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ABBREVIATIONS

ADB	–	Asian Development Bank
AP	–	affected people
AusAID	–	Australian Agency for International Development
DMF	–	design and monitoring framework
DNPM	–	Department of National Planning and Monitoring
DOT	–	Department of Transport
DOW	–	Department of Works
DRIP	–	district road improvement program
EARF	–	environmental assessment review framework
GoPNG	–	Government of Papua New Guinea
HDM-4	–	Highway Development and Management Model
HIV/AIDS	–	human immunodeficiency virus
HRMG	–	Highlands Road Maintenance Group
IEE	–	initial environmental examination
LLG	–	local level government
MFF	–	multi tranche financing facility
MTDS	–	Medium-Term Development Strategy
NEC	–	National Executive Council
NGO	–	non government organization
NRSC	–	National Road Safety Council
NTDP	–	National Transport Development Plan
NPV	–	net present value
PMV	–	public motor vehicle
PNG	–	Papua New Guinea
PRSS	–	poverty reduction and social strategy
PSA	–	poverty and social assessment
RAMS	–	road asset management system
REA	–	rapid environmental assessment
SHP	–	Southern Highlands Province
TIPS	–	transport infrastructure priority study
ToR	–	Terms of reference
TSSP	–	transport sector support program
UNDP	–	United Nations Development Programme

I. TA CONTEXT AND SCOPE

A. Introduction

1. This is the Draft Final Report for the TA: 4945-PNG: Highlands Region Road Improvement Project funded by the Asian Development Bank (ADB). The proposed project will establish a multi-tranche funding facility (MFF). This report addresses the rationale and scope of the entire facility and in particular the proposed first tranche.

2. This report sets out the background to the project and describes the roads that are proposed to be included. It describes the other components proposed for inclusion in the project. It includes the material usually incorporated into a "Report and Recommendations to the President" ("RRP") but only loosely follows the format of an RRP. In particular, the initial chapters contain more discussion of the process of developing the project than normally found in an RRP. The Development and Monitoring framework is included as Appendix 1. Background on the road sector and its role within PNG is discussed below, with more detail provided in Appendix 2.

3. An appropriate policy and institutional framework is critical in achieving a sustainable network of roads in the Highlands region. For roads, the Medium Term Development Strategy (MTDS) and the National Transport Development Plan Review 2006-2010 (NTDP) provide clear policies in terms of development, maintenance including institutional responsibility, cost recovery through user charges, public-private partnerships to supplement Government initiatives, safety, and environmental protection. These along with other sectoral issues such as vehicle overloading, development of domestic contracting industry, road transport services are reflected in the policy framework. (Appendix 3) The policy framework includes (i) status of past and ongoing initiatives by the Government and other development partners to achieve the policies, and (ii) further initiatives and outcomes that need to be supported by the Project.

4. Social and environmental assessments are an important component of any TA and have been undertaken for the subprojects. Issues addressed included potential impacts on physical, ecological and socioeconomic resources, and significant resettlement. Possible interactions between the proposed road improvements and commercial and Government of PNG (GoPNG) initiatives were also investigated. Summary appendices for social and poverty impact, resettlement and environmental impact are included with the report, while detailed the Poverty and Social Assessment, resettlement framework and individual reports and Initial Environmental Examinations (IEE) for the individual roads are available separately.

5. An extensive program of consultation has taken place. At the inception stage, a stakeholder analysis was carried out to identify the primary and secondary stakeholders; their interests in the proposed project, their perceptions of current problems related to road accessibility, mobility and transport services and, the resources they could bring to the achievement of the goals and objectives of the project. Meetings have been held at the national level with DOW, Ministry of Transport (MOT), National Roads Authority (NRA), Department of National Planning and Monitoring (DNPM), Department of Land and Physical Planning (DLPP), Department of Community Development (DCD), National Aids Council (NAC) and National Council of Women (NCW); Lae Chamber of Commerce; relevant development partners and international organizations such as Australian Aid for International Development (AusAID), UNDP, UNICEF, WHO, Population Services International (PSI), CARE Australia; and consultants engaged in ADB, AusAID and other donor-funded projects relevant to the Program.

6. Provincial and district authorities in Enga and Southern Highlands provinces have been actively consulted including provincial and district administrators; national and provincial works departments; provincial community development, health and education

advisors; provincial AIDS Councils; and, provincial and district women's networks. Other regional stakeholders met include civil work contractors, trucking companies and representatives of major development enclaves in the Highlands region, i.e. Porgera JV and Oil Search. The provincial, district and regional stakeholders participated in consultation workshops held in the provinces along with other local stakeholders including representatives of the community sector (local NGOs, health institutions, radio stations, etc.) and the private sector (local business houses, bus/truck drivers, etc.). Along each road section, the views of the local population have been sought through surveys of households, market sellers, trade store owners, road users and vehicle operators, as well a program of community consultations and focus groups with village women.

B. Country Economic and Social Overview

1. Country Overview

7. Papua New Guinea (PNG) sits between Asia and the Pacific: north of Australia and east –south east of Indonesia and the Philippines. To the East are the islands of the Solomons and to the South East New Caledonia. It comprises the eastern half of the island of New Guinea - the second largest island in the world, together with some 600 associated islands; with a total land area of 25,700km² of which only some 7,300 km² is occupied. The terrain in many parts of PNG is extremely rugged. The highlands region has high mountain ranges, steep valleys and fast flowing rivers. Earthquakes, volcanic eruptions and high rainfall, together with a highly dispersed population make communications difficult and expensive to sustain.

8. The population of PNG in 2005 was estimated at about 6.1 million (UNDP, 2007) compared with 4.8 million the time of the 2000 Census. The population is very young: in 2000, 40% were under the age of 15 years; 60% were under the age of 24 years; and almost 70% were under the age of 30 years. Of the total population, approximately 85 percent live in rural areas. The population distribution is very uneven. While the overall density is low, less than 20% of the population lives at low densities, while 45% live in areas with high or very high densities. The mountain valleys in the Highlands region are some of the highest density areas.

9. Between 1990 and 2000, the population increased on average 3.2% per year. Continued growth at that rate would nearly double the population in 15 years, giving a population of about 8.4 million by 2015. The National Population Policy (2000-2010) is targeting a reduction of the growth rate to 2.1% per year by 2010. Other projections foresee growth rates to 2015 of 1.5% per year (UNDP, 2007).

10. 97% of land is held in collective, customary forms of ownership by the members of a clan or sub-clan. The clan territory is subdivided along descent lines; clan members have rights to use land for their gardens and tree crops, as well as to build houses. Customary land is a fundamental part of people's cultural identity, it belongs to past and future generations as well as the present generation and, under normal conditions, it cannot be sold or alienated.

11. The Highlands region is the country's primary source of national income and export earnings. The country's major gold mine is at Porgera in Enga province while the oil and gas fields in Southern Highlands are responsible for all PNG's oil production and 95% of its gas. The project roads are used to transport fuel and supplies to the resource enclaves, food, fuel and other supplies to the general population and export commodities such as coffee, tea and vegetables.

12. PNG is a parliamentary democracy with a unicameral Parliament; the Prime Minister is elected by Parliament and appointed by the Governor General. Parliament has 109 seats representing the 19 provinces and the National Capital District (NCD); members serve for 5-year terms. There are four main political parties and a large number of smaller parties.

However, the party system has traditionally been weak. Political alliances are determined by tribal and geographical ties and individual personalities.

13. The Constitution provides for free speech, and the government upholds the freedom of the media and freedom of religion. The Government also recognizes the rights of workers to engage in collective bargaining and to strike. There are a number of civil society organizations that provide services and advocate for women's rights, environmental and other issues. Nonetheless, and despite recent reforms, PNG was ranked 130 out of 163 countries surveyed in Transparency International's 2006 Corruption Perceptions Index (Freedom House, 2007).

14. Government in PNG is divided into (i) the national level; (ii) 19 province and the National Capital District; and, (iii) local government. Local government includes districts and 299 rural and 27 urban local-level governments (LLG). The legislation that presently determines the structure, roles and responsibilities of the sub-national governments is the 1995 *Organic Law on Provincial Governments and Local-Level Governments* (Amendment No. 11, 2006).

15. All roads other than national roads are the responsibility of the provinces and the LLG. National departments such as Department of Works have no line authority over provinces in devolved sectors. However, the Organic Law does permit provincial and LLG administrations to delegate their responsibility to the national government (Lee, 2004).

2. The Economy

16. PNG has a dualistic economic structure. The formal market economy comprises: enclave developments for the export of natural resources such as minerals, oil and gas, tree crops and logs; government; limited manufacturing; and a small services sector. The informal sector employs over 80% of the population including nearly everyone living in rural areas where people rely on semi-subsistence agricultural activities with few if any cash exchanges. This distinction has blurred in some places over time, as smallholders increase their participation in commercial agriculture and fisheries.

a) Overview

17. The economy is highly dependent on the export of a small number of primary commodities: oil, gold, copper, logs, vanilla and coffee account for 70% of export earnings (WB, 2005). The economy is vulnerable to exogenous shocks including, among others, world commodity prices, weather and natural disasters. In recent years the country has been adversely affected by fiscal mismanagement, high levels of corruption and political instability.

Sectoral Share of GDP, 2001	
Agriculture	28%
Industry	40%
Mining & petroleum	31%
Manufacturing	9%
Services	32%

Source: Holden et al., 2003

18. Strong economic growth after independence was followed, in the late 1990's, by a period when the PNG economy did not perform well. The causes included declines in production levels at major mine projects and lower world commodity prices combined with the effects of a major drought. During the period 1997-2002, the economy contracted in real terms, while inflation, interest rates and external debt increased (AusAID, 2003; Holden et al., 2003; WB, 2005). Since 2003, the country has been experiencing modest growth due primarily to favourable commodity prices and renewed political stability. Annual rates varied between 2.5 and 3.0 percent through 2005, and increased to 3.7% in 2006 (ADB, 2007).

19. From 1997 to 2003, population growth equalled or was greater than the level of economic growth, and per capita income dropped from \$970 to \$510. (WB, 2005). Living standards were also adversely affected by stagnant agricultural production and a lack of jobs

in other sectors. As a result, the estimated levels of poverty increased significantly during this period.

20. Since 2003, economic growth has exceeded average annual population growth. However, due to an inequitable distribution of wealth this has failed to reduce poverty.

21. The Medium Term Development Strategy (MTDS) 2005-2010 is based on the GoPNG Program for Recovery and Development introduced in 2002 and confirms the overarching goals that are defined as:

...export-driven economic growth, rural development and poverty reduction, including through good governance and the promotion of agriculture, forestry, fisheries and tourism on a sustainable basis. The strategy will be realized by empowering Papua New Guineans, especially those in rural areas, to mobilize their own resources for higher living standards.

22. The MTDS is a strategic framework to prioritize Government expenditures in order to support these goals. The key priorities for the period to 2010 are: (i) rehabilitation and maintenance of transport infrastructure; (ii) promotion of income-earning opportunities; (iii) basic education and adult education; (iv) primary health care and HIV/AIDS prevention; and, (v) law and justice.

23. The target for economic growth is 5% per annum over the time frame of the MTDS. The focal sectors include those where PNG has competitive strengths in global markets. They include agriculture (oil palm, coffee, cocoa, copra and spices), forestry, fisheries and tourism, supported by mining, petroleum, gas and manufacturing.

b) Extractive Industries

24. Papua New Guinea has large deposits of gold, silver and copper, as well as commercially viable minerals such as nickel. Since the early 1990's, the export of minerals has been a major source of government revenues and foreign exchange earnings. The GoPNG has the option to acquire up to 30% of any large mineral development and currently holds equity in all major projects. In 2000, minerals contributed 21% to GDP (Baxter, 2001). These projects bring significant direct benefits in the form of royalties for land owners and provincial governments; and, increasingly, mines have built health care and community facilities, as well as roads.

25. In the Highlands region, gold mining is a major source of economic activity in Enga Province. The Porgera Joint Venture (JV) operates an open pit mine at Porgera in the district of Laiagam-Porgera in the western part of the province. The principal partner is Barrick Gold, the world's largest gold mining company. Mineral Resources Enga Pty. Ltd., representing the provincial government and landowners, holds 5% equity. The mine is expected to be operating until about 2020. A high voltage transmission line transports electricity over 78 km from the Hides gas field in Southern Highlands Province.

26. An estimated 3,000-4,000 people in Enga and 200-300 people in SHP were involved in small-scale mining in 2001. Based on informal surveys in the sector, 20-25% are women and 30% are children under the age of 16 years. Women and children assist men by transporting materials and digging; stronger children are also involved in panning sluicing and final separation of gold. Assuming a multiplier of 7 to account for people who provide goods and services, the total number of people dependent on small-scale mining in these two provinces was up to 30,000.

27. Oil production in PNG and 95% of natural gas production is located in the Southern Highlands Province (Baxter, 2001). The major fields are (i) the Kubutu fields (a cluster of several fields) located near Moro in Nipa-Kutubu district in the south-central part of the province; (ii) Hides located at Nogoli southwest of the town of Tari in Tari-Pori district; and,

(iii) Juha located west of the town of Koroba and just over the provincial border in Western Province.

28. The largest gas fields are located at Hides and have been producing since the early 1990s. In energy equivalents, the currently known gas reserves are estimated to be ten times the oil endowment of the country and should last for 30-50 years (M. McWalter, pers. comm., 2008). The GoPNG strategy is to export liquefied natural gas (LNG) to Asian markets, for example, Japan, Taiwan and Korea; LNG prices are tied to the price of crude oil and may, in coming years, reach parity. Therefore, up to US\$14 billion will be invested to build a second, parallel pipeline to Kokori and, undersea, to a site near Port Moresby where a processing plant and port will be established. Construction is expected to begin in early 2009 and could require transport of heavy loads on portions of the Highlands Highway although current plans are to build a construction road along the pipeline route from Kikori on the South coast; A labour force of 1,000 will be required to construct the pipeline and an additional work force of 7,000 to construct the processing plant and port facilities.

29. The extractive industries operate as enclave activities, creating limited employment (only 0.4% of the labour force is employed in the mining and petroleum sectors (AusAID, 2006)) and have few forward or backward linkages to the PNG domestic economy. An exception is a tax credit scheme whereby mines (and oil/gas companies) contribute funds that are used for upgrading health care facilities in the vicinity of enclaves as well as emergency maintenance of roads providing access to enclaves.

c) Agriculture

30. Agriculture including forestry and fisheries accounts for about one-third of PNG's GDP (ADB, 2007). In 2006, the two main export commodities were palm oil and logs. Other export commodities include coffee, cocoa, copra, coconut oil, tea, rubber, and vanilla. The production of palm oil is based on nucleus estates that produce and mill palm oil, but also negotiate production contracts with associated smallholders who produce about one-third of the crop (Bourke et al., 2000).

31. The traditional agriculture sector provides livelihoods for 80-85% of the population; this sector accounts for 64.5% of the PNG labour force. Rural livelihoods are based on combinations of subsistence farming of food crops; raising small animals for own consumption and sale and, small-scale cash cropping. In all instances, the family is the main source of labour. In the Highlands region, coffee and tea are the principal cash crops. In villages close to urban centres or roads such as the Highlands Highway, households use improved farming methods to grow fresh vegetables for sale in local and regional markets; these activities are an increasingly important source of cash income for rural households. Other cash income is obtained from the sale of livestock or fish; meat, skins and feathers from hunted animals and birds; and, herbs and other food collected in forests.

32. Most rural households raise small animals; pigs are the most valued, but livestock also includes poultry (chickens and ducks), goats and sheep. In the Highlands region, pig raising is intensive and the animals are often penned; the number of pigs is roughly equal to the number of people in the region (Hanson *et al.*, 2001). Approximately half of the sweet potatoes that are grown are fed to pigs. Pork is the main source of dietary protein in the Highlands. However, meat is not a regular part of daily diets and pigs are reserved for special occasions.

d) Other Enterprises

33. People living in rural and urban areas throughout PNG have established a wide variety of micro and small enterprises (MSE)¹. It is estimated, based on 2000 estimates, that there are 100,000-120,000 micro enterprises and 12,000-15,000 small enterprises in PNG (ADB, 2000a). In rural areas outside of towns, most of these enterprises are located along major roads such as the Highlands Highway (Hanson, *et al.*, 2001). Small enterprises in rural areas such as the Highlands commonly include retail and wholesale businesses; ground transport services; small-scale logging and mining; and, production and sale of coffee and poultry. These are mainly family or clan-based businesses; most trade in local markets; and, they generally have weak cash flow and limited savings, as profits are often eroded by traditional family/social obligations.

34. Some households in the highlands make money from small-scale logging operations. Portable sawmills are used to exploit forest resources that are easily accessible; elsewhere, small, permanent mills have been established. Timber for constructing houses is sold at the roadside.

35. Despite widespread sale of cash crops in the Highlands, the increasing agricultural pressures contribute to low rural incomes. Over 50% of the rural population has annual per capita incomes of less than K40 (US\$15). Only one-quarter of rural people have annual per capita incomes over K100 (US\$40). People with higher incomes tend to live in peri-urban areas or along the axis of major roads such as the Highlands Highway. In these locations they have increased opportunities for non-agricultural and business activities. In these circumstances, many rural households rely on the *wantok* system of exchange to ensure that they can meet their basic needs. Based on the 1996 household survey, 92% of households receive and give assistance (Igua, 2001). About one-third of households are involved in cash exchanges, while about 90% are involved in in-kind exchanges.

Rural Cash Incomes, 2000		
Income Categories (kina/person/year)		% Rural Popn.
Very low	0-20 kina	35.2
Low	21-40 kina	19.0
Moderate	41-100 kina	20.3
High	101-200 kina	18.4
Very high	>200 kina	7.1
<i>In 2000, 1 kina = approx. US\$ 0.40.</i>		
<i>Source: Hanson et al., 2001</i>		

3. Social and Poverty Issues

a) Social Structure

36. PNG is a multi-ethnic society with over 800 different language groups. Most groups have very small populations, with the number of speakers ranging from less than 100 to over 100,000 (WB, 2005). The three largest groups represent, respectively, 4%, 7% and 8% of the national population (Anere, 2004). The official languages are English, Pidgin and Motu; English and Pidgin are spoken across PNG; Motu is spoken in the Papuan region.

37. Most indigenous societies in PNG, including those in the Highlands region, have patriarchal social structures². They are traditionally based on the clan - an extended family of people who share a common ancestry. Cooperation within the group is strong, but drops off sharply between groups. *Wantok* variously translated as "same descent" and "one talk" defines kinship relations and obligations [WB, 2005, Lewis, 2007] and has a higher priority than the legal obligations of the modern state. Men's masculinity is a central value where status is conferred on the basis of physical strength, political power and, in the modern context, capacity to amass wealth. Status is generally acquired rather than inherited. Most

¹ Micro enterprises are defined as commercial enterprises undertaken on a regular basis that have annual sales up to \$16,000; small enterprises include permanent commercial enterprises whether or not they are incorporated that have annual sales between \$16,000 and \$80,000 (ADB, 2000a).

² . Matrilineal societies are found primarily in the provinces of New Ireland and Milne Bay

community-wide decisions are made by consensus in a process whereby men meet to discuss problems before making a decision.

38. Aggression remains a key aspect of how men define and express their masculinity. Claims and grievances between clans are traditionally pursued through fighting. Even when grievances do not lead to violence, the principle of reparation remains an important cultural value. It is manifest in the compensation demands that are associated with land acquisition for resource exploitation and road construction.

39. People in PNG, even those who migrate to cities, maintain strong attachments to their land through ancestral belief systems³. Most of the land in PNG is vested in about 700 clans and tribal groups under collective, customary land tenure systems. Clans grant land use rights to families and individuals. While clan territories may be small, they are at the centre of clan identity. People tend to live dispersed on the land of their clan territory, rather than in nucleated settlements of villages.

40. Highlands people have tended to live in dispersed homesteads or small hamlets of 4-10 closely-related households on territory belonging to their clan. More recently, and particularly since the upgrading of portions of the Highlands Highway and feeder roads, slightly larger villages have been established immediately adjacent to roads. Villages are often loosely organized settlements. Households may have several structures grouped in small clusters. Highlands groups have strict social norms of gender avoidance, i.e., a set of cultural beliefs and practices that minimize contact between men and women. Some households maintain the custom of men and women living separately; but this practice is declining.

41. Most people in PNG belong to the Catholic Church or to one of a number of Protestant sects, the most important in the Highlands region being the Lutheran and Seven Day Adventists. The work of churches has contributed significantly to the availability of education and health care services and facilities throughout the Highlands. Christian missionaries have also been instrumental in changes in traditional customs in rural communities. Most clans have sacred sites located on their territory. Gravesites are often located in proximity to roads, including individual graves or small clusters. It is customary to bury political and community leaders at locations along roads where the graves are visible to relatives and the public, to remember and honour them.

b) Human Development

42. Despite significant monetary benefits from exploitation of natural resources, the human development indicators in PNG are generally poor particularly in rural areas. The 2005 Human Development Index (HDI) for Papua New Guinea is 0.530, ranking the country 145th out of 177 countries (UNDP, 2007). The 2005 values of the HDI components are: (i) life expectancy at birth of 56.9 years; (ii) adult literacy rate of 57%; (iii) combined gross enrolment of 40.7%; and (iv) GDP per capita of \$2,563 (\$PPP)⁴. The 2005 HDI (0.530) represents a substantial decline from the 2000 level (0.544) and is below the 1995 level (0.532). PNG currently has the lowest human development of the Pacific island nations.

43. Provincial-level analysis of human development levels is available for 1996 (UNDP, 1999). At that time, except for West Sepik, the poorest conditions were found in Southern Highlands and Enga provinces, with HDI values of, respectively, 0.274 and 0.283 compared with a national HDI of 0.318 (UNDP, 1999). While the situation may have improved for some

³ "Under no circumstances will a New Guinean ever consider that he has irrevocably sold or parted from his land. All he is allowed is a right to share in its usage. Land sold becomes land stolen. Land taken by conquest must be recovered, if necessary by violence." (Ian Downs. 1970. *The Stolen Land*. cited in Holden, 2003)

⁴ The 2007 Human Development Report is the source for these data that are not always the same as data available in other sources and reported elsewhere in this PSA.

people living near and benefiting from resource development in the Highlands region, the provinces of Southern Highlands and Enga remain among the poorest in the country.

44. The United Nations has recently published a millennium development goals (MDG) progress report (UNESCAP, 2007); it is significant because 2007 is the mid-point in the time frame for achieving MDGs by 2015. The status of Papua New Guinea tends to support the contention that PNG will not achieve most of its MGD goals or targets. For example, based on data reported, (i) achievement in the areas of control of TB and emissions controls is offset by (ii) lack of progress and even backward movements against important targets to meet goals for universal primary education, gender parity in education, control of the HIV/AIDS epidemic and safe water supply and sanitation and (iii) slow progress in reducing child mortality.

c) Poverty

45. In general, there is no serious food security problem in PNG (Hanson, et al., 2001). Most people have land, grow food crops and, despite being poor, generate small amounts of cash to be able to buy food when their production is not sufficient. They also have extensive family and clan networks to assist them in times of need. Nonetheless, there is concern for the quality of people's diets: protein-energy malnutrition is widespread among children and adults. There can also be periods when food security is threatened; for instance, it is estimated that 1.2 million people in PNG suffered from food shortages in 1997 due to the drought caused by the El Nino (FAO, 2003). The impact on future food security due to climate change and the loss of working adults due to the HIV/AIDS epidemic cannot yet be predicted (Hanson et al., 2001).

46. In addition to low incomes, a 2001 participatory poverty assessment clearly indicates the non-income dimensions of poverty in PNG: specifically, people consider they are poor when they lack (i) jobs, (ii) land, (iii) education, (iv) services such as health and water and (v) transport and roads; the most pressing needs were safe drinking water and useable roads (ADB, 2002).

47. In 1999, the World Bank used the results of the 1996 Household Survey to conduct an assessment of poverty levels in PNG; in 2004, further work was done combining the 1996 data with 2000 census data. These assessments defined a poverty line in relation to a daily nutritional norm of 2,200 calories per adult equivalent plus a basic non-food expenditure allowance.

48. Based on data from the 1996 household survey, 37% of the population lived below a poverty line of \$350 (K461) per year. Further, 17% of the population was unable to meet the basic food requirement of 2,200 calories per day per adult equivalent even if they spent all their income on food. In terms of the international poverty line, in 1996 approximately one-quarter of people in PNG (24.6%) lived on less than \$1/day; 54% lived on less than \$2/day (WB, 2005).

PNG Poverty, 1996 & 2003		
	1996	2003
Headcount (%)	37.5	53.8
Poverty gap index (%)	13.8	24.3
Poverty severity index (%)	6.7	12.8
Gini coefficient	0.48	0.48
Source: WB, 2005		

49. Due to poor economic performance combined with rapid population growth, the incidence of poverty is estimated to have nearly doubled in the period 1996-2003 from 37.5% to 53.8% (WB, 2005). By comparison, the levels in other countries in the East Asia and Pacific region declined, on average, from 14.8% in 1996 to 10.4% in 2003 (WB, 2005).

d) Poverty Distribution

50. The distribution of wealth in PNG is very uneven: in 1996, the richest 10% accounted for more than one-third of consumption while the poorest 50% accounted for only 20%. The Gini coefficient was 0.48 which is high compared with other countries of similar income levels. Between 1996 and 2003, the Gini coefficient remained at the same level.

51. Poverty is concentrated in rural areas. The rural poverty level (41%) was significantly higher than urban poverty (16%). The poorest regions in PNG are Momase and the Highlands regions. The incidence of poverty in 1996 was, respectively, 45.8% and 35.8%. As these two regions have the largest populations, together they account for over 70% of all poor people in PNG. The indices for poverty gap and poverty severity are also highest in these regions (6.6 in Momase and 5.3 in the Highlands region). Four of the most disadvantaged districts are in Southern Highlands and Enga provinces.

52. Poverty Indicators are shown in Table I-1. Districts that include Project roads are highlighted.

53. Recent improvements in economic growth may have stabilized the incidence of poverty but not improved it significantly (ADB, 2006a). In rural areas, poverty trends include (i) increased numbers of school leavers who remain in the village without work and (ii) the continued deterioration of roads and school and health facilities (ADB, 2002). The twin issues of (i) creating jobs and income-earning opportunities and (ii) rebuilding service delivery also emerge clearly from 2001 participatory surveys of the poor. The rural poor also highlight deteriorating transport infrastructure as a major impediment. (ADB, 2006a)

Table I-1 District-Level Poverty Indicators

Province/District	Income Poverty		Adult Literacy		Gross School Enrolment		District Devt. Index
	%	Rank	%	Rank	%	Rank	Rank
SHP	41	-	37	-	-	-	-
Komo-Magarima	44	22	24	2	13	2	11
Koroba-Lake Kopiago	50	13	33	18	20	13	14
Kagua-Erave	48	15	33	16	18	9	17
Nipa-Kutubu	42	31	32	15	19	10	23
Tari-Pori	43	29	49	39	23	27	32
Mendi-Munihu	38	39	38	22	29	18	33
Imbong'gu	33	52	42	29	31	26	39
Ialibu	29	59	46	36	29	30	47
Enga	30	-	35	-	-	-	-
Kompam-Abum	40	33	30	12	24	12	10
Kandep	30	58	24	4	19	4	19
Lagaip-Porgera	26	73	28	9	26	11	28
Wapenamanda	29	61	50	42	39	40	40
Wabag	26	70	43	32	43	38	42

The rankings are 1=poorest or lowest; the maximum is 85 = number of districts in PNG. Shaded districts are included in the 20 most disadvantaged districts in PNG as determined by a poverty mapping exercise using UNDP HDI indicators, conducted by the National Economic and Fiscal Commission (NEFC). N.B. Life expectancy is not reported in this table as there was no sub-provincial data available.
Source: WB, 2004

II. RATIONALE: SECTOR PERFORMANCE, PROBLEMS AND OPORTUNITIES

A. Performance Indicators and Analysis

1. Role and Structure of the Road Sector

54. Roads carry a significant percent of the transport task. However they do not form an integrated network due to PNG's rugged geography and dispersed population. Coastal and river shipping also play a significant part, while air transport is used to service remote areas and development enclaves. There is minimal use of animal power, although portage (mainly by women) is common and is the only means of transporting goods for the many villages that are not on the road network. Studies of road improvement projects in PNG have demonstrated a clear link between the improved accessibility provided by road rehabilitation and improvements in the human development index (HDI) – in particular through increased participation in education and use of health facilities.

55. The road network is divided into national and provincial roads. There are 7,600 kilometres (km) of National Roads of which about 5,000 km are gravel and 2,600 km are sealed. In addition there are a large number of provincial and district roads. Only about 40% of the national road network is considered to be in a maintainable condition. About half the national network requires some significant rehabilitation, restoration, or reconstruction to make the roads trafficable. Provincial Roads connect provincial capitals with district centres. Their number and total length have been changing continuously as provinces create new districts and designate existing tracks as provincial roads. The total length is around 10,000 km of which only about 1,000 km are sealed.

56. Provincial Roads connect provincial capitals with district centres. Their number and total length have been changing continuously as provinces create new districts and designate existing tracks as provincial roads. The total length is around 10,000 km of which only about 1,000 km are sealed.

57. Many roads in the Highlands region are in poor condition and this has been getting worse. Expenditure on road maintenance has been insufficient to prevent deterioration in the network. This has resulted in longer journey times, higher vehicle operating costs and the complete isolation of some communities. As a consequence, significant national income from export of agricultural products and other businesses is being foregone. Social conditions have worsened and this has exacerbated problems of social unrest and lack of security.

58. The condition of the national roads in the highlands region as shown in the RAMS database is shown in table 1. (Note while the RAMS database includes some provincial roads, the data for the Highlands is incomplete and less up to date).

59. RAMS has not been updated with the latest survey data and it is reasonable to assume that the situation is now worse than indicated except in some specific locations where upgrading has been undertaken. AusAID is providing an advisor to RAMS under the Transport Sector Support Program (TSSP) and additional assistance to improve the performance of the RAMS unit is proposed under this project.

Table II-1 Condition of Highlands National Roads

Condition	Earth	Gravel	Sealed	Total
good				
fair	2%	5%	24%	31%
poor	1%	58%	10%	69%
Total	3%	63%	24%	100%

Source RAMS data

60. While the first tranche will be focused on priority national roads within the highlands region, it is proposed that the project will also include important connecting and feeder roads in the Highlands region. Inclusion of feeder roads is important to the

achievement of the project's objective of bringing land into efficient utilization and extending services to currently isolated towns and villages.

2. Transport Agencies

61. The Ministry of Transport is the nodal transport agency, responsible for policy making, regulation and planning. The Department of Works (DOW) is the executing agency for roads, responsible for the national highway, but also undertaking work on provincial and highways at the request of the provinces. The DOW has not had its own workforce since the 1990's, its activities being limited to design, contract administration and supervision. However the Plant and Transport Branch (PTB) has recently been re-established with equipment provided by donors, and it is proposed that DOW will be directly involved in construction and maintenance for the more remote areas where mobilizing contractors has proved difficult.

62. There are a number of other organizations involved in the transport sector. At the national level, the Department of National Planning and Monitoring plays a supervisory role. There is also the newly formed National Roads Authority and various transport and infrastructure committees. At the provincial level, there are provincial works departments under the direction of the provincial governments. The Highlands Road Maintenance Group (HRMG) was established within DOW in 2006 to act as a project management office for the implementation of internationally funded projects in the Highlands region.

B. Analysis of Key Problems and Opportunities

1. Poor Road Condition

63. The poor condition of the majority of the road network is a major factor in the failure of the PNG economy to achieve its potential. Stakeholders repeatedly identified problems with access resulting from the state of the roads leading to lack of economic development poorly staffed and inaccessible schools and health facilities. It is also arguably a factor contributing to a lack of cohesion and understanding between PNG citizens. The reasons for the poor condition is part financial – insufficient monies are allocated and spent maintaining roads – and part institutional – lack of capacity and focus within the Department of Works leading to an emphasis on major works and the neglect of basic maintenance.

64. The primary cause of poor road condition is lack of expenditure on maintenance. Road maintenance is funded by the government from funds appropriated by parliament. In recent years the amount appropriated has fallen short of the amount requested by DOW, while monies released have fallen well short of the amounts appropriated. For example in 2003, 32 million Kina were appropriated, but only 8.3 million kina was actually received. The amount necessary to provide a comprehensive ongoing maintenance program is probably closer to K250 million per year.

65. The development partners, ADB, World Bank, AusAID, JICA, EU and others fund road rehabilitation and reconstruction work under low interest loans or grants. This work is made necessary by the lack of routine and periodic maintenance. The agencies expect GoPNG to contribute a share of the reconstruction costs, reducing the funding available for routine and periodic maintenance elsewhere on the network and thus creating a 'vicious circle' of underfunding. An initiative by AusAID, the Key Roads for Growth project has attempted to address this issue by grant funding periodic maintenance contracts for the Highlands Highway in Morobe and Eastern Highlands provinces.

66. Lack of money is not the only problem. Road work that is undertaken is often not adequately supervised, allowing poor workmanship and materials. DOW lacks the capacity to effectively undertake its contract management functions. AusAID is financing advisors under TSSP in an attempt to build capacity, but DOW is likely to continue to have difficulty

retaining qualified staff on public service pay rates in competition with the oil and gas and minerals sectors.

67. The prioritization of what money is made available is a further issue. A lesson learnt from previous projects is that rehabilitation alone provides only a short term solution. Without ongoing maintenance, roads quickly fall back into disrepair. DOW has developed a road asset maintenance system (RAMS) with assistance from ADB with the aim of better prioritizing road maintenance expenditure and this has now been supplemented with a bridge asset system. Annual surveys of condition are undertaken so that the system can be used to prepare annual expenditure plans and programs. Although data for 2007 has been collected, it has yet been entered into the database and some condition data is now several years old. This reduces the usefulness of the tool. Bridge data so far in most instances only includes the bridge name.

2. Road Safety

68. PNG has a very high rate of road accidents with fatality rates believed to be higher than other countries within the region⁵. The National Transport Development Plan 2006-2010 (NTDP) lists the main causes of accidents as drunk driving, inadequate road safety awareness for drivers and pedestrians, an absence of uniform traffic engineering standards, hazardous road locations (accident black-spots), and inadequate enforcement of traffic rules. It foresees a reduction in accidents as a result of road improvements.

69. While improvement to the Project roads should provide more uniform engineering standards and reduce the probability of accidents, it will also result in higher vehicle speeds, thus increasing accident severity. Experience from the Key Roads for Growth project has been that the number of accidents has increased⁶. The main safety issue is pedestrians using the road. There is significant use of most roads by pedestrians, while footpaths or safe areas on the roadside are rare.

3. Government Transport Policy

70. The GoPNG's plans for the transport sector, designed to achieve the objectives of the Medium Term Development Strategy, are set out in the National Transport Development Plan Update, 2006 -2010 (NTDP). The plan covers infrastructure improvement, institutional and legislative reforms in the transport sector. The aim, as expressed in the plan, is

to provide safe and dependable transport services to all sections of the community in PNG in a cost efficient and effective manner

71. To achieve this aim in the road sector, the strategy is:

- First to maintain and improve the existing infrastructure and services
- Second to upgrade, rehabilitate and do new construction works only where economically feasible
- Third to conduct business on "Safety and Security First" basis

72. The NTDP proposes raising funds directly from road users and depositing the resulting revenues into a road fund to be managed by a National Road Authority (NRA) Board with a small Secretariat to be used exclusively on road maintenance activities

73. The priority for investment is identified as sixteen national highways identified by work undertaken by Australian National University (ANU) and the Transport Infrastructure Priority Study (TIPS). The ANU study identified 29 roads based on population served and economic influence. It thus identified roads based on a measure of their importance. The

⁵ Reliable accident data have not been collected in recent years

⁶ Minor accidents tend to go unreported, so it may be that what has happened is that the number of reported accidents has increased due to their greater severity.

TIPS study used a wider range of indices but also considered each road's condition. It thus identified priority for improvements. The 16 roads were identified as part of the TIPS study.

74. For local and rural roads, the NDTP proposed a District Road Improvement Program (DRIP). This has now become part of the District Services Improvement Program (DSIP), administered by the Office of Rural Development. DISP received funding of K10 million per district in the 2007 Supplementary Budget and the 2008 Budget. Implementation of the program must comply with the District Services Improvement Guidelines developed by the department of Finance. While the program allows expenditure in seven sectors, 40% of the K890 million allocated is quarantined for the transport sector.

75. Although money has been allocated, there has been no work done under DISP to date. The Office of Rural Development intends to work in collaboration with Provincial Administrators and existing tender boards to implement the program. Implementation will commence shortly after completion of explanatory workshops in the four regions designed to explain the initiative to Local Level Government administrations. Transport sub-projects will be selected from the approved District five year plans prepared by LLGs working in collaboration with the relevant provincial administration. Contracts less than K0.3 million will be classed as shopping, with 3 written quotes required. Contracts above K0.3 million will be classed as minor works with a formal tendering process administered by the relevant provincial tender board, or if a provincial tender board does not exist, by the Central Supply and Tenders Board.

76. A National Roads Authority (NRA), proposed in the NTDP, was established with ADB assistance by Act of Parliament in 2003 but is not yet staffed or functioning. The process of staff recruitment has now commenced. Creation of the NRA reportedly stemmed from frustration of the private sector and GOPNG central agencies about the effectiveness of DOW and perceived problems of poor governance. The purpose of the NRA is to manage the funding and undertaking of road maintenance. NRA has a predominantly private enterprise board including road user representatives. The NDTP indicated that initially the Authority would concentrate on the rehabilitation and maintenance of the Highlands Highway followed by other national highways depending on their priority. Once all the national highways are brought to acceptable levels, it is anticipated that NRA would focus attention on provincial roads. The NRA is intended to be self sustaining, generating income through various revenue measures to service itself and to carry out its designated functions and responsibilities. A description of the NRA and its mandate is provided in Appendix []

4. Finance for Road Maintenance

77. Maintenance has not taken place in the past due to a failure to obtain the necessary money. If the Project is to provide outcomes that are sustainable, a long term reliable source of funding must be put in place. NRA currently has some income through a levy of four toea (K0.04) on diesel and an allocation of K20 million per annum. This brings in some K1.2 million per month and would be adequate for maintaining up to about 600 km of roads. This will enable NRA to take over the maintenance of some existing roads in the Highlands and the first tranche of the new Project, but will need to be supplemented for NRA to undertake its full responsibilities.

78. The Government could provide additional money through its normal budgetary process. However this either requires the government to raise additional taxes or charges, or to reduce the money going to other sectors. The proportion of the national budget going to transport has been increasing, but it seems unlikely that any significant increase will come from this source. A common experience with tax-based funding is that there is never enough money. Governments want to reduce or hold the level of general taxation, and other sectors (education, health, etc) have rival claims for the money collected. Typically users express a willingness to pay more to get more roads, but there is no easy mechanism whereby this can

be achieved. This is certainly the case in PNG. Hence the policy stated in the NTDP is to raise the funds directly from road users, through cost recovery.

a) Fuel levies

79. One of the preferred road charging systems worldwide are fuel levies, because the charge can be seen as related to road use, while collection can be based on quantities distributed by fuel wholesalers, thereby minimising the administrative cost involved. There is a levy on diesel fuel and gasoline of 6 toea per litre. Four toea per litre of diesel goes to the NRA with the balance going to consolidated government revenue. Fuel levies can closely reflect the road use of light vehicles. However the wear caused by heavy vehicles is disproportionate to the fuel used. Normally fuel levies are therefore supplemented with other charges for heavy vehicles.

b) Heavy Vehicle Fees

80. Licence fees can be used to increase the contribution from heavy vehicles to better reflect their costs. NEC approved a range of fees for each category of trucks in 2005 and NRA are currently discussing this with the Motor Vehicles Insurance Ltd. The problem with annual fees is that pavement wear is a function of axle loads and distance. Annual licence fees can be based on the vehicle weight, but are unrelated to the actual use of the vehicle. Road wear is also heavily dependent on the road design and how well the road is maintained: a well constructed and maintained road will last much longer than a lightly constructed or poorly maintained one. An ideal road user charging system would charge vehicles depending on their mass, axle loads, condition of the road, and the distance travelled. Most current charging systems unavoidably provide perverse incentives, for example discouraging vehicles with multiple axles, which are more road-friendly.

c) Tolls and Permit Fees

81. In contrast with general pricing instruments that can only imperfectly reflect the cost of road use, tolls have the potential to provide precise charges reflecting vehicle, load and road characteristics—but usually at the expense of high transaction costs. Tolls have advantages and disadvantages. The main advantage is that they do create a nexus between road use and cost for both the supplier and the user. They can ensure users are faced with appropriate charges. In particular, tolls can reflect the relationship between tonne-kilometres and pavement wear for different heavy vehicle configurations and they can reflect the congestion costs imposed by vehicles at different times of day. Tolls can also help ensure maintenance is undertaken by providing a direct mechanism linking receipts to work done

82. The main disadvantage of tolls is the additional collection costs. Since most road maintenance expenditure is directly attributable to heavy goods vehicles, an alternative to tolls that would enable the charge to relate to the axle load and distance travelled of heavy vehicles but would not affect light vehicles would be a permit scheme for heavy vehicles. Every heavy vehicle would require a licence authorising its normal use and could apply for a permit to make trips outside the terms of the licence. Permits could be bought from a garage or even from certain stores, or could be entirely 'electronic', significantly reducing the collection cost. Companies that operate trunk services such as along the Highlands Highway would be able to buy a permit that allowed multiple trips, or were valid for a given period to reduce administration costs. This concept provides a cheap, low compliance-cost option for introducing some mass-distance element into the road user charge. Enforcement may be able to be subcontracted to the road maintenance contractor.

83. Light vehicles would not need permits. Thus the system would not affect private motorists or the poor. They would, however benefit from better roads.

d) Private Sector Contribution

84. The two major industries in the region – Porgera Mine (PJV) and Oilsearch – have been contributing to road maintenance in the highlands through a tax credit scheme whereby a specified percentage of revenue can be used for approved projects and off-set against tax liabilities. There some question over the future of the scheme, although PJV have indicated that they would continue to maintain the road to the mine whether the scheme is available or not . Discussions with the industries indicate the potential for this money to be channeled into the proposed long term maintenance contracts. Other industries such as coffee processing factories may see benefit in entering into an arrangement with NRA to assist in funding the road network.

5. External Assistance to the Transport Sector

85. There are three main development agencies active in the road transport sector in PNG – ADB, World Bank and the Australian agency for international development (AusAID). The Japanese Government is also active through its development agencies, concentrating primarily on bridges. While the agencies generally operate in different provinces, there is a potential for overlap and even conflict in the areas of institutional support and governance and in implementation conditions imposed on GoPNG. Efforts to overcome these problems include a transport sector support program (TSSP) initiated by AusAID to support the implementation of GoPNG policies, strategies and plans for the transport sector, while ADB is financing assistance to harmonise development agency initiatives in the transport sector.

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87. Since 2000 World Bank principal activity in the road maintenance sector has been the Road Maintenance and Rehabilitation Proin Central, East New Britain, Manus, Morobe, Oro and West New Britain Provinces. An initial IBRD loan of US\$35 million with counterpart funds of US\$30 became effective in February 2003 and was completed by 2007. An IDA Credit of US\$37.3 million in 2007 extended the duration of the activity to the end of 2009 with two additional provinces, Gulf and Western Province, being added to the original six.

88. AusAID has provided significant grant aid funds to maintain and rehabilitate roads and develop the road sector since 1994. Road maintenance and rehabilitation has been performed through a series of projects implemented through the DOW with support from management and technical consultants.

Project	Dates	Provinces	Grants
National Road Regravelling and Sealing Project	1994 to 2005	Central, Eastern Highlands and Morobe	\$105 million
The National Road and Bridge Maintenance Project	2001 to 2006	Sandaun, East Sepik, Madang, Milne bay, New Ireland East and West New Britain	\$85 million
Bougainville Coastal trunk Road Maintenance Project	2002 to 2006	Bougainville	\$17 million
Key Roads for Growth Maintenance Project	2005 to 2009	Eastern Highlands and Morobe	\$45 million

Source AusAID

89. Since 2007 AusAID has sought to improve transport outcomes through the Transport Sector Support Program (TSSP). The TSSP focus is to improve governance and strengthen capacity to improve service delivery. The program has been designed to offer flexible responses in supporting the implementation of GOPNG policies, strategies and plans for the transport sector. While initially the program will work in individual agencies over time it is planned the program will develop into a sector wide approach. Since 2007 the Transport Sector Support Program has maintained and rehabilitated roads in nine provinces. In 2007 the interim phase of this project awarded 13 contracts with a value of \$21 million covering 404 kilometres. Since 2007 the main phase of the project has awarded contracts with a value of \$22 million to maintain and rehabilitate 127 kilometres of road. AusAID is also funding capacity development within the transport sector agencies included central agencies through the placement of policy advisors.

90. ADB has funded road rehabilitation and maintenance in the Highlands region through the Highlands Road Maintenance and Upgrading Project since 2000. The initial loan and counterpart funding provided by Provincial Governments and the National Government will rehabilitate 213 kilometres and upgrade 256 kilometres at a cost of \$96 million. A Supplementary loan, once again with counterpart funding, will rehabilitate 189 kilometres and upgrade 80 kilometres at a cost of \$23 million.

III. THE PROPOSED PROJECT

A. Objective

91. The objective of the proposed Highlands Region Road Improvement Program (the Program) is to increase economic development and reduce poverty in Papua New Guinea by improving and ensuring the ongoing maintenance of the core road network of the Highlands Region. The Highlands Region is home to forty percent of PNG's population and generates a disproportionate share of the country's GDP.

92. The Program will establish a sustainable road system in the Highlands region that will enable maximum use of its natural, mineral and human resources for the people of the Highlands region and the country. This will contribute to ADB's CSP and MTDS objectives of (i) export driven economic growth, and (ii) fostering rural development, poverty reduction, and human resource development.

93. The Program will result in improved accessibility to ports, markets, and livelihood opportunities. The improved road network will reduce travel time and transport costs in the Highlands region.

B. Components and Outputs

94. The Program focuses on the Highlands core road network (HCRN) of 2,500 km comprising of all national, the main provincial, and some district roads, which together carry bulk of the traffic in the region and provide accessibility to the population. HCRN represents 65% of the total road network in the Highlands region.

95. At the completion of the Program, (i) 1,400 km of HCRN will be improved to maintainable level; (ii) the entire 2,500 km of HCRN will be maintained through long-term contracts; (iii) capacity of NRA staff to maintain roads and DOW staff to develop and rehabilitate roads will be improved; (iv) policies to introduce road user charges and to reduce traffic accidents have been implemented; and (v) a new National Transport Development Plan (NTDP) for 2011 to 2020 would have been finalized.

C. Special Features

96. Under-funding of routine maintenance is a major failure that affects the sustainability of the sector. Failure to perform regular routine maintenance results in rapid deterioration of the condition of the roads to the extent that major periodic maintenance or rehabilitation is required. This cycle of inadequate maintenance leading to accelerated deterioration and rehabilitation is self-perpetuating because the apparent urgency of repairs to roads that are failing draws funds away from the routine maintenance that could have prevented the problem.

97. The design of the project is therefore predicated on providing sustainable routine maintenance so that the investment in rehabilitation and upgrading of the project roads is not dissipated through neglect. The systemic failure to perform road maintenance is addressed in this project through the following actions.

- Ensuring that the roads are managed by an organisation whose primary focus is road maintenance
- Making a long term maintenance contract an integral part of the project rather than relying on covenants or promises
- Developing funding mechanisms to provide money required for maintenance

1. Operationalization of the NRA

98. NRA is the appropriate organisation to focus on road maintenance. Transfer of maintenance functions to the NRA is a key institutional policy set out in the NDTP and ADB has assisted in its establishment. This project will include assistance to the newly formed NRA to enable it to take responsibility for the core road network. the project will provide capacity building for the NRA in the following areas:

- Establishment of accounting and Management information systems
- Establishment definition and Staff recruitment
- Developing and implementing additional road user charges/levies
- Contract procurement and management (including establishing local offices)
- Establishing condition monitoring procedures
- Training on social and environmental issues
- Publicity and promotions including establishing a web site.

2. Long Term Maintenance Contracts

99. The project will make long term maintenance contracts an integral part of the project rather than relying on covenants or promises. For the 1,400 km of roads to be upgraded under the project, the contracts will be in the form of “build and operate” whereby the same contractor will both undertake the repairs and rehabilitation to bring the road up to the desired standard but will also maintain it to a specified standard for the remainder of a ten year contract period. Responsibility for the road will be transferred to the NRA once rehabilitation is complete. The maintenance contract will be performance based. Fixed monthly payments will be made subject to performance standards being met, with defined penalties for underperformance.

100. While the primary focus is on the roads to be rehabilitated and upgraded, it is proposed that other major roads in the highlands that are currently in maintainable condition are included in the project. The benefits are twofold: this will ensure that the entire network benefits rather than (as often happens) only the rehabilitated roads benefit at the expense of all other roads; and it will result in larger maintenance contracts that will be more attractive to international bidders. Approximately 1,100 km of the core road network is already of maintainable standard. These roads will also be transferred to the NRA and placed under 10 year maintenance contracts. These contracts perform rehabilitation and improvements using schedule of rates method of payment and maintenance using performance specified road maintenance with fixed monthly payments less penalties.

3. Road User Charges

101. Ensuring that the core road network is sustainable requires developing funding mechanisms to provide money required for maintenance. Road user charges are proposed in the NTDP and are provided for in the NRA Act: however there is an understandable reluctance to actually impose what are seen as additional costs on the transport sector. The Project will assist with the design and introduction of appropriate charges, including assisting with raising awareness of the costs imposed by lack of maintenance.

4. Private Sector Participation

102. NRA has a predominantly private sector board and is being encouraged to operate on a commercial basis, charging its users and maintaining the network on their behalf. It will work with the major industries in the region as well as other industries such as coffee processing factories. This may involve the use of tax credit money or other direct contributions.

5. Policy Development

103. The project will work with the GoPNG towards the achievement of a safe and reliable road transport network. It will assist the Department of Transport with the development of a successor document to the National Transport Development Plan 2006 – 2010. A TA, described in Chapter IV, is proposed for this work

6. Road Safety

104. One potential problem resulting from road improvements is an increase in accident severity resulting from higher speeds, and increased danger to pedestrians. The project will assist the National Road Safety Council to undertake its role in raising awareness of road safety and road hazards in advance of road upgrading.

7. Road Transport Services

105. Vehicle ownership in the highlands region is very low. Travel is almost entirely by passenger motor vehicles (PMV). These are regulated and fares are set by the Ministry of Transport. The form of services are almost entirely 'on demand' with no formal timetables. This form of service is ideal for heavily used routes, but can lead to chronic underprovision on low density routes.

106. The project will include a review of the adequacy of existing passenger and freight services in the region and will make recommendations for administrative or regulatory change if appropriate.

8. Social Monitoring Study

107. The Project will include a benefit tracking study to monitor the social and economic benefits of upgrading and maintaining roads in the Highlands region. This will involve benchmarking and follow up studies of villages within the road influence areas and within control villages unaffected by the development. The methodology will closely follow similar studies undertaken by Department of Works and World Bank since 2004 and recently also undertaken by AusAID. Results of these studies show clear measurable benefits from investments in road upgrading and maintenance⁷.

108. The scope of the study will include roads that are being upgraded and maintained under PROGRAM, as well as roads that ADB has upgraded under Loan 1709-PNG. The key indicators will include road transport characteristics, income patterns, access to social services and environmental issues. Data collection will target households, PMV drivers and trade store owners. A baseline survey will establish a database of existing conditions on project roads and on "control" roads that are not scheduled for upgrading; follow-up rounds of data collection from the same respondents will occur on an annual basis to document changes in conditions in communities on the project and control roads. The study will facilitate comparisons of the benefits of road upgrading and maintenance in all regions of PNG and help to build a consolidated database of social and economic conditions, particularly for rural areas of the country.

⁷ Benefits identified include (i) expanded public transport (PMV) services makes travel faster and, for groups like women, easier; (ii) greater accessibility to markets induces diversification and increased production of cash crops; (iii) household incomes increase due to more market sales, with increases averaging 27% in sample villages; (iv) more boys and girls attend school, drop outs decline and academic performance improves; and, (v) improved roads reduce the travel time to health care facilities and contribute to saving lives

D. Cost Estimates

1. Tranche 1

109. Construction quantities for each sub-project upgrading project have been estimated based on the current condition of the road and the proposed upgrading standard. Derivation of significant quantities and detailed Bills of Quantities for each sub-project are provided in [Appendix .] The resulting construction cost estimates for roads and bridges are provided in Table III-1.

Table III-1 Construction Cost Estimates for the First Tranche

Section	Start	End	Amount (Kina)
Koroba Road	Nipa	Margarima	31,958,000
Koroba Road	Margarima	Ambua Lodge	34,090,000
Koroba Road	Tari	Koroba	36,442,000
Wabag-Mendi Road	Tente Junction	Kandep	38,197,000
Enga Highway	Wapenamanda	Wabag	24,246,000
Porgera Road	Laiagam	Porgera	60,945,000
		Total	225,878,385

Source consultant estimates

110. It is proposed that these road sections are constructed under build and maintain contracts which include the maintenance of additional roads that are in a maintainable condition. The cost of routine, periodic and emergency maintenance on the above sub-project roads and the additional maintainable roads for periods up to ten years are detailed in Table III-2. Costs for the initial rehabilitation and recurrent maintenance are included for the maintainable roads.

Table III-2 Maintenance Cost for First Tranche

Section	Start	End	Length (Km)	Amount
Upgraded Roads				
Koroba Road	Nipa	Margarima	26.4	4,290,000
Koroba Road	Margarima	Ambua Lodge	41.1	6,679,000
Koroba Road	Tari	Koroba	38.7	6,289,000
Wabag-Mendi Rd	Tente Junction	Kandep	49.9	7,500,000
Porgera Road	Laiagam	Porgera	65.0	11,375,000
Maintenance Only				
Wabag – Mendi	Wabag	Laiagam	41	9,225,000
Wabag- Mendi Rd	Laiagam	Kandep	55	11,000,000
Enga Highway	Togoba	Wapenamanda	58	14,500,000
Koroba Road	Mendi	Nipa	58	12,325,000
Koroba Road	Ambua	Tari	22	4,675,000
Highlands Highway	SHP/WHP Border	Mendi	84	17,640,000
Erave Road	Kisenepoi	Kagua	44	8,800,000
		Total	583.1	114,298,000

Source consultant estimates

111. Other costs related to the implementation of the project are detailed in Table III-3.

Table III-3 Other Project Related Costs for First Tranche

Description	Amount
Land Acquisition	3,387,000
Consulting Services	28,234,000
GOPNG Supporting Personnel	2,676,000
Financial Charges	12,949,000
Total	47,246,000

112. Project costs are estimated at \$225.5 million equivalent, with a foreign exchange cost of \$106.9 million and local currency cost of \$118.54 million equivalent, as shown in . The high total cost compared to the initial cost of \$ [] m arises because maintenance costs are included in the project rather than being covered by covenants as in conventional projects.

Table III-4 Cost Estimates

Item	Foreign Exchange	Local Currency	Total Cost
A. Investment Costs			
a. Civil Works	38,617,000	29,132,000	67,748,000
b Land acquisition		3,387,000	3,387,000
c Consulting Services	6,611,000	21,623,000	28,234,000
d Project Admin (GOPNG)		2,676,000	2,676,000
e Taxes & Duties	10,230,000	10,145,000	20,375,000
Sub-total A	55,458,000	66,963,000	122,421,000
B. Recurrent			
a-b Road Maintenance	19,819,000	19,266,000	39,084,000
c Taxes & Duties	3,498,000	3,136,000	6,634,000
Sub-total B	23,317,000	22,402,000	45,719,000
C Contingencies	15,208,000	29,175,000	44,382,000
D Financial Charges	12,949,000	0	12,949,000
Total	106,931,000	118,540,000	225,472,000

Notes: (i) Base costs are 2007 market prices,. (ii) Price escalation based on projected international & domestic cost escalation factors supplied by ADB Source: Consultant estimates.

2. Remaining Tranches

113. Based on the current condition of the core road network in the five Highland provinces after the completion of Tranche 1 there will remain approximately 1180 kilometres of roads that will require significant improvement and rehabilitation before they can be maintained through a long term performance based maintenance contract. Based on current prices the base cost of these works is estimated to be \$465 million.

114. Based on the current condition of the existing road network in the five highland provinces after the completion of Tranche 1 there will be approximately 735 kilometres of roads that will be suitable for maintenance with only a minimum of rehabilitation works. The estimated cost to maintain these roads and the 1180 kilometres of upgraded roads up to the end of the project in 2018 is \$88 million. Details of the location of the roads only requiring maintenance and their classification are provided in Table III-5.

Table III-5 Roads requiring Maintenance in Tranches 2 to 4

Province	National	Provincial	Total
Simbu	198	19	217
Eastern Highlands	244	109	353
Enga	0	44	44
Southern Highlands	0	0	0
Western Highlands	110	11	121
Total	552	183	735

Source : consultant estimates

3. Program Cost

115. The full program costs comprising the total estimated cost of the four tranches is \$1,234 million. A breakdown of this cost is provided in Table III-6.

Table III-6 Program Cost

Item	Amount
A. Investment Costs	
a. Civil Works	542,800,000
b Land acquisition	27,100,000
c Consulting Services	28,234,000
d Project Admin (GOPNG)	2,676,000
e Taxes & Duties	121,218,000
Sub-total A	722,069,000
B. Recurrent	
a-b Road Maintenance	126,684,000
c Taxes & Duties	21,502,000
Sub-total B	148,187,000
C Contingencies	265,558,000
D Financial Charges	98,763,000
Total	1,234,576,000

E. Financing Plan

116. A tentative financing plan is set out in tables 2 and 3.

Table 2: Tentative Financing Plan for the Program
(\$ million)

Source	Total
Asian Development Bank	400.0 32.00
Other Cofinanciers ^a	429.5 35.00
Government	405.1 33.00
Total	1,234.6 100.00

Table 3: Tentative Financing Plan for Project 1

(\$ million)		
<u>Source</u>	Total	
Asian Development Bank	142.4	63.00
Government	83.1	37.00
Total	225.5	100.00

^a Possibly JBIC or China EXIM Bank. Source: ADB estimates.

F. Implementation Arrangements

1. Organization and Management

117. The project will be implemented by the Highlands Road Maintenance Unit (HRMG). Based on lessons learned on the implementation of previous ADB loans in PNG the implementation consultants' role will undertake line management functions rather than act in advisory positions. Local staffing will include officers from both DOW (to manage the construction phase) and NRA (to manage maintenance works). The head of the unit will be a DOW officer. HRMG will (i) investigation and design all works (ii) prepare tender documents, administer construction contracts and supervise construction (iii) prepare withdrawal applications, (iv) prepare project progress reports, and (v) maintain project accounts and complete loan financial records for auditing the Project.

118. While rehabilitation and maintenance works will be contracted together the construction supervision functions for these two activities will be separated. Construction for the rehabilitation works will be performed by consultants acting on behalf of DOW while the NRA will provide personnel to supervise the maintenance activities. The head of the HRMG, who must be acceptable to ADB and have adequate experience in project management, will be responsible for the day-to-day supervision of implementation activities. Support will be provided by professional and clerical staff with expertise and experience in financial accounting, road engineering, construction supervision, and contract administration. ADB has been working closely with DoW for several years on implementation of other road projects and believes that DoW has, and HRMG will have, with necessary consultant support, the financial management capacity to manage the Project effectively.

2. Implementation Schedule

119. The Project will be implemented over 10 years from March 2009 to March 2019, including mobilization. The initial works to bring the tranche 1 roads up to the minimum standard are scheduled to begin in late 2009 and to be completed by December 2013. The contracts will require National Executive Council (NEC) approval, and this process can take many months. The Government has agreed to endeavour to give approvals priority. The proposed implementation schedule is shown in Appendix 5.

3. Procurement

120. All procurement to be financed under an ADB loan must be carried out in accordance with ADB's *Procurement Guidelines February 2007*. Contracts valued in excess of \$500,000 for goods and \$1.0 million for civil works will be procured through international competitive bidding. The Project has been packaged into five contracts at will be financed under international competitive bidding procedures following ADB's Performance Based Procurement rules. The tentative contract packages are listed in Appendix 6.

4. Disbursement Arrangements

121. Payment to the contractors will be in the form of monthly payments made by HRMG to the contractor. Payments will be at the contracted sum plus allowable escalation.

122. All disbursements under the loan will be carried out in accordance with ADB's *Loan Disbursement Handbook (2001)*. The disbursement procedures will include (i) a direct payment procedure, (ii) a commitment procedure, or (iii) a reimbursement procedure.

5. Accounting, Auditing, and Reporting

123. HRMG will prepare and submit to ADB quarterly and annual progress reports on project implementation and operation, the form and content of which will be agreed with ADB. Separate accounts will be maintained for all project components financed by ADB and the Government, and will be audited by an independent auditor that has adequate knowledge and experience of international accounting practices and is acceptable to ADB. The audited project accounts and the auditor's reports will be provided to ADB within six months of the end of each financial year. The Government has been informed of ADB's requirement for the timely submission of audited project accounts and financial statements, including the suspension of disbursements in case of noncompliance. To facilitate evaluation of the Project, the Government has agreed to provide a project completion report to ADB within three months of physical completion of the Project.

6. Project Performance Monitoring and Evaluation

124. ADB will agree a set of indicators with DoW and NRA for monitoring and evaluating project performance in relation to the agreed outputs and input milestones. Representative output indicators included in the project framework include number of staff trained, number of staff transferred to the private sector, kilometers of road maintained by private contractors, and annual user fees collected. Changes to these measures will be monitored and reported. Key inputs are the successful introduction of the key project components: appointment of consultants, establishment of a ten year maintenance contract, operationalization of NRA and introduction of a permit fee for heavy vehicles. Milestones for having these inputs in place will be agreed between ADB and the Government.

125. The social monitoring study will be used to monitor the Program's effectiveness in providing economic and social benefits to the road influence zone.

126. Because it is a multi-tranche facility, there will be opportunity for regular implementation reviews in association with project preparation reviews relating to subsequent tranches. In addition to such reviews, ADB and the Government will carry out a formal midterm review (MTR) of project implementation in late 2010. The MTR will identify any problems or weaknesses in implementation arrangements and agree on any changes needed to achieve the Project objectives. The review will also address any procurement problems and financing and scheduling matters as well as achievement of the institutional and legislative changes. The Project's economic viability and other relevant aspects that may have an impact on project performance will also be assessed. The review will examine the implementation progress for and compliance with assurances specified in the Loan Agreement. Two months before the MTR, both the executing agencies (DOW and NRA) will submit to ADB a detailed status report on project implementation. Terms of reference of the MTR will be included in the project administration memorandum to be prepared by the ADB's inception mission for the Project.

127. ADB's Anticorruption Policy was explained to the officials of the Government during project processing. The Government is committed to creating and sustaining a corruption-free environment, and has agreed to abide by the relevant provisions of ADB's Anticorruption Policy in preparing all documents and contracts during the bidding process and project implementation.

IV. TECHNICAL ASSISTANCE

128. To support the Project and assist in improving the effectiveness of the road sector institutions, the Government has requested (i) assistance to NRA to develop its systems and procedures, (ii) assistance to NRSC to take greater responsibility for safety issues, (iii) assistance to Lands Department prepare a land inventory report, (iv), training for DoW to deal with land issues in a way that is consistent with ADB requirements, (v) assistance to DoW to update RAMS and make it available to multiple users, (vi) training for DoW and NRA in PBC contract administration and supervision, and (vii) assistance to DoT in the review of the NTDP and preparation of its successor.

129. Items (i) to (vi) will be funded from the proposed loan. ADB will finance Item (vii) on a grant basis from the ADB funded technical assistance program. The key dimensions of the technical assistance (TA) are set out in the following sections.

A. Capacity Development of DOW and NRA

130. The project will develop the capacity of DOW and NRA by appointing specialist consultants. The project will provide the following capacity development services.

1. Road Safety

131. 37.The project will appoint Advisors to provide technical assistance to the National Road Safety Council in improving road safety outcomes in the Highlands region. An international consultant (6 months) will provide advisory technical assistance in the following areas,

- (i) Establishment of a Highlands regional office for the NRSC. The project will provide material support over the first 12 months of the office's operation.
- (ii) Development and trial in the Highlands hazard reduction plans on selected roads. Train NRSC staff in road accident preventative measures and roads safety audits.
- (iii) Assist NRSC plan and implement community road safety education campaigns in the Highlands region.

2. Land acquisition

132. The project will appoint Advisors to provide training and technical support to HRMG for land acquisition and compensation. An international consultant (6 months) and a national consultant (12 months) will provide formal and on-the-job training for HRMG staff including members of the Land Acquisition and Crop Compensation Cell, Community Relations Officers and Provincial Works Managers and Coordinators; and, for Provincial and District Land Officers. The scope of the training will include GoPNG and ADB policies and procedures for land acquisition and compensation; and, methods and tools for asset inventory and valuation, community consultations and grievance redress. The Advisors will ensure the capacity of HRMG staff to provide future training to provincial and district authorities; and, will provide technical assistance during their tenure to carry out land acquisition activities and prepare resettlement plans for subprojects.

3. Road Asset Management

133. The project will provide technical assistance to the improvement of GOPNG road asset management systems. The support to be provided will be defined in consultation with the DOW RAMS unit and NRA considering the advice of the TSSP RAMS Advisor. A nominal input of 6 months for a road asset management specialist is provided as a provisional sum.

4. Performance Based Contracting

134. The project will provide as part of the Design and Implementation Assistance Consultant 47 person months of a Performance Based Contract Specialist. The Specialist will assist DOW and NRA to develop and implement performance specified road maintenance contracting. The Specialist will work principally with the NRA to develop PBC procedures and systems but will also work closely with DOW, contractors and consultants and other stakeholders. The Specialist will provide advisory technical assistance to the NRA and DOW in the development and implementation of PBC, the private sector in the preparation of PBC tenders and the community in monitoring the performance of PBC contractors. Other key tasks to be performed include: consultation with the contractors, consultants and road agencies on the form of PBC contracts. development of tender and contract documents and development and presentation of training to road agency personnel and the private sector,

B. Policy and Institutional reform

1. Objectives and Scope

135. The overall objective of the TA is to assist the DoT in its preparation of a successor document to the NTDP 2006-2010 with the aim of this successor document (the Plan) being approved by the Minister, endorsed as Government Policy by the National Executive Council (NEC) and readied for publication by December 2010 with commencement from 1 January 2011.

2. Services to be Performed

136. The TA will provide the services of a transport planner/economist team leader (the Consultant) supported by short term specialists to assist and advise the Secretary for Transport in the DoT's preparation of the Plan including, but not necessarily limited to, the DoT's:

- (i) review and benchmarking of the performance of the present NTDP and application of lessons learned in the development of the Plan
- (ii) development of the order and contents, format and dissemination of the Plan
- (iii) consideration and decision-making on the sub-sector scope (land transport, maritime and aviation; domestic and international transport), and the treatment of transport sector commercialized enterprises (CAA, PNGPL, NMSA, NRA)
- (iv) consideration and decision-making on the national, provincial and local level coverage of the Plan and the relationship between, or integration with, the Plan and the provincial transport planning process and provincial transport plans
- (v) framing of the Plan as fixed 10 year investment plan (as for the existing NTDP); or as a longer term National Transport Strategy (10-30 years) linked to a medium term indicative investment plan (5-10 years) and short term rolling investment program (1-3 years); or other model
- (vi) consideration of the updating and review mechanisms, linkages between the Plan and the Government's Budget process and those of the commercialized transport agencies

- (vii) collation and analysis of information on the transport network, its utilization, demand factors, demand projections, transport and construction costs, and funding, at national and provincial level
- (viii) development of procedures for identifying potentially desirable transport infrastructure and service improvements, including screening and multi-criteria appraisal, economic evaluation, prioritization and programming
- (ix) consultation with stakeholders on sector policy, institutional development and investment issues and priorities, at both national and provincial level
- (x) policy development process, and drafting of statements of adopted Government policy for inclusion in the new plan
- (xi) proposals for institutional development for inclusion in the plan
- (xii) arrangements for graphic design, printing, publication and dissemination of the new plan

137. In performing these services, the Consultant will maintain coordination and exchange of information with other sector donors, in particular with AusAID's TSSP program manager and team members, so that the services are complementary, avoid duplication and observe the principles of donor aid harmonization. It is envisaged that the TSCMIC will provide a forum to facilitate harmonization of the approach and inputs to the NTDP, and that the Consultant will attend on TSCMIC meetings with other donor representatives active in the transport sector.

3. Expected Timing

138. The services will be provided intermittently over a period of 2 years between January 2009 and December 2010.

4. Staffing and Management

139. A TA Steering Committee will oversee the conduct of the TA, receive periodic reports and briefings from the team leader, and provide guidance on GoPNG's policy and investment direction for inclusion in the NTDP. It is envisaged that the TSCMIC will be the Steering Committee for the TA.

140. A total of 18 person-months of international consulting services will be required. The ADB team will be lead by a transport planner/economist (12 months) who will act as coordinator for inputs to the NTDP and will report to the Secretary for Transport. The team leader should have a broad background and Pacific regional experience in transport infrastructure planning, policy, economics and institutional development. The team leader shall coordinate the engagement, and manage the inputs, of other short-term specialists recruited as and when required (envisaged up to 6 persons and up to 6 months total). The areas of specialization and selection of specialists will be undertaken in consultation with the DoT.

V. PROJECT BENEFITS, IMPACTS AND RISKS

A. Economic and Financial Benefits

141. The main benefits of the overall project will come from the stimulation of economic activity due to the provision of reliable all weather access to the region. This will lead to the development of potentially productive lands and agriculture-based industries such as coffee processing; and improvements to the health and education of the population, providing the preconditions for establishment of non-agriculture based enterprises. Since the first tranche is focused on upgrading existing national roads, the benefits of tranche 1 will be more directly related to the reduced vehicle operating costs consequent upon the road improvement.

1. Traffic Forecast

142. The initial impact on traffic levels will be moderate, and forecasts have been developed based on growth of the existing traffic. Traffic levels have actually declined since the turn of the century due to a combination of poor performance of the national economy, social unrest, and rapidly deteriorating road conditions. The national economy is now picking up, and there are indications that this is being reflected in an increased demand for travel. However the usual linkages between GDP and traffic would be unreliable – recent growth in GDP has been following the rising value of oil and gas, while the LNG export agreement just signed has the potential to double GDP but will have minimal direct impact on traffic. Due the high uncertainty in the traffic growth estimate, a ‘central’ estimate of 6% has been used with a low estimate of 2% and an upper estimate of 10%.

2. Vehicle Operating Costs

143. The DoW has been using the Highway Development and Management model (HDM-4) as part of the RAMS system and has already identified representative vehicles and their costs for inclusion in the economic analysis. These have been confirmed by the consultant and the costs updated to take account of the movement in fuel prices and wages. HDM-4 was used to estimate the vehicle operating costs per kilometer for the representative vehicles. Sample costs (in this example for the Nipa Margarima road) for are shown as Table V-1

**Table V-1: Representative Vehicle Operating Costs by Vehicle Type
(Kina per vehicle-km)**

Item	Current Condition	After Upgrade
Car	0.88	0.67
Pick up	1.26	085.
Bus	1.50	1.04
Light Truck	3.17	1.96
Medium Truck	5.44	3.84.
Heavy truck	7.82	5.18
Multi-Axle Truck/trailer	10.68	7.09

Source: Consultant estimate (Includes time costs)

3. Construction and Maintenance Costs

144. Construction and maintenance costs have been developed based on an estimated bill of quantities and rates for recently awarded contracts.

4. Economic Internal Rate of Return

145. The economic analysis was carried out for the project road on the basis of a comparison of the with- and without-project scenarios (Appendix 10). For the ‘build and

maintain' subprojects, the 'with project' involves widening the roads, sealing and maintenance for a period of 20 years. This is longer than the proposed contract period, but reflects the intention that the contracts will be re-let on expiry. A significant benefit from the project is ensuring the road is kept in good condition: the benefit from this in terms of slower deterioration of the pavement becomes increasingly noticeable over the evaluation period. The 'without project' option retains the road in un-sealed condition. A periodic maintenance program is assumed, although in practice this has been somewhat haphazard. While in theory the benefits from the upgrade could be evaluated separately from the long term maintenance, in practice these will only occur as a package.

146. For the maintain only subprojects, the 'with-project' case provides a high level of maintenance including regular patching, crack sealing and surface dressing at five year intervals. The 'without-project' case has minimal crack sealing and patching.

147. The return on the build and maintain projects is 22.7 percent while the return from the maintain only subproject is 36.1 percent. The evaluation, by section, is summarized in Table V-2

Table V-2: Benefit Calculation and Estimated EIRR (Kina M)

Section	Length	Cost (K million)	NPV (K million)	IRR (%)
Build and Maintain				
Laigam Porgera	65	51.2	46.8	24.7
Mendi Kandep	50	32.1	21.1	20.5
Nipa Margarima	26	26.8	12.1	16.7
Margarima Ambua	41	28.6	18.6	22.2
Tari Koroba	39	30.6	35.2	25.7
Total Build and Maintain	221	169.4	133.8	22.7
Maintain Only				
Ambua Tari	22	10.6	35.9	30.2
Hagen Mendi	90	31.1	78.0	24.3
Wabag Kandep	96	32.5	424.6	48.4
Kissenpoi Kagua	44	27.8	220.5	50.4
Mendi Nipa	58	13.4	24.0	28.2
Togoba Wapenamunda	58	21.1	477.5	68.7
Total Maintain Only	368	136.5	1,260	36.1

Source: Consultant estimates, 2008

5. Risk Analysis

148. A risk analysis was undertaken for the build and maintain sub-projects using the new sensitivity analysis feature of HDM-4 version 2 to perform a Monte Carlo simulation. A random number generator was used to select values for the key variables over a pre-selected range. This was repeated 100 times and a frequency distribution of the results obtained. The NPV and IERR for the overall project varied between a minimum of –K15 million (EIRR=10.7%) and a maximum of K285 million (30.4%) with a mean value of K137 million (22.7%). The probability that the EIRR of the project falls below 12 is 6%.

6. Distribution Analysis

149. A distribution analysis was carried out to show how the costs and benefits are expected to lie.

150. There is currently no mechanism for direct cost recovery from road users. Hence the Government (and the rest of the economy) will be the primary bearer of the economic resource costs associated with capital expenditure and maintenance. The government also suffers a financial loss as the result of lower vehicle operating costs (particularly fuel) and

the consequent lower tax payment. If a road maintenance charge is levied on heavy vehicles as proposed, this will change the distribution of the benefits. The impact will depend on the design of the charge. The analysis has been undertaken assuming no charge so the results could be used as a basis for discussing cost sharing with the enclave industries. In the absence of a charge, the enclave industries are estimated to receive 21% of the benefits. The other main beneficiaries are local users with approximately 50% of the benefit (38% passenger and 12% freight).

151. The Consultant recommends the introduction of a road user charge that would have the effect of ensuring users pay in line with the benefits received.

7. Financial Benefits

152. The NRA Act provides for the NRA to raise money directly from road users. To the extent that revenue comes from fuel levies or registration fees, it is likely that increased heavy vehicle use in the highlands will have a negative impact on NRA finances. Investigation of the introduction of a heavy traffic fee based on axle load and distance travelled is proposed as part of technical assistance to the NRA under the project. The aim should be to set fees at a commercial rate so that NRA provides road maintenance service to its clients, the vehicle operators, at the level they demand (through representation on the NRA Board and otherwise) at a price that enables NRA to be financially sustainable.

B. Social and Poverty Impact and Stakeholder Participation and Consultations

1. Impact on Poverty

153. Existing research on the social impacts of road improvements in PNG has clearly demonstrated measurable benefits. These benefits will also result from the upgrading, rehabilitation and maintenance of roads in the Highlands region. Namely, when roads are improved:

- Household incomes increase: Households expand and diversify their agricultural production, particularly cash crops. With improved transport services, women (and men) are able to get to markets more often, sell more and/or sell directly rather than through middlemen.
- Educational opportunities and attainment improve: Following road improvements, more children including girls as well as boys attend school, stay in school longer and perform better academically. Better road conditions also contribute to strengthening the school system, e.g., by reducing absentee rates among teachers and better enabling school authorities to attract teachers.
- Women's and children's health improves: Easy, faster (and, in some cases, cheaper) transport services and access to health care facilities encourages people to seek medical assistance and results in better health outcomes. Better road conditions also contribute to strengthening the health system, e.g., by reducing absentee rates among aid post and clinic staff and better enabling health authorities to attract staff.

2. Social Impact

154. The preparation of the Program has included a detailed poverty and social analysis (PSA) that provides analysis and discussion of (i) the existing poverty and social conditions in PNG and the Highlands region; (ii) livelihood, social and economic conditions in the road influence zone (RIZ) for each subproject in Tranche 1 of the Program; and, (iii) specific issues relevant to road improvements including the HIV/AIDS situation in PNG; gender conditions, opportunities and constraints; and, land use and management systems. The government has endorsed criteria for selection of subproject roads that, among others, address social issues, e.g., community support for the road improvements; avoidance of the displacement of housing and other permanent structures; location of the road on State-

owned land or customary land that owners/communities agree to contribute voluntarily; and, no major adverse environmental or social impacts.

155. A summary social and poverty analysis is included as Appendix 12. The full Poverty and Social Assessment report is available separately.

3. Resettlement

156. Due to the possibility that additional land will be required to upgrade and rehabilitate roads, the Resettlement Framework (RF) has been prepared and reviewed with the EA to establish the policies and procedures for payment of compensation to affected people for lost or damaged assets. The scope of land acquisition impacts, where they occur, will be minor: there will be no displacement of housing and affected people will experience small losses of crops, trees, fences or other secondary structures. The Program is Category B with respect to involuntary resettlement. Therefore, short Resettlement Plans (RP) have been prepared for Tranche 1 (T1) subprojects that require additional land; these plans will be updated based on detailed engineering design during loan implementation. A summary resettlement framework is included as Appendix 14.

4. Indigenous People

157. Papua New Guinea has over 800 different language groups. In the Highlands region, patriarchal societies are organized on the basis of clans belonging to different tribes; in Enga and the Southern Highlands provinces, the Huli, Enga, Ipili and Angal are the principal linguistic/tribal groups in the areas of the T1 subprojects. Each clan has a specified territory that is owned jointly by and supports the needs of its members; individuals and households are allocated land within the clan territory according to their needs to build a homestead and establish food and cash crop garden. All tribes rely on subsistence agriculture based on the cultivation of sweet potato; cash income is generated primarily through the sale of cash crops such as coffee, potato and pyrethrum. In general, there are no tribes or ethnic groups that are significantly different from others or that consider themselves to be minorities. Therefore, the Program is classified as a Category C project with respect to the ADB indigenous people's policy and no IP framework or plans have been prepared.

5. Stakeholder Participation and Consultation

158. Stakeholder participation and consultation with communities and social groups that are affected directly and indirectly by road improvements under the Program will occur at different stages during implementation. Key criteria for inclusion of candidate roads require (i) that there is wide community support for road improvements and (ii) there are no, significant adverse impacts related to requirements for additional land or affecting the social and environmental conditions along the road. Therefore, early in the preparation of projects, the EA and local authorities will consult with communities to inform them about the proposed road improvements and confirm their eligibility.

159. During preparation of project road, and as additional land is required to upgrade the road, the EA will collaborate with provincial and district land officers (PLO and DLO) to acquire used of the required land and compensate affected people for loss of crops, trees, fences and other structures. As a first step, HRMG, PLO and DLO will convene community consultations to inform leaders, affected landowners and other members of the community about the policies and procedures related to land matters. The affected people will be consulted individually and will participate with PLO and DLO to carry out detailed assessments and verify the extent of their affected assets. The proposed compensation and other provisions related to land acquisition will be disclosed to affected communities and people prior to final approval of resettlement plans.

160. The Program includes a Community Empowerment Project (CEP) that will utilize Japan Fund for Poverty Reduction (JFPR) funding to achieve objectives to (i) incorporate a

participatory approach into the preparation and implementation of the Program, (ii) assist communities to initiate strategies to strengthen the social and economic benefits of road improvements and (iii) promote equitable benefits for all gender and social groups. The CEP will include components relating to: (i) raising community awareness of public health including HIV/AIDS and road safety in roadside villages; (ii) small-grant funding to local level governments to assist selected communities to upgrade the physical facilities at local markets and construct pedestrian areas along roads under the Program; (iii) road maintenance related job opportunities and basic business training program for both men and women in selected communities; (iv) training and workshop on CEP for local NGOs and faith based organizations in selected provinces in the Highlands region; and, (v) long-term participatory social research for monitoring and evaluation of the social and economic benefits improved roads.

C. Environmental Assessment

161. The environmental assessment process has been carried out in compliance with the PNG regulatory framework and ADB guidelines. Under the PNG Environment Act 2000, complemented with the Prescribed Activities Regulation (Statutory Instrument No. 30 of 2002), only the construction of new national roads would be subject to the approval of the Department of Environment and Conservation (DEC). Otherwise, no specific approval is required for the upgrading and rehabilitation of existing road sections.

162. Environmental assessment relevant to the Program include: air quality, noise, water quality, and wastewater discharge. The PNG environmental legislation provides Water Quality Criteria for Aquatic Life Protection that will be used, especially where there will be major earth works. For other parameters international best practices will be applied, as provided for noise in the World Bank Handbook for Roads and the Environment (1997) and, where air quality becomes a major issue, the World Health Organisation (WHO) Air Quality Guidelines (WHO 1987 and WHO 2000) will be used.

163. An initial environment examination (IEE) has been undertaken for each road under the first project based on field reconnaissance surveys and public consultation undertaken for this study plus secondary sources of information. The IEEs have confirmed the initial classification of the project as "B" with moderate but mitigatable environmental impacts. Special attention was given to the possibility of interactions between this Program and other projects in the region relating to the oil and gas industry and other potentially sensitive developments. It was concluded that undertaking the proposed Program will not increase the risk of adverse environmental impacts in other sectors. A summary IEE is included as Appendix 13.

D. Road Safety

164. The proposed works under the Project will substantially improve road safety. The Project includes a number of measures to improve road safety, in addition to improving the road surface, where extensive deterioration results in unsafe driving conditions. The installation and maintenance of proper signage and lane markings to highlight changes in alignment and other safety hazards including safety barriers will be emphasized.

E. Project Risks

165. Risks to the project are in several categories. These are discussed in the following sections.

1. NRA's Effectiveness:

166. Although the NRA Board started functioning in 2004, NRA has remained without adequate staff. A CEO was appointed in 2007. The 3-year duration of the Board expired in 2007 and a new Board was approved on 14 May 2008. NRA is now actively engaging key

staff to start functioning. Initial assistance for operational and financial management system is planned to be provided through ongoing TA, complemented by major capacity development under the Program.

2. Road Maintenance Funding:

167. NRA manages a Road Fund financed through fuel levy based on very low rates. The funds collected are enough to maintain only 20% of the Highlands Core Roads Network. Several proposals were made in the past for increasing maintenance resources through road user charges without much success. The Program includes assistance to NRA to prepare fresh proposals and assurances by the Government to increase maintenance funds.

3. Shortage of Civil Work Contractors:

168. Implementation of ongoing road related works are adversely affected by lack of capable international and national contractors. The problem is further compounded in the Highlands region due to security conditions. The Government is fully aware of the issues and is taking measures such as (a) providing safety to the international contractors through the provincial governments, and (b) improving licensing and classification of the national contractors, and providing opportunities to SME construction industry. The long-term build and operate contracts will attract international contractors and will also facilitate joint ventures with national firms.

4. Land Acquisition and Resettlement:

169. Due to customary landholding in PNG, the land acquisition process is intricate and long. DOW normally seeks approval of the communities to carry out improvement work on roads without formal acquisition through a Memorandum of Agreement. However, DOW has now started acquiring the right of way (ROW) of major roads in the Highlands region. The Program will assist DOW in carrying out the field surveys and preparation of land acquisition documents for all Program roads to enable DOW make payments and acquire ROW.

5. Governance and Anticorruption:

170. Using RETA funds under GACAP II, a detailed governance and anticorruption assessment is planned for the Program and the sector.

6. Counterpart Funding:

171. Though the Government supports the Program, the Departments of Planning and Treasury are still reviewing its impact on their Medium-term Fiscal and Debt Strategies.

7. Co-financing:

172. The Program is not fully funded. Though JBIC and China EXIM Bank have expressed interest, financing has not been committed by these institutions. Also, the Government has indicated that it will review the financing terms before taking a decision.

VI. ASSURANCES

A. Specific Assurances

173. In addition to the standard assurances, the Government has given the following assurances, which are incorporated in the legal documents:

174. **Counterpart funding.** The Government will provide, on a timely basis, all funds and resources necessary for its contribution to the Project in accordance with the financing plan agreed for the Project. The Government will ensure that the Ministry of Finance takes all necessary measures such that DoW can successfully manage and fund the road rehabilitation and upgrading work under the Project. Before the end of each year, the Government will submit to ADB a public investment program for the succeeding year, demonstrating availability of necessary funds and resources for meeting its contract payment and management obligations

175. **Road maintenance:** The GoPNG, through NRA, will ensure that (a) sufficient funds are allocated for the maintenance of the roads financed under the Project and to keep the Road Asset Management System operational, and (b) contractors are encouraged to engage individuals and groups from local communities for routine and periodic road maintenance work.

176. **Contract Management** The Government will ensure that appropriate personnel in HRMG that will assume responsibility for the Project are available and receive training and that they are adequately resourced.

177. **Environment.** The Government will ensure that the road construction and maintenance works are carried out in accordance with the environmental laws and regulations of the independent state of Papua New Guinea and ADB's environmental policies, procedures, and guidelines, specifically ADB's *Environmental Policy (2002)*. The Government will ensure the implementation of adequate environmental mitigation measures by requiring that all contracts contain provisions requiring the contractor to (a) take appropriate erosion control measures; (b) minimize any adverse impact due to altered embankments, borrow pits, and other activities as set out in the summary IEE and EMP; (c) take appropriate safety measures to minimize risks of landslides, soil subsidence, and related occurrences; and (d) keep construction materials and facilities, such as asphalt and hot-mix plants, at least 500 meters away from schools, hospitals, and other sensitive facilities. The Government will ensure that (a) DoW regularly undertakes inspections of the environmental aspects of the Project, including erosion control, and include the results of the inspections in the project quarterly reports DoW submits to ADB; and (b) the contractors implement the mitigation measures in accordance with the IEE.

178. **Land acquisition.** The GoPNG and DOW will ensure that project rehabilitation and upgraded works are undertaken within the existing right of way to the extent possible. In the event of any requirements for additional land for a subproject, the GoPNG will inform ADB and prepare and implement a Resettlement Plan (RP); the RP will be prepared in accordance with the Resettlement Framework (RF) which complies with the relevant PNG laws and regulations and the ADB Policy on Involuntary Resettlement (1995). The GoPNG will allocate the adequate resources to prepare and implement the RP, and supervise and monitor its implementation. The GoPNG, through DOW, will ensure (i) that national or provincial funds as appropriate are allocated and disbursed to pay compensation for affected assets; (ii) that land acquisition will not commence before the resettlement plan is reviewed and approved by ADB; and, (iii) that civil works will not start before the RP is approved by ADB.

179. **Road safety:** The GoPNG will ensure that appropriate road safety facilities such as pavement markings, warning signs, traffic signs and signals, and hazard barriers are

installed during project implementation and after completion and that adequate training on road safety is provided to local communities by NRSC.

180. **Gender and development.** The Government will ensure compliance with ADB's Policy on Gender and Development (1998) during implementation of the Project. MPW will be responsible for monitoring the impact of the Project on women throughout project implementation, in consultation with local governments, local women's associations, and nongovernment organizations. The GoPNG, through DOW and NRA, will (a) encourage local contractors to recruit women for the rehabilitation and maintenance of the roads and (b) provide safe working conditions for both male and female workers. The GoPNG, through DOW, will ensure that the above requirements are included in the bidding documents and civil works contracts.

181. **Employment of local labour.** The Government will take steps to encourage (a) the use of local labour, including disadvantaged women, in project works; and (b) procurement of local materials. It will ensure that civil works contractors comply with all applicable PNG laws and regulations as well as international treaties; do not employ child or forced labour for road rehabilitation, and maintenance; provide equal opportunities for women in road rehabilitation, and maintenance activities; and promptly pay equal wages to men and women for work of equal value. DOW will ensure that specific provisions to this effect are included in bidding documents and civil works contracts and that compliance is monitored on an ongoing basis.

182. **Health risks.** The GoPNG, through DOW and/or HRMG, will ensure that all civil works contractors engaged under the Project will participate in the community-based training programs with respect to road safety and STI/HIV/AIDS prevention (in consultation with Provincial AIDS Council and the Health Administration) to be funded under the Project along the prioritized road sections. In addition, HRMG shall ensure that similar information on the risk of transmission of STI/HIV/AIDS is also disseminated to local communities in the road influence zone, in coordination with national agencies working on this issue. Specific provisions to this effect will be included in civil works contracts, and compliance will be strictly monitored by HRMG.

183. **Monitoring and evaluation.** The Government will ensure that HRMG, with the assistance of the international consultants, will monitor and evaluate project impacts to ensure that the project facilities are managed effectively, and that the benefits are maximized. HRMG will collect the data agreed with ADB at the commencement of rehabilitation, at project completion, 1 year from project completion, and 3 years after project completion.

B. Condition for Loan Effectiveness

184. A condition for effectiveness is that the Covenants with respect to previous loans are complied with or action has been taken to ensure compliance to the satisfaction of ADB.

C. Condition for Disbursement

185. Initial payments for consulting services will be made as soon as consultants are in place. Disbursement of the main loan component will be conditional that a ten year contract for ongoing maintenance is in place.

VII. RECOMMENDATION

186. It is recommended that the project described above be implemented.