

Semi-annual Report

January 2019

# **PNG: HIGHLANDS REGION ROAD IMPROVEMENT INVESTMENT PROGRAM (TRANCHE 3)**

## **Henganofi-Nupuru Road Sub-Project**

Prepared by Highlands Road Management Group (HRMG) of the Department of Works for the Asian Development Bank

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**FACT SHEET:**

Loan	ADB Loan: 3404/3408 and Grant 0485 PNG
Project Number	CSTB 3533
Subproject	Henganofi – Nupuru Road Subproject
Executing Agency	<p>The Department of Works (DOW) is the executing agency for the Highlands Region Road Improvement Investment Program (HRRIP). It has overall responsibility to manage the planning, implementation and monitoring for all road improvement works including environmental management and environmental compliance monitoring. It also includes the acquisition of use rights for additional land to implement HRRIP subprojects, as well as compensation for damages on project-affected land DOW is also responsible for reporting to ADB and the recruitment of the organization to conduct independent monitoring</p>
Implementing Agency/Unit	<p>The DOW will also be the Implementing Agency for the road improvement works. The DOW has delegated to the Highlands Road Management Group (HRMG), the responsibility to carry out the planning, implementation and monitoring for environmental management and environmental compliance monitoring, land acquisition and/or resettlement activities, as required. The more relevant delegated responsibilities include the following;</p> <p><b>Prior to the commencement of civil works:</b></p> <ul style="list-style-type: none"><li><input type="checkbox"/> Submit and indorse environmental assessments required for regulatory approval of the CEPA and require the contractor to obtain approval, e.g., environmental clearance, environmental permit or permits from other statutory authorities as required by the Government.</li><li><input type="checkbox"/> Ensure that all regulatory clearances for the subproject are obtained from the relevant government authorities and are submitted promptly to ADB.</li><li><input type="checkbox"/> Ensure that the EMP is updated based on detailed design and included in the bidding document of the subproject and that all bidding contractors have access to the environmental assessments and EMP.</li><li><input type="checkbox"/> Ensure that the EMP and all required mitigation measures during construction, including conditions stipulated in the CEPA's clearance or environmental permit, are included in BCD with requirements to update the EMP in response to any unexpected impacts and</li><li><input type="checkbox"/> That all selected contractors have agreed to implement in full the requirements of environmental mitigation measures prescribed in the EMP</li><li><input type="checkbox"/> Provide training as required to HRMG in Mt Hagen and contractor;</li></ul>

	<ul style="list-style-type: none"> <li><input type="checkbox"/> Receive environmental safeguard clearance on subproject(s).</li> <li><input type="checkbox"/> Provide training to contractor prior to preparation of CEMP, safeguards requirements of ADB and regulatory requirements of CEPA.</li> <li><input type="checkbox"/> Approve CEMP for the subproject, after being cleared by PSC.</li> </ul> <p><b>During the implementation of civil works:</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Ensure that the CEMP including all proposed mitigation measures and monitoring and relevant provisions of the environmental assessments is updated as required,</li> <li><input type="checkbox"/> Conduct environmental management and compliance monitoring on a monthly basis in cooperation with the PSC.</li> <li><input type="checkbox"/> Review and assess the contractor's monthly environmental monitoring report and compliances as contained in the CEMP.</li> <li><input type="checkbox"/> Assist the Engineer in the compliance of the submitted CEMP.</li> <li><input type="checkbox"/> Prepare the quarterly and semi-annual reports in cooperation with the PSC for submission to DOW and ADB.</li> </ul>
Coverage of the Environmental Monitoring Report	July to December 2018

## 1.0 EXECUTIVE SUMMARY

This Semi-annual environmental monitoring report cover the period from July to December 2018. This report was carried out by the Department of Works (DOW) through the Highlands Road Management Group (HRMG) and the monitoring results will be communicated to ADB through this report.

Henganofi-Nupuru sub-project road is one of the four (4) sub-projects of Tranche 3 of the Highlands Region Roads Improvement Investment Program (HRRIP), an ADB financed road program. The sub-project is covered by CSTB contract # 3533 entered into by the Independent State of Papua New Guinea represented by the Department of Works and China Wu Yi LTD (CWY China).

The contract was awarded on March 4, 2017 and mobilization started in October 2017. The construction period is 24 months. The Long Term Performance Based Maintenance Services is 60 months from the issuance of the Performance Certificate for the Improvement Work.

Two induction trainings for the contractor environmental, safety and social specialists were conducted in July and October 2017 to ensure contractors are fully aware of ADB safeguards requirements and country systems, laws and regulations and best practices with local understanding in implementing safeguards in the project construction period.

Several seminars and trainings were also conducted from both the PSC and other training providers in Port Moresby.

Monthly reports from the PSC, HRMG and the Contractor indicate that in terms of environmental performance some mitigation and corrective actions were needed for solid waste management, sewage management, elevated noise and dust at Haganofi Primary School, spoils disposal, deficiency in PPEs issued, environmental grievances and other concerns have been observed and several of these have been addressed.

The monthly assessment of air, water and noise has only been done in September. This should be done on a regular monthly basis.

Although the Upegu Quarry has obtained a permit from CEPA last March 23, 2018, monitoring needs to be done considering that it also impacts a water body which is widely used for domestic purposes. There is a need to conduct water sampling and provide sediment traps to reduce the turbidity downstream.

## 2.0 INTRODUCTION

### 2.1 Background

The Highlands Region of Papua New Guinea (PNG), comprising the Provinces of Western Highlands, Jiwaka, Southern Highlands, Hela, Eastern Highlands, Enga and Chimbu, is a major contributor to the PNG economy through its agricultural production and mineral resources. A well-maintained road network is essential to facilitate the movement of goods and people. The Government of PNG (GoPNG) has made significant investments in improving the road network but a lack of maintenance has resulted in the deterioration of the roads such that the Highlands Core Road Network (HCRN) is now in poor condition.

In order to address the deterioration of the HCRN, there is a clear need to: (i) implement a program of regular maintenance on all HCRN roads that are in good condition; and (ii) improve those roads that are in poor condition and (iii) ensure that maintenance begins on those roads as soon the improvement works are completed.

The GoPNG has negotiated a Multi-Tranche Financing Facility (MFF) loan with the Asian Development Bank (ADB) to implement the Highlands Region Road Improvement Investment Program (HRRRIIP) in tranches. The HRRRIIP includes projects to improve the HCRN, the preparation of long-term maintenance contracts for the HCRN, and the capacity development of road agencies. In total, 13 road sections are expected to be funded under the program.

Project 1 has included the improvement to two road sections and Project 2 is currently being implemented to upgrade three road sections while Project 3 proposes to rehabilitate four road sections comprising 113.3 km of the HCRN.

The Execution Agency (EA) for the program is the Department of Works (DOW) whilst the Highland Region Management Group (HRMG) is the Implementation Agency (IA).

Tranche 3 (ADB 3043/3408 and EU Grant 0485) include the upgrading, rehabilitation and maintenance of four road sections namely, Henganofi-Nupuru, Gewa-Gembogl, Pangia-Wiru Loop, and Nipa-Munihi in the Eastern Highlands Province (EHP), Chimbu Province and Southern Highlands Province (SHP).

The rehabilitation of the Henganofi to Nupuru road in the Eastern Highlands province has a length of 33.96 km. The works proposed for the upgrading and rehabilitation of the Henganofi to Nupuru Road such as earthworks, establishment and operation of quarry sites and extraction of materials, minor civil works and discharge of wastewater are Level 2 activities under the EPAR and may require an EP depending on the duration and scale of those activities.

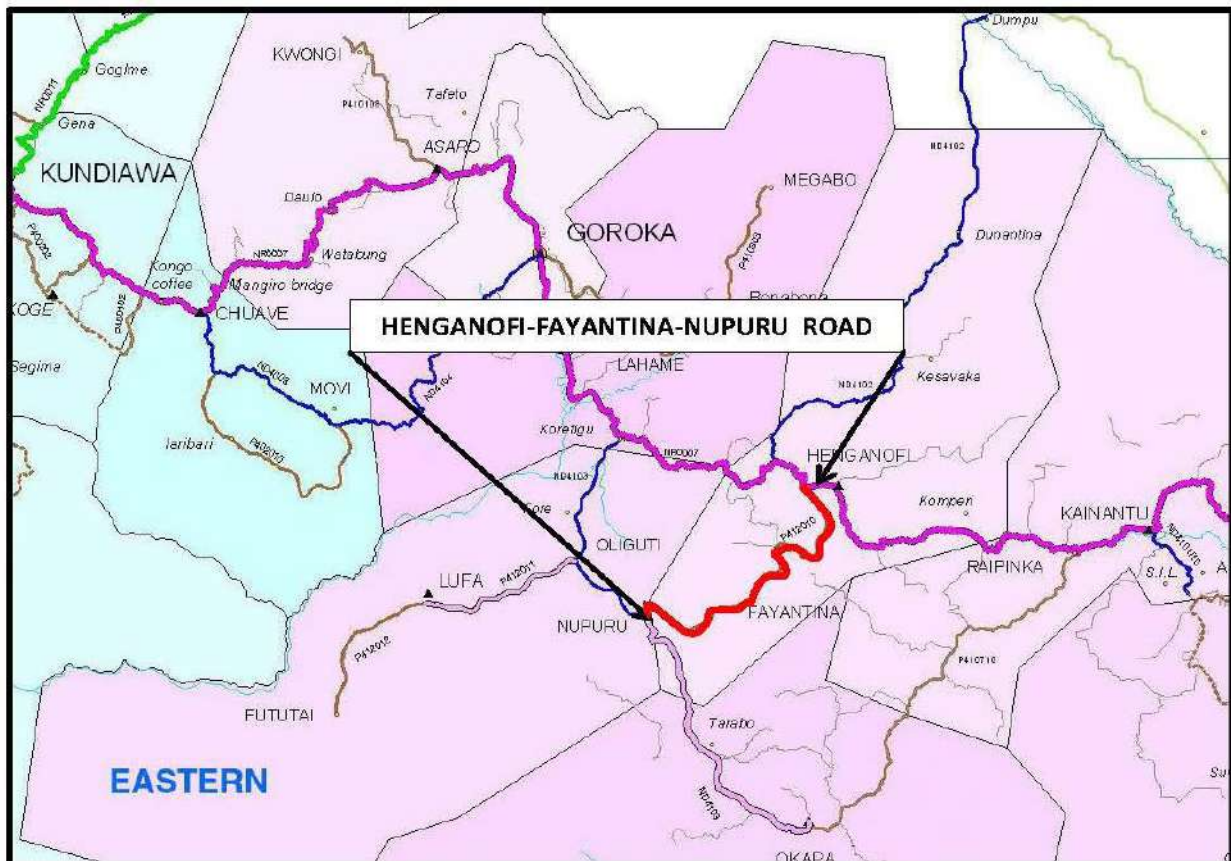
The contract was awarded in March 4, 2017 and civil works started in October 2017 following the contractor's mobilization. The construction period of the project is 24 months. The Long Term Performance Based Maintenance Services is 60 months from the issuance of the Performance Certificate for the Improvement Work.

The Henganofi-Nupuru Road Section is covered by CSTB contract # 3533 entered into by the Independent State of Papua New Guinea represented by the Department of Works and China Wu Yi LTD (CWYC China).



## 2.2 Sub-Project Description

The road from Henganofi to Nupuru, passing through Fayantina, is approximately 34 km in length. The road commences at the junction with the Highlands Highway, approximately one kilometer from Henganofi Station and ends at the junction with the Okapa road in Nupuru. The road serves the Henganofi and Okapa Districts of Eastern Highlands Province which together have an average population of 40,000. The road is the only link from the two districts to Goroka and Kainantu townships and hence improvement is vital to the economic development of the area and the delivery of fundamental services to the population. *Figure 1 Location of the Henganofi - Nupuru Road.*



**Figure 1 Location of the Henganofi - Nupuru Road**

The Henganofi – Nupuru road was initially a walking trail which since the late 1960s or early 1970s has gradually been opened to provide the current road. The route traverse's mountainous terrain and extensive sections of the alignment follow ridges. Elsewhere, the route is benched into sidelong ground and comprises a twisting alignment with steep gradients at the approaches to river and creek crossings. Improvement of either the horizontal or vertical alignment would not be economically justified at the present time.

The route crosses a total of 4 rivers and 3 major creeks on existing bridges. Two of these bridges are of comparatively recent construction and will require only minor maintenance whereas the remaining structures will require rehabilitation of the superstructure, the provision of steel decking to replace the existing timber and the provision of pedestrian facilities across the bridges. One new bridge is required.

The route passes through 11 villages/tribal settlements, the largest of which is Pore that acts as a local centre for the population living within the middle third of the road length and



the immediate surrounding area. There are also numerous junctions along the road with local roads connecting to the interior.

The first 20 kilometers of the road primarily follows a ridge top alignment and the landscape is dominated by swathes of grassland with occasional secondary growth of trees, generally around settlement areas and individual homes. In the section of the road from km 20 to the end at Nupuru, the local tribes have made extensive plantings of pine trees.

The entire length of the road corridor has been extensively disturbed by human habitation and the activities of clearance for cultivation, the gathering of wood for fuel and hunting for food, hides and feathers for ceremonial purposes. As a consequence there are no natural habitats of significance immediately adjacent to the road corridor and within the areas which will be affected by the proposed improvement works.

The Eastern Highlands province plays host to the Crater Mountain WMA and is located southwest of the Henganofi Nupuru road.

The environmental impacts assessed at the time of preliminary design categorised the subproject as Category B for environment. The same category was confirmed by the in-depth environmental analysis conducted at the time of project preparation. The Initial Environment Examination (IEE) dated April 2016 has already been disclosed in the web site. The IEE confirmed that environmental impacts of the rehabilitation of the Henganofi-Nupuru subproject road are limited to the road corridor, are of minor scale and can be mitigated through the thorough implementation of the measures contained in the environment management plan. The impacts such as dust, noise, materials sourcing, storage, haulage, soil erosion, sedimentation and run-off are likely to occur mainly during the construction phase.

Based on the EMP presented in the IEE, a construction environment management plan (CEMP) was prepared by the contractor and was issued a no objection letter in January 23, 2018.

An Induction Meeting was conducted for all the contractors in July 12, 2017 by the Engineer and HRMG with the PSC to provide a background of the environmental management plans and compliance monitoring requirements. A reference compact disc (CD) was also provided to the contractors during this meeting containing best practices for environmental management and mitigation, including sewage treatment, solid and hazardous waste management; and soil erosion control and management. Based on the experiences with Tranche 1 and Tranche 2, environmental laws including a summary presentation on the legal framework of PNG, CEPA Act, Environment Act of 2000, list of suggested environmental monitoring equipment, and PNG Water Quality Standards, was also provided in the CD. Further, also provided were sample forms and requirements on sample monthly monitoring report, Notice of Violation Form, and Logbook Sample Content.

Internal monitoring will be conducted by the environmental specialist of the Project Supervision Consultant (PSC) whereas independent monitoring will be conducted by the Environmental Officer (EO) of HRMG.

## **2.3 Proposed Scope of Works**

The project intends to improve the existing Henganofi – Nupuru road through the provision of a 5.5 meter wide pavement, sealed with DBST and 0.25 meter wide shoulders. Earthworks will be required to provide an adequate bench for construction of the pavement. Associated drainage will also be required where improvements are necessary in the vertical alignment to ensure adequate stopping sight distance. An average additional width of 1.0 m on each side of the existing cleared width will be required to accommodate the improvement works. The estimated volume of excavation is 95,000 cu.m. of which 60,000 cu.m. will be reused for

embankments and the remainder is expected to be unsuitable and therefore to be disposed of. Approximately 40,000 cu.m. of borrow area will be required for the balance of embankment construction.

The proposed drainage system for the road will entail the installation of 80 new culverts, primarily to provide relief to road side drains, the removal and replacement of 50 existing culverts which are either badly damaged or undersized and the maintenance of 9 large diameter existing culverts i.e. dia >1,200 mm. Most of the culverts to be maintained will require extensions on each side to accommodate the carriageway above. Approximately 21,000 linear meters of lined roadside drains will be constructed to cater for run-off from the carriageway and the adjacent slopes.

There are 7 existing bridges within the road length, the details of which are presented in the following Figure 1 Location of the Henganofi - Nupuru Road. Five of the bridges require major rehabilitation and the provision of steel decks. The Pore bridge is relatively new and require only minor maintenance while the bridge at the Imayata River has been washed out and requires replacement. This will necessitate the construction of bank seat abutments with gabion protection to prevent scour of the foundations and the installation of Barley bridge superstructure.

Table 1. Bridges Along the Henganofi - Nupuru Road

NAME	CHAINAGE	TYPE	PROPOSED WORKS
Konamebi River	00 + 365	Steel Girder	Rehabilitation of Girders and provision of Steel Deck.
Menipi Creek	00 + 925	Steel Truss	Rehabilitation of Truss and Provision of Steel Deck
Pore River	20 + 520	9 Bay Bailey	Good Condition – No Works Required
Okoteri Creek 1	23 + 815	10 Bay Bailey	Minor Rehabilitation and Provision of Steel Deck
Okoteri Creek2	24 + 240	4 Bay Bailey	Rehabilitation and Provision of Steel Deck
Imayata River	28 + 030	6 Bay Bailey	Construction of a new Bailey bridge includes provision of Steel Deck
Iyapa Creek	29 + 722	2 Bay Bailey	Rehabilitation and Provision of Steel Deck

The rehabilitation and upgrading would approximately take 36 months and would involve the following:

- (i) Transport, handling and storage of construction materials, fuel and lubricants and, machinery to site;
- (ii) Preparation of contractor's camp and work sites;
- (iii) Establishment of ancillary facilities, i.e. identification and establishment of suitable material sources/quarries, batching, crushing and asphalt plants;
- (iv) Clearing and grubbing (shoulders and drainage);
- (v) Excavate defective sections and improve side drains as required;
- (vi) Excavation and/or filling to widen the existing road bench;
- (vii) Culvert removal, installation, extension and/ or replacement;
- (viii) Construct masonry retaining walls;
- (ix) Construction of gabion protection works;
- (x) Rehabilitate bridges which may include installation of new steel decks if necessary, removing rust and repainting and, construct a new bridge;
- (xi) Backfill and compact as required;
- (xii) Layout sub-base and base materials and compaction;
- (xiii) Install road furniture required (guardrails, pavement markings, etc.); and

- (xiv) Pave roadway with DBST.

The upgrading and rehabilitation works for the Henganofi to Nupuru Road would require approximately 231 people of which 120 unskilled workers will be sourced from the local communities in the area. Various machinery and heavy equipment will be required in the rehabilitation and upgrading works. This would range from 4WD vehicles to bulldozers. The human-power complement, machinery and equipment required for the works rehabilitation and upgrading would approximately take 24 months and would involve the following:

The works require materials including fuel, lubricants, paint, bitumen, cement, aggregates, sand, timber, geotextile, drainage pipes and culverts. All materials will be sourced from approved suppliers. Workers, including local women, will make gabion baskets for embankment and bridge pier protection.

## **2.4 Purpose**

This report is written to present the status of the environment including compliance with the approved CEMP in respect of the Henganofi – Nupuru road section covering July to December 2018. Semi-Annual environment safeguards monitoring reports is a requirement under the SPS. In addition, the report provides a clear picture with regard to the future implementation of CEMP activities as well as the environmental outcome.

Furthermore, the report serves the client, ADB and other organisations to understand the environmental management process, its outcome, the corrective actions that are required and the impact of such actions on the environment.

## **2.5 Methodology**

This six-month consolidated report is written using data gathered from several sources. These include (i) Contractor's interviews and monthly reports; PSC monthly reports and; (iii) HRMG-PIU verification of site and field observations.

This report is reviewed by the Supervision Consultant and HRMG-PIU prior to its submission to ADB. It also follows the format prescribed by ADB and a checklist for monitoring environmental compliance.

The list of reports reviewed is in Appendix 1 whilst names of people interviewed are in Appendix 2.

## **2.6 Institutional Arrangements**

The Department of Works, as the executing agency, has the overall responsibility to manage the planning, implementation and monitoring related to acquiring use rights for additional land to implement HRRIP subprojects, as well as compensation for damages on project-affected land.

DOW established a Project Management Office (PMO) headed by a Project Director which manages the day to day activities of the program. Within the PMO, there are two units, the Project Management Unit (PMU) which is based in Port Moresby. The other is the Highlands Road Management Group (HRMG), the DOW's Project Implementation Unit (PIU) for HRRIP subprojects to carry out the planning, implementation and monitoring for land activities, as required and is based in Mt. Hagen.

In the revitalized organizational chart (as of February 2017), the HRMG is headed by the Field Project Manager (FPM). Under the FPM are two sub-units, the construction unit

headed by the “Engineer” and the social and environmental safeguards unit headed by the Senior Field Project Coordinator (SFPC).

## **2.7 Report Organisation**

The report consists of the foregoing introduction and 2 other sections as follows:

- i) Section 1 – Executive Summary
- ii) Section 2 - Introduction,
- iii) Section 3 – Monitoring results and finding
- iv) Section 4 – Conclusions and recommendations and appendices

### 3.0 MONITORING RESULTS AND FINDINGS

The main findings of monitoring shall include the assessment of environmental impacts during the review period and proscriptive requirements are presented in this section.

The basis for monitoring are the parameters that would be considered in the CEMP of which there are 15 as follows:

- Contractor's camp and yard
- Erosion and sedimentation
- Water quality
- Air quality
- Noise
- Waste management
- Hazardous material management
- Aggregates extraction
- Tree removal and vegetation management
- Socio-economic issues (workers)
- Socio-economic issues (community)
- Public safety
- Health and safety issues
- Traffic management
- Prevention of HIV/AIDS and STDs
- Existing Infrastructure Issues
- Environment Related Grivances
- Training and Mentoring

The summary of non-compliance from the monthly reports prepared jointly by HRMG and PSC is provided in Table 2. Environment Officers from HRMG with PSC should prepare the Notices of Violation if warranted based on the standards set during a meeting for this purpose.

Table 2. Summary of Non-Compliance Notices for July to December 2018.

NON-COMPLIANCE	MONTHS					
	J	A	S	O	N	D
Monitoring was only done for September.	X	X	✓	X	X	X
Not all workers are issued with PPEs.	X	X	X	X	X	X
Wastes are not segregated and disposed properly as contained in the Solid Waste Management Plan.	X	X	X	X	X	X
Burning of tires, workshop refuse and other potentially hazardous chemicals	X	X	X	X	X	X
Carrying passengers in heavy equipment machinery and exposing them to risks.	X	X	X	✓	✓	✓
Unhygienic toilets and clogged pipes	X	X	✓	✓	✓	✓
Failure to comply with the 30% female employment requirement.	X	X	X	X	X	X



### 3.1 Contractor's Camp and Yard

The absence of proper disposal of solid wastes is in violation of the CEMP's provision (Photograph 1). The contractor needs to implement its solid waste management plan to ensure that wastes are reduced, reused and recycled. Materials were provided to the contractor to implement a composting activity. This could also serve as a demonstration activity for other households and schools.

Close monitoring need to be conducted for solid waste, liquid waste and hazardous waste management plan compliance. The contractor has to provide strict rules to ensure that motor pool components are not burned and disposed properly (Photograph 2).



Photograph 1. Improper disposal of solid wastes in the contractor's campsite.



Photograph 2. Burning trash containing motor parts could be hazardous.

### 3.2 Erosion and Sedimentation Control

The previous report has shown responsible soil erosion control through the hauling of soil spoils to approved dumpsites and construction of temporary retaining walls to protect erosion prone slopes (Photograph 3).

Monitoring should be done in the clearing and grubbing area at Km 10+700, excavation and earthworks at Km. 7 and culverts installation at Km 0 – 10+700. An important resource is the Erosion and Sediment Control Best Management Practices Manual which was provided during the Induction Meeting.



Photograph 3. Temporary retaining wall to contain landslips at Ch: 7+200-350

### 3.3 Water Quality

Baselines have been gathered for water quality and in-situ equipment have also been procured for monthly monitoring activities (Photograph 4).

In the case of waste water from the camps, it would be important to gather water samples to determine for the presence of E. coli considering that Tranche 2 projects show positive results and address the problem immediately.

The results of monthly monitoring for water quality has only been conducted for the month of September 2018. Temperature and pH values are summarized in Table 3 while dissolved oxygen and turbidity values are summarized in Table 4. The values for dissolved oxygen are above the PNG guidelines. However, samples from stations 2 and 3 have values less than 6 mg/L which is below PNG guidelines.

It is recommended that the contractor conduct regular monthly monitoring for the identified environmental parameters for water, air and noise in the environmentally sensitive receptors.





Photograph 4. In-situ equipment procured by the contractor for water, air and noise.

Table 3. Results of in-situ environmental parameters for temperature and pH.

Months	Temperature						PNG Standards	pH											
								S1		S2		S3		S4		S5		S6	
	S1	S2	S3	S4	S5	S6		S	B	S	B	S	B	S	B	S	B	S	B
July							< 2°C increase												
August																			
September		24.4	25.4	23.9	25.8	26.7				8.16	7.0	6.8	7.0	7.3	6.4	6.00	6.8	6.2	7.3
October																			
November																			
December																			

**Temperature:** There has been no increase of temperature greater than 2°C.

**pH:** PNG standard advocates no alteration of pH based on the baseline values. Where S = Water Sample;

B = Baseline Value

Table 4. Environment parameters for dissolved oxygen and turbidity.

Months	Dissolved Oxygen						PNG Standards	Turbidity						PNG Standards
	S1	S2	S3	S4	S5	S6		S1	S2	S3	S4	S5	S6	
July							Samples should not be less than 6 mg/L							No alteration greater than 25 NTU
August														
September		5.5	5.2	6.5	8.7	6.3			17.91	5.1	8.39	10.4	5.5	
October														
November														
December														

### 3.4 Air Quality

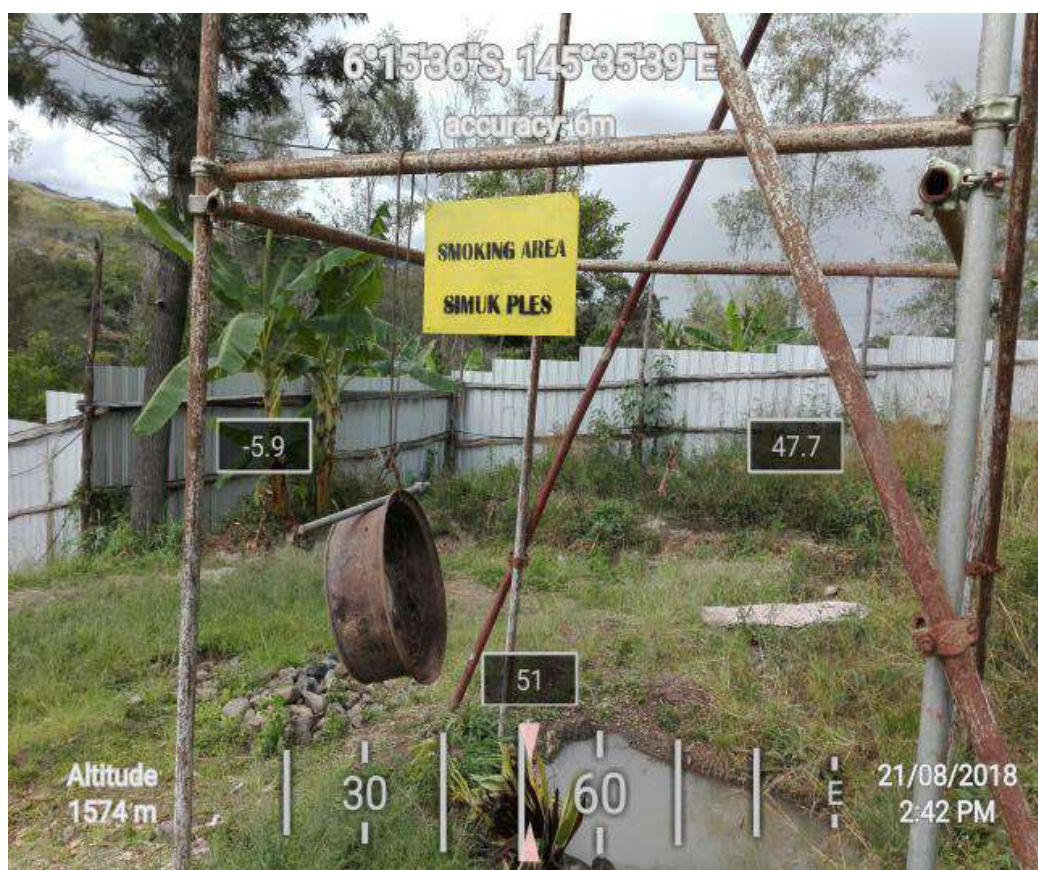
The baselines for air quality should be used for comparison with the monthly monitoring schedule. This should be done as a result of the air quality concerns of a nearby school, the Habanofi Primary School. Following the difficulty of procuring sampling equipment for SO<sub>x</sub> and NO<sub>x</sub> and the absence of an air quality laboratory, particulate pollution sampling for PM<sub>10</sub> and PM<sub>2.5</sub> was conducted using in-situ equipment (Table 5).

Designating a place for smokers in the camp might also encourage this vice which is harmful to people and the environment (Photograph 5)

Table 5. Environmental parameters for total suspended particulates (TSP).

Months	PM <sub>2.5</sub>						PNG Standards	PM <sub>10</sub> With vehicles						PNG Standards
	S1	S2	S3	S4	S5	S6		S1	S2	S3	S4	S5	S6	
July							No Standards							No Standards
August														
September	4.9	3.3	3.5	7.9				6.0	5.0	10.2	14.5			
October														
November														
December														

Note: WHO Air Quality Guidelines for annual mean concentrations should not be greater than 10 µm/m<sup>3</sup> for PM<sub>2.5</sub> and 20 µm/m<sup>3</sup> for PM<sub>10</sub>.



Photograph 5. Designated smoking area in the campsite.

### 3.5 Noise

The impact of excessive noise levels need to follow best management practices including use of mufflers and engine conditioning. A noise level meter has been procured for in-situ monitoring. Noise pollution has been reported as a concern by the Habanofi Primary School.

Ambient noise levels range from 40-60 dB. The results of the single month monitoring period are within acceptable levels (Table 6). However, monitoring should be done for sites with heavy equipment including quarry areas where the operation of heavy equipment could reach 85 dB and cause hearing impairment.

Table 6. In-situ noise level monitoring in the identified sampling sites.

Months	Noise Levels (dB)*											
	S1		S2		S3		S4		S5		S6	
	With	Without	With	Without	With	Without	With	Without	With	Without	With	Without
July												
August												
September	58.7	41.8	52.4	39.9	66.8		46.8	37.4				
October												
November												
December												

\* With and without cars/trucks.

### 3.6 Wastes Management

Clearing and grubbing spoils are deposited in agreed upon disposal sites with stable slopes and with the permission of the landowners. The monthly reports covering the period indicate that spoils are disposed of properly.

However, the contractor disposes its unsegregated solid wastes into open dump areas which could be breeding grounds for insects which are vectors for diseases. There is also the possibility of the wastes or leachate seeping into the groundwater. It is recommended that the contractor segregate its waste and follow best practices for solid waste management including composting and the principles of reduce, reuse and recycle.

### 3.7 Hazardous Materials Management

The hazardous wastes from the camp consist mostly of leaking lubricant drums and burning of residue (Photograph 6). The hazardous waste management strategy is to ensure that the soil is not contaminated by cementing the storage area and providing bunds to prevent leakage into other parts of the workshop area.

The management of hazardous wastes include their storage and ultimately disposal of fluorescent bulbs, computers and peripherals, printers and other equipment. This also includes used batteries, battery fluids, oils, lubricants, and asphalt products (Photograph 7). There is a need to regularly monitor the implementation of the Hazardous Waste Management Plan.





Photograph 6. Leaking lubricant drums seeping into the soil and storm drain.



Photograph 7. Bitumen application in aggregate materials.

### 3.8 Aggregates Extraction

There are two quarries in the project. Upengu quarry is riverine while Minive is land based. The former is used for embankment works while the riverine quarry materials are used for base and sub-based works. The contractor has negotiated with the local landowners to extract materials from the quarry.

The Upegu Quarry has an approved QMP and Quarry Permit from CEPA, consisting of Permit No: EP-L2 (612) issued on 23/3/18 with a term of 10 years. Presently, the extraction volumes were estimated at 20,070 m<sup>3</sup>.

The Upegu Quarry needs to be carefully monitored for erosion and sediment impacts to ensure that mitigation measures are in place to reduce its impact to the communities who use it for domestic purposes.

### 3.9 Trees Removal and Vegetation Management

The contract document stipulates that the contractor shall ensure that no trees or shrubs are felled or harmed except those required to be cleared for the execution of the works.

For the monitoring period, the trees that have been removed or destroyed during the construction works are duly logged in and reported in a grievance logbook. All trees earmarked for removal should be marked together with the Environmental Officer of HRMG and only the marked trees are allowed to be removed. No tree shall be removed without the prior approval of the Engineer and any competent authority.

### 3.10 Socio-economic Issues of Workers

The socio-economic issues of workers were assessed based on compliance with labor laws of PNG and the social safeguards recommendations from ADB particularly the inclusion of 30% women workers (Table 7). The total number of workers employed for the period was 1,318 consisting of 1,263 males and 55 females or 96% and 4% respectively. This is way below the recommended 30% hiring of women.

Women workers in non-payroll activities were also documented in Table 8 totalling 139. Further monitoring on compliance regarding these issues need to be done and the contractor's compliance to employ 30% women in the workforce.

Table 7. Summary of disaggregated employees from July to December 2018.

Month	Male	Female	Total	DPs Employed	Estimated Female Wages
July	164	8	172	85	7 900
August	118	8	126		7 900
September	236	9	245	168	16 400
October	229	10	239	168	11 600
November	267	10	277		11 623
December	249	10	259	165	11 611
<b>Total</b>	<b>1263</b>	<b>55</b>	<b>1318</b>	<b>586</b>	<b>67 034</b>
<b>Monthly Average</b>	211	9	220	98	11 172.33
<b>Percentage</b>	95.9%	4.1%	100%	44.6%	

Table 8. Women involvement in Non-Payroll activities from July to December 2018.

Month	Gabions	Line drain	Rip Raps	Head walls	Spotters	Total
July					18	18

August					9	9
September		2			16	18
October	1	2		2	21	26
November	2	5		3	27	37
December	3	7		2	21	33
<b>Total</b>	<b>6</b>	<b>16</b>	<b>0</b>	<b>7</b>	<b>112</b>	<b>139</b>
Average	2	4	0	2	18	23

### 3.11 Socio-Economic Issues of Community

The Contractor has initiated community meetings to discuss the project and the impacts it would have on the community. Other stakeholders including young students are also provided with short consultation meetings (Photograph 8).

The documentation of these meetings are very important and the PRO has been tasked for this important task.



Photograph 8. Consultation meeting with young stakeholders of the project.

The benefits to the community in terms of local food purchases, local construction materials and local purchases totalling PGK 52,060 are provided in Table 9.

The summary of lease rentals paid to the customary landowner totalled PGK 16,300 are for Upegu and Konamempi camps, and stockpile sites Table 10.

The benefits from the quarry activities are provided in Table 11 for Upegu and Konamempi Quarry and stockpile areas. Approximately 70% of the total amount has been paid to the owners of Upegu Quarry.

Aside from employment, purchases of local food, quarry and camp site rent and royalties, economic activity seems to have been stimulated increasing the buying and selling of coffee from local growers.

Table 9. Monthly Expenditure for local purchases from July to December.

Month	Purchases of food	Construction materials	Purchases of other items	Other local expenditure	Total
July	7 260	300			7 590
August	5 000	2000	3 000		10 000
September	2 000		830	3 200	6 030
October	3 000	3100	337		9 470
November	3 000	3500	3 450		9 950
December	3 000	1890	4 130		9 020
<b>Total</b>	<b>23 260</b>	<b>10 790</b>	<b>14 780</b>	<b>3 200</b>	<b>52 060</b>
<b>Monthly Average</b>	3876.70	1798.30	2463.30	533.3	8676.70
<b>Percentage</b>	44.7%	20.7%	28.4%	6.2%	100%

Table 10. Summary of Lease Rental Paid to Customary Land Owners.

Month	Upegu Camp	Konamempi Camp	Stockpiles	Disposal Sites	Total
July	K1 200	K1 100	K500		K2 800
August	K1 200	K1 100	K500		K2 800
September	K1 200	K1 100	K500		K2 800
October	K1 200	K1 100	K500		K2 800
November	K1 200	K1 100	K500		K2 800
December	K1 200	K1 100			K2 300
<b>Total</b>	<b>K7 200</b>	<b>K6 600</b>	<b>K2 500</b>	<b>0</b>	<b>K16 300</b>
<b>Percentage</b>	44.2%	40.5%	15.3	0	100%

Table 11. Paid quarry royalties for July to December 2018

Month	Konamempi Quarry	Hapanofi Quarry	Mehenave Quarry	Upegu Quarry	Total (m <sup>3</sup> )	Estimated Value (Kina)
July			12 000	4 297.6	1 6297.6	51 337.44
August				5 950.8	5 950.8	18 745.02
September				2 900	2 900	9 135.00
October				7 444.88	7444.88	23 451.37
November				4 050.72	4 050.72	12 759.77
December				2 853.6	2853.6	8 988.84
<b>Total</b>	<b>0</b>	<b>0</b>	<b>12 000</b>	<b>27 497.6</b>	<b>39497.6</b>	<b>124 417.44</b>
<b>Percentage</b>			30.4%	69.6%	100%	





Photograph 9. Coffee buyer in Henganofi – Nupuru road.

### 3.12 Public Safety

The steep slopes of the project site are continuing public safety concerns. Houses near the construction site at the most risk (Photograph 10).

Monitoring the implementation of the Contingency Emergency Response Plan prepared by the contractor should be closely monitored.



Structure  
due to

Photograph 10.  
affected by landslip  
excavation work at  
Ch:20+400

### 3.13 Workers Health and Safety

Notices of violation has been issued to the contractor by HRMG and PSC. The contractor has complied with these violations to prevent untoward accidents. PPEs were also issued to employees.

The contractor has also provided an equipment to monitor drugs and drunkenness in the workplace (Photograph 11).



Photograph 11. Worker Tested for Alcohol and Drug by the Health and Safety Officer.

### 3.14 Traffic Management

The contractor's Traffic Management Plan is being implemented and employs mostly women workers. However, the traffic signages and warning placards do not follow the traffic requirements and standards (Photograph 12).

The contractor also has to provide signages warning motorists and the public with potentially hazardous situations including eroding areas and landslips.





Photograph 12. A female traffic aide provides assistance to motorists.

### 3.15 Prevention of HIV/AIDS and STDs

The statistics on the prevalence of HIV-AIDS in the area showing a peak of 249 infected people in 2015. However, current data must be updated and localized to better target persons at risk. This number could increase due to the added economic activities from the road construction

The contractor has engaged the services of an HIV/AIDS and STDs the FORE Health Centre and is assisted by the Salvation Army in Goroka whose main activity is awareness campaigns (Photograph 13).

The Centre has conducted 8 awareness activities from July – December 2018 with a total of 1,986 participants (Table 12). The contractor and service provider should be required to provide non-confidential information for reporting requirements.

Other activities in the plan should be implemented including condom distribution, family planning, counselling and testing.

Table 12. Monthly HIV/AIDS Activities from July – December 2018.

Month	HIV/AIDS Activity	Number of Participants	Issues and concerns
July	1 Awareness	244	The provision of data by the service provider and contractor has been difficult. Better coordination is planned.
August	2 Awareness	290	
September	2 Awareness	332	
October	2 Awareness	648	
November	1 Awareness	472	
December			
<b>Total</b>	8 awareness activities	1 986	
<b>Monthly Average</b>		331	
<b>Percentage</b>		16.7%	



Photograph 13. Service provider FORE providing HIV/AIDS awareness campaign.

### 3.16 Existing Infrastructure Issues

There is no reported cases on affected infrastructures issues and concerns covering the monitoring period.

### 3.17 Environment Related Grievances

There were two environment related grievances reported during this reporting period. These grievances were mostly related to soil erosion caused by tractor grading land with loose soil and installation of new culvert which resulted in flooding of the food gardens. The affected people raised a complaint to the contractor and site environmental officer. These two issues were redressed by the contractor concerned (Table 13), however, the compensation payment is pending. It is recommended that the Contractor to facilitate the payment sooner and also have a committee to look into environmental issues caused by the contractor during construction.

Table 13. *Environmental grievances for July to December 2018.*

Month	Environmental Grievances	Person / Organisation
July	None	
August	None	
September	Complaint was made by local landowners at Sky community regarding machine grading causing loose soil to erode beyond the 10meter construction marker at CH5+800.	HRMG, CWYC, CLC enterprise
October	Complaint was raised due to the installation of a new culvert at CH 18+346. The locals want the contractor to install the culvert where the old one is, since this new location will divert water directly into food gardens and coffee gardens.	GLC enterprise, CWYC
November	None	
December	None	

### 3.18 Training and Mentoring

A Workplace Health and Safety Training held in Port Moresby was participated in by selected Environment Officers from both the contractor and HRMG (Photograph 13). A seminar workshop on Technical Report Writing was provided for all environmental and social safeguards officers of the contractor, PSC and HRMG last November 31, 2018



Photograph 14. Attendees of the Workplace Health and Safety Training.

## 4.0 CONCLUSIONS AND RECOMMENDATIONS

### 4.1 Conclusions

- This semi-annual report indicates that the CEMP is being implemented accordingly and the contractor provides remedies and measures for mitigation of environmental issues and grievances.
- The main drainage of the contractor's camp needs to be further assessed to ensure free flow of water with proper septic tank construction standards including the provision of discharge with efficient leaching fields.
- The issue of providing mitigation for dust pollution has been mitigated by regular watering in the affected areas.
- The provision of PPEs to all workers is a major concern which the contractor has to ensure all workers to be proper attired with safety gears during works.
- The contractor has to conduct monthly monitoring of environmental parameters identified in the CEMP and IEE.

### 4.2 Recommendations for Implementation and Corrective Actions

The recent purchase of environmental in-situ monitoring equipment has to be utilized on a monthly basis. Hands on training will be provided during the first quarter of 2019.

It is important to enhance further the capabilities of the contractor's environmental officers together with those of HRMG. For this purpose, the following trainings are proposed in Table 14.

The importance of identifying environmental harm and mitigating or remediating these harmful activities need corrective action Table 15.

Table 14. Recommended Seminars and Trainings for Capacity Building

Activity Number	Item and Recommended Action	Responsibility	Completion Date
1	Training on the use of environmental In-situ equipment for monitoring.	HRMG-PSC-CONTRACTOR	February 2019
2	Echo Seminar-Workshop on Traffic Safety.	DOW-HRMG-PSC-CONTRACTOR	February 2019
3	Echo Seminar-Workshop on First Aid Procedures	HRMG-PSC-CONTRACTOR	March 2019
4	Echo Seminar-Workshop on Environment Health and Safety Best Practices.	HRMG-PSC-CONTRACTOR	March 2019
5	Seminar Workshop on Status, Issues and Concerns in the Implementation of the CEMP and other plans.	HRMG-PSC-CONTRACTOR	March 2019
6	Training on Mapping Using Geotagging and Google Maps for Monitoring and Quarry Management.	HRMG-PSC-CONTRACTOR	March 2019

Table 15. Corrective Action Plan.

<b>Non Compliance</b>	<b>Recommendations for Implementation</b>	<b>Corrective Actions</b>	<b>In-Charge</b>	<b>Date of Implementation</b>
Irregular monitoring of environmental parameters by the contractor.	Initiate the conduct of environmental monitoring using in-situ equipment.	Provide on-site demonstration to the contractor's EOs.	PSC HRMG	January 2019
Non-implementation of solid waste management including waste segregation and open dumps.	Initiate the planning of activities with the contractor to implement Solid Waste Management.	Provide demonstration activities to implement the SWMP.	CWYC	January - February 2019
Burning of potentially hazardous materials such as tires and workshop refuse.	Assist the contractor in the review of HWMP and things that need to be done.	Implement best practices of HWM.	CWYC	January - February 2019
Absence of PPEs for majority of the workers.	Assess the extent of the non-issuance with the contractor.	Assist the contractor in the formulation of a doable policy.	CWYC	January 2019
Failure to comply with the 30% female employment requirement.	Advise the contractor on the need to hire more women to reach or exceed the employment of 30% women.	Review with the contractor the requirements of the contract.	CSC-RE CWYC	January – March 2019



## 5.0 APPENDICES

### Appendix 1: List of References

1. Initial Environmental Examination for Henganofi – Nupuru Road section (2016).
2. Contractor's Environment Management Plan for Henganofi – Nupuru (January 2018)
3. Department of Works Specification for Road and Bridge Works 1995.
4. Department of Works Specification for Road and Bridge Works 2015 Edition.
5. Back to Office Report of HRMG Environmental Officer and Quarterly Report.
6. Conformed Documents for the Improvement Works and Long Term Performance Based Maintenance Service (LTPBM) for Henganofi Nupuru Road. Contract Number CSTB 3533.
7. Scherer, Thomas F. 2016. North Dakota State University Extension Service. Reviewed and Reprinted October 2016.
8. DOWL. 2015. Erosion and Sediment Control Best Management Practices Manual. Montana Department of Transportation. HIV Semi Annual Report
9. General Construction Waste Management and Hazardous Materials Handling and Waste Disposl DEC 1997.
10. Sample Environmental Baseline Procedure for Tranche 3 Projects. The Case of Pangia Wiri Loop Road.

### Appendix 2: List of People Interviewed

1. Mr. Alberto Fieramosca – Resident Engineer PSC.
2. Mr. Johnny Buduhan – Resident Engineer PSC
3. Alphonse Niggins, Senior Field Coordinator, HRMG
4. Stephen Sukot -National Environmental Specialist, PSC
5. Paul Nombri, Manager, Technical Services, HRMG
6. Paraka Newman, Environmental Officer, HRMG
7. Imbi Tapame – COVEC Environmental Officer
8. Nazmie Ruape, Social Safeguards Officer, HRMG
9. Graham Tofagau, Public Relations Officer, China Wu Yi Co., Ltd
10. Anita Uvovo, Environmental Officer, HRMG
11. John Upave, Community Relations Officer, HRMG
12. Terrix Lanefae, Public Relations Officer, China Wu Yi Co., Ltd
13. James Gurinoware, Health and Safety Officer, China Wu Yi Co., Ltd
14. Abel Kapari, Environmental Officer, China Wu Yi Co., Ltd