aspects are the development of engineering capacity within the CADIP PIU, although integration with NAC's engineering branch activities did not progress. Closer coordination and oversight of the CADIP accounting and finance unit with NAC's finance branch could have been achieved. In hindsight, the magnitude of the organizational changes and reforms required to evolve from a government service department into four separately functional corporations was underestimated at appraisal.

## **K. Performance of the Asian Development Bank**

44. PNRM processed the program loan over nine months and was responsible for monitoring the project. While the project concept and design were relevant and consistent with government and ADB policies, the implementation framework was ambitious and did not take adequate account of endemic project implementation difficulties experienced in PNG under previous ADB loans.<sup>26</sup> The complexity of restructuring CAA and the need for strategic, operational, and financial management capacity support were underestimated. PNRM's project review and monitoring task would have benefitted from more experienced staff being deployed. There was a 12-month gap between ADB review missions in February 2012 and January 2013. The need for direct support and remedial action, particularly in the financial management area, was not acknowledged until mid-2013.

45. From mid-2013, PNRM took determined steps to improve the performance of the project. Regular, almost daily discussions were held, beyond the monthly coordination meetings. Some

<sup>25</sup> During PCR preparation, dialogue with PNGASL revealed the following issues with the Port Moresby ILS installation: "... few environmental issues which we believe could have been addressed during installation. The main issue being the waterlogging of the ILS reflective surface during rainy periods as a result of the lack of proper drainage system. This causes the ILS to fail. It would have been better if the reflective surface was raised to avoid waterlogging and a proper drainage built to drain out all excess water."

<sup>26</sup> In regard to shortfalls in government counterpart funding, poor project financial accounting, and noncompliance with audited project financial statements.

proposed scope changes were declined and outstanding procurement packages were reviewed and restructured. Resettlement issues were discussed and resolved before construction. In June 2014, ADB suspended the effectiveness of Tranche 2 contingent on outstanding issues being resolved (para. 29). This improved the performance of the project to a satisfactory level until project closing.

46. At project completion, financial reporting on subprojects, capacity-building support, and long-term maintenance contracts remains inadequate. ADB's performance is rated *partly satisfactory*; stronger monitoring involvement of experienced, senior international staff would have brought to light the serious implementation issues before 2011, and would have led to immediate remedial action, particularly regarding financial management and strategic organization.

### **III. EVALUATION OF PERFORMANCE**

#### **A. Relevance**

47. At both appraisal and completion, the project design was *highly relevant* to government and ADB policies and strategies to establish a sustainable civil aviation network in PNG, and thereby support economic growth and help meet the objectives of ADB's country strategy and program (particularly in the transport sector) and of the MTDS (para. 6). The government's priorities in the MTDS included the rehabilitation and maintenance of transport infrastructure. Its NTDP proposes major airport investments at Gurney, Madang, Mount Hagen, Nadzab, Tokua, and Wewak to facilitate growth and eventual competition on domestic routes, and to reform CAA to become self-sufficient and fund much of the remedial maintenance of airports and airways (para. 7 and 8). CAA's strategic plan is in line with the MTDS and NTDP policies and priorities (para. 8).

#### **B. Effectiveness in Achieving Outcome**

48. The project was assessed *less effective* in achieving the intended project outcomes. Civil works for the rehabilitation of airport infrastructure fell short, e.g., runways, taxiways, aprons, and navigational aids for Mount Hagen, Wewak, and Gurney were not completed.

#### **C. Efficiency in Achieving Outcome and Outputs**

49. Although a majority of the population will benefit from having access to air transportation, those actually using the airports financed under Tranche 1 are the immediate beneficiaries. Safer airports and more readily available, more frequent, more reliable, and lower-cost transport services will benefit the airlines and the traveling public who rely on them, and will increase travel to the project areas. The economic benefits foreseen from safer and better-maintained airports are: (i) more varied economic opportunities, higher production rates, and more direct sales as a result of better access to regional markets and towns; (ii) more sales for market vendors because of the increase in customers; (iii) better business for trade stores and industrial enterprises; and (iv) more opportunities to create and expand small and medium-sized enterprises. The anticipated social benefits are: (i) more agricultural sales through the upgrade of markets near airport sites; (ii) more employment through the civil works contracts; (iii) higher school enrollments and better access to health care through increased household incomes; and (iv) more opportunities to diversify and expand industrial and agricultural production. The economic internal rate of return (EIRR) for project 1 is about 8.8%. The actual outcomes and returns are significantly lower than those expected at appraisal, given that all benefits associated with airport improvement works at Mount Hagen, Wewak, and Gurney were lost when these works did not proceed as planned. The



loss can be quantified at about K120.1 million (\$45.2 million) in 2009 values,<sup>27</sup> so the project is assessed as *less efficient*.

#### **D. Preliminary Assessment of Sustainability**

50. The sustainability of the civil works carried out under the project is rated *less likely* because the 10-year maintenance contracts planned at appraisal were not implemented. The investment program's alternative proposal to set up a maintenance sinking fund to finance future maintenance work has not yet been realized. Future sustainability will depend on whether the NAC proceeds with the intended 10-year maintenance contracts.

#### **E. Impact**

51. All airport-related civil works were within the airports' existing boundaries, and their environmental impact was deemed temporary and reversible, and was mitigated with available methods. The mitigation and monitoring procedures set out in the initial environmental examination and the environmental management plan minimized the environmental impact from construction and operation to insignificant levels. The number of people that experienced the incidental impact of the civil works was small and well within the category of "no significant resettlement impact" under ADB's policy. No ethnic minority groups were adversely affected by the project. Social impacts were limited to better incomes from airport market sales thanks to better accessibility, and because air traffic into Hoskins generated more customers.

### **IV. OVERALL ASSESSMENT AND RECOMMENDATIONS**

#### **A. Overall Assessment**

52. The project was *partly successful* in implementing the civil works proposed at appraisal. It fell short in establishing a sustainable civil aviation network due to reduced scope. In addition, the reduced civil works output took 3.5 years longer to be completed than was assumed at appraisal. Prudent financial management proved to be a challenge given the persistent qualified opinions<sup>28</sup> in audited financial statements since 2010.

53. The 10-year maintenance contracts included in the civil works costs at appraisal did not materialize at Port Moresby, Mount Hagen, and Hoskins. At this time, given NAC's limited current maintenance budget and lack of sufficient government counterpart funding, it is unlikely that the sinking-fund modality will be implemented.

54. A significant component of project costs (\$17.3 million) was spent on capacity building and project implementation, although this expenditure was predominantly spent on engineering-related services and training, with only a small amount spent on areas covering environmental services, poverty and social impacts, financial administration, economic surveys and evaluation, and benefit monitoring. At the end of the project, no benchmark or project-end impact surveys were undertaken, nor was a functioning civil works financial management mechanism established to monitor project cost performance and record final project costs. The economic and financial reevaluations are presented in Appendixes 7 and Supplementary Appendix A respectively.

<sup>27</sup> Report and recommendation of the President (footnote 2), Appendix 9, Table A9.2: Summary of Economic Analyses.

<sup>28</sup> A qualified opinion is a cautionary written notice from an auditor stating that a company has not complied with generally accepted accounting principles (GAAP).

55. The project design was *highly relevant* but its outcome *less efficient*. The project achieved inferior economic and social outcomes and outputs, as shown in the economic reevaluation.

## **B. Lessons**

56. Early attention needs to focus on establishing effective financial management systems, including civil works budgeting, with costing and appraisal components that provide accurate monthly civil works performance reports as compared to budgets and contract values.

57. Enforcement of compliance with project financial systems, reporting, and audit requirements should be more stringent from the start. If not met, external financial auditors should be engaged early to rectify issues after the first year, rather than making a limited effort in the last years of project implementation. Late and ineffective compliance with the requirement to submit project financial reports has been a long-standing issue in PNG civil works loans. However, the audited project financial statement for fiscal year 2014 was submitted to ADB on time.

58. Despite a difficult start, but with close supervision and monitoring in the last three years of its life, the project monitoring unit's capacity to prepare future tranches has been strengthened, and advanced procurement was completed ahead of time.

## **C. Recommendations**

### **1. Project Related**

59. **Future monitoring.** The key to achieving sustained benefits from the completed airport investments lies in the regular maintenance of these facilities. The implementation of long-term maintenance contracts should be monitored during the remaining tranches of this program. Close attention is also required to overcome inadequate financial management and reporting, and to improve the financial performance and monitoring of civil works. Strict monitoring is needed to track changes in scope, and any significant expansion or reduction should be subject to full economic reevaluation.

60. A project benefit monitoring system with baseline and completion surveys to assess environmental, social, and economic impacts should be set up and implemented in the remaining tranches of the program.

61. **Covenants.** Future projects' covenants may incorporate a requirement for the allocation of an appropriate level of budgetary resources to maintain airport facilities for a specified period (e.g., at least 10 years after project completion).

62. **Further action or follow-up.** Action is required to ensure finalization of the government's PCR. Moreover, continuing implementation support is needed in future tranches in the areas of project financial management, project benefit monitoring, and project impact assessment (economic, financial, social, and environmental) to accurately evaluate project and program benefits and their sustainability.

63. **Additional assistance.** Consideration should be given to supporting NAC with ongoing capacity building in financial management, project benefit monitoring, and project impact assessment, as well as strategic management, to enhance the overall program's performance and sustainability.

64. **Timing of the project performance evaluation report.** The most appropriate time for a project performance evaluation report would be two years after loan closure.

## **2. General**

65. Project implementation can be improved in future tranches by ensuring that the scope of all civil works is identified and that detailed engineering design and cost estimates are prepared at appraisal in addition to advance procurement and recruitment of consultants.

66. The development of an effective baseline monitoring and evaluation system, including regular collection of detailed information on project performance variables, should be improved in future projects, as this would form the basis for more effective review missions and PCR reporting.

## **3. Specific**

67. Given the persistently qualified audit reports for Tranche 1, ensuring sustained and accurate financial reporting requires a strategic engagement, i.e., (i) a full-time international financial management specialist who is a chartered financial accountant; and (ii) a full-time tier-1 auditor. Both are to be engaged for the remainder of the MFF. It is advocated for future projects that loan effectiveness should be linked to the engagement of these specialists, among other key positions.

68. Supplementary Appendix A on the financial reevaluation suggests that a significant revenue increase is required for the project to be financially viable. This demands improvement in the service standards and upkeep of the facilities. It is therefore recommended that NAC venture into public-private partnerships for the improvement, operation, and maintenance of certain airports.



## DESIGN AND MONITORING FRAMEWORK

### A1.1: Investment Program

Design Summary	Performance Targets and Indicators	Data Sources and Reporting Mechanisms	Assumptions and Risks
<b>Impact</b> Economic growth and poverty reduction in project areas	<b>By 2020</b> 5% average annual economic growth in project areas <sup>a</sup> 20% decrease in the number of people below the poverty line in project areas <sup>b</sup> 20% increase in the income of formal and nonformal vendors from visitors in project areas <sup>c</sup>	Development partners' country reports. Government socioeconomic monitoring reports. Baseline survey and monitoring surveys at inception, midterm, and completion	<b>Assumptions</b> Continued political stability  Sufficient incentives for investment and growth in production  <b>Risk</b> Deterioration in domestic and external economic and financial conditions, constraining growth and development
<b>Outcome</b> Safer, more efficient, and more accessible all-weather air transport services in the project area	<b>By 2018 (end of MFF)</b> All national airports certified to meet ICAO safety and security standards  Seven national airports suitable for larger jet aircraft  Growth in passenger demand increased from 3% to 5% annually and in freight demand increased from 1% to 3% annually  Airport incidents (delays, diversions, and closures) due to safety or security decreased from an average of 4 per month to 1 per month	ICAO safety and security audit reports  CAA technical and annual reports  PNGAL, PNGASL, ADL annual reports	<b>Assumptions</b> Government and CAA counterpart funding provided as planned  Sustainable financing and execution of maintenance  <b>Risk</b> Delay in airline expansion and fleet modernization

Design Summary	Performance Targets and Indicators	Data Sources and Reporting Mechanisms	Assumptions and Risks
<p><b>Outputs</b>  <b>A. Reformed Institutions</b></p> <p>Sustainable and focused operational units established for airports, air traffic services, property development, and regulatory oversight</p>	<p><b>By 2018</b></p> <p>CAA restructure completed</p> <p>PNGAL, PNGASL, ADL revenues increase from 50% to 75% of operating costs</p> <p>CAA strategy updated at least every 3 years</p> <p>PNGAL, PNGASL, ADL prepare and implement own projects on schedule and at estimated cost</p> <p>Reduced ICAO audit findings of safety and security noncompliance</p> <p>Airport landing fees, terminal facility charges, and air navigation fees revised and implemented</p>	<p>PNGAL, PNGASL, and ADL annual reports</p>	<p><b>Assumptions</b></p> <p>Government support for institutional reforms</p> <p>Proper functioning of the investment program steering committee and project implementation unit counterpart staff qualified for program management</p> <p>Adequate counterpart funds and parallel external assistance made available on time</p> <p>Airlines' positive response to the civil aviation development program</p> <p><b>Risks</b></p> <p>Delayed or incomplete institutional restructuring</p> <p>Delayed passage of the appropriate legislation</p> <p>Limited capacity of CAA for program management</p> <p>Limited availability of capable contractors to complete projects on schedule</p>

Design Summary	Performance Targets and Indicators	Data Sources and Reporting Mechanisms	Assumptions and Risks
<p><b>B. Improved Infrastructure</b></p> <p>1. Airside infrastructure meets safety and security certification requirements</p> <p>2. Airside infrastructure and land-side facilities meet future operational and capacity requirements</p> <p>3. Airport maintenance practices improved</p>	<p><b>By 2018</b></p> <p>Runways, taxiways, and aprons certified at 14 national airports</p> <p>Safety and security improvements meet ICAO standards at 14 national airports</p> <p><b>By 2018</b></p> <p>Runways, taxiways, and aprons at 7 national airports meet airline fleet requirements</p> <p>New airport terminal at Mount Hagen with sufficient facilities for international processing</p> <p>Flight times reduced by an average of 10%</p> <p><b>By 2018</b></p> <p>Long-term performance-based maintenance contracts awarded for 21 national airports</p>	<p>Quarterly program reports</p> <p>National statistics PNGAL annual reports ICAO audit reports</p> <p>Quarterly program reports</p> <p>National statistics PNGAL annual reports</p> <p>Quarterly program reports</p>	

Design Summary	Performance Targets and Indicators	Data Sources and Reporting Mechanisms	Assumptions and Risks
<b>C. Improved Operations</b> 1. Equipment for communications navigation and surveillance equipment modernized to meet air traffic management requirements  2. Fire safety and rescue equipment meets operational requirements	<b>By 2018</b> Communications, navigation, and surveillance equipment in 4 national airports certified by ICAO  Air traffic management system commissioned at Port Moresby  <b>By 2018</b> Ten rescue or fire tenders commissioned at national airports	Quarterly program reports PNGASL annual reports  Quarterly program reports PNGASL annual reports	
<b>Activities with Milestones</b> <b>1. Institutional and Sector Reforms</b> 1.1 Formation of PNGAL, PNGASL, ADL project management units (2009) 1.2 Creation of CAA policy and strategy advisory unit (2010) 1.3 Recruitment of consultants (2010–2013) 1.4 Completion of national airports strategic management plan (2010) 1.5 Completion of CSO policy and review of tariffs (2012) 1.6 Completion of restructuring of independent safety regulator (2011) 1.7 Implementation of institutional and sector reforms (2009–2018)  <b>2. Rehabilitation and Improvement of Remaining 14 National Airports (2012–2017)</b> 2.1 Conduct of condition surveys (2009–2014) 2.2 Bid document preparation, tendering, and award of contracts (2009–2015) 2.3 Implementation of civil works contracts (2011–2018)  <b>3. Procurement of Equipment for Navigation, Communication, and Surveillance</b> 3.1 Preparation of design and bid documents (2010) 3.2 Tendering and award of equipment contracts (2010) 3.3 Implementation and commissioning of equipment contracts (2011–2014)  <b>4. Consulting Services (design, construction supervision, maintenance planning, and capacity development)</b> 4.1 Short-listing of consultants and finalization of requests for proposals (2010–2013) 4.2 Evaluation and contract award (2011–2014)			<b>Inputs</b> ADB: \$480.0 million  Government/CAA: \$85.0 million  Private Sector Participation: \$75.0 million

ADB = Asian Development Bank, ADL = Airport City Development Ltd., CAA = Civil Aviation Authority, ICAO = International Civil Aviation Organization, MFF = multitranchise financing facility, PNGAL = PNG Airports Ltd., PNGASL = PNG Air Services Ltd.

<sup>a</sup> In accordance with the Government's Medium Term Development Strategy (Government of Papua New Guinea. 2004. *Medium Term Development Strategy 2005–2010*. Port Moresby.)

<sup>b</sup> In accordance with the national target for Millennium Development Goals monitoring using the 1996 national average figure of 30% below the lower poverty line as the benchmark figure.

<sup>c</sup> Benchmark figures to be determined following the ICAO Universal Safety Oversight Audit Program report (December 2009).

## A1.2: Tranche 1

Design Summar	Performance Targets and Indicators	Data Sources and Reporting Mechanisms	Assumptions and Risks	Achievements
<b>Impact</b> Economic growth and poverty reduction in project areas	<b>By 2015</b> 5% average annual economic growth in project areas <sup>a</sup>  10% decrease in the number of people below the poverty line in project areas <sup>b</sup>  Increased income of formal and nonformal vendors derived from visitors in project areas by 10% <sup>c</sup>	Development partners' country reports  Government socioeconomic monitoring reports  Baseline survey and monitoring surveys at inception, midterm, and completion	<b>Assumptions</b> Continued political stability  Sufficient incentives for investment and growth in production  <b>Risk</b> Deterioration in domestic and external economic and financial conditions, constraining growth and development	No surveys have been undertaken to provide measurement of this impact.

Design Summar	Performance Targets and Indicators	Data Sources and Reporting Mechanisms	Assumptions and Risks	Achievements
<p><b>Outcome</b> Safer, more efficient, and more accessible all-weather air transport services in the project area</p>	<p><b>By 2013</b> Five national airports (Gurney, Hoskins, Mount Hagen, Port Moresby, Wewak) certified to meet ICAO safety and security standards</p> <p>Growth in passenger demand increased from 3% to 5% annually and in freight demand increased from 1% to 3% annually</p> <p>Airport incidents (delays, diversions, and closures) due to safety or security decreased from an average of 4 per month to 2 per month</p>	<p>ICAO safety and security audit reports</p> <p>CAA technical and annual reports</p> <p>PNGAL, PNGASL, ADL annual reports</p>	<p><b>Assumptions</b> Government and CAA counterpart funding provided as planned Sustainable financing and execution of maintenance</p> <p><b>Risk</b> Delay in airline expansion and fleet modernization</p>	<p>PNG airports are audited by CASA PNG in accordance with ICAO standards and certified for periods varying from 6 to 36 months. Port Moresby and 16 regional airports were certified in 2009, including the five national airports nominated.</p> <p>Current certificate details: Gurney (9 months, expiry 16 Sep 2016), Hoskins (6 months, expiry 31 April 2016, Mount Hagen (12 months, expiry 30 Sep 2016), Wewak (6 months expiry 19 Aug 2016)</p> <p>No formal data compilation was done by CADIP. However, during reappraisal, interviews and data were obtained from ANG, PNG Air, and Travel Air, which represent the seven project 1 airports. The aggregated data are considered to provide a reliable trend pattern for traffic forecasting. Generally, there is a strong underlying growth trend in aviation sector activity, involving 7% passenger growth and 5% growth in aircraft movements in last 10 years(2005-2015).</p>

Design Summa	Performance Targets and Indicators	Data Sources and Reporting Mechanisms	Assumptions and Risks	Achievements
<b>Outputs</b> <b>A. Reformed Institutions</b> Sustainable and focused operational units established for airports, air traffic services, property development, and regulatory oversight	<b>By 2013</b> CAA restructure completed CAA strategy updated Reduced ICAO audit findings of safety and security noncompliance <sup>c</sup>	PNGAL, PNGASL, ADL annual reports	<b>Assumptions</b> Government support for institutional reforms Proper functioning of the investment program steering committee and project implementation unit Availability of CAA counterpart staff qualified	CAA restructured and establishment of NAC, PNGASL, CASA PNG, and PNGAIC completed NAC: Strategic Direction CASA PNG: Corporate Plan 2016– 2020 PNGASL: Development Plan 2011–2015 PNGAIC: Mission and Vision Statements Organization rated by ICAO as at global standard
			for program management Adequate counterpart funds and parallel external assistance made available on time Airlines' positive response to the civil aviation development program <b>Risks</b> Delayed or incomplete institutional restructuring Delayed passage of the appropriate legislation Limited capacity of CAA for program management Limited availability of capable contractors to complete projects on schedule Delays in preparation and implementation of subsequent projects	ICAO audits no longer conducted, but air space regulatory performance indicators are monitored continuously. Currently PNG is below global average in Licensing, Operations, and Accident Investigation assessment criteria—minor improvements only achieved since 2009 because of unfilled staff positions at CASA PNG as a result of limited allocations from PNG budget.

Design Summary	Performance Targets and Indicators	Data Sources and Reporting Mechanisms	Assumptions and Risks	Achievements
<p><b>B. Improved Infrastructure</b></p> <p>1. Air-side infrastructure meets safety and security certification requirements</p> <p>2. Air-side infrastructure and land-side facilities meet future operational and capacity requirements</p> <p>3. Airport maintenance practices improved</p>	<p><b>By 2013</b> Runways, taxiways, and aprons certified at 5 national airports Safety and security improvements meet ICAO standards at 4 national airports</p> <p><b>By 2013</b> New airport terminal at Mount Hagen with sufficient facilities for international processing Flight times reduced by an average of 10%</p> <p><b>By 2013</b> Long-term performance-based maintenance contracts awarded for 5 national airports</p>	<p>Quarterly program reports National statistics PNGAL annual reports ICAO audit reports</p> <p>Quarterly program reports National statistics PNGAL annual reports</p> <p>Quarterly program reports</p>		<p>ICAO ratings for aerodromes, air navigation systems, airworthiness, and legislation at global standard. Many regional airports still only issued limited-period certification (3–12 months)</p> <p>Mount Hagen terminal completed late 2015, with international processing. No reduction in flight times because airport upgrades not completed.</p> <p>No long-term performance-based maintenance contracts in place as at June 2016</p>
<p><b>C. Improved Operations</b></p> <p>1. Equipment for communications navigation and surveillance equipment modernized to meet air</p>	<p><b>By 2013</b> Instrument landing system purchased and commissioned at Port Moresby</p>	<p>Quarterly program reports PNGASL annual reports</p>		<p>Instrument landing system purchased and commissioned at Port Moresby. PAPI landing aid system installed at Hoskins.</p>



Design Summary	Performance Targets and Indicators	Data Sources and Reporting Mechanisms	Assumptions and Risks	Achievements
traffic management requirements				
2. Fire safety and rescue equipment meets operational requirements	<b>By 2012)</b> Three rescue or fire tenders commissioned at Port Moresby airport	Quarterly program reports  PNGAL annual reports		Three firefighting equipment tenders commissioned at Port Moresby airport in March 2013.
<b>Activities with Milestones</b>  <b>1. Institutional and Sector Reforms</b> 1.1 Formation of PNGAL, PNGASL, ADL project management units (2009) 1.2 Creation of CAA policy and strategy advisory unit (2010) 1.3 Recruitment of consultants (2010–2013) 1.4 Completion of national airports strategic management plan (2010) 1.5 Completion of restructuring of independent safety regulator (2011) 1.6 Implementation of institutional and sector reforms (2009–2013)  <b>2. Rehabilitation and Improvement of 7 National Airports, Project 1</b> 2.1 Preparation of design and bid documents (2010) 2.2. Tendering and award of civil works contracts (2010) 2.3 Implementation of civil works contracts (2011–2013)  <b>3. Procurement of Equipment for Navigation, Communication, and Surveillance</b> 3.1 Preparation of design and bid documents (2010) 3.2. Tendering and award of equipment contracts (2010) 3.3 Implementation and commissioning of equipment contracts (2011–2013)  <b>4. Consulting Services (design, construction supervision, maintenance planning, and capacity development)</b> 4.1 Short-listing of consultants and finalization of requests for proposals (2010) 4.2 Evaluation and award of contract (2010)			<b>Inputs</b>  ADB: \$95.0 million  Government/CAA: \$17.0 million	Institutional and sector reforms completed broadly to schedule.  Rehabilitation and improvement of 7 national airports: only Hoskins airport completed and Mount Hagen terminal. All preparation, tendering, and implementation delayed by 2–3 years, with completion end 2015  Procurement of equipment for navigation, communication, and surveillance: completed to plan and under budget by April 2011  Design consulting services recruited with delay, and mobilization end of June 2011

ADB = Asian Development Bank, ADL = Airport City Development Ltd., CAA = Civil Aviation Authority, CASA PNG = Civil Aviation Safety Authority of Papua New Guinea, ICAO = International Civil Aviation Organization, NAC = National Airports Corporation, PNGAIC = Papua New Guinea Accident Investigation Commission, PNGAL = PNG Airports Ltd., PNGASL = PNG Air Services Limited.

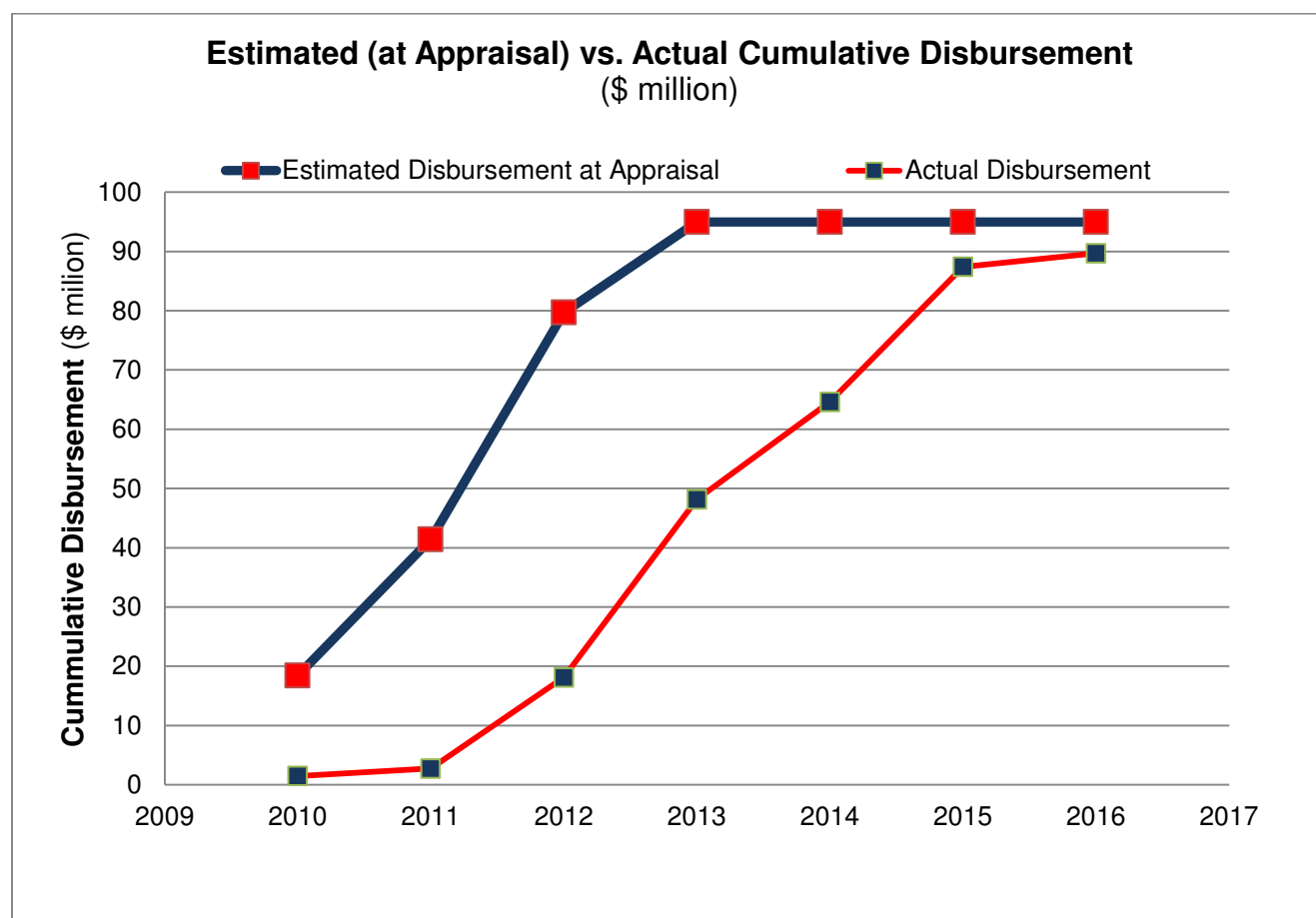
<sup>a</sup> In accordance with Government of Papua New Guinea. 2004. *Medium Term Development Strategy 2005–2010*. Port Moresby.

<sup>b</sup> In accordance with the national target for Millennium Development Goals monitoring using 1996 national average figure of 30% below the lower poverty line as the benchmark figure.

<sup>c</sup> Benchmark figures to be determined following ICAO Universal Safety Oversight Audit Program report (December 2000).

**PROJECTED AND ACTUAL DISBURSEMENTS**  
(\$'000)

Estimated Year	Estimated Disbursement at Appraisal	Actual Disbursement
2010	18.45	1.49
2011	41.42	2.74
2012	79.69	18.10
2013	95.00	48.17
2014	95.00	64.63
2015	95.00	87.41
2016	95.00	89.70



## CHRONOLOGY

Date	Event
<b>2009</b>	
March	PNG government requests ADB to prepare CADIP MFF
9–20 March	ADB technical assistance fact-finding mission
3 April	ADB approves small-scale project preparatory technical assistance (S-PPTA [TA 7263-PNG])
14 April	Draft concept paper circulated for interdepartmental review
27 April–2 May	ADB inception review mission
May	PIU established and PIU project director appointed
28 May	ADB concept clearance
18 May–3 June	ADB project fact-finding mission
26 June	CAA submits bidders prequalification documentation for the expansion of Port Moresby airport's domestic apron
15 July	ADB management review mission
27 July–7 August	ADB appraisal mission
30 July	NAC issues EOI under ICB method for Port Moresby parking apron extension
29 September	EOI for Port Moresby parking apron extension closed
November	PIU unit established during project loan processing, and fully functioning with 7 full-time staff members, including a full-time project director, during 2009
1 December	ADB approves CADIP MFF loan for \$480 million
<b>2010</b>	
13 January	Bid start date for instrument landing system at Port Moresby airport
28 January	Loan agreements for tranche 1 for \$95 million signed
February	Environmental permits secured
1 February	Start of full-time safeguards officer (environmental/social, local)
8 February	PNG Minister for Finance & Treasury approves document to establish CADIP project trust account
9 February	NAC submits to ADB prequalification report for Port Moresby parking apron extension
26 April–7 May	ADB inception mission
March	CADIP trust account opened
March	First-quarter GoPNG counterpart funding of K1.28 million secured
8 March	Bids start for Kavieng airport fencing
10 March	Bids close for instrument landing system at Port Moresby airport
22 March	Loan agreements for tranche 1 effective
30 March	Advance procurement action at different stages of processing: (i) construction supervision EOI advertised; (ii) prequalification and bids invited for Kavieng airport security fencing; (iii) evaluation of bids in progress for Port Moresby instrument landing system; (iv) EOI closed and bid evaluation completed for Port Moresby domestic apron; recruitment in progress for airport engineer, rescue and firefighting specialist, and financial management specialist
30 March	Procurement mode for Port Moresby domestic apron package changed from "prequalification" to "post qualification"
19 April	Bids close for Kavieng airport fencing
21 April	Bids start for Port Moresby domestic apron

Date	Event
April	Change in executing agency from CAA to NAC
5 May	ADB receives the first CADIP quarterly report
11 June	Bids close for Port Moresby parking apron extension
9–10 August	Firefighting specialist starts 5-month CADIP consultancy
27 September	Mobilization of international firefighting specialist
12–20 November	PIU staff attends ADB Regional Project Implementation and Administration Seminar
17 November	Mobilization of international airport specialist and deputy program manager
<b>2011</b>	
13–21 February	ADB project review mission
February	Proposed change to procurement plan: separation of civil works for Mount Hagen infrastructure improvements and for airport terminal into two separate ICB procurement packages
February	Proposed change to procurement plan: change in procurement method for remaining ICB civil works packages from prequalification to “postqualification”
25 February	Firefighting specialist completes CADIP consultancy
19 April	PNGASL commissions instrument landing system at Port Moresby airport
27 April	NAC submits CADIP FY2010 financial accounts to ADB and AGO for audit
April	Engagement of international financial management specialist
April	Kavieng fencing contract awarded
March	NAC submits to ADB design and bid documents for combined security fencing contract for Goroka, Wewak, Hoskins, and Gurney airports
April	NAC advertises tenders for combined security fencing contract for Goroka, Wewak, Hoskins, and Gurney airports
May	New tender advertised for Port Moresby domestic apron extension
28 June	DSC contract awarded and signed. Contracted until 31 December 2014
29 June	
11 July	DSC mobilized—original plan had envisaged engagement in second quarter of 2010
16 August	AGO issues qualified audit report on CADIP FY2010 financial accounts
August	Project steering committee meeting
Q3	Tender for Port Moresby fire trucks advertised
19 September	NAC submission to ADB of audited CADIP FY2010 financial accounts, qualified by AGO
31 October– 4 November	ADB project review mission
<b>2012</b>	
18 January	Resignation of international airport specialist and deputy program manager
3 February	ADB approves contract award for three Port Moresby fire tenders and equipment
15 February	NAC invites bids for Mount Hagen terminal building and Hoskins airport improvements

<b>Date</b>	<b>Event</b>
19–28 February February	ADB midterm review mission ADB approves combined security fencing contract for Goroka, Wewak, Hoskins, and Gurney airports, as well as Port Moresby domestic apron extension
2 March	NAC issues bids for civil works contract for Hoskins airport improvements
March	Completion of Kavieng security fencing contract
27 April	NAC signs contract for three Port Moresby airport fire tenders and equipment
April	Procurement Committee and ADB approve Port Moresby domestic apron extension contract
11 May	Bids close for civil works contract for Hoskins airport improvements
16 May	Bids close for Mount Hagen terminal building contract
24 May	AGO issues to NAC 2011 audit management letter on CADIP FY2011 financial accounts
May	Contract for Port Moresby domestic apron extension signed
May	ADB approves first extension of loan disbursement closing date for tranche 1 from 30 June 2013 to 30 June 2014
May	Security fencing contract for Kavieng airport completed
1 June	NAC response letter to AGO's 2011 audit management letter on CADIP FY2011 financial accounts
5 June	AGO issues to NAC 2011 audit management letter on CADIP FY2011 financial accounts
15 June	AGO issues qualified audit report on CADIP FY2011 financial accounts
29 June	NAC submits to ADB the audited CADIP FY2011 financial accounts, qualified by AGO
July	Civil works for Port Moresby domestic apron extension begin
July	NAC issues Taking Over Certificate for Kavieng fencing civil works
31 July	Mobilization of international contract management specialist
August	Fencing package contract for Goroka, Gurney, Hoskins, and Wewak airports awarded and signed
1–9 September Q3	Recruitment of short-term economist and planner Designs completed for Mount Hagen pavement strengthening, Wewak airport improvements, and Gurney airport improvements
<b>2013</b>	
18 January	Procurement Committee proposes award of contract for Hoskins airport improvement works
21 January	ADB approves contract for Hoskins airport improvement works
27–28 January	ADB review mission
4 February	International environmental safeguards specialist begins 1-month consultancy
12 February	Procurement Committee proposes award of Mount Hagen terminal contract
13 February	ADB approves Mount Hagen terminal contract
4 March	International environmental safeguards specialist ends consultancy
March	Three Port Moresby fire tenders and equipment commissioned
April	Mount Hagen terminal contract signed
22 April	Hoskins airport improvements contract signed

<b>Date</b>	<b>Event</b>
June	Start of Mount Hagen terminal works
June	Termination of initial international financial management specialist
June	Start of Hoskins airport improvement works
30 June	Initial loan disbursement closing date for tranche 1
6 August	AGO issues to NAC audit management letter on CADIP FY2012 financial accounts
23 August	NAC response letter to AGO's audit management letter on CADIP FY2012 financial accounts
11 September	AGO issues qualified audit report on CADIP FY2012 financial accounts
24 September	NAC submits to ADB the audited CADIP FY2012 financial accounts, qualified by AGO
September	Completion of civil works for Port Moresby domestic apron extension
September	Construction of combined security fencing for Goroka, Wewak, Hoskins, and Gurney airports completed
Q4 <b>2014</b>	Start of Mount Hagen terminal extension contract variation
13 March	ADB approval to extend DSC contract to 30 June 2015, with amount increase of \$0.2 million
27 March	NAC submits CADIP FY2013 financial accounts to ADB and AGO for audit
24 April	PSC meeting
16 May	ADB follow-up letter to NAC requesting implementation plan to address fiduciary risks identified at PSC meeting on 24 April 14
16 May	AGO issues to NAC an audit management letter on CADIP FY2013 financial accounts
23 May	NAC response letter to AGO's audit management letter on CADIP FY2013 financial accounts
29 May	ADB letter to NAC regarding response to AGO's qualified audit report on CADIP FY2013 financial accounts, and requirement for NAC to conduct a forensic audit with independent audit firm
12 June	NAC response letter to ADB regarding response to AGO's qualified audit report on CADIP FY2013 financial accounts
14 June	Engagement of replacement international financial management specialist
25 June	NAC/PNG government request to extend loan disbursement date for tranche 1 from 30 June 2014 to 31 December 2015
Q2	Advertisement for Nadzab, Mount Hagen, and Tokua fire tenders
June	Second extension of tranche 1 loan disbursement closing date, from 30 June 2014 to 31 December 2015
July	New financial management specialist recruited for PIU
9 July	ADB approves loan disbursement date for tranche 1 from 30 June 2014 to 31 December 2015
18 August	PNG Department of National Planning & Monitoring issues letter to NAC (incorrectly dated 30 January 2013) advising stop of 2014 government funding to CADIP until CADIP team solves outstanding audit issues raised in prior AGO audit qualifications
18 August	NAC response letter to PNG Department of National Planning &

Date	Event
	Monitoring outlining NAC action plan to address issues raised in AGO's audit qualifications
25 August	Contract management specialist's contract completed
29 August	AGO issues to Minister for Civil Aviation audit certificate on qualified CADIP FY2013 financial accounts
1 September	AGO issues qualified audit report on CADIP FY2013 financial accounts
12 September	ADB receives from NAC the PNG Department of National Planning & Monitoring letter advising stop of 2014 government funding to CADIP until the CADIP team solves outstanding audit issues raised in prior AGO audit qualifications
20 September	NAC submission to ADB of audited CADIP FY2013 financial accounts, qualified by AGO
24 October	ADB special project administration review mission
November	Contracts for three works and one goods packages for CADIP tranche 2 procured and awarded
<b>2015</b>	
23 January– 18 February	ADB project review mission
February	ADB mission agrees to extend DSC contract by 6 months to June 2015
February	ADB mission advises that lack of counterpart funds is affecting disbursements of contracted amounts and new contracts under CADIP tranche 2. GoPNG allocated only K26 million (\$10 million) of requested K70 million (\$29 million)
12 February	NAC request to ADB for reallocation of uncontracted funds under CADIP tranche 1 for extension of Mount Hagen terminal to include an international passenger-handling facility
13 March	ADB approves extension to Mount Hagen passenger terminal to provide separate processing facilities for international passengers, increasing contract price by \$6 million
24 March	NAC submission of CADIP FY2014 financial accounts to ADB and AGO for audit
Q1	CADIP PSC meeting
29 July	Auditor management letter issued for audited CADIP FY2014 financial accounts,
31 August	CADIP PSC meeting
31 December	Second extension of tranche 1 loan disbursement closing date

## PROJECTED AND ACTUAL IMPLEMENTATION SCHEDULE

[illegible]





Year	2009		2010			2011			2012			2013			2014			2015		
C. Consulting Services																				
1. PIU																				
Procurement of Consulting Service																				
Consulting Services																				
2. Design and Supervision																				
Procurement of Consulting Service																				
Consulting Services																				
3. Survey and Geotechnical Investigations																				
Procurement of Consulting Service																				
Consulting Services																				

## Legend

Appraisal estimate

Actual implementation

Intermittent investigation and design

Source: Civil Aviation Development Investment Program.

**STATUS OF COMPLIANCE WITH LOAN COVENANTS**  
**Loans 2588/2589/2590-PNG (SF): Civil Aviation Development Investment Project**

		<b>Covenants</b>	<b>Reference</b>	<b>Timing</b>	<b>Status</b>
	Sector Covenants				
		CAA shall carry out the Project with due diligence and efficiency, and in conformity with sound administrative, financial, engineering, environmental and air transport practices	Project Agreement - Article II, Section 2.01 (a)	During implementation	Mostly compliant, financial efficiency requires improvement.
		CAA shall, promptly as required, take all action within its powers to maintain its corporate existence, to carry on its operations, and to acquire, maintain and renew all rights, properties, powers, privileges and franchises which are necessary in the carrying out of the project or in the conduct of its business	Project Agreement- Article II, Section 2.11 (a).	During implementation	Compliant
	Environmental Covenants				
		The Borrower, through the PIU, shall ensure that (a) the Project is carried out in accordance with the Project design, and constructions and operations of project facilities shall comply with applicable Borrower's environment laws and regulations, and ADB's Environment Policy(2002); (b) the EMP as provided in the IEE is updated during final design of the particular Project facility, and submitted to ADB for approval before the issuance of the relevant bidding documents to any interested civil contractors; (c) the environmental mitigation measures specified in the EMP are incorporated into the bidding documents, and civil works contractors specifications include requirements to comply with the environmental mitigation measures provided in the EMP; (d) civil works contractors are closely supervised to ensure their compliance; (e) the project undertakes environment monitoring and reflects the results in the project progress reports and project completion reports; (f) adequate environmental management and training shall be provided to an environment officer of CAA to increase his/her capacity to enable environmental supervision and monitoring during construction and operations; and (g) adequate support shall be	L2589-PNG - Schedule 5 (B.3)	During implementation	Mostly compliant. EMPs for subprojects were updated during procurement and included in the approved bidding documents.  Progress reports were intermittent and no project completion report was prepared.  Training and support was not provided to NAC environment officer.

		provided to an environment specialist of CAA to ensure that he/she properly undertake the tasks.			
	Financial Covenants				
1		CAA shall (i) maintain separate accounts of the project and for its operations; (ii) have such accounts and related financial statements (balance sheet, statement of income and expenses, and related statements audited annually, in accordance with appropriate auditing standards consistently applied, by independent auditors whose qualifications, experience and terms of reference are acceptable to ADB; and (iii) furnish to ADB promptly after their preparation but in any event not later than 6 months after the close of the fiscal year to which they relate, certified copies of such audited accounts and financial statements and the report of the auditors relating thereto (including the auditors opinion on the use of proceeds of the Loans and compliance with the financial covenants of the Loan Agreements), all in the English language. CAA shall furnish to ADB such further information concerning such accounts and financial statements and the audit thereof as ADB shall from time to time reasonably request.	Project Agreement - Article II, section 2.09(a).	During implementation	<p>Not fully compliant. The investment program has operated largely independently of NAC chief financial officer and did not establish a full project financial accounting system until 2014. Submission of audited financial accounts to ADB was always late.</p> <p>FY2010 accounts submitted for audit on 27 April 2011; AGO issued qualified report on 16 August 2011; NAC submitted audited accounts to ADB on 19 September 2011</p> <p>FY2011 accounts submitted for audit in March 2012; AGO issued qualified report on 15 June 2012; NAC submitted audited accounts to ADB on 29 June 2012</p> <p>FY2012 accounts submitted for audit on 27 March 2013; AGO issued qualified report on 11 September 2013; NAC submitted audited accounts to ADB on 24 September 2013</p> <p>FY2013 accounts submitted for audit on 27 March 2014; on 18 August 2014, PNG Department of National Planning and Monitoring stops government budget allocation to CADIP until audit issues dating back to 2010 are addressed; AGO issued qualified report on 1 September 2014; NAC submitted audited accounts to ADB on 20 September 2013</p> <p>FY2014 accounts submitted for audit on 24 March 2014; KPMG issued qualified report on 29 July 2014; NAC submitted audited accounts to ADB on 29 July 2014</p> <p>As of 13 June 2016, forensic audit report commissioned by ADB for period 2010–2013 remains outstanding.</p>
2		CAA shall enable ADB, upon ADB's request, to discuss CAA's financial statements and its financial affairs from time to time with the auditors appointed by CAA pursuant to Section 2.09(a) here above, and shall authorize and require any representative of such auditors to participate in any such discussions requested by ADB, provided that any such discussion shall be conducted only in the presence of an authorized	<b>Project Agreement-</b> Article II, section 2.09(b).	During implementation	Compliant. ADB had regular discussions with NAC specifically on status of project accounts.

		officer of CAA unless CAA shall otherwise agree			
3		CAA shall put in place specific performance measures, satisfactory to ADB, to monitor a reduction in expenditure and an increase cash-flow. Specifically CAA shall approve and implement an Operating Ratio measure and an Accounts Receivables efficiency measure. The target benchmark for the Operating Ratio measure shall be to achieve a reduction in the fiscal year 2008 operating ratio of at least twenty percent (20%) by 2011. The benchmark for the Accounts Receivables efficiency measure shall be no more than seventy (70) days by 2012.	L2589-PNG-Article IV, section 4.01, (Schedule 5 J-11)	During implementation	Complied
4		The Borrower shall provide, on a timely basis, all funds and resources necessary for upgrading, rehabilitation, maintenance, land acquisition costs and compensation for asset and management of project facilities financed under the project.	L2589-PNG- Schedule 5 (I.10)	Annually during implementation	Mostly complied. Government failed to provide adequate counterpart funds in 2016.  Counterpart funds were K4.5 million in 2010; K8.0 million in 2011; K12 million in 2012; K16 million in 2013; and K26 million in 2015; reduced to K5 million in 2016.
	Social Covenants				
1		Land Acquisition and Resettlement: The Borrower and CAA shall ensure that all works under Component A are undertaken within existing airport boundary to the extent possible. In the event that any resettlement impacts are unavoidable for a particular project activity, the Borrower shall inform to ADB such situation and prepare and implement such RP. The RPs shall be prepared in accordance with agreed resettlement framework which complies with the Borrower's relevant laws and regulations and the ADB's Involuntary Resettlement Policy (1995). The Borrower shall allocate the adequate resources to prepare and implement the RP and supervise and monitor its implementation. The Borrower, through CAA, shall ensure that (i) any land acquisition activities shall not commence until the RP and its due diligence report is reviewed and approved by ADB; (ii) Works shall not start until the affected people identified in the respective RP have being compensated at replacement value for their losses due to the Project; (iii) the RP is	L2589-PNG-Schedule 5(c.4).	During implementation	Complied. No outstanding resettlement issue.

		updated after the completion of the detailed design, agreed on with transparent manner before taking possession of the acquired land, structures, and other assets. The Borrower shall finance all land acquisition and resettlement costs from its resources.			
2		Gender Development: CAA shall (a) encourage contractors to employ women in airport and market upgrading works such as for management and engineering works, (b) provide or cause to be provided, equal pay for men and women for work for equal type in accordance with national laws and international treaty organizations, and (c) provide or cause to be provided safe working conditions for both male and female workers. CAA shall ensure that specific provisions will be included in the bidding documents to implement (a) to (c) above. CAA shall review the achievement of hiring women in project progress reports and project completion report.	L2589-Schedule 5(0.5).	During implementation	Partial compliance. This requirement was captured in the bidding documents.  No review of the achievement of hiring women was provided in the infrequent and late project progress reports, and no project completion report was prepared, as the EA never got to do the completion report.
3		Ethnic Minorities: The Borrower shall ensure that the Project does not have any adverse impacts on the livelihood of ethnic minorities living in the project area. In the event of any unforeseen impact on the livelihood of ethnic minorities, (i) the Borrower shall inform ADB of such situation and prepare an ethnic minority development plan in accordance with the Borrower's relevant laws and regulations, and ADB's policy on Indigenous Peoples (1998); and (ii) the Borrower shall not give a notice to proceed to a civil works contractor until ADB has reviewed and approved such plan.	L2589-PNG-Schedule 5(E.6).	During implementation	Complied. The executing agency closely monitored progress during implementation. No ethnic minorities were impacted by the project.
4		Health Risk: The Borrower through CAA shall ensure that all civil works contractors participate in the STI and HIV prevention program to be funded under the Project in the construction campsites. In addition, CAA shall ensure that similar information on the risk of transmission of STI and HIV/AIDS is disseminated at the worksites and local communities, in coordination with National and Provincial Aids Councils and local non-government organizations working on STI and HIV. CAA shall ensure that civil works contracts have special provisions for participation in the STI and HIV prevention program, and shall strictly monitor its compliance.	L2589-PNG-Schedule 5(F.7)	During implementation	Complied. This requirement was captured in the bidding documents.
5		Labor Laws: The Borrower,	L25899-PNG-Schedule	During implementation	Complied. This requirement was

		through CAA, shall ensure that bidding documents and civil works contracts financed under the Project have special provisions that civil works contractors comply with all applicable labor laws and related international treaty obligations and do not employ child labor or trafficked labor for any activities. CAA shall strictly monitor its compliance.	5(G.8).		captured in the bidding documents.
6		Grievance and Redress Mechanism: Within 3 months of Effective Date, the Borrower shall establish a complaint and problem management mechanism and appoint a neutral agency, acceptable to ADB, to (i) review and address grievances of Project stakeholders, arising out of either the Investment Program, any of the service providers, or any person responsible for carrying out the Investment Program; and (ii) set the threshold criteria and procedure for (a) handling such grievances, (b) proactively responding to them, and (c) providing the stakeholders with notice of chosen mechanism/ action.	L2589-PNG-Schedule 5 (H.9)	During implementation	Late and partial compliance. NAC did not proceed with initial ADB requirement for use of neutral agency and establishment of website. Only in 2014 were MOUs signed for each airport project between NAC and respective provincial governments. No evidence was provided to verify existence and updates of these mechanisms.
	Other Covenants				
1		Established, Staffed, and Operating PMU/PIU: In the carrying out of the Project, CAA shall employ competent and qualified consultants and contractors, acceptable to ADB, to an extent and upon terms and conditions satisfactory to ADB.	Article II, Section 2.03(a), ???	During implementation	PIU established; complied
2		CAA shall be the Project Executing Agency. It shall be responsible for implementing the Investment Program. A PSC, chaired by the Executive Officer of CAA and comprising representatives from the Papua New Guinea Air Service Ltd., Department of Treasury, Department of National Planning and Monitoring, Department of Transport, Air Niugini Airlines and other aviation stakeholders, if necessary, shall (a) oversee the implementation of the Investment Program, (b) monitor Project Implementation, (c) approve airports for subsequent projects under the Investment Program, and (d) provide guidance. The PSC shall meet at least quarterly.	L2589-PNG-Schedule 5 (a.1)	Quarterly	Limited compliance. Only 2 PSC meetings held (August 2011 and August 2014) during 6 years of project implementation. Limited oversight, monitoring, approval, and guidance provided to PIU, except by chief executive officer, NAC.
3		a) CAA shall furnish to ADB all such reports and information as ADB shall reasonably request concerning (i) the loans and the expenditure of the proceeds thereof; (ii) the Goods, works and	the Project Agreement- Article II, Section 2.08.	During implementation	Partial compliance. Only intermittent and infrequent monthly expenditure details on the project submitted to ADB. Consistency in those submissions that were received was lacking.

		<p>consulting services and other items of expenditure financed out of such proceeds; (iii) the Project; (iv) the administration operations and financial condition of CAA; and (v) any other matters relating to the purposes of the Loans.</p> <p>(b) Without limiting the generality of the foregoing, CAA shall furnish to ADB quarterly reports on the execution of the Project and on the operation and management of the Project facilities. Such reports shall be submitted in such form and in such detail and within such a period as ADB shall reasonably request, and shall indicate among other things, progress made and problems encountered during the quarter under review, steps taken or proposed to be taken to remedy these problems, and proposed program of activities and expected progress during the following quarter.</p> <p>(c) Promptly after physical completion of the Project, but in any event not later than three 13\ months thereafter or such later date as ADB may agree for this purpose, CAA shall prepare and furnish to ADB a report, in such form and such detail as ADB shall reasonably request, on the execution and initial operation of the Project, including its cost, the performance by CAA of its obligations under this Project Agreement and the accomplishment of the purposes of the Loans.</p>			<p>Only two quarterly reports were submitted during the 6 years of project implementation.</p> <p>No project completion report was prepared.</p>
	ARTICLE IV Particular Covenants				
1		The Borrower shall cause CAA to carry out the Project with due diligence and efficiency and in conformity with sound administrative, financial, engineering, environmental and air transport practices.	<u>L2588-PNG-</u> Article IV Section 4.01(a),	During implementation	Mostly Compliant, financial efficiency requires improvement
2		(b) In the carrying out of the Project and operation of the Project facilities, the Borrower shall perform, or cause to be performed, all obligations set forth in Schedule 5 to the Special Operations Loan Agreement.	<u>L2588-PNG-</u> Article IV Section 4.01(b),	During implementation	Mostly compliant. Regular reporting needs improvement
3		The Borrower shall make available to CAA, promptly as needed and on terms and conditions acceptable to ADB, the funds, facilities, services, land and other resources which are required, in addition to the proceeds of the	<u>L2588-PNG-</u> Article IV Section 4.02,	During implementation	Partly complied. Government has failed to provide adequate counterpart funds in 2016. Counterpart funds were K4.5 million in 2010; K8.0 million in 2011; K12 million in 2012; K16 million in 2013;



		Loan, for the carrying out of the Project.			and K26 million in 2015; reduced to K5 million in 2016.
4		The Borrower shall ensure that the activities of its departments and agencies with respect to the carrying out of the Project and operation of the Project facilities are conducted and coordinated in accordance with sound administrative policies and procedures.	<u>L2588-PNG</u> - Article IV Section 4.03,	During implementation	Mostly compliant. Steering Committee meeting were held intermittently and conducted after few reminders from ADB.
5		The Borrower shall take all action which shall be necessary on its part to enable CAA to perform its obligations under the Project Agreement, and shall not take or permit any action which would interfere with the performance of such obligations.	<u>L2588-PNG</u> - Article IV Section 4.04	During implementation	Mostly compliant. Lack of funding hampered the effectiveness of NAC in delivering the project.
	ARTICLE IV Particular Covenants				
1		The Borrower shall enable ADB's representatives to inspect the Project, the Goods and Works financed out of the proceeds of the Loan, all other plants, sites, properties and equipment of the Borrower, and any relevant records and documents.	<u>L2589</u> - Article IV 4.02, schedule 5 A.2 and J.11	During implementation	Complied.
2		The Borrower shall take all action which shall be necessary on its part to enable CAA to perform its obligations under the Project Agreement, and shall not take or permit any action which would interfere with the performance of such obligations.	<u>L2589</u> - Article IV , 4.03, schedule 5 A.2 and J.11	During implementation	Mostly compliant. Lack of funding hampered the effectiveness of NAC in delivering the project.
3		A PIU, headed by Director-ADB Project, shall implement the sector policy under the Investment Program and Component A of the Project. The PIU shall engage all consulting services and conclude airport improvement contracts under the Investment Program. The PIU include staff for civil engineering, aviation equipment engineering, financial accounting, economics, environmental and procurement.	<u>L2589</u> - Schedule 5 A.2	During implementation	<b>Complied</b>
4		CAA shall put in place specific performance measures, satisfactory to ADB, to monitor a reduction in expenditure and an increase cash-flow. Specifically CAA shall approve and implement an Operating Ratio measure and an Accounts Receivable efficiency measure. The target benchmark	<u>L2589</u> - Schedule 5 J.11	During implementation	Not complied due to delay in implementation. As of June 2016, this is still not in compliance and work in progress.

		for the Operating Ratio measure shall be to achieve a reduction in the fiscal year 2008 operating ratio of at least twenty percent (20%) by 2011. The benchmark for the Accounts Receivable efficiency measure shall be no more than seventy (70) days by 2012.			
	ARTICLE IV Particular Covenants				
1		The Borrower shall enable ADB's representatives to inspect the Project, the Goods and Works financed out of the proceeds of the Loan, all other plants, sites, properties and equipment of the Borrower, and any relevant records and documents.	<u>L2590</u> - Article IV 4.02,	During implementation	Complied.
2		The Borrower shall take all action which shall be necessary on its part to enable CAA to perform its obligations under the Project Agreement, and shall not take or permit any action which would interfere with the performance of such obligations.	<u>L2590</u> - Article IV , 4.03	During implementation	Mostly compliant. Lack of funding hampered the effectiveness of CAA/NAC in delivering the project.
	ARTICLE II Particular Covenants				
1		In the carrying out of the Project and operation of the Project facilities, CAA shall perform all obligations set forth in each of the Loan Agreements to the extent that they are applicable to CAA.	Project agreement- Sections 2.01(b)	During implementation	Mostly compliant. Lack of funding hampered the effectiveness of CAA/NAC in delivering the project.
2		CAA shall make available, promptly as needed, the funds, facilities, services, equipment, land and other resources which are required, in addition to the proceeds of the Loans, for the carrying out of the Project.	Project agreement- Sections 2.02	During implementation	Partly complied. Government has failed to provide adequate counterpart funds in 2016.  Counterpart funds were K4.5 million in 2010; K8.0 million in 2011; K12 million in 2012; K16 million in 2013; and K26 million in 2015; reduced to K5 million in 2016.
3		Except as ADB may otherwise agree, all Goods, Works and consulting services to be financed out of the proceeds of the Loans shall be procured in accordance with the provisions of Schedule 4 to the Special Operations Loan Agreement. ADB may refuse to finance a contract where Goods, Works or consulting services have not been procured under procedures substantially in accordance with those agreed between the Borrower and ADB or where the terms and conditions of the contract are not satisfactory to	Project agreement- Sections 2.03(b),	During implementation	Complied.

		ADB.			
4		CAA shall carry out the Project in accordance with plans, design standards, specifications, work schedules and construction methods acceptable to ADB. CAA shall furnish, or cause to be furnished, to ADB, promptly after their preparation, such plans, design standards, specifications and work schedules, and any material modifications subsequently made therein, in such detail as ADB shall reasonably request.	Project agreement-Sections 2.04,	During implementation	Complied.
5		CAA shall take out and maintain with responsible insurers, or make other arrangements satisfactory to ADB for, insurance of the Project facilities to such extent and against such risks and in such amounts as shall be consistent with sound practice.	Project agreement-Sections 2.05(a)	During implementation	Complied.
6		Without limiting the generality of the foregoing, CAA undertakes to insure, or cause to be insured, the Goods to be imported for the Project and to be financed out of the proceeds of the Loans against hazards incident to the acquisition, transportation and delivery thereof to the place of use or installation, and for such insurance any indemnity shall be payable in a currency freely usable to replace or repair such Goods.	Project agreement-Sections 2.05(b)	During implementation	Complied.
7		CAA shall maintain, or cause to be maintained, records and accounts adequate to identify the Goods, Works and consulting services and other items of expenditure financed out of the proceeds of the Loans, to disclose the use thereof in the Project, to record the progress of the Project (including the cost thereof) and to 3 reflect, in accordance with consistently maintained sound accounting principles, its operations and financial condition.	Project agreement-Sections 2.06,	During implementation	Complied.
8		ADB and CAA shall cooperate fully to ensure that the purposes of the Loans will be accomplished.	Project agreement-Sections 2.07(a)	During implementation	Complied.
9		CAA shall promptly inform ADB of any condition which interferes with, or threatens to interfere with, the progress of the Project, the performance of its obligations under this Project Agreement, or the accomplishment of the purposes of the Loans.	Project agreement-Sections 2.07(b)	During implementation	Complied.

10		ADB and CAA shall from time to time, at the request of either party, exchange views through their representatives with regard to any matters relating to the Project, CAA and the Loans.	Project agreement-Sections 2.07(c),	During implementation	Complied.
11		CAA shall enable ADB's representatives to inspect the Project, the Goods and Works financed out of the proceeds of the Loans, all other plants, sites, properties and equipment of CAA and any relevant records and documents.	Project agreement-Sections 2.10,	During implementation	Complied.
12		CAA shall at all times conduct its business in accordance with sound administrative, financial, environmental and air transport practices, and under the supervision of competent and experienced management and personnel.	Project agreement-Sections 2.11(b)	During implementation	Partly compliant. Collection of revenues is being improved. Reliance of Government funding affecting the operation of CAA/NAC.
13		CAA shall at all times operate and maintain its plants, equipment and other property, and from time to time, promptly as needed, make all necessary repairs and renewals thereof, all in accordance with sound administrative, financial, engineering, environmental, air transport, and maintenance and operational practices.	Project agreement-Sections 2.11(c)	During implementation	Partly compliant. Regular maintenance is performed on needed basis. Long-term performance based maintenance contract is yet to be implemented.
14		Except as ADB may otherwise agree, CAA shall not sell, lease or otherwise dispose of any of its assets which shall be required for the efficient carrying on of its operations or the disposal of which may prejudice its ability to perform satisfactorily any of its obligations under this Project Agreement.	Project agreement-Sections 2.12,	During implementation	Complied.
15		Except as ADB may otherwise agree, CAA shall apply the proceeds of the Loans to the financing of expenditures on the Project in accordance with the provisions of the Loan Agreements and this Project Agreement, and shall ensure that all Goods, Works and consulting services financed out of such proceeds are used exclusively in the carrying out of the Project.	Project agreement-Sections 2.13	During implementation	Complied.

ADB = Asian Development Bank, AGO = Auditor's General Office, CAA = Civil Aviation Authority, EMP = Environmental Management Plan, KPMG = KPMG International, NAC = National Airports Corporation, PIU = Project Implementation Unit, PNG = Papua New Guinea, PSC = Program Steering Committee, RP = Resettlement Plan.

## SUMMARY OF AUDITED PROJECT FINANCIAL STATEMENTS

Fiscal year					
2010	2011	2012	2013	2014	2015
Auditor's Opinion: <b>Qualified</b> with the following remarks;  1. Cash at bank and Petty cash cannot be fully audited due to stale and unverified cheques. 2. Salaries were not provided due to the absence of payroll records.	Auditor's Opinion: No declared opinion* with 6 remarks;  1. Cash at bank and Petty cash – reconciliation not done properly. 2. Staff advance register not observed properly. 3. Fixed asset register was not maintained. 4. Procurement not following the procedures. 5. Non-compliance with Superannuation Act. 6. Abuse of Car/Motor vehicle allowance.  <u>Note:</u> Similar remark was provided for <b>Qualified</b> audit result for 2010.	Auditor's Opinion: No declared opinion* with 3 remarks;  1. Improper cash at bank and Petty Cash reconciliation. 2. Staff advance register not observed properly. 3. Fixed asset register was not maintained.  <u>Note:</u> Similar remark was provided for <b>Qualified</b> audit results for 2010, 2013 & 2014.	Auditor's Opinion: <b>Qualified</b> with the following remark.  Staff advances were paid from the project fund, which in the opinion of the auditor should not have been used.	Auditor's Opinion: <b>Qualified</b> with the following notes.  1. Lack of sufficient and accurate records on Account balances on cash at banks, taxes receivables, Capital works in progress, Staff advances and current liabilities. 2. Inaccurate recording of taxes. 3. Staff advances were paid from the project fund which in the opinion of the auditor should not have been used. 4. Expenses without valid supporting documentation.	Auditor's Opinion:  Audit in progress and due 30 June 2016
Audited by: AGO	Audited by: AGO	Audited by: AGO	Audited by: AGO	Audited by: KPMG	Audited by: KPMG

Note: AGO—Auditor General's Office of Papua New Guinea, KPMG—tier 1 auditor.

\* The audit report states that "Financial statements of the Civil Aviation Investment Program are based on proper accounts and records; ..."

## FINANCIAL MANAGEMENT AREAS FOR IMPROVEMENTS

Key Theme	Observation	Impact on audit	Audit Outcome	Action	Priority
<b>Cash Management</b>	Deficiencies identified in the maintenance of the cash account	Increased testing required	Audit differences identified and corrected.	Control strengthening opportunities identified	High
<b>Supporting Documentation</b>	Several critical documents were not available or complete.	Increased the level of testing required throughout the audit.	Qualifications on the audit opinion	Control strengthening opportunities identified	High
<b>Completeness of claims to ADB</b>	CADIP is entitled to claim certain funds from ADB for expenditure throughout the project	Minimal impact on the audit as ADB funds are only recorded when received	Recommendation below	Review the backlog of claims and implement an effective process moving forward	High
<b>GST and Tax Position</b>	CADIP tax positions on audit	Several transactions needed greater review given the unclear tax position	Qualifications on the audit opinion	Tax review required	High
<b>Project Asset Management</b>	There is no fixed asset register	KPMG reconstructed a fixed asset register as part of the audit process	Audit differences identified and corrected	Review & implementation of asset management processes	Moderate
<b>Cut-off and Accuracy of Accounting</b>	Errors were identified during the Cut-off procedures and between classification of some expenditure	Additional work required to ensure cut-off is accurate and classification between is correct	Audit differences identified and corrected	Strengthen controls around close out procedures and account recognition	Moderate

Source: KPMG, CADIP year-end management letter 31 December 2014 and 29 July 2015, Port Moresby.

## ECONOMIC REEVALUATION OF PROJECT 1 AIRPORTS

### A. Introduction

1 Air transport plays a vital role in the economic and social development of Papua New Guinea (PNG) because of the mountainous terrain in vast areas of its inland regions, where road access to communities is difficult, and its numerous islands, where coastal and interisland shipping services are infrequent and involve long journey times. Besides access to government, health, community, and law-and-order services, airports are increasingly providing access to mobile communication facilities required to provide reliable service throughout the country.

2 Starting in the 1990s, the deterioration of airport infrastructure and ground navigation aids began to affect the PNG economy by increasing air service operating costs and reducing the safety of air services. Failure to reverse these adverse trends was expected to lead to restrictions on some airport operations, the provision of air services by smaller aircraft, a reduction in air service frequency, and even the cessation of regular passenger transport (RPT) operations into the worst-affected airports.

3 The first tranche of the Civil Aviation Development Investment Program (CADIP) multitranchise financing facility (MFF) to improve compliance with the safety and security standards of the International Civil Aviation Organization (ICAO) was to involve: (i) designing and supervising airport improvements, and preparing and administering long-term maintenance contracts for nine national airports; and (ii) monitoring the socioeconomic benefits from the operation and maintenance improvements to help PNG meet its need for continuous domestic air service operations to its dispersed communities and for mobile communication infrastructure. This meant carrying out urgently needed upgrades and improvements at the highest-priority airports. Aviation sector safety in compliance with ICAO standards was to be improved and regional economic growth stimulated through construction activity and economic growth in local communities.

### B. Traffic Forecasts

4. At appraisal, domestic RPT air services were provided by two operators—Air Niugini (ANG) and Airlines of Papua New Guinea (APNG). ANG, the dominant operator, used five Fokker 100 (F100) planes, a 100-seat regional jet aircraft, and eight De Havilland DHC-8 (Dash 8) turboprop regional airliners, seating 30–40 passengers in the 100 and 200 series aircraft and 50 passengers in the stretched 300 series. APNG operated a fleet of 15 Dash 8 aircraft, eight of the smaller 100 and 200 series, and seven of the stretched 300 series.

5. At project completion in 2016, domestic RPT air services were being provided by three air service operators, Air Niugini (ANG), PNG Air (formerly APNG), and since 2012, Travel Air. ANG, including its subsidiary Link PNG,<sup>1</sup> is the dominant operator using 1 B737-700, a 97-seat regional or international jet airliner,<sup>2</sup> six F100, a 98-seat regional jet aircraft, two Fokker 70 (F70),

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<sup>1</sup> [Link PNG](#) is a low-cost subsidiary and began operations on 1 November 2014, using a 'low cost carrier' model. It plans to provide affordable and safe services to the people of [PNG](#), serving domestic [routes](#) on a community service (CSO) obligation, which mandates not only to maintain remote and less profitable services, but progressively expand them to meet the growing transport needs of the nation. Link PNG is to be a smarter, less-frills, and low-cost carrier that will principally operate on routes to the provincial and district centers that are currently being served by the ANG Dash 8 [fleet](#).

<sup>2</sup> Used mainly for international flights and to some domestic ports, including Momote (Manus Island), on demand.

a 68-seat regional jet aircraft, three Bombardier Q400, a 70-seat regional turboprop aircraft, and seven De Havilland DHC-8 (Dash 8) turboprop regional airliners, seating 50–36 passengers in the 300 and 200 series aircraft. PNG Air operates a fleet of two ATR 72-600 72-seat twin-engine turboprop short-haul regional airliner aircraft,<sup>3</sup> and 11 Dash 8 300 series aircraft. The Dash 8 can be reconfigured for passengers and freight with seating capacities of 36, 28, or 20. Travel Air is based in Madang and operates three Fokker 50 turboprop aircraft, a small 50-seat regional aircraft. While ANG and PNG Air hub operations out of Jackson Airport (Port Moresby), Travel Air is developing regional hubs in Lae and Madang.

6. Route traffic records are maintained essentially for the purpose of charging aviation sector fees, and aggregation of the data for statistical purposes is limited, being based only on aircraft movements. National Airports Corporation (NAC) compiles some passenger data from airline returns, which are incomplete, and no records are consistently maintained for freight carried. No consistent survey work was undertaken by the CADIP project implementation unit (PIU). During this reappraisal, interviews and data were obtained from ANG, PNG Air, and Travel Air, which represent all RPT aircraft movements, and passengers and freight handled through the seven project 1 airports. The aggregated data are considered to provide a reliable trend pattern for traffic forecasting. Table A7.1 outlines past air traffic statistics.

7. Growth trends are somewhat distorted by services being restricted at some airports, a high degree of second-level charter and private aircraft activity from selected airports (e.g., Mount Hagen), and the exogenous impact on specific airports due to exploration, mining, and resource processing sites being developed and exploited. Generally, there is a strong underlying growth trend in aviation sector activity, involving 7% passenger growth and 5% growth in aircraft movements. Because of the small relative size of RPT operations in PNG, a change to larger-capacity aircraft can have a distorting effect on steady aircraft movement growth at individual airports.

### **C. Methodology**

8. The methodology used follows the standard practice of comparing economic costs and benefits with and without the project, using the economic internal rate of return (EIRR) and EIRR sensitivities to further increases in costs and decreases in benefits as decision criteria.

9. A 20-year evaluation period was used and the residual value at the end of this period was assumed to be zero. The benefits and costs of the project occur as an annual stream, at different points in time, as benefits start after expenditure has been completed. All costs and benefits used for the analysis are in 2009 values.

### **D. Costs**

10. The financial costs of the subprojects consist of all incremental capital expenditures, but exclude price contingencies and interest and other charges during construction. The incremental operation and maintenance costs of the project facilities were estimated on the basis of cost parameters developed by the consultant. The project's economic costs include the resource costs for traded and nontraded goods, materials, and labor. All cost elements are valued at border prices, with all taxes and duties excluded. A standard conversion factor of 0.9 was applied to the financial costs of nontraded inputs to calculate economic prices. Table A7.2

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<sup>3</sup> PNG Air has forward delivery orders and planned to have three of these aircraft operating by the end of March 2016, five by the end of 2016, and seven by the end of 2017.

presents the economic costs for each airport. Project facilities are expected to have an average economic life of 20 years.



Table A7.1: Air Traffic Statistics for Selected National Airports

Item	2005	2008	2009 Est.	2009 Actual	2010	2011	2012	2013	2014	2015	Growth Rate 2008–
<b>Aircraft Movements<sup>a</sup></b>											
Goroka	9,107	8,488	8,500	8,709	8,523	11,172	11,220	9,085	11,395	10,127	2.6%
Gurney	1,811	1,690	1,950	2,309	2,426	2,256	2,734	2,987	2,866	2,706	7.0%
Hoskins	4,530	2,965	3,000	2,907	3,182	3,874	5,458	5,706	5,458	5,003	7.8%
Kavieng	1,613	1,849	1,950	2,091	1,936	2,399	2,445	2,394	2,168	2,173	2.3%
Mount Hagen	14,209	14,804	15,000	15,299	18,479	18,730	23,270	21,064	20,869	20,326	4.6%
Port Moresby	30,993	36,189	37,000	39,151	42,342	44,234	50,490	53,164	54,419	51,934	5.3%
Wewak	6,656	4,538	6,800	3,935	4,289	3,954	5,017	6,726	6,673	5,954	4.0%
<b>Passengers<sup>b</sup></b>											
Goroka	47,754	45,258	54,100	67,257	74,190	88,299	85,188	74,129	82,338	81,256	8.7%
Gurney	29,273	38,539	46,000	42,548	48,184	50,305	57,930	59,547	57,882	63,978	7.5%
Hoskins	90,203	33,581	50,581	62,089	71,276	69,783	67,230	74,853	61,295	56,484	7.7%
Kavieng	30,288	24,093	44,000	42,687	45,971	45,955	47,822	48,151	47,798	51,947	11.6%
Mount Hagen	95,203	113,602	152,000	136,488	170,195	187,598	214,873	219,115	224,610	230,653	10.6%
Port Moresby	586,583	1,020,187	1,219,000	875,777	886,052	896,447	906,965	917,605	928,371	995,597	4.6%
Wewak	47,658	26,018	31,100	41,598	60,310	57,927	61,210	69,657	90,928	95,267	20.4%
<b>Freight and Mail<sup>c</sup></b>											
Goroka	190	348	415	416	437	388	243	278	306	357	8.4%
Gurney	162	237	325	239	261	220	225	275	324	331	9.0%
Hoskins	424	691	575	437	514	387	324	253	368	308	(9.9%)
Kavieng	155	232	465	237	217	172	165	196	263	272	5.1%
Mount Hagen	388	674	1,160	1,333	1,303	1,152	1,406	1,601	1,783	1,190	14.8%
Port Moresby	3,792	5,491	7,625	5,491	7,625	7,714	7,805	7,897	7,989	8,083	8.2%
Wewak	565	464	575	301	467	347	352	495	540	324	(5.1%)

( ) = negative, Est. = estimated.

a Includes regular passenger transport, charter, and private/other aircraft activity.

b Includes regular passenger transport activity only; excludes all charter activity for all operators.

c Includes Air Niugini cargo and mail figures only (70%–80% of total).

Source: National Airports Corporation, Air New Guinea, PNG Air, and Travel Air data.

## E. Benefits

11. The project primarily aimed to improve aviation operations and safety standards by rehabilitating existing facilities to cater to current aircraft types (F100), e.g., runways, taxiways, aprons; airfield drainage; maintenance, operational, and terminal facilities; and navigational equipment. To measure project benefits, the willingness-to-pay approach was applied to estimate incremental aviation revenues for airside and landside operations. Other economic benefits considered for the analysis are (i) aircraft operating cost savings accrued from non-incremental movement of aircraft; (ii) passenger time savings accrued from non-incremental movement of aircraft; (iii) benefits from safety improvements; and (iv) benefits to regional and local communities from construction activity, market sales, and increased tourism. A standard conversion factor of 0.9 was applied to the financial value of benefits to calculate their economic value.

12. The benefits to operators are significant—improvements in aircraft productivity resulting from a reduction in air operating time arising from landing delays, as well as a reduction in downtime for maintenance by eliminating costs associated with damage to aircraft (external instruments, wing flaps, propeller blades, engines) caused by flying stones from deteriorated sealed runways; and a reduction in costs for braking systems and tire replacement thanks to a longer operational life of braking systems and tires. Airline savings would also arise from the elimination of flight-delay direct costs (e.g., having to accommodate overnight crews and passengers at a regional airport after an aircraft was made “nonoperational” on landing when damage to brakes, tires, or the undercarriage occurred); the cost of relocating replacement aircrafts; and the associated cost impact on national flight schedules. The investment program subprojects will also diminish the risk and economic costs of accidents or other incidents caused by poor airstrip conditions, inadequate airport security fencing, and inoperative navigational and landing equipment.

13. Passengers will benefit from greater arrival and departure reliability, savings in travel time (valued in terms of the economic value of time) and from the diminished risk of flight cancellation or diversion, and safety improvements calculated on the basis of risk reduction of a catastrophic accident.<sup>4</sup>

14. The confidence of passengers is currently affected by reduced seat availability at airports where runway damage causes service downgrade to smaller aircraft, safety hazards, and a poor record of on-time arrivals and departures.

15. It is significant to recognize that in PNG, air safety is largely controlled through RPT airline operating procedures and in-flight decisions by the captain. Safety limitations such as poor weather forecast services, outdated airport landing profiles, short landing fields, and unsecured airport boundaries are managed by air service operators, with consequential impact on their aircraft operational costs. While major aircraft accidents and incidents are less likely under these operational conditions, airline operational costs are higher as a consequence. Unsecured airport boundary fences, for example, are managed through overflight inspection before landing. Short landing fields are accommodated by short field landing and takeoff procedures that require more-precise pilot judgment and control, and higher aircraft operating costs.

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<sup>4</sup> According to the risk factors for different types of airfields, the current risk of a catastrophic accident would be reduced by one accident in 10 million operating hours.

16. In the regions and local communities, other than direct labor benefits related to airport construction and operation, the economy could enjoy significant second-round benefits from increased market sales (at those airports where a market facility is provided under the investment program) and tourism. Calculations have assumed that all airports will receive some incremental foreign and local tourist and business traffic because of improved and reliable air service access. All airports other than Port Moresby have attractive tourism resources, and all have business potential to be further accessed. A forecast based on conservative assumptions was developed to calculate benefits, assuming only 20% of incremental business and tourism expenditure representing the real cost of consumption of locally produced goods and services, and return on local investments. On this basis, it is estimated that about K400 per tourist and K227 per business visitor represent the real net benefit from these visitors arriving by air. The long-term benefits to the community are conservative, because they would also include the unquantified benefits from additional employment that would not be created if the airports had not been improved.

17. A conservative approach was adopted in assessing quantifiable benefits incorporated into the economic appraisal. Incremental financial revenue was derived from the financial analysis, adjusted using a standard conversion factor of 0.9. Airline operating cost savings were assessed on the basis of direct aircraft operating cost savings of 10% of hourly aircraft operating costs for F100, F70, Q400, DASH 8, and Twin Otter aircraft, on a with (wet) and without (dry) aircrew basis, when improvements in terminal or airport apron movement were involved. Passenger time cost savings were conservatively calculated assuming time cost savings of 10 minutes valued at K14 per hour (weighted average salary of business and private passengers). Safety improvements were assessed in consultation with ANG and PNG Air, using a proxy value based on aircraft operating cost savings equivalent to 15 minutes for each landing at airports where improved security was provided through new security fencing.<sup>5</sup> Regional benefits were conservatively assessed on the basis of increased business passenger spending of 30% and tourist passenger spending of 20% per total visit expenditure.<sup>6</sup>

## **F. Economic Internal Rate of Return and Sensitivity Analysis**

18. The EIRR for the seven airports and PNG Air Services Ltd (PNGASL) varies between 6.0% and 23.4%, with a consolidated EIRR of 8.8%, indicating that project 1 is not economically viable (Table A7.2). These reevaluation results compare with the assessment in the report and recommendation of the President (RRP), which expected EIRR values between 17.7% and 507.2%, with a consolidated EIRR of 45.3%.

<sup>5</sup> Time savings from not having to overfly the airfield to check whether the airport runway was clear of any hazards, or to await ground confirmation, range from 20 to 30 minutes depending on weather conditions, time of day, and potential obstructions. Fifteen minutes was selected as a conservative figure.

<sup>6</sup> According to the PNG Tourism Promotion Authority's visitor expenditure survey in 2005 and 2007, increased regional expenditure can be expected because (i) improved airport facilities would mean more reliable and more frequent service, which in turn would increase the length of passenger stays in the region; (ii) the development of market facilities at airports would generate increased "impact" and "convenience" expenditure in the region by passengers; and (iii) local authorities would undertake promotion efforts to encourage longer visits and increased visitor expenditure.

**Table A7.2: Summary of Economic Analyses**

<b>Project 1 Airport Location</b>	<b>RRP Values</b>		<b>PCR Reevaluation</b>	
	<b>EIRR</b>	<b>NPV (K million)</b>	<b>EIRR</b>	<b>NPV (K million)</b>
Papua New Guinea Air Services instrument landing system	86.2%	44.5	17.3%	1.1
Port Moresby – Domestic apron extension & fire tenders	22.9%	20.1	10.3%	(4.6)
Mount Hagen – Terminal only			4.9%	(23.2)
Mount Hagen – Airport upgrade & terminal	18.9%	55.2		
Goroka – Safety fence	507.2%	82	23.4%	6.4
Gurney – Airport upgrade & safety fence	24.9%	15		
Gurney – Safety fence only			15.4%	1.2
Hoskins – Airport upgrade	17.7%	16.8	6.0%	(22.6)
Kavieng – Security fencing	337.6%	98	14.1%	0.8
Wewak – Safety fence only			16.3%	1.9
Wewak – Airport upgrade & safety fence	46.5%	49.9		
<b>Consolidated - Airport Upgrades, Terminals &amp; Fencing</b>	<b>45.3%</b>	<b>390.8</b>	<b>8.8%</b>	<b>(28.7)</b>

( ) = negative, EIRR = economic internal rate of return, NPV = net present value at 12%, PCR = project completion report.

Source: National Airports Corporation and Asian Development Bank estimates.

19. For a similar project cost than at appraisal,<sup>7</sup> the outputs of the project were significantly reduced because rehabilitation of airport infrastructure (e.g., runways, taxiways, and aprons) did not proceed at Mount Hagen, Gurney, and Wewak. This reduction of project outputs resulted in a loss of benefits equivalent to K418.0 million (\$131.9 million) in net present value (NPV) calculated at a 12% rate, or a reduction in EIRR by 36.2%.

20. The consolidated project costs and benefits by year are in Table A7.3. As capital costs are now final, a sensitivity analysis was conducted to examine the impacts of increased maintenance costs and variations in benefit levels. The sensitivity analysis indicates that the project EIRR is more sensitive to benefit variations and that it requires a 23% benefit increase to achieve a project EIRR of 12%. Elimination of all maintenance costs would yield an EIRR of 10.6%, indicating that the level of maintenance costs assumed is not a sensitive influence on EIRR.

<sup>7</sup> At appraisal, \$87.8 million (91.5% of the project costs) was estimated for the civil works components of the project (including contingencies). Actual achievement was slightly higher, with actual expenditure on civil works of \$92.0 million (80.7% of actual project costs).

**Table A7.3: Consolidated – Airport Upgrade, Terminal & Fencing Economic Analysis (2009 K'000)**

	Economic Costs			Economic Benefits					Sensitivity Tests					
	Capital Cost	O&M Cost	Total Cost	Incremental Financial Revenue	Airline Operating Cost Savings	Pax Time Savings	Safety Improvements	Regional Benefits	Total Benefit	Net Benefits	Maintenance Costs plus 20%	Benefits less 20%	Benefits less 50%	Benefits increase 20%
2010	2,684		2,684							(2,684)	(2,684)	(2,684)	(2,684)	(2,684)
2011	121	125	246				549		549	303	278	193	28	412
2012	38,713	125	38,838				1,315		1,315	(37,523)	(37,548)	(37,786)	(38,181)	(37,260)
2013	75,717	243	75,960				2,423		2,423	(73,537)	(73,586)	(74,022)	(74,749)	(73,053)
2014	50,521	833	51,354	3,748	2,642		6,068		12,459	(38,895)	(39,062)	(41,387)	(45,125)	(36,404)
2015	59,341	833	60,174	2,968	2,774		6,220		11,963	(48,212)	(48,378)	(50,604)	(54,193)	(45,819)
2016		2,705	2,705	3,838	4,974	359	11,361	3,153	23,685	20,980	20,439	16,243	9,137	25,717
2017		2,892	2,892	4,607	5,173	359	11,605	3,221	24,965	22,073	21,495	17,080	9,591	27,066
2018		3,182	3,182	4,738	5,432	386	11,894	3,462	25,911	22,729	22,093	17,547	9,774	27,911
2019		3,653	3,653	4,870	5,703	415	12,190	3,722	26,900	23,247	22,516	17,867	9,797	28,627
2020		5,017	5,017	5,070	5,988	446	12,495	4,001	28,001	22,984	21,981	17,384	8,984	28,584
2021		4,490	4,490	5,073	6,288	479	12,808	4,301	28,950	24,460	23,562	18,670	9,985	30,250
2022		4,708	4,708	5,175	6,602	515	13,131	4,624	30,047	25,339	24,397	19,329	10,315	31,348
2023		4,799	4,799	5,267	6,932	554	13,462	4,970	31,185	26,386	25,426	20,149	10,793	32,623
2024		5,017	5,017	5,359	7,279	595	13,803	5,343	32,380	27,363	26,360	20,887	11,173	33,839
2025		4,490	4,490	5,515	7,643	640	14,154	5,744	33,696	29,206	28,308	22,467	12,358	35,945
2026		4,708	4,708	5,630	8,025	688	14,515	6,175	35,033	30,325	29,383	23,318	12,808	37,332
2027		4,799	4,799	5,745	8,426	739	14,887	6,638	36,436	31,637	30,677	24,350	13,419	38,924
2028		5,017	5,017	5,862	8,848	795	15,270	7,136	37,911	32,894	31,891	25,312	13,939	40,476
2029		4,490	4,490	5,996	9,290	855	15,665	7,671	39,476	34,987	34,089	27,091	15,248	42,882
2030		4,708	4,708	6,133	9,755	919	16,071	8,246	41,124	36,416	35,474	28,191	15,854	44,641
2031		4,799	4,799	6,274	10,242	988	16,491	8,865	42,859	38,060	37,100	29,488	16,630	46,632
2032		5,017	5,017	6,418	10,754	1,062	16,924	9,529	44,688	39,671	38,668	30,734	17,327	48,609
Net present value at 12%										(28,732)	(31,896)	(53,529)	(90,724)	(3,935)
Economic internal rate of return										8.8%	8.4%	5.7%	(0.3%)	11.6%
Sensitivity indicator											0.43	3.56	10.36	(3.15)

O&amp;M = Operations and Maintenance, PAX = Passenger.

Source: Consultant analysis

21. The Port Moresby instrument landing system (ILS) was completed at a lower cost (\$1.2 million) than assumed at appraisal (\$1.8 million). Although it is likely that ILS benefits were overstated at appraisal, the completed component still yields a robust 17.3%. The ILS costs and benefits by year are in Table A7.4. A sensitivity analysis was conducted to examine the impacts of increased maintenance costs and variations in benefit levels. The sensitivity analysis indicates that the project EIRR is more sensitive to benefit variations and that it requires a 24% decrease in the benefit level to reduce the ILS component's EIRR to 12%. Elimination of all maintenance costs would yield an EIRR of 21.5%, indicating the level of maintenance costs is not a sensitive influence on the EIRR.

22. The firefighting equipment tender component of the Port Moresby domestic apron also was completed at a lower cost (\$2.5 million) than assumed at appraisal (\$2.8 million).

23. In contrast, the costs of the Port Moresby domestic apron extension escalated from the K15.7 million (\$5.7 million) assumed at appraisal to K40.9 million (\$16.9 million), an increase of 234%. The CADIP team provided insufficient information on the reasons for this cost increase. The appraisal cost was raised to K37.4 million (\$18.0 million) in a 2013 revised CADIP financing plan document, reflecting inflation and other impacts between 2009 and 2013. The original contract price in May 2012 was K38.2 million, the final contract price was K40.9 million.<sup>8</sup> There is an indication of some scope increase in these civil works compared with appraisal assumptions, though full details were not provided. There is also an indication that the extended domestic apron is not currently used for daily domestic flight operations, but rather as an operational overflight and parking area for domestic service aircraft. The design of the pavement to B737-800 standard is likely excessive, since the current and expected future domestic aircraft standard is F100, F70, and ATR70. The current ANG B737-800 operates a limited number of domestic flights to Momote and Nadzab airports,<sup>9</sup> but uses the international apron area at Port Moresby for passenger loading and unloading. The impact of this significant cost escalation has reduced the Port Moresby EIRR from 29% at appraisal to a below-benchmark 10.5%, with a related reduction in the NPV at the 12% benchmark by K23.3 million, yielding a negative overall NPV (–K3.2 million).

24. The fire trucks and the extended domestic apron at Port Moresby airport, operated by NAC, are aggregated for reappraisal, and costs and benefits by year are in Table A7.5. A sensitivity analysis was conducted to examine the impacts of higher maintenance costs and variations in benefit levels. The sensitivity analysis indicates that the project EIRR is more sensitive to benefit variations and that it requires a 12.5% increase in the benefit level to increase the Port Moresby domestic airport EIRR to 12%. Elimination of all maintenance costs would yield an EIRR of 11.3%, indicating that the level of maintenance costs is not a sensitive influence on the EIRR.

<sup>8</sup> Work for the extension of the Port Moresby domestic airport apron began in May 2012 and was completed in September 2013.

<sup>9</sup> Most NAC regional airports are not suitable for B737-800 operations because of restricted runway lengths and widths. Port Moresby International Airport is the only airport that can handle unrestricted B737-800 aircraft operations. The following regional airports can accommodate B737-800 with restrictions: (i) Momote and Nadzab, where ANG is currently restricted to a maximum of two flights per week on limited weight; and (ii) Wewak, Tokua, and Gurney, where only 1 flight per week on limited weight is accepted.

**Table A7.4: Port Moresby Instrument Landing System – Economic Analysis (2009 K'000)**

	Economic Costs			Economic Benefits			Sensitivity Tests				
	Capital Cost	O&M Cost	Total Cost	Safety Improve-ments	Regional Benefits	Total Benefit	Net Benefits	Maintenance Costs plus 20%	Benefits less 20%	Benefits less 50%	Benefits increase 20%
2010	2,684		2,684				(2,684)	(2,684)	(2,684)	(2,684)	(2,684)
2011		125	125	549		549	423	398	314	149	533
2012	276	125	401	566		566	165	140	52	(118)	278
2013		125	125	584		584	459	434	342	167	576
2014		125	125	602		602	477	452	357	176	598
2015		125	125	620		620	495	470	371	185	619
2016		125	125	638		638	513	488	385	194	641
2017		125	125	656		656	531	506	400	203	662
2018		125	125	674		674	549	524	414	212	684
2019		125	125	692		692	567	542	429	221	705
2020		125	125	710		710	585	560	443	230	727
2021		125	125	728		728	603	578	457	239	748
2022		125	125	746		746	621	596	472	248	770
2023		125	125	764		764	639	614	486	257	791
2024		125	125	782		782	657	632	500	266	813
2025		125	125	800		800	675	650	515	275	835
2026		125	125	818		818	693	667	529	284	856
2027		125	125	836		836	710	685	543	293	878
2028		125	125	854		854	728	703	558	302	899
2029		125	125	871		871	746	721	572	311	921
2030		125	125	890		890	765	740	587	320	943
2031		125	125	909		909	783	758	602	329	965
2032		125	125	928		928	802	777	617	339	988
Net present value at 12%							1,075	904	170	(1,186)	1,979
Economic internal rate of return							17.3%	16.5%	12.9%	5.1%	21.5%
Sensitivity indicator								0.49	2.56	7.04	(2.43)

O&M = Operations and Maintenance.  
Source: Consultant analysis.

**Table A7.5: Port Moresby Domestic Apron Extension and Fire Tenders – Economic Analysis (2009 K'000)**

	Economic Costs			Economic Benefits					Sensitivity Tests					
	Capital Cost	O&M Cost	Total Cost	Incremental Financial Revenue	Airline Operating Cost Savings	Pax Time Savings	Safety Improve-ments	Regional Benefits	Total Benefit	Net Benefit s	Maintenance Costs plus 20%	Benefits less 20%	Benefits less 50%	Benefits increase 20%
2010														
2011														
2012	27,057		27,057							(27,057)	(27,057)	(27,057)	(27,057)	(27,057)
2013	18,128		18,128							(18,128)	(18,128)	(18,128)	(18,128)	(18,128)
2014		171	171	3,748	2,642				6,390	6,220	6,185	4,942	3,024	7,498
2015		171	171	2,968	2,774				5,742	5,571	5,537	4,423	2,700	6,720
2016	0	277	277	2,188	2,913				5,101	4,824	4,769	3,804	2,273	5,844
2017		464	464	2,220	3,059				5,278	4,815	4,722	3,759	2,175	5,870
2018		610	610	2,252	3,212				5,463	4,853	4,731	3,760	2,121	5,946
2019		531	531	2,285	3,372				5,657	5,126	5,020	3,995	2,298	6,258
2020		584	584	2,318	3,541				5,859	5,275	5,158	4,103	2,346	6,447
2021		464	464	2,352	3,718				6,070	5,606	5,513	4,392	2,571	6,820
2022		610	610	2,387	3,904				6,290	5,680	5,558	4,422	2,535	6,938
2023		531	531	2,422	4,099				6,521	5,991	5,884	4,686	2,730	7,295
2024	0	584	584	2,458	4,304				6,762	6,178	6,062	4,826	2,797	7,531
2025		464	464	2,495	4,519				7,014	6,550	6,458	5,147	3,043	7,953
2026	0	610	610	2,533	4,745				7,278	6,667	6,545	5,212	3,028	8,123
2027		531	531	2,571	4,982				7,553	7,023	6,917	5,512	3,246	8,533
2028		584	584	2,610	5,231				7,842	7,258	7,141	5,689	3,337	8,826
2029		464	464	2,650	5,493				8,143	7,679	7,586	6,050	3,607	9,307
2030		610	610	2,690	5,768				8,458	7,847	7,725	6,156	3,618	9,539
2031		531	531	2,731	6,056				8,787	8,257	8,150	6,499	3,863	10,014
2032		584	584	2,773	6,359				9,131	8,548	8,431	6,721	3,982	10,374
Net present value at 12%										(4,588)	(5,096)	(11,900)	(22,867)	2,723
Economic internal rate of return										10.3%	10.1%	7.3%	1.8%	13.0%
Sensitivity indicator											0.19	2.89	8.23	(2.60)

O&M = Operations and Maintenance, PAX = Passenger.  
Source: Consultant analysis.



25. At appraisal, the civil works proposed for Mount Hagen airport included (i) rehabilitation of airport infrastructure, e.g., runways, taxiways, and aprons; (ii) a new domestic passenger terminal; and (iii) a 10-year maintenance program at a total cost of K82.2 million (\$29.9 million). On 30 March 2011,<sup>10</sup> 12 months after loan effectiveness, in what was referred to as a “minor change in project scope,” the estimated cost of the Mount Hagen civil works was \$33.5 million, and a change in the procurement method was requested to split the civil works into two packages because (i) building the terminal and strengthening the pavement required different construction methods and expertise, (ii) separating the packages would attract more competition from bidders because each individual contract was estimated to be above \$10 million, and (iii) a separate terminal construction package would allow NAC to expedite its procurement work without waiting for the design for the pavement strengthening. Only the civil works for the terminal were completed during the project. The airport infrastructure work was deferred and is included in the current CADIP tranche 3 periodic financing request, and the 10-year maintenance contract was deferred in favor of a sinking fund approach to financing airport maintenance, although no action has yet been initiated to establish such a sinking fund.

26. At appraisal, the estimated cost for the new domestic terminal at Mount Hagen was K24.2 million (\$8.8 million), including the cost of providing a temporary terminal facility during construction on the site of the then existing domestic terminal. This estimate was revised upward to above \$10 million in the March 2011 request for approval to change procurement method, and was further upgraded to K33.3 (\$16.0 million) in an updated CADIP 2013 financing plan. The civil works contract was signed in April 2013 and work began in June 2013 with a contract price of K37.8 million. In May 2013, a proposal from NAC to expand the scope of the terminal to include an international passenger-handling facility was costed at an additional K20 million. An appraisal of the expanded domestic–international terminal was undertaken in February 2015 and indicated an EIRR of 14.7% for the domestic terminal project and a lower 12.0% for the expanded domestic–international terminal. Sensitivity tests indicated that the domestic–international terminal’s economic viability would fall to the lowest value of 7.7% in a combination of contract cost increase by 20% and benefit reduction by 20%. ADB approved the reallocation of unallocated funds for the domestic–international terminal on 13 March 2015.<sup>11</sup> The final cost was K68.5 million, representing 83% of the allocation in the RRP for the complete civil works package, i.e., rehabilitated airport infrastructure (including runways, taxiways, and aprons); new domestic passenger terminal; and 10-year maintenance program.

27. The Mount Hagen domestic–international terminal costs and benefits by year are in Table A7.6. The low EIRR of 4.9% is due to the high cost of the airport terminal, which does not itself generate sufficient benefits to justify such an expenditure, particularly as a result of the addition of the international facilities, which are hardly used. A sensitivity analysis was conducted to examine the impacts of increased maintenance costs and variations in benefit levels. The sensitivity analysis indicates that the project EIRR is more sensitive to benefit variations and that it requires a 63% increase in benefit levels to increase the EIRR to 12%.

28. The future use of the Mount Hagen international terminal facility depends on formal launching of the international operations. Prime Minister has already announced intentional operations at Jaipiura (Indonesia) in near future. To maximize the utility of international terminal, new operations would be required in addition to currently flying in and out are mining and exploration workers on ATR42 aircraft operated by Hevilift charter flights from Cairns, Australia. The annual passengers number about 3,750, and this traffic is subject to the rise and fall of

<sup>10</sup> Approved by ADB Vice President, Operations on 27 April 2011.

<sup>11</sup> Letter from ADB to NAC appears to be incorrectly dated 13 March 2014.

mining and exploration activity based around Mount Hagen. These international passengers are now processed through PNG Customs and Immigration at the Hevilift terminal facility in Mount Hagen, and Hevilift is reluctant to shift this operation to the new terminal and is also opposed to paying for its use. Some of these three weekly flights to and from Cairns are processed by Immigration and Customs at Port Moresby.

Table A7.6: Mount Hagen Airport Terminal – Economic Analysis (2009 K'000)

	Economic Costs			Economic Benefits					Sensitivity Tests					
	Capital Cost	O&M Cost	Total Cost	Incremental Financial Revenue	Airline Operating Cost Savings	Pax Time Savings	Safety Improvements	Regional Benefits	Total Benefit	Net Benefits	Maintenance Costs plus 20%	Benefits less 20%	Benefits less 50%	Benefits increase 20%
2010														
2011														
2012														
2013	13,987		13,987							(13,987)	(13,987)	(13,987)	(13,987)	(13,987)
2014	16,739		16,739							(16,739)	(16,739)	(16,739)	(16,739)	(16,739)
2015	34,792		34,792							(34,792)	(34,792)	(34,792)	(34,792)	(34,792)
2016		1,147	1,147	438	998	359	763	2,251	4,809	3,662	2,516	2,701	1,258	4,624
2017		1,147	1,147	1,101	998	359	763	2,251	5,472	4,326	3,179	3,231	1,590	5,420
2018		1,147	1,147	1,127	1,048	386	801	2,420	5,782	4,636	3,489	3,479	1,745	5,792
2019		1,147	1,147	1,148	1,100	415	841	2,601	6,105	4,959	3,812	3,738	1,906	6,180
2020		2,293	2,293	1,171	1,155	446	884	2,797	6,453	4,160	1,866	2,869	933	5,450
2021		2,293	2,293	1,196	1,213	479	928	3,006	6,822	4,529	2,236	3,164	1,118	5,893
2022		2,293	2,293	1,220	1,274	515	974	3,232	7,215	4,921	2,628	3,478	1,314	6,364
2023		2,293	2,293	1,234	1,337	554	1,023	3,474	7,622	5,329	3,036	3,805	1,518	6,854
2024		2,293	2,293	1,249	1,404	595	1,074	3,735	8,057	5,764	3,471	4,152	1,735	7,375
2025		2,293	2,293	1,324	1,475	640	1,128	4,015	8,581	6,288	3,995	4,572	1,997	8,004
2026		2,293	2,293	1,354	1,548	688	1,184	4,316	9,090	6,797	4,504	4,979	2,252	8,615
2027		2,293	2,293	1,385	1,626	739	1,243	4,640	9,633	7,339	5,046	5,413	2,523	9,266
2028		2,293	2,293	1,416	1,707	795	1,305	4,988	10,211	7,918	5,625	5,876	2,812	9,960
2029		2,293	2,293	1,448	1,792	855	1,371	5,362	10,827	8,534	6,241	6,369	3,121	10,700
2030		2,293	2,293	1,481	1,882	919	1,439	5,764	11,485	9,192	6,898	6,895	3,449	11,489
2031		2,293	2,293	1,515	1,976	988	1,511	6,196	12,186	9,893	7,600	7,456	3,800	12,330
2032		2,293	2,293	1,550	2,075	1,062	1,587	6,661	12,934	10,640	8,347	8,054	4,174	13,227
Net present value at 12%										(23,160)	(32,302)	(30,475)	(41,449)	(15,844)
Economic internal rate of return										4.9%	1.1%	1.8%	(4.6%)	7.4%
Sensitivity indicator											7.68	6.21	19.38	(5.23)

O&M = Operations and Maintenance, PAX = Passenger.  
Source: Consultant analysis.

29. At appraisal, the civil works proposed for Hoskins airport included (i) rehabilitation of airport infrastructure, e.g., runways, taxiways, and aprons; (ii) renovation or extension of the existing domestic passenger terminal; and (iii) a 10-year maintenance program at a total cost of 42.6 million (\$15.5 million). In December 2009, the month of loan approval, the CADIP team appears to have increased the estimated cost to K64.8 million (\$25.3 million). A 2013 CADIP revised financing plan has the costs at K63.0 million (\$30.0 million). The allocation for the terminal civil works was K500,000 (\$182,000) in all three estimates. The next available document shows a summary bill of quantities<sup>12</sup> with a total 2009 RRP cost estimate of K64.8 million (31.2 million) and a contract price of K63.4 million (\$30.5 million). The final contract payments totaled K70.0 million (\$28.9 million), about 86% higher than assumed at appraisal.<sup>13</sup>

30. Table A7.7 is the summary bill of quantities for the civil works contract for Hoskins airport improvements, which shows the main areas of difference between the CADIP design estimates and the successful contractor's tender submission. There are several areas of savings as well as several areas of higher cost estimates. The aggregated airport civil works excluding the terminal building were lower than estimated, but the terminal building was significantly more costly at K2.3 million than the RRP and design estimate of K0.5 million—an increase of 358%. Excluding the new Hoskins airport terminal, the balance of airport civil works was K55.2 million against the equivalent RRP estimate of K42.6 million (both excluding contingencies)—an increase of 29.6%. The significant cost increase for the Hoskins airport civil works is mainly the result of the decision to build a new terminal rather than renovate the existing one, as planned at appraisal. While no record exists of ADB's approval of this significant change in scope, ADB did require a reevaluation of a much larger terminal expansion proposal during the civil works construction period. This proposal from NAC, after representation by the provincial government, was to double the capacity to 150 passengers in 80 minutes of landside dwell time, or to 300 passengers during peak times. The additional cost of this expanded terminal was estimated at K4.7 million, excluding goods and service tax, representing an increase of 9.5 times over the appraisal cost for airport terminal works. The reevaluation showed an EIRR of 11.5%, and the extension to the new terminal already under construction was not approved by ADB, so the proposal lapsed.

31. The Hoskins civil works also included an airport safety fence. It was estimated at \$1.7 million (K4.7 million) but the final contract price was K10.8 million (\$4.5 million) because the appraisal estimates were based on inaccurate perimeter data, e.g., the need to circumvent squatter encroachments on the NAC property was not factored into the total length.

32. The economic reevaluation combined the airport improvements, airport terminal, and safety fencing works because of their common and interactive benefits, as had been the methodology at appraisal. The combined Hoskins Airport costs and benefits by year are in Table A7.8. A sensitivity analysis was conducted to examine the impacts of increased maintenance costs and variations in benefit levels. It indicates that the project EIRR is more sensitive to benefit variations and that it requires a 55% increase in benefit levels to increase the EIRR to 12%. Elimination of all maintenance costs would yield an EIRR of 8%, indicating that the level of maintenance costs is not a sensitive influence on the EIRR. The low EIRR for the combined civil works of 6.0% is mostly due to the high cost of the Hoskins Airport terminal, which in itself does not generate sufficient benefits to justify such an expenditure.

<sup>12</sup> Around the time of contract signing on 22 April 2013.

<sup>13</sup> Based on US dollar value estimates, and 64% based on kina estimates.

**Table A7.7: Summary Bill of Quantities – Cost Assessment of Hoskins Airport Civil Works Contracts**

Item	Description	2009 RRP Costs (K)	2013 Contract (K)	Difference	Remarks
1.0	General and Preliminaries - allow 8% construction cost.	4,000,000	12,440,209	8,440,209	Item 10 and 11 included in here
2.0	Strengthen existing Runway including turning nodes.	16,132,850	11,122,762	(5,010,088)	Savings as a result of detailed design
3.0	Strengthen existing Taxiway.	466,720	326,080	(140,640)	Savings as a result of detailed design
4.0	Strengthen existing main Apron.	1,253,400	1,068,660	(184,740)	Savings as a result of detailed design
5.0	Lengthen Runway by 490m (310m + 180m) at SE end (inland end) to give 1900m new runway length by 36m wide.	10,659,060	4,879,235	(5,779,825)	Savings as a result of detailed design
6.0	Extend Apron at NW end to cater for 2Nos. F100 and 1No. Dash 8 parking positions. Extension approx. 70m long x 70m wide.	2,931,700	2,090,354	(841,346)	Savings as a result of detailed design
7.0	Construct 3.0m wide sealed full strength Shoulders each side of existing Runway.	5,691,030	-	(5,691,030)	This item is included under item 2.0
8.0	Construct 5.0m wide sealed Shoulders each side of existing Taxiway.	246,300	124,792	(121,508)	
9.0	Construct 5.0m wide sealed Shoulder to Apron.	192,950	-	(192,950)	This item is included under item 6.0
10.0	Construct 60.0m long Stopway at each end of Runway.	696,600	-	(696,600)	This item is included as part of item 2.0 & 6.0
11.0	Construct 90.0m long x 90.0m wide RESA's each end of stopway.	923,400	395,405	(527,995)	Savings as a result of detailed design
1.0	Flank Earthworks, Topsoil and Grassing.	1,079,000		(1,079,000)	This item is included under item 4.0 below
2.0	Aircraft Pavement Markings.	350,000	478,401	128,401	
3.0	Aircraft Parking Positions.	88,400	132,395	43,995	
4.0	Widen Flight Strip to 150m wide.	5,880,600	4,818,814	(1,061,786)	
5.0	PAPI Landing Aid System.	100,000	970,583	870,583	This item was not deleted but reworded. Refer to Bill No. 19 & 20 in the Contract BOQ
6.0	Relocate Fuel Storage Compound approx. 80m towards sea end.	100,000	-	(100,000)	This item was a prerequisite; however, due to delay in relocating, this item was captured under contingency. It has not been deleted.
7.0	Drainage Improvements.	1,000,000	3,129,158	2,129,158	Increase due to detailed design
8.0	Terminal Building Renovation and Modification.	500,000	2,287,673	1,787,673	Increase due to detailed design. Engineer's estimate upon 100% design completion was K2.1million
9.0	Upgrade Carpark	100,000	665,810	565,810	Increase due to detailed design
10.0	Standby Generator and Power House.	500,000	-	(500,000)	This item is not deleted but moved to item 1.0 above
11.0	New Tractor, Slasher and Tractor Shed.	200,000	-	(200,000)	This item is not deleted but moved to item 1.0 above
12.0	New CAA Foreman's Residence.	300,000	-	(300,000)	This item was not deleted but was made a part of the security fencing project
13.0	New Airport Market.	150,000	-	(150,000)	This item was deleted from the scope of works as a new market was being built approx. 0.5 km from the airport in 2010 by the Government of PNG.
a	Electrical works	-	2,544,582	2,544,582	Additional works item determined in detailed design
b	Water supply and sewerage systems	-	972,037	972,037	Additional works item determined in detailed design
c	New GA Apron	-	108,629	108,629	Additional works item determined in detailed design
d	Temporary Taxiway	-	1,297,214	1,297,214	Additional works item determined in detailed design
e	Provision of Day works	-	304,805	304,805	
14.0	<b>CONSTRUCTION COST (Items 2.0 to 24.0)</b>	<b>49,542,010</b>			
15.0	<b>SUBTOTAL (Item 1.0 + Item 25.0)</b>	<b>53,542,010</b>	<b>50,157,596</b>		
16.0	<b>ADD 10% GST (Item 26.0 x 10%)</b>	<b>5,354,201</b>	<b>5,015,760</b>		
17.0	<b>ALLOW 10% CONST. CONTINGENCY ([Items 26.0 + 27.0]x 10%)</b>	<b>5,900,000</b>	<b>8,276,003</b>		
18.0	<b>TOTAL PROJECT COST (Items 26.0 + 27.0 + 28.0)</b>	<b>64,796,211</b>	<b>63,449,359</b>	<b>&lt;&lt;==</b>	<b>accepted contract price</b>

() = negative.

**Table A7.8 : Hoskins – Airport Upgrade Economic Analysis (2009 K'000)**[illegible]

33. The Kavieng airport safety fence was estimated at \$1.7 million (K4.7 million) but the final contract price was K7.4 million (\$3.1 million) because the appraisal estimates were based on inaccurate perimeter data, e.g., the need to circumvent squatter encroachments on the NAC property was not factored into the total length. The costs and benefits by year are in Table A7.9, showing a not so robust 14.1%. A sensitivity analysis was conducted to examine the impacts of increased maintenance costs and variations in benefit levels. It indicates that the project EIRR is more sensitive to benefit variations and that it requires an 11.5% reduction in benefit levels for the EIRR to fall below 12%. Elimination of all maintenance costs would yield an EIRR of 15.9%, indicating that the level of maintenance costs is not a sensitive influence on the EIRR.

34. The Gurney airport safety fence was estimated at \$1.7 million (K4.7 million) but the final contract price was K7.9 million (\$3.3 million) because the appraisal estimates were based on inaccurate perimeter data, e.g., the need to circumvent squatter encroachments on the NAC property was not factored into the total length. The costs and benefits by year are in Table A7.10, showing a relatively robust 15.4%. A sensitivity analysis was conducted to examine the impacts of increased maintenance costs and variations in benefit levels. It indicates that the project EIRR is more sensitive to benefit variations and that it requires a 15.5% reduction in benefit levels for the EIRR to fall below 12%. Elimination of all maintenance costs would yield an EIRR of 17.4%, indicating that the level of maintenance costs is not a sensitive influence on the EIRR.

35. The Wewak airport safety fence was estimated at \$1.7 million (K4.7 million) but the final contract price was K8.2 million (\$3.4 million) because the appraisal estimates were based on inaccurate perimeter data, e.g., the need to circumvent squatter encroachments on the NAC property was not factored into the total length. The costs and benefits by year are in Table A7.11, showing a relatively robust 16.3%. A sensitivity analysis was conducted to examine the impacts of increased maintenance costs and variations in benefit levels. It indicates the project EIRR to be more sensitive to benefit variations and that it requires a 21.5% reduction in benefit levels for the EIRR to fall below 12%. Elimination of all maintenance costs would yield an EIRR of 18.0%, indicating that the level of maintenance costs is not a sensitive influence on the EIRR.

36. The Goroka airport safety fence was estimated at \$1.6 million (K4.4 million) but the final contract price was K9.9 million (\$4.1 million) because the appraisal estimates were based on inaccurate perimeter data, e.g., the need to circumvent squatter encroachments on the NAC property was not factored into the total length. The costs and benefits by year are in Table A7.12, showing a robust 23.4%. A sensitivity analysis was conducted to examine the impacts of increased maintenance costs and variations in benefit levels. It indicates the project EIRR to be more sensitive to benefit variations and that it requires a 43% reduction in benefit levels for the EIRR to fall below 12%. Elimination of all maintenance costs would yield an EIRR of 25%, indicating that the level of maintenance costs is not a sensitive influence on the EIRR.

**Table A7.9: Kavieng – Security Fencing Economic Analysis (2009 K'000)**

[illegible]



**Table A7.10: Gurney – Airport Security Fence Economic Analysis (2009 K'000)**

	Economic Costs			Economic Benefits							Sensitivity Tests			
	Capital Cost	O&M Cost	Total Cost	Incremental Financial Revenue	Airline Operating Cost Savings	Pax Time Savings	Safety Improvements	Regional Benefits	Total Benefit	Net Benefits	Maintenance Costs plus 20%	Benefits less 20%	Benefits less 50%	Benefits increase 20%
2010														
2011														
2012	972		972				749		749	(224)	(224)	(340)	(598)	(74)
2013	6,370		6,370				786		786	(5,584)	(5,584)	(5,706)	(5,977)	(5,427)
2014		127	127				825		825	698	672	570	285	863
2015		127	127				867		867	739	714	605	306	912
2016		127	127				910		910	782	757	641	327	964
2017		127	127				955		955	828	802	680	350	1,019
2018		127	127				1,003		1,003	876	850	720	374	1,076
2019		127	127				1,053		1,053	926	900	763	399	1,137
2020		127	127				1,106		1,106	979	953	807	426	1,200
2021		127	127				1,161		1,161	1,034	1,008	854	453	1,266
2022		127	127				1,219		1,219	1,092	1,066	903	482	1,336
2023		127	127				1,280		1,280	1,153	1,127	954	513	1,409
2024		127	127				1,344		1,344	1,217	1,191	1,008	545	1,486
2025		127	127				1,412		1,412	1,284	1,259	1,065	578	1,566
2026		127	127				1,482		1,482	1,355	1,329	1,125	614	1,651
2027		127	127				1,556		1,556	1,429	1,403	1,188	651	1,740
2028		127	127				1,634		1,634	1,507	1,481	1,253	690	1,833
2029		127	127				1,716		1,716	1,588	1,563	1,322	730	1,931
2030		127	127				1,802		1,802	1,674	1,649	1,395	773	2,034
2031		127	127				1,892		1,892	1,764	1,739	1,471	818	2,142
2032		127	127				1,986		1,986	1,859	1,833	1,551	866	2,256
Net present value at 12%										1,241	1,092	11	(2,727)	2,829
Economic internal rate of return										15.40%	15.00%	12.00%	3.90%	19.80%
Sensitivity indicator											0.26	2.19	7.45	(2.87)
( ) = negative; O&M= operations and maintenance; PAX = passenger.														
Source: Consultant analysis.														



**Table A7.12: Goroka – Safety Fence Economic Analysis (2009 K'000)**

[illegible]