Government of Nepal

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Environmental and Climate Resilience Report

RAP 3 – MHLR

Maintenance and Resilience Component

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iMC worldwide
Development | Management | Infrastructure

RAP3 MHLR

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ABBREVIATIONS

BOG	Basic Operating Guideline
CFUG	Community Forest Users Group
CoC	Code of Conduct
CTEVT	Council for Technical Education and Vocational Training
DFID	Department for International Development
DFO	Divisional Forest Office
DoLI	Department of Local Infrastructure
DSE	Display Screen Equipment
EBRW	Equipment Based Road Work
EOI	Expression of Interest
GBP	Great Britain Pound
GON	Government of Nepal
H&S	Health and Safety
ICT	Information Communication and Technology
IDO	Infrastructure Development Office
IMC	International Management Consulting
LRN	Local Road Network
LRUCs	Local Road User Committees

M&E	Monitoring and Evaluation
MEL	Monitoring Evaluation and Learning
MHLR	Mugu Humla Link Road
MoFAGA	Ministry of Federal Affairs and General Administration

1.1.ENVIRONMENTAL MANAGEMENT AND MONITORING

1.1.1. Environmental Assessments

According to GoN regulations environmental assessments were required for RAP3 implementation. Each new construction and improvement sub-project was screened as per Schedule - 1 and -2 of the Environmental Protection Rules (EPR, 1997, as amended from time to time). The results of environmental screening were categorized for i) IEE study, ii) EIA study, and iii) none of i) and ii) requirements. All RAP3 LRN new construction sub-projects were subjected to IEE study. DFID policy also refers to screening and compliance with recipient country legislation.

Based on screening results, Initial Environmental Examination (IEE) for all new district road sub-projects were performed as per the processes and procedures outlined in the EPR and Guidelines of Ministry of Federal Affairs and Local Development (MoFALD). The IEE reports prepared for all sub-projects were approved by MoFALD and include; 1) Sanighat - Shipkhana (17.7km), 2) Jarkot-Ramnakot (5.93km) in Kalikot; 3) Maure – Kailashmandu (11.15 km) 4) Maure – Toli- Chhatara (16.22 km) in Bajura; 5) Gamgadi -Dhaina District Road (19.95 km) in Mugu; 6) Sallisalla-Darma (14.4 km) and 7) Galphagad – Shreenagar – Kalika (12.16 km) in Humla.

In addition, under RAP3 a walkover/feasibility study of Gamgadhi-Chankhali-Darma route of the Mugu Humla Link Road (MHLR) was conducted at the request of DDC offices of Humla and Mugu local communities in both districts. The study examined MHLR from technical, social and economic development perspectives. There followed an Environmental Impact Assessment of MHLR, mainly because of the need for removal of forest from more than a 5 ha area along the road alignment. The EIA study was conducted by a multidisciplinary team comprising in-house specialists and some outsourced experts. The EIA study took two years to conduct, the majority of the time spent waiting GON approval of each stage of the process.

1.1.2. Environmental Mitigation and Monitoring

Environmental mitigation and monitoring were performed by making and updating site specific implementable Environmental Management Plans (EMPs). Updated site specific EMPs set out the location/chainage of mitigation measures for each issue/impact related to the proposed road construction. Implementation of site specific EMPs for new construction road corridors was continued during the entire project period. EMPs were implemented and supervised by district supervision field staff. Implementation of mitigation measures was monitored through regular follow up visits and field verification by technical and environmental specialists from RAP3 head office.

Furthermore, RAP-3 conducted LRN training that also included environmental safeguard requirements as provisioned in GoN environmental legislation including policy, rules and guidelines. The purpose of inclusion of environmental safeguards in LRN training courses was to raise awareness among RAP-3 technical field staff and integrate environmental safeguards right from the start of construction.

Implementation of environmental mitigation measures also covered reinstatement of public and private utilities and structures such as cremation sites, electric poles, water mills, resting places, cultural sites, irrigation channels, drinking water tanks, water supply pipes, pedestrian routes and houses, animal sheds and farm land damaged during road construction works. Details of reinstated utility facilities and structures in new road corridors are presented in the following figure.

Figure 4.1. : Status of reinstated utility facilities and structures in new road corridors

S.No.	Type of reinstatement	Unit	District				Total
			Bajura	Kalikot	Mugu	Humla	
1	Private house/animal shed relocation/protection	no	11	16	0	8	35
2	Pedestrians trails	no	87	104	6	53	250
3	Drinking water supply pipes/irrigation/structures	no	10	32	10	3	55
4	Resting place (chautara) and religious sites	no	1	7	4	1	13
5	Water mill	no	0	3	1	2	6
6	Farm land clearance	no	10	155	7	1	173
7	Cremation/graveyard sites	no	0	2	0	0	2
8	Electric pole relocation	no	5	14	0	0	19

1.1.3. Bioengineering Works

Bio-engineering application is considered one of the environmental mitigation measures for protection and stabilisation of fresh cut and fill slopes. In RAP3 district road sub-projects, bio-engineering works were given priority as they offer a large number of benefits as sustainable, environmentally-friendly and cost-effective preventative and curative measures for stabilizing soil erosion and preventing landslides. Bio-engineering also provide multifarious functions and offers beautification of landscapes along road alignment. When implementing bioengineering works success and failure stories from RAP 1 and 2 were also taken into consideration. During LRN training bio-engineering courses such as causes of slopes failures, types and functions of bio-engineering structures, advantages and design aspects were also covered to refresh the knowledge of field and TMO technical staff. Field level technicians made use of knowledge acquired from field work training, generally adopting brush layering, and palisade on fill slopes and grass seeding/plantation/sodding/turfing on both cut and fill slopes. Locally available plants including grasses and shrubs/small tree species and saplings were planted at bio-engineering sites along road corridors. Apart from this, tree plantation and distribution of fruit and fodder tree saplings chosen by local people were accomplished in many of the new road corridors. Details of bio-engineering works performed in new construction road corridors is presented in the following figure.

Figure 4.2: Bio-engineering works in new construction road corridors

S.No.	Bio-engineering type	New construction districts								Total	
		Bajura		Kalikot		Mugu		Humla			
		Area (ha)	Site (no)	*Area (ha)*	*Site (no)*	Area (ha)	Site (no)	Area (ha)	Site (no)	Area (ha)	Site (no)
1	Grass plantation	0.8	47	1.37	139	0.36	31	0.1979	37	0.986	206
2	Brush layering	0.8	91	1.32	217	0.08	21	0.0556	35	1.5	342
3	Grass sodding/turfing	0	0	0.022	2	0.01	4	0	0	0.04	6
4	Palisade	0	0	0.07	45	0	0	0	0	0.05	45
5	Grass seeding	3.6	31	0.07	7	0	0	1.017	19	4.684	36
6	Tree plantation (no)		5,000		10,460		4,510	1,375		21,345	635

1.2.DISASTER RESILIENCE

1.3. CLIMATE RESILIENCE AND ROAD SAFETY AUDIT

A Climate Resilience Audit for new construction road corridors was conducted for the first time on SSDR in Kalikot, which was the first road to be substantially completed amongst RAP3's 7 new road projects. The audits for later roads were then performed as they reached substantial completion.

Resilience Audits were performed to examine the adequacy of civil engineering structures, particularly water management structures and bio-engineering techniques designed to improve climate resilience of road infrastructure. In general, the road pavement and structures have followed GON design norms and standards which has limited the scope to make further gains in resilience. However, given the geological frailty of soil conditions that are prone to landslides and water damage during the monsoon, RMGs provides a cost effective approach to maintaining the resilience of the local road network in the Karnali region.

All new roads underwent safety audits before they were handed over to their respective Palikas using RAP3 in-house audit teams immediately after the roads became trafficable by driving a four-wheeler on the entire section except for Jarkot-Ramnakot, Galfagad-Shreenagar-Kalika and Sallisalla-Darma as these roads have yet to be connected to the national road network. Each audit team was led by a senior engineer from RAP TMO. In line with the basic principle of road safety audits to maintain impartiality, RAP management assigned in-house specialists to ensure that each team was independent of the design process and did not have direct supervision oversight during the construction. The first road safety audit was conducted on Sanighat-Shipkhana District Road, Kalikot in April 2017, followed by the audits in Bajura in early 2018, and Humla and Mugu in late 2018.

The purpose of the road safety audit was to identify potential road safety concerns and issues by examining every feature/component of the road, and to recommend practical and low-cost remedial measures to improve safety for all road users at hazardous locations identified during the field inspection. Separate audit reports were produced following the field visits for each of the road. Following consultations with field teams as well as TMO, clear, practical and implementable recommendations were provided by the audit reports. Field teams were advised and instructed to implement safety enhancement measures as recommended in the reports. Some of the road safety improvement measures included: improving the visibility at sharp (blind) curves by cutting back the hillside of the road, construction of gabion safety barrier at sections with blind curves and steep valley side slopes or deep vertical drops. In addition, necessary traffic signs were procured and installed at potential safety hazards such as sharp and hairpin bends, narrow sections, settlement areas, school zones and pedestrian route-road junctions. Safety improvement measures were designed to prevent head-on vehicle collisions, run-off-road crashes and vehicle-pedestrian conflicts on all RAP3 new roads.

1.4.LESSONS LEARNED

Some of the key lessons related to climate resilience, environmental management and bio-engineering during RAP3 implementation include:

- Integration of environmental protection measures with infrastructure development activities from the beginning is fundamental, even with minor mitigation measures relating to environmental soundness and sustainability.
- Selection of the correct plant species is crucial for successful slope protection.
- Plant species such as trees, shrubs, grasses used for bio-engineering purposes require site protection, aftercare and maintenance to survive and provide bio-engineering protection.
- Support of local communities is essential, especially for water management, protection of bioengineering works and road structures as well.
- The practice of maintaining outward camber only after completion of road opening to full width should be reviewed. Providing required camber right from initial track opening allows for any deformations, settlements and depressions to be adjusted in subsequent construction years and allows the cambered road surface consolidate over 3-4 years of construction.
- The practice of building un-pitched drains should be abandoned. In view of water scouring on high gradients, earthen drains need frequent maintenance. The cost of stone pitching is nominal compared to overall investment in structural works and the provision of dry-stone drains on steeper gradients should be made right from the initial design.
- Bio-engineering works should be undertaken on a larger scale than so far witnessed and be given a higher priority rather than leaving it to the final year of construction and completed sites. The cost of bio-engineering is small compared to overall project cost, but can prevent shallow-seated failures and minimises the risks of bigger slope failures, which in most cases results from an un-addressed small scale soil erosion and gully formation.

1.5. VALUE FOR MONEY

The Climate Resilience Audit identifies the lapses and deficiencies of road construction, especially water management and slope instability. Recommendations following audits can strengthen the capacity of the road system to cope with unusual and intense rainfall. The cost of improving climate resilience generally appears to be very small compared with the overall investment in road works. Appropriate mitigation measures even with a minimal cost can reduce the risk of expensive road assets from being damaged by extreme weather conditions.

Likewise, road safety improvement measures such as delineators, safety barriers, and traffic signs can have significant contribution to preventing and reducing accidents. Hazardous locations identified by road safety audits lead to appropriate safety enhancement measures which save lives and reduces road injuries. Rural roads in Nepal generally have numerous accident-prone locations such as sharp bends, high-grades and narrow widths, which are often left unaddressed. RAP3 has introduced the practice of road safety audits to address such safety related concerns and measures that can prevent accidents and reduce road operation costs to local communities.