The Royal Government of Cambodia's Seila Program

Rural Investment and Local Governance Project
Environmental Analysis & Sub-project Review Procedures

SEILA TASK FORCE
March 11, 2003
Introduction

The purpose of this brief environmental report is to describe potential sub-project investments eligible for financing under the Rural Investment and Local Governance Project (RILGP) and to identify specific environmental concerns and possible mitigation measures associated with each investment type. The report also describes the procedures for environmental planning, screening and sub-project EA expected to be used for different sub-project proposals.

The RILGP will finance small scale village and commune level infrastructure throughout Cambodia. RILGP will actively work in about 1,110 communes in fifteen provinces nationwide. Using nationally standardized planning approaches developed for the Seila program, commune-level decision-makers will determine local priorities for investment, selecting from proposals prepared by village-level committees. Use of commune funds for investments will be limited to community infrastructure needs such as construction or improvement of tertiary roads, access tracks, bridges or culverts; improvement or repair of small irrigation works; construction or improvement of public buildings such as schools, clinics, and community centers; and provision of or improvements to community water supply systems.

Environmental Issues

Potential environmental issues associated with the vast majority of sub-project investments are not expected to be significant. Most investments will be of less than $10,000 each and are likely to involve rehabilitation of existing infrastructure which is in a dilapidated state or construction of new facilities which are very small in scope. To the extent that there would be any adverse effects, they will primarily be related to construction phase activities. Most adverse impacts will be highly localized (i.e., effects rarely more than 10-20 m. from the construction works), temporary in nature (i.e., experienced during construction phase only) and easily mitigated through the application of sensible site selection criteria, good construction practices and diligent management practices in the operational phase.

Based on Bank field evaluation of Seila sites and discussions with Seila implementation teams, similar sub-projects financed under the Seila program in the past seem to have experienced few environmental problems. Still, some adverse impacts from small scale infrastructure sub-projects have been described depending on the specifics of each site. While most activities will have limited effects, those that involve new physical works or changes in the sites of existing infrastructure could have some adverse environmental implications. Notable examples are new road construction and the construction of new irrigation facilities. In these cases, local problems have been identified with respect to poor site selection decisions resulting in drainage problems, restricted flows in natural water course, conversion of local habitat, and erosion problems during the operational phase following road construction.

The potential for adverse impacts from any sub-project investment will ultimately depend on the magnitude of the specific investment type, the characteristics of the specific location, and in some cases the long term operations of the sub-project. Anticipated effects include dust and noise generated during construction; modifications to local drainage patterns; small-scale habitat loss from vegetation clearing or drainage of wetland areas; erosion and increased sedimentation resulting in reduced water quality; and pollution resulting from inappropriate
disposal of construction waste materials. A more complete description of sub-project types, environmental concerns, and possible management measures is presented below.

These potential adverse impacts need to be evaluated with a balanced view as some sub-projects will also have environmental benefits. For example, rehabilitation of degraded rural roads can have significant improvements to local drainage and to improving sedimentation resulting from run-off from highly degraded road surfaces. Based on the small scale nature of the sub-projects and the unlikely prospects of cumulative effects of these small investments, the Project has been rated as a B category environmental risk according to World Bank policy OP 4.01 Environmental Assessment.

Environmental Review Procedures

The Project’s basic approach to environmental review will be to fully integrate consideration of adverse impacts into the commune level program planning, design, construction procurement and operations. Based on a review of the proposed nationally approved commune planning guidelines, several key points in the overall decision process lend themselves to including environmental review. These are summarized below. (See the Commune Sangkat Planning Guidelines for a full description of each planning step).

Key Steps in Commune Planning and Sub-Project Implementation

Planning Steps 1-3 Commune / Sangkat Data Assessment
- Basic data gathering to support and verify Commune Needs Assessments
- Outputs at this step include the production of lists of commune issues plus commune maps identifying environmentally sensitive areas and other development constraints

Planning Step 4
- Identify priority goals environmental and NRM priorities
- Identify alternative solutions and strategies

Planning Step 5
- Outline list of projects. Potential environmental impacts and land acquisition issues identified and discussed.

Planning Steps 7
- Draft 3-year Commune Investment Plan is prepared. Based on this plan, a workplan for project preparation activities is agreed with the TSS.

Planning Steps 8 to 11
- Finalisation and approval of Commune Development Plan and Commune Investment Program
- Project Preparation activities can proceed contemporaneously with these steps.

Sub-Project Preparation Phase
- Use of environmental site selection criteria in design
- Environmental Screening for projects requiring environmental analysis (EA)

Technical Clearance Phase
The Project will work closely within the commune councils during the planning phase to identify potential environmental problems. At the planning stage, emphasis will be placed on integrating environmental and natural resource education and awareness raising at the village level. During commune planning, emphasis will be placed on careful site selection for infrastructure to ensure that problems are avoided or minimized right from the start. Provincial and District Facilitation teams (PFT, DFT) will be required to introduce and discuss environmental issues during consideration of alternative investments with Commune Councils and with individual villages as appropriate. DFT will be given training and standard reference materials to assist them in helping communes to identify environmental problems at the commune level and to set environmental goals within their commune development plans (See Attachment 4 for an example of an environmental training module being tested during sub-project preparation phase).

The Project will also adopt the use of sound and consistent application of technical design standards which address possible adverse effects of each sub-project type. The Project will expect the provincial technical support service (TSS) teams responsible for individual sub-project designs to take into account environmental problems commonly encountered in specific infrastructure Projects. As a key step, the Seila Technical Manual will be adopted as the principal technical guideline. This manual has proven useful and relevant under Cambodian field conditions and standardized technical designs are being developed and revised to take into account environmental concerns.

The Project will also require the inclusion of environmental management clauses in all construction contracts. Contractors responsible for construction of proposed works will be required to adhere to contract clauses with specific expected performance standards relating to environment protection. For most sub-projects this will simply mean that contractors have to adopt “good-housekeeping” measures to ensure erosion is controlled on-site and that waste materials are disposed of in appropriate manner. Seila has included contractual clauses into recent contracts and this practice will be expected to be continued and expanded under the Project. While such practice has already begun under LDF programs but its use is not widespread and supervision has been limited in the past.

Finally, communes will be expected to adhere to good management practices during sub-project operations. These measures are expected to be simple, low cost and feasible under Cambodia field conditions. For example, communities would be expected to adopt community rules to prevent contamination of water wells and to undertake periodic monitoring to ensure that water quality is maintained in wells. The Project as a whole will develop and refine guidance and reference materials which identify common risks and possible mitigation measures suitable for these small-scale sub-project s.

Environmental Screening

For the majority of sub-projects, formal environmental analysis will not be required. Environmental analysis will be required in the following cases:

- Construction of the sub-project may cause damage to any place that is important for environmental or cultural reasons (for example, forest, a National Park or wildlife park, or a temple);
- Construction of the sub-project may cause damage to water supplies used by people;
- Construction of a new road alignment;
- Construction of a new irrigation scheme.
For all sub-projects, the Commune Chief will carry out sub-project studies with the assistance of the TSS. These studies will include screening to identify those sub-projects requiring environmental analysis. The TSS will be trained to conduct this initial screening. The screening will lead to one of two recommendations: no EA required, or EA required. The results of the sub-project screening will be submitted to the Provincial Office of Local Administration (POLA) on the Project Information Form.

Environmental Analysis

In each Province, one or more Provincial Officials will be nominated by ExCom for training in the environmental analysis procedures required for the Project. These officials will be required to sign an agreement to be available to carry out this work when required.

For sub-projects requiring EA, POLA will commission either an official, who has received appropriate training, or an independent consultant with the appropriate skills, to carry out the EA. The official assigned to the task will carry out the EA with the participation of local people who will be affected by the sub-project. The EA will consist of the following parts:

1. Participatory environmental mapping: preparation of an environmental map of the project. The map will identify:
   a. Topography: Steep slope, slight slope or flat land, with direction of slope;
   b. Soil types: highly erodible, slightly erodible and not erodible;
   c. Vegetation and land use
   d. Important cultural sites;
   e. Access routes to the site;
   f. Water courses
   g. Extents of seasonal inundation.
   h. Areas of human habitation and type of domestic water supply.

2. Completion of a checklist common types of environmental impact, to be classified as “High risk,” “Medium Risk,” or “Low risk.” For medium/high risks mitigation measures should be proposed.

3. An Environmental Management Plan (EMP) showing proposed changes to the project design, measures to be included in the Contractor Workplan during construction, and proposed measures to mitigate environmental impacts of operation. Responsibilities for implementation will be defined.

4. A Monitoring Plan showing monitoring activities to be carried out.

A format for the environmental analysis, including the EMP and the monitoring plan, is provided in Attachment 3. This proposed format is open to refinement and editorial changes through the Project implementation period.

The Commune Chief will be responsible for making results of the EA public and for ensuring that issues raised in the EA are discussed in a public forum before a final decision is made on whether to proceed with the sub-project or not.

The EMP and monitoring plan will be agreed with the Commune Council. The report of the EA, including these plans, will then be submitted to POLA. POLA will be responsible for technical clearance of the EMP in collaboration with the Provincial Department of the
Environment. For all sub-projects of the Commune Councils, Technical Clearance is required before procurement for sub-project implementation can begin.

Organizational Roles And Responsibilities

Commune Council  As the principle decision making body for community investments, the Commune Council has the primary responsibility to ensure that all investment decisions are given due environmental consideration. The Commune Council is responsible for approving changes to the sub-project proposal, including the EMP.

Commune Chief  The Commune Chief is responsible for implementation of the Commune Development Plan. The Commune Chief is responsible for ensuring that village residents are kept informed regarding possible environmental concerns relating to investment proposals. He or she should work closely with the DFT to ensure that information on possible impacts is made available in a timely manner to facilitate informed decision-making. In addition the Chief will closely monitor and assist the village committees in matters relating to environment. With the assistance of the TSS, Commune chiefs will also be responsible for monitoring contractor performance to ensure that any environmental clauses are adhered to and respond to any grievances submitted by adversely affected people.

PFT/DFT  The provincial and district facilitation teams will have an important role in advising communes on potential environmental implications of investment decisions. The DFT will take a pro-active role in public awareness raising and education of commune council members about potential environmental problems. They will be responsible for advising the commune council on site selection criteria and they should assist the councils in their attempts to minimize adverse impacts.

Technical Support Staff (TSS) Teams  The TSS will be responsible for ensuring that standard technical designs are applied at the field level. They should also take steps to ensure that site-specific measures to protect against environmental disturbance are included in sub-project design. The TSS will assist the Commune Chief in environmental screening. The TSS may also assist in proposing mitigation measures during preparation of the Environmental Management Plan. The TSS will assist the Commune Chief in monitoring the work of the contractor, including compliance with environmental protection measures.

Officials or consultants assigned to perform Environmental Analysis  The officials or consultants assigned to this task will be responsible to ensure that environmental analysis is carried out in a timely and effective manner, and that the views and concerns of local people, who may be affected by environmental impact of the sub-projects, are heard and taken account of. The officials will report their recommendations to POLA and will monitor implementation of the EMP.

Monitoring

A Technical Committee comprising the Senior TSS and other senior ExCom officials, and assisted by the PLG Infrastructure Adviser, will carry out technical audits of completed subprojects. For sub-projects having an EMP, the audit will include assessing the effectiveness of the environmental mitigation measures undertaken.
Safeguards

The Project will develop mechanisms for monitoring effectiveness of the environmental review criteria and screening mechanisms. At a minimum, the Project will require periodic stocktaking of the planning process and in addition efforts will be made to compare Project results with other Projects undertaking similar approaches. Monitoring of field implementation will be undertaken during supervision missions.

Disclosure And Consultation

Disclosure of Project safeguards documents and procedures will occur on several different levels. On the national level, significant consultation and debate over the Commune planning guidelines has taken place over the last several years. The environmental review criteria and requirements for environmental assessment, while recently added, are an integral part of the national planning procedures and will be subject to continuous review and refinement throughout the evolution of the Seila program.

A draft version of these Procedures, in English and in Khmer, has been made available for public review and comment, through the Seila Task Force office in Phnom Penh and through the PRDC of each participating province, as required by standard World Bank disclosure procedures. Location of this document was advertised in the Cambodian press on 27 January 2003 for public comments.

A public review period of no less than 30 days was given to allow interested stakeholders time to provide written feedback on the procedure to be followed under the Project. The document has also been made available through the World Bank’s information center in Phnom Penh as well as in the World Bank’s Info Shop in Washington D.C.

More importantly public disclosure and consultation is an integral part of the Commune planning process and public input will be solicited at numerous points in the overall planning process. Community leaders and other stakeholders will be given several opportunities to identify environmental issues in the commune, to influence the type, scale and location of sub-projects and to review EA reports in cases where these may be required.

For sub-projects requiring a stand alone EA, consultation and disclosure of EA reports will take place at the commune level. It will be the responsibility of the Commune Chief to post the EA reports in a public place prior to a final decision meeting on whether to proceed with a particular sub-project. In addition, the EA report will be a required agenda item during the final decision meeting for any sub-project.

Financing Of Environmental Mitigation Actions

For sub-projects requiring EA or EMP, the costs of preparing these studies or implementing the required management measures will be borne by the Provincial Project Support budget and by the Commune Council. If mitigation measures result in an increase in sub-project implementation costs, these costs will be incorporated into the sub-project costs.
World Bank Supervision Arrangements

The World Bank will undertake periodic Project supervision of all RILGP provinces to assess compliance with these requirements and to recommend any corrective measures that may be necessary to resolve implementation problems or inadequacies. To facilitate Bank supervision, any approved EMPs will be made available for Bank review at each PRDC. Reports of technical inspections of completed schemes, by a technical committee including the Senior TSS, will record compliance with environmental protection measures, and these reports will be held at TSU for review by the Bank.

Sub-Project Environmental Review Criteria

For the majority of sub-projects, it is proposed that in place of a formal EA, simple site selection criteria and technical design standards be adopted through the planning process. The Project will prepare a manual which will provide specific guidance on the types of investments to be supported under the Project; environmental implications of such sub-projects; technical design considerations; sample construction contract clauses; and suggested management measures during operations. The PFT and DFT will use Khmer translations of these guidelines as a technical resource during the planning phase. Some examples of such reference materials are provided in the following sections. These examples will continue to be refined throughout the preparation phase of the Project. The design is intended to be flexible allowing for easy modification and creation of new guidelines for different sub-project types.
Example 1 Bridges And Small River Crossings

PROJECT ACTIVITIES.
Small-scale bridge construction sub-projects may involve both permanent or temporary structures with a pier support structure or shore-to-shore suspension spans. Sub-projects may involve both rehabilitation or replacement of existing structures as well as new construction. Bridges supported by the project may be very small facilitating village track to road connections allowing low volume passages of tractors, bullock carts, pedestrians, bicycles, motorcycles and small cars. Alternatively they may be more substantial structures designed to facilitate increased motor vehicle or truck traffic. Construction materials typically include poured reinforced concrete, steel support beams, wood, or combinations of these materials.

ENVIRONMENTAL CONCERNS.
Environmental impacts associated with bridge construction usually involve disturbance to banks and streambeds to establish foundations. Erosion of stream-banks may adversely affect aquatic habitats and water quality locally and downstream. The use of heavy construction equipment in or near water bodies may result in inappropriate hazardous substance contamination from fuel, lubricants, and greases.

In some cases ancillary works associated with bridges may involve bank stabilization with rip-rap, river training works, and dredging. Bridge construction may adopt measures which confine river flow in order to protect the structure from future flood damage. These flow changes can lead to unexpected changes in stream flow velocity immediately downstream of the bridge. The most likely effects of such confinement is increased erosion downstream of the bridge. Depending on the site, dredge materials may contain toxic or hazardous substance.

In general, environmental concerns are only indirectly related to bridge length. More important factors include volume of excavation for foundation work; modifications to flow velocity and channel alignment, introduction of new or modified traffic patterns and increased traffic volumes leading to dust and noise concerns. In some cases, the increased access provide by bridges and other rural road development can encourage use by vehicles which exceed the capacity of the bridge leading to shortened life span and bridge failures.

In some locations - and depending on the size of construction - bridges may become focal points for small markets and commercial enterprises. Such development is typically spontaneous and unplanned leading to traffic congestion, and pollution from increased commercial activity. These indirect effects may exceed the direct impacts of construction.

PLANNING AND SITE SELECTION CRITERIA
- Identify and avoid environmental sensitive sites
- Prefer suspension bridge design where feasible
- Select site to minimize land acquisition
- Evaluate foundation site stability
- Evaluate any pre-existing problems with existing bridges
- Avoid sites where creation of stagnant pools may become a problem
Safeguards

Evaluate expected traffic / vehicle types

TECHNICAL DESIGN CONSIDERATIONS

- Design by qualified engineer / architect with reference to standard designs
- Design should incorporate adequate erosion control measures during construction and measures to reduce erosion post-construction phase;
- Avoid sites which require changes to hydrological regime

CONSTRUCTION CLAUSES

- Construction by qualified and experienced contractors
- Construction in dry season
- Protection of streams from sediment runoff using erosion barriers
- Ensure protection during construction; erosion prevention using plastic fencing; re-vegetation or physical stabilization
- Disposal of dredge spoil or excavation materials in designated sites. Direct dumping into streams should generally be avoided
- Site restoration after construction, including re-vegetation of riverbanks, bank erosion control measures;
- Ensure construction contracts have appropriate clauses addressing appropriate site management, spoil disposal, construction materials storage and disposal,
- Cleanup of construction sites following construction
- Proper signage / control of access to construction site safety

OPERATIONS AND MAINTENANCE

- Community monitoring and control of inappropriate traffic and usage
Example 2 Community Buildings

Project Activities. There are several types of village buildings that could be supported by the project and qualify as sub-projects. These include schools, health centers, stores, and community centers that act as meeting or gathering places. Work on these buildings may range from minor rehabilitation, rehabilitation with major construction, to new constructions.

Environmental concerns. Concerns are generally greater with sub-projects that include major re-construction or dilapidated buildings or new construction on previous unutilized space. Conditions that differentiate between minor rehabilitation and major rehabilitation include the end use of the building being rehabilitated, the amount of demolition, and the involvement of any land clearing. Environmental concerns generally include erosion control from land clearing, good housekeeping on construction sites, noise control, hazardous materials such as asbestos, safe building design, and clean water supply and sanitation. For minor rehabilitation, good management practices should be followed to reduce environmental impacts.

Planning and Site Selection Criteria
- Site new construction location away from natural habitat areas, fragile lands, or areas that contain threatened or endangered species
- Minimize land allocated for new buildings
- Limiting the number of trees cut for clearing the site location – i.e., only cut what is necessary.
- Site sensitive buildings (schools, health clinics) away from roads where dust and noise would be significant concerns

Technical Design Considerations
- Adhere to predefined SEILA technical standards
- Use qualified architect / engineer to design major structures
- Provide proper water supply and sewage disposal on site
- Use building materials at specified standards

Construction Clauses
- Require “good housekeeping” on all construction sites including storage of construction materials,
- Ensure adequate worker sanitation
- Undertake safety measures to control fire hazards
- Carry out post-construction landscaping of construction site
- Adopt on-site erosion control.
- Control dust during construction
- Construct works during normal business hours to minimize noise
- Dispose of old building materials such as glass, asbestos in an appropriate manner

Operations Phase
- Verify that water supply and sanitation systems in schools and health centers are adequately maintained and remain operational
- Confirm that disposal of any health center medical waste is done in a proper and sanitary manner
Example 3 Rural Roads

**PROJECT ACTIVITIES.**

The RILGP could fund sub-projects to rehabilitate existing rural roads as well as construct new roads. These roads are small 3-5 m wide and are usually laterite surface. Most rural road subprojects will involve road rehabilitation rather than construction of new roads. Road projects may involve realignment, raising the road bed, provision of lateral and cross drainage, bridges and river crossings.

**ENVIRONMENTAL CONCERNS.**

Road rehabilitation or maintenance sub-projects do not usually result in significant environmental impacts because the ROW are typically small, traffic volumes are low and the existing ROW are usually followed. However, there are a number of concerns which should be taken into consideration when proposing rural roads rehabilitation sub-projects.

Impacts from road rehabilitation may occur on-site during construction. For example, erosion along road alignment can be significant as well as at areas such as quarries where construction material is being obtained or transported. Impacts during operation can result from increased erosion, traffic safety, changes to air quality from dust. Impacts occurring during operation, such as noise nuisance and safety hazards, should be considered if road upgrading significantly changes traffic patterns. In many parts of Cambodia the composition of vehicle traffic is usually limited to small farm vehicles and motorcycles.

Major concerns in new rural road construction are erosion and loss of habitat resulting from vegetation clearing. Construction during rainy season can leave soils exposed and can cause significant erosion. Dust from road construction and operation can damage crops or affect human and livestock health. In Cambodia, roads built on raised embankments can interfere with cross drainage and can impede the flow of water leading to changes in the local hydrology. In such cases roads have been known to exacerbate local flooding problems if adequate drainage is not taken into account.

Environmental impacts of new construction include direct impacts at the road construction site and in the immediate environs of the right of way. Air and water pollution and noise, generally associated with highways, are not typically major problems in rural roads because traffic volumes are low. However, dust raised from the road and blown by vehicles pose a significant local nuisance and, under extreme prolonged conditions, possible health hazards. Damage to vegetation, crops and livestock nearby roads is also known to be problematic. If the road is paved, some water pollution can occur from chemicals carried away in runoff. Other possible sources of water pollution are chemicals applied along the roadside or on the right-of-way for the control of weeds or dust.

Other sedimentation problems can also occur through slips and landslides in steeper areas where slope control measures have now been adopted. This can lead to serious sedimentation and siltation problems in nearby surface waters. With their greater potential for causing environmental problems, roads built in steep, humid zones will require higher standards and costs than roads on flatter low lying areas. In flatter areas of Cambodia, for example, roads built on raised embankments interfere with cross drainage. Movement of water can permanently impair the biological cycles and productivity of the wetland areas and these roads can cause flooding of adjacent areas by blocking the flow of water and by increasing runoff.

Siting of a road is the most critical decision in road construction. It will largely determine the type and magnitude of environmental and social impacts that will result from road
construction. Once the area for the road is chosen, care must be taken to avoid constructing it on steep slopes, unstable soils and places where runoff and drainage will be problematic. Siting decisions typically involve consideration of baseline data on the climate, soil, topography, hydrology, biology/ ecology, and social factors of the sites proposed for construction.

Maintenance of rural roads also poses several concerns. Maintenance costs are often underestimated and maintenance routines deficient, especially on low volume roads such as roads through lightly populated regions. Adequate road maintenance can be costly but is essential to avoid environmental problems and to ensure the expected economic returns. Overloading of trucks and buses is a chronic problem that should be taken into account in road design and maintenance. To the extent possible, road maintenance should be supported technically and financially by the provincial government, but carried out by local authorities and the community.

In those rare instances where a new road is to be built, especially in areas of undisturbed natural habitat, an environmental analysis (EA) will be required. New roads should be evaluated for their direct impacts and appropriate measures developed for mitigation and management of problems. In some situations an evaluation of possible indirect effects such as increased potential for illegal logging or spontaneous development should also be taken into account. Among other issues an EA should evaluate the possible impact on existing terrestrial and aquatic habitats, erosion concerns, noise, air quality, siting of quarries and borrow pits and construction waste management issues. An EA for such projects should provide a map of the project area showing important sensitive areas; a mitigation plan; and a monitoring plan to be implemented during construction.

Planning and Site Selection Criteria

- Limit the amount of construction undertaken in rainy season
- Use existing alignment / limit
- For new roads, consider several alternative alignments to minimize impacts
- Evaluate potential for local drainage problems
- Identify pre-existing problem areas of significant erosion and request special measures such as drainage or retaining walls
- Avoid environmentally sensitive areas such as forest or wetlands

Technical Design Considerations

- Include appropriate lateral and cross drainage facilities along road alignment
- Identify borrow pit areas in advance

Construction Clauses

- Contractor to prepare brief environmental site management plan
- Avoid construction in rainy season
- Require use of sediment control fencing, or other suitable barriers, near all permanent water courses or residences which may be affected
- Mitigate noise through agreed operating and construction hours
- Post appropriate signage to ensure local safety during construction
- Mitigate fugitive dust through period watering of road surface during construction
- Require contractor to dispose of hazardous construction and waste materials in designated location according to agreed waste disposal plan
- Contractor to ensure vehicles transporting road construction materials such as sand, topsoil etc. are covered with a tarp to avoid unnecessary dust and spillage;
- Apply vegetative erosion control measures such as vetiver grass along road embankments close to permanent water sources
For quarries or borrow pits, contractor should specify location and site remediation measures such as landscaping and re-vegetation measures to be undertaken following completion of the site;

- On-site compliance monitoring and supervision of road contractors

**Operations and Maintenance**

- Ensure adequate financing for road maintenance
- Local monitoring and control of inappropriate traffic
- Periodic watering to control dust during dry season
Example 4 Village Water Supply

Project Activities. The project would finance village water supply sub-projects designed to provide reliable and safe drinking water to communities. These sub-projects may take on various designs including rain-water collection tanks, jars, ring wells, drilled wells with pumps, and community ponds. The scale of these investments are typically very small. They are usually designed to serve the needs of a few families but could involve the provision of water supply for several families or even entire villages in some cases.

Environmental Concerns. One of the most important environmental considerations with regard to water supply sub-projects is avoiding well-water contamination and subsequent exposure to humans. Contamination poses direct human and animal health risks and will affect the long-term viability of the investment. During construction and operation of the wells measures need to be taken to prevent contamination from sedimentation, agricultural, livestock and human waste disposal. Once a well or pond is contaminated it not only affects the utility of the specific investment but may impact other downstream users as well.

In wells and ponds, contamination usually results from inadequate care and attention to controlling contaminants from entering through the well or pond itself. Hand dug wells and open ponds are the most susceptible to contamination. Typical contaminants include: sediments entering the groundwater during construction of the well itself; sediment from erosion on the periphery of ponds; sediments entering through the well directly or from failure in the well casing; animal waste entering the water supply through uncontrolled livestock. Depending on the situation wells and ponds could also be contaminated from hazardous materials stored near the water supply or from agricultural runoff which introduces pesticides into the supply.

Some typical sources of contamination within a small to medium sized village might include: storage of gasoline, diesel or other fuels; storage and application of manure, fertilizers and pesticides; poor quality surface water runoff from irrigation schemes; animal feeding pens; sewage disposal; open pits or quarries from previous construction activities; land clearance for agricultural or living quarters; small scale manufacturing or industrial activity (e.g. machine shop, animal slaughterhouse, vehicle repair etc)

Depending on the characteristics of the aquifer or surface water source, contamination may also come from sources far from the village itself. For systems designed to serve the needs of many individuals it is important that possible sources of contamination are identified during the planning stages.

Measures should also be taken to determine the reliability and quality of water sources. For example, it is increasingly documented that arsenic in groundwater is becoming a more significant problem. In areas known to be prone to this type of contamination water quality testing is recommended. This is normally done through initial groundwater assessment to determine the quality of water. For water supply projects it is desirable to carry out basic inventory to determine the possible sources of contamination within a village.

Supervision of water supply projects should also be organized periodically. Testing of the water supply should be performed regularly to detect any contamination to the system, and this should be done in conjunction with periodic treatment. Hence, proper training of technicians is critical to ensure that adequate maintenance occurs.
Planning and Siting Criteria
- Conduct a simple community inventory of potential contamination sources (livestock; fertilizer/pesticide use; storage of hazardous materials; sedimentation from land use or construction projects)
- Choose site for well or pond to avoid contamination sources;
- Establish a wellhead or pond protection area within the village;
- Educate families within the village on the importance of protecting the water supply source;
- Establish some community guidelines for livestock near wells;
- For systems designed for many households undertake basic water quality analysis
- Visit other villages in area to determine the experiences with water supply;

Technical Design Considerations
- Mark off protection area with fence;
- Follow SEILA technical design manual
- Use of better quality pumping equipment
- Ensure proper drainage near pumping stations;
- Ensure appropriate community participation in site selection;

Construction Clauses
- Select a qualified contractor to build the well;
- Protection of vegetation during construction
- Clean up after construction

Operations and Maintenance
- Establish a community water committee to oversee operations and supervise agreed management practices
- Periodic review of water quality as per provincial monitoring program
## Attachment 2: Format for Environmental Analysis

**Commune / Sangkat Infrastructure Project**

### ENVIRONMENTAL ANALYSIS FORM

<table>
<thead>
<tr>
<th>Province / Municipality</th>
<th>Commune / Sangkat</th>
</tr>
</thead>
<tbody>
<tr>
<td>District</td>
<td>GIS Code</td>
</tr>
</tbody>
</table>

### Name of Project

<table>
<thead>
<tr>
<th>Date of participatory environmental analysis</th>
<th>Name of official responsible for analysis</th>
</tr>
</thead>
</table>

### Place of doing the analysis

<table>
<thead>
<tr>
<th>How many local people took part in the analysis (attach a list)</th>
</tr>
</thead>
</table>

### Reason for carrying out Environmental Study (can be more than one)

- Project may damage area that is important for environmental or cultural reasons
- Project may cause damage to domestic water supplies
- The project is to build a new road
- The project is to build a new irrigation system

### Checklist of types of environmental damage that may occur

<table>
<thead>
<tr>
<th>Problem</th>
<th>Severity</th>
<th>Locations on the map</th>
</tr>
</thead>
<tbody>
<tr>
<td>Damage will be caused by vehicles transporting materials to the site</td>
<td>Big impact</td>
<td></td>
</tr>
<tr>
<td>Damage will be caused by excavating soil or gravel to build the project</td>
<td>Big impact</td>
<td></td>
</tr>
<tr>
<td>Dust problem during construction</td>
<td>Big impact</td>
<td></td>
</tr>
<tr>
<td>Noise problem during construction</td>
<td>Big impact</td>
<td></td>
</tr>
<tr>
<td>Contamination of water resources during construction</td>
<td>Big impact</td>
<td></td>
</tr>
<tr>
<td>Damage to natural trees</td>
<td>Big impact</td>
<td></td>
</tr>
<tr>
<td>Damage to wild animals that live in the area</td>
<td>Big impact</td>
<td></td>
</tr>
<tr>
<td>Other kind of damage to valuable natural area or natural resources</td>
<td>Big impact</td>
<td></td>
</tr>
</tbody>
</table>

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## Checklist of types of environmental damage that may occur (2)

<table>
<thead>
<tr>
<th>Problem</th>
<th>Severity</th>
<th>Locations on the map</th>
</tr>
</thead>
<tbody>
<tr>
<td>Damage to valuable cultural site, for example by construction in the area of an ancient temple.</td>
<td>Big impact, Some impact, No impact</td>
<td></td>
</tr>
<tr>
<td>Damage to agricultural land</td>
<td>Big impact, Some impact, No impact</td>
<td></td>
</tr>
<tr>
<td>Damage to domestic water supplies</td>
<td>Big impact, Some impact, No impact</td>
<td></td>
</tr>
<tr>
<td>Damage to fish stocks</td>
<td>Big impact, Some impact, No impact</td>
<td></td>
</tr>
<tr>
<td>Erosion caused by removing vegetation</td>
<td>Big impact, Some impact, No impact</td>
<td></td>
</tr>
<tr>
<td>Erosion caused by changes to alignment or size of streams</td>
<td>Big impact, Some impact, No impact</td>
<td></td>
</tr>
<tr>
<td>Flooding</td>
<td>Big impact, Some impact, No impact</td>
<td></td>
</tr>
<tr>
<td>Noise pollution from traffic</td>
<td>Big impact, Some impact, No impact</td>
<td></td>
</tr>
<tr>
<td>Dust pollution from traffic</td>
<td>Big impact, Some impact, No impact</td>
<td></td>
</tr>
<tr>
<td>Road safety problems</td>
<td>Big impact, Some impact, No impact</td>
<td></td>
</tr>
<tr>
<td>Problems caused by people moving to live in the area</td>
<td>Big impact, Some impact, No impact</td>
<td></td>
</tr>
<tr>
<td>Problems caused by more people coming to use natural resources in the area</td>
<td>Big impact, Some impact, No impact</td>
<td></td>
</tr>
<tr>
<td>Other problem (describe)</td>
<td>Big impact, Some impact, No impact</td>
<td></td>
</tr>
<tr>
<td>Other problem (describe)</td>
<td>Big impact, Some impact, No impact</td>
<td></td>
</tr>
</tbody>
</table>

Describe any good impact of the project on the environment
## ENVIRONMENTAL MANAGEMENT PLAN

<table>
<thead>
<tr>
<th>Problem</th>
<th>Mitigation measure</th>
<th>Cost</th>
<th>Who is responsible</th>
<th>Impact remaining with mitigation</th>
<th>Priority</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Recommended changes to the design of the project</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>2. Recommended changes to the way the project will be constructed</td>
<td></td>
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<tr>
<td>3. Recommended changes to the way the project will be operated or maintained</td>
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</tr>
</tbody>
</table>
### ENVIRONMENTAL MONITORING PLAN

<table>
<thead>
<tr>
<th>What will be monitored?</th>
<th>Place for monitoring</th>
<th>How to monitor</th>
<th>Times when monitoring will be done</th>
<th>Who will be responsible to monitor?</th>
</tr>
</thead>
<tbody>
<tr>
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</tbody>
</table>
## RECOMMENDATION

<table>
<thead>
<tr>
<th></th>
<th>IF THE PROJECT IS IMPLEMENTED FOLLOWING THE EXISTING DESIGN, THERE WILL NOT BE ANY UNACCEPTABLE IMPACT ON THE ENVIRONMENT.</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>THE PROJECT CAN HAVE AN UNACCEPTABLE IMPACT ON THE ENVIRONMENT. HOWEVER, IF THE RECOMMENDATIONS ARE FOLLOWED, THERE WILL NOT BE ANY UNACCEPTABLE IMPACT.</td>
</tr>
<tr>
<td>3</td>
<td>THE PROJECT WILL CAUSE UNACCEPTABLE BAD IMPACT ON THE ENVIRONMENT.</td>
</tr>
</tbody>
</table>

## SIGNATURE
<table>
<thead>
<tr>
<th>#</th>
<th>Name</th>
<th>Village</th>
<th>Sex</th>
<th>Age</th>
<th>Occupation</th>
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07/03/03