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DFID Nepal Rural Access Programme 3  
Monitoring, Evaluation and Learning Component  
**LOCAL ROADS NETWORK (LRN) REVIEW**

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Submitted by Itad

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## Acronyms

ADB	Asian Development Bank
ARAMP	Annual Road Asset Management Plan
ARMP	Annual Road Maintenance Plan
CIM	Continual Improvement Matrix
DDC	District Development Committee
DDF	District Development Fund
DFID	Department for International Development (UK)
DoLIDAR	Department of Local Infrastructure Development and Agricultural Roads
DoR	Department of Roads
DRCN	District Road Core Network
DRR	Disaster Risk Reduction
DTO	District Technical Officer
DTMP	District Transport Master Plan
EIA	Environmental Impact Assessment
GoN	Government of Nepal
LRIP	Local Roads Improvement Programme
LRN	Local Roads Network
MoFALD	Ministry of Federal Affairs and Local Development
NRs	Nepali Rupee
NRSAS	Nepal Road Sector Assessment Study
RAI	Rural Access Index
RAP	Rural Access Programme
RBG	Road Building Group
RMG	Road Maintenance Group
RBN	Roads Board Nepal
RTI	Rural Transport Infrastructure
SNRTP	Strengthening the National Rural Transport Program
SRN	Strategic Roads Network
SWAp	Sector Wide Approach
TA	Technical Assistance
UC	User Committee
VDC	Village Development Committee
VFM	Value for Money

## Executive Summary

Itad has been commissioned by DFID to undertake a review of Local Roads Network (LRN) component of Rural Access Programme Phase 3 (RAP3). The objectives of the LRN review are to: a) develop a quantitative analysis of RAP3 LRN delivery through a detailed assessment of a minimum number of relevant road stretches; b) assess the effectiveness of current RAP3 LRN approaches in a sample of RAP 3 districts in delivering results and value for money; c) develop recommendations on the future effective delivery of the RAP3 LRN component.

The report is structured into three sections: 1) LRN field visit analysis; 2) Assessment of RAP3; and 3) Future Directions for RAP3 and Recommendations. The review team visited 162 km of roads in six districts, and although it was not possible to quantify the change in road condition resulting from RAP3, a wide range of observations relating to maintenance and construction, planning and the management of the programme were reported. Overall it was found that RAP3 was very effective in meeting its objectives of providing access and employment for the poor. The review is supportive of continuing and extending the programme and a range of recommendations are made.

The review was led by a team of three consultants: international consultant John Hine, and two national consultants Indu Sharma Dhakal and Kamal Pande. The team was supported by two full-time RAP3- MEL staff Vishal Gadhavi and Navin Subedi.

## Section 1: LRN Field Visit Analysis

### 1. Overview

The LRN Review team's task was to assess how effectively the LRN component is being delivered by RAP3 by sampling a representative number of districts and road stretches (in maintenance and construction) in the programme. The team sampled 6 out of 14 RAP districts for field work (a separate methodology outlines this in more detail) and visited road stretches in 2 pilot maintenance districts, 2 core maintenance districts and 2 core construction districts. In total, 162 km on 23 roads were visited, representing 8% of the total length of roads under RAP (see Table 1 for details).

The number and kilometre length of sampled road stretches are a statistically representative sample of RAP implementing districts with the exception of the Terai. The review team were unable to visit the planned district Morang, due to political disturbances connected to Nepal's recently drafted constitution. However this presented the team with an opportunity to visit the district of Sindhupalchowk that was badly affected by the recent earthquake.

A quantification of the current condition of road surfaces sampled is provided in Table 2. However in view of the lack of detailed historical data, together with the wide annual fluctuations and surveying during the monsoon period, it was not possible to quantifiably assess the change in road condition resulting from the LRN maintenance programme. The findings in the main body of the report relate to the field observations and cover road engineering, institutional issues and social considerations. All these aspects combined determine the effective delivery of the LRN in the mode outlined by RAP, which is to deliver high quality and sustainable rural roads with maximum poverty-reducing benefits.

### 2. New Construction

The review team visited the districts Bajura and Kalikot under new construction. The team looked specifically at technical-engineering issues to determine if road construction was adhering to engineering specifications. The team also looked at wider issues related to the effectiveness of RAP3 approaches, for example including assessing the participation of women in the RBGs and applying Disaster Risk Resilience (DRR) and climate proofing approaches as much as possible. The following observations refer specifically to construction.

#### 2.1 Engineering

The alignment selection and road geometry for new roads appears to be appropriate. The consistency of measurements between different contracts has been well maintained. The review team recognises this as being a difficult task to coordinate, given the scale of RBG contracts. The design of horizontal and vertical curves are within DoLIDAR's standards, and the maximum average gradient is limited to 7%. The road cut slopes are well maintained and a camber is provided on one side of the road. Bio-engineered slope protection is in place using indigenous plant species, and tree planting activity exists on the downward slopes to provide a natural safety barrier. Dry stone and gabion walls are used for retaining structures and the locations were found to be appropriate, the stones placed were of good quality and backfill materials were appropriate and well compacted.

#### 2.2 Road Building Groups

The selection of RBG members was transparent and the level of participation of women was around one third. All RBG members that the team talked to said that wages were equal between men and women and that they received their wages in a timely manner. People in the road-building communities, not directly involved in RBG activities, expressed strong interest in becoming a member

of a RBG, which demonstrates positive perceptions and a level of prestige for these groups. A public hearing audit on the Bajura-Kailasmandu Road was well attended by RBG members.

### 2.3 Noted Issues

- More passing zones should be provided approximately every 200 metres for smooth traffic movement. This is not currently provided.
- Further provision of road side drains should be considered.
- Bio-engineering slope protection using indigenous plant species could be enhanced.
- The construction progress at the far end of the in-construction road is comparatively better than the road section close to the existing road head. It appears that remotely located road building teams are better motivated than those in more accessible locations.

## 3. Maintenance

The team visited 4 maintenance districts in the pilot and core working areas (Sindhupalchowk, Parbat, Accham and Jumla). The LRN review recognises that there is little or no distinction between core and pilot maintenance districts in operational terms. The findings can similarly be broken down by engineering observations and social issues that relate to delivering maintenance works. These are undertaken through the Road Maintenance Groups (RMGs), User Committees (UCs) and local contractors.

### 3.1 Engineering and Quality of Works

RAP3 has the task of maintaining roads that were not constructed to proper geometric standards prior to being handed over to RAP3 and this was reflected in the field surveys. With a few exceptions the roads surveyed did not meet proper engineering standards, such as excessive gradients, horizontal curves which did not meet the required standard of the minimum radius of curvature, poor sight distances and inadequate passing places. The roads were built either by local people or other agencies to a non-engineering standard and hence these deficiencies are inherited. This issue is a key cost driver for expenditure on specific maintenance in order to make the roads maintainable in the first instance.

The total length of the District Road Core Network (DRCN) in the 14 RAP3 districts is 3,318 KM. The breakdown is 72% earthen, 23% gravel and 5% black top/paved. Around 90% of the roads surveyed by the team were earthen, the remaining were gravel. A larger proportion of gravel roads are in the Terai, which the team did not visit, hence accounting for this minor discrepancy. Specific maintenance was mainly limited to construction of retaining structures, drainage and stone soiling to reduce damage and increase traction on steep gradients. Earthen side drains and reinforced concrete (RCC) pipe culverts are commonly used for drainage management but the provisions are not sufficient for the entire stretch of roads examined. In some instances the earthen drains were not functioning. However stone soiling is generally of a good standard preventing the further deterioration of the surface and allowing water drainage and build-up of pavement strength. Gabion walls are used for retaining structures. The selection of locations were appropriate, stones were of good quality and backfill materials were of good quality and well compacted. Overall their condition is good. Heavy loaded vehicles were noticed plying the roads in Parbat and Jumla.

### 3.2 Road Maintenance Groups

The review team observed routine and recurrent maintenance conducted by the RMGs. Emergency, specific and periodic works are carried out by contracting companies or by User Committees (UCs) where the scope is beyond the capability of the RMGs. The combination of RMG and specific maintenance works has contributed to increased passability, lower incidence of landslides, and in the case of RMGs the biggest contributing factor is clearing water flows. Where small streams cross the

road, the RMGs have contributed to maintaining conditions that allow vehicles to pass on these stretches and helped to prevent adverse effects on farmland.

The targeting of poor households to work in RMGs is sound. Approximately a third of members observed in the groups were women, and there appears a high inclusion of Dalits and disadvantaged groups. RMGs were well equipped with correct tools and trained to clear roads in basic routine and recurrent maintenance works. RMG members expressed satisfaction with the timeliness of wage payments. The current allocation of RMG input per road km is based on a common standard. However it would be better if the level of input could vary according to the maintenance need. For example a higher labour input is required in dealing with roads passing through paddy fields in valley bottoms.

In some districts Emergency and Specific Maintenance works below a given threshold (usually NRs 6 million) is allocated to local User Committees, although approaches between districts varies considerably. In Sindhupalchowk, the threshold was NRs 4 million, in other districts the User Committees may be thin on the ground, with work mostly being given to contractors, while in Jhapa and Dadeldhura there are no User Committees. The District Development Committee (DDCs) appoint the committees to undertake the work and there is some effort to ensure that the committee is representative of different communities residing along the road, with some female participation. Work may be undertaken by members of the Committee or by others. In Jumla in 2014 there were 405 workers employed by UCs, with an average of 38 worked days per worker. The DDCs procure materials and equipment, however the process is sometimes slow. Increased supervision and intensive input of RAP3 technicians are required to ensure progress and quality. It is sometimes difficult to convince UCs over quantity based payments, and this in all likelihood relates to their levels of experience and education. Overall the field survey was not able to distinguish any difference in the quality of work between contractors and User Committees.

Contractors complain that DDCs sometimes avoid competitive tendering by allocating work to the User Committees and this work, in turn, may be handed straight to a contractor. However under RAP3 there was also a recognition that UCs provide work for poor local communities. Local cooperation of roadside communities with contractors tends to be weaker than with UCs. There are also concerns that local 'Class D' Contractors do not have experienced technicians and it is recommended that proper training of contractors and staff is necessary.

The Nepal Road Sector Assessment Study (NRSAS) has advocated a greater use of private sector and contractors and reducing the role of User Committees. In general RAP supports this guidance, and there is some evidence that districts have improved their competitive bidding and have reduced the role of User Committees. Nevertheless RAP have recognised the speed advantage of using UCs and have not imposed any restrictions on DDCs. They have allowed the DDCs to formulate the choice in their 'implementation plans' depending on the District experience and preference to date.

#### 4. Institutional Arrangements

The RAP3 technical assistance team have a good working relationship with the DDCs through the Technical Assistance (TAs) embedded in the DDC offices and are supporting the Sector Wide Approach (SWAp) implementation in those districts. RAP3 has established good monitoring and procurement practices in DDCs and have a good level of oversight. RAP3 commands a high level of respect in the district administration hierarchy and is generally viewed in a very positive light. In particular, training to government staff has been appreciated. The common objective of preserving the road assets in the maintenance districts was well understood by DDCs. Overall, RAP3 has contributed to strengthening district implementation systems.

## 5. Sustainability Challenges

In all cases for RBGs and RMGs, employment in the groups is welcomed because of the security of wages and the skills provided through training. In some instances, it was noted that some RMG members had worked on similar cash-for-works programmes in earlier years. When prompted about what they would do when RAP3 finishes, many RMG members expressed their hope that RAP would continue as the work was better than other opportunities available in their respective local communities.

The transport fare on public buses was felt to be unaffordable to the poor, and some members from the local communities stated they prefer to walk to the road end. The inability to ply the road in the monsoon season places a higher burden on maintenance works on RMG members during this time. However it is recognized that better access, with roads open longer to traffic, has wider benefits for the whole community in better functioning of markets, health and education.

**Table 1: Number of Roads Sampled**

RAP3 District	No of Roads Visited	Total Length Km	Visited Length Km	Causes of impassability
<b>Bajura (Core Construction)</b>	2	27	14	N/A
<b>Kalikot (Core Construction)</b>	1	18	18	N/A
<b>Jumla (Core Maintenance)</b>	6	45	32	Landslide & River Crossing
<b>Achham (Core Maintenance)</b>	4	92	38	Landslide & River Crossing
<b>Sindhupalchowk (Pilot)</b>	2	40	16	Landslide & River Crossing
<b>Parbat (Pilot)</b>	8	80	44	Landslide & River Crossing
<b>Total</b>	<b>23</b>	<b>302</b>	<b>162</b>	



**Table 2: Condition of sampled road stretches and KM observed for Maintenance Districts**

District	Name of Road Visited	Code	Total Length Km	Surface Type	Surface Condition	Remarks
<b>Parbat (Pilot)</b>	Kushma Halhale	44DR008	11.52	Gravel+ Earthen	Fair	
	Padam Kholsi-Sarunchaur	44DR009	1.44	Earthen	Fair	
	Dovila-Cyclechowk-Phalebas	44DR014	16	Gravel	Fair (90%); Poor (10%)	
	Silmi-Thulipokhari	44DR017	13.43	Earthen	Fair (80%); Poor (20%)	Landslides
	Armadi-Bhatebari Banau	44DR006	12.58	Earthen	Fair	
	Bagaicha-Badahare	44DR007	2.69	Earthen	Fair	
	Patichaur-Bajung-Kyany	44DR010	14.46	Earthen	Fair (80%); Poor (20%)	Landslides
	Dimuwa-Dakar-Chitre	44DR013	7.44	Earthen	Fair	River
<b>Jumla (Core)</b>	GachhusanguLekpor-Kotghar	63DR007	15.47	Earthen	Fair (80%); Poor (20%)	Landslides
	Jumla-Upallo Rana	63DR008a	5.47	Earthen	Fair	
	Upallo Rana-Urthu-Khali	63DR008b	12.08	Earthen	Fair (80%); Poor (20%)	River
	Urthu-Dillichaur Lamri	63DR010	6.09	Earthen	Fair (80%); Poor (20%)	River
	Dillichaur-Chumchaur	63DR011	8.87	Earthen	Fair	River
	Bagbazaar-Patharkhola	63DR001	2.62	Earthen	Fair	
<b>Achham (Core)</b>	Timilsen-Ramarosan	69DR016	16	Earthen	Fair	River
	Mangalsen-Chitre	69DR011	12.50	Earthen	Fair	Landslide
	Kirtikhan-Lungra	69DR003	3.5	Earthen	Fair	
	Mangalsen-Ollgau	69DR017	6	Earthen	Fair	Landslide
<b>Sindhupalch owk (Pilot)</b>	Barhabise-Budhepa	23DR032	10	Earthen	Fair	Landslides
	Melamchi-Tipeni	23DR005	30.56	Earthen	Fair (80%); Poor (20%)	River

## Section 2: Assessment of RAP3

### 1. Overview

The LRN component of RAP3 (GBP 19m) is one of several major programmes operating in Nepal to improve rural road infrastructure. RAP is an infrastructure led poverty reduction programme and the LRN component is designed to help alleviate poverty through:

- a) Creating employment for the poorest sections of the population, including women.
- b) Providing access particularly in remote areas.
- c) Improving planning and the delivery of road maintenance and construction.

Other programmes include:

- The SNRTP (\$100m donor financing for 36 districts) led by the World Bank.
- The Asian Development Bank (ADB) has lead both the RRRSDP (\$131m donor financing is now closed but GoN works continues in 20 districts) and the DRILP-AF (\$52m donor financing for 18 districts). The LRIP is a bilateral donor funded programme (\$32m donor financing for 4 districts).

RAP3 currently works in 8 'Core' districts in the Mid and Far West with 4 districts concentrating on new construction and 4 districts on maintenance together with 6 'Pilot districts' (maintenance only) that are spread across Nepal. There are significant overlaps with the RAP3 programme working in districts supported by other programmes. Although there are similarities of objectives, the other programmes are more focused on providing infrastructure while RAP3 has a greater emphasis on creating employment and using labour intensive technology for both new construction and road maintenance.

### 2. Delivering Benefits to the Poor

In working in the Mid and Far West and the more mountainous parts of Nepal the Core districts of RAP3 have targeted some of the poorest and most remote districts in Nepal. By September 2015, 1.88 million person-days of employment have been generated. The poorest are selected for working in the Road Building Groups (RBGs) and Road Maintenance Groups (RMGs). A forthcoming DFID sponsored Systematic Review of research on the impact of rural road investment (Hine et. al. 2015) suggests that rural road investment, particularly in areas of low road density, will strongly promote economic growth and reduce poverty. It is also widely recognised that rural isolation is a key characteristic of poverty hence the programme should, overall, help to reduce poverty in both the short term (through employment) and in the long term. Approximately 40% of the RBG members are women. Dalits and ethnic groups make up 26%. For RMGs, approximately 41% are women; and 26% are Dalits and ethnic groups.<sup>1</sup>

### 3. Engineering

#### 3.1 Road Maintenance

The RAP basic maintenance philosophy for low volume earth roads is to provide basic access rather than higher standard smooth road surfaces. This is a sensible and economical approach for most low

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<sup>1</sup> RAP3 MIS database

traffic district roads. However where traffic volumes are higher, as in the Terai, gravel surface maintenance is undertaken. The quality of maintenance work undertaken was found to be satisfactory.

The field surveys were not able to assess any significant change in the quality of road surfaces in the two years of RAP maintenance. This was because of a relatively crude level of classification within the records (i.e. good/fair/poor, rather than detailed road roughness measurements), surveying in the late monsoon period, combined with the natural annual variability and the localised disruptive effects of the recent earthquake. The biggest effect on road surfaces would certainly have been noticed in the Terai districts (Jhapa and Morang) where major periodic maintenance works and improvements were undertaken. However we were unable to visit this area because of the disturbances mentioned earlier.

Local officials have suggested that under the RAP3 programme, there has been a reduction in the frequency of roadside landslides compared with previous years. There is also data to suggest that for some districts, there has been a substantial decline in the incidence and length of road closure. For example in Morang, the length closed was reported to be 111 km in 2011, 106 km in 2012 and 48 km in 2014. Similarly aggregated days of closure on different roads was 300 days in both 2011 and 2012, and 50 days in 2014.

The RMGs have assisted with maintaining vehicle passable conditions at rivulets/small streams, filling potholes, clearing of vegetation encroaching the road corridor and clearing small land slips. Cleaning of side drains is given priority before and during rainy season. Larger work undertaken by User Committees and Contractors has assisted with emergency and specific maintenance, the clearing of larger landslides, the construction of gabions and building stone pavements on steep gradients. The overall reporting mechanism is good and, with increased regular maintenance, the specific maintenance requirements appear to be reducing.

The current level of RMG labour maintenance input (per km) is based on common standards applicable to all roads. However this could be adjusted according to the specific maintenance requirements based on the nature of terrain and the road profile (crossing farm land or water channel). Maintenance categories are well defined and the order of priority according to available budget are emergency, routine, specific, periodic and improvements. DDCs with the help of District Transport Master Plan (DTM) and Annual Road Asset Management Plan (ARAMP) are now in a position to efficiently allocate the fund and prioritize the maintenance of the district road core networks. Safety training and safety equipment are provided to all RMGs and workers are insured against accidents.

### 3.2 New Construction

The design of new construction is good and the design of structures and earthworks is appropriate. The quality of new construction undertaken by the RBGs is good and satisfactory. Road slope cuttings are generally in line and level. The design of retaining structures are appropriate and the use of machine made gabion boxes are of good quality. Selected sound stones are used in retaining structures, and backfill materials are generally good and well compacted.

The packaging of three RBGs per km (on average) is satisfactory. Cost estimates (taking account of gender participation and equal wages) is satisfactory. The technical implementation and management is good, both for in house RAP engineers (e.g. in Bajura) and by consultant (e.g. in Kalikot).

A labour based 'green road' approach has been adopted and hence the negative environmental impacts have been kept to a minimum, for example with regard to the felling of trees. The programme includes the scope of bioengineering and tree planting activity in the down slopes to provide a natural safety barrier against vehicular roll-off.

Technical and safety training provided to RBGs is useful. Operational safety gear is provided to each RBG and is monitored. All RBG members are insured in case of accidents. A feeling of ownership for the roads has been created. From the latest household survey of RMGs in 2015, 62% of survey respondents were aware of their insurance provisions and 99% of member had received at least one of the two mandatory training courses. The mean time for workers to reach their work site was less than one hour.<sup>2</sup>

### 3.3 Implementation Progress

Implementation progress has been good with key LRN log frame targets (for example employment days generated) having been met. It should be possible to improve the LRN Delivery Cycle by extending the present average working months of 7 months and by introducing competition among RBG by giving additional contracts based on early completion.

## 4. Organisation and Coordination

RAP maintains good relationships with key stakeholders including the Department of Local Infrastructure Development and Agricultural Roads (DoLIDAR), district officials, communities, work groups, DFID and other LRN donor programmes. Although concern has been expressed (in Kathmandu) over how it can manage a diverse programme across the country, these concerns were not raised in discussions with local officials. Key factors in the success are: RAP3 engineers working directly in local offices; the use of the Continual Improvement Matrix (CIM) for identifying progress of the districts; and the three-fold management approach to dealing with problems (i.e. at the district, at an intermediate level, and by a senior management group).

## 5. Value for Money (VfM)

The emphasis on maintenance through the 'Maintenance First' approach is well recognised as being extremely cost effective, giving very high returns in comparison with letting roads fail and subsequent reconstruction. In addition the labour based approach provides much needed employment opportunities.

Regular maintenance of roads has reduced the risk of losing marginal farm land due to landslides. There is a higher cost of construction and maintenance (compared to other rural road construction) but the additional cost has been compensated for by: equal wages to women, minimum damage to the environment, preserving traditional skills and knowledge (tools made and repaired in villages), increasing awareness among females (increased incidence of females owning more immovable assets like land), and market credit worthiness of the RBG established and widened.

The main VfM concern for RAP3 relates to the delay (by the Department of Roads) in connecting up newly built isolated roads to wider road network.

## 6. Governance

The RAP planning and management process (involving DTMPs and ARAMPs) maintains strict prioritisation of project works, which helps to keep political interference to a minimum. Regular social audits, public hearings and display boards (which include funding, volume of work and time frame of works information) at the work sites appear to make people aware of the programme. Periodic

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<sup>2</sup> RMG Household Survey June 2015, conducted by MEL

monitoring by district level stakeholders committees have been important tools in creating transparency and addressing conflicts. The Public Procurement Act and Regulations (2007) appear to have been followed. The local media have also played a part in highlighting the cases of poor governance. RAP3 supports the DDC/District Technical Officer (DTO) in planning, technical, financial and institutional aspects. At the district level, the DTMPs have provided a useful tool for decision-makers to allocate limited resources which in turn could contribute towards promoting a culture public accountability.

## 7. Payments

Payments to RBGs appear appropriate, transparent and for the most part timely. Harmonization of payment practice between DDC/DTO and RAP3 should be improved to avoid possible delays in payment to contractors.

## 8. Planning and Prioritisation – Putting Maintenance First

Key documents used for planning and prioritising interventions are the 5 year DTMP and the ARAMP. The DTMP focusses on the DRCN connecting village headquarters to the District headquarters and the Strategic Road Network (SRN). The Government of Nepal has accepted that the DTMP should be the main basis for road interventions in all districts. Prioritisation is based on a costs per head of affected population, while traffic volumes are used to identify when widening or paved road surfaces should be built.

Although the DTMP ranking approach is relatively crude, it is easy to apply, transparent and gives a useful overall basis for planning and providing access to the bulk of the population. The districts can focus on providing and maintaining this network while the Village Development Committees (VDCs) take responsibility for village roads. RAP2 assisted with simplifying the DTMP while RAP3 has helped provide 31 DTMPs to Districts across Nepal.

The ARAMP is a development of the Annual Road Maintenance Plan (ARMP) and draws on information (including road preservation, improvements and new construction) from the DTMP. It was developed and trialed by RAP3 in the Pilot Districts. It puts forward and prioritises an integrated maintenance and investment programme for each district (also referred to as a Sector Wide Approach or SWAp). Different maintenance activities are identified and prioritised on the following basis:

1. Emergency maintenance
2. Routine/Recurrent maintenance
3. Specific Maintenance
4. Periodic Maintenance
5. Improvements
6. New Construction

Work on each road is then prioritised for the first four categories on the basis of cost per vehicle (on a standardised basis). For improvements and new construction, work is prioritised by costs per head; however there are good grounds for arguing that improvements should be prioritised on a measure of traffic,. Within the procedure, annual budgets must first meet all emergency maintenance needs. Left over funds are allocated to routine and recurrent work; anything remaining is spent on specific maintenance. Finally new construction should only take place once all identified maintenance and improvements have been met.

The prioritisation of maintenance work in this way is sensible and consistent with standard maintenance planning, including the road planning model Highway Development and Management Software (HDM4). Hence for gravel roads, because of the high cost-benefit returns, there are grounds for including grading as 'recurrent' maintenance and not as 'periodic' maintenance. However, there are clearly cases where new construction, including bringing access to remote areas will give higher

returns per Rupee spent than for some components of periodic maintenance and improvements. Hence while the approach may be sensible within districts, it will not necessarily be the case that improvements in one district should score more highly than new construction in another. Nevertheless the procedure is relatively simple and transparent and helps emphasize the need for maintenance that has so often been lacking in Nepal in the past.

It is recognised that there are current weaknesses in the prioritisation of bridge investment (National Bridge Programme for Local Roads, 2014). While it may be sensible to include bridges as part improvements to significant road lengths within the DTMP/ARAMP framework, individual bridges (as part of an isolated bridge programme) cannot be sensibly planned in this way because the usefulness of the bridge in providing all season access will also be dependent on the quality of the associated road. This issue needs to be addressed in RAP3 if it is to take on a significant stand-alone bridge construction programme.

Another weakness of the DTMP is that insufficient attention is given, when prioritising investment, to ensure that isolated roads are quickly linked to the wider road network. Prioritisation procedures in other countries often insist that new roads must connect to the network. The RAP3 programme has encountered this problem and there are likely to be substantial delays before two roads in Humla are connected to the network and the full benefits realised.

## 9. Compensation and Land Transfer

During the field visit complaints were made that, in line with Government Policy, compensation is not paid to land owners and farmers who have their land taken for rural road use. An example was found where a land slide had taken the road away together with part of a farm. If a new road diversion is constructed then further land will be taken from the farmer. RAP is currently working with GON to address this issue.

## 10. Innovative Solutions

RAP has had a very good record of seeking out and adopting innovative solutions, particularly with regard to planning and management. Because of its close relationships with DoLIDAR, Districts and DFID it is able to respond flexibly to issues as they arise.

Examples include:

- Improving and providing DTMPs.
- Developing the 'Maintenance First' ARAMP approach, which is incorporated into a SWAp.
- RAP has substantially reduced the cost of District Transport Master Plans from £35,000 to £7,000.
- The adoption of the CIM to help monitor District performance, together with other results indicators.
- Developing the Road Maintenance Group (RMG) approach for Nepal.

When it was found that consulting companies gave poor results, a new approach was adopted whereby engineers were recruited and employed directly. An internship programme has also been introduced for new graduates. So far this approach has worked well.

There are currently serious concerns about the delays in contracting physical works. Contract tenders can only be called once work has been surveyed, quantities calculated and specifications drawn up. This often means that work cannot start until April. If an alternative approach was adopted (as now proposed by RAP3) where contracting companies specified their schedule of rates in advance, then work could start much earlier, in say the previous November.

## 11. Funding

In the first year of the programme (2013), RAP3 provided the major source of LRN funds for many districts, for example accounting for up to 90% of total funds in Dailekh. For 10 districts RAP3 accounted for 59% of total funding, including other donors. During the first year, very substantial flows went to the large pilot districts such as Jhapa and Morang where all routine, specific and periodic maintenance funding was met and the remaining funding went to improvements.

In 2014, the overall RAP3 funding was substantially reduced compared with 2013, and was reallocated away from Pilot towards Core districts. (It may be argued that the requirements for specific maintenance were likely to have been substantially reduced in some of the Pilot districts following the heavy expenditure in 2013.) Nevertheless, for Morang, the 2014 allocation accounted for about 6% of previous RAP funding (excluding the carry over for a small amount of RMG funding). Obviously these big fluctuations in funding can lead to difficulties in managing the flow of work, in relations with districts, and, in accordance with the set planning criteria, interfere with achieving the most optimal use of funds. Table 3 details funding allocation for each RAP district in the last two UK fiscal years.

**Table 3: Funding for the District Road Core Network (UK fiscal year)**

District	2013/2014					2014/2015				
	GoN	DFID	Others	Total	% of DFID Funding	GoN	DFID	Others	Total	% of DFID Funding
<b>Morang</b>	35,075,500	204,000,000	63,100,000	<b>302,175,500</b>	67.5%	19,815,000	12,300,000	35,500,000	<b>67,615,000</b>	18.2%
<b>Sindhupalchowk</b>	42,500	53,000	1,290	<b>96,790</b>	54.8%	8,900,000	5,200,000	51,770,000	<b>65,966,791</b>	7.9%
<b>Jhapa</b>	27,080,000	12,979,000	174,100,000	<b>214,159,000</b>	6.1%	39,201,000	8,500,000	0	<b>47,701,000</b>	17.8%
<b>Sunsari</b>	17,250,000	100,000,000	115,000,000	<b>232,250,000</b>	43.1%	5,623,750	11,200,000	26,200,000	<b>43,023,750</b>	26.0%
<b>Parbat</b>	4,325,000	116,000,000	12,000,000	<b>132,325,000</b>	87.7%	5,290,000	12,200,000	7,700,000	<b>25,190,000</b>	48.4%
<b>Achham</b>	5,542,000	96,000,000	8,827,000	<b>110,369,000</b>	87.0%	9,300,000	48,000,000	2,000,000	<b>59,300,000</b>	80.9%
<b>Dailkeh</b>	7,050,000	104,400,000	4,790,000	<b>116,240,000</b>	89.8%	7,043,000	21,900,000	2,778,000	<b>31,721,000</b>	69.0%
<b>Doti</b>	7,642,000	65,000,000	8,800,000	<b>81,442,000</b>	79.8%	9,600,000	28,800,000	0	<b>38,400,000</b>	75.0%
<b>Dadeldhura</b>	2,160,000	80,000,000	11,500,000	<b>93,660,000</b>	85.4%	3,425,000	37,400,000	2,500,000	<b>43,325,000</b>	86.3%
<b>Jumla</b>	22,909,000	60,000,000	151,583,000	<b>234,492,000</b>	25.6%	54,114,596	13,000,000	89,308,382	<b>156,422,978</b>	8.3%
<b>Humla</b>	1,700,000	117,618,000	44,000,000	<b>163,318,000</b>	72.0%	0	82,810,000	55,920,000	<b>138,730,000</b>	59.7%
<b>Mugu</b>	15,600,000	30,000,000	78,000,000	<b>123,600,000</b>	24.3%	15,665,000	90,500,000	86,324,000	<b>192,489,000</b>	47.0%
<b>Kalikot</b>	15,000	0	22,700	<b>37,700</b>	0.0%	7,830,000	123,332,000	95,457,000	<b>226,619,000</b>	54.4%
<b>Bajura</b>	8,000,000	43,000,000	105,700,000	<b>156,700,000</b>	27.4%	3,200,000	92,000,000	88,600,000	<b>183,800,000</b>	50.1%

**Notes:**

- All computation based on ARAMP of respective fiscal year.
- GoN funding includes MoFALD direct funding, DDC internal funding, GoN RAP3 matching fund, VDC grant and peoples' participation.
- DFID funding includes (RAP3 and KEPTA where possible). Figures for DFID/RAP3 for Year 2 exclusive of carryover from previous year.
- \*Others include funding received from donors other than DFID (RAP3).



## Section 3: Future Directions of RAP3 and Recommendations

### 1. National Trends and Issues

The economic and social conditions in Nepal are changing fast. Over the last 20 years there has been a substantial rise in per capita incomes, food production per head, and life expectancy. The poverty rate has fallen from 53.1% in 2003 to 23.7% in 2014. However the poverty rate in 2014 was estimated to be 45% in the mid-west and 46% in the far west, with the RAP3 Core districts amongst the poorest in the country. In addition it was estimated by one GoN source that the April 2015 earthquake may have caused the poverty rate to rise by between 2.5% to 3.5%. The RAP3 Sindhupalchowk district was particularly hard hit.

Vehicle populations have also grown at a fast rate, reportedly by 13 fold in the 20 years to 2010, with a total of 1 million vehicles of which three quarters are motorcycles. A recent estimate gave a vehicle population growth at 18% per year (Nepal Road Sector Assessment Study, 2012). The mid-western and far-western regions reported having the smallest vehicle population. During the last 10 years, petrol imports to Nepal have risen 226% while diesel has risen by 139%, equivalent to annual growth rates of 12.5% and 9.1% (Nepal Oil Corporation website).

Until recently Nepal had a very low road density (0.11 km/sq km in 2002). In 2004 it was estimated that only 30% of the rural population had access to an all-season road. Over many years there has been strong political pressure to increase the coverage of the network, and provide access to remote areas, with less attention being given to maintenance. In 2012 it was estimated that the road density had increased to 0.48 km/sq km. A recent survey suggests that there may be as much as 60,000 km of rural roads but most are not motorable (NRSAS, 2012). The new emphasis on the LRN Road Core Network, (approximately 23,000 km), put forward by the DTMP and ARAMP documents, enables district maintenance resources to be concentrated on keeping the most important district roads open to traffic.

### 2. Sustainability of RAP

As with all donor programmes there are natural concerns over the long term sustainability of the programme. Under the Capacity Building and Institutional Development component, RAP3 has undertaken a great deal of training, substantially exceeding targets. The widespread and close interaction with district officials has helped establish the rationale of the approach.

In the long term, financial sustainability will depend on the buy-in of the GoN and local stakeholders. The need for maintenance is now accepted much more than before. With the future growth of incomes and reduction in poverty rates, the need for poverty reducing programmes should in theory, in the long term, reduce. However, rates of poverty reduction in the mid and far West of Nepal have been much slower, and aid programmes should continue to target the most persistent pockets where poverty remains rife.

In terms of funding, although the Roads Board Nepal (RBN) currently only provides a small component of district LRN funds, over the very long term, provided the fuel levy per litre remains the same in real terms, then with the fast rate of growth of fuel consumption, it will gradually be able to fund an increasing proportion of the maintenance needs of the LRN Core network. This is because the Core network will now grow relatively slowly, and a substantial amount of maintenance is length, rather than traffic, dependent. However other funding support for maintenance (including from donors) will still be required for the foreseeable future.

RAP3 is a low-cost basic access approach that should provide long term social and economic benefits and be technically and environmentally sustainable. It promotes social equity through the emphasis of new construction in some of the poorest districts in Nepal and by providing employment to some

of the poorest sections of the population. By addressing critical accessibility issues, there is good reason to believe the programme will provide long term economic benefits to the population. The approach is technically and environmentally sustainable by relying on local people and local materials, using a 'green road' approach which keeps disturbance to the environment to a minimum.

The strong emphasis on maintenance, bio-engineering, and being prepared to deal with issues as they arise is. For low volume roads, this an approach is best suited to deal with risks of climate change, earthquakes and landslides.

### 3. A Possible Extension to the LRN Programme

A possible extension of the RAP3 programme, beyond 2017, is being discussed with DFID. Components might include continued basic maintenance in the Pilot and Core districts, making up the shortfall and continuing with the planned 97 km of new construction (because of rising construction prices), upgrading 3.5 km of sections started by the districts, building the Mugu-Humla road and carrying a small bridge programme.

The case for the 65 km Humla-Mugu earth road depends upon providing road access to Humla District within 4 years, compared with waiting 10 years or even up 20 years (on current rates of progress) by an alternative corridor under a DOR Strategic Network programme. Although the proposed Humla – Mugu link would provide a longer travel distance (by 57 km) to Manma and the East-West Highway than the current DOR road, other links are present and so the remaining construction is much shorter (65 km compared with 140 km), easier and cheaper and possible with labour intensive construction. It does not involve negotiating rocky cliffs as the alternative. An engineering feasibility study has been undertaken and a detailed engineering design is in progress together with an Environmental Impact Assessment. Road alignment standards would be similar although one would be initially part of the LRN and the other part of the SRN. Once the road link is established, this would enable much faster progress on the SRN road and in connecting other RAP roads (that are currently isolated) to the national network. The project will require two additional bridges.

Clearly the new road would provide a much higher profile for RAP and have substantial social and political advantages, including meeting an important equity consideration of connecting up the last remaining unconnected district. In view of its substantial costs, a formal justification is really required, which outlines the costs and alternatives (for example are there ways whereby the DOR road could be completed in a much faster time?). The justification should also identify and, as far as possible, quantify the economic and social benefits. This can then be discussed with the GON and a final decision made. However it is recognized that further justification and analysis will also delay the project and prevent the road being completed within a four year time horizon.

There is a good case for the small bridge programme to help improve the seasonal accessibility in Western Nepal, and complement the RAP3 road construction programme. A small bridges component was initially planned for RAP3, but this was dropped because of incomplete information, combined with a limited time window. However, as mentioned before, there is also a need to ensure that a proper strategic prioritization process is in place for road bridges.

There is clearly a strong case for RAP3 to continue to assist with road maintenance, using a labour intensive approach in the Core districts. There is also a need to ensure that, as far as possible, road maintenance, using a labour intensive approach can continue, particular in the Pilot districts located in the Hills. In general the engineering case for the labour intensive approach of RAP3 to continue in the Terai is, in contrast to the Hills, somewhat weaker given the need for machine intensive activities such as grading and re-gravelling, and that the environmental issues are less severe. However, although the Terai has higher per capita incomes than other parts of Nepal, in absolute terms the number of poor is very high, and hence RMG activities undertaking routine maintenance, supplementing machine based work, should still benefit the poor and provide engineering benefits. The strength of the RAP3 ARAMP message will continue to develop provided the programme's communication strategy remains effective and the Pilot transition/exit strategy is well managed.

## 4. Recommendations

The review team supports the continuation and extension of RAP3 (as outlined above) covering new construction and maintenance in the Core districts and maintenance in the Pilot districts. However we should like to suggest the recommendations in the following areas.

1. **Planning:** There is a need to refine the DTMP and ARAMP methodologies. Traffic needs to be included in the prioritization of Improvements and also needs to be considered for New Construction where traffic diversion is likely to occur. Priority also needs to be given to road links that connect to the wider road network, keeping connection delays to a minimum. There is a need to improve and formalize the planning of bridges (the National Program for Motorable Bridges on Local Roads Concept Note, 2014 provides guidance on this). The use of GIS data should be properly integrated into the DTMPs and maintenance management. Because of its high cost-benefit returns grading should fall within the ARAMP routine/recurrent category and not in the periodic category.
2. **Humla-Mugu Road:** Because of its high expense and character, the planning of this road falls outside of the normal DTMP approach. A detailed formal justification of this road is required.
3. **Engineering Design, Maintenance and Solution:** For new construction, consideration should be given to providing passing places every 200 m, increasing the provision of side drains and providing RMG input, varied according to maintenance need. More attention needs to be given to improving work quality through better supervision. Consideration should also be given to improving both road safety (e.g. through better design and countermeasures), and, safety at work.
4. **New Contractual Arrangements and Improving Contractor Performance:** To help speed up the implementation of maintenance work, it is recommended that the 'schedule of rates' approach be trialed in the Pilot districts. This will also involve contractor training to prepare rates and assess the risks involved. There is also a need to improve contractor performance. RAP should be more proactive in identifying ways of strengthening contractor capacity to deliver quality output.
5. **The use of Engineer Interns:** This approach should be continued and if possible enhanced. However it should also be evaluated at a later stage.
6. **Land Transfer and Compensation:** It is recognised that this is a difficult area to address. However RAP should continue to engage with government on how to transfer the ownership of land when their land is needed for rural roads.
7. **Expanding the 'Maintenance First Approach' and Lesson Learned from RAP:** The lead taken by RAP in road maintenance needs to be further extended and fully internalised by other districts. Hence the advocacy role of RAP should be further supported to assist with publicity and training.
8. **Indicators:** There is a need to review indicators. With frequent road closures, due to landslides and seasonal water crossings perhaps the most important outcome/performance indicator relates to the length and time roads are open to traffic. Some of this data is already collected by RAP and might be usefully included in the log frame. A combined measure of kilometer-days open for traffic might be the most useful. Other indicators such as the distance people live from road access, and all-season road access (i.e. including the Rural Access Index - RAI) should also be explored.

## Annexes

### Annex 1 - List of People Interviewed

- Maheshwor Ghimire, Senior Divisional Engineer/RAP3 Coordinator, DoLIDAR/MoFALD
- Bill Seal, Engineering Team Leader, RAP3/IMC
- Kirsteen Merrilees, Deputy Program Manager System Performance, RAP3/IMC
- Michael Green, Project Manager, RAP3/IMC
- Manoj Krishna Shrestha, LRN Specialist, RAP3/IMC
- Director, Roads Board Nepal, Arniko Bhawan
- Krishna Basnet, Director, Senior Engineer, Roads Board Nepal
- Govinda Gewali, Senior Programme Officer, ADB Nepal
- Aman Jonchhe, Transport Sector Specialist/Team Leader, SDC Nepal
- Dr. Suman Baidya, Infrastructure Adviser, DFID Nepal

### Annex 2 - Photographs of Sample Roads



