DFID Nepal Rural Access Programme 3 (RAP3)
Monitoring, Evaluation and Learning (MEL) Component

TECHNICAL ASSESSMENT OF COMPLETED RAP ROADS (INDEPENDENT VERIFICATION - 2018 ROUND 2)

Date: December 2018

Submitted by Itad

Results in development

Contents

Abbreviations

DFID	UK Department for International Development
DLI	Disbursement Linked Indicator (used for the Payment by Results mechanism)
DPM	RAP3 Deputy Programme Manager
DRCN	District Road Core Network
DTL	District Team Leader
IoE	Institute of Engineering (Tribhuvan University, Nepal)
Km	Kilometre
LF	Logframe
LFI	Logframe Indicator
LNGO	Local Non-Governmental Organisation
GoN	Government of Nepal
LRN	Local Roads Network
M	Metre
MEL	Monitoring, Evaluation and Learning Component of RAP3
PBR	Payment by Results
PM	Programme Manager (of RAP3)
PMV System	Performance Management and Verification System of RAP3
RAP3	Rural Access Programme 3
RBG	Road Building Group
RMG	Road Maintenance Group
SBG	Special Building Group
SC	Supervision Consultant (sub-contracted by RAP3)

Summary

This is the final round of verification undertaken by the independent MEL unit for RAP3. It provides a technical assessment of roads built by the programme that are either complete or close to completion. It is therefore, unlike previous verification exercises it is not strictly focused on the Disbursement Linked Indicators (DLIs) that the RAP project reports progress and results against (Km of roads built and employment days generated). Given that the project will close in early/mid 2019, it is now more important to assess the quality of build construction along the length of the road corridors.

The independent technical assessment focused on three road corridors in the districts Bajura (now in Province 7), Kalikot and Mugu (Province 6, or Karnali Pradesh). Together the total length of these roads equals 44 Km of newly constructed RAP roads, out of the total 97 Km that is being built in this project. These road corridors were chosen due to their completion schedule in late 2018.

The technical assessment was undertaken by Engineers from the Institute of Engineering (IoE), Tribhuvan University. Support and guidance was provided by the MEL unit. The team developed a process and checklist to spot-check build quality and construction along each road corridor. This technical assessment is intended to also provide insights to issues along the road corridors that will be important for the local government bodies at the Municipal level to prioritise, now that maintenance of these newly constructed roads will be handed over from the UKaid funded project to the Government of Nepal.

The findings from the assessment show that the construction of the roads have been built to a high technical standard and comply with the norms and specifications for rural road design as specified by DoLIDAR. The team found that the roads were in good shape, operable and with vehicular movement up-and-down the road corridor. Minor issues, that are not uncommon for many rural roads in Nepal, have been observed. These are issues that are less to do with RAP's construction of the road, and more of the general conditions found on all local roads in Nepal - and as such are issues that require attention in the future, largely through government-funded maintenance work (for example, clearing small landlslides, waterlogging, etc.)

The team completed a technical checklist at each Km of the road, and at every critical section. Photographic evidence was also collected, so that others may make their own judgement based on the evidence, if they so wish.

The MEL team have incorporated the feedback from the RAP team and included this in Annex 2 of this report. The table in Annex 2 provides detailed action responses from RAP based on the recommendations provided. Hence, it should be noted that the RAP team have taken adequate measures to respond to technical matters observed by the MEL team.

All the evidence has been made available in GoogleDrive and can be accessed here:
https://drive.google.com/open?id=1kSSJ-HNeb5Nsm2qMymaONr2AzXPJxSWq

1. Introduction

1.1 What RAP does

The objective of the Rural Access Programme 3 (RAP) is to reduce poverty in western Nepal. The programme aims to deliver economic benefits to the poor through improved rural road access and connectivity using a pro-poor targeted labour based approach to road works. The primary output of RAP is the construction and maintenance of rural roads within the District Road Core Network (DRCN) which makes up a strategic part of Nepal's Local Roads Network (LRN) in eight core districts of the Mid and Far West region. Poor and vulnerable individuals are targeted to become part of Road Building Groups (RBGs) and Road Maintenance Groups (RMGs) who are paid to construct and maintain rural roads.

At the end of 2017, Nepal became a Federal Republic with autonomous provincial and local governments, replacing the district level government administrative structures that existed previously. Whilst the country transitions to fully and practically implementing the Federal administrative structures, the DRCN remains an important strategic network of rural roads. RAP is constructing 97.5km of new roads in four core build (or new construction) districts: Bajura, Humla, Kalikot and Mugu. Bajura is part of Province No.7 whilst Humla, Kalikot and Mugu are part of Province No.6 (also referred to as Karnali Pradesh) in Federal Nepal. RAP is maintaining existing rural roads in the DRCN of four core maintenance districts: Achham, Dailekh, Doti and Jumla.[1] Dailekh and Jumla are part of Province No.6 (or Karnali Pradesh) whilst Achham and Doti are part of Province No.7 in Federal Nepal. This report acknowledges the significant political changes that are underway, but for the purposes of verification of results in the areas that RAP operates in, it refers to these areas using the district names.

RAP is being implemented by IMC Worldwide. The **construction** of RAP roads is based on three broad stages: 1) track opening to 2.5m, 2) track widening to 3.5m, and 3) track widening to 4.5m with structures (this includes supporting structures such as gabion walls, cross drainage, etc.). Construction is completed in sections along the entirety of a planned road corridor.

1.2 Background to MEL's Independent Verification Work

The verification process was initiated to provide assurance to DFID on the progress reported against key work milestones. The independent MEL component of RAP conducts verification twice annually on Disbursement Linked Indicators (DLIs) related to RAP's results, with the focus of each round of verification (e.g. relative focus on employment days versus new construction versus maintenance) being agreed by RAP, DFID and MEL before any field work is conducted.

The scope and coverage of verification has evolved over the rounds:

1. **August 2016:** Pilot Verification. **Focus:** All new construction districts and a sampled approach to employment days.
2. **March 2017:** Round 1 Verification 2017. **Focus:** Three new construction districts, one maintenance district and a sampled approach to employment days
3. **September 2017:** Round 2 Verification 2017. **Focus:** Census of employment days in all new construction districts.

[1] RAP has maintained approximately 2,100km of rural roads in the DRCN across 10 districts in Nepal, of which 4 are within the core maintenance districts in the Mid and Far West. RAP plans to maintain up to 2,250km by 2019. The verification is concerned only with the 4 core districts and not the remaining 6 pilot districts.

4. **March 2018:** Round 1 Verification 2018. **Focus:** Three new construction districts, one maintenance district.

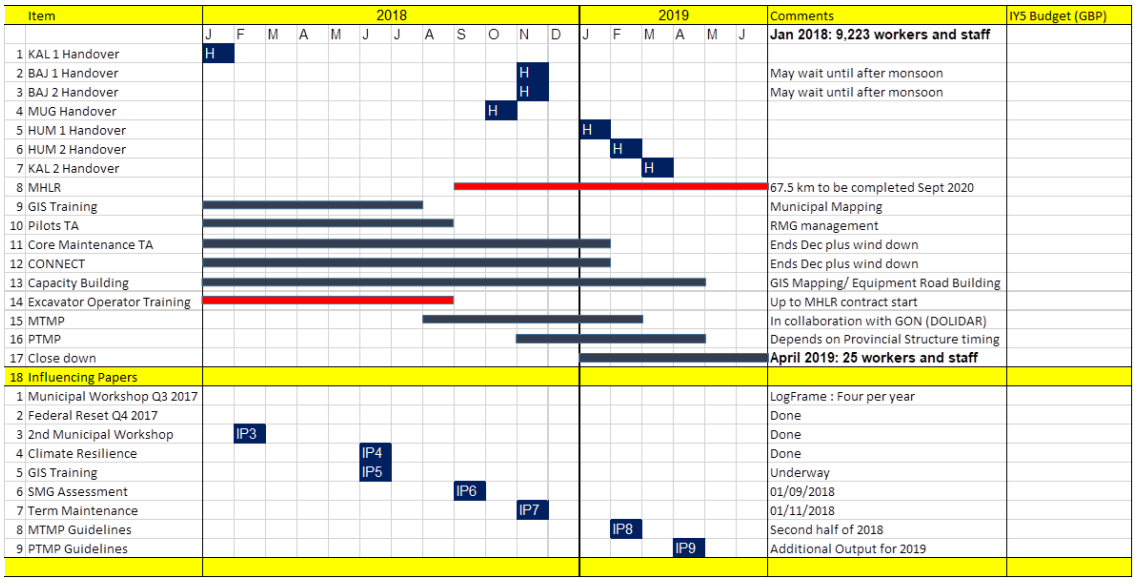
The results from previous verification reviews have been positive (i.e. accurate reporting by RAP to DFID). These reports can be found at this link: http://rapnepal.com/component-results/948

1.3 Objectives of the Final Round of Verification - Independent Technical Assessment of Completed RAP Roads

As the RAP programme heads towards completion in early/mid-2019, most of the construction work is either complete or close to completion. The completion scheduled provided by IMC Worldwide (see figure 1) indicates the completion schedule of roads in each district for 2018 and 2019 (see item numbers 1 – 7, which refer to roads in the districts of Kalikot, Bajura, Mugu and Humla). Due to work either being complete or close to completion, this final round of verification is not focused on the DLIs that RAP reports against, and therefore cannot be strictly classifed as a verification exercise. Hence the objective of this assignment differs from all the previous rounds of verification that MEL has undertaken.

Instead, this verification round has been designed as a technical assessment of the completed RAP roads. The objective of this independent technical assessment is to spot-check that the roads have been built and assess the built condition based on design standards, norms, and specifications of construction quality.

Figure 1: Road Completion Schedule (up-to-date as of July 2018)



To meet the objective of this technical assessment, the scope of the work includes the following:

- To assess the overall build and geometry of the road.
- To spot-check whether different structures are constructed as per design, drawings, and specification and assess the construction quality of different structures.
- To provide recommendations on areas that require prioritisation for maintenance work by the Government of Nepal.

The findings will also help provide perspective for stakeholders, particularly the Government of Nepal, on where to focus future maintenance work that will be their responsibility to undertake.

2. Methodology

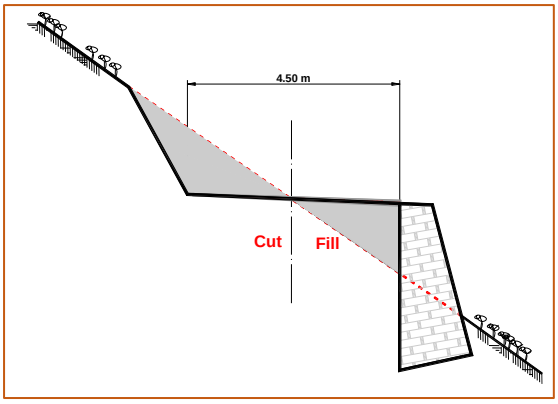
2.1 Verification Team

The physical and technical assessment was conducted by a five-person engineering team with support from the MEL unit. This is the same team that has conducted the previous rounds of verification. The verification team consisted of one Senior Rural Roads Engineer and four senior graduate engineers from the Institute of Engineering (IoE), Tribhuvan University. An orientation session was organised by the MEL unit to train the graduate engineers on the methodologies and process of the verification. The field level verification was conducted between November and December 2018.

2.2 Methodology and Sampling for Technical Assessment of Completed RAP Roads Verification

The technical assessment is not concerned with the DLIs that were of focus in previous rounds of verification. In those previous rounds the the DLIs were concerned with: a) km of roads built, and b) employment days generated from the road works. As the roads are close-to-completion/completion, the DLIs are less relevant from a verification perspective. At this stage of the project, stakeholders (DFID and the GoN) are more concerned with the build and condition of the roads and the quality of construction as a sum of the work completed. Figure 2 indicates a typical cross-section of construction work of rural roads in Nepal.

Figure 2 A typical cross-section of a rural road in the hills of Nepal



During the field visit, the team members assessed the quality and functionality (where appropriate) of the technical design, physical structures built and environmental aspects using a pre-defined checklist – this is provided in Annex 1. The team compared their assessment against the planned work of the RAP team. This was done by physically observing along the road; photos were taken as evidence of records. Areas considered for technical assessment included:

- Design of road profile and cross section with site condition
- Provision of cross drainage structures as per drawings and their performance
- Use of construction materials and their quality
- Compaction of earthwork in excavation/filling
- Leveling of pavement surface
- Conservation/management and condition of waste material disposal
- Slope stabilisation works and their performance, plantation, bio-engineering
- Sign board/traffic sign marking as per guidelines of DoLIDAR

Each Engineer was responsible for one length of road in one of three RAP working districts of: Bajura, Mugu and Kalikot. As roads in Humla are not yet close to completion, Humla was not considered for this round of technical assessment.

Figure 3 provides a process flow for the technical assessment. The checklist (see Annex 1) for the technical assessment was completed for each KM of road and for each critical section of the road. Here we define critical sections that require heavy structures and/or are technically complex due to hard-rock and the need for further consideration (e.g. hairpin bends). Table 1 indicates the road corridor that was subject to technical assessment in each district and the length of the road corridor.

A note on terminology: the report uses the term 'chainage' throughout and this refers to the specific section of the road that is being observed and assessed. For sample, chainage 13+200, would refer to 13,200 metres (or 13.2 Km) *from the start* of the road.

Figure 3: Process of Technical Assessment

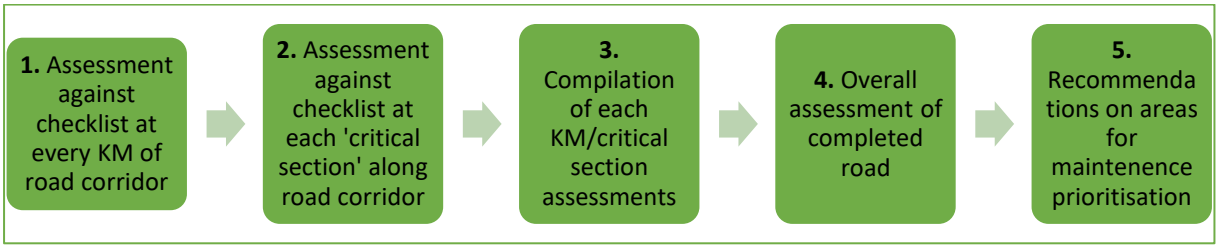


Table 1: Road Corridors under Technical Assessment

District	Road Corridor Sample[2]	Length of Road Corridor	No. Minimum Technical Assessments to complete
Bajura	Maure-Toli Chhatara District Road	17.5 Km	16
Kalikot	Sanighat Phukot Syuna Shipkhana District Road	16.6 Km	16
Mugu	Gamgadi Daina Dulachaur Road (GDDR), Gamgadi-Gila Section	22.75 Km	22
TOTAL	n/a	56.85 Km	54

2.3 Compilation of Results

Each engineer was responsible for completing the technical assessment at every Km and critical section along the road corridor. They took photos as proof of the spot-check and to provide an objective means by which DFID and other external readers of this report may make for each section of the road. Other issues were photgraphed as proof of the specific issue observed (e.g. landslides, etc.)

All the evidence has been made available in GoogleDrive and can be accessed here:
https://drive.google.com/open?id=1kSSJ-HNeb5Nsm2qMymaONr2AzXPJxSWq

[2] District roads are a strategic part of Nepal's Local Roads Network (LRN) prior to the formation of a new federal, province and local government.

3. Verification Findings

The findings provided below provide a summary assessment of each road corridor based on detailed technical assessments at each Km and critical section, as outlined in the methodology. Should the reader wish to see each technical assessment, they can do so through the GoogleDrive link provided at the end of the methodology section. Some recommendations are also provided after the summary assessments for each road corridor.

The MEL team have incorporated the feedback from the RAP team and included this in Annex 2. The table in Annex 2 provides detailed action responses from RAP based on the recommendations provided. Hence, it should be noted that the RAP team have taken adequate measures to respond to technical matters observed by the MEL team.

Bajura: Maure-Toli Chhatara District Road

Summary Assessment:

- The overall condition of the built road is good. It is in proper operable condition. Photo 1: Chainage 11+490 to 11+620. Good example of overall construction of length of road.

- The width of the road is consistently above 4.5m (as per DoLIDAR rural roads specifications), and exceeds this in most of the sections, with few exceptions (for example at section 13+000-13+005 where a width of 3.1m was observed. This width is fine given the probable instability than can occur by moving boulder strata).

Photo 2: Width of 3.1m at chainage 13+000 where rock was not cut because movement may cause slope destablisation

- The overall longitudinal gradient of the road is 0% to 7% which is within the Nepal Rural Roads Standard.

- The compaction of earthwork in filling areas is adequately completed and satisfactory. The construction quality of material is good. Constructed earthen rural road can be operated throughout the year.

- Bioengineering works is done in critical and applicable sections (like 0+600, 3+580-3+930, 4+650, 4+780, 4+860, 4+300, 4+880, 5+030, 5+570, 5+650, 6+050-6+110, 6+500, 8+550, 16+460-16+475) but in some of locations is not functioning like in chainage 14+250 to 14+270, 6+800 to 6+995.

Photo 3: Chainage 14+250 to 14+270: Composite wall and crash barriers with minimal bioengineering works on slope

- Causeways have been built with dry stones and major cross drainage structures are in place in most of the required locations.

- The overall geometry of the road (width, sight distance, ruling gradient and curve at bends) is adequate and as per site conditions.

- The provision of road safety structures like crash barriers/confidence wall is adequate at the curves and vulnerable sections. The quality and functionality of road side structure (gabion wall, dry wall, check wall and composite wall) is good except some of retaining structures at chainage 3+850 (about to topple), 5+650, 7+300, 11+520 and 15+800 (bulging). https://drive.google.com/open?id=1Iyi-a1lE0UpYjA7vAFXIaUZh9-soEINS

- Extra widening is provided at the curves in roads in the right required locations except in curve at chainage 11+230 due to social issues and laybays.

- The condition of pavement surfaces is in good and levelled condition with no rutting, depression and limited unevenness.

- The road is clear with no obstructions lying in the roadway.

- Cut materials have been used in filling areas and others have been conserved by constructing the toe walls and check walls and depositing there for future use (like 8+380, 9+000, 11+700, 11+960, 13+900, 14+250, 15+120, 15+860) and stacking (8+720-8+750, 15+100).

- Composite walls along with gabion and dry walls have been used as retaining structures in the valley side. Gabion retaining wall was only method used for slope stabilization on the hill side.

- Gabion retaining walls are constructed to protect houses on the hill side in chainages 7+980, 8+230 and 16+580.

Photo 4: Chainage: 16+580. Gabion retaining wall for protection of settlements on the hillside provided.

- Foot trails were constructed for easy movement for pedestrians at chainages 8+940, 9+170, 9+390, 10+000, 10+720, 10+900, 11+510, 11+760, 12+900, 13+700, 15+400 and 15+960.

Photo 5: Chainage: 9+390. Foot trails constructed.

- Relocation of house lying in the alignment was done i.e. house from 8+060 was relocated to 8+240.

- Check walls for diversion of water from Kholsi to causeway (river training works) is constructed in chainage 0+080, 1+320, 15+780, 16+260.

- Change of alignment was done at chainages 13+120 and 14+600 to maintain the longitudinal grade for efficient performance of the vehicles.

- Subsurface drains were provided in highly seepage prone areas (e.g. at 1+250-1+300, 7+800-7+850, 10+280 to 10+360, 14+170, 16+270-16+400.)

- Concrete masonry drains were provided at chainage 5+550 to 5+680 to prevent passing of water to the fractured rock and hence prevent sliding of rocks.

Recommendations

- Permanent cross drainage structure like minor bridge is required at chainage 0+550 over Malagad River.

- There are existing potential landslide zones due to fragile topography and cutting in the natural slopes where slope stabilization can be done to improve slope stability (For example, 0+900, 11+380-11+420, 14+250-14+270, 16+500)

- The retaining structure at chainage 3+850 (about to topple), 5+650, 7+300, 11+520 and 15+800 (bulging) should be replaced or maintained as early as possible as they can cause problems of landslides or road accidents.

Photo 6: Chainage 3+850. Gabion wall on the verge of toppling/collapse

- Some locations require causeways, such as at chainage 7+900 (to manage water from kholsi) and chainage 9+120 (to manage tap water).

- Eroded debris to causeway should be cleared in a timely manner for proper functioning of causeway. For example, Causeway at 7+630 and 3+200 requires clearance of debris materials.

- Problems which are in critical stages including seepage from rocks (e.g. at chainage 3+300) and seepage from landslide scarp (e.g. at 4+410) should be properly accounted.

Photo 7: Chainage 4+410. Seepage from landslide which requires mitigating measures.

- Side drains should be constructed and integrated to cross drainage structures or camber should be provided properly to manage rain water and water from kholsi in most of sections.

- Bioengineering works should be conserved, maintained and inspected in a timely manner until they grow completely to perform all the proposed functions.

- As heavy traffic is now in operation, routine and recurrent maintenance works should commence.

Kalikot: Sanighat Phukot Syuna Shipkhana Road

Summary Assessment:

The overall condition of the built road is good. The geometry of the road (width, sight distance, ruiling gradient and curve at bends) is adequate and is per design standards. The quality of construction material is good. The quality and functionality of road side structure (gabion wall, dry wall, check wall and composite wall) is good and effective (e.g. 14+980).

Photo 8: Chainage 14+000. Good example of good overall condition, road build, geometry and construction.

The present pavement surface is good and levelled in most of the sections. Bioengineering works have been completed in a few sections (e.g. 1+400 and 2+700) which are functioning well.

Photo 9: Chainage 2+700: Bioengineering works to a good standard.

Lay-bys were not visible along the alignment. Extra widening of curves has been provided at required locations. Although constructed as earthen rural road it can be operated as an all-weathered road. Traffic is operating in fair condition.

Recommendations

- There is existing and potential minor landslide in the hairpin bends, curve and other locations due to fragile topography and cutting of natural slope. Hence, slope stabilization work should be done to improve slope stability (e.g. 0+500, 0+700, 1+100, 3+600, 3+700, 4+370, 5+300, 6+900, 7+800, 10+010, 11+720, 12+460, 13+060, and 16+320).

Photo 10: Chainage 12+460. Observed landslide.

Photo 11: Chainage 1+100. Hairpin bend could require further slope stabilisation

- Water management structures need to be improved (e.g. 0+100, 2+010, 2+260, 2+310, 4+298, 7+400, 9+817, 10+500, 11+900, 12+400, 13+640, 14+080, 15+680, 15+900, 16+280,16+815, 17+150).

Photo 12: Chainage: 11+900. Cross-drainage water management structure has eroded and requires maintenance

Photo 13: Chainage 15+900. Minimal side-drain and stone piling. Pipe required for water drainage.

- Routine and recurrent maintenance activities of road should be performed regularly (e.g. 15+480).

Photo 14: Chainage 15+480. Routine and recurrent maintenance activities to be performed regularly.

- The road safety structures such as delineator post or block is not adequate. More safety structures need to be provided at the required site. (e.g. 9+000, 12+000).

Photo 15: Chainage 12+000. Safety structures at steep curve should be considered.

- Traffic sign and milestone blocks need to be maintained (e.g.0+000, 4+000, 8+200, 9+817).

Photo 16: Chainage 8+200. Traffic sign not properly visible and requires fixing.

Other observed issues

The photo below along the newly constructed RAP road in Kalikot shows an observed road traffic accident. This serves to spotlight issues that are known to occur in rural Nepal and is not indicative of the road quality or the work completed by RAP.

The Government of Nepal should prioritise road safety awareness and enforce these on all roads, particularly these newly contructed roads. Road safety and its promotion and enforcement should continue to be emphasised and prioritised at all levels of government.

Photo 17: Chainage 11+000. Observed road traffic accident.

Mugu: Gamgadhi Daina Dulachaur Road (GDDR), Gamgadhi-Gila Section

Summary Assessment:

This road corridor was constructed well according to the DoLIDAR design standard, norms, specification of construction. A summary of findings from the field:

- The overall width of the road is above 4.5m with some sections above 5.5m.
- The longitudinal gradient is as per design standard.
- The road section has an adequate number of Causeways for cross-drainage with gabion and dry stone soiling.
- Gabion walls and dry walls are used in most of the sections for retaining structures, and the quality of wall construction is good. Check walls and toe walls are constructed for conservation of cut soils and protection of road structures. Confidence wall and crash barriers are being installed in many sections for safety.

Photo 18: Chainage: 7+250. Good construction with adequate structures in place on steep terain

- Soil is well compacted on the pavement surface and is in fair condition for vehicular movement. The pavement is in good condition for traffic movement in most sections of the road. In the

sections which require stabilization of the slopes, bio-engineering works have been completed which seems to be functioning well.

- The observation team did not find any major obstructions in the roadway and no specific Lay-bys have been provided. The curves have been widened for traffic safety and smooth movement of vehicles.

Recommendations:

Protection is required of sites which could cause landslide and damage the road section. For example, Quarry site (0+900), some landslide side zones (eg.7+150), loose rocks (9+530) and debris fall area (10+250) and trees in many sections may create obstruction to vehicular movement and to the road structure.

Photo 19: Chainage 0+900. Quarry site with potential landslide risks.

No side drain was seen along the road. Although not specified in design, drain should be provided in most of the sections. Although there were causeway structures, there were no appropriate road pavement completed in causeway areas for example (1+600, 9+980, and 13+150)

Photo 20. Chainage: 13+150. Lack of adequate cross-drainage creating waterlogging (Observation in December – relatively dry compared to monsoon season).

Pavement surface in certain section were too dusty (eg.1+250, 10+650) and rocky (10+200, 18+200). An appropriate solution should be applied in such areas.

Photo 21. Chainage 10+650. Dusty sections of road.

Bioengineering works should be conserved and maintained. Traffic signs and mile stones should be installed. Widening of road section and provision of lay-bys should be done for movement of big and heavy vehicles. Routine and recurrent maintenance works should be started as the traffic operation has been already started.

Annex 1: Checklist for Technical Assessment

Checklist for collection of information of Completed Roads
RAP3 MEL
Road Name:
Road Length:
Location:
Road section Chainage From: To:

Type of work	Technical parameter to be checked/ensured	Site condition	Remarks
A. Geometry	a. Check and ensure the road width		
	<3.5 m		
	3.5-5.5m		
	>5.5m		
	b. Camber provided or not		
	Yes		
	Not adequately		
	c. Longitudinal Slope (grade) in general		
	0-3%		
	3-7%		
	> 7%		
B. Drain condition	a. Whether side drain is provided or not appropriately according to requirement of site condition		
	Yes		
	Not adequately		
	b. Whether adequate number of cross drainages is provided or not		
	Yes		
	Not adequately		
	c. Side drain integrated with cross drainages or not		
	Yes		
	No		
C. Structures	a. Whether retaining walls are provided is adequate or not		
	Yes		
	Not adequately		
	b. Type of retaining walls (specify section)		
	Dry		
	Gabion		
	Composite		
	c. Construction Quality of structures (Specify section)		
	Good		
	Fair		
	Bad		

D. Road Surface	a. Compaction of Earthwork in excavation/ filling		
	b. Condition of pavement surface		
	Good		
	Rutting		
	Depression		
	unevenness		
	others		
	c. Clearance of obstructions from roadway		
E. Slope Stabilization	a. Use of bioengineering works in required sections		
	b. Other Type of method for slope stabilization used if any specify		
	c. Conservation of cut/disposed materials		
G. Traffic Sign/ safety	a. Road board/ traffic sign/ milestone provided or not		
	b. Road safety structures used or not (specify if any)		
H. Others	a. Spacing of 2 hairpin bends (100m minm)		
	b. Radius of curvature		
	c. Provision of Lay-bys		
	c. Extra widening of curves		
Additional Comments:			

Observations:

-at least one observation within one kilometer of stretch of the road

-at critical sections (heavy cut, unstable areas, hairpin bends etc.) of the road

Annex 2: RAP Responses to MEL Independent Assessment

The table below provides detailed action responses from RAP based on the recommendations provided. Hence, it should be noted that the RAP team have taken adequate measures to respond to technical matters observed by the MEL team.

No.	Recommendation (MEL)	RAP3 Response
Maure-Toli Chhatara District Road (BAJURA)		
General Comments: **The Road was 'substantially completed' just ahead of 2018 monsoon. During monsoon there was some minor settlement of fills and scouring. Post monsoon we remobilised RBG / SBGs to attend to these matters and complete outstanding works recommended by our internal Resilience / Road Safety Audits, the majority of which were done following MEL's inspection and due to finish by mid-Jan 2019.**		
1	Permanent cross drainage structure like minor bridge is required at chainage 0+550 over Malagad River.	Bridges are outside RAP3 scope. Both BAJ roads operate on the basis of fords providing fair weather access outside monsoon. Understood that Municipality is pressing to include this crossing and the main Budiganga River in Provincial Bridges programme.
2	There are existing potential landslide zones due to fragile topography and cutting in the natural slopes where slope stabilization can be done to improve slope stability (For example, 0+900, 11+380-11+420, 14+250-14+270, 16+500)	Overhanging stones and loose material have since been removed from the slide areas as far as possible and we have built a two layer breast wall at Ch 11+380.
3	The retaining structure at chainage 3+850 (about to topple), 5+650, 7+300, 11+520 and 15+800 (bulging) should be replaced or maintained as early as possible as they can cause problems of landslides or road accidents.	We have removed the remaining overhanging wall and done back cutting where the road width was narrow (3+850). At Ch 5+650 and 7+300 provisions are working well with no further rectification needed. The wall at Ch 11+520 has been inspected and no bulge is evident. We have completed rectification of the wall at Ch 15+800.
4	Some locations require causeways, such as at chainage 7+900 (to manage water from kholsi) and chainage 9+120 (to manage tap water).	We have since constructed causeways at Ch 7+900 and placed the HDPE pipe to cross the tap water at Ch 9+120.
5	Eroded debris to causeway should be cleared in a timely manner for proper functioning of causeway. For example, Causeway at 7+630 and 3+200 requires clearance of debris materials.	All landslide and debris have now been cleared.
6	Problems which are in critical stages including seepage from rocks (e.g. at chainage 3+300) and seepage from landslide scarp (e.g. at 4+410) should be properly accounted	We have since installed a HDPE pipe to cross the seepage water.
7	Side drains should be constructed and integrated to cross drainage structures or camber should be provided properly to manage rain water and water from kholsi in most of sections.	We have provided side drains where required and feasible (RAP3 standard approach is for outward sloping roadway except in special cases). 'Finishings' team has since maintained the outward slope throughout the alignment.
8	Bioengineering works should be conserved, maintained and inspected in a	Bio-engineering works have generally faired very well on this alignment and are under the care of RMGs. There may be further opportunity for further minor Bio-engineering

	timely manner until they grow completely to perform all the proposed functions.	works to be conducted by the Municipality but this should be just prior to 2019 monsoon i.e. June / July.
9	As heavy traffic is now in operation, routine and recurrent maintenance works should commence.	Both RAP3 BAJ roads have been under continuous RMG maintenance (2 Groups on each road). Funding will be handed over to Municipality on road Hand-over (budget already provisioned by GoN up to July 2019).
Sanighat Phukot Syuna Shipkhana Road SSDR (KALIKOT)		
General Comments: **The Road was completed and handed over to Raskot Municipality on 31st January 2018. Although RMGs have been applied continuously thereafter under GoN funding, it can be expected that these may need to be supplemented by clearance of any slipped materials following monsoon (through RMGs if small or Emergency Maintenance if larger) plus Specific Maintenance interventions on needs basis. We continue to support the Municipality through TA on these issues. Immediately following monsoon there is inevitably somewhat of a backlog to be performed.**		
1	There is existing and potential minor landslide in the hairpin bends, curve and other locations due to fragile topography and cutting of natural slope. Hence, slope stabilization work should be done to improve slope stability (e.g. 0+500, 0+700, 1+100, 3+600, 3+700, 4+370, 5+300, 6+900, 7+800, 10+010, 11+720, 12+460, 13+060, and 16+320).	Before we handed over to the Municipality, we had completed all outstanding works. The alignment passes through agricultural land. When people start to irrigate to their land, small land-slips are often triggered. Largely this is an ongoing maintenance issue on the part of Municipality who have been advised to plan accordingly (Routine / Recurrent, small Emergency and Specific as per ARAMP norms).
2	Water management structures need to be improved (e.g. 0+100, 2+010, 2+260, 2+310, 4+298, 7+400, 9+817, 10+500, 11+900, 12+400, 13+640, 14+080, 15+680, 15+900, 16+280, 16+815, 17+150).	Most of the alignment passes through agriculture land so while farmers are irrigating their land, existing drainage often becomes choked and clogged. RMGs will attend to this. Additionally as RMGs have continuous input it takes a little while for them to attend to the post-monsoon backlog.
3	Routine and recurrent maintenance activities of road should be performed regularly (e.g. 15+480).	As mentioned above, RMGs have been handed over to the Municipality to take care of these matters.
4	The road safety structures such as delineator post or block is not adequate. More safety structures need to be provided at the required site. (e.g. 9+000, 12+000).	Prior to substantial completion RAP3 conducted a Road Safety Audit of the full alignment by a highly experienced road engineer specifically trained in road safety issues. All the Audit recommendations have been completed including erection of traffic warning signs and gabion barriers at sharp bends. It is not possible to eliminate all traffic risks and generally barriers have not been provided where the side-drops aren't severe or the bend is not acute.
5	Traffic sign and milestone blocks need to be maintained (e.g.0+000, 4+000, 8+200, 9+817).	Traffic warning signs have suffered vandalism from bored youths / school children (they have managed to peel off some of the black legends). We have agreed a rectification whereby the legends are reapplied by stencil and black enamel paint. At the same time the milestone blocks will have legends applied (programmed in mid-Jan 2019).
Gamgadhi Daina Dulachaur Road GDDR (MUGU)		
General Comments: **Although the Road was open to traffic and 'substantially complete' at the time of MEL's inspection, we have continued working on 'finishing' aspects with work Groups engaged up to the 1st week of Jan 2019.** **During last week of Dec 2018 we conducted Resilience and Road Safety Audit of this road and that team was also passed a copy of MEL's report. The Audit is not expected to have major findings (as findings from similar Audits on our other roads have already been incorporated) but we will attend to anything pressing under remaining RAP3.**		

1	Protection is required of sites which could cause landslide and damage the road section. For example, Quarry site (0+900), some landslide side zones (eg.7+150), loose rocks (9+530) and debris fall area (10+250) and trees in many sections may create obstruction to vehicular movement and to the road structure.	Further protection work has been done by construction of Gabion Breast walls in many sections. Budget limitations have limited the scope of gabion breast wall construction in non-essential areas. Slope trimming and removal of overhanging/outcropped boulders etc. has now been completed in critical sections. Fallen debris have been removed from the road.
2	No side drain was seen along the road. Although not specified in design, drain should be provided in most of the sections. Although there were causeway structures, there were no appropriate road pavement completed in causeway areas for example (1+600, 9+980, and 13+150)	RAP3's construction approach is to construct outward sloping pavements in preference to side drains except in special cases (e.g. steep gradients / waterlogging, etc.). This final trimming of pavement slope has now been completed. Most of GDDR section is rocky resulting in a granular road surface. Generally this does not require DS drain as suggested. Dry stone causeways have been constructed in perennial Khola/Kholsi. This was verified in safety and climate resilience audit conducted by TMO.
3	Pavement surface in certain section were too dusty (eg.1+250, 10+650) and rocky (10+200, 18+200). An appropriate solution should be applied in such areas.	Dusty pavement sections have now been filled by granular material founded near site. In rocky sections oversized material has been removed.
4	Bioengineering works should be conserved and maintained. Traffic signs and mile stones should be installed. Widening of road section and provision of lay-bys should be done for movement of big and heavy vehicles. Routine and recurrent maintenance works should be started as the traffic operation has been already started.	Bio-engineering work was done during last three years in appropriate locations. But fertilisation rate is very low in Mugu, so could not be achieved fully as planned. Inventory of Traffic signs has been sent for procurement and is ongoing. Lay-bys are not geometrically shaped, but vehicles can pass adequately in road sections of increased width. RMGs have been formed for routine/recurrent maintenance. Budget is allocated from Province for RMG work and is in process to mobilise.