

Environmental Assessment Report

Summary Initial Environmental Examination
Project Number: 40173
July 2008

Proposed Multitranche Financing Facility Papua New Guinea: Highlands Region Road Improvement Program

Prepared by the Department of Works, Papua New Guinea for the Asian Development Bank (ADB).

The summary initial environmental examination is a document of the borrower. The views expressed herein do not necessarily represent those of ADB's Board of Directors, Management, or staff, and may be preliminary in nature.

CURRENCY EQUIVALENTS

(As of June 2008)

Currency Unit Papua New Guinea Kina (PN)

\$1.00 = PGK2.5

ABBREVIATIONS

ADB	–	Asian Development Bank
DEC	–	Department of Environment
PMC	–	Design Implementation and Assistance Consultants
DOW	–	Department of Works
EARF	–	Environmental Assessment and Review Framework
EHP	–	Eastern Highlands Province
EA	–	Environmental Assessment
EMP	–	Environmental Management Plan
EP	–	Environmental Permit
EPA	–	Environmental Protection Agency
IEE	–	Initial Environment Examination
HRRIP	–	Highlands Region Road Improvement Project
IEE	–	Initial Environmental Examination
LLG	–	Local Level Government
km/h	–	kilometre per hour
m ³	–	cubic meter
MFF	–	Multi-tranche Financing Facility
MMP	–	Materials Management Plan
PIU	–	Programme Implementation Unit
PJV	–	Porgera Joint Venture
PNG	–	Papua New Guinea
PSC	–	Programme Support Consultant
NRA	–	National Roads Authority
NTDP	–	National Roads Development Plan
PNG	–	Papua New Guinea
PSC	–	Programme Support Consultant
REA	–	Rapid Environmental Assessment
RRP	–	Report and Recommendations to the President
SEIA	–	Summary Environmental Impact Assessment
SIEE	–	Summary Initial Environmental Examination
SHP	–	Southern Highlands Province
SR	–	Sensitive Receiver
TA	–	Technical Assistance
WHP	–	Western Highlands Province

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I. INTRODUCTION

1. The SIEE presents the results of environmental assessments on four roads that form Project 1 (Table 1), following work carried out under another technical assistance.¹ The Project 1 subprojects are considered for immediate improvement under the HRRIP and in accordance with ADB's *Environmental Assessment Guidelines* (2003)—that classified the project as Category B—IEEs have been carried. Environmental assessments will be prepared for the remaining subprojects in subsequent subprojects, subject to environmental assessments in line with ADB's *Environmental Assessment Guidelines*, and the Environmental Assessment Review Framework (EARF) that is also prepared as required under the MFF modality.

2. The environmental regulations of PNG are derived from the Environment Act 2000. The Environment Regulation 2002 categorizes designated projects as *Prescribed Activities* in two schedules, according to the anticipated potential environmental impact. Proponents of projects that have more adverse environmental impact (Levels 2 and 3) are required to obtain an Environmental Permit (EP) from the Department of Environment and Conservation (DEC) following environmental assessment. The upgrading and rehabilitation of existing road sections are not listed with other *Prescribed Activities* and would neither be in Level 2 or 3. However, certain associated project activities commonly associated with road improvement—such as quarry operations, extraction of gravel or discharge of waste water—are Level 2 activities that may require an EP depending on the duration and scale of the activities. DEC is the authority on permit requirements and in response to enquiries made with DEC, DOW will disclose the scale and scope of the subprojects to DEC so that it can decide on any procedures that need to be completed under Environment Act 2000.

II. DESCRIPTION OF THE PROJECT

3. The standards and conditions of many highland roads in PNG are inadequate to meet rapidly growing demand for efficient travel. The road infrastructure needs to be improved, upgraded and maintained on a regular basis. The HRRIP will focus on 1,400km of priority roads in the Highlands and include institutional arrangements and capacity to support strategic management of the sector.

4. Project 1's subprojects consisting of four road sections all require rehabilitation, upgrading and maintenance. These have some minor alterations by 1 meter (m) to 1.5m in some places on either side to improve road geometry. In most places, the existing road corridor is ample for the proposed rehabilitation works. The subproject works will then take place within the existing road corridor and no direct impacts are expected outside of it. However, to get better road geometry, some minor land acquisition is involved in some locations.

Table 1: List of Subprojects for Project 1

IEE	Subproject Road Name and Location	Length (km)	Pavement Width (m)	Formation Width (m)	Bridges
1	Koroba Road (Nipa-Ambua) ^a	67	6	7.5	6
2	Koroba Road (Hiwinda Junction -Koroba)	29	6	7	4
3	Mendi – Kandep- Road (Tente-Kandep)	50	5.5	6.5	8
4	Porgera Road (Laiagam-Porgera)	65	6	7.5	7

^a The section consists of two subsections: Nipa-Magarima (26km) and Magarima-Ambua (41km). The section from Ambua to Hiwinda Junction is currently programmed for improvement by others.
Source: TA4945 TA Consultants.

¹ Under ADB. 2007. *Technical Assistance to Papua New Guinea for Preparing the Highlands Highway (Southern Highlands and Enga Provinces Network) Rehabilitation Project*. Manila (TA 4945-PNG).

5. One bridge along the Hiwinda Junction-Koroba stretch, at the Tagari River 1km south of Erebo and about 20km south of Koroba, will require reconstruction. Other bridges are generally in good condition to accommodate vehicles of up to 40 tonnes, as required by the PNG road standards. The contractor for the road reconstruction will also cover subsequent maintenance for a period of up to 10 years under a performance-specified contract. The Project 1 rehabilitation is expected to be complete by end 2011 and maintenance will run to 2018.

III. DESCRIPTION OF THE ENVIRONMENT

A. Physical Environment

6. **Meteorology and Climate.** The climate of PNG Highlands is alpine/sub tropical. Temperatures vary from about 20°C during daytime to 10°C at night. The northwest and southeast trade winds continue throughout the year. Climate was influenced strongly by severe El Nino events. The World Bank² reported that rates of change are likely to increase in the future, in terms of both average and extreme conditions. In general, the future climate is expected to become more like El-Niño resulting in more rain in the equatorial Pacific. The project area is expected to receive up to 10 percent more rainfall for a 1°C of global warming (by 2100, the average temperatures are expected to rise by between 1.6–3.4°C).

7. **Topography, Geology, and Soils.** The subproject areas in the Highlands are biophysically diverse. PNG is also tectonically active being in the collision zone between the Pacific and the Australian tectonic plates. However, there is no record of recent volcanic activity or earthquakes in the Highlands. Overall seismic activity is mostly evidenced by landslides. Heavy rainfall and smaller ground tremors are responsible for deteriorated sections of national and rural roads, particularly in the Eastern Highlands and Chimbu Provinces. Southern Highlands and Enga provinces have altitudes between 1600m to 2800m and these regions have rugged mountains, steep limestone formations, flat plateaus, and fertile swampy valleys. Soil type should have very little bearing on the implementation of the subprojects.

8. **Surface and Groundwater.** The Highlands areas provinces provides the catchments for some large river systems. The headwaters of the Kikori, Erave and Strickland rivers cross the Southern Highlands. River flows in the highlands are the highest from December to April. Most of the streams and creeks discharge all year around carrying high sediment loads, depositing large quantities of gravels and sands in the lower reaches. During the wet season, bridges and culverts are regularly inundated, cutting off roads and villages. The region of Tari in the Southern Highlands has subterranean rivers that travel through the numerous caves and sinkholes in the limestone rock formations. All the subprojects are close to natural water courses with several bridges. None of the rivers near the subproject roads are subject to industrial pollutants. The nearby industries are well away from the proposed subproject roads including the Porgera Mine (Enga) and the Hides Gas Field (Southern Highlands). The swamps used to cultivate water cress and taro used by the local population must be protected during construction.

B. Biological Environment

9. **Agriculture.** Subsistence agriculture is common throughout Project 1 subproject area, wherein almost all of the area below the effective upper limit of cultivation (2,400masl) is a

² World Bank. 2006. *Not If But When – Adapting to Natural Hazards in the Pacific Islands Region*. A Policy Note. Washington, DC.

mosaic of gardens, crops, grasslands, shrub-lands, timber trees, and patches of re-growth forest. Cash crops, mainly coffee and tea, are also grown in large amounts. Some of the valleys have good agricultural potential but agriculture is constrained by steep slopes, poor soils, frequent cloud cover, low temperatures and occasional frost.

10. **Fauna and Flora.** There are areas of forest visible in between forests those cleared for agriculture, but there are no undisturbed forests or forests used for large timber extraction near the Project 1 roads. There was evidence of some small scale working of timber but large scale timber extraction was not observed. The nearest timber authority (Pi Tukure) is some 20km to the north of the Nipa-Ambua subproject road. Timber extraction is generally local small-scale/saw-mill production for local construction purposes and these are unlikely to increase if the roads are improved. The human impact on the vegetation is most pronounced in the areas where grasslands created by numerous cycles of forest clearance for agriculture and their reversion to fallow gradually transformed the forest to short grassland. Whereas there are some valuable ecological resources and protected sites to the south west of the subproject roads, none of the subproject roads runs near any protected area because of the unique natural habitats or occurrence of rare/endangered species.

C. Social-Cultural Environment

11. **Population and Life Quality.** The combination of high population densities and strong agricultural pressures constrain the opportunities for people living in these areas, and the subproject areas are in some of the most disadvantaged districts in PNG. Income levels are generally very low at usually less than K40 per person, the exceptions being the small number of people who earn much higher wages working at Oil Search in the Nipa-Ambua and Halimbu-Koroba areas and the small number of households in Porgera that earn cash income from their work at the mine and/or receive royalties related to the resource exploitation. A detailed description of the socioeconomic environment of the study area is given in the Summary Social Impact Assessment report.

12. **Cultural and historical sites, schools and housing.** There were no sites of cultural significance found near Project 1. There are chapels and churches nearby in some villages and graves placed along most of the roads but generally at least 5m outside the road corridor and away from the rehabilitation works. Schools are located along the roads but set well back from the roads. Traditional houses built of light materials are located infrequently along some of Project 1 subproject roads. In many areas, the traditional style involves high fences (>2m) and mud walls next to the roads creating a segregated compound for the inhabitants and separating the houses from the roads.

IV. SCREENING OF POTENTIAL ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

13. The proposed mitigation measures for the roads have been condensed in the summary environmental management plan matrix in Appendix 1. Detailed EMPs are presented in the IEE reports for each subproject.

A. Environmental Impact and Mitigation Measures Associated with Planning, Location and Design

14. The environmental impacts associated the subprojects in Project 1 will be generally insignificant as the works only involve rehabilitation and upgrading of existing roads within the

existing corridor. At this stage, statutory compliance with Environment. Act 2000 (EA 2000) will be made, including notifying HRRIP subprojects and design to the DEC (under Sec 48 EA 2000).

15. Sensitive receivers have been assessed and it was found that the residential dwellings near the subproject road are generally set back sufficiently for traffic fumes can be dispersed and road traffic noise will not be sufficient to affect the sensitive receivers in the developments. There are no schools or any medical facility near the subproject road. The roadside graves are set back from the working areas. The occasional roadside tea and food stalls are also set back from the likely working areas for road rehabilitation. During the detailed design phase and in preparation for the construction phase, the PSC/HRMG will prepare tender documents to ensure that contractors will be prepared for implementing the environmental impacts mitigation.

16. In order to comply with best international practice and ADB guidelines, the procurement procedures will follow *ADB Guidelines on Environmentally Responsible Procurement 2007*. Procurement documents will specify that contractors shall service and maintain powered mechanical equipment in safe way that will not cause significant impacts on the environment. Overall environmental impacts will be addressed, and the proposed mitigation measures for the roads are summarized in the summary environmental management plan matrix in the IEE and detailed EMPs are presented in the IEE reports for each subproject.

17. The requirements in the contract will include full implementation of the EMP. The contractor would also be required to engage capable and trained staff or site agents to take responsibility for the environmental management at the working level. The effective implementation of the EMP will be audited as part of the loan conditions. In this regard, the DOW (the Implementing Agency) will also prepare resources to fulfill the requirements of the law and guide the contractors on the environmental aspects of road construction.

B. Environmental Impact and Mitigation Measures During Construction Activities

18. The required mitigation measures that will be adopted to minimize impacts at all subproject sites during construction have been summarized in Appendix 1

1. Physical Environment

19. Site clearing may involve removal of trees and vegetation that will contribute to soil erosion during construction in rainy season. In the construction phase the physical impacts will be from earthworks and may affect air quality, cause noise and may have potential impacts on surface water, and the use of bitumen can be controlled by following prescribed management plan procedures and all the mitigation measures proposed in the environmental management plan. No significant impacts will arise if the environmental management plan is implemented properly. Monitoring will be undertaken and if complaints arise, waste management, noise water or air quality will be measured, ensure that the impacts are within acceptable levels and when necessary identify corrective measures.

20. Construction waste will be addressed properly to avoid potential soil contamination and nuisance to the public, and a solid waste management will be addressed. There are several sources of water quality impacts in a construction site such as fuels, lubricants, solid wastes, and material stockpiles. These impacts can be avoided by proper storage of the materials, proper disposal, avoiding stockpiling near water sources, etc. If complaints are received, possible sources of the problem will be investigated, water samples will be taken and analyzed,

and compared with the baseline and on Water Quality Criteria Regulation 2002. For possible erosion problems, engineering controls that include erosion protection measures will be designed and installed to control soil erosion both at all the constructed works and in peripheral areas, particularly in borrow areas and along haul tracks. Public safety, particularly of pedestrians and children can be threatened by the excavation of the trenches for side drains construction, therefore a safety and health plan will be submitted by the contractor.

2. Ecological Environment

21. The subprojects identified for Project 1 will not be located within national parks or wildlife sanctuaries or any of the protected areas published by DEC. Neither do any of Project 1 subprojects affect any land near monuments of cultural or historical importance. Compliance with the Fauna (Protection and Contract) Act 1966 needs to be achieved on all subprojects with respect to preventing poaching of protected wild animals. No protected forests or forest management areas are in close proximity to the proposed subprojects; however compliance with Forestry Act 1991 needs to be achieved in the event that such areas are identified near other subproject packages in the future. Pi Tukure timber authority is the nearest forest industry at about 8km north east of Tari. There is also a proposed Forest Management Area some 10km south west of the Halimbu-Koroba subproject road.

22. The layout of Project 1 and all subsequent subprojects will be designed to ensure the least disturbance to natural species near the sides of the subproject roads, particularly old and large trees and any special trees connected with religious rites.

3. Social Environment

23. The construction of subprojects will involve moderate physical works and no displacement of housing or other permanent structures. Community support for road upgrading is expected where small parcels of additional land are required. Affected persons may incur small losses of crops, trees and/or secondary structures but compensation will be provided in line with ADB guidelines. The subproject works will be of moderate scale and will be in short duration in most areas and therefore severance of villages during construction is not an issue.

24. HRRIP endorses the principle of community participation in the construction phase of upgrading and rehabilitation of roads using local labor for civil works, i.e., employment at the local level. The HRRIP also includes a Community Empowerment Project (CEP) that will utilize Japan Fund for Poverty Reduction (JFPR) funding to achieve a participatory approach to preparation and implementation of the Project. The CEP also includes raising awareness of public health including HIV and road safety and small-grant funding to upgrade the physical facilities at local markets and construct pedestrian areas along roads. Road related job opportunities, basic business training programs for men and women and workshops on CEP are included to promote equitable benefits for all gender and social groups. Social indicators are included in the design and monitoring framework to facilitate monitoring of social development activities and these social impacts are expected to be acceptable to the local community.

C. Environmental Impact and Mitigation Measures during Operation Phase

1. Physical Environment

25. Traffic on all subproject roads will be in the order of a few hundred vehicles per day and it is unlikely that the subprojects will give rise to any significant noise disturbance,

accumulations of gaseous emissions, as well as particle emissions in the operational stage. No significant effect on groundwater or surface water is expected and waste management issues will be controlled through the maintenance contracts.

26. The main environmental impacts during operations phase include soil erosion, water quality and community safety. Soil erosion will be prevented by developing a comprehensive suite of engineering controls in the detailed designs to prevent and maintain erosion. A system will be devised and engineered to control erosion and flooding on either side of the embankment in case of heavy rains. Apart from affecting the community lands and resources, this may cause natural streams and irrigation channels to become silted. Ensuring public safety is an important aspect of road operation, particularly newly constructed or upgraded roads where vehicle speeds are expected to increase.

2. Ecological Environment

27. There will be no intervention by ADB on the roads that link directly to the sensitive forest environments of the Kikori River Basin area. The rehabilitation of the road from Hiwinda Junction–Koroba road is considered not to cause significant induced impacts on the forest areas in the northern Kikori river basin, because the road is already constructed with gravel pavement and the road has been well used by vehicles, including public utility vehicles. It is unlikely that upgrading of this road section will significantly change pattern of people movement in the area. Therefore, possible induced environmental impacts (caused by increase in people movement to the south) on the forested areas to the south is unlikely.

3. Social Environment

28. The social impacts of the subprojects in the operational phase will include easier access and improvements will facilitate some movement of goods to markets, and people to health and education facilities. Community-based maintenance of roads is also endorsed by HRRIP and some local people can expect to work on the maintenance of subprojects. Therefore there some additional employment will continue in the operational phase. Detailed EMP of each subproject are presented in the IEE of each subproject.

D. Cumulative Environmental Impact Associated with the Project Locations

29. There will be no significant adverse cumulative impacts expected from Project 1. The subprojects are scattered around the Enga and Southern Highlands provinces and therefore separated by significant distances. The subprojects will be on existing roads and there is not likely to be any significant change to the current pattern of impacts that would be brought about by road rehabilitation that could potentially lead to some further uncontrolled access to attempt uncontrolled exploitation of minerals and forest resources. The statutory provisions under the PNG Environment Act covers pollution control, the Forestry Act covers exploitation of forest products and the Fauna (Protection and Contract) Act 1966 provides protection to wildlife. Whereas these laws are recently established, institutional strengthening is required and improvements in resources are needed.

V. INSTITUTIONAL REQUIREMENTS, ENVIRONMENTAL MONITORING PLAN

A. Institutional Requirements

30. The executing agency of the MFF Program will be the DOW, and the implementing agency is the HRMG. The Project Management Unit (PMU) will be responsible in daily implementation of the Program through a Program Support Consultant (PSC). An International Environmental Specialist (IES) will be engaged intermittently as part of the PSC, i.e. three months each in the Project 1 design-preconstruction stage and in the construction stage and four months in Project 2. It is expected that there will be adequate capacity for environmental management during the subsequent subprojects. The primary tasks of the IES will be: (i) strengthen the environmental management of the Project during detailed design, bidding process, contract process, construction, and implementation, (ii) supervise and guide the environmental assessment process for all subprojects under the MFF, (iii) supervise EMP implementation of subprojects, and (iv) undertake the necessary institutional strengthening including on-the-job- training for the EO and environment specialist of DOW by giving major tasks to them in all of these activities. The IES will report directly to the PSC and the EO will report to HRMG, they will be accountable and responsible for implementation of the EMP. The dedicated IES and the EO coordinate the implementation of the EMP of the subprojects. The DOW will allocate sufficient resources to the IES and the EO of HRMG to undertake their tasks to supervise and monitor the environmental assessment process and to monitor the EMP implementation of all subprojects under the MFF.

31. Prior to implementation of the subproject packages, DOW and PSC/HRMG will notify DEC through submission of subproject notification in accordance with DEC's prescribed format, and endorsement of the environmental assessments as required by the Government. DOW through the PSC/HRMG will have responsibility to ensure the implementation of all mitigation measures by the Contractors and other recommendations in the environmental assessments for each of the respective subprojects. A summary of the EARF for screening, assessing and monitoring subprojects in subsequent subprojects is presented below.

32. The PSC will need to confirm that all statutory requirements and local byelaws for each subproject have been complied with and that contractors have appropriate and valid permits where necessary. Because of the similar nature of the works for each subproject, the EMPs will also be similar. In this SIEE, a generic EMP (Attachment) has been provided based on the designs for the Project 1 subprojects identified so far. Subproject specific EMPs are presented in the IEEs. At a later stage, it will be necessary to review and update the EMP for each subproject prior to implementation and prescribe any additional detailed mitigation measures for all aspects of each subproject in the construction and operational stages. The actions described in the EMPs will be properly carried out in accordance with the time frame, or as required by DEC as conditions for compliance with the Environment Act 2000.

33. The DOW has one Environmental Specialist in headquarters - Port Moresby, a post established under a project financed by the World Bank. There is also an Environmental Officer in the HRMG based in Mt. Hagen who is fully committed on the Road Maintenance and Upgrading Project (Loan 1709-PNG), and has accrued 5 years experience in HRMG. The Environmental Specialist is with the DOW with sole responsibility of bringing environmental issues to the notice of senior management. The most significant challenge is inadequate human and financial resources and necessary infrastructure.

34. Overall implementation of the EMP will become DOW responsibility. Other parties to be involved in implementing the EMP are as follows:

- (i) Contractors - responsible for implementing all measures required to mitigate environmental impacts during construction;

- (ii) Government agencies - such as DEC will be responsible for monitoring the implementation of environmental permit conditions related to subprojects; and
- (iii) DOW Secretary and PSC Manager - responsible to ensure that sufficient resources are allocated in advance to allow the appropriate time to process the environmental assessments and to implement all construction and operational mitigation measures required to mitigate environmental impacts.

B. Training and Monitoring

35. Several government agencies and private sector parties will be involved in implementing the EMP. Induction training workshops will be designed and conducted by the IES to suit managerial as well as site agents, and the working level staff as personnel are brought into the subprojects. The environmental training workshops will continue throughout all subprojects and refresher courses will be carried out over the lifetime of the HRRIP, as necessary.

36. Monitoring during construction will be the responsibility of the IES and the EO in PSC/HRMG. Monitoring will relate to compliance with construction contracts, the state and health of the nearby environmental resources, and the effectiveness of mitigation measures and complaints. Monthly progress reporting will include a summary of this monitoring to the DOW on a regular basis (at least quarterly) and to ADB semi-annually. Table 1 presents the indicative estimated costs for EMP and monitoring plan implementation of the overall MMF.

Table 1: Summary of Estimated Costs for EMP Implementation

Item	Sub Item	Estimated Total Costs [PGK]	Estimated Total Cost [USD]
Staffing, audit and monitoring (IES)	1 persons for 10mo 20,000US\$/mo	200,000	200,000
Monitoring (e.g. lab. activities) ^a	As detailed under EMP (particularly water quality)	125,000	50,000
Mitigation measures ^b	As prescribed under EMP and IEE	5,000,000	2,000,000
Permitting ^c	Based on S.I. 31 of 2002	125,000	50,000
Transport (vehicle for EO to undertake the tasks) ^d			
Total		5,450,000	2,300,000

^a This estimated cost included in project administration costs.

^b This estimated cost included in the civil works costs.

^c Permitting for about 30 subsequent subprojects with permits based on possible requirements from DEC in Environment (Fees and Charges) Regulation 2002 (Government share).

^d EO will share project vehicle to undertake its tasks (included under Administration Costs).

VI. PUBLIC CONSULTATION AND DISCLOSURE

37. Public consultation was conducted from January to May 2008 for Project 1. The public was informally consulted in villages near the subproject roads and more formal meetings were conducted in the provincial capitals at Wabag, Enga Province and Mendi, Southern Highlands.

Other groups and relevant government agencies were also consulted at the local level. The consultations were carried out with individuals, community leaders and village administration and at local and civil administration levels. The consultation was designed to inform the parties about the proposed Project and to identify their concerns. The findings of these consultations were considered in identifying the mitigation measures and alternatives.

38. Individual and households along the subproject roads and groups congregating at markets were interviewed and focus workshop meetings conducted. The results indicated that stakeholders view roads as very important and any improvements are welcome to facilitate access to markets, health facilities and education. Stakeholders also acknowledged the link between road improvement and lower vehicle operating costs, and indicated that the communities might purchase and use more vehicles for goods and people, enabling them to market more produce and improve livelihoods. All sections of the community were keen to gain employment on any road works or maintenance in their own areas. Road safety issues and risks (especially for pedestrians from speeding traffic) were also raised.

39. Concerns of the local people included that possible alternative routes in subsequent subprojects will be discussed with local people to ensure the equal development opportunities in many areas. They were also concerned about damage to local surroundings property and freshwater sources, and increased traffic noise and controlling sanitation during construction. Concerns for operations were possible flooding and adequacy of drainage. Communities were in support providing compensation for loss of property was properly addressed and that tribal sensitivities were recognized. For local officials security issues are the biggest threat to contractors and traveling public. Tribal negotiations are still common and better roads will allow police to patrol the area. Concerns were expressed about engineering details and quality of work as local Contractors do not have proper equipment and requested that background of companies seriously investigated before awarding contracts

40. They requested for the sub projects to include community awareness and participation including training and business advisory services to support micro business development such as coffee growing or other agricultural ventures. Local support for the subprojects was almost unanimous and local employment opportunities are expected by most of the consulted parties.

VII. FINDINGS AND RECOMMENDATIONS

41. Essential secondary data were used to assess the environmental impacts in a comprehensive manner, and public consultation and reconnaissance were carried out in order to complete the environmental assessments and to recommend suitable mitigation measures. The IEE reports on the various subprojects provided a picture of potential environmental impacts associated with Project 1 and suitable mitigation measures have been recommended. In the event that any design details are changed for the location or scope of any subproject, the respective environmental assessment and EMP will be reviewed and revised accordingly. The responsibilities for the implementation of mitigation measures and the parties responsible will be clearly defined in contracts and agreements, and the implementation by various parties will be checked and monitored by the Environmental Officer in the PSC, including a mechanism to address unexpected environmental impacts.

42. Since most anticipated environmental impacts related to the subprojects will take place during the construction phases, there are a few potential cumulative impacts during operation which require environmental monitoring and auditing. However, environmental reporting is nevertheless recommended to be included in the monthly monitoring report throughout the

construction phase. The implementation of the environmental mitigation measures during construction period can be assigned to the contractors and these requirements must be included in the contracts. The operational mitigation measures for maintenance will be taken up by the DOW/NRA through the PSC during the duration of the subprojects.

43. Contractor environmental awareness training will be undertaken by the PSC. The Environmental Officer in the HRMG of DOW will be supported in the short to medium term by the IES and the Environmental Officer will be able to liaise with and advise the PSC to better utilize the additional staff resources to support environmental management. This capability can be used to extend environmental awareness throughout the contractors in the short term.

44. The IEE, including the EMP, will be used as a basis for an environmental compliance in a regular program of environmental monitoring and auditing. In addition, any condition included as part of the environmental compliance from the Government (DEC) will also be included as a basis for the environmental monitoring and compliance program. Therefore, continued monitoring of (i) the implementation of mitigation measures; (ii) the implementation of the conditions of environmental compliance; and (iii) the environmental impact related to the operation and maintenance of the subprojects will be carried out and reported at least quarterly as part of the project performance and bi-annual reports to ADB.

VIII. SUMMARY OF ENVIRONMENTAL ASSESSMENT REVIEW FRAMEWORK

A. Specific Procedures to be used for Subprojects under the MFF

45. Considering the government environmental requirements and ADB Environmental Assessment Guidelines (2003), the PSC/HRMG in DOW will ensure that environmental assessments are prepared for category A and B project, and for implementing EMPs for subprojects as outlined in the framework that must be submitted to ADB for review with the PFR and for approval prior to finalization of contracts or commencement of work. DOW will monitor the progress of the environmental work stream to ensure that all environmental assessments and clearances are submitted to ADB prior to the PFR for all subprojects.

46. Each subproject will undergo categorization and environmental assessment and focus on the most significant issues. A change in subproject scope with potential adverse environmental impacts will also be categorized. The IEE or EIA will be prepared following ADB prescribed format. Where a subproject requires an IEE at least one public consultation during the IEE preparation will be conducted with local community, potentially affected people, and local NGOs. Any subprojects that are classified as environmental category A will require full environmental impact assessment (EIA) and two rounds of public consultation. The second consultation will be conducted after the draft EIA is prepared which includes the EMP. A summary EIA (SEIA) will be made available to the general public at least 120 days before the subproject approval by ADB. Similar disclosure requirement will also apply to Category B subprojects deemed sensitive by ADB, with an IEE and SIEE (including an EMP). In either case, the SEIA/SIEE will be posted on the ADB website at least 120 days before the PFR is submitted to ADB.

47. The DOW as EA will be responsible for the implementation of the entire environmental assessment and review procedures. This will include, but not be limited to, ensuring that the subproject EARF procedures are strictly adhered to, that preparation of IEE/SIEE or EIA/SEIA will be carried out in a timely and adequate manner, environmental monitoring and institutional requirements will be met while meaningful public consultations will be carried out satisfactorily.

DOW will submit the categorization checklist (Rapid Environmental Assessment or REA checklist), IEE/SIEEs and EIA/SEIAs, and monitoring reports to ADB in a timely manner.

B. Responsibilities of HRMG of DOW

48. Prior to the submission of the PFR for subprojects (under the following tranches), the HRMG will:

- (i) Prepare an environmental screening checklist (REA) to classify the subprojects in each subsequent Projects (tranches).
- (ii) Supervise consultants in preparing the environmental assessments (IEE or EIA), including an Environmental Management Plan (EMP) for each subproject including the SIEE/SEIA for each tranche.
- (iii) Ensure that adequate public consultation has been undertaken with affected groups, local stakeholders, and NGOs, review the environmental assessments and submit the IEE/EIAs, EMPs, SIEE/SEIA documents as required, to ADB.
- (iv) Ensure submission of the necessary environmental assessments to ADB in sufficient time to permit the necessary disclosure by ADB.
- (v) Undertake the necessary actions to ensure subproject environmental compliance with the Government's and ADB's requirements;

49. Prior to the commencement of civil works for subprojects, the HRMG will:

- (i) Submit any of the environmental assessments required for regulatory approval of the DEC and obtain approval, e.g., environmental clearance/environmental permit from another statutory authority, as required by PNG.
- (ii) Ensure that all regulatory clearances for the subproject obtained from the relevant Government authorities are submitted promptly to ADB.
- (iii) Ensure that the required mitigation measures during construction, the IEE and the EMP, are included in the bidding document of the subproject and that all bidding contractors have access to the environmental assessments and EMP.
- (iv) Ensure that the EMP and all required mitigation measures during construction, including conditions stipulated in the DEC's clearance or environmental permit, are included in all the contracts signed by the contractor(s) with requirements to update the EMP in response to any unexpected impact and that all selected contractors have agreed to implement the full suite of environmental mitigation measures prescribed in the EMP.

50. During the implementation of civil works for a subproject, the HRMG will:

- (i) Ensure that the EMP, including all proposed mitigation measures and monitoring programs and relevant provisions of the environmental assessments, is updated as required, and is properly implemented by the contractors.
- (ii) Monitor the implementation of EMP and prepare and forward the monitoring reports to ADB.
- (iii) In case unpredicted environmental impacts occur during project implementation, inform ADB, review the EMP with the contractor, and implement alternative environmental mitigation program.
- (iv) In case a subproject changes in scope, inform ADB and reconfirm the environmental classification, determine whether a supplementary IEE or EIA study is required with ADB, and carry out the study including the requirement for information disclosure and public consultation;
- (v) Submit the requisite reports on progress with social and environmental compliance, and implement the EMP as required by the DEC and ADB.

- (vi) Ensure that ADB be given access to undertake environmental due diligence for all subprojects. However, the DOW will have the main responsibility for undertaking environmental due diligence and monitoring of all the subprojects. Such reports, will be made available to the public, if requested.

C. Responsibilities of ADB

51. ADB will be responsible for review and timely clearance of subproject IEE/SIEEs and EIA/SEIAs. Technical guidance will be provided by ADB to the DOW as needed. ADB will also be responsible for reviewing monitoring reports and disclose the summary environmental assessments for selected subprojects (Category A and B sensitive) on the ADB website. During the implementation of the MFF, ADB will:

- (i) Review and clear environmental assessment reports as a basis for subproject approval.
- (ii) Publicly disclose the SIEE and SEIA for category “B-Sensitive” and category “A” subprojects in the ADB website 120 days before a PFR is submitted to ADB.
- (iii) Monitor the EMP implementation, as required, and conduct due diligence as part of HRRIP reviews.
- (iv) Provide assistance to HRMG, if required, in carrying out its responsibilities and for building capacity for safeguard compliance.
- (v) Ensure that HRMG conducts the required consultations with project affected groups and local NGOs in PNG, and that the HRMG/DOW as project sponsor provides relevant information on the project’s environmental issues in a form and language(s) accessible to those being consulted. Such information disclosure will be guided by the Public Communication Policy or PCP (2005).

D. Environmental Assessment and Review Procedures for Additional Subprojects

52. Environmental categorization will be applied to all subprojects using the REA checklist in compliance with the ADB’s Environment Policy 2002 and ADB Environmental Assessment Guidelines 2003. In selecting subprojects, a set of selection criteria including environmental consideration will be used for the first level of screening. A candidate subproject will meet the following environmental related conditions: (i) an existing or former road; (ii) support of the local population and the district and provincial administrations; (iii) does not require removal of permanent structures; (iv) located on Government land, or there is an agreement with the affected community; (v) does not endanger or provide access to at-risk flora and fauna; and (vi) does not have any other significant adverse environmental and social impacts. All subprojects with category A and B will be subject to environmental assessment.

E. Institutional Arrangements & Institutional Strengthening

53. The executing agency of the MFF Program will be the DOW, and the implementing agency is the HRMG. The Program Support Consultant (PSC) will be responsible in daily implementation of the Program . An International Environmental Specialist (IES) will be engaged intermittently as part of the PSC during the first two tranches with the primary tasks to: (i) strengthen the environmental management of the Project, (ii) supervise and guide the environmental assessment process for all subprojects, (iii) supervise EMP implementation of subprojects, and (iv) undertake the necessary institutional strengthening including on-the-job-training for the EO and environment specialist of HRMG. The IES will report directly to the PSC and the EO will report to HRMG, they will be accountable and responsible for implementation of the EMP. The IES and EO will be responsible for coordinating and supervising all environmental

related management of the program, and prepare the quarterly progress reports on implementation of the EMP.

IX. CONCLUSION

54. The IEE reports for the subproject packages have assessed the main potential environmental impacts arising from Project 1 of the HRRIP. The IEE reports are presently based on the preliminary designs for rehabilitation proposals along the specified routes. At the implementation stage, HRMG will monitor the schedules of mitigation measures and monitoring programs provided in each of the IEE reports (including EMPs and Monitoring Plans). With these measures in place, environmental impacts identified by the study will be manageable and will not result in any residual impact which are above accepted environmental standards. No further or additional impact assessment is considered necessary at this point.

55. Environmental assessment will be required for all subprojects in future subsequent projects when feasibility studies have been completed by the PSC and the locations and design details are available. HRMG will adopt the review procedures as required in the Environmental Assessment Review Framework and will require additional capacity in the form of an Environmental Cell to implement the EARF as required under the HRRIP.

Appendix 1 Highlands Region Road Improvement Project - Environmental Management Plan – Matrix

		Impact mitigation					Impact monitoring			
Environ-mental Concern	Objective	Proposed Mitigation Measures (MM)	Resp to Implement MM	Timing to Implement MM	Locations to Implement MM	Mitigation Cost	Paramater to monitor	Fequency and verification	Resp to Monitor	Monitorin cost
<u>PRE-CONSTRUCTION</u>										
1. Project disclosure	Ensure statutory compliance with Environment. Act 2000 (EA 2000).	Notify HRRIP subprojects and design to the DEC (under Sec 48 EA 2000) whether Environmental Permits will be required (for the subprojects or supporting activities such as quarries or extraction of gravel)	Detailed design consultant/IES/EO in PSC/HRMG	Start of detailed design.	All subprojects routes.	Cost included in staffing.	Response from DEC on permits.	Once, completion of detailed design.	EO in PSC/HRMG - ADB	Cost met by PSC/DOW project staffing.
2. Sensitive Receivers	Ensure that impacts on sensitive receivers (residences, schools, hospitals) will be within acceptable levels.	Include measures to meet such requirements in detailed design, e.g. <ul style="list-style-type: none"> Carry out noisy construction activities during normal working hours Use modern and well maintained equipment (with mufflers where appropriate) Use noise screens or mounds when necessary. 	Detailed design consultant/ IES/EO in PSC/HRMG	Start of detailed design.	All subprojects routes.	Cost included in staffing.	Response from DEC on permits.	Once, completion of detailed design.	EO in PSC/HRMG - ADB	Cost met by PSC/DOW project staffing.
3. Addressing mitigation measures	Mitigation measures incorporated in the detailed	Tender document will incorporate mitigation of environmental impacts as describe in	Detailed design consultant/ IES/EO in PSC/HRMG	Start of detailed design.	All subprojects routes.	Cost included in staffing.	Response from DEC on permits.	Once, completion of detailed design.	EO in PSC/HRMG - ADB	Cost met by PSC/DOW project

		Impact mitigation					Impact monitoring			
Environ-mental Concern	Objective	Proposed Mitigation Measures (MM)	Resp to Implement MM	Timing to Implement MM	Locations to Implement MM	Mitigation Cost	Parameter to monitor	Frequency and verification	Resp to Monitor	Monitoring cost
	design and Contractor's contract	Chapter 4 of the IEE.								staffing.
4. Environmentally Sound Design	To avoid problems with inadequate road drainage	To avoid problems with inadequate road drainage, the following will be considered in road drainage design: 1. Roads will have sufficient camber so that rainwater flows away from the road itself. 2. Road structure will have effective drainage systems (side-drains, culverts and sufficient turnouts). 3. Crossing water flows will be properly taken care of (bridges, culverts). 4. Drainage system capacity will consider the increase in rainfall due to climate change.	PSC/HRMG	.During detailed design.	Areas considered prone to flooding, and near bridges and culverts.	Cost included in design	Complete check on detailed design.	Once, completion of detailed design.	EO in PSC/HRMG – ADB	Cost met by PSC/DOW project staffing
<u>CONSTRUCTION STAGE</u>										
1. Loss of trees and vegetation	To avoid several negative impacts due to unnecessary removing of shrubs / trees and other foliage.	1. Marking of vegetation <u>not</u> to be removed prior to commencement of construction. 2. Clearing of trees for construction and other important vegetation during construction minimized.	Contractor	1. One month prior to and during construction	All subproject routes.	Cost included in contracts	Check on detailed design.	Prior to and during construction	EO in PSC/HRMG - ADB	Cost met by PSC/DOW project staffing

		Impact mitigation					Impact monitoring			
Environ-mental Concern	Objective	Proposed Mitigation Measures (MM)	Resp to Implement MM	Timing to Implement MM	Locations to Implement MM	Mitigation Cost	Parameter to monitor	Frequency and verification	Resp to Monitor	Monitoring cost
		3. Debris, foliage and waste will be removed throughout the subproject at regular intervals.								
2. Air quality and noise	To minimize air and noise impacts effectively and avoid complaints due to the airborne dust.	<p>A noise and dust control plan will be implemented reflecting the following:</p> <p>1. If the surface is dry water will be sprinkled on the road and exposed surfaces when work is carried out within 50m of the roadside tea and food stalls.</p> <p>2. No work will be carried out within 500 m of any settlement during the night (2100hrs to 0700hrs).</p> <p>3. If works have given rise to complaints over dust, the contractor will investigate the cause and review and propose alternative mitigation measures before works recommence.</p> <p>4. All heavy equipment and machinery will be fitted in full compliance with the national and local regulations.</p>	Contractor	during construction	Throughout all subproject routes.	Cost included in contracts	Installation of mitigation measures.	Continuous during construction.	EO in PSC.	Cost met by PSC/DOW project staffing

		Impact mitigation					Impact monitoring			
Environ-mental Concern	Objective	Proposed Mitigation Measures (MM)	Resp to Implement MM	Timing to Implement MM	Locations to Implement MM	Mitigation Cost	Paramater to monitor	Fequency and verification	Resp to Monitor	Monitorin cost
		such as schools. 8. Bitumen will not be used as fuel and fuel wood will not be used for heating bitumen.								
3. Construction Waste Disposal	To minimize the impacts from construction waste disposal.	<p>Waste management plan to be submitted to the EO in PSC and approved one month prior to starting works.</p> <ol style="list-style-type: none"> 1. Estimating the amounts and types of construction waste to be generated. 2. Identify opportunities for waste to be reused in the project or by other interested parties. 3 Identifying potentially safe disposal sites close to the project OR designated sites in the contract or agreed with landowners (in writing). <p>The following practices will be adopted to minimize the risk of soil contamination:</p> <ol style="list-style-type: none"> 1. The contractors will be required to instruct and train their 	Contractor	Update once a month and report quarterly.	<ol style="list-style-type: none"> 1. List of dumping areas identified by PSC engineer prepared in contract for agreement. 2. The list of waste sites to be recon-firmed, with contractor and local community. 	Cost included in contracts	Checks before and during construction.	Continuous during construction.	EO in PSC.	Cost met by PSC/DOW project staffing

<i>Environ-mental Concern</i>	<i>Objective</i>	<i>Impact mitigation</i>					<i>Impact monitoring</i>			
		<i>Proposed Mitigation Measures (MM)</i>	<i>Resp to Implement MM</i>	<i>Timing to Implement MM</i>	<i>Locations to Implement MM</i>	<i>Mitigation Cost</i>	<i>Paramater to monitor</i>	<i>Feqency and verification</i>	<i>Resp to Monitor</i>	<i>Monitorin cost</i>
		workforce in the storage and handling of materials and chemicals that can potentially cause soil contamination. 2. Debris generated by the dismantling of existing pavement will be recycled subject to the suitability of the material.								
4. Water quality	To prevent adverse water quality impacts due to negligence and ensure unavoidable impacts are managed effectively. Ensure adverse impacts on water quality caused by construction activities are minimized.	1. Storage of lubricants, fuels and other hydrocarbons in self-contained dedicated enclosures >50 m away from water bodies. 2. Proper disposal of solid waste from construction activities and labor camps (no burning). 3. Covering the construction material and spoil stockpiles with a suitable material to reduce material loss and run-off and sedimentation. 4. Avoiding stockpiling nearer than 100m to water bodies. 5. Borrow sites will not be close to sources of drinking water in case	Contractor responsible for all listed mitigation measures. 6 investigations also by EO in PSC.	1, 2, 3, 4, 5 timing will depend on the construction timetable and 6 depend on substantiated complaints.	Throughout all subproject routes, particularly near drinking water supplies.	Cost included in contracts	1, 2, 3, 4, 5 location of storage etc. 6. Selected indicator water quality parameters Environment Water Quality Criteria Regulation 2002 E(WQC) 2002].	1, 2, 3, 4, 5 as required. 6. At least three baseline samples per stretch. Two weeks before start of construction and monthly at streams / rivers within 100m of active rehabilitation construction works.	EO in PSC.	Cost met by MFF monitoring costs and project staffing

<i>Environ-mental Concern</i>	<i>Objective</i>	<i>Impact mitigation</i>					<i>Impact monitoring</i>			
		<i>Proposed Mitigation Measures (MM)</i>	<i>Resp to Implement MM</i>	<i>Timing to Implement MM</i>	<i>Locations to Implement MM</i>	<i>Mitigation Cost</i>	<i>Parameter to monitor</i>	<i>Frequency and verification</i>	<i>Resp to Monitor</i>	<i>Monitoring cost</i>
		runoff causes 6. Monitor and investigate water quality if complaints occur.								
5. Soil Erosion	To avoid threat to established works and minimize excessive erosion of works in progress.	Immediately after completion of any sections that requires erosion control, protection measures will be implemented. These will include the following: 1. Low embankments will be protected from erosion by seeding and planting indigenous grasses that can flourish under local conditions 2. High embankments, i.e. 2 m high and above, will be considered for protection by constructing stone pitching or a riprap across the embankment immediately after the works are completed. This practice will also be applied along cross-drainage structures where embankments are more susceptible to erosion by water runoff.	Contractor	At all times with special focus in rainy seasons.	Embankments and vulnerable slopes identified during detailed design	Cost included in contracts	Check complete installation after construction.	Once, after completion of each stretch.	EO in PSC	Cost met by MFF monitoring costs and project staffing

		Impact mitigation					Impact monitoring			
Environ-mental Concern	Objective	Proposed Mitigation Measures (MM)	Resp to Implement MM	Timing to Implement MM	Locations to Implement MM	Mitigation Cost	Paramater to monitor	Fequency and verification	Resp to Monitor	Monitorin cost
		3. Contractors will also be required to include appropriate measures for slope protection, i.e. vegetation cover and stone pitching, as required in the detailed construction drawings and implement them accordingly Payments will be linked to the completion of the works as indicated by the installation of erosion control measures to protect the works to the satisfaction of PSC/HRMG.								
6. Traffic Management	Minimize disturbance of vehicular traffic	1. Implementation construction traffic management plan. 2. Assign traffic control personnel in vicinity of schools and villages. 3. Awareness programs on safety and proper traffic behavior in populated areas near the construction.	Contractor	Day time	The most important locations to be identified and listed.	Cost included in design	Complete check before construction.	Once, one month before construction.	HRMG-DOW/PSC	Cost met by PSC/DOW project staffing
7. Safety and Health	To ensure safety and	The following measures will be	Contractor and PSC	During construction	all construction	Cost included in	Complete check before	entire Continuous	HRMG-DOW/PSC	Cost met by PSC/DOW

		Impact mitigation					Impact monitoring			
Environ-mental Concern	Objective	Proposed Mitigation Measures (MM)	Resp to Implement MM	Timing to Implement MM	Locations to Implement MM	Mitigation Cost	Paramater to monitor	Fequency and verification	Resp to Monitor	Monitorin cost
	health of public and workers	<p>implemented:</p> <ol style="list-style-type: none"> 1. Implementation of a safety and health plan 2. ensure all occupational health and safety requirements are in place at construction sites and in work camps; 3. install lights and warning sign in hazardous area; 4. establish footpaths and pull-off bays along roads through villages, near markets, schools, and other community facilities; 5. limit time of exposure to dust particles, chemical, and noise; 6. enhance safety and inspection procedures; 7. use of personal protection equipment (PPE) 8. establish safe handling procedures of toxic and hazardous materials 			sites and quarry areas	contracts	construction.	during construction.		project staffing

		Impact mitigation					Impact monitoring			
Environ-mental Concern	Objective	Proposed Mitigation Measures (MM)	Resp to Implement MM	Timing to Implement MM	Locations to Implement MM	Mitigation Cost	Parameter to monitor	Frequency and verification	Resp to Monitor	Monitoring cost
OPERATIONAL STAGE	(maintenance)									
1. Soil erosion.	To minimize excessive erosion of embankments and slopes.	Ensure that storm drains and highway drainage systems are periodically cleared to maintain clear drainage to allow rapid dispersal of storm water flow. An adequate system of monitoring, reporting and maintenance will be developed	PSC and HRMG-DOW.	Throughout operations	All embankments and slopes with protection measures.	Cost included in design	Check on detailed design.	Prior to and during construction	HRMG-DOW	Cost met by PSC/DOW project staffing
2. Water quality	To address adverse water quality impacts and ensure adverse impacts on water quality caused by construction activities are minimized.	1. Storage of lubricants, fuels and other hydrocarbons in self-and proper disposal of solid waste from maintenance activities. 2. Avoiding stockpiling nearer than 100m to water bodies. 5. Borrow sites will not be close to sources of drinking water in case runoff causes	Contractor	Timing will depend on the construction timetable.	At locations where water quality complaints sub-stantiated in construction phase.	Cost included in monitoring budget	Selected indicator water quality parameters Environment Water Quality Criteria Regulation 2002.	At monthly intervals if complaints persist or until baseline water quality is achieved.	EO in PSC.	Cost met by MFF monitoring costs and project staffing
3. Public Safety	To improve public safety of road users	The following measures will be implemented to improve public safety: 1. Measures to slow traffic (e.g. speed bumps) at selected sites such as schools,	NRA / HRMG / DOW	During operation.	All subproject routes	Cost included in MFF monitoring	Complete check throughout operations and maintenance	Every six months and report every year.	NRA / HRMG-DOW	Cost met by PSC/DOW project staffing

		Impact mitigation					Impact monitoring			
Environ-mental Concern	Objective	Proposed Mitigation Measures (MM)	Resp to Implement MM	Timing to Implement MM	Locations to Implement MM	Mitigation Cost	Paramater to monitor	Fequency and verification	Resp to Monitor	Monitorin cost
		markets, and densely populated areas. 2. Provision of off-road let down stops for vehicles 3. Proper road signage and pavement markings, particularly accident-prone spots.								

HRRIP = Highlands Region Road Improvement Program, HRMG = Highlands Road Maintenance Group, DOW = Department of Works, PSC = Project Support Consultant, EO = Environmental Officer.

^a Construction stage = after the selected contractor is appointed.