

SUMMARY INITIAL ENVIRONMENTAL EXAMINATION

ROAD REHABILITATION-2 PROJECT

IN

INDONESIA

May 2004

CURRENCY EQUIVALENTS

(as of 5 May 2004)

Currency Unit	–	rupiah (Rp)
Rp1.00	=	\$0.000115
\$1.00	=	Rp 8,705

ABBREVIATIONS

ADB	–	Asian Development Bank
AIDS	–	acquired immunodeficiency syndrome
ASEAN	–	Association of Southeast Asian Nations
BAPEDALDA	–	Environmental Impact Management Agency
BAPPENAS	–	National Development Planning Agency
CO	–	carbon monoxide
DFT	–	design and field team
DGRI	–	Directorate General of Regional Infrastructure
HIV	–	human immunodeficiency virus
IEE	–	initial environmental examination
NOx	–	nitrogen oxides
P3JJ	–	road and bridge planning and management project
PM	–	particulate matter
SDEA	–	sub-directorate of environmental affairs
TKH	–	Trans-Kalimantan Highway
TSCC	–	Trans-Sumatra Central Corridor
TSEC	–	Trans-Sumatra Eastern Corridor

WEIGHTS AND MEASURES

dB(A) (decibel)	–	'A' weighted equivalent decibel
Ha	–	hectare

GLOSSARY

AMDAL	–	analisis mengenai dampak lingkungan (environmental impact assessment)
Kepala adat	–	person implementing the traditional law
Dinas	–	Provincial Sub-Project Management
Kabupaten	–	region/district
UKL-UPL	–	upaya pengelolaan lingkungan (environmental management and monitoring plan)
warung	–	roadside mobile stores

CONTENTS

	Page
I. INTRODUCTION	1
II. DESCRIPTION OF THE PROJECT	1
III. DESCRIPTION OF THE ENVIRONMENT	2
A. Physical Resources in Project Area	2
B. Ecological Resources in Project Area	3
C. Human and Economic Resources	5
IV. SCREENING OF POTENTIAL ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES	5
A. Physical Environment	6
B. Ecological Environment	8
C. Socioeconomic Environment	8
V. INSTITUTIONAL REQUIREMENT AND ENVIRONMENTAL MONITORING PLAN	10
A. Institutional Framework and Environmental Monitoring Program	10
B. Environmental Management Training	11
VI. PUBLIC CONSULTATION AND INFORMATION DISCLOSURE	11
VII. FINDINGS AND RECOMMENDATIONS	12
VIII. CONCLUSION	12
APPENDIXES	
1. Environmental Monitoring and Mitigation Measures During Design, Construction and Operation	13
2. Frequency of Environmental Monitoring	21
3. Outline Terms of Reference for Consulting Services for Strengthening Capabilities in Environmental and Social Management	23

I. INTRODUCTION

1. The proposed Road Rehabilitation-2 Project (the Project) for the islands of Sumatra and Kalimantan, Indonesia, has been classified as a category “B” sensitive project in accordance with ADB’s environmental assessment requirements. An initial environmental examination (IEE) report was prepared for each group of road links comprising the Trans-Sumatra Central Corridor (TSCC), Trans-Sumatra Eastern Corridor (TSEC), and Trans-Kalimantan Highway (TKH). This report summarizes the environmental impacts based on the information in the IEE report of project preparatory technical assistance (TA).¹ In addition, the Government’s regulatory requirements of environmental impact assessment (AMDAL) and environmental management and monitoring plan (UKL-UPL) for road rehabilitation projects were also reviewed, which indicates that the AMDAL and UKL-UPL do not have to be prepared for this Project.

2. In determining environmental impacts of the Project, year 2003 is used as the base year for forecasting, with impacts predicted for 2008. The study has been limited to the existing right of way with the exception of noise, which is considered up to 100 meters (m) on either sides of the roadway.

II. DESCRIPTION OF THE PROJECT

3. The Project involves rehabilitation of 1,266 kilometers (km) of national road sections in 10 provinces on the TSCC, TSEC, and TKH: 261 km of “betterment”² and 389 km of periodic maintenance³ in Jambi, Lampung, North Sumatra, Riau, South Sumatra, and West Sumatra; and 202 km of betterment and 414 km of periodic maintenance in Central, East, South, and West Kalimantan. In addition to this, 21 timber or log bridges in Central, South, and West Kalimantan will be replaced. The periodic maintenance and betterment works for roads and bridges are all in the existing right of way, even when widening of pavements and shoulders is carried out. No land acquisition and resettlement will be required. The Project also includes measures to improve road maintenance funding, strengthen the capabilities of provincial road agencies, monitor environmental aspects, and toughen controls over damage to roads by heavy-loaded trucks. The Project’s civil works will include collection of borrow materials, quarry operations, excavation for embankment cut and fill, aggregate mixture, cement works, masonry, asphalt plants, and the establishment of construction camps.

4. In the aftermath of the Asian financial crisis, the Government’s budget allocations for road maintenance fell short of needs and the condition of the roads deteriorated. In Sumatra, as a result, transport costs have increased and their associated inter-regional trade flows have been affected. In Kalimantan, the costs of transport between the main provincial centers have increased; in some cases, strategic routes have even become impassable for the whole periods of the year. By restoring the condition of high-priority links, the Project will facilitate trade, investment, and economic growth in Sumatra and improve the accessibility, and reduce poverty, in areas of potential growth in Kalimantan.

¹ ADB. 2003. *Road Rehabilitation-2 Project*. Manila.

² “Betterment” is defined as the improvements and additions to surface and subsurface drainage, and widening and strengthening within existing right of way of pavements and shoulders; and has design life cycle of 10 years.

³ Periodic maintenance consists of single or double layer asphalt concrete overlays and associated reshaping of roadway shoulders and minor drainage works, pavement markings. It has a design life cycle of 5 years.

5. The Project is scheduled to commence in January 2005 and to be completed in July 2008. The Directorate General of Regional Infrastructure (DGRI), Ministry of Settlements and Regional Infrastructure, will be the Executing Agency. DGRI will establish a project implementation unit to coordinate design, implementation, supervision of the road rehabilitation, maintenance, road safety, and capacity building components. DGRI's project management in the 10 project provinces will be through the local representation of DGRI in the provinces (P3JJ units), assisted by consultants funded under the Project.

III. DESCRIPTION OF THE ENVIRONMENT

A. Physical Resources in Project Area

1. Topography and Soil

6. The TSCC's topography in West Sumatra is mainly hilly, with some flat and swampy areas. High mountains and the large Danau Toba crater lake dominate central North Sumatra. In Jambi, the TSCC area is generally flat and swampy. Embankment slopes and shoulders are silty sand with clay fractions. The links in South Sumatra have consolidated sand and gravel terrace deposits, with some alluvial plain meander belt and valley-bottom deposits. Embankment slopes and shoulders are sandy-silt with clay and sand fractions. The topography of the corridor in Lampung is generally flat. Embankment slopes and shoulders are clayey-silt with sand fractions.

7. The TSEC links run in North Sumatra through mainly lowland areas with swamps. There are coal and oil deposits and old sedimentary rocks, often metamorphosed, along the route between Batas Labuhan Batu and the Riau border. Volcanic cones, some still active, indicate the presence of old continental crust close to the link Simpang Kawat-Batas Labuhan Batu. Most links in this corridor in Riau run through lowland plain, including alluvial islands that average below 200 m above mean sea level. The soil is generally of orgaosol type (histosol) containing much organic material. Lowland Riau also contains bauxite deposits.

8. Most of the TKH in West Kalimantan is in mountainous/rolling terrain (Teraju-Balai Bekuak-Aur Kuning); Tayan-Teraju is relatively flat. Embankment slopes are silty-sand. Links in Central Kalimantan are in southern coastal areas and swamps are 0–50 m above mean sea level. Embankments are sandy-silty with clay. The northern and central parts of South Kalimantan contain the Meratus mountain range, the west is low and swampy, and the east has forest and grassland. Embankments are sandy-silty with clay. Links in East Kalimantan run along lowland regions with rivers flowing from the west to the eastern coast. Embankments are sandy-silty with clay.

2. Climate

9. Sumatra has a largely tropical monsoon climate. June-September are relatively dry. Temperatures vary from 20°C to 32°C, with humidity of 83–90%. Average rainfall is 1,000–4,000 millimeters/year. Kalimantan enjoys a dry season between May and September with rains between October and April, when tropical showers alternate with clear skies. The average temperature varies from 17°C to 36°C, with humidity of 81–95%; average rainfall varies from 2,000 to 3,560 millimeters/year.

3. Water Resources

10. Indonesia receives abundant rainfall and has approximately 6% of the world's freshwater resources. The distribution varies between islands. Indonesia's water quality is deteriorating. The overall water river quality is poor. Dissolved Oxygen levels progressively worsen toward the river mouth, to the point that only limited forms of aquatic life can survive in the lower reaches of the rivers. Suspended solids increase with distance downstream. Artisan small-scale mining (gold production from the dredges and hard rock small-scale mines) along the rivers in Central Kalimantan is a major source of river pollution. Illegal miners use toxic mercury to separate gold from ore and this mercury is seeping into the local environment, poisoning the miners, plants, and the local river. The impact on the river water is very critical.

11. Groundwater resources are limited and are used for domestic, municipal, and industrial purposes. The quantity and quality of groundwater have also been adversely affected by water and wastewater management practices in the past 10 years. Domestic sewage, factory wastes, and agricultural runoff are responsible for groundwater pollution; lack of an appropriate pricing policy and slow and declining aquifer recharge have led to overexploitation of groundwater beyond sustainable yields. The ambient air quality along the TKH is within standards because of low traffic. The Project will have the positive impact of reducing resuspension of dust by paving the roads.

4. Air Quality

12. Analysis of air quality data in Indonesia shows that particulate matter (PM₁₀) concentrations in major urban areas are higher than the standard in June to September,⁴ sulfur dioxide (SO₂) levels are growing rapidly; nitrogen dioxide (NO₂) concentrations quintupled between 1992 and 2000 but have largely remained below the standard of 150 micrograms/cubic meter. Carbon dioxide (CO) concentrations in 2001 for Medan and Pekanbaru were significantly above the standard (10 milligrams/cubic meter).

5. Noise

13. Noise levels along the corridors were estimated using empirical relationships⁵ commonly used in Indonesia. The noise levels 15 m from the road exceed standards for residential and human settlement of 55 decibels (dBA) along many of the TSCC and TSEC links and some of the TKH. The noise predictions confirm the findings of other noise studies, showing that the noise standards are frequently exceeded near to roads countrywide.

B. Ecological Resources in Project Area

14. The TSCC road links pass through three protected areas (Table 1). Rimbo Panti nature reserve⁶ and recreational park⁷ in link 030 Lubuksikaping-Panti are 100 km from Bukittinggi and comprise areas of 2,830 hectare (ha) and 570 ha, respectively. The areas are mainly swamp

⁴ World Bank. 2003. *Indonesia Environment Monitor*. Jakarta.

⁵ Malkhamah, S., (1992-1996). *Journal of Civil Engineering*, Jogjakarta: University of Gadjah Mada.

⁶ Rimbo Panti nature reserve is classified as International Union for Conservation of Nature and Natural Resources (IUCN) Category Ia: land possessing some outstanding or representative ecosystems, or physiological features and/or species, available primarily for scientific research and/or environmental monitoring.

⁷ Rimbo Panti recreational park is classified as IUCN Category V: land where the interaction of people and nature over time has produced an area of distinct character with significant aesthetic, ecological, and/or cultural value, and often with high biological diversity. Safeguarding the integrity of this traditional interaction is vital to the protection, maintenance, and evolution of such an area.

forest (2,050 ha, 60.29%) with smaller areas of tropical rainforest (900 ha, 20.47%) and secondary forest (450 ha, 13.23%). The main function of the nature reserve is to preserve habitats, ecosystems, and species, and the recreation park serves to manage the protected area mainly for landscape conservation and recreation. Melampah Alahan Panjang⁸ (link 029 Kumpulan-Lubuksikaping) with an area of 22,364 ha is a protected forest and natural reserve. Sampur II, with an area of 54,223 ha, is another protected forest near link 032 Panti-Batas-Sumut. These protected areas are set aside for conservation of genetic resources and life support systems, protection of watershed and catchment areas, and the development of science and education. The major activities of the corridor are transportation of goods and services to North Sumatra and tourism. This corridor links two famous tourist spots: Lake Toba in North Sumatra and Bukittinggi in West Sumatra.

Table 1: Information on Protected Forest in the Project Area

Link	Forest Area and Type	Management Agencies	Restriction for Road Construction	Existing Activities that Use the Link	Land Use Plan	Management Practices
Link 030 Lubuksikaping-Panti	Rimbo Panti Protected Forest and Tourism	Under Control of Joint Management of : - Provincial Forestry Office - Kabupaten Forestry Office - Board of Conservation Natural Resources	None	1. Part of middle trans Sumatra highways 2. Main route for transportation of goods and services to North Sumatra 3. Link two famous tourism regions: Lake Toba in Sumatra and Bukit Tinggi in West Sumatra	- Conservation area - Watershed and catchment area	- Conservation activities - Flora and fauna protection and safety - Tourism - Flora and fauna inventory and identification - Research and education
Link 029 Kumpulan-Lubuksikaping	Melampah Protected Forest and Tourism	Under Control of Joint Management of : - Provincial Forestry Office - Kabupaten Forestry Office - Board of Conservation Natural Resources	None	1. Part of middle trans Sumatra highways 2. Main route for transportation of goods and services to North Sumatra 3. Link two famous tourism regions: Lake Toba in Sumatra and Bukit Tinggi in West Sumatra	- Conservation area - Watershed and catchment area	- Conservation activities - Flora and fauna protection and safety - Tourism - Flora and fauna inventory and identification - Research and education
Link 032 Panti-Bts. Sumut	SAMPUR II Protected Forest and Tourism	Under Control of Joint Management of : - Provincial Forestry Office - Kabupaten Forestry Office - Board of Conservation Natural Resources	None	1. Part of middle trans Sumatra highways 2. Main route for transportation of goods and services to North Sumatra 3. Link two famous tourism regions: Lake Toba in Sumatra and Bukit Tinggi in West Sumatra	- Hydrology area - Conservation area - Watershed and catchment area	- Conservation activities - Flora and fauna protection and safety - Tourism - Flora and fauna inventory and identification - Research and education

⁸ Gunung Belimbing, Gunung Tayap (mountains), Melampah Alahan Panjang, Sumpur II, and Sungaidawak, are all categorized as IUCN Category VI, protected area managed mainly for the sustainable use of natural ecosystems. These protected areas contain predominantly unmodified natural systems, managed to ensure long-term protection and maintenance of biological diversity, while providing a sustainable flow of natural products and services to meet community needs.

Table 1— (continued)

Link	Forest Area and Type	Management Agencies	Restriction for Road Construction	Existing Activities that Use the Link	Land Use Plan	Management Practices
Link 079-1 Tayan-Teraju	Sungaidawak Protected forest for water conservation	Under management of Kabupaten Forestry Office	None	Part of trans Kalimantan highway Underutilized due to poor road condition	Soil and water conservation	Reforestation
Link 069 Aur Kuning-Sandai	Belimbing Protected forest for water conservation	Under management of Kabupaten Forestry Office	None	Part of trans Kalimantan highway Underutilized due to poor road condition	Soil and water conservation	Reforestation
Link 020 Sandai-Nanga Tayap	Gunung Tayap Protected forest for water conservation	Under management of Kabupaten Forestry Office	None	Part of trans Kalimantan highway Underutilized due to poor road condition	Soil and water conservation	Reforestation

15. The TKH also passes through three protected forests in West Kalimantan: on links 079-1 Tayan-Teraju (Sungaidawak), 069 Aur Kuning-Sandai (in Belimbing) and 020 Sandai-Nanga Tayap (Gunung Tayap). All three are IUCN Category VI forests, which are managed mainly for the sustainable use of natural ecosystems.

16. During project preparation it was evident that the protected areas in West Sumatra and Kalimantan are well managed and maintained. Rimbo Panti recreational park has a hot spring and hiking trails, which are attractive to tourists. Improved access will help develop responsibly-managed tourism in this corridor. Tourism contributes 30% of West Sumatra's gross domestic product and road rehabilitation along this corridor is highly expected.

C. Human and Economic Resources

17. Population densities vary from 45 to 214 persons/square kilometer in the two Sumatra corridors and 11-69 persons/square kilometer along the TKH. In Sumatra, the incidence of poverty in rural areas is similar to that in urban areas. In Kalimantan, poverty rates are higher in rural than in urban areas. Agriculture is a major sector of the economy along TSCC and TKH, with the main food products being rice, corn, peanuts, small green peas, cassava, soybean, fruits, and vegetables. The main commercial crops are copra, oil palm, rubber, cacao, and pepper. The main forest products are logs, processed wood, veneer, plywood, blackboard, slate pencil, resin, and rattan. Areas along the TSEC are rich in mineral deposits such as petroleum, natural gas, coal, gold, silver, platinum, copper, granite, kaolin, limestone, clay, and obsidian.

IV. SCREENING OF POTENTIAL ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

18. The longer-term environmental impacts of the proposed Project are likely to be insignificant, with impacts resulting directly from construction activities only. Environmental impacts during construction depend on (i) contractors' work practices, especially those related to the storage of construction materials and cleanliness of the work sites; (ii) cooperation by local communities in terms of traffic management and use of land and utilities; (iii) enforcement

of construction practices and standards through supervision; and (iv) implementation of mitigation measures identified in the IEE and included in bid and contract documents.

A. Physical Environment

1. Soils and Materials

19. The main impacts during construction are from extraction of fill materials from rivers or borrow pits, conversion of land for materials stockpiles, soil erosion in borrow pits and on uncompacted embankments, and soil contamination by fuel and construction material spillage. To reduce soil erosion, construction should take place mainly in the dry season; participants in public consultations also suggested this. To reduce soil damage, especially in Kalimantan, embankments will be given grass cover as soon as possible, embankments will be monitored during construction for signs of erosion, long-term material stockpiles will be covered to prevent erosion, and the contractor's plans for sources of spoil will be submitted to the project management unit for approval and monitoring. The spoil plan should show the locations of any borrow pits and measures to be taken to rehabilitate these on project completion. DGRI will approve and monitor implementation of the plan.

2. Recycling of Construction Materials

20. Contractors will be encouraged to recycle reclaimed asphalt pavement in cold mixes or aggregate in granular or stabilized surface material and to use recyclable materials such as fly-ash wherever possible. In addition to saving cost, this will reduce environmental impacts of quarrying, reduce dumping of waste materials, and reduce air quality impacts.

3. Slope Stability and Drainage

21. In mountainous regions of Sumatra most retaining structures are gravity-type, made of masonry. Mostly the thickness is adequate but some cracks, broken sections, and poor drainage are evident. Effective retaining structures are included in the design to protect slopes in the mountainous regions of West Sumatra and Kalimantan.

22. Embankments on earth/gravel roads in Kalimantan tend to disrupt natural watercourses, and culverts are often not present. Water collects on the upstream side and sometimes spills over the embankment. The subgrade is often damaged where there are no cross- and side-drains. Improved drainage structures will improve slope stability and are included in the proposed rehabilitation works.

4. Water

23. The project roads will cross numerous creeks and rivers and could affect the surface runoff flow pattern. In TKH, 21 bridges require reconstruction, including periodic maintenance of bridges and culverts in Sumatra. The Project will likely increase the silt load during construction if embankments and construction materials are washed out with rainwater. During operation of the Project, the water quality could be affected by accidents near rivers or creeks, involving vehicles containing toxic and hazardous substances. Oil and grease from engine leaks might pollute surface water. Mitigation measures are recommended in the IEE to control silt from the embankments and toxic and hazardous waste discharge. Mitigation and monitoring measures will be enforced during construction to protect surface waters from pollution by construction waste, especially along TKH where 21 bridges require reconstruction.

5. Air Quality

a. Construction Impacts

24. During construction, air quality is likely to be degraded by exhaust emissions from the operation of construction machinery; fugitive emissions from aggregates, concrete, and asphalt plants; and dust generated from haul roads, unpaved roads, exposed soils, and material stock piles. To mitigate this, (i) construction equipment will be maintained to a good standard, idling of engines discouraged; and machinery causing excessive pollution (e.g., visible smoke) will be banned from construction sites; (ii) aggregate, asphalt, and concrete plants will be operated within the terms of Government pollution control guidelines, and located as far away from human settlements and protected areas as possible; and (iii) prior to construction, the contractor will submit to DGRI a dust suppression program that will detail the action to be taken to minimize dust generation (e.g., spraying of roads with water), and will identify equipment to be used.

b. Operational Impacts

25. The operation of the Project road will lead to air pollution, including hydrocarbon, carbon monoxide, nitrogen oxides, sulfur dioxide, and particulate matter (PM). Predicted worst-case pollutant concentrations indicate that air quality in all three corridors will generally be within the ambient air quality standards.

6. Exhaust Emission and Resuspension of Dust

26. The evaluation of exhaust emissions indicates that pollution will be less than that produced in the “without project” scenario except for NO_x emissions, which increase under the project scenario. This is because vehicle speeds will be higher; NO_x emissions increase with vehicle speeds up to about 70 km/hour. When the Project is completed, the dust generated will be less, due to better paved roads. Dust is common on earth roads in Kalimantan, and is deposited within 20–30 m of the edge of the road. Such dust is a health risk to roadside communities and can damage the biological environment.

27. The CALINE-4 model is used to determine the worst-case air quality scenario along the corridors in Sumatra. The prediction indicates that the concentrations of carbon monoxide, PM, and nitrogen dioxide are mostly within ambient air quality standards of Indonesia in all three corridors. Two links of Lampung (Tegineneng-Gunung Sugih and Gunung Sugih-Tembanggi Besar) along TSCC, two links in North Sumatra (Simpang Kawat-Batas Labuhan Batu and Rantau Prapat-Aek Nabara) and one link in Riau (Simpang Balam-Simpang Batang) in TSEC have higher PM concentration because of the high traffic volumes and heavy duty vehicles. This also confirms other studies in Indonesia, which indicate that particulate concentration is high where traffic is heavy.

7. Noise and Vibration

28. Prevention of noise and vibration will be an issue during construction. Machinery operations will be restricted to between 0600 to 2100 hours. In addition, a limit of 70 dBA will be set and strictly followed near the construction site. Controlled blasting using low volume charges will reduce the potential for damage to structures, while owners of houses that will obviously be damaged will be fully compensated in accordance with DGRI’s compensation policy guidelines.

29. Noise levels along the corridors were predicted for the “with” and “without” project scenarios. The results show that noise levels along the project road will be higher in 2008 with the implementation of the Project, but that noise attenuation are not needed. However, roadside planting along project influence areas using densely leafed shrubs and trees should decrease noise by 2-4 dBA. The main focus of noise mitigation will be on reducing levels at sensitive receptors such as schools and hospitals. During road operation, heavy vehicle movements can cause vibration damage to nearby structures within 50 m of the roadways.

B. Ecological Environment

30. A short-term impact on ecology along the rehabilitated roads is likely to occur in and around the quarry sites, material stockpiles, and workforce camps due to minor vegetation clearance. After construction is finished, quarry sites and similar locations will be covered by grass, rehabilitation works are proposed to be undertaken by local labor, and no other additional demands are expected on the local natural resources.

31. Road rehabilitation will improve accessibility to Melampah Alahan Panjang, Rimbo Panti, and Sampur II in West Sumatra. The impacts of road rehabilitation on protected areas are analyzed for the “with” and “without” project scenarios. The analysis considered whether the buffer zones are sufficient to protect rare habitats from human disturbances. Discussions with the provincial forest department, field visits, and current maintenance practices show that the Project is unlikely to have a significant impact on the protected areas of West Sumatra due to the road rehabilitation (simple overlay). However, some minor negative impact is expected during construction and operation, which will be mitigated by not allowing any construction camps in the protected section of the road, improved road signs, and the provision of improved roadside fencing. A special monitoring and management plan will be established (e.g., asphalt and mixing plants will be set-up at outside the protected forest and the material transported to overlay the pavement in the protected section) for the protected areas. Excluding the rehabilitation of the protected sections from the corridor would have increased negative environmental and socioeconomic consequences e.g., (i) traffic would be slower generating more pollution by allowing the pavement to deteriorate; (ii) the provincial government would loose revenue from tourism and transport due to the poor accessibility;⁹ and (iii) the current maintenance and management practices of forest authorities would be hindered by the poor accessibility. Provincial forest, environmental management agencies, and nongovernment organizations were consulted regarding the rehabilitation of the protected sections of the road. Written clearances and no-objections have been obtained for simple overlay within the road right of way from the provincial forest and environmental management agencies and are available in the IEE.

C. Socioeconomic Environment

1. Compensation Plan

32. The Project will not require land acquisition, resettlement, or removal of permanent structures. Some temporary disturbance, however, is possible due to displacement of roadside stores, setting up of temporary construction camps, and cutting of trees. Public consultations indicate concern for policy guideline on the compensation plan to be disclosed to the local community. Such a policy and plan has been prepared by DGRI.

⁹ Tourism and transport sectors contribute 30% and 8% of West Sumatra’s gross domestic product, respectively.

2. Accessibility and Regional Cooperation

33. The proposed rehabilitation of most of the road links in TKH will reduce poverty by improving access to the provincial capitals, and enhance regional cooperation by connecting with highways in neighboring countries. The road is currently impassible between West and Central Kalimantan, resulting in social and economic isolation of the two areas, limited mobility of the rural poor, and substantially increased marketing costs for their agricultural products. Improved access can reduce transport costs, improve access to social services and employment opportunities, bring new markets for farm produce, and increase agricultural production, which will eventually generate greater rural incomes.

3. Illegal Logging

34. During the technical assistance study, the consultant discussed with the provincial forest departments the impact of the road rehabilitation on logging concessions close to the roads, TSCC, TSEC, and TKH. Logging in the project areas is not of commercial scale but is community based. Commercial-scale logging operations in the project have largely ceased. Forest products are put to local uses. Therefore, the Project will have little impact on the scale or intensity of logging.

35. Furthermore, the Government has taken action to deal with illegal logging nationwide. A committee has been formed, with the National Development Planning Agency (BAPPENAS) as chair, to address special issues (including illegal logging) related to road infrastructure development. A number of agencies (BAPPENAS, Department of Finance, DGRI, and Directorate General of Land and Communications) are involved in the committee, which includes two sub committees (a supervisory sub committee and a technical directions sub committee). The technical sub committee is responsible for identifying and resolving social issues (including illegal logging) arising during the implementation of road infrastructure development projects. In practice, provincial forest departments have set up forest stations and checkpoints along major roads, including some road links in the Project, to monitor log transport.

4. Community Impacts

36. Construction camps may place stresses on nearby communities. The contractors will be required to establish a mechanism by which local people can raise grievances. The use of local labor and the provision of construction support services will be encouraged and will help alleviate potential conflicts. Village leaders consulted during public consultation meetings requested that local people be involved in road construction and maintenance.

5. Proper Construction Practices

37. Contractors' conformity with contract procedures and specifications during construction will be carefully monitored. Public consultations showed that prime contractors tended to use sub contractors without ensuring that they conform with prime contract clauses. Such practices reduce the quality of construction and the benefits of the Project. Contractors will be made to follow standard construction practices, monitored and supervised by field team consultants employed under the Project.

6. Health, Safety, and Hygiene

38. Construction camps are likely to have public health impacts. There will be a potential for diseases to be transmitted, exacerbated by inadequate health and safety practices. Each contractor will therefore be required to recruit an environmental, health, and safety manager to address such concerns in the camps.

7. Tourism

39. Tourism is a major source of revenue for West Sumatra. The Project will improve access to Malampah Alahan Panjang and Rimbo Panti in West Sumatra and Meratus Mountains in South Kalimantan by rehabilitating the roads in TSCC and TKH. Hence, the number of tourists accessing these resources will increase, which will enhance local tourism.

V. INSTITUTIONAL REQUIREMENT AND ENVIRONMENTAL MONITORING PLAN

A. Institutional Framework and Environmental Monitoring Program

40. An environmental management and monitoring plan was prepared to mitigate the potential environmental impacts of the Project (Appendix 1). The required frequency of environmental monitoring is attached as Appendix 2. The agencies involved in executing and monitoring the environmental aspects of the Project include DGRI's Subdirectorate of Environmental Affairs, responsible for managing the social and environmental impacts of road projects, and the provincial DGRI offices and provincial works agencies, responsible for environmental monitoring under the IEE (Table 2). The core team of consultants will be responsible for incorporating the environmental management and monitoring plan into engineering design and for environmental monitoring during construction. The field specialists will supervise the monitoring of mitigation measures during construction. In addition, each contractor will be required to nominate an environmental, health, and safety manager responsible for meeting the contractors' environmental and health responsibilities.

Table 2: Responsibilities for Environmental Monitoring Program

Project Stage	Responsible Organization	Responsibilities
Detailed Design	<ul style="list-style-type: none"> • Core Team Consultant • Sub-project management and supervision team • Sub-Directorate of Environmental Affairs 	<ul style="list-style-type: none"> • Incorporation of mitigation measures into engineering design and technical specification. • Review and approve environmental mitigation and management measures.
Construction	<ul style="list-style-type: none"> • Contractor • Design and Field Team Site Engineer • Field Team Consultants 	<ul style="list-style-type: none"> • Implementation of required environmental measures. • Supervise contractor's implementation of environmental measures on a daily basis. Enforce contractual requirements.

Table 2— (continued)

Project Stage	Responsible Organization	Responsibilities
	<ul style="list-style-type: none"> • Field Team Consultants • Sub-project Management Team • Provincial/Kabupaten BAPEDALDA 	<ul style="list-style-type: none"> • Audit construction phase through environmental inspections and collection of monitoring data. Submission of quarterly reports. Provision of awareness/training to workers and technology transfer to the contractor. • Ensure compliance with Government legal requirements during construction. • Review complicated issues that arises from the Project.
Operation	<ul style="list-style-type: none"> • Sub-Directorate of Environmental Affairs and Sub-project Management Team (Dinas) • Local BAPEDALDA • Sub-Directorate of Environmental Affairs and Dinas 	<ul style="list-style-type: none"> • Provide budget to undertake environmental monitoring. • Review monitoring reports. • Implement the environmental management and monitoring plan.

B. Environmental Management Training

41. As a component of the Project, the capacities of the Subdirectorate of Environmental Affairs and provincial agencies will be strengthened through a program of training in basic and advance environmental and social management. The outline terms of reference is included in Appendix 3.

VI. PUBLIC CONSULTATION AND INFORMATION DISCLOSURE

42. The IEE process included public participation and consultation to help DGRI achieve public acceptance of the Project. The technical assistance consultant has involved a wide range of participants representing affected people, community leaders, nongovernment organizations, provincial governments, and DGRI. The consultations were organized in seven provincial capitals for a sample of road links and had a total of 173 participants mostly from the project-affected areas. The affected people and the local communities expressed support for the Project, perceiving benefits to the community and the region. The main concerns expressed related to the provision of proper drainage, quality construction, proper engineering practices during construction, and transparency in construction work. Responses to these concerns are incorporated in the Project's design.

43. The IEE report documenting the mitigation measures and consultation process is available for public review. As the public consultation is an ongoing process, additional disclosure and consultation will occur during the construction and operation phases, through dissemination of a project brochure in Indonesian. The brochure will explain the affected peoples' entitlements and the procedures for obtaining compensation and recording grievances and setting up a formal grievance redress committee with representation from the affected people.

VII. FINDINGS AND RECOMMENDATIONS

44. The IEE study reveals that no significant negative environmental impacts are likely to occur due to the construction activities and normal operations after the proposed rehabilitation. Recommendations are made to mitigate expected negative impacts in the IEE.

45. Positive impacts of the Project will be economic, and better accessibility in project areas will enhance trade and economic flow, reduce travel time between the provincial capitals, and improve road safety (in particular in the mountainous areas and high traffic volume links).

46. Soil erosion is expected after project completion. Roads passing along the rivers will require slope protection, for which provision has been made in the engineering design. The residual impact on the environment will be minor and, in some cases, positive where erosion has been active and henceforth will be controlled. Environmental management and monitoring will be required for 42 months, covering preconstruction and construction period.

47. Minor negative impacts are expected during implementation of the civil works in the protected forest and natural reserve by civil works. A special management plan, road sign, information display board, and roadside fence will mitigate this. The cost of these measures has been included in the project budget.

48. Environmental and social management and advance environmental training of Government officials at different stages in the project cycle is required and has been included in the project budget.

VIII. CONCLUSION

49. The Project will have some minor environmental impacts, some positive and some negative, including (i) less air emission and resuspension of dust, (ii) increased noise levels along the corridor, (iii) increased growth in the economy of the region, (iv) substantial income and employment opportunities, (v) improved living conditions, (vi) reduced poverty, and (vii) provision of a road currently impassible in Kalimantan.

50. Implementation of appropriate mitigation measures during construction and operation phases will minimize the negative impacts of the Project to acceptable levels. Environmental monitoring of the Project will be undertaken regularly during construction and through the first 5 years of its operation by local Environmental Impact and Management Agencies (BAPEDALDAs) to ensure that the measures are being implemented properly.

51. In conclusion, the Project will have overall beneficial impacts in reducing air pollution, dust, and noise pollution and improving socioeconomic conditions along the project corridor, and will have insignificant negative impacts, which will be carefully monitored and adequately mitigated. No further environmental study is required for this Project.

ENVIRONMENTAL MONITORING AND MITIGATION MEASURES DURING DESIGN, CONSTRUCTION AND OPERATION

Activity/Issue	Potential Impact	Mitigation Measures	Persons to Implement	Persons to Monitor	Timing
Design Stage Nonmotorized traffic	Exposed to high speed motorized traffic	Consideration is made in the preliminary engineering design to strengthen shoulder (1.5 meter [m] on both sides) for the nonmotorized transport and the pedestrians. Where space permits, either as a part of the roadway features (substandard pavement) or a separate surface 1–2 m wide from the edge of the roadbed is considered, especially where road passes through villages and by schools and markets. Special provisions are also made at bridge designs.	Design consultants	DGRI and P3JJ	Feasibility and design phase
Increased traffic	Increased accidents due to traffic volume and higher speed	The rehabilitated road will attract more traffic. To help reduce the risk of serious accidents, speed control signs and other visual means will be employed at the entrances to the road and through the urban zones of towns and villages along the road. Many of the activities of the villages are centered on the road with many pedestrians crossing. Proper speed control will help improve safety and reduce noise, particularly in the evening.	Design consultants	DGRI and P3JJ	Feasibility and design phase
Compensation for temporary and mobile stores and plants	Social instability	DGRI has prepared compensation policy guidelines. On the approaches to towns and villages, vendors who sell wares on or by the road will be moved to the newly strengthened shoulders.	Resettlement expert	DGRI and Dinas	Feasibility stage and design phase
Strengthening and constructing culverts and bridges	Social and community disturbances by flooding	Damaged culverts and small bridges will be reconstructed with proper engineering design to allow smooth water flow from creeks and canals. In Central, South, and West Kalimantan, 21 bridges must be constructed.	Design consultants	DGRI and P3JJ	Design phase, construction phase

BAPEDALDA = Environmental Impact Management Agency, dBA = decibel, DFT = design and field team, DGRI = Directorate General of Regional Infrastructure, Dinas = Provincial Sub-Project Management, HIV/AIDS = human immunodeficiency virus/acquired immune deficiency syndrome, HSM = health and safety manager, m = meter, P3JJ = road and bridge planning and management project; SDEA = Subdirectorate of Environmental Affairs

Activity/Issue	Potential Impact	Mitigation Measures	Persons to Implement	Persons to Monitor	Timing
Construction Phase Air Quality Dust and odor	Respiratory hazards for the residents and school children	<ul style="list-style-type: none"> During the construction phase, water will be sprayed on all mixing areas where dry materials are handled and/or crushed. Temporary access roads to aggregate sites must be included in the dust suppression program. A spraying schedule will be prepared by the contractor and will serve as the basis of a dust control program. The project authorities will regularly monitor this schedule. Vehicles delivering materials to and from the construction sites should be covered to reduce spills. Asphalt application will be heated liquid bitumen sprayed onto an aggregate base. Bitumen preparation sites will be noisy, with some odor and a considerable risk of fire. Therefore, all bitumen preparation and loading sites must be over 500 m downwind from any community development, and the contractor must have spill and fire protection equipment available to deal rapidly with any accidents. Mixing and crushing plants/operations should be equipped with dust suppression devices such as water sprays. Operators should wear dust masks and ear protection. 	Contractor	DFT and consultant, with assistance from BAPEDALDA if required	Construction phase
Air pollution	Health hazards to residents and school children	<ul style="list-style-type: none"> Vehicles and machinery used for construction are to be regularly maintained so that air quality conforms to national standards. Special care must be taken to assure all construction vehicles are properly maintained and correctly operated (including the use of dust filters or hoods) during construction in the protected areas. 	Contractor	DFT and consultant, with assistance from BAPEDALDA	Construction phase
Noise	Health hazards to residents and school children	<ul style="list-style-type: none"> Noise standards at aggregate crushing plants and bitumen preparation sites will be strictly enforced to noise above 55 dBA in residential and human settlement areas and 70 dBA in industrial areas far from human settlements. Maintenance of machinery and vehicles should be enhanced to minimize noise. 	Contractor	DFT and consultant, with assistance from BAPEDALDA if required	Construction phase

BAPEDALDA = Environmental Impact Management Agency, dBA = decibel, DFT = design and field team, DGRI = Directorate General of Regional Infrastructure, Dinas = Provincial Sub-Project Management, HIV/AIDS = human immunodeficiency virus/acquired immune deficiency syndrome, HSM = health and safety manager, m = meter, P3JJ = road and bridge planning and management project; SDEA = Subdirectorate of Environmental Affairs

Activity/Issue	Potential Impact	Mitigation Measures	Persons to Implement	Persons to Monitor	Timing
		<ul style="list-style-type: none"> When construction is taking place less than 100 m from a village or within 150 m of sensitive areas such as hospitals, construction should be stopped from 20:00 to 06:00. This will reduce nighttime noise levels. It must be ensured that noise level in all protected area sections of the roads is kept 55 dBA during construction. 			
Water Alteration of drainage	Flooding	<ul style="list-style-type: none"> In sections along creeks and canals, earth and stones will be properly disposed of so it does not block rivers and streams and have an adverse impact on water quality and flow. All necessary measures will be taken to prevent earthworks and stone works related to the road from impeding cross drainage at rivers / streams and canals or existing irrigation and drainage systems. 'Side-borrow' sites will be used as drainage ditches and designed such that they drain into the nearest watercourse. But at a slope (e.g., <5%) permitting fine suspended materials to settle down. 	Contractor	Dinas and DFT	Construction phase
Stagnant water as insect-borne disease vector	Malaria, dengue fever, and schistosomiasis	Standing water at construction sites in tropical areas helps spread insect-borne diseases such as malaria, dengue fever, and schistosomiasis. Therefore, the contractor must implement measures to avoid such standing waters, including the removal of old materials such as used tires and storage drums. For standing water that is managed, e.g., for fish or waterfowl stocking, the owners/operators will be held responsible for insect control, and should be given information about the dangers of waterborne diseases and how to prevent them.	Contractor	Contractor environment, HSM, and consultant	Construction phase
Siltation	Sedimentation in watercourses, flooding	Construction materials containing fine particles, e.g., limestone or laterite, should be stored in an enclosure so that the particles do not drain into nearby watercourses, but rather percolate slowly into the soil. See measure for soil erosion.	Contractor	Dinas and DFT	Construction phase

BAPEDALDA = Environmental Impact Management Agency, dBA = decibel, DFT = design and field team, DGRI = Directorate General of Regional Infrastructure, Dinas = Provincial Sub-Project Management, HIV/AIDS = human immunodeficiency virus/acquired immune deficiency syndrome, HSM = health and safety manager, m = meter, P3JJ = road and bridge planning and management project; SDEA = Subdirectorate of Environmental Affairs

Activity/Issue	Potential Impact	Mitigation Measures	Persons to Implement	Persons to Monitor	Timing
Spillage of bitumen and petroleum products	Contamination of water table or surface drainage	Bitumen will not be allowed to enter stream beds and be disposed of in ditches or small waste disposal sites prepared by the contractor. Bitumen storage and mixing areas must be protected against spills and all contaminated soil must be properly handled according to Ministry of Environment or other acceptable standards. As a minimum, these areas must be contained, so that any spills can be immediately contained and cleaned up. Prior to initiating the work, the contractor will meet with the provincial BAPEDALDA to determine the proper siting of the mixing areas and the handling and management of such spills. Any petroleum products used to prepare the bitumen mixture must also be carefully managed to avoid spills and contamination of the local water table.	Contractor	Contractor environment, HSM, and consultant, with assistance from BAPEDALDA if required.	Construction phase
Spillage of fuel and lubricants	Contamination of water table or surface drainage	Vehicle maintenance and refueling should be confined to areas in construction camps designed to contain spilled lubricants and fuels. Waste petroleum products must be collected, stored, and taken to approved disposal sites, according to Ministry of Environment requirements.	Contractor	Contractor environment, HSM, and consultant	Construction phase
Construction Camp and Sanitation and Waste Disposal	Contamination of surface water	<ul style="list-style-type: none"> • Sufficient measures will be taken in the construction camps, i.e., provision of garbage bins and sanitation facilities. All toilet facilities should be at least 300 m from water sources or residences. Prior to initiating work, the contractor will present a simple sewage management plan to the SDEA and Dinas for approval. • Drinking water will meet national potable water standards. • Solid waste and garbage will be collected in bins and disposed of daily, according to a brief and basic waste management plan prepared by the contractor and approved by the SDEA and Dinas, prior to the commencement of civil works. 	Contractor	Contractor environment, HSM, and consultant	Construction phase

BAPEDALDA = Environmental Impact Management Agency, dBA = decibel, DFT = design and field team, DGRI = Directorate General of Regional Infrastructure, Dinas = Provincial Sub-Project Management, HIV/AIDS = human immunodeficiency virus/acquired immune deficiency syndrome, HSM = health and safety manager, m = meter, P3JJ = road and bridge planning and management project; SDEA = Subdirectorate of Environmental Affairs

Activity/Issue	Potential Impact	Mitigation Measures	Persons to Implement	Persons to Monitor	Timing
		<ul style="list-style-type: none"> The natural water movement (in terms of flow and volume) must be maintained. No construction camp will be within 500 m of the protected area section of the road. Care must be taken to collect solid waste daily from the protected area section of the road in TSCC. 			
Disposal of construction material	Littering	Contractors will be encouraged to recycle reclaimed asphalt pavement for village access road maintenance and to use recyclable materials as much as possible.	Contractor and village leader	Dinas, DFT, and consultant	Construction phase
Soil Soil erosion	Landslide	<ul style="list-style-type: none"> On slopes and other potentially erodible places along the road, appropriate vegetation should be planted to retard erosion. On sections with high filling and deep cutting, the slopes should be protected by a retaining wall and planted with appropriate vegetation. 	Contractor	Dinas, DFT, and consultant	Construction phase
Excavation	Loss of topsoil	<ul style="list-style-type: none"> The topsoil (15 centimeter or so) should be kept and refilled after excavation is over to minimize the impact on productive lands. It may be necessary to construct new access roads to aggregate sites, and place them through agricultural lands. These temporary roads will be made along existing farm tracks to avoid losses to agricultural lands. Contractors will be required to present proposed construction road alignments and hauling schedules for approval before construction is to commence. 	Contractor	Dinas, DFT, and consultant	Construction phase
Compaction of soil	Loss of strength	Construction vehicles should operate within the corridor of impact, i.e., approximately 9 m to either side of the carriageway centerline, to avoid damaging soil and vegetation. It is most important to avoid soil compaction around trees. Generally the rule will be to avoid driving heavy equipment or trucks anywhere into the "drip-line" of a tree (on imaginary line around a tree where rainwater falls freely to ground unimpeded by the tree's foliage).	Contractor	DFT and consultant	Construction phase

BAPEDALDA = Environmental Impact Management Agency, dBA = decibel, DFT = design and field team, DGRI = Directorate General of Regional Infrastructure, Dinas = Provincial Sub-Project Management, HIV/AIDS = human immunodeficiency virus/acquired immune deficiency syndrome, HSM = health and safety manager, m = meter, P3JJ = road and bridge planning and management project; SDEA = Subdirectorate of Environmental Affairs

Activity/Issue	Potential Impact	Mitigation Measures	Persons to Implement	Persons to Monitor	Timing
Flora Loss of trees	Deforestation	A tree-cutting and replanting scheme will be prepared within the first 4 months of the start of civil works.	Contractor	Dinas, DFT, and consultant	Construction phase
Fauna Introduction of construction workers	Intrusion of habitats and hunting animals	<ul style="list-style-type: none"> Construction workers should be advised to protect natural resources and wild animals. Hunting is strictly prohibited, especially in the protected areas. 		DFT and consultant	Construction phase
Social Environment Loss of access	Social grievances and disturbances	<ul style="list-style-type: none"> Temporary bypasses should be constructed and maintained (including dust control) during the construction period particularly at bridge crossings. A grievance redress committee must be formed in association with the City Mayor "Kepala Desa" before starting the civil works and advance notice must be given to the community about the construction schedule. 	Contractor	Dinas, DFT, and consultant	Construction phase
Traffic jams and congestion	Social upheaval	If there are traffic jams during construction, measures should be taken to relieve the congestion through better coordination between the contractor, the Provincial Transportation Department, and the police.	Contractor	Dinas and DFT	Construction phase
Road safety; collisions between vehicles, people, and livestock	Traffic injuries and fatalities	<ul style="list-style-type: none"> Control speed of construction vehicles through road safety education and fines. Allow for adequate traffic flow around construction areas. Provide adequate signage, barriers, and flag persons for traffic control. Communicate to the public through community consultation and newspaper announcements regarding the scope and time frame of projects, as well as certain construction activities causing disruptions or access restrictions. 	Contractor	Dinas, DFT, and consultant	Construction phase
Deterioration of health of workers due to poor camp conditions	Health impact	<ul style="list-style-type: none"> Make certain that drainage is good at all construction areas, to avoid creation of stagnant water bodies (including water in old tires) especially in urban/industrial areas. 	Contractor	Contractor environment, HSM, DFT, and consultant	Construction phase

BAPEDALDA = Environmental Impact Management Agency, dBA = decibel, DFT = design and field team, DGRI = Directorate General of Regional Infrastructure, Dinas = Provincial Sub-Project Management, HIV/AIDS = human immunodeficiency virus/acquired immune deficiency syndrome, HSM = health and safety manager, m = meter, P3JJ = road and bridge planning and management project; SDEA = Subdirectorate of Environmental Affairs

Activity/Issue	Potential Impact	Mitigation Measures	Persons to Implement	Persons to Monitor	Timing
		<ul style="list-style-type: none"> Provide adequate sanitation and waste disposal at construction camps. Provide adequate health care for workers and locate camps away from sensitive areas. 			
Disposal of waste construction materials	Littering of environment	All construction materials should be reused, recycled, and properly disposed of. This will become particularly important at the many small bridge replacement sites, where old reinforced concrete will need to be properly disposed of. All worn out parts, equipment, and empty containers must be removed from the site to a proper storage location designated by Dinas.	Contractor	Contractor environment, HSM, Dinas, DFT, and consultant	Construction phase
Awareness of HIV/AIDS and Sexually Transmitted Disease	Spread to the community along the corridors	<ul style="list-style-type: none"> All construction workers will be adequately trained in basic sanitation and health care issues (e.g., how to avoid transmission of sexually transmitted diseases such as HIV/AIDS). Group consultations will be held to create awareness among the community about these diseases. 	Contractor	Contractor environment, HSM, DFT, and consultant	Construction phase
Littering/polluting with solid waste and smoking	Potential forest fire	<ul style="list-style-type: none"> Awareness campaign for road users' education on the importance of preserving the protected sites. Improved road signs and awareness display boards (banning smoking, horn blowing, dumping, etc.) including information or laws about violations are recommended in the protected areas. 	Contractor	Contractor environment, HSM, DFT, and consultant	Construction phase
Protected area encroachment	Encroachment of natural habitat	<ul style="list-style-type: none"> The contractors will be encouraged to employ local labor during construction. Provision of improved roadside fence in the protected areas. 	Contractor	Contractor environment, HSM, DFT, and consultant	Construction phase
Operational Phase Air Quality Dust nuisance	Potentially moderate impact	<ul style="list-style-type: none"> Maintain and clean roads properly. Replace roadside tree lost to construction and encourage new afforestation projects. 	Local community under contract from SDEA/Dinas	Dinas and DFT	Operation phase

BAPEDALDA = Environmental Impact Management Agency, dBA = decibel, DFT = design and field team, DGRI = Directorate General of Regional Infrastructure, Dinas = Provincial Sub-Project Management, HIV/AIDS = human immunodeficiency virus/acquired immune deficiency syndrome, HSM = health and safety manager, m = meter, P3JJ = road and bridge planning and management project; SDEA = Subdirectorate of Environmental Affairs

Activity/Issue	Potential Impact	Mitigation Measures	Persons to Implement	Persons to Monitor	Timing
Air pollution	Public health	<ul style="list-style-type: none"> A consultant under an SDEA/Dinas contract with cooperation from Directorate General of Land and Communications should check emissions from diesel trucks, buses, and old vehicles regularly and force owners of ill maintained vehicles to service their automobile. Localized air pollution will be reduced due to the increasing roadside plantations. 	Consultant	Dinas and DFT	Operation phase
			Local community under contract from SDEA/Dinas	Dinas and DFT	Operation phase
Noise	Hearing hazard to residents and school students	Based on monitoring results, at places with noise violation, mitigation measures such as earth berms, densely layered plantings, wooden noise barriers, etc. should be considered.	Local community under contract from SDEA/Dinas	Dinas and DFT	Operation phase
Water Resources Contamination from spills due to traffic movement and accidents	Accidental spills of toxic material and loss of life	Contingency plans to clean up spills of oil, fuel, and toxic chemicals will be prepared by the consultant for the Government, within 1 week of the commencement of the Project.	Contractor	Dinas and DFT	Operation phase
Maintenance of storm water drainage system	Flooding	The drainage system will be periodically cleared to ensure adequate storm water flow. Local community groups under contract from Dinas will be responsible for cleaning the drainage facilities especially clearing drains, cutting grasses, clearing shrubs, etc. Employing local people will be efficient, effective, and economic, as the localized problems can be easily resolved at the early stages.	Contractor	Dinas and DFT	Operation phase
Ecological Resources Afforestation along the roads	Reduce noise level, cleaner air	The local communities will plant and maintain designated areas along the road. Token payment is recommended. A portion of the profits raised from the trees and plants (e.g., from the sale of timber) can be given to the community.	Local groups of women or landless people	Dinas and DFT	Operation phase

BAPEDALDA = Environmental Impact Management Agency, dBA = decibel, DFT = design and field team, DGRI = Directorate General of Regional Infrastructure, Dinas = Provincial Sub-Project Management, HIV/AIDS = human immunodeficiency virus/acquired immune deficiency syndrome, HSM = health and safety manager, m = meter, P3JJ = road and bridge planning and management project; SDEA = Subdirectorate of Environmental Affairs

FREQUENCY OF ENVIRONMENTAL MONITORING

Impact	Location	Means of Monitoring	Frequency of Monitoring
Construction Phase			
Sourcing of Spoil	All borrow sites. Refer to maps of borrow materials	Inspection of borrow pits	Spot checks
Soil Erosion	Along the links in West Sumatra and Kalimantan	Site inspection	Ongoing/monthly
Chemical Storage and Use	All construction camps	Site inspection	Ongoing/monthly
Construction Camp	Applied to entire project corridor; no camp inside the protected section of links 30 and 32	Site inspection	Ongoing/monthly
Surface Water Quality	Throughout project corridor and at all associated work sites	Measurement of DO, COD, BOD, SS, fecal coliforms, conductivity, turbidity, pH, oils and greases and temperature	Monthly or after pollution event
		Site Inspection	Ongoing/monthly
Dredging Spoil	Throughout project corridor at all construction sites	Analysis of benthic sediment for meals and organic content	Predredging
Dredge Water Runoff	Throughout project corridors, sites temporarily acquired, and borrow areas	Measurement of metals and SS	Monthly or after significant pollution event
Drinking Water Quality	Throughout project corridors	Measurement of DO, pH, fecal coliforms, and Fe	Monthly or after significant pollution event
Air Quality and Dust	Throughout project corridors, access roads, construction sites, and borrow areas	Measurement of dust and TSP	Monthly or after complaint
		Measurement of NO _x , SO ₂ , Pb, CO, and THC	Before construction and midway through construction
		Site inspection	Ongoing/monthly
		Inspection of aggregate, asphalt, and cement facilities.	Spot-checks

AADT = Annual Average Daily Traffic, BOD = biological oxygen demand, CO = carbon dioxide, COD = chemical oxygen demand, dBA = decibel, DO = dissolved oxygen, Fe = iron, IPK = izin pemotongan kayu (land clearing permit), Nox = nitrogen oxides, Pb = lead, pH = measure of acidity-alkalinity, SO₂ = sulfur dioxide, SS = suspended solids, THC = total hydrogen carbon, TSP = total suspended solids

Impact	Location	Means of Monitoring	Frequency of Monitoring
Noise and Vibration	Throughout project corridors, construction sites, and borrow areas	Measurement of noise dBA	Monthly or after complaint
		Consultation with the Community	Ongoing
Exploitation of Trees	Links in West Sumatra and South Kalimantan	Regulate strictly IPK (land clearing permit)	Ongoing
Health and Safety	Construction camps of entire project	Site Inspection	Ongoing/monthly
Waste Disposal	Construction camps of entire project	Inspection of waste disposal sites and construction camps	Spotchecks
Community	Entire project corridor	Consultation with community groups	Before construction/Ongoing
Compensation Plan	Entire project corridor	Site inspection (temporary disturbances, trees, crops, construction camps, etc.)	Ongoing
Socioeconomic	Entire project corridor	Poverty Reduction Monitoring Program	Twice during construction
Public Safety	Entire project corridor	Site inspection	Ongoing/monthly
Operational Phase			
Noise and Vibration	Only for links with AADT 10,000 or more	Measurement of noise dBA	Once every quarter or after a complaint for 5 years
Air Quality and Dust	Only for links with AADT 10,000 or more	Measurement of TSP, NO _x , SO ₂ , Pb, CO, and THC	Once every quarter or after a complaint for 5 years
Water Quality	Throughout project corridors, worksites, and construction camps	Measurement of DO, SS, conductivity, turbidity, pH, oils and greases, and temperature	Once every quarter or after a complaint for 5 years
Socioeconomic	Entire project corridor	Poverty Reduction Monitoring Program	Once
Tree Plantation and Nursing	ROW width of 50m plus any areas to be cleared	Site inspection	Once every 6 months for 2 years

AADT = Annual Average Daily Traffic, BOD = biological oxygen demand, CO = carbon dioxide, COD = chemical oxygen demand, dBA = decibel, DO = dissolved oxygen, Fe = iron, IPK = izin pemotongan kayu (land clearing permit), Nox = nitrogen oxides, Pb = lead, pH = measure of acidity-alkalinity, SO₂ = sulfur dioxide, SS = suspended solids, THC = total hydrogen carbon, TSP = total suspended solids

OUTLINE TERMS OF REFERENCE FOR CONSULTING SERVICES FOR STRENGTHENING CAPABILITIES IN ENVIRONMENTAL AND SOCIAL MANAGEMENT

A. Objectives

1. The objective of the services are (i) to help build the capacity and procedures of the Subdirectorate of Environmental Affairs (SDEA) of the Directorate General of Regional Infrastructure (DGRI) to analyze environmental and social impacts of road rehabilitation projects and to prepare environmental and social impact management plans in accordance with Government regulations and guidelines of funding agencies, and (ii) to provide training on environmental and social management to the provincial subproject management (Dinas) group and design and field teams. This will be done through a program of technical assistance and training over a period of 3 months.

B. Scope of Work

2. The consultant's scope of work will include the following tasks:

- (i) reviewing prevailing government regulations and guidelines of funding agencies governing the assessment and management of environmental and social impacts of road rehabilitation projects;
- (ii) identifying the procedures and tasks required to be performed by SDEA to meet the requirements of these regulations and guidelines;
- (iii) reviewing the skills available with SDEA trainers and assessing the need for advanced training to strengthen the capability to review complex environmental impact assessment problems;
- (iv) reviewing the skills of provincial subproject management, design, and field teams and assessing the need for training to establish the capability to meet environmental and social management monitoring requirements;
- (v) preparing a short-term staff training plan and associated materials to meet immediate needs;
- (vi) undertaking the training through a combination of hands-on assistance, on-the-job training, training workshops, and short-term advanced training in a training institute;
- (vii) evaluating the effectiveness of the training provided by measuring improvements in attitudes and skills achieved; and
- (viii) preparing outline proposals for the longer-term development of SDEA's organization and capabilities.

C. Organization and Staffing

3. The services are expected to be provided over a 3-month period by a small team comprising one domestic environmental, social, and poverty specialist who is also the team leader (3 person-months), and one domestic curriculum and material development specialist (3 person-months).

4. The team leader will be the training organizer, will have had a minimum of 10 years experience in training for environmental and social management of road infrastructure projects,

and must possess a relevant post-graduate degree (preferably Masters) in civil engineering/environmental management. The curriculum and material development specialist will have similar education and experience.

D. Supervision

5. The team will work in association with the SDEA trainers, reporting to the head of the subdirectorate on a day-to-day basis. Overall supervision will be by the steering committee established under DGRI's chairmanship to supervise implementation of the proposed Project as a whole.

E. Outputs

6. The team's outputs will include (i) an inception report, after month 1, reviewing SDEA's skills and training needs and setting out detailed proposals for training under the consultancy; (ii) an interim report, after month 2, with details of materials developed and training provided to date; and (iii) a draft final report, after month 3, containing a description of achievements, details of the training services provided (including all materials), an assessment of their effectiveness in meeting objectives, and recommendations for further training assistance.