

Semi-annual Report

January 2020

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

### **GEWA-GEMBOGL ROAD SUB-PROJECT**

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

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# **SEMI-ANNUAL ENVIRONMENTAL SAFEGUARDS MONITORING REPORT**

**(JULY TO DECEMBER 2019)**

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



### **Gewa-Gembogl Road Sub-Project (CSTB# 3530)**

**Submission date: 31 January 2020**

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## ABBREVIATIONS

ADB	-	Asian Development Bank
AIDS	-	Acquired Immune Deficiency Syndrome
AP	-	Affected People
CEMP	-	Construction Environment Management Plan
CRO	-	Community Relations Officer
PSC	-	Project Supervision Consultant
DBST	-	Double Bitumen-layer Surface Treatment
DC	-	Design Consultant
DOW	-	Department of Work
EA	-	Executive Agency
EMP	-	Environmental Management Plan
EO	-	Environmental Officer
ESSU	-	Environment and Social Safeguards Unit
GOPNG	-	Government of Papua New Guinea
GRC	-	Grievance Redress Committee
HCRN	-	Highlands Core Road Network
HIV	-	Human Immunodeficiency Virus
HRMG	-	Highlands Road Management Group
HRRIP	-	Highlands Region Road Improvement Investment Program
IA	-	Implementation Agency
IEE	-	Initial Environment Examination
IS	-	International Specialist
LLG	-	Local Level Government
MFF	-	Multi-tranche Financing Facility
MOA	-	Memorandum of Agreement
NOV	-	Notice of Violation
NRA	-	National Road Authority
PNG	-	Papua New Guinea
PRO	-	Public Relations Officer
PWM	-	Provincial Works Manager
ROW	-	Right of Way
RP	-	Resettlement Plan
SIS	-	Socio-economic Impact Study
SPS	-	Safeguard Policy Statement
STDs	-	Sexual Transmitted Diseases

**FACT SHEET:**

<b>Loan</b>	ADB Loan: 3404/3408 and Grant 0485 PNG
<b>Project Number</b>	40173-044
<b>Contract Number</b>	CSTB 3530
<b>Subproject</b>	Gewa-Gembogl Road Subproject
<b>Executing Agency</b>	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.
<b>Implementing Agency/Unit</b>	<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> <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</li> </ul>

	<p>of CEPA.</p> <p><input type="checkbox"/> Approve CEMP for the subproject, after being cleared by PSC.</p> <p><b>During the implementation of civil works:</b></p> <p><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,</p> <p><input type="checkbox"/> Conduct environmental management and compliance monitoring on a monthly basis in cooperation with the PSC.</p> <p><input type="checkbox"/> Review and assess the Contractor's monthly environmental monitoring report and compliances as contained in the CEMP.</p> <p><input type="checkbox"/> Assist the Engineer in the compliance of the submitted CEMP.</p> <p><input type="checkbox"/> Prepare the quarterly and semi-annual reports in cooperation with the PSC for submission to DOW and ADB.</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Coverage of the Environmental Monitoring Report for 2019 July to December 2019</li> </ul>
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## EXECUTIVE SUMMARY

- A. This Semi-annual Environmental Monitoring Report covers the period from July to December 2019. This report is prepared by the DOW through the Highlands Road Management Group (HRMG). The monitoring results and proposed corrective actions will be communicated to ADB through this report.
- B. The Gewa-Gembogl road subproject is one of the more challenging projects of the 4 sub-projects of Tranche 3 of the Highlands Region Roads Improvement Investment Program due to its very steep terrains and limited road widening opportunities.
- C. This report is a consolidation of the various monthly reports from the contractor, PSC and HRMG.
- D. The activities undertaken from July onwards to December 2019 were mainly the final stages of road construction which included installation of culverts, sealing and construction of bridges. All clearing and grubbing activities were completed in the first half of 2019 (January-June). November and December's Monthly Monitoring Reports gives the report of completed road construction of entire road stretch and final road maintenance works. The maintenance works are performed as a result of land slippage and erosion that poured onto gabion baskets and line drains.
- E. Most of the environmental issues are minor and manageable including the solid waste, liquid waste and hazardous waste management implementation which fail to follow the submitted plans. The issues include the contamination of the soil and water from used oil and lubricants, proper construction of septic tanks and leaching fields. Non-compliance in PPEs at the batching plant has been an ongoing concern but Contractor failed to comply regardless issuance of NOV.
- F. One major issue that delayed time and progression of work is land slippage on either side of the road. This is beyond the control of contractors and human since it is due to natural rainy weather patterns together with steep sloppy landform of the area. During the last six months, landslide has been common destroying gabions, line drains and rails. Maintenance is still under way.
- G. Other issues of concern are the disposal of spoils on hilly slopes, also, un-intentional disposal of spoils that is part of grabbing which covers riverbeds and steep slopes. Farmers food gardens downhill erode, rivers and streams turn brownish and flood during rainy weather. This is of concern considering the previously mentioned steep slopes which are being used for subsistence farming.
- H. The explosive store at sta. 17+200 were already being decommissioned on the 4th Of November 2019. There were 6 neat blasting activities for the road project. All remaining explosives were transported to Kundiawa. The Goghme Camp is left with facilitates for living quarters, office space and the engineer's laboratory including the contractor's laboratory. The Camp is sparsely occupied since most of the Chinese employees have left. Sumbur Quarry is still operating because maintenance works to road is still under progress.
- I. Road construction is under final varnishing works now. Water, air, and noise qualities are still being monitored. Finishing off the road means less workers available, less aggregate and necessary expenditures, less purchase and payments, less pollution and less work yet to be done.



## 1.0 INTRODUCTION

### 1.1 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 of 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-Napuru, Gewa-Gembogl, Nipa-Munihu, and Gewa-Gembogl in the Eastern Highlands Province (EHP), Chimbu Province and Southern Highlands Province (SHP).

The rehabilitation of the Gewa to Gembogl road in the Simbu province has a length of 21.025 km. The works proposed for the upgrading and rehabilitation of the Gewa to Gembogl 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 requires an EP depending on the duration and scale of those activities.

The project commencement date was October 16, 2017. However, the civil works only started in February 26, 2018 and reaching its final completion stage December 2019. 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 Gewa-Gembogl Road Section is covered by CSTB contract # 3530 entered into by the Independent State of Papua New Guinea represented by the Department of Works and China Harbour Engineering Co. Ltd (CHEC LTD).

## 1.2 Sub-Project Description

The existing Gewa to Gembogl Road is the first part of the old Bundi Highway which runs in a north east direction from Kundiawa Town and eventually connects through to Bundi in Madang Province. The location of the Gewa-Gembogl Road is shown in Figure 1 Road Map.

The IEE assessment has discovered that the first 10.6 kilometers from Kundiawa to Gewa has recently been improved. The report therefore covered the next 21.025 km section from Kokonigle Bridge, Gewa to Gembogl Station. The road serves as the primary access for the remote rural populations living in the northern part of Simbu Province to the township of Kundiawa. The road is the only link to the major tourist destination of Mt. Wilhelm, a major trout farm industry, and is also used by the people to transport coffee, potatoes and vegetables to the market. This is also the main supply route to two mines prospects, located near Gembogl. The upgrading of this road is expected to improve vital commercial trade and promote agricultural activity, improve living standards and facilitate access for government services to connect the people. The route passes through eight villages of which Maupini (km18) and Williame (km 31) are the largest. There are also several smaller settlements that typically consist of clusters of up to six or so houses.

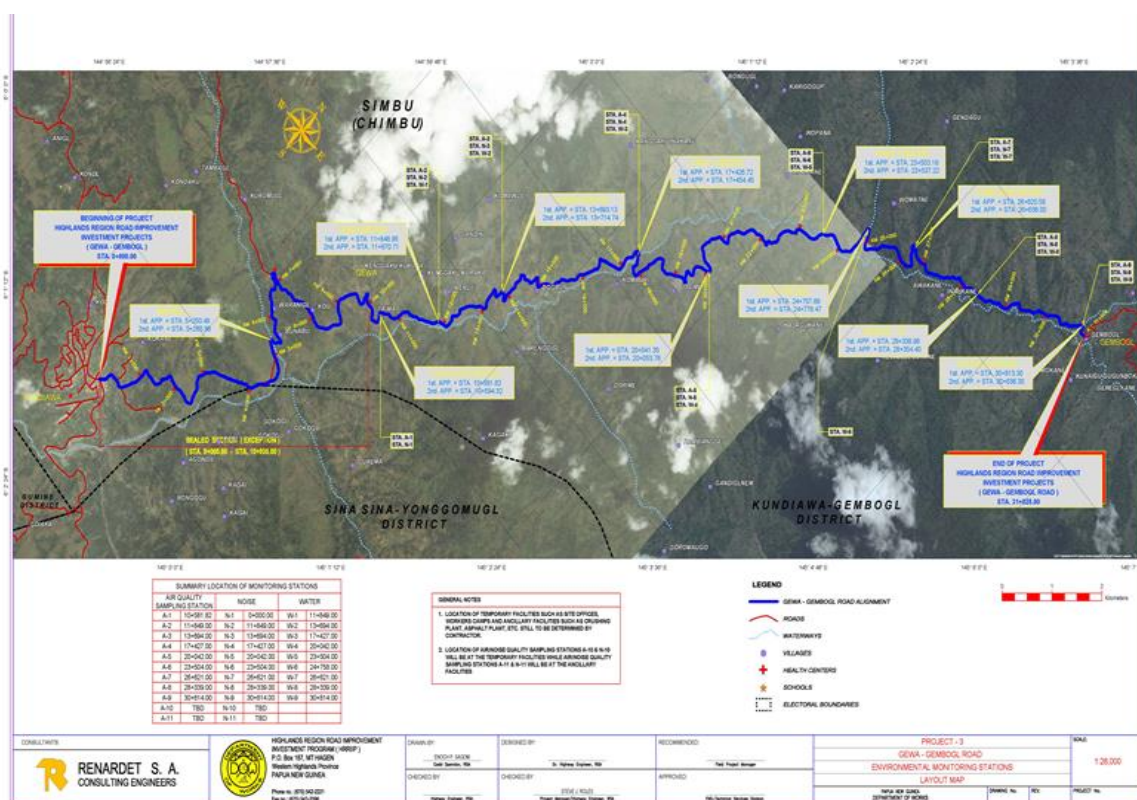


Figure 1. Location Map of Gewa Gembogl Road Sub-Project.

The alignment of the Gewa – Gembogl road runs along the valley of the Simbu River. The terrain is rugged and mountainous with very steep slopes and frequent rock outcrops. The road is benched into these slopes and there are steep drops to the river below and almost vertical cut faces above. The topography is such that sites for the development of settlements are limited. The alignment passes through 10 major and 12 minor villages/settlement areas, the largest of which is Womatne. These settlements are generally clusters of tribal houses, typically numbering around 15 to 20 with additional linear development in major villages. Elsewhere along the route there are occasional structures, but the rugged terrain limits the

areas where construction is feasible. Similarly, the opportunities for cultivation immediately adjacent to the road corridor are restricted.

The environmental impacts were assessed at the time of preliminary design and the subproject is categorised as Category B for environment. The same category was confirmed by the detail environmental analysis conducted at the time of project detailed design preparation. The Initial Environment Examination (IEE) dated April 2016 was disclosed in the ADB web site. The IEE confirmed that environmental impacts of the rehabilitation of the Gewa-Gembogl 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 Contractor's Environment Management Plan (CEMP) has been prepared and submitted by the Contractor and ADB has provided a No Objection letter in January 23, 2018.

Induction Meetings were conducted for all the Contractors in July 12, 2017 and October 31 and November 1, 2018 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 Construction Supervision Consultant (PSC) whereas independent monitoring will be conducted by the Environmental Officer (EO) of HRMG. The PSC, HRMG and Contractor are all required to provide monthly environment reports.

### **1.3 Proposed Scope of Works**

The project proposes to rehabilitate the existing road and provide a 6.0-meter-wide carriageway with DBST and 1.0-meter-wide gravel shoulders which will be sealed as necessary to prevent possible scour/erosion. The horizontal and vertical alignments will follow the existing alignments as much as possible with improvements limited to those consistent with meeting the required pavement width and stopping sight distance requirements.

The route traverses through mountainous terrain and significant excavation will be required in existing cut slopes to widen the existing road bench to the required width. An average width of 2.5 m each side of the existing cleared area will be required to accommodate the earthworks. In practical terms this additional work will only be taken on one side of the road where cuttings will be made. It will also be necessary to provide slope protection and retaining structures to ensure the long-term stability of the road.

A total of 92 additional culverts to discharge roadside drains are proposed in addition to the replacement of 29 existing culverts which are of inadequate capacity (typically 450mm diameter) while seven existing culverts are to be retained and rehabilitated with the capacity of 750 to 900 mm diameter to cope with the flows from roadside drains. Approximately 28,000 meters of lined roadside drain will be provided to cater for surface works run off from the road and adjacent slopes.

A total volume of 480,000 cu.m. Of excavation will be necessary to accommodate the carriageway, shoulder and drainage. Of this volume, 50,000 cu.m. will be reused in embankment, 130,000 is expected to be unsuitable which will need to be disposed of together with approximately 300,000 cu.m. of surplus material. The selection and management of disposal sites will be of the utmost importance in the execution of the earthworks.

There are nine existing bridges within the road section, details of which are given in the Table 1. All of the bridges are in maintainable condition and will only require minor repairs, clean and painting and the provision of steel decking (apart from Kaer 2 Bridge)

**Table 1:** Bridges repaired and maintained along the Gewa–Gembogl Road.

BRIDGE NAME	CHAINAGE	SPAN	TYPE
Gewa	11+860	22.24	Standard Bailey
Yombai	13+704	21.61	Standard Bailey
Seme	17+440	27.73	Compact 200
Nununige	20+048	12.41	Standard Bailey
Kaer 2	23+520	34.04	Compact 200 with Steel Deck
Davai	24+786	18.58	Standard Bailey
Kombukme	26+628	15.42	Standard Bailey
Bendam	28+346	15.42	Standard Bailey
Akonige	30+825	23.00	Steel Truss

All rivers and streams carry clear water in the dry season. Communities along the road depend heavily on water courses for their domestic activities. The civil works will therefore have a high impact on the community and would necessitate the need to coordinate construction adjacent to water courses with community needs.

The rehabilitation and upgrading would approximately take 24 months and would involve the following:

- a) Transport, handling and storage of construction materials, fuel and lubricants and, machinery to site.
- b) Preparation of Contractor's camp and work sites.
- c) Establishment of ancillary facilities, i.e. identification and establishment of suitable material sources/quarries, batching, crushing and asphalt plants.
- d) Clearing and grubbing (shoulders and drainage).
- e) Excavate defective sections and improve side drains as enquired.
- f) Excavation and/or filling to widen the existing road bench.
- g) Culvert removal, installation, extension and/ or emplacement.
- h) Construct masonry retaining walls.
- i) Construction of gabion protection works.

- j) Rehabilitate bridges which may include installation of new steel decks if necessary, removing rust and repainting and, construct a new bridge.
- k) Backfill and compact as required.
- l) Layout sub-base and base materials and compaction.
- m) Install road furniture required (guardrails, pavement markings, etc.); and
- n) Pave roadway with DBST.

It is estimated that the upgrading and rehabilitation works for the Gewa to Gembogl Road would require 216 people of which 105 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 works requires materials including fuel, lubricants, paint, bitumen, cement, aggregates, sand, timber, geotextile, steel plates, drainage pipes, gabion baskets, culvert pipes, trees and plants. All the materials will be sourced from approved suppliers whilst some locally procurable materials will be supplied by the community. Workers, including local women, will make gabions using local materials for embankment and bridge pier protection

#### **1.4 Purpose**

The purpose of this report is to present the status of the environment including compliance with the approved CEMP in respect of the Gewa - Gembogl road section covering July to December 2019. The semi-annual environment safeguards monitoring report is a requirement under the ADB through its SPS. In addition, the report provides a clear picture with regards the implementation of CEMP activities, environmental mitigation outcomes and proposed corrective measures.

Considering that the project civil works has just commenced in February, the compliance monitoring requirements enumerated in the monitoring findings are prospective and will be guided by the approved CEMP. The submitted CEMP was provided with a letter of no objection by ADB. However, an evaluation by the DOW-ESSB in March 22, 2018 indicate that the CEMP was not yet approved.

#### **1.5 Methodology**

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

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

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

#### **1.6 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 (PMU) headed by a Project Director which manages the day to day activities of the program and is based in Port Moresby. The Project

Implementation Unit (PIU) is the Highlands Road Management Group (HRMG), the DOW's. The Project Implementation Unit (PIU) for HRRIP subprojects is established to carry out the planning, implementation and monitoring for land acquisition and resettlement activities, as required and is based in Mt. Hagen City.

In the 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).

### **1.7 Report Organisation**

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

1. Section 1 – Executive Summary
2. Section 2 - Introduction,
3. Section 3 – Monitoring results and finding
4. Section 4 – Conclusions and recommendations and appendices

## **2.0 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 is the parameters that would be considered in the CEMP of which there are 18 as follows:

1. Contractor's camp and yard
2. Erosion and sedimentation
3. Water quality
4. Air quality
5. Noise
6. Waste management
7. Hazardous material management
8. Aggregates extraction
9. Tree removal and vegetation management
10. Socio-economic issues (workers)
11. Socio-economic issues (community)
12. Public safety
13. Health and safety issues
14. Traffic management
15. Prevention of HIV/AIDS and STDs
16. Existing Infrastructure Issues
17. Environment Related Grievances
18. 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 for July to December 2019.

NON-COMPLIANCE	MONTHS					
	J	A	S	O	N	D
Complete monthly environmental monitoring with comparisons on environmental baselines.	X	✓	✓	X	X	X
Soil erosion due to absence of management practices	✓	✓	X	X	X	X
Lack of implementation of solid, liquid and hazardous waste management	X	X	X	X	X	X
Leaking sewage system of the contractor could contaminate community's water system.	X	X	X	X	X	X
Replacement of damaged and cut trees during the construction activities.	X	X	X	X	X	X
Submit or revise all required plans which have not been approved.	X	X	X	X	X	X
Submit the required Quarry Management Plans	X	X	X	X	X	X

## 2.1 Contractor's Camp and Yard

The camp site is located at Goghme Station (Ch.19+300) which is in between the Catholic Mission Station and the District Administration area. It is fenced with steel fence to prohibit entrance of unauthorised personnel.

The camp is occupied by Chinese and the Police Personnel. It only facilitates for living quarters, office space and The Engineers Laboratory including the contractor's Laboratory. The contractor rents rooms for local skilled and professional employees who are from other Provinces of the Highlands Region just around the Goghme Camp site. There are no ancillary facilities located in the Goghme Camp. Their sewerage system is treated with chlorine and flashing method is used. No complaints from surrounding villagers regarding water or air pollution for the past six months. The camp is generally clean with domestic waste being controlled.

During site visit November 2019, the camp was seen nearly empty. Most foreign workers already left since nearly all work is completed. Less number of people means less waste and rubbish.





**Picture 1:** Kitchen area at Contractor's camp at Goglme looked deserted.



**Picture 2:** Household waste holding area at the camp site.

## 2.2 Erosion and Sedimentation Control

Soil erosion and the deposition of sediments in water bodies such as streams and rivers and food gardens are been managed where necessary. The major causes for the high erosion rates for the last six months are due lack of adequate soil protection and walls culminated with high rainfall during this period.

Geographical location (hilly terrains) of the project area is another major contributing factor to high rate of erosion. The contractor has mitigated this concern by constructing gabions walls and reworks on walls destroyed by landslips (Photograph 3).





**Picture 3:** Landslides on top of gabion baskets protection walls

Despite the continuous landslide experienced along the construction corridor, the contractor is constant in rebuilding of gabion baskets and other retaining walls structures when destroyed (Photograph 4).



**Picture 4:** Reconstruction of gabion basket walls at Ch.27+000





**Picture 5:** Cement sealing of road to prevent erosion.

## 2.3 Water Quality

During this period from July to December, the results from assessment of water bodies prove no water pollution done to the rivers. Also, there is no grievances raised.

Water quality was tested using the in-suit equipment. The results are provided in the tables in all the monthly monitoring reports. All the perimeters (Temperature, pH value, Dissolve Oxygen and Turbidity) for the monitoring stations are conducive for living organisms in the stream or river. Monitoring stations between Gewa and Gembogl Station.



**Picture 6:** Environment Officer Collecting and testing Water Samples at Sta.24+300

## 2.4 Air Quality

The Air quality was also monitored for the last six (6) monitoring months. Monitoring were done at three locations, (i) the contractor's campsite, (ii) Cement Batching Plant and (iii) Sumburu Crusher Site. Air Quality were all good ranging from 0-35 $\mu$ g/m<sup>3</sup>.

Water trucks were seen spraying water to minimise dust circulation in public marketplaces, near homes along the road and travelling public along the construction corridor. At Sumburu Quarry, they use water hoses to water crushed rocks to prevent circulation of dust particles into the air and to the nearby bushes.



**Picture 7:** Water Sprinkler suppressing dust on the road

## 2.5 Noise

Noise is created where machines and trucks are operating during road construction on working hours. Working hours are during the day and overtime working occurs at nights. Noise is inevitable where such projects are underway, hence workers are provided with earmuffs for ear protection.

From the noise monitoring results from the last six (6) months, there is no significant noise pollution.

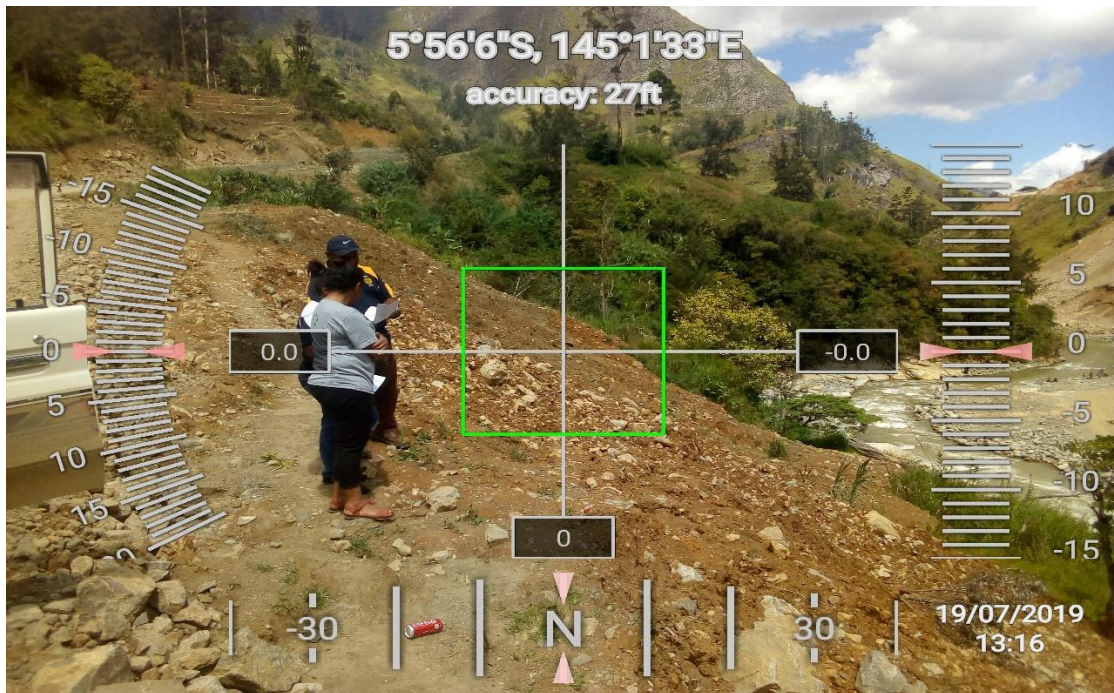
Also, there were no grievance reports on excessive noise from the community and schools near the project area.

## 2.6 Wastes Management

In the second quarter of the year, contractor was seen to dispose spoils in very steep slopes impact not only the trees and vegetation that hold the soil but also pollute the water bodies downstream. HRMG has put measures and provide notice to contractor to avoid such practice. Towards the third quarter and onwards, contractor has complied and disposed spoils at proper disposal designated areas.



But because of the geographical setting of the area and mountainous, disposals of spoils during clearing and grubbing down steep slopes is unavoidable, therefore have caused soil erosion onto underlying vegetation and eventually into streams. This is anticipated since the slopes are too steep to manoeuvre the trucks during clearing and grabbing. Also, some landowners want the waste materials to be poured on there land to reclaim some parts of the and that is lower. This was part of community initiative help and support help improve the land area for locals to build their structures since there is fewer flat lands.



**Picture 8:** Soil materials been cleared and disposed on hillside after blasting

The temporary landfill at Sumburu Quarry was filled up with excessive wastewater from crusher so was closed. After landfill was closed, household waste was seen dumped on top of closed landfill. Waste oil was also seen dumped on top of closed pit. Together with wastewater from the crusher, the closed pit over flew with oil and water plus household waste. NOV was issued 28<sup>th</sup> October.





**Picture 9:** Household rubbish dumped on surface near quarry camp site



**Picture 10:** Mixture of Oil and Wastewater spilled at Surumbu quarry

Due to no proper outlet to discharge wastewater, wastewater and oil from the bitumen preparation area permitted to drain out at the back of the workshop into the receiving Simbu River. After two months of non-compliance in mitigating and managing wastewater, tests were conducted on the 15<sup>th</sup> of October by RSA team and confirmed highly alkaline at one station. Tadpoles, fish and other living organisms in the river are affected, bioaccumulation will also affect species at the top of food chain including human in the long run. Notice of environmental violation has been issued October 28<sup>th</sup> and compliance is expected. Coliform test was supposed to be conducted at several stations along rivers but was cancelled due to project closure and no reported pollution or grievances.





**Picture 11:** Water from crusher at Sumburu overflowing

## 2.7 Hazardous Materials Management

The contractor needs to provide an inventory of hazardous and e-wastes generated and its proper disposal. These include fluorescent bulbs, computers and peripherals, printers and other equipment. Other monitored wastes needing attention are used batteries, battery fluids, oils, lubricant, and asphalt products.

Waste copper sheets and iron laying all over the place inside the quarry, no proper waste management techniques applied. Rags with grease, car parts with grease and rubbish are not controlled at Sumburu Quarry.

Waste oils are stored in sealed trimmed drums, some are distributed to locals for timber treatment. Empty bitumen drums are piled up ready to be painted and distributed to the Kundiawa town authority to serve as rubbish bins in town.



**Picture 12:** Empty drums ready to be transported to Kundiawa town for reuse.



There has been continuous burning of waste tyres and oil wastes inside Sumburu Quarry yard and aware from people (Picture 13). A Notice of violation (NOV) was issued on October 28<sup>th</sup>, 2019 due to air pollution but still the contractor failed to comply. All these issues are now minimised due to Quarry closure and project completion.



**Picture 13:** Burning of old tyres at quarry site.

The explosive store at sta. 17+200 were already being decommissioned on the 4<sup>th</sup> Of November 2019.



**Picture 14:** Container packed with explosives relocated to Kundiawa

## 2.8 Aggregates Extraction

Sumburu Quarry is the only Quarry that has its Quarry Management Plan approved and Permit obtained. All the other quarries have no approved separate QMPs and permit. The landowners are paid according to initial negotiations and agreements. Extractions apart from those and along the construction corridor are considered as part of earthworks (grubbing) and falls under the construction environment management plans.

Coming to the completion of the project, all the quarries have been slowly closing. The Same Riverine Quarry was abandoned for the last nine (9) months thus the area has almost restored to its natural state. The Nengnik quarry operations also ceased on the 10th of October 2019. Banduma quarry operations are into its completion staged. The Simburu Quarry also ceased in December 2019. All the data of material types and volume extracted from the quarries and their expenses are presented in the Monthly Monitoring Reports.

## 2.9 Trees Removal and Vegetation Management

The project marked trees for cutting (Table 3) in 2018, a requirement of the project contract. It is recommended that the trees destroyed should be replaced and replanted on a ratio of 1:10 or for every tree cut, it should be replaced through the replanting of 10 seedlings to ensure the survival of the replacement.

**Table 3:** Summary of Trees Removed Inventory between Ch:13+770- Ch:23+00

Trees Species	Small Diameter	Average Diameter	Matured	Total
Gum	92	76	71	239
Pine	56	75	90	221
Casuarina	68	81	144	293
Other Native sp	8	23	52	83
Coffee			48	48
Pandanus (Marita)			35	35
Bananas			36	36
<b>Total</b>				<b>955</b>

Source: CHEC Ltd Tree Clearance Inventory July 2018

It was recommended that tree planting should commence at an early stage of the project to ensure that the seedlings have a higher chance of survival. Which means, more time in the nursery and the inclusion of seedling hardening to cope with the harsher conditions in the project site.

When planted, the seedlings were to be maintained and protected by the contractor.

In the third quarter of the year, the contractor was advised to start tree planting. On June 26th, 2019, first seed sowing for re-vegetation was carried out. A species of evergreen shrub whose leaves and bids are used to produce tea was sowed along slopes prone to landslips. This species was said to be chosen because it can grow quickly. Sadly, the seeds failed to grow.

Since then, there hasn't been any form of seed or tree planting for re-vegetation. Contractor's Officers when asked said they were still working on deciding the time and type of tree to plant.

Only native plant species are seen recolonising the areas cleared for wall constructions.



## 2.10 Socio-economic Issues of Workers

The socio-economic data were also collected to reflect the direct benefits of the road construction project. The total number of workers hired for the period was 4,316 consisting of 3,965 males and 351 females or 92% and 8% respectively Table 4. The hired women is below the ADB recommended 30% hiring requirement for women.

In the case of employment for non-payroll activities on a per piece basis, the total women hired totalled 177 women for the reporting period Table 5.

**Table 4.** Summary of disaggregated employment from July-December 2019

Month	Male	Female	Total	DPs Employed	Estimated Female Wages
July	1080	120	1200	290	60,000
August	1050	100	1150	455	50,000
September	600	50	650	80	25,000
October	570	46	616	451	23,000
November	390	30	420	447	15,000
December	275	5	280	450	2,500
<b>Total</b>	<b>3,965</b>	<b>351</b>	<b>4,316</b>	<b>2,173</b>	<b>175,500</b>
<b>Average</b>	<b>660</b>	<b>59</b>	<b>725</b>	<b>362</b>	<b>29,250</b>
<b>Percentage</b>	<b>92</b>	<b>8</b>	<b>100</b>	<b>xxx</b>	

**Table 5.** Women Employment in Non-Payroll Activities from July-December 2019

Month	Gabions	Line Drains	Rip Raps	Head Walls	Others	Total
July	12	15	2	10	6	45
August	10	10	4	12	10	46
September	8	5	2	8	6	29
October	7	6	1	7	5	26
November	8	5	0	2	3	18
December	4	2	1	2	4	13
<b>Total</b>	<b>49</b>	<b>43</b>	<b>10</b>	<b>41</b>	<b>34</b>	<b>177</b>
<b>Average</b>	<b>8</b>	<b>7</b>	<b>1</b>	<b>6</b>	<b>5</b>	<b>30</b>



**Picture 15:** Women involves in line drain works and stone wall protection.

## 2.11 Socio-Economic Issues of Community

The Contractor has spent a total of PGK 55,500 for local purchases of food, construction materials, other items and other local expenditures the period (Table 6).

It is important that documentation is provided for socio-economic benefits and issues.

**Table 6.** Monthly Expenditures for local purchases from July – December 2018.

Month	Purchases of Food (K)	Construction Materials (K)	Purchases of other items K	Other Local Expenditure K	Total
July	8000	4000	4000	2000	<b>18,000</b>
August	6000	4000	3500	1500	<b>15,000</b>
September	5000	2000	2000	1000	<b>10,000</b>
October	4000	2000	700	300	<b>7,000</b>
November	2000	500	300	200	<b>3,000</b>
December	1000	1000	300	200	<b>2,500</b>
<b>Total</b>	<b>26,000</b>	<b>13,500</b>	<b>10,800</b>	<b>5,200</b>	<b>55, 500</b>
<b>Monthly Average</b>	<b>4,333</b>	<b>2, 250</b>	<b>3,000</b>	<b>866</b>	<b>9, 250</b>
<b>Percentage</b>	<b>46.8</b>	<b>24.3</b>	<b>19.5</b>	<b>9.4</b>	<b>100</b>

The only reported payments for quarry extraction is for Sumburu Quarry amounting to PGK 12,000 per month or an assumed PGK 72,000 for the reporting period.



There is rise in the economic activity along the project road corridor. Informal markets are seen increasing along the project road corridor.



**Picture 16:** Local market built by the project at Gembogl station for women.

Because of the upgraded road conditions PMV vehicles are seen increasing and are making more added trips than the previous road condition resulting in PMV owners making money.



**Picture 17:** PMV Transport buses operating on the newly sealed roads

## 2.12 Public Safety

For public safety and traffic management has been effective during road construction works and after sealing. Passing vehicles were controlled carefully so there were no traffic jam or related accidents reported in the second half of the year. Safety lines were also inserted to keep vehicles and people away from risky areas.





**Picture 18:** Safety Lines placed at sta.23+000 bridge construction site

One major accident resulted in the deaths of two workers was mechanical fault related. Truck load reversed roughly 100m back until it fell off the cliff killing the driver and offside. No accidents occurred to people along the road, except the two workers in the truck.

Heavy machineries and trucks were moving freely since road was now widened and sealed at various sections. At areas where work was in progress, heavy machines and trucks were given way by travelling vehicles. This was made possible by traffic control signage and controllers.

At the time when sealing was at certain locations of the chainage, traffic controllers were placed where work was in progress to control and prevent speed of passing vehicles.

Now that all the road works are done and project is towards completion, traffic control signboards have been inserted at sharp corners and bridges to control passing vehicles.

### **2.13 Workers Health and Safety**

For this reporting period, there was non-compliance with PPEs all through the length of the road construction area and quarries. The casual workers along the road construction area were seen in half of their PPEs.

At Ch. 24+350 Sumburu Quarry, there is non-compliance with PPEs. The workers at the Bitumen and Concrete Batching plant have been at high risks of health and safety issues since they were working without proper nose or facial/dust mask, safety wear and hand gloves. This was reported but there is no change his month. Contractor have not re-issue PPEs to its workers.

Contractor's Environmental Officer made clear of constant issuance of PPEs every month. Workers miss-use PPEs and seem to be irresponsible in personal safety.

Burning of old tyres including used oily rags and oil filters produce strong fumes that can cause dizziness, headaches and can cause heart and lung problem in the long run.





**Picture 19:** Workers at bitumen storage yard without safety nose mask.



**Picture 20:** Safety meetings and instructions given to workers during bridge construction

## 2.14 Traffic Management

The Contractor has provided traffic signage for public traffic (Photograph 21). However, this sign could have been more visible if mounted on a traffic post. Women were employed by the contractor as traffic aides and are utilized to control the traffic during the construction (Photograph 22).





**Picture 21:** Traffic sign board with speed limits at Gewa station



**Picture 22:** Local female employee controlling traffic

## 2.15 Prevention of HIV/AIDS and STDs

Several activities were conducted by the service provider for the reporting period and are summarized in Table 7. These include awareness raising, social issues and behaviour, distribution and demonstration of use of male and female condom, pamphlets distribution and HIV-AIDS tests,

The stigma attached to HIV-AIDS may have caused the low number of people availing of the tests and the number of participants in these activities.

The number of HIV-AIDS positive persons need to be identified in a baseline to determine the affectivity of the campaign.



More effort has been put to increase awareness activities, HIV-AIDS tests, pamphlets, condom distribution and the number of participants from the average of 62. Attendance to awareness was high in the three months awareness conducted. No HIV/AIDs awareness were conducted in the other three months.



**Picture 23:** HIV and Aids Awareness at Gembogl station in October 2019.

**Table 7.** Monthly HIV-AIDS activities from July-December 2019

Month	HIV/AIDS Activity	Number of Participants	Issues and Concerns
July	No awareness	-	-
August	Counselling in private, demonstrations on use of condoms; condom distribution and distribution of educational brochures. HIV-AIDS tests were administered.	89	Reluctance of people to get tested. Only 1 was tested.
September	Counselling in private, demonstrations on use of condoms; condom distribution and distribution of educational brochures. HIV-AIDS tests were administered.	235	High number of attendances. No HIV-AIDS tests were administered.
October	Counselling in private, demonstrations on use of condoms; condom distribution and distribution of educational brochures. HIV-AIDS tests were administered.	160	High attendance. No HIV-AIDS tests were administered.
November	No awareness	-	-
December	No awareness	-	-
<b>Total</b>		<b>484</b>	

## 2.16 Existing Infrastructure Issues

For the monitoring period from July to December 2019, there were no existing infrastructure issues.

## 2.17 Environment Related Grievances

A summary of environment related grievances is provided in Table 8.

**Table 8.** Recorded Environmental Grievances and Mitigation

Month	Environmental Grievance	Concerned Person / Organization	Resolution or Mitigation
July	Road tracks to villages blocked off by retaining walls and gabion baskets.	Local villagers along the road	Contractor to build environmentally friendly structures to connect road tracks to the road.
August	Fishpond polluted by oil spillage near Sumburu Quarry.	Local community near the quarry.	Contractor compensated for fish loss and oil spillage controlled.
September	Truck killed Chinese and Local employee caused Sumburu people to react and fight with Contractor near Sumburu Quarry.	Foreign and local workers near the quarry.	Contractor compensated for death and peace made between Sumbur community and Contractor.
October	Complain regarding missed out in payments by DRST.	Local villagers along the road.	Not ADBs responsibility so no response regarding payments.
November	Nil		
December	Landslips containing huge rocks caused destruction to underlying vegetation.	Local villagers along the road.	Contractor did clearance.

## 2.18 Training and Mentoring

There was a short training on Quarry Management, Closure & Rehabilitation held at Kimininga Hotel on the 9<sup>th</sup> of September 2019. The training was facilitated by Grace Nuevas-International Environment and Social Safeguards Specialist. Main discussions were based on the difference between the two Quarry Types, Riverine Quarry and Hard rock Quarry. Basing on the ongoing projects at the moment, views were expressed by officers from each project of how existing quarries are managed and their plans to rehabilitate and close quarries when projects wind down.



Constant advice and guidelines are provided by former RSA National Environmental Specialist Mr Sukot and former HRMG Environmental Officer Gerry Dum, and former Social Safeguards Officer Jerry Kevin. Also, ongoing mentoring is given by the senior Environment and Social Safeguards officers.



**Picture 24:** Quarry Closure and Rehabilitation Workshop at Kimininga Hotel in Mt. Hagen

### **3.0 CONCLUSIONS AND RECOMMENDATIONS**

#### **3.1 Conclusion**

Basing on the inspection of the 21 parameters, assessments throughout the last six months show most compliance and few non-compliance. All those parameters are being reported and those partially and non-compliance are reported, and recommendations are made.

Sealing is fully completed from Ch10 Gewa to Gembogl Station Ch.30+000, and Ch. 31+000. Construction of line drainage, gabion basket, guard rails and Bridge are completed as well.

Landslide and soil erosion seem to be on going due to the hilly landform and rainy climate conditions of the area. Land slide onto built gabion basket and walls have been common at various sections of the road this reporting month. Contractor is still doing maintenance work after landslide and slips.

Traffic control is now limited only to areas where maintenance works to landslides are in progress. Warning signs are placed at land slip and rock falling zones for travelling public and villagers along the road to see.

The explosive store at sta. 17+200 were already being decommissioned on the 4th Of November 2019.

All the Quarries have been decommissioned as of October, November and Sumbur Quarry has been decommissioned this month of December.

Solid and Hazardous waste management at Sumbur Quarry has always been a concern through-out the last 6months. Now when Sumbur Quarry is ceased, waste is limited also.

Rise in informal markets and added PMV trips means a rise in economic and social activities in the district.

Road is at completion and so there is less work, resulting in less employees now. Provisions in the contract document between DOW and the contractor regarding 30% women workers participation still stands despite any circumstance. This month's female workers decreased to 2%% which is too low.

Re-vegetation is important since project is coming to its closure. First method of seed planting failed and there hasn't been any form of tree planting for re-vegetation.

Noise, Air and Water quality and levels were all monitored this month. All results are good.

HIV/AIDS Awareness was conducted for the first 4 months, November and December awareness's were not carried out.

### 3.2 Recommendations for Implementation and Corrective Actions

The importance of identifying environmental harm and mitigating or remediating these harmful activities need corrective action. In this case, corrective action could be categorized into two; corrections mean that there is immediate relief or action to an environmental problem. Corrective action refers to actions that would ensure that these environmental problems are not repeated either through policy or application of environmental management best practices (Table 8).

**Table 9.** 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 10.** Recommendations for Implementation and Corrective Action.

<b>Non-Compliance</b>	<b>Recommendations for Implementation</b>	<b>Corrective Actions Plan</b>	<b>In-Charge</b>	<b>Date of Implementation</b>
Absence of complete monthly monitoring for identified environmental parameters.	Advise the contractor to conduct environmental monitoring using in-situ equipment.	Assist the contractor's Environmental Officer in the use of their equipment.	CHEC PSC HRMG	January – February 2019
Soil erosion due to absence of management practices.	Implement sediment traps construction and tree and grass seeding or planting.	Contractor to provide action plan with detailed activities.	CHEC	January – February 2019
Lack of implementation of the solid, liquid and hazardous waste management plans.	Contractor to review the respective plans with PSC and HRMG.	Identify activities that are implementable in both the short and long term.	CHEC PSC HRMG	January – February 2019
Replacement of damaged and cut trees during the construction activity.	Identify the resources required and the sites for tree planting.	PSC and HRMG to assist in the planning activity.	CHEC PSC HRMG	February – March 2019
Absence of appropriate health personnel to provide first aid assistance.	Designate personnel who attended the First Aid training to assume such role.	Implement the submitted Health and Safety Plan	CHEC	January – February 2019
Submit or revise all required plans which have not been approved.	Review with the contractor the pending plans.	Assist the contractor in the plans' accomplishment.	CHEC	January – February 2019
Submit the required Quarry Management Plans	Follow the prescribed format in QMP.	Assist the contractor in the plans' accomplishment.	CHEC PSC HRMG	January – February 2019

## **APPENDDICES**

### **Appendix 1: List of References**

1. Initial Environmental Examination for Gewa - Gembogl Road section (2016).
2. Department of Works Specification for Road and Bridge Works 1995
3. Department of Works Specification for Road and Bridge Works 2015 Edition
4. Back to Office Report of HRMG Environmental Officer
5. Conformed Documents for the Improvement Works and Long-Term Performance Based
6. Maintenance Service (LTPBM) for Gewa - Gembogl 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.
9. General Construction Waste Management and Hazardous Materials Handling and Waste Disposal DEC 1997.
10. Sample Environmental Baseline Procedure for Tranche 3 Projects.

### **Appendix 2: List of People Interviewed**

1. Alphonse Niggins, Senior Field Coordinator, HRMG
2. Steven Sukot, Environmental consultant, PSC
3. Paul Nombri, Manager, Technical Services, HRMG
4. Garry Dum, Environmental Officer, HRMG
5. Grace Nuevas-International Environment and Social Safeguards Specialist.
6. Ms. Jane Kapi – HRMG Environmental Officer
7. Evelyn Kup, Environmental Officer, CHEC
8. Wang Shifu-Environmental Health and Safety Manager, CHEC
9. Jerry Kevin, Social Safeguards TL, HRMG