



HIS MAJESTY'S GOVERNMENT OF NEPAL
MINISTRY OF PHYSICAL PLANNING AND WORKS
DEPARTMENT OF ROADS

POLICY DOCUMENT



ENVIRONMENTAL ASSESSMENT IN THE ROAD SECTOR OF NEPAL

GEO-ENVIRONMENTAL UNIT
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FOREWORD

The environment is the future for every person living on Earth. We have a responsibility to protect it for those who come after us.

In Nepal we have a particularly rich diversity of natural environment. It covers the complex bio-physical features of mountains and plains, ridges, valleys, glaciers, lakes and floodplains; and the innumerable forms of plants and animals. These are naturally dynamic, with the fragile slopes of the Himalayas still evolving at a rapid geological rate, and the pioneer and climax communities of natural organisms which grow among them and change with them. Many species are rare or endangered, and we have a responsibility to protect them on behalf of the world.

Within this natural environment has evolved another complex level which has merged into it: that of the human socio-cultural environment. Among these fragile slopes and forests have emerged a diverse range of peoples with ancient languages and customs. The majority depend directly on the natural resources for their livelihoods. Nepal has a predominantly rural, agricultural population: the wellbeing and future of this society depends on its ability to continue living in harmony with the natural environment.

The Department of Roads is responsible for constructing and maintaining the main national lines of access through these intricate, inter-connected environments. In the past, the pressure to open a road network as quickly as possible has caused us to neglect many environmental considerations. This bad practice must be stopped. The construction, rehabilitation and maintenance of roads with sensitivity for possible damage to the surroundings is fundamental to good professional practice in engineering. Since the enactment of the Environment Protection Act 2053 BS, it has also become our legal obligation.

The staff of the Department of Roads are now charged with the responsibility for incorporating sound environmental practice into all their activities. This Policy Document explains how it must be done. It gives clear, practical guidance and explains where more information can be found in support of particular issues. Emphasis is given to straightforward, achievable and effective measures which can be incorporated into engineering practice to achieve the main principles of sound environmental management.

All staff must now follow these guidelines. The Geo-Environmental Unit in Babar Mahal and the Ministry of Population and Environment will support them in doing so.

Ananda Khanal

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January 2000

INTRODUCTION

The use of environmental assessment has been introduced as a requirement of all projects in the road sector. The Department of Roads, as the government agency responsible for the planning, design, construction and maintenance of the strategic road network, is required to ensure that all environmental assessment obligations are completed.

A number of suggestions have been made over the last ten years as to how the Department of Roads should carry out environmental assessment activities. These have come from five main sources:

- general world-wide guidelines from the World Bank, the UK Department for International Development and other donors;
- specific proposals from consultants attached to the Road Maintenance and Rehabilitation Project;
- other general world-wide guidelines (most of which are available in the library of the Geo-Environmental Unit in Babar Mahal);
- initiatives from the National Planning Commission working with the International Union for the Conservation of Nature; and
- national guidelines and rules from the Ministry of Population and Environment.

None of these have been binding, with the exception of some parts of the last set of guidelines, which include the Environment Protection Act 2053.

The staff of the Department of Roads have been little involved in the introduction of this new additional requirement expected of them. As a result, there is a low level of understanding among departmental staff, either of environmental assessment or of the reasons for it.

The various documents supplied to the Department have been complex, poorly presented and often contradictory. A few staff have been given short training courses, but these have not been related specifically to the sector's needs.

The purpose of this Policy Document is to explain what environmental assessment procedures involve and to propose a straightforward set of procedures which make it workable and useful.

It is very important that environmental assessment be seen by Departmental and Ministry as making a positive and useful contribution to the decision-making process. It is not simply another bureaucratic hurdle to project approval. It is there to ensure that Nepal's rich and unique physical and cultural environments are protected from excessive damage during development. Every professional engineer has a responsibility to ensure that his or her actions safeguard the environment and livelihoods of others as far as possible.

ENVIRONMENTAL ASSESSMENT

What is environmental assessment?

Environmental assessment is the study of the possible effects, good or bad, on the area to be affected by a road. This includes all natural and human resources: all physical and biological attributes, as well as effects on people, their quality and way of life, and economic development. Table 1 lists the main environmental assessment activities. Full definitions of all the environmental terms are given in Appendix A.

Table 1. The five main types of environmental assessment activities.

Environmental activity	Purpose
• Screening	To check the level of environmental assessment required.
• Initial environmental examination	The first level of environmental study, often all that is required.
• Scoping	If the screening or the IEE states that an EIA is necessary, the scope of the EIA is determined.
• Environmental impact assessment	The full, in depth study of potential impacts, carried out if the screening or the IEE find that it is necessary.
• Monitoring	The process of making sure that recommendations from the IEE or the EIA are really applied in practice, both during the project and afterwards.

Why do environmental assessments?

Environmental assessments must be made for all development projects. They are designed to be a constructive tool which ensures that the project does not give rise to problems affecting any aspect of the environment. They help to ensure that development improves the way of life for the people affected, without damaging the natural surroundings. Sometimes a degree of damage is inevitable. In this case, an environmental assessment should find ways of reducing or compensating for the damage. This is by the use of mitigation measures.

When are environmental assessments done?

Environmental assessment activities must be integrated carefully into the project cycle in order for them to be effective. If this is done correctly, then any negative impacts can be avoided or reduced without impeding the project in any way. Table 2 shows how the various environmental assessment activities relate to the cycle of project planning, design and implementation, and the purpose of each environmental component.

Table 2. Phases of the project cycle and the environmental activities required.

Phase of project	Environmental activity	Purpose
Pre-feasibility (new roads only)	Environmental screening	An early check to see what level of environmental assessment is required.
Feasibility (new roads and rehabilitation)	Initial environmental examination; or, if necessary, scoping followed by environmental impact assessment	The required level of environmental assessment is carried out. A full EIA must appraise alternatives, so it must be done during the feasibility phase, and before detailed design can be started.
Detailed survey and design	Review of IEE or EIA and incorporation of recommendations (e.g. as an environmental management plan)	To ensure that the project design uses the recommendations of the IEE or EIA, and either avoids or mitigates any potential environmental problems.
Construction or rehabilitation	Monitoring	Checks are made to ensure that recommendations for environmental mitigation measures, made in the IEE or EIA, are carried out.
Maintenance (the road operation phase)	Monitoring	Regular inspections (usually annual) are made to check that the environmental mitigation measures are working satisfactorily.

ENVIRONMENTAL IMPACTS OF ROADS

The actual impacts of roads have been numerous and extensive. Since 1950 a strategic network of highways and feeder roads has been extended to all Regional centres, all national borders and many remote District centres. This has no doubt aided the spread of development and improved the quality of life for a large number of people. Exactly how much roads have contributed to this may never be known, since the specific effects of improved transportation are obscured by the broad range of other developmental efforts. But the establishment of the road network has certainly had a beneficial impact on the social environment.

These benefits have been accompanied, of course, by a number of adverse impacts. These must be seen against the extraordinary physical environment of the southern Himalayas, which is naturally extremely dynamic. The development of any form of infrastructure inevitably runs into a range of environmental problems and some damage is unavoidable.

The main areas of visible environmental damage by roads have been on the physical environment. These include problems of slope stability, spoil disposal and water management. Less visible effects have occurred which detract from the social environment. The chief among these is the safety of road users. However, the low traffic volume of most roads has avoided damaging levels of air and noise pollution, disruption to wildlife and other impacts commonly associated with roads in industrialised countries.

While the negative environmental impacts of roads have often been the result of misguided techniques, particularly in attempts to construct roads with a minimal budget, there have also been many cases of simple mitigation measures being employed. These form the basis for a way forward following simple environmental management guidelines.

The law now makes a formal environmental assessment obligatory to all individuals and organisations promoting physical development projects. While this is new and may need refining, it is essentially sound and means that the Department of Roads, as for other agencies, must undertake a comprehensive environmental study of every proposed project. A summary of the law regarding environmental assessment is given in Appendix C.

ENVIRONMENTAL MITIGATION MEASURES

Mitigation measures are the actions taken to prevent environmental damage; or failing that, to reduce the scale of the damage; or alternatively, to compensate for the damage caused. A wide range of environmental mitigation measures are appropriate to the Nepal road sector: they are mostly low in cost and can be adapted for the specific problem by the site engineer. Table 3 lists a number of examples.

Environmental mitigation measures must be incorporated into every part of the design, implementation and maintenance of a road. Many of the measures given in Table 3 are already in widespread use on roads in Nepal during the construction and operation phases.

Compensatory measures do not necessarily need to involve direct payments. An example might be the construction of school buildings or an improved water supply system to compensate a community for noise pollution during construction; or the planting of trees to replace those cut down to widen a road. With individual landowners, however, compensation is normally a financial arrangement.

At the design stage, potential environmental damage can be avoided by aligning roads away from sensitive areas. This is one of the simplest and most effective mitigation measures, if it can be achieved: terrain and other restrictions sometimes mean that this is not possible. It can be done by drawing a map of environmentally sensitive areas of both national and local importance before selecting the alignment, and then by avoiding those areas. Other aspects for consideration at the design stage include the incorporation of local features (e.g. building chautaras and planting bar and pipal trees) and utilities. The latter includes such things as making provision for irrigation channels to cross roads, and building proper paths up steep cut slopes. In some cases it is possible to go further, for example by making provision for bazaars to develop in suitable locations beside roads.

Table 3. Environmental mitigation measures appropriate to the Nepal road sector

Category	Potential problem	Appropriate environmental mitigation measures
Slope stability	Landslides or other forms of mass instability on the slopes	Geological/geomorphological studies conducted to investigate and recommend best available options. Civil engineering structures and bio-engineering measures used. Measures taken to avoid undercutting of slope toes. Quarrying prohibited in river beds, where increased flood discharge velocity could give rise to subsequent damage.
	Development of erosion or gulying	Check dams and bio-engineering measures used as necessary.
	Road crosses major areas of deep-seated instability	Width and surfacing standards relaxed for short lengths, as required.
Spoil disposal		Minimise spoil by balancing cut and fill wherever possible. Safe tipping areas identified and enforced.
	Spoil tipped away from designated areas	
	Spoil falling or being washed on to farmland	Spoil traps constructed. Land owner compensated.
Water management	Scour and erosion below unprotected drainage outfalls	Mattresses, check dams and other protection measures constructed as necessary. Cascades constructed, to be as long as necessary.
	Disruption of drinking or irrigation water supplies	Measures to resolve these problems incorporated into project works, or compensation paid.
Land use	Houses need to be removed	Compensation paid to house owners.
	Loss of agricultural land	Compensation paid to land owners. Check impacts are limited to acquired land.
	Loss of forest land	Forest User Groups compensated for trees and products lost. Check impacts are limited to compensated trees and products.
Plants and wildlife	Large numbers of trees being removed	Felled trees replaced, using the same species if appropriate. Trees planted wherever land is available.
	Disturbance to wildlife	Damage to wildlife habitats avoided as far as possible. Habitats re-created on marginal roadside land.
Quarries and borrow pits	Pollution, disturbance and danger from quarry operations	Construct bunds to screen noise and dust. Enforce access restrictions.
	Safety risks from abandoned quarries or borrow pits	Quarries made safe by re-grading slopes and installing structures as necessary.
	Land seriously disturbed or lost from production	Quarry and borrow areas rehabilitated to productive plantations using bio-engineering techniques.
	Quarries continue to be used by unauthorised persons	Unauthorised quarrying stopped, where necessary by working with the District Development Committee.
Stone crushing & asphalt plants	Dust and noise pollution	Plants re-sited or compensation arranged if pollution is caused. Large earth bunds constructed and vegetated to reduce hazard.
Hazardous materials	Spills, leaks or injuries from any type of hazardous material (e.g. bitumen, cement, paint, explosives, fuels, lubricants)	Checks to ensure that storage is good and that there are no losses or leaks. Checks to ensure that protective clothing and safety measures are used.
	Bleeding bitumen	Appropriate chippings spread and rolled into the affected areas.
Camp operation	Pollution from work and labour camps	Checks to ensure that camps are not polluting neighbouring areas, especially from sewerage and rubbish disposal.
	Labourers cut trees for firewood	Kerosene stoves and kerosene provided to labourers.
	Land remains damaged after construction	Checks to ensure camp areas are fully restored, including re-topsoiling and tree planting if appropriate.
Dust and noise	Dust generated from construction works or by construction traffic	Speed controlled using speed bumps. If water is available, the road surface can be sprayed on a frequent schedule.
	Dust from a road with an earth or gravel surface	Permanent speed bumps installed in villages and bazaars to reduce traffic speeds in inhabited areas. Bitumen surface constructed in bazaars, with speed controls. Dense vegetation planted on roadsides.
	Noise from large work sites	Large earth bunds constructed and vegetated to reduce noise. Work scheduled to minimise disturbance.
Social issues	Positive impact of road limited to wealthier sections of society	Other agencies encouraged to develop activities beneficial to poor and excluded sections of society.
	Local people excluded from project activities	Designs incorporate methods within the skills of local people. Contractors encouraged to use local labour wherever possible.
	Promises were made to local people during feasibility and planning phases	Checks to ensure that the promises are fulfilled; if they prove to be not possible, reasonable alternatives must be negotiated.
	Significant disparities emerge in levels of compensation	Compensation levels rationalised to ensure reasonable parity.
Road safety	Faster traffic resulting from a new, smoother road surface	Traffic safety measures installed, such as warning signs, delineators and barriers. Awareness of road safety raised among affected communities. Road safety audits carried out and recommendations implemented.
General	Other impacts on the social environment	Co-ordination increased with other agencies, to encourage positive complementary activities.

DEPARTMENT OF ROADS SCREENING PRACTICE

The screening criteria are largely determined by the Environment Protection Act 2053 and Environment Protection Rules 2054 (revised 2055). They involve two stages.

Screening should normally be done by the Programme Manager or some other senior person familiar with the intended programme. Two steps are followed and the process should be completed within a few hours by someone familiar with the intended site works and the alignment of the road concerned (or, for new roads, the possible alternative alignments).

A rule of screening is that all maintenance activities, whether routine, recurrent, periodic or emergency, are always exempted. This means that they can always be done without an IEE or an EIA being necessary, unless they involve the extraction of materials in a new way, which may require an IEE or EIA.

Screening stage 1: project type

For all road construction, upgrading, rehabilitation and reconstruction activities, the first stage of screening is based on the type of project, as shown in Table 4.

Table 4. Screening criteria by project type (the first part of the screening process).

Type of project	Type of assessment required
A. National highways [construction of]	Environmental impact assessment
B. Major feeder roads [construction of]	Environmental impact assessment
C. Minor feeder roads [construction of]	Initial environmental examination
D. District roads [construction of]	Initial environmental examination
E. Urban roads [construction of]	Initial environmental examination
F. Village roads [construction of]	Initial environmental examination
G. Major and medium bridges and approach roads [construction of]	Initial environmental examination
H. Minor bridges and approach roads [construction of]	Exempted
I. Tunnels [construction of]	Initial environmental examination
J. Routine, recurrent, periodic and emergency maintenance	Exempted
K. Upgrading, rehabilitation and reconstruction of national highways and feeder roads	Initial environmental examination
L. Any project which requires the clearing of national forest	≤ 5 ha: IEE; > 5 ha: EIA
M. Any project which involves the extraction of boulders, gravel, sand or soil from national forest areas	Initial environmental examination
N. Any project which involves the extraction of boulders, gravel, sand or soil from river beds	≤ 50 tonnes (or 50 m ³) / day: IEE; > 50 tonnes (or 50 m ³) / day: EIA
O. Any project which involves the extraction of construction materials from medium to large quarries	Environmental impact assessment
P. Stone crushing plants	Initial environmental examination
Q. Mechanical workshops	1 – 3 ha: IEE; > 3 ha: EIA

The classes of roads and bridges are defined in Appendix B.

Following the initial screening, any project which needs an EIA must now be moved forward for the scoping of the EIA.

Otherwise, stage 2 of the screening process must now be addressed (see next page).

Screening stage 2: environmentally sensitive areas

Projects either exempted or requiring an IEE, must be put through the second level of screening. This states that any road running through an environmentally sensitive area must be subjected to a full EIA. Table 5 lists the current list of environmentally sensitive areas for the whole of Nepal.

Table 5. Screening criteria by environmentally sensitive area (the second part of screening).

Type of area	Defined areas
National parks	Royal Chitwan National Park Sagarmatha National Park Langtang National Park Rara National Park Shey-Phoksundo National Park Khaptad National Park Royal Bardia National Park Makalu-Barun National Park
Wildlife reserves	Royal Shukla Phanta Wildlife Reserve Koshi Tappu Wildlife Reserve Parsa Wildlife Reserve Dhorpatan Hunting Reserve Shivapuri Watershed and Wildlife Reserve
Conservation areas	Annapurna Conservation Area Makalu-Barun Conservation Area
Wetland areas (other than those covered by defined areas above)	Lake Gosainkund, lake Bhairabkund and Panch Pokhari catchments Lake Taudaha and Basant Gaon Pokhari catchments Phewatal, Rupatal and Begnastal catchments Lake Tilicho catchment Lake Gokyo and Panch Pokhari catchments Rapti, Riu and Narayani floodplains Lake Gaidhawa and Jagdishpur reservoir catchments Karnali floodplain Lake Ghoda Ghodi catchment
World Heritage Sites	Kathmandu Durbar Square Patan Durbar Square Bhaktapur Durbar Square Swayambhunath Baudhanath Pashupatinath Changu Narayan Lumbini Panaudi
Other areas	Known religious sites (e.g. temple areas) Known archaeological sites (e.g. ruined rajas' durbars) Nationally renowned forest areas (e.g. Milke Danda, Mai Pokhari) Drinking water supply catchments for hill towns with populations greater than 10,000 Hospital compounds

The next phase

On the basis of this double screening process, it is possible to go forward by one of three ways:

- exemption: use good engineering techniques and follow the environmental monitoring checklists (see page 11);
- initial environmental examination: follow the guidelines to undertake an IEE during the feasibility stage (see next page); or
- determine the scope of an environmental impact assessment and arrange for it to be undertaken (see page 9).

INITIAL ENVIRONMENTAL EXAMINATIONS

All initial environmental examinations must comply with the regulations set by the Environment Protection Act 2053 and Environment Protection Rules 2054 (revised 2055). However, these leave considerable space for flexibility and size. It is important that IEEs are not made rigidly, but instead are adapted for the needs of the particular road and the work planned on it which are the subject of the study.

An IEE should be undertaken by one or two engineers. They do not necessarily need to be already familiar with environmental assessment procedures, although this would help. It is, however, essential for them to visit the whole site. Data will also have to be gathered from a number of sources. It should take between one and two weeks to complete, depending on the size of the programme and the diversity of potential environmental impacts.

The topics to be covered by an IEE are outlined below. These are general in nature and the exact balance must be determined for each study of this type. It is often useful to call a meeting of experienced colleagues to discuss and agree the particular needs of a project over a few hours.

- **Description of the project.**
This entails a brief description of the road, the works to be undertaken, and the length and general alignment characteristics of the road.
- **Baseline environmental conditions.**
A brief description of the natural and socio-economic environments through which the road passes.
- **Potential impacts and mitigation measures.**
Identification of the possible beneficial impacts (which support the case for the project) and adverse impacts, in the physical, biological, social and economic environments of the area likely to be affected by the road. Suggestions should be made as to how the adverse impacts should be prevented or avoided or, failing that, what might be done to offset the damage (*i.e.* the mitigation measures).
- **Mitigation and monitoring.**
Specific instructions on practical mitigation measures and monitoring during the construction (or rehabilitation) phase and afterwards, during maintenance.
- **Conclusion and recommendation.**
Should the project be implemented or is an environmental impact assessment necessary?

Once they are known, the contents of the IEE should also be checked against Schedule 5 of the Environment Protection Rules 2054 (revised 2055) to ensure that all necessary aspects are covered.

The two most important rules for IEE studies are:

- **keep the study as closely focussed as possible on the project in question; and**
- **keep the report brief and relevant (a few pages should be adequate).**

The procedure for gaining approval of an initial environmental examination report is described in Appendix D.

SCOPING AND ENVIRONMENTAL IMPACT ASSESSMENTS

Scoping should be undertaken by one individual who is familiar with environmental assessment procedures, in consultation with the Programme Manager and other people familiar with the planned programme. It should take about one month to complete, depending on the complexity of the programme; consultation may take longer to complete.

An EIA typically requires a team of three or four specialists (e.g. geologist, socio-economist, botanist, zoologist, tourism specialist, anthropologist or geographer, determined by the scope of the EIA), working together over a period of one to six months, depending on the scale of the proposed site works and the likely environmental impacts.

The topics to be covered by an environmental impact assessment are determined by the scoping exercise, and so it is not possible to generalise. Scoping should lead to precise terms of reference for the EIA of the project in question, and should make it clear as to what detail is required under each topic. The list below is therefore only for guidance.

- **Project description.**
A detailed description of the project, the reasons for it, the expected costs and the intended benefits it will bring.
- **Baseline information.**
Relevant material covering the natural and socio-economic environments of the road corridor itself, and limited only to environmental aspects expected to be affected by the project under study.
- **Identification of environmental impacts.**
A detailed assessment of the potential environmental impacts, both positive and negative. This should concentrate on the main impacts and should be highly relevant to the project. It must cover all the physical, biological, social and economic environments of the area likely to be affected.
- **Consultation with people in the area to be affected.**
A dialogue must be opened with a range of the people living in the area to be affected. This should include the normal representatives such as Ward and Village Development Committee electives. However, every attempt must also be made to canvass the views of groups who may not be well represented, such as women, the poor and low castes. It is important that the environmental impact assessment takes into account the views and concerns of a wide range of the people in the local communities.
- **Alternative analysis.**
Consideration of at least one, and usually two, possible alternatives to the proposed project. In the case of roads, this normally entails alternative alignments. This part of the study must also consider the relative cost and environmental benefits of the alternatives.
- **Mitigation plan.**
The mitigation plan must give details of all the measures proposed to avoid or reduce the negative environmental impacts. These should be as practical, simple and low in cost as possible. Mitigation measures must be designed to prevent or reduce damage, or alternatively, to compensate for it (compensation may be a form of replacement rather than a financial payment). The timing for the implementation of the measures and a table of responsibilities must be clearly given.

- **Review of policy and legal framework.**
The environmental impact assessment must include an appraisal of relevant governmental policy and legislation regarding the possible wider effects of the project.
- **Monitoring and auditing.**
A recommended programme of monitoring throughout the construction (or rehabilitation) phase of the project, and then on a regular basis during the operation (the maintenance phase), must be defined. This has to be practical and realisable within the scope of the implementing agency. In addition, all activities needed to safeguard the environment and reduce negative impacts must be listed as part of the monitoring plan.
- **Critical review and conclusions.**
The final part of the EIA should be a brief section which conducts a critical review of the project, its likely impacts and the potential for their mitigation. This should lead into the conclusions of the entire study. From these it must be clear as to whether the study finds the project environmentally acceptable or not; and if so, under what conditions. If the proposed project appears environmentally unacceptable, the conclusions should identify ways in which it might be made acceptable.

Once they are known, the terms of reference for each EIA should also be checked against Schedule 6 of the Environment Protection Rules 2054 (revised 2055) to ensure that all necessary aspects are covered.

The procedures for gaining approval of the scoping and terms of reference, and also of the environmental impact assessment report, are described in Appendix D.

ENVIRONMENTAL MONITORING CHECKLISTS

Projects must follow the environmental guidelines set out in specific IEE and EIA reports. These should give instructions for mitigation measures in the early part of the project's works and should also give details on ways of checking and monitoring the success of these. This type of checking must be practical and straightforward if it is to be applied in practice. It is therefore necessary that a simple system of checklists should be used. These should be completed according to the schedule in Table 6.

Table 6. Use of environmental checklists during and after project implementation.

Type of work	Checklist	Timing	Responsibility
Construction or rehabilitation under a project	Construction phase environmental checklist	One checklist to be submitted at the end of each Trimester	Project Manager, in consultation with the Geo-Environmental Unit
Maintenance under a Division Road Office or project	Maintenance phase environmental checklist	One checklist to be submitted annually, by the end of Chaitra	Division Chief, in consultation with the Geo-Environmental Unit

Possible checklists are given on the next two pages. However, these need to be modified to be project- or Division-specific, and therefore should only be taken as indicative.

The purpose of these checklists is mainly to assist Project Managers and Division Chiefs to ensure that the roads under their responsibility comply with environmental protection regulations. This is part of good engineering practice, and should be the concern of every professional engineer. It is also a legal requirement under the Environment Protection Act 2053.

The checklists will also allow the Geo-Environmental Unit to monitor environmental issues throughout the road network. This should help to ensure that the strategic roads contribute to national development without causing an undue scale of disruption to the environments through which they pass.

In drawing up a project- or division-specific checklist, care should be taken to ensure that it is as closely tied as possible to the specifications or guidelines of the Department of Roads. For this reason, the column "action taken by project" or "action taken by division" in the checklists should include specific references to detailed specifications or general guidelines. These may have been devised as part of a project (*e.g.* detailed design specifications) or may be from a general Department of Roads reference text (*e.g.* *Design standards for feeder roads* or *Roadside Bio-engineering*). This practice makes it much easier to quantify the action required. The references in Appendix E include the main sources of best practice.

It is stressed that each Division or project must determine its own site-specific checklists; and that the examples given here suggest only typical action that can be taken, rather than action which must be taken in every case. Help and advice should be requested from the Geo-Environmental Unit where there is any doubt.

Construction phase environmental checklist (indicative)

Potential problem	Possible action if answer is "yes" (not exhaustive)	Action taken by project
Slope stability Are there landslides or other forms of mass instability on the slopes?	Use civil engineering structures and bio-engineering measures as necessary. Avoid the undercutting of slope toes. Prohibit quarrying in river beds, where increased flood velocity could give rise to damage.	
Is there erosion or gully development?	Use check dams and bio-engineering measures.	
Are there major areas of deep-seated instability?	Relax width and surfacing standards for short lengths, as appropriate.	
Spoil disposal Can spoil be reduced?	Balance cut and fill wherever possible	
Is spoil being tipped away from designated areas?	Identify safe tipping areas. Enforce safe tipping.	
Is spoil falling or being washed on to farmland?	Compensate the land owner. Take measures to prevent further problems.	
Water management Are slope drainage designs inadequate?	Improve and increase slope drainage measures.	
Are drainage outfalls unprotected against scour and erosion?	Construct mattresses, check dams and other protection measures as necessary. Construct cascades, to be as long as necessary.	
Is there any disruption of drinking or irrigation water supplies?	Incorporate measures to resolve these problems into project works or pay compensation.	
Land use Has there been any loss of land for which landowners should be compensated?	Check that <i>lal purjas</i> have been modified. Ensure compensation has been paid. Check impacts are limited to acquired land.	
Plants and wildlife Are large numbers of trees being removed?	Replace felled trees with new plantations, using the same species if appropriate. Plant trees wherever land is available.	
Is any form of wildlife being disturbed?	Avoid damage to wildlife habitat as far as possible. Re-create habitats on marginal roadside land.	
Quarries and borrow pits Are there any abandoned quarries or borrow pits?	Make quarry safe by re-grading slopes and installing structures as necessary. Rehabilitate all quarry and borrow areas using bio-engineering techniques.	
Stone crushing and asphalt plants Is the project operating stone crushing or asphalt plants?	Check that dust and noise are not causing problems. Re-site the plants or compensate.	
Hazardous materials Is the project using any type of hazardous material (e.g. bitumen, cement, paint, explosives, fuels, lubricants)?	Check that storage is good and that there are no losses or leaks. Ensure that protective clothing and safety measures are used.	
Camp operation Does the project have work and labour camps?	Check that these are not polluting neighbouring areas, especially sewerage and rubbish disposal.	
Are labourers cutting trees for firewood?	Provide kerosene stoves and kerosene to labourers.	
Dust Is dust generated from construction works or by construction traffic?	Control the speed of traffic using speed bumps. If water is available, spray road surface frequently.	
Does the road have an earth or gravel surface?	Install speed bumps in villages and bazaars to reduce traffic speeds in inhabited areas.	
Social issues Are local people being excluded in the project's activities?	Alter construction methods to use local skills. Ensure contractors use local labour where possible.	
Were promises made to local people during planning?	Check; if promises cannot be fulfilled, reasonable alternatives must be negotiated.	
Are there disparities in compensation?	Rationalise compensation levels to ensure parity.	
Are there conflicts between the project and local people?	Listen carefully to peoples' problems; try to resolve them amicably if they are reasonable.	
Road safety Will the new road surface mean faster traffic?	Install traffic safety measures such as warning signs, delineators and barriers. Get specialist advice and road safety audits from the Traffic Engineering and Safety Unit.	

Submission: one checklist is to be submitted to the Geo-Environmental Unit at the end of each Trimester

Maintenance phase environmental checklist (indicative)

Potential problem	Possible action if answer is "yes" (not exhaustive)	Action taken by division
Slope stability		
Are there landslides or other forms of mass instability on the slopes?	Use civil engineering structures and bio-engineering measures as necessary.	
Is there erosion or gully development?	Use check dams and bio-engineering measures as necessary.	
Is debris falling or being washed on to farmland?	Compensate the land owner. Take measures to prevent further problems.	
Water management		
Are slope drainage designs inadequate?	Improve and increase slope drainage measures.	
Are drainage outfalls unprotected against scour and erosion?	Construct mattresses, check dams, cascades and other protection measures as necessary.	
Is there any disruption of drinking or irrigation water supplies?	Incorporate measures to resolve these problems into road works or pay compensation.	
Plants and wildlife		
Are large numbers of trees being removed in the vicinity of roads?	Inform the District Forest Officer of the problem and request his action. Plant trees wherever land is available, to improve the general environment.	
Quarries		
Are quarries continuing to be used by unauthorised persons?	Stop unauthorised quarrying, where necessary by working with the District Development Committee.	
Hazardous materials		
Is the Division using any type of hazardous material (e.g. bitumen, cement, paint, explosives, fuels, lubricants)?	Check that storage is good and that there are no losses or leaks. Ensure that protective clothing and safety measures are used.	
Is there a problem with bleeding bitumen?	Spread appropriate chippings and roll them into the affected areas.	
Camp operation		
Are the Division's camps operated properly?	Check that camps are not causing pollution to neighbouring areas. Especially check sewerage and rubbish disposal systems.	
Dust		
Do any roads have an earth or gravel surface, and traffic is creating a significant dust problem?	Install speed bumps in villages and bazaars to reduce traffic speeds in inhabited areas. Consider upgrading road surfaces to bitumen in bazaar areas (with appropriate speed controls)	
Social issues		
Are there areas of conflict between the road and neighbouring land uses?	Discuss the matter with local people. Aim to reach a compromise and undertake ameliorative works.	
Road safety		
Have there been any serious road accidents in the last year?	Install traffic safety measures such as warning signs, delineators and barriers. Get specialist advice from the Traffic Engineering and Safety Unit.	
Can the safety of the road be improved anywhere, such as on sharp bends?	Improve minor road layouts and install additional warning signs.	

Submission: one checklist per Division is to be submitted to the Geo-Environmental Unit by the end of Chaitra each year

APPENDIX A: DEFINITIONS OF ENVIRONMENTAL ASSESSMENT TERMS AND PROCEDURES

Definitions

Environment	In the context of road projects, the “environment” can be defined as “the area to be affected by the project, including all natural and human resources”. This incorporates all physical and biological attributes, as well as effects on people, their quality and way of life, and economic development.
Environmental assessment	In this paper, as in most other documents, the term “environmental assessment” is used in a general way to describe any type or scale of environmental study, investigation or report.
Environmental impact	The effect on any part of the existing environment as a result of project activities. Impacts may be good (beneficial to some part of the environment) as well as bad (adverse to some aspect of the environment).
Significant environmental impact	The determination as to whether an environmental impact is significant or not is largely subjective. Some definitions include in this category those impacts which affect human life for better or worse. Since environmental assessments are intended as a constructive planning tool, all of the environmental impacts considered should be “significant”.
Environmentally sensitive areas	The environment is sensitive everywhere. The term “environmentally sensitive area” specifically refers to any area where the environment needs to be protected for a particular reason, such as a national park or a water supply catchment.
Mitigation measures	Actions which prevent, reduce or compensate for the potential adverse environmental impacts. An example might be the establishment of a tree plantation to offset the effects of trees felled in the construction of a new road.
Effects and impacts	In the strict sense, effects are the objective results of certain actions (<i>e.g.</i> area of land cleared in hectares), while impacts are the subjective impositions of values on these actions (<i>e.g.</i> the value to society of the changes made in clearing the land). In practice, most publications make no distinction between effects and impacts.

Environmental assessment procedures

Pre-screening	This is a first initial assessment of some projects to be funded by the World Bank. It is a simple check as to whether the project will have an impact on any environmentally sensitive areas. If it does, then the investment proposal ends and the project is rejected. This has to be a very simple checking procedure. It is carried out at the pre-feasibility or early planning stage and takes the Programme Manager only a few minutes to determine.
Screening	All road construction, upgrading, reconstruction and rehabilitation programmes must be screened. This is a rapid evaluation to check the likely environmental impacts and determine whether there is a need for further study. If the programme fails to be cleared by the screening process, then either an IEE or an EIA must be undertaken. Screening should normally be done by the Programme Manager or some other

senior person familiar with the intended programme. A series of steps are followed and the process should be completed within a few hours by someone familiar with the intended site works and the alignment of the road concerned (or, for new roads, the possible alternative alignments).

All maintenance projects (routine, recurrent, periodic or emergency) are exempted from further environmental study at the screening stage.

**Initial
environmental
examination (IEE)**

A preliminary level of study of the likely environmental impacts of any road construction, upgrading, reconstruction or rehabilitation programme which has not been cleared by the screening process. The purpose of an IEE is to make a brief but informed evaluation of possible environmental impacts.

An IEE should be undertaken by one or two engineers. They do not necessarily need to be already familiar with environmental assessment procedures, although this would help. It is, however, essential for them to visit the whole site. Data will also have to be gathered from a number of sources. It should take between one and two weeks to complete, depending on the size of the programme and the diversity of potential environmental impacts. Other specialists may be involved, but this should not normally be necessary.

If the IEE shows a potentially severe level of environmental impacts, then it should recommend that the planned works be subjected to a full EIA. However, all road rehabilitation programmes and most small road construction projects should be satisfactorily covered by an IEE unless they cannot avoid an environmentally sensitive area.

Scoping

If it is determined that an EIA is necessary, the process of scoping is used to determine the details of an EIA. The main areas and level of detail to be studied in the EIA are defined on the basis of the perceived environmental impacts, and terms of reference are devised for the team to carry out the EIA.

Scoping should be undertaken by one individual who is familiar with environmental assessment procedures, in consultation with the Programme Manager and other people familiar with the planned programme. It should take about one month to complete, depending on the complexity of the programme; consultation may take longer to complete.

The main output from scoping is a set of terms of reference for an EIA.

Any project which is to be subjected to an EIA must first be scoped.

The term "scoping" is grammatically incorrect, which accounts for the confusion it creates among engineers unfamiliar with environmental assessment terminology. A better term would be "determining the scope of".

**Environmental
impact
assessment (EIA)**

An EIA is a full study of the likely environmental impacts of a planned project. It should be a constructive document, offering alternatives to reduce adverse impacts or to increase beneficial ones. It should also identify the measures to be used to reduce damage.

An EIA requires a team of three or four specialists (e.g. geologist, botanist, zoologist or socio-economist, determined by the scope of the EIA), working together over a period of one to six months, depending on the scale of the proposed site works and the likely environmental impacts, as determined by the scoping exercise.

All large road construction projects, and any new construction activity in a sensitive area should normally be subject to an EIA.

APPENDIX B: ROAD AND BRIDGE CLASSIFICATIONS

National highways	The main highways connecting east to west and north to south, joining the main north-south valleys of the nation, and joining the regional headquarters. They form the main arterial routes over the length and breadth of the nation.
Major feeder roads	Major links (AADT > 100 vehicles/day) between national highways; roads linking district and zonal headquarters to the national highways; and links from the national highways to the major places of industry, tourism, public utilities and power generation, <i>etc.</i>
Minor feeder roads	Links from major feeder roads and urban roads to the major places of industry, tourism, public utilities and power generation, <i>etc.</i>
District roads	Roads within a district which provide access while carrying little or no through movement. These roads give access for one or more villages to the nearest market or a higher class of road.
Urban roads	Roads other than any in the classes above, within the urban limit of a municipality boundary. These roads provide access between neighbouring residential, business and industrial areas within municipalities.
Village roads	Short, no-through roads linking single villages to district roads.
Agricultural roads	Short, no-through roads linking farms to small bazaars, centres of agricultural processing, district or feeder roads. The definition appears to have originated in the 1997 Agricultural Perspective Plan.
Culverts	Span structures up to 6 metres in length.
Minor bridges	Bridges more than 6 metres and up to 20 metres in length.
Medium bridges	Bridges more than 20 metres in length, but with span lengths less than 20 metres.
Major bridges	Any bridge with span lengths greater than 20 metres.

APPENDIX C: THE LEGAL SITUATION

This appendix clarifies the legal requirements of agencies such as the Department of Roads in undertaking environmental assessments. The law covering this is relatively new and so far is little known. Refinements can be made, both to the law and to the rules which enhance it, but for the present it provides a comprehensive basis to environmental protection.

His Majesty's Government of Nepal passed the Environment Protection Act 2053 (1997) with the aims of maintaining a healthy environment, minimising adverse impacts likely to degrade it and move towards resource use which combines sustainable development with protection of the environment. This law affects the Department of Roads and its activities in a number of ways. The relevant clauses are given below.

In essence, this law makes it obligatory to carry out initial environmental examinations or environmental impact assessments on all physical development projects.

No proposal (i.e. physical development project) can be implemented without the approval of the agency concerned (in this case, the Department of Roads) or the Ministry of Population and Environment.

Environment Protection Act 2053,
Section 4

Every proposal must be submitted with an initial environmental examination or an environmental impact assessment carried out by the proposer.

Environment Protection Act 2053,
Section 5

In the case of a proposal which required only an IEE, if the study shows that the project does not appear to have any significant adverse environmental impact, the Ministry of Physical Planning and works may grant approval for the project. In this case it may go ahead without further consultation. Alternatively, the Department of Roads may decide that the IEE is inadequate and may demand a full EIA study.

Environment Protection Act 2053,
Section 6, sub-section 1

Section 6, sub-section 2

In the case of a proposal which required an EIA, the Department of Roads may recommend approval for the project (if it does not appear to have any significant adverse impact which cannot be mitigated) and shall inform the Ministry of Population and Environment of its opinion, submitting a copy of the proposal and its EIA at the same time.

Environment Protection Act 2053,
Section 6, sub-section 1

On receiving a proposal accompanied by an EIA report, the Ministry of Population and Environment will make the report available for public review. It may also arrange for its review by a committee of experts. If these reviews do not reveal any significant adverse environmental impact, then the MOPE will also approve the proposal.

Environment Protection Act 2053,
Section 6, sub-section 3
Section 6, sub-section 4
Section 6, sub-section 5

If it appears that any identified significant adverse environmental impacts can be mitigated or controlled, then either the Department of Roads or the Ministry of Population and Environment can give conditional approval to the proposal.

Environment Protection Act 2053,
Section 6, sub-section 6

No one may undertake any activity, polluting or damaging, which may significantly affect the environment. If this happens on a road project, then the Department of Roads must control it. The Ministry of Population and Environment can also forbid the activity causing the pollution.

Environment Protection Act 2053,
Section 7, sub-section 1
Section 7, sub-section 2
Section 7, sub-section 3

The Ministry of Population and Environment may appoint Environmental Inspectors to check against environmental damage and to make sure that prescribed mitigation measures are being used. These Inspectors must give prior notice, but they then have the legal power to inspect every part of a project. The project must assist them in doing so, and may be punished if it does not.

Environment Protection Act 2053,
Section 8

Environmental damage suffered by anyone may be compensated by the person or organisation causing the problem. Anyone may file a law suit against organisations causing environmental damage and that organisation can be ordered to stop its activities, pay a fine and pay compensation.

Environment Protection Act 2053,
Sections 17 and 18

His Majesty's Government may frame rules to carry out the objectives of the Environment Protection Act.

Environment Protection Act 2053,
Section 24

A number of other laws cover the acquisition and ownership of land for roads. These state that the roads of the strategic network (i.e. Rajmargs and feeder roads) belong to His Majesty's Government of Nepal. The Department of Roads is responsible for all activities regarding the construction, maintenance and management of the roads, unless over-ridden by a higher authority (either the Cabinet or the Ministry of Physical planning and Works). The specific provisions most relevant to environmental assessments are as follows.

Land for public property (e.g. roads) can only be acquired by His Majesty's Government in the public interest.

Constitution of the Kingdom
of Nepal 2047, Article 17(2)

Compensation must be paid on the acquisition by His Majesty's Government of any privately owned land.

Constitution of the Kingdom
of Nepal 2047, Article 17(3)

The processes of acquisition and compensation are given in a special law.

Land Acquisition Act 2034

A "public road" is any road which is not owned or used privately. The definition of a "public road" includes everything associated with it, such as bridges, culverts, footpaths, etc.

Public Road Act 2031,
Section 2(A)

The "road boundary" is defined. It includes the road itself and the areas to right and left.

Public Road Act 2031,
Section 2(B) and Section 3

His Majesty's Government can classify any road as a Highway, Feeder Road, District Road or Urban Road. It may fix the boundary to a maximum of 31 metres on either side. It can also change these boundaries on account of topography or habitation.

Public Road Act 2031,
Section 3

In practice, "His Majesty's Government" means the Cabinet. Once the Cabinet has decided on a road and the width of the road boundary (or road reserve), this land becomes the responsibility of the Department of Roads. If the road crosses Government forest land, then this decision effectively means that the land has been transferred from the Department of Forests to DOR. From this point, DOR has authority over everything within the boundaries of the road.

Details of the legal position of trees and other forest products are given in the *Reference Manual* volume of *Roadside Bio-engineering* (published by the Department of Roads, 1999).

A number of additional instructions are given in the Environment Protection Rules 2054 (revised 2055). These are given in Appendix D, and form the extension of the Environment Protection Act 2053.

APPENDIX D: RESPONSIBILITIES UNDER THE ENVIRONMENT PROTECTION RULES

In addition to the direct legal provisions described in Appendix C, a number of additional instructions are given in the Environment Protection Rules 2054 (revised 2055). These make a number of actions obligatory on the part of all organisations proposing projects which are subject to environmental assessments.

The rules for the preparation of both IEEs and EIAs, and their submission to the Ministry of Population and Environment, involve a procedure of consensus-based approval. This takes some time to achieve, but is a logical and necessary part of the environmental assessment process. Because of it, implementing agencies such as the Department of Roads must complete IEEs and EIAs, if they are required, in a timely way during the project feasibility stage, and well before committing projects to implementation. This would ensure that the environmental assessment process is worthwhile and effective, and that no delays are caused.

The paragraphs below give the main requirements of the Environment Protection Rules 2054 (revised 2055) for the different levels of environmental assessment.

Initial environmental examination reports

The proponent shall prepare an initial environmental examination report in line with the format given in Schedule 5 of the Environment Protection Rules.

The proponent shall paste notices, retaining proof of signed witnesses, in the offices of the VDC or municipality, DDC, hospital and health posts of the project area, soliciting written opinions and suggestions from them and other concerned individuals or institutions with regard to environmental impacts of the implementation of the project. The proponent shall also publish similar notice in a national daily newspaper. Written replies should be provided within fifteen days. The opinions and suggestions so received shall be included in the report.

The proponent shall submit fifteen copies of the report together with the recommendations of the VDC or municipality to the relevant line ministry for approval. The line ministry shall then take a decision within twenty-one days from the date of its receipt, and may approve the report with some conditions.

The proponent must abide by the recommendations and provisions made in the report, as well as by the approval conditions.

Approval of scoping documents for environmental impact assessments

The proponent of the project shall publish a notice in a national daily newspaper soliciting written opinions and suggestions from the VDC or municipality, schools, hospitals, health post *etc.*, as well as from interested individuals or institutions of the area, with regard to the possible impacts of the implementation of the proposal on the environment. The written opinions and suggestions should reach the proponent within fifteen days from the first date of publication of the notice. The opinions and suggestions may also be copied to the relevant line ministry for information.

The proponent is required to submit an application to the relevant line ministry for the determination of the scope of work. This should mention what environmental factors are likely to be affected in what ways. The opinions and suggestions received should also be attached.

The line ministry shall review the application together with the attached documents, and then forward them to the MOPE with its opinion and suggestions regarding the scope of works.

The MOPE shall determine or approve the scope of work in the proposed or revised form by reviewing the application and the attached documents.

Approval of terms of reference (TOR)

The proponent shall prepare terms of reference for an initial environmental examination in line with the format given in Schedule 3 of the Environment Protection Rules, and have it approved by the relevant line ministry.

The proponent shall prepare terms of reference for an environmental impact assessment in line with the format given in Schedule 4 of the Environment Protection Rules, and on the basis of the scoping document, and have them approved by the MOPE. The proponent may submit both the scoping document and the terms of reference together, accompanied by the opinion of the relevant line ministry. In this case, the MOPE may determine the scope of work and approve the TOR together.

Both the MOPE and the line ministry have the right to make changes or improvements to the TOR in consideration of the nature of the project.

Environmental impact assessment reports

The proponent shall prepare an environmental impact assessment report in line with the format given in Schedule 6 of the Environment Protection Rules.

The proponent shall organise a public hearing in the VDC or municipality where the project is to be implemented, to collect opinions and suggestions from interested parties.

The proponent shall submit fifteen copies of the environmental impact assessment report together with the recommendations of the VDC or municipality to the relevant line ministry. The line ministry shall forward ten copies of the EIA report, along with its opinion, to the MOPE within twenty-one days from the date of its receipt.

The MOPE shall publish a notice in a national daily newspaper, opening the EIA report for comments, opinions and suggestions, and shall make the report available for study or for copying. Any comments, opinions and suggestions on the report shall reach MOPE within thirty days of the first date of publication of the notice.

The MOPE shall also make a general review of the EIA report, within sixty days of its receipt. In exceptional circumstances the MOPE may take an additional thirty days for the review. The MOPE may constitute an expert committee to advise on the EIA report.

The MOPE shall grant approval for the implementation of the project if the review on the basis of the comments, opinions and suggestions received from the expert committee, and interested individuals and institutions, show that its implementation will have no substantial adverse impact on the environment. The MOPE may approve the report with conditions.

The proponent must abide by the recommendations and provisions made in the report, as well as by any approval conditions.

Monitoring and evaluation

The relevant line ministry shall monitor and evaluate the impact of the implementation of the project on the environment.

The line ministry shall issue any necessary instructions to the proponent to adopt measures to reduce or control the adverse impacts, if monitoring and evaluation show that the actual impact is greater than the limit specified in the report or approval conditions. These instructions shall be copied to the MOPE. The proponent shall comply with the instructions.

Environmental audit

Two years after the commencement of any project that required a full environmental impact assessment, the MOPE shall undertake an environmental audit to record actual environmental impacts resulting from the implementation of the project, and the results of the mitigation measures employed to reduce the impacts.

APPENDIX E: REFERENCES FOR FURTHER INFORMATION

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