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# **Key Management Issues for Low Volume Rural Roads in Developing Countries**

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**DEPARTMENT OF PUBLIC WORKS  
GOVT. OF PUNJAB  
CHANDIGARH**



**INDIAN ROADS CONGRESS  
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SCF 61-62, PHASE-II, S.A.S. NAGAR, MOHALI (CHANDIGARH) – 160055



# Presentation

**Research & investigations in South East Asia, compiled by the  
Global Transport Knowledge Partnership (gTKP) & South East  
Asia Community Access Programme (SEACAP)**

**Applicable broadly to Tertiary and Access Roads:**

- **Low Volume Rural Roads (LVRRs) : <400vpd**
- **Very Low Volume Rural Roads (VLVRRs) : <50vpd**



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# Key Issues

- Policy
- Rural Road Classification
- Road Standards
- Road Environment
- Environmentally Optimised Design
- Surface & Paving Options
- Whole Life Costing
- Materials
- Specifications and Supervision
- Maintenance
- Further Investigations



# Policy

**Sector legislation & policy necessary to set framework for investments and to define aims and arrangements for Low Volume Rural Roads with respect to:**

- **Classification of all roads, including LVRRs**
- **Who owns roads and margins?**
- **Who responsible for planning, construction, maintenance?**
- **Options for financing and resourcing?**
- **Setting and monitoring standards & specifications**
- **Addressing socio-economic, employment, technology, safety, health and sustainability issues**
- **Monitoring performance**



# Rural Road Classification

Appropriate definition of road categories based on local conditions and priorities.

Relating to transport policy, responsibilities, traffic characteristics, economic and social factors

Not least upon financing available

LVRs (<400vpd) usually local authority responsibility

VLVRs (<50vpd) likely require a stakeholder partnership



# Road Standards

**Standards should be compatible with task, road category, environment, and be affordable**



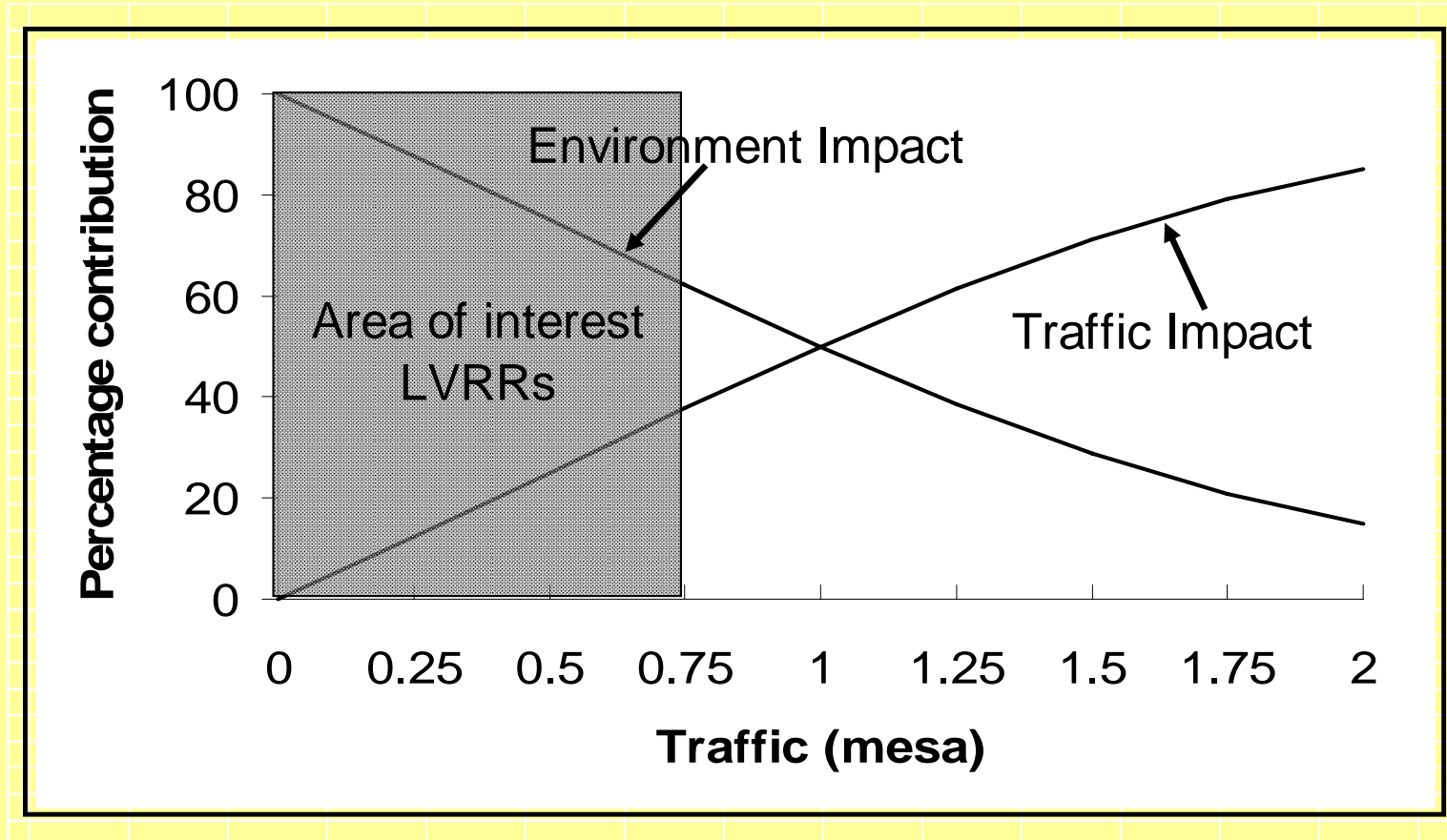
*Figure 1, above left, shows an inappropriate over-provision of road width for a LVRR. This road will incur high maintenance costs. Figure 2, above right, shows a 1.4 metre wide concrete, all-weather, low maintenance VLVR suitable for the predominant 2 wheeled vehicles using the route, allowing safe passing of loaded vehicles.*



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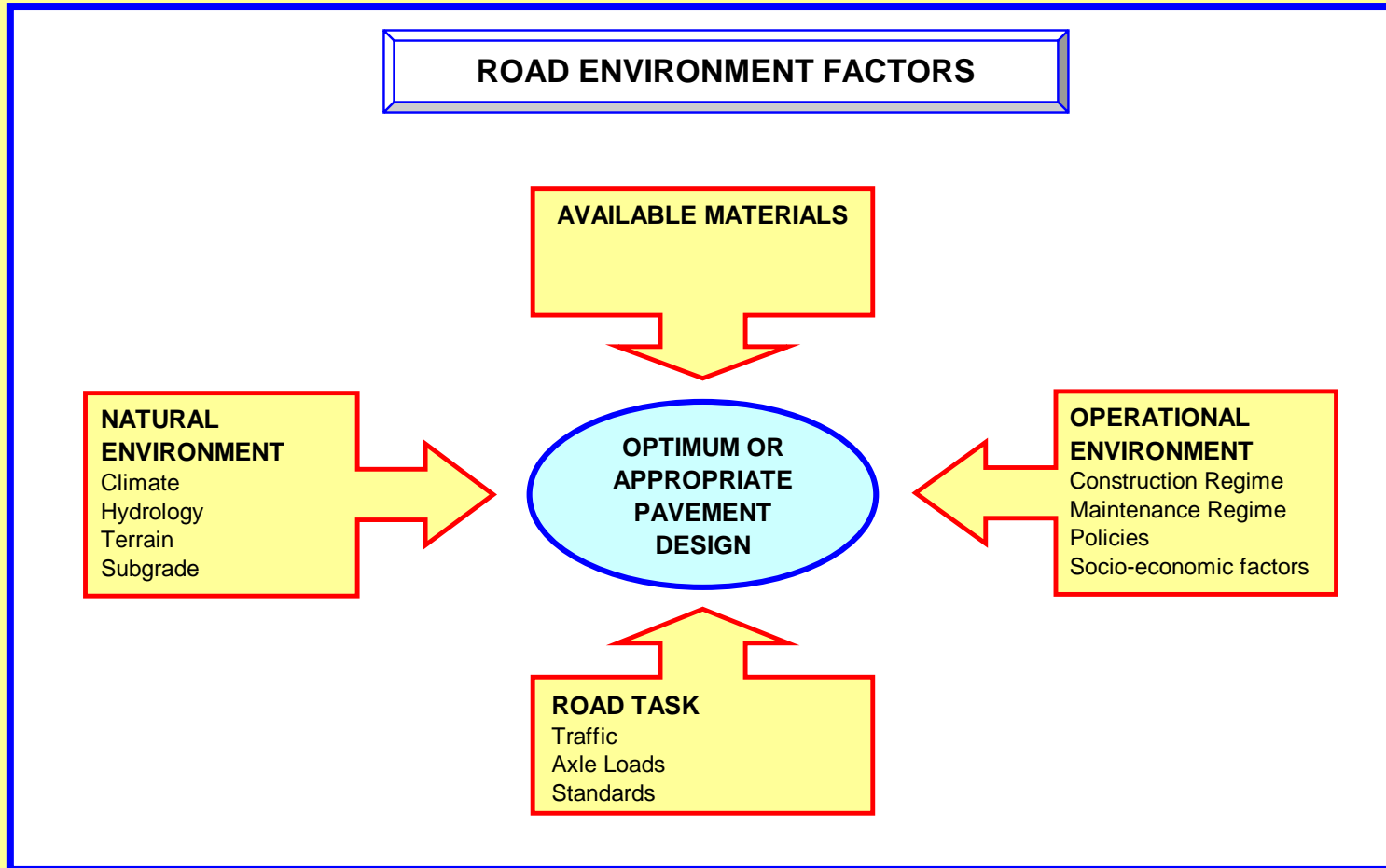
# Road Environment

Previously road design was primarily traffic related



# Road Environment

A new more holistic approach is required for LVRR design



# Environmentally Optimised Design

**LVRR Standards and designs need to support the function of each road section, matching the environment, with the limited resources available**

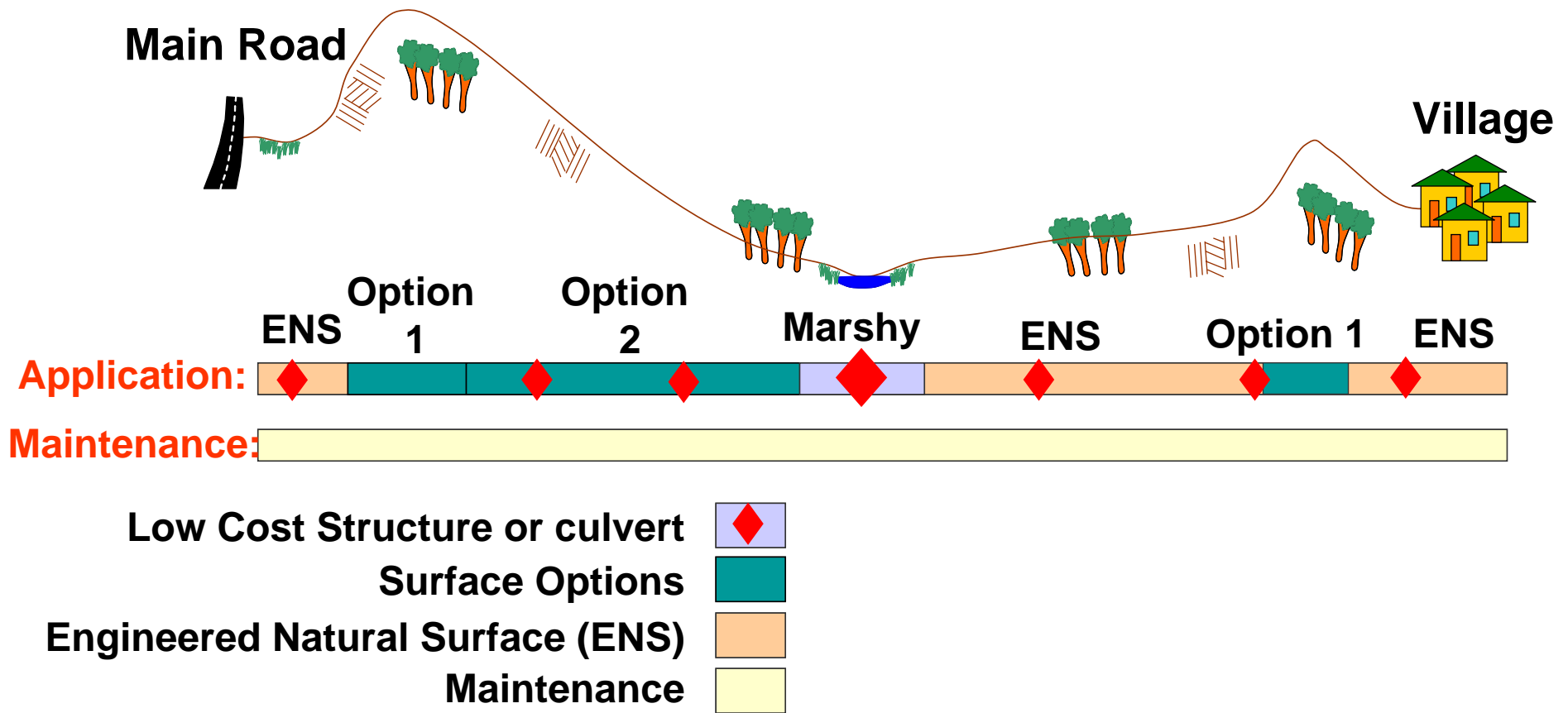
**Using a spectrum of solutions incorporating spot improvements through to whole link upgrades**

**Using surfaces from Engineered Natural Surfaces, gravel where appropriate, to durable paving**



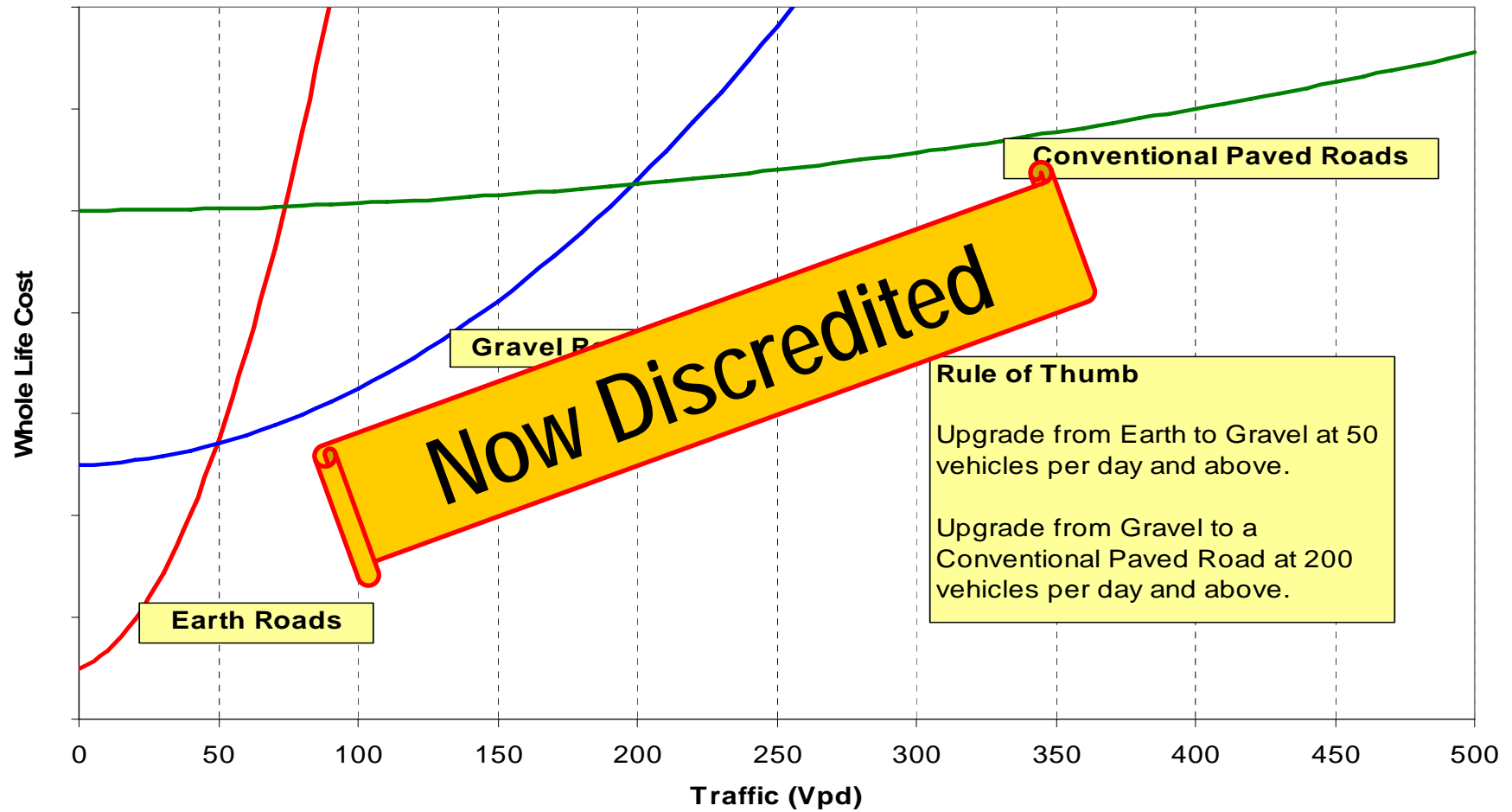
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# EOD Spot Improvement Strategy – application over a typical rural route



# Paving Options – Traditional ‘Rule of Thumb’

## Surface Choice based on Whole Life Costs



## Research shows Gravel may NOT be appropriate, especially where:

- Gravel quality is poor (*Majority surveyed outside recognised specs*)
- Compaction & thickness cannot be assured
- Drainage is not provided (*>50% camber & drainage defective*)
- Haul distances are long (*suggest WLC for >10km*)
- Rainfall is very high (*>2m*), or dry season dust problems
- Traffic levels are high
- Longitudinal Gradients (*> 4% if rainfall >1,000mm/year*)
- Adequate maintenance cannot be provided (*75% not*)
- Sub-grade is weak or soaked (flood risk), or
- Gravel deposits are limited/environmentally sensitive



There are many **PROVEN** Alternative Surface Options using:

- **Stone**
- **Bitumen**
- **Concrete**
- **Brick**



**They can have better Whole Life Cost and Local Resource Use attributes.**



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# Whole Life Costing

Should be used for investment decision making

Current constraints are:

- Limitations of existing models
- Knowledge of maintenance costs (for various surfaces)
- Actual maintenance capacity
- Local VoC – road condition relationships

More research required



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# Materials

## Issues:

- Resources are largely non-renewable
- Gravel is a 'wasting' surface
- Growing sustainability/energy issue

## Need to select materials on basis of:

- Fitness for purpose
- Adapting specs/design to suit available materials, and
- Adapting/modifying materials to suit realistic specifications



# Specifications & Supervision

## Keys issues:

- **Scope: excavation, transportation, processing, placing, compaction**
- **Source and on-site testing**
- **Authority/motivation of the supervision staff**
- **Must be achievable with materials, plant, contractors available**
- **Evidence of widespread non-compliance of gravel**



# Maintenance

**Key issues are:**

- **All LVRRs require on-going maintenance**
- **Vital if the investments are not to be wasted**
- **Widespread occurrence of in-effective maintenance**
- **Some surfaces require less maintenance and are intrinsically lower risk**
- **Renewed efforts required to get ALL stakeholders engaged and committed**



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# Conclusions

**Low Volume Rural Roads are a substantial challenge for road managers, engineers and the communities themselves**

**Range of issues justifies more attention than hitherto provided**

**Recent research has improved knowledge of low cost, more sustainable road and access solutions**



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# Further Investigations

Improved knowledge required for:

- **Maintenance arrangements and costs related to all surface options**
- **Vehicle Operating Cost – road condition relationships for range of Asian environments and vehicles**
- **Social costs and benefits**



## Dissemination

Currently two important dissemination forums supporting  
Low Volume Rural Roads knowledge:

**gTKP**

<http://www.gtkp.com/>

**SEACAP**

<http://www.seacap-info.org/>

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***Thank you***

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