PAPUA NEW GUINEA
DEPARTMENT OF WORKS AND HIGHWAYS

PREPARATORY SURVEY FOR THE PROJECT OF LANDSLIDE RISK REDUCTION ON THE KOKOPO-RABAUL COASTAL ROAD IN PAPUA NEW GUINEA

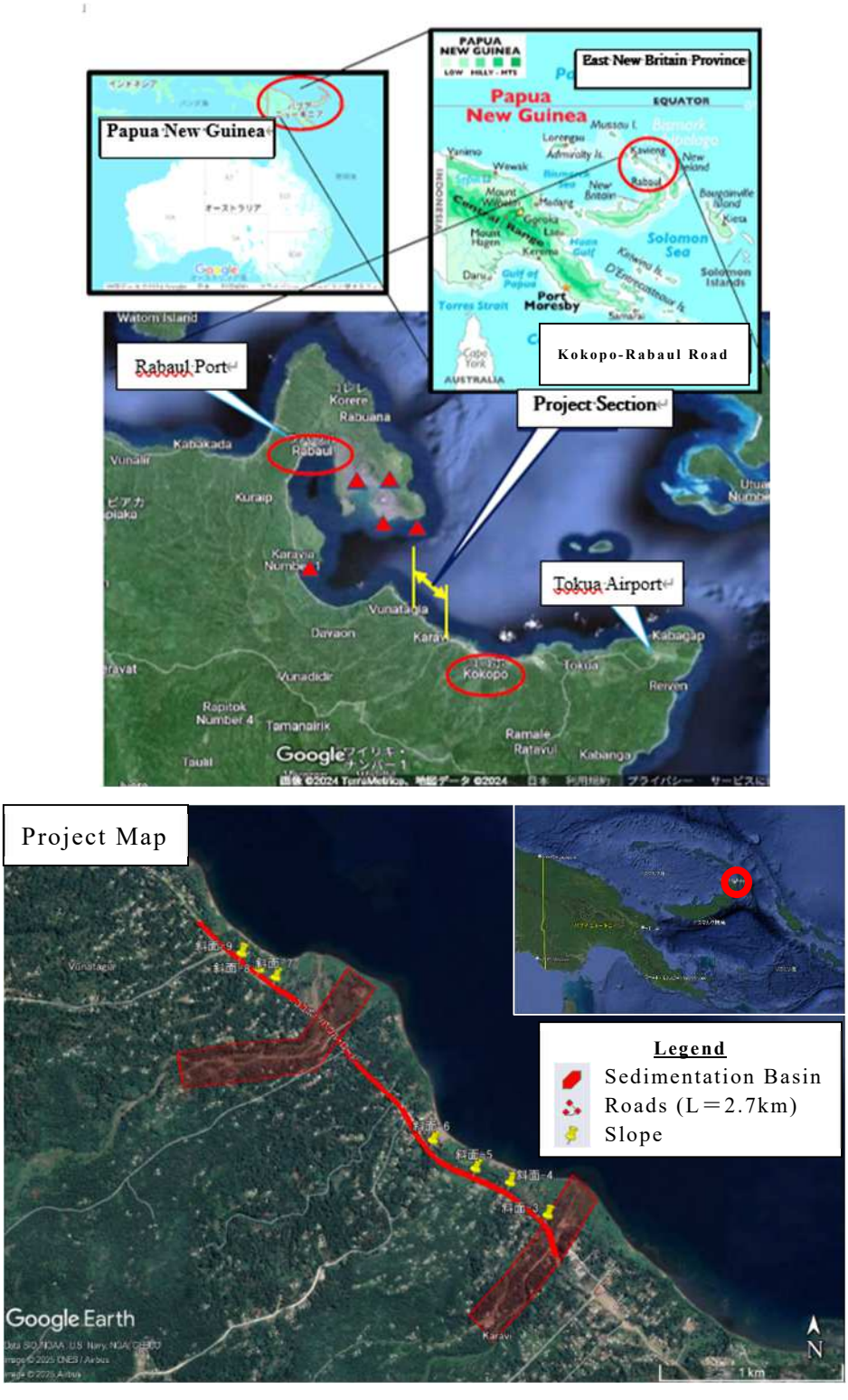
INITIAL ENVIRONMENT EXAMINATION REPORT

JANUARY 2026

JAPAN INTERNATIONAL COOPERATION AGENCY

ORIENTAL CONSULTANTS GLOBAL CO., LTD.
INGERÓSEC CORPORATION

ENRD SYSTEMS MANAGEMENTS SERVICES LIMITED



Project Location Map

Preparatory Survey for the Project of Landslide Risk Reduction and Prevention on the Kokopo-Rabaul, Coastal Road, East New Britain Province of Papua New Guinea

IEE Report (Environmental and Social Considerations)

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Acronyms and Abbreviations

AoI	Area of Influence of the project (500m)
BOD	Biochemical Oxygen Demand
C-EMP	Contractor's Environmental Management Plan
CEPA	Conservation and Environment Protection Authority
CFCs	Chlorofluorocarbons
CO	Carbon Monoxide
CO2	Carbon Dioxide
CSR	Corporate Social Responsibility
DOLPP	Department of Lands and Physical Planning
DoT	Department of Transport
DOWH	Department of Works and Highways
EA	Environmental Assessment
EC	Environmental Council
EHSS	Environmental, Health, Safety and Security
ESHS	Environment and Social Health and Safety
EIA	Environmental Impact Assessment
EIS	Environmental Impact Statement
EMP	Environmental Monitoring Plan
ENBPG	East New Britain Provincial Government
EP	Environmental Permit
FPIC	Free, Prior, and Informed Consent
GHG	Greenhouse Gases
GoJ	Government of Japan
HIV/AIDS	Human Immunodeficiency Virus/Acquired Immunodeficiency Syndrome
HSE	Health and Safety and Environment
IEE	Initial Environmental Examination
IFC	International Finance Corporation
IPP	Indigenous Peoples Plan
IRR	Inner Ring Road
ITS	Intelligent Transport System
JICA	Japan International Cooperation Agency
JICA GL	Japan International Cooperation Agency's Guideline for Environmental and Social Considerations
NO2	Nitrogen Dioxide
OGC	Oriental Consultants Global Co., Ltd
PAPs	Project Affected Persons
PEA	Preliminary Environmental Assessment
PER	Preliminary Environmental Report

PEMP	Provisional Environmental Management Plan
PH	Public Hearing
PNGFA	PNG Forestry Authority
PPEs	Personal Protection Equipment
PPV	Peak Particle Velocity
RAP	Resettlement Action Plan
ROW	Right of Way
SDGs	Sustainable Development Goals
SO2	Sulphur Dioxide
VG	Valuer General
VOCs	Volatile Organic Compounds
WMAs	Wildlife Management Areas

CHAPTER 1. Executive Summary

1.1 CHAPTER 1: Introduction

The Japan International Cooperation Agency (JICA), in partnership with the Department of Works and Highways (DOWH) in PNG, seeks to upgrade the 2.4 km section of the Kokopo – Rabaul Coastal Road between Butuwin Health Centre at Kokopo and Ranguna Plantation of East New Britain Province. The core component of this road upgrading project involved appropriate civil works and engineering design to prevent and minimize landslides and direct deposition of silt and flooded materials and debris onto the road preventing access. It was reported that, flooding has been inevitable during heavy rain and has affected the road access for transportation and business between Kokopo and Rabaul.

This section has experienced prolonged flooding and land slippage during rainy season causing heavy silt and sediment deposition on the main road, nearby villages and gardens and also burying 2 bridges 3 blocking culverts. The fine sandy loam washed off from the hilly hinterland flow down with high energy turbidity during heavy rain and settles on low the lying villages, gardens and cover the roads and bridges. Over time the deposited loamy silt dries up and when disturbed by moving vehicles, creates dusts particles causing localized air pollution.

The Department of National and Provincial Works and Highways have carried out road maintenance work on the same segment of the road currently under investigation some year ago. According to local and state eyewitnesses, a single day of heavy rainfall caused significant landslides and flooding. The resulting sediment buildup covered recently completed roadwork.

1.2 Project Background and Objectives

The Kokopo to Rabaul coastal road has been treated as high economic valued and priority infrastructure development that connected Kokopo and Rabaul townships, accessing government services, hospitals, educational institutions and economic opportunities like exporting export products like cocoa, copra, balsa and other SME products.

The 2.4km road maintenance project starts from Butuwin Health Headquarters through to the Ranguna Plantation within the Kokopo District of East New Britain Province is part of the 25km Kokopo Rabaul Coastal Road. The 2.4km segment of the road has been highly prone to flooding and landslide. There were two seasonal rivers; Karavi and Raguna with a few small drainages that carried the silt and sediment load flooding the low-lying gardens, villages and covered the Kokopo Rabaul Road. Apparently, this road was a strategic old road for trade and for public used, built before the 2nd World War (1942).

This project was initiated by the East New Britain Provincial Administration and submitted to the National Government through the Department of Works and National Highways for funding through the National Government's Annual Budget under the Public Investment Programme (PIP). The Department of Works and Highways (DOWH) has approached JICA for possible joint-funding with the PNG National Government and Japan. JICA has considered this proposal to be genuine and important for the two towns for business, trade and service delivery.

DOWH is working on the PIP funding and incorporate this project in the Department's Budget Submission for funding through the 2026 National Budget. In the meantime, JICA is funding relevant technical surveys, public consultation and project design. The Department of Works and Highways cooperating with JICA with the preliminary studies and works and also preparing a PIP submission for the project to be included in the National Budget for 2026.

JICA contracted Oriental Consultants Global Co. Ltd to carry out all technical investigation, survey and project design including the environmental impact studies. The Contract has mobilized and has dispatched a survey team to conduct a preparatory survey, including site surveys, outline design, and

cost estimation, under the Japanese Grant scheme to ascertain the viability of the proposed intervention. To provide context and insights into the potential environmental impact of the proposed project, an Initial Environmental Examination (IEE) was conducted by Oriental Consultants Global Co. Ltd in association with a local sub-contractor consultant company (ENRD Systems Management Services Limited adhering) to the Environmental Regulations 2002 of the Environment Act 2000, Conservation and Environment Protection Authority of PNG and JICA's Environmental Guidelines and

ENRD has used the field data and environment impact studies to prepare an Environment Permit document following specific guideline in conformity with the New Environment Act 2000 and the Environmental Regulation 2002. To meet JICA Requirement and the IEE Guidelines, the same information are here presented.

1.2.1 Need for the Project

The project is essential to address significant deposition of eroded silt materials and debris caused by heavy flooding and landslide during heavy raining flowing downhill from the hinterland hills and ridges. The silt sediments and other wash off debris load from the rivers and drains restrict access of the Kokopo Rabaul Coastal Road.

1.2.2 Applicable Legislation and Standards

This IEE has been prepared in accordance with national legislations, policies and institutional frameworks relevant to this IEE as well as JICA Guidelines for Environmental and Social Considerations (January 2022) and applicable international requirements and good international industry practices. The legislations applied include Environment Act 2000 and Environment Regulation 2002. Chapter 1.4 of this document is dedicated to the discussions on the applicable frameworks and their relevance to the IEE.

1.2.3 IEE Methodology

In accordance with the Environment Act 2000 and the Environmental Regulations 2002, this kind of activity falls under Level 2B, Sub-Category 13.2. Thus, this documentation was prepared following the prescribed guideline set by Conservation and Environment Protection Authority for a Level 2B Environment Permit Application. The document details the corresponding environmental impacts (adverse and useful) on the social, biological and the physical environment and mitigatory measures that will be put in place to minimize adverse environmental harm. Despite the category given above, existing national road's civil works that will be put into this exercise shall include construction of the water retention ponds upstream, landslide prevention wall, road surfacing materials and consider raising the bridges and road to allow free flow slit and solid wastes. The engineer designs are currently being considered to assess the significant environment consequences that required standard engineering designs and project implementation.

The IEE for the project, conducted per PNG's Environmental Assessment Regulations and JICA Guidelines, involved field inspections, literature reviews, specialist studies, and stakeholder consultations. The team also assessed potential impacts on the environment, social structures, and cultural sites, including resettlement effects on Project Affected Persons (PAPs). Various stakeholders were engaged to incorporate both technical and local feedback into the assessment. Risks were also evaluated based on severity and likelihood using scientific measurements and professional judgment. Mitigation strategies were proposed to avoid, reduce, or compensate for adverse effects and Environmental Management and Monitoring Plans (EMMPs) were developed.

1.3 CHAPTER 3: Project Description

1.3.1 Project Description

This Environment Permit Application covers environmental impacts and mitigative measures for the proposed 2.4km portion of the Kokopo Rabaul coastal road. This section has experienced prolonged flooding and land slippage during rainy season causing heavy silt and sediment deposition on the main

road, nearby villages and gardens and also burying 2 bridges 3 blocking culverts. The fine sandy loam washed off from the hilly hinterland flow down with high energy turbidity during heavy rain and settles on low the lying villages, gardens and cover the roads and bridges. Over time the deposited loamy silt dries up and when disturbed by moving vehicles, creates dusts particles causing localized air pollution.

The project spans from the Butuwin Hospital (GPS Coordinates of Lat.-4.325096 and Long: 152.240979) to Kuradui Junction (-4.310717 lat, 52.225360 long.)

1.4 CHAPTER 4: Environmental and Social Baseline

This chapter provides an overview of the existing physical and biological baseline characteristics of the project area, including climate and weather, ambient air quality, noise, geology and soil, relief and drainage, hydrology, climate change risks, vegetation, biological resources, fauna, and ecosystem services. Additionally, it covers the socio-economic conditions such as demography, education, religion, health, and livelihoods, as well as land use patterns, cultural heritage, traffic conditions, and utility services related to the project area.

1.4.1 Physical Environment

The project area, located along the Karavi-Kuradui road corridor, sits at a low elevation (2–6m asl) on undulating volcano-alluvial plains. The region experiences an equatorial climate with a wet season from December to April and a dry season from May to November.

・ **Air & Noise:** Ambient air quality is generally clean, though occasionally influenced by volcanic emissions (PM 2.5 >6μg/m3) and vehicle exhaust. Noise levels are currently low, generated primarily by passing traffic.

・ **Soil:** The area features porous, fertile volcanic ash soils (Eutrandepts and Vitrandepts). While fertile, these soils are susceptible to erosion during heavy rainfall.

1.4.2 Biological Environment

・ **Ecosystem Status:** The project area is highly disturbed, having been cleared for coconut and cocoa plantations over 80 years ago. Consequently, the original natural biodiversity has been largely diminished.

・ **Protected Areas:** There are no designated conservation areas or protected sites within the project corridor. The nearest protected site, Nanuk Provincial Park, is approximately 12 km away, and the Kerevat-Toma Key Biodiversity Area (KBA) is 10 km away,.

1.4.3 Social Environment

・ **Land Use & Ownership:** The road traverses the Malapao Copra Plantation, which is Free-Hold State Lease Land. Unlike customary land, this status minimizes complexities regarding land ownership and acquisition.

・ **Socio-Economic Conditions:** The area serves as a mix of residential settlements and plantation blocks. The local economy is driven by trade, services in Kokopo town, and agriculture (cocoa, copra). The population has access to essential services such as the Butuwin Health Centre, schools, and utilities.

1.5 CHAPTER 5. Policy, Legal, and Administrative Framework

1.5.1 Environmental and Social Consideration Systems and Organizations in Papua New Guinea

This chapter outlines the legal and institutional framework governing environmental management for the project. The primary legislation is the Environment Act 2000 and the Environment Regulation 2002, managed by the Conservation and Environment Protection Authority (CEPA). The project is also consistent with the Climate Change (Management) Act 2015 and the Department of Works and

Highways (DOWH) Safeguard Policy 2019.

Project Categorization: Under the Environment (Prescribed Activities) Regulation 2002, this road and bridge maintenance project is classified as a Level 2 (Category B), Sub-Category 13.2 activity (Construction of new national roads or other infrastructure). This requires an Environmental Permit but does not automatically require a full Environmental Impact Statement (EIS) unless deemed necessary by CEPA.

Gap Analysis with JICA Guidelines: The IEE was prepared in accordance with JICA Guidelines for Environmental and Social Considerations (January 2022). A comparative analysis confirms that PNG's legal system generally aligns with JICA Guidelines regarding impact assessment, mitigation hierarchy, and public consultation. The project is classified as Category B under JICA guidelines as the adverse environmental impacts are not considered significant.

1.6 CHAPTER 6 Project Alternatives

Two alternatives were considered for the project in CHAPTER 6. The "No Project" scenario and the project development scenario. Upon careful analysis of the alternatives' pros and cons, the project development scenario is the preferred alternative as its benefits significantly outweigh those of the "No Project" scenario.

This chapter evaluates two primary scenarios: the "No Project" (Zero Option) and the "Project Implementation" option.

・**"No Project" Option:** This scenario assumes the status quo is maintained. It was rejected because the current road lacks the capacity to handle increased traffic and is frequently blocked by flooding and silt deposition during heavy rains, hindering access to business areas and essential services.

・**"Project Implementation" Option (Preferred):** This option involves widening the road to two lanes, raising the road level by one meter, constructing new bridges over the Karavi and Ranguna rivers, and installing sediment retention ponds.

Analysis Results: The "Project Implementation" option is preferred because its benefits—such as improved traffic efficiency, reduced emissions through smoother traffic flow, and resilience to natural disasters—significantly outweigh the disadvantages of construction costs and temporary environmental impacts. Additionally, specific low-cost disaster prevention measures for bridges (e.g., riverbed stabilization and sediment ponds) were adopted to minimize risks.

1.7 CHAPTER 7: Scoping

1.7.1 Scoping Results

Scoping was conducted based on JICA Guidelines to identify potential environmental and social impacts. The results are summarized in the Scoping Matrix (Table 7.1-1).

・**Pollution:** Potential impacts such as Air Pollution (Rating B-), Waste (B-), and Noise/Vibration (B-) were identified, primarily occurring during the construction phase due to heavy machinery and earthworks.

・**Natural Environment:** Impacts on the ecosystem are rated as C (Unknown/Minor) because the road corridor is already highly disturbed, and no protected areas are directly affected.

・**Social Environment:** Issues such as Local Economy/Livelihood (B-/+) and Social Infrastructure (B-) were identified due to potential traffic disruptions and temporary access restrictions during construction. No involuntary resettlement of houses is expected, though some small structures and crops may be

affected.

1.7.2 TOR for Environmental and Social Survey

Based on the scoping results, the Terms of Reference (TOR) for the survey were established (Table 7.2-1). The survey includes on-site measurements for Air Quality (PM 2.5 ,PM 10), Water Quality (pH, SS, etc.), and Noise, as well as a Biodiversity Assessment (200m along the road) and Social Surveys (RAP survey) to confirm the extent of impacts and necessary mitigation measures.

1.8 CHAPTER 8: Result of Site Survey Based on Scoping

1.8.1 Environmental Survey Results and Forecasts

Based on the scoping in Chapter 7, detailed field surveys were conducted to establish baseline data and predict future impacts.

· Air Quality:

Baseline: Measurements at four sites (including a hospital and church) showed that parameters like PM 2.5 , PM 10 , and SO2 are within IFC Guidelines and Japanese Environmental Standards.

Forecast (2039): Predictions indicate that future concentrations during the operation phase will remain within IFC guidelines, resulting in negligible impact.

· Noise Levels:

Baseline: Monitoring at four locations revealed that noise levels at the Butuwin Bus Stop exceeded Japanese roadside standards, and levels at the United Church exceeded IFC residential standards due to existing local activities.

Forecast (2039): Future noise levels are predicted to remain within IFC standards or increase by less than 3 dB compared to the baseline, which is considered a minor impact. As the standard is already exceeded, the +3dB rule is applied and it is determined to be compliant.

· Water Quality:

Baseline: Measurements of pH, turbidity, and other parameters at five locations (wells, river, sea) showed no extreme values, indicating no significant current pollution.

· Ecosystem Assessment:

Flora: The vegetation consists mainly of secondary regrowth and exotic species (e.g., coconut, cocoa, weeds) typical of disturbed plantation environments. No rare or endemic plant species were recorded in the corridor.

Fauna: Animal diversity is low. Common species include the House Rat, Spiny Rat, and birds like the Bismarck Crow and Rainbow Lorikeet. No threatened species were observed directly in the project footprint.

• Social Aspects (Gender):

◦ **Findings:** Women in the area rely heavily on walking to access markets for their livelihoods.

◦ **Impact:** Construction activities could restrict market access and pose safety risks (e.g., harassment).

◦ **Mitigation:** The report recommends implementing a "Code of Conduct" for workers, creating employment opportunities for women, and establishing a Grievance Redress Mechanism (GRM) to ensure safety and economic stability.

1.9 CHAPTER 9: Impact and Risks Assessment and Mitigation Measures

Impacts were identified and evaluated across scoping, preconstruction, construction and operation stages. The Leopold Matrix was used to visualize the relationship between impacted items according to JICA 's GL and project factors for the scoping followed by the development of the TOR impact to guide the impact evaluation. While specific details are not available at the feasibility stage (F/S), this chapter outlines the expected impacts, survey methodologies, forecasts, risk assessment and draft mitigation measures.

1.10 CHAPTERS 10: Environmental Management and Monitoring Plan (EMMP)

Following the evaluation of impacts, mitigation measures have been developed as part of the IEE which will be integrated into both the project design and execution phases, aiming to enhance project opportunities.

An Environmental Management Plan (EMP) and a monitoring plan have been developed under the Environmental Assessment Regulations of 2002 of the Environment Act 2002. This plan ensures that the road upgrade and the landslide prevention civil works and silt retention structures are constructed in an environmentally safe and sustainable manner.

1.11 Decommissioning Plan(in Chapter 10)

All decommissioning activities are governed by the Environment (Amendment) Act a post-project closure plan, including a timeline and cost estimates, will be periodically reviewed with the relevant regulatory authorities like CEPA, DoWH, and ENBPG through the Division of Lands and Physical Planning in the province. The estimated cost for implementing environmental and social risk management during the decommissioning of the construction site at Karavi and Ranguna will be incorporated into the project cost.

1.12 CHAPTER 11: Stakeholder Consultation

In accordance with JICA Guidelines for Environmental and Social Considerations (January 2022) and Section 12(k) of the Environmental Assessment Regulation, Environment Act 2000), which mandates the consultation of the members of the public likely to be affected by Project undertakings for project information disclosure, and stakeholder opinion and inputs into the project, several stakeholder engagements were undertaken during the preparation of the IEE document. During the preliminary engagement, we had two main stakeholders being consulted; the statutory agencies and the local communities. Statutory agencies included Department of Works and Highways (DOWH), Conservation and Environment Protection Authority (CEPA), the East New Britain Provincial Administration. The local community consultation meeting included local landowner communities who own and occupy parcels of traditional land belonging to tribal villages and armlets. The purposes of these meetings were basically sharing information on the project's technical and socio-economic implications of the project and, of course, outline the environmental consequences and management strategies to minimize adverse effects from civil works construction when implementing the project.

These involved stakeholders from relevant government ministries and agencies, local government authorities, project-affected persons, residents, organized community groups and vulnerable populations. Stakeholder engagement is a continuous process throughout project implementation and a Stakeholder Engagement Plan (SEP) has been integrated into the IEE document to support this process. Chapter 11 of the report focuses on discussions on stakeholder engagements.

1.13 Conclusion and Recommendations

JICA acknowledges the Environment Act 2000 and Environment Regulations 2002 and commits to compliance. This Initial Environmental Examination Report (IEE) identifies and assesses the environmental and social impacts of the Kokopo Rabaul Landslide Prevention and Road upgrade project. Extensive stakeholder consultations, literature reviews, and field studies informed the mitigation measures and management plans to ensure high environmental protection. JICA aims for sustainable environmental management and public health and safety. The project is expected to create employment, improve traffic flow, and boost local and national economies.

The IEE's recommendations will enhance the project's environmental and social soundness, aligning with national and international laws and JICA regulations.

CHAPTER 2. Project Background and Objectives

2.1 Introduction

2.1.1 Background

The Kokopo to Rabaul coastal road has been treated as high economic valued and priority infrastructure development that connected Kokopo and Rabaul townships, accessing government services, hospitals, educational institutions and economic opportunities like exporting export products like cocoa, copra, balsa and other SME products.

The 2.4km road maintenance project starts from Butuwin Health Headquarters through to the Kuradui Plantation within the Kokopo District of East New Britain Province is part of the 25km Kokopo Rabaul Coastal Road. The 2.4km segment of the road has been highly prone to flooding and landslide. There were two seasonal rivers; Karavi and Ranguna with a few small drainages that carried the silt and sediment load flooding the low-lying gardens, villages and covered the Kokopo Rabaul Road. Apparently, this road was a strategic old road for trade and for public used, built before the 2nd World War (1942).

This project was initiated by the East New Britain Provincial Administration and submitted to the National Government through the Department of Works and National Highways for funding through the National Government's Annual Budget under the Public Investment Program (PIP). The Department of Works and Highways (DOWH) has approached JICA for possible joint-funding with the PNG National Government and Japan. JICA has considered this proposal to be genuine and important for the two towns for business, trade and service delivery.

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ENRD has used the field data and environment impact studies to prepare an Environment Permit document following specific guideline in conformity with the New Environment Act 2000 and the Environmental Regulation 2002. To meet JICA Requirement and the IEE Guidelines, the same information are here presented.

2.1.2 JICA Survey Team's Profile

The Japan International Cooperation Agency (JICA) has commissioned a survey team for the "Preparatory Survey" for the Kokopo Rabaul Road Landslide Prevention Project in East New Britain, PNG. This survey team comprises three Japanese consulting firms: OC Global Limited, another company and local subcontractor (ENRD Systems Management Services Limited) of PNG. The team was dispatched to East New Britain, PNG following a request for cooperation from the Government of Papua New Guinea (GoPNG) to the Government of Japan (GOJ). As the leader of the JICA survey team, Oriental Global Consultants Co. Ltd, profiles and documents environmental commitments.

Objective of the Survey

The objectives of the JICA Survey Team's mission are aimed at formulating the Project subject to the Japanese Grant Scheme. The mission is intended to achieve the following:

- Conduct an engineering survey and environmental and social survey in Kokopo.
- Collect data and information necessary for the project's appraisal and outline design.
- Perform the outline design.
- Determine the project scope in collaboration with PNG counterparts considering the budget constraint of the Japanese Grant.

The outline design and cost estimation will consider the project background, project scale, project effect, labor and material costs in PNG as well as technological and economic validity. Also, the tentative scope proposed in the data collection survey is as follows;

- outline design for road upgrade is approximately 2.4km from Butuwin to Kuradui village.
- outline design of road ancillaries (drainage facility, traffic safety facility, Intelligent Transport facility etc.)

The main objectives involved in embarking on the upgrade and maintenance work of Project in Kokopo district are:

- Connect to access Kokopo District with Rabaul District as a vital economic corridor market, export, government services
- Alleviate village poverty and improve health and general lifestyle of the Kokopo District.
- To assist eradicate law and order problems within the district to allow free movement and trade amongst all villages and plantations in the district.
- To boost economy growth through establishing SME and grow the internal rural.
- To compliment Kokopo District, Provincial and the National Government's economic development goals and objectives on "Connect PNG" and establishment of economic corridors.

2.1.3 Purpose and Objectives of Undertaking

The purpose and objective of this project are to address excessive and uncontrolled flooding, landslide and increased silt and sediment load flowing downhill into the lowland covering Kokopo Rabaul Coastal Road and sabotaging its accessibility.

This section has experienced prolonged flooding and land slippage during rainy season causing heavy silt and sediment deposition on the main road, nearby villages and gardens and also burying 2 bridges 3 blocking culverts. The fine sandy loam washed off from the hilly hinterland flow down with high energy turbidity during heavy rain and settles on low the lying villages, gardens and cover the roads and bridges. Over time the deposited loamy silt dries up and when disturbed by moving vehicles, creates dusts particles causing localized air pollution.

The Department of National and Provincial Works and Highways have carried out road maintenance work on the same segment of the road currently under investigation some year ago. According to local and State eye witnesses stated that a one-day heavy rainfall caused significant land slippage, flooding with increased sediment load covered the newly maintained road works. The Kokopo to Rabaul coastal road has been treated as high economic valued and priority infrastructure development to connect the Kokopo and Rabaul townships, accessing government services, hospitals, educational institutions and economic opportunities like exporting export products like cocoa, copra, balsa and other SME products.

The 2.4km road maintenance project starts from Butuwin Health Headquarters through to the Ranguna Plantation within the Kokopo District of East New Britain Province but is part of the 25km Kokopo Rabaul Coastal Road which became highly prone to flooding and landslide.

This report has been prepared following a Initial Environmental Examination (IEE) for Kokopo Rabaul Coastal Road Landslide Prevention Project. This project requires an environmental permit in accordance

with the Environment Regulation 2002. A draft Environment Permit Application for CEPA has been prepared by the local subcontractor. The IEE aligns with JICA's Guidelines for Environmental and Social Considerations (January 2022), ensuring compliance with the laws, standards, and plans of the host country. Based on CEPA's Environmental Regulation 2002, this project is a categorized as a Level 2 activity. The project's Environment Permit Application has been prepared following the specific Guidelines provided by the Conservation and Environment Protection Authority (CEPA). Refer to attachment of the EP Application Guidelines.

This report will provide additional information from JICA to give confidence and support to the Environment Permit Application documentation that the project has complied with both local and international environmental and social standards.

2.1.4 Relevant Institutional, Policy, Legal and Regulatory Framework

This section summarizes the national and international institutional, policy, legal and regulatory frameworks that apply to the project.

The proposed activity is very consistent and compatible with various development policies of the three tier Governments in PNG. For example:

- The National Government's thrust to promote Connect PNG with road Networks and Promote Economic Development in PNG.
- Provincial Government's Policy on Economic Growth.
- Local Level Government's policy on rural development and people empowerment and self-reliant on rural economic growth.
- Kokopo District Development Authority's Economic Development and Kokopo-Rabaul Road Network Project Agenda
- The National Government's policy to alleviate poverty and promote food security programs.

Comparison of JICA Guidelines on Environmental and Social Considerations in EIA Procedures and the PNG Legal System

2.1.5 IEE Methodology

This section provides a summary of the approach adopted for the Initial Environmental Examination (IEE) as provided in the Environmental Regulations 2002 and JICA Guidelines for Environmental and Social Considerations. In comparison, both the JICA GL and the PNG Environment Regulation 2002 methodologies generally align strongly. Therefore, the approach and methodology adopted for the study included:

- Field inspections and trekking;
- Review of available literature and legislation;
- Specialist studies for baseline information;
- Stakeholder Consultations; and
- Impact analysis and reporting

2.1.5.1 Field Inspections

The IEE team undertook site inspections along routes connecting to the corridor to confirm baseline environmental and social issues and conditions that are likely or will be affected by the project implementation. This included an assessment of environmental, social, and culturally sensitive sites and the extent of resettlement of Project Affected Persons (PAPs) whose properties/ assets may be impacted adversely during the construction phase of the project.

2.1.5.2 Specialist Studies/ Detailed Assessments

The detailed assessment process included additional desk study combined with independent field surveys and computer modelling where appropriate. They covered biodiversity and ecosystem assessment within the project corridor (20m) road, the road corridor's ambient noise, air and vibration monitoring, cultural heritage assessment; socio-economic baseline survey and stakeholder consultations.

2.1.5.3 IEE Team

The Initial Environmental Examination (IEE) for the project was undertaken by a team of Independent Consultants from ENRD Systems Management Services Limited. Table 2.1-1 provides details of the team members responsible for this IEE Report.

Table 2.1-1 Team Composition

Name	Position	
Leo Mandeakali	Team Leader (EIA Expert) Environmental Consultant	
Prof Pius Piskaut	Specialist (Natural Environment and Ecologist)	
Ms Joyce Linge	ENBPG Lands Office	RAP and Social Survey
Mr. Peter Utlage	ENBPG Lands Office	RAP and Social Survey
Mr. Berson Paulias	ENBPG Lands Office	RAP and Social Survey
Mr. Jonah Penias	ENBPG Lands Office	RAP and Social Survey

Source: Prepared by JICA Survey Team

2.2 Impact and Risk Assessment And Mitigation Measures

This chapter outlines key impacts related to the project's Initial Environmental Examination.

The 2.4km Kokopo Rabaul Landslide Prevention Project is a stand-alone project, strategically identified along the Kokopo Rabaul highway to address an ongoing impediment of the free access of the Kokopo Rabaul Coastal Road. There were occasional landslide and floodings that has significantly affected the free access of that section of the road. This proposal is economically a strategic intervention from the DWH (PNG National Government) and JICA to ease access between Kokopo and Rabaul towns under the National Government's Connect PNG Infrastructure and Economic Policy.

CHAPTER 3. Description of the Project

3.1 Project Description and Alternatives

This section describes the Project in terms of its location and sphere of influence, scope, components, and project alternatives, as well as the intended activities during both the construction and operation phases. Apparently, there are no alternative routes for this proposed road upgrade and civil works to prevent landslide and minimize flood effects on the current Kokopo Rabaul Coastal Road. There is minimal vegetation cover to be cleared and is vividly understood by traditional tribal and clan representatives. The landowner or the general community welcomed the roads with open arms and with much gratitude. All landowner public consultations have been comprehensively recorded. There was overwhelming support from the political hierarchy, DOWH, ENBPG, Kokopo District Local Level Government.

3.1.1 Project Location

The Kokopo –Rabaul coastline road was built in 1910 by the colonial masters. Over last century, this road was maintained using gravel as surfacing material and maintained it as one of the province's main highways linking Kokopo and Rabaul. However, in 2011, a 2km road was specifically sealed in Gelagela under the District Services Improvement Program (DSIP) and then another 10km road was sealed in 2018 through to Kokopo from Rabaul, funded by the East New Britain Provincial Government. Now the 2.4km section of the Kokopo Rabaul coastal road is from Butuwin (Lat.-4.325096 and Long: 152.240979) to Kuradui (-4.310717 lat, 52.225360 long.).

This section of the road needed urgent maintenance or change of structure and design for the Karavi and Ranguna rivers that experience heavy floods that devastated the gardens and covering the main road and the two bridges. This road is a very important road link for Kokopo and Rabaul for a lot of reasons. The proposed project is a strategic invention by the PNG and Japanese governments funding so that the up graded road and bridges shall sustain future heavy rainfall that forms heavy floods causing big damage to the road, bridges, gardens and houses along the Kokopo Rabaul Road.

3.1.2 Project Description

This project was proposed and initiated by the East New Britain Provincial Government through the Kokopo Open member's request to carry out civil earth works and road maintenance and reconstruct Karavi and Ranguna rivers that span 2.4 km from Butuwin to Kuradui. along the Kokopo Rabaul Coastal Road. The road access has been affected by heavy disposition of silt, sediment and plant debris eroded downhill from the two rivers and several adjoining drainages and surface runoff during heavy rain. The provincial government has caried out routine maintenance work to access the Kokopo Rabail but the road and lowland gardens and villages have been under uncontrolled flooding.

This project proposal would investigate the main causes and design appropriate landslides prevention ponds and other measures to minimize the surface runoff. It was observed during our field investigation, that landslides and the increasing silt and sediment load flow downhill into the two main gorges and other small drainages coupled with surface runoff during heavy rainfall that has impacted the Kokopo Rabaul Coastal Road from easy access for business, trade and access to social and government services. This road maintenance and bridge construction project will sustain the road linkup from Kokopo township with Rabaul town and the Simpson Harbour which is the main wharf point for exports of commodity crops and other products and imports of goods and equipment for various social and economic development activities in East New Britain Province.

3.1.3 Rationale

Road Network and Connect PNG are important Government Policies which is also being reflected in the Kokopo District's development Policy spearheaded by Hon. Ereman ToBaining MP and the East New Britain Provincial Government and Administration. They envisaged that Kokopo District should be sustainably linked and connected with improved road connection between Kokopo and Rabaul towns

without impediments by natural disaster, let alone flooding and silt laden deposition covering the road and the bridges.

This envisagement propelled them to carry out various technical studies which led them to compile a very comprehensive project proposal for funding under the Connect PNG Policy to the Department of Works and Highways (DWH).

The project was approved by DOWH and JICA has proposed to co-fund the project, thus this current environmental investigation with other engineering studies.

3.1.4 Project Components

3.1.4.1 Road Works

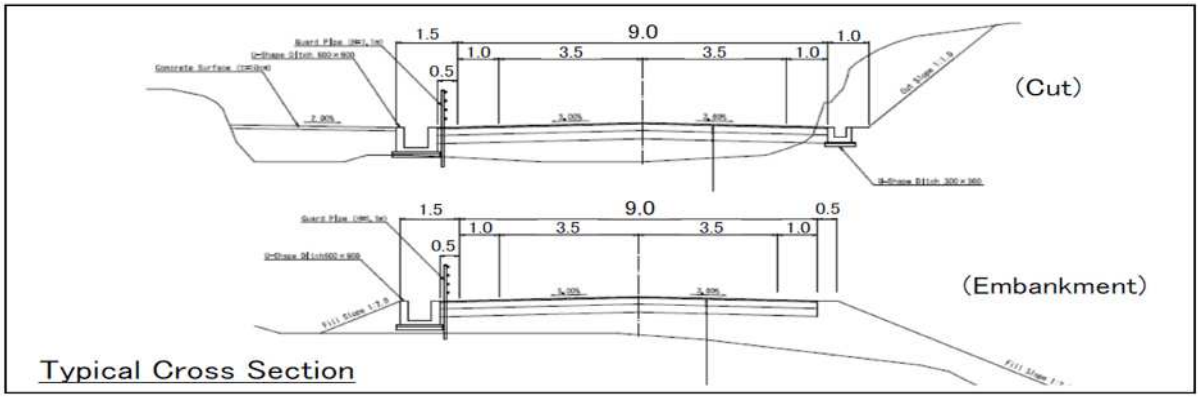
(1) Road Alignment Conditions

- The road centerline will be established along the existing road centerline.
- However, to reduce the volume of cut, the centerline will be offset 2.0 m toward the seaward side at sections adjacent to hill slopes.
- The longitudinal gradient will generally follow the existing conditions, with adjustments made as necessary according to the overall drainage plan.
- Treatment of the slope edges will be considered separately.

Table 3.1-1 Road Design Parameters

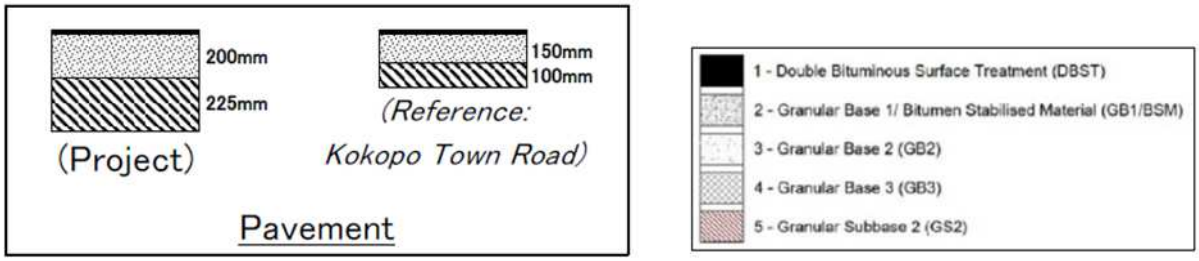
Parameter	Unit	Design Value	Remarks
Carriageway width	m	3.5 × 2 = 7.0	Set based on the forecasted AADT of 4,375 in 2049 (Manual Tab.4.9)
Shoulder width	m	1.0 × 2 = 2.0	Although the Manual specifies 2.5 × 2 = 5.0 m, the Australian standard has been applied as it is, and since the same is not adopted for Kokopo urban roads, the existing shoulder width is used.
Standard crossfall	%	Carriageway: 3.0 Shoulder: 3.0	Manual (Tab.4.6, Tab.4.12)
Maximum crossfall	%	7	Manual (Tab.4.48)
Longitudinal gradient	%	Exceptional: 8.0 General: 6.0	Manual (Tab.4.55)
Minimum horizontal curve radius	m	71.0	Manual (Tab.4.46)
Minimum curve length	m	100.0	Manual (Tab.4.47)
Widening on curves (per lane)	m	Radius = 71 → 1.03 71 < Radius ≤ 80 → 0.91 80 < Radius ≤ 90 → 0.81 90 < Radius ≤ 100 → 0.71 100 < Radius ≤ 120 → 0.63 120 < Radius ≤ 140 → 0.56 140 < Radius ≤ 160 → 0.49 160 < Radius ≤ 180 → 0.42 180 < Radius ≤ 200 → 0.35 200 < Radius ≤ 250 → 0.29 250 < Radius ≤ 300 → 0.23	Manual (Tab.4.52)

Source: Prepared by JICA Survey Team



Source: Prepared by JICA Survey Team

Figure 3.1-1 Typical Cross-Section



Source: Prepared by JICA Survey Team

Figure 3.1-2 Typical Pavement Cross Section

3.1.4.2 Bridges Works (2 locations: Karavi, Ranguna)

Table 3.1-2 Bridge Design Load Conditions shows the bridge design load conditions.

Table 3.1-2 Bridge Design Load Conditions

Parameter	Standard
Dead load	Japan Industrial Standards (JIS)
Live load	Guideline of culvert works (Japan Road Association)
Wind load	Not considered.
Temperature	Guideline of culvert works (Japan Road Association) Design guidelines Part-2: Culvert works (Nippon Expressway Company Limited)
Seismic load	Specifications for highway bridges Part-5: Seismic design (Japan Road Association)

Source: Prepared by JICA Survey Team

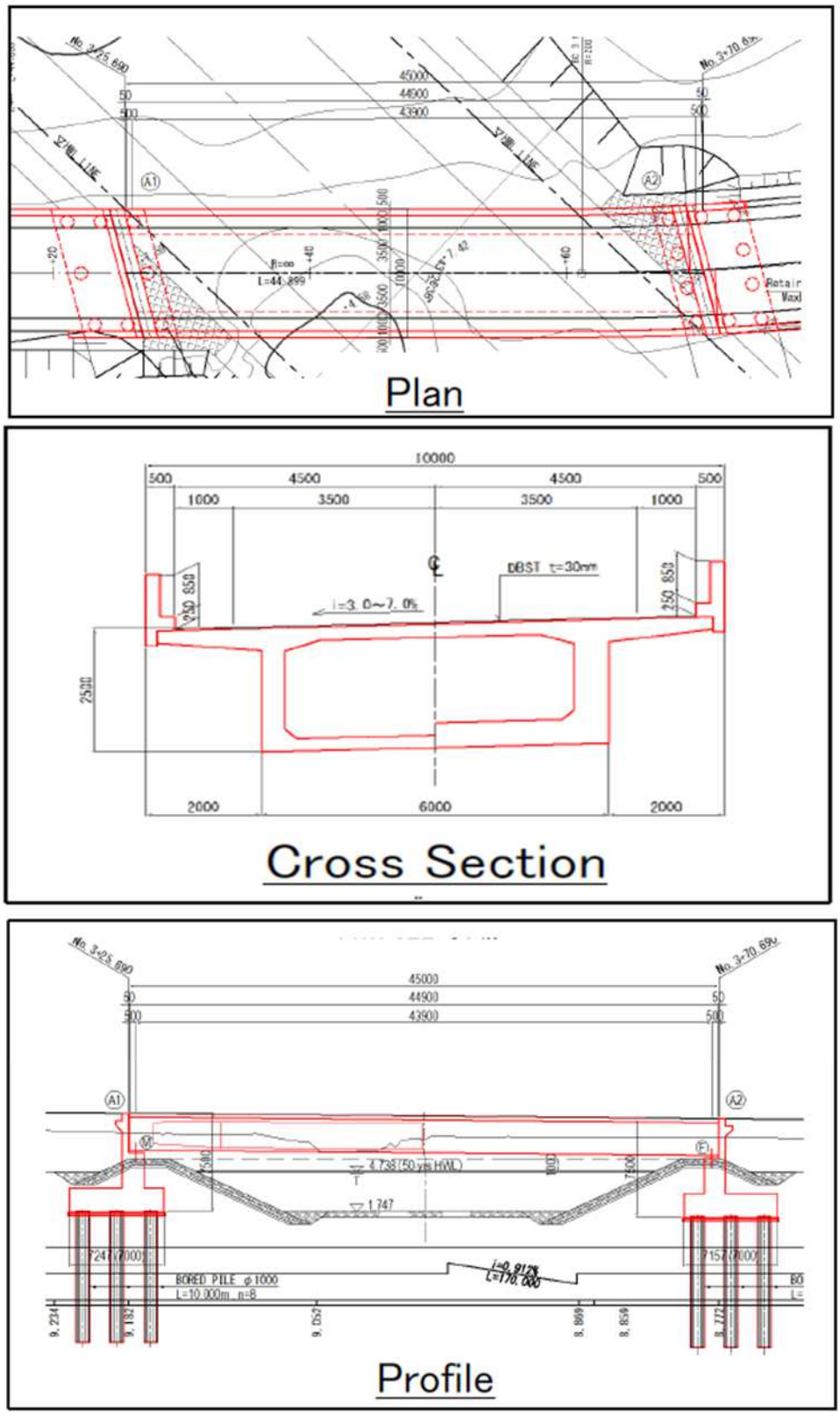
Table 3.1-3 Bridge Design Parameters

Parameter	Unit	Design Value	Remarks
Carriageway width	m	3.5 × 2 = 7.0	Set based on the forecasted AADT of 4,375 in 2049 (Road Design Manual Tab.4.9)
Standard crossfall	%	3	Manual (Tab.4.6, Tab.4.12)
Maximum crossfall	%	7	Manual (Tab.4.48)
Maximum longitudinal gradient	%	8	Manual (Tab.4.55)

Source: Prepared by JICA Survey Team

The design summary of the Karavi Bridge is shown in the figure below.

- Superstructure : PC box girder
- Length : 45m
- Foundation : Bored pile (D1.0, L=10m)



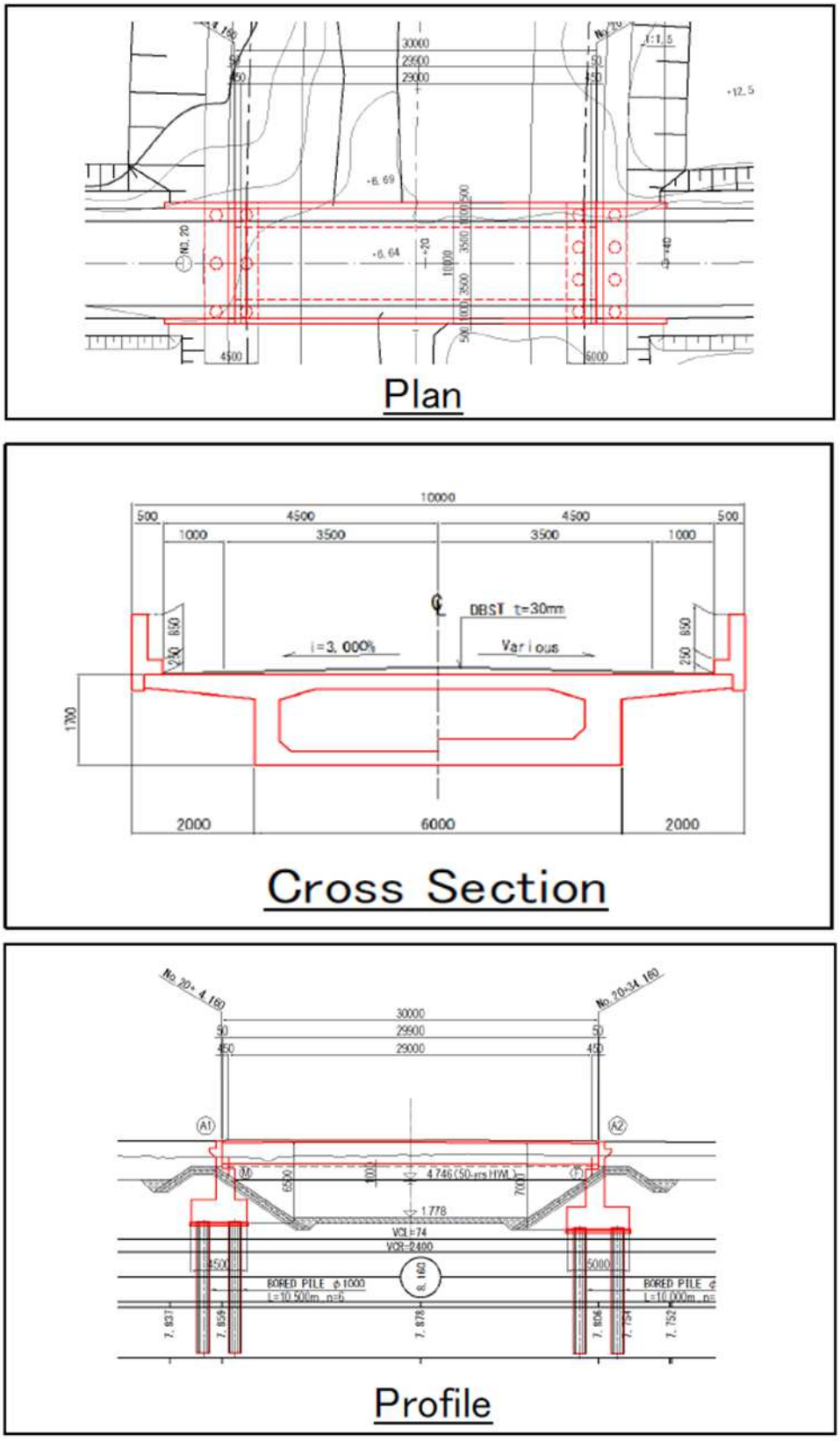
Source: Prepared by JICA Survey Team

Figure 3.1-3 General Arrangement of Bridge (Karavi Bridge)

The design summary of the Ranguna Bridge is shown in the figure below.

- Superstructure : PC box girder
- Length : 30m

・Foundation : Cast-in-place piles (D1.0, L=10-10.5m)

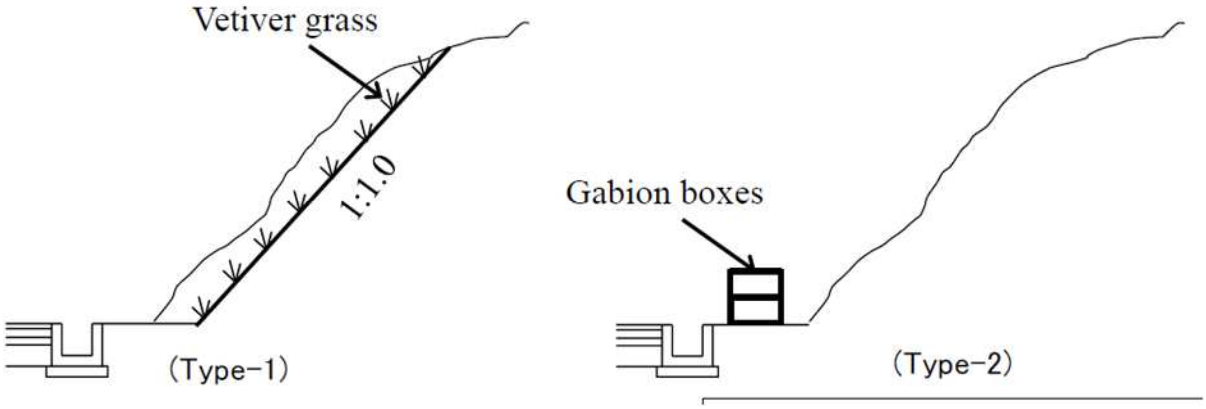


Source: Prepared by JICA Survey Team

Figure 3.1-4 General Arrangement of Bridge (Ranguna Bridge)

3.1.4.3 Slope Stabilization Works (cutting, vegetation works, concrete canvas)

The basic concept of the countermeasure works is to remove protruding trees, boulders, and collapsed or accumulated soil on the slope, and then implement slope protection works for erosion prevention.
The countermeasures will be displayed as a good practice for future slope management trials by the PNG government, taking into account material procurement, technical difficulty, and economic feasibility.
The basic approach consists of "cutting to a stable slope + vegetating with vetiver grass." In cases where houses or other structures exist on the upper slope and cutting to a stable slope is difficult, measures using concrete canvas will be adopted.
Type-1: After cutting work with a stable gradient (1:1.0) on the slope, vegetation work (vetiver grass) is installed on the slope surface.
Type-2:Install gabion boxes to prevent scattering of collapsed soil onto the road.



Source: Prepared by JICA Survey Team

Figure 3.1-5 Slope Stabilization Works (cutting, vegetation works, concrete canvas)

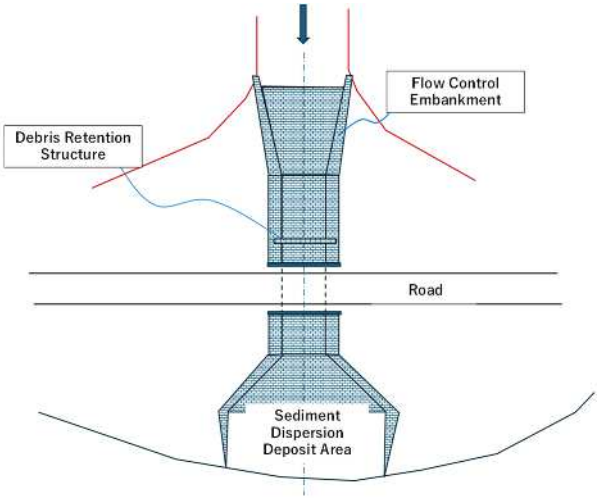
Source: Prepared by JICA Survey Team

Figure 3.1-6 Vegetating with Vetiver Grass

3.1.4.4 Desertification Basins Works(2 locations: Karavi, Ranguna)

(1) Sediment Control Measures for Karavi and Ranguna Flood Channels

Based on the grain size distribution test, the D95 particle size is up to 53 mm. Given the steep channel gradient of 1/46, particles of this size can be transported even at a flow depth of around 20 cm.
Although sediment supply fluctuates and deposition and erosion occur repeatedly, sediment is continuously conveyed from the upstream area to the river mouth due to the consistent gradient.
A guiding levee and diversion channel are planned upstream of the coastal road to direct sediment-laden flows beneath the road.
A debris trap is planned on the upstream side of the road crossing to capture driftwood.
To mitigate further growth of the downstream delta, a widened sediment dispersion and deposition area is planned downstream of the diversion channel, where periodic sediment removal will be conducted.



Source: Prepared by JICA Survey Team

Figure 3.1-7 Sediment Control Measures for Karavi and Ranguna Flood Channels

Source: Prepared by JICA Survey Team

Figure 3.1-8 Planned Layout(Left: Ranguna Bridge Area, Right: Karavi Bridge Area)

The design summary of the Karavi and Ranguna Sediment Ponds is as follows.

Table 3.1-4 Sediment Ponds Design Parameters

Item	Karavi	Ranguna
Structure	Concrete & stone masonry	Concrete & stone masonry
Design return period	50 years	50 years
Effective sediment depth	3.0 m	3.0 m
Total sediment capacity	Approx. 47,000 m3	Approx. 64,000 m3

Source: Prepared by JICA Survey Team

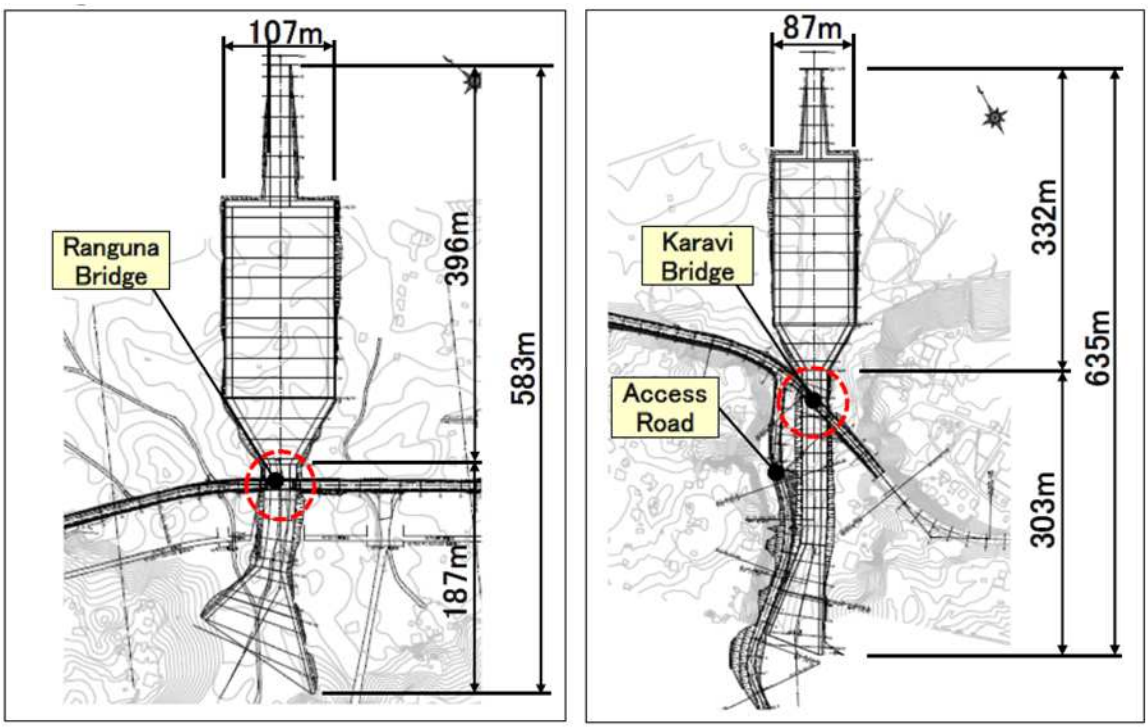


Figure 3.1-9 Plan Layout (Left: Ranguna Sediment Pond, Right: Karavi Sediment Pond)

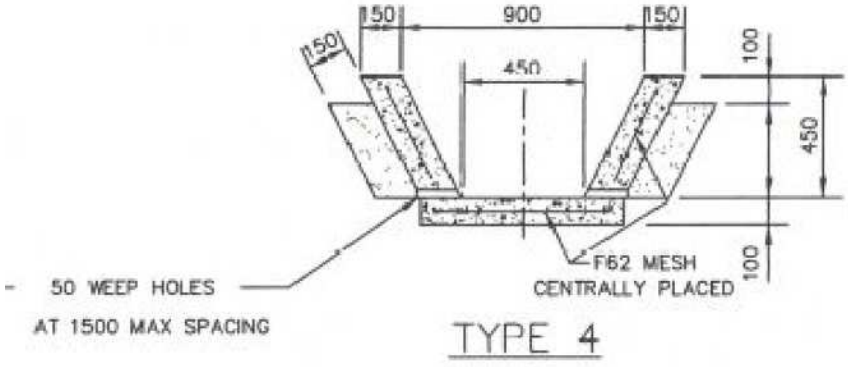
3.1.4.5 Drainage structure

(1) Roadside Gutters

The trapezoidal-type structure specified in the PNG National Standard Drawings will be used as the basic design.

(2) Cross Drainage Structures

Cross drainage structures will be installed primarily at the locations of existing facilities.
New drainage structures will be provided at locations where connecting roads meet the target road.
Sediment traps will be installed at the inlets of drainage structures located near connecting roads.

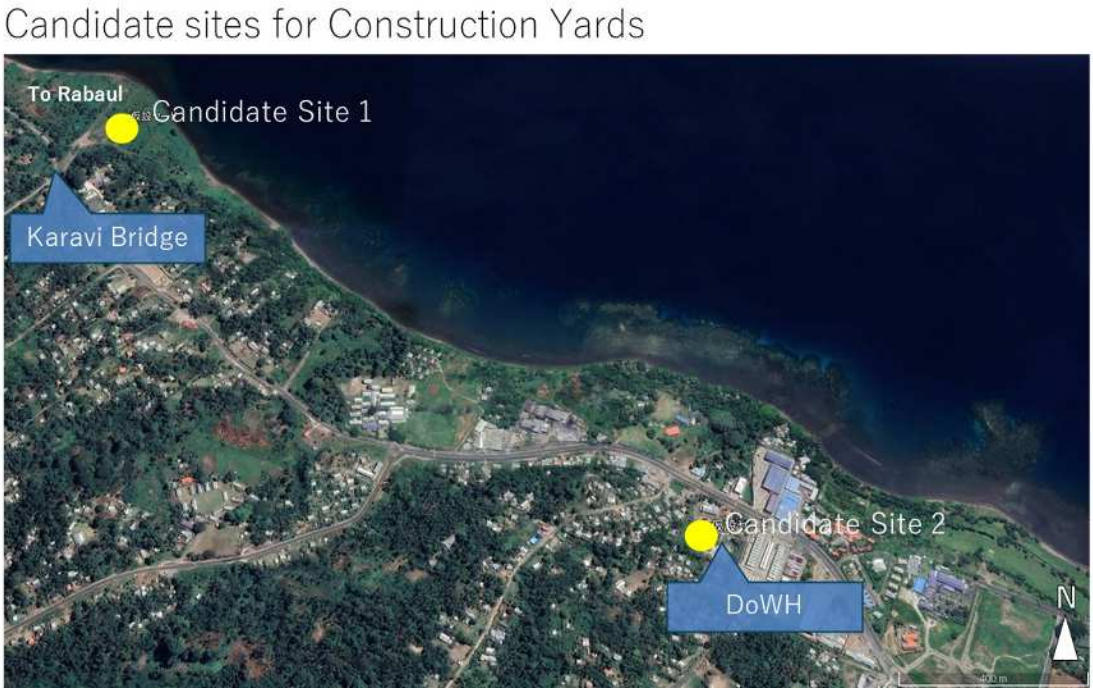


Source: Prepared by JICA Survey Team

Figure 3.1-10 Gutter Shape Specified in the PNG Standard Drawings

3.1.4.6 Construction Plan

(1) Candidate Sites for Construction Yards



Source: Prepared by JICA Survey Team

Figure 3.1-11 Candidate Sites for Construction Yards

3.1.4.7 Procurement Plan

・Expected transportation routes for construction materials and machinery
-Japan / third countries → Lae Port, Port Moresby Port (by sea)
-Lae / Port Moresby → Rabaul Port (domestic shipping)
-Rabaul Port → Construction site (by land)

During construction, single-lane traffic or detours via mountain roads will be required.
The land south of Karavi Bridge, owned by DOWH, is proposed as a temporary yard site.

Table 3.1-5 Draft Procurement of Materials, Equipment and Construction Machinery

Item	Japan	PNG	Third Country	Notes
Cement		✓		
Aggregate		✓		
Ready-mix concrete		✓		
Asphalt concrete	△		DBST	
Rebar	✓	△	✓	
Steel products	✓		✓	Except electric furnace products
PC steel	✓			
PC cables (stay cables)	✓			
Pavement materials		✓		
Road secondary products		✓		
Backhoe		✓		
Truck crane		✓		
Roller		✓		
Asphalt finisher	✓	△		
Concrete plant		✓		
Asphalt concrete plant	✓	△		
Adzeater	✓	✓	✓	

Note: ✓ = Available, △ = Partially available

3.1.5 Project Right of Way

The two-lane road section will have a 20m Right of Way (ROW).

3.1.6 Possible Implications of the Project on Climate Change

The construction of the 2.4 km road and associated infrastructure, while addressing local transportation needs, is inevitably linked with the broader context of climate change.

The improvement of the road and bridges and the construction of the sediment and silt retention pond and any civil works relating preventing possible landslide civil works would likely lead to increased greenhouse gases (GHGs) through construction activities. During the construction phase, heavy machinery and vehicles will be used, emitting mainly Carbon Dioxide (CO2) and dust particles. Also, the widening of the road may require the clearing of trees and vegetation, thereby reducing the carbon sequestration capacity of the area.

At the operational phase of the project, an improved road network may lead to increased traffic as better roads attract more drivers, potentially increasing the total vehicle miles travelled and thus higher levels of CO2 and other GHG emissions. This can also lead to urban sprawl, which further increases land use changes and associated emissions through new development, which may require the clearing of remaining vegetation within the project area. On the other hand, the project can significantly reduce GHG emissions through reduced traffic congestion.

Smooth traffic flow is more fuel efficient with reduced emissions. The project will develop and implement sustainable solutions to mitigate its impacts on climate change. Chapter 3.6 of this report will discuss in detail the possible implications of climate change on the project.

CHAPTER 4. Baseline of Natural and Social Aspect (based on literature data)

Since this project is primarily a road renovation project, derivative/secondary impacts, cumulative impacts, and impacts from inseparable integrated projects are not anticipated.

4.1 Baseline Information

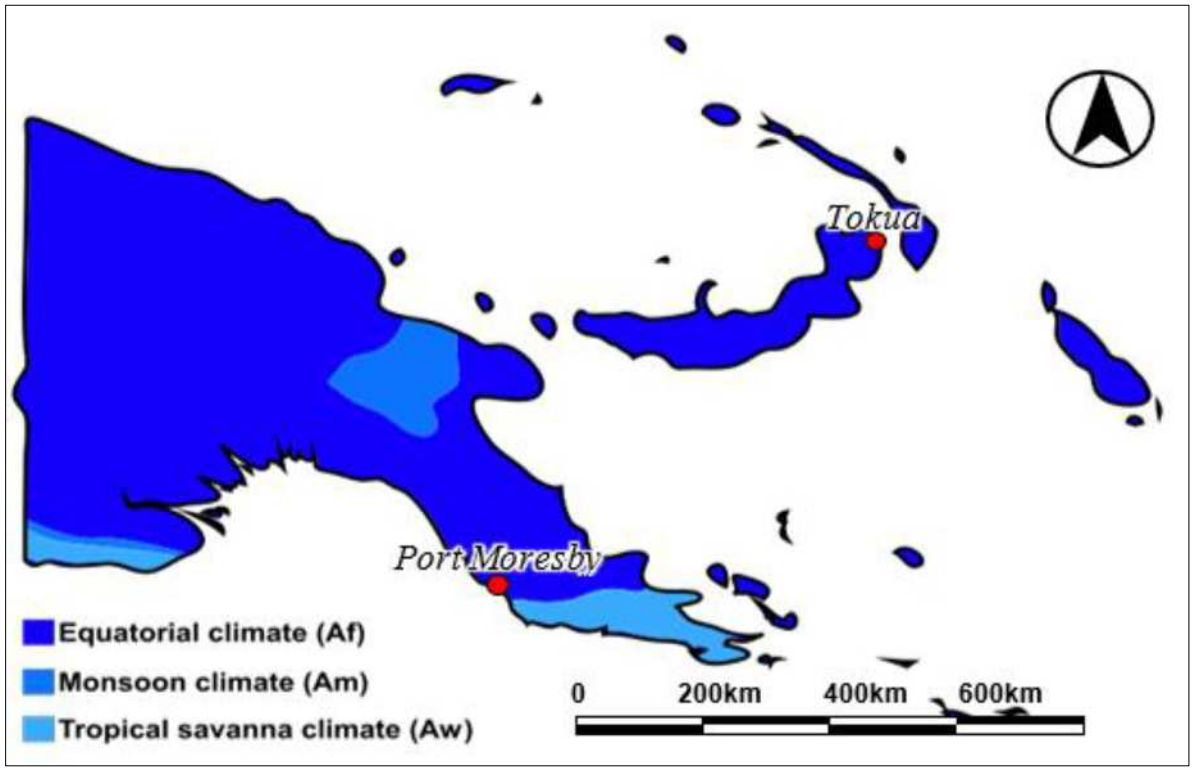
4.1.1 Physical Environment

The Karavi-Kuradui road corridor traverses the coastline at a modest elevation between 2m and 6m asl. The corridor is part of the undulating volcano-alluvial fans and plains which characterizes the lowland areas of Kokopo and the Cape Gazelle. The main drainage system within the corridor is the Karavi and the Ranguna drainages. There are several other small creeks that discharge into the north western end of the airport. The porous volcanic ash soils permit rapid infiltration and subsurface flow, and thus intense rainfall is required to generate sufficient surface runoff for such small drainage channels to flow. On the all, the Tokua Airport is well drained with no temporary or permanent inundation, although the gully probably remains moist for much of the year because of the high ground water table.

4.1.1.1 Climate and Weather of the Project Area

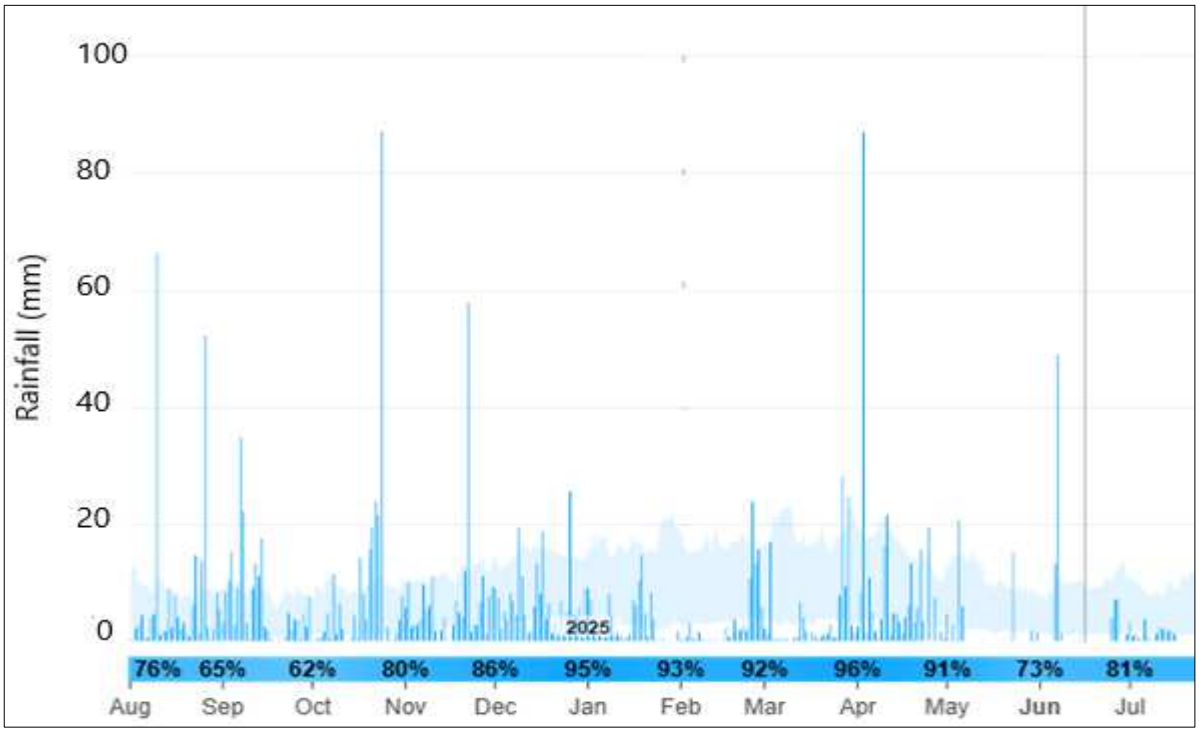
Given, its relative position to the equator, Papua New Guinea has two seasons; dry season from May to November and rainy season from December to April. In the Köppen climate classification (Figure 4.1-1), the main New Britain Island belongs to the equatorial climate, with an average maximum temperature ranging from 28 to 33 ℃ and average minimum temperature range between 23 and 26℃.

Based on 12-month daily recordings from August 2024 to June 2025 (Figure 4.1-2), the average rainfall amounts at 5.8mm/day or 2,117 mm/year (www.msn.com/en-us/weather/forecast/in-Kokopo/ retrieved 16.06.2025, 9pm). Additionally, humidity records from similarly period ranged from 62% to 95% (Figure 4.1-3).



Source: Prepared by JICA Survey Team

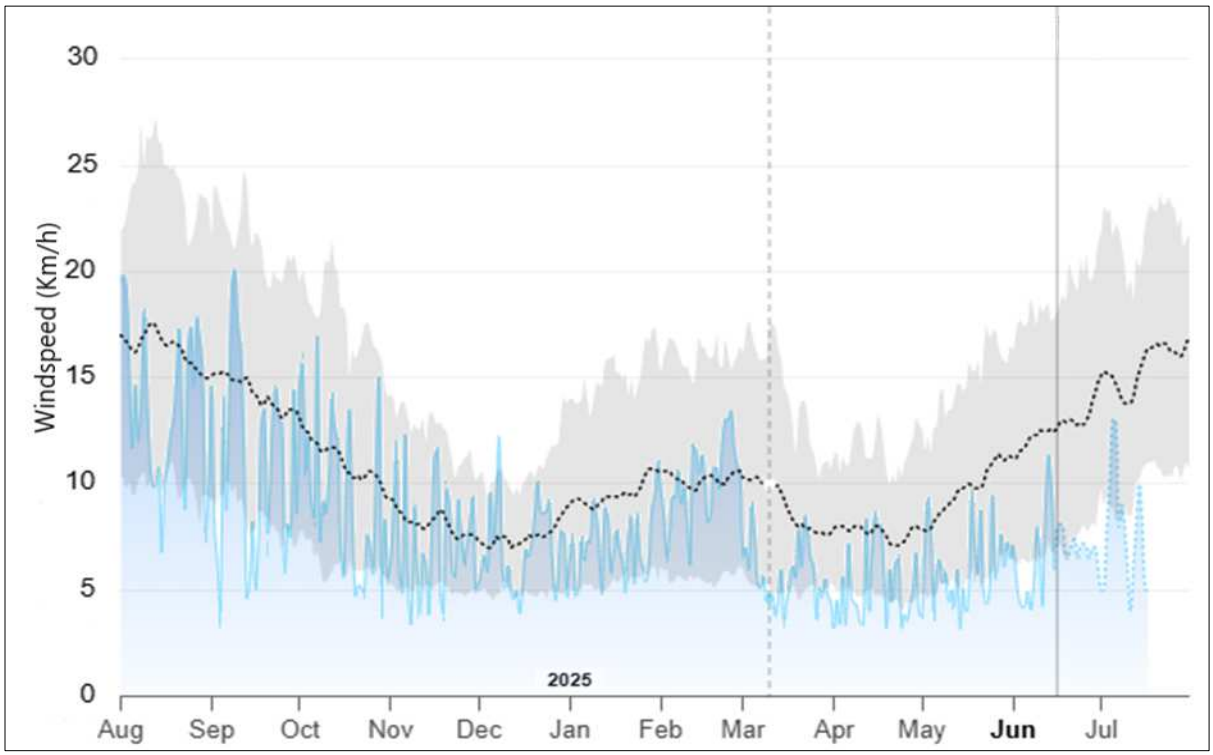
Figure 4.1-1 Koppen Climate Classification in PNG.



Source: Prepared by JICA Survey Team

Figure 4.1-2 Monthly Rainfall Records of Kokopo Area (August 2024 to July 2025).

Wind gust over the Kokopo area travels at a minimum speed of 3km/h and maximum speed of 20km/H. On average, wind travels at 8km/h



Source: Prepared by JICA Survey Team

Figure 4.1-3 Windspeed Over a 12-month period from August 2024 to July 2025

4.1.1.2 Ambient Air Quality

The ambient air quality within the project area is typically clean and unpolluted. There are no industrial

or agricultural activities adjacent to the road corridor that would contribute to the secondary air pollution. However, there is marginal aerial emission from vehicle exhaust fumes and the ship chimney fumes. These emission sources have no significant impact on the air qualities as the emissions are small in quantities and marginal.

The quality of air around the Kokopo in general is moderately polluted. Measurements of PM10 and PM2.5 were >6 µg/m3. PM2.5 appeared to influence the air quality over the Kokopo/Vunamami area (Table 4.1-1). Large amount of NO2 are emitted from quiet emission of gas in active volcanoes of Mt Tarvurvur, Vulcan and Mt Ulawun. Studies have shown that a number of volcanoes around the world continuously exhale water vapor laced with heavy metals, carbon dioxide, hydrogen, sulphide and nitrogenous oxides (NOx), among many other gases. Of these, NOx and SO2 are the easiest to detect from space.

Table 4.1-1 Air Quality Data for Kokopo

Date	Time (24hr)	AQI	NO2 (µg/m3)	O3 (µg/m3)	CO (µg/m3)	PM10 (µg/m3)	PM2.5 (µg/m3)	Pollution Status
2025.06.10	0600	18	3	8	-	7	18	Low
2025.06.10	0900	15	1	11	-	6	15	Low
2025.06.10	1130	21	0	12	-	9	12	Moderate
2025.06.10	1500	16	0	11	-	6	16	Low
2025.06.10	1700	12	1	9		5	12	Low
2025.06.10	2100	13	3	7		5	13	Low
2025.06.10	2330	20	3	6		7	20	Low
2025.06.11	0600	15	3	6		6	15	Low
2025.06.11	0900	16	1	9		6	16	Low
2025.06.11	1100	27	0	11		11	27	Moderate
2025.06.11	1500	31	0	12		13	31	Moderate
2025.06.11	1700	29	1	11		12	29	Moderate
2025.06.11	2100	30	3	8		13	30	Moderate
2025.06.12	0000	36	3	6		15	36	Moderate
2025.06.12	0530	32	3	6		13	32	Moderate
2025.06.12	0700	32	2	6		13	32	Moderate
2025.06.12	0900	23	1	8		9	23	Moderate
2025.06.12	1130	20	0	8		8	20	Moderate

Source: Prepared by JICA Survey Team

4.1.1.3 Noise

The ambient noise level along the road corridor is very low. The only noise generated is from moving traffic. Other noises are more localized and poses no major audibility problem.

4.1.1.4 Geology and Soil

The Karavi-Ranguna road corridor, is characterized by volcanic soils, primarily derived from the region's active geological history. These soils are typically Eutrandepts and Vitrandepts, which are common in volcanic landscapes. Eutrandepts soils are rich in minerals and have high fertility, making them well-suited for agriculture. They retain moisture effectively and support diverse vegetation. The Vitrandepts soils, on the other hand, contain volcanic glass and tend to be well-drained but may have lower nutrient availability compared to Eutrandepts.

Generally, the soil is deep (>1m), well drained, medium textured (loams, with textures varying from clay loam to fine sandy loam), fertile soils with moderate cation exchange capacities, high base saturation, and high nitrogen and organic matter levels in the top soils (typically 15-25 cm deep). Soil organic matter contributes substantially to the cation exchange capacities (Graham and Baseden 1956), but high cultivation rates have resulted in loss of organic matter and soil degradation in some areas (Bleeker and Freyne 1981). The high allophone levels in the volcanic soil parent materials result in low levels of available phosphate and high anion fixation.

The volcanic origin of these soils contributes to their high organic matter content, which supports robust plant growth. However, their susceptibility to erosion has posed challenges, especially in areas with steep slopes or heavy rainfall.

4.1.1.5 Climate Change Risk in the Project Area of Influence

The project should have minimal impact on the environment and climate change risks.

4.1.2 Biological Environment

4.1.2.1 Fauna and Flora

Although an ecological survey has not been conducted in the project area, a review of the IUCN (https://www.iucnredlist.org/) Red List for PNG and its habitat distribution maps confirmed the following flora and fauna classified as Vulnerable (VU) or higher.

Table 4.1-2 Main Rare Species believed to inhabit the Project Area

No.	Group	Scientific Name	Common Name	IUCN Category	Habitat Distribution
1	Birds	*Accipiter brachyurus*	New Britain Sparrowhawk	VU	All of New Britain Island
2	Birds	*Cacatua ophthalmica*	Blue-eyed Cockatoo	VU	All of New Britain Island
3	Birds	*Ceyx websteri*	Bismarck Kingfisher	VU	All insular regions
4	Birds	*Henicopernis infuscatus*	Black Honey-buzzard	VU	All of New Britain Island
5	Birds	*Henicophaps foersteri*	New Britain Bronzewing	VU	All of New Britain Island
6	Birds	*Ninox odiosa*	New Britain Boobook	VU	All of New Britain Island
7	Birds	*Pseudobulweria becki*	Beck's Petrel	CR	Northern New Britain Island Southern New Ireland Island
8	Birds	*Puffinus heinrothi*	Heinroth's Shearwater	VU	All insular regions
9	Birds	*Tyto aurantia*	Golden Masked-owl	VU	All of New Britain Island
10	Reptiles	*Caretta*	Loggerhead Turtle	VU	Equatorial to mid-latitude regions
11	Reptiles	*Chelonia mydas*	Green Turtle	EN	Equatorial to mid-latitude regions
12	Reptiles	*Dermochelys coriacea*	Leatherback	VU	Equatorial to mid-latitude regions
13	Reptiles	*Eretmochelys imbricata*	Hawksbill Turtle	CR	Equatorial to mid-to-high latitude regions
14	Reptiles	*Lepidochelys olivacea*	Olive Ridley	VU	Equatorial to mid-latitude regions
15	Plants	*Oryza schlechteri*	Schlechter's Wild Rice	EN	All of Papua New Guinea
16	Fish	*Pristis*	Largetooth Sawfish	CR	Coastal areas from equatorial to low-latitude regions
17	Mammals	*Thylogale browni*	New Guinea Pademelon	VU	All of New Britain Island All of New Ireland Island Northern New Guinea

Source: Prepared by JICA Survey Team

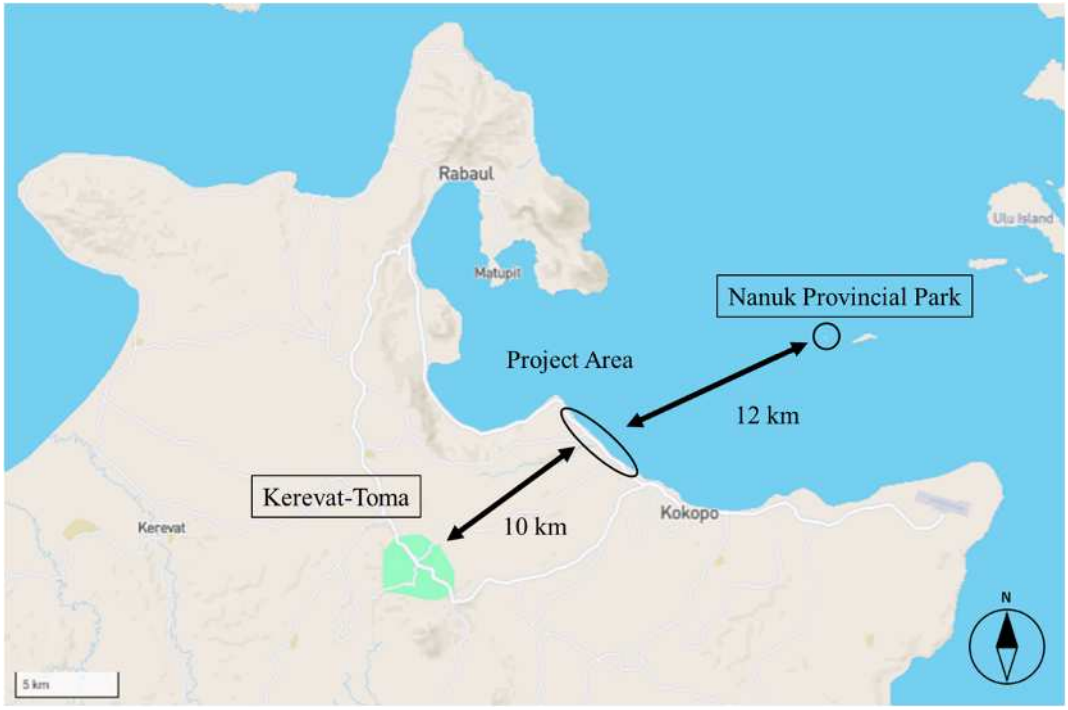
4.1.2.2 Conservation and Protected Areas

There is no specific site identified as a Conservation or Protected area found along the Karavi-Ranguna Road Corridor area. There was a Conservation Need Analysis (CNA) survey carried out by CEPA, CCDA and UNDP in collaboration other NGOs but there was no special mention of Cape Gazelle except the Duke of York Island LLG.

Despite this situation, there are traditional historical sites and war relic sites within Bitapaka LLG and the Kokopo Urban LLG but no special sites of interest areas were found within the proposed development site.

In Papua New Guinea (PNG), 57 protected areas have been designated, including Wildlife Sanctuaries, National Parks, and Nature Reserves. Of these, five protected areas are designated in East New Britain Province as follows. In the vicinity of the project site, Nanuk Provincial Park, located approximately 10 km northeast, was designated in 1973. Although it is classified under IUCN Management Category IV (Habitat/Species Management Area), information regarding other management plans or trigger species has not been identified.

Additionally, the Kerevat-Toma area in East New Britain Province was formerly designated as a Key Biodiversity Area (KBA). Figure 4.1-4 shows the protected areas and KBAs (Key Biodiversity Areas) near the project area.



Source: Prepared by JICA Survey Team

Figure 4.1-4 Key Biodiversity Area around the Project Site

Table 4.1-3 Overview of the protected area

Name of Protected Area	Distance from Project Area	Location	Related Information
Nanuk Provincial Park/ Recreational Area	12km	Pigeon Island LLG, Kokopo District	IUCN Management Category IV
Kavakuna Cave	150 km	Central/Inland Pomio LLG, Pomio District	
Talele Island Reserve Area	75km	Reimber/Livuan LLG, Gazelle District	
Klampun Wildlife Management Area	110km	East Pomio LLG, Pomio District	
Tavolo Wildlife Management Area	240km	Meikoi LLG, Pomio District	
Kerevat-Toma	10 km	Vunadidir/Toma Rural LLG, Gazelle District	KBA

Source: Prepared by JICA Survey Team

4.1.2.3 Key Biodiversity Areas, Nationally Protected Areas and Ramsar Wetlands

The project area is an overly disturbed area. The original natural environment has been disturbed for more than 80 years. Thus, occurrence of any traditionally valued biodiversity was clear felled in exchange for commercial plantation (coconut and cocoa) development by early colonial administrators Therefore, any suggestions regarding protection of cultural sites are considered void along the project area.

4.1.2.4 Ecosystem Services within the Project Area

There are nil ecosystem services as there is no protected area in the project area.

4.1.3 Social and Economic Characteristics

The baseline information discussed are based on both field observations carried out during field survey, public meetings and from existing field data obtained in earlier field studies.

4.1.3.1 Introduction

This project proposal involves a 2.4km section of the existing Kokopo-Rabaul coastal road to be significantly upgraded through maintenance works, construct new bridges over Karavi and Ranguna rivers, carry out civil works to prevent landslide occurring on the sides of hills and slopes up the flood prone areas and finally construct two sediment and silt retention ponds about 1km upstream of the two rivers.

It is expected that the civil earth works will have minimal environmental harm or any significant disturbances. The proposed project development section of the road has been immensely impacted through forest clearance for coconut plantation during the colonial era. The local people's traditional values on the biodiversity and other special sites have been destroyed. The current landscape is typical plantation vegetation which are predominantly mixed secondary and exotic sun loving shrubs and herbs, weeds and grasses. The road runs through the Malapao Copra Plantation owned by the people of Vunamami, Karavi, Balanataman and Ranguna. The plantation was believed to be bought off by Queen Emma of the South Seas and made it alienated in 1942 and registered under the East New Britain Administration. The Malapao Copra Plantation still remains a Free-Hold Title land. However, there has been a lot of discussions over the years from the traditional landowners to get the land title back to themselves.

Field investigation suggests that the 2.4km project area has no scared or protected sites that required special protection. The coconut plantations have been inter-cropped with either balsa or cocoa to maximize economic return.

4.1.3.2 Project Overview

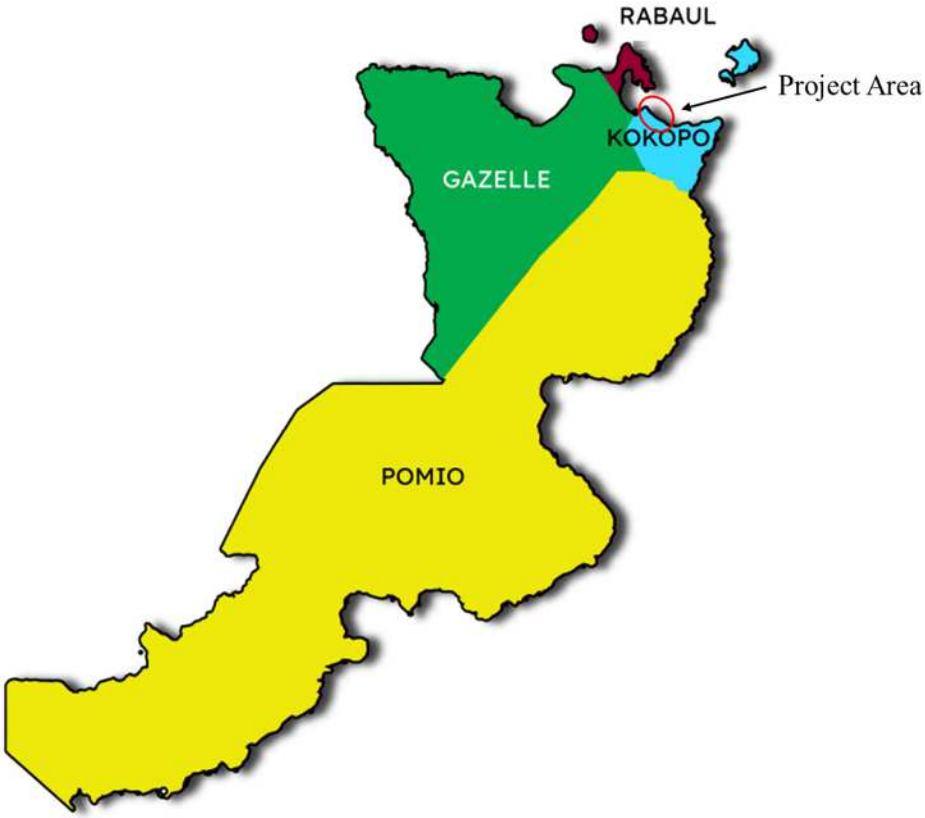
The rights of the original landowners may have changed hands over the last one hundred years where the colonial administrators at that time introduced coconut and cleared large areas around Kokopo, Gazelle and Rabaul for coconut plantation. There were several settlements and armlets spread out within the Malapao Plantation Estate. Malapao Plantation covers coconut plantation blocks within Karavi, Malapao and Ranguna communities. These settlements are currently occupied by local landowners from Kokopo district and a handful of other plantation workers who have mixed parentage children through intermarriages over the years. The settlers have been living for more than 50 to 100 years. The plantation land is currently being subdivided into portion and allotments, The traditional landowners and block holders would be allocated a parcel of land after all legal papers works have been completed by ENBPG Lands Division.

4.1.3.3 Administrative Framework

Political representation for the project area includes; the National, Provincial, Local and the community ward councilors. The representations are designated by the Governor for East New Britain, Kokopo Open MP, the Presidents of the Kokopo/ Vunamami Urban and Raluana Rural Local Level Government Councils with their respective ward councilors.

4.1.3.1 Administrative District Boundary

Kokopo is the capital town of Kokopo District in the East New Britain Province. Kokopo District has four Local Level Government administration in the district. The project starts from Kokopo / Vunamami LLG through to Raluana LLG covering 3 Council Ward; Karavi, Balanataman and Ranguna.



Source: Prepared by JICA Survey Team

Figure 4.1-5 Administrative District Boundary of the East New Britain Province

4.1.3.2 Demography

The 2022 and the 2024 National Population Census data were not made public. Their data is still being complied for public use.

Table 4.1-4 Total Population of the Project Area

Geographical Area	Households	Persons		Male	Females
		2011	2021 Pop.est.		
02 Kokopo, ENBP	13,591	87,829	117,064	45,284	42,545
Kokopo/Vunamami LLG		31,965	40,231		
Raluana LLG		18,739	23,655		

Source: Prepared by JICA Survey Team (2011 census data and Pop. Est for 2021)

4.1.3.3 Ethnicity and Religion

The project area has a mixed population of local Tolai people and other people from Papua New Guinea who are Melanesian through employment and inter marriages with the local Tolai population.

The dominant Christian denominations that exist in the area include Catholic, United Church and SDA with smaller groups of Lutheran, Pentecostals and other Christian denominations. Of course, there are other traditional customary ritual practices that are important to individual members of the local communities.

4.1.3.4 Education and Literacy

The people in and around the project area are literate. This has been attributed by the early colony administration and establishment of a lot of schools from primary to secondary schools, technical colleges, nursing schools and teacher's schools.

4.1.3.5 Health

The general observations on the health of the settlers and local community indicated that the people are healthy. Health services in the area are relatively adequate, there is Butuwin Health Centre and Vunapope Catholic Hospital. They provide the clinical services to the local communities of the project area.

4.1.3.6 Livelihoods and Economy

The major economic activity where the local community members participate are cocoa planting, copra work, artifacts, fishing and gardening food which are sold in Kokopo Market. The big plantation owners produce balsa, copra and cocoa and market to overseas markets.

Aside from cash crop developments, they are a huge tourism industry boom with hotels, scenic and war relics sites that keep the local tourism activity robust. Thus, there is a very vibrant cash economy in the Kokopo District and the Rabaul Towns.

4.1.3.7 Urban Poverty and Vulnerability

The local people's main activities are subsistence agriculture lifestyle bended with plantation and formal employment for their livelihood. Urban Poverty and Vulnerability issues tend to be negligible, as the literacy level is comparatively high among the local communities with that of other areas in PNG.

4.1.3.8 Land Use Distribution and Infrastructure

The rights of the original landowners may have changed hands over the last one hundred years where the colonial administrators at that time introduced coconut and cleared large areas around Kokopo, Gazelle and Rabaul for coconut plantation. There were several settlements and armlets spread out within the Malapao Plantation Estate. Malapao Plantation covers coconut plantation blocks within Karavi, Malapao and Ranguna communities. These settlements are currently occupied by local landowners from Kokopo district and a handful of other plantation workers who have mixed parentage children through intermarriages over the years. The settlers have been living for more than 50 to 100 years. The plantation shall be given back to the local owners and currently with help from their local Member of Parliament are organizing subdivisions and give back the land title to rightful landowners.

4.1.3.9 Transport Infrastructure

The project area had road access to Tokua Airport and Simpson's Harbor in Rabaul. There are so numerous social services and infrastructure existing within the Kokopo township including, post office, banks, hospitals, shopping malls, technical colleges, teacher training colleges, nursing school, business schools, primary to secondary schools, Christian churches and off course hotels, industrial area and business communities.

4.1.3.10 Utilities

The local people of Karavi, Malapao and Ranguna communities have access to road, power supply, health and education services

4.1.3.11 Public Security and Safety

Aside from presence of Police officers and other law enforcing agencies of government, the local communities have their local ward councilors, local magistrates and village communities' leaders represented by both genders in their village autonomy.

4.1.3.12 Tourism

Kokopo township offers both local and foreign tourists with good exotic hotels and bungalows with scenic sites and 2nd World War relic, diving, snorkeling and cultural experiences.

4.1.3.13 Cultural Heritage

The East New Britain province has a very rich culture blended with numerous active dormant volcanoes attracting tourists each year.

4.1.3.1 Industrial Structure and Main Industries in Kokopo Township

4.1.3.1.1 Overview of the Industrial Structure of the Kokopo Town

The economic activity in Kokopo District and town is divided into two main sectors: agriculture, industry and commerce/services. The main sectors of the economy are trade, commerce and services, which account for about 75% in Kokopo township activities. The rural villages and communities participate largely on agriculture base economy. They participate primarily engaged in large scale and small-scale agriculture. Processing of coconut, cocoa, and balsa are Ullapeo on the North East while other processing facilties are in Rabaul town. Export of the agriculture products are done from Simpsons Harbour in Rabaul on the Northwest of the project area.

A) Car Repair and Parts Distributor

There several car sales and car service station in Kokopo town.

B) Wood Processing Company

Wood processing including Balsa are done in Tokubar, Ulapeo

It is very important to note that these industrial sites are not located within the project area.

4.1.3.2 Traffic Accidents

Table 4.1-5 shows the number of road traffic accidents involving fatalities or injuries reported to the police over the five-year period from 2011 to 2015 in East New Britain Province.

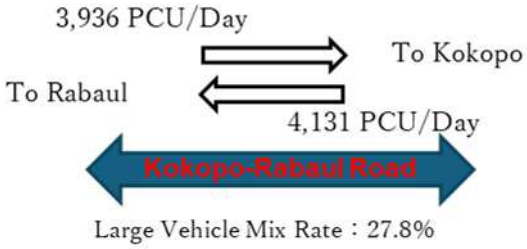
Table 4.1-5 Number of Accidents by Severity in East New Britain Province (2011-2015)

Severity	2011	2012	2013	2014	2015	Total
Fatal Accidents	1	6	2	5	3	17
Accidents Involving Injuries Requiring Admission to Hospital	5	6	9	7	6	33
Accidents Involving Injuries Not Requiring Admission to Hospital	3	5	3	5	3	19

Source: Prepared by JICA Survey Team

4.1.3.3 Traffic Conditions

The project sites and the Kokopo township are not heavily congested with traffic. The road conditions are excellent, permanent sealed road except for the feeder roads leading into village houses and plantation blocks. The proposed section of the Kokopo-Rabaul Road needed upgrade and maintenance because of dust and silt load affecting the free flow and air pollution from the silt and dust during occasional heavy flooding. The traffic volume is shown in the Figure 4.1-6 below



Source: Prepared by JICA Survey Team

Figure 4.1-6 Traffic Volume of Kokopo-Rabaul Road

4.1.3.4 Distribution of Social Facilities

(1) Distribution of Health Facilities

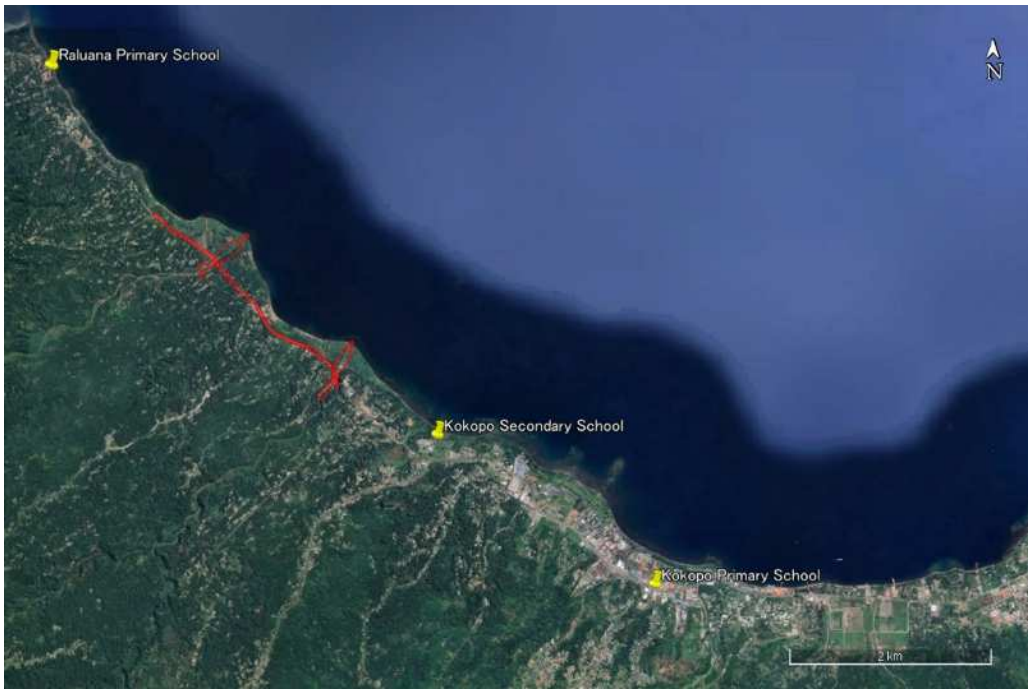
The locations of health facilities around the project area are shown in Figure 4.1-7.

Source: Prepared by JICA Survey Team

Figure 4.1-7 Distribution of Health Facilities

(2) Distribution of Educational Facilities

The locations of educational facilities around the project area are shown in Figure 4.1-8.



Source: Prepared by JICA Survey Team

Figure 4.1-8 Distribution of Educational Facilities

4.1.4 JICA Climate Fit

4.1.4.1 Climate Risk Assessment and Consideration of Adaptation Measures

(1) 1.1.1 Background and Objectives

Climate change is altering the frequency and intensity of extreme phenomena such as extreme temperatures, heavy rainfall, and droughts, exerting significant impacts on terrestrial and marine ecosystems, water resources, agriculture, urban infrastructure, health, well-being, and poverty. Developing countries, in particular, are vulnerable to climate change risks, necessitating measures to avoid or mitigate these impacts.

Against this background, the Government of Japan and JICA are promoting climate change countermeasures in support for developing countries as part of their Global Agenda business strategy, aiming for the promotion of co-benefit type measures and the achievement of the Paris Agreement goals.

Therefore, this project also aims to design business contents and structures that contribute to sustainable development by ensuring that expected effects and outcomes are continuously manifested throughout the project life. Concurrently, to identify climate change risks and consider policies to address them, climate risk assessment and consideration of adaptation measures were conducted based on JICA Climate-FIT (Adaptation Version).

(2) 1.1.2 Climate Risk Assessment

Regarding the definition of climate change, JICA adopts the definition provided by the IPCC (Intergovernmental Panel on Climate Change). The assessment of climate change risks in this project was conducted based on the IPCC definition, and the results are summarized in Table 4.1-6.

The target area, the Kokopo-Rabaul Coastal Trunk Road (specifically the 2.4km section between Karavi and Languna), is backed by volcanic mountains and covered with fragile volcanic ash soil (pumiceous). In this region, heavy rainfall during the rainy season frequently causes floods and sediment disasters. Even at present, road closures occur several times a year, and during the heavy rains of 2019, massive sediment inflow caused severe damage that required three weeks for restoration. With predictions of increased rainfall intensity in the future due to climate change, current infrastructure capacity is insufficient to cope. Consequently, physical functional impairment such as road burial by sediment and blockage of bridges, as well as a decrease in service levels through the interruption of access for local residents' lives and economic activities, were evaluated as significant risks.

Table 4.1-6 Climate Risk Assessment

Climate Hazard	H1 Heavy Rainfall	H2 Sediment Disasters	H3 Sea Level Rise
Current Frequency	++	++	-
Future (Direction of Change)	↗ (Increase)	↗ (Intensification)	↗
Exposure			
E1 Road (Pavement/Roadbed)	2	3	1
E2 Bridge	2	3	1
E3 Drainage Facilities	2	3	1
E4 Traffic Function (Resident Access)	2	3	1

Note) Frequency ++: Frequently occurring thus far or at present.
+: Sometimes occurring thus far or at present
-: Has hardly occurred thus far or at present

Impact Level
3: Past events and impacts were so difficult that they could not be addressed or handled (e.g., road closures).
2: Past events and impacts were moderately difficult to manage or address.
1: Addressing and handling past events and impacts was not so difficult.
Source: Prepared by JICA Survey Team

(3) 1.1.1 Consideration of Adaptation Measures

In this project, as a result of conducting satellite image analysis and other assessments during the Preparatory Survey (OD Survey), it was found that the riverbed gradient of the target watershed is steeper than expected and possesses a consistent slope overall, creating a topographical structure where runoff sediment flows down to the river mouth all at once. In light of this, to respond to the future

increase in sediment disaster risk, the plan was changed from the original proposal of installing a settling basin on the upstream side of the bridge to trap sediment, to a structure that allows sediment to flow downstream and intercepts it on the downstream side.

This is clearly positioned as an adaptation measure to reduce vulnerability to climate hazards (heavy rainfall and sediment runoff).

Table 4.1-7 Climate Risk Tree Including Adaptation Measures

Element	Content
Climate Hazard	H1 Heavy Rainfall (increased rainfall intensity, increased extreme phenomena)
	H2 Sediment Disasters (increased sediment and driftwood runoff from rivers)
Exposure	E1 Roads and Bridges (Coastal Trunk Road)
	E2 Drainage Facilities and Culverts
	E3 Access for Local Residents (travel to Kokopo city area)
Vulnerability	V1 Geology and Topography: Fragile volcanic ash soil with steep hinterlands susceptible to erosion.
	V2 Insufficient Infrastructure Capacity: Existing bridges and culverts lack sufficient flow capacity and are prone to burial by sediment.
	V3 Lack of Alternative Routes: Major local roads where blockage results in significant social impact.
Risk	R1 Loss of Road Function: Road severing due to sediment inflow and accumulation, and burial or washout of bridges.
	R2 Interruption of Traffic: Stagnation of economic and social activities due to blocked access to the Kokopo city area.
	R3 Increase in Restoration Costs: Frequent sediment removal costs (e.g., 3 million Kina per year).
Adaptation Options	A1 Development and Strengthening of Settling Basins (Hard): Based on the OD survey results, the target watershed was found to belong to a group showing high runoff. In anticipation of future climate change risks (intensification of heavy rainfall), the capacity of the settling basins will be significantly expanded from the original plan (4.1 times for Karavi, 5.8 times for Languna). This will prevent sediment inflow onto the roads.
	A2 Strengthening of Bridges and Roads (Hard): Raising the road height and replacing bridges with ones having sufficient flow capacity to reduce the risk of overtopping and burial.
	A3 Slope Measures (Hard): Basically addressed through road alignment without modifying the slopes. However, for steep slopes where sediment runoff is possible due to surface peeling from weathering, measures will be taken by securing approximately 1.5m including side ditches and installing gabions. Additionally, where excavation is unavoidable, the slope will be cut at a 1:1.0 gradient and stabilized using vegetation methods (e.g., Vetiver grass).

CHAPTER 5. Policy, Legal, and Administrative Framework

5.1 Environmental and Social Consideration Systems and Organizations in Papua New Guinea

5.1.1 Environmental Policy History

PNG got independence from Australian Colony in 1975. PNG established a strong environmental mandate through the country's Constitution and its early legislation. These are: -

a. **National Goals**
The Fourth National Goal and Directive Principle of the Constitution called for PNG's natural resources and environment "to be conserved and used for the collective benefit of us all, and be replenished for the benefit of future generations".

b. **Early Laws**
The government enacted foundational laws like the *Environmental Planning Act 1978* and the *Environmental Contaminants Act 1978*.

c. **Colonial Legacy**
Many of these early laws were inherited from Australia and, before that, Britain. Some commentators have noted that this "copy and paste" approach meant the legislation did not always align with PNG's unique customary land ownership and societal values.

5.1.2 Modern Environmental Legislation

In 2000, PNG reformed its environmental laws with the **Environment Act 2000**, which replaced its predecessors and created a new regulatory system. Notable changes included: -

a) The act established a comprehensive framework for Environmental Impact Assessments (EIA) and environment permits, classifying projects into levels based on their potential impact.
b) The Conservation and Environment Protection Authority (CEPA) was established under the *Conservation and Environment Protection Authority Act 2014*. It was given the authority to manage conservation and environmental protection in PNG. This then gave rise to the Climate Change and Conservation Policy. Subsequently, in recent years, PNG has developed specific policies to address climate change and protect biodiversity.

i. **Climate commitments:** PNG ratified the UN Framework Convention on Climate Change (UNFCCC) in 1994 and the Kyoto Protocol in 2002. It submitted its Nationally Determined Contribution (NDC) under the Paris Agreement in 2020 and aims for a 25% reduction in deforestation by 2030.
ii. **Climate institutions:** The Climate Change and Development Authority (CCDA) was created under the *Climate Change Management Act 2015* to facilitate policy and a regulatory framework for addressing climate change.
iii. **Protected Areas Act 2024:** PNG passed the *Protected Areas Act 2024*, which aims to meet the global "30 by 30" target of protecting 30% of the country by 2030. The act uniquely incorporates customary land ownership by allowing landowners to voluntarily convert their land into protected areas.

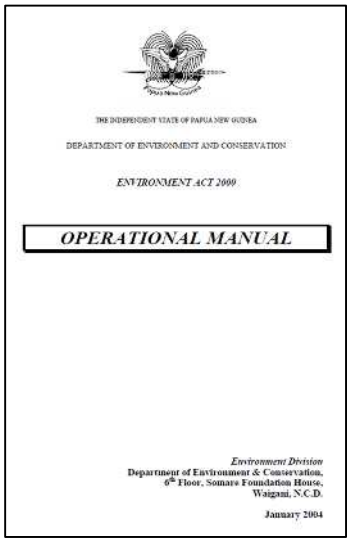
The main laws and regulations pertaining to the environment are as follows: -

In Papua New Guinea, the Environment Regulations are governed by the Conservation and Environment Protection Authority (CEPA) and are centred on the Environment Act 2000. The regulatory framework is designed to manage the environmental impacts of development activities and promote sustainable use of the country's natural resources. The primary legislation and administration are established by the Conservation and Environment Protection Authority Act 2014. It oversees and enforces environmental regulations, issues permit for development projects, and environmental

management and compliance monitors.

Key features of the Environment Act 2000 are: -

a) **Environmental Impact Assessment (EIA)**. The Act requires an EIA and a permit for development projects, especially for activities that may cause significant environmental harm. Projects are categorized into different levels based on their potential impact, with the highest-impact projects requiring an extensive Environmental Impact Statement (EIS) and public consultation.
b) Pollution Control. It provides a framework for preventing, abating, and controlling pollutants, including establishing licensing procedures for discharges into water, air, and land.
c) Water Resources Management. The Act regulates the management and protection of national water resources.
d) National Environmental Management Strategy (NEMS) 2021–2025. This document provides a framework of strategies and actions for environmental management over a five-year period. Its themes cover a broad range of areas, including freshwater, land, marine and coastal resources, biodiversity, and climate.
e) Sustainable Development Goals (SDGs). PNG has integrated the UN's SDGs into its national planning frameworks, including efforts to reduce vulnerability to climate change and decrease greenhouse gas emissions.
f) Protected Areas. The Conservation Areas Act 1978 and the Protected Area Policy enable the creation and management of national parks and protected areas to conserve biodiversity. The policy emphasizes the need for agreements with customary landowners, who own the vast majority of land in PNG, before protected areas can be established.



Source: CEPA Materials

Figure 5.1-1 Manual on the Environment Act 2000

Specific sectoral regulations

In addition to the overarching Environment Act 2000; other laws govern specific sectors; for example;

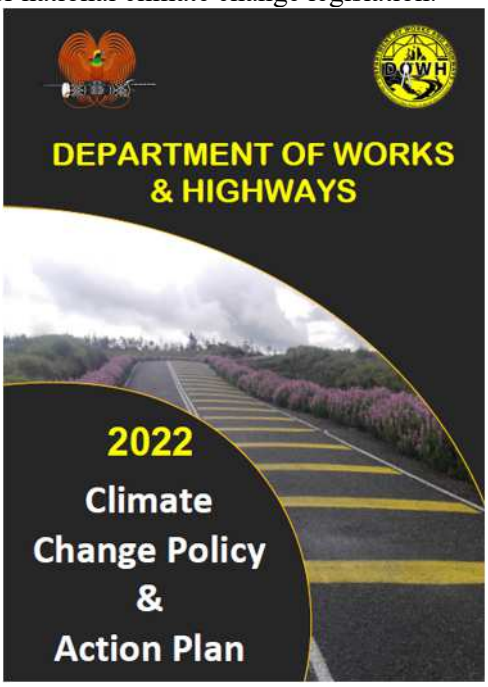
I. Climate Change (Management) Act 2015: Establishes a framework for managing climate-compatible development through mitigation and adaptation activities.
II. Forestry Act 1991: Regulates logging operations, with the Environment Act requiring an EIS for large-scale timber activities.
III. Mining Act 1992: Requires mining projects to undergo environmental assessments and obtain leases. It also sets out principles for compensating landholders.

IV. Fisheries Management Act 1998: Empowers the National Fisheries Authority to preserve biodiversity in fisheries waters.

V. Fauna and Flora Legislation: Acts such as the Fauna (Protection and Control) Act 1966 and the International Trade (Fauna and Flora) Act 1979 protect endangered species and regulate the trade of wildlife.

Standards within DOWH

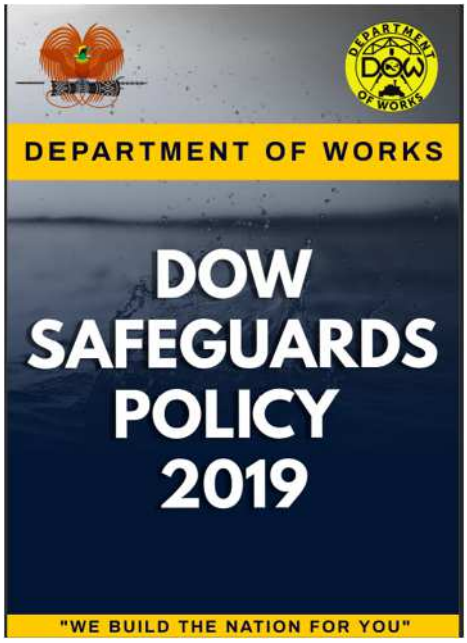
I. DOWH Climate Change Policy: This policy outlines strategies, goals, and specific action plans for the Department of Works and Highways (DOWH) of Papua New Guinea to integrate climate change mitigation and adaptation measures and fulfill its obligations as a regulated sector under national climate change legislation.



Source: DOWH

Figure 5.1-2 DOWH Climate Change Policy and Action Plan 2022

II. DOWH Safeguard Policy 2019: A comprehensive handbook outlining assessment, management strategies, and operational procedures by risk level (Level 1, 2, 3) for social and environmental safeguards, ensuring that all stages of road, bridge, and infrastructure projects by the Papua New Guinea Department of Works and Highways (DoW) comply with national laws and regulations as well as the requirements of international donors such as the ADB and World Bank.

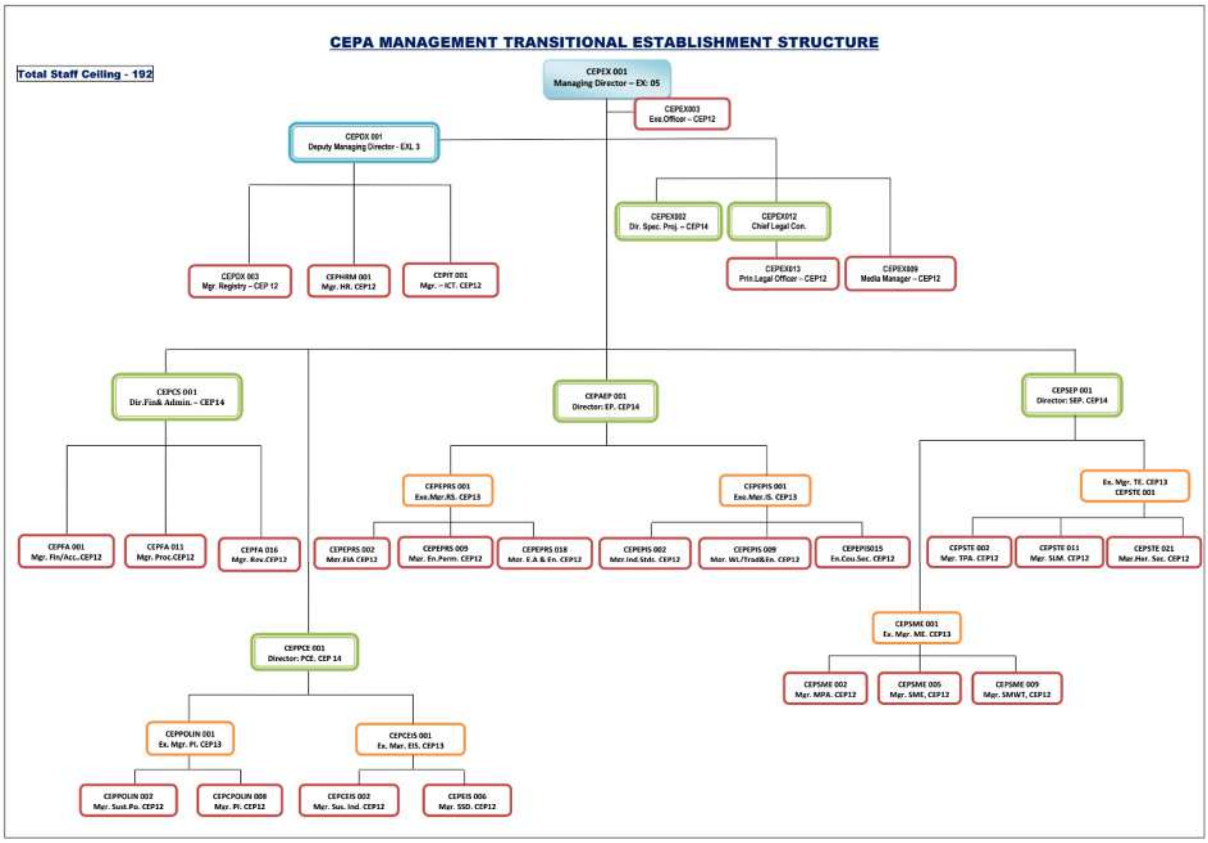


Source: DOWH

Figure 5.1-3 DOWH Safeguard Policy 2019

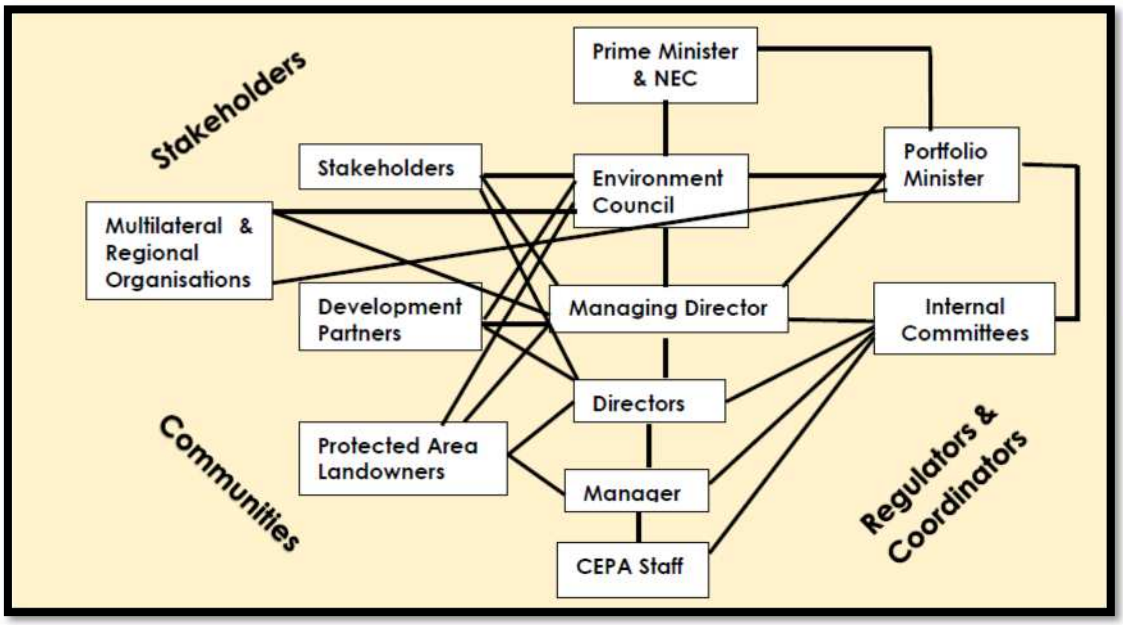
5.1.3 Environmental Management Organization

The organizational structure of the Conservation and Environmental Protection Authority (CEPA) is shown in Figure 5.1-4. In addition, its strategic framework is shown in Figure 5.1-5.



Source: CEPA Corporate Plan 2025 to 2027

Figure 5.1-4 Organizational Structure for CEPA



Source: CEPA Corporate Plan 2025 to 2027

Figure 5.1-5 Strategic Framework and Structure (CEPA)

5.1.3.1 Environment Regulatory Framework

The environment regulatory framework provides the mechanisms for dealing with activities with potential for causing environmental harm and the different categories of environmental harm. Activities with risk of causing environmental harm and serious environmental harm are defined in the Environment Act 2000 as prescribed activities and are permitted. Non-prescribed activities do not require a permit to operate but they must operate in accordance with the requirements of the Act.

The regulatory framework provides for the establishment of three different regulatory processes to enable CEPA to adequately control and regulate development activities based on their different levels of risk of causing environmental harm. Those activities with very low risk of causing environmental harm are classified as Level 1 activities and are exempted from the permitting requirement. Level 2 activities have low to high potential for causing environmental harm and are subjected to the permitting process. Activities that present a high risk of causing serious or material environmental harm are of importance to CEPA are put through the environment impact assessment process before an Environment Permit can be issued.

(1) Level 1 activity

Level 1 activities are exempted from the obligation to have an Environment Permit. However, activities under this category are required to observe the appropriate environmental guidelines and code of practice that are relevant to the activity.

(2) Level 2 activity

Activities that are classified as Level 2 under the Environment (Prescribed Activities) Regulation 2002 are required to have an Environment Permit prior to commencement of works. Level 2 activities are further categorized into Level 2 (Category A) and Level 2 (Category B).

Level 2 (Category A) activities are defined as those activities that are exempted from notification and referral process because they do not pose a high risk of causing environmental harm (e.g. water extraction, trade in chemical products, etc.). Applications under this category should be processed within 30 days of acceptance of application unless the Director requires an extension in the assessment timeframe.

Level 2 (Category B) activities are differentiated from Level 2 (Category A) activities due to their high level of risk of causing environmental harm. Activities under this category go through the notification and referral requirements under the permit assessment process. Applications from a Level 2 (Category B) activity should

be processed within 90 days of acceptance of application unless the Director requires an extension in the assessment timeframe.
This road and bridge maintenance project falls under Level 2 (Category B, Sub-Category 13.2. of the Environment Regulations.

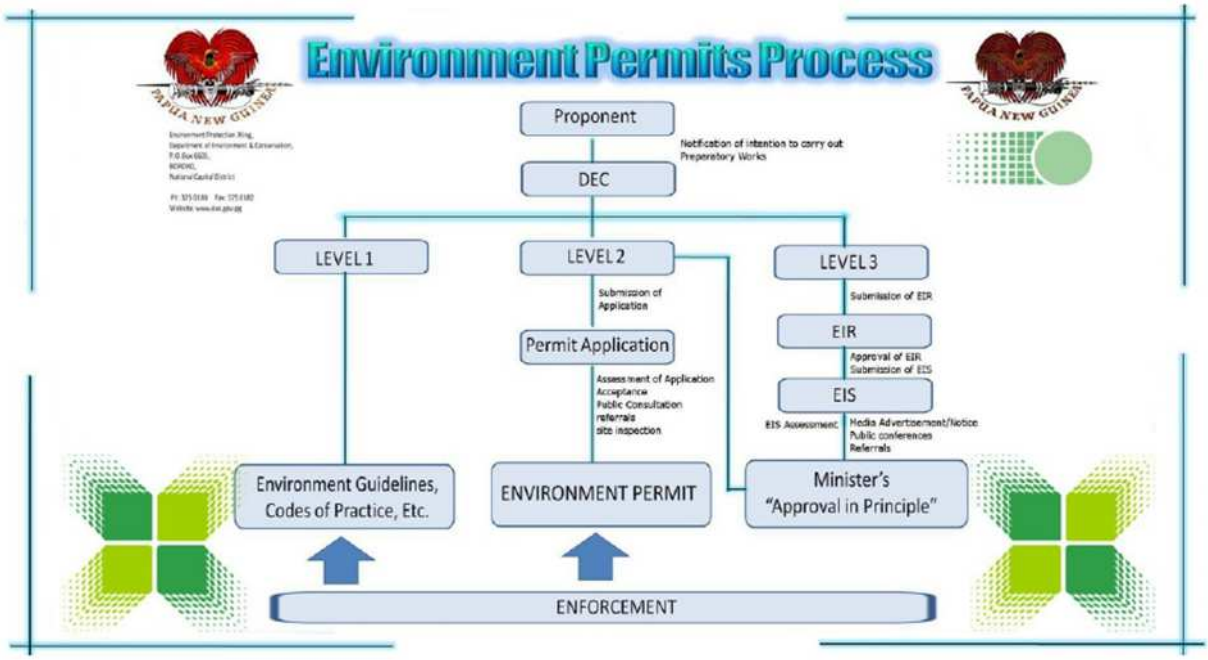


Figure 5.1-6 Procedures for Environmental Impact Assessment (Screening)

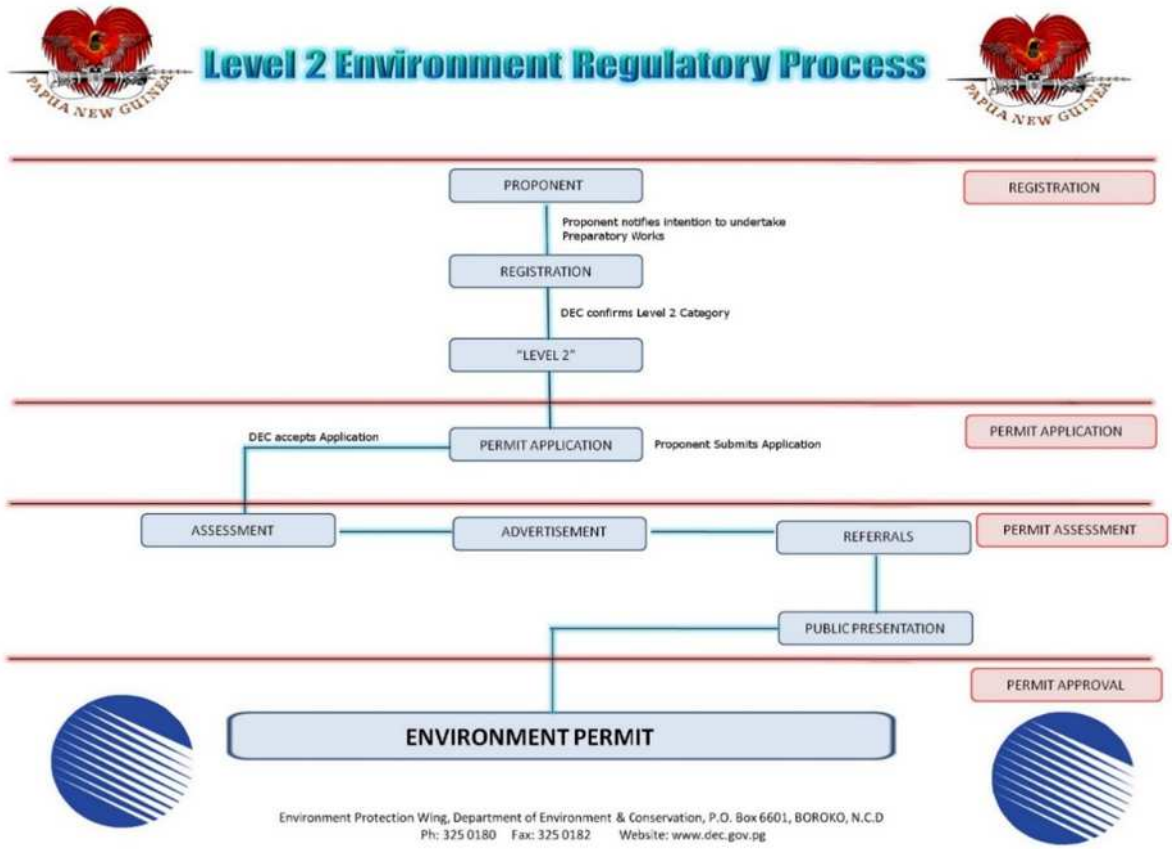


Figure 5.1-7 Procedures for Environmental Impact Assessment (Level 2)

5.1.3.2 Projects Subject to Environmental Impact Assessment

As confirmed with CEPA, this project, a road and bridge rehabilitation project, falls under Level 2 (Category B, Sub-category 13.2) of the environmental regulations. The target projects are shown in Table 5.1-1.

Table 5.1-1 Projects Subject to Environmental Impact Assessment (Screening: Level 2)

Number	Sub-Category Name	Activity Details	Category Division
Sub-Category 1	Petroleum Exploration	Drilling of oil and gas wells.	CATEGORY A
Sub-Category 2	Mineral Exploration and Mining	Any drilling program at a defined prospect where the aggregate depth of all holes drilled is greater than 2,500 metres.Mechanised mining on a Mining Lease issued under the Mining Act 1992 involving nonchemical processing of no greater than 50,000 tonnes per annum.Gravel extraction operating continuously for more than 6 months and involving the extraction of no greater than 10,000 tonnes per annum.Quarrying involving the extraction of no greater than 100,000 tonnes per annum.	CATEGORY A
Sub-Category 3	Minor Forest Activities	Activities carried out under a Timber Authority issued under the Forest Act.	CATEGORY A
Sub-Category 13	Other activities (SEE EXPLANATORY NOTE, BELOW)	Damming or diversion of rivers or streams.Discharge of waste into water or onto land in such a way that it results in the waste entering water, except where such discharge is ancillary or incidental to, or associated with, any other activity in this Regulation in which case that category of activity will apply to the discharge of waste.Abstraction or use of water for commercial purposes, except where such abstraction or use is ancillary or incidental to, or associated with, any other activity in this Regulation in which case that category of activity will apply to the abstraction or use of water.Import or export of ozone depleting substances or pesticides.	CATEGORY A
Sub-Category 4A	Manufacturing operations (predominantly physical operations and blending not involving significant chemical reaction)	Cement clinker manufacturing and grinding.	CATEGORY B
Sub-Category 4B	Processes involving chemical reactions	Manufacture of products by any chemical process in works designed to produce more than 100 tonnes per year of chemical products.Manufacture of fibre-reinforced plastic (FRP) in works with a capacity of more than 50 tonnes per year.Manufacture of acrylic compounds, fertilisers, herbicides, insecticides or pesticides by any chemical process.Manufacturing operations involving the use of toluene di-isocyanate, methylene di-isocyanate, chlorofluorocarbons and halons.	CATEGORY B
Sub-Category 5	Activities involving petroleum or chemicals	Manufacturing of organic chemicals requiring a Petroleum Processing Facility Licence issued under the Oil and Gas Act 1998.Pipeline transport and storage using facilities with a holding capacity of more than 0.5 million litres.	CATEGORY B

Sub-Category 6	Forestry and production of timber products	Activities associated with a logging operation which are or should be undertaken under a timber permit or a licence, unless such licence holder is a subcontractor of a timber permit, (including sewage disposal, camp construction including power & water reticulation, operation of machinery workshops and construction of road and other infrastructure works including wharf and ship loading and unloading facilities).Operation of stationary sawmills and treatment facilities with a production capacity of greater than 30,000 m3 per year of sawn timber.Chemical treatment of timber using copper-chrome-arsenate solutions with a capacity of greater than 100 tonnes of treated wood product per year.Processing of wood to form veneer, plywood, particleboard or fibre board.Processing of wood, wood products, waste paper or other cellulose materials to form pulp, paper or cardboard.	CATEGORY B
Sub-Category 7	Mining and extraction	Mechanised mining on a Mining Lease issued under the Mining Act 1992 involving chemical processing of no greater than 50,000 tonnes per annum.Mechanised mining on a Mining Lease issued under the Mining Act 1992 involving nonchemical processing of more than 50,000 tonnes per annum.Mineral benefication or processing other than alluvial mining in accordance with an Alluvial Mining Lease issued under the Mining Act 1992.Quarrying involving the extraction of more than 100,000 tonnes per year.Gravel extraction operating continuously for more than 6 months and involving the extraction of more than 10,000 tonnes per year.Commercial salt harvesting.	CATEGORY B
Sub-Category 8	Aquaculture and agriculture	Intensive animal industries including the raising of cattle, sheep, pigs, poultry and crocodiles with an annual production capacity of more than 200 animal units.Operation of livestock holding pens with a capacity of more than 2,000 animal units per year.Operation of aquaculture facilities with a design discharge flow rate greater than 1 per day or 100 tonnes of wet product per year.Aquaculture carried out in “open sea” (cage) operations.Agricultural cultivation of an area greater than 1,000 hectares.	CATEGORY B
Sub-Category 9	Food processing and plant product processing	Processing of alcoholic and non-alcoholic beverages in a plant with a design production of more than 5,000 litres per day.Operation of abattoirs and poultry processing facilities processing more than 200 animal units per year.Processing coconut oil in plants producing more than 10,000 tonnes per year.Processing of coffee or cocoa in plants producing more than 5,000 tonnes per year.Palm oil extraction and processing in plants producing more than 5,000 tonnes per year.Seafood processing operations which involve the production of more than 500 tonnes per year.Production of stock feed in mills producing more than 5000 tonnes per year.Processing of latex and rubber in operations producing more than 500 tonnes per year.Sugar refining operations with a production capacity of more than 5,000 tonnes per year.	CATEGORY B
Sub-Category 10	Energy production	Operation of hydroelectric plants with a capacity of more than 2 Megawatts (MW).Operation of fuel burning power stations with a capacity of more than 5MW, but not including emergency generators.Operation of fuel burning appliances including furnaces and boilers with a rated thermal output of 20MW.	CATEGORY B
Sub-Category 11	Waste treatment	Sewage treatment in plants serving more than an equivalent population of 5,000 people.Septic tank sludge disposal systems intended to serve an equivalent population of greater than 500 people.Operation of public and private landfills for the disposal of municipal wastes, serving a population of more than 10,000 people.Incineration, reprocessing, treatment or disposal of industrial or biomedical waste of a capacity greater than 10 tonnes per year.Operation of rendering works with a capacity of greater than 500 tonnes per year.Recycling waste material including but not limited to glass, oil, metal, paper and	CATEGORY B

		putrescible materials with a capacity greater than 100 tonnes per year.Commercial drum reconditioning.	
Sub-Category 12	Infrastructure	Operation of maritime construction, deballast and repair facilities designed to handle vessels of a mass of greater than 50 tonnes.Construction of marinas and boating facilities designed or used to provide moorings for more than 50 powered vessels at any one time.Operation of potable water treatment plants with a design capacity of greater than 1 million litres per day.Construction of aerodromes or airfields except unpaved airstrips more than 10 km from an urban area.Construction of new national roads.Construction of electricity transmission lines or pipelines greater than 10 km in length.Construction of housing estates with an area of more than 5 hectare.	CATEGORY B
Sub-Category 13	Other activities	Damming or diversion of rivers or streams.Discharge of waste into water or onto land in such a way that it results in the waste entering water, except where such discharge is ancillary or incidental to, or associated with, any other activity in this Regulation in which case that category of activity will apply to the discharge of waste.Abstraction or use of water for commercial purposes, except where such abstraction or use is ancillary or incidental to, or associated with, any other activity in this Regulation in which case that category of activity will apply to the abstraction or use of water.Import or export of ozone depleting substances or pesticides.	CATEGORY B

Source: Environmental Act 2000 Operational Manual

5.1.4 National Legal Framework

5.1.4.1 Institutional and Stakeholder Context

The Constitution of PNG and other relevant Development Strategies and Goals do reflect importance of protecting and safeguarding the national environment and sustainable use the country's natural resources. The Fourth Aspiration of the PNG Constitution states boldly the Wise use of Natural Resources and the Environment for the benefit of the country. The Environment Act 2000 and the Environment Regulation 2002 provide clear guidance and standards for resource developers to comply.

- Conservation and Environment Protection Authority (CEPA)

The CEPA has the mandate to decide on project screening, guide the conduct of any Environmental Assessment studies, and grant environmental approval for road sector projects to commence. Its mandate also covers monitoring the implementation phases of road projects to ensure compliance with approval conditions, mitigation measures, and other environmental commitments and quality standards.

5.1.4.2 Applicable National Policy, Legal and Regulatory Frameworks

The relevant national policy, legal and legislative frameworks (Table 5.1-2) applicable to the project are:

Table 5.1-2 Relevant National Policy, Legal and Legislative Frameworks

Laws and regulations	Overview
Environmental Regulations 2002 And Environment (Prescribed Activities) Regulation 2002	The Environmental Regulations 2002 define the procedures and requirements for obtaining an environmental permit for any undertaking in PNG. These regulations provide details on Screening, Scoping, the Environmental Impact Assessment process, Environmental Management Plans as well as grievance procedures and other matters related to this Project. These procedures require that the resultant Environment Permit (EP) Application) be submitted to the CEPA for review and be approved in order to obtain an Environmental Permit, which allows the Project to proceed from an environmental standpoint.
Environment (Fees and Charges) Regulation 2002	The Fees and Charges under Environment Act 2000 and Environment Regulation 2002 sets out the fee regime for processing and environmental permits. This instrument will therefore provide a specific amount to be paid for processing and permit fees of the project.
ENVIRONMENT ACT 2000 WATER QUALITY CRITERIA FOR AQUATIC LIFE PROTECTION	Water quality criteria are provided here to ensure water quality is protected from adverse impacts from any earth works and developmental activities.
Environment (Water Quality Criteria) Regulation 2002	The Water Use Regulations, 2002 list activities for which a water use permit is required, and this includes domestic, commercial, municipal, and industrial water use among others. The Regulations also prescribe the raw water charges and processing fees to be paid by prospective water users with respect to the water use permits. The Water Use Regulations 2002 prohibits the use of water resources without authority from the CEPA. The Environment Permit covers the Water Use Permit which was repelled by the new Environment Act and the Environment Regulation 2002.

Source: Prepared by JICA Survey Team

5.1.4.3 Gap Analysis with JICA Guidelines for Environmental and Social Considerations

The results of the comparison between the JICA Environmental and Social Guidelines and the legal system of PNG are shown in Table 5.1-3. This project is classified as "Category B" because it does not fall under the sensitive sectors, characteristics, or areas listed in the "JICA Guidelines for Environmental and Social Considerations" (January 2022), and its adverse environmental impacts are judged not to be significant.

Table 5.1-3 Comparison of JICA Guidelines on Environmental and Social Considerations in EIA Procedures and the PNG Legal System

Item		JICA Guidelines	Laws and Regulations Relating to the Country of PNG	Comparative Analysis and Proposed Solutions
1	Basic Principles	• Environmental and social impacts caused by projects must be assessed and examined at the earliest possible planning stage. Alternatives or mitigation measures must be examined, in order to avoid such impacts as much as possible, and to minimize, reduce or mitigate them when such avoidance is impossible. The result of the examinations must be reflected into the project plan. • Such examinations must be endeavored to include an analysis of environmental and social costs and benefits in the most quantitative terms possible, as well as a qualitative analysis, and to be in a close harmony with the economic, financial, institutional, social, and technical analyses of projects. • The findings of the examination of environmental and social considerations, including alternatives and mitigation measures, must be documented as an independent document or as a part of other documents. Environmental assessment reports must be prepared for projects with potential significant impacts. • For projects which may have significant impacts in particular, or for controversial projects, a committee of experts may be formed so that projects may seek their opinions, in order to increase accountability.	• The Environment Act 2000 mandates reasonable measures to minimize environmental harm and sets adverse effect mitigation as a primary goal. Registration for activities is required one month prior to starting preparatory work. • The Act requires qualitative analysis by defining environment to include social, economic, and cultural conditions [21(e)]. The EIS must cover social impacts [53,107(b)]. Quantitative limits for water quality criteria are also established [291(1),294]. • An EIA process and EIS submission are mandated for Level 3 activities [50(1)]. All reports must be recorded in a public Register [131(1)] and be available for inspection by any person [244(2)]. • The Environment Council is established with experts (including social impact assessors) [17(1),59(f)]. The Council reviews EISs and provides a mandatory recommendation for major activities [58(1),123(1)]. Working Committees of experts can be appointed [69(1),24(1)].	• No significant divergences are observed. • Implemented in line with the requirements of the JICA guidelines.

Item		JICA Guidelines	Laws and Regulations Relating to the Country of PNG	Comparative Analysis and Proposed Solutions
2	Examination of Measures	• Multiple alternatives must be examined in order to avoid or minimize adverse impacts by the project and to choose better project options in terms of environmental and social considerations. In the examination of measures, priority is to be given to avoidance of environmental impacts. When this is not possible, minimization, reduction, and then mitigation of the impacts must be considered, n accordance with the mitigation hierarchy. Compensation measures must be examined only when significant impacts are still remained even with the aforementioned measures. • Appropriate plans and systems for measures, such as monitoring plans and environmental management plans, must be prepared. The costs of implementing such plans and systems, and the financial methods to fund such costs, must be determined. For projects with particularly significant impacts, detailed environmental management plans must be prepared.	• The Environment Act 2000 establishes avoidance and mitigation of adverse effects [38(e),12(b)] as core objectives and enforces the mitigation hierarchy by requiring persons to take "all reasonable and practicable measures to prevent or minimize the environmental harm" [44(1)]. The Director accepts an EIS only if satisfied that "all reasonable steps will be taken to minimize environmental harm" [117(b)]. Compensation is clearly provided for under the Act [174(a),(b)]. • The Environment Act 2000 mandates the preparation and execution of an environmental management programs (EMP) [26,132(d)] and requires monitoring and reporting on its progress [132(c)] as permit conditions. The Act addresses costs by establishing Charges, imposing Environmental Bonds to ensure compliance, and aiming to allocate the costs of environmental protection [39(g)].	• No significant divergences are observed. • Implemented in line with the requirements of the JICA guidelines.

Item		JICA Guidelines	Laws and Regulations Relating to the Country of PNG	Comparative Analysis and Proposed Solutions
3	Scope of Impacts to Be Assessed	• The impacts to be assessed with regard to environmental and social considerations include impacts on human health and safety, as well as on the natural environment, that are transmitted through air, water, soil, waste, accidents, water use, climate change, biodiversity, and ecosystem services, including trans-boundary or global scale impacts. These also include social considerations such as: Migration of population including involuntary resettlement, local economy such as employment and livelihood, utilization of land and local resources, social institutions such as social capital and local decision-making institutions, existing social infrastructures and services, vulnerable social groups such as poor peoples and indigenous peoples, equality of benefits and losses and equality in the development process, gender, children's rights, cultural heritage, local conflicts of interest, infectious diseases such as HIV/AIDS, and working conditions including occupational safety. • In addition to the direct and immediate impacts of projects, derivative, secondary, and cumulative impacts as well as impacts associated with indivisible projects are also to be examined and assessed to a reasonable extent. It is also desirable to consider the impacts through a project life cycle.	• The Environment Act 2000 mandates comprehensive scope, defining environment to include social, economic, and cultural conditions [21(e)], people and communities [20(a)], and explicit protection for traditional social structures [40(a)] and biological diversity [41(c)]. Physical impacts must cover broad contaminants, including noise and radioactivity. Health and safety protection are addressed via the Regulations [253(w)] and requirements for Emergency Response Plans [133(h)] • The Environment Act 2000 explicitly requires the consideration of indirect and cumulative effects through its definition of "environmental harm," which includes harm resulting from the combined effects of acts or omissions [23(a)(i), (ii)]. Life cycle consideration is ensured through permit conditions requiring the preparation of an Environmental Management Program (EMP) [26,132(d)], periodic audits [133(g)], and plans for rehabilitation of the affected area [134(l)].	• No significant divergences are observed. • Implemented in line with the requirements of the JICA guidelines. • The assessment of impacts is weighed out and considered as "significant" or insignificant based on the assessment views from CEPA officers. • Assessments are incorporated as EIS or EP Approval Conditions that the project proponent could use to minimizing the extend of the impacts. Mitigative measures are spelt out for proponent to apply or use a better technology that eases the adverse environmental impacts.

Item		JICA Guidelines	Laws and Regulations Relating to the Country of PNG	Comparative Analysis and Proposed Solutions
4	Compliance with Laws, Standards, and Plans	• Projects must comply with the laws, ordinances, and standards related to environmental and social considerations established by host country governments, including local governments. Projects must also conform to the environmental and social consideration policies and plans of the host country governments. • In principle, Projects must be undertaken outside of areas that are specifically designated for conservation of nature or cultural heritages by the host country governments, unless the main purpose of the Projects is to promote or restore the protection of such areas. Also, projects shall not cause significant adverse impacts on such designated conservation areas.	• The Environment Act 2000 requires projects to comply with the Act itself and its Regulations and policies. Permits must ensure consistency with all relevant Environment Policies and Regulations [117(c),129(a)]. Furthermore, governmental authorities are restrained from issuing approvals that would breach this Act [101(1)]. • The Environment Act 2000 recognizes as a Matter of National Importance the "protection of areas of significant biological diversity" [41(c)]. It ensures assessment considers impacts on beneficial values relating to an area of high conservation value [33(b)]. Furthermore, environmental harm is classified as Serious Environmental Harm if it causes detriment to beneficial values relating to an area of high conservation value. The EIA process is designed to prevent activities that cause Serious Environmental Harm [97(b),105(c),42(2)].	• No significant divergences are observed. • Implemented in line with the requirements of the JICA guidelines.
5	Social Acceptability	• Projects must be adequately coordinated so that they are accepted in a socially appropriate manner for the countries and areas where the projects are planned. For Projects with potentially significant environmental and social impacts, sufficient consultations with local stakeholders, such as local residents, must be conducted via disclosure of information at an early stage, at which time alternatives for project plans are examined. The outcome of such consultations must be incorporated into the project plans. • Appropriate considerations must be given to vulnerable social groups, such as women, children, elderly peoples, people in poverty, indigenous peoples, persons with disabilities, refugees, internally displaced persons, and minorities. Such vulnerable social groups are susceptible to environmental and social impacts and may have little access to decision-making processes within society.	• The Environment Act 2000 secures public consultation for proposed Level 3 activities [55(1)], requiring proponents to make information available and hold public presentations [55(2)]. Disclosure occurs early, with public access to the Register containing key documents and submissions [131(2),244(2)]. The Council must incorporate public submissions and expressed views [58(2)(k),121], and the Director may require the EIS to be amended to address issues raised [55(6)]. • The Environment Act 2000 mandates consideration of "people and communities" [20(a)] and social, economic, and cultural conditions [21(e)] in EIA. Authorities must recognize the preservation of traditional social structures [40(a)] and aim to ensure that proper weight is given to equity considerations [37(d)], providing a broad mandate for addressing groups disproportionately affected. Customary rights to the use of water are specifically protected [79(2)].	• No significant divergences are observed. • Implemented in line with the requirements of the JICA guidelines.

Item		JICA Guidelines	Laws and Regulations Relating to the Country of PNG	Comparative Analysis and Proposed Solutions
6	Climate Change	• For projects that are expected to generate more than a certain amount of greenhouse gas emissions, the total amount of greenhouse gas emissions will be estimated and disclosed before the project implementation.	• The Environment Act 2000 defines "contaminant" broadly to include gases [17(a)], and Regulations may be made to regulate the release of any contaminant [249(e)]. The Act requires recognition of international treaty obligations relating to the environment [40(j)]. The EIA process requires the EIS to set out all physical impacts [53,107(b)].	• No significant divergences are observed. • Implemented in line with the requirements of the JICA guidelines.
7	Biodiversity	• Projects must not involve significant conversion or significant degradation of critical habitats or critical forests. • Illegal logging of forests must be avoided. Project proponents need to obtain logging permits from regulatory agencies, and are encouraged to obtain forest certifications for forestry projects, in order to ensure the prevention of illegal logging.	• The Environment Act 2000 explicitly recognizes the "protection of areas of significant biological diversity" [41(c)] as Matters of National Importance. Detriment to beneficial values related to an "area of high conservation value" [33(b)] is defined as Serious Environmental Harm [33(b)], which Level 3 activities must avoid [42(2),97(b),105(c)]. • The Environment Act 2000 regulates activities for the purpose of extracting or harvesting natural resources [95(c),41(1)(c)] and mandates that carrying out such an activity requires an Environment Permit [97,44(1)]. Carrying out an activity without a permit constitutes an offense [97,44(1)].	• No significant divergences are observed. • Implemented in line with the requirements of the JICA guidelines.

8	Involuntary Resettlement and Loss of Livelihood	• Involuntary resettlement and loss of means of livelihood are to be avoided when feasible by exploring all viable alternatives. If avoidance is not possible even after such examination, effective measures to minimize impacts and to compensate for losses must be taken upon agreement with the affected people. • Project affected people, such as people to be resettled involuntarily and/or people who may lose their livelihoods by the project, must be provided sufficient compensations and supports by the project proponents in a timely manner. Compensations must be calculated at full replacement cost as much as possible, and provided in advance. Project proponents must make efforts for the affected people to improve or at least restore their standards of living, income opportunities and production levels to the pre-project levels. Measures to achieve this may include: Providing land or monetary compensations for losses of land or assets, supporting for alternative sustainable livelihood, supporting for expenses necessary for relocation, and supporting for re-establishment of communities at resettlement sites. • Compensation standards are disclosed and consistently applied. The project affected persons need to be aware of the compensation standards. In principle, the contents of the individual compensation to be agreed are explained to the project affected persons in writing, and the project affected persons can confirm the contents at any time. • Appropriate participation of the project affected people and their communities must be promoted in the planning, implementation and monitoring of measures against involuntary resettlement and loss of livelihood. • For projects that result in large-scale involuntary resettlement, a Resettlement	• The Environment Act 2000 mandates the general environmental duty to prevent or minimise environmental harm [44(1)], and compensation must be paid for the deprivation of the use and enjoyment of the surface of the land or any part of it, or of rights to water customarily associated with the land [174(a)], and for damage consequential on the holder's use or occupation of the land [174(d)]. Compensation agreements may be reached with the affected person [176(4)] or determined by the Director if no agreement is reached [176(6), (7)]. The purpose of the Act is to avoid, remedy or mitigate any adverse effects of activities [12(b)], aligning with the avoidance and mitigation hierarchy. • The Environment Act 2000 establishes liability for compensation to owners, occupiers, and persons with customary rights in private land [173(1)]. Compensation is mandated for the deprivation of the use and enjoyment of the surface of the land or customary rights to water [174(a)] and for damage to property or flora/fauna [174(b)]. The Director determines the amount and form of compensation and the time for payment [176(7)]. Payment of the determined amount is an ongoing condition of the permit [179(11)], and failure to pay compensation is grounds for permit suspension or cancellation [140(f)]. • The Environment Act 2000 aims to regulate activities in an open and transparent manner and ensures consultation occurs [39(i)]. Compensation agreements must be signed by the parties and lodged with the Director [176(5)]. The Director maintains a Register [131(1)] which is made available for inspection by any person [244(2)]. • The Environment Act 2000 promotes participation by ensuring consultation occurs with persons and bodies who are likely to be affected [39(i)]. The EIA process secures public consultation via Public Review and Submissions [55(1)], requiring the proponent to hold public presentations [55(2)]. Monitoring is required through permit conditions [132(c)], and reports are lodged in the public Register [244(2)].	• Minor divergence observed • The Act does not explicitly mandate compensation at "full replacement cost" or specify the goal of improving or restoring standards of living to pre-project levels. • The Act does not explicitly require a dedicated Resettlement Action Plan (RAP) document, nor does it specify that information must be provided in languages and forms understandable to the affected persons for resettlement. • The Act does not explicitly require a dedicated Resettlement Action Plan (RAP) document, nor does it specify that information must be provided in languages and forms understandable to the affected persons for resettlement.

Item		JICA Guidelines	Laws and Regulations Relating to the Country of PNG	Comparative Analysis and Proposed Solutions
		Action Plans (RAP) must be prepared and made available to the public prior to the resettlement and provision of compensation and support. In preparing the RAP, consultations must be held with the project affected people and communities, based on sufficient information made available to them in advance. When consultations are held, explanations must be given in languages and forms that are understandable to the project affected people. It is desirable that the RAP includes elements laid out in the Environmental and Social Standard (ESS) 5 of the World Bank's environmental and social policies.		

Item		JICA Guidelines	Laws and Regulations Relating to the Country of PNG	Comparative Analysis and Proposed Solutions
9	Indigenous Peoples	• Any adverse impacts that a project may have on indigenous peoples are to be avoided when feasible by exploring all viable alternatives. If avoidance is not possible even after such examination, effective measures for indigenous peoples must be taken to minimize the impacts and to compensate for the losses. • When projects may have adverse impacts on indigenous peoples, all of their rights in relation to land and resources must be respected in accordance with the spirit of the relevant international declarations and treaties, including the United Nations Declaration on the Rights of Indigenous Peoples. Efforts must be made to obtain the Free, Prior, and Informed Consent (FPIC) of the affected indigenous peoples. • Measures for the affected indigenous peoples must be prepared as an Indigenous Peoples Plan (IPP), which may constitute as a part of other documents for environmental and social considerations, and must be made public in compliance with the relevant laws and ordinances of the host country. In preparing the IPP, efforts must be made to obtain the FPIC of the affected indigenous peoples based on sufficient information made available to them in advance. When consultations are held, explanations are given in languages and forms that are understandable to the indigenous peoples concerned. It is desirable that the IPP includes the elements laid out in the ESS 7 of the World Bank's environmental and social policies.	• The Environment Act 2000 prioritizes the avoidance and mitigation of adverse effects [12(b),38(e)] and requires the proponent to take all reasonable measures to prevent or minimise environmental harm [44(1)]. The Act specifically recognizes the preservation of traditional social structures [40(a)] and the maintenance of sources of water and subsistence food sources to maintain traditional lifestyles [41(b)]. Compensation is mandated for the deprivation of customary rights to the use of water or land [174(a)]. • The Environment Act 2000 includes, as an objective, carrying into effect obligations under any international treaty or convention relating to the environment. The Act specifically recognizes the role of land-owners in decision-making about the development of resources on their land , and it protects customary rights to the use of water or land. • The Environment Act 2000 mandates the preparation of an EIS detailing social environmental impacts [107(b)] and a public consultation process via Public Review and Submissions [55(1)], with documents placed in the public Register [244(2)]. Consultation requires public presentations [55(2)(c)], ensuring early information disclosure. Compensation agreements related to customary rights must be signed by the parties and lodged with the Director [176(5)].	• Minor divergence observed. • The PNG Act and its excerpts do not explicitly mandate efforts to obtain Free, Prior, and Informed Consent (FPIC) from affected indigenous peoples. • Appropriately implemented in line with the requirements of the JICA guidelines.

Item		JICA Guidelines	Laws and Regulations Relating to the Country of PNG	Comparative Analysis and Proposed Solutions
10	Monitoring	• During the project implementation, project proponents monitor whether any unforeseeable situations occur, and the performance and effectiveness of the planned mitigation measures. Project proponents take appropriate measures based on the results of such monitoring. • In cases where sufficient monitoring is deemed essential for appropriate environmental and social considerations, such as projects for which mitigation measures should be implemented while monitoring their effectiveness, Project proponents must ensure that the project plans include feasible monitoring plans. • Project proponents should make efforts to make the monitoring results available to local stakeholders involved in the project. • When third parties point out specifically that environmental and social considerations are not being fully undertaken, project proponents should make efforts to reach an agreement on the procedures to resolve the problems, through forums for discussions and examinations of the countermeasures with participation of stakeholders involved in the projects, based on sufficient information disclosure.	• The Environment Act 2000 mandates that permits require monitoring and reporting [132(c)] and carrying out an environmental management programme (EMP) [132(d)] which must include corrective action. The Director may require an Environmental Improvement Plan [133(f),75] and periodic audits [133(g)]. The Director is required to ensure the proponent takes appropriate measures for protecting and restoring the environment [56(f)]. • The Environment Act 2000 aims for open and transparent regulation [39(i)] and requires the Director to maintain a public Register [131(1)] containing monitoring and management reports [244(p)]. The Register must be made available for inspection by any person [244(2)], ensuring public access.to the monitoring results. • The Environment Act 2000 aims to regulate activities in an open and transparent manner and ensures consultation occurs with persons and bodies who are likely to be affected [39(i)]. The EIA process includes mandatory mechanisms for Public Review and Submissions [55(1)], requiring proponents to hold public presentations for affected persons [55(2)]. If environmental harm is caused or threatened, the Director can issue an Environment Protection Order [101(1)] or a Clean-up Order [103(1)] to force corrective action [105(1)]. Any person dissatisfied with a decision can apply for a review by the Environment Council [68(1), 109(1)], where the Council must have regard to public submissions and expressed views when making its recommendation. This provides a formal avenue for third parties to seek resolution and redress.	• No significant divergences are observed. • Implemented in line with the requirements of the JICA guidelines

Item		JICA Guidelines	Laws and Regulations Relating to the Country of PNG	Comparative Analysis and Proposed Solutions
11	Grievance Redress Mechanism	• A mechanism for handling concerns and grievances from people and communities affected by the project's environmental and social impacts must be in place. • The grievance redress mechanism needs to be easily accessible for the project affected people and communities. Project proponents disseminate the information about the grievance redress mechanism through consultations with local stakeholders. The project affected people and communities must not be disadvantaged by filing a grievance. • Project proponents should make efforts to respond promptly to the grievances they receive, taking into account the concerns and needs of the project affected people and communities.	• The Environment Act 2000 provides multiple formal mechanisms for affected parties to raise grievances and seek redress or review of decisions. This includes the right to apply for a review by the Environment Council [136(1),68(1)]. Affected persons may apply to the Director to determine compensation [176(6)]. Failure by the permit holder to pay compensation is grounds for permit suspension or cancellation [140(f)]. All key documents are lodged in the public Register [244(2)]. The Act requires regulation in an open and transparent manner and ensures consultation occurs [39(i)].	• Minor divergence observed. • The Act does not explicitly detail a specific "grievance redress mechanism" managed by the project proponent or require the dissemination of information about such a mechanism. Consequently, the available recourse is primarily through formal administrative and legal review processes (e.g., Council review, compensation determination), creating a gap with the Guideline's requirement for an accessible, project-level GRM. • Implemented in line with the requirements of the JICA guidelines.

12	Information Disclosure	• In principle, project proponents disclose information about environmental and social considerations of their projects. JICA assists the project proponents through implementing cooperation projects as needed. • JICA discloses important information about environmental and social considerations at the key stages of cooperation projects, in an appropriate manner in accordance with the JICA Guidelines. • JICA discusses and agrees with project proponents on the frameworks that ensure information disclosure at the early stage of cooperation projects. • The information to be disclosed has to include environmental and social considerations, as well as the project information. • In addition to the information to be disclosed, JICA provides information about environmental and social considerations to third parties to the extent possible in response to their requests. • JICA actively encourages project proponents to disclose and present information about environmental and social considerations of their projects to local stakeholders. • Project proponents disclose information well in advance when they have consultations with local stakeholders in cooperation with JICA. On such occasions, JICA supports project proponents in preparation of documents in an official or widely used language(s) and in a form understandable by local peoples. • JICA discloses information on its website in Japanese, English, official language(s) and/or language(s) widely used in the host countries. It also provides the relevant reports for public reading at the JICA library and at related overseas offices. • JICA pays due consideration to the confidentiality of the commercial and other matters of project proponents, taking into account their competitive	• The Environment Act 2000 aims to regulate activities in an open and transparent manner [39(i)]. Proponents must disclose information via Public Review and Submissions [55(1)], and may be directed to hold public presentations [55(2)]. Disclosure occurs at an early stage and must detail physical and social environmental impacts [53,107(b)]. The Director maintains a public Register [131(1)] containing key assessment documents, which is available for inspection by any person [244(2),244(p)]. • The Environment Act 2000 mandates that the Director maintains a public Register [131(1)] containing key documents, which is made available for inspection by any person [244(2)]. • The Environment Act 2000 mandates the protection of commercial confidentiality. The Director must exclude confidential information relating to trade secrets or business/financial nature before public disclosure [115(5)]. The Director cannot require the provision of such confidential information [154(3)(a),(b)], and unauthorized disclosure is an offense [246(7)].	• Partial Divergence Observed. • Provisions regarding JICA's disclosure media (website, library, overseas offices) or specific languages are not contained in the PNG legislation. • Project Proponent are required to provide information on environmental and social considerations, including project information, to local stakeholders, • At the public hearing, explanations will be given in English as well as in the local language. • Landowners and public communities are always given chance in Pidgin and English and so information on the EIS and EP are clearly outlined in the public forum. • Implemented in line with the requirements of the JICA guidelines.

Item		JICA Guidelines	Laws and Regulations Relating to the Country of PNG	Comparative Analysis and Proposed Solutions
		relationships. JICA encourages project proponents to exclude confidential information from any documents on environmental considerations that they submit which may later be subject to public disclosure. JICA takes into account the management of information of project proponents, and discloses their documents subject to their approval. Any information that is prohibited from public disclosure in the agreement documents between JICA and project proponents may be disclosed only upon obtaining the approval of the project proponents or in accordance with legal requirements.		

Source: Prepared by JICA Survey Team

CHAPTER 6. Alternative Analysis (including Zero Option (Without Project Case))

6.1 Consideration of Alternatives

Two (2) main alternatives have been considered. These are:

- ”No Project”
- Project Development.
    - Landslide Prevention Civil Works
    - Road and Bridge Upgrade and Maintenance Works

Two main alternative options were considered. Since there are buildings such as shops around the existing road right-of-way, it is difficult to consider multiple alignment options; therefore, the alternatives are limited to the following two:

- "No Project" Option (not implementing the project)
- "Project Implementation" Option (implementing the project)

6.1.1 “No Project” Option

The proposal assumes that the status quo is maintained. The project section plays an important transport role but is not able to cope with economic growth and population increase.

They lack the capacity to cope with increased traffic volumes during peak periods. As a result, future traffic congestion will increase, access to business areas will become more difficult, time and fuel wastage will increase, and the environment will be adversely affected.

6.1.2 “Project Implementation” Option

This option envisages widening the road to two lanes with better drainage, raising the road level height by one meter (1m) and construction of new permanent drainages on both sides of the 2.4km road, new bridges over 2 big creeks; the Karavi and Rangina rivers. The current road width of 20m shall be maintained. It is expected that the traffic capacity will increase but the improvement of this section of the road would reach high efficiency of traffic flows between Kokopo and Rabaul.

Furthermore, it will contribute to sustainable urban development, economic growth, and enhanced connectivity within the East New Britain Province. In addition, vehicle emissions and road dusts will be significantly reduced

Meanwhile, the road design was carried out to avoid impacts on structures in residential areas as much as possible, while making maximum use of the existing road alignment.

Source: Prepared by JICA Survey Team

Figure 6.1-1 Configuration of Road Alignment

Furthermore, considering the risk of inundation and road closures on the current road during heavy rain and floods, this project has formulated low-cost disaster prevention and flood resistance measures for bridges and river channels as shown in Table 6.1-1.

Table 6.1-1 Alternative Disaster Prevention and Flood Resistance Measures (Risk Avoidance and Adaptation) for Bridges and River Channels

Category	Measure Name	Key Details	Characteristics / Considerations	Cost	Adopted
1) Flow Capacity Security	Widening Bridge Opening	Increase the spacing between piers to secure the flow cross-section during floods without raising the girder height.	・ Requires changes to the superstructure, but manageable by revising abutment/pier positions. ・	Potential High Cost (Superstructure changes / increased construction cost)	-

			Suppresses flow velocity concentration upstream.		
1) Flow Capacity Security	Gradual Overflow Structure for River Crossing	Design a section of the structure to allow planned overflow during floods, preventing direct impact on main girders.	・ Structure designed to release fluid force by allowing inundation. ・ Reduces traffic interruption time.	High Cost (Increased design and construction management burden)	-
2) Foundation Protection	Reinforcement of Riprap and Footing Protection	Install large gravel or block mats around foundations and piers to suppress scouring.	・ High on-site constructability and easy maintenance. ・ Applicable to existing bridges.	Medium Cost (Material and construction costs)	-
2) Foundation Protection	Introduction of Bed Armoring (Mattress) Method	Lay a protective layer (crushed stone/mats) over the entire riverbed to prevent localized scouring.	・ Effective in sections with high flow velocity changes. ・ Requires deformation checks during periodic inspections.	Medium Cost (Material, construction, and inspection costs)	-
3) Channel Stabilization	Installation of Riverbed Stabilization Works (Ground sills / Guiding levees)	Control the main flow during floods to prevent fluid concentration on bridge piers.	・ Construction upstream rather than directly under the bridge eliminates the need for girder height changes.	Low Cost (Suppresses construction costs by avoiding girder height changes)	✓
3) Channel Stabilization	Construction of Sediment Ponds and Retarding Basins	Temporarily store sediment and driftwood during peak flood periods.	・ Reduces sediment impact on the bridge section. ・ High affinity with the river improvement works of this project.	Low Cost (Consistent with existing river improvement, easy maintenance)	✓
4) Maintenance and Operation	Regular Driftwood Removal and Sediment Inspection	Promptly remove blockages or deposits after heavy rain.	・ Low cost as a non-structural measure.	Low Cost (Reduces disaster risk through periodic management)	✓

Source: Prepared by JICA Survey Team

From the above, Table 6.1-2 shows that the advantages of the 'implement the project' proposal significantly outweigh the disadvantages of the 'do not implement the project' proposal, so the preferred alternative is the 'implement the project' proposal.

Table 6.1-2 Summary of Merits and Demerits With and Without Project Implementation

Idea	Implementing Projects	No Project Implementation
Merits	- Increased traffic capacity- Ease of traffic	- No additional budget or resources

	congestion- Traffic efficiency- Sustainable development- Promoting economic growth- Improved connectivity- Reduction of emissions	required- No need to rehabilitate or widen existing roads
Demerits	- Additional budget and resources required- Existing roads need to be rehabilitated	- Inability to cope with increased traffic- Future traffic congestion- Difficulty in accessing business areas- Waste of fuel and time- Negative impact on the environment
Recommendation	✓	-

Source: Prepared by JICA Survey Team

CHAPTER 7. Scoping

7.1 Scoping Results

The results of the scoping of impact items due to the project, extracted based on the JICA Guidelines for Environmental and Social Considerations and the Papua New Guinean EIA preparation policy, are presented in Table 7.1-1.

Table 7.1-1 Scoping Results for Environmental Impact Items

Category	No.	Impacted Item on JICA Guidelines	Rating At scoping stage		Reasons for the Rating
			Pre/ During Construction	Operation Phase	
Pollution	1	Air pollution	✓	✓	Co: Temporary negative impacts on air quality are anticipated due to earthwork construction, the operation of construction vehicles, and the use of construction machinery and equipment O: Increased traffic volume is expected and will increase emissions in the atmosphere. However, improved roads can lead to reduced congestion and reduced emissions.
	2	Water pollution	✓	-	Co: Earthworks and excavation activities close to the streams for road works and culvert construction may generate turbid water. Additionally, there is a potential risk of discharge from the campsite into nearby water bodies. Water pollution may temporarily occur due to (i) runoff from construction sites (ii) wastewater from campsite and construction sites, and (iii) spills of toxic materials such as oil and lubricants. O: Light impacts are expected because of the improved drainage facilities which can manage stormwater runoff more effectively, reducing the risks of pollutants entering water bodies. Also, riverine vegetation will be preserved.
	3	Waste	✓	-	Co: Construction activities are expected to produce waste, including soil, debris and vegetation clearing. Furthermore, domestic waste is likely to be generated from the contractor's campsite and construction site as well. O: Light impacts are expected because of reduced congestion and increase commercial activities which could potentially increase waste within the project area.
	4	Soil contamination	✓	-	Co: The soil excavated at the site may be contaminated. Also, stored or spilt construction materials like oil, grease and chemicals could further pollute the soil at the construction locations. O: No impacts are anticipated since construction activities will cease. However, there will be serious impacts if soil contamination happens at the construction stage and effective mitigation measures are not implemented.
	5	Noise and vibration	✓	✓	Co: Construction activities involving heavy machinery and equipment movement are anticipated to generate noise and vibration. O: Improved traffic flow comes with increased traffic volume and higher travelling speeds are anticipated to result in greater noise and vibration levels
	6	Ground subsidence	-	-	Co and O: Geological surveys have identified any soft ground in the project area and measures will be taken to address it, so there will be no impact.
	7	Odour	-	-	Co: Unpleasant odours may arise from domestic waste and construction materials at the campsite. Chemicals and materials such as asphalt, sealants and other construction chemicals used in road construction can emit strong odours during and after application. Intense commercial activities are also expected to generate some waste on site. O: No impacts are expected at the operations phase.
	8	Sediment quality	-		Co: There are about 2 streams and 3 drainages on the

Category	No.	Impacted Item on JICA Guidelines	Rating At scoping stage		Reasons for the Rating
			Pre/ During Construction	Operation Phase	
				✓	corridor. Earthworks and the frequent movement of heavy machinery will disturb the soil structure, making it more prone to erosion. Oil and chemical spills, as well as improper disposal of waste, particularly wastewater from camps and construction sites, can contaminate the sediment. Additionally, the removal of trees and vegetation destabilised the soil, increasing runoff and sediment transport into nearby streams. O: Light impacts are expected with the operation of the road; however, landscaping the corridor, which is a likely mitigation measure to be proposed, will help stabilise the soil and reduce erosion.
Natural environment	9	Protected area	-	-	Co: The road alignment passes through the Malapao Plantation and a historical burial site near Kuradui located 100m of away from the road corridor. O: No impacts to any legally protected natural areas, Important Bird Areas (IBA), or Key Biodiversity Areas (KBA) are expected at the operational phase. Burial site is not a projected site
	10	Ecosystem	✓	✓	Co: Since the project alignment passes through the forest, there is the potential of impacting the surrounding ecosystem through loss of habitat, food and breeding ground. Also, the construction activities, including noise, vibration, and the generation of turbid water in nearby streams, may affect the local environment. The development of a campsite may also cause disturbances to the surrounding ecosystem. O: The presence of structures such as drainage systems and culverts, along with traffic flow generating noise and vibrations, shall have minimal disturbance for a sparsely populated insect and faunal species that use the project area as a feeding ground and find shelter. The road corridor is highly disturbed and it is anticipated that occurrence of any protected species is none existence.
	11	Hydrology	✓	✓	Co and O: The road expansion works are likely to change the hydrological condition within the project area. The construction of drainage and culverts can redirect water flow.
	12	Topography and geology	-	-	Co and O: Considerable topography and geological impacts are not expected during the construction and operational phase of the project.
Social environment	13	Involuntary resettlement	✓	-	P: There were some small structures and less than 7 small local markets for selling garden produce and small store items and drink along the corridor will be impacted. It is also observed that there would minimal nil impact on the residence as there may be no house relocated. Also, there is no land acquisition expected as the RoW has already been established. Only some land used as garden will be impacted through drainage and bridge clearance. O: No impact is expected as there will be no resettlement or land acquisition after construction
	14	The poor	✓	-	P: The characteristics of the affected persons and communities have been assessed through surveys and questionnaires. O: No impact is expected as there will be no resettlement or land acquisition after construction.
	15	Indigenous and ethnic people	-	-	P: Indigenous Peoples or ethnic groups subject to World Bank OP 4.10 have not been identified. O: No impact is expected as there will be no resettlement or land acquisition after construction.

Category	No.	Impacted Item on JICA Guidelines	Rating At scoping stage		Reasons for the Rating
			Pre/ During Construction	Operation Phase	
	16	Local economy such as employment and livelihood	✓	✓	P: The livelihoods of commercial entities like trade stores within the RoW, including small fruits and food markets will likely be impacted. The traffic restrictions and roadblocks will also affect some local businesses. However, the project will create employment opportunities for some locals and boost the livelihood of some businesses due to the influx of workers in the project communities. The diversions created will also likely boost some livelihoods. O: Improved traffic flow enhances access to some established businesses, boosting livelihoods. However, reduced congestion negatively impacts hawking businesses, which rely on slow-moving traffic to thrive.
	17	Land use and utilisation of local resources	✓	-	P: Further studies will be required to assess the potential land use changes within the project corridor. The project will also assess further to determine utilising local labour, materials and services wherever possible. O: Minor impacts such as changes in land use are anticipated during the operational phase, especially after the relocation of some business operations during the pre-construction phase.
	18	Water usage	✓	-	Co: Water will be used to dampen the project corridor to reduce dust generated by construction activities, which can inconvenience people and impact their health. Additionally, the project will require water for construction purposes and will rely on local water sources within the project area O: No impacts are expected at the operations phase.
	19	Existing social infrastructures and services	✓	✓	P and Co: Some schools, guest house facilities, and utility infrastructure are located along the route and may be affected by the road construction. Construction activities could disrupt the operations of primary schools, guest houses and local trade stores. Traffic diversions and road closures will affect access to these facilities and commuting routes. The safety of commuters and facility users will also be impacted. O: The presence of the road and its supporting infrastructure will facilitate smooth traffic flow, benefiting commuters and facility users. Additionally, it will enhance commuter safety, particularly for school children, and improve the aesthetics of facilities and services along the stretch, making them more appealing to visitors.
	20	Social institutions such as local decision-making institutions	✓	-	P and Co: Diversion routes and the acquisition of the land for the siting of the construction campsite may be decided by the traditional authorities within the communities to ensure consideration for local needs and priorities. O: No impacts are expected at the operations phase.
	21	Misdistribution of benefit and damage	✓	✓	Co: Businesses located along the construction route may experience disruptions such as reduced access to customers, increased noise, dust, and limited parking O: Operational changes, such as traffic rerouting or restrictions like U-turns, could continue to affect businesses negatively. For example, reduced traffic flow or changes in customer access patterns may impact sales for businesses reliant on passing trade. Alternatively, some businesses will benefit from the improved access.
	22	Local conflict of interests	✓	-	Co: Residents and local authorities may demand employment opportunities from the project to ensure cooperation from them. O: No impact is expected in the operational phase.
	23	Cultural heritage	-	-	P and Co: Some monuments were identified at the roundabouts which will require further engagement and inquiries to establish the extent and degree of impacts on

Category	No.	Impacted Item on JICA Guidelines	Rating At scoping stage		Reasons for the Rating
			Pre/ During Construction	Operation Phase	
					cultural heritage. The influx of workers will likely affect some traditions and customs unknown to the visitors. O: The degree of impact is unknown at the operational phase as the potential relocation of some cultural assets may disrupt some cultural beliefs and customs.
	24	Landscape	✓	✓	Co: Some impacts are expected due to a portion of the Kumasi Forest and the lawns and horticultural businesses potentially being affected. O: The existence of the road and its ancillary infrastructure will have a positive impact on creating an aesthetically pleasing view.
	25	Gender	✓	✓	Co and O: The extent of impacts is unknown in terms of equal opportunities in employment. Also, there are no gender restrictions observed in the project area. Therefore, no impact is expected in the operational phase.
	26	Right of children	✓	✓	Co and O: Child labour issues were not observed within the project area however, child labour may occur at project sites or campsites. There are no impacts expected in the operational phase.
	27	Infectious diseases such as HIV/AIDS	✓	-	Co: The influx of construction workers and visitors to seek employment may lead to the spread of infectious diseases, such as STDs. Also, the earthworks through land cutting and filling could create habitats for mosquitoes, potentially increasing the risk of malaria transmission. O: There will be a potential influx of settlers and visitors which could potentially lead to the spread of infectious diseases as well
	28	Labour environment	✓	-	Co: Workers will be directly exposed to high dust, noise and vibration levels because they will work within the point of generation. Accidents are likely to happen at construction sites from the operation of heavy machinery, to handling materials and chemicals etc. Campsites will only be accessible to workers and the construction work environment must comply with relevant laws and regulations to keep workers safe. O: No impacts are expected because the campsite and construction activities will be decommissioned at the operational phase
Others	29	Accidents	✓	✓	Co: construction activities such as excavations and earthworks generate dust into the atmosphere and can reduce the visibility of road users. Construction vehicles present on the road can disrupt traffic flow and potentially cause accidents. O: Improved traffic flow means an increase in travelling speeds. The risk of traffic accidents on the new road is expected to increase due to higher travel speeds. The existence of traffic safety features will promote road safety.
	30	Cross-boundary impacts and climate change	-	-	Co: Greenhouse gas emissions are limited. O: Since it is a renovation of an existing road, there is no impact on current emission levels.

Note) Rating: ✓: Items subject to environmental and social impact assessment because impacts are expected to occur due to project implementation, or because it cannot be determined whether impacts will occur.
-: Light impact expected. Thus, baseline surveys and analysis are not necessary.
P: Pre-construction, Co: Construction, O: Operation,
Source: Prepared by JICA Survey Team

7.2 TOR of the Environmental and Social Considerations Survey

The survey methodology for the environmental items narrowed down by scoping is shown in Table 7.2-1 in the TOR (special specification).

Table 7.2-1 TOR of Environmental Impact Survey Items

Category	No.	Impacted Item on JICA Guidelines	Survey Item and Methodology	Forecast Methodology
Pollution	1	Air pollution	(1) Site measurement: 4 points (2) Item: PM2.5, PM10, Temperature, Humidity (3) Frequency: Once Note) Collection of Secondary data, if any	Puff Model or refer to other example case
	2	Water pollution	(1) Site measurement: 4 points (2) Item: temperature, pH, EC, TDS, Salinity Concentration, S.G, ORP (3) Frequency: Once Note) Secondary data collection, if any	Qualitative forecast
	3	Waste	(1) Site survey: Registered landfill site near project site (2) Item: Summary of the site (3) Frequency: Once Note) Secondary data collection, if any	Qualitative forecast
	4	Soil contamination	Interview, Secondary data collection	-
	5	Noise and Vibration	(1) Site measurement: 4 points (2) Item Ambient Noise: L_{Aeq}, 2 time slots /weekday (3) Frequency: Once Note) Secondary data collection, if any	Quantitative forecast (Traffic noise on the boundary and at sensitive receptor / L_{Aeq} dB(A))
	6	Ground subsidence	Not required	-
	7	Odour	Not required	-
	8	Sediment quality	Not required	-
Natural environment	9	Protected area	Not required	-
	10	Ecosystem	(1) Site survey: 200m each alongside the road (2) Item: Fauna and flora, ecosystem, considerable species such as listed species on IUCN list Fauna: Mammals, Birds, Reptiles, Amphibians, Aquatic life, insects and benthos Flora: Land plants and aquatic plants (3) Frequency: Once	Qualitative forecast
	11	Hydrology	No.2 results and Secondary data collection	Qualitative forecast
	12	Topography and geology	Boring data, Secondary data collection	Qualitative forecast
Social environment	13	Involuntary resettlement	Refer to the RAP Survey	Qualitative forecast
	14	The poor	Refer to the RAP Survey	Qualitative forecast
	15	Indigenous and ethnic people	Not required	-
	16	Local economy such as employment and livelihood	Refer to the RAP Survey	Qualitative forecast
	17	Land use and utilisation of local resources	Secondary data collection and field observation	Qualitative forecast
	18	Water usage	(1) Site survey: 500m range (2) Item: -Water utilisation on the site Note) Secondary data collection, if any	Qualitative forecast
	19	Existing social infrastructures and services	(1) Site survey: 1,000m range from the five bridges (2) Item: Distribution of public services and facilities such as hospitals, schools, religious places, community centres, etc.	Qualitative forecast

Category	No.	Impacted Item on JICA Guidelines	Survey Item and Methodology	Forecast Methodology
			(3) Frequency: Once Note) Secondary data collection, if any	
	20	Social institutions such as social infrastructure and local decision-making institutions	Refer to the RAP Survey	-
	21	Misdistribution of benefit and damage	Refer to local stakeholder meetings on IEE or RAP	Qualitative forecast
	22	Local conflict of interests	Refer to local stakeholder meetings on IEE or RAP	Qualitative forecast
	23	Cultural heritage	Not required	Qualitative forecast
	24	Landscape	(1) Site survey: Inquire about major sightseeing points (2) Item: Taking photograph (3) Frequency: Once	Photomontage
	25	Gender	Collect gender policy and regulation, Interview to village heads/key informants	Qualitative forecast
	26	Rights of children	Collect policies and regulations for child labour etc. Interview with village heads/key informants	-
	27	Infectious diseases such as HIV/AIDS	Refer to local stakeholder meetings on IEE or RAP And a collection of statistical data	Qualitative forecast
	28	Labour environment	Collect regulations on the construction workforce	-
Others	29	Accidents	Collect public data	Qualitative forecast
	30	Cross-boundary impacts and climate change	Not required	-

Source: Prepared by JICA Survey Team

CHAPTER 8. Result of Site Survey Based on Scoping

8.1 Scoping and TOR of the Environmental Survey

8.1.1.1 Baseline Survey and Methodology TOR

(1) Air Pollution

It is also anticipated that the road works will not cause a substantial change in the air quality. Any aerial emissions from exhaust fumes from earth moving machines, trucks and loader or light vehicles will be marginal and insignificant to cause human harm. The dusts particulates shall be controlled and minimized as they are watered down by use of spraying water truck.

There is also good wind and rainfalls throughout the day that would disperses and absorb any high concentrated air pollutants polluting the local air space. However, there is minimal air pollutants to affect the local community.

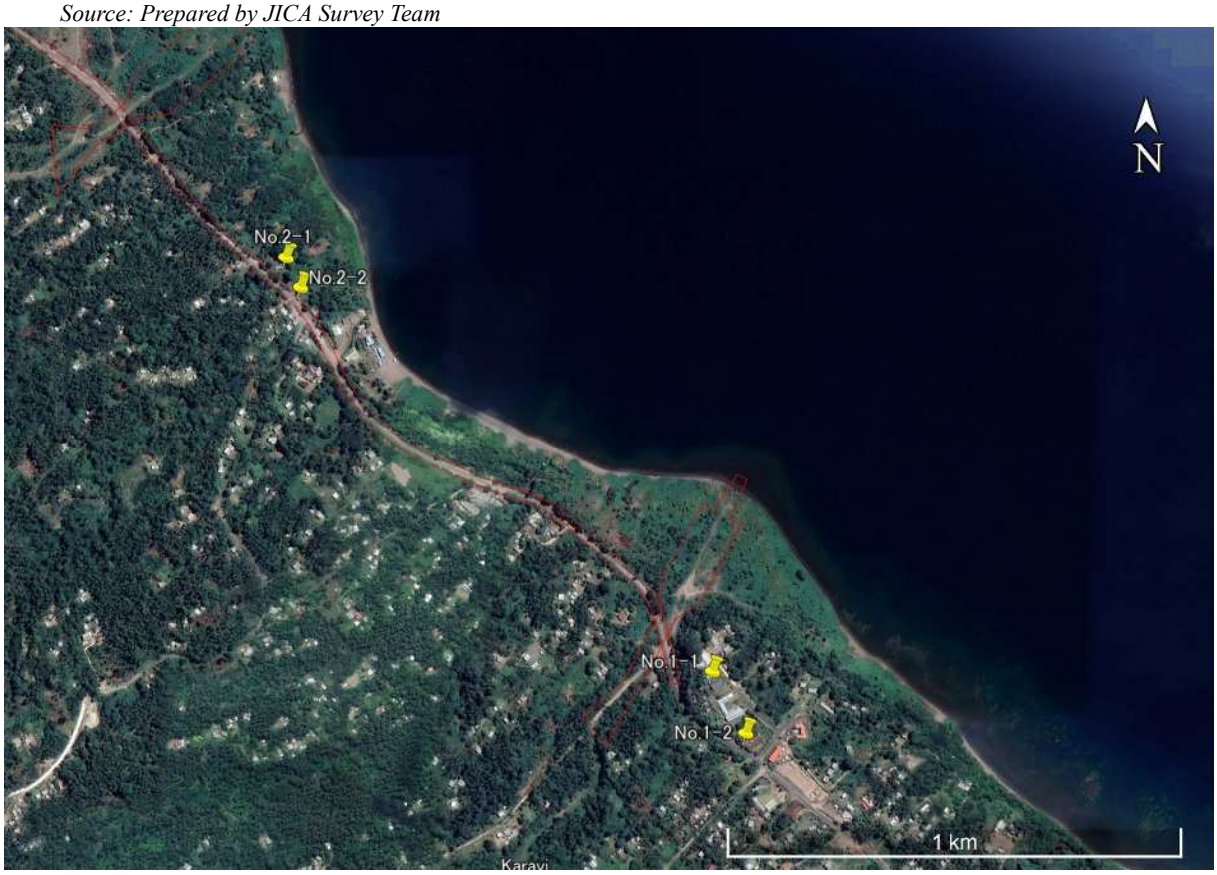
Survey sites are shown in Table 8.1-1 and Figure 8.1-1.

Table 8.1-1 Summary of Air quality, Noise Survey Sites

No.	Location	Area	Measured Photograph
1-1	Sir Martin Tovadek Clinic (Hospital)	Residential Area	
1-2	Butuwin Sub-Health Center (Bus Stop)	Road Side	
2-1	United Church	Residential Area	

No.	Location	Area	Measured Photograph
2-2	Malapau Service Station (Bus Stop)	Road Side	

Source: Prepared by JICA Survey Team



Source: Prepared by JICA Survey Team

Figure 8.1-1 Air Quality, Noise and Vibration Survey Sites

1) Result of Measurement

The air quality measurement results are shown in Table 8.1-2. Since there are no domestic standards in PNG, the measurement results were compared with IFC standards and Japanese standards.

All measurement results were within the reference values.

Table 8.1-2 Result of Air Quality Measurement

No.	Location	Area	Time	PM2.5 µg/m³	PM10 µg/m³	Temp ℃	Humidity %
No.1-1	Hospital	Residential Area	10AM, 21st May 2025	10	11	34	56
			15PM, 21st May 2025	10	11	32	59

No.	Location	Area	Time	PM2.5 µg/m^3	PM10 µg/m^3	Temp ℃	Humidity %
No.1-2	Hospital	Road Side (Bus Stop)	10AM, 21st May 2025	7	8	33	60
			15PM, 21st May 2025	11	12	34	55
No.2-1	United Church	Residential Area	10AM, 21st May 2025	5	6	32	55
			15PM, 21st May 2025	8	9	32	65
No.2-2	United Church	Road side (Bus Stop)	10AM, 21st May 2025	6	7	33	56
			15PM, 21st May 2025	17	19	34	60
IFC				10 (annual) 25 (24 hrs)	0.02 (annual) 0.05 (24 hrs)	-	-
Japan				15 (annual) 35 (24 hrs)	200 (1 hr) 100 (daily mean for hourly)	-	-

Source: Prepared by JICA Survey Team

In addition, as it was not possible to procure survey equipment locally and an environment for analyzing measurement results has not been established, Table 8.1-3 shows the measurement results obtained from the website (https://www.windy.com). These results satisfied both the IFC guideline values and the Japanese environmental standards.

Table 8.1-3 Result of Air Quality Measurement

No.	Location	Area	Time	NO2 (µg/m3)	SO2 (mg/m2)	O3 (µg/m3)	CO (ppb)	PM2.5 (µg/m3)	Temp ℃	Humidity %
No. 1-1	Hospital	Residential Area	6 AM,16th Jun 2025	0.93	6.41	17.15	82	3	25	90
			12 PM,16th Jun 2025	0.12	9.59	24.78	70	4	29	69
			6 PM,16th Jun 2025	0.73	10.39	18.16	73	3	27	86
			10 PM,16th Jun 2025	1.02	10.72	15.57	75	3	25	91
			6 AM,17th Jun 2025	0.66	10.13	18.78	72	2	25	89
			12 PM,17th Jun 2025	0.15	12.89	30	63	2	28	78
			6 PM,17th Jun 2025	1.12	14.4	23.85	70	3	26	87
			10 PM,17th Jun 2025	1.81	9.21	19.51	78	3	25	91
No. 1-2	Hospital	Road Side (Bus Stop)	6 AM,16th Jun 2025	0.93	6.4	17.14	82	3	25	90
			12 PM,16th Jun 2025	0.48	9.57	24.77	70	4	29	69
			6 PM,16th Jun 2025	0.89	10.38	18.15	73	3	27	86
			10 PM,16th Jun 2025	1.31	10.58	15.21	77	3	26	90
			6 AM,17th Jun 2025	0.66	10.12	18.77	72	2	25	89

No.	Location	Area	Time	NO2 (µg/m3)	SO2 (mg/m2)	O3 (µg/m3)	CO (ppb)	PM2.5 (µg/m3)	Temp ℃	Humidity %
			12 PM,17th Jun 2025	0.13	12.62	30.21	63	2	28	78
			6 PM,17th Jun 2025	1.12	14.39	23.84	70	3	26	89
			10 PM,17th Jun 2025	1.76	9.97	19.68	78	4	25	91
No. 2-1	United Church	Residential Area	6 AM,16th Jun	0.94	6.57	17.2	82	3	25	90
			12 PM,16th Jun 2025	0.12	9.79	24.91	70	4	29	69
			6 PM,16th Jun 2025	0.73	10.59	18.25	73	3	27	86
			10 PM,16th Jun 2025	1.03	10.85	15.58	75	3	25	91
			6 AM,17th Jun 2025	0.49	10.72	21.29	71	2	25	89
			12 PM,17th Jun 2025	0.16	13.09	30.03	63	2	28	78
			6 PM,17th Jun 2025	1.12	14.65	23.9	70	3	26	87
			10 PM,17th Jun 2025	1.8	9.44	19.54	78	3	25	91
No. 2-2	United Church	Road side (Bus Stop)	6 AM,16th Jun 2025	0.67	6.58	19.54	78	3	25	90
			12 PM,16th Jun 2025	0.14	10.16	24.67	70	4	29	69
			6 PM,16th Jun 2025	0.89	11.03	17.21	75	4	27	86
			10 PM,16th Jun 2025	1.14	10.72	15.25	77	3	26	89
			6 AM,17th Jun 2025	0.49	10.72	21.29	71	2	25	89
			12 PM,17th Jun 2025	0.16	13.09	30.03	63	2	28	78
			6 PM,17th Jun 2025	1.12	14.64	23.89	70	3	26	87
			10 PM,17th Jun 2025	1.8	9.43	19.54	78	3	25	91
Environmental standards										
IFC				40 (annual) 200 (1 hr)	20 (24 hrs) 500 (10 min)	100 (8 hrs)		10 (annual) 25 (24 hrs)		
Japan				74 – 111 (daily mean for hourly)	103 (24 hrs) 260 (1 hr)		10,000 (daily mean for hourly) 20,000 (8 hr)	15 (annual) 35 (24 hrs)		

Source: Prepared by JICA Survey Team

2) Impact Prediction

a) During Construction

Emissions from construction equipment, including CO, NO_2, SO_2 and PM, can impact on nearby residential areas, operating hours are only during daylight hours, and further operations are limited.

b) Operation Phase

i) Prediction Model

The following method is based on the prediction methodology for road environmental impact assessments.

$$C(x,y,z)=\frac{Q}{(2\pi)^{3/2}\cdot\alpha^2\cdot\gamma}\left\{\frac{1-\exp\left(-\frac{\ell}{t_0^2}\right)}{2\ell}+\frac{1-\exp\left(-\frac{m}{t_0^2}\right)}{2m}\right\}$$

$$\ell=\frac{1}{2}\cdot\left\{\frac{x^2+y^2}{\alpha^2}+\frac{(z-H)^2}{\gamma^2}\right\},\quad m=\frac{1}{2}\cdot\left\{\frac{x^2+y^2}{\alpha^2}+\frac{(z+H)^2}{\gamma^2}\right\}$$

C (x, y, z) Predicted value at: point (x, y, z)
Q : Emissions from pollution sources (ml/s or mg/s)
H : Height of the emission source (m)
σ ,yz : Horizontal and vertical diffusion width (m)
x : Downwind distance (m)
y : Horizontal distance perpendicular to the x-axis (m)
z : Vertical distance perpendicular to the x-axis (m)
t_0 : Time (in seconds) corresponding to the initial diffusion width
α , γ : Coefficients of the diffusion width

The in-service impact estimates were calculated mainly based on distances at the measurement points, estimated traffic volumes in 2039 (Table 8.1-4) and design speeds (Table 8.1-5), which are post-service.

Table 8.1-4 Estimated Traffic Volumes (2039)

Small Vehicles (units/day)	Large Vehicles (units/day)
8,815	3,395

Source: Prepared by JICA Survey Team

Table 8.1-5 Design Speed

Small Vehicles (km/h)	Large Vehicles (km/h)
60	60

Source: Prepared by JICA Survey Team

ii) Prediction Results

Similar to the results of the field survey, the reference values $PM_{2.5}$, PM_{10} and SO_2 satisfied the standard values, similar to the results of the field survey.

The prediction results for $PM_{2.5}$, PM_{10} and SO_2 satisfied the IFC reference values.

Table 8.1-6 Air Quality Forecast Results (Year 2039)

No.	Location	Area	Particulate Concentration	Gaseous Concentration	
			$PM_{2.5}$ (μg/m)^3	NO_2 (μg/m)^3	SO_2 (μg/m)^3
No.1-2	Hospital	Road Side (Bus Stop)	4.007	2.257	12.89
No.2-1	United Church	Residential Area	4.034	3.222	14.65
IFC Guidelines (Over 24 hours except NO_2 guideline which is 1 hour)			**25**	**200**	**20**

Source: Prepared by JICA Survey Team

(2) Water Pollution

All surface runoff shall be channeled into the side drainages before discharging and disappear into the grassland or shrubs or natural water ways. The solid wastes and debris like silt, fallen shrub, trees or any vegetation cover generated during road corridor clearance or silt retention ponds are biodegradable that could be easily disintegrated into the natural environment. Thus, potential environmental impact to the water bodies shall be minimal or near nil.

Survey sites are shown in Table 8.1-7 and Figure 8.1-2.

Table 8.1-7 Summary of Water quality Survey Sites

No.	Location	Type	Measured Photograph
1	Kada Tawa Water Supply (Well Water)	Well Water	
2	Malapau Beach Resort (Well Water)	Well Water	
3	Malapau Beach Resort (Sea Water)	Surface Water (Sea)	

No.	Location	Type	Measured Photograph
4	Karavi Bridge (River Water)	Surface Water (River/Pond)	
5	Karavi Community Hall	Well Water	

Source: Prepared by JICA Survey Team

Figure 8.1-2 Water Quality Survey Sites

1) Result of Measurement

Table 8.1-8 shows the water quality survey results. Regarding the measured water quality parameters, with the exception of No. 4, pH levels were within the range of Japanese environmental standards (5.8–8.6), Regarding the exceedance of No. 4, the surrounding area is a region where volcanic ash has accumulated, and it is considered a temporary effect due to the leaching of volcanic ash-derived components into stagnant water; therefore, no issues with acidity or alkalinity are observed.

Additionally, regarding DO (dissolved oxygen) and BOD (biochemical oxygen demand), which are normally measured in surface water quality surveys, measurement was not possible because this country and location are remote islands, making it difficult to transport samples to a research institution for analysis after collection. Therefore, measurements were conducted only for items using simple measuring instruments capable of immediate measurement.

Table 8.1-8 Result of Water Quality Measurement

Point	Date	Temperature (℃)	pH	EC (µS/cm mS/cm)	TDS (ppm/ ppt)	Salinity Concentration (ppm/ ppt/ %)		S.G (Specific Gravity) %	ORP (Oxidation-Reduction Potential) (mV)
No. 1	21st May,2025,11:17 am	33	6.75	216µS/cm	108ppm	106ppm	0.01	1.003	278
No. 2	21st May,2025,11:32 am	30.6	7.36	427µS/cm	213ppm	214ppm	0.02	1.002	258
No. 3	21st May,2025,11:40 am	30.5	7.89	49.5mS/cm	24.7 ppt	30.1ppt	3.03	1.02	235
No. 4	21st May,2025,12:06pm	34.2	8.99	239µS/cm	118ppm	118ppm	0.01	1.003	167
No. 5	21st May,2025,16:42PM	31.3	7.94	284µS/cm	154ppm	145ppm	0.01	1.002	201
Environmental standards									
IFC		-		-	1000	-	-	-	-
Japan		-	5.8-8.6	-	500	-	-	-	-
PNG		-	-	-	-	-	-	-	-

Source: Prepared by JICA Survey Team

(3) Waste

The types of wastes generated in civil works, especially road and bridge construction needed sound engineering design and management that will identify the wastes types, its impacts and work out a waste minimization program that will assist in minimizing the wastes generation and its impact on the receiving environment. Apparently, there is no specific or perhaps better cleaner production technology that can be used in a road construction in PNG that CEPA could provide to construction companies, except to employ the guidelines employed in the typical conventional logging practices now used in the forest industry applying the PNG Logging Code of Practice and the 24 Key Standards. The National Department of Works has standard engineering designs and guidelines for civil works which the project managers and supervisors would to comply. All project designs are given approval by the National and Provincial Division of Works in headquarters in Port Moresby and in the respective provincial headquarters.

The solid wastes will be systematically collected and disposed into acceptable designated sites along the road alignment.

This section will attempt to identify the waste sources, the types of wastes, nature of the wastes, and generate a waste management program to remedy possible the adverse impacts.

1) Result Measurement

Source: Prepared by JICA Survey Team

Figure 8.1-3 Locations of Borrow Pits, Spoil Banks, and Construction Yards

(4) Soil contamination

As a result of hearings with DOWH, ENB, and local residents, there was no information related to soil contamination. Secondary data regarding soil contamination could not be confirmed.

(5) Noise

The anticipated noise increase along the road alignment is from the heavy earth moving machines and trucks. The noise levels would not be significant to cause any substantial change or harm to any biotic community or the human population living alone the road corridors. The noise levels are also dispersed rapidly in the open natural environment. There is adequate air circulation or wind flow to disperse concentrated noise emission.

The measurement points for noise and vibration are the same as for air quality. Survey sites are shown in Table 8.1-1 and Figure 8.1-1.

Measurements were taken at each selected site for 24 hours. The measurement results were compared with the PNG standards. Vibrations were compared to Japanese standards as a reference, as there are no PNG standards.

1) Result of Measurement Noise

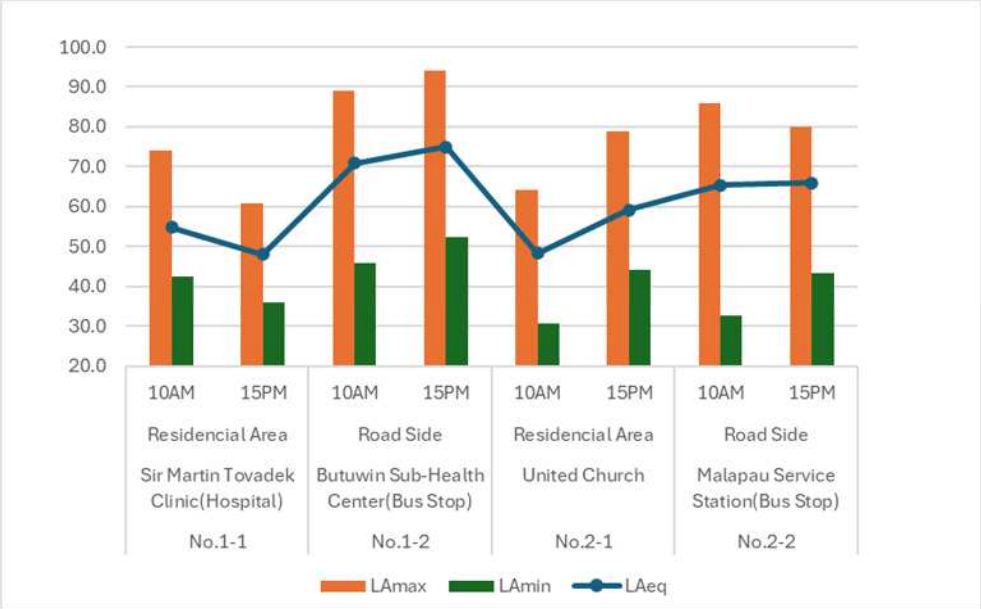
Noise measurements showed that the standard was exceeded at No. 4; it is considered that the standard was exceeded because of noise generated during the day in the vicinity of the No. 4 survey point due to operations at the timber and stone quarrying site.

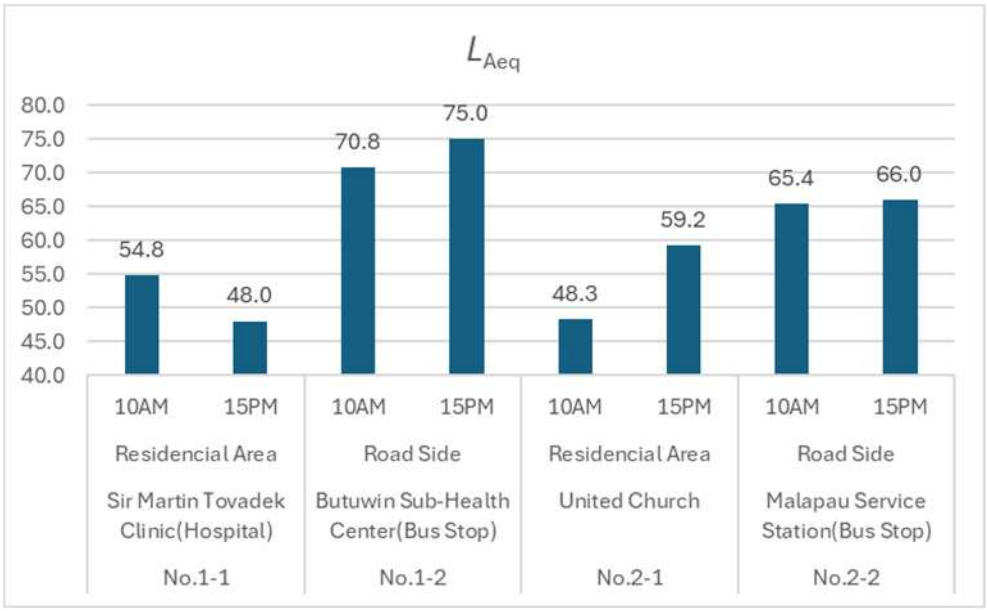
Table 8.1-9 Result of Noise Quality Measurement

No.	Location	Area	Time	*Noise Level (dB(A))*						
				L_{Aeq}	L_{Amax}	L_{Amin}	L_{A10}	L_{A50}	L_{A90}	L_{A95}
No.1-1	Sir Martin Tovadek Clinic(Hospital)	Residential Area	10AM	54.8	74.0	42.5	66.7	61.7	59.2	58.6
			15PM	48.0	60.7	35.9	63.6	57.0	47.8	44.9

No.1-2	Butuwin Sub-Health Center(Bus Stop)	Road Side	10AM	70.8	89.0	45.7	67.4	61.9	57.6	56.3
			15PM	75.0	94.0	52.2	59.5	52.8	49.8	49.5
No.2-1	United Church	Residential Area	10AM	48.3	64.3	30.7	60.6	54.7	50.7	49.8
			15PM	59.2	78.8	44.0	60.0	48.1	39.9	38.8
No.2-2	Malapau Service Station(Bus Stop)	Road Side	10AM	65.4	85.9	32.7	73.1	67.0	62.4	61.4
			15PM	66.0	80.0	43.4	71.0	65.7	59.5	57.5
Environmental standards										
IFC			7:00~22:00	55	-	-	-	-	-	-
			22:00~7:00	45	-	-	-	-	-	-
Japan (Trunk Traffic/Proximity Space) (Roadside Environment)			6:00~22:00	70	-	-	-	-	-	-
			22:00~6:00	65	-	-	-	-	-	-

Source: Prepared by JICA Survey Team





Source: Prepared by JICA Survey Team

2) Potential Impacts

a) During Construction

Prediction Model

Noise during construction is generated from the operational operation of construction machinery. Noise source levels were taken from measurements taken at 10 m from the construction machinery (road earthworks 108 dB(A)).

For the assessment of noise levels during construction, noise levels at distances from the source were estimated. The prediction equation used the attenuation equation in (1).

$$L_{p2} = L_{p1} - 20\,log(r_2/r_1)$$

However, L_{p1} = noise level (dB) at distance r_1 from the source.
L_{p2} = Predicted noise level at distance r_2 from the source (dB)
r_1, r_1 = distance (m) of L_{p1} and L_{p2} from the *source* at sound pressure *level*

Prediction Results

As a result of the predictions, construction noise did not exceed the reference standard.

Table 8.1-10 Result of the Noise predictions

Location Name		Distance from ROW (m)	Measured Value Daytime 6:00-22:00 [dB(A)]	Predicted Value Daytime 6:00-22:00 [dB(A)]	Reference Japanese standard (During construction) 7:00-19:00 [dB(A)]
No.1-1	Sir Martin Tovadek Clinic (Hospital)	68.4	54.8	79.0	85
No.2-1	United Church	16.4	59.2	83.7	

Note: Noise Regulation Act, Specific Construction Noise Regulation Standards (1968).
Source: Prepared by JICA Survey Team

b) Operation Phase

Prediction Model

In-service noise is generated by road traffic. The in-service impact predictions were calculated based mainly on the distances at the measurement points, the estimated traffic volumes in 2039 (Table

8.1-4), which is the year after service, and the design speeds (Table 8.1-5).

The ASJ-2013 model was adopted for the quantitative road traffic noise predictions using the traffic volume estimates for the year 2039.

Prediction Results

Around the hospital (No. 1-1), the measured daytime noise level is 54.8 dB(A) and the nighttime level is 48.8 dB(A). The predicted values for 2039 are 56.0 dB(A) for daytime and 50.0 dB(A) for nighttime. The nighttime values are calculated by estimating current conditions based on traffic volume fluctuations. All predicted values are within IFC guideline levels or within +3 dB, indicating that the impact is minimal.

Around the church (No. 2-1), the measured daytime noise level is 59.2 dB(A) and the nighttime level is 53.2 dB(A). The predicted values for 2039 reach 61.7 dB(A) for daytime and 56.1 dB(A) for nighttime. The nighttime values are also calculated based on estimates from traffic volume fluctuations. All predicted values are within IFC guideline levels or within +3 dB, indicating that the impact is minimal.

Table 8.1-11 Noise Prediction Results (Year 2039)

Location Name		Distance from ROW (m)	Measured Value		Projected Value (2039)	
			Daytime	Nighttime	Daytime	Nighttime
			6:00-22:00 [dB(A)]	22:00-2:00 [dB(A)]	6:00-22:00 [dB(A)]	22:00-2:00 [dB(A)]
No.1-1	Sir Martin Tovadek Clinic (Hospital)	68.4	54.8	48.8	56.0	50.0
No.2-1	United Church	16.4	59.2	53.2	61.7	56.1
Reference standard value	IFC Standards	Residential District	55	45	55	45
		Commercial Area	70	70	70	70
		-	-	-	Within +3 dB of measured values	
	Japanese Standards	Environmental Standard (Trunk Traffic and Proximity Space)	70	65	70	65

Source: Prepared by JICA Survey Team

8.1.1.2 Natural Environment

The road maintenance and various construction activities in this project will have little or no impact on the floral environment, because the biodiversity of the entire area or the 2.4km segment of the Kokopo-Rabaul Road have been cleared and diminished. It is anticipated that there shall be minimal faunal community disturbances because the native species have moved away from the Malapao Plantation moved up the mountains toward Toma area.

(1) Ecosystem

The road maintenance and various construction activities in this project will have little or no impact on the floral environment, because the biodiversity of the entire area or the 2.4km segment of the Kokopo-Rabaul Road have been cleared and diminished. It is anticipated that there shall be minimal faunal community disturbances because the native species have moved away from the Malapao Plantation moved up the mountains toward Toma area.

The project area is in a tropical forest ecosystem, where a variety of tree species can be found. The rich soil promotes urban agriculture and horticultural projects.

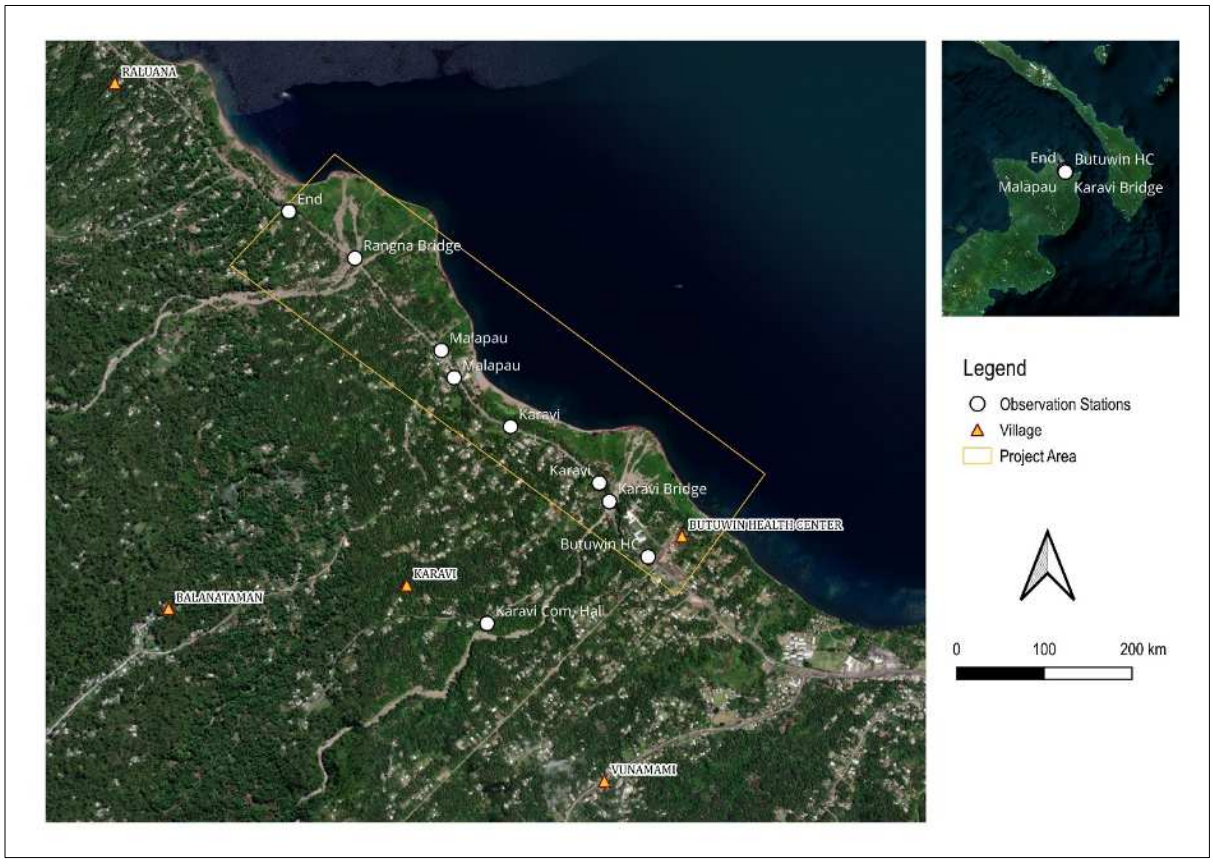
In the northern part of the project area, there are many green areas, which are being used as tourist attractions for scenic beauty and leisure facilities. On the other hand, in the southern part of the project area, natural resources have been depleted due to rapid urbanization, and there are significant differences in species diversity.

The biological environment of the 2.4 km Karavi- Ranguna road corridor was assessed. Observation sites, herein known as stations, were predetermined based on river channels and slope cuts along the section of the road (Table 8.1-12, Figure 8.1-4).

Table 8.1-12 Observed Stations on the 2.4km Karavi- Ranguna Road Corridor

Station	Location	Latitude	Longitude	Altitude (m)	Environment Characterization
1	Butuwin HC (Start)	-4.326687°	152.242222°	36	Institution
2	Karavi Bridge	-4.324303°	152.240553°	22	River bed
3	Karavi	-4.323504°	152.240118°	18	Mixed-used
4	Karavi	-4.321066°	152.236286°	15	Mixed-used
5	Malapau	-4.318945°	152.233851°	16	Residence
6	Malapau	-4.317771°	152.233302°	14	Residence
7	Ranguna Bridge	-4.313797°	152.229573°	16	Plantation
8	Ranguna (End)	-4.311786°	152.226721°	17	Secondary
9	Karavi Com. Hall	-4.329559°	152.235277°	59	Bank/gorge of Dry River Channel

Source: Prepared by JICA Survey Team



Source: Prepared by JICA Survey Team

Figure 8.1-4 Observed Stations as per Table 8.1-12

The rapid biodiversity assessment of the road corridor was conducted from the 17th May to 20th May, 2025. The biological information (flora and fauna) and the physical settings were observed and recorded while traversing the road corridor. Other information and data were extracted from both published and unpublished reports for the Province and the New Britain-New Ireland eco-region. For verification

purposes, information on floral and faunal compositions were sourced from the National Herbarium (PNGFRI, Lae), UPNG Natural Science Resource Centre (NSRC) and the PNG National Museum. Other site-specific information (physical) was extracted from landsat satellite images (www.googlemap.com) and from the PNGRIS datasets (Bryan and Shearman, 2007; Hammermaster and Saunders, 1995).

(2) Flora

The vegetation along the road corridor is highly disturbed. Much of the area has been settled and cleared for plantation development, gardening and other uses (Figure 8.1-5). What is seen are some pockets of remnant vegetation on slopes. Prior to conversation, the vegetation would probably have been characterized as large to medium crowned forest with a canopy height of 30-35m. Flora diversity is low compared to the Baining and Pomio areas. The remnant tree species include *Pometia pinnata*, *Ficus spp. Alstonia scholaris* and *Terminalia spp*. (Saunders 1993). Other genera include *Pterocarpus*, *Artocarpus*, *Planchonella*, *Canarium*, *Elaeocarpus*, *Cryptocarya*, *Celtis*, *Dysoxylum*, *Syzygium*, *Vitex*, and *Spondias*.

Table 8.1-13 Some of the Floral Communities (Tree Species)

Species/Genera	Common Name	IUCN Status
Pometia pinnata	Taun	LC
Ficus spp.	-	-
Alstonia scholaris	-	LC
Terminalia spp.	-	-
Pterocarpus	-	-
Cryptocarya	-	-
Syzygium,	-	-
Artocarpus	-	-
Planchonella	-	-
Canarium	-	-
Elaeocarpus	-	-
Celti	-	-
Dysoxylum	-	-
Vitex	-	-
Spondias.	-	-

Nevertheless, the vegetation type on the road corridor is categorized as secondary regrowth with mixed landuse.as describe below.

1) Secondary Regrowth with Mixed Land Use

The land areas of the Karavi-Ranguna road corridor is dominated by coconut, and balsa patches towering over regrowth species of grasses and secondary shrubs and creepers. A large portion of the land area is occupied villages and hamlets. On slope cuts, the area is degraded comprising grasses and few secondary species such as zingers, legumes and tree species that do not form any distinct tree canopy. Common secondary species include, *Ficus spp.*, *Spathodea campanulata*, *Melanolepis multiglandulosa, Artocarpus*, *Terminalia, Alstonia spectabilis* or *Eleocarpus* species. Often times the invasive species, *Spathodea campanulata* (or commonly known as pispis diwai) may dominate the secondary forest.

The locals in villages and hamlets also influence the regrowth forest by clearing smaller plots for gardening. This contributes toward mosaic vegetation pattern observed within the entire area.

Figure 8.1-5 to Figure 8.1-7, show regrowth vegetation within the dry river bed and along the road.

Source: Prepared by JICA Survey Team

Figure 8.1-5 Disturbed Vegetation with Regrowth and Gardens on Bank

Photo taken at Karavi Community Hall looking down towards the dried up Karavi River bed. The tree in the middle is *Pometia pinnata*, an edible fruiting tree.

Source: Prepared by JICA Survey Team

Figure 8.1-6 Roadside Vegetation at Butuwin

Dominated by kunai grass, *Imperata cylindrica* and species of *Ficus* (indicated in red), and *Psidium guajava* (indicated in blue).

Source: Prepared by JICA Survey Team

Figure 8.1-7 Roadside Pass Karavi Towards Malapau (Station 4)

One of the unstable cut during rainy season. Again a disturbed vegetation dominated by secondary plant species.

2) Endemic Flora

No endemic, rare or threaten plant species were recorded from surveys and assessments conducted along the road corridor. These could be overlooked due to low sampling intensity. However, endemic species of palms and most orchids are likely to be present but outside the road corridor.

The proposed road corridor is located within an existing Kokopo-Rabaul Road. The natural original flora and faunal communities have been clear felled since thus species of special use have been completely and permanently displaced some 60 years ago. Species (flora or fauna) that occur in the vicinity of the road corridor are mainly exotic species with a relatively low biodiversity. They do not require special protection or description. They are mainly creepers, weeds and scattered shrubs growing under the cocoa and coconut plantation that would hardly provide an appropriate niche.

(3) Fauna

1) Mammals

The mammal diversity along the road corridor is very low indeed. The three common ones are the Common House Rat (*Rattus rattus*), Large Spinny Rat (*Rattus praetor*) and the pig (*Sus scrofa domesticus*). In coconut patches toward Karavi, the flying fox, *Pteropus capistratus,* was observed. This species is found only in New Britain and New Ireland. flying fox. Other mammals including the flying foxes were not observed. However, presented below are mammals that once occurred in the area (Table 8.1-14).

Table 8.1-14 List of Mammals Common in the Area

Family	Genus	Species	Common name	Status
Pteropodidae	*Pteropus*	*capistratus*	New Britain Masked Flying Fox	VU
Rhinolophoridae	*Rhinolophus*	*megaphyllus*	Eastern Horseshoe Bat	LC
Rhinolophoridae	*Rhinolophus*	*euryotis*	New Guinea Horseshoe Bat	LC
Hipposideridae	*Hipposideros*	*diadema*	Diadem Horseshoe-Bat	LC
Hipposideridae	*Hipposideros*	*servinus*	Fawn Horseshoe-Bat	LC
Vespertilionidae	*Myotis*	*adversus*	Large-footed Mouse-eared Bat	LC
Vespertilionidae	*Pipstrellus*	*papuanus*	Papuan Pipistrelle	LC
Muridae	*Rattus*	*rattus*	Common House Rat	LC
Muridae	*Rattus*	*praetor*	Large spiny Rat	LC

Source: Prepared by JICA Survey Team (source: Flannery, 1995; Bonaccorso, 1998).

2) Birds

As with the mammals, only few birds were observed at Karavi and along the Karavi-Ranguna road corridor. The obvious ones are the Bismarck Crow (Corvus insularis), the Rainbow or coconut lorikeet (Trichoglossus haematodus) and one kite was observed hovering above Butuwin. Despite, over 50 species of birds had been observed and recorded within area. Only 15 species were considered rare, threaten, endemic or protected under the CITES II listing or protected by the PNG Laws (Table 8.1-15).

Bismarck Crow Brahminy Kite

Source: Prepared by JICA Survey Team

Figure 8.1-8 Two of the Few Birds Observed at Karavi-Ranguna road corridor

Table 8.1-15 Protected Avian Fauna Known to Occur in the Area and Towards the Baining Mountains

Common Name	Scientific Name	Conservation Status	IUCN Status
Blyth's hornbill	*Aceros plicatus*	Common, Protected	LC
Eclectus parrot	*Eclectus roratus*	Common, CITES II	LC
Black kite	*Milrus migrans*	Common, CITES II	LC
Red breasted pigmy parrot	*Micropsitta bruijnii*	Common, CITESII	LC
Blue eyed cockatoo	*Cacatua ophthalmica*	Common, CITES II	VU
Brush cuckoo	*Cacomantis variolossus*	Endemic	LC
Eastern black-capped lory	*Lorius hypoinchrus*	Common, CITES II	LC
Rainbow or coconut lorikeet	*Trichoglossus haematodus*	Common, CITES II	LC
Brahminy kite	*Haliastur indus*	Common, CITES II	LC
New Britain babook orol	*Hinox odiosa*	Endemic, CITES II	VU
New Britain buzzard	*Hernicopermis infuscate*	Endemic, CITES II	VU
New Britain sparrow hawk	*Accipiter brachyurus*	Endemic, CITES II	VU

Source: Prepared by JICA Survey Team (source. Coates, 1985).

3) Amphibians

So far 5 species are known to occur in the area (Allison, 1993). The common ones are Bafo marinus and (cane toad), Cornufer papuensis (synonym: Platymantis papuensis). Others include Cornufer spp. and Litoria infrafrenata. C. papuensis is endemic to the area. Apart from B. marinus which is common in plantations, all amphibian species are very sensitive to disturbances and tend to occur near streams and creeks. Two common ones are as shown in Figure 8.1-9.

White Lip Treefrog (Litoria infrafrenata)

Cane toad (Bufo marinus)

Source: Prepared by JICA Survey Team

Figure 8.1-9 Common Amphibians in the Project Area

4) Reptiles

Only the 'monitor lizard' becomes traditionally important to the local people for the use of skin to make cultural instruments such as the 'kundu' drum. Other species, recognized traditionally to the people with little or no importance are skinks, geckos, and snakes. Figure 8.1-10 shows a species of skink, occurring in the area.

Source: Prepared by JICA Survey Team

Figure 8.1-10 Species of Skink Common in the Area.

5) Insects

Due to fugitive dust, the diversity of insects along the road corridor cannot be ascertain. However, the most economically important groups include the Pteridae (butterflies), Lycaenidae (butterflies),

Curculionidae (Weevils), Cetoninae (beetles), Lucanidae (beetles) Dynastinae (beetles) and moths.

8.1.1.3 Social Environment

The potential socio-economic impacts resulting from biophysical impact from this activity are:

- · Deprivation of the local community's exclusive use of the traditional gardening land and settlement.
- · There will be more positive impacts because the project will encourage the local people to participate more in economic activities as markets are accessible. The local communities have agreed and wanted the project.
-

(1) Gender

1) Result Measurement

The survey results indicate that while both men and women use the roads "daily," there are significant differences in their usage patterns. Men primarily use the roads for "commuting and wide-area travel," utilizing public transport or private cars, whereas women primarily use the roads for "market selling (daily cash income)" and have a significantly higher rate of traveling "on foot."

2) Potential impacts

a) During construction

Due to their high reliance on walking, women are physically more vulnerable to deteriorating road conditions and the surrounding security environment, exposing them to higher poverty and safety risks. When disasters or traffic restrictions occur, while it means "inconvenience in commuting (blockage of wide-area access)" for men, for women, it signifies "Cannot go near market" and "Cannot do business," representing a "disruption of peddling (livelihood)" and leading to an immediate and severe economic hit through the cessation of daily cash income.

b) Operation

No impacts are expected.

3) Impact forecast

a) During construction

During the construction period, since women pass through the vicinity of the site on foot daily, increased opportunities for contact with external construction workers are forecast to heighten the risk of Gender-Based Violence (GBV) and harassment. Furthermore, temporary restrictions on market access due to construction are concerned to have a direct negative impact on women's household finances, which depend on daily cash.

4) Mitigation measures

a) During construction

Based on the women's vulnerabilities revealed in the survey (dependence on walking and daily cash income), the following soft measures will be implemented.
To ensure the safety of women and girls, the contractor will be required to formulate a "Code of Conduct" and ensure compliance by all workers. Additionally, a "Grievance Mechanism (GM)" will be introduced to allow residents to report issues such as harassment, and thorough awareness-raising activities will be conducted for residents.
To mitigate economic losses due to market access restrictions caused by construction and to promote empowerment, women will be actively employed in construction work (traffic control, light labor, administrative assistance, etc.) to provide opportunities for cash income.

5) Evaluation

In this project, women are the most vulnerable group in terms of "safety while walking" and "livelihood maintenance." Therefore, the implementation of the above mitigation measures (GBV countermeasures and job creation) is essential to avoid negative impacts (harassment victimization, impoverishment) and maximize positive benefits (safety assurance, income improvement), making their significance extremely high.

(2) Labor Environment

There is opportunity for semi-skilled labor available to participate during the construction phase of the project.

CHAPTER 9. Anticipated Environmental and Social Impacts and Evaluation

9.1 Impact and Risks Assessment

Anticipate impacts with mitigation measures when the result of anticipated impact without mitigation measures exceeds evaluation criteria such as environmental standards.

The Leopold matrix was used to visually map out the relationships between impacted items and influencing factors, helping to understand the severity and scope of impacts. Impact assessment considered impacts at each stage from scoping to operation. The impact evaluation required the use of a variety of different methods depending on the type of impact in question. These include, where appropriate, scientific measurements, while the application of professional expertise and judgement has also often been required, especially when there are no legal standards, policy objectives and targets, or accepted practice.

The approach for risk assessment includes hazard identification, quantitatively assessing each identified hazard for severity, probability and effectiveness of existing or proposed control measures. The likelihood of occurrence i.e., how likely is the impact to occur and the impact severity was used to determine the risk level.

Specific details of the assessment methodology and risk assessment criteria used for each impacted item are described within the relevant impact assessment and mitigation chapters.

A summary of the results of the environmental impact study and predictive impact assessment, based on the findings of the main environmental and social considerations studies, extracted from the Initial Environmental Impact Assessment Report (IEE) (Appendix - 3), is presented in Table 9.1-1.

Table 9.1-1 Summary of Results of Environmental Impact and Forecast Impact Assessments (Road Rehabilitation Works)

Area	No.	Impacted Item	Scoping Rating		After Analysis		Summary of Results		
			Co	Op	Co	Op	Baseline	Forecast	Evaluation
Pollution	**1**	**Air pollution**	✓	✓	**B-**	**B+**	Measurements were conducted at four locations. Measurement results for the same locations were also collected from public information. Both the on-site measurements and the measurement results collected from public information satisfied the IFC guideline values and Japanese environmental standards.	During construction: Excavation, land leveling, and drilling operations for road construction, stockpiling of excavated soil, and the movement of vehicles and machinery, including haul trucks for transporting raw materials, excavated soil, and aggregates, will generate dust and exhaust gases. However, the impact on air quality is not significant, as it is localized, short-term, and of moderate scale associated with construction activities. Negative impacts on air quality are expected due to material transport, construction of detour roads, and operation of construction machinery and site cleaning equipment. Exhaust gas emissions (such as CO, NO2, and SO2) from construction machinery, combined with the effects of sandy soil and strong winds, may degrade air quality. However, since the construction period is limited, the impact is judged to be not significant. Furthermore, emissions of CO, NO2, SO2, and PM (particulate matter) from construction equipment may affect neighboring residential areas. During operation: Predicted concentrations of PM2.5, NO2, and SO2 satisfied the IFC reference values (**Table 8.1-6**).	During Construction: Exhaust gases and dust from construction machinery may be generated. However, adverse impacts will be minimized as measures such as water sprinkling and surface treatment will be implemented near residential and commercial areas. In addition, emissions of CO, NO2, SO2, and PM (particulate matter) from construction equipment are evaluated to have limited further impact, as working hours are restricted to daytime. After Construction: Air quality concentrations will increase due to the increase in traffic volume. However, since the forecast results are almost the same as the baseline figures, the impact of the project on air quality is negligible. During Operation: No special mitigation measures are required. By paving unpaved roads through this project, vehicle speeds will stabilize in the medium-speed range, reducing unnecessary acceleration and deceleration. As a result, the amount of exhaust gas generated is expected to decrease, and the generation of particulate matter originating from unpaved road surfaces is expected to decrease significantly. Reducing traffic congestion and vehicle emissions may help improve air quality. Particulate matter is expected to decrease significantly.

Area	No.	Impacted Item	Scoping Rating		After Analysis		Summary of Results		
			Co	Op	Co	Op	Baseline	Forecast	Evaluation
	2	**Water pollution**	✓	−	**B-**	**D**	Temperature, pH, electrical conductivity (EC), TDS (total dissolved solids), salinity, specific gravity, and ORP (oxidation-reduction potential) were measured. Since measurement point No. 3 is seawater, a comparison with freshwater standards is not possible. The other points are within the IFC and Japanese reference values. Specific gravity (S.G.) and oxidation-reduction potential (ORP) also showed no extreme values and were comparable to those of normal natural water bodies (**Table 8.1-8**).	During construction: Road construction is expected to temporarily degrade the water quality of rivers and ponds. There is a possibility that turbid water may enter wells due to the construction. During operation: No serious impacts are expected after construction.	During construction: Construction activities are expected to have a temporary impact on water resources due to potential increases in turbidity and surface contamination. However, the implementation of proposed mitigation measures can alleviate the negative impacts predicted during construction. During operation: No significant impacts are expected.
	3	**Wastes**	✓	−	**B-**	B-	If fuel leakage from construction machinery occurs, or if improper actions are taken in the handling or disposal of hazardous substances, the condition of the soil may be affected by commercial activities such as used car sales and gas stations located along the project area.	During construction: When using excavated soil for embankments in the road section, contaminated soil may not be suitable and must be disposed of appropriately. During operation: There is no impact.	During construction: Appropriate safe disposal and treatment of contaminated materials excavated during construction are required. During operation: No impacts are expected after construction. However, if contaminated soil is not treated properly, it could lead to the pollution of nearby rivers and health risks for local residents through the consumption of crops grown on such land. Therefore, mitigation measures must be implemented.
	4	**Soil contamination and Sedimentation Quality**	✓	−	**B-**	D	Some commercial activities, including garages and gas stations, present along the project footprint, can impact the soil conditions if inappropriate practices are carried out when handling and disposing of hydrocarbons and hazardous products.	**During Construction:** If there are plans to utilise the excavated material for the embankment of certain road sections, contaminated soil may not be suitable and will need to be disposed of accordingly and vice versa. **Operation:** No impacts are expected	**During Construction**: Any contaminated materials excavated as part of construction will require appropriate safe disposal and or treatment. **Operation**: No impacts are expected after construction. However, contaminated soil if not properly disposed of or treated can lead to pollution of nearby streams from polluted runoffs and health risks of the community from ingesting crops grown on such lands. Therefore, mitigation measures should be implemented.

Area	No.	Impacted Item	Scoping Rating		After Analysis		Summary of Results		
			Co	Op	Co	Op	Baseline	Forecast	Evaluation
	5	**Noise and vibration**	✓	✓	**B-**	**D**	Measurements were taken at 4 locations. Results exceeded Japanese roadside standards at No. 1-2 and IFC general environment standards at No. 2-1. (**Table 8.1-9**)	Construction: Noise/vibration are mainly caused by construction machinery. Assessment shows results remain below Japanese reference standards. (**Table 8.1-10**) Operation: Caused by road traffic. Predictions based on traffic volume and design speed are within IFC standards or within +3 dB of measured values. (**Table 8.1-11**)	Construction: Impacts will occur but will not exceed the Japanese reference standard of 85 dB. Operation: Future roadside predictions are within IFC standards or +3 dB of current levels; impact is evaluated as negligible.
	6	**Ground subsidence**	−	−	**D**	**D**	-	-	-
	7	**Odour**	−	−	**D**	**D**	-	-	-
	8	**Sediment quality**	−	✓	**D**	**D**	-	See No. 4	See No. 4
Natural Environment	9	**Protected area**	−	−	**D**	**D**	No Key Biodiversity Areas (KBA) or protected areas were confirmed within or around the project site.	Construction: All protected areas are far from the project site and will not be affected. Operation: -	Construction: No natural reserves, national parks, or wildlife sanctuaries exist in the project area; therefore, no significant impact is possible. Operation: -
	10	**Ecosystem**	✓	✓	**D**	**D**	Biodiversity along the Kokopo–Rabaul road (2.4 km section) has already decreased due to clearing and human activity. Most flora/fauna are exotic species with low biodiversity value.	Construction: Fauna (snakes, frogs, crabs) may lose habitats due to excavation. Loss of grassland near rivers may lead to loss of insects (bird food source). Flora may be directly impacted by clearing and machinery movement. Operation: No wildlife traffic accidents are expected; any impact would be short-term and minor.	Construction: The area is already highly urbanized with no critical habitats. Impacts are limited. Operation: No impact is anticipated from the project.
	11	**Hydrology**	✓	−	**B-**	**D**	Refer to No. 2	Refer to No. 2	Refer to No. 2
	12	**Topography and geology**	−	−	**D**	**D**	-	-	-

Area	No.	Impacted Item	Scoping Rating		After Analysis		Summary of Results		
			Co	Op	Co	Op	Baseline	Forecast	Evaluation
Social Environment	13	**Involuntary resettlement**	✓	−	B-	D	No resettlement will occur. (Ref. Chapter 2)	Construction/Post-Construction: Although land acquisition and involuntary resettlement will not occur, since the planting of crops by local residents and the occupation of land through the installation of temporary structures have been confirmed within existing road land and river channels, compensation shall be appropriately implemented.	Serious impacts are unlikely as potential adverse effects will be mitigated through proper compensation.
	14	**The poor**	✓	−	B+	D	No resettlement will occur. (Ref. Chapter 2)	Construction/Post-Construction: Increased employment opportunities may have a positive impact; no negative impacts expected. Operation: -	Serious impacts are unlikely. Adverse effects will be mitigated through proper compensation.
	15	**Indigenous and ethnic people**	−	−	D	D	-	-	-
	16	**Local economy such as employment and livelihood**	✓	✓	B-/+	B+	Main industries are food services and agriculture.	Construction/Post-Construction: Shops within the project area will not be affected. Operation: Improved access will attract more road users and residents, stimulating existing businesses and attracting new ones.	Construction/Post-Construction: This project will create employment opportunities, improve traffic flow, and revitalize the local economy during construction, but compensation will be required for affected persons whose businesses or farms are damaged. Operation: This project creates employment opportunities, improves traffic flow, and revitalizes the local economy.
	17	**Land use and utilisation of local resources**	✓	−	B-	D	Land use includes agriculture, commerce, and utility reserves. Significant amounts of aggregate/sand/gravel will be sourced from existing quarries.	Construction/Post-Construction: Compensation for agricultural crops within the project area will be required. Operation: No impact is anticipated from the project unless unplanned development occurs.	Construction/Post-Construction: Affected persons (PAPs) will be compensated per law/JICA guidelines. Operation: No impact is anticipated from the project.

Area	No.	Impacted Item	Scoping Rating		After Analysis		Summary of Results		
			Co	Op	Co	Op	Baseline	Forecast	Evaluation
	18	**Water usage**	✓	−	**B-**	**D**	Domestic water is mainly from wells. The project is downstream from residential areas and will not significantly affect wells.	Construction/Post-Construction: High water usage for dust suppression/washing. Excavation near wells could disturb water levels or quality. Operation: No impact is anticipated from the project due to improved infrastructure.	Construction/Post-Construction: Mitigation measures will be implemented to address water quantity/quality challenges and support sustainable development. Operation: No impact is anticipated from the project.
	19	**Existing social infrastructures and services**	✓	✓	**B-**	**B+**	Utilities may be relocated or damaged, causing temporary service interruptions and inconvenience.	Construction/Post-Construction: Temporary service interruptions may occur due to utility relocation. Operation: Economic activities likely to be revitalized by improved infrastructure.	Significant potential impacts on utilities, community facilities, and cultural activities will occur, but these can be effectively managed through mitigation measures and stakeholder engagement. Furthermore, revitalization of economic activities is expected.
	20	**Social institutions such as local decision-making institutions**	✓	−	**B-**	**B+**	Same as above	Same as above	Same as above
	21	**Misdistribution of benefit and damage**	✓	✓	**B-**	**B+**	Same as above	Same as above	Same as above
	22	**Local conflict of interests**	✓	−	**B-**	**B+**	Same as above	Same as above	Same as above
	23	**Cultural heritage**	−	−	**D**	**D**	No cultural heritage sites exist around the project area.	Construction/Operation: Confirmed no cultural heritage within the project scope.	No impact is anticipated from the project.
	24	**Landscape**	✓	✓	**B+**	**B+**	Some unpaved sections exist. The area is suburban roadside; no significant landscape impact.	Construction/Operation: Road improvements and facilities will create an aesthetically pleasing landscape, attracting development.	Landscaping associated with the road project generally has a positive impact on the area's appearance.
	25	**Gender**	✓	✓	**B-/+**	**D**	Women primarily rely on walking to access markets for daily cash income, differing from men's vehicular commuting.	Construction/Operation: Influx of workers poses GBV risks to women walking nearby. Restricted market access threatens daily livelihoods.	During construction The impact of this project is limited, but gender-based violence, sexual harassment, abuse, and other human rights violations may occur. Operation: No impact is anticipated from the project.

Area	No.	Impacted Item	Scoping Rating		After Analysis		Summary of Results		
			Co	Op	Co	Op	Baseline	Forecast	Evaluation
	26	**Right of children**	✓	✓	**B-**	**D**	No child labor observed.	Construction/Post-Construction: Risk of children being employed as basic laborers at sites. Operation: No impact is anticipated from the project.	Construction: No child labor was confirmed during surveys. Strict prevention measures will be implemented to ensure compliance and prevent exploitation. Operation: No impact is anticipated from the project.
	27	**Infectious diseases such as HIV/AIDS**	✓	−	**B-**	**D**	-	Construction: Inflow of workers may lead to the spread of infectious diseases, including STDs. Operation: No impact is anticipated from the project.	Construction: While risks increase with worker inflow, mitigation measures will minimize impacts; serious consequences are unlikely. Operation: No impact is anticipated from the project.
	28	**Labour environment**	✓	−	**B-**	**D**	-	Construction/Post-Construction: Exposure to hazardous substances (cement dust/chemicals). Potential for exploitation (wages/hours) without monitoring. However, training/experience will improve local skills and future employability. Operation: No impact is anticipated from the project.	Construction/Post-Construction: The project can have both positive and negative impacts. DOWH and contractors will prioritize local hiring, fair labor practices, and health/safety monitoring. Operation: No impact is anticipated from the project.
Others	**29**	**Accidents**	✓	✓	**B-**	**D**	No existing records of accidents in this section.	Construction/Operation: Negative impact due to traffic congestion from material transport. Parked construction trucks may cause vehicle/pedestrian collisions. Operation: No impact is anticipated from the project.	Construction: Negative impact expected; any accidents would have long-term consequences for those involved. Operation: No impact is anticipated from the project.
	30	**Cross-boundary impacts and climate change**	−	−	**D**	**D**	-	Construction/Operation: Greenhouse gas emissions are limited.	Construction/Operation: Greenhouse gas emissions are limited.

Note) Rating: ✓: Items subject to environmental and social impact assessment because impacts are expected to occur due to project implementation, or because it cannot be determined whether impacts will occur. A: Serious impact is expected. B: Some impacts are expected. C: Degree and area of impacts are unknown (further surveys and analysis shall be done) D: Light impact is expected. Thus, baseline surveys and analysis are not necessary. +/-: Positive and Negative Impacts.

P- Pre-construction Phase, Co- Construction Phase, Af Co (De)- After construction (Demolition) Phase, O-Operation Phase

Source: Prepared by JICA Survey Team

9.2 Mitigation Measures and Implementation (Environmental Management Plan)

The mitigation measures (environmental management plans) for the environmental items assessed as negative impacts in the previous section are presented in Table 9.2-1.

Table 9.2-1 Mitigation Measures and Environmental Management Plans

Category	No.	Impacted Item on JICA Guidelines	Scoping Rating		After Analysis		After Analysis		Responsibility		Cost
			Co	Op	Co	Op	During Construction and After Construction (Site Closing)	Operation	Implementation Agency	Responsible Agency	
Pollution	1	Air pollution	✓	✓	B-	B+	[Pre-Construction] No mitigation measures are necessary. [Construction] Spray water at least twice daily, especially during dry periods; cover transport trucks with tarpaulins; conduct air quality monitoring (Dust); install temporary enclosures at high-dust sites; enforce a 20 km/h speed limit for trucks on-site; regular maintenance of all trucks; switch off idling engines; provide workers with proper PPE (goggles, masks); hold weekly toolbox meetings for safety training and chemical exposure awareness.	Ensure appropriate land use management along the road. Designate commercial/industrial zones along the roadside to prevent direct air pollution impacts on residential areas.	The Contracting Entity	DOWH	The Contracting Entity
	2	Water pollution	✓	-	B-	D	[Pre-Construction] No mitigation measures are necessary. [Construction] Install temporary drainage around sites; reuse excavated soil for backfill/embankment and dispose of surplus at authorized sites; cover stockpiles with tarpaulins; conduct temperature monitoring; store/dispose of waste oil at designated sites; implement proper waste management at construction yards and accommodation facilities.	No mitigation measures are necessary.	The Contracting Entity	DOWH	The Contracting Entity
Pollution	3	Wastes	✓	-	B-	B-	[Pre-Construction] No mitigation measures are necessary. [Construction] Allow locals to collect cleared wood for fuel; reuse excavated	No mitigation measures are necessary; however, trash bins will be installed along the roadside.	The Contracting Entity	DOWH	The Contracting Entity

Category	No.	Impacted Item on JICA Guidelines	Scoping Rating		After Analysis		After Analysis		Responsibility		Cost
			Co	Op	Co	Op	During Construction and After Construction (Site Closing)	Operation	Implementation Agency	Responsible Agency	
							soil for backfill/embankment and dispose of surplus at authorized sites; cover stockpiles with tarpaulins; outsource solid waste to accredited contractors; consign recyclables to certified agencies; properly manage/dispose of waste oil and scrap metal (batteries, tires, etc.); provide gender-segregated mobile toilets; transport waste to municipal sites.				
	4	Soil contamination and Sedimentation Quality	✓	-	B-	D	[Construction] Ensure waste oil from machinery is promptly collected and treated by authorized agents; store chemical/hazardous waste at construction yards for disposal by certified contractors.	No mitigation measures are necessary unless contamination occurs requiring ongoing treatment and monitoring.	The Contracting Entity	DOWH	The Contracting Entity
	5	Noise and vibration	✓	✓	B-	D	[Pre-Construction] No mitigation measures are necessary. [Construction] Switch off idling engines; regular machinery maintenance to reduce friction noise; place high-noise machinery away from sensitive areas; prohibit unnecessary honking; adjust schedules to avoid continuous noise; optimize site layout and haul roads.	No mitigation measures are necessary.	The Contracting Entity	DOWH	The Contracting Entity
	6	Ground subsidence	-	-	D	D	-	-	-	-	
	7	Odour	-	-	D	D	No mitigation measures are necessary.	No mitigation measures are necessary.	-	-	
	8	Sediment quality	-	✓	D	D	Refer to No. 4.	No mitigation measures are necessary.	The Contracting Entity	DOWH	The Contracting Entity
Natural environment	9	Protected area	-	-	D	D	[Pre-Construction] No mitigation measures are necessary.	No mitigation measures are necessary.	-	-	-

Category	No.	Impacted Item on JICA Guidelines	Scoping Rating		After Analysis		After Analysis		Responsibility		Cost
			Co	Op	Co	Op	During Construction and After Construction (Site Closing)	Operation	Implementation Agency	Responsible Agency	
							[Construction] No mitigation measures are necessary.				
	10	Ecosystem	✓	✓	D	D	[Pre-Construction] No mitigation measures are necessary. [Construction] No mitigation measures are necessary.	No mitigation measures are necessary.	-	-	-
	11	Hydrology	✓	-	B-	D	Refer to No. 2.	Refer to No. 2.	Refer to No.2	Refer to No.2	-
	12	Topography and geology	-	-	D	D	-	-	-	-	-
Social environment	13	Involuntary resettlement	✓	-	B-	D	[Pre-Construction] Resettlement will not occur. Provide compensation for crops and assets within the project site (Refer to RAP).	No mitigation measures are necessary.	DOWH/ENB/LLG/WARD	DOWH/ENB/LLG/WARD	DOWH
	14	The poor	✓	-	B+	D	[Pre-Construction] Resettlement will not occur (Refer to RAP).	No mitigation measures are necessary.	-	-	-
	15	Indigenous and ethnic people	-	-	D	D	-	-	-	-	-
	16	Local economy such as employment and livelihood	✓	✓	B-/+	B+	[Pre-Construction/Construction] Conduct consultation meetings on compensation policies and livelihood restoration programs; ensure fair compensation processes via approved RAP; establish a Grievance Redress Mechanism (GRM).	Establishment of a Grievance Redress Mechanism (GRM).	DOWH/ENB/LLG/WARD	DOWH/CEPA	DOWH
	17	Land use and utilisation of local resources	✓	-	B-	D	[Pre-Construction] Consult with affected business/farm owners and implement RAP; coordinate with local authorities (ENB Province/LLG/Wards) for resource procurement (sand/gravel) from existing quarries and obtain all relevant permits.	Develop land use and management plans for the project area.	DOWH/ENB/LLG/WARD	DOWH/ENB/LLG/WARD	DOWH
	18	Water usage	✓	-	B-	D	[Pre-Construction] No mitigation measures are necessary. [Construction/Post-Construction]	No mitigation measures are necessary.	[During Const] [After Const.] The Contracting Entity	DOWH/ENB/LLG/WARD	DOWH

Category	No.	Impacted Item on JICA Guidelines	Scoping Rating		After Analysis		After Analysis		Responsibility		Cost
			Co	Op	Co	Op	During Construction and After Construction (Site Closing)	Operation	Implementation Agency	Responsible Agency	
							Adopt water-saving technologies; regularly monitor water quality in rivers and groundwater; implement corrective actions if contamination is detected; coordinate with the community to address water needs and concerns. - Provide alternative water supply if water supply is affected.				
	19	Existing social infrastructures and services	✓	✓	B-	B+	[Pre-Construction] Consult with affected facility operators to establish basic compensation policies. [Construction/Post-Construction] Provide access routes/alternative routes to maintain accessibility; engage with local leaders/chiefs regularly and respect cultural traditions. Involve utility service providers when relocating infrastructure, and relocate it appropriately.	No mitigation measures are necessary.	[Pre Const] DOWH [During Const] [After Const.] The Contracting Entity	[During Const] [After Const.] DOWH	[During Const] DOWH [After Const.] The Contracting Entity
	20	Social institutions such as local decision-making institutions	✓	-	B-	B+	[Pre-Construction] Same as No. 19. [Construction/Post-Construction] Provide access routes/alternative routes; engage with local leaders/chiefs regularly and respect cultural traditions.	No mitigation measures are necessary.	[Pre Const] DOWH [During Const] [After Const.] The Contracting Entity	DOWH	[During Const] DOWH [After Const.] The Contracting Entity
	21	Misdistribution of benefit and damage	✓	✓	B-	B+	[Pre-Construction] Hold consultation meetings to explain compensation policies. Provide appropriate compensation per approved RAP; establish a GRM.	No mitigation measures are necessary.	DOWH	DOWH	DOWH
	22	Local conflict of	✓	-	B-	B+	[Pre-Construction] No mitigation	No mitigation measures	[During Const]	[During Const]	The

Category	No.	Impacted Item on JICA Guidelines	Scoping Rating		After Analysis		After Analysis		Responsibility		Cost
			Co	Op	Co	Op	During Construction and After Construction (Site Closing)	Operation	Implementation Agency	Responsible Agency	
		interests					measures are necessary. [Construction/Post-Construction] Prioritize hiring a local workforce; provide appropriate education and training; hire workers from other areas if necessary.	are necessary.	[After Const.] The Contracting Entity	[After Const.] DOWH/ ENB/LLG/WARD	Contracting Entity
	23	Cultural heritage	-	-	D	D	[Pre-Construction/Construction] Confirmed that no cultural heritage sites exist within the project area.	No mitigation measures are necessary.	-	-	-
	24	Landscape	✓	✓	B+	B+	[Pre-Construction/Construction/Post-Construction] No mitigation measures are necessary.	No mitigation measures are necessary.	-	-	-
	25	Gender	✓	✓	B-/+	D	[Pre-Construction] No mitigation measures are necessary. [Construction/Post-Construction] Ensure workers sign a Code of Conduct; provide human rights education; implement a GRM/hotline for reporting harassment and GBV (respecting anonymity); sensitize the community on GRM usage.	No mitigation measures are necessary.	[During Const] [After Const.] The Contracting Entity	[During Const] [After Const.] DOWH/ ENB/LLG/WARD	The Contracting Entity
	26	Right of children	✓	✓	B-	D	[Pre-Construction] No mitigation measures are necessary. [Construction/Post-Construction] Establish rules not to hire children under 18; verify ID at the time of employment.	No mitigation measures are necessary.	[During Const] [After Const.] The Contracting Entity	[During Const] [After Const.] DOWH/ ENB/LLG/WARD	The Contracting Entity
	27	Infectious diseases such as HIV/AIDS	✓	-	B-	D	[Pre-Construction] No mitigation measures are necessary. [Construction/Post-Construction] Prevent stagnant water; enhance HIV/AIDS awareness programs; support health	No mitigation measures are necessary.	[During Const] [After Const.] The Contracting Entity [Operation] ENB/LLG/WARD	[During Const] [After Const.] [Operation] DOWH/ENB/LLG/WARD	The Contracting Entity

Category	No.	Impacted Item on JICA Guidelines	Scoping Rating		After Analysis		After Analysis		Responsibility		Cost
			Co	Op	Co	Op	During Construction and After Construction (Site Closing)	Operation	Implementation Agency	Responsible Agency	
							authorities for education campaigns; distribute leaflets; educate workers on the Code of Conduct.				
	28	Labour environment	✓	-	B-	D	[Pre-Construction] No mitigation measures are necessary. [Construction/Post-Construction] Ensure fair wages and safe conditions; provide safety training; supply and enforce PPE use; implement health monitoring; establish a GRM; maintain transparent communication; prohibit forced labor. provide anti-vibration gloves for operators; equip mobile machinery with padded seats and replace them when worn; provide PPE (earplugs) with safety training; implement 4-hour shifts for operators of noisy equipment;	No mitigation measures are necessary.	[During Const] [After Const.] The Contracting Entity	[During Const] [After Const.] DOWH	The Contracting Entity
Others	29	Accidents	✓	✓	B-	D	[Pre-Construction] No mitigation measures are necessary. [Construction/Post-Construction] Install road signs; deploy traffic controllers; enforce speed limits (30 km/h community / 20 km/h on-site); provide defensive driving training; provide communication devices; use tarpaulins on trucks; spray access roads twice daily; maintain trucks; implement safety campaigns.	No mitigation measures are necessary.	[During Const] [After Const.] The Contracting Entity	[During Const] [After Const.] DOWH	The Contracting Entity
	30	Cross-boundary impacts and climate change	-	-	D	D	-	-	-	-	-

Note) Rating: ✓: Items subject to environmental and social impact assessment because impacts are expected to occur due to project implementation, or because it cannot be determined whether impacts will occur. A: Serious impact is expected. B: Some impacts are expected. C: Degree and area of impacts are unknown (further surveys and analysis shall be done) D: Light impact

is expected. Thus, baseline surveys and analysis are not necessary. +/-: Positive and Negative Impacts.
P- Pre-construction Phase, Co- Construction Phase, Aft.Co (De)- After construction (Demolition) Phase, O-Operation Phase
Source: Prepared by JICA Survey Team

9.2.1 Approach to Mitigation

A hierarchical mitigation strategy has been proposed through the consideration of alternatives, physical design, project management or operation to avoid, reduce and where no measures are possible, compensate for any significant adverse effects on people and the environment resulting from the proposed development.

CHAPTER 10. Environmental Management and Monitoring Plan (EMMP)

10.1 Environmental Monitoring Plan (EMP) and Decommissioning Plan

Environmental Management and Monitoring Plans have been produced as part of the IEE. This has been designed to indicate the parameters to be monitored, frequency of monitoring, reporting regime, budget estimates as well as people responsible for the outlined parameters.

Similarly, a decommissioning plan has been designed to guide the decommissioning phases of the different components of the project. Details of the EMP and the decommissioning plan are provided in chapters 6,7 & 8 of this report.

10.2 Provisional Environmental Management Plan

10.2.1 Waste Management

The types of wastes generated in civil works, especially road and bridge construction needed sound engineering design and management that will identify the wastes types, its impacts and work out a waste minimization program that will assist in minimizing the wastes generation and its impact on the receiving environment. Apparently, there is no specific or perhaps better cleaner production technology that can be used in a road construction in PNG that CEPA could provide to construction companies, except to employ the guidelines employed in the typical conventional logging practices now used in the forest industry applying the PNG Logging Code of Practice and the 24 Key Standards. The National Department of Works has standard engineering designs and guidelines for civil works which the project managers and supervisors would to comply. All project designs are given approval by the National and Provincial Division of Works in headquarters in Port Moresby and in the respective provincial headquarters.

The solid wastes will be systematically collected and disposed into acceptable designated sites along the road alignment.

This section will attempt to identify the waste sources, the types of wastes, nature of the wastes, and generate a waste management program to remedy possible the adverse impacts.

10.2.2 Road Maintenance and other Civil Construction works

There is no alternative road maintenance or civil works that would have nil environmental consequences. The processes that will be used in this project are the Standard Road Construction methods applied in PNG for road construction and the 24 Key standards and the Operational Manual for Logging Roads. The planning and design of the roads including bridges and culverts will be undertaken by engineers and experienced road foreman in accordance with the road design standards from the Department of Works.

Public and main road construction use heavy equipment like bulldozer, graders, rollers and other machinery. These activities do generate certain amount of earth disturbance and wastes.

10.2.3 Sources and Types of Wastes

There are several operational areas where the waste materials will produced in this project's civil works (roads, bridges and silt retention pond and hill side landslide prevention earth works) These areas are:

a) Road
b) Bridges Works
c) Fuel Carrier
d) Heavy Equipment and
e) Silt retention pond
f) Landslide prevention works
g) Drainage works

However, the comprehensive review of all waste-producing activities including surface run-off and drainage that occur at the sites is presented in Table 10.2-1.

10.2.4 Types of Waste Products

The types of waste products are classified into solid, liquid, gaseous relative to their control and containment at source and are further classified into degradable, non-degradable and toxic as it might relate to their treatment and disposal.

10.2.4.1 Road and Bridge and all civil works Works

The common waste products during road and bridge works are soil debris, general ground cover vegetation, creepers, grasses, shrubs, trees, branches, barks, dead logs, leaves, soil, gravels and any solid wastes like soft drink cans, empty bottles, cartons packs, plastic wrappers, and food discards.

10.2.4.2 Motor (light vehicles, trucks, loaders, dozers, crane and graders) Wastes

Junk machinery parts, scrap metals, cable wire, tyres, used batteries, fuel and lubricant spillage are common wastes observed from road side refueling, mini servicing, tyres changes or any mechanical works. Of course, there will fuel fume or exhaust emissions and accidental fuel spillage during refueling.

10.2.5 Nature of Specific Wastes

All waste types are classified according to their specific disintegration nature, like degradable, non-degradable and toxic. This classification is relevant for waste treatment and disposal method applied to each waste types.

10.2.6 Biodegradable Waste

This specific nature of waste is capable of being decomposed by bacteria or other biological means. It implies that the residues of decomposition are not harmful or toxic to living organism and man within the receiving environment. However, the specific waste might render negative environmental effect if not properly managed.

Most organic wastes such as papers, log/wood debris, can be categorize biodegradable.

10.2.7 Non-biodegradable Waste

This type of waste has a nature of not being decomposed by the biological means. The specific examples are junk machinery and parts, cable wires, tires, bottles, cans and plastic products.

10.2.8 Toxic Waste

This type of waste is commonly the product of industrial or commercial processes that are capable of causing injuries or possible death to living organism or very harmful to human health. The waste includes like fuel/oil spillage and contaminated storm water.

10.2.9 Site-Specific Potential Impacts

The wastes management and disposal from a civil construction site might affect the surrendering environments and other sites. In this project, the specific site that needs particular protection were the main creeks and rivers that drains through the villages and the plantation block holder's copra plantation, gardens and traditional community land. The detailed site-specific potential impact is presented in Table 10.2-2.

Table 10.2-1 The Waste Management Plan Matrix for the Specific Environmental Issues.

Identified Environmental Issues	Waste Products/ Emissions	Potential Sources	Environmental Management Option
Air Related Issues	Emissions from Fuel Tanker	Fuel Tank and Accidental Spillage	Allow open air dispersion because the fuel tank is mobile and not highly concentrated. The emission

Identified Environmental Issues	Waste Products/ Emissions	Potential Sources	Environmental Management Option
			will be minimal and less toxic.
	Accidental Spillage	Fuel Tank	Prevention by good housekeeping and adequate spill control and clean/disposal procedures.
	Exhaust Fumes	Operational equipment/plant	Service the earth moving machines and the heavy equipment regularly and minimize air pollution.
Water Pollutants	Increased Total Suspended solid (TSS) in all the creeks and rivers within where the road alignment crosses the rivers	Surfacing materials, wash off clay and earth materials from the road construction.	Construct or install drainage system to channel eroded earth materials toward the nearby bush as per the roading codes and avoid direct discharge of eroded material into the creeks or rivers.
	Waste oil, fuel and other hydrocarbon products	Refuel tanker and heavy dozers and cranes used in the construction	Store engine oil, gear oil and other related products in a secured bunded storage area particularly far away from any watercourses.
Solid Waste Issues	All biodegradable solid wastes	Road corridor clearance, and temporary resting sites	Dispose in a small excavated area and cover the on roadside.
	Non-biodegradable and toxic wastes	Heavy equipment and machines and trucks etc.	Dispose in Kokopo township landfill site
Noise Pollution	Noise Pollution	Dozer, excavator trucks, loaders, fuel tanker	Provide safety earmuffs especially loader and dozer operators.

Source: Prepared by JICA Survey Team

Table 10.2-2 Site-Specific Potential Impacts

Specific Area	Description	Site Specific Impacts	Mitigative Measures or Remedial Action	Responsible Personnel
Rivers and Creeks	These rivers are used as a drinking and washing for the villagers living downstream. The rivers are usually clean and clear during dry periods but murky during rainy periods.	The rivers and creeks will be contaminated by the silt and dirt from the road construction. The particular impact will be on the water quality that will then affect the water users like aquatic species and human beings.	Strict adherence to the Code of Practice and 24 Key Standards on constructing new roads especially in vegetated and forested areas. This code will assist with the control and management of siltation issues. Proper drainage on road sides and near bridges would assists with excessive silt runoff into the creeks and rivers. The drains will be constructed away from the river but rather towards vegetated areas to minimise possible direct effect. Strictly no dumping of any form of waste into the river. Install placard of "No Dumping of Debris and other solid Trash".	The Project Manager and the Environmental Consultant

Source: Prepared by JICA Survey Team

Table 10.2-3 Showing Emergency Action Program

Non-Routine Incidents	Remedial / Contingency Measures	Responsible Personnel
Fuel and oil Spillage	Refuel at Kokopo Service Stations that have been certified as fuel stations. These fuel stations have Environmental Permits to operate.	Coordinated effort among the drivers, service Station Operators.
	In case of spillage (fuel and oil), dilution and detoxifying must be done with water to reduce the risk of fire, toxicity, degradation of water quality, damage to aquatic/fresh water life and contamination of soil.	Project Manager
	If possible, manually collect spillage of fuel and oil using container. Immediately make a pit and directing the flow of spills to it as a temporary	Road Foreman and Project Manager

Non-Routine Incidents	Remedial / Contingency Measures	Responsible Personnel
	storage while the manual collection has to be continued and fully undertaken. Another alternative if the spill is not much, cover with earth debris so that it will be absorbed, thus preventing flowing to the nearby river, stream and other body of water.	
Fire Occurrence	Strategically provide fire extinguisher in all equipment, dozer, trucks etc…and Project Manager and Foreman's vehicles.	Foreman and all operators to respond immediately.
Accident like Physical injury and other work-related incident	Orientate the workers on safety working attitude. Emphasize the importance of the safety in all areas of operation.	Project Manager, Foreman and supervisors.

Note: DWH shall inform all contractors to conduct a workshop on safety awareness and service all earth moving equipment and truck operators of emergency responds and apply appropriate safety measures.
Source: Prepared by JICA Survey Team

10.2.10 Waste Management Program

10.2.10.1 Waste Management Program Component

The waste management program comprises of eight components:

- Identification of Sources and Types of Waste
- Identification of Specific Waste Products
- Waste Control, Containment and Minimization Action
- Waste Storage and Treatment Method
- Waste Handling and Transportation Method
- Final Waste Disposal Method
- Collection and Disposal Frequency
- Responsible Personnel

10.2.10.2 Waste Management for the Specific Environmental Issues

The project particularly identifies environmental issues generated from road line clearance, earth works on silt retention ponds, landslide prevention works on slopy sides upstream, road and bridge construction and other preparatory and related works which are necessary to address in waste management plan of the project.

The following environmental issues are:

- Air Related Issues- these are fuel combustion emissions and accidental fuel spillage and dust particulates.
- Water Borne Pollutants - these are waste water containing oil, fuel, solvents, suspended solid such as dirt, soil, silt and solid wastes wash off by run water.
- Liquid Waste Issues - these are waste fuel or spillage during refuel.
- Solid Waste Issues - these mechanical parts, plastics, tins and vegetation debris, trees, twigs and so on.
- Noise Pollution - this is a noise emission generated by motors (heavy machines, loaders, trucks, graders, and light vehicles.

10.2.11 Method of Waste Disposal and Treatment

DOWH shall employed two methods of waste management to handle the waste products derived from the road and other civil works with the bridge construction. These are; landfill disposal (pit dug and cover on situ) and surface dumping.

10.2.11.1 Landfill Method

Landfill method disposes all waste products such as contaminated soils, sediments, soil contaminated with petro-chemical, bottles, glasses, cans, batteries, plastic wrappers, and domestic waste into a dug pit along road side cover it with earth materials. It is anticipated that the volume of the waste products

generated by this project would be relatively small. Landfill site would not be required here.

10.2.11.2 Surface Dumping

Waste products such as soil, vegetation debris, rock debris, are properly disposed and pushed on either side of the roads and covered by waste soil debris from the construction works.

10.2.12 Emergency Action Measures

Non-routine incidents like fuel and oil spillage on roadsides are seldomly considered but included in case an accident does happen. Thus, Emergency Action Measures (EAM) are incorporated in the waste management matrix. Refer to Table 10.2-3

10.2.13 Personnel and Staff Support

JICA has subcontracted ENRD Systems Management Services Limited for the initial environment studies and preparing this Environment Permit Application. The project shall be owned by DWH. Thus, DWH could engage the services of ENRD Systems Management Services Limited again to will carry out environmental monitoring or attend to any one off-case concerning any environmental issues. The entire operation will be supervised by the DWH provincial Works Manager and the Provincial Engineer.

10.2.14 Commitments

DWH through ENBPG shall surely implement the Waste Management Plan and comply with the environmental requirements particularly waste management as mandated by the government to protect the environment of the road corridors for the welfare of the local community.

10.2.15 Confidential Information

There is no particular confidential information regarding the Kokopo Rabaul Coastal road's Landslide Prevention Proposal.

A Provisional Environmental and Management Plan (PEMP) is developed for the project in accordance with the Environmental Assessment Regulations to ensure that the road corridor works are carried out in an environmentally safe and sustainable manner. The provisional EMP outlines management commitment and the required training programmes for the sustainable implementation of the proposed project. An estimated budget for the PEMP is also included in this section.

10.2.16 Key Objectives of the Provisional Environmental Management Plan

The primary objective of the PEMP is to implement the appropriate mechanisms that will address the risks and adverse impacts likely to be associated with the implementation of the project. The action plans constituting the PEMP define the approaches and activities to ensure project implementation is followed up to achieve desired outcomes and ensure project sustainability.

The specific objectives of the provisional plans are listed below:

- To protect the nearby drainage channel from siltation and oil contamination, while preserving the integrity of groundwater;
- To ensure the project-induced biodiversity losses are restored to maintain the microclimate conditions;
- To protect the health and safety of workers by minimizing exposure to noise and emissions, accident risks, and hazards;
- To ensure public health and safety (particularly near the project site and communities along haulage routes) is not compromised, by minimizing noise, dust, and emission generation;
- To facilitate the management of all processes and handling of waste streams in compliance with national environmental and sanitation policies;
- To ameliorate project-induced socio-cultural changes and manage community apprehension;
- To ensure fire prevention and control whether originating from on-site or off-site sources, thereby eliminating the risk of spread; and
- To prevent the potential incidence of GBV, sexual abuse and exploitation, and infringement of the

rights of workers during project implementation.

10.2.17 PEMP Implementation Capacity

The design and construction management of the project will be done by DOWH; affording them the full responsibility for maintaining control of the budget and schedule throughout all the stages of project development, as well as implementation of the PEMP. The main entities identified to perform key roles in the environmental and social management plans and activities during the implementation of the project are the:

- Project Proponent (DOWH);
- Design and Supervision Engineers and Supervisor (DOWH)
- Specialist Contractor; and
- ENB.

10.2.17.1 Project Proponent

DOWH will ensure that all the relevant environmental and social management measures are mainstreamed into all engineering, procurement and construction management services associated with the project development. This will include the following:

- Engineering design (blueprint) for earthworks, civil works, etc.;
- Project services including, cost control, scheduling, reporting, and claims processing;
- Procurement including purchasing, inspection of materials and equipment, expediting and contract administration;
- Logistics coordination, including an overview of all aspects of the logistic services;
- Construction management including site management, control and inspection of all construction activities, safety management; and
- Project commissioning including pre-commissioning and testing, operator training and operational assistance.

The availability of qualified personnel with the requisite capacity is essential to the project implementation. The broad capacity-building areas include environmental and social (E&S) risk management implementation and regulatory compliance, as well as institutional and reporting requirements. The relevant personnel identified for E&S coordination include:

- Environmental and Social Specialists of DOWH;
- Project Manager of Contractor; and
- Staff of the Key department of ENB and LLG.

10.2.17.2 The Contractor

DOWH will engage specialist contractors with expertise in road infrastructure development. This contractor will work on specialist tasks with relatively shorter project duration, though some could be on a long-term basis. These contractors will bid tenders and the best will be awarded the contract, based on their technical competencies and experiences, as well as the extent to which they will be able to demonstrate understanding and familiarity in applying social and environmental risk management measures.

The contractor would be required to, during the project construction phase, submit project implementation monitoring reports, demonstrating their environmental and social risk management compliance and environmental and social management stewardship.

The DOWH will review these monitoring reports. The Specialists will complement their review with results from field monitoring exercises to verify the compliance status of the Contractor and provide feedback to the contractor. Furthermore, DOWH will regularly conduct E&S risk management compliance audits. This will ensure that all specialist contractors carry out their construction or service tasks in a manner consistent with the PEMP. The monitoring reports from the specialist contractors will also serve as useful input to DOWH's Annual Environmental and Social Reports and other monitoring reports to be submitted to EPA.

10.2.18 Programme to Meet Requirements.

The programmes proposed to meet mitigation measures and monitoring programmes will include the following:

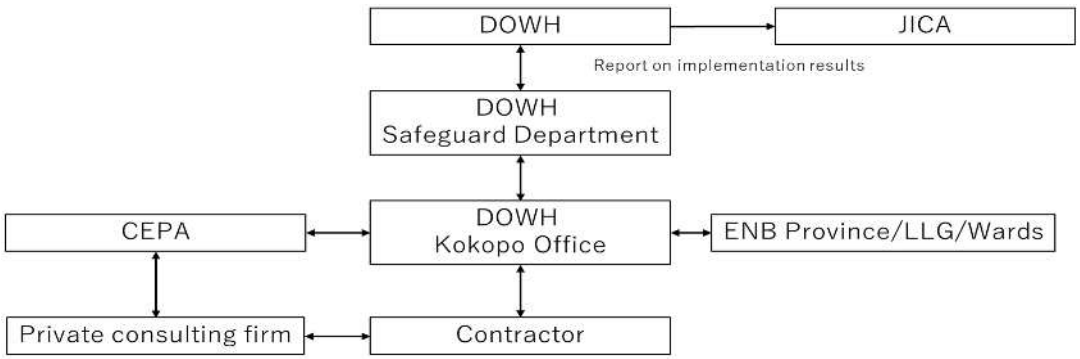
- Adoption of Environmental, Health and Safety Policies and Operational Procedures;
- Management Structuring; and
- Environmental and social monitoring programmes; and
- Environmental and social management budgeting.

10.2.18.1 Adoption of Environmental, Health and Safety Policies and Operational Procedures

DOWH shall implement its environmental, health and safety policies to guide the sustainable implementation of the project. Standard Operational Procedures (SOPs) for all the operations of the project from land preparation through to structure development to mapping of the road, waste management, and management of the road etc. shall also be developed. The standard operational procedures will serve to guide the DOWH in their daily activities.

10.2.18.2 Environmental, Health, Safety and Security (EHSS) Management Structuring

DOWH shall be responsible for managing, supervising and regulating the activities of the project. The Regional DOWH office shall have additional responsibility for the management of the environment, health and safety of road users on the road corridor during the operation phase of the project. The ENB and LLG road safety unit shall work with the DOWH on the day-to-day implementation of environmental, health and safety procedures for the Road. They shall hold monthly meetings to deliberate and discuss environment, health, safety, and security issues arising during the previous month and put in measures for the ensuing week. Figure 10.2-1 shows the organisational structure for EHSS Management of the scheme.



Source: Prepared by JICA Survey Team

Figure 10.2-1 Organizational Structure for ESHS Management

10.3 Monitoring Plan (Item, Frequency, Budgeting and Responsible Agency)

10.3.1.1 Environmental Monitoring Programs

The monitoring plan contained in the PEMP will be updated during project implementation for relevant parameters, in accordance with the directives of the CEPA in the environmental permit conditions.

The Environmental Management Plan (EMP) consists of mitigation measures and monitoring in general. Necessary mitigation measures are based on the result of impact forecasts. Table 10.3-1 and Table 10.3-2 present the EMP.

10.3.1.2 Financial Contingencies Expected

The likelihood of an event outside the predicted scope of the Environmental Assessment occurring is never zero and as such a financial contingency is needed to cover such eventualities. Oil spills, fire outbreaks, earthquakes, floods, landslides and windstorms are phenomena that can occur having cascading impacts on the project. Though insurance will be required to cater for this, a predetermined amount of money as agreed between the client and the contractor will also need to be allocated to address unanticipated ESHS risk.

10.3.1.3 Estimated Cost of Resettlement

The potential resettlement cost for the proposed project will be provided in the RAP. These costs include possible claims for replacement of demolished permanent structures within the project RoW, relocation assistance for temporary structures, loss of business income for a period of 1 month, and resettlement assistance for the disturbance to potentially affected individuals/entities, business operators and structure owners. The estimate also includes lump sum costs for relocating utility lines (estimated as respective percentages of outstanding resettlement costs). The estimate was based on assumptions including the following:

- Constructional details of affected structures/assets are basic and uniform for identified classes of assets.
- The potential project footprint will possibly be maintained along the existing footprint with minimal expansion.
- Assets were enumerated through a rapid survey; details collected are not sufficient for a complete assessment of compensation/resettlement claims. Thus, the assessed cost only provides an idea of the possible cost of resettlement.
- The definite footprint for the proposed project has not been determined. The exact delineation of the footprint will likely include more physical and economic displacement and impact which may require a resettlement scoping to inform a RAP.

10.3.1.4 Relevant Contractual Provisions Needed to Reset the Project in Evident of Environmental Effects Escalating Beyond Control

DOWH will set out the minimum expectations regarding environment, social, health and safety (ESHS) performance from the onset to ensure that the contractor(s) is fully aware of ESHS obligations. The contractor will be required to prepare and submit a Contractor's Environmental Management Plan (C-EMP) to DOWH for approval prior to the commencement of construction activities. The C-EMP will detail all the necessary and specific strategies and implementation plans necessary to mitigate and manage the ESHS risks and demonstrate commitment to compliance with the project's ESHS as well as allocate sufficient funds and capacity to oversee, monitor and report on C-ESMP performance. A code of conduct outlining standards, morals and ethical work behaviors including standards on sexual exploitation and abuse and sexual harassment, that will apply to the contractor's workers and subcontractors to ensure compliance with ESHS requirements will be provided by the contractor. Also, it will be required of the contractor to employ qualified ESHS personnel as their key personnel to ensure implementation of C-ESMP and supervise ESHS performance. The contractor will be accountable for any environmental or social damage caused by their sub-contractor or workers and thus will be expected to put in place controls and procedures to manage their environmental and social performance.

In addition to the requirements from the contractor, some specific provisions relating to ESHS performance will be incorporated into the contracts for the management of project environmental impacts in case these go beyond control. The DOWH will possess every right to suspend/ stop works until ESHS performance is brought under control or acceptable standards at the stage of construction where the contractor has not taken appropriate action to achieve compliance with ESHS requirements after repeated notices of violation and warnings of noncompliance. The contractor will be required to provide a specified percentage of the contract price as ESHS performance security in the form of 'bank demand guarantee'. This is to ensure that adequate funds are available for rehabilitation works to be carried out to restore the environment to a prespecified condition. In the event that the contractor is not meeting its ESHS obligations, DOWH should have the ability to withhold financial payment to the

contractor. In a similar case where ESHS performance is not up to the expected standard and is resulting in serious environmental impacts and risks, the DOWH will employ a third party or another contractor using the ESHS performance security and withhold payments to cover the cost of remediation. Finally, when there is an ongoing failure on the part of the contractor to remedy poor ESHS performance, and failure to show good faith and efforts to correct noncompliance, the issues will rise to the level of material breach of contract allowing enforcement action or even termination of the contract.

10.3.2 Provisional Monitoring Plan

This section outlines the environmental and social monitoring and reporting programme to be implemented to ensure that the potential impacts identified from the proposed project are effectively controlled. The relevance of this programme is to help predict unforeseen impacts and propose mitigation actions to address their occurrences.

10.3.3 Objectives of the Monitoring Plan

The main objectives of the monitoring plan include the following:

- Ensure regulatory requirements and international guidelines are complied with;
- Verify that predicted impacts are accurate and mitigation measures taken are effective;
- Provide early warning of potential environmental impacts and social risks;
- Identify any unforeseen impacts so that appropriate mitigation measures can be taken at the earliest stage;
- Inform future operations and contribute to continuous improvement in the management of environmental and social issues related to the project; and
- Eliminate or reduce environmental and social-related costs.

10.3.4 Monitoring Approach

This environmental and social monitoring program involving visual inspections, compliance, and receptor monitoring is designed to ensure that the road dualization project is in conformity with environmental laws and regulations as well as project mitigations.

10.3.4.1 Inspection

Inspection is one of the key monitoring approaches that will be utilised to ensure that mitigation measures and commitments are properly maintained and that specific management procedures are being followed. Relevant environmental and social issues including ambient air quality, water quality, health and safety performance, ambient noise levels, and waste management will be planned and carried out on a regular basis.

10.3.4.2 Impact Detection Monitoring

Impact detection monitoring involves the assessment of the performance of environmental, social, health and safety mitigation measures as well as the detection of further impacts which could arise from the construction work. The DOWH -Environmental and Social Specialists shall ensure that impacts and their mitigation measures are implemented and that potential negative impacts are minimised. Impact detection monitoring will serve as the threshold where any monitoring component exceeding the stipulated limit for their respective parameters as per those presented in monitoring results for water quality will be taken as an indication of the ineffectiveness or defectiveness of mitigation measures for those aspects.

10.3.4.3 Compliance Monitoring

Mitigation measures can only take effect if they are properly implemented. The level of implementation may vary in accordance with the commitment made by the project proponents and contractor to comply with the mitigating measures. Procedures and requirements for compliance monitoring will comprise the availability of project performance data.

10.3.4.4 Monitoring and Statutory Reporting

Periodic reports summarising the status of the project shall be compiled by the DOWH Environmental and Social Specialists and submitted to the CEPA as required. These reports shall include but not be limited to Monitoring Reports, Annual Environmental Reports (AERs), and Contractor's Environmental Management Plan (C-EMP).

10.3.4.5 Monitoring Plans

The following key elements will be monitored for the pre-construction, construction, and maintenance proposed project. The monitoring plans will require a cumulative annual budget of Twenty-Four thousand, Three Hundred United States Dollars (USD 24, 300) for smooth implementation. This will be financed by DOWH as a demonstration of its commitment to sustainable implementation of the proposed project.

10.3.5 Environmental Monitoring Plan

Environmental quality parameters that will be monitored to track the effectiveness of the proposed mitigation measures the project will focus on are presented in Table 10.3-1 and Table 10.3-2.

The Environmental and Social Monitoring Form (Draft) is shown in Annex-H.

Table 10.3-1 Environmental Monitoring Plan（Pre- and During Construction Phase)

Area	No.	Item	Mitigation measure	Parameter	Method	Location	Frequency a year	Implementing Organization	Responsible Organization	Direct Cost (Thousands USD)	Standard and related Laws, Regulations and Guidelines
Pollution	1	Air pollution	Maintenance of heavy machinery, trucks, and equipment.	Maintenance records	Inspection and maintenance	Project Area	Quarterly	Contractor	DOWH	Included in project cost	
			Proper loading and towing of excavated soil.	Monitoring	Review of work schedules and machinery	Project Area	Quarterly	Contractor	DOWH	Included in project cost	
			Implementation of water sprinkling	Monitoring	Review of work schedules and machinery	Project Area	Quarterly	Contractor	DOWH	Included in project cost	
			Use of waterproof sheets for scattering prevention.	Monitoring	Confirmation of waterproof sheet usage	Project Area	Quarterly	Contractor	DOWH	Included in project cost	
			Installation of temporary enclosures	Monitoring	Confirmation of the installation of temporary enclosures	Project Area	Quarterly	Contractor	DOWH	Included in project cost	
			Installation of 20km/h speed limit warning signs.	Monitoring	Presence and visibility of signs; spot checks	Project Area	Quarterly	Contractor	DOWH	Included in project cost	
			Air quality monitoring (Dust).	Dust levels	Visual inspection and resident interviews	Project Area	Semi-annually	Contractor	DOWH	Included in project cost	
	2	Water pollution	Installation of temporary drainage around sites	Inspection and monitoring	Confirmation of the installation status of temporary drainage	Project Area	Quarterly	Contractor	DOWH	Included in project cost	
			Covering excavated soil with sheets; proper backfill/disposal.	Inspection and monitoring	Review of work schedules	Project Area	Monthly	Contractor	DOWH	Included in project cost	
			Restriction of maintenance and refueling areas.	Monitoring	On-site verification of oil spills	Project Area	Quarterly	Contractor	DOWH	Included in project cost	
	3	Wastes	Distribution of large branches/wood to local residents.	Quantity check	Recording distribution quantities	Project Area	Daily	Contractor	DOWH	Included in project cost	
			Backfilling with excavated soil.	Material consumption check	Check quantity of used materials	Project Area	Weekly	Contractor	DOWH	Included in project cost	
			Sorting, reuse, and recycling of construction waste.	Check volume of waste	Inspection of waste logs and disposal sites	Project Area	Weekly	Contractor	DOWH	Included in project cost	
			Proper sorting and disposal of domestic waste.	Check volume of waste	Inspection of disposal status	Project Area	Monthly	Contractor	DOWH	Included in project cost	
			Installation of waste oil tanks for storage.	Waste oil quantity check	Verify storage and absence of floor spills	Project Area	Quarterly	Contractor	DOWH	Included in project cost	
			Installation and maintenance of toilet facilities.	Condition of facilities	Check status and adequacy of equipment	Project Area	Quarterly	Contractor	DOWH	Included in project cost	
			Proper management of electronic waste (E-waste).	Storage volume and return records	Review records of returns to suppliers	Project Area	Monthly	Contractor	DOWH	Included in project cost	
	4	Soil contamination and Sedimentation Quality	Prevention of soil contaminants.	Soil contamination status	Verify that excavated soil is not contaminated	Project Area	Semi-annually	Contractor	DOWH	Included in project cost	
	5	Noise and vibration	Maintenance system for trucks, machinery, and vehicles.	Maintenance records	Review of maintenance records	Project Area	Quarterly	Contractor	DOWH	Included in project cost	
			Engine shutdown during idling.	Power-off compliance	Monitoring of machine idle status	Project Area	Monthly	Contractor	DOWH	Included in project cost	
			Restriction of transport and work to daytime hours.	Logbook records	Review of truck logbooks/diaries	Project Area	Monthly	Contractor	DOWH	Included in project cost	
			Prompt replacement of parts for aging equipment.	Parts replacement records	Review of parts replacement records	Project Area	Annually	Contractor	DOWH	Included in project cost	
			Noise measurement.	Measured noise values	Measurement of noise levels	Project Area	Monthly	Contractor	DOWH	Included in project cost	
Social Environment	7	Involuntary resettlement	Payment and compensation based on RAP.	Implementation status	Consultations or surveys with PAPs	Project Area	Quarterly	DOWH	DOWH/CEPA	Included in RAP cost	RAP Report
			Consultation meetings and/or surveys with Project Affected Persons (PAPs).	Implementation status	Consultations or surveys with PAPs	Project Area	Quarterly	DOWH	DOWH/CEPA	Included in RAP cost	RAP Report
	8	Local economy such as employment and livelihood	Impact monitoring and Grievance Redress Mechanism (GRM).	Livelihood status	Monitoring of RAP implementation status	Project Area	Once	DOWH	DOWH/CEPA	Included in RAP cost	RAP Report
	9	Land use and utilization of local resources	Consultation with the project owner and other relevant parties.	Payment and implementation of compensation based on the RAP.	Consultation meetings and/or surveys with project-affected persons (PAPs).	Project Area	Quarterly	DOWH	DOWH/CEPA	Included in RAP cost	
	10	Water usage	Introduction of water-saving technologies and practices.	Community opinions	Visual inspection and photo documentation	Project Area	Annually	Contractor	DOWH	Included in project cost	
			Water quality monitoring	Water condition	Resident interviews	Project Area	Quarterly	Contractor	DOWH	Included in project cost	
			Implementation of alternative water supply.	Implementation of alternative water	Resident interviews	Project	Monthly	Contractor	DOWH	Included in	

Area	No.	Item	Mitigation measure	Parameter	Method	Location	Frequency a year	Implementing Organization	Responsible Organization	Direct Cost (Thousands USD)	Standard and related Laws, Regulations and Guidelines
				supply.		Area				project cost	
	11	Existing social infrastructures and services	Utility relocation and community involvement/feedback.	Identification of lines and confirmation of relocation	Inform stakeholders and guide access with signs	Project Area	Monthly	Contractor	DOWH	Included in project cost	
			Obtain feedback regarding access.		Access via signs: Provide guidance for access using signs.	Project Area	Monthly	Contractor	DOWH	Included in project cost	
	12	Misdistribution of benefit and damage	Monitoring worker voices and community complaints.	Complaint records	Review worker lists and grievance logs	Project Area	Semi-annually	Contractor	DOWH	Included in project cost	
	13	Gender	Worker education on rights and Code of Conduct.	Signed CoC	Review worker lists and GRM resolution	Project Area	Semi-annually	Contractor	DOWH	Included in project cost	National Gender Policy
			Anti-harassment/abuse Grievance Redress Mechanism.	Case records	Review worker lists and GRM resolution	Project Area	Semi-annually	Contractor	DOWH	Included in project cost	
	14	Infectious diseases such as HIV/AIDS	HIV/AIDS awareness (peer counseling, testing, etc.).	Program records	Review program types and attendance logs	Project Area	Annually	Contractor	DOWH	Included in project cost	Occupational Health and Safety
	15	Labour environment	Safety measures and condition of construction workers.	Condition of workers	Interviews for safety measures and status	Project Area	Semi-annually	Contractor	DOWH	Included in project cost	Occupational Health and Safety
			Provision and usage of PPE (Yard/Camp).	PPE usage rate	Spot checks on site	Project Area	Quarterly	Contractor	DOWH	Included in project cost	Occupational Health and Safety
			Accident and injury records (Yard/Camp).	Injury logs	Review of accident and near-miss logs	Project Area	Semi-annually	Contractor	DOWH	Included in project cost	
			Management of first-aid center (Yard/Camp).	First-aid center records	Check adequacy and usage of the center	Project Area	Monthly	Contractor	DOWH	Included in project cost	
			Medical records and health monitoring (Yard/Camp).	Health records	Review of supplies and treatment records	Project Area	Monthly	Contractor	DOWH	Included in project cost	
	16	Right of children	Do not employ child labor under the age of 18.	Verification of records.	Verification of identification (ID).	Project Area	Semi-annually	Contractor	DOWH	Included in project cost	
	17	Accidents	Monitoring of accident numbers and records.	Accident records	Review lists from authorities/police	Project Area	Semi-annually	Contractor	DOWH	Included in project cost	Occupational Health and Safety
			Availability of first-aid kits and fire extinguishers.	Presence of kits	Immediate inspection of kit conditions	Project Area	Quarterly	Contractor	DOWH	Included in project cost	
			Machinery maintenance schedule management.	Maintenance records	Review of maintenance schedules	Project Area	Quarterly	Contractor	DOWH	Included in project cost	
			Installation and visibility of road signs.	Signage status	Verification of visibility and presence	Project Area	Semi-annually	Contractor	DOWH	Included in project cost	
			Implementation of safety awareness programs.	Program records	Review of implementation records	Project Area	Monthly	Contractor	DOWH	Included in project cost	
			Emergency contact numbers and reflectors on trucks.	Label visibility	Check label position and visibility	Project Area	Semi-annually	Contractor	DOWH	Included in project cost	
			Monitoring of driver alcohol concentration levels.	Alcohol test records	Immediate breathalyzer tests/checks	Project Area	Semi-annually	Contractor	DOWH	Included in project cost	
			Speeding control and speed tracking systems.	Speeding violations	Use of speed tracking systems	Project Area	Semi-annually	Contractor	DOWH	Included in project cost	
			Verification of driver license validity.	License records	Verification of expiration dates	Project Area	Semi-annually	Contractor	DOWH	Included in project cost	

Remarks
**1: Frequency and timing of monitoring shall be modified at detailed design stage*
**2: The cost indicates direct cost, not including consultant fee, overhead and personal expense*

Table 10.3-2 Environmental Monitoring Plan (Operation: 3 Years After the Operation)

Category	No.	Item	Mitigation measure	Parameter	Method	Location	Frequency a year	Implementing Organization	Responsible Organization	Direct Cost (Thousands USD)	Standard and related Laws, Regulations and Guidelines
Pollution	1	Air pollution	Air quality monitoring.	Dust levels; Number of complaints	Interviews with residents; Visual inspection	Project Area	Annually	DOWH	DOWH	Included in project cost	
	2	Wastes	Maintenance of sediment and earth/sand.	Sedimentation pond status	Visual inspection	Project Area	Annually	DOWH	DOWH	Included in project cost	

Remarks
**1: Frequency and timing of monitoring shall be modified at detailed design stage*
**2: The cost indicates direct cost, not including consultant fee, overhead and personal expense*

CHAPTER 11. Public Consultation

11.1 Stakeholder Consultations

National, Provincial and Local levels government and Local community consultations were also undertaken and including relevant stakeholders DOWH, CEPA, ENBPG, Kokopo District Authority).

Stakeholders were briefed on the proposed project and the need for the IEE to address potential environmental and social impacts. The views and feedback obtained regarding potential benefits and adverse impacts of the intended road expansion and improvement work and measures to address anticipated adverse impacts have been adequately incorporated into the Initial Environmental Examination Report and the Environment Permit Application and Document.

11.2 Stakeholder Engagement and Consultations

11.2.1 Purpose of Stakeholder Engagement

The engagement of stakeholders was conducted in accordance with good EA practice, following the guidelines outlined in the CEPA Environmental Regulation 2002 well as international best practices. This approach will enable robust public participation in the assessment process, build transparency in project information sharing and encourage valuable contributions towards the construction and operation phases. Additionally, the approach will improve environmental sustainability and enhance the social acceptability of the proposed road expansion and improvement works. Relevant stakeholders include those likely to be affected (either positively or negatively) and those that have power or interest in the proposed undertaking. This helps identify potential conflict and minimize misinformation, develop alternatives and aid in decision-making through increased mutual understanding. It promotes the feeling of ownership and cooperation and helps to establish a good rapport, manage single-issue viewpoints, and gain technical expertise and first-hand local and expertise knowledge on a subject matter.

11.2.2 Consultations with Local Stakeholders

Consultations were held with local stakeholders prior to the public consultation. The results are presented in Table 11.2-1. As a result of the consultations, no particular objections to the project were identified. Relevant government agencies were individually visited to inform them of the date and time of the public consultation meeting.

Table 11.2-1 Summary of Local Stakeholder Consultations

No.	Date	Interviews with	Main Issues Discussed	Main Results of Consultations
1	26th May 2025	Karavi Bridge	• Main Issues Discussed • Project Scope and Overall Benefit • Flood Mitigation & Bridge Design • Upstream & Comprehensive Flood Control • Road Extension and Footpaths • Roadside Economic Activities and Livelihoods • Feeder Roads and Walking Tracks • Environmental Management and Safety • Alternative Water Supply	• Main Results of Consultations • Project is beneficial; past maintenance ineffective. • Consider flyover to maintain water flow; road height to minimize sediment. • Review upstream works and drainage along full 2.4 km alignment. • Extension to Kuradui Junction and footpath feasibility to be reviewed. • Acknowledge impacts; holistic development including drainage and footpaths. • Feeder road upgrade noted; footpaths on bridges may be added. • Consider soil preservation and vegetation; local support requested. • Concern acknowledged; alternative water supply to be considered.

Source: Prepared by JICA Survey Team

11.2.3 Summary of 1st Public Consultation

Table 11.2-2, Table 11.2-3and Table 11.2-4 provide an overview of the first public consultation and a summary of what was said. As a result of the consultation, no specific objections to the project were identified. The contents of the RAP survey were also explained at the same time at the public consultation meeting.

Regarding the method of information dissemination, residents were informed through the heads of each community (six areas) via their respective community associations, and notices were also posted at the community halls. Additionally, on the day of the meeting, a public announcement vehicle was used to inform residents of the time and venue.

Table 11.2-2 Summary of 1st Public Consultation

Date Venue	Participant	Agenda
[Date] 26th May 2025 [Venue] Karavi Bridge [Languages used] Local language and English	Karavi Ward Member: 1 Ranguna Ward Member: 1 ENBPA/LLG/Kokopo-Open: 8 DOWH: 1 JST: 5 Residents: 233 Total 249 (147 Male, 102 Female)	• Opening Remarks (Community Leader) • Opening Player - Pastor / Priest • Opening Remarks (DOWH) • Presentation of Project Outline (DOWH) • Presentation of IEE /RRA(ARAP) Survey (JICA Survey Team /ENRD) • Lands Departments (Valuer / Provincial Office) • Provincial Affairs (LLG President / Ward Councilor) • Exchange Opinions, Public Views, Questions and Answers • Focus Group Discussion for Women (Gender) • Closing Remarks (DOWH) • Closing Player - Pastor / Priest
Situation Photograph		
		

Source: Prepared by JICA Survey Team

Table 11.2-3 Summary of Opinions of Residents on 1st Public Consultation

Contents	Main issues for comment and discussion
1. Project Scope and Overall Benefit 2. Flood Mitigation & Bridge Design 3. Upstream & Comprehensive Flood Control 4. Road Extension and Footpaths 5. Roadside Economic Activities and Livelihoods 6. Feeder Roads and Walking Tracks 7. Environmental Management and Safety 8. Alternative Water Supply	1. Comment: The project is good, economical, and will benefit the province and community. Past maintenance has failed to solve silt deposition and flooding problems. Response: Not explicitly required, but the overall comment was positive acknowledgement. 2. Suggestion: JICA should consider a flyover bridge structure to allow natural water flow and prevent silt/sediment accumulation on the road. Response (DOWH/JST): A hydrological and hydraulic analysis will be conducted to set the appropriate road height, ensuring natural water flow and minimizing sediment risk. 3. Request: JICA should consider going 1km upstream to conduct landslide prevention civil works on two major flood-prone rivers. Also, concerns raised that Malapau area is affected and the project should cover the entire 2.4km alignment, including two little drainages. Response (DOWH/JST): The request for upstream intervention will be carefully considered, focusing on river channel improvement and the installation of sedimentation basins. The existing drainage conditions along the entire 2.4 km alignment, including the Malapau area, will be reviewed and appropriate drainage measures planned. 4. Request: Extend the project all the way to Kuradui Junction and consider constructing a footpath on one side of the road (towards the mountain). Response (DOWH/JST): The proposed extension to Kuradui Junction and the possibility of constructing a footpath will be reviewed, and the scope confirmed accordingly. (Footpaths on bridges may also be considered in the final design.) 5. Comment: Roadside economic activities, gardens, and markets have been devastated by increased sediment load. A holistic development is requested, including landslide prevention upstream, drainage, and side foot pathways. Response (DOWH/JST): Upstream construction will be considered. The DOWH/JST acknowledged the severity of the impact on livelihoods. 6. Request: The project should consider upgrading the village feeder road into Karavi (about 1km) so it can be used during floods. Also, assist with walking tracks affected by the flood. Response (DOWH/JST): The project is primarily focused on the national road. Concerns about the feeder road are noted for future coordination with relevant authorities. The installation of footpaths on the bridge may be considered depending on the final design. 7. Suggestion: Preserve soil after digging (cover it up and plant grasses) as the soil is loose sandy loam and can be easily washed away. Request: Local people (especially youth) should support the JICA team, provide security, and maintain amicable solutions for disputes of ownership during construction. Response (DOWH/JST): The possibility of vegetation works to preserve the soil will be considered. A social survey related to compensation will be conducted if necessary. Note: Local people were requested to support the JICA team and provide security. 8. Comment: The project should consider alternative water supply to affected people. Response (ENBPA): ENBPA has acknowledged the concern regarding alternative water supply to the affected people.

Source: Prepared by JICA Survey Team

Table 11.2-4 Main Comments, Questions, and Responses from the 1st Public Consultation

NO.	Major Opinion and Answer				
	Question /Comment		Answer		Questioner's Response
	Name / Position	Question	Name / Position	Answer	
1	Karavi Village Ward Member	• Comments: • The project is good for the province, district and the community. The is an economical project and also will help the affected communities. He said past road maintenances carried out by the	-	-	-

NO.	Major Opinion and Answer				
	Question /Comment		Answer		Questioner's Response
	Name / Position	Question	Name / Position	Answer	
		government have not effectively solved the silt deposition during heavy rain that has flooded the village gardens, houses, road and bridges.			
		Suggestion: • JICA can consider a flyover bridge structure to allow natural water flow carrying the silt and sediment load downstream than settling the sediment load on the road and bridge causing road block and other social issues.	DOWH/JST	DOWH/JST will conduct a hydrological and hydraulic analysis to set the appropriate road height, ensuring natural water flow and minimizing the risk of sediment accumulation on the road.	Accepted the answer
2.	Malapau Village Ward Member	Comment: • Appreciated the project. Request JICA if they could go in 1km upstream to do landslide prevention civil works on two of the major flood prone rivers mitigate the spread of the flooding.	DOWH/JST	DOWH and JST will carefully consider the request and examine the appropriate extent of upstream intervention, focusing mainly on river channel improvement and the installation of sedimentation basins as part of the overall project planning.	Accepted the answer
3	President Raluana LLG	Comment: • For project to be extended all the way to Kuradui Junction and if JICA would consider constructing footpath on one side of the road, towards the mountain	DOWH/JST	DOWH/JST will review the proposed extension to Kuradui Junction and the possibility of constructing a footpath on one side of the road, and confirm the scope accordingly.	Accepted the answer
4.	Malapau Resident	Comment: • Concerned that the floodings have affected Malapau area as well, not only the 2 river areas. The project should cover the entire 2.4km road alignment.	DOWH/JST	DOWH/JST will review the existing drainage conditions along the entire 2.4 km alignment, including the Malapau area, and will plan appropriate road drainage measures accordingly.	Accepted the answer
5	Villager	Comment: • The project should also consider upgrading the village feeder road into Karavi about 1km so that they could also use it when there is flood, because when it floods they do not	DOWH/JST	DOWH/JST understand the concerns regarding the village feeder road to Karavi, this project is primarily focused on strengthening the resilience of the national road. However, DOWH/JST will take note of your concerns for future coordination with relevant authorities.	Accepted the answer

NO.	Major Opinion and Answer				
	Question /Comment		Answer		Questioner's Response
	Name / Position	Question	Name / Position	Answer	
		use those roads anymore, the sediment load and silt covers those roads as well.			
6	Villager	Question: • Can the project also assist walking tracks that have been affected by the flood?	DOWH/JST	While the primary scope is focused on the main road, the installation of footpaths on the bridge may be considered depending on the final road design.	Accepted the answer
7	Villager	Comment: • 1.Preserving soil after digging, meaning cover it up and plant grasses over any dug out pits. The soil is loose sandy loam, can be washed away easily by surface runoff during rainfall. • 2. Challenged the youth folks to support the JICA team, provide security, maintain amicable solutions to disputes of ownership of crop trees and assets during the road construct.	DOWH/JST	DOWH/JST will consider the possibility of vegetation works to preserve the soil. Additionally, if necessary, a social survey related to compensation will be conducted.	Accepted the answer
8	Ward Member Balanataman	Question: • If the road level can be raised from Butuwin through to the Ranguna. • Local people were requested to support the JICA team and provide security.	DOWH/JST	Planned embankments will be constructed as necessary.	Accepted the answer
9	Villager	Comment: • Thank you and appreciate to JICA for the project	-	-	-
10	Villager	Comment: • Appreciate and thank you to JICA for the project • Also advised to youths and community to help team when on site survey and guaranteed JICA safety while on site	-	-	-

Source: Prepared by JICA Survey Team

11.2.4 Summary of 2nd Public Consultation

(1) Background

Initial Schedule for this Public Consultation and Presentation was proposed for the 8th of December 2025. Due to heavy rain and project site community programs the scheduled meeting was postponed to the 9th of December 2025.
However, the JICA team, local consultant and the Karavi Ward Member made a courtesy visit to Hon. Ereman Tobaining Member for Kokopo who was at his village resort at Malapao beach front. The brief visit turned out to be a very significant meeting and issues discussed with the Hon. Member are incorporated in this meeting minutes.
The rain continued through to the 9th December meeting was conducted in two (2) separate locations due to Kokopo District and the province's the continuous rain
The JICA team briefed the newly elected Ward Member, Mr. Joseph Malau, on the project's progress and successfully resolved a resident's grievance by clarifying that the property surveys were conducted transparently and accurately with the cooperation of the former member, leading Mr. Malau to express his full support for the road improvement project.

(2) Summary of Courtesy Visit to National Member for Kokopo

Table 11.2-5 to Table 11.2-15 provide an overview of the Pre second public consultation and a summary of what was said.

Table 11.2-5 Summary of Courtesy Visit to National Member for Kokopo

Date Venue	Participant	Agenda
[Date] 8th December 2025, [Venue] Malapao Beach Resort [Languages used] Local language and English	Kokopo Open Member MP and Chairman - KDDA: 1 Karavi Ward Member: 1 JST: 3 Total No: 5 Males=4 Females= 1	• Welcome and Remarks (KDDA Chairman): • Appreciation of Japan's support and project significance. • Briefing on IEE and RAP Survey (ENRD): • Introduction of survey findings and field examinations. • Clarification of Land Status (KDDA Chairman): • Confirmation of Free Hold State Lease and absence of customary land issues.
Situation Photograph		
 		

Date Venue	Participant	Agenda
		

Source: Prepared by JICA Survey Team

Table 11.2-6 Main issues for comment and discussion of Courtesy Visit to National Member for Kokopo

Contents	Main issues for comment and discussion
1. Strategic Importance for Trade and Economy 2. Land Tenure and Legal Status, 3. Future Historical and Tourism Ties	1. Comment: The project is critical for the ENB Province and PNG as it links Kokopo and Rabaul, easing access to Rabaul Port for the trade of agricultural products. Response: The JICA team acknowledged the strategic value and provided a briefing on the completed RAP and IEE reports. 2. Comment: The 2.4km road traverses Free Hold State Lease land (Malapao Plantation), meaning no customary land is involved. Response: The team confirmed that since it is registered State Land, acquisition issues should be minimal, and consultations will focus on identified land users,. 3. Comment: The MP noted the long history with Japan since WWII and expressed interest in developing tourism through future sister-city relationships,. Response: The JICA team appreciated the historical context and the district's technical and funding support.

Source: Prepared by JICA Survey Team

(3) Summary of 2nd Public Consultation at Karavi

Table 11.2-7 Summary of 2nd Public Consultation at Karavi

Date Venue	Participant	Agenda
[Date] 9th December 2025 [Venue] Karavi Community Hall [Languages used] Local language and English	Karavi Ward Member: 1 ENBPA/ Land Use Officer- Lands : 1 DoWH: 1 JST: 3 PAPs: 6 Total 12 (7 Male, 5 Female)	• Explanation of IEE and RAP reports and survey results • Explanation of local concerns • Explanation of asset valuation and compensation (individual explanation with Project Affected Persons (PAPs)) • Expression of community support for the project and hearing of requests • Introduction of contact points for grievance redress
Situation Photograph		
		

Source: Prepared by JICA Survey Team

Table 11.2-8 Summary of Opinions of Residents on 2nd Public Consultation at Karavi

Contents	Main issues for comment and discussion
1. Environmental Impact Mitigation (Dust and Flooding)	1. Comment: Residents expressed happiness and emphasized that the project is essential to solve long-standing dust and flooding problems in the community.

Contents	Main issues for comment and discussion
2. Asset Evaluation and Grievance Focal Points	Response: The team explained that the civil works are designed to address these specific environmental issues. 2. Comment: Project Affected Persons (PAPs) appreciated the evaluation of their properties and asset assessment for compensation. Response: The team conducted one-on-one briefings due to rain, sharing RAP/IEE reports and introducing focal points for future grievances,

Source: Prepared by JICA Survey Team

Table 11.2-9 Main Comments, Questions, and Responses from the 2nd Public Consultation

NO.	Major Opinion and Answer				
	Question /Comment		Answer		Questioner's Response
	Name / Position	Question	Name / Position	Answer	
1	Ward Member / PAPs	• Due to heavy rain restricting attendance, agreed to the proposal to conduct individual consultations regarding impacts and compensation.	JST	Confirmed to proceed with individual consultations for each affected household based on RAP/IEE field surveys.	Agreed
2	PAPs / Community	• [Support & Expectations]Expressed happiness and strong support for the project. Appreciated the compensation arrangements and requested civil works to solve long-standing dust and flooding issues.	JST / DOWH	Acknowledged the support. Shared RAP and IEE reports one-on-one and explained the asset evaluation process for compensation.	Noted
3	PAPs / Community	• [Land Tenure Acknowledgement]Acknowledged that the road traverses State Freehold Lease land. Appreciated the authorities' efforts regarding land subdivision and titling processing.	-	(The acknowledgment of State Lease status and appreciation were noted).	Confirmed
4	PAPs	• [Contact Exchange]Shared contact details and WhatsApp numbers to facilitate communication.	JST	Introduced Focal Points (JST Sub-Consultant / Provincial Lands Office) to address further queries and grievances.	Contacts Exchanged
5	-	• -	DOWH	[Role Clarification]Stressed that DOWH Safeguard Branch acts as the custodian and shall address all concerns relating to project management and monitoring.	Confirmed

Source: Prepared by JICA Survey Team

(4) Summary of 2nd Public Consultation at Ranguna

Table 11.2-10 Summary of 2nd Public Consultation at Ranguna

Date Venue	Participant	Agenda
[Date] 9th December 2025 [Venue] Mr. Uralom Roro's residential area within the Ranguna Community	Ranguna Ward Former Member: 1 JST (OCG/ENRD): 3 DOWH: 1 Lands ENBPA: 1 PAPs: 21	• Explanation of IEE and RAP reports and survey results • Explanation of local concerns • Explanation of asset valuation and compensation (individual explanation with Project Affected Persons (PAPs))

[Languages used] Local language and English	Total: 27 (16 Male,11 Female)	• Expression of community support for the project and hearing of requests • Introduction of contact points for grievance redress

Situation Photograph

Source: Prepared by JICA Survey Team

Table 11.2-11 Summary of Opinions of Residents on 2nd Public Consultation at Ranguna

Contents	Main issues for comment and discussion
1. Community Support and Reliable Data Collection, 2. Bridge Construction and Land Acquisition Plan	1. Comment: The community pledged full support and promised not to sabotage the project with unnecessary demands regarding gardens and structures. Response: The JICA team appreciated the stable leadership of Community Chief Uralom Roro in providing accurate socio-economic data for the survey. 2. Comment: There were concerns regarding the expansion of the road width and its impact on gardens. Response: It was clarified that the road will stay within the existing corridor, but minor land acquisition may be required near the Karavi and Ranguna bridges pending final engineering designs.

Source: Prepared by JICA Survey Team

Table 11.2-12 Main Comments, Questions, and Responses from the 2nd Public Consultation at Ranguna

NO.	Major Opinion and Answer				
	Question /Comment		Answer		Questioner's Response
	Name / Position	Question	Name / Position	Answer	
1	JST, DOWH, & Lands	• Presented the IEE and RAP findings to the community and Project Affected Persons (PAPs). Explained that properties and assets have been evaluated for compensation..	Community / PAPs	Expressed happiness and noted the project's importance. They appreciated the arrangements for compensation for lost properties/structures.	Agreed

NO.	Major Opinion and Answer				
	Question /Comment		Answer		Questioner's Response
	Name / Position	Question	Name / Position	Answer	
2	Former Ward Member/Chief	• Organized the meeting and identified rightful families/households. Provided socio-economic data for surveys.	JST / DOWH	Recognized Mr. Uralom as a reliable strategic partner who provides stable leadership for the assessment process.	Noted
3	Community / PAPs	• Pledged full support for the project. They highlighted that civil works are urgently needed to solve long-standing dust and flooding issues in the area.	-	-	-
4	Community / PAPs	• Acknowledged the road sits on State Freehold Lease land. They thanked KDDA, ENBPA, and Lands Dept for the ongoing process of subdividing the plantation into family blocks and processing land titles.	-	-	-
5	JST, DOWH, & Lands	Informed the community of focal points for future queries and grievances: • Stressed that as the custodian of road projects, the DOWH Safeguard Branch will handle all matters relating to project management and monitoring.	Community / PAPs	-	Confirmed

Source: Prepared by JICA Survey Team

(5) Summary of 2nd Public Consultation at New Ranguna Ward Member's Residence

Table 11.2-13 Summary of 2nd Public Consultation at New Ranguna Ward Member's Residence

Date Venue	Participant	Agenda
[Date] 16th December 2025 [Venue] Hon. Roro's Residence, Ranguna Community [Languages used] English and local language	[Total Participants] Ward Member: 1 Community/Household Members: 3 ENBPA: 1 JICA Team (JST): 3 Total 8 (7 Male, 1 Female)	• Protocol visit to Hon. Alois Roro • Information update on JICA team's RAP survey work in Ranguna • Clarification of allegations regarding survey methodology and asset identification
Situation Photograph		
 		

Source: Prepared by JICA Survey Team

Table 11.2-14 Summary of Opinions of Residents on 2nd Public Consultation

Contents	Main issues for comment and discussion
1. Briefing of the newly elected Ward Member and leadership involvement 2. Accountability and transparency of the RAP survey methodology 3. Resolution of grievances regarding tree crops and project appreciation	1. An allegation was made that the newly elected Ward Member was not involved in the RAP survey process. Response: JST explained that the former Ward Member, who is the biological brother of the new elect-member, participated heavily to ensure leadership continuity and accountability. 2. Concerns were raised regarding the visibility and evidence-based nature of the field data collection . Response: The JST confirmed that all investigations were carried out visibly and audibly to ensure the survey process was transparent and reliable . 3. Mr. Joseph Malaur alleged that his tree crops were missed during the asset identification process. Response: JST clarified that every landowner's rights and assets were counted through community leadership, resolving the grievance and leading Hon. Alois Roro to express appreciation for the road improvement efforts.

Source: Prepared by JICA Survey Team

Table 11.2-15 Main Comments, Questions, and Responses from the 2nd Public Consultation New Ranguna Ward Member's Residence

NO.	Major Opinion and Answer				
	Question /Comment		Answer		Questioner's Response
	Name / Position	Question	Name / Position	Answer	
1.	JST, DOWH, & Lands :	Updated the newly elected Ward Member (elected late 2024/early 2025) on the RAP survey work and activities conducted in the Ranguan area.	New Ward Member	• Acknowledged the briefing and appreciated the work done by JICA and the Provincial Lands Team.	
1	JST	• Updated the newly elected Ward	New Ward Member	• Acknowledged the briefing and appreciated	-

NO.	Major Opinion and Answer				
	Question /Comment		Answer		Questioner's Response
	Name / Position	Question	Name / Position	Answer	
		Member (elected late 2024/early 2025) on the RAP survey work and activities conducted in the Ranguan area.		the work done by JICA and the Provincial Lands Team.	
2.	PAPs	**Comment:** • Alleged that the RAP survey was not conducted properly, claiming he was missed during crop identification and that the new Ward Member was not involved.	JST	• Explained the transparent process used to account for all assets. Noted that the former Ward Member (the current Member's brother) was heavily involved to ensure every PAP was identified.	Accepted the explanation. The issue was resolved as the survey was confirmed to be visible, audible, and evidence-based.
3	JST	• Reiterated that the former Member, Mr. Uralom Roro, ensured all landowners with ownership rights over properties and assets were counted before the project starts.	New Ward Member	• Confirmed his support for the project to improve the current road conditions.	-

Source: Prepared by JICA Survey Team

11.2.5 Summary of Focus Group Discussion (FGD)

The first Focus Group Discussion was held at the Karavi Bridge site following the first RAP Public Consultation Meeting on October 13, 2025. The summary is provided below.

Table 11.2-16 Main Comments, Questions, and Responses from the 1st Public Consultation

NO.	Major Opinion and Answer				
	Question /Comment		Answer		Questioner's Response
	Name / Position	Question	Name / Position	Answer	
1	Karavi village As plantation in Malapau	Comment: • She said all their roadside small economic activities, gardens and markets have been devastated by the increased sediment load caused by the flood over the years. They could not go garden and market to sell their produced. • She request wholistic development including; landslide prevention upstream drainage and and construct side foot	DOWH/JST	DOWH/JST respond that upstream construction will be considered. Acknowledged the existence of two little drainages also causing flood. This also need to be considered during the construction.	Accepted the answer

NO.	Major Opinion and Answer				
	Question /Comment		Answer		Questioner's Response
	Name / Position	Question	Name / Position	Answer	
		pathways along the road.			
2	Community Leader Karavi	Comment: • Commented on alternative water supply to affected people.	ENBPA	ENBPA has acknowledged the concern regarding alternative water supply to the affected people.	Accepted the answer
3	Womens Rep Villager	• Appreciation to JICA on behalf of Women of Karavi because for now, they will acess good road and also urge community for the safety of JICA team on site	-	-	-

CHAPTER 12. Grievance Redress Mechanism

12.1 Overview

This chapter outlines the grievance mechanism and procedures available to Project Affected Persons (PAPs) for the processing and resolution of complaints or claims related to the resettlement process.

The DOWH and Lands Department shall establish a GM to specifically address grievances resulting from resettlement activities; however, it will also combine with the overall Project grievance process so that both are streamlined. The grievance process will serve to:

1. Provide early warning of possible problems;
2. Involve all necessary stakeholders in the grievance management process, including representatives of PAPs;
3. Provide PAPs with accessible procedures for settlement of disputes;
4. Provide a consistent way to address, resolve and close grievances;
5. Identify and implement appropriate and mutually acceptable corrective actions to address complaints;
6. Contribute to building trust and good relationships with the PAPs, the host communities and other key stakeholders; and
7. Avoid, wherever possible, the need to resort to judicial proceedings.

12.2 Registration of Grievances

It is inevitable that complaints and grievances will arise, especially given the emotive nature of displacement issues. In this report, a grievance is considered to be any complaint or concern raised by an individual or group within communities affected by project operations. Grievances are likely to peak during the verification of the valuation report, further negotiations, and finalization of compensation agreements. Grievances relevant to land tenure and resettlement need to be accommodated by the GM (database), taking cognizance of the various categorizations as shown in Table 12.2-1.

Table 12.2-1 Types of Grievances

Type of grievance	Description
Grievances/errors relating to additional asset inventory	Potential grievances may arise during additional asset inventories (Updating of this Report/RAP) that may be required, whereby the PAP does not agree with assets and values recorded.
Misidentification of owner/occupier of eligible property and assets	Valuers may misidentify the owner/occupier creating grievances or conflict between owners
Complaints regarding the eligibility and entitlements matrix/policy	Grievances may be raised regarding the eligibility and entitlements matrix and compensation provided to PAPs
Potential grievances following valuation	Grievances may arise following the public disclosure of the valuation report by the government. In particular these may include disagreement on asset valuation

Source: Prepared by JICA Survey Team

12.3 Structure of the GRM

Provincial Grievances Redress Committee (P/GRC) The P/GRC will include the Provincial Works Manager (Chair), Provincial Administrator/or representative (Co-Chair), Provincial Department of Lands representative, Provincial Department of Environment representative, Village Chief and Civil

Society Representative. The P/GRC will ensure that the grievance is investigated and a proposed resolution is provided within 15 days of receipt.

The GRM shall involve both formal and informal grievance resolution mechanisms, characterized by; multiple uptake points. Complainants shall be provided with multiple channels to submit their complaints including electronic messages, telephone, SMS, and personal delivery/walk-in. Detailed procedures are described below:

12.3.1 Telephone:

A project specific hotline will be established to enable complainants lodge their complaints. The hotline will be available from 9am to 3pm, Monday to Friday. A trained project staff member will assist with any inquiries and record complaints details and nature of the complaint using a standardized template. Each call will be logged, and the complainant will be given a unique case number for reference. Within 24 hours, the complaint will be reviewed, and if it requires further investigation, the complainant will be informed of the next steps and a follow-up date.

12.3.1 Email:

Complaints can be submitted via email to a designated, publicly shared email address. A standard template will be available on the DOWH website to assist complainants in drafting their messages. Upon receipt of a complaint, an automated acknowledgment email is sent immediately. The GRM team will review and categorize the complaint within 48 hours, assigning it to a responsible officer for resolution. Within five working days, the complainant will receive a follow-up email with either a resolution or a status update.

12.3.2 Walk-in Submissions:

Complaints may be submitted in person at the project office located at the Kokopo Works or the ENBP Lands Office. A designated grievance officer will record walk-in complaints, and complainants will complete a standard form and receive a case reference number. The grievance officer will outline the process and resolution timelines. Complaints will be addressed within seven days, and complainants can revisit the office or contact the officer via phone or email for updates.

The project will take advantage of the presence of local assembly members in each project community to receive/share complaints with project staff.

12.3.3 Procedures for Handling Grievances

The following flowchart (Figure 12.3-1) from the DOWH ESSD will be adopted and shows the Procedures for Handing Grievances.

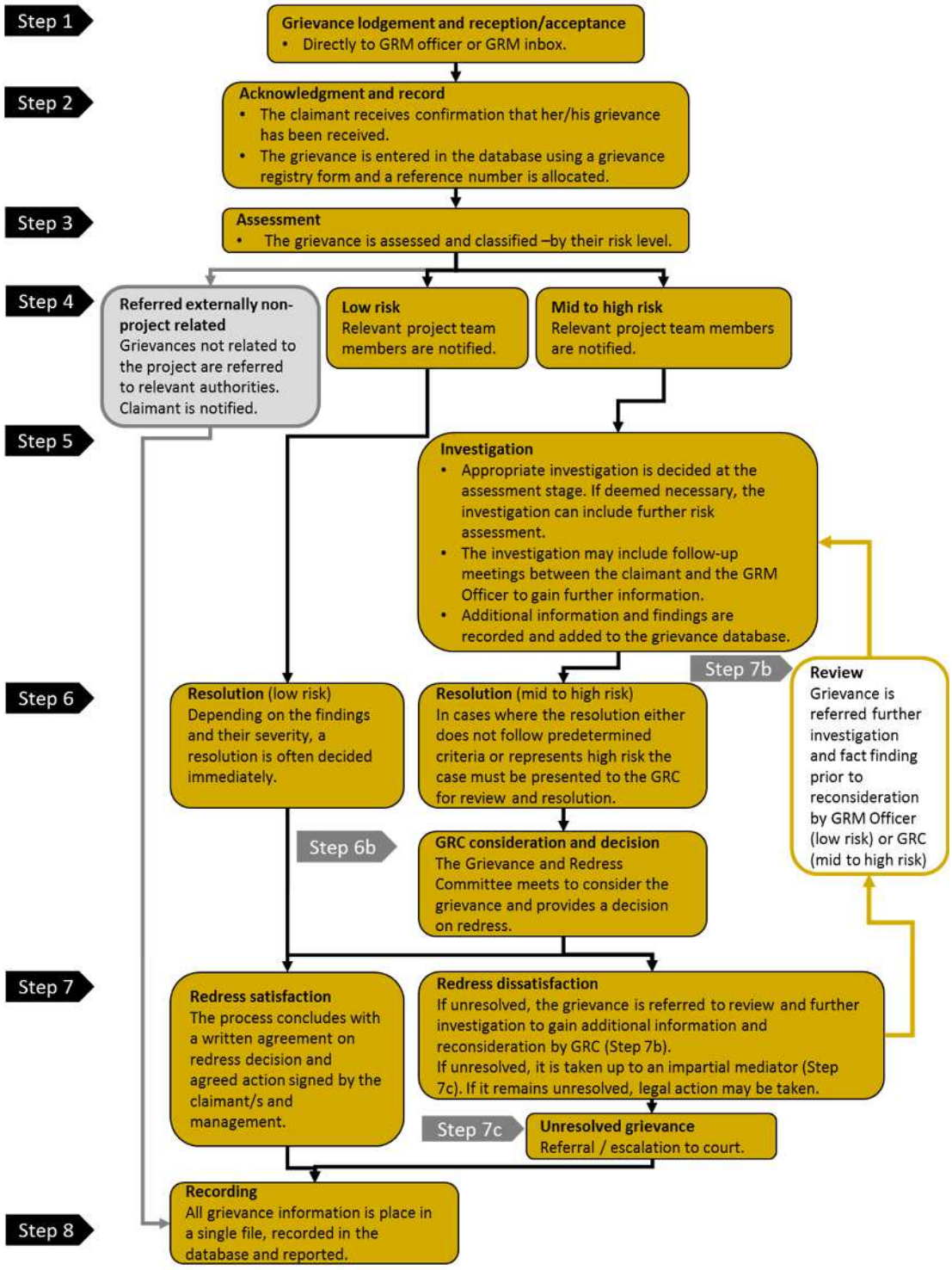


Figure 12.3-1 Flow Chart for Grievance Redress

CHAPTER 13. Others

13.1 Draft Monitoring Form

A draft monitoring form is shown in Appendix-1.

13.2 Environmental Checklist

An environmental checklist is presented in Table 13.2-1-2.

Table 13.2-1 Environmental Checklist (As of February 6, 2026)

Category	Environmental Item	Main Check Items	Yes: Y No: N	Confirmation of Environmental Considerations (Reasons, Mitigation Measures)
1 Permits and Explanation	(1) Environmental Assessment and Environmental Permits	(a) Have EIA reports been already prepared in official process? (b) Are the EIA reports written in the official or widely used language of the host country? (c) Have EIA reports been approved by authorities of the host country government? (If not yet approved, write the expected date of the approval in the "Confirmation of Environmental Considerations" column.) (d) Have EIA reports been approved with any conditions? If conditions are imposed on the approval of EIA reports, are the conditions satisfied? (e) In addition to the above approvals, have other required environmental permits been obtained from the appropriate regulatory authorities of the host country's government? (f) Do the EIA reports cover the items described in Appendix 2 of the JICA Guidelines? (The scope and detail of the impact assessment may be adjusted according to the impact of the project.) (g) Do the environmental and social consideration confirmation cover the project's whole scope, cumulative impacts, derivative and secondary impacts, as well as impacts of indivisible projects?	(a)Y (b)Y (c)N (d)N (e)N (f)Y (g)Y	(a) IEE report prepared. (b) Prepared in English. (c) The IEE Report will be submitted to CEPA by DOWH (Scheduled for approval at the end of March 2026). (d) No specific ancillary conditions are planned. (e) No environmental permits or approvals other than CEPA. (f)The project will cover the items listed in Annex 2 of the Guidelines. (g) The project involves the renovation of existing roads (road paving improvements, road bridges, slope stabilization, and sediment control basins), the results of the consideration of cumulative impacts, indirect or secondary impacts, and indivisible integrated projects indicate that no such project impacts are anticipated.

Category	Environmental Item	Main Check Items	Yes: Y No: N	Confirmation of Environmental Considerations (Reasons, Mitigation Measures)
	(2) Explanation and Consultation with Local Stakeholders	(a) Are local stakeholders properly analyzed and identified? (b) Does the project provide appropriate explanations to local stakeholders about the content and impact of the project, and gain their understanding, through the process of ensuring meaningful consultation including information disclosure? (c) For local stakeholder consultations, are records of consultations prepared, including the gender and other attributes of the participants? (d) Have comments from local stakeholders (such as local residents) been reflected to the project design, etc.?	(a)Y (b)Y (c)Y (d)Y	(a) Identified in consultation with DOWH's environmental officer. (b) Two stakeholder meetings were held (the first on May 26, 2025, and the second on December 9, 2025). (c) Minutes of the meetings, including the gender and demographics of attendees, have been prepared. (d) Of the comments received from residents and other stakeholders, those deemed appropriate and valid will be reflected in the project. (For example, the extension of the endpoint to Kuradui Junction, raising the road elevation, and the scope of flood control measures.)
	(3) Examination of Alternatives	(a) Is the project/plan's scope of multiple alternatives adequately considered? (b) Are alternatives that are feasible in terms of technical, financial, and environmental and social aspects considered from the viewpoint of environmental and social items and, if necessary, reducing total greenhouse gas emissions? (c) Are comparisons made with the “without project” scenario?	(a)Y (b)Y (c)Y	(a) Since this is a road renovation project, multiple alternatives do not exist (only the "Zero Option" was considered). b) Ditto. (c) The “without project” scenario was considered.
2 Pollution Control	(1) Air Quality	(a) Are any impacts by air pollutants emitted from vehicles, etc. expected During operation period? Does the project meet the environmental standards of the host country, etc.? (b) Where air pollution already exceeds the environmental standards near the route, will the project make the air pollution worse? (c) Does the construction have negative impacts? Are there any mitigation measures in place for the impacts?	(a)Y (b)N (c)Y	(a) It is considered that there will be no deterioration of air pollution during the operation phase. By paving the currently unpaved roads, it is expected that dust along the roadside will be reduced. (b) Confirmed by baseline survey; results were below the reference values. (c) Air pollution is expected during construction due to the operation of heavy machinery, etc. and increased dust, but this can be mitigated and reduced by taking mitigation measures.

Category	Environmental Item	Main Check Items	Yes: Y No: N	Confirmation of Environmental Considerations (Reasons, Mitigation Measures)
	(2) Water Quality	(a) Does the water quality in the downstream waters deteriorate due to soil erosion from exposed topsoil such as embankments and cuts? (b) Does surface runoff from roads contaminate water sources such as groundwater? (c) Do effluents, including domestic wastewater and storm water, from various facilities, such as parking areas/service areas, comply with effluent standards of the host country, etc.? (d) Do effluents from the project cause areas that do not comply with the ambient water quality standards of the host country? (e) Does the construction have negative impacts? Are there any mitigation measures in place for the impacts?	(a)N (b)N (c)N (d)N (e)Y	(a) No such impacts are foreseen. Surface water is not observed in the river channels even during the rainy season. (b) The project is basically a road rehabilitation project that follows the existing road alignment, so there will be no impact on water sources such as wells. (c) There will be no parking/service areas in the project. (d) Same as (a). To be confirmed by future baseline surveys etc. (e) Negative impacts are anticipated; therefore, mitigation measures (Install temporary drainage, proper storage and disposal of waste oil, proper waste management) will be implemented.
	(3) Waste	(a) During the operation period, are wastes generated from maintenance works of the road or from the project facilities, such as parking areas/service areas, properly treated and disposed of in accordance with regulations of the host country? (b) Does the construction have negative impacts? Are there any mitigation measures in place for the impacts?	(a)Y (b)Y	(a) In-service maintenance is properly carried out by DOWH. Waste will be properly disposed of. There will be no parking/service areas in the project. (b) There will be removal of existing road pavements and road structures due to construction, but waste will be disposed of appropriately.
	(4) Soil contamination and Sedimentation Quality	(a) Does the construction have negative impacts? Are there any mitigation measures in place for the impacts?	(a) Y	(a) Negative impacts are anticipated; therefore, mitigation measures (proper disposal of waste oil, chemicals, and hazardous materials) will be implemented.
	(5) Noise and Vibration	(a) Do noise and vibration caused by passing vehicles meet the standards of the host country, etc.? (b) If noise and vibration near the route already exceed environmental standards, will the project further worsen the noise and vibration? (c) Does the construction have negative impacts? Are there any mitigation measures in place for the impacts?	(a)N (b)N (c)Y	(a) There is no national standard value in PNG. (b) Impact predictions indicate that the levels will be within international standards, and no issues are anticipated. (c) During construction, noise and vibration from the operation of heavy machinery and construction vehicles are expected, but these can be mitigated and reduced by taking mitigation measures (switch off idling engines, regular machinery maintenance, consideration of placement for high-noise or high-emission machinery/equipment, prohibition of unnecessary honking, adjustment of operation schedules for machinery and trucks, avoidance of unnecessary machinery operation and optimized site layout).

Category	Environmental Item	Main Check Items	Yes: Y No: N	Confirmation of Environmental Considerations (Reasons, Mitigation Measures)
3 Natural Environment	(1) Protected Areas	(a) Is the project site located in protected areas designated by the country's laws or international treaties/ conventions? (b) Does the project affect the protected areas? (c) Does the construction have negative impacts? Are there any mitigation measures in place for the impacts?	(a)N (b)N (c)N	(a) The project site is not located within a protected area as defined by the State of PNG. (b) The nearest protected area (Kerevat–Toma) is located approximately 10km south-west of the project site and will not be affected. (c) The project site is more than 10 km away from the protected area and will not be negatively affected by the construction works.
	(2) Biodiversity	(a) Does the project site encompass primary forests, natural forests in tropical areas, habitats with important ecological value (coral reefs, mangrove wetlands, tidal flats, etc.)? (b) Does the project site encompass habitats of rare species that require protection under domestic legislation, international treaties, etc.? (c) Are there any concerns about the significant impact on biodiversity by the project, with significant conversion or significant degradation of critical habitats or critical forests? If yes, are appropriate measures taken to address the impact on biodiversity? (d) Are adequate measures taken to prevent impacts, such as disruption of migration routes, habitat fragmentation, and traffic accident of wildlife and livestock? (e) Do the roads cause impacts, such as destruction of forest, poaching, desertification, reduction in wetland areas, and disturbance of ecosystems due to introduction of exotic (nonnative invasive) species and pests? (If such impacts are expected, mitigation measures should also be written in the "Confirmation of Environmental Considerations" column.) (f) If the roads are constructed in an undeveloped area, will the new area's development cause significant damage to the natural environment? (g) If there are any other concerns about significant impacts on biodiversity, are measures taken to reduce the impacts on biodiversity? (h) Does the construction have negative impacts? Are there any mitigation measures in place for the impacts?	(a)N (b)N (c)N (d)N (e)N (f)N (g)N (h)N	(a) The project does not include primary forest, tropical natural forest or ecologically important habitats associated with the project site as it is an existing road rehabilitation project. (b) No habitats for valuable species are present within the project site area. (c) There are no significant impacts on biodiversity. (d) The project site is in an urban area and no measures are required. (e) There are no significant impacts on biodiversity. Due to an existing road rehabilitation project. (f) Ditto. (g) Ditto. (h) Ditto.

Category	Environmental Item	Main Check Items	Yes: Y No: N	Confirmation of Environmental Considerations (Reasons, Mitigation Measures)
	(3) Hydrology	(a) Do the hydrologic changes due to the installation of structures adversely affect surface water and groundwater flows? (b) Does the construction have negative impacts? Are there any mitigation measures in place for the impacts?	(a)N (b)Y	(a) No major groundwater pumping or works that would affect the groundwater table veins. (b) Negative impacts are anticipated; therefore, mitigation measures (install temporary drainage, proper storage and disposal of waste oil, proper waste management) will be implemented.
	(4) Topography and Geology	(a) Is there any soft ground on the route that may cause slope failures or landslides? (b) Do the civil works such as cutting and filling cause slope failures or landslides? (If yes, adequate measures to prevent slope failures or landslides should also be written in the "Confirmation of Environmental Considerations" column.) (c) Does soil runoff result from cut and fill areas, waste soil disposal sites, and borrow sites? (If yes, adequate measures to prevent slope failures or landslides should also be written in the "Confirmation of Environmental Considerations" column.) (d) Does the construction have negative impacts? Are there any mitigation measures in place for the impacts?	(a)Y (b)Y (c)Y (d)Y	(a) For slopes along the road, avoidance is to be achieved by allowing a margin for road alignment, and no slope modification is to be carried out. (b) Ditto. (c) Ditto (d) Ditto

Category	Environmental Item	Main Check Items	Yes: Y No: N	Confirmation of Environmental Considerations (Reasons, Mitigation Measures)
4 Social Environment	(1) Resettlement	(a) Is land acquisition with involuntary resettlement caused by project implementation? If yes, please describe the scale of land acquisition and resettlement. (b) Are efforts made to minimize the impacts caused by the resettlement? Are there any other land acquisition or loss of livelihoods? (c) Is adequate explanation on compensation and livelihood restoration program given to affected people prior to resettlement? (d) Is the resettlement plan, including compensation with full replacement costs, restoration of livelihoods and living standards, developed based on socioeconomic studies on resettlement? (e) Are the compensations paid prior to the resettlement? (f) Are the compensation policies prepared in document? (g) Does the resettlement plan pay particular attention to vulnerable social groups, such as women, children, elderly peoples, people in poverty, persons with disabilities, refugees, internally displaced persons, and minorities? (h) Is the compensation to be agreed explained to the project affected persons in writing, and are agreements with the affected people obtained prior to resettlement? (i) Is the organizational framework established to properly implement resettlement? Are the capacity and budget secured to implement the plan? (j) Are any plans developed to monitor the impacts of resettlement? (k) Is the grievance redress mechanism established?	(a)Y (b)Y (c)Y (d)Y (e)Y (f)Y (g)Y (h)Y (i)Y (j)Y (k)Y	(a) Since the project site is government-owned land, no land acquisition is required. No involuntary resettlement will occur. However, compensation for structures and crops within the project site is planned to be implemented. (b) RAP has been prepared to minimize the impact of relocation. (c) Two public meetings were held to provide explanations to residents. (The first was held on October 13, 2025. and the second was held on December 9, 2025) (d) RAP has been prepared. (e) RAP has been prepared. In PNG, compensation is provided before relocation. (f) RAP has been prepared. (g) RAP has been prepared. It addresses the socially vulnerable. (h) RAP has been prepared. It will be implemented before construction in the future. (i) RAP has been prepared.. (j) RAP has been prepared. (k) RAP has been prepared.

Category	Environmental Item	Main Check Items	Yes: Y No: N	Confirmation of Environmental Considerations (Reasons, Mitigation Measures)
4 Social Environment	(2) Living and Livelihood	(a) Where the bridges and access roads are newly installed, does the project affect the existing means of transportation and the associated workers? Does the project cause significant impacts, such as extensive alteration of existing land uses, changes in sources of livelihood, or unemployment? (If such impacts are expected, mitigation measures should also be written in the "Confirmation of Environmental Considerations" column.) (b) Does the project adversely affect the living conditions of the inhabitants other than the target population? (c) Does the project adversely affect road traffic in the surrounding areas (e.g. increase of traffic congestion and traffic accidents)? (d) Does the project impede the movement of inhabitants? (e) Do the bridges cause a sun shading and radio interference? (f) Does the project have a negative impact on ecosystem services (provisioning services and regulating services) and affect health and safety of the community (especially indigenous peoples who depend on the services)? (g) Does the construction have negative impacts? Are there any mitigation measures in place for the impacts?	(a) Y (b) N (c) Y (d) Y (e)N (f)N (g)Y	(a) The project involves the improvement of an existing junction and widening of an existing road, not the construction of a new road. As temporary traffic congestion, etc. may occur due to construction traffic restrictions, signs will be erected during construction to ease traffic congestion. (b) No negative impact on the lives of other residents is envisaged as a result of the road being rehabilitated. (c) Traffic congestion may occur during construction, but measures will be taken as described in (a). (d) Same as (c). (e) No overpasses or viaducts will cause any obstruction to daylight and radio interference. (f) The project will not have a negative impact on the services (supply and coordination) of the state system due to the existing road rehabilitation project. In addition, the area is an urban area and there are no indigenous peoples in the vicinity of the area. (g) Traffic congestion may occur during construction, but measures will be taken as described in (a). In addition, it is assumed that the introduction of safety facilities on the road will reduce the number of traffic accidents during the provision of the project.
	(3) Vulnerable Social Groups	(a) Is appropriate consideration given to vulnerable social groups, such as women, children, elderly peoples, people in poverty, persons with disabilities, refugees, internally displaced persons, and minorities? (b) Does the construction have negative impacts? Are there any mitigation measures in place for the impacts?	(a)N (b)N	(a) Since no vulnerable social groups have been identified in the vicinity of the project area, this is not necessary. (b) Ditto.
	(4) Water usage	(a) Does the construction have negative impacts? Are there any mitigation measures in place for the impacts?	(a) Y	(a) Negative impacts are anticipated; therefore, mitigation measures (adopt water-saving technologies and practices, regular monitoring of water quality, corrective actions if contamination is detected, coordination with the community and addressing concerns, provision of alternative water supply if water supply is affected) will be implemented.
	(5) Heritage	(a) Does the project damage any archeological, historical, cultural, and religious heritage? Are adequate measures considered to protect these sites in accordance with the laws of the host country? (b) Does the construction have negative impacts? Are there any mitigation measures in place for the impacts?	(a)N (b)N	(a) No negative impact as there are no cultural heritage sites are located in the vicinity of the project site. (b) Ditto.

Category	Environmental Item	Main Check Items	Yes: Y No: N	Confirmation of Environmental Considerations (Reasons, Mitigation Measures)
	(6) Landscape	(a) Does the project adversely affect landscapes that require special considerations? (b) Does the construction have negative impacts? Are there any mitigation measures in place for the impacts?	(a) N (b) N	(a) No negative impacts as there are no landscapes in the vicinity of the project site that require special consideration. (b) Ditto.
	(7) Ethnic Minorities and Indigenous Peoples	(a) Are considerations given to reduce impacts on the culture and lifestyle of ethnic minorities and indigenous peoples? (b) Are all of the rights of ethnic minorities and indigenous peoples in relation to land and resources to be respected? (c) Is an indigenous peoples plan prepared and published, if necessary? (d) Do the project make efforts to obtain the Free, Prior, and Informed Consent (FPIC) of the affected indigenous peoples? (e) Does the construction have negative impacts? Are there any mitigation measures in place for the impacts?	(a) N (b) N (c) N (d) N (e) N	(a) There are no ethnic minorities and indigenous peoples in the vicinity of the project site. (b) Ditto. (c) Ditto. (d) Ditto. (e) Ditto.
	(8) Working Conditions	(a) Does the project comply with laws related to occupational health and safety of the host country? (b) Are tangible safety considerations in place for individuals involved in the project, such as installation of safety equipment which prevents industrial accidents, and management of hazardous materials, etc.? (c) Are intangible measures being planned and implemented for individuals involved in the project, such as development of health and safety plans, and conducting safety trainings (including traffic safety and public health) for workers etc.?	(a) Y (b) Y (c) Y	(a) Supervise construction contractors and ensure compliance with occupational health and safety legislation. (b) Supervise construction contractors to ensure appropriate safety considerations are taken into account. (c) Supervise construction contractors to develop and implement appropriate safety care plans.

Category	Environmental Item	Main Check Items	Yes: Y No: N	Confirmation of Environmental Considerations (Reasons, Mitigation Measures)
	(9) Health, Safety and Security of Local Communities	(a) Are there any negative impacts on health/hygiene of the local community, such as disease outbreaks (including HIV and other infectious diseases) due to the influx of workers, etc. associated with the project? Are there any mitigation measures in place for the impacts? (b) Are there any negative impacts on the safety of the local community, such as deterioration of public safety, due to the influx of workers, etc. associated with the project? Are there any mitigation measures in place for the impacts? (c) When security guards are hired for the project or other personnel are deployed to ensure and maintain the security of the project area as well as the persons related to the implementation of the project during the project preparation and implementation, are any appropriate measures taken for such personnel not to use any force to provide security except for preventive and defensive purposes? (d) Does the construction have negative impacts? Are there any mitigation measures in place for the impacts?	(a)Y (b)Y (c)Y (d)Y	(a) In this project, in order to prevent infectious diseases expected from the influx of construction workers, measures such as conducting training sessions for workers will be planned. (b) The project plans to implement measures, such as training courses for workers, to prevent the deterioration of public security envisaged by the influx of construction workers. (c) There are no plans to use security personnel or other personnel to ensure safety. (d) As per (a) and (b) above, plan measures such as organising training courses for workers.
5 Others	(1) Monitoring	a) Does the project proponent develop and implement monitoring program for the environmental and social items that are considered to have potential impacts? (b) What are the items, methods and frequencies of the monitoring program? (c) Does the project proponent establish an adequate monitoring framework (organization, personnel, equipment, and budget to sustain the monitoring framework)? (d) Are any regulatory requirements pertaining to the monitoring report system identified, such as the format and frequency of reporting the monitoring results from the project proponent to the regulatory authorities? (e) Is the grievance redress mechanism regarding environmental and social considerations established?	(a) Y (b) Y (c) Y (d) Y (e) Y	(a) Monitoring of the resettlement plan will be carried out before construction. And during construction and operation, monitoring will be carried out for items that are expected to have an impact (air quality, water quality, noise, waste, accidents, etc.). (b) This will be carried out in accordance with the environmental management plan and monitoring forms, based on the IEE report and RAP report. (c) During construction, this will be carried out by the construction contractor. During operation, this will be carried out by DOWH. (d) Implemented in accordance with the environmental management plan. (e) To be maintained with diverse methods for filing complaints, such as email, telephone, SMS (Short Message Service), and in-person visits, as well as grievance redress procedures, in accordance with the grievance redress mechanism.

Category	Environmental Item	Main Check Items	Yes: Y No: N	Confirmation of Environmental Considerations (Reasons, Mitigation Measures)
6 Note	(1) Reference to Checklist of Other Sectors	(a) Where necessary, pertinent items described in the Roads, Railways, and Forestry Projects checklists should also be checked. (b) Where necessary, pertinent items described in the Power Transmission and Distribution Lines checklist should also be checked (e.g., projects including installation of power transmission lines and/or electric distribution facilities).	(a) N (b) N	(a) The project is in an urban area and does not involve large-scale logging. (b) It is a road project and does not involve the construction of power transmission and distribution facilities.
	(2) Reference to Checklist of Other Sectors	(a) Where necessary, the impacts to transboundary or global issues should be confirmed (e.g. the project includes factors that may cause problems, such as transboundary waste treatment or global warming). (b) For projects that are expected to generate more than a certain amount of GHG emissions, is the total amount of the GHG emissions estimated before the project implementation?	(a) N (b) N	(a) The project is a road project and does not have transboundary or global environmental impacts. (b) It is a road project and is not expected to generate greenhouse gases in excess of a certain amount.

Source: Prepared by JICA Survey Team

Appendix

Appendix1 Environmental and Social Monitoring Form (Draft)

Appendix-01

Draft Monitoring Form

This form contents are subject to change according to the results of detailed design and contractor's construction plan.

1. Pre-construction, Construction, Post-construction Phase

1. Air Pollution

Date	Location	Item / Method	Frequency a year	Result / Status	Measures / Remarks
	Project Area	Maintenance: Maintenance records of heavy machinery, trucks, and equipment.	Quarterly		
	Project Area	Dust Prevention: Monitoring of work schedules regarding proper loading/towing of excavated soil, implementation of water sprinkling, installation of temporary enclosures, and use of waterproof sheets.	Quarterly		
	Project Area	Speed Limit: Presence and visibility of 20km/h speed limit warning signs (spot checks).	Quarterly		
	Project Area	Air Quality (Dust): Visual inspection and interviews with residents regarding dust levels.	Semi-annually		

2. Water Pollution

Date	Location	Item / Method	Frequency a year	Result / Status	Measures / Remarks
	Project Area	Install temporary drainage around sites	Quarterly		
	Project Area	Soil Management: Inspection of work schedules to ensure excavated soil is covered with sheets and properly backfilled/disposed.	Monthly		
	Project Area	Oil Spills: Monitoring of maintenance and refueling area restrictions; on-site verification of oil spills.	Quarterly		

3. Waste

Date	Location	Item / Method	Frequency a year	Result / Status	Measures / Remarks
	Project Area	Vegetation Waste: Quantity check of large branches/wood distributed to local residents.	Daily		
	Project Area	Construction Waste: Check material consumption for backfilling; inspection of sorting, reuse, and recycling logs and disposal sites.	Weekly		
	Project Area	Domestic Waste: Inspection of sorting and disposal status.	Monthly		

	Project Area	Waste Oil: Verify storage in waste oil tanks and check for floor spills.	Quarterly		
	Project Area	Sanitation: Check condition and adequacy of toilet facilities.	Quarterly		
	Project Area	Electronic waste: Verify records of storage volume and return records	Monthly		

4. Soil Contamination & Sediment

Date	Location	Item / Method	Frequency a year	Result / Status	Measures / Remarks
	Project Area	Soil Contamination: Verify that excavated soil is not contaminated.	Semi-annually		

5. Noise and vibration

Date	Location	Item / Method	Frequency a year	Result / Status	Measures / Remarks
	Project Area	Maintenance system for trucks, machinery, and vehicles: Check maintenance records.	Quarterly		
	Project Area	Engine shutdown during idling: Power-off compliance verification.	Monthly		
	Project Area	Restriction of transport and work to daytime hours: Check logbook records	Monthly		
	Project Area	Prompt replacement of parts for aging equipment: Check parts replacement records	Annually		
	Project Area	Noise Measurement: Measure noise values	Monthly		

6. Involuntary Resettlement / The Poor (RAP Monitoring)

Date	Location	Item / Method	Frequency a year	Result / Status	Measures / Remarks
	Project Area	Compensation: Implementation status of payment and compensation based on RAP.	Quarterly		See RAP Report
	Project Area	Consultation: Consultations or surveys with Project Affected Persons (PAPs).	Quarterly		

7. Local Economy (Employment and Livelihood)

Date	Location	Item / Method	Frequency a year	Result / Status	Measures / Remarks
	Project Area	Livelihood Impact: Monitoring of RAP implementation status and Grievance Redress Mechanism (GRM).	Annually		

8. Land Use and Utilization of Local Resources

Date	Location	Item / Method	Frequency a year	Result / Status	Measures / Remarks
	Project Area	Consultation & Compensation: Consultation meetings and/or surveys with PAPs regarding compensation based on RAP.	Quarterly		

9. Water Usage

Date	Location	Item / Method	Frequency a year	Result / Status	Measures / Remarks
	Project Area	Water Saving: Visual inspection of water-saving technologies/practices and collection of community opinions.	Annually		
	Project Area	Water condition: Interviews with residents	Monthly		
	Project	Alternative Supply: Resident interviews	Monthly		

	Area	regarding implementation of alternative water supply (if affected).			

10. Existing Social Infrastructures and Services

Date	Location	Item / Method	Frequency a year	Result / Status	Measures / Remarks
	Project Area	Utility Relocation: Identification of lines, confirmation of relocation, and involvement of service providers.	Monthly		
	Project Area	Access: Verification of access guidance via signage and community feedback.	Monthly		

11. Misdistribution of Benefits / Conflict

Date	Location	Item / Method	Frequency a year	Result / Status	Measures / Remarks
	Project Area	Complaints: Review of worker lists and local community grievance logs.	Semi-annually		

12. Gender

Date	Location	Item / Method	Frequency a year	Result / Status	Measures / Remarks
	Project Area	Code of Conduct (CoC): Review of signed CoC and worker education implementation.	Semi-annually		
	Project Area	GRM: Review of case records regarding harassment/abuse and resolution status.	Semi-annually		

13. Infectious Diseases (HIV/AIDS)

Date	Location	Item / Method	Frequency a year	Result / Status	Measures / Remarks
	Project Area	Awareness Programs: Review of program records (types, frequency, attendance) for HIV/AIDS awareness.	Annually		

14. Labour environment

Date	Location	Item / Method	Frequency a year	Result / Status	Measures / Remarks
	Construction site /Camp	Worker Condition: Interviews regarding safety measures and condition of construction workers.	Semi-annually		
	Yard/Camp	PPE: Spot checks on provision and usage rate of Personal Protective Equipment.	Quarterly		
	Yard/Camp	Injuries: Review of accident and injury logs (including near-misses).	Semi-annually		
	Yard/Camp	Medical: Check adequacy/usage of first-aid center and review health/treatment records.	Monthly		

15. Right of children

Date	Location	Item / Method	Frequency a year	Result / Status	Measures / Remarks
	Project Area	Child Labor: Do not employ child labor under the age of 18. Verification of identification (ID).	Semi-annually		

16. Accidents

Date	Location	Item / Method	Frequency a year	Result / Status	Measures / Remarks
	Project Area	Accident Records: Review of accident numbers from authority/police lists.	Semi-annually		
	Site/Vehicles	Safety Equipment: Immediate inspection of first-aid kits and fire extinguishers.	Quarterly		

	Vehicles	Maintenance : Review of maintenance records.	Quarterly		
	Project Area	Signage: Verification of road sign visibility and presence.	Semi-annually		
	Project Area	Safety Programs: Review of safety awareness program implementation records.	Monthly		
	Vehicles	Compliance: Review of license validity, alcohol test records, and speed tracking.	Semi-annually		

17. GRM

Date	Location	Item / Method	Frequency a year	Result / Status	Measures / Remarks
	Project Area	Grievance Redress Mechanism: Number and content of complaints, and status of response.	Quarterly		

2. Operation Phase (3 Years After the Operation)

1. Air Pollution

Date	Location	Item / Method	Frequency a year	Result / Status	Measures / Remarks
	Project Area	Dust/Complaints: Visual inspection and interviews with residents regarding dust levels and number of complaints.	Annually		

2. Waste

Date	Location	Item / Method	Frequency a year	Result / Status	Measures / Remarks
	Project Area	Sediment Maintenance: Visual inspection of sedimentation pond status (sediment accumulation).	Annually		

3. GRM

Date	Location	Item / Method	Frequency a year	Result / Status	Measures / Remarks
	Project Area	Grievance Redress Mechanism: Number and content of complaints, and status of response.	Quarterly		

Appendix2 Minutes of Meetings for Consultations

1.Minutes of Meeting 1st Consultation Meeting at Karavi Bridge

Table Appendix 1-1 Minutes of Meetings Form-1st Public Consultation Meeting

Date and Location	Major Participants		
	Organisation	**Designation**	**Name**
Date: 26TH May 2025 **Location:** Karavi Bridge	Karavi	Ward Member	[redacted]
	Ranguna	Ward Member	[redacted]
	East New Britain Provincial Administration (ENBPA) Div Lands & Physical Planning (DLPP)	Advisor	[redacted]
	ENBPA Div Lands & Physical	Acquisition	[redacted]
	Kokopo/Vunamamai LLG	Town Planner	[redacted]
	ENBPA DLPP	Assessment Planner	[redacted]
	ENBPA DLPP	Valuer	[redacted]
	ENBPA DLPP	Cartographer	[redacted]
	Kokopo-Open	Member of Parliament	[redacted]
	Raluana LLG	LLG Manager	[redacted]
	DOWH	Provincial Civil Engineer	[redacted]
	ENBPA	Deputy Provincial Administrator (Corporate Services)	[redacted]
	JICA SURVEY TEAM(JST)(OCG)	Deputy Team Leader	[redacted]
	JST (OCG)	Environment &Social Consideration Specialist	[redacted]
	JST (OCG)	Project Assistant	[redacted]
	JST (APISAI GEOSPATIAL)	Topographical Specialist	[redacted]
	JST (ENRD)	Environmental Specialist	[redacted]
Number of Total Participants	Total No: 249 (Males=147, Females= 102)		

Agenda

- ✓ Opening Remarks (Community Leader)
- ✓ Opening Player - Pastor / Priest
- ✓ Opening Remarks (DOWH)
- ✓ Presentation of Project Outline (DOWH)
- ✓ Presentation of IEE /RRA(ARAP) Survey (JICA Survey Team /ENRD)
- ✓ Lands Departments (Valuer / Provincial Office)
- ✓ Provincial Affairs (LLG President / Ward Councillor)
- ✓ Exchange Opinions, Public Views, Questions and Answers
- ✓ Focus Group Discussion for Women (Gender)
- ✓ Closing Remarks (DOWH)
- ✓ Closing Player - Pastor / Priest

Major Opinion and Summary of Discussions

The Public consultation meeting was held at the Karavi Bridge which included the Ward Members of Karavi and Ranguna Wards. Other leaders were involved including Member of Kokopo [redacted] Advisor of Division of Lands and Physical Planning and MOC of the program welcomed everyone and few good remarks on the project. Ward member of both Karavi and Ranguna explained more to their respective villagers on how JICA Consulting Agent were there for local knowledge and comments from everyone. Mr. Leo JST talked mainly about villagers who own and live alongside the roadside kindly warning them of their gardens and plants could be affected by when construction begins. [redacted] JST explained that he was deputy Team leader and was happy to be back in PNG and be part of another great Project. [redacted] DOWH, firstly thanked the community and everyone and later continued to explaining the Tokua road construction was different from JICA Project just so community understood. Additionally, he mentioned such Public Consultation initiated and organized by JICA is very good so there is no problem like what Tokua road is now facing. [redacted] made mentioned that this project will benefit the entire ENBP and that the project was 2.4km most likely to move further by 1km and at a later stage, the road can continue all the way to Malaguna, 24km. He recalled road was constructed by Curtain Brothers back and ever since nothing much has been done apart from clearing flood remains. More explanation about land border and customary and state land, whereas such project will then create also job opportunities and that community members must take ownership of the project.

There was over-whelming support for the project to go ahead and appreciated JICA to realize their longtime dream.

Table Appendix 1-2 Meeting Interactions and Views

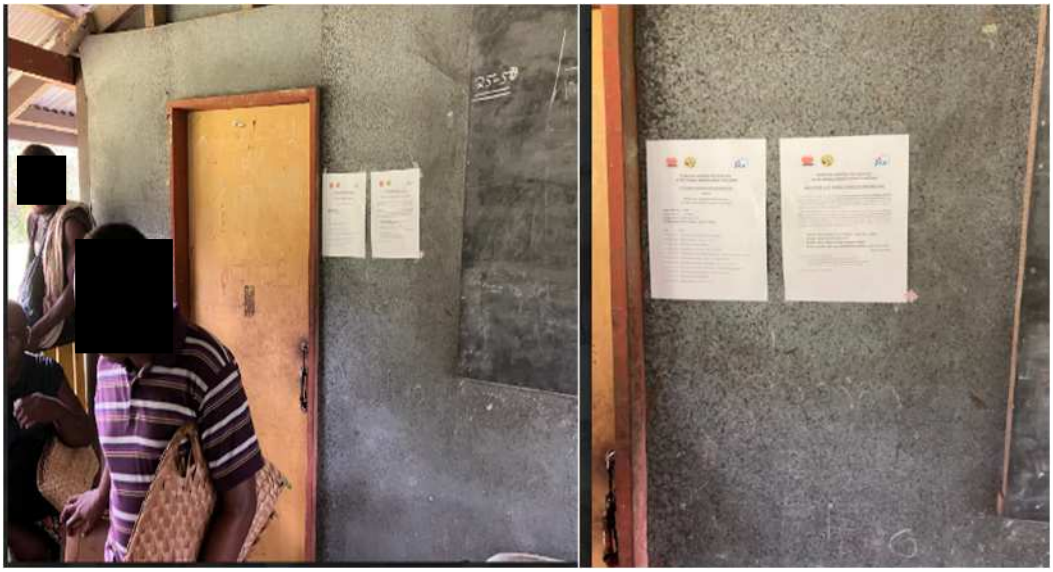
No.	Major Opinion and Answer				
	Question /Comment		Answer		Reaction of questioner
	Name/Position	Question	Name/Position	Answer	
1	[redacted] Karavi Village Ward Member	**Comments:** The project is good for the province, district and the community. The is an economical project and also will help the affected communities. He said past road maintenances carried out by the government have not effectively solved the silt deposition during heavy rain that has flooded the village gardens, houses, road and bridges.	-	-	-
		Suggestion: JICA can consider a flyover bridge structure to allow natural water flow carrying the silt and sediment load downstream than settling the sediment load on the road and bridge causing road block and other social issues.	DOWH/JST	DOWH/JST will conduct a hydrological and hydraulic analysis to set the appropriate road height, ensuring natural water flow and minimizing the risk of sediment accumulation on the road.	Accepted the answer
2.	Malapau Village Ward Member	**Comment:** Appreciated the project. Request JICA if they could go in 1km upstream to do landslide prevention civil works on two of the major flood prone rivers mitigate the spread of the flooding.	DOWH/JST	DOWH and JST will carefully consider the request and examine the appropriate extent of upstream intervention, focusing mainly on river channel improvement and the installation of sedimentation basins as part of the overall project planning.	Accepted the answer
3	President Raluana LLG [redacted]	**Comment:** For project to be extended all the way to Kuradui Junction and if JICA would consider constructing footpath on one side of the road, towards the mountain	DOWH/JST	DOWH/JST will review the proposed extension to Kuradui Junction and the possibility of constructing a footpath on one side of the road, and confirm the scope accordingly.	Accepted the answer
4.	Malapau Resident [redacted]	**Comment:** Concerned that the floodings have affected Malapau area as well, not only the 2 river areas. The project should cover the entire 2.4km road alignment.	DOWH/JST	DOWH/JST will review the existing drainage conditions along the entire 2.4 km alignment, including the Malapau area, and will plan appropriate road drainage measures accordingly.	Accepted the answer
5	[redacted] Karavi village As plantation in Malapau	**Comment:** She said all their roadside small economic activities,	DOWH/JST	DOWH/JST respond that upstream construction will be considered.	Accepted the answer

No.	Major Opinion and Answer				
	Question /Comment		Answer		Reaction of questioner
	Name/Position	Question	Name/Position	Answer	
		gardens and markets have been devastated by the increased sediment load caused by the flood over the years. They could not go garden and market to sell their produced. She request wholistic development including; landslide prevention upstream drainage and construct side foot pathways along the road.		Acknowledged the existence of two little drainages also causing flood. This also need to be considered during the construction.	
6	[redacted] Villager	**Comment:** The project should also consider upgrading the village feeder road into Karavi about 1km so that they could also use it when there is flood, because when it floods, they do not use those roads anymore, the sediment load and silt cover those roads as well.	DOWH/JST	DOWH/JST understand the concerns regarding the village feeder road to Karavi, this project is primarily focused on strengthening the resilience of the national road. However, DOWH/JST will take note of your concerns for future coordination with relevant authorities.	Accepted the answer
7	Villager	**Question:** Can the project also assist walking tracks that have been affected by the flood?	DOWH/JST	While the primary scope is focused on the main road, the installation of footpaths on the bridge may be considered depending on the final road design.	Accepted the answer
8	[redacted] Community Leader Karavi	**Comment:** Commented on alternative water supply to affected people.	ENBPA	ENBPA has acknowledged the concern regarding alternative water supply to the affected people.	Accepted the answer
9	[redacted] Villager	**Comment:** 1.Preserving soil after digging, meaning cover it up and plant grasses over any dug-out pits. The soil is loose sandy loam, can be washed away easily by surface runoff during rainfall. 2. Challenged the youth folks to support the JICA team, provide security, maintain amicable solutions to disputes of ownership of crop trees and assets during the road construct.	DOWH/JST	DOWH/JST will consider the possibility of vegetation works to preserve the soil. Additionally, if necessary, a social survey related to compensation will be conducted.	Accepted the answer
10.	Ward Member Balanataman	**Comment:** If the road level can be raised from Butuwin through to the Ranguna. Local people were	-	-	-

No.	Major Opinion and Answer				
	Question /Comment		Answer		Reaction of questioner
	Name/Position	Question	Name/Position	Answer	
		requested to support the JICA team and provide security.			
11.	[redacted] Villager	**Comment:** Thank you and appreciate to JICA for the project	-	-	-
10	[redacted] Villager	**Comment:** Appreciate and thank you to JICA for the project Also advised to youths and community to help team when on site survey and guaranteed JICA safety while on site	-	-	-

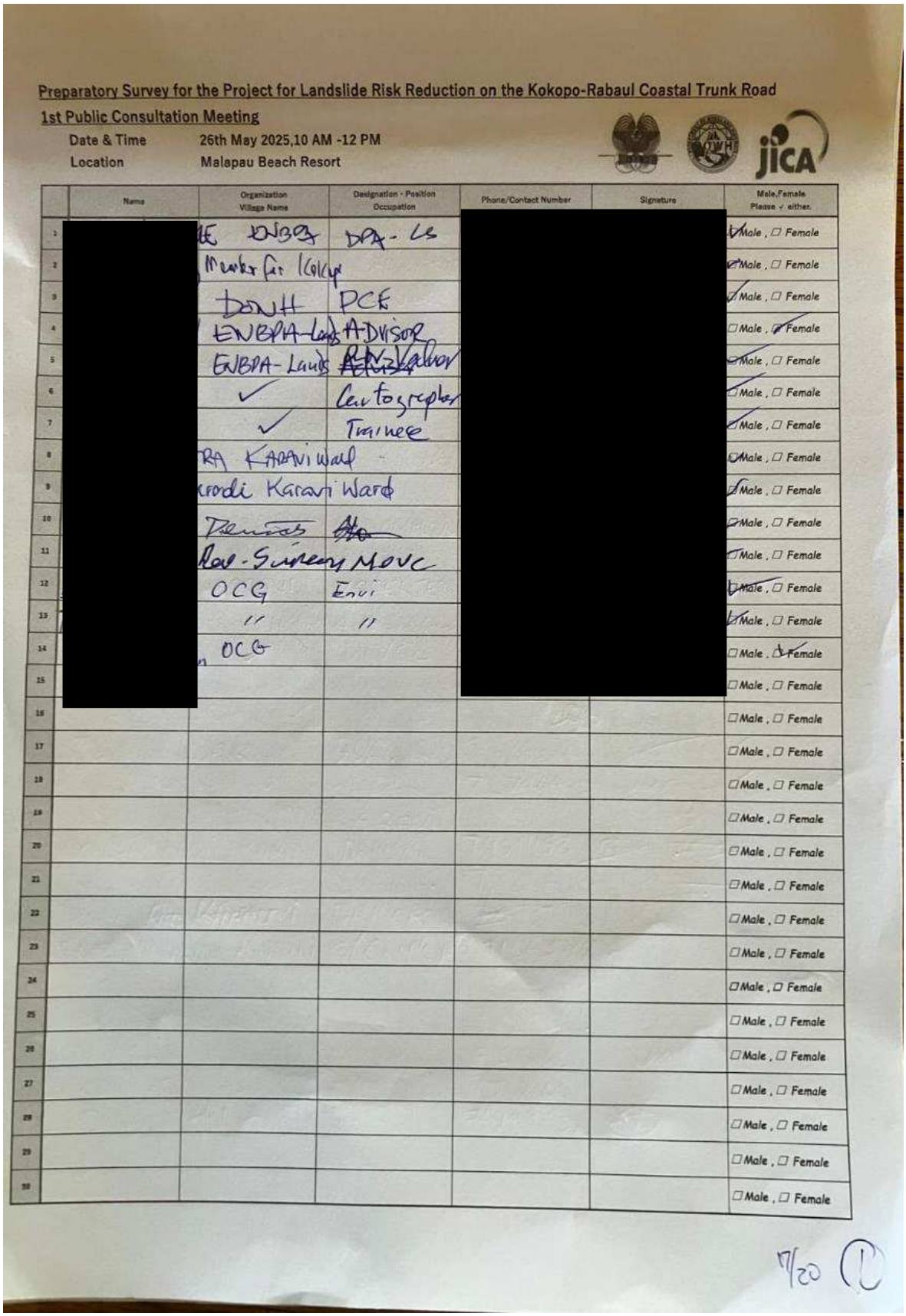
Source: Prepared by JICA Survey Team

Figure Appendix 1-1 Captions of Public Meeting/Consultation at Karavi Bridge



Source: Prepared by JICA Survey Team

Figure Appendix 1-2 Status of notice on bulletin board at Karavi Community Hall



Preparatory Survey for the Project for Landslide Risk Reduction on the Kokopo-Rabaul Coastal Trunk Road

1st Public Consultation Meeting

Date & Time 26th May 2025,10 AM -12 PM

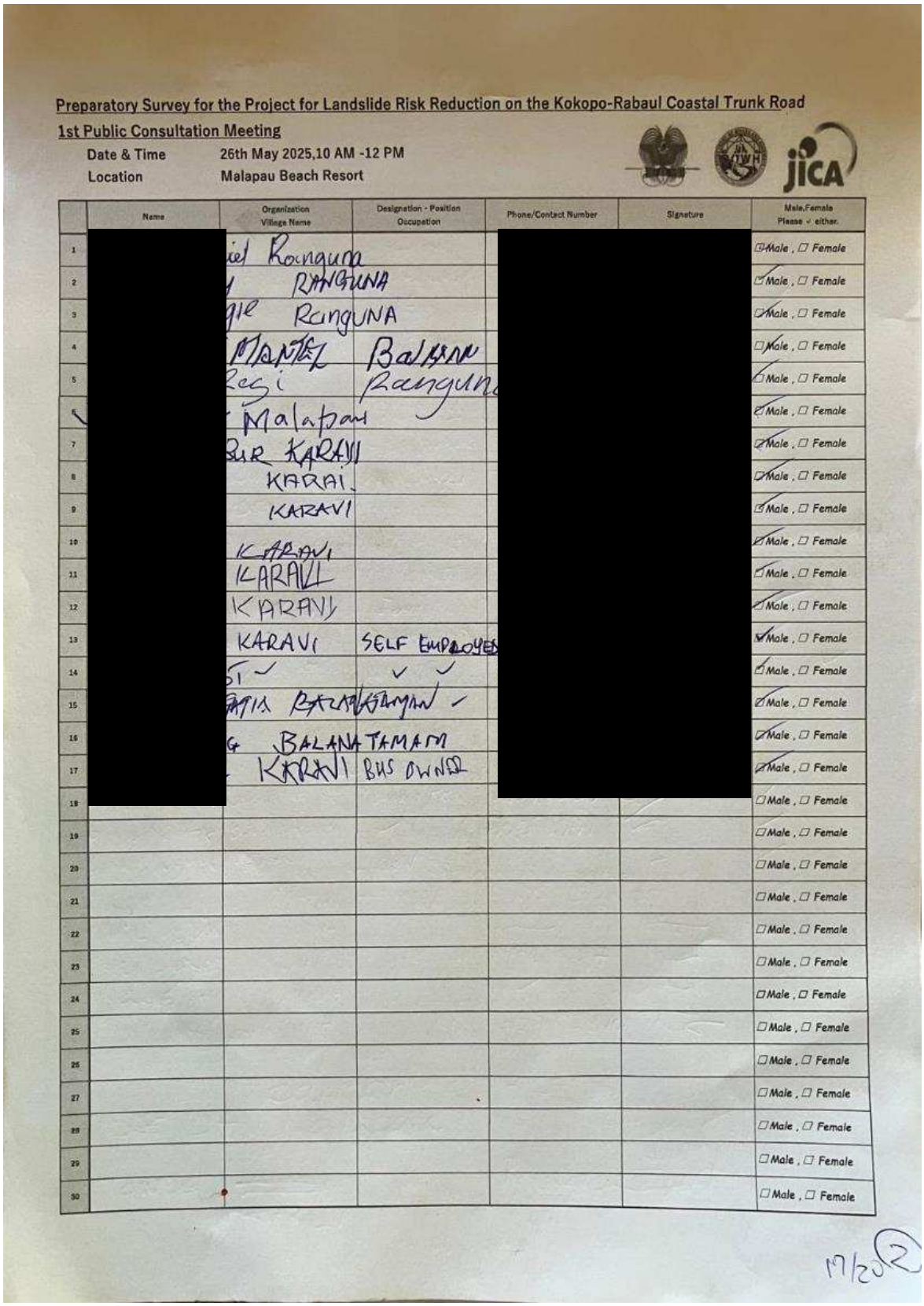
Location Malapau Beach Resort

	Name	Organization Village Name	Designation - Position Occupation	Phone/Contact Number	Signature	Male,Female Please ✓ either.
1	[redacted]	[illegible]	DPA - LS	[redacted]		✓ Male , ☐ Female
2		Member for Kokopo				✓ Male , ☐ Female
3		DOWH	PCE			✓ Male , ☐ Female
4		ENBPA-Lands	A-Divisor			☐ Male , ✓ Female
5		ENBPA-Lands	[illegible]			✓ Male , ☐ Female
6		✓	Cartographer			✓ Male , ☐ Female
7		✓	Trainee			✓ Male , ☐ Female
8		RA Karavi Ward				✓ Male , ☐ Female
9		Kerodi Karavi Ward				✓ Male , ☐ Female
10		[illegible]	[illegible]			✓ Male , ☐ Female
11		Rabaul-Surveyor MOVC				✓ Male , ☐ Female
12		OCG	Envi			✓ Male , ☐ Female
13		〃	〃			✓ Male , ☐ Female
14		OCG				☐ Male , ✓ Female
15						☐ Male , ☐ Female
16						☐ Male , ☐ Female
17						☐ Male , ☐ Female
18						☐ Male , ☐ Female
19						☐ Male , ☐ Female
20						☐ Male , ☐ Female
21						☐ Male , ☐ Female
22						☐ Male , ☐ Female
23						☐ Male , ☐ Female
24						☐ Male , ☐ Female
25						☐ Male , ☐ Female
26						☐ Male , ☐ Female
27						☐ Male , ☐ Female
28						☐ Male , ☐ Female
29						☐ Male , ☐ Female
30						☐ Male , ☐ Female

17/20

Source: Prepared by JICA Survey Team

Figure Appendix 1-3 Attendance Sheets No.1



Preparatory Survey for the Project for Landslide Risk Reduction on the Kokopo-Rabaul Coastal Trunk Road

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Date & Time 26th May 2025,10 AM -12 PM

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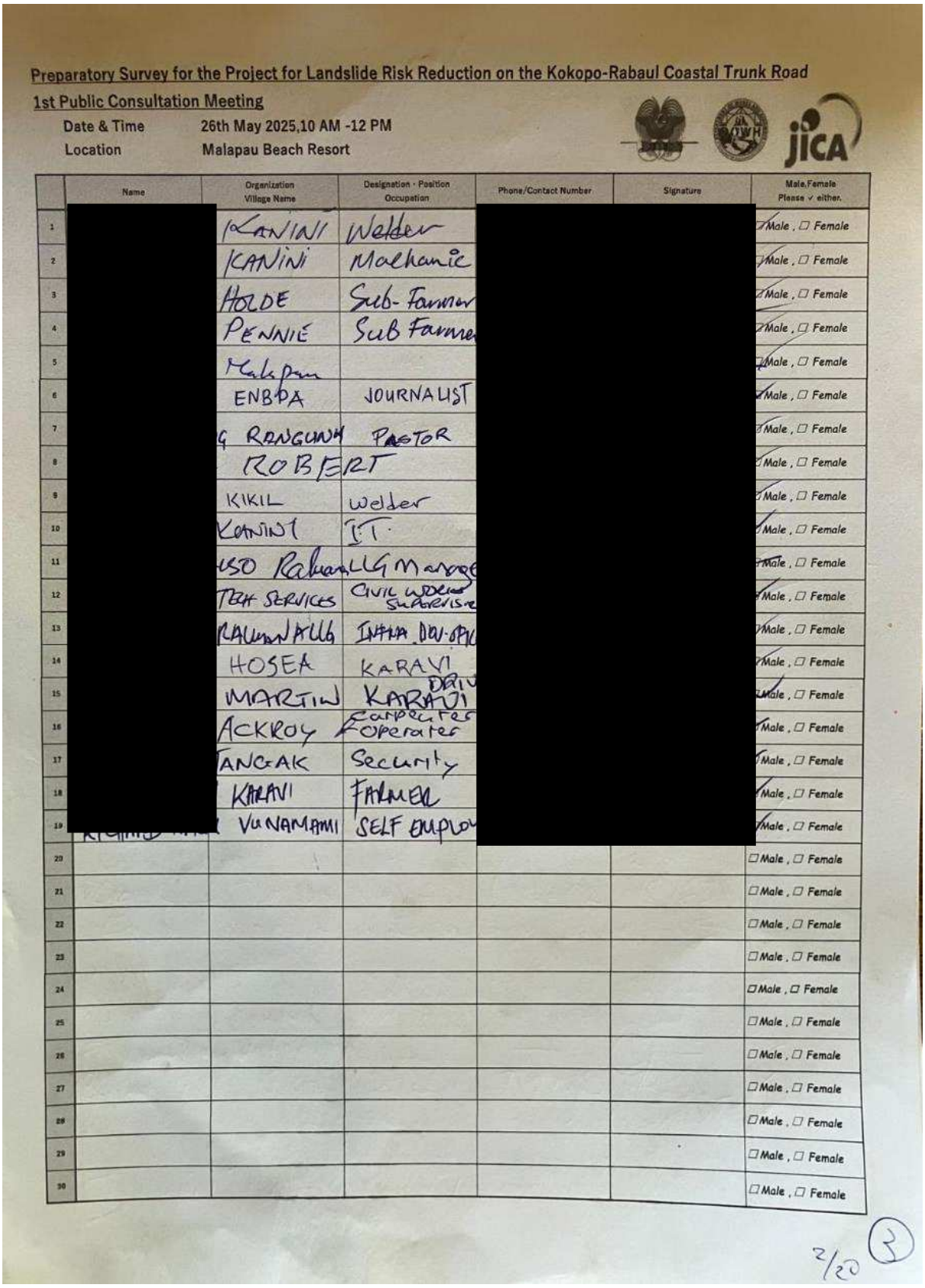
	Name	Organization Village Name	Designation - Position Occupation	Phone/Contact Number	Signature	Male,Female Please ✓ either.
1	[redacted]	iel Rongura		[redacted]		☑Male , ☐ Female
2		RANGUNA				☑Male , ☐ Female
3		gie RongUNA				☑Male , ☐ Female
4		MANTEL	Balana			☐Male , ☐ Female
5		Regi	Rangun			☑Male , ☐ Female
6		Malapau				☑Male , ☐ Female
7		BUR KARAVI				☑Male , ☐ Female
8		KARAI				☑Male , ☐ Female
9		KARAVI				☑Male , ☐ Female
10		KARAVI				☑Male , ☐ Female
11		KARAVI				☑Male , ☐ Female
12		KARAVI				☑Male , ☐ Female
13		KARAVI	SELF EMPLOYED			☑Male , ☐ Female
14			✓ ✓			☑Male , ☐ Female
15						☑Male , ☐ Female
16		BALANA TAMAM				☑Male , ☐ Female
17		KARAVI	BHS OWNER			☑Male , ☐ Female
18						☐Male , ☐ Female
19						☐Male , ☐ Female
20						☐Male , ☐ Female
21						☐Male , ☐ Female
22						☐Male , ☐ Female
23						☐Male , ☐ Female
24						☐Male , ☐ Female
25						☐Male , ☐ Female
26						☐Male , ☐ Female
27						☐Male , ☐ Female
28						☐Male , ☐ Female
29						☐Male , ☐ Female
30						☐Male , ☐ Female

17/20(2)

Source: Prepared by JICA Survey Team

Figure Appendix 1-4 Attendance Sheets No.2



Preparatory Survey for the Project for Landslide Risk Reduction on the Kokopo-Rabaul Coastal Trunk Road

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Date & Time 26th May 2025,10 AM -12 PM

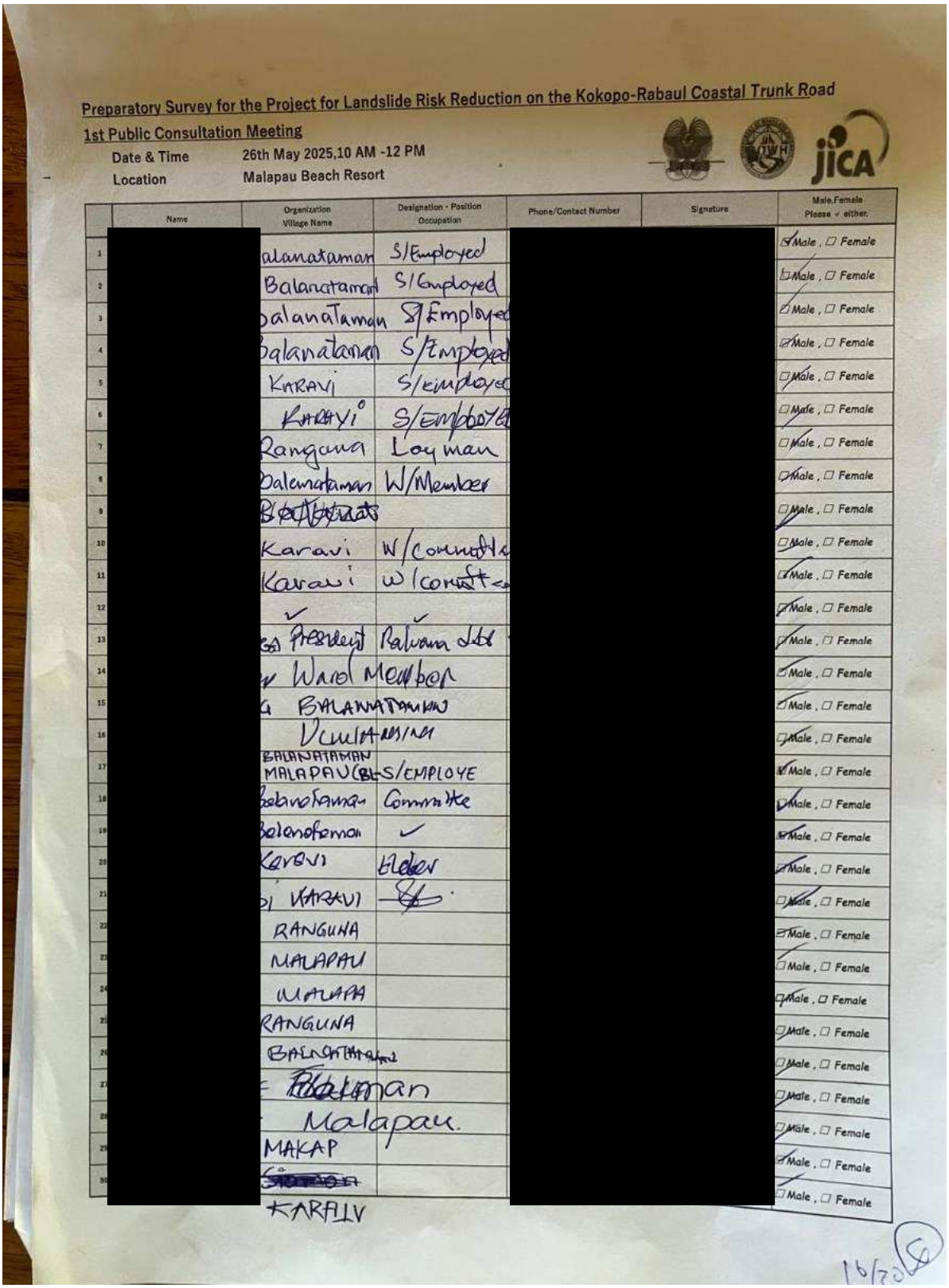
Location Malapau Beach Resort

	Name	Organization Village Name	Designation · Position Occupation	Phone/Contact Number	Signature	Male,Female Please ✓ either.
1	[redacted]	KANINI	Welder	[redacted]		☑ Male , ☐ Female
2		KANINI	Mechanic			☑ Male , ☐ Female
3		HOLDE	Sub- Farmer			☑ Male , ☐ Female
4		PENNIE	Sub Farmer			☑ Male , ☐ Female
5		Malapau				☑ Male , ☐ Female
6		ENBPA	JOURNALIST			☑ Male , ☐ Female
7		G RONGUNA	PASTOR			☑ Male , ☐ Female
8		ROBERT				☑ Male , ☐ Female
9		KIKIL	Welder			☑ Male , ☐ Female
10		KANINI	IT			☑ Male , ☐ Female
11		USO Rabaul LLG	Manage			☑ Male , ☐ Female
12		TECH SERVICES	CIVIL WORKS SUPERVISOR			☑ Male , ☐ Female
13		RABAUL LLG	INFRA. DEV. OFF			☑ Male , ☐ Female
14		HOSEA	KARAVI			☑ Male , ☐ Female
15		MARTIN	KARAVI DRIV			☑ Male , ☐ Female
16		ACKROY	Carpenter Operater			☑ Male , ☐ Female
17		TANGAK	Security			☑ Male , ☐ Female
18		KARAVI	FARMER			☑ Male , ☐ Female
19		VUNAMAMI	SELF EMPLOY			☑ Male , ☐ Female
20						☐ Male , ☐ Female
21						☐ Male , ☐ Female
22						☐ Male , ☐ Female
23						☐ Male , ☐ Female
24						☐ Male , ☐ Female
25						☐ Male , ☐ Female
26						☐ Male , ☐ Female
27						☐ Male , ☐ Female
28						☐ Male , ☐ Female
29						☐ Male , ☐ Female
30						☐ Male , ☐ Female

2/20

Source: Prepared by JICA Survey Team

Figure Appendix 1-5 Attendance Sheets No.3



Preparatory Survey for the Project for Landslide Risk Reduction on the Kokopo-Rabaul Coastal Trunk Road

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Date & Time 26th May 2025,10 AM -12 PM

Location Malapau Beach Resort

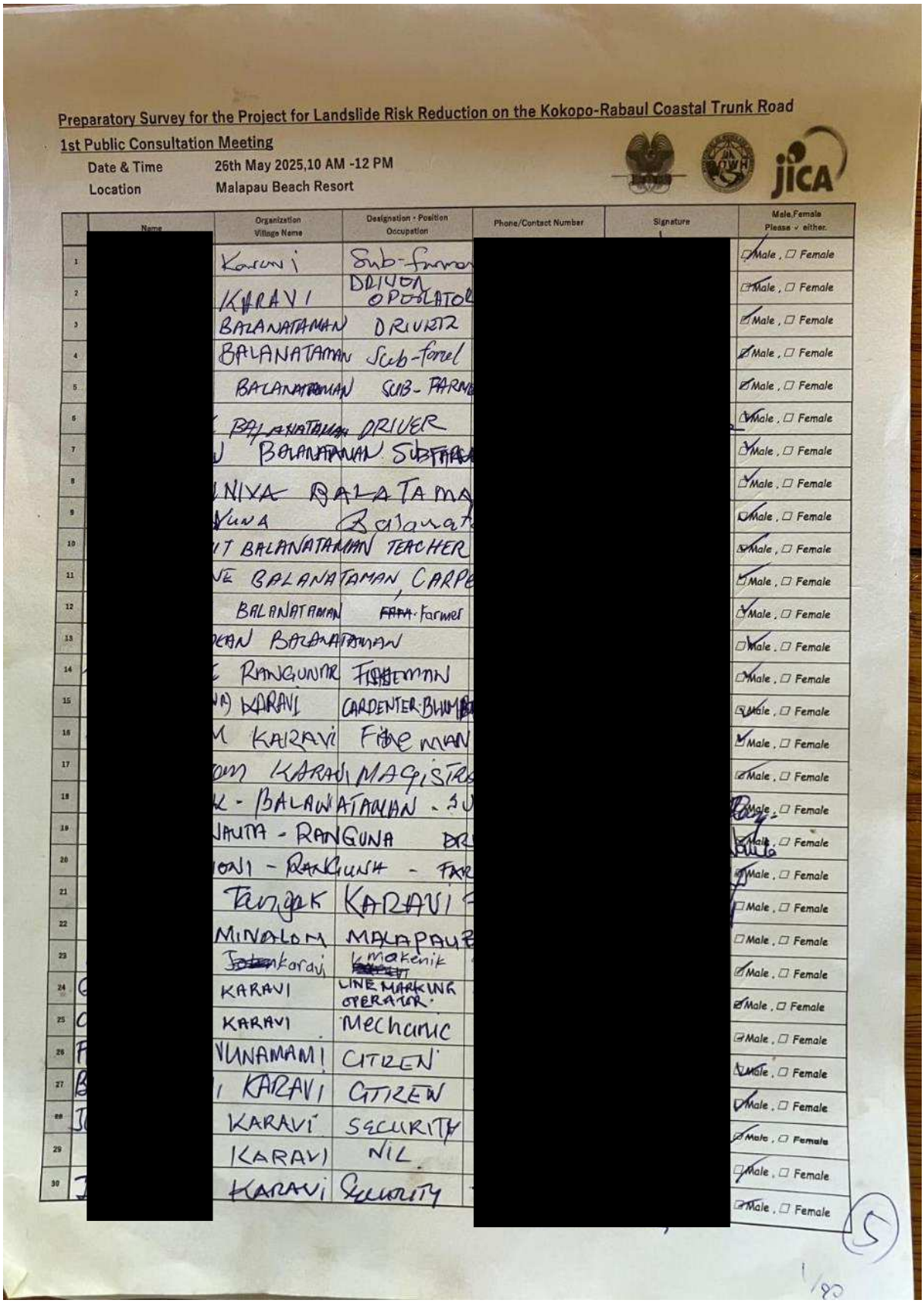
	Name	Organization Village Name	Designation - Position Occupation	Phone/Contact Number	Signature	Male,Female Please ✓ either.
1	[redacted]	alanataman	S/Employed	[redacted]		☑ Male , ☐ Female
2		Balanataman	S/Employed			☐ Male , ☐ Female
3		balanaTaman	S/Employed			☐ Male , ☐ Female
4		Balanataman	S/Employed			☑ Male , ☐ Female
5		KARAVI	S/Employed			☐ Male , ☐ Female
6		KARAVI	S/Employed			☐ Male , ☐ Female
7		Rangana	Layman			☐ Male , ☐ Female
8		Balanataman	W/Member			☐ Male , ☐ Female
9		[illegible]				☐ Male , ☐ Female
10		Karavi	W/Community			☐ Male , ☐ Female
11		Karavi	W/Comm			☐ Male , ☐ Female
12		✓				☐ Male , ☐ Female
13		President	Raluana Lbt			☐ Male , ☐ Female
14		Ward Member				☐ Male , ☐ Female
15		BALANATAMAN				☐ Male , ☐ Female
16		VILLAGE/NA				☐ Male , ☐ Female
17		BALANATAMAN MALAPAU(BL	S/EMPLOYE			☑ Male , ☐ Female
18		Balanataman	Committe			☐ Male , ☐ Female
19		Balanataman	✓			☐ Male , ☐ Female
20		Karavi	Elder			☐ Male , ☐ Female
21		KARAVI				☐ Male , ☐ Female
22		RANGUNA				☐ Male , ☐ Female
23		MALAPAU				☐ Male , ☐ Female
24		MALAPA				☐ Male , ☐ Female
25		RANGUNA				☐ Male , ☐ Female
26		BALANATAMAN				☐ Male , ☐ Female
27		Balanaman				☐ Male , ☐ Female
28		Malapau.				☐ Male , ☐ Female
29		MAKAP				☐ Male , ☐ Female
30		[illegible]				☐ Male , ☐ Female

KARAVI

16/2025

Source: Prepared by JICA Survey Team

Figure Appendix 1-6 Attendance Sheets No.4



Preparatory Survey for the Project for Landslide Risk Reduction on the Kokopo-Rabaul Coastal Trunk Road

1st Public Consultation Meeting

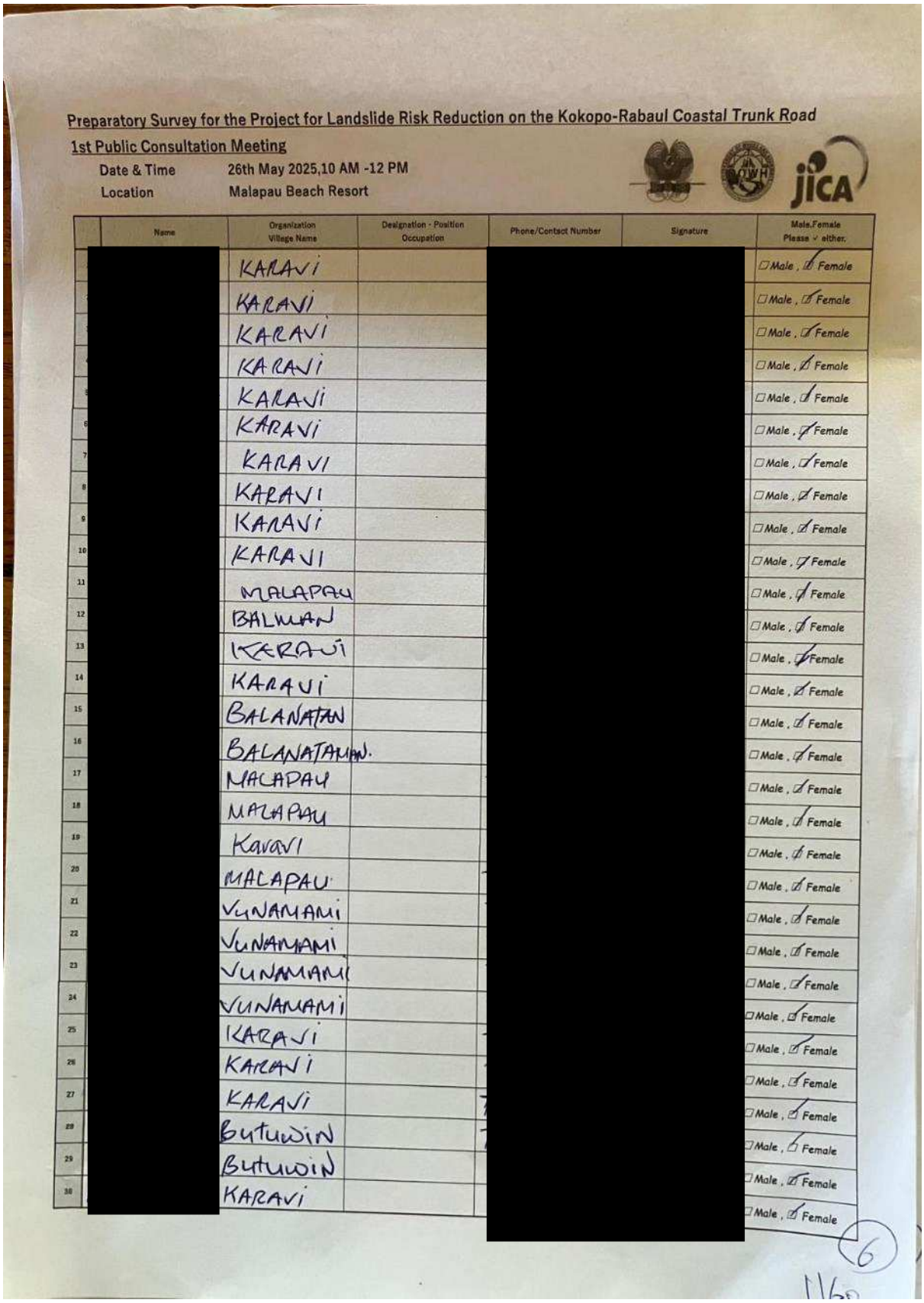
Date & Time 26th May 2025,10 AM -12 PM

Location Malapau Beach Resort

	Name	Organization Village Name	Designation · Position Occupation	Phone/Contact Number	Signature	Male,Female Please ✓ either.
1	[redacted]	Karavi	Sub-farmer	[redacted]		☑ Male , ☐ Female
2		KARAVI	DRIVER OPERATOR			☑ Male , ☐ Female
3		BALANATAMAN	DRIVER			☑ Male , ☐ Female
4		BALANATAMAN	Sub-farmer			☑ Male , ☐ Female
5		BALANATAMAN	SUB-FARMER			☑ Male , ☐ Female
6		BALANATAMAN	DRIVER			☑ Male , ☐ Female
7		BALANATAMAN	SUBFARMER			☑ Male , ☐ Female
8		NIVA BALATAMA				☑ Male , ☐ Female
9		VUNA	Balanata			☑ Male , ☐ Female
10		T BALANATAMAN	TEACHER			☑ Male , ☐ Female
11		E BALANATAMAN	CARPE			☑ Male , ☐ Female
12		BALANATAMAN	FARM-farmer			☑ Male , ☐ Female
13		BALANATAMAN				☑ Male , ☐ Female
14		RANGUNA	FISHERMAN			☑ Male , ☐ Female
15		KARAVI	CARDENTER-BHM			☑ Male , ☐ Female
16		KARAVI	FIRE MAN			☑ Male , ☐ Female
17		KARAVI	MAGISTR			☑ Male , ☐ Female
18		BALANATAMAN				☑ Male , ☐ Female
19		RANGUNA				☑ Male , ☐ Female
20		RANGUNA	FAR			☑ Male , ☐ Female
21		KARAVI				☐ Male , ☐ Female
22		MALAPAU				☐ Male , ☐ Female
23		karavi	makenik			☑ Male , ☐ Female
24		KARAVI	LINE MARKING OPERATOR			☑ Male , ☐ Female
25		KARAVI	Mechanic			☑ Male , ☐ Female
26		VUNAMAMI	CITIZEN			☑ Male , ☐ Female
27		KARAVI	CITIZEN			☑ Male , ☐ Female
28		KARAVI	SECURITY			☑ Male , ☐ Female
29		KARAVI	NIL			☑ Male , ☐ Female
30		KARAVI	SECURITY			☑ Male , ☐ Female

Source: Prepared by JICA Survey Team

Figure Appendix 1-7 Attendance Sheets No.5



Preparatory Survey for the Project for Landslide Risk Reduction on the Kokopo-Rabaul Coastal Trunk Road

1st Public Consultation Meeting

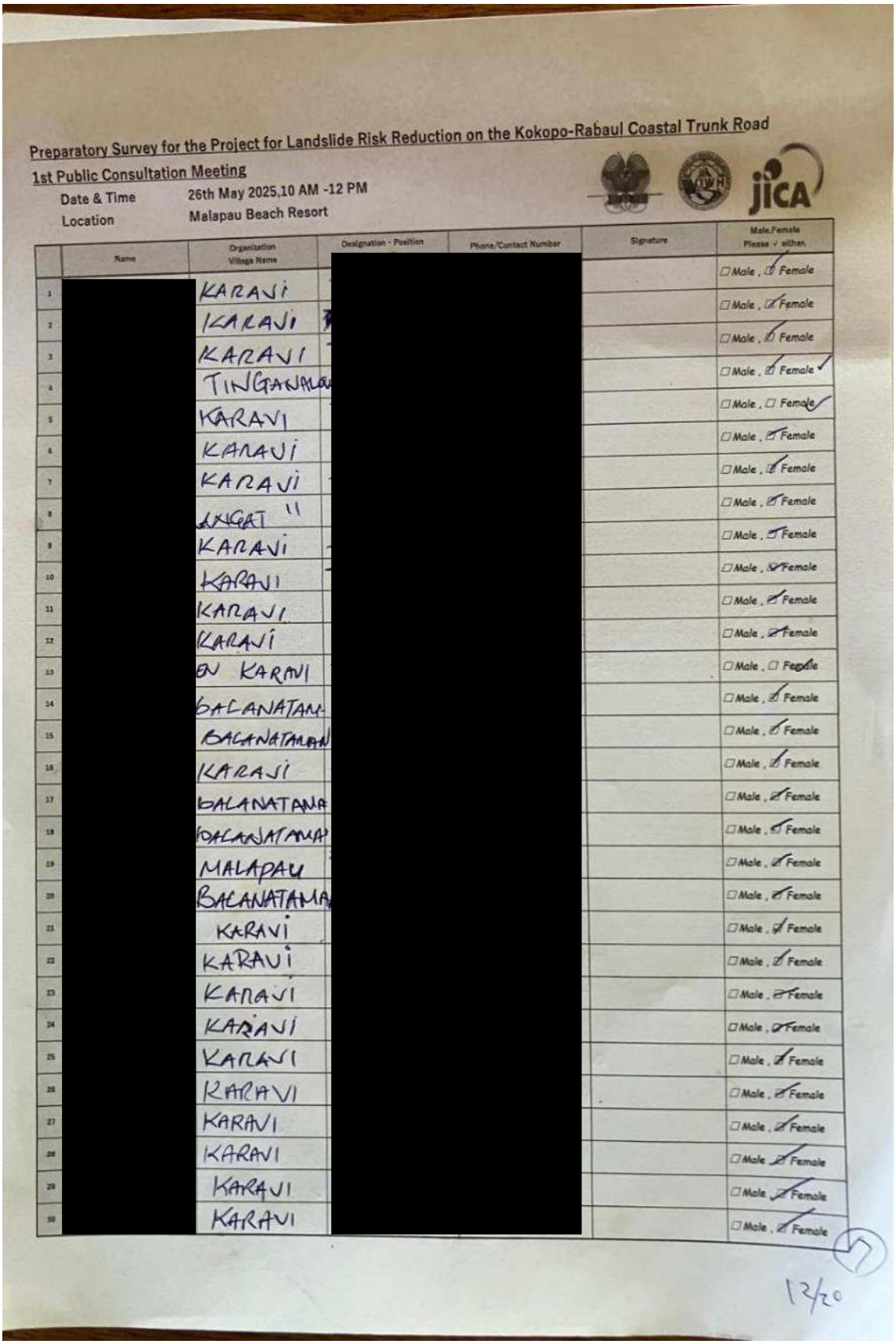
Date & Time 26th May 2025,10 AM -12 PM

Location Malapau Beach Resort

	Name	Organization Village Name	Designation - Position Occupation	Phone/Contact Number	Signature	Male,Female Please ✓ either.
1	[redacted]	KARAVI		[redacted]	[redacted]	☐Male , ☑ Female
2		KARAVI				☐Male , ☑ Female
3		KARAVI				☐Male , ☑ Female
4		KARAVI				☐Male , ☑ Female
5		KARAVI				☐Male , ☑ Female
6		KARAVI				☐Male , ☑ Female
7		KARAVI				☐Male , ☑ Female
8		KARAVI				☐Male , ☑ Female
9		KARAVI				☐Male , ☑ Female
10		KARAVI				☐Male , ☑ Female
11		MALAPAU				☐Male , ☑ Female
12		BALWAN				☐Male , ☑ Female
13		KARAVI				☐Male , ☑ Female
14		KARAVI				☐Male , ☑ Female
15		BALANATAN				☐Male , ☑ Female
16		BALANATAMAN.				☐Male , ☑ Female
17		MALAPAU				☐Male , ☑ Female
18		MALAPAU				☐Male , ☑ Female
19		Karavi				☐Male , ☑ Female
20		MALAPAU				☐Male , ☑ Female
21		VUNAMAMI				☐Male , ☑ Female
22		VUNAMAMI				☐Male , ☑ Female
23		VUNAMAMI				☐Male , ☑ Female
24		VUNAMAMI				☐Male , ☑ Female
25		KARAVI				☐Male , ☑ Female
26		KARAVI				☐Male , ☑ Female
27		KARAVI				☐Male , ☑ Female
28		BUTUWIN				☐Male , ☑ Female
29		BUTUWIN				☐Male , ☑ Female
30		KARAVI				☐Male , ☑ Female

Source: Prepared by JICA Survey Team

Figure Appendix 1-8 Attendance Sheets No.6



Preparatory Survey for the Project for Landslide Risk Reduction on the Kokopo-Rabaul Coastal Trunk Road

1st Public Consultation Meeting

Date & Time 26th May 2025,10 AM -12 PM

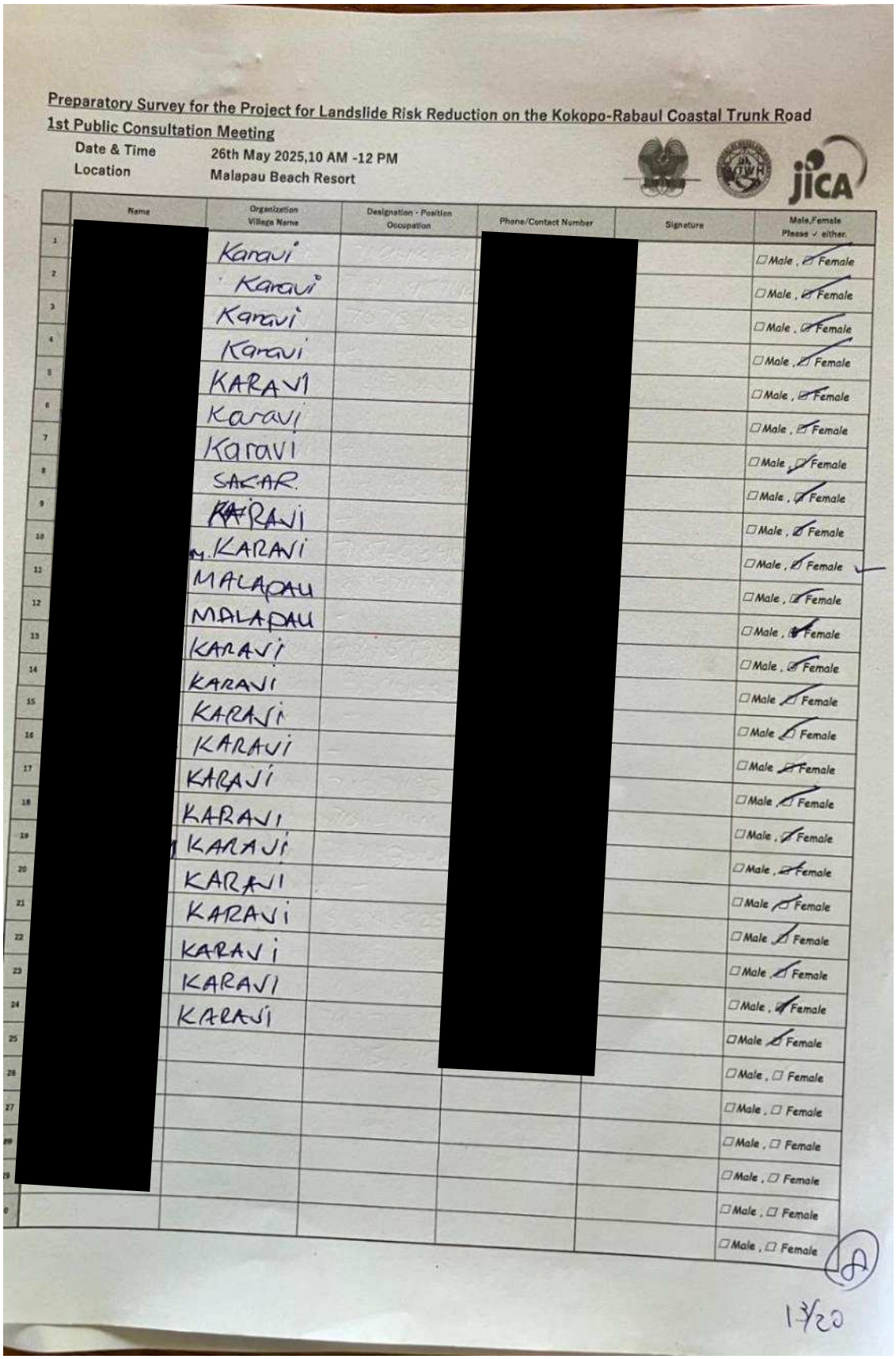
Location Malapau Beach Resort

	Name	Organization Village Name	Designation - Position	Phone/Contact Number	Signature	Male,Female Please √ either.
1	[redacted]	KARAVI	[redacted]	[redacted]		☐Male , ☑ Female
2		KARAVI				☐Male , ☑ Female
3		KARAVI				☐Male , ☑ Female
4		TINGANALA				☐Male , ☑ Female
5		KARAVI				☐Male , ☐ Female
6		KARAVI				☐Male , ☑ Female
7		KARAVI				☐Male , ☑ Female
8		KARAVI				☐Male , ☑ Female
9		KARAVI				☐Male , ☑ Female
10		KARAVI				☐Male , ☑ Female
11		KARAVI				☐Male , ☑ Female
12		KARAVI				☐Male , ☑ Female
13		KARAVI				☐Male , ☐ Female
14		BALANATANA				☐Male , ☑ Female
15		BALANATANA				☐Male , ☑ Female
16		KARAVI				☐Male , ☑ Female
17		BALANATANA				☐Male , ☑ Female
18		BALANATANA				☐Male , ☑ Female
19		MALAPAU				☐Male , ☑ Female
20		BALANATANA				☐Male , ☑ Female
21		KARAVI				☐Male , ☑ Female
22		KARAVI				☐Male , ☑ Female
23		KARAVI				☐Male , ☑ Female
24		KARAVI				☐Male , ☑ Female
25		KARAVI				☐Male , ☑ Female
26		KARAVI				☐Male , ☑ Female
27		KARAVI				☐Male , ☑ Female
28		KARAVI				☐Male , ☑ Female
29		KARAVI				☐Male , ☑ Female
30		KARAVI				☐Male , ☑ Female

12/20

Source: Prepared by JICA Survey Team

Figure Appendix 1-9 Attendance Sheets No.7



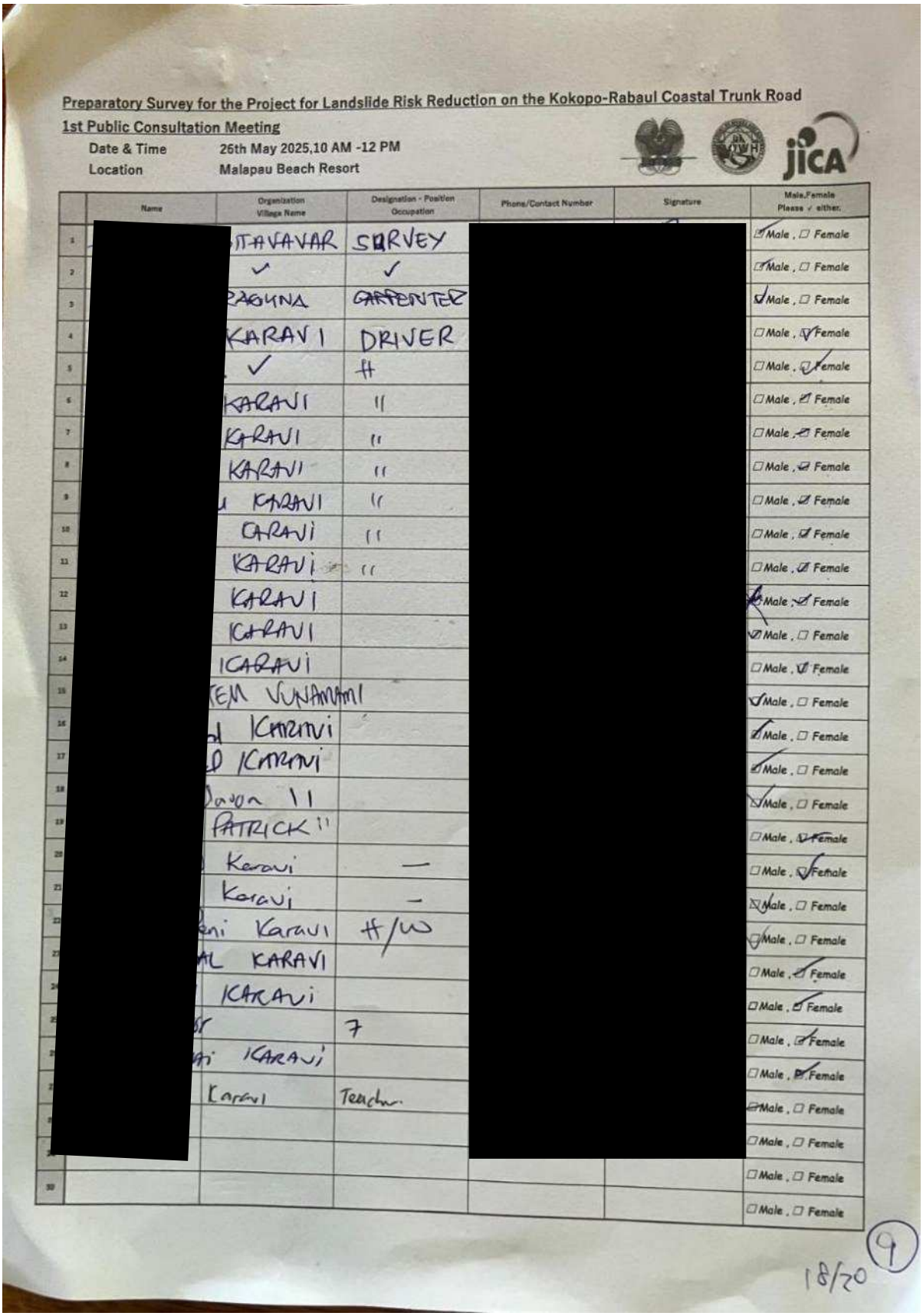
Preparatory Survey for the Project for Landslide Risk Reduction on the Kokopo-Rabaul Coastal Trunk Road
1st Public Consultation Meeting
Date & Time 26th May 2025,10 AM -12 PM
Location Malapau Beach Resort

	Name	Organization Village Name	Designation - Position Occupation	Phone/Contact Number	Signature	Male,Female Please ✓ either.
1	[redacted]	Karavi		[redacted]		☐Male , ☑ Female
2		Karavi				☐Male , ☑ Female
3		Karavi				☐Male , ☑ Female
4		Karavi				☐Male , ☑ Female
5		KARAVI				☐Male , ☑ Female
6		Karavi				☐Male , ☑ Female
7		Karavi				☐Male , ☑ Female
8		SAKAR				☐Male , ☑ Female
9		KARAVI				☐Male , ☑ Female
10		KARAVI				☐Male , ☑ Female
11		MALAPAU				☐Male , ☑ Female
12		MALAPAU				☐Male , ☑ Female
13		KARAVI				☐Male , ☑ Female
14		KARAVI				☐Male , ☑ Female
15		KARAVI				☐Male , ☑ Female
16		KARAVI				☐Male , ☑ Female
17		KARAVI				☐Male , ☑ Female
18		KARAVI				☐Male , ☑ Female
19		KARAVI				☐Male , ☑ Female
20		KARAVI				☐Male , ☑ Female
21		KARAVI				☐Male , ☑ Female
22		KARAVI				☐Male , ☑ Female
23		KARAVI				☐Male , ☑ Female
24		KARAVI				☐Male , ☑ Female
25						☐Male , ☑ Female
26						☐Male , ☐ Female
27						☐Male , ☐ Female
						☐Male , ☐ Female
						☐Male , ☐ Female
						☐Male , ☐ Female
						☐Male , ☐ Female

17/20

Source: Prepared by JICA Survey Team

Figure Appendix 1-10 Attendance Sheets No.8



Preparatory Survey for the Project for Landslide Risk Reduction on the Kokopo-Rabaul Coastal Trunk Road

1st Public Consultation Meeting

Date & Time 26th May 2025,10 AM -12 PM

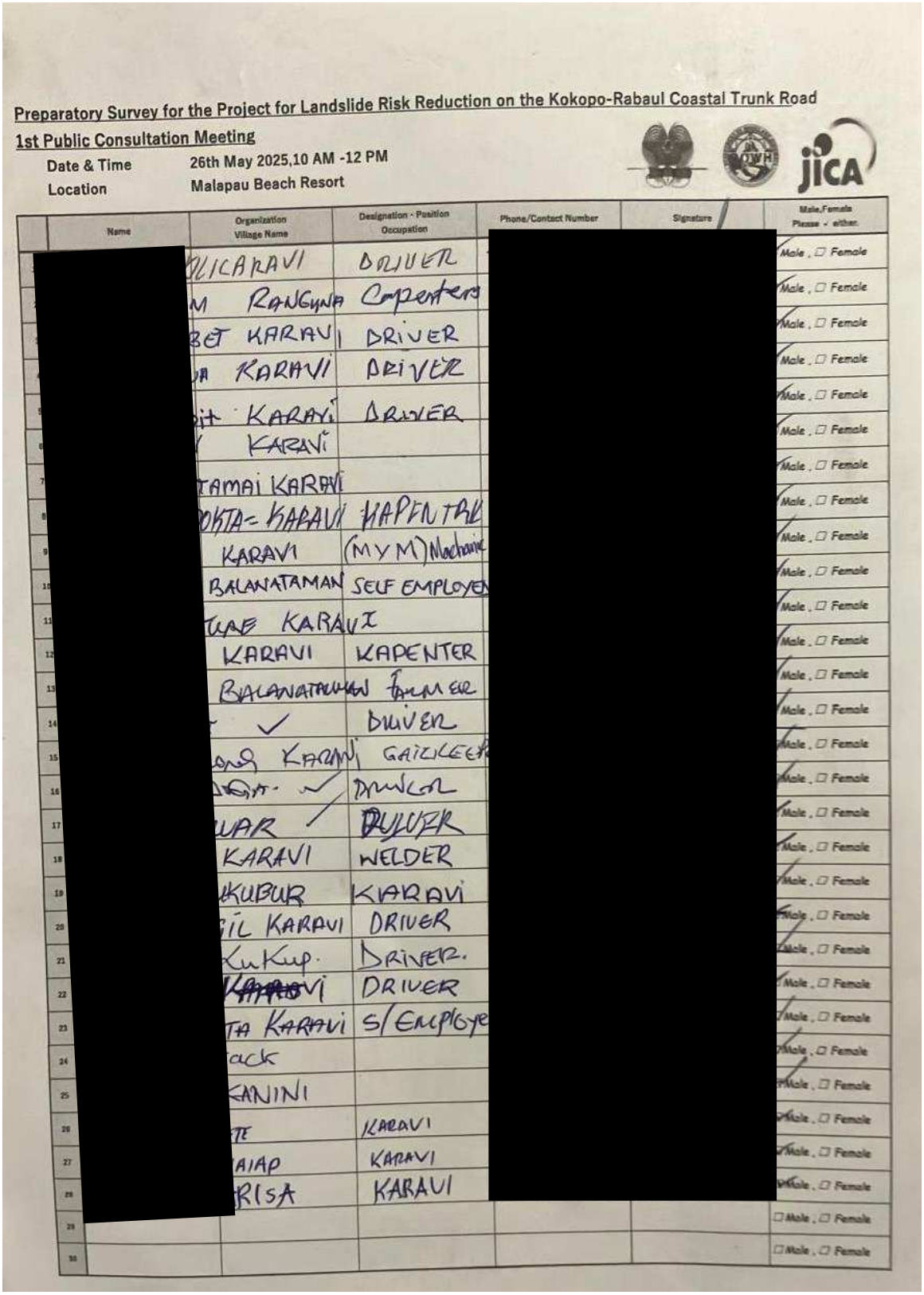
Location Malapau Beach Resort

	Name	Organization Village Name	Designation - Position Occupation	Phone/Contact Number	Signature	Male,Female Please ✓ either.
1	[redacted]	TAVAVAR	SURVEY	[redacted]		☑ Male , ☐ Female
2		✓	✓			☑ Male , ☐ Female
3		RAGUNA	CARPENTER			☑ Male , ☐ Female
4		KARAVI	DRIVER			☐ Male , ☑ Female
5		✓	〃			☐ Male , ☑ Female
6		KARAVI	〃			☐ Male , ☑ Female
7		KARAVI	〃			☐ Male , ☑ Female
8		KARAVI	〃			☐ Male , ☑ Female
9		KARAVI	〃			☐ Male , ☑ Female
10		KARAVI	〃			☐ Male , ☑ Female
11		KARAVI	〃			☐ Male , ☑ Female
12		KARAVI				☑ Male , ☑ Female
13		KARAVI				☑ Male , ☐ Female
14		KARAVI				☐ Male , ☑ Female
15		KEM SUNAMAMI				☑ Male , ☐ Female
16		KARAVI				☑ Male , ☐ Female
17		KARAVI				☑ Male , ☐ Female
18		〃				☑ Male , ☐ Female
19		PATRICK 〃				☐ Male , ☑ Female
20		Karavi	—			☐ Male , ☑ Female
21		Karavi	—			☑ Male , ☐ Female
22		Karavi	H/W			☑ Male , ☐ Female
23		KARAVI				☐ Male , ☑ Female
24		KARAVI				☐ Male , ☑ Female
25			7			☐ Male , ☑ Female
26		KARAVI				☐ Male , ☑ Female
27		Karavi	Teacher			☑ Male , ☐ Female
28						☐ Male , ☐ Female
29						☐ Male , ☐ Female
30						☐ Male , ☐ Female

18/20 (9)

Source: Prepared by JICA Survey Team

Figure Appendix 1-11 Attendance Sheets No.9



Preparatory Survey for the Project for Landslide Risk Reduction on the Kokopo-Rabaul Coastal Trunk Road

1st Public Consultation Meeting

Date & Time 26th May 2025,10 AM -12 PM

Location Malapau Beach Resort

	Name	Organization Village Name	Designation - Position Occupation	Phone/Contact Number	Signature	Male,Female Please ✓ either.
1	[redacted]	LICA KARAVI	DRIVER	[redacted]		Male , ☐ Female
2		M RANGUNA	Carpenters			Male , ☐ Female
3		BET KARAVI	DRIVER			Male , ☐ Female
4		A KARAVI	DRIVER			Male , ☐ Female
5		it KARAVI	DRIVER			Male , ☐ Female
6		KARAVI				Male , ☐ Female
7		TAMAI KARAVI				Male , ☐ Female
8		OKTA-KARAVI	KAPENTAR			Male , ☐ Female
9		KARAVI	(MVM) Mechanic			Male , ☐ Female
10		BALANATAMAN	SELF EMPLOYED			Male , ☐ Female
11		UAE KARAVI				Male , ☐ Female
12		KARAVI	KAPENTER			Male , ☐ Female
13		BALANATAMAN	FARMER			Male , ☐ Female
14		✓	DRIVER			Male , ☐ Female
15		KARAVI	GAIZLEER			Male , ☐ Female
16		✓	DRIVER			Male , ☐ Female
17		UAR ✓	DRIVER			Male , ☐ Female
18		KARAVI	WELDER			Male , ☐ Female
19		KUBUR	KARAVI			Male , ☐ Female
20		IL KARAVI	DRIVER			Male , ☐ Female
21		KuKup.	DRIVER.			Male , ☐ Female
22		[redacted]VI	DRIVER			Male , ☐ Female
23		TA KARAVI	S/EMPLOYE			Male , ☐ Female
24		ack				Male , ☐ Female
25		ANINI				Male , ☐ Female
26		TE	KARAVI			Male , ☐ Female
27		AIAP	KARAVI			Male , ☐ Female
28		RISA	KARAVI			Male , ☐ Female
29						☐ Male , ☐ Female
30						☐ Male , ☐ Female

Source: Prepared by JICA Survey Team

Figure Appendix 1-12 Attendance Sheets No.10

2.Minutes of Meeting RAP Consultation Meeting at Karavi Bridge

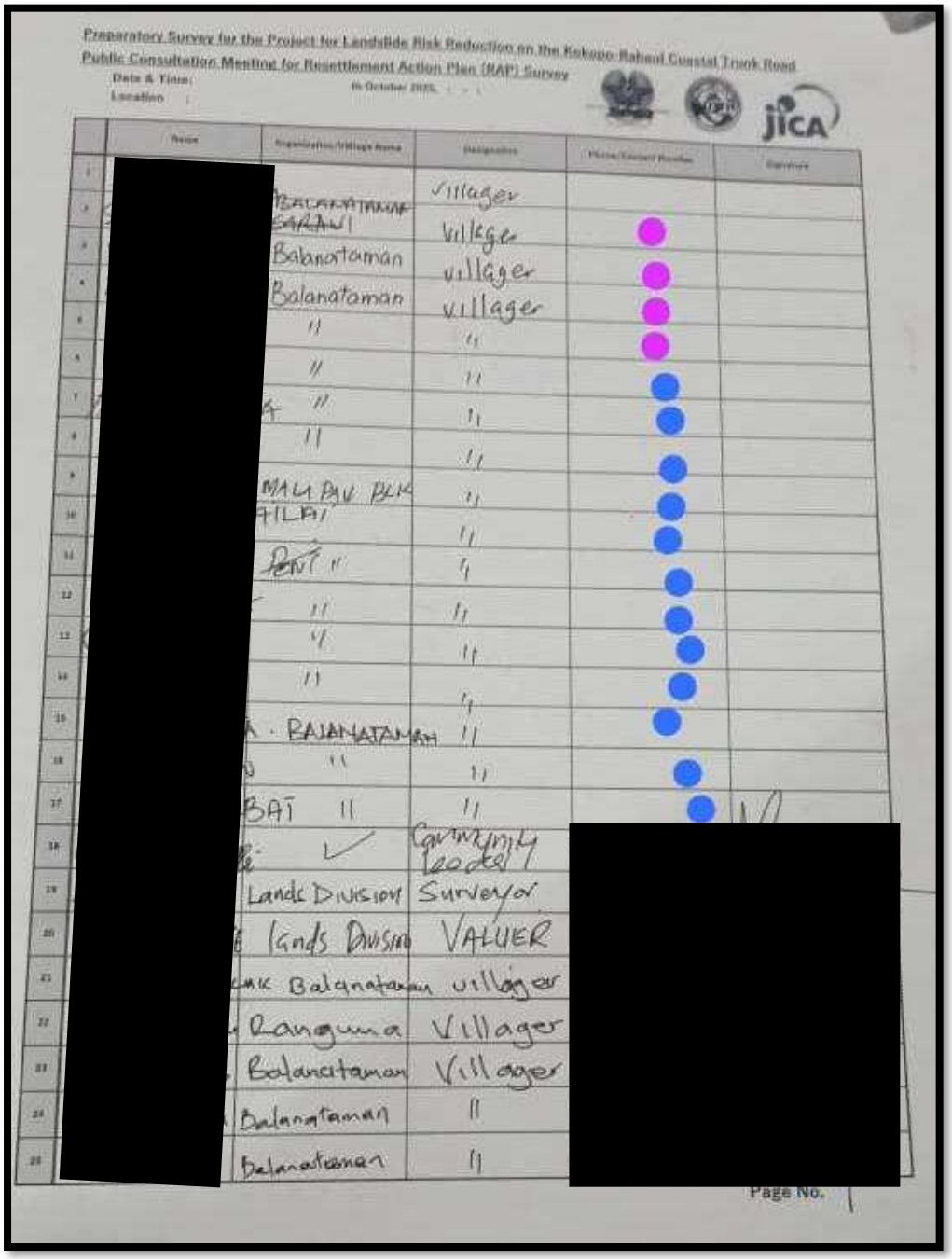
Table Appendix 2-3 Meeting Minutes

Date and Location	Major Participants		
	Organization	**Designation**	**Name**
Date: 13th October 2025 **Location:** Karavi Bridge	East New Britain Provincial Administration (ENBPA) Division of Lands & Physical Planning (DLPP)	Advisor	[redacted]
	ENBPA-DLPP	Valuer	[redacted]
	ENBPA-DLPP	Surveyor	[redacted]
	JST (OCG)	Environmental & Social Consideration Specialist	[redacted]
	JST (OCG)	Project Assistant	[redacted]
	JST (ENRD)	Environmental Specialist	[redacted]
	Land & Property Administrator	Land Administration Specialist	[redacted]
	Balanataman	Affected people	[redacted]
Number of Total Participants	Total: 48		
Agenda			
✓ Opening Remarks ([redacted]) ✓ Opening Prayer – [redacted] (JST ENRD)) ✓ Opening Remarks - [redacted] (JST ENRD) Closing Prayer – [redacted] (JST ENRD)			
Major Opinion and Summary of Discussion			
This was a second consultative meeting held at the Karavi bridge following the first held on the 26th of May 2025. The community leaders like the ward members were not present at this second meeting despite being advised of it. Of the three or four communities (Karavi, Balanataman, Ranguna and Kuradui) that will be affected by this project only Balanataman attended. [redacted] advisor of Division of Lands & Physical Planning welcomed everyone and made few good remarks regarding the project and made an introduction of the members of the team which comprises of two JICA officials ([redacted]), her team from lands Division and [redacted]. She highlighted the purpose of the meeting and stressed that the meeting was just a repetition of the earlier or the last meeting held on the 26th of May 2025. She did emphasize the importance of the project and what JICA's desire is when it comes to the actual construction phase of the project. The highlight of the discussion as stated by [redacted] is the compensation component of the project which is the main purpose or subject of the meeting or gathering at Karavi. Leo JST Shared the same sentiments as [redacted] that the meeting is an awareness similar to the first meeting held in the same place on the 26th of May 2025. That the main issue of discussion is compensation and that Department of Work & Highways (DoWH) has made a PIP submission for the government to allocate some funding for the administration of properties that will be affected during the road construction phase. [redacted] emphasized that continuous inhaling of dust particles generated by the sand sediments on the road has and will have an adverse effect on the health of everyone living along the road corridor therefore this project should not be stalled by any means. Appreciated and was grateful for the communities' support and understanding unlike in some other parts of the country where the desire for money supersedes the benefits to be gained in the long run of any particular service, eg. Schools, health facilities and roads. Reiterated the PIP submission by DoWH to address the compensation issue and that it will take effect next year 2026 and will depend again on the data that the team will gather and upon compilation and submission of the final report by 25th October 2025.			

No.	Major Opinion and Answer				Reaction of questionnaire
	Question/Comment		Answer		
	Name/ Position	Question	Name/ Position	Answer	
1	Community Leadr of Balanataman	**Comments:** Raised an issue of additional planting or erection of road side markets or any other improvements after learning of the governments compensation towards those that will be affected by	[redacted]	As of the 13th until the 25th October 2025 whatever data/information the team can gather will be processed for compensation and anything after this specified date will not be considered or processed.	

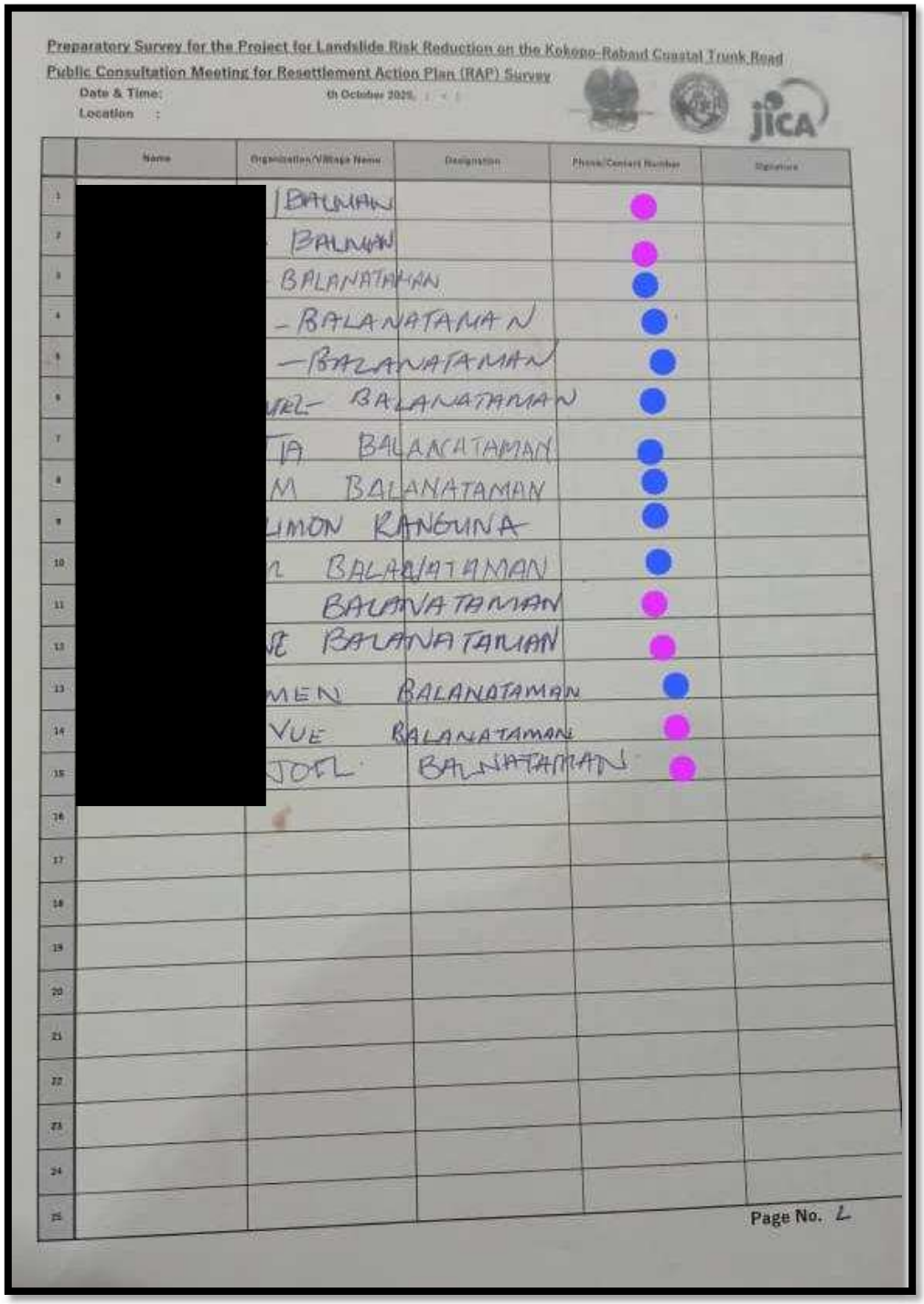
		the construction of the section of the road.		Requested for honesty from the local community and that they should refrain from planting or putting up new structures as of the date of the meeting.	
	Community Leader		[redacted]	Everyone should act responsibly for the good of all parties and fore most the project which will benefit the local community This road is the economic lifeline of the Kokopo people. All goods supplied by stores and market are transported through this road and it is paramount that the rehabilitation of the road must proceed as planned.	
	Community Leader (Male)	**Suggestion:** That everyone including those further in from the road side should also be consulted. Excluding them might cause some confusion that can affect the project.	[redacted] JST	There is no need to include those further in unless they are also going to be affected	Accepted the answer
2	Community Leader (Female)	**Suggestion:** The attendance shows the reluctance of those who do not want to attend as the project will not directly affect them and suggested that any future meetings should involve only	ENBPA Lands Advisor [redacted]	The officers are there to do whatever is required of them as government officers. Any negativity expressed by any parties is not healthy for such a project and it does not affect the officers in executing their job and that the officers are only assisting the JICA team and the consultant in disseminating the information to whoever is going to be affected by the project. Concurred with the woman leader on her suggestion and mention that any future meetings will exclude those who are not going to be affected.	The woman leader accepted the response.

Source: Prepared by JICA Survey Team



Source: Prepared by JICA Survey Team

Figure Appendix 2-13 Name list for the RAP Public Meeting attendees at Karavi Community Market



Source: Prepared by JICA Survey Team

Figure Appendix 2-14 The RAP Public Meeting at Karavi Community Market


Community Leader Acknowledging the Public Meeting


Plate 2 and 4 Participants attending the public awareness and also selling tomato


JST carrying out Awareness


Woman Leader explaining the why the community members turn up was small. People attending the meeting were the impacted people who live along the Kokopo Rabaul


Remarks by ENB DLPP and the Consultants at Karavi community Market area near the Karavi bridge.

Source: Prepared by JICA Survey Team

Figure Appendix 2-15 The RAP Public Meeting at Karavi Community Market

3.Minutes of Meetings -2nd Public Consultation Meeting for IEE and RAP Survey Report Update and Consideration

Background
1. Refer to Attached Meeting Notice and Agenda Items
2. Initial Schedule for this Public Consultation and Presentation was proposed for the 8th of December 2025. Due to heavy rain and project site community programs the scheduled meeting was postponed to the 9th of December 2025.
3. However, the JICA team, local consultant and the Karavi Ward Member made a courtesy visit to [redacted] Member for Kokopo who was at his village resort at Malapao beach front. The brief visit turned out to be a very significant meeting and issues discussed with the [redacted] Member are incorporated in this meeting minutes.
4. The rain continued through to the 9th December meeting was conducted in two (2) separate locations due to Kokopo District and the province's the continuous rain

Table Appendix 3-4 Minutes of Meetings -2nd Public Consultation Meeting for IEE and RAP Survey Report Update and Consideration

Date and Location	Major Participants		
	Organisation	**Designation**	**Name**
Date: 08th December 2025 **Location:** Malapao Beach Resort	Kokopo District Development Authority (KDDA)	Kokopo Open Member MP and Chairman - KDDA	[redacted]
	Karavi Ward	Member	[redacted]
	JST (OCG)	Environment &Social Consideration Specialist	[redacted]
	JST (OCG)	Project Assistant	[redacted]
	JST (ENRD)	Environmental Specialist	[redacted]

Major Opinion and Answer

Discussions highlighted below are the summarized views and comments of the Member for Kokopo Open Electorate in which this project falls in. [redacted] after a short introduction gave a short brief on the IEE and RAP survey and field examination of the project.

1. The JICA team and the Karavi Ward member paid a courtesy visit to brief the [redacted] for Kokopo of the RAP and IEE Report being completed.
2. [redacted] welcomed us and was very pleased with the IEE and RAP preparation and survey work.
3. He said, the project is a very important for his electorate, the ENB Province and PNG as a whole because, it links up with Kokopo and Rabaul for trade and eases access to Simpson Harbor (Rabaul Port) for export and importation of agriculture products and general merchandizing.
4. He said his district and the province has a long history with the people of Japan especially participating in the 2nd world War in then1942. It is pleasing it to see Japan involve with technical and funding support in the development of Kokopo District and ENBP.
5. He would seek more understanding with JICA and the Japanese government develop Tourism opportunities with Kokopo City sister city with a one of the Japanese Cities in the future.
6. The [redacted] stressed that the 2.4km road project traverses through a Free Hold State Lease land. The rights of the original traditional land owners were acquired from the forefathers for large scale plantation development, currently known as Malapao Plantation.
7. He said there is no customary land within the 2.4km road. Thus, there should be no issue relating to land acquisition as the land is now a State Land.
8. Any form of community consultations shall be with the land users who have a user right over a parcel of land that they dwell and have carried out some land use development.
9. Kokopo District Development Authority and the ENBPG with the Lands Department are currently working on the Free Hold Lease land, subdividing the plantation land into blocks, register the blocks of land, issue titles to the subdivisions and give it to the identified block holder.
10. Thus, for the purpose of this project, the approach has been made plainly clear that, the developments are carried out in a State Land (Free Hold Lease Land).

Participants of the Meeting _ No# 2 9th December 2025

Date and Location	Major Participants		
	Organization	Designation	Name
Meeting Venue:	Karavi Ward	Member	[redacted]

Karavi Community Hall			[redacted]
	JST (OCG)	Environment &Social Consideration Specialist	[redacted]
	JST (OCG)	Project Assistant	[redacted]
	JST(ENRD)	Environmental Specialist	[redacted]
		PAP	[redacted]
		PAP	[redacted]
		PAP	[redacted]
		PAP	[redacted]
		PAP	[redacted]
		PAP	[redacted]
		DOWH	[redacted]
		Land Use Officer- Lands ENBPA	[redacted]
Number of Total Participants	Total No: 12 (Males=7, Females= 5)		

Agenda Items, Discussions and the Views of the PAPs and communities that attended.

- ✓ Due the heavy rain, the public community turn was restricted to only people who would be directly affected during the project implementation phase. Thus, tit was agreed between the Ward Member and Messrs [redacted] that we can talk with each affected persons and household regarding the impacts and compensation assessment and consideration based on JICA teams field survey and initial environment and social examinations.
- ✓ Apparently, the JICA team and the relevant statutory authorities like DOWH and ENBPA have conducted a few Public Consultation Meetings in last few months. The local communities being adequately educated have received the various concerns and project implications to the communities. They have supported the project technical teams with the various studies and field surveys. The technical team has held several talks with the affected PAPs. In this meeting the JICA team shared the RAP and IEE report and concerns one on one explaining the community concerns, inform them of their properties and assets being evaluated and assessed for compensation payments.
- ✓ The community members and the PAPs were very happy and the general comment was that the project is important to them. They stressed that whatever arrangement in terms of compensating them for the loss of properties and structure is well appreciated. They pledged support to the project and appropriate civil works to solve the dust and flooding issues that has affected the communities for a long time.
- ✓ The community members also acknowledge that the road traveres through the state freehold lease plantation land. They also appreciate the efforts put in by the Kokopo District Development Authority, the ENBPA, the Lands and Survey Division and the DOWH for the current project proposal and the allocation of the plantation into family blocks and the processing of the land title.
- ✓ The JICA Team, the ENBPA and DOWH have introduced and inform the local communities regarding the focal point to address further queries and clarification including the expression of grievances for the project. The Focal Points were:

[redacted]

The PAPs also shared their contacts and WhatsApp numbers with Messrs. [redacted]

However, it was stressed that DOWH being the custodian of all road projects in PNG, DOWH Safeguard Branch shall address all concerns relating to project management and monitoring.

The RAP and IEE Report and Presentation at Karavi ended at around 10:15am.

Participants of the Meeting _ No# 3 9th December 2025

Date and Location	Major Participants		
	Organization	**Designation**	**Name**
Meeting Venue: [redacted] residential area within the Ranguna Community	Ranguna Ward	Former Member	[redacted]
	JST (OCG)	Environment &Social Consideration Specialist	[redacted]
	JST (OCG)	Project Assistant	[redacted]
	JST(ENRD)	Environmental Specialist	[redacted]
	DOWH	Provincial Engineer	[redacted]
	Lands ENBPA	Land Use Officer-	[redacted]
		PAP	[redacted]
		PAP	[redacted]
		PAP	[redacted]
		PAP	[redacted]
		PAP	[redacted]

		PAP	[redacted]
		PAP	[redacted]
		PAP	[redacted]
		PAP	[redacted]
		PAP	[redacted]
		PAP	[redacted]
		PAP	[redacted]
		PAP	[redacted]
		PAP	[redacted]
		PAP	[redacted]
		PAP	[redacted]
		PAP	[redacted]
		PAP	[redacted]
		PAP	[redacted]
		PAP	[redacted]
		PAP	[redacted]
Number of Total Participants	Total No: 36 (Males= 16, Females = 10)		

Agenda Items, Discussions and the Views of the PAPs and communities that attended.

- ✓ We continued conducting similar Public Consultation approach that was deployed at Karavi Community Hall. The rain continued showering and again the public community turn was restricted to only people who could encounter direct impacts during the project implementation phase. The meeting was arranged by the former Ward Member who in previous meetings has been heavily involved with the project's preliminary survey and identification of PAPs has identified especially rightful families and households whose properties and gardens will be affected during the project construction stage. [redacted] was also a community chief of the Ranguna community. He commands respect and provides stable leadership. His strategic position has gained recognition from the JICA team especially as a reliable person who is genuinely providing appropriate socio-economic data for our various surveys and assessment.
- ✓ Messrs [redacted] from DOWH and [redacted] from Lands Department have commenced talking with Mr. Uralom and other community members and PAPS of the IEE and RAP report and findings.
- ✓ The local communities have been fully made aware of the project implications in terms of the benefits and the environmental and social impacts. In this meeting the JICA team shared the RAP and IEE report and concerns one on one explaining the community concerns, inform them of their properties and assets being evaluated and assessed for compensation payments.
- ✓ The community members and the PAPs were very happy and the general comment was that the project is important to them. They stressed that whatever arrangement in terms of compensating them for the loss of properties and structure is well appreciated. They pledged support to the project and appropriate civil works to solve the dust and flooding issues that has affected the communities for a long time.
- ✓ The community members also acknowledge that the road traveres through the state freehold lease plantation land. They also appreciate the efforts put in by the Kokopo District Development Authority, the ENBPA, the Lands and Survey Division and the DOWH for the current project proposal and the allocation of the plantation into family blocks and the processing of the land title.
- ✓ The JICA Team, the ENBPA and DOWH have introduced and inform the local communities regarding the focal point to address further queries and clarification including the expression of grievances for the project. The Focal Points were:

[redacted]

The PAPs also shared their contacts and WhatsApp numbers with Messrs. [redacted].

However, it was stressed that DOWH being the custodian of all road projects in PNG, DOWH Safeguard Branch shall address all concerns relating to project management and monitoring.

The RAP and IEE Report and Presentation at Ranguna ended at around 12:30pm.

Source: Prepared by JICA Survey Team

4.Concluding Remarks from the 2nd IEE and RAP Report Public Presentation on the 8th to the 9th of December 2025

1. The Road Upgrade Project traverse through a State Free Hold Lease Land
2. There were no conflicting issues with traditional landowners and the Free Hold State Lease.

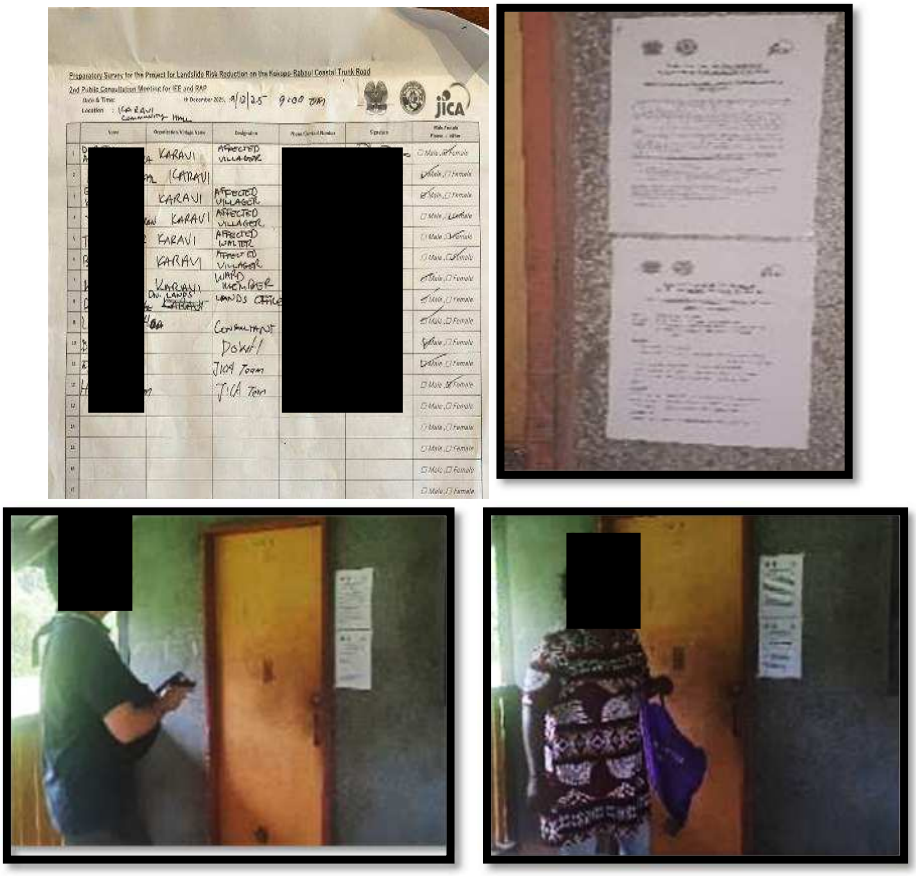
3. The local community and block holders are living on the plantation land as users until such time, the land is formally reverted back to the traditional landowners and block owners, subdivide the land into blocks with portion titles.
4. There would be no further expansion on the road width along the existing road corridor and the RoW.
5. The only concern for any form of land clearance that would require full land acquisition would be identified near the two Karavi and Ranguna bridge. The land acquisition plan would await the final engineering design. Once the final engineering is appropriated, the land surveyor will carry out the land survey for acquisition with the Kokopo District Development Authority (KDDA) and the ENBPA.
6. The identified PAPs whose land developments, improvement and properties have been assessed and evaluated for compensation payments. The full assessment report and compensation payment schedules are described and included in the RAP Reports.
7. The PAPs and the community at large are fully in support of the Road Upgrade Project. They pledged not to sabotage the project with unnecessary demands and complaints. They appreciated JICA, DOWH, KDDA and the ENBPA for the RAP survey and social considerations and appreciating the existing land developments like gardens, tree crops and structures that have been identified for compensation before the execution of the project.
8. They would contact the focal point contacts in [redacted] (JICA), [redacted] (ENBPA) and DOWH (Social and Environment Safeguard) for further queries.
9. The important people to deal with in this project are the community leaders and the Ward members. Every member of the community, they adhere to the leadership provided by the community leaders.

Source: Prepared by JICA Survey Team

Figure Appendix 4-16 Photos from Meeting 1. Malapau Beach Resort (08th Dec 2025)

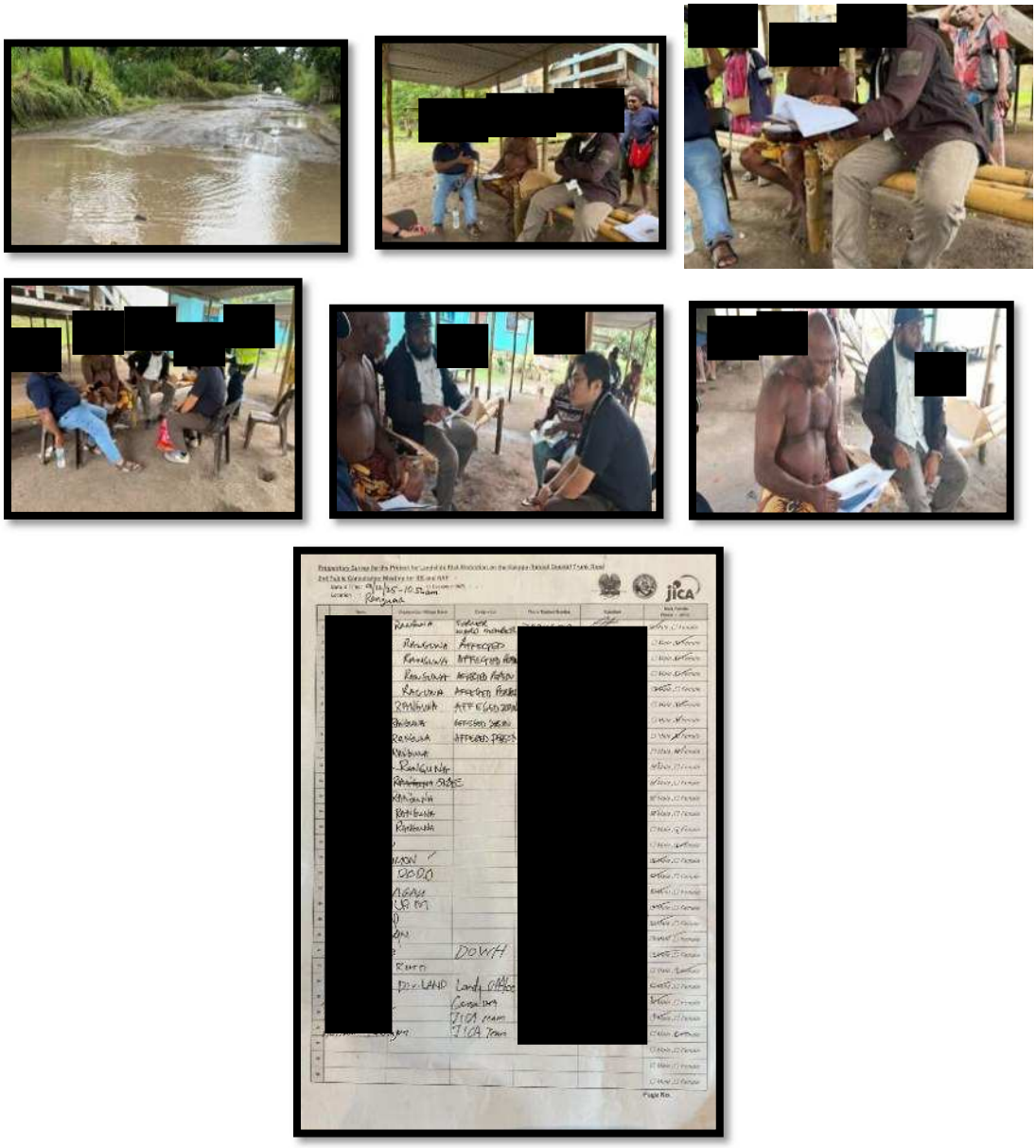
Source: Prepared by JICA Survey Team

Figure Appendix 4-17 Meeting # 2 Karavi Community Hall (9th December 2025)



Source: Prepared by JICA Survey Team

Figure Appendix 4-18 Status of Notice on bulletin board at Karavi Community Hall meeting attendance lists



Source: Prepared by JICA Survey Team

Figure Appendix 4-19 Meeting # 3 Ranguna Village (Residential Area) and Attendance Lists

5.Minutes of Meetings -Protocol Visit and Update Meeting with the new Ranguna Ward Member- Hon. Alois Roro

2nd RAP MEETING MINUTES
Date: 16TH December 2025
Venue: Residence, Ranguna Community, Raluana LLG. Kokopo District, ENBP
Time: 14:00pm

Attendees: [redacted]

[redacted]

Agendas

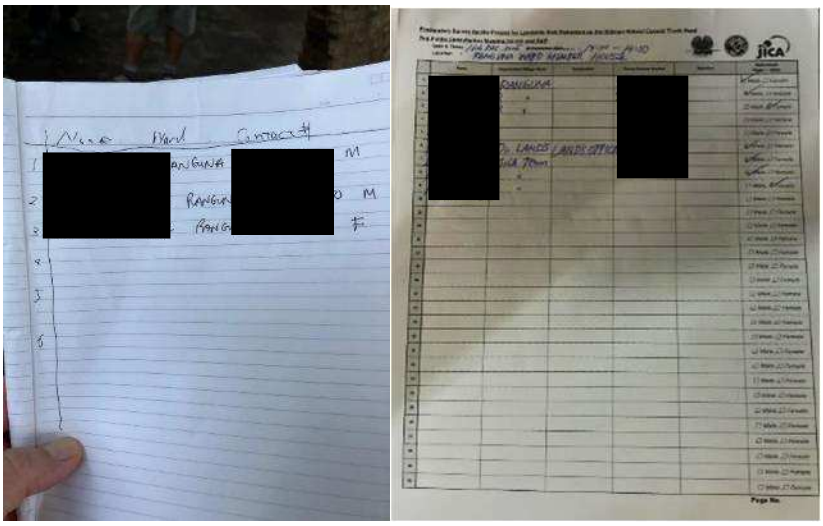
1. Protocol Visit to [redacted]

Meeting Minutes

2. Inform and Update of the JICA team's RAP Survey Work carried in Ranguna and the project area. This outline of activities was shared with him because he was elected Ward Member in the recent Ward Council Election in late November and early December 2025.
3. After a brief introduction and greeting we wasted no time to clear out an allegation by [redacted] that the RAP survey was not carried out properly because he missed identifying his tree crops from his block and also the new Ward member was not involved in the RAP meeting.
4. [redacted] explained the process and steps taken to account for all properties and gardens crops and fruits tree for proper compensation before the project starts. Apparently, the former Ward Member who participated heavily and the new elect- ward member are biological brothers. Making reference to consideration and accountability provided earlier by the former member [redacted], that every landowner who has right of ownership over the properties and assets were all counted.
5. [redacted] appreciated the work and thanked the JICA and Provincial Lands Team for a good work to improve the current road condition. There was no further issue relating to the earlier allegation by [redacted] because [redacted] explained that the former Ward member ensure the approach taken were transparent and considered every PAPs in this endeavor. The investigations were carried out visibly and audibly, making the field survey and data collection very were transparent and evidence base.
6. The meeting came to a stop at 14:30pm.

Source: Prepared by JICA Survey Team

Figure Appendix 5-20 Photos of Participants at Ranguna Village (2nd RAP Consultation 4th with their attendance list



Source: Prepared by JICA Survey Team

Figure Appendix 5-21 Names list for meeting participants at Ranguna Community