Report Number: ICRR0023925

1. Project Data

Project ID	Project Name
P119471	PNG Road Maintenance & Rehab Project II
Country	**Practice Area(Lead)**
Papua New Guinea	Transport

L/C/TF Number(s)	Closing Date (Original)	Total Project Cost (USD)
IDA-49310,IDA-54040	31-Jul-2016	141,750,452.15
Bank Approval Date	**Closing Date (Actual)**	
03-May-2011	28-Apr-2023	

	IBRD/IDA (USD)	Grants (USD)
Original Commitment	43,000,000.00	0.00
Revised Commitment	162,838,912.55	0.00
Actual	141,875,255.74	0.00

Prepared by	Reviewed by	ICR Review Coordinator	Group
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2. Project Objectives and Components

a. Objectives

The project objectives as written in the International Development Association (IDA) Financing Agreement (p.4) dated June 9, 2011, and the Project Appraisal Document (p.3) were “to (i) improve road transport to project areas through providing satisfactory physical condition and safety in selected roads; and (ii) strengthen institutional arrangements for road maintenance, including the participation of the private sector and communities.”

At the time of the additional financing, a third objective was added to the project formulation: "to enhance road-related economic opportunities for women," as reflected in the Financing Agreement (p.5) dated April 10, 2014 and the project paper (Report No: 78410-PG, p.4).

b. Were the project objectives/key associated outcome targets revised during implementation?

Yes

Did the Board approve the revised objectives/key associated outcome targets?

Yes

Date of Board Approval

09-Jan-2014

c. Will a split evaluation be undertaken?

No

d. Components

The project initially had two components:

1. Rehabilitation, Upgrade and/or Maintenance of Roads and Bridges. (Cost at appraisal: US$46 million; revised cost at additional financing: US$184.65 million; revised cost at the second project restructuring: US$161.15 million; actual cost at closing: US$121.7 million)

This component was to finance the rehabilitation, upgrade, and maintenance of roads and bridges. Key activities included the following: rehabilitation, upgrade, and initial routine maintenance of selected sections along the Hiritano Highway from the capital Port Moresby to Kerema; and selected national and district roads and bridges in ten coastal or island provinces. This involved detailed planning by the Department of Works and Highways (DoWH), using the Roads and Bridge Asset Management Systems for economic analysis, planning, and prioritization.

2. Technical Assistance for Project Management, Design and Supervision Services, and Capacity Building (Cost at appraisal: US$ 7 million; revised cost at additional financing: US$25.35 million; actual cost at closing: US$19.8 million)

This component was to finance support for project management, design, and supervision services, along with capacity building to the National Roads Agency (NRA) to improve its capacity for long-term routine maintenance, as well as technical support to the contracts for preparing bidding documents and implementing the contracts.

Revised Components

During the 2014 restructuring a third component on **Contingency for Disaster Risk Response** was added to the project scope to respond to a disaster that could have occurred. Such a disaster risk response was not triggered during project implementation.

The additional financing also expanded the scope of Component 1 activities and included new geographic areas beyond the Gulf and Central provinces as well as new indicators for women's involvement in maintenance contracts. Component 2 was restructured to include pilots on integrated road maintenance and performance-based road contracting, capacity building for DoWH, NRA and small contractors for road management and maintenance, awareness raising on gender in DoWH, development of ex-ante and ex-post socio-economic surveys; and resources for a second Employer's Project Manager consultancy to support project implementation. The costs of Components 1 and 2 revised at the time of additional financing are given in the entries above.

e. Comments on Project Cost, Financing, Borrower Contribution, and Dates

Project Cost: At appraisal, the project cost was estimated at US$53 million including US$10.6 million for physical and price contingencies. At the time of additional financing, the estimated project cost was revised up to US$210.00 million. In the 2016 restructuring, the estimated project cost was revised down to US$186.50 million due to reduction in borrower's funding that resulted in a reduction in the length of the roads to be rehabilitated from 220 km to 185 km. The actual project cost at project closing was US$141.5 million.

Bank Financing: At appraisal, the IDA credit amount was estimated at US$43.0 million. At the time of additional financing in 2014, an IDA credit of US$126.5 million was approved increasing the total IDA credit commitment to US$169.5 million. By project closing, the project had fully disbursed the original credit amount of US$43 million, and US$98.5 million of the additional financing totaling US$141.5 million. Approximately US$ 6.65 million was cancelled in the 2023 restructuring, and a further US$ 4.93 million was cancelled following the grace period, and around US$16.4 million was lost in exchange rate fluctuations.

Borrower's Contribution: The Government of Papua New Guinea (PNG) committed a total of US$40.5 million in funding, which included an initial commitment of US$10 million and an additional financing of US$30.5 million in 2014. However, because of macro-economic and budgetary pressures, the borrower's estimated contribution was reduced from US$40.5 million to US$17.0 million at the second project restructuring. The total borrower contribution was US$17 million.

Dates: The project was approved on May 3, 2011, and became effective three months later on August 30, 2011. An additional financing was approved in June 2014. A mid-term review was carried out in July 2017. The closing date of the original financing agreement was July 31, 2016, which was extended by 20 months at the second project restructuring. The original financing agreement closed on March 31, 2018. The closing date of the additional financing agreement was April 30, 2021, which was extended by about two years at the third project restructuring. The additional financing agreement and the project closed on April 28, 2023.

Project Restructuring and Additional Financing: The project was restructured four times, including one additional financing.

- **First Restructuring and Additional Financing (Jan 9, 2014):** An additional financing of USD126.50 million and Level 1 restructuring was approved to expand the project scope. It was to finance road rehabilitation and construction in two additional provinces and introduced a focus on enhancing economic opportunities for women through routine road maintenance. Because of this, the project objective was revised to include "to enhance road-related economic opportunities for women." Additional indicators were added to the results framework to capture the project results related to the new objective. The target values of the indicator measuring the length of the roads rehabilitated or upgraded under the project was revised up from 150 km to 200 km while the indicator number of road users on project roads was deleted because it was difficult to obtain data on non-motorized users. A new indicator *number of person days worked by women in project-related routine road maintenance activities* was introduced to track progress on the activities introduced to support for economic opportunities for women through maintenance contracts. The additional financing also introduced pilots on integrated maintenance and Performance Based Contract (PBC) to improve road maintenance systems.

- **Second Restructuring (May 5, 2016):** A Level 2 restructuring was carried out to adjust targets because of the reduction in borrower's contribution (see Borrower's Contribution section above). The restructuring reduced the target on *km of roads rehabilitated* from the previous target of 220 km to a revised target of 185 km. Additionally, due to procurement delays, it extended the IDA loan closing date by 20 months to allow the completion of activities. Other changes included revising the calculation methodology for the indicator *percentage of national project roads being maintained by private contractors* and introducing an indicator to capture progress on jobs for women beyond maintenance works.
- **Third Restructuring (April 15, 2021):** This Level 2 restructuring was carried out in response to delays caused by procurement challenges, lack of qualified technical staff, and Covid-19 impacts. The restructuring extended the closing date of the additional financing by about two years to April 28, 2023, reallocated the balance of proceeds of IDA credit, updated project implementation and disbursement schedules, as well as key risk and mitigation measures. The restructuring also introduced a Citizen Engagement indicator following corporate requirement and revised up the target for km of road rehabilitated from 185 km to 224 km to include the Bogia-Awar (27 km) and Epo-Kerema (10 km) road lengths. At the time of this restructuring, the project had already completed the rehabilitation of 174 km of roads and the Vanapa-Brown River road section (14 km) was under construction.
- **Fourth Restructuring (May 2, 2023):** A Level 1 restructuring was completed to cancel US$6.65 million of unutilized credit financing.

Reasons not to undertake a split assessment of the project outcome: The additional financing expanded the project scope in road rehabilitation while introducing a new objective on economic opportunities for women. Since this increased the project's ambition and a new objective was added at the same time, this review will assess the project's performance based on the revised objectives and targets without undertaking a split assessment in accordance with the Bank guidance.

3. Relevance of Objectives

Rationale

Country context: At appraisal, PNG's economy had benefitted from strong growth since the mid-2000s, but development continued to be hindered by systemic challenges. Public revenue depended heavily on resource exports, and the country had been classified as fragile. Poverty was high, especially in rural areas, and lack of reliable road access was a critical constraint to economic development, service delivery, and raising living standards. Challenging terrain and climate risks, low maintenance levels, and limited public and private capacity hindered road network development. Only about 35% of the limited road network was in good or fair condition, and many communities relied on air or maritime transport. This infrastructure gap was exacerbated by a challenging physical environment, long periods of underfunding, weak institutional capacity, and limited private sector involvement in road maintenance.

Previous Bank experience in the sector/country: The World Bank had been supporting PNG's transport sector strategy since the 1990s. The Road Maintenance and Rehabilitation Project (RMRP), which was the predecessor to this project, had similar objectives focused on rehabilitating physical and safety conditions of roads, improving strategic planning and management of road sector assets, strengthening institutional arrangements, and improving private sector contracting of maintenance works. It improved 640 km of roads, supported the NRA, and trained 79 domestic contractors between 2002 and 2012. The follow-on project's development objective was slightly more ambitious as it aimed to also improve economic opportunities for women.

PDO alignment to World Bank Strategies: The PDO was aligned with the World Bank's Country Assistance Strategy (CAS FY08-FY11), which prioritized support for the country's road sector. Pillar II of the strategy aimed to improve livelihoods and service delivery by developing well-managed national and local transport services. The PDO remained relevant to the latest World Bank Group Country Partnership Framework (CPF FY19- FY23), particularly objective 2.1: "Improve Management and Maintenance of PNG's Road Infrastructure". The CPF highlighted transport infrastructure and management of related infrastructure as key to better connectivity and access to services. Lack of climate-resilient transport infrastructure was highlighted as one of the drivers of fragility in PNG. Additionally, reducing the gender gap in employment through addressing structural barriers was considered an important pathway to increase household income. The project was responsive to these CPF priorities.

PDO alignment to Country priorities: The Government of PNG's strategic plans, including Vision 2050, the 2010-2030 Development Strategic Plan, and the 2011-2015 Medium Term Development Plan, called for investments to rehabilitate and maintain the roads infrastructure to maximize economic returns. The plans prioritized concentrating resources on a network of economic corridors and priority roads that offered the greatest potential to support economic development and improve nationwide connectivity. The National Transport Strategy Plan aimed to continue developing an integrated road network connecting provinces and regions. The government had increased road spending over the prior decade with support from development partners, halting the decline in overall road network conditions. However, establishing reliable road connectivity remained a high priority to address physical isolation and improve rural livelihoods and services.

Level of the Project Development Objective (PDO): Given the FCV context and project scope focusing on road rehabilitation and upgrading works and establishment of maintenance systems, the level of the PDOs were, relevant to the country context and appropriately pitched for the development status.

Rating

High

4. Achievement of Objectives (Efficacy)

OBJECTIVE 1

Objective

To improve road transport to project areas through providing satisfactory physical condition and safety in selected roads.

Rationale

Theory of Change for Objective 1

The project inputs were to be used to finance road rehabilitation and upgrading activities and technical assistance support to domestic companies to facilitate their participation in the project's bidding process. These activities were to result in the project outputs of upgraded and rehabilitated roads along selected sections of the Hiritano highway, upgraded bridges, decks, and river channels for selected areas, and routine maintenance contracts put in place. These outputs were expected to lead to the project outcomes of improved and safer movement of goods and people and better access to health services, schools, and markets because of reduced travel time and improved transport comfort due to improved road surface conditions and strengthening of the bridges. In the long run, these should be expected to result in improved health, increased schooling, and increased economic activity and development, while addressing the main drivers of fragility in the country caused by poor road access. The increased contract management capacity of the domestic companies that were to be involved in the execution of the project's road rehabilitation, upgrading, and maintenance works were expected to result in successful completion of the project's civil works.

The theory of change assumed that the national transport agencies would have the capacity to rehabilitate and upgrade infrastructure across 10 provinces, that adequate staffing and expertise for employer's project manager could be recruited during project implementation, and that large procurements could be processed in a timely manner. These aspects proved to be challenging during implementation.

Overall, the causal links from the project activities and outputs to the project outcomes were direct and valid, and the achievement of the project objectives could be attributed to the project's intervention, but the critical assumptions were overly optimistic.

Outputs

- **Roads rehabilitated, Rural:** The ICR reports that 224 km of roads were rehabilitated, achieving the revised target of 224 km. The original target was 150 km. However, according to the data provided in Annex 1.B Key Outputs by Component and on page 13 of the ICR, the total length of roads rehabilitated or upgraded under the project was 227.4 km. The breakdown of the works completed is as follows:
    - **Hiritano Highway (112 km):** From Inawabui to Bereina (22 km); from Brown River to Veimauri (24 km); from Malalaua to Epo (56.5 km); and from Epo to Kerema (9.5 km).
    - **Coastal Highway (26 km):** From Bogia to Awar in Madang Province (26 km).
    - **Hula Road (37.4 km):** From Gabone to Geno Junction in Central Province (37.4 km).
    - **East Cape Road (52 km):** From Yalua to Kehelala in Milne Bay Province (52 km).

In addition, the project financed the construction of bridges, drainage, a 400-meter sea wall in Milne Bay Province, and other ancillary structures, and the installation of road safety features. The project's results framework did not include indicators to capture the project outputs given below.

- The project financed the maintenance activities on unsealed and some sealed roads as follows:
  - The Hiritano Highway (102 km of the 295 km of the total road length).
  - The road from Malalaua to Kerema in the Gulf Province (65 km).
  - A part of the road from Gabone to Geno Junction in the Central Province (11.75 km).
- As a result of the sealing and maintenance of the project roads, the roads' conditions, as measured in accordance with the International Road Index, improved as shown below (ICR, p.41):
  - Hula Road from 15.11 before project to 4 after project.
  - East Cape Road from 13.26 to 4.
  - Hiritano Highway (Brown River-Veimarui section) from 12.8 to 4.
  - Hiritano Highway (Bogia-Awar section) from 13.50 to 4.
  - Coastal Highway from 15.69 to 4.
- **The number of domestic companies trained in bidding and contract management:** The project provided training to ten domestic companies in bidding and contract management including performance-based contract, meeting the revised target of ten. The original was target of 30. The target was revised down because of the limited market size in PNG. The original target of training 30 companies was overly ambitious.

Outcomes

The project's results framework did not include any indicator to capture the achievement of the project outcome in improving road transport. Originally, the results framework included an indicator measuring the "increase in the number of road users on project roads," but this indicator was dropped at the time of additional financing because it was assessed to be "not a good measure of progress in meeting the PDO, and data difficult to gather for nonmotorized users" (Project Paper, Report No: 78410-PG, p.11). The project was to conduct a total of eight social and economic surveys (SESs) before and after the project, but the post-project surveys could not be conducted because "the protracted delays left insufficient time to complete ex post SESs" (ICR, p.18). For a project that was implemented for 12 years, the shortcomings in the M&E system and the conducting of the SESs to capture the project's outcome in improving the road transport were significant.

While the results framework did not include indicators on road safety. The ICR notes that safety features were included in the road and bridge rehabilitation including guardrails, pavement markings, signage, speed humps, widened shoulders, and limited lengths of footpaths. In high-risk market locations along the Hiritano Highway, markets were relocated further from the road and improved with additional safety facilities and solar powered lighting.

The indicators in the results framework are all output indicators and do not capture the project outcomes such as increased road traffic, reduction in travel time, reduction in vehicle costs (in terms of repairs and regular maintenance), and reduction in the number of accidents. The ICR reports some anecdotal information gathered through site visits and stakeholder consultations such as lowered transport costs, reduced travel time, improved supply and quality of transport services, increased economic activity. For example, while the project did not carry out ex post traffic surveys, stakeholders in beneficiary communities reported that the frequency of public motor vehicle services increased along all project corridors. However, the evidence base is insufficient to validate these assertions and adequately assess the project's impact on improving road transport in project areas.

Overall, while the project was successful in improving the surface quality of the project roads and implementing some limited maintenance activities, the evidence is insufficient to assess the improvement in road safety and the achievement of the project outcome of improved road transport. Therefore, the project's efficacy in achieving the project objective "to improve road transport to project areas through providing satisfactory physical condition and safety in selected roads" is rated Modest.

Rating
Modest

OBJECTIVE 2

Objective
To strengthen institutional arrangements for road maintenance, including the participation of the private sector and local communities.

Rationale
Theory of Change for Objective 2:

Based on the information in the PAD, project activities included establishing a project implementation unit called Employer's Project Manager (EPM) to lead project implementation and oversee design and supervision of road and bridge works, providing training and assistance to contractors in preparing bidding documents and on contract administration, providing technical support and training to the National Roads Authority (NRA) for undertaking effective road maintenance, carrying out data collection and socio-economic surveys. The 2014 Additional Financing introduced the following activities to pilot community-based maintenance approaches: i) direct contracting with communities; ii) communities carrying out routine maintenance under guidance of the contractors; and iii) communities serving as sub-contractors to primary contractors to maintain roads.

Expected outputs from these activities included consultants hired to support day-to-day project supervision, EPM established, contractors trained on bidding and contract management, NRA trained on effective road maintenance procedures and use of Road Asset Management System (RAMS) and Bridge Asset Management System (BAMS) for data collection, community sub-contracts signed, and the staff of Department of Works and Highways (DoWH) trained on environmental and social safeguards.

In the medium to long term, the activities were expected to result in an improvement of the NRA's capacity for managing routine road maintenance, DoWH's capacity to consider and respond to environmental and social risks arising from project activities, enhanced government capacity in using RAMS, and improved capacity of private sector companies to bid and manage performance-based contracts (PBC) for road rehabilitation and maintenance, including through community engagement.

The theory of change assumed that trainings would be sufficient to improve the NRA's capacity on routine maintenance and the private sector contractors' capacity to implement contracts efficiently. Other factors and underlying drivers of low institutional capacity such as low level of technical staff, inadequate systems and procedures in the national agencies, and low financing and physical capital capacity among the contractors to undertake large contracts were not addressed by the project's theory of change. There was also an assumption that community-based maintenance could be arranged through the private sector sub-contracting without direct engagement, capacity building, and social mobilization of communities at the grassroots level. The theory of change also assumed that the NRA would have the capacity and resources to make payments to private sector on time and allocate adequate resources for long-term maintenance through the PBC. Several factors that contribute to sustainability of maintenance systems were not explicitly discussed or addressed.

Overall, the theory of change demonstrated a logical causal link on improved national capacity to manage PBC and enhanced participation of the private sector. However, the causal link on community participation and sustainability of maintenance arrangements was weak in the absence of explicit activities and attributable results.

Outputs

- **The number of domestic companies trained in bidding and contract management:** The project provided training to 10 domestic companies in bidding and contract management including PBC contracting, meeting the revised target of 10. The original was target of 30. The target was revised down because of the limited market size in PNG. The original target of training 30 companies was overly ambitious.

The project achieved the following outputs that were not captured by the results framework:

- Prepared an Options Analysis paper assessing market capacity for performance risk sharing.
- Provided DoWH with sample hybrid PBC contracts and bidding documents including cost estimates for sustainable maintenance of roads.
- Developed PBC policy statement and organogram for PBC monitoring and management unit.
- Prepared assessment for the DoWH on requirements to scale up PBC.
- Contractors assumed responsibility for all stages of routine maintenance.
- The contractors demonstrated improved response time.
- Community-based approaches through sub-contracting and wage employment improved quality of maintenance. A pilot initiative introduced in 2014 showed that community-based maintenance approaches using wage labor and sub-contracting models were more practical than contracting with communities directly.

Outcomes

- **Percentage of Hiritano Highway maintained to good condition under PBC:** Out of 295 km of the Hiritano Highway, the project increased the part of the highway adequately maintained from the baseline of about 89 km (30%) to 124 km of (42%) under a PBC. The original target was 50% but was revised down to 42% because of the reduction in the borrower's contribution at the second restructuring in 2016. The indicator definition was clarified in the 2014 restructuring and revised again in the 2016 restructuring to increase the standard from an International Roughness Index of 5 to 4.
- **Percentage of project roads being maintained by private contractors under PBC:** 39% of project roads were maintained by private contractors under performance-based contracts (PBC). This was an increase from the baseline of 20% and exceeded the original target of 25% while meeting the revised

target of 39%. The ICR reports (page 27) that this indicator measures the same result as the previous indicator. The project team mentioned to IEG (on Feb 7, 2024) that the remaining 61% of the roads were covered by the traditional government maintenance model.

The project achieved its target of improving the road quality and introducing PBC as new institutional arrangements for road maintenance. The project also achieved its planned outputs in terms of training provided to the DoWH and private sector companies. While there are risks regarding the sustainability of the road maintenance arrangements, the project facilitated the participation of private sector in road maintenance under a PBC that was introduced by the project. Overall, the efficacy of the project in achieving the project objective to strengthen institutional arrangements for road maintenance, including the participation of the private sector and local communities is rated Substantial.

Rating
Substantial

OBJECTIVE 3

Objective
To enhance road-related economic opportunities for women.

Rationale
Theory of Change for Objective 3:

Activities included facilitation of routine roadside maintenance activities through wage labor for women and other project related works such as directing traffic along sections of road under rehabilitation, serving as cooks or cleaners in work camps, and working as day laborers. This was expected to lead to employment and income generation for women contributing their socio-economic development.

The theory of change assumed that a pool of ready-to-work women with technical skills and tools required to conduct maintenance activities would be available. It also did not explicitly discuss whether social norms could pose as a constraint to women's participation in maintenance works. Based on the PDO indicator, economic opportunities were defined as working as daily laborer in both maintenance works and non-maintenance project works.

Outputs

- **Number of person days worked (by women) as a result of project activities on highways rehabilitation:** 37,842 person days were worked by women as a result of project activities, exceeding the original target of 2,100 and the revised target of 40,000. Works included under this indicator were traffic directing, serving as cooks or cleaners, and other non-maintenance related daily works. The target was revised up significantly at the third restructuring in 2021 based on actual results and recalculation.
- **Number of person days worked (by women) in project-related routine road maintenance activities:** This indicator is applicable to works created for women under the PBC only. 8,372 person days were worked by women under routine road maintenance activities, exceeding the original target

of 1,122 and slightly below the revised target of 8,500. The target was revised up significantly at the third project restructuring in 2021 based on actual results and recalculation.

The ICR reports that women were employed systematically under seven road rehabilitation contracts and two road maintenance contracts (ICR, p.34). The project prepared a financial literacy training program prepared, including terms of references and printed learning materials, but could not implement it because of insufficient time left for implementation (ICR, p.18).

The project achieved its target on number of days of labor created for women, and nearly achieved its target on non-maintenance related employment generated for women. Additionally, the project team commented that the PBC contractors were required to hire a specific number of women to carry out the works. Overall, the project's efficacy in achieving the project objective to enhance road-related economic opportunities for women is rated Substantial.

Rating
Substantial

OVERALL EFFICACY

Rationale
The project's efficacy in achieving the first objective "to improve road transport to project areas" is rated Modest because of insufficient evidence related to road transport improvement. The project's efficacy in achieving the second objective "to strengthen institutional arrangements for road maintenance, including the participation of the private sector and communities" is rated Substantial because the project was successful in introducing private sector in road maintenance through Performance-Based Contracts, but there are risks to the sustainability of these maintenance arrangements developed under the project mostly related to its funding. The project's efficacy in achieving the third objective "to enhance road-related economic opportunities for women" is rated Substantial because the project activities resulted in job opportunities for women as planned. The overall efficacy is rated Substantial.

Overall Efficacy Rating

Substantial

5. Efficiency

Economic Analysis

A "with project" and "without project" economic analysis was conducted at appraisal, additional financing, and project closing. The economic analyses conducted at appraisal and additional financing used the Highways Design and Maintenance Model, 4th Edition (HDM-4). The ICR (p.38) notes that "for all the projects, the HDM-4 object files used at appraisal stage could not be obtained, and key assumptions are not available." The economic analysis conducted at project closing used the Roads Economic Decision (RED) model. While the methodological approaches varied, the core parameters focused on comparing the costs of road rehabilitation and maintenance against the benefits of reduced road agency and road user costs based on a predicted International Road Index value over the analysis period. The analysis period of 20 years was consistent across the three analyses. However, the scope of the analyses varied. At appraisal, it was limited to selected road sections (two road sections on the Hiritano Highway and the ECR in the Milne Bay Province) before board approval and expanded to include two additional provinces at the time of additional financing. The post-project analysis considered costs and benefits associated with 115 km of roads rehabilitated out of 224 km under the project because of data limitations.

The models included various factors incorporating sensitivity analysis based on maintenance strategy, level of investment, traffic patterns, and road deterioration overtime to measure overall costs and benefits. For this project, the analysis assumed an increasing road traffic and decreasing vehicle operating costs over time. The assessment assumed minimal maintenance costs at a constant rate over 20 years, which is not realistic as maintenance costs tend to increase overtime, but according to the historical data in PNG, routine maintenance is regularly deferred in project areas (ICR, p.39). The costs of accidents and impacts of environmental incidents were excluded from the analysis, which could result in an underestimation of the true costs associated with road maintenance.

The appraisal analysis estimated an Economic Internal Rate of Return (EIRR) of 17% for road works that were selected at the time (approximately 78 kms of road) and estimated an EIRR of 12% for roads that were going to be identified during implementation. The analysis conducted at the additional financing estimated an EIRR of 13% and 11% for the two additional provinces proposed at the time. The post-project economic analysis estimated EIRRs ranging from 15% to 49% for different sections of the 115 km roads rehabilitated under six contracts. The simple average of the EIRRs is 25.92 percent. While these EIRRs calculated based on estimates show the economic viability of the project's intervention, the exclusion of the costlier rehabilitation works along Malalaua and Epo (109 km) from the post-project analysis because of lack of data was a significant shortcoming in the economic analysis of the project. Furthermore, a comparison of the results of the economic analyses before and after the project is not possible because of the assumptions used for the economic analysis at appraisal are unknown.

Administrative and Operational Efficiency

The project's efficiency was adversely affected by protracted procurement process, lack of staff (i.e., a seven-month vacancy in the project director position in the DoWH), lack of expertise in DoWH's Environmental and Social Safeguards Branch, delays in implementing resettlement compensation requirements, and delays in commencing the Bogia-to-Awar and Epo-to-Kerema road upgrading works that led to a two-year extension of the additional financing. The decision to prefer the road rehabilitation designs and hire the Employer's Project Manager (EPM) during project implementation resulted in slow progress adversely affecting project efficiency. The project was restructured multiple times and implemented over a 12-year period. There was a significant increase in project implementation costs from US$7 million initially allocated to US$20 million spent on project implementation and capacity building at completion time.

GoPNG's commitment to fund 22% of the works did not materialize during implementation due to an increase in construction costs, declining public revenues, and other competing priorities. The project was then restructured to compensate for this gap through additional financing.

Overall, the project's efficiency in achieving the project objectives is rated Modest.

Efficiency Rating

Modest

a. If available, enter the Economic Rate of Return (ERR) and/or Financial Rate of Return (FRR) at appraisal and the re-estimated value at evaluation:

	Rate Available?	Point value (%)	*Coverage/Scope (%)
Appraisal	✓	12.00	100.00 ☐ Not Applicable
ICR Estimate	✓	15.00	51.00 ☐ Not Applicable

* Refers to percent of total project cost for which ERR/FRR was calculated.

6. Outcome

The project objectives were highly relevant to the country's development priorities and aligned with the World Bank strategy both at appraisal and project closing. The project's efficacy in improving road transport was modest because of insufficient evidence. The project's efficacy in introducing private sector in road maintenance and creating road-related economic opportunities for women was substantial. Overall efficacy of the project in achieving the project objectives in an FCV context is rated Substantial. There were significant administrative and operational inefficiencies that affected the overall efficiency of the project in achieving the project objectives, which was implemented for about 12 years. The efficiency of the project in achieving the project objectives is rated Modest. Overall, the project outcome is rated Moderately Satisfactory.

a. **Outcome Rating**
Moderately Satisfactory

7. Risk to Development Outcome

Financial Risk: The ICR notes on page 28 that DoWH has stated its intention to expand the use of PBC through both its own resources and financing from development partners. Since the project closing, DoWH has continued with the implementation of maintenance under the Hiritano hybrid OPBRC with its own financing but has not implemented the project's technical assistance recommendations for establishing a PBC Monitoring and Management Unit. There is a high risk that GoPNG could not pay the PBC companies for maintenance services due to lack of public funds and competing priorities.

Technical Risk: The PAD noted that both government agencies and the private sector struggle with limited resources, skills, and expertise necessary for the efficient implementation of road infrastructure projects and maintenance activities. Efforts to strengthen these capacities were part of the project's objectives, aiming to improve road maintenance. The project also included maintenance periods within the contracts. While the project delivered some trainings to NRA and DoWH, a majority of the technical aspects were outsourced to consultants rather than being led by the public service. There is still a substantial risk of inadequate technical capacity in terms of systems, policies, regulatory framework, and management capacity to ensure continued rehabilitation and maintenance of the roads.

Environmental Risk: The risks of natural disasters and climate incidents in PNG and project areas are substantial, primarily due to the country's challenging physical environment, including steep mountainous terrain, warm climate, and heavy rainfall concentrated in short periods leading to floods and landslides. These conditions can compromise roads and drainage, resulting in rapid surface deterioration.

Social Risks: While the ICR discusses improved socio-economic outcomes based on anecdotal information, transport studies have shown that access to improved infrastructure for the poor population requires further investments and policy reform such as affordable public transport options, flexible routes and frequencies, safety, and security along the route. There is a substantial risk that the poor, particularly women and children, are unable to use the road infrastructure due to factors such as gender-based violence or sexual harassment on the road and lack of safety and security.

8. Assessment of Bank Performance

a. Quality-at-Entry

Leveraging the experience of its predecessor (RMRP), the project design built on the existing assessments in many areas, including the use of social assessments and consultations to establish a baseline and assessments of national capacity with regard to financial management, procurement, and environmental and social risk management to prepare capacity building plans. The project maintained the same implementing bodies, NRA and DoWH, and largely overlapped geographically with its predecessor. This facilitated a smoother preparation, yet with only six months in the preparation timeline, the project deferred necessary actions such as hiring the EPM and addressing the lack of technical E&S specialists in the DoWH.

Activities in the first component activities were relatively clearly defined with around 78 km of road initially identified for rehabilitation and the remaining sections to be identified during implementation. The second component's institutional development activities lacked clarity. Despite having a PDO on institutional strengthening, the project lacked specific activities in this area, allocating US$1 million to capacity building of the DoWH without a clear execution plan. On lessons learned, one of the lessons from RMRP was that community-based maintenance was often ineffective. The PAD (p.35) discusses that community contracting was often minimally effective, while works undertaken by the National Capital District Council were considered more effective. Yet the project went on to include activities around community-based maintenance without reconciling this discrepancy.

Safeguards and fiduciary implementation arrangements were in place. The project met most environmental and social safeguards requirements at the appraisal stage as it developed a new Land Acquisition and Resettlement Framework (LARF) to tackle involuntary resettlement risks and incorporated an Indigenous Peoples Plan, including a grievance mechanism. The main concerns were potential cost overruns and procurement delays due to institutional capacity challenges. The implementation plan included activities to bolster the NRA and DoWH capacity in contract management and procurement, with added contingency costs to cushion against overruns.

As discussed in section 9, M&E design was weak. The appraisal-stage results framework included only five indicators and lacked M&E tools to track outcomes of improving road transport. Overall, the project design was informed by the experience from its predecessor. At the same time, there were missed opportunities in strengthening the M&E design, conducting baseline socio-economic surveys to capture broader impacts, defining outcome-oriented benchmark to track progress, and setting up robust M&E arrangements.

The quality at entry is rated Moderately Unsatisfactory.

Quality-at-Entry Rating

Moderately Unsatisfactory

b. Quality of supervision

Four task team leaders (TTLs) oversaw the project, conducting 35 missions over 12 years which allowed for consistency of supervision support. The Bank team demonstrated adaptive management by making course-corrections throughout implementation. The 2014 restructuring introduced a focus on women's economic empowerment, expanded the road rehabilitation work to two additional provinces that had high poverty rates, and introduced pilots to improve maintenance arrangements. Project ratings and intensified supervision missions were used to address delays in completion of contracts and lack of capacity for timely management of environmental and social issues.

Despite these efforts, there were shortcomings in terms of enhancing project's focus on development impacts. For example, although initially planned, the project did not carry out socio-economic surveys to determine the effect of the road and bridge improvements on the population served by the roads involved. This could have addressed the shortcomings in M&E design. Additionally, capacity building activities remained limited in scope which hindered the project's ability to achieve its full potential in strengthening institutional capacities.

On safeguards and fiduciary issues, the Bank team maintained due diligence throughout implementation and put in place measures in response to emerging issues. The Bank team conducted trainings for relevant client staff, although the specifics of these activities remain vague. Most issues were resolved during implementation although a few lingered at project closure as discussed in section 10. External challenges like contractor capacity, remote site locations, Covid-19, and insecurity adversely affected project implementation and supervision.

The quality of supervision is rated Moderately Satisfactory.

Overall, there were significant shortcomings at entry and in focus on development impact during supervision. While some critical gaps remained in Bank performance, the project team proactively took actions through project restructurings to address these weaknesses to ensure the completion of project activities and the achievement of the project objectives in an FCV country. In accordance with the Bank guidance, the Bank performance is rated Moderately Satisfactory.

Quality of Supervision Rating
Moderately Satisfactory

Overall Bank Performance Rating
Moderately Satisfactory

9. M&E Design, Implementation, & Utilization

a. M&E Design
The project objectives were formulated at the output level in the results chain rather than outcome level. The project objectives required diverse quantifiable indicators for tracking progress, yet this was not adequately established. The first objective lacked road safety indicators, such as user traffic, user types, user satisfaction, and accident rates. The second objective's metrics—number of PBCs signed, training conducted, and road condition—did not measure the extent and quality of community engagement. The third objective, aimed at boosting women's economic opportunities through roads was ambitiously stated but supported by limited activities.

Some indicators posed attribution challenges; for example, there was no project-level baseline for the percentage of roads in good or fair condition in the project area. As the ICR (p.24) reports, the core sector indicators for transport, the Rural Access Index, and 'population with enhanced access to transport services' could have been adopted and monitored based on the best available population estimates. The sampling methods and calculation methodology lacked clarity for two indicators tracking number of road users and number of private sector companies engaged on project roads. With only five output indicators, the project's theory of change was not reflected in the results framework adequately. A socio-economic survey to assess effects of road and bridge improvement on the population was planned but the baseline work was deferred to implementation stage. While the project aimed to help the NRA develop a long-term PBC management mechanism and monitor initial contracts in the final years for sustainable maintenance, M&E efforts only measured the tendering and establishment of PBC contracts. The results framework did not capture some outputs (such as the construction or upgrading of bridges, decks, protection works, and river channels, and installation of safety features) or the improvement of the road quality.

On institutional arrangements, the project relied on existing entities within NRA to collect data, update the results framework, and report implementation progress with regard to procurement, expenditures under contracts, and financing projections. Arrangements to use and reflect national data, impact assessments, or triangulation of evidence with other sources were not discussed.

b. M&E Implementation
During implementation, indicators and targets were revised primarily to address challenges of data collection. Several M&E design weaknesses discussed above remained unaddressed, thus the project

could not provide evidence of outcomes beyond immediate outputs such as the length of roads rehabilitated, and contracts signed.

The socio-economic surveys were to provide data about the project's impact on beneficiaries (which would also have been useful in addressing the weaknesses in the M&E design), but these surveys could not be conducted because of insufficient time for implementation. Two indicators that were useful in determining the road condition and usability did not have updates in the initial Implementation Status and Results Reports and were later dropped. Rather than finding a solution to improve calculation methodology, the project team dropped the only indicator that tracked outcomes and use of roads.

The project involved stakeholders, particularly through community consultations. Yet, the extent of stakeholder engagement in the M&E process itself is not elaborated.

c. M&E Utilization

The project prepared and disclosed implementation progress reports regularly and carried out community consultations during preparation and as part of the 2014 additional financing. The ICR does not explicitly outline how M&E data was communicated to and used by various stakeholders.

The project made some adaptations in response to emerging challenges, such as adjusting procurement processes and addressing safeguard compliance issues. However, the extent of systematic learning and adjustment based on M&E findings is not fully detailed.

M&E data contributed to evidence of outcomes but there were limitations in its comprehensiveness and execution. The project was not able to rely on national data, external assessments, or proxy information to triangulate evidence towards showcasing outcomes.Some elements of M&E systems are likely to continue beyond the project cycle. Technical assistance on RAMS should have been expected to improve DoWH's capacity to collect data and monitor the implementation of PBCs. The project's grievance mechanism and stakeholder consultations are also likely to be used in operations beyond this project, as the project team informed IEG in February 2024, which, although limited. implies some influence of the project's M&E on future interventions in similar contexts.

The project's M&E quality is rated Modest due to deficiencies in design and implementation. Indicators were insufficient to track progress effectively and monitor the achievement of some of the project outcomes especially related to the improved road transport. The absence of safety and community engagement metrics, alongside lack of socio-economic data hindered precise outcome measurement.

M&E Quality Rating

Modest

10. Other Issues

a. Safeguards

The project was classified as Category B under Environmental Assessment (OP/BP 4.01) and triggered the Indigenous Peoples (OP/BP 4.10) and Involuntary Resettlement (OP/BP 4.12) safeguard policies both at appraisal and at the time of additional financing.

Environmental Assessment (OP/BP 4.01): The project was classified as Category B because it anticipated a moderate level of environmental and social risks, project sites did not include any critical habitats, and the scale of resettlement actions was moderate. An Environmental and Social Management Plan (ESMP) was prepared and disclosed in country and on the World Bank's InfoShop in February 2011. For project areas that were not identified at the time of appraisal, an Environmental Social Management Framework (ESMF) was prepared outlining the requirements for each sub-project, including further community consultations. There were issues of non-compliance, particularly in mid-2016; for example, households were resettled before the preparation of a Resettlement Action Plan; sites were cleared before inventory of roadside assets was prepared; fuel and bitumen did not have adequate storage; workers faced safety risks; and required permits were not obtained in time. These issues were addressed by preparing ex-post documentation for households and resorting to community compensation in lieu of an inventory. Intensive missions followed to ensure compliance and hire E&S specialists.

Indigenous Peoples (OP/BP 4.10): The project triggered this safeguard policy because most communities in the targeted provinces fulfilled the characteristics of indigenous peoples. Free, prior and informed consultation leading to broad community support was conducted during project preparation. Consultations were also done during the 2014 AF on the additional activities, and minutes were disclosed.

Involuntary Resettlement (OP/BP 4.12): At appraisal, the project triggered this safeguard policy because of the potential for small land acquisition or land impacts during the rehabilitation of the Hiritano Highway. A Land Acquisition and Resettlement Framework (LARF) was prepared based on the one prepared for the previous RMRP. The ICR discusses a few non-compliance issues including non-implementation of the LARF in one of the work sites, which was later addressed through a community approach. The ICR did not discuss the number of households affected by the project.

Grievance Mechanism: The project established a grievance mechanism at the time of approval. By completion stage, all grievances received through the mechanism had been responded to although the number and nature of grievances received were not discussed.

Gender-based Violence and HIV: Initially, the project did not assess risks related to sexual harassment and abuse or HIV. The 2014 restructuring later introduced mitigation measures to prevent the spread of HIV and incidence of gender-based violence (GBV). Throughout implementation, a total of 75 awareness workshops were delivered to contractors and communities, a code of conduct was prepared, and a mapping of GBV services was carried out. Information on number of cases reported through GRM or resolved through the GBV services were not available in the ICR.

b. Fiduciary Compliance

Procurement: Procurement for the project was carried out in accordance with World Bank procurement guidelines. The project faced significant procurement delays and management challenges, including low clearance thresholds and unpredictable timelines in PNG, resulted in project implementation inefficiencies. The DoWH extended the ECR contract's closing date without World Bank's prior approval and encountered issues with bid securities not being refunded due to procedural missteps. Despite these hurdles, measures were put in place to prevent further delays, and procurement was rated Moderately Unsatisfactory in the last two years, partly due to delays in extending the hybrid OPBRC contract. The Bank continues to address the bid security refund issue. The project team explained to IEG (on Feb 7, 2024) that procurement was a recurring challenge throughout project implementation driven by government bureaucracy, lack of communication, and lengthy decision-making processes.

Financial Management: The Bank carried out financial management trainings to support the DoWH and EPM following Bank standards. Quarterly financial reports and annual interim financial statements were submitted according to schedule and acceptable to the Bank. External audits were unqualified for all years except for 2021 because of misallocated funds, which was refunded to the World Bank during the grace period. Financial Management was rated as Moderately Satisfactory at project closing.

c. Unintended impacts (Positive or Negative)

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d. Other

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11. Ratings

Ratings	ICR	IEG	Reason for Disagreements/Comment
Outcome	Moderately Satisfactory	Moderately Satisfactory	
Bank Performance	Moderately Satisfactory	Moderately Satisfactory	
Quality of M&E	Modest	Modest	
Quality of ICR	---	Substantial	

12. Lessons

This review has drawn three lessons based on the information in the ICR.

Systematic data collection on road connectivity and building capacity for the implementation of Roads Assets Management System (RAMS) is critical in providing a sufficient evidence base of the achievement of desired outcomes. The project highlighted the value of systematic data collection on road connectivity outcomes to guide future investments and policy reforms. Data collection throughout project implementation was insufficient. Initially planned socio-economic surveys were not conducted, missing a crucial chance to understand the project's impact on various populations and to refine the M&E design. Utilizing additional data sources could have enriched the evidence base, offering clearer insights into the specific needs of diverse beneficiary groups, such as women, children, the disabled, and the elderly. Building capacity for the implementation of RAMS could provide a sufficient evidence base to assess the development impact of road rehabilitation projects especially so in an FCV context.

In an FCV context, regular technical assistance in financial management, procurement, and safeguards can prevent lengthy project implementation delays. The project's experience reaffirms the necessity of ongoing capacity building in fiduciary and safeguards areas in an FCV context, beyond delivering sporadic training sessions and issuing communication when faced with non-compliance. Encountered delays due to procurement issues and capacity gaps highlight the need for consistent and strategic support for addressing implementation challenges and achieving project objectives effectively and for building long-term capacity as envisaged in the World Bank Environmental and Social Framework, and World Bank guidelines for procurement and financial management.

Insufficient preparation of civil works designs and employer's project manager (EPM) bidding documents at appraisal can adversely affect project implementation and cause significant delays in an FCV context. The preparation of the civil works designs and EPM bidding documents were deferred to the implementation stage, which resulted in no support from the EPM at the initial phases of the project implementation and resulted in a two-year delay. In an FCV context, project preparation should take into account high-capacity risks. As the ICR (p.24) notes, additional preparation support and longer lead times for engineering studies and work designs could improve the effective and efficient implementation of road projects in FCV countries. Such support may include initiating the procurement process of an EPM and preparing civil works and bidding documents under an ongoing project and including flexible terms in EPM contracts to extend EPM support to other projects during their preparation phase.

13. Assessment Recommended?

Yes

Please Explain

This is an important example of where PBC has been applied and rolled out in a fragile environment. Better understanding the ramifications for this would be extremely useful for the global practice.

14. Comments on Quality of ICR

The ICR is comprehensive and well-written. It follows the Bank guidance and is concise. It presents a clear picture of the project implementation experience. Figure 2 on project implementation timeline clarifies the sequence of activities and external events that had an impact on implementation. The reconstructed theory of change in Figure 1 provides a comprehensive picture of the activities and expected results.

While there were significant shortcomings in the project's M&E design and implementation, the ICR uses, to the extent possible, evidence from the project's M&E framework, client reports, and RAMS to demonstrate results.

The report covers outputs beyond the results framework such as construction or upgrading of bridges, decks, protection works, and river channels, and installation of safety features and improvement of road quality. There is an attempt to support the achievements through anecdotal information gathered during the completion mission through interviews with select project beneficiaries. However, it lacked national or sub-national data and external assessments to triangulate the evidence provided.

The report detailed environmental and fiduciary issues, along with the responses during implementation. While it elaborated on GBV awareness training and service mapping, it lacked specifics on the number of GBV cases reported or resolved via GRM and GBV services. Additionally, details on the number of households affected and assisted by the resettlement action plan were not provided.

The report was largely consistent, though discrepancies were noted in the borrower contribution figures across different sections, including the main text, Annexes 3 and 4, and the data sheet.

Overall, the quality of the ICR is rated Substantial.

a. Quality of ICR Rating

Substantial