ROYAL GOVERNMENT OF BHUTAN

MINISTRY OF AGRICULTURE

DECENTRALIZED RURAL DEVELOPMENT PROJECT

BHUTAN

Environmental Assessment Report and Environmental Management Framework

September 2004
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ACRONYMS AND GLOSSARY OF BHUTANESE TERMS

Acronyms

ADB  Asian Development Bank
CA   Competent Authority
Danida Danish International Development Assistance
DAO  Dzongkhag Agriculture Officer
DE   Dzongkhag Engineer
DFEO Dzongkhag Forestry Extension Officer
DoF  Department of Forestry
DoA  Department of Agriculture
DoR  Department of Roads
DRDP Decentralized Rural Development Project
DYT  Dzongkhag Yargye Tshogdu
EA   Environmental Assessment
EAA  Environmental Assessment Act, 2000
EC   Environmental Clearance
ECOP Environmental Codes of Practice
EFRC Environment Friendly Road Construction
FNCA Forest and Nature Conservation Act, 1995
FNCR Forest and Nature Conservation Rules, 2000
FRC  Farm Roads Construction
FRMC Farm Road Management Committee
FYP  Five Year Plan
GYT  Geog Yargye Tshogchung
IPM  Integrated Pest Management
ISD  Irrigation Scheme Development
LoU  Letter of Understanding
MoA  Ministry of Agriculture
MoU  Memorandum of Understanding
NEC  National Environment Commission
NECS National Environment Commission Secretariat
NIP  National Irrigation Policy
Nu.  Ngultrum
PA   Protected Area
PAB  Pesticides Act of Bhutan, 2000
RECOP Regulation for the Environmental Clearance of Projects, 2002
RGoB Royal Government of Bhutan
RNR  Renewable Natural Resources
SEA  Strategic Environmental Assessment
WB   World Bank
WUA  Water Users’ Association
**Bhutanese Terms**

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<th>Term</th>
<th>Definition</th>
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<tr>
<td><em>Chathrim</em></td>
<td>Act, rules and regulations, codes of conduct</td>
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<tr>
<td><em>Dungkhag</em></td>
<td>Sub District</td>
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<tr>
<td><em>Dzongdag</em></td>
<td>District Administrator</td>
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<td><em>Dzongkhag</em></td>
<td>District</td>
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<td><em>Dzongkhag Yargye Tshogdu</em></td>
<td>District Development Committee</td>
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<tr>
<td><em>Geog</em></td>
<td>Administrative block</td>
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<td><em>Geog Yargye Tshogchung</em></td>
<td>Block Development Committee</td>
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<tr>
<td><em>Gup</em></td>
<td>Elected head of a <em>geog</em></td>
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<tr>
<td><em>Ngultrum</em></td>
<td>Bhutanese currency, pegged to Indian Rupee</td>
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<tr>
<td><em>Sokshing</em></td>
<td>Forest registered in a household’s name for collection of leaf litter for use in farm yard manure</td>
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<tr>
<td><em>Tsamdo</em></td>
<td>Land over which a community or household has customary grazing rights</td>
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<tr>
<td><em>Tseri</em></td>
<td>Slash and burn cultivation</td>
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EXECUTIVE SUMMARY

1. Introduction

The Royal Government of Bhutan (RGoB) will be implementing the Decentralized Rural Development Project (DRDP) with World Bank financing to support rural development activities based on the geog plans formulated for the 9th Five Year Plan (July 2002 – June 2007). In a major departure from the earlier five-year plans and in keeping with the increased impetus on the decentralization process, the geog plans form the core of the 9th FYP and have been prepared with extensive participatory inputs from the local communities and their elected bodies. Given that the renewable natural resources (RNR) activities, comprising of crop agriculture, livestock rearing and social forestry, make up the bulk of the geog plans, the DRDP will focus on the RNR sector. With the development objective to improve market access and increase agricultural output for rural communities, the project will have three components namely: Rural Access an Economic Infrastructure; RNR Centers; and Institutional Strengthening. The areas identified for the project include Chhukha, Dagana, Trongsa, Tsirang, Wangduephodrang, and Zhemgang dzongkhags.

Development of rural access and economic infrastructure in Bhutan can be environmentally challenging because of the fragile and rugged mountain terrain, heavy monsoon rains, lack of trained manpower, and limited financial resources. Some of the common environmental problems associated with rural infrastructure development in Bhutan include slope failure, haphazard disposal of spoil, water sedimentation, clearance of vegetation, loss of productive land, scarring of landscape, and damage to other infrastructure and services.

2. Objectives of the Report

The key objectives of this Report and the Environmental Management Framework (EMF) are to provide:

- An assessment of existing Bhutanese environmental policies, legislations, regulations and guidelines, closely comparing them with the World Bank safeguard policy guidelines that are likely to be triggered by the project;
- An assessment of the extent and effectiveness of the implementation of the Bhutanese environmental policies, legislations, regulations and guidelines; and
- A framework (EMF) for implementation of environmental management measures based on existing national environmental management policies, legislations, regulations and guidelines, local environmental and social conditions and in concord with World Bank safeguard policies.

3. Methodology

The assessment and the EMF are based on analysis of information collected through literature review, consultative meetings/ interviews and field visits. Documents reviewed include various policies, legislations, regulations, guidelines and other relevant documents as well as the World Bank Safeguard Policies. In addition, other relevant documents such as the conservation management plans of operational protected
areas, 9th FYP Main Document, RNR Sector 9th FYP documents, and relevant dzongkhag and geog plans were referred to.

Consultative meetings and interviews were held with a number of institutions and people, ranging from officials of government agencies at the central level, Dzongdags and dzongkhag sectoral heads, Geog Yargye Tshogchung (GYT) members, and local villagers in the field. Field visits include visits to a few farm roads, an irrigation scheme, an RNR Center, and villages in Chhukha, Wangduephodrang and Zhemgang dzongkhags. The draft of this document was circulated for review by key stakeholders and comments received have been incorporated.

4. Environmental policies

World Bank safeguard policies that are likely to be triggered by the project pertain to environmental assessment, natural habitats, pest management, forestry, and cultural property. These policies are largely consistent with existing environmental policies in Bhutan.

Bhutan’s Environmental Assessment Act, 2000, establishes procedures for the assessment of potential effects of strategic plans, policies, programs, and projects on the environment, and for the determination of policies and measures to reduce potential adverse effects and to promote environmental benefits. It makes environmental clearance mandatory for any project/activity that may have potentially adverse impact on the environment. To support the implementation of this Act, the National Environment Commission has issued the Regulation for the Environmental Clearance of Projects, 2002, and sectoral Environmental Assessment guidelines for highways and roads, industries, mining and mineral exploration, urban development, forestry, hydropower, power transmission lines. In addition, the Department of Roads has prepared Environmental Codes of Practice for Road Construction.

The emphasis of the National Forest Policy, 1974, is primarily on conservation of forests and biodiversity for their ecological values and secondarily on their exploitation for economic benefits but within sustainable limits. The Forest and Nature Conservation Act, 1995, is the main legal framework for protection of forests and nature. The legislation is enforced through the implementation of Forest and Nature Conservation Rules, 2000.

Pesticide distribution and use is well controlled through a centralized system and is legally governed by The Pesticides Act of Bhutan, 2000. The Act has been enacted with the purpose of, among other things, ensuring that integrated pest management is pursued, limiting the use of pesticides as the last resort, and minimizing deleterious effects on human beings and the environment consequent to the application of pesticides. Integrated Pest Management guidelines are in place and are under implementation as a part and parcel of the National Plant Protection Center’s regular programme.

In addition to the above and in the context of decentralized environmental management, the Dzongkhag Yargye Tshogdu and Geog Yargye Tshogchung Chathrims...
2002 mandate locally elected bodies to exercise authority and functions for environmental management at the local level.

Although not specifically pertaining to environmental management, other key guidelines relevant to the project include: National Irrigation Policy Procedural Manual and Modules; Geotechnical Manual for Irrigation Scheme Development and Guidelines for Farm Roads Construction. Existing national policies, legislations, regulations and guidelines compare well with World Bank safeguard policy requirements, but implementation – particularly when it comes to Environmental Assessment – remains wanting largely because the Environmental Assessment concept was only recently introduced and the associated legislation, regulations and guidelines have yet to be propagated and mainstreamed fully at the sectoral, dzongkhag and geog levels. Efforts are underway to enhance the implementation of the Environmental Assessment. These include the ongoing process of formation of Dzongkhag Environmental Committees, establishment of environmental units in key line ministries, a plan for mass training on Environmental Assessment, and an upcoming Environmental Assessment capacity building programme covering four dzongkhags on a pilot basis.

5. Environmental impact of the Project

The project is expected to have moderate to low environmental risks. As a whole, it can be identified as a “Category B” project based on World Bank classification for Environmental Assessment. The subcomponents that are likely to have adverse environmental impacts include farm roads, irrigation schemes, and upgradation of existing mule tracks to power tiller roads (if the upgradation entails major widening and realignment). Other subcomponents – construction of RNR Centers, construction of marketing infrastructure, and rehabilitation of existing irrigation schemes – are expected to have potentially low adverse environmental impacts. In general, basic Environmental Assessment (equivalent to Initial Environmental Examination) will be adequate for aforesaid activities. However, detailed Environmental Assessment will be necessary if it is proven that:

- the proposed construction of farm road, irrigation scheme or upgradation of existing mule track to power tiller road (if such upgradation entails major widening and/or realignment) is sited inside, or goes through, a protected area or an area recognized as critical wildlife habitat (even if outside a protected area);
- the proposed construction activity is likely to have significant geologic hazard;
- the proposed construction activity is likely to have significant adverse impact on existing infrastructure;
- the basic Environmental Assessment suggests the need for a detailed Environmental Assessment.

Potential adverse environmental impacts are listed in the full report along with corresponding mitigation measures. These present an indicative list to illustrate examples of environmental impacts and mitigation measures that can be associated with the project subcomponents. To draw an accurate and comprehensive list of environmental impacts and mitigation measures, site-specific field assessments will be carried out and environmental information will be prepared according to Bhutanese guidelines and practices.
6. Implementation arrangements

The Ministry of Agriculture (MoA) will implement the Environmental Assessment and EMF in close partnership with the Dzongkhag Administrations and National Environment Commission Secretariat (National Environment Commission Secretariat). In terms of Environmental Assessment implementation, the responsibilities will be based on existing institutional mechanism as summarized below:

(a) Geog Administrations and local community organizations: Frequent site monitoring to ensure implementation of the environmental mitigation measures and compliance with joint agreement signed by the community, GYT/DYT and contractor. If any non-compliance is found, report to the appropriate authority in Geog and Dzongkhag administration. The community is responsible for continuing the maintenance of the community infrastructure after the initial investment.

(b) Dzongkhag Administrations: Field investigation and multi-disciplinary feasibility study; securing of no objection certificates from all affected agencies; preparation of environmental information and submission of application for Environmental Clearance; mobilization of expertise from outside the Dzongkhag Administration if found necessary; drafting of terms of reference for full-blown Environmental Assessment where such Environmental Assessment is determined necessary; conducting of full-blown Environmental Assessment as per the approved terms of reference; regular monitoring of implementation of environmental terms and conditions in the field. This responsibility will be carried out by the Dzongkhag Environment Committee (DEC) which is being formally established.

(c) Ministry of Agriculture: Screening of applications for Environmental Clearance; soliciting additional information from the Dzongkhag Administrations if environmental information is inadequate; forwarding of Environmental Clearance applications pertaining to farm roads, power tiller roads, RNR Centers and certain other activities to the NEC; review of Environmental Clearance applications pertaining to irrigation schemes and issuance/ denial of Environmental Clearance; periodic spot checks.

(d) National Environment Commission Secretariat: Review of Environmental Clearance applications and issuance/ denial of Environmental Clearance; determination if full Environmental Assessment is required; approval of terms of reference for full Environmental Assessment; review of Environmental Assessment report where full Environmental Assessment is carried out and issuance/ denial of Environmental Clearance based on such report; periodic spot checks.

7. Initial Screening

Every sub-project proposal to be funded under the project will undergo an environmental and social screening process before it is selected for implementation. The screening process will establish the level of environmental and social assessment required, as well as help project officers to understand environmental and social issues related to the project before they are considered for implementation, and assist in the decision making process. To the extent possible, environment and social screening will be done together with technical and economic screening. All sub-projects that are
determined to have adverse and irreversible environmental impacts will not be included in the project. Any sub-project that falls within the negative list below will not be included under the project for funding.

8. **Negative List of Activities**

The following list of activities has been compiled based on the laws, regulations and guidelines of the RGoB and the World Bank safeguard policies. These are the activities that will not be supported under this project:

- Any construction activity that has not been issued environmental clearance in accordance with the requirements of the Environmental Assessment and Regulation for the Environmental Clearance of Projects;
- Any construction activity that does not include environmental management measures and associated costs necessary to comply with the environmental terms and conditions specified in the environmental clearance issued by the Department of Forestry or National Environment Commission Secretariat;
- Any activity inside the core zone of a protected area or inside/nearby an area which is known to be a critical wildlife habitat (irrespective of whether or not inside a protected area);
- Any construction of farm road, irrigation scheme or upgradation of existing mule track to power tiller road (if the upgradation entails major widening and/or realignment) inside a protected area if the proposed activity has not undergone a full Environmental Assessment;
- Any construction activity inside a Government Reserved Forest without written permit or authorization from the Department of Forestry in accordance with the requirements of the Forest and Nature Conservation Act;
- Any activity that involves use of explosives and blasting without written authorization from all concerned agencies and technical guidelines for best and safe practices of blasting;
- Any activity that may cause pollution of a water source or watercourse which cannot be reasonably mitigated;
- Any activity that involves cutting of trees or land clearance within 100 feet on either side of the banks or edge of the rivers, streams, water courses or water sources kept as riparian reserve for conservation;
- Any activity that involves the procurement and/or use of pesticides categorized as Class Ia, Ib and II as per World Health Organization guidelines;
- Any activity that involves the procurement and/or use of pesticides that has not been authorized in accordance with the Pesticides Act of Bhutan 2000;
- Any activity that may adversely impact cultural property, including construction within 50 m distance of any cultural property, without written authorization from the Ministry of Home and Cultural Affairs and written consent of the DYT and GYT. The areas of cultural property are identified by the GYT and DYT.

9. **The Environmental Management Framework**

As part of every Initial Environmental Examination and Environmental Assessment, each sub-project will require screening and, preparation of the an
Environmental Management Plan (EMP) and Memorandum of Understanding which will be agreed upon by each of the stakeholders – Community representatives (i.e. Water User Committee), Geog and Dzongkhag representatives and the contractor. The implementation of the EMP and the Memorandum of Understanding will be periodically monitored by the community and Geog/dzongkhag representatives.

A project’s EMP consists of the set of mitigation, monitoring, and institutional measures to be taken during implementation and operation to eliminate adverse environmental and social impacts, offset them, or reduce them to acceptable levels. The plan also includes the actions needed to implement these measures.

To prepare a management plan, the RGoB and its Environmental Assessment design team (a) identify the set of responses to potentially adverse impacts; (b) determine requirements for ensuring that those responses are made effectively and in a timely manner; and (c) describe the means for meeting those requirements. The EMP will include the following components:

(a) Identification of the potential environmental impacts: The identification of environmental impacts should be site specific and as detailed as possible and will include additional information on environmental aspects particularly with regards to whether or not the proposed site is located inside a protected area, Government Reserved Forest, inside (or close by) a critical wildlife habitat, etc.

A group interview or exercise to discuss environmental aspects, essentially including possible environmental risks and mitigation measures, will be part of the multi-disciplinary feasibility study. This will be an opportunity to capture local knowledge and perception on possible local environmental risks and solutions as well as an opportunity to stimulate environmental thinking among the local community early on during the process.

At the first pre-construction meeting when the role and responsibilities are discussed, there is also the need to identify environmental management duties and assign a focal person, who should be to ensure that the agreed terms and conditions, based on which environmental clearance was issued, are carried out during and after construction.

The letter of undertaking, which is reviewed at the first pre-construction meeting and finalized at the second pre-construction meeting, will need to incorporate a specific clause to ensure that the user group addresses environmental management needs as agreed in the terms and conditions of the environmental clearance. An Memorandum of Understanding signed by the GYT, community representative and contractor will stipulate the exact mitigation measures that have been agreed upon.

(b) Mitigation: The EMP identifies feasible and cost-effective measures that may reduce potentially significant adverse environmental impacts to acceptable levels. The plan includes compensatory measures if mitigation measures are not feasible, cost-effective, or sufficient. The mitigation measures should include the type and amount of materials that will be used for every identified environmental impact. These measures will be reflected in the design of every activity under the project.
(c) **Monitoring:** Environmental monitoring during project implementation provides information about key environmental aspects of the project, particularly the environmental impacts of the project and the effectiveness of mitigation measures. Such information enables the RGoB and the World Bank to evaluate the success of mitigation as part of project supervision, and allows corrective action to be taken when needed. Therefore, the EMP identifies monitoring objectives and specifies the type of monitoring, with linkages to the impacts assessed in the Initial Environmental Examination or Environmental Assessment report and the mitigation measures described in the EMP.

Monitoring will include an assessment of the implementation of the terms and conditions, based on which environmental clearance was issued, and their effect on the performance of the irrigation scheme, farm road, power tiller road or RNR center construction. If necessary, it should also recommend any additional environmental management work that needs to be carried out.

(d) **Capacity Development and Training:** To support timely and effective implementation of environmental project components and mitigation measures, the EMP draws on the Initial Environmental Examination or Environmental Assessment’s assessment of the existence, role, and capability of environmental units on site or at the geog, dzongkhag and Ministry levels. If necessary, the EMP recommends the establishment or expansion of such units, and the training of staff, to allow implementation of Environmental Assessment recommendations. Specifically, the EMP provides a specific description of institutional arrangements for carrying out the mitigation and monitoring measures. The training will also include modules on operation and maintenance.

(e) **Implementation Schedule and Cost Estimates:** For all three aspects (mitigation, monitoring, and capacity development), the EMP provides (a) an implementation schedule for measures that must be carried out as part of the project, showing phasing and coordination with overall project implementation plans; and (b) the capital and recurrent cost estimates and sources of funds for implementing the EMP. These figures are also integrated into the total project cost tables.

(f) **Integration of EMP with Project:** The RGoB’s decision to proceed with a project, and the World Bank’s decision to support it, are predicated in part on the expectation that the EMP will be executed effectively. Consequently, the World Bank expects the plan to be specific in its description of the individual mitigation and monitoring measures and its assignment of institutional responsibilities, and it must be integrated into the project’s overall planning, design, budget, and implementation. Such integration is achieved by establishing the EMP within the project so that the plan will receive funding and supervision along with the other components. The mitigation measure integration in the design phase will also help in strengthening the benefits and sustainability of the project.

(g) **Mitigation Implementation:** The mitigation measures should be integrated into project design and tender documents. Using this approach, the mitigation measures will automatically become part of the project construction and operation phase. By including mitigation measures in the contract or in specific items in the Bill of Quantities,
monitoring and supervision of mitigation implementation could be covered under the normal engineering supervision provisions of the contract.

(f) Project Contract: The project contractor will be bound by the parameters identified in the environmental and social assessment pertaining to specific mitigation measures in the contract. The final acceptance of the completed works should not occur until the environmental clauses have been satisfactorily implemented.

(g) Bill of Quantities: The tender instruction to bidders will explicitly mention the mitigation measure works to be performed. Such a definition would clearly exhibit the cost requirement to undertake mitigation measures, which otherwise might be lost as the bidders in an attempt to be more competitive may not include the price realistic enough to fund mitigation measures and other protection measures.
Brief Background for the Assessment

The Royal Government of Bhutan (RGoB) will be implementing the Decentralized Rural Development Project with World Bank financing to support rural development activities based on the geog plans formulated for the 9th Five Year Plan (July 2002 – June 2007). In a major departure from the earlier FYP periods and in keeping with the increased impetus on the decentralization process, the geog plans form the core of the 9th FYP and have been prepared with extensive participatory inputs from the local communities and their elected bodies. Given that the renewable natural resources (RNR) activities, comprising of crop agriculture, livestock rearing and social forestry, make up the bulk of the geog plans, the DRDP will focus on the RNR sector. With the development objective to improve market access and increase agricultural output for rural communities, the project will have three components namely: Rural Access an Economic Infrastructure; RNR Centers; and Institutional Strengthening. The areas identified for the project include Chhukha, Dagana, Trongsa, Tsirang, Wangduephodrang, and Zhemgang dzongkhags.

The DRDP will primarily focus on developing rural infrastructure, mainly farm roads, power tiller roads, irrigation schemes and RNR Center buildings. Such development can be environmentally challenging because of the fragile and rugged mountain terrain, heavy monsoon rains, lack of trained manpower, and limited financial resources. Some of the common environmental problems associated with rural infrastructure development in Bhutan include slope failure, haphazard disposal of spoil, water sedimentation, clearance of vegetation, loss of productive land, scarring of landscape, and damage to other community infrastructure and services.

Environmental conservation occupies a pivotal place in the national development philosophy. The RGoB seeks to ensure that all development activities take place in an environmentally sustainable manner. This stands in harmony with the World Bank’s principle of environmentally sustainable development.

The assessment presents an overview and analysis of environmental policies, regulations and procedures and outlines a framework for implementation of environmental measures to ensure that the DRDP components/ sub-components are undertaken in a manner that is consistent with the RGoB and World Bank’s policy of environmentally sustainable development.

Objective and Scope of the Assessment

The objective was to conduct a review of environmental assessment in Bhutan as it pertains to the proposed project, focusing on three aspects:

- Reviewing existing Bhutanese environmental policies, legislations, regulations and guidelines, in close comparison with the World Bank safeguard policy guidelines that are likely to be triggered by the project;
Assessing the extent and effectiveness of the implementation of the Bhutanese environmental policies, legislations, regulations and guidelines; and

Providing a framework for implementation of environmental management measures based on existing national environmental management policies, legislations, regulations and guidelines, and in concord with WB safeguard policies.

**Methodology**

The assessment and the EMF are based on analysis of information collected through literature review, consultative meetings/interviews and field visits.

Documents reviewed include various policies, legislations, regulations, guidelines and other relevant documents as well as the WB Safeguard Policies. In addition, other relevant documents such as the conservation management plans of operational protected areas (PAs), 9th FYP Main Document, RNR Sector 9th FYP documents, and relevant dzongkhag and geog plans were referred to.

Consultative meetings and interviews were held with a number of institutions and people, ranging from officials of government agencies at the central level, Dzongdags and dzongkhag sectoral heads, Geog Yargye Tshogchung (GYT) members, and local villagers in the field. A complete list of people met is provided in Annex 1 of this report. Field visits include visits to a few farm roads, an irrigation scheme, an RNR Center, and villages in Chhukha, Wangduephodrang and Zhemgang dzongkhags. Annex 2 of this report lists the field trips undertaken and results of meetings.

The draft of this document was circulated for review by key stakeholders and comments received have been incorporated.
COUNTRY BACKGROUND

Geopolitical Situation

The Kingdom of Bhutan – 38,394 km² in area and 698,950 in population\(^1\) – is a small, landlocked, mountainous country in the Eastern Himalayan region. It is bordered by India to its east, west and south and by the Tibetan Autonomous Region of China to its north. Almost all of the country is mountainous with altitudes ranging from about 200 metres above sea level (masl) in the south to over 7,500 masl in the north. It can be divided into three distinct physiographic zones: one, the southern foothills consisting of the Siwalik hills adjacent to a narrow belt of flatland along the Indian border with altitudes ranging from about 200 masl to 2,000 masl; two, the inner Himalayas made up of the main river valleys and steep mountains with altitudes ranging from 2,000 masl to 4,000 masl; and, three, the great Himalayas in the north along the Tibetan border consisting of snow-capped peaks and alpine meadows above 4,000 masl.

Administratively, the country is divided into 20 dzongkhags. The dzongkhags are further divided into several geogs. At the present, there are altogether 201 geogs in the country. Some of the dzongkhags such as Chhukha, Samdrup Jongkhar, Samtse, Sarpang, Trashigang, and Zhemgang, have sub-districts, known as dungkhags. A dzongkhag is headed by a dzongdag, a dungkhag by a dungpa, and a geog by a gup. Dzongdags and dungpas are civil service officials whereas as a gup is a locally elected community leader of a geog. At the central level, there are ten ministries and a number of non-ministerial bodies such as the National Commission for Cultural Affairs, National Environment Commission, and Royal Civil Service Commission. The ministries are the Ministry of Agriculture, Ministry of Education, Ministry of Finance, Ministry of Foreign Affairs, Ministry of Health, Ministry of Home and Cultural Affairs, Ministry of Information and Communications, Ministry of Labour and Human Resources, Ministry of Trade and Industry, and Ministry of Works and Human Settlement.

Development Context

\(^1\) Area cited from 9th Five Year Plan Main Document and population from Statistical Year Book of Bhutan 2001.
After centuries of self-imposed isolation, the country embraced modern development with the launch of the first Five Year Plan in 1961. Since then, the country has made remarkable progress in most spheres of national development – "remarkable" especially because it has been achieved without compromising the country’s environmental capital and cultural integrity. Development indicators maintained by the National Statistical Bureau (previously known as Central Statistical Office) show that between 1977 and 1999, crude death rate (per thousand people) had dropped from 20.5 to 9, life expectancy had increased from 46.1 to 66.1 years, adult literacy rate had grown from a meager 17.5 to 54 per cent, school enrolment from 24.5 to 72 per cent, and gross domestic product per capita from US$ 100 to US$ 551.

The country’s development philosophy is most well enunciated in the statement of His Majesty King Jigme Singye Wangchuck that “Gross National Happiness is more important than Gross National Product”. For the last two decades or so, Gross National Happiness – underscoring that economic, spiritual and environmental well-being are all equally important and that we need to balance these aspects for overall development – has remained the guiding principle for the Bhutanese in pursuing national development efforts. Around the main tenet of Gross National Happiness, Bhutan has designed its Vision Statement, Bhutan 2020: A Vision for Peace, Prosperity and Happiness. The Vision Statement is a strategy document to guide implementation of FYPs. For the 9th FYP, Bhutan has adopted five overall goals: improving quality of life and income, especially of the poor; ensuring good governance; promoting private sector growth and employment generation; preserving and promoting cultural heritage and environment conservation; and achieving rapid economic growth and transformation.

In the recent years, the RGoB has taken significant steps in terms of institutionalizing the decentralization process, first initiated in 1981 by His Majesty King Jigme Singye Wangchuck. A clear reflection of the increased impetus on decentralization is the 201 geog plans formulated with extensive participatory inputs from the local communities and their elected representatives for the 9th FYP. To support the decentralization policy, the National Assembly enacted the Dzongkhag Yargay Tshogdu Chathrim 2002 and Geog Yargay Tshogchung Chathrim 2002 in July 2002, empowering locally elected community bodies with greater authority and responsibilities to decide, plan and implement development activities at the dzongkhag and geog levels.

**RNR Sector Background**

The country is predominantly an agrarian country. Seventy-nine per cent of the people live in rural areas and subsist on an integrated livelihood system based on crop agriculture, livestock rearing and use of forest products – collectively known as the RNR sector. The RNR sector is the largest contributor to the Gross Domestic Product (GDP) in the country. It accounted for nearly one-third of the GDP in 2002 (see Figure 1 on page 5).

Given that the rural economy is largely based on renewable natural resources, the bulk of the geog plans is made up of crop agriculture, livestock rearing and social forestry activities. In keeping with the overall national policy framework for the 9th FYP
and the local community needs reflected in the geog plans, the RNR sector has set the following objectives for itself during the 9th FYP:

- Attainment of national food security;
- Conservation and management of natural resources;
- Enhancement of rural income;
- Generation of employment opportunities.

The Ministry of Agriculture (MoA), which is responsible for the RNR sector development, has adopted what it calls the “triple gems” – enhancing production, improving accessibility, and marketing – for achieving the aforesaid objectives.

### Environmental Situation

Bhutan is internationally reputed for its well-preserved natural environment. Stable political leadership, nature-reverent religious ethics, rugged and lofty terrain, low population pressure, cautious modernization, and environmentally sound development policies have delivered the country into the 21st century with much of its biodiversity and natural environment intact. Land use surveys completed by the MoA in 1995 revealed that a good 64.4 per cent of the country was under forest cover (72.5 per cent when scrub forest is included). It is, therefore, little wonder when the country is dubbed as one of the crown jewels of the Eastern Himalayas – a region recognized as a global biodiversity hotspot.

<table>
<thead>
<tr>
<th>Sector</th>
<th>Contribution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Renewable natural resources</td>
<td>32%</td>
</tr>
<tr>
<td>Mining and quarrying</td>
<td>9%</td>
</tr>
<tr>
<td>Manufacturing</td>
<td>7%</td>
</tr>
<tr>
<td>Electricity</td>
<td>7%</td>
</tr>
<tr>
<td>Construction</td>
<td>7%</td>
</tr>
<tr>
<td>Wholesale and retail trade, restaurants and hotels</td>
<td>10%</td>
</tr>
<tr>
<td>Transport, storage and communications</td>
<td>2%</td>
</tr>
<tr>
<td>Financing, insurance, real estate and business services</td>
<td>8%</td>
</tr>
<tr>
<td>Community, social and personal services</td>
<td>8%</td>
</tr>
</tbody>
</table>
The country’s extreme altitudinal variation has created a corresponding range of climatic conditions varying from hot and humid tropical/subtropical conditions in the southern foothills to cold and dry tundric conditions in the northern mountains. This is further modified by latitude, precipitation, slope gradient, and exposure to sunlight and wind, giving each valley and often opposite-facing slopes a unique set of climatic conditions. As a result of the wide variation in macro- and micro-climatic conditions, there is great diversity of vegetation within the country’s small geographical area. Eleven vegetation zones have been distinguished (see Table 1).

Extensive forest cover and the wide range of vegetation zones have endowed Bhutan with one of the most spectacular biodiversity in the world. Its diverse ecosystems harbor more than 5,400 species of vascular plants, 770 species of birds and 170 species of mammals. Wild fauna includes several globally threatened species such as the tiger *Panthera tigris*, snow leopard *Uncia uncia*, clouded leopard *Neofelis nebulosa*, Asian elephant *Elephas maximus*, red panda *Ailurus fulgens*, takin *Budorcas taxicolor*, golden langur *Trachypithecus geei*, capped langur *Trachypithecus pileatus*, Asian elephant *Elephas maximus*, musk deer *Moschus chrysogaster*, serow *Capricornis sumatraensis*, black-necked crane *Grus nigrocollis*, rufous-necked hornbill *Aceros nipalensis*, and white-bellied heron *Ardea insignis*.

In keeping with its rich biodiversity and the need to maintain it for sustainable development, the country has designated a vast protected areas system – a network of four national parks, four wildlife sanctuaries, and a strict nature reserve (see Table 2 and map on page 7). The system, which together with the connecting biological corridors, occupies more than 35 per cent of the country’s area and encompasses representative examples of all major ecosystems found in the country – from subtropical forests and grasslands in the south to alpine scrubland and meadows in the north – making it one of the most comprehensive and robust in the world.

### Table 1. Vegetation Zones of Bhutan and Corresponding Range of Altitude and Precipitation

<table>
<thead>
<tr>
<th>Zones</th>
<th>Altitude (masl)</th>
<th>Precipitation (mm per year)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sub-tropical Forest</td>
<td>200 – 1,000 (-1,200)</td>
<td>2,500 – 5,000</td>
</tr>
<tr>
<td>Warm Broadleaf Forest</td>
<td>1,000 – 2,000 (-2,300)</td>
<td>2,300 – 4,000</td>
</tr>
<tr>
<td>Chir Pine Forest</td>
<td>900 – 1,800 (-2,000)</td>
<td>1,000 – 1,300</td>
</tr>
<tr>
<td>Cool Broadleaf Forest</td>
<td>2,000 – 2,900</td>
<td>2,500 – 5,000</td>
</tr>
<tr>
<td>Evergreen/Oak Forest</td>
<td>1,800 – 2,000 (-2,600)</td>
<td>2,000 – 3,000</td>
</tr>
<tr>
<td>Blue Pine Forest</td>
<td>2,100 – 3,000 (-3,100)</td>
<td>700 – 1,200</td>
</tr>
<tr>
<td>Spruce Forest</td>
<td>(2,500-) 2,700 – 3,100 (-3,200)</td>
<td>500 – 1,000</td>
</tr>
<tr>
<td>Hemlock Forest</td>
<td>2,800 – 3,100 (-3,300)</td>
<td>1,300 – 2,000</td>
</tr>
<tr>
<td>Fir Forest</td>
<td>2,800 – 3,300 (-3,800)</td>
<td>1,300 or more</td>
</tr>
<tr>
<td>Juniper/Rhododendron Scrub</td>
<td>3,700 – 4,200</td>
<td>?</td>
</tr>
<tr>
<td>Dry Alpine Scrub</td>
<td>4,000 – 4,600</td>
<td>?</td>
</tr>
</tbody>
</table>

*Source: Flora of Bhutan Vols I, II and III*

### Table 2. Protected Areas of Bhutan

<table>
<thead>
<tr>
<th>Protected Area</th>
<th>Area (km²)</th>
<th>Main Habitat Types</th>
<th>Key Species</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bumdeling Wildlife Sanctuary</td>
<td>1,487</td>
<td>Alpine meadows, high altitude coniferous forest and temperate broadleaf forest</td>
<td>Tiger, snow leopard, musk deer, blue sheep, capped langur, red panda, black-necked crane, chestnut-breasted partridge, Pallas’ fish eagle.</td>
</tr>
<tr>
<td>Park Name</td>
<td>Area</td>
<td>Vegetation Type</td>
<td>Wildlife</td>
</tr>
<tr>
<td>-----------------------------------------------</td>
<td>-------</td>
<td>--------------------------------------------------------------------------------</td>
<td>--------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Jigme Dorji National Park</td>
<td>4,349</td>
<td>Alpine meadows, high altitude coniferous forest, temperate and warm broadleaf forests</td>
<td>Snow leopard, tiger, leopard, takin musk deer, blue sheep, Himalayan black bear, red panda, satyr tragopan,</td>
</tr>
<tr>
<td>Jigme Singye Wangchuck National Park</td>
<td>1,723</td>
<td>High altitude coniferous forest, temperate and subtropical broadleaf forests</td>
<td>Himalayan black bear, red panda, giant flying squirrel, leopard, tiger, golden cat, rufous-necked hornbill, black-necked crane, Pallas’ fish eagle</td>
</tr>
<tr>
<td>Khaling Wildlife Sanctuary</td>
<td>273</td>
<td>Tropical and subtropical broadleaf forests</td>
<td>Tiger, elephant, pygmy hog</td>
</tr>
<tr>
<td>Phipsoo Wildlife Sanctuary</td>
<td>278</td>
<td>Tropical and subtropical broadleaf forests</td>
<td>Tiger, spotted deer, elephant, golden langur</td>
</tr>
<tr>
<td>Royal Manas National Park</td>
<td>1,023</td>
<td>Tropical and subtropical broadleaf forests, and temperate broadleaf forest.</td>
<td>Tiger, leopard, clouded leopard, golden langur, Assamese macaque, elephant, gaur, pygmy hog, hispid hare, rufous-necked hornbill, great Indian hornbill, Pallas’ fish eagle</td>
</tr>
<tr>
<td>Sakten Wildlife Sanctuary</td>
<td>650</td>
<td>High altitude coniferous forest and temperate broadleaf forest.</td>
<td>Tiger, leopard, musk deer, Himalayan black bear, serow</td>
</tr>
<tr>
<td>Thrumshingla National Park</td>
<td>768</td>
<td>Old growth fir forest, mixed coniferous forest, temperate and subtropical broadleaf forests</td>
<td>Tiger, serow, leopard, red panda, giant squirrel, satyr tragopan, rufous-necked hornbill, wood snipe</td>
</tr>
<tr>
<td>Torsa Strict Nature Reserve</td>
<td>644</td>
<td>Temperate coniferous forests and alpine meadows.</td>
<td>Snow leopard, leopard, tiger, serow, rufous-throated wen babbler</td>
</tr>
</tbody>
</table>

Source: The areas of BWS, JDNP, JSWNP, RMNP and TNP have been obtained from their respective conservation management plans. The areas of rest of the protected areas are as per the revised notification of protected areas issued by the Ministry of Agriculture in 1993.
Of the existing nine protected areas, four are operational with conservation management plan and basic management capacity in place. These are Bumdeling Wildlife Sanctuary, Jigme Dorji National Park, Jigme Singye Wangchuck National Park, and Thrumshingla National Park. Despite being the first protected area to have a conservation management plan, activities in Royal Manas National Park have been limited and ad hoc due to risks from militancy in the bordering Indian states. Conservation management planning for Sakten Wildlife Sanctuary is underway and scheduled to be completed by 2006. The rest of the protected areas are for the time being “paper parks” but are expected to be taken up for conservation management incrementally over the subsequent FYPs as in-country capacity improves, particularly in terms of trained personnel.

Bhutan’s natural environment is also of enormous importance for its watersheds. There are five major watersheds, namely Wang Chhu, Puna Tsang Chhu, Mangde Chhu, Kuri Chhu, and Dangme Chhu, in the country. The upstream part of these watersheds includes 677 glaciers and 2,674 glacial lakes. The security of these watersheds is crucial to sustain hydropower development and agriculture, which are the mainstays of the Bhutanese economy. These watersheds are also of immense ecological and economic consequence to the downstream communities in India and Bangladesh.

Much of environmental conservation has been possible due to the strong political will that has existed since the formative years of modern development in the country. The first protected area – now known as Royal Manas National Park – was created in 1966, that is during the very first FYP. As early as 1974, the National Assembly passed the resolution to maintain at least 60 per cent of the country under forest cover at all times. In 1984, Social Forestry Day (2nd June) was launched as a nationwide annual event to promote tree planting by schools, rural households and public institutions.

Although the country is strongly committed to ensuring a future where the natural environment is still intact, pressures are mounting due to an array of forces such as rapid population growth, infrastructure development and market expansion. Around urban concentrations and in several rural places especially in eastern and southern Bhutan, where population density is high and human activity intense, localized deforestation is occurring, overgrazing is prevalent, and there is a paucity of forest products such as fuelwood and house-building timber.

The country, given its fragile mountain ecosystem, is highly vulnerable to natural disasters mainly in the form of glacial lake outburst floods, flash floods, and land slides. Road blocks due to land slides are a recurrent phenomenon during the monsoons. In the last one decade, the country has experienced some unprecedented natural disasters in its history. For example, in 1994, there was a major glacial lake outburst flood emanating from Lunana area in northwestern Bhutan. The flood resulted in widespread damage to property, including agricultural fields, and loss of several human lives in downstream valleys. Subsequently, the summer of 2000 was witness to the worst ever monsoon rains in the country’s recent history. The heavy rains triggered off unprecedented number of floods and landslides, causing loss of dozens of human lives and damage to infrastructures and natural resources.
PROJECT OVERVIEW

Brief Description of Project Components

In concurrence with the RNR sector strategy, the DRDP’s development objective is to improve market access and increase agricultural output for rural communities at the geog level in selected dzongkhags of Bhutan. The dzongkhags identified for the project include Chhukha, Dagana, Trongsa, Tsirang, Wangduephodrang, and Zhemgang dzongkhags. To achieve its development objective, the Project will focus on the following three components:

Rural Access and Economic Infrastructure
RNR Centers
Institutional Strengthening

3.1.1 Component #1: Rural Access and Economic Infrastructure

The output of this component will be local public goods, i.e. farm roads, power tiller roads, irrigation channels, and other economic infrastructure. The majority of these have already been identified at the local level as part of the 9th FYP. There are four sub-components.

**Rural access:** Geogs across the country have expressed high demand for access to markets, inputs, and public services. This subcomponent will focus on farm roads (both new construction and rehabilitation) and will upgrade mule tracks to permit passage of power tillers. An estimated target of 101 km of farm roads and 160 km of power tiller roads are proposed, to be screened and implemented in accordance with MoA’s Farm Road Guidelines, and according to rules for “environmentally friendly road construction” (EFRC) practices which already apply to the larger feeder roads. Seven small suspension bridges would also be constructed. Dzongkhags would contract out construction to private service providers to expedite completion and ensure consistent quality. Community members are expected to benefit as hired labourers. In accordance with the guidelines, GYTls will be expected to own the asset upon completion and will be in charge of covering maintenance with tax revenue and labour contributions (GYTs are vested with these powers from the new decentralization legislation and are already collecting tax revenues).

**Irrigation:** Irrigated agriculture is an important source of growth in the RNR sector, contributing to increased and diversified farm incomes. Approximately 99.5 km of new irrigation channels and 343.5 km of rehabilitated channels are proposed for financing under this project. These will be implemented in accordance with the National Irrigation Policy and the existing procedural manuals. Water users’ associations at the Geog level would be expected to be the key implementing agency, as these are farmer-managed schemes with simple infrastructure needs.

**Other infrastructure:** In addition to roads and irrigation channels, a variety of other economic infrastructure has been identified in geog plans. These include storage.

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2 Flexibility has been kept to allow implementation of some activities in a few other dzongkhags, where need and financial gap arises.
facilities, produce collection points, “Sunday markets”, and agricultural processing equipment such as dryers and pulpers. These investments are intended to bridge gaps in the supply chain and add value to farm produce. Depending on the good being financed, implementation could be handled by dzongkhags, geogs, or economic interest groups. MoA, in particular the Agricultural Marketing Unit, will play a key role in procuring certain equipment not available locally.

**Geog Innovation Grant**: This subcomponent that will provide small one-time grants (e.g. <$15,000) directly those geogs that submit successful proposals for infrastructure micro-projects that are compatible with but not necessarily programmed into the 9th FYP and project targets. The purpose of this grant is aimed at providing flexibility to adjust to changing demands, stimulating innovation, and also supporting community empowerment by providing an incentive for direct financial management at the local level. Grant applications will be reviewed at the dzongkhag level using transparent criteria (see Annex 15 for GIG guidelines).

### 3.1.2. Component #2: RNR Centres

The output of this component is ability among farmers to take advantage of productivity and income gains through demonstration, knowledge sharing, and capacity building. Extension staff will play the central role. MoA proposes RNR centres as the front-line institution in its efforts to improve productivity and sustainability of crop, livestock, and forest production. In addition to providing training and demonstration of new technologies, these Centres can provide a meeting place for communities and limited office space for GYTs. These Centres will also improve living and working conditions to the extension staff who are already located at the geog levels. This component will finance both hardware and software in two sub-components.

**RNR construction**: This subcomponent will finance approximately 16 RNR centres in as many geogs. Prototype designs already exist. Many, if not most, of these geogs are also demanding Geog offices as working space for the “gup” (Geog head) and clerk, and RNR centres can accommodate this office space at a low marginal cost. Although this strictly falls outside of the mandate of MoA³, they see this as a way to promote the Centres as the focal point of communities, and to strengthen ties between local government and MoA at the grass-roots level. The Dzongkhag Administration will implement this sub-component.

**RNR capacity-building**: This subcomponent will finance applied training, demonstrations, and farmer-to-farmer field visits, corresponding to demand expressed by geogs and consistent with the Field Programs and National Programs of the MoA. There will be special emphasis on high-value crops and livestock products. The Extension Division of MoA will implement this sub-component.

### 3.1.3. Component #3: Institutional Strengthening

The output of this small but important component is timely submission of accurate financial and physical reporting of project implementation performance to ensure a

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³ Decentralization is the mandate of the Ministry of Home Affairs
smooth transfer of funds to the local level for implementation. To implement geog priorities, there is a critical need for capacity-building at several levels, and there is concern (and evidence from other projects) that current capacity may be exceeded as plans are implemented. Institutional strengthening involves training of finance personnel from the selected geogs, dzongkhags and the Administration and Finance Department (AFD) of the MOA on the Budget and Administration System (BAS) and provision of training to geog administrators on geog planning, geog administration, community mobilization, and reporting. A training needs assessment will be needed early in project implementation. A secondary output of this component is improved capacity in MoA and at the dzongkhag level for environmental assessment of sub-projects, particularly for farm roads, irrigation works, and RNR centres.

Geopolitical and Environmental Profile of the Project Area

General Overview of the Project Area

The six dzongkhags proposed for the project have a total area of approximately 11,801 km², covering most of the central part of the country (see map on page 11). There are altogether 61 geogs in these dzongkhags, with a total population of 15,065 rural households. Wangduephodrang is the largest dzongkhag (4,038 km²) and Tsirang is the smallest (639 km²) while Chhukha is the most populated dzongkhag (3,291 rural households) and Trongsa the least populated (1,073 rural households). Area under arable agriculture land ranges from a low of 2.3 per cent in Wangduephodrang to a high of 21.7 per cent in Tsirang. The total livestock population⁴ is approximately 130,800, with cattle being by far the most predominant. Chhukha has the highest number of livestock (32,720) while Trongsa has the lowest (13,126). Livestock population density is highest at 34.5 heads/ km² in Tsirang and lowest at 6.6 heads/ km² in Zhemgang.

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⁴ Pigs and poultry have not been included here and in subsequent livestock population figures.
All dzongkhags have a true forest coverage\(^5\) that is higher than the national average of 64.4 per cent. Wangduephodrang dzongkhag has the lowest per cent of forest coverage (65.4 per cent) while Zhemgang dzongkhag has the highest (85.7 per cent). Major forest types are subtropical broadleaf, warm broadleaf, cool broadleaf and coniferous forests.

Average annual rainfall ranges from about 750 mm (in some parts of Dagana and Wangduephodrang) to 5,000 mm (in southern parts of Zhemgang). The major rivers that run through the area are Wang Chhu, Puna Tsang Chhu (known as Sunkosh when it flows into the south), Mangde Chhu and Chamkhar Chhu (the latter two joins the Manas in the south of Zhemgang).

Jigme Singye Wangchuck, Royal Manas and Thrumshingla National Parks are the protected areas that transcend into the project area. These protected areas are known to be rich in wildlife, including some globally threatened species such as tiger, golden langur, Himalayan black bear, red panda, musk deer, rufous-necked hornbill, and Pallas’s fish eagle (see Annex 7 for the list of globally threatened species found in these protected areas). Barring Chhukha and Dagana, all dzongkhags have areas that fall inside protected areas or their buffer zones. In all, 12 geogs fall inside protected areas or their buffer zones.

Dzongkhag-wise statistics on area under forest cover, area under arable agriculture, livestock population, livestock population density, and number of geogs inside protected area (including buffer zone) have been compiled in Table 3 on page 12.

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\(^5\) True forest coverage excludes area under scrub forest.
Dzongkhag Profiles

Chhukha Dzongkhag

Chhukha is made up of one dungkhag and 11 geogs. The dungkhag is Phuentsholing and the geogs are Bhalujhora, Bjachho, Bongo, Chapchha, Dala, Dungna, Geling, Getena, Logchina, Metekha, and Phuenstholing. There are 3,291 rural households, with an estimated total population of 23,000.

The dzongkhag covers an area of about 1,802 km$^2$ with elevations ranging from 200 to over 3,500 masl, with nearly 85 per cent of the area being below 3,000 masl. At over 85 per cent, area under true forest cover is one of the highest in the country with the main vegetation types being subtropical, warm broadleaf and cool broadleaf forests. Arable agriculture land constitutes just a little more than nine per cent of the dzongkhag. Livestock population is estimatedly 32,720 and mainly includes cattle (76 per cent), goats (17.5 per cent) and sheep (4.2 per cent). The livestock population density is therefore relatively high, with more than 18 heads per km$^2$.

One of the country’s major rivers, the Wang Chhu, runs through the dzongkhag. Annual rainfall ranges from 750 mm in the north to 4,000 mm in the south. As a result of rich water resource and high precipitation, the dzongkhag has currently the country’s largest hydropower plant, the 336 MW Chhukha Hydro Power Plant. The construction of another hydropower plant – the Tala Hydro Electric Power Project with a planned capacity of 1,020 MW – is underway and a third hydropower plant, Chhukha 3, is in the pipeline.

Chhukha is also one of the highly industrialized dzongkhags, with industrial estates in Gedu, Tala, Pasakha and Phuentsholing. The last mentioned is the commercial hub and the second largest town of the country. The dzongkhag is also to home to Bhutan Board Private Limited, perhaps the biggest wood-based industry in the country.

The dzongkhag is among the four dzongkhags in the country that do not have any area inside a protected area. The other three are Dagana, Pema Gatshel and Samtse.

Dagana Dzongkhag

To the east of Chhukha is Dagana. It is one of the remotest dzongkhags in the country and is made up of 11 geogs. These geogs are Dorona, Drujegang, Gesarling,
Goshi, Kana, Khebisa, Lajab, Trashiding, Tsangkha, Tsendagang, and Tseza, There are 2,448 rural households, with an estimated total population of 17,100.

The total area of the dzongkhag is approximately 1,389 km², with elevation ranging from 600 to over 3,800 masl. The annual rainfall ranges between 750 and 2,000 mm. True forest coverage is nearly 80 per cent and is mainly made up of coniferous, warm broadleaf and cool broadleaf forests. The dzongkhag has 12.7 per cent of its land under arable agriculture. Most prominent forms of agriculture are dryland farming and tseri (slash and burn cultivation). Livestock population numbers just over 19,000 and includes mainly cattle (nearly 75 per cent) and goats (nearly 19 per cent).

The dzongkhag is one of the least developed in the country as a result of rugged terrain and poor access conditions. Like Chhukha, Dagana has no area inside a protected area.

**Trongsa Dzongkhag**

Right in the center of the country is Trongsa with an area of 1,807 km². Elevation ranges from about 800 to over 4,500 masl, with more than 82 per cent of the area being between 800 and 3,600 masl. There are five geogs, namely Dragteng, Korphu, Langthi, Nubi, and Tangsibji. A total of 1,073 rural households, with an estimated population of about 7,500, live in the dzongkhag.

Annual rainfall ranges between 1,500 and 3,000 mm. Mangde Chhu, one of the major rivers in the country, flows right through the middle of the dzongkhag.

Approximately 78 per cent of the total area is under true forest cover. Major forest types are warm broadleaf, cool broadleaf and coniferous forests. Area under arable agriculture land is less than 6 per cent of the dzongkhag. Livestock population is more than 13,000, with major livestock being cattle (over 86 per cent) and sheep (over 10 per cent). Given the size of the dzongkhag, livestock population density is relatively low at just over 7 heads per km².

Much of the western part of the dzongkhag falls inside Jigme Singye Wangchuck National Park or its buffer zone. This includes areas of Bjakteng, Korphu, Langthel and Tangsibji geogs.

**Tsirang Dzongkhag**

In terms of area, Tsirang is the second smallest dzongkhag in the country and the smallest in the project area. With an area of about 639 km², the dzongkhag has 12 geogs namely Beteni, Chanaute, Dungleang, Gairigaun, Goseling, Kikhorthang, Mendrelgang, Patale, Phutenchhu, Semjong, Tshokhana, and Tsirangdangra. There are 2,844 rural households, with an estimated total population of about 19,900.

Elevation ranges from about 400 to over 3,500 masl. Annual rainfall is between 1,000 and 3,000 masl. True forest coverage is a little over 76 per cent, with the main forest types being warm broadleaf and chirpine forests. Area under arable agriculture land is nearly 22 per cent, one of the highest in the country. Livestock population is very high both in terms of number (over 22,000) and density (more than 34 heads per km²), and mainly includes cattle (over 66 per cent) and sheep (over 24 per cent).
Some portion of the northern part of the dzongkhag – consisting of areas of Patale and Phutenchhu geogs – falls in the buffer zone of Jigme Singye Wangchuck National Park.

**Wangduephodrang Dzongkhag**

The second largest dzongkhag in the country in terms of area, Wangduephodrang has a total area of approximately 4,038 km$^2$. It has 15 geogs namely Athang, Bjena, Daga, Dangchu, Gangte, Gasetsho-gom, Gasetsho-om, Kazhi, Nahi, Nyisho, Phangyuel, Phobji, Ruepaisa, Sephu, and Thedtsho. There are 3,264 rural households, making up an estimated total population of 22,800.

The elevation ranges from 800 to 5,800 masl, with more than 72 per cent of the area being between 1,200 and 4,200 masl. The dzongkhag is among the drier ones in the country, with average annual rainfall being approximately 1,000 mm. Puna Tsang Chhu (called Sunkosh as it flows into the south), one of the country’s major rivers, flows through the southeastern part of the dzongkhag.

More than 65 per cent of the total area is under true forest cover. Major forest types are coniferous, warm broadleaf and cool broadleaf forests. Covering only 2.3 per cent of the total area, area under arable agriculture land is one of the lowest in the country. The dzongkhag has nearly 29,800 livestock, mainly consisting of cattle (about 70 per cent), sheep (about 13 per cent), and yaks (over 10 per cent).

Areas of Athang and Phobji (partly in buffer zone) geogs in the southeastern part of the dzongkhag fall inside Jigme Singye Wangchuck National Park. The Phobjikha valley adjacent to the northwestern boundary of Jigme Singye Wangchuck National Park has special conservation value as an Outstanding Bird Area recognized by BirdLife International. It is the most important winter habitat in the country for the globally threatened black-necked crane. Some 200 of these cranes roost in the valley every winter (November to March).

**Zhemgang Dzongkhag**

Zhemgang has a total area of about 2,126 km$^2$. The dzongkhag is made up of one dungkhag and seven geogs. The dungkhag is Panbang and the geogs are Bardo, Bjoka, Ngangla, Nongkhar, Phangkhar, Shingkhar, and Trong. There are 2,145 rural households, making up a population of about 15,000.

The elevation ranges from 200 to over 3,600 masl, with more than 92 per cent of the area being below 3,000 masl. The dzongkhag receives plenty of rains, with annual rainfall varying from 1,000 mm in the northern mountains to 5,000 mm in the southern foothills. Two major rivers, Chamkhar Chhu and Mangde Chhu, join in the central part of the dzongkhag. Further to the south, the river joins the larger Manas Chhu.

Nearly 86 per cent of the dzongkhag is under true forest cover. Warm and cool broadleaf forests are the predominant forest types. Area under arable agriculture accounts for 10.6 per cent of the total area. Tseri is the most predominant form of agriculture.
The dzongkhag has much of its area – perhaps more than any other dzongkhag – within protected areas. All the three protected areas – Jigme Singye Wangchuck, Royal Manas and Thrumshingla National Parks – transcend it. Jigme Singye Wangchuck National Park covers the mid-western part of Trong geog (partly in buffer zone), Royal Manas National Park covers the southern part of Trong geog, and Ngangla and Phangkhar geogs, and Thrumshingla National Park covers the northern half of Shingkhar geog.

The subtropical forest in the southern part of the dzongkhag, along with adjacent forest areas in other dzongkhags, is perhaps among the most prime tiger habitats in the country, with an estimated density of one adult tiger in every 50 km$^2$. 
EXISTING POLICY AND LEGAL FRAMEWORK
FOR ENVIRONMENTAL MANAGEMENT

An Overview

The country has made significant progress in environmental management policy development, particularly over the last ten years. The following are the key policies, legislations and regulations that currently exist for environmental management:

- National Forest Policy, 1974
- Forest and Nature Conservation Act, 1995
- Forest and Nature Conservation Rules, 2000
- Environmental Assessment Act, 2000
- Regulation for the Environmental Clearance of Projects, 2002
- Regulation for Strategic Environmental Assessment, 2002
- Sectoral Environmental Assessment Guidelines and Environmental Codes of Practice (first published in 1999 and later revised in 2003/04)
- Pesticides Act of Bhutan, 2000
- Biodiversity Act of Bhutan, 2003

In addition to the above and in the context of decentralized environmental management, the DYT and GYT Chathrims 2002 are important policy instruments as they mandate the locally elected bodies to exercise authority and functions for a number of activities related to environmental management.

Although not specifically pertaining to environmental management, other key documents relevant to the project components/subcomponents include:

- Geotechnical Manual for Irrigation Scheme Development
- Guidelines for Farm Roads Development
- Farm Roads Construction Manual and Modules

National Forest Policy, 1974

The essence of the National Forest Policy 1974 is primarily on conservation of forests and associated resources for their ecological values and secondarily on their exploitation for economic benefits but within the limits of sustainability. It hinges on the following four guiding principles:

- Protection of the land, its forest, soil, water resources and biodiversity against degradation, such as loss of soil fertility, soil erosion, landslides, floods and other ecological devastation and the improvement of all degraded forest land areas, through proper management systems and practices;
- Contribution to the production of food, water, energy and other commodities by effectively coordinating the interaction between forestry and farming systems;
• Meeting the long-term needs of Bhutanese people for wood and other forest products by placing all production forest resources under sustainable management;

• Contribution to the growth of national and local economies, including exploitation of export opportunities, through fully developed forest based industries, and to contribute to balanced human resources development through training and creation of employment opportunities.

**Forest and Nature Conservation Act, 1995**

The first environmental legislation to be passed in Bhutan was the Bhutan Forest Act, 1969, which brought all forest resources under government custody with the intent to regulate forest utilization and control excessive forest exploitation. This law was repealed in 1995 with the enactment of the Forest and Nature Conservation Act (FNCA), 1995, in keeping with evolving conservation needs and to allow for community stewardship of forests. The objective of the FNCA is to “provide for the protection and sustainable use of forests, wildlife and related natural resources of Bhutan for the benefit of present and future generations”. It covers forest management, prohibitions and concessions in government reserved forests, forestry leases, social and community forestry, transport and trade of forestry produce, protected areas, wildlife conservation, soil and water conservation, forest fire prevention, and enforcement and penalties.

**Forest and Nature Conservation Rules, 2000**

• In accordance with the powers and duties conferred under the FNCA, the MoA has promulgated the Forest and Nature Conservation Rules (FNCR), 2000, for:

• preparation, review, approval, implementation, monitoring and evaluation of forest management plans;

• reservation of government reserved forests, allotment of land and land rights in government reserved forests, regulation of activities in lands allotted for private use, collection of forest produce from government reserved forests, compensation for acquired lands, prohibitions, restrictions and concessions in government reserved forests, and forestry lease;

• creation of private and community forests, including procedures for registration of private and community forests and effects consequent upon registration, management and use of community forest resources, and responsibilities and powers of the community forest management group and concerned government agencies;

• transport and trade of forest produce, including extraction and marketing procedures and inspection of forest produce in transit or in trade;

• declaration of protected areas, administration of PAs, and prohibitions in PAs;

• protection of wildlife and use of certain wild species;

• prevention of forest fires, land clearance, and activities potentially impacting soil, water and wildlife resources; and
enforcement and penalties for offences related to all of the above.

**Environmental Assessment Act, 2000**

The Environmental Assessment Act (EAA), 2000, establishes procedures for the assessment of potential effects of strategic plans, policies, programs, and projects on the environment, and for the determination of policies and measures to reduce potential adverse effects and to promote environmental benefits. The Act requires the RGoB to ensure that environmental concerns are fully taken into account when formulating, renewing, modifying and implementing any policy, plan or program as per regulations that may be adopted within the appropriate provision of the Act. It makes environmental clearance (EC)\(^6\) mandatory for any project/activity that may have adverse impact(s) on the environment. See **Annex 4** for a sample of environmental clearance for roads and **Annex 5** for a list of the environmental information required for environmental clearance of roads.

Based on the review of environmental information submitted by the project applicant, the National Environment Commission Secretariat (NECS) or the Competent Authority (CA)\(^7\) may issue/deny EC or determine the need for a full environmental assessment (EA). Where a full EA is determined necessary, the applicant will be asked to prepare EA documents according to the terms of reference (ToR) approved by the NECS. On approval of the ToR by the NECS, the applicant is required to carry out a full EA and consequently submit the EA Report to the NECS. The NECS will review the EA report and accordingly issue/deny EC.

The NECS or CA may issue EC when it is satisfied that: (a) the effects of the project on the environment are foreseeable and acceptable; (b) the applicant is capable of carrying out the terms of EC; (c) the project, alone or in connection with other programmes/activities, contributes to the sustainable development of the Kingdom and the conservation of its natural and cultural heritage; (d) adequate attention has been paid to the interests of concerned people; and (e) the project is consistent with the environmental commitments of the Kingdom.

EC for a project shall be reviewed and may be revised and renewed at least every five years, unless a shorter period is stated. The NECS or CA may review and modify the terms whenever there is: (a) unacceptable risks to the environment resulting from the project which were not known at the time the clearance was issued; (b) availability of improved and cleaner technology; and (c) a need to bring the project into compliance with changes to the laws of the country.

Non-compliance with environmental terms specified in the issuance of environmental clearance makes the offender liable to penalties that may include compensation for environmental damage, fines, sanctions, and suspension or revocation of environmental clearance in part or full.

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\(^6\) Article 6.11 of the EAA defines Environmental Clearance as the decision, issued in writing by the NECS or the relevant Competent Authority, to let a project proceed, which includes terms (and conditions) to ensure that the project is managed in an environmentally sound and sustainable way.

\(^7\) Article 6.2 of the EEA defines a Competent Authority as any agency of RGoB who has the power to issue development consent for a project.
Regulation for the Environmental Clearance of Projects, 2002

The Regulation defines responsibilities and procedures for the implementation of the EAA concerning the issuance and enforcement of EC for individual projects and to:

- provide meaningful opportunities for public review of potential environmental impacts of projects;
- ensure that all projects are implemented in line with the sustainable development policy of the Royal Government;
- ensure that all foreseeable impacts on the environment, including cumulative effects are fully considered prior to any irrevocable commitments of resources or funds;
- ensure that all feasible alternatives are fully considered;
- ensure that all feasible means to avoid or mitigate damage to the environment are implemented;
- encourage the use of renewable resources, clean technologies and methods;
- ensure that concerned people benefit from projects in terms of social facilities;
- help strengthen local institutions in environmental decision making; and
- help create a uniform, comprehensive data base on the environmental and cultural conditions and assets in the country.

- At the minimum, all EC applications must contain the following information:
  - The potential adverse effects of the project on the environment including direct, indirect and cumulative effects;
  - How the project complies with relevant sectoral guidelines or codes of practices, if any, issued by the NECS or CA;
  - How the impacts of the project will be avoided, minimized or reduced; and
  - The environmental benefits of the project, including how the project will benefit concerned people and use clean and sustainable technologies.

All ECs must contain terms and conditions adequate to fully protect the environment and satisfy the requirements set forth in the Regulation. The EC shall be subject to and contingent upon public notice, and the absence of any appeal within 30 days. At the minimum, the EC shall specify binding mitigation and compliance measures, and appropriate monitoring, recording and reporting requirements. Non-compliance with environmental terms prescribed in the issuance of EC makes the offender liable to penalties that may include compensation for environmental damage, fines, sanctions, and suspension or revocation of EC in part or full. The NECS or CA may renew the EC after expiry of its duration if the project is in compliance with the...
environmental terms or may change the terms and conditions at the time of renewal with a sound justification for such changes in writing to the holder.

The Act requires that all CAs establish an environmental unit to implement the EA process for projects/activities assigned to them. The NECS may require the applicant to designate a focal person to ensure compliance with the terms of EC. All significant projects are required to establish an environmental unit responsible for ensuring compliance with the terms of EC.

Annex 2 of the Regulation lists projects/activities for which competent authorities have been assigned for screening and issuance/denial of environmental clearance, and projects/activities that do not require EC. A full list of all projects/activities that feature in Annex 2 of RECOP is available in Annex 3 of this Report. For activities that are not listed in the aforesaid Annex, EC must be secured from the NECS.

**Regulation for Strategic Environmental Assessment 2000**

The purpose of this regulation is to:

- Ensure that environmental concerns are fully taken into account by all government agencies when formulating, renewing, modifying or implementing any policy, plan or programme, including FYPs;

- Ensure that the cumulative and large scale environmental effects are taken into consideration while formulating, renewing, modifying or implementing any policy, plan or programme;

- Complement project-specific environmental reviews as per RECOP and to encourage early identification of environmental objectives and impacts of all government proposals at appropriate planning levels;

- Promote the design of environmentally sustainable proposals that encourage the use of renewable resources and clean technologies and practices; and

- Promote and encourage the development of comprehensive natural resource and land use plans at the local, dzongkhag and national levels.

It outlines the duties of government agencies formulating, renewing, modifying, or implementing any policy, plan, or programme, the principles of strategic environmental assessment, and essential contents of the environmental statement.

**Sectoral Environmental Assessment Guidelines and ECOPs**

The sectoral guidelines for EA were first formulated in 1999, preceding the enactment of the EAA in 2000. The guidelines then pertained to hydropower, power transmission lines, highways and roads, forestry, mining and mineral processing, and new and existing industries. In 2003/04, the NECS undertook a revision of the existing sectoral EA guidelines with assistance from the Asian Development Bank (ADB). In addition, it also developed new guidelines for tourism and urban development sectors and environmental codes of practices (ECOP) for storm water drainage system and
installation of underground and overhead utilities. To support environment friendly road construction, the Department of Roads (DoR) has developed ECOP for roads.

In issuing ECs for roads, one of the terms and conditions specified by the NECS is that the road construction must be in line with the ECOP developed by the DoR and the Sectoral EA Guidelines for Highways and Roads issued by the NECS. Information required to be submitted for EC in accordance to the sectoral EA guidelines include:

- Applicant’s details;
- Project objectives;
- Relevance to overall planning;
- Funding and costs, including environmental management costs;
- Project description, including project location, category and length of the road, road specifications, management of excavated materials, and quantity of explosives and the techniques that will be employed in their use;
- Alternatives in terms of the project itself and road alignment;
- Details of public consultation;
- Project site environmental details such as topography, geology and water courses;
- Project site ecological details such as land use and vegetation, protected areas, and wildlife and flora;
- Project site social details such as beneficiary population and affected properties (including cultural properties);
- Impacts and mitigation measures.

Detailed description of the above information is provided in Annex 5 of this Report.

**Pesticides Act of Bhutan, 2000**

The Pesticides Act of Bhutan (PAB), 2000, has been enacted with the objective to:

- ensure integrated pest management (IPM) is pursued, limiting the use of pesticides as the last resort;
- ensure that only appropriate types and quality of pesticides are introduced in the country;
- ensure that pesticides are effective when used as recommended;
- minimize deleterious effects on human beings and the environment consequent to the application of pesticides; and
- enable privatization of sale of pesticides as and when required.
Biodiversity Act of Bhutan, 2003

The Biodiversity Act of Bhutan, 2003, was ratified by the National Assembly in August 2003. The Act asserts the sovereignty of the country over its genetic resources, the need to promote conservation and sustainable use of biodiversity resources as well as equitable sharing of benefits arising from sustainable use, and the need to protect local people’s knowledge and interests related to biodiversity. It lays down the conditions for the grant of access, benefit sharing, and protection, and describes various rights, offences and penalties.

DYT and GYT Chathrims, 2002

In the context of decentralized environmental management, the DYT and GYT Chathrims, 2002, have laid down a number of provisions. These Chathrims were enacted with the main aim to support the decentralization policy and empower locally elected community bodies (DYTs and GYTs) with the authority and responsibility to decide, plan and implement development programmes and activities, including those concerning environmental management, in their respective areas of jurisdiction. Powers and functions vested in the DYTs and GYTs in relation to environmental management are specified below.

Environment-related provisions in DYT Chathrim, 2002

Article 8 of the DYT Chathrim 2002 gives the DYT the power and function to:

- promote awareness and dissemination of national objectives (section 3);
- adopt procedures and rules to implement national laws, wherever relevant (section 10); and
- make recommendations on activities with major environmental impacts such as construction of roads, extraction and conservation of forests, mining and quarrying (section 13).

Article 9 of the DYT Chathrim 2002 gives the DYT the power and function to adopt and enforce regulations with respect to:

- designation and protection of monuments and sites of cultural and historical interests (section 1);
- designation and protection of areas of special scenic beauty or biodiversity as dzongkhag parks and sanctuaries (section 2);
- control of noise pollution (section 8);
- establishment of quarries and mines in accordance with Mines and Mineral Management Act 1995; and
- protection of public health as per prevailing national guidelines or acts (section 14).

Article 10 of the DYT Chathrim, 2002, gives the DYT broad administrative power and function to give direction and approval on:

- construction of farm and feeder roads (section 5);
- forest management plan including extraction, conservation and forest road construction in accordance with the FNCA (section 8);
• protection of forests, tsamdo and all types of government and community lands from illegal house and similar construction and other encroachments (section 19);

• control of construction of structures, whether on national, communal or private lands, within 50 feet of highways, including enforcement of measures such as cessation of construction and demolition of the structures (section 20);

• choice of trekking routes and camps for tourists (section 22); and

• mobilization of voluntary actions in times of natural catastrophes and emergencies (section 26).

Article 13 of the DYT Chathrim 2002 gives the Dzongkhag Administration the powers and functions to:

• construct farm and feeder roads, in conjunction with the NEC (section 5);

• determine the choice of design, construction methods and building materials for forms, which do not have to follow standard designs in conformity with acceptable technical and structural norms (section 12); and

• approve allocation of timber permits as per the rules and regulations issued by the MoA from time to time (section 16).

Environment-related provisions in GYT Chathrim 2002

Article 8 of the GYT Chathrim 2002 gives the GYT the power and function to adopt and enforce regulations at the geog level with respect to:

• safe disposal of waste (section 1);

• control and prevention of pollution of air, soil and water (section 2);

• sanitation standards (section 3);

• control of communicable livestock diseases within the geog in accordance with the Livestock Act 2001 (section 4);

• allocation of safe and clean drinking water from water supply schemes (section 5);

• allocation of irrigation water, in accordance with the provision of the Land Act 1979 (section 6); and

• protection and harvesting of edible forest products in the local area in accordance with the Forest and Nature Conservation Act 1995 (section 8).

Article 9 of the GYT Chathrim 2002 gives the GYT broad administrative power and function at the geog level with respect to:

• administration, monitoring and review of all activities that are part of the geog plan, including the maintenance of community properties such as lhakhangs, goendeys and their nangtens, chhoerten, mani dangrem, water supply schemes, irrigation channels, footpaths, mule tracks, farm and feeder roads, suspension and cantilever
bridges, micro-hydel, basic health units and outreach clinics, lower secondary school and community schools, and extension centers of the RNR sector (section 2);

- conservation and protection of water resources, lakes, springs, streams, and rivers (section 7);
- custody and care of communal lands, community forests, including sokshing and nyekhor tsamdo, medicinal herbs and accordingly prevention of illegal house construction and all other types of encroachments on land and forests (section 8);
- prevention of construction of structures, whether on national, communal or private lands, within 50 feet of highways falling in local area (section 9); and
- protection and preservation of ney, nyekhang or yulha and zhiday, which are not part of custody of a monastic body or central agencies (section 10).

**NIP Procedural Manual and Modules**

The National Irrigation Policy (NIP), which was first officially adopted in 1992, has been drawn up with the purpose for sustainable irrigation development through the participation of water users. It stresses three basic principles: meaningful farmer participation, support to water user groups, and multi-disciplinary teamwork. Subsequently, a Procedural Manual was developed to enable effective implementation of the National Irrigation Policy in the field. The full Procedural Manual is made up of the NIP Procedural Manual, the Modules, and the Supporting Materials.

The NIP Procedural Manual Modules contains a step-by-step explanation of how to implement the procedures of the NIP. The modules – eight in all – serve as field implementation guide for preliminary investigations, multi-disciplinary feasibility study, pre-construction meetings, development of water user association constitution and bylaws, trainings on banking and book-keeping and on scheme management, and establishment period inspection. Geotechnical survey is prescribed as an integral part of the engineering survey and it involves soil and slope stability studies.

A flow chart illustrating the suite of activities covered by the Modules is provided in **Annex 8**.

**Geotechnical Manual for Irrigation Scheme Development**

The Geotechnical Manual, formulated in 1993, has been developed with the objective to contribute to sustainability of government assisted irrigation development by: (a) increasing irrigation officers’ understanding of interrelated factors that may be the cause, or contribute to, canal instability and command area erosion; and (b) presenting a practical methodology for the identification and assessment of potential geotechnical problems for which appropriate solutions are recommended. The Manual includes descriptions of different types of land units and appropriate design principles, checklist of possible geotechnical problems and possible solutions (temporary and permanent) during initial construction, operation, and rehabilitation, and methods of stabilization and erosion control.

**Farm Roads Construction Procedural Manual**
The Farm Roads Construction (FRC) Procedural Manual (Revision I, 2003) includes a set of four modules, along the lines of Irrigation Scheme Development (ISD) Modules. The first module pertains to preliminary investigation and provides guidelines for meeting with intended beneficiaries and preliminary survey. The second module is about multi-disciplinary feasibility study and involves community meeting before and after the feasibility study. The feasibility study is required to cover engineering, agricultural and environmental aspects (activities for the latter have however not yet been defined in the module). The third module is about pre-construction meeting and covers explanation of roles and responsibilities of the Farm Road Management Committee (FRMC), election of FRMC members, explanation on the need to establish a maintenance fund and agreement on contributions to the fund, and signing of the formation of beneficiaries group and Letter of Understanding, including agreement on maintenance fund contribution. The fourth module pertains to completion and handing over of farm road and entails the approval of project completion report and issuance of the certificate of satisfactory completion, including the undertaking that FRMC assumes full responsibility for routine operation and maintenance. The FRC Module differs from the ISD module as in the former construction is to be contracted out to a private party while in the latter construction is to be implemented by the local community with technical and material support from the Dzongkhag Administration.

Assessment in Relation to WB Safeguard Policies

Overview of WB Safeguard Policies

The Bank’s safeguard policies require that potentially adverse environmental impacts and selected social impacts of Bank Group investment projects are identified, avoided or minimized where feasible, and mitigated or monitored.

The safeguard policies provide a mechanism for integrating environmental and social concerns into development decision making. Most safeguard policies provide that: (a) potentially adverse environmental impacts as well as specific social impacts should be identified and assessed early in the project cycle; (b) unavoidable adverse impacts should be minimized or mitigated to the extent feasible; and (c) timely information should be provided to the stakeholders, who should have the opportunity to comment on both the nature and significance of impacts and the proposed mitigation measures.

Environment-related safeguard policies that are relevant to this Project pertain to:

- Environmental Assessment;
- Natural Habitats;
- Pest management;
- Forestry;
- Cultural Property.

Environmental Assessment (OP 4.01)

Guiding Principles
An Environmental Assessment is conducted to ensure that Bank-financed projects are environmentally sound and sustainable, and that decision-making is improved through appropriate analysis of actions and of their likely environmental impacts. Any World Bank project that is likely to have potential adverse environmental risks and impacts in its area of influence requires and EA indicating the potential risks, mitigation measures and environmental management framework or plan.

This project is classified as a *Category B* where potential adverse environmental impacts on human populations or environmentally important areas -- including wetlands, forests, grasslands, and other natural habitats -- are limited. These impacts are site-specific; few if any of them are irreversible; and in most cases mitigatory measures can be designed. The EA examines the project’s potential negative and positive environmental impacts and recommends any measures needed to prevent, minimize, mitigate, or compensate for adverse impacts and improve environmental performance.

b. **Applicability to the Project**

The project will trigger WB EA safeguard policy as majority of the activities pertain to development of rural infrastructure for agricultural production, which is likely to have impacts on land, water, air, vegetation, cultural properties, and other rural development infrastructure. Based on WB classification for EA, the project as a whole can be identified as a Category B project as majority of the components/ subcomponents will potentially have moderate adverse environmental impacts, for which mitigation measures can be readily specified and implemented. The subcomponents that are likely to have adverse environmental impacts include farm roads, irrigation schemes, and upgradation of existing mule tracks to power tiller roads (if the upgradation entails major widening and realignment). Other subcomponents – construction of RNR Centers, construction of marketing infrastructure, and rehabilitation of existing irrigation schemes – are expected to have potentially low adverse environmental impacts.

c. **Existing National Legal and Regulatory Provisions**

The EAA and RECOP require that all development projects/ activities, which may potentially have adverse impact on the environment, acquire environmental clearance. From among the project activities, excepting irrigation schemes all other infrastructure activities have to be environmentally cleared by the NECS. For irrigation schemes the Department of Agriculture (DoA) has been assigned as the CA for environmental clearance.

The Sectoral EA Guidelines for Highways and Roads and the ECOP developed by the DoR provide elaborate guidelines on EA of roads and identification of potential adverse impacts and mitigation measures. See Annex 4 for a sample of environmental clearance for roads and Annex 5 for a list of the environmental information required for environmental clearance of roads.

The NIP Procedural Manual and Modules for ISD, in combination with Geotechnical Manual, also provide sufficiently strong guidelines for planning and construction of irrigation schemes although there is a need to enhance the EA aspect in the modules, for which recommendations are specified in the Environmental Management Framework.
Natural Habitats (OP 4.04)

Guiding Principles

The conservation of natural habitats, like other measures that protect and enhance the environment, is essential for long-term sustainable development. The Bank, therefore, does not support projects that, in the Bank’s opinion, involve significant conversion or degradation of critical natural habitats. Critical natural habitats are those natural habitats which are either (i) legally protected; (ii) officially proposed for protection; and (iii) unprotected but of known high conservation value.

Wherever feasible, Bank-financed projects are sited on lands already converted (excluding any lands that in the Bank’s opinion were converted in anticipation of the project). The Bank does not support projects involving significant conversion of natural habitats unless there are no feasible alternatives for the project and its siting, and comprehensive analysis demonstrates that overall benefits from the project substantially outweigh the environmental costs. If the environmental assessment indicates that a project would significantly convert or degrade natural habitats, the project includes mitigation measures acceptable to the Bank. Such mitigation measures include, as appropriate, minimizing habitat loss (e.g. strategic habitat retention and post-development restoration) and establishing and maintaining an ecologically similar protected area. The Bank accepts other forms of mitigation measures only when they are technically justified.

While there are no numerical thresholds for determining “significant” conversion or degradation, a useful rule of thumb is that project-related conversion or degradation is likely to be significant if it involves either (a) in absolute terms, more than about 10,000 hectares (ha) of natural habitats or (b) in relative terms, more than one percent of the remaining area of any ecosystem type within the same country.

Applicability to the Project

The project will trigger the WB safeguard policy on natural habitats as there are 12 geogs in the project area that have areas inside protected areas or their buffer zones. However, given that the infrastructure activities to be financed by the project are small-scale, it is highly unlikely the project will cause any “significant” conversion or degradation of natural habitats. All the project-related infrastructure activities put together are estimated to use less than 250 ha of land and much of this is expected to be outside areas which are considered natural habitats. See Annex 6 for sample rules and regulations for activities in buffer zone in Bundeling Wildlife Sanctuary and Annex 7 for Globally threatened species and birds and mammals in and around Jigme Singye Wangchuck, Royal Manas and Thrumshingla National Parks.

Existing National Legal and Regulatory Provisions
The FNCA, in conjunction with the FNCR, provides a comprehensive legal and regulatory framework for protection of natural habitats. Key natural habitat protection regulatory provisions relevant to the project activities include:

- Prohibition of any construction, including motor roads, buildings, fences, or any other physical structures inside a PA, except with written permission or authorization from the MoA;

- Prohibition of any kind of construction, including motor roads, buildings, fences, or any physical structures in the core zone of a PA, except by forest officials if determined necessary to achieve conservation objectives.

Guided by the general provisions laid down in the FNCR, PAs in their conservation management plans may further spell out rules and regulations to more specifically address their conservation needs. An example is provided in Annex 6.

Complementing the FNCA, FNCR and PA conservation management plans, the sectoral EA guidelines for highways and roads stipulates that a full EA is necessary if the proposed road is inside or goes through a protected area.

At the dzongkhag level, the DYT is empowered by the DYT Chathrim 2002 to make recommendations on activities with major environmental impacts such as construction of roads, extraction and conservation of forests, mining and quarrying and to enforce regulations with respect to designation and protection of areas of special scenic beauty or biodiversity as dzongkhag parks and sanctuaries.

At the geog level, the GYT is vested with broad administrative power and function with respect to conservation and protection of water resources, lakes, springs, streams, and rivers, prevention of encroachments on land and forests, and protection and preservation of ney, nyekhang or yulha and zhiday, which are not part of custody of a monastic body or central agencies. Neys may include sacred forests, lakes, etc.

**Pest Management (OP 4.09)**

*Guiding Principles*

The Bank supports a strategy that promotes the use of biological or environmental control methods and reduces reliance on synthetic chemical pesticides. In Bank-financed projects, the borrower addresses pest management issues in the context of the project’s environmental assessment. In Bank-financed agriculture operations, pest populations are normally controlled through IPM approaches, such as biological control, cultural practices, and the development and use of crop varieties that are resistant or tolerant to the pest.

Any procurement of pesticides that are classified as Class Ia, Ib and II in the WHO Guidelines can not be included in a Bank-financed project, if the country lacks restrictions on their distribution and use or they are likely to be used by, or accessible to, lay personnel, farmers or others without training, equipment and facilities to handle, store and apply these products properly.

**Applicability to Project Activities**
The project may involve, on a minor scale, procurement and use of pesticides as a part of the RNR Centers’ field programme. In addition, the irrigation schemes may indirectly induce use of pesticides. However, the procurement, distribution and use of pesticides in Bhutan is strictly controlled through a centralized system, with only butachlor (a herbicide used in rice, which has been classified in the WHO Guidelines as one with no acute hazard under normal use) being distributed through a semi-private system of commission agents. Butachlor accounts for more than 80 per cent of the pesticide used in the country. The distribution list of pesticides used in Bhutan and the trend of their distribution are provided in Annex 9. Application of hazardous chemicals is not encouraged and prescribed only as a last resort when pest attacks reach severe levels. Furthermore, consultations with agricultural personnel both in the center and in the field clearly suggested that farmers are in general averse to using pesticides because of local religious sentiments against taking any form of life.

**Existing National Legal and Regulatory Provisions**

Procurement and use of pesticides is legally governed by the PAB. The PAB has been enacted with the purpose of, inter alia, ensuring that IPM is pursued, limiting the use of pesticides as the last resort, and minimizing deleterious effects on human beings and the environment consequent to the application of pesticides.

Rules to support the implementation of the PAB are yet to be formulated but IPM guidelines have been developed and are under implementation as a part and parcel of the National Plant Protection Center’s regular programme. The IPM guidelines exist in the form of a series of extension leaflets on various pest organisms, their life cycles and associated damage symptoms, biological and cultural control methods, and, where necessary, instructions are given on safe use of chemicals. See Annex 9 for a distribution list of pesticides used in Bhutan and Annex 10 for samples of IPM extension leaflets.

**Forestry (OP 4.36)**

**Guiding Principles**

Bank involvement in the forestry sector aims to reduce deforestation, enhance the environmental contribution of forested areas, promote afforestation, reduce poverty, and encourage economic development. The Bank does not finance projects that contravene applicable international environmental agreements. The safeguard policy also stipulates that no significant adverse impact should take place on forested areas as a result of project activities financed by the Bank.

**Applicability to Project Activities**

The project entails no activities related to forestry. However, farm roads, irrigation schemes and power tiller roads are likely to have potentially adverse environmental impacts as these may involve clearing of vegetation or opening of small corridors of forest land. In this regard, the EA and Natural Habitats safeguard requirements are adequate to address environmental concerns related to forest areas.

**Existing National Legal and Regulatory Provisions**

Forestry activities in the country are legally governed by the FNCA in conjunction with FNCR. Project-relevant regulatory provisions for safeguarding forest areas (which
also applies to natural habitats as forests constitute the most dominant habitat type in Bhutan) include:

- Prohibition of use of dynamite or other explosives for any purpose in Government Reserved Forests\(^8\), except when permitted by the DOF in an emergency or in compliance with any applicable forest management plan;

- Prohibition of felling or marking trees within a river buffer in Government Reserved Forests, except when permitted by the DOF in an emergency or in compliance with any applicable forest management plan or PA conservation management plan;

- Prohibition of felling any tree without proper markings in Government Reserved Forests, except permitted by the DOF in an emergency or in compliance with any applicable forest management plan;

- Restriction on felling, girdling, lopping, tapping, uprooting or injuring of any tree in Government Reserved Forests, except with written permission granted in accordance with FNCR;

- Restriction on harvesting or removing any timber or other forest produce (including stones, boulders and sand), or quarrying, except with written permission granted in accordance with FNCR;

- Restriction on disposal of garbage or other waste material in a Government Reserved Forests;

- Restriction on construction or placement of any permanent or temporary structure, road fences, marker or other device in Government Reserved Forests, except with written permission granted in accordance to FNCR;

- Restriction on willful or other damage to forests due to poor maintenance or mismanagement of irrigation channels and roads.

Furthermore, with regards to land clearance, the FNCR stipulates the following criteria:

- Land located within a protected area, water catchment and area containing high forest may be avoided:

- The land should be near the existing habitation as far as possible;

- Land clearance or operations under the following situations shall not be permitted:
  - Within 600 feet uphill and 300 feet downhill of the motor road except forest road;

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\(^8\) All forests in Bhutan are Government Reserved Forests, excepting those which have been registered as community forests or allotted to individuals for other land use in accordance with FNCR. FNCA defines forest as “any land and water body, whether or not under vegetative cover, in which no person has acquired a permanent and transferable right of use and occupancy, whether such land is located inside or outside the forest boundary pillar, and includes land registered in a person’s name as tsamdo or sokshing.
- Within 100 feet on either side of the banks or edge of rivers, streams or water courses kept as riparian reserve for conservation; and
- Land with greater than 45 degree slope.

**Cultural Property (OP 11.03)**

*Guiding Principles*

Cultural resources are important as sources of valuable historical and scientific information, as assets for economic and social development, and as integral parts of a people’s cultural identity and practices. The loss of such resources is irreversible, but fortunately, it is often avoidable. The Bank seeks to avoid, or mitigate, adverse impacts on cultural resources from development projects that it finances.

*Applicability to Project Activities*

Safeguard policy concerning cultural property is applicable to all the infrastructure-related project activities and can be covered under the EA requirement.

*Existing National Legal and Regulatory Provisions*

The RECOP requires that environmental clearance applications are supported by clearance from the Ministry of Home and Cultural Affairs if the project involves activities within 50 meters distance of a cultural site or sacred landscape.

The DYT and GYT Chathrims 2000 also provide adequate mandate for the protection of cultural properties at the local level as is evident from the following provisions contained therein:

- Article 9 of the DYT Chathrim 2002 gives the DYT the mandate to adopt and enforce regulations, inter alia, for designation and protection of monuments and sites of cultural and historical interests; and

- Article 9 of the GYT Chathrim 2002 gives the GYT the mandate at the geog level pertaining to, inter alia, administration, monitoring and review of all activities that are part of the geog’s plans, including the maintenance of community properties such as lhakhangs (temples), goendeyos (monastic institution) and their nangtens (religious treasures), chhoertens (stupas), mani dangrems… and protection and preservation of ney (sacred natural features), nyekhang (dwelling place for deities) or yulha and zhiday, which are not part of custody of a monastic body or central agencies.
Table 5: Comparison between WB Environmental Safeguard Policies and Existing National Provisions

<table>
<thead>
<tr>
<th>Applicability to the Project Activities</th>
<th>Key WB Requirements</th>
<th>Relevant Provisions in Existing National Legislations, Regulations and Guidelines</th>
<th>Actions under the project</th>
</tr>
</thead>
<tbody>
<tr>
<td>WB Safeguard Policy: Environmental Assessment</td>
<td>Applicable as much of the project involves development of rural infrastructure, which are likely to have environmental impacts on land, water, air, vegetation, cultural properties, and other rural infrastructure.</td>
<td>EA of all projects/activities that are proposed for WB financing and are likely to have potential environmental risks and adverse impacts in their area of influence.</td>
<td>The project will assist the MoA in the establishment of an environmental unit within the MoA in line with the requirements of the RECOP (Sections 25 to 27) and in keeping with the objective of decentralization of the EA process.</td>
</tr>
<tr>
<td></td>
<td>WB Safeguard Policy: Natural Habitats</td>
<td>No significant conversion or degradation of critical natural habitats, whether directly through construction or indirectly through human activities induced by the project activities.</td>
<td>FNCR (Section 62) prohibits any human activities within the core zone of a protected area unless determined necessary by forest/protected area officials to achieve nature conservation objectives.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Farm roads, upgradation of mule tracks to power tiller roads (if major realignment or widening is expected), and irrigation schemes require a full EA if these activities are located inside a PA or a critical wildlife habitat whether or not inside a PA.</td>
<td>Farm roads, upgradation of mule tracks to power tiller roads (if major realignment or widening is expected), and irrigation schemes require a full EA if these activities are located inside a PA or a critical wildlife habitat whether or not inside a PA.</td>
</tr>
<tr>
<td>Applicability to the Project Activities</td>
<td>Key WB Requirements</td>
<td>Relevant Provisions in Existing National Legislations, Regulations and Guidelines</td>
<td>Actions under the project</td>
</tr>
<tr>
<td>----------------------------------------</td>
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</tr>
<tr>
<td>Activities</td>
<td></td>
<td>either side of the banks of rivers, streams or water sources kept as riparian reserve for conservation. As per the RECOP (Section 17 and 18), official clearance from the DOF is mandatory for projects/activities that affect natural habitats. The Sectoral EA Guidelines for Highways and Roads stipulates a full EA for any road that is located in or goes through a protected area.</td>
<td></td>
</tr>
<tr>
<td>WB Safeguard Policy: Pest Management</td>
<td></td>
<td>PAB enacted <em>inter alia</em> to ensure IPM is pursued, limiting the use of chemical pesticides as the last resort, and only appropriate types and quality of pesticides are introduced into the country, and to minimize deleterious effects to human beings and the environment from pesticide use. PAB (Articles 4 to 6) stipulate strict requirements for import, sale and use of pesticides. Distribution of all pesticides is centrally controlled, except for butachlor (classified as a pesticide with no acute hazard under normal use) which is distributed through a network of semi-private commission agents.</td>
<td>The project will encourage the promotion of IPM and organic farming through farmer training and extension by the RNR Centers.</td>
</tr>
<tr>
<td>WB Safeguard Policy: Forestry</td>
<td></td>
<td>An IPM programme is in place and IPM guidelines exist in the form of a series of extension leaflets describing pest organisms, their lifecycles, damage symptoms, biological and cultural control measures, and controlled use of chemical pesticides where such use becomes inevitable.</td>
<td>-</td>
</tr>
<tr>
<td>WB Safeguard Policy: Forestry</td>
<td></td>
<td>Relevant prohibitions inside a Government Reserved Forest as per FNCR (Section 22) include, except when permitted by the DOF in an emergency or in compliance with any applicable forest management plan: using dynamite or other explosives for any purpose; any felling of trees without written permit and without marking; and felling or marking of trees within a river buffer.</td>
<td>-</td>
</tr>
</tbody>
</table>

**DECENTRALIZED RURAL DEVELOPMENT PROJECT BHUTAN**

Environmental Assessment Report and Environmental Management Framework

35
### Applicability to the Project Activities

<p>| Natural Habitat safeguards requirements are adequate to address protection of forest areas. |</p>
<table>
<thead>
<tr>
<th>Key WB Requirements</th>
<th>Relevant Provisions in Existing National Legislations, Regulations and Guidelines</th>
<th>Actions under the project</th>
</tr>
</thead>
<tbody>
<tr>
<td>As per the RECOP (Section 17 and 18), official clearance from the DOF is mandatory for projects/activities that affect forest land.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### WB Safeguard Policy: Cultural Property

| Applicable to all projects requiring EA. | No project/activity to have potential adverse impact on cultural properties | The RECOP (section 17) requires official clearance from the Ministry of Home and Cultural Affairs for any project/activity within 50 m distance of a cultural site or sacred landscapes.  
The DYT Chathrim 2002 mandates the DYT to adopt and enforce regulations for designation and protection of monuments of cultural and historical importance in the dzongkhag.  
The GYT Chathrim 2002 mandates the GYT to administer, monitor and review geog plan activities, including maintenance and preservation of religious monuments that are not under the custody of monastic body or central agencies |
|----------------------------------------|-----------------------------------------------------------------|--------------------------|

### Status of Implementation

#### Environmental Assessment

The need for environmental assessment of development projects/activities is relatively recent in the country. The concept of EA was launched in the late 1990s with the preparation of a series of sectoral EA guidelines. To provide the legal and regulatory framework for EA implementation, the EAA was enacted in 2000 and RECOP and Regulation for SEA was formulated in 2002. Currently, the EA process is to a large extent centrally driven at the level of the NECS. The NECS receives about 250 environmental clearance applications, a majority of which are for minor projects. Given that the NECS has personnel constraint and that it has policy coordination, advisory and regulatory mandate and not that of implementation, efforts are underway to decentralize the EA process to the sectoral and dzongkhag levels. Environmental units have been established in the Ministry of Trade and Industry and the Ministry of Works and Human Settlements. Establishment of an environmental unit in the MoA is being discussed between the NECS and MoA. At the present, the MoA is the CA for 11 activities, including irrigation schemes from among the project activities. Should the MoA decide to establish an environmental unit, it could possibly take up environmental clearance responsibility for farm roads, power tiller roads, RNR Centers and suspension bridges, which are currently being issued environmental clearance by the NECS. The NECS has started working with Dzongkhag Administrations to establish Dzongkhag Environmental Committees (DECs) with a primary objective to decentralize the EA process for small-scale and less complicated development activities (e.g. livestock farms, forest nurseries) to these committees. It has already received nominations of DEC from 12 dzongkhags and is developing ToR for the DECs in consultation with the dzongkhag officials.
It was clear from consultations with the NECS officials and the dzongkhag officials that the major impediment to EA implementation was the lack of capacity at various levels from the center to the field. It was noted that where there was a high level of awareness of the EA process, e.g. in Chhukha and Wangduephodrang, commitment to the EA process was stronger. The NECS will be shortly commencing mass training on EA with financial assistance from the ADB and Sustainable Development Secretariat (SDS). In addition, the NECS will be starting an EA capacity building project covering four dzongkhags on a pilot basis with assistance from Danida.

**Protection of Natural Habitats and Forests**

Natural habitats and forests are treated together here as the two fall under the purview of one organization, i.e. the DoF, and are both legally governed by the FNCA and FNCR.

The strong political will for environmental conservation that exists in the country has translated into the policy resolution of maintaining 60 per cent of the country under forest cover for all times and the establishment of a comprehensive protected areas system encompassing more than 26 per cent of the country. The enactment of the Bhutan Forest Act (which was later repealed with the enactment of FNCA) as early as in 1969 has given the DoF a long experience of conservation law enforcement. Owing to its early establishment, the DOF has now a widespread network of field offices to implement FNCA and FNCR. These include 12 territorial forest divisions, at least one territorial forest range in each dzongkhag, and park management offices in all the operational PAs. The efforts of the DOF is complemented by the Royal Society for the Protection of Nature – one of the few NGOs that exist in the country and the only one that is dedicated to environmental conservation – through educational programmes in protected areas and protection of critical wildlife habitats, in particular the wintering habitats of black-necked cranes in Phobjikha and Bomdeling valleys. Given the long experience and institutional spread of DOF, enforcement of laws and regulations for protection of forests and natural habitats has been relatively vigorous.

**Pest Management**

Barring the distribution of butachlor through semi-private agents, the procurement, distribution and use of all other pesticides is centralized at the National Plant Protection Center. As a result, control over pesticide use has remained very effective. Nearly 85 per cent of the pesticides used in the country belong to what WHO has categorized as “no acute hazard under normal use” and another 8 per cent belong to the non-toxic group. Use of WHO class Ia and Ib pesticides is almost negligible and is confined largely to controlling rodents while use of WHO class II pesticides is limited and resorted to when there is a need to control severe pest outbreaks.

**Protection of Cultural Properties**

The protection of cultural properties is under the purview of the Ministry of Home and Cultural Affairs and is built in the mandate of the DYT’s and GYT’s. No development activities that may have impact on cultural resources can be implemented without clearance from the MHCA.

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9 The dzongkhags are yet to be identified.
10 The DOF was created in 1952, making it the oldest government organization.
4.4 Potential Environmental Impacts of Infrastructure related works

4.4.1 Potential environmental impacts due to infrastructure related works

The potential environmental and social effects and public concerns can generally be outlined as:

Direct effect – caused by the project directly
Indirect effect – caused due to facilitation, such as material extraction, for the road project
Onsite effect – occurring within the physical boundaries of a project
Offsite effect – occurring outside the boundaries

The direct impacts of the infrastructure development are observed within the construction area or immediately adjacent lands, and at supplementary sites such as quarries from where materials are extracted for construction. Direct construction impacts may include the loss of agricultural land and crops, damage to ecological features such as forests, landslides, damage to man-made structures, displacement and resettlement. Although direct environmental effects are usually greatest within the area surrounding the RNR construction and the road’s right of way (RoW), they are not confined to this area alone. Impacts often extend beyond the RoW, particularly as a result of slope destabilization and poor cross-road drainage. The indirect effects of the road construction are degradation of forests and ecology, degradation of social and cultural values and others and all these effects are subject to vary across different sub-project sites.

Table 6 provides the possible impacts on the physical, natural and social environments.

Table 6: Potential Environmental Impacts of infrastructure related works

<table>
<thead>
<tr>
<th>SN</th>
<th>Parameter</th>
<th>Impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Physical Environment</td>
<td>Destruction of topography/physical features</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Damage to landscape</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Erosion and loss of productive soils, and soil contamination</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Slope destabilization and mass movements</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Disruption to surface water run-off system</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Disruption of groundwater system</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Contamination of water bodies</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Spread of dust, debris, and waste in air, water, and land</td>
</tr>
<tr>
<td>2</td>
<td>Natural Environment</td>
<td>Forest destruction</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Habitat intrusion</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Ecological destabilization</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Damage to flora and fauna</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Transmission of diseases</td>
</tr>
<tr>
<td>3</td>
<td>Social Environment</td>
<td>Disturbance to agriculture and aquaculture</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Disturbance to economic activities</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Disturbance to human settlements</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Disturbance to residences and workplaces</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Adverse effects on human health</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Adverse effects on safety</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Impairment of aesthetics</td>
</tr>
</tbody>
</table>

Environmental Code of Conduct

Since the scale of rural access infrastructure development is not large, the ecological and environmental problems would be limited with the possibility of avoiding the damage, which otherwise would go beyond the control and affordability of that particular area. The issues can be best dealt during the planning phase of the development activity. The following is a list of...
environmental parameters, which has close links with social and cultural characteristics of the area, which require critical thinking while planning the rural access development. These procedures, if followed, would yield benefits for longer period in terms of financial and environmental sustainability.

Table 7: Environmental Code of Conduct for Rural Access Rural Road Development (Farm roads and power tiller roads)

<table>
<thead>
<tr>
<th>SN</th>
<th>Environmental Issue</th>
<th>Potential Impact</th>
<th>Codes of Conduct</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pre-construction/Construction Phase</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Land Use</td>
<td>Road alignment may pass through cultivated and forested land resulting in a permanent loss of the resources.</td>
<td>Plan road alignment to minimize loss of resources. Avoid width of road of more than 4.5 m in hilly area. Demarcate RoW to avoid encroachment.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>When the landowner has to part with his land, the environmental effects can amplify if proper operation and maintenance schedules are overruled.</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Material Use</td>
<td>Excessive extraction of local resources, such as wood, sand, soil, boulders, etc.</td>
<td>Extract materials only on need basis. Avoid sensitive areas, such as steep slopes and water-ways.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Degradation of forests, erosion and landslide at steep locales due to boulder, stone extraction.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Change in river/stream ecosystem due to unchecked sand extraction.</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Slope Stability</td>
<td>Extraction of forest products and cutting of trees in the steep slopes increases soil erosion/landslide due to loss of soil binding materials.</td>
<td>Extract carefully and secure the top soil within 25 cm from the surface. Limit down grading of the road to 50. If down grading exceeds 70, construction of side drainage is necessary. Keep optimum balance in extraction and filling of soil works. geo-hazardous assessment and mapping Use designated disposal site and avoid side casting of spoil Provide proper drainage Use bio-engineering on exposed slopes</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Wrong alignment can trigger slope failure</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Haphazard disposal of construction waste can disturb slopes</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Improper drainage facilities can result in erosion and landslides</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Wildlife</td>
<td>Wildlife habitats at forests, shrub land along road alignment are affected from the road construction activities. Wildlife and human conflicts increase as wildlife might destroy the crops or attack the construction worker.</td>
<td>Avoid as much as possible areas with high biodiversity. Efficient movement of machinery and other traffic. Control poaching activities and regulate movement of labour force and their dependents into the forest area. District Forest Office and its subsidiary body should be involved in monitoring the activities of the construction workers and officials to minimize wildlife harassing, trapping and poaching.</td>
</tr>
<tr>
<td>5</td>
<td>Drainage</td>
<td>Higher flow rate of surface water and water logging induce land slides, erosion. Quality of road diminishes due to poor drainage such as water logging, immense flow rate of surface water.</td>
<td>Cross drainage outlets must be channelled to the confirmed natural drains. If horizontal slope exceeds 5%, construction of flow control device necessary every 20m.</td>
</tr>
<tr>
<td>6</td>
<td>Protection of Vegetation</td>
<td>Protected areas and highly forested areas.</td>
<td>Use minimum and efficient use of wood products for construction. Initiate plantation at damaged and damage prone areas. Increase liability of local forest user groups. Avoid protected areas or densely forested areas.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Degradation of forest areas.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Degradation of agricultural land.</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Disposal of Construction Wastes</td>
<td>Dumping of wastes along the road or elsewhere.</td>
<td>Selected spoil dumping sites should be used. After disposal, the area should be levelled and compacted. Conserve the soil by planting indigenous plants including grasses. Wastes to be used as levelling materials along the roadside.</td>
</tr>
<tr>
<td>8</td>
<td>Disposal of Sanitary Wastes</td>
<td>Unmanaged sanitary waste disposal creating health problems and public nuisance.</td>
<td>Proper sanitation area needs to be demarked. Check for hygiene of work force.</td>
</tr>
<tr>
<td>9</td>
<td>Impacts on</td>
<td>Road crossings at water supply, irrigation lines</td>
<td>Avoid as much as possible the crossing over such</td>
</tr>
<tr>
<td>SN</td>
<td>Environmental Issue</td>
<td>Potential Impact</td>
<td>Codes of Conduct</td>
</tr>
<tr>
<td>----</td>
<td>---------------------</td>
<td>-----------------</td>
<td>------------------</td>
</tr>
<tr>
<td>10</td>
<td>Pollution</td>
<td>Dust generation from construction activities, construction vehicular movement increases air pollution. Noise pollution likely from construction machinery operation and vehicular movement. Sanitary problems likely at the construction and workforce quarters.</td>
<td>Possibly construction period should be during August to December when soil moisture content is most. Consider construction of road at 50 m from settlement. Enforce speed limit of vehicles and construct the road according to volume and size of traffic movement.</td>
</tr>
</tbody>
</table>

**Operation Phase**

<table>
<thead>
<tr>
<th>1</th>
<th>Encroachment</th>
<th>Unmanaged settlement, construction along the RoW.</th>
<th>Establish RoW properly and enforce its limits.</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>Interruption of Water Flow along RoW</td>
<td>Concentrated flow left unattended might have severe impact at the downhill alignment of the road.</td>
<td>Cross drain structures, namely pipe culverts, slab culverts, box culverts, need to be maintained. Outlet of these structures would be carrying the concentrated run off flow of the respective catchments, which will be quite high during rainy season, which in turn would require proper planning of drainage systems.</td>
</tr>
<tr>
<td>4</td>
<td>Aesthetics</td>
<td>Road construction is likely to increase landscape scars along the road alignment. In addition if the construction spoils are disposed off improperly, the ground vegetation would be destroyed which will be visible from a distance.</td>
<td>Such damage cannot be avoided but can be minimized through re-plantation of indigenous species and greenery development.</td>
</tr>
</tbody>
</table>
ENVIRONMENTAL MANAGEMENT FRAMEWORK

Description and Purpose

The Environmental Management Framework (EMF) outlines the framework for implementation of environmental management measures required to ensure that potential adverse environmental impacts from the project activities are eliminated, offset, or reduced to an acceptable level. The EMF has been built on existing national environmental management policies, legislations, regulations and guidelines, which are consistent with WB safeguard policies. The EMF will follow the all existing RGoB guidelines and legislation and only supplement to enhance environmental management under this project. It explains implementation responsibilities based on existing institutional mechanism and specifies training activities and other key actions required to enhance the implementation of environmental management measures.

Furthermore, due to the relatively new responsibility placed upon the MoA by the NEC to establish an environmental unit and process the field investigation, environmental clearance for the irrigation schemes and prepare the environmental clearance applications for farm roads and power tiller roads, the EMF focuses on building the capacity of the MoA and the dzongkag administration to take on the environmental management responsibilities.

The EMF is organized in four sections:

- **Initial environmental screening**: All proposed sub-projects will be screened based upon the negative list of activities to determine whether they should be funded under this project. If any activity is found to be on the negative list, it will not be included.

- **Environmental Assessment (EA) procedures**: The EA procedures are largely based upon the existing Bhutanese Government guidelines and enhanced in components such as community consultation and disclosure requirements to incorporate the safeguard guidelines of the World Bank;

- **Implementation Framework**: This section outline the roles and responsibilities of the different actors and agencies in implementing environmental screening and assessment; and

- **Environmental Management Plan (EMP)**: The EMP section outlines the contents of an EMP and provides guidance on how to prepare and ensure the effective implementation of the environmental management during the sub-project implementation.

**Initial screening**

Every sub-project proposal to be funded under the project will undergo an environmental and social screening process before it is selected for implementation. The screening process will establish the level of environmental and social assessment required, as well as help project officers to understand environmental and social issues.
related to the project before they are considered for implementation, and assist in the
decision making process. To the extent possible, environment and social screening will
be done together with technical and economic screening. All sub-projects that are
determined to have adverse and irreversible environmental impacts will not be included
in the project. Any sub-project that falls within the negative list below will not be
included under the project for funding.

**Negative List of Activities**

The following list of activities has been compiled based on the laws, regulations and
guidelines of the RGoB and the WB safeguard policies. These are the activities that will not be
supported under this project:

- Any construction activity that has not been issued environmental clearance in accordance
  with the requirements of the EAA and RECOP;

- Any construction activity that does not include environmental management measures and
  associated costs necessary to comply with the environmental terms and conditions specified
  in the environmental clearance issued by the DoA or NECS;

- Any activity inside the core zone of a protected area or inside/ nearby an area which is
  known to be a critical wildlife habitat (irrespective of whether or not inside a protected
  area). Critical wildlife habitats would essentially include habitats of globally threatened
  species as per the red list prepared by the IUCN and those that are listed as totally protected
  species in the FNCR (see **Annex 7**). The various zones of protected areas and critical
  wildlife habitat are stipulated by the NEC. ;

- Any construction of farm road, irrigation scheme or upgradation of existing mule track to
  power tiller road (if the upgradation entails major widening and/or realignment) inside a
  protected area if the proposed activity has not undergone a full EA;

- Any construction activity inside a Government Reserved Forest without written permit or
  authorization from the DOF in accordance with the requirements of the FNCR;

- Any activity that involves use of explosives and blasting without written authorization from
  all concerned agencies and technical guidelines for best and safe practices of blasting;

- Any activity that may cause pollution of a water source or watercourse;

- Any activity that involves cutting of trees or land clearance within 100 feet on either side of
  the banks or edge of the rivers, streams, water courses or water sources kept as riparian
  reserve for conservation;

- Any activity that involves land clearance on slopes greater than 45 degree;

- Any activity that involves the procurement and/or use of pesticides categorized as Class Ia,
  Ib and II as per WHO guidelines;

- Any activity that involves the procurement and/or use of pesticides that has not been
  authorized in accordance with the Pesticides Act of Bhutan 2000;

- Any activity that may adversely impact cultural property, including construction within 50
  m distance of any cultural property, without written authorization from the Ministry of
Environmental Assessment Procedures

5.3.1 Scope

The project is expected to have moderate to low environmental risks. As a whole, it can be identified as a Category B project based on WB classification for EA. The subcomponents that are likely to have adverse environmental impacts include farm roads, irrigation schemes, and upgradation of existing mule tracks to power tiller roads (if the upgradation entails major widening and realignment). Other subcomponents – construction of RNR Centers, construction of marketing infrastructure, and rehabilitation of existing irrigation schemes – are expected to have potentially low adverse environmental impacts. In general, basic EA (equivalent to Initial Environmental Examination) will be adequate for aforesaid activities. However, detailed EA (equivalent to Environmental Impact Assessment) will be necessary if:

- the proposed construction of farm road, irrigation scheme or upgradation of existing mule track to power tiller road (if such upgradation entails major widening and/or realignment) is sited inside, or goes through, a protected area or an area recognized as critical wildlife habitat (even if outside a protected area);

- the proposed construction activity is likely to have significant geologic hazard;

- the proposed construction activity is likely to have significant adverse impact on existing infrastructure;

- the basic EA suggests the need for a detailed EA.

5.3.2 EA Implementation Framework

The MoA will have the primary responsibility for implementation of the EMF in partnership with the NECS and Dzongkhag Administrations. Quality assurance of the environmental assessment process will be determined by periodic supervision by the NEC. The detailed responsibilities for implementation is provided in Annex 13. The following EA framework takes into account the requirements of the EAA and RECOP and the WB safeguard policies. It closely follows existing institutional procedures.

5.3.2.1 Preparatory

Field Investigation and Feasibility Study

Responsible Agency: Dzongkhag Administration
Conduct desktop study of the proposed site using topo map, geologic map and aerial photos if available and necessary. Carry out field survey to verify desktop study and to consult local public. During the field survey, apply participatory rural appraisal (PRA) tools, e.g. resource mapping, community alignment walk, and disaster timeline, to complement map studies in assessing the potential of adverse environmental impacts and locating areas with environmental risks. Also, collect other information necessary as per existing MoA guidelines and sectoral EA guidelines listed below:

**Farm roads:**

- EA Sectoral Guidelines for Highways and Roads (available with NECS);
- ECOP for Roads (available with the DoR; can also be downloaded from their website www.dor.gov.bt)
- MoA Farm Roads Construction Procedural Manual (available with Engineering Division, DoA). The above guidelines can be adaptively applied to power tiller roads.

- MoA Engineering Manual for Irrigation (available with Engineering Division, DoA)
Irrigation schemes:

- Procedural Manual for Irrigation Scheme Development (available with Engineering Division, DoA)
- Geotechnical Manual for Irrigation Scheme Development (available with Engineering Division, DoA)
Where necessary, expertise from outside the Dzongkhag Administration will be employed, e.g. Department of Geology and Mines for geologic hazard and risk assessment.

**Preparation of Environmental Information**

**Responsible Agency: Dzongkhag Administration**

Compile all the information collected from the field investigation and prepare environmental information as outlined in the RECOP, which requires that the following information is available at the minimum:

- The potential adverse effects of the project on the environment including direct, indirect and cumulative effects;
- How the project complies with relevant sectoral guidelines or codes of practices, if any, issued by the NECS or CA;
- How the impacts of the project will be avoided, minimized or reduced; and
- The environmental benefits of the project, including how the project will benefit concerned people and use clean and sustainable technologies.

Where sectoral EA guidelines exist, as is in the case of roads, the existing guidelines will apply. **Annex 5** details the information that has to be provided in the application for environmental clearance of roads.

Secure all necessary no objection certificates from affected agencies and submit them to the MoA along with the environmental information prepared for environmental clearance.

**5.3.2.2 Screening and Environmental Clearance**

**Responsible Agency: Ministry of Agriculture**

The MoA will screen the applications and do the following:

- Reject applications that pertain to activities that feature in the negative list of project activities;
- Assess if environmental information is adequate for a decision on environmental clearance. If inadequate, ask the Dzongkhag Administration for necessary additional information;
- Forward applications pertaining to farm roads, power tiller roads, RNR Centers and any other activities not listed in Annex 2 of RECOP to the NECS for review and decision on environmental clearance;
- Review applications for irrigation schemes and issue/ deny environmental clearance. Where the proposed irrigation scheme is located inside a protected area, forward the application to the NECS for processing of full EA;
Where environmental clearance is issued, clearly state the environmental terms and conditions that need to be complied with and copy the information to the NECS;

Where environmental clearance is denied, clearly state the reasons for denial of environmental clearance to the Dzongkhag Administration.

**Responsible Agency: NECS**

On receiving environmental clearance applications, the NECS will:

- Review and issue/ deny environmental clearance;
- Where environmental clearance is issued, clearly state the environmental terms and conditions that need to be complied with and copy the information to the NECS;
- Where environmental clearance is denied, clearly state the reasons for denial of environmental clearance to the Dzongkhag Administration;
- Determine if the proposed activity calls for a full EA.

**Further EA Work**

Where it is determined that a full-blown EA is necessary, e.g. a farm road or an irrigation scheme inside a protected area, the following procedures will apply:

- The NECS will ask the Dzongkhag Administration to draft the terms of reference for a full EA of the proposed activity.
- The NECS will review and approve the terms of reference for the full EA.
- Accordingly, the Dzongkhag Administration will carry out the full EA as per the approved terms of reference and submit an EA Report to the NECS with copy to the MoA.
- The NECS will review the EA Report and issue/ deny environmental clearance;
- Where environmental clearance is issued, the NECS will clearly state the environmental terms and conditions that need to be complied with and copy the information to the NECS;
- Where environmental clearance is denied, the NECS will clearly state the reasons for denial of environmental clearance to the Dzongkhag Administration with copy to the MoA.

**Disclosure of the Environmental Clearance**

The MoA or the NECS, who ever issues the environmental clearance, will disclose the information to the public in accordance with the EAA and RECOP. Only after the public disclosure requirement has been fulfilled, the environmental clearance will become effective.
When environmental impacts are determined, appropriate mitigation measures and enhancements will be included in the individual Environmental Management Plans (EMP) and implemented. The mitigation activities to be implemented will be mutually agreed upon in an MoU through a joint walk through of the construction site with representatives from dzongkhag, community representatives (if appropriate, the Water User’s association) and contractor.

The Dzongkhag Administration will fully inform the contractor (in the case of farm roads and RNR Centers) and the local community (in the case of irrigation schemes and power tiller roads) about the environmental terms and conditions specified in the environmental clearance. The Dzongkhag Administration will ensure that the environmental terms and conditions are incorporated in the contract (farm roads and RNR Centers) and letter of undertaking (irrigation schemes and power tiller roads).

**Compliance Monitoring**

Monitoring will be addressed during pre-construction, construction, and post-construction stages.

During the pre-construction stage, it will be required that the environmental information prepared for EC includes a monitoring plan. The monitoring plan should specify the environmental issues, baseline situation, indicators for monitoring, timing of monitoring, and person/ institution responsible for monitoring. Also during the pre-construction stage, verification will be done to ensure that the environmental terms and conditions are incorporated fully in the contract document (for construction activities to be carried out by private contractors) or in the letter of understanding (for construction activities to be carried out by the local communities).

At the time of the construction, compliance monitoring will be carried out as specified in 5.5.5. After the construction, an assessment of the implementation of the environmental terms and conditions will be conducted and the fulfillment of the terms and conditions will be used as one the criteria for issuing the certificate of satisfactory completion.

Periodic progress reports will be required to include information on the status of implementation of the environmental terms and conditions. Periodic and terminal project evaluations will also include assessment of the environmental management aspect.

In the case of farm roads and RNR Centers, the Dzongkhag Administration will assign the site engineer to monitor on a daily basis the implementation of environmental terms and conditions. In the case of irrigation schemes and power tiller roads, the Water Users’ Association or any local committee formed for the power tiller roads will assign a member from amongst them to monitor the implementation of the environmental terms and conditions on a daily basis. The monitoring will be checked against the EMP and MoU that was agreed upon and signed before the beginning of the construction works. The monitoring will be carried out using the Impact monitoring table presented in Annex 12 for various stages of construction. The consultative process for monitoring...
is presented in Table 7 below. The Dzongkhag Engineer and the Dzongkhag Agriculture Officer will carry out periodic site inspections, at least once in a month, to ensure that the environmental terms and conditions are being implemented as stipulated in the EMP and MoU. The MoA and NECS will carry out surprise spot checks as and when necessary.

An assessment of the fulfillment of environmental terms and conditions will be done at the end of the construction and the findings of the assessment will serve as a measure, along with other criteria, for issuance of certificate of satisfactory completion of work.

Table: 7 Consultation/Information Dissemination/Documentation Activity Supporting Monitoring and Evaluation of Sub-Project Implementation

<table>
<thead>
<tr>
<th>SN</th>
<th>Responsible Party</th>
<th>Activity</th>
<th>Date</th>
<th>Evidence of Participation</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>MoA</td>
<td>Dissemination of information regarding project type to the local community. Performing environmental and social screening.</td>
<td></td>
<td>Recording of date and duration of consultation.</td>
<td>Collection of letters from the local authorities regarding public consultation.</td>
</tr>
<tr>
<td>2</td>
<td>Chokpas &amp; GYT</td>
<td>Gathering of local people for their inputs. Ensuring awareness of people regarding the project.</td>
<td>Do.</td>
<td>Do.</td>
<td>Collection of letters from the local authorities regarding public consultation.</td>
</tr>
<tr>
<td>3</td>
<td>GYT, Chokpas &amp; DYT</td>
<td>Identification of major issues related to the project. Tripartite MoU</td>
<td>Do.</td>
<td>Do.</td>
<td>Recording of evidence of participation and communication by project officials.</td>
</tr>
<tr>
<td>4</td>
<td>DYT</td>
<td>Disclosing of beneficial and negative impacts to the local community due to implementation of the project.</td>
<td>Do.</td>
<td>Do.</td>
<td>Collection of minutes of discussion meetings regarding different aspects of project components.</td>
</tr>
<tr>
<td>5</td>
<td>GYT &amp; Chokpas</td>
<td>Clearly mention the areas of impacts. Identifying of communities under influence of the impacts.</td>
<td>Do.</td>
<td>Do.</td>
<td>Identification of participatory planning.</td>
</tr>
<tr>
<td>6</td>
<td>Local Communities</td>
<td>Participation in public hearings and enable community consultation.</td>
<td>Do.</td>
<td>Recording of evidence of participation and communication by project officials and community members.</td>
<td>Make sure that community members realize project impacts.</td>
</tr>
<tr>
<td>7</td>
<td>GYT Chokpas &amp; contractor</td>
<td>Dissemination of information regarding project design and its components.</td>
<td>Do.</td>
<td>Collection of minutes of discussion meetings regarding different aspects of project components.</td>
<td>Planning of monitoring activity (EMP) and other impact mitigation.</td>
</tr>
<tr>
<td>8</td>
<td>GYT &amp; DYT</td>
<td>Monitoring of labor, social service delivery and conflict resolution.</td>
<td>Do.</td>
<td>Do.</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>GYT, chokpas &amp; Local Communities</td>
<td>Keeping track of design components of the project.</td>
<td>Do.</td>
<td>Recording of evidence of participation and communication by project officials and community members.</td>
<td>Understanding of design components of the project.</td>
</tr>
<tr>
<td>10</td>
<td>Contractor</td>
<td>Providing necessary</td>
<td>Do.</td>
<td>Keeping records and</td>
<td>Providing relevant</td>
</tr>
</tbody>
</table>

DECENTRALIZED RURAL DEVELOPMENT PROJECT BHUTAN
Environmental Assessment Report and Environmental Management Framework
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<table>
<thead>
<tr>
<th>SN</th>
<th>Responsible Party</th>
<th>Activity</th>
<th>Date</th>
<th>Evidence of Participation</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>information to the authorities and community for approval procedures.</td>
<td></td>
<td>track of information provided and persons responsible for approval.</td>
<td>information.</td>
</tr>
<tr>
<td>11</td>
<td>GYT &amp; Chokpas</td>
<td>Understanding of project components and its impacts for approval recommendation.</td>
<td>Do.</td>
<td>Keeping records of information provided.</td>
<td>Impartial investigation of project components.</td>
</tr>
<tr>
<td>12</td>
<td>GYT, Chokpas &amp; Local Communities</td>
<td>Enabling and encouraging sense of public ownership of the project.</td>
<td>Do.</td>
<td>Keeping records and track of information provided and persons responsible for approval.</td>
<td>Monitoring of approval procedures.</td>
</tr>
</tbody>
</table>

**Project Construction**

| 13 | Contractor | Making sure that environmental damages are avoided or mitigated. Making sure that beneficial impacts are identified and enhanced. Keeping track of project indirect effects. Maintenance of project standards. | Recording of start and completion dates of each construction activity. | Recording of persons/contractors responsible for construction and implementation. | Monitoring implementation of all the project components. |
| 14 | GYT, Chokpas & Local Authorities | Monitoring of project activities. Resolution of conflicts. Monitoring of project affected people. Monitoring of project indirect effects. Maintenance of project standards. | Do. | Do. | Making sure that project components are not overlooked. |
| 15 | GYT, Chokpas & Local Communities | Understanding of project components being constructed. Making sure implementation of project standard. | Do. | Do. | Realization of project necessity and ownership. |

**Post-Construction**

| 16 | Contractor, chokpas & local communities | Observing maintenance and compliance norms. Preparation of monitoring reports. | Recording of monitoring start and completion dates. | Recording of names of persons/authorities/community members responsible for monitoring activities. | Also include dissemination of operation goal information and discrepancies, if any. |
| 17 | DYT, GYT & Chokpas | Assessment of project operation. Observing direct and indirect impacts of project in community livelihood. | Do. | Keeping track of responsible parties for operation of the project. | Recording of any discrepancies in the project implementation. |
| 18 | GYT, Chokpas & Local Communities | Taking interest and ownership of the project implemented. Enabling all community members to take benefits of the project. | Recording of dates of monitoring of project activities is based on MoU and EMP | Do. | Participation in monitoring activities. |

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**Potential Adverse Environmental Impacts and Mitigation Measures**

In the following tables, potential adverse environmental impacts are listed along with corresponding mitigation measures. It is necessary to note that the tables simply present an indicative list to illustrate examples of environmental impacts and mitigation measures that can be associated with the project subcomponents. To draw an accurate
and comprehensive list of environmental impacts and mitigation measures, site-specific field assessments will be carried out and environmental information will be prepared accordingly and in line with the requirements of the EIA, RECOP and sectoral EA guidelines where such guidelines exist.

Farm Roads (4.6 m wide with carriageway 3.5 m, drain 0.6 m and shoulder 0.5 m. Dirt track with stone sealing in difficult sections and drainage structures.)

<table>
<thead>
<tr>
<th>Activity</th>
<th>Potential Impacts</th>
<th>Mitigation Measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>Feasibility Study</td>
<td>Future temporary or permanent large scale slope failures</td>
<td>Desk study based on topo map, geologic map and aerial photos complemented with participatory rural appraisal (village resource map, natural disaster timeline) to identify and locate land slide risks; Involve a geotechnical expert in the multi-disciplinary feasibility study; Avoid slopes of more than 45 degree and areas with high water seepage.</td>
</tr>
<tr>
<td></td>
<td>Temporary or permanent disturbance to cultural sites, e.g. a lhakhang or Ney, and/or environmentally sensitive areas, e.g. in the core zone of a protected area or in/nearby a critical wildlife habitat whether or not inside a protected area.</td>
<td>Avoid road construction within 50 meters of any cultural sites and in environmentally sensitive areas.</td>
</tr>
<tr>
<td>Design</td>
<td>Massive soil erosion due to excessive water discharge</td>
<td>Plan proper drainage; Specify side drain water discharge at every available stream crossing; Specify erosion protection measures for all discharge structure locations.</td>
</tr>
<tr>
<td></td>
<td>Slope erosion and failures</td>
<td>Avoid too many zigs; Specify bioengineering and other low-cost slope stabilization measures.</td>
</tr>
<tr>
<td>Construction</td>
<td>Damage to vegetation</td>
<td>Keep felling of trees to the minimum and plant areas where vegetation has been damaged; Avoid downhill disposal of excavated material. Designate safe places for disposal of debris only in these designated places.</td>
</tr>
<tr>
<td></td>
<td>Slope erosion and failures</td>
<td>Carry out bioengineering on bare slopes and vulnerable areas.</td>
</tr>
<tr>
<td></td>
<td>Noise pollution disrupting wildlife and livestock</td>
<td>No blasting to be done in general. Where inevitable and authorized, low-impact blasting techniques to be strictly employed and that too during day time, e.g. between 10 am and 4 pm.</td>
</tr>
<tr>
<td></td>
<td>Sedimentation of surface water</td>
<td>Construct proper drainage.</td>
</tr>
<tr>
<td></td>
<td>Soil erosion, including creation of new gullies, due to runoff</td>
<td>Construct catch drains to tap excess water and drain off natural streams and gullies.</td>
</tr>
<tr>
<td>Operation and maintenance</td>
<td>Slope failure</td>
<td>Carry out supplementary bioengineering works; Protect from grazing.</td>
</tr>
<tr>
<td></td>
<td>Clogging of side drains</td>
<td>Carry out regular cleaning of debris from drains.</td>
</tr>
</tbody>
</table>
Landscape scarring
Rehabilitate scarred areas with planting of indigenous tree species and other greening works.

<table>
<thead>
<tr>
<th>Irrigation Schemes (new construction)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Activity</strong></td>
</tr>
<tr>
<td>Feasibility Study and Site Selection</td>
</tr>
<tr>
<td>Construction</td>
</tr>
<tr>
<td>Soil erosion</td>
</tr>
<tr>
<td>Slope destabilization</td>
</tr>
<tr>
<td>Operation and maintenance</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Sedimentation and blockage of canals</td>
</tr>
</tbody>
</table>

Power tiller tracks (upgradation of existing mule tracks) (2.5 m wide with carriageway 1.5 m and shoulder 0.5 m. Dirt roads.)
### Activity Potential Impacts Mitigation Measures

<table>
<thead>
<tr>
<th>Activity and Planning</th>
<th>Disturbance to culturally or environmentally sensitive sites</th>
<th>Avoid upgradation in areas within 50m distance of cultural sites and in the core zone of protected areas or in/nearby a critical wildlife habitat whether or not inside a protected area</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Slope erosion and failures</td>
<td>Identify vulnerable areas and specify bioengineering works. Avoid areas with high number of vulnerable areas. Avoid areas where the slope is more than 60 degree.</td>
</tr>
<tr>
<td>Widening</td>
<td>Damage to vegetation due to clearance</td>
<td>Clearance of vegetation should be limited, with minimal felling of trees. Slope cutting should be limited to use of low-impact tools/equipment.</td>
</tr>
<tr>
<td></td>
<td>Slope erosion</td>
<td>Carry out bioengineering works in vulnerable areas.</td>
</tr>
<tr>
<td>Operation and</td>
<td>Slope erosion</td>
<td>Carry out supplementary bioengineering works; Protect from grazing.</td>
</tr>
<tr>
<td>maintenance</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**RNR Centers**

<table>
<thead>
<tr>
<th>Activity</th>
<th>Potential Adverse Impacts</th>
<th>Mitigation Measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>Site Selection</td>
<td>Unstable ground conditions</td>
<td>Avoid areas with unstable features</td>
</tr>
<tr>
<td>Design</td>
<td>Incongruity with the surrounding landscape</td>
<td>Use local architectural features to the extent possible and design the physical features to gel with the surrounding landscape</td>
</tr>
<tr>
<td>Sanitation</td>
<td>Problems</td>
<td>Provide adequate sanitation facilities (septic tank, toilets, etc) in proportion to expected number of users</td>
</tr>
<tr>
<td>Construction</td>
<td>Sanitation problems and domestic waste generation</td>
<td>Construct temporary pit latrines for the workers; Construct pits for disposal of domestic materials.</td>
</tr>
<tr>
<td></td>
<td>Improper disposal of excavated material and</td>
<td>Identify safe places for disposal of excavated material and construction debris and dispose only in these places</td>
</tr>
<tr>
<td></td>
<td>construction debris</td>
<td></td>
</tr>
<tr>
<td>Post-</td>
<td>Scarred site</td>
<td>Rehabilitate areas that have been scarred during construction with planting of trees and flowers and other ornamental measures.</td>
</tr>
<tr>
<td>construction</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### 5.5 Environmental Management Plan

As part of the EA, each sub-project will require screening and, if required, preparation of an Environmental Management Plan (EMP) and MoU which will be agreed upon by each of the stakeholders – Community representatives (i.e. Water User Committee), Chiohg Geog and Dzongkhag representatives and the contractor. The implementation of the EMP and the MoU will be periodically monitored by the community and Geog/dzongkhag representatives.

A project's EMP consists of the set of mitigation, monitoring, and institutional measures to be taken during implementation and operation to eliminate adverse environmental and social impacts, offset them, or reduce them to acceptable levels. The plan also includes the actions needed to implement these measures.
A sample EMP template for subproject requiring a limited environmental assessment is attached in Annex 14.

To prepare a management plan, the RGoB and its EA design team (a) identify the set of responses to potentially adverse impacts; (b) determine requirements for ensuring that those responses are made effectively and in a timely manner; and (c) describe the means for meeting those requirements. More specifically, the EMP includes the following components.

**Identification of the potential environmental impacts**

The identification of environmental impacts should be site specific and as detailed as possible and will include additional information on environmental aspects particularly with regards to whether or not the proposed site is located inside a protected area, Government Reserved Forest, inside (or close by) a critical wildlife habitat, etc.

A group interview or exercise (e.g. PRA) to discuss environmental aspects, essentially including possible environmental risks and mitigation measures, will be part of the multi-disciplinary feasibility study. This will be an opportunity to capture local knowledge and perception on possible local environmental risks and solutions as well as an opportunity to stimulate environmental thinking among the local community early on during the process. Furthermore, information acquired from such interview can be useful to substantiate the rating of environmental impact(s) in the Multi-disciplinary Feasibility Report.

At the first pre-construction meeting when the role and responsibilities are discussed, there is also the need to identify environmental management duties and assign a focal point for it. The water guard may be an appropriate member to take up this function and, as the environmental focal point, his/her primary responsibility should be to ensure that the agreed terms and conditions, based on which environmental clearance was issued, are carried out during and after construction.

The letter of undertaking, which is reviewed at the first pre-construction meeting and finalized at the second pre-construction meeting, will need to incorporate a specific clause to ensure that the WUA addresses environmental management needs as agreed in the terms and conditions of the environmental clearance. An MoU signed by the GYT, community representative and contractor will stipulate the exact mitigation measures that have been agreed upon.

During the formulation of WUA Constitution and Bylaws, environmental management duties will need to be incorporated and terms and conditions based on which environmental clearance was issued will need to be annexed as a part of the bylaw.

**Mitigation**

The EMP identifies feasible and cost-effective measures that may reduce potentially significant adverse environmental impacts to acceptable levels. The plan
includes compensatory measures if mitigation measures are not feasible, cost-effective, or sufficient. The mitigation measures should include the type and amount of materials that will be used for every identified environmental impact.

**Monitoring**

Environmental monitoring during project implementation provides information about key environmental aspects of the project, particularly the environmental impacts of the project and the effectiveness of mitigation measures. Such information enables the RGoB and the Bank to evaluate the success of mitigation as part of project supervision, and allows corrective action to be taken when needed. Therefore, the EMP identifies monitoring objectives and specifies the type of monitoring, with linkages to the impacts assessed in the EA report and the mitigation measures described in the EMP.

Monitoring will include an assessment of the implementation of the terms and conditions, based on which environmental clearance was issued, and their effect on the performance of the irrigation scheme. If necessary, it should also recommend any additional environmental management work that needs to be carried out.

**Capacity Development and Training**

To support timely and effective implementation of environmental project components and mitigation measures, the EMP draws on the EA’s assessment of the existence, role, and capability of environmental units on site or at the geog, dzongkhag and Ministry levels. If necessary, the EMP recommends the establishment or expansion of such units, and the training of staff, to allow implementation of EA recommendations. Specifically, the EMP provides a specific description of institutional arrangements for carrying out the mitigation and monitoring measures. The training will also include modules on operation and maintenance.

**Implementation Schedule and Cost Estimates**

For all three aspects (mitigation, monitoring, and capacity development), the EMP provides (a) an implementation schedule for measures that must be carried out as part of the project, showing phasing and coordination with overall project implementation plans; and (b) the capital and recurrent cost estimates and sources of funds for implementing the EMP. These figures are also integrated into the total project cost tables.

**Integration of EMP with Project.**

The RGoB’s decision to proceed with a project, and the Bank’s decision to support it, are predicated in part on the expectation that the EMP will be executed effectively. Consequently, the Bank expects the plan to be specific in its description of the individual mitigation and monitoring measures and its assignment of institutional responsibilities, and it must be integrated into the project’s overall planning, design, budget, and implementation. Such integration is achieved by establishing the EMP within the project so that the plan will receive
funding and supervision along with the other components. The mitigation measure integration in the design phase will also help in strengthening the benefits and sustainability of the project.

**Mitigation Implementation**

The mitigation measures should be integrated into project design and tender documents. Using this approach, the mitigation measures will automatically become part of the project construction and operation phase. By including mitigation measures in the contract or in specific items in the Bill of Quantities, monitoring and supervision of mitigation implementation could be covered under the normal engineering supervision provisions of the contract.

**Project Contract**

The project contractor should be bound by the parameters identified in the environmental and social assessment pertaining to specific mitigation measures in the contract. The final acceptance of the completed works should not occur until the environmental clauses have been satisfactorily implemented. (Refer Annex 11 for examples of simple environmental clauses in contract specifications.)

**Bill of Quantities**

The tender instruction to bidders should explicitly mention the mitigation measure works to be performed. Such a definition would clearly exhibit the cost requirement to undertake mitigation measures, which otherwise might be lost as the bidders in an attempt to be more competitive may not include the price realistic enough to fund mitigation measures and other protection measures.

**Supervision and Monitoring**

The purpose of supervision is to make sure that specific mitigation parameters identified in the environmental and social assessment and as bound by the contract is satisfactorily implemented. Likewise, monitoring is necessary such that the mitigation measures are actually put into practice. Annex 12 provides detailed table for environmental and social impact monitoring that will be carried out throughout the project implementation period. A categorized mitigation measures, its implementation is given in the table below.

**Table 6. Mitigation Implementation**

<table>
<thead>
<tr>
<th>SN</th>
<th>Mitigation Activity</th>
<th>Implementation Responsibility Party</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Project Design</td>
</tr>
<tr>
<td>1</td>
<td>Slope stability</td>
<td>Specify bio-engineering and relevant techniques.</td>
</tr>
<tr>
<td>2</td>
<td>Spoil disposal</td>
<td>Identify mass balance techniques. Safe tipping areas identified and enforced. Design spoil traps.</td>
</tr>
</tbody>
</table>

---

DECENTRALIZED RURAL DEVELOPMENT PROJECT BHUTAN

Environmental Assessment Report and Environmental Management Framework

56
<table>
<thead>
<tr>
<th>SN</th>
<th>Mitigation Activity</th>
<th>Implementation Responsibility Party</th>
<th>Project Design</th>
<th>Contract</th>
<th>Bill of Quantity</th>
<th>Monitoring*</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>Land use</td>
<td>Do</td>
<td>-</td>
<td>Quantify actual land use pattern for construction and other activities. Public complaints.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Plants and wildlife</td>
<td>Do</td>
<td>Quantify restoration costs and present technical specifications.</td>
<td>Check for water ponding, formation of gullies, water turbidity. Check unauthorized quarrying activities.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Quarries and borrow pits</td>
<td>Do</td>
<td>Design safe discharge drainage and techniques (check dam) to natural water course.</td>
<td>Do Physical works for safe discharge drainage listed.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Stone crushing and asphalt plants</td>
<td>Do</td>
<td>Amount to be included in contractor's own expense.</td>
<td>Dust control equipment being utilized. Public complaints.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Hazardous materials</td>
<td>Do</td>
<td>Amount to be included in contractor's own expense through rate for supplying materials.</td>
<td>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.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Camp operation</td>
<td>Do</td>
<td>Latrine construction and effective waste disposal. Check disruption in water supply. Replantation, rehabilitation of site.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Dust and noise</td>
<td>Do</td>
<td>Specify buffer area requirements. Amount to be included in contractor's own expense through work camp item expense.</td>
<td>Air pollution control equipment. Dust deposition on crops and vegetation. Survival rate of plants. Public complaints.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Social issues</td>
<td>Do</td>
<td>-</td>
<td>Check issues pertaining to social concern.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### 5.6 EMF Implementation mechanism

The overall responsibility of EMF Implementation will lie with the MoA. The EMF Implementation schedule is provided in Annex 15. However, it will be assisted by all stakeholders i.e. NECS, Dzongkhag Administration/DEC and GYT in this task. The individual roles and responsibilities of these agencies for EMF implementation are described below.

#### 5.6.1 Geog Level

The primary responsibility for development and implementation of Environmental Management Plan (EMP)/MoU remains with the GYT. However, at this stage given the limited capacity of the GYT the DYT/Dzongkhag Administration vis-à-vis Dzongkhag Environmental Committee (DEC) will provide necessary technical support to the GYT to implement the EMP/MoU. Notwithstanding this shortcoming the GYT will have the following duties with regard to EMF implementation;
• Conduct public consultation on proposed sub-projects (including EA)
• Assist DEC on EA for sub-projects listed
• Submit EC application to NECS/DoA through DEC
• Supervise & Monitor EMP implementation

Project Identification is done based on the Geog plan which was developed through a participatory approach with extensive local inputs. During this process the local communities will prioritize activities according to their relative importance. The GYT will follow this plan and accordingly submit proposals to the DYT for approval. The advantage of this process is that it avoids the need for another public discussion on project identification.

After the DYT’s approval a technical team from the Dzongkhag Administration will assist the GYT in the Preliminary Investigation of the project. The GYT members comprising of chairman, assistant Gup, Choepens (village representatives) and Chimmi (People’s representative) will join the technical team and participate in the investigation. Among others the GYT members will help in project site selection and alignment of farm road, power tiller track and irrigation channels.

**Public Consultation**

Stakeholder consultation is necessary to obtain better insights, share information, understand different concerns, shed light on opportunities/ constraints and agree on appropriate responses, increase participation and to enhance coordination for common objectives or complementary actions. A beneficial outcome of consultation is increase in awareness and understanding among the concerned stakeholders.

Following Project Identification (based on the approved Geog Plans) and Preliminary Investigation but prior to the actual EA the GYT chairman will call for a public consultation (after prior notice) with the stakeholders on various aspects (including environmental) of the project. The GYT chairman will first explain to the stakeholders about the aims and objectives of the proposed project and sensitize them on their general roles and responsibilities in the project and the general benefits and impacts that it is likely to bring. The meeting will discuss on various issues of planning, design and implementation of the project including the EA. Decisions will be taken on how people who would be affected by the project will be compensated. The decisions made during the discussion will be recorded in the Minutes of the Meeting but the formal agreement will be made only during the Multidisciplinary Feasibility Study period when final decision on site selection/alignment of the project is made. Once the affected parties are identified the communities will sign a legal agreement on compensation as per Land Act 1979 or as per conditions agreed between the parties. The agreement will contain the mode of compensation to be made and its time frame within which it will be effected.

With regard to EA, the forum will identify in general the potential environmental impacts of the project and the mitigation measures that will be required. This will provide an opportunity to acquire local ideas on the mitigation measures that are would be simple and cost-effective. It will also discuss on how the mitigation measures will be implemented and monitored.
More importantly, the roles and responsibilities of the project beneficiaries and other stakeholders for the implementation of mitigation measures and the project in general will be identified. This will help ensure accountability and proper implementation of the EMP later.

Following the public consultation the GYT will conduct EA for projects that require EC. The EA will be carried out during Multi-disciplinary Feasibility Study for the project with Dzongkhag Administration/DEC’s support. If required private consultants will be hired to carry out the detail EA study. The GYT chairman and/or few representatives from the GYT will work with the DEC in carrying out the EA. During the EA the team will take stock of decisions made during the public consultation and wherever feasible, incorporate them into the EMP/MoU. Before the finalization of EMP the GYT will conduct another meeting with the project beneficiaries to inform them on the contents of the EMP and for their concurrence. The public will be explained on details of the mitigation measures proposed in the EMP/MoU and necessary amendments will be made during this meeting. A copy of the EMP/MoU will be retained at the GYT office for reference. After the completion of EA the GYT will submit the application to NECS/DoA through DEC for Environmental Clearance.

Upon receipt of EC the GYT will implement the project. The GYT will jointly supervise and monitor the implementation of EMP with the site engineer on a daily basis. A focal person will be appointed to person this duty. It will ensure that the User Group (irrigation and power tiller track)/Contractors implement the environmental measures as per the approved EMP/MoU and Bill of Quantities. In case of non-compliance the GYT will instruct the defaulter in writing to comply with the EMP/MoU and correct the lapses. A copy of this letter will be sent to the DEC and DoA/NECS. The GYT will send a monthly monitoring report to the DEC.

After completion of the project the GYT/focal person will jointly carry out assessment and evaluation of the project with the DEC and check if all the terms and conditions of the EMP/MoU have been fulfilled. If the terms and conditions verified by the DEC (or its focal person) have been fulfilled the GYT will issue the Satisfactory Completion Report. Otherwise it will sufficiently indicate to the User Group/Contractor the type and amount of works that have to be completed. Only when the remaining works are completed will the GYT issue the Satisfactory Completion Report. Should the Contractors/User Groups further fail to meet the terms then the GYT will report to the NECS/DoA for appropriate action.

Dzongkhag Level/DYT

The DYT is responsible for screening of project proposals from the Geogs. During screening the DYT among others will; check if the proposed project is in the approved Geog Plan; evaluate the project’s importance in relation to other proposals; and availability of funds. It retains the authority to approve administrative and technical sanction for projects worth Nu.2 million and under.

The Dzongkhag Environmental Committee (DEC) currently is being institutionalized to decentralize the EA functions. It has been given the authority to issue environmental clearance for small and simple projects within their respective Dzongkhag. However,
given their relatively bigger scale and which is beyond the DEC’s jurisdiction, EC for all sub-projects under the DRDP will be issued by the NECS/DoA.

Once a project is approved by the DYT, the GYT with the help of DEC will conduct the Preliminary Investigation followed by EA. In addition to assisting the GYT in conducting Preliminary Investigation and Multi-disciplinary Feasibility Study, the DYT vis-à-vis DEC will assist in carrying out EA and development of EMP. The DEC will forward EC application to the NECS/DoA. If the project requires a full blown EA the DEC will assist the GYT in developing the ToR for detailed EA and in carrying out the EA. For cases where DEC support cannot be provided private consultants will be hired to do the detail work.

The DEC will also have the responsibility of carrying out periodic monitoring of EMP. The frequency of monitoring visits will be EMP. The DEC will appoint a focal person to ensure physical compliance with environmental terms and conditions of EC. It will inform the GYT of any observations made in regard to non-compliance with EMP by User Groups/Contractors during the monitoring visits. The Dzongkhag site engineer along with the GYT will also compliment the DEC on supervision and monitoring EMP implementation.

The DEC shall submit monitoring reports to the NECS/DoA in every two (2) months during the project implementation period. It will also submit Compliance Report to the DoA/NECS at the end of project completion if the terms and conditions have been met.

Central Level (NECS/MoA)

MoA (DoA/EU)

The overall responsibility of EMF for the DRDP lies with the MoA. The establishment of Environmental Unit (EU) (Annex shows the draft ToR for EU) within the MoA is currently underway. Once established it will oversee EMF management for the ministry. Until the EU is fully established the DoA will carry out the environmental management functions for farm roads, power tiller track and irrigation projects. It will review EC applications for all sub-projects and as Competent Authority it will be responsible for issuance/denial of EC for irrigation projects. EC applications for all other sub-projects will be forwarded to the NECS.

In its review of EC applications the DoA/EU will check conformity of proposed projects with the Geog and Dzongkhag plans. Administrative and technical approvals are some of the prerequisite for obtaining Environmental Clearance. It will see if the EA has followed relevant sectoral guidelines e.g. DoR guidelines for road construction, DoA guidelines for irrigation etc. The review will also check for following information in the EA report.

- NOC from affected parties (e.g. DOF, DoE, DoR, MoHCA, private landholders etc.)
- Compensation arrangements for affected individuals (Letter of Undertaking)
- Predicted/assessed Impacts
- Proposed Mitigation Measures
- Time schedule for Environmental Management Plan
- Monitoring Plan
The DoA/EU will issue EC for irrigation projects if all the EA report has fulfilled the above requirements. If the EA report is incomplete it will seek additional information from the Dzongkhag before issuing the EC. For other sub-projects the DoA/EU will review the EC applications and if information provided are adequate the applications will be forwarded to the NECS.

Besides review and issuance of EC the DoA/EU will carry out periodic monitoring of sub-projects. It will conduct spot checks to the project site to ensure physical compliance with environmental terms and conditions and review Compliance Report submitted by the DEC. For irrigation projects it will enforce the environmental terms and conditions and levy fines from defaulter. It will advise the project proponent to comply with the environmental terms and if they are still not met the EC will be revoked/suspended.

The DoA/EU will also review the DEC/GYT monitoring reports and conduct site visits if it deems necessary. Monitoring visits will be made in every two months during the implementation period. It will conduct a final visit towards the end of the project. If environmental terms are not met it will issue a notice to proponent to implement the necessary measures.

NECS

NECS is the apex body responsible for overall management of environment in the country. For the DRDP project it will review EC applications and sanction EC for all sub-projects beside irrigation projects. While reviewing EC applications for farm roads and power tiller tracks the NECS will use the same procedures as used by DoA for irrigation projects. It will review applications forwarded by DoA and where information provided are insufficient it will inform the DEC/GYT with clear indication of the additional information to be provided. If the NECS decides that a full blown EA is required for a project DEC/GYT will be informed about it with an instruction to submit the ToR for the detailed EA. NECS will review and approve the ToR. The EC will be issued based on the approved ToR for EA.

NECS will conduct periodic spot checks (every two months) to the project site and determine whether environmental terms and conditions are being met or not. It will levy fines from defaulters as per RECOP and revoke/suspend EC if the proponent repeatedly fails to meet the requirements. It will also review the Compliance Report submitted by DEC/GYT and verify it with field visits as deemed necessary.

Grievance Redressal System

Often the conditions laid out in the Agreement on Compensation for affected individuals/groups are not fulfilled. To mitigate such problems the Agreement on Compensation shall contain provisions/procedures for the affected parties to pursue for fulfillment of the agreement by the other party. The affected party will submit a formal complaint to the Tshogpa of the Chiogh on the issue and if it cannot be resolved within their jurisdiction, it will be submitted to the GYT chairman. The GYT will review the complaint against the terms and conditions of the agreement and call a public hearing. During the hearing it will review the agreement and instruct the party at fault to honour the agreement. However, if the party still fails to fulfill the agreement the affected party
will file a complaint to the Dzongkhag Administration for intervention. The Dzongkhag Administration will try to solve the problem amicably. It shall warn the defaulters of legal prosecution if they fail to compensate the affected party. Further non-compliance will result in filing a suit to the Dzongkhag Court, which will settle the case as per existing laws and based on the agreement signed.
GYT requests Dzongkhag Administration for its support on Project Feasibility Study & EA

Dzongkhag Administration fields a Multi-disciplinary team (DAO, DFEO, DE, DLO, DEC focal person) for field investigation and collection of environmental information

DEC/focal person prepares environmental report and EC application to DoA/EU, along with No Objection Certificates (NOCs) from affected parties

GYT representatives participate in the study

NOCs secured from affected parties (e.g. DFS, DoE, DoR, MoHCA and private landholders)

GYT conducts public consultation on the proposed project and EA

Department of Agriculture (DoA) receives and screens EA applications

If environmental information is inadequate, additional information is sought from the Dzongkhag Administration (DEC)

DoA reviews and issues EC for irrigation projects

DoA reviews and denies EC for irrigation projects

DoA forwards EC applications pertaining to farm roads, upgradation of existing mule tracks to power tiller tracks, and any other activities not listed in Annex II of RECOP to the NECS

DoA reviews and issues EC

DoA reviews and denies EC

Monitoring and Reporting
(Dzongkhag Administration/DEC appoints a focal person to ensure physical compliance with environmental terms and conditions; GYT and Site Engineer will provide daily supervision; DEC will submit Compliance Report to DoA/NECS annually; DoA/NECS will conduct regular monitoring visits.

Public Disclosure of EC

NECS reviews and issues EC

NECS reviews and denies EC

NECS reviews the full EA Report

NECS issues EC

NECS denies EC

NECS reviews and determines the need for full EA

NECS approves the ToR for full EA

Dzongkhag Administration (DEC) conducts full EA as per approved ToR and submits the EA report to the NECS

Dzongkhag Administration (DEC) drafts and submits ToR for full EA to the NECS

Dzongkhag Administration (DEC) conducts full EA as per approved ToR and submits the EA report to the NECS

Monitoring and Reporting
(Dzongkhag Administration/DEC appoints a focal person to ensure physical compliance with environmental terms and conditions; GYT and Site Engineer will provide daily supervision; DEC will submit Compliance Report to DoA/NECS annually; DoA/NECS will conduct regular monitoring visits.

Public Disclosure of EC

NECS reviews and issues EC

NECS reviews and denies EC

NECS reviews the full EA Report

NECS issues EC

NECS denies EC

NECS reviews and determines the need for full EA

NECS approves the ToR for full EA

Dzongkhag Administration (DEC) conducts full EA as per approved ToR and submits the EA report to the NECS

Dzongkhag Administration (DEC) drafts and submits ToR for full EA to the NECS

Monitoring and Reporting
(Dzongkhag Administration/DEC appoints a focal person to ensure physical compliance with environmental terms and conditions; GYT and Site Engineer will provide daily supervision; DEC will submit Compliance Report to DoA/NECS annually; DoA/NECS will conduct regular monitoring visits.

Public Disclosure of EC

NECS reviews and issues EC

NECS reviews and denies EC

NECS reviews the full EA Report

NECS issues EC

NECS denies EC

NECS reviews and determines the need for full EA

NECS approves the ToR for full EA

Dzongkhag Administration (DEC) conducts full EA as per approved ToR and submits the EA report to the NECS

Dzongkhag Administration (DEC) drafts and submits ToR for full EA to the NECS

Monitoring and Reporting
(Dzongkhag Administration/DEC appoints a focal person to ensure physical compliance with environmental terms and conditions; GYT and Site Engineer will provide daily supervision; DEC will submit Compliance Report to DoA/NECS annually; DoA/NECS will conduct regular monitoring visits.

Public Disclosure of EC

NECS reviews and issues EC

NECS reviews and denies EC

NECS reviews the full EA Report

NECS issues EC

NECS denies EC

NECS reviews and determines the need for full EA

NECS approves the ToR for full EA

Dzongkhag Administration (DEC) conducts full EA as per approved ToR and submits the EA report to the NECS

Dzongkhag Administration (DEC) drafts and submits ToR for full EA to the NECS
5.7 Capacity Building

The biggest impediment to EA implementation is the lack of training and experience at various levels from central line agencies to the dzongkhag and geog levels. The following areas have been identified for training. The responsibility of organizing the trainings rests on the MoA with assistance from NEC.

The MoA and the newly established Environmental Unit, will, before the implementation of the works (1) finalize the necessary guidelines for, farm and tiller
road construction and the construction of RNRs; (2) establish the mechanism to conduct
the required environmental assessment and process the EIA documents; (3) conduct the
environmental management training; and (4) set up a monitoring and supervision
system for environmental management in the MoA.

The environmental management training will include the following programs:

**Area of Training** | **Target Audience**
--- | ---
Awareness workshops on environmental management essentially covering:
the concept and rationale of EA;
detailed EA procedural and informational requirements as per the
EAA and RECOP, general concept of environmental management and application of IPM
Training workshop on field techniques for environmental assessment, preparation of environmental information,
environmental management and application of IPM
Training workshop on geologic hazard and risk assessment,
including the use of existing geotechnical manual for irrigation scheme development
Training workshop on ECOP for roads and sectoral EA guidelines for highways and roads
Training on implementation of mitigation measures

MoA agency charged with environmental clearance, Dzongdags, relevant Dzongkhag Sectoral Heads, DYT members, GYT members, and contractors.

Relevant Dzongkhag Sectoral Heads or the DEC members (where DECs have been formed)

DEs – 3 from each dzongkhag

DEs – 3 from each dzongkhag and contractors

Contractors (for farm roads and RNR Centers) and local communities (for irrigation schemes, farm roads and power tiller tracks)

The following plan outlines the approximate number of participants, duration and resource agencies that could provide the training:

<table>
<thead>
<tr>
<th>Activity</th>
<th>Approximate No. of Participants</th>
<th>Duration</th>
<th>Resource Agency(ies)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Environmental Management workshop for MoA</td>
<td>10</td>
<td>1 day</td>
<td>NECS</td>
</tr>
<tr>
<td>Environmental management workshop for Chhukha and Wangduephodrang dzongkhags</td>
<td>45</td>
<td>1 day</td>
<td>NECS and MoA</td>
</tr>
<tr>
<td>Environmental management workshop for Dagana and Tsirang dzongkhags</td>
<td>45</td>
<td>1 day</td>
<td>NECS and MoA</td>
</tr>
<tr>
<td>Environmental management workshop for Trongsa and Zhemgang dzongkhags</td>
<td>45</td>
<td>1 day</td>
<td>NECS and MoA</td>
</tr>
<tr>
<td>Training workshop on field techniques for environmental assessment, preparation of environmental information, environmental management and application of IPM</td>
<td>36</td>
<td>3 days</td>
<td>NECS and MoA</td>
</tr>
<tr>
<td>Training workshop on geologic hazard and risk assessment</td>
<td>20</td>
<td>4 days</td>
<td>DGM and Engineering Division/ DoA</td>
</tr>
<tr>
<td>Training workshop on ECOP for roads and sectoral EA guidelines for roads and highways</td>
<td>30</td>
<td>4 days</td>
<td>DoR and NECS</td>
</tr>
<tr>
<td>Contractors’ training on implementation of mitigation measures</td>
<td>30</td>
<td>2 days</td>
<td>DoR, DoF, DoA</td>
</tr>
<tr>
<td>Community training on implementation of mitigation measures in Chhukha and</td>
<td>40</td>
<td>2 days</td>
<td>DoR, DoF, DoA</td>
</tr>
</tbody>
</table>
Altogether, the implementation of the training is estimated to cost for one year training program is Nu. 1.76 million (Total over the entire project period: Nu. 3.52). Training activity-wise breakdown is as given below:

<table>
<thead>
<tr>
<th>Activity</th>
<th>Cost in Nu.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Environmental management workshop for MoA</td>
<td>20,000</td>
</tr>
<tr>
<td>Environmental management workshop for Chhukha and Wangduephodrang dzongkhags</td>
<td>150,000</td>
</tr>
<tr>
<td>Environmental management workshop for Dagana and Tsirang dzongkhags</td>
<td>150,000</td>
</tr>
<tr>
<td>Environmental management workshop for Trongsa and Zhemgang dzongkhags</td>
<td>150,000</td>
</tr>
<tr>
<td>Training workshop on field techniques for environmental assessment and preparation of environmental information</td>
<td>240,000</td>
</tr>
<tr>
<td>Training workshop on geologic hazard and risk assessment</td>
<td>180,000</td>
</tr>
<tr>
<td>Training workshop on ECOP for roads and sectoral EA guidelines for roads and highways</td>
<td>220,000</td>
</tr>
<tr>
<td>Contractors’ training on implementation of mitigation measures</td>
<td>140,000</td>
</tr>
<tr>
<td>Community training on implementation of mitigation measures in Chhukha and Wangduephodrang dzongkhags</td>
<td>170,000</td>
</tr>
<tr>
<td>Community training on implementation of mitigation measures in Dagana and Tsirang dzongkhags</td>
<td>170,000</td>
</tr>
<tr>
<td>Community training on implementation of mitigation measures in Trongsa and Zhemgang dzongkhags</td>
<td>170,000</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>1,760,000</strong></td>
</tr>
</tbody>
</table>

5.9 Incorporation of Environmental Management Costs in Budget Estimates

It became evident from field consultations that more often than not it was not possible for contractors/ local communities to implement the environmental management measures as no budgetary provision is made to cover the extra costs involved in carrying out environment management works.

Under the ongoing Rural Access Project implemented by the DoR with financing from the World Bank and technical assistance from the Netherlands Development Organization (SNV), preliminary comparative investment analysis shows that environment friendly road construction costs about 35 per cent more than conventional road construction but this additional cost can be recovered by the eighth year of the road operation due to low maintenance cost. This figure being for feeder roads can not be
directly applied to farm roads as the latter is characteristically less expensive and more rudimentary. As such, it may not be realistic to apply the same proportion of environmental management cost as that of feeder roads. However, given the need to proactively include costs for implementing environmental management works in farm road construction, at least 25 per cent additional cost will have to be built into the cost estimate to enable environment-friendly farm road construction. Similarly, additional cost for environmental management will need to be built into the cost estimates for irrigation schemes and power tiller roads. RNR Centers are expected to entail very low environmental management costs.

The additional 25% cost is included in the overall project budget for farm roads. The project has kept provision for cost of EIA studies which cannot be taken up by DEC/DoA/EU. The provision is kept only for hiring and payment to consultants for complete EIA works. Annex 16 provides the details of this.
References/ Documents Reviewed

Documents


**Websites**

[www.dor.gov.bt](http://www.dor.gov.bt) - website of the Department of Roads, RGoB

[www.nec.gov.bt](http://www.nec.gov.bt) - website of the National Environment Commission Secretariat, RGoB

[www.pcs.gov.bt](http://www.pcs.gov.bt) - website of the Department of Planning (formerly Planning Commission Secretariat), RGoB

[www.redlist.org](http://www.redlist.org) – website of red list of threatened species of animals produced by the World Conservation Union

ANNEX 1
List of People Met

At Thimphu

Ministry of Agriculture
Lyonpo Sangay Ngedup, Honourable Minister*
Dasho Sangay Thinley, Honourable Secretary*
Mr. Sangay, Policy and Planning Division, Ministry of Agriculture
Mr. Karma Tenzin, Policy and Planning Division
Mr. Ugyen Tshewang, Engineering Division, Department of Agriculture
Ms. Chimi P. Wangdi, Deputy Secretary, Policy and Planning Division
Mr. Kaylzang Tshering, Superintending Engineer, DoA
Mr. Karma Tshethar, Assistant Engineer, Irrigation Schemes, DoA
Mr. Chencho Norbu, Programme Director, National Soil Center
Dr. Sangay Wangchuck, Joint Director, Nature Conservation Division
Dr. Thinley Dorji, Programme Director, National Plant Protection Center
Mr. Chencho Dorji, Entomologist, NPPC
Mr. Doe Doe, Plant Pathologist/ IPM Specialist, NPPC
Mr. Karma Nidup, Vertebrate Pest and Weed Specialist, NPPC
Ms. Namgay Om, Plant Pathologist, NPPC

Ministry of Finance
Aum Yanki T. Wangchuk, Secretary*
Mr. Nima Wangdi, Director, Department of Aid and Debt Management*
Mr. Ugyen Norbu, Programme Officer, Department of Aid and Debt Management*

* Met as a part of the WB Preparation Mission (25th March – 7th April 2004)

Department of Roads, Ministry of Works and Human Settlements
Mr. Hendrik Visser, EFRC Specialist, Rural Access Project
Mr. KD Chamling, Environmental Specialist, Rural Access Project
Mr. SN Rai, Rural Access Project
Mr. Yeshey Nidup, Assistant Project Manager, Rural Access Project

Department of Geology and Mines, Ministry of Trade and Industry
Mr. Dorji Wangda, Director

National Environment Commission Secretariat
Mr. Karma C. Nyedrup, Head, EA Section
Mr. Tenzin Khorlo, EA Officer
Mr. Yeshey Penjor, EA Officer
Field Consultations

Tsirang Dzongkhag
Dzongdag
Dzongkhag sectoral heads
GYT members

Zhemgang Dzongkhag
Dzongdag
Dzongkhag sectoral heads
GYT members of Nangkhor geog
GYT members of Trong geog

Chhukha Dzongkhag
Dzongkhag Agriculture Officer
Dzongkhag Engineer
GYT members of Bjapchho geog

Wangduephodrang Dzongkhag
Dzongdag
Dzongkhag Agriculture Officer
Dzongkhag Engineer
Dzongkhag Assistant Engineer
Dzongkhag Junior Engineers
RNR Agriculture Extension Agent, Ruepesa geog
RNR Agriculture Extension Agent, Thetsho geog
RNR Agriculture Extension Agent, Athang geog
Local villagers of Rinchegang village
Nisho Geog GYT members
Samtengang village member
Annex 2: Summary of Field Consultations

Summary of Field Consultations

Trip to Tsirang, 31 March 2004

Traveled to Tsirang together with the visiting WB Mission, represented by Daniel Sullen (team leader) and Ghazali Raheem (M&E International Consultant), MoA officials, Sangay and Karma Tenzin, and Saroj Nepal, Social Assessment Specialist (local consultant). Reached Tsirang at around 12 noon, after 4 and a half hours’ drive.

Meeting with Dasho Dzongdag of Tsirang, dzongkhag sectoral officers (planning officer, agriculture office, animal husbandry officer, forestry officer) and a few gups (heads of geogs/blocks), at the Dzongkhag Meeting Hall. It focused on introduction of the DRDP and on financial and monitoring and evaluation aspects. With regards to environmental assessment, the dzongkhag officials informed that formation of a Dzongkhag Environment Committee is underway in discussion with the National Environment Commission. They, however, expressed lack of awareness and capacity for environmental assessment at the dzongkhag level. The gups informed that they had attended environmental awareness workshops organized by the National Environment Commission and that these workshops were useful in terms of raising their general awareness on various environmental issues, policies, laws and regulations. It was emphasized that presently at the local level environmental management was largely confined to some community and private forestry activities.

Returned to Thimphu after the meeting.

Trip to Zhemgang, 1 – 4 April 2004

On day 1, traveled to Tsirang together with the visiting WB Mission, represented by Ghazali Raheem, Ministry of Agriculture officials, Sangay, Karma Tenzin, and Ugyen Tshewang, and Saroj Nepal, Social Assessment Specialist. Reached Zhemgang at around 6 p.m. after 10 hours’ drive.

On day 2, in the morning, had meetings with Dasho Dzongdag of Zhemgang, dzongkhag agriculture officer, dzongkhag animal husbandry officer, dzongkhag forestry officer, and dzongkhag engineer. The meetings, as in Tsirang, focused on introduction of the DRDP and on financial and monitoring and evaluation aspects. In terms of environmental assessment, the Zhemgang Dzongkhag Administration has formed a Dzongkhag Environmental Committee (DEC) but the composition and terms of reference is under discussion with the National Environment Commission. The dzongkhag officials expressed the need for regional environmental officer, who can more readily provide technical guidance and support to the DECs once these are fully established. In addition, the dzongkhag officials expressed the need for intensive course in environmental assessment and monitoring for the focal points of DECs and basic training for other members. Currently, environmental clearance applications for farm roads are prepared by the dzongkhag agriculture officer with support from the dzongkhag engineer and clearance from the divisional forest officer. Environmental clearance, however, took considerable time since final clearance has to come all the way from the National Environment Commission, frequently involving field verification by NEC officials. The dzongkhag officials suggested the need for an expedited process.
After the meeting with dzongkhag officials, we drove to Tali village and met the GYT members there. The GYT members informed that in terms of environmental management, activities at the geog level were limited to community and private forestry. During instances of natural disasters (such as landslides), the tshogpas (village heads) mobilize help from all individual households for labour and obtain logistical assistance from the Dzongkhag Administration. In terms of environmental assessment, GYT members were involved as key informants during public consultations. Although there was no farm road to visit in the site, the Dakpai-Buli feeder road that we drove through showed no visible negative environmental impact.

On day 3, the intent was to visit the local community in Zurphey village but returned halfway due to rain and slippery trail. Instead we returned to the road head and drove to Praling to see a farm road which is under construction. Slope stability was observed to be a major concern as the farm road, as is the general case, was rudimentary in terms of soil stabilization works which in turn is because of the budgetary limitations associated with farm roads. The GYT members accompanying us informed that while they were aware about some of the provisions related to environmental management in the GYT Chathrim 2002, they were unable to implement them due to lack of capacity and experience. Illiteracy was also cited as an impediment for the GYT member to understand the GYT provisions.

On day 4, returned to Thimphu.

**Trip to Tshimazam, Chhukha, 15 May 2004**

Traveled to Chhukha, together with Yuka Makino, WB Natural Resource Management Specialist, Afshan Khawaja, WB Social Scientist, Saroj Nepal, Social Assessment Specialist, and Karma Tenzin, MoA Planning Officer. Reached Tshimazam at about 11.30 a.m., after nearly 3 hours’ drive.

Meeting with dzongkhag agriculture officer and dzongkhag engineer at the Chhukha Dzongkhag Administration office. There was good awareness of, and commitment to, the environmental assessment process as the dzongkhag officials had to go through a relatively vigorous environmental process for a farm road as it was located above the tunnel of the Chhukha Hydropower Plant and posed geotechnical risks. A detailed geotechnical survey was carried out by the Department of Geology and Mines and the road was realigned in sections which were located in geologically vulnerable areas. Documents related to environmental assessment, which were exchanged between Dzongkhag Administration and NEC, reflected that there was fairly good awareness of, and commitment to, the EA process at the dzongkhag level. The EA process, however, took considerable time. In the case of Bjapchho farm road, about a year and a half was involved but this was also due to the fact that it involved detailed geotechnical survey because of its location above the tunnel of Chhukha Hydropower Plant.

The dzongkhag agriculture officer explained that use of pesticides was limited not only due to controlled, centralized distribution system but also very much due to the religious sentiment (the Buddhist belief that taking of any form of life is a grave sin and that we should have compassion for all forms of life) of the farmers. Many farmers refrained from using pesticides even during severe pest attacks.

In the afternoon, met community members of Bjapchho geog. They informed that construction of farm roads and irrigation channels are based on their request. Community requests for infrastructure development are discussed at the GYT meetings and then forwarded to the DYT for review and approval. Once such requests are approved, the MoA (in the case of farm roads and irrigation schemes) conducts consultation meetings with the beneficiaries and feasibility
studies in the field. No objection certificate from the GYT is mandatory to certify completion of, and community satisfaction with, construction work.

After the community meeting, visited the Bjapchho farm road (under construction) and Bjapchho RNR Center (also under construction). Downhill disposal of debris was observed in a section of the farm road. The site engineer suggested that this was due to lack of awareness among the road workers.

Returned to Thimphu.

**Trip to Wangduephodrang, 21-22 May 2004**

Traveled to Wangduephodrang. Reached at 10.30 a.m. after about two and a half hours’ drive.

Met Dasho Dzongdag, dzongkhag agriculture officer and assistant engineer. Gave them the background of the DRDP and the objective of my trip. The dzongkhag officials informed that the environmental assessment process is not yet very clear at the dzongkhag level as the concept and process were only recently launched. Although the NEC has been conducting environmental workshops for local authorities, there was still need for environmental assessment sensitization and training for a wide range of stakeholders at the local level, such as the dzongkhag officials, DYT members, GYT members, water users’ associations as well as private contractors. A major problem in environmental management of infrastructure development, such as farm roads and irrigation schemes, was that environmental management costs are not discussed during preliminary consultations with local communities and not taken into account during budgeting. The dzongkhag officials felt the need to institutionalize a proactive system to integrate environmental management costs in budget and incorporate environmental terms and conditions in contracts.

In the afternoon, accompanied by the assistant engineer, drove to Rinchengang to see the irrigation scheme and meet the members of water users’ association there. The water users’ association informed that their irrigation scheme was not subjected to environmental assessment as the irrigation scheme was established long ago while the environmental assessment requirement is recent. They informed that they were fully responsible for maintenance of the irrigation scheme, including protection against landslides, clearing of sediments and surrounding debris, and minor masonry work. However, when major maintenance work is required, request is submitted for government assistance through GYT and DYT. With the construction of the Nahi feeder road, which traverses the irrigation channel at a number of places, maintenance need has increased especially to keep the intersection points clear of debris. A small community fund was established for carrying out minor maintenance work. However, they have not been able to manage the fund properly due to lack of capacity for accounting work. They are kept informed of new laws and regulations by the chimi (local community representative at the National Assembly) and GYT members.

Overnighted at Wulakha as it was late and the weather had turned bad (heavy rain and misty) for traveling.

Next day, returned to Thimphu in the morning.
Field trip to Samteygang (Nisho Geog/Wangdue Dzongkhag) on 23 October 2004

Yuka Makino, Natural Resources Management Specialist from the World Bank, Kaylzang Tshering, Supt. Engineer (DOA), and Karma Tenzin from the PPD, MOA traveled from Thimphu at 8:00 a.m. and reached Wangdue by 11:00 a.m. Pema Dorji, DAO, Kinga Dorji, DE and Akey Dorji, DFO/Environment Focal Person from Wangdue Dzongkhag joined the team and traveled to Samteygang and reached there at 1:00 p.m.

Meeting with Nisho GYT members including the Gup (GYT Chairman), Phub Dorji, Deputy Gup/Mangap, Tshering, Tshogpa of Gaylekha, Kinlay Wangchuk and the Agri. Extension Officer, Chogyes at the Gup’s Office along with the sector heads from the Dzongkhag.

The DAO explained the purpose of the mission’s visit and thanked the Gup for seeing the team at a short notice. Yuka provided an overview of the World Bank and a brief explanation on DRD project and the importance of environmental clearance for finalizing the negotiation process. The consultation with GYT members was geared towards finding out more about 1) environmental issues that the GYT members have come across so far 2) who and how do GYT monitor environmental impacts due to rural infrastructure development 3) whether there is a grievance redressal system, how do GYT solve problems in the community and 4) suggestions from the GYT members on possible ways they can best manage the environmental issues of the project.

The GYT members informed that under Nisho Geog, there has been no RNR construction and no new irrigation schemes developed in the 9th FYP. The farm road from Samteygang to Gaylekha (2 km) is the only construction activity, which is ongoing and that the community have not experienced any major environmental issues so far. The GYT members explained that for the farm road, the community of Gaylekha expressed the need for the road, which was put up in the GYT and approved. An undertaking from the community was obtained by the GYT, agreeing that in case the alignment of the road passes through private land, it will be voluntarily contributed. The GYT along with the community identified the alignment and requested the Dzongkhag to carry out technical feasibility. Once the technical feasibility was carried out, forest/environmental clearances were processed. In this particular case, NEC changed the alignment to the present alignment as the initial one passed by a sacred site and a lake. Once all the clearances are obtained, tenders were called and the work was awarded to a private contractor.

On the issue of monitoring, the GYT members informed the team that the Dzongkhag Agriculture Officer supervises the actual construction along with the Dzongkhag Engineer. When they cannot visit, the Agriculture Extension Officer visits the site regularly. Apart from that, the Dzongkhag Forest Officer and the staff from the Range/Beat Office, visits the site to see if the contractor has felled any unmarked trees. The team was also told that the GYT has appointed community Forest Protectors, who are mandated to monitor these construction sites for any irregularities. NEC also makes regular visits but their assessment is based on the reports of the officials in the field. However, the GYT members themselves monitors these construction sites to see that tree felling is done as marked, that the existing irrigation channels are not disturbed, that there are no damages to the agricultural fields.

On maintenance, the GYT members informed that the beneficiaries of the farm road, which is 40 households of Gaylekha village will maintain the road after completion and once it is handed over to them, which will be coordinated by the Tshogpa of Gaylekha. Yuka then explained the importance of constructing these roads as per the environment friendly road construction
concept in the beginning itself so that the burden of maintenance is less to the communities later.

On the system of grievance redressing, the GYT members explained the process with example from the farm road construction. In the process, boulders roll down to the agricultural fields, the affected party(ies) will report the incidence and the damage thereof to the GYT through the Tshogpa of that community. The GYT will investigate the matter, calculate the damage and ask the contractor to compensate the damage and remove the boulder(s) or calculate and negotiate compensation for removing it. If both the parties agree to the decision of the GYT, matter is resolved. If either of the party disagrees, the matter is forwarded to the DYT. However, it was informed that so far no such incidences have occurred in Nisho Geog.

On the EMF, the GYT members informed that in terms of the principles of management, it is not a new concept/procedure. However, they expressed that they welcome new ideas like bioengineering and tripartite agreement among the GYT, Contractor and Community, which would be very useful as all stakeholders would have written agreement what should be done and who should do it, where and how. The GYT members also explained that the capacity building could be very helpful. Meeting wrap-up by Kaylzang Tshering, after which a short visit to nearby community to see irrigation schemes.

Night Halt at Samteygang in Gup’s Office cum residence.

Consultation with Gaylekha community on 24 October 2004.

On day 2: 8:30 am, walked along the 2 km farm road from Samteygang-Gaylekha. The Gup, Mangap, Tshogpa, Extension Agent and the community (25 members) met with the team (Yuka from WB, Kaylzang and Karma from MOA). The Gup (GYT Chairman) introduced the team members and explained the objectives and the purpose of the visit to the community. Yuka thanked the community for taking time off their fields to see the team and explained about the DRDP project supported by the World Bank, its component and the need to properly carry out all construction activities under the project as per the EFRC guidelines in the beginning itself so that there are no negative environmental impacts later.

The consultation revolved around issues of environmental impact due to construction activities in the geog or the community. The community was also asked for suggestions as to how best these environmental issues can be monitored, resolved, reduced or coordinated to have minimal impact on the community. The community was urged to share their experiences and come up with suggestions, as it was very crucial for proper project designing to suite the need/capacity of the community themselves. The community was also asked if formats for responsibility sharing through tripartite agreements were drawn, can they be implemented, would they be useful.

Mr. Wangpo thanked the mission and the World Bank for their support in providing many rural infrastructures and pledged that the community would fully live up to expectations of their contribution and that once infrastructures are in place, the community can carry out the maintenance. When asked how they maintain their irrigation system, Wangpo informed the mission that there has been no major new irrigation channel constructed so far. The four major irrigation systems that exist have been built a long time back and have stabilized. The community is now required to put
in only minor maintenance, which are done on annual basis and as and when need arises. Wangpo explained that for every irrigation channel, they have a user committee with the Tshogpa as the chairman. He is entrusted with the responsibility of mobilizing labor for maintenance: usually the month before transplanting takes place. Each household contributes 1 labor day for such general maintenance work.

For major maintenance work, Tshogpa Kinlay Wangchuk explained that during annual or emergency maintenance work, some households who cannot contribute labor or are absent are made to pay Nu. 100 per day. He informed that under Gaylekha Water User’s account, they have Nu. 40,000 (forty thousand) in the Bank, which was collected through such mechanism and they will use it if need arises.

Upon enquiring if the community experienced any other environmental problems of landslide due to irrigation or farm road construction, Mr. Letho informed the team that so far no major problems have come up due to these constructions. He informed that even if there were some issues, provisions are kept in the contract agreement with the contractor for compensation.

Enquiries were also made as to how community selected or arrived at a decision to select the present dumping site for the disposal of the earth. The Gup informed that the communities are not involved in such decision-making. The GYT together with the engineer decides the site selection, as it is the mandate of the GYT to act on behalf of the community. However, it was informed that when the road alignment is done, the communities are taken along the alignment and decision made on community recommendation and consensus.

On the tripartite agreement for monitoring the project activities, the community agreed that monitoring can be done and that each village has its own Tshogpa representing the community at the GYT who is responsible for providing them information how to do it in the proper manner. Mr. Namgay informed that as long as GYT guides them, monitoring is not an issue. He also expressed that short training for the community as to what to look for during monitoring, would be very useful. Mr. Dengo also shared similar sentiment. He explained that although they have received some training on irrigation channel maintenance in the past, he would welcome further training and exposures.

Questions were also asked what involvement the women of the community had in the process of such construction activities? Mrs. Pem informed the team that women are generally involved in digging and carrying materials but are equally involved in the project activities.

The community was told that the project has no power tiller roads for them but in case if such an activity was to be provided and the community asked to contribute labor unlike the farm roads where it is contracted out, can they provide labor and if tripartite agreements are drawn, will the community be able to shoulder the responsibility of monitoring the activities. To this, Mrs. Pem informed that monitoring will not be a problem but since they would be playing a new role, capacity building may need to be done.
Mrs. Zangmo thanked the World Bank and the other development partners for their support and pledge for full support from the community’s side in whatever way they can. The Gup then made the wrap-up note by thanking the community for being present to answer the queries made by the mission and also thanked the mission on behalf of the community and the GYT for visiting them and providing them insight into many interesting and new areas of management and project implementation, especially on the environmental issues.

Returned to Thimphu via Wangdue at 12:20 pm.

**Summary of key points from the field consultations**

Where there is awareness on the environmental assessment process, commitment to the process is strong as evident from the case in Chhukha dzongkhag.

While the Environment Assessment Act, 2002, Regulation for the Environmental Clearance of Projects, 2002, sectoral EA guidelines, and modules for farm road construction and irrigation scheme development provide a significant role for the local authorities and communities in the EA process, lack of capacity (training, awareness) prevents them from fully participating in it.

The EA process involves considerable time. The establishment of DECs is a good move to decentralize the EA process and expedite the process. However, for the DECs to perform their functions competently training will be immensely critical.

Enforcement of the Environmental Assessment Act, 2000, and Regulation for the Environmental Clearance of Projects, 2002, is weak at the local level because these were introduced only recently and, consequently, local awareness, experience and skills for EA have not developed. DRDP would serve as a valuable vehicle in enhancing the enforcement of environmental assessment through adherence to the existing national procedures and guidelines for EA in the planning and implementation of project activities and capacity building for EA.

EA alone is not an end in itself. It will need to be backed up by integration of environmental management costs in budget and incorporation of environmental terms and conditions in contracts.
ANNEX 3
Activities Listed in Annex 2 of the RECOP

The following list is the most recently updated list. The list is reviewed annually and updated, usually resulting in addition of more activities as the EA capacity and confidence of the Competent Authorities improve. Application for Environmental Clearance of activities that are not listed is required to be submitted to the National Environmental Commission Secretariat.

Competent Authority: Ministry of Trade and Industry

Department of Industry
Automobile services
Wooden/ steel furniture units
Sawmills
Printing Press
Tyre rethreading activities
Stone crushing activities
Bakery/ confectionaries
Oil mills
Manufacturing of handmade paper
Brick/ hollow-block manufacturing
Fabrication activities
Tiles production
Poultry farms
Carpet production using dyes
Textile production using dyes
Photo studios
Dry cleaning units

Department of Trade
Operation of fuel stations not involving land use changes

Department of Geology and Mines
Quarrying/ mining, covering less than 3 hectares
Mineral exploration
Emergency responses to natural disasters/ hazards

Competent Authority: Ministry of Works and Human Settlements (previously Ministry of Communications)

National Authority for Construction Standards and Quality Control
Road widening/ curve improvement
Construction of urban roads
Location of housing colony (temporary/ permanent)
Construction of urban drainage
Permanent works (retaining walls, breast walls, causeways)
Utilities and service lines
Road realignment (less than 1 km and not falling within a protected area)
River training works
Monsoon damage restoration works
Bridges

City Corporation
Construction of buildings
Any other activities within municipal boundary duly approved by the government

Competent Authority: Ministry of Agriculture

Department of Forestry Services
Surface collection of sand and boulder
Allocation of forest produces to rural communities outside FMUs
Community forest harvesting
Private forest harvesting
Afforestation
Reforestation
Management and collection on non-wood forest produce
All activities within an FMU (road construction, logging operations, reforestation)
Forest sanitation operations

Department of Agriculture
Irrigation channels
Activities related to agricultural research and development

Activities not requiring Environmental Clearance
Consultancy firms
Cinemas no involving land use change
Barber shops
Communication services (telephone, TV cable services, etc.)
Umbrella repairs
Seedling nurseries
Carpet production without dyes
Restaurants
Hotels not involving land use change (taking into account waste disposal)
Arts and handicrafts
Electronic/ electrical repair services
Tailoring
Candle production
Potato chip production
Contracts
Incense production
Jari (Bhutanese tea leaves) production
Noodle production
Audiovisuals
Cobbling
Training institutes not involving land use changes
Desktop publishing
Photo studio without developing and printing facilities
Indoor games
Cycle repairs
Beauty parlours
Quilt making
Clearing and forwarding agencies
Health clubs
Tours and travel services
Discotheques
Textile production without dyes
Manufacture of organic fertilizers
Road resurfacing
Road maintenance
Bioengineering
Bridge maintenance not involving land use change
Road improvement (base course, black topping and permanent works)
Construction of buildings (individual residential houses in rural areas)
Goods and passenger transport
Cottage mills
Goldsmith and blacksmith units
Laundry services
Tyre and tube repair services
Day care centre for children
ANNEX 4
Sample of Environmental Clearance for Farm Road Construction

ROYAL GOVERNMENT OF BHUTAN
NATIONAL ENVIRONMENT COMMISSION SECRETARIAT

NEC/EA/213/DOO-Chu/2004/6532
4 February 2004

Sir,

Subject: Environmental Clearance for Bjapchho Farm Road, Chhukha

The National Environment Commission Secretariat (NECS) issues environmental clearance (EC) for 5.2 kilometers Mepetsa-Bjapchho farm road construction under Chhukha dzongkhag with following terms and conditions:

The road construction must be in line with the Environmental Codes of Practice for Highways and Roads 1999, developed by the Department of Roads, Ministry of Communication, and the Sectoral Guidelines for Highways and Roads, NECS, 1999;

The original attempt should be followed and no deviations must be made without prior NECS approval;

No blasting activity is permitted in construction of this road to prevent possible effects on Chhukha Hydropower Plant headrace runnel;

Only excavator machine is permitted for use in road construction;

All geological conditions laid in the Department of Geology and Mines Study Report must be strictly adhered to;

The implementation of the activity shall not affect the public, private parties and any religious/ historic site;

Side and cross drains and support structures like retaining wall/ breast walls must be constructed as per the plan/ design specifications to prevent future soil erosion and land slides;

Waste materials (timber, soil, stones, etc.) must be disposed off in designated areas (identified prior to construction) and as per Forest and Nature Conservation Act 1995;

Aesthetic value must be preserved/ enhanced by reclaiming the disturbed areas with revegetation of grasses or trees in consultation with the Department of Forests;

Occupational health and safety measures must be strictly maintained at all times; and
Any land disputes arising due to the construction of the road shall be covered under the Resettlement Policy Framework under DRDP.

Non-compliance of any of the above conditions shall constitute an offense under the EA Act 2000. This shall result in revocation of the EC without any liability on the part of the NECS.

This EC is valid for a period of twenty four (24) months from the date of issue. In case of non-completion of the activity within the given period, the EC must be renewed one month prior to the date of its expiry.

**DATE OF EXPIRY OF THIS EC: 4th February 2006**

Sincerely,

Sd/-

Head, Technical Division

Dasho Dzongdag
Dzongkhag Administration
Chhukha

Copy to:
The Director, Department of Forests, Thimphu
The Director, Department of Roads, Thimphu
The Director, Department of Geology and Mines, Thimphu
The Managing Director, Chhukha Hydro Power Corporation, Chhukha
The Gup, Bjapchho Geog, Chhukha
ANNEX 5
Environmental Information Required for Environmental Clearance of Roads

PROJECT PROONENT’S DETAILS

Necessary information to be included are:

Name of the Project;
Name of the Project Proponent;
Present mailing address including telephone number, fax, and email (if any):
Name of the environmental focal person:
Qualification/designation of the focal person:
Telephone number of environmental focal person:
If the Application is prepared by a consultant, give the name and contacts of the consultant that prepared the Application.

PROJECT OBJECTIVES

Clearly describe the main objective or objective(s) of project. The objective(s) can be written in bulleted form.

RELEVANCE TO OVERALL PLANNING

Government funded development programs or activities are normally part of the Five Year Plan. State whether the proposed road construction is in line with the Five Year Plan or whether it is an ad hoc project. If it is an urban road, provide information that identifies the road with a particular Urban Development Plan.

It is important to provide a time schedule for construction, to assist the CA or the NEC to determine the processing priority for the Environmental Clearance. To facilitate this show the starting and completion dates.

FUNDING AND COSTS

State who is funding the project. The funding agency could be a donor, RGoB, a company, a private person, etc.

Show the estimated project cost. Out of the total estimated cost, show how much of the total project cost is allocated for environmental management. When calculating the environmental costs these will need to be separated into two components as follows.

Environmental costs related to construction, may include both material costs and labour and supervision costs. For example, if the focal person is supervising both project construction and the environmental requirements, the salary of environmental focal person can be split based on an estimate of the percentage of time the person is supervising either activity. Separate the amounts spent on (a) environmental materials and (b) the amount spent on supervision of environmental activities. Include both amounts as separate entries in the environmental management budget.
The budget for the project’s mitigation measures is based on the type and size of the impacts that need to be mitigated. The environmental cost of the project mitigation measures is determined in section 5.9. Include this cost as a separate item in the environmental management budget.

**PROJECT DESCRIPTION**

**Project Location**

Provide the name and location of the takeoff point for the road. If the place has no name, mention the name of the nearest place and identify the takeoff point as being e.g. 2.4 km west of xxxx. Follow the same procedure for the termination point. Show the estimated length of the road either in meters or in kilometres.

Construct a table similar to Table 1 which specifies the road location by stating which Dzongkhag, geog and town the road is located in or passing through. When determining the location, the location must be specified in road chainage. For example chainage 0+000 – 12+230, Wangdue Dzongkhag, Lobesa Geog. *12+230 should be read as 12km and 230m.*

**Table 1: Road location details by Dzongkhag and Geog**

<table>
<thead>
<tr>
<th>Road Chainage</th>
<th>Dzongkhag</th>
<th>Geog</th>
<th>Town/Village</th>
</tr>
</thead>
<tbody>
<tr>
<td>From</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>To</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Attach maps as below:

For a road longer than 5 km, include a 1:50,000 scale topographic map that shows the proposed road alignment together with alternative options, the location of construction camps, quarry sites, excavated material dump sites and existing infrastructure. The map should also show rivers, existing roads, Protected Area boundaries, Dzongkhag HQ, important historical sites and other main towns, if these are located within the area of the road.

For roads less than 5 km, a sketch map should be provided showing details as above for the 1:50,000 map.

**Category of Road**

Specify: (i) the road category; and (ii) the length of the road (km).

**Road Specifications**

Prepare a table similar to Table 2 with the required specifications.
Table 2: Road Specification/Quantities

<table>
<thead>
<tr>
<th>Item</th>
<th>Unit</th>
<th>Specification/Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Road RoW width</td>
<td>m</td>
<td></td>
</tr>
<tr>
<td>Formation width</td>
<td>m</td>
<td></td>
</tr>
<tr>
<td>Pavement width</td>
<td>m</td>
<td></td>
</tr>
<tr>
<td>Pavement material</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Volume of excavated material</td>
<td>m$^3$</td>
<td></td>
</tr>
<tr>
<td>Maximum road gradient</td>
<td>%</td>
<td>From chainage: To chainage:</td>
</tr>
<tr>
<td>Cross drains (pipes)</td>
<td>no</td>
<td></td>
</tr>
<tr>
<td>Box culverts</td>
<td>no</td>
<td></td>
</tr>
<tr>
<td>Bridges</td>
<td>no</td>
<td></td>
</tr>
<tr>
<td>Total length of bridges</td>
<td>m</td>
<td></td>
</tr>
<tr>
<td>V-shape side drain dimensions (horizontal x vertical)</td>
<td>cm</td>
<td></td>
</tr>
<tr>
<td>Total length of V shape drains</td>
<td>m</td>
<td></td>
</tr>
<tr>
<td>Box shape side drain dimensions (length x breadth x height)</td>
<td>cm</td>
<td></td>
</tr>
<tr>
<td>Total length of box drains</td>
<td>m</td>
<td></td>
</tr>
</tbody>
</table>

**Excavated Materials**

Briefly state how the excavated materials will be managed and how they will be safely disposed of so as to avoid losses of forests and agricultural lands and initiate landslides.

**Explosives**

State if the project will require explosives. If “yes”, show the total quantity that will be required and state blasting technique that will be adopted; e.g. silent blasting, single shot hole blasting, simultaneous blasting, etc.

**ALTERNATIVE(S)**

Describe the possible road alternatives as follows:

*Project Alternatives*: Explain why this project is chosen over other alternative(s), such as cableway, tunnelling etc. If this is not relevant to your project, mention NA.

*Alignment Alternatives*: Explain why this alignment is chosen over other options. This could be further supported by a map or sketch marking the alternative alignment/s. If there are no alternative options, mention NA.

**PUBLIC CONSULTATION**

Provide the details of public consultation with affected people. The proponent must explain to the affected people the expected impacts, where they will occur and how they will be mitigated. Provide a record of the meeting with the affected people, including comments and issues raised by the affected people and how the Applicant will resolve these issues. Attach a list of the names of the affected people with details of their Geog and village. Attach a list of the affected people who were consulted, together with their signatures, and the agreement/s arrived at. Describe if any issues remain unresolved.
PROJECT SITE PHYSICAL ENVIRONMENTAL DETAILS

Topography and Geology

Prepare a table similar to Table 3 with the relevant details.

**Table 3: Topography and observations along the road**

<table>
<thead>
<tr>
<th>Chainage (km+m)</th>
<th>Distance (m)</th>
<th>Side Slope in percentage (% or degrees)</th>
<th>Observations on geology and possible problems arising from the terrain</th>
<th>Method of Slope stabilization Required</th>
</tr>
</thead>
<tbody>
<tr>
<td>From</td>
<td>To</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

In the column observations, describe the area’s geology and possible problems arising from the terrain, such as susceptibility to landslides.

Water Course Crossings

Prepare a table similar to Table 4 and provide details on each perennial river or stream crossing. Also specify if there are any proximate downstream water users resident along the water course that may be affected by work on the road or in the stream channel. If yes, explain what the water is used for.

**Table 4: Details of watercourses that will require crossing along the proposed road**

<table>
<thead>
<tr>
<th>Chainage at which road crosses watercourse</th>
<th>Name of watercourse</th>
<th>Type of crossing</th>
<th>If bridge. Length of bridge (m)</th>
<th>Downstream water users – details</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Name of community or Individual</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Number of households</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Type of use</td>
</tr>
</tbody>
</table>

PROJECT SITE ECOLOGICAL DESCRIPTION

Land Use and Vegetation

Prepare a table similar to Table 5, and use it to specify the type of land use the proposed road will pass through. Estimate the area needed to construct the road for each type of land use. The types of land use include: chhuzhing, kamzhing, tseri, tsamdo, sokshing, broadleaf forest, coniferous forest, scrubland, wetland and others. In case of “others”, specify the type of land use. Should mixed forest (broadleaf + coniferous) occur allocate this to the broadleaf category unless it is dominated by coniferous forest in which case allocate it to coniferous forest. Scrubland also includes disturbed areas of broadleaf and coniferous forest that have been recently logged and are now regenerating.
“Affected households” are those who own or occupy the area and are dependent on it for their livelihood. They may or may not be the actual landowner. The tenure can be private, community, monk body and government.

Table 5: Land use and forest clearance required for road construction

<table>
<thead>
<tr>
<th>Chainage from takeoff</th>
<th>Land use</th>
<th>Area (m²)</th>
<th>Tenure</th>
<th>Number of affected households</th>
</tr>
</thead>
<tbody>
<tr>
<td>To</td>
<td>From</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Prepare a table similar to Table 6 and use it to specify the area of land (m²) and type of land use required for each of the project facilities, which includes; labour camps, construction machinery parking and service areas, workshops etc.

Table 6: Areas Required for Project Facilities

<table>
<thead>
<tr>
<th>Facility</th>
<th>Land use</th>
<th>Area (m²)</th>
<th>Tenure/ownership</th>
<th>Remarks (See Guideline)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Labour camp</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Construction camp</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Others</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Protected Areas

Information about the location of protected areas can be obtained from the Nature Conservation Division, Ministry of Agriculture.

Provide information as to whether (i) the project falls within any designated protected area and (ii) the length of road involved.

**If a road passes through any part of a protected area, the proponent will be required to undertake a full environmental impact assessment.**

**Wildlife and Flora**

Where roads pass through forest land, using one or more of the methods shown below, the proponent will need to collect information on the occurrence of flora and fauna (animals, birds and vegetation) which has special significance to Bhutan and to this area (see Schedule I of FNCA, which lists Totally Protected Species). State whether the flora or fauna is rarely or commonly observed.

From the nearest Forest Office obtain a list of vegetation, animals and birds that exists in the project area and attach to this document.

Conduct village interviews on the occurrence of vegetation, animals and birds in the project area and document the findings. Compare the findings to the list provided by the Forest Office. This finding must be attached to this document.
During site visits, note the occurrence of vegetation types, animals and birds that occur along the road corridor. Provide a list of flora and fauna recorded along the road during these visits. Attach these findings to this document.

Specify which of the methods was used to obtain the information.

**PROJECT SOCIAL ENVIRONMENT**

**Population**

Using a table similar to Table 7, show the number of households benefiting from the road project. When assessing the benefiting households, the applicant must count those households that are within two kilometres of either side of the proposed road. This will apply to roads constructed by the Department of Roads and to farm roads. The source of the information must be cited, e.g. data collected through site assessment or data supplied from the Gup, etc.

*Table 7: Project Beneficiaries. Households with possible access <2 km either side of the road*

<table>
<thead>
<tr>
<th>Drongkhag</th>
<th>Geog</th>
<th>Number of households</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Source of information: …………………………………*

**Loss of Houses, Services, Infrastructure and Cultural Heritage Sites**

This section assesses, whether the siting of the road will create any adverse impacts (loss or disturbance) to any existing houses, infrastructure and cultural or heritage sites. Provide details of the losses (either temporary disturbance or permanent loss) for facilities such as: (i) Services (ii) Houses (iii) Infrastructure (iv) Cultural or heritage site, etc.

Services include: telephone, electricity, TV cabling, water supply and sewerage connections etc. Houses can include shops and other buildings. Infrastructure losses could include: roads, bridges, tracks, etc. Cultural sites could include; *chortens*, *lhakhangs*, monuments, sacred sites (*ney*) etc. Where these sites may be disturbed by the proximity of the project, show the distance in metres from the cultural or heritage site to the project.

Locate the structures on the 1:50,000 map for roads longer than 5 km, or for roads less than 5 km in a sketch map. Provide information on the same map requested in Section 4.5.1.

Provide details of the losses using the format shown in Table 8.

*Table 8: Loss or disturbance of existing services and infrastructure*

<table>
<thead>
<tr>
<th>Type of Loss (list)</th>
<th>Number</th>
<th>Description of disturbance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Services</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Assess the possible adverse visual impact that may arise from the construction of the road, such as whether the road may be highly visible from a settlement or scenic viewpoint. Another possible visual impact is to evaluate whether scarring from sliding debris may have a visual impact.

**PROJECT IMPACTS AND MITIGATION MEASURES**

From the information provided in the preceding sections, identify the impacts that will occur from these activities and list these as shown in the table below. Impacts can be identified as those due to (i) the location of the project, (ii) design of the project; (iii) construction related activities; and (iv) operation of the project. For each negative impact provide mitigation measures and the approximate cost required to implement the mitigation measure.

<table>
<thead>
<tr>
<th>Type of Negative Impact</th>
<th>Possible Mitigation Measure/s</th>
<th>Estimated Mitigation Cost (Nu)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The proponent will be responsible for ensuring that the mitigation measures that are included as part of the environmental terms and condition are carried out. The environmental terms and conditions will be attached to the Environmental Clearance. Where a Contractor will be employed the proponent will be responsible for ensuring that the environmental terms and conditions are to be attached to the Contract Document so that the Contractor has a clear understanding of responsibilities.

At the time of tendering, the Contractor will be required to provide a Contractor’s Site Environmental Management Plan (CSEMP) that shows how the Contractor will implement the environmental terms that will be included in the Tender Specifications. The CSEMP is to be included as part of the Contract Documents and be evaluated as part of the overall tender. The NEC can assist with providing further information in this area.

**NO OBJECTION CERTIFICATE FROM AFFECTED AGENCIES**

In order to obtain an Environmental Clearance for a project it is required that an NOC – No Objection Certificate – is obtained from all relevant parties. Attach these documents. Below is a checklist of possible sensitive areas that may require an NOC.

<table>
<thead>
<tr>
<th>Agency/concerned people to issue NOC</th>
<th>Why/when</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dzongkhag Administration/City Corporation</td>
<td>When project is located within a Dzongkhag or a Municipality Area</td>
</tr>
<tr>
<td>Department of Forestry Services</td>
<td>Should the road go through a forest land</td>
</tr>
<tr>
<td>----------------------------------</td>
<td>----------------------------------------</td>
</tr>
<tr>
<td>Department of Culture</td>
<td>Should the road be located within 50 m of a cultural or religious site</td>
</tr>
<tr>
<td>Nature Conservation Division</td>
<td>within boundary of a Protected Area</td>
</tr>
<tr>
<td>Municipal Authority</td>
<td>within 50 m of a public park</td>
</tr>
<tr>
<td>Private owner</td>
<td>within 50 m of a human dwelling</td>
</tr>
<tr>
<td>Private property owners</td>
<td>Should the road construction need to acquire private property</td>
</tr>
<tr>
<td>Department of Health</td>
<td>within 50 m of hospital</td>
</tr>
<tr>
<td>Department of Education</td>
<td>within 50 m of school</td>
</tr>
<tr>
<td>Department of Energy</td>
<td>Should the project require the relocation of power transmission line</td>
</tr>
<tr>
<td>Bhutan Telecom Authority</td>
<td>Should the project require relocation of telephone lines</td>
</tr>
<tr>
<td>Department of Roads</td>
<td>Should the project require access from highways and feeder roads</td>
</tr>
</tbody>
</table>
## ANNEX 6

Sample of Rules and Regulations for Activities in the Buffer Zone in Bumdeling Wildlife Sanctuary

<table>
<thead>
<tr>
<th>Activity</th>
<th>Across high ridges or major rivers or bordering a wide multiple use zone</th>
<th>FMUs</th>
<th>Undisturbed or little disturbed wildlife habitats</th>
<th>Black-necked crane feeding areas</th>
</tr>
</thead>
<tbody>
<tr>
<td>Road construction</td>
<td>Yes, requires environmental assessment and restricted in government reserved forest</td>
<td>Yes, requires environmental assessment and use of environment friendly practices</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>House construction</td>
<td>Yes</td>
<td>Yes, but no new settlement</td>
<td>Yes, but no new settlement</td>
<td>No</td>
</tr>
<tr>
<td>Cultivation</td>
<td>Yes, only on registered land and no extension into government reserved forest</td>
<td>No extension into government reserved forest</td>
<td>Yes, only on registered land and no extension into government reserved forest</td>
<td>Yes, only on registered land and no extension into government reserved forest</td>
</tr>
<tr>
<td>Grazing</td>
<td>Yes, only in agricultural fields and registered tsamdrog</td>
<td>Some, only in agricultural fields and registered tsamdrog</td>
<td>Light grazing, only in agricultural fields and registered tsamdrog</td>
<td>Some, only in agricultural fields and registered tsamdrog</td>
</tr>
<tr>
<td>Collection of timber, firewood, NEFPs, etc.</td>
<td>Yes, but restricted to non-commercial, domestic consumption</td>
<td>Yes</td>
<td>Some, but restricted to non-commercial, domestic consumption</td>
<td>No</td>
</tr>
<tr>
<td>Social forestry</td>
<td>Yes</td>
<td>Some</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Camping</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes, only at designated sites</td>
<td>No</td>
</tr>
<tr>
<td>Tourist trekking and migratory movement of herds</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes, only if the main trail passes through the habitat</td>
<td>Yes, only if the main trail passes through the area</td>
</tr>
<tr>
<td>Research/habitat management</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Hunting and fishing with permit</td>
<td>Yes</td>
<td>Yes</td>
<td>No, except if necessary for management purposes.</td>
<td>Not permissible during winter, cranes' roosting season</td>
</tr>
<tr>
<td>Remarks</td>
<td>Restrictions may be required for important bird habitats across rivers</td>
<td>Some of these habitats should be considered for inclusion within the sanctuary</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Source: Bumdeling Wildlife Sanctuary Conservation Management Plan (July 2001 – June 2007)*
ANNEX 7
Globally Threatened Species of Birds and Mammals in and around Jigme Singye Wangchuck, Royal Manas and Thrumshingla National Parks

Birds

Endangered Species
White-bellied Heron *Ardea insignis*

Vulnerable Species
Black-necked Crane *Grus nigricollis*
Rufous-necked Hornbill *Aceros nipalensis*
Chestnut-breasted Partridge *Arborophila mandellii*
Himalayan Swiftlet *Collocalia brevirostris*
Pallas’ Fish Eagle *Haliaeetus leucoryphus*
Beautiful Nuthatch *Sitta formosa*
Wood Snipe *Gallinago nemoricola*

Near Threatened Species
Great Hornbill *Buceros bicornis*

Mammals

Critically Endangered Species
Pygmy hog *Sus salvanius*

Endangered Species
Golden Langur *Trachypithecus geei*
Red Panda *Ailurus fulgens*
Tiger *Panthera tigris*
Asian Elephant *Elephas maximus*
Hispid Hare *Caprolagus hispidus*
Asian Buffalo *Bubalus bubalis*

Vulnerable Species
Assamese Macaque *Macaca assamensis*
Himalayan Black Bear *Ursus thibetanus*
Serow *Capricornis sumatraensis*
Dhole/ Wild Dog *Cuon alpinus*
Clouded Leopard *Neofelis nebulosa*
Gaur *Bos gaurus*
Sloth Bear *Melursus ursinus*
Marbled Cat *Pardofelis marmorata*
Asiatic Golden Cat *Catopuma temmincki*
Fishing Cat *Prionailurus viverrinus*

Near Threatened Species
Goral *Naemorhedus goral*
Musk Deer *Moschus chrysogaster*

*These species are also listed in Schedule 1 of the FNCA as Totally Protected Species*
ANNEX 8
Flow Chart of Irrigation Scheme Development based on NIP
Procedural Manual
## ANNEX 9
### DISTRIBUTION LIST OF PESTICIDES USED IN BHUTAN

<table>
<thead>
<tr>
<th>Common Name</th>
<th>Toxicity Class</th>
<th>1998/99</th>
<th>1999/00</th>
<th>2000/01</th>
<th>2001/02</th>
<th>2002/03</th>
<th>Total</th>
<th>% of Overall Use</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Insecticides</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chlorpyrifos</td>
<td>II</td>
<td>400.0</td>
<td>383.5</td>
<td>362.5</td>
<td>834.0</td>
<td>690.9</td>
<td>2,670.9</td>
<td>0.850</td>
</tr>
<tr>
<td>Cypermethrin</td>
<td>II</td>
<td>439.5</td>
<td>325.5</td>
<td>388.0</td>
<td>488.5</td>
<td>595.3</td>
<td>2,236.8</td>
<td>0.712</td>
</tr>
<tr>
<td>Dimethoate</td>
<td>II</td>
<td>406.5</td>
<td>179.0</td>
<td>256.9</td>
<td>113.5</td>
<td>318.6</td>
<td>1,274.5</td>
<td>0.405</td>
</tr>
<tr>
<td>Malathion 50 EC</td>
<td>III</td>
<td>118.0</td>
<td>150.0</td>
<td>142.4</td>
<td>94.0</td>
<td>56.0</td>
<td>560.4</td>
<td>0.178</td>
</tr>
<tr>
<td>Malathion 5 D</td>
<td>III</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>1,545.0</td>
<td>1,545.0</td>
<td>0.492</td>
</tr>
<tr>
<td>Fenvalerate 0.4</td>
<td>II</td>
<td>1,703.0</td>
<td>1,714.0</td>
<td>1,768.0</td>
<td>2,184.0</td>
<td>2,333.0</td>
<td>9,702.0</td>
<td>3.086</td>
</tr>
<tr>
<td><strong>BT</strong></td>
<td>-</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>5.0</td>
<td>5.0</td>
<td>0.002</td>
</tr>
<tr>
<td><strong>Fungicides</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Edifenphos</td>
<td>Ib</td>
<td>0.0</td>
<td>13.0</td>
<td>1.0</td>
<td>0.0</td>
<td>0.0</td>
<td>14.0</td>
<td>0.004</td>
</tr>
<tr>
<td>Carbendazim</td>
<td>No acute hazard</td>
<td>195.0</td>
<td>178.0</td>
<td>302.0</td>
<td>348.0</td>
<td>395.0</td>
<td>1,418.0</td>
<td>0.451</td>
</tr>
<tr>
<td>Captan</td>
<td>No acute hazard</td>
<td>110.0</td>
<td>226.0</td>
<td>79.0</td>
<td>107.0</td>
<td>64.6</td>
<td>586.6</td>
<td>0.187</td>
</tr>
<tr>
<td>Hexaconazole</td>
<td>No acute hazard</td>
<td>39.0</td>
<td>74.5</td>
<td>77.0</td>
<td>82.0</td>
<td>60.7</td>
<td>333.2</td>
<td>0.106</td>
</tr>
<tr>
<td>Mancozeb</td>
<td>No acute hazard</td>
<td>432.0</td>
<td>500.0</td>
<td>687.5</td>
<td>957.0</td>
<td>1,012.0</td>
<td>3,588.5</td>
<td>1.142</td>
</tr>
<tr>
<td>Tridemorph</td>
<td>II</td>
<td>0.0</td>
<td>20.5</td>
<td>17.0</td>
<td>24.9</td>
<td>23.4</td>
<td>85.8</td>
<td>0.027</td>
</tr>
<tr>
<td>Blasticidin</td>
<td>Ib</td>
<td>0.0</td>
<td>9.5</td>
<td>27.0</td>
<td>0.0</td>
<td>0.0</td>
<td>36.5</td>
<td>0.012</td>
</tr>
<tr>
<td>Copper oxychloride</td>
<td>III</td>
<td>177.0</td>
<td>268.0</td>
<td>250.3</td>
<td>222.0</td>
<td>316.0</td>
<td>1,233.3</td>
<td>0.392</td>
</tr>
<tr>
<td>Carbuxin</td>
<td>No acute hazard</td>
<td>0.0</td>
<td>0.0</td>
<td>100.0</td>
<td>100.0</td>
<td>0.0</td>
<td>200.0</td>
<td>0.064</td>
</tr>
<tr>
<td>Kasurabcide</td>
<td>No acute hazard</td>
<td>0.0</td>
<td>0.0</td>
<td>10.0</td>
<td>0.0</td>
<td>0.0</td>
<td>10.0</td>
<td>0.003</td>
</tr>
<tr>
<td>Tricyclazole</td>
<td>II</td>
<td>0.0</td>
<td>20.0</td>
<td>18.0</td>
<td>12.5</td>
<td>50.3</td>
<td>95.3</td>
<td>0.016</td>
</tr>
<tr>
<td>Copper sulphate</td>
<td>II</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>5.5</td>
<td>5.5</td>
<td>0.002</td>
</tr>
<tr>
<td>Copper hydroxide</td>
<td>III</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>5.5</td>
<td>5.5</td>
<td>0.002</td>
</tr>
<tr>
<td>Rodenticides</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bromadiolone</td>
<td>Ia</td>
<td>42.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>42.0</td>
<td>0.013</td>
</tr>
<tr>
<td>Zinc phosphate</td>
<td>Ib</td>
<td>0.0</td>
<td>35.2</td>
<td>31.0</td>
<td>70.5</td>
<td>56.4</td>
<td>193.1</td>
<td>0.061</td>
</tr>
<tr>
<td><strong>Herbicides</strong></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pendimethalin</td>
<td>III</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>301.0</td>
<td>301.0</td>
<td>301.0</td>
<td>0.096</td>
</tr>
<tr>
<td>Metribuzin</td>
<td>II</td>
<td>204.0</td>
<td>250.0</td>
<td>320.0</td>
<td>380.0</td>
<td>510.0</td>
<td>1,664.0</td>
<td>0.529</td>
</tr>
<tr>
<td>Glyphosate</td>
<td>No acute hazard</td>
<td>85.0</td>
<td>81.0</td>
<td>128.0</td>
<td>126.0</td>
<td>179.0</td>
<td>599.0</td>
<td>0.191</td>
</tr>
<tr>
<td>Oxyfluoren</td>
<td>No acute hazard</td>
<td>0.0</td>
<td>0.0</td>
<td>1.0</td>
<td>0.0</td>
<td>0.0</td>
<td>1.0</td>
<td>0.000</td>
</tr>
<tr>
<td>Butachlor*</td>
<td>No acute hazard</td>
<td>120,960.0</td>
<td>137,090.0</td>
<td>1,380.0</td>
<td>-</td>
<td>-</td>
<td>259,430.0</td>
<td>82.532</td>
</tr>
<tr>
<td><strong>Acaricides</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Dicofol</td>
<td>III</td>
<td>0.0</td>
<td>6.2</td>
<td>5.3</td>
<td>2.0</td>
<td>17.0</td>
<td>30.5</td>
<td>0.010</td>
</tr>
<tr>
<td><strong>Others</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Protein hydrolysate</td>
<td>Non toxic</td>
<td>0.0</td>
<td>17.0</td>
<td>33.0</td>
<td>10.0</td>
<td>20.7</td>
<td>80.7</td>
<td>0.026</td>
</tr>
<tr>
<td>Tree spray oil</td>
<td>Non toxic</td>
<td>0.0</td>
<td>0.0</td>
<td>8,011.0</td>
<td>8,516.0</td>
<td>8,676.0</td>
<td>25,203.0</td>
<td>8.018</td>
</tr>
<tr>
<td>Linseed oil</td>
<td>Non toxic</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>234.0</td>
<td>236.0</td>
<td>470.0</td>
<td>0.150</td>
</tr>
<tr>
<td>Sandovit</td>
<td>Non toxic</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>313.0</td>
<td>410.0</td>
<td>723.0</td>
<td>0.230</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td>125,311.0</td>
<td>141,520.9</td>
<td>14,397.9</td>
<td>15,525.4</td>
<td>17,582.5</td>
<td>314,337.7</td>
<td>100.000</td>
</tr>
</tbody>
</table>

Note:
Ia: Extremely hazardous technical grade active ingredients of pesticides
Ib: Highly hazardous technical grade active ingredients of pesticides
II: Moderately hazardous technical grade active ingredients of pesticides
III: Slightly hazardous technical grade active ingredients of pesticides
No acute hazards: Technical grade active ingredients of pesticides unlikely to present any acute hazard in normal use

*Data not available for 2001/02 and 2002/03 as its distribution has been transferred to Druk Seeds Corporation (Paro) since 2001/02
Sample 1

**IPM EXTENSION LEAFLET NO. 19**
15 July 2001
**BOLLWORM**
**TOMATO, CHILLI, MAIZE, PEAS**

**THE PEST ORGANISM**

The Bollworm *Helicoverpa armigera* (Hubner) belongs to the Noctuidae. Quite some confusion exists about its scientific and English names. The old name *Heliothis armigera* is still often used. The English name used to be American Bollworm, but the species does not occur in the Americas. *Helicoverpa armigera* is polyphagous as indicated by common names like cotton bollworm, corn earworm and (in Bhutan) chilli podborer. In Bhutan, the Bollworm can be troublesome in tomatoes, early chillies and chickpeas. It is a minor pest in crops like maize and other pulses.

Eggs are small (0.5 mm in diameter), yellowish and with longitudinal ridges. They are laid in small batches of single eggs on the leaves of flowering plants. Caterpillars vary in colour. The first two larval instars are yellowish-white to red-brown. Later instars are usually greenish, but sometimes brown to black. The pattern of longitudinal stripes is typical: especially the very pale, lateral band around the spiracles is characteristic. Larvae can reach 4 cm. Moths have a wingspan of up to 4 cm. The colour is variable, but usually brownish, males being more greenish-grey and females orange-brown. Forewings have a dark brown band a row of black spots near the hind margin. Hindwings are pale with a black border.

**LIFE CYCLE AND DAMAGE SYMPTOMS**

In the temperate regions of Bhutan female start oviposition in March. At night, presence of the moths near light forms a clear indication of potential oviposition activities. Females can lay more than 1000 eggs. The larvae hatch after three days and initially feed on leaves and flowers. While growing older, the caterpillars prefer to bore into fruiting bodies. In tomatoes and pulses the feeding habit is very characteristic: the front half of the body in the fruit, with the rear half sticking out. However, in chilli the caterpillar is completely hidden inside the pod. In fruits like tomato, the bore holes are characteristic. The larval stage takes 2-3 weeks. Pupation normally takes place in the soil, while the pupal stage lasts two weeks. In the temperate regions of Bhutan 2-3 generations occur, but in the south more generations are likely. In winter the pupae hibernate in the soil. The moths appear again in early March. Life span of the moth is three weeks.
In chillies, the bollworm attacks mainly the early planted chillies. The caterpillars go straight into the pod leaving no visible entry point. Feeding concentrates on the developing seeds and the seed-bearing parts. The pericarp is not attacked. Actual loss to the pod is limited, unless the consumer is keen on the hot seeds. The main problem is esthetic: consumers do not like caterpillars and unappetizing excreta in their chillies. In Bhutan up to 10% of the early chilly harvest can contain a caterpillar. Attacked tomatoes often drop prematurely and/or start rotting. Newly introduced chickpeas were heavily attacked in eastern Bhutan.

**Control Measures**

The bollworm is a major crop pest in large areas in Europe, Asia, Africa and Oceania. As such, an enormous amount of research on control methods has been carried out, focusing on major hosts like cotton and tobacco. However, given the mobility of the moths, high reproductive rate, polyphagy and resistance developed against many insecticides, H.armigera remains a difficult pest to control. A multi-pronged IPM approach is clearly the long term solution. The following components are of relevance in Bhutan.

**Cultural Control.** For many crops, post-harvest cultivation of the field is advised, to destroy the Bollworm pupae in the soil. A drawback to this method is immigration of moths, which, if borne by wind, can cover hundreds of kilometers. In tomato fields, tomatoes with caterpillars sticking out should be collected and destroyed. For chilli this is not possible as the caterpillars are hidden. Various trap crops have been advised to lure egg laying moths away from the main crop. Maize is used as trap crop for the main crop cotton, but timing is a problem as moths are only attracted to tasseling maize. Promising results were obtained in India with Marigolds (Dzongkha name Seyshey Metho, Nepali Shaipatri) as a trap crop in tomato cultivation. Marigolds are sown twice to ensure presence of marigold flowers during the whole susceptible period of the tomato crop. The trapcrop can be later destroyed or sprayed, depending on the number of caterpillars present.

**Biological Control.** As biopesticides, Bacillus thuringiensis and Helicoverpa armigera nuclear polyhedrosis virus (HaNPV) are often used for Bollworm control. Both products are available in India. However, the short shelf life of these products form a big disadvantage in Bhutan, while in addition, HaNPV is rapidly broken down by UV light. To protect the many natural enemies of the Bollworm, insecticide use should be reduced to the minimum. In India intercropping with Coriander is practiced to attract natural enemies of the Bollworm.

**Hostplant resistance** ICRISAT developed chickpea varieties with some resistance against Bollworm.

**Chemical Control.** Use of insecticides has four drawbacks. 1. Bollworm rapidly develop resistance, especially against pyrethroids. 2. Only young caterpillars are vulnerable as the older stages are protected by the flowers or fruits in which they are boring. 3. Indiscriminate spraying wipes out the natural control system. 4. Bollworm attack in the flowering stage, so for crops depending on crosspollination (like pulses), insecticides interfere with fruit setting.
Judicious use of pesticides depends on accurate timing of the vulnerable stage of the Bollworm. Scouting for eggs is one reliable method for determining the need for spraying. The second method consist of monitoring of moth with help of pheromone traps (available in India). Provided proper timing for the application is carried out. NPPC advise the use of Fenvalerate 4D dust (1.2 kg per acre) or Malathion 50 EC (2 ml/litre of water). Fenvalerate sometimes causes spotting in tomatoes. A waiting period of two weeks has to be observed after spraying before harvesting is allowed.
The Pest Organism

In Bhutan, rice is grown in irrigated, terraced fields at altitudes ranging from 150-2600 metres. Farmers prefer traditional varieties for their grain colour, taste and yield of straw. The traditional rice categories are chum maap (red rice) and chum kaap (white rice). Worldwide, the most important disease of rice is Blast. This disease occurs in all rice-growing areas. In Bhutan, an outbreak in 1995, led to a total loss of 1090 ton of paddy in Paro, Thimphu, Wangdue Phodrong and Punakha. Although the overall yield loss was 2.5%, many farmers lost their whole crop. Blast is caused by a fungus which has sexual and asexual states. The sexual (teleomorphic) state is known as *Magnaporthe grisea* (Hebert) Baar, while the asexual (anamorphic) state is named *Pyricularia grisea* (Cooke) Saccardo. The teleomorphic state is rare in nature, so that blast disease is spread almost exclusively by conidia (asexual spores) from the anamorphic state. Besides paddy, blast can attack various grasses like *Echinochloa* spp.

Disease Symptoms and Cycle

Blast can affect leaf blades, stem nodes, panicle and grains. **Leaf Blast** attacks especially between the seedling stage and tillering stage. Early leaf lesions are rounded, white to grey-green with darker green borders. Older lesions become spindle-shaped with grey centre and brown margin. In older or later leaves the disease declines. At heading, blast again increases, attacking nodes and panicles. Infected nodes start rotting and eventually the culm can break at the nod. **Nodal Blast** can also result in barren panicles (white heads). In early **Neck Blast**, lesions at the neck appear greyish-green and later turn black. Infected necks can rot and break. Early Neck Blast leads to chaffy grains, while late Neck Blast gives partly filled grains with kernels that are chalky, brittle and often useless. The pathogen survives as mycelium and conidia on the diseased rice straw, seed, stubble and possibly on weed hosts. The fungus produces conidia during periods of high relative humidity. Mature spores are released into the air, disseminated by the wind and then land on other rice plants. The conidium only germinates when rice stems or leaves are wet. The spore penetrates plant surfaces or enters through stomata. At optimum temperature and high relative humidity, new lesions can appear in 4-5 days, but in colder parts of Bhutan it takes around ten days. Multiple rice cropping systems greatly increase the chance of blast outbreaks, but in Bhutan normally only single rice crops are grown.

Control Measures

Management of Rice Blast involves cultural, varietal and chemical measures.
CULTURAL CONTROL

Use disease free seeds. Never use seeds from blast-infected field since the fungus can be transmitted through seeds.

Raise seedlings on a wet bed, as dry nurseries generally favour blast.

Do not apply too much manure or fertilizers as too much Nitrogen will increase the susceptibility of paddy to blast.

Avoid high density planting. Blast incidence increases with an increase in plant density.

Farmers in the same area should transplant at the same time.

Do not leave the fields dry after transplanting. Paddy is more resistant to blast when grown under proper water management.

Burn infected straw and stubble in the field.

VARIETAL CONTROL

Traditional varieties like Janam, Dumja and Themja are susceptible to blast. These traditional varieties can be grown in open and wide valleys where accumulation of moisture and dew is low. However, in blast-prone areas near rivers, near forest or in the shade, susceptible traditional varieties should not be used. In such places, resistant varieties like Chumroo, No.11 and IR64 should be cultivated.

CHEMICAL CONTROL

Seed treatment in high risk areas for Blast, seeds can be treated with a fungicide as a preventive measure. The treatment for pre-germinated seed is:

Soak seeds in water for 24 hours (as practiced by farmers)

Treat seed with a solution of Tricyclazole at a rate of 3 g product for 1 kg of seed.

Allow seed to germinate for 24-48 hours (as practiced by farmers) before sowing.

Field spraying. Regular scouting, especially in blast prone areas, is essential in order to come to timely decision on the need for spraying. Leaf Blast can be controlled effectively by fungicides if detected at an early stage. However, spraying when plants are already infected by Nodal Blast or Neck/Panicle Blast is usually not effective. Modern fungicides are mainly systemic with a residual activity of two weeks. The need for follow-up sprays for leaf blast control depends on monitoring of developments. The following Blast fungicides are available at NPPC:

<table>
<thead>
<tr>
<th>Fungicide</th>
<th>Trade name</th>
<th>Action</th>
<th>Dose</th>
<th>Application mode</th>
<th>Toxicity class</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blasticidin S 1 EC</td>
<td>-</td>
<td>Contact</td>
<td>1 ml/1 litre of water</td>
<td>Foliar spray</td>
<td>Ib</td>
</tr>
<tr>
<td>Edifenphos 50 EC</td>
<td>Hinosan</td>
<td>Contact</td>
<td>2 ml/1 litre of water</td>
<td>Foliar spray</td>
<td>Ib</td>
</tr>
<tr>
<td>Isoprothiolane 40WP</td>
<td>Fuji-one</td>
<td>Systemic</td>
<td>1 gm/1 litre of water</td>
<td>Foliar spray</td>
<td>III</td>
</tr>
<tr>
<td>Kasugamycin 71.2 WP</td>
<td>Kasurabcide</td>
<td>Preventive curative</td>
<td>1 ml/1 litre of water</td>
<td>Foliar spray</td>
<td>-</td>
</tr>
<tr>
<td>Pyroquilon 5 GR</td>
<td>Oryzemate</td>
<td>Systemic</td>
<td>12 kg/acre</td>
<td>Granules</td>
<td>-</td>
</tr>
<tr>
<td>Probenazole 8GR</td>
<td>Oryzemate</td>
<td>Systemic</td>
<td>12 kg/acre</td>
<td>Granules</td>
<td>II</td>
</tr>
<tr>
<td>Tricyclazole 75 WP</td>
<td>-</td>
<td>systemic</td>
<td>1 gm/litre of water</td>
<td>Foliar spray</td>
<td>II</td>
</tr>
</tbody>
</table>

Please note that five fungicides have a hazard classification following WHO. Special care should be taken in the case of Hinosan. The active ingredients of this organophosphorous product is placed in Class 1 B (highly hazardous). In combination with its concentration, Hinosan is the most toxic pesticide in the NPPC stock. Extension agents should ensure that farmers take all precautions while spraying. The large selection of blast fungicides is temporary and will be reduced later on.
ANNEX 11

EXAMPLES OF SIMPLE ENVIRONMENTAL CLAUSES IN CONTRACT SPECIFICATIONS

Installation of work site
The contractor shall submit the work site for inspection and shall define the facilities to be created.
The contractor shall limit disturbances to the environment for the site selected and for residents in the immediate vicinity, both in surface (clearing of brush or trees, water flow, waste storage) and in depth (rupture or pollution of ground water).
The contractor shall execute, upon work completion, all work necessary to restore the site. The inspector shall write up a report outlining the site reclamation prior to official delivery.

Preparation and supply of quarry material
During the work phase, the contractor shall
- preserve trees during materials stockpiling;
- level stripped materials to facilitate water percolation and make natural grass planting possible;
- restore the natural flow to its previous state; and
- create runoff recovery ditches and conserve access ramps, if the quarry is declared fit for use as watering point for livestock or residents.

The contractor shall, upon work completion and at own expenses, restore the environment around the site. A report will be submitted by the inspector certifying that such site restoration work has been completed.

Tree planting
The contractor shall plant trees at locations defined by the inspector, provide the recommended protection (clay brick wall, fencing, etc.), supply the required water and if necessary replace dead trees. The contractor shall provide complete maintenance for a period of one year after planting, including: watering, cleaning out the bed at the foot of the tree, etc.

The number of trees planted, along with the execution of protection and the digging of beds at the foot of the trees, will be noted down by inspector on the site records.

This record will be used at the official delivery to evaluate the services actually rendered. Once road maintenance work has been completed, the contractor shall indicate on the itinerary map the planting carried out (position, number).

Environmental Management Plan compliance
THE CONTRACTOR SHALL ABIDE BY THE ENVIRONMENTAL MITIGATION MEASURES AS JOINTLY AGREED UPON AND STIPULATED IN THE MoU SIGNED BY THE GYT, COMMUNITY REPRESENTATIVE AND CONTRACTOR. THE CONTRACTOR SHALL PROVIDE COMPLETE MAINTENANCE FOR A PERIOD OF ONE YEAR AFTER THE RELEVANT MITIGATION WORKS.
ANNEX 12

ENVIRONMENTAL AND SOCIAL IMPACT MONITORING

It is very important that the environmental assessment and its recommendations are carried out according to its spirit in order to achieve the expected outcomes of the project being implemented. Therefore, it is very essential that a proper analysis is carried out during the project conception period. In this regard, the impact prediction plays a vital role as these predictions are used for developing mitigation measures and alternative options. For this purpose, the RAIP may refer to the checklist given below for possible impact prediction.

Checklist for Environmental and Social Impact Monitoring

<table>
<thead>
<tr>
<th>Project Undertakings</th>
<th>Baseline Condition</th>
<th>Possible Environmental Impact</th>
<th>Field Analysis</th>
<th>Impact &amp; Monitoring</th>
<th>Mitigation Measures</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>I M S</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Opening of trail and site for power tiller road, farm road, irrigation channels, and RNR centers. Establishment of RoW Removal of vegetation</td>
<td>Land use pattern along the road alignment</td>
<td>Loss of agricultural and forest area within RoW</td>
<td>Loss of private land</td>
<td>Loss of forest Compensation</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Topography of the alignment, soil and geology/slope inclinations</td>
<td>Slope instability resulting land slides and erosion</td>
<td>Number and size of landslides along the alignment</td>
<td>Soil erosion and land slides initiated by the clearance of vegetation</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Water bodies near project</td>
<td>Sedimentation of the streams and siltation to agricultural land</td>
<td>Turbidity in streams and soil condition of adjoining agriculture land</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Natural drainage pattern</td>
<td>Disturbance to natural drainage</td>
<td>Water logging</td>
<td>Design of drainage facilities</td>
</tr>
<tr>
<td></td>
<td>Physical Environment</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Type, area, and condition of forest along road alignment</td>
<td>Loss of trees and vegetation</td>
<td>Quantity of forest and trees extracted during alignment clearance</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>List of locally found &amp; endangered species</td>
<td>Disturbance to wildlife population</td>
<td>Disturbance to wildlife population</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Physical Environment</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Topography of the alignment, soil &amp; geology</td>
<td>Accelerated erosion resulting slope instability and landslides</td>
<td>Number and locations of landslides</td>
<td>Extent of civil and bioengineering works for stabilizing eroded and unstable areas?</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Water bodies near project</td>
<td>Siltation of surface water</td>
<td>Turbidity in streams</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Biological Environment</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Forest located along the alignment and its area/type/condition</td>
<td>Destruction of vegetation</td>
<td>Quantity/number of trees felled</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>List of locally found &amp; endangered species</td>
<td>Disturbance to wildlife</td>
<td>Wildlife siting in the area according to locals</td>
<td></td>
</tr>
</tbody>
</table>

There is a table that outlines various project undertakings, their baseline conditions, possible environmental impacts, field analysis, and impact & monitoring formulations. This table includes various aspects like physical environment, biological environment, and earthworks (cut and fill equalization), with specific entries for land use patterns, topography, water bodies, natural drainage, type, area, and condition of forest, and topography of the alignment, soil, and geology. Each entry is followed by possible environmental impacts and mitigation measures.
### Impact Prediction & Monitoring

**Mitigation Measures**

<table>
<thead>
<tr>
<th>Project Undertakings</th>
<th>Baseline Condition</th>
<th>Possible Environmental Impact</th>
<th>Field Analysis</th>
<th>Impact Reduction &amp; Monitoring</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>I   M   S</td>
</tr>
</tbody>
</table>

**Physical Environment**

- **Natural drainage pattern**
  - Disturbance to natural drainage patterns resulting in water logging
  - Water logging
- **Location/Topography**
  - Scouring of valley side slopes resulting landslides and erosion
  - Spoil disposal practice adopted by the project. Landslides
  - Spoil disposal practice (designated site/compaction/leveling/rehabilitation with planting vegetation)
- **Land used/Area**
  - Destruction of property (agriculture land, irrigation etc.)
  - Land use nearby disposal site
- **Natural drainage pattern**
  - Disruption of natural drainage
  - Water logging
  - Cross road drainage/side, drainage/surface drainage construction
- **Water bodies**
  - Siltation of surface water
  - Turbidity

**Biological Environment**

- **Location/vegetation type**
  - Disturbance to vegetation
  - Area of vegetation disturbed and condition
- **Locally found aquatic life in the Water bodies**
  - Disturbance to Aquatic life due to siltation
  - Turbidity of the water bodies/change in availability of aquatic life

**Physical Environment**

- **Use of machineries and local ambience**
  - Short-term air and noise pollution from machine operation
  - Site observation
- **Water bodies nearby**
  - Contamination of water bodies due to run-off
  - Water quality of the nearby stream
- **Area and type of land occupied or hired**
  - Temporary loss of land
  - Location of work camp
- **Water bodies nearby**
  - Contamination of water
  - Runoff to water bodies nearby, sanitary condition, water quality
  - Provision of rehabilitation after the project completion

**Biological Environment**

- **Location/vegetation type**
  - Disturbance to vegetation due to site clearance
  - Area of vegetation disturbed and condition
### Physical Environment

<table>
<thead>
<tr>
<th>Project Undertaking</th>
<th>Baseline Condition</th>
<th>Possible Environmental Impact</th>
<th>Field Analysis</th>
<th>Mitigation Measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>Labour camp</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Area and type of land occupied or hired</td>
<td>Temporary loss of land (agriculture land/forest land)</td>
<td>Previous land use of the camp/condition of the camp site</td>
<td>Provision of rehabilitation after the project completion</td>
<td></td>
</tr>
<tr>
<td>Location</td>
<td>Solid waste disposal issues</td>
<td>Waste disposal site and waste disposal system</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Biological Environment

<table>
<thead>
<tr>
<th>Project Undertaking</th>
<th>Baseline Condition</th>
<th>Possible Environmental Impact</th>
<th>Field Analysis</th>
<th>Mitigation Measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>Labour camp</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Area/Type/condition of forest nearby</td>
<td>Pressure to the forest vicinity for fuel wood</td>
<td>Fuel wood consumption by workers</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Locally found fauna including endangered ones</td>
<td>Possibility of illegal hunting/trapping/fishing</td>
<td>Illegal hunting, trapping of wildlife</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Locally found aquatic lives</td>
<td>Impact due to surface and ground water contamination from unsanitary disposal of toilet waste</td>
<td>Number and condition of toilets at camp</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stockpiling of construction materials</td>
<td>Water bodies nearby</td>
<td>Siltation of surface water resulting from uncontrolled runoff from storage piles</td>
<td>Visual turbidity of surface waters</td>
<td></td>
</tr>
<tr>
<td>Biological Environment</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Physical Environment</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Stockpiling of construction materials

<table>
<thead>
<tr>
<th>Project Undertaking</th>
<th>Baseline Condition</th>
<th>Possible Environmental Impact</th>
<th>Field Analysis</th>
<th>Mitigation Measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>Labour camp</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Area and type of land occupied or hired</td>
<td>Temporary loss of land (agriculture land/forest land)</td>
<td>Previous land use of the camp/condition of the camp site</td>
<td>Provision of rehabilitation after the project completion</td>
<td></td>
</tr>
<tr>
<td>Location</td>
<td>Solid waste disposal issues</td>
<td>Waste disposal site and waste disposal system</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Impact Prediction & Monitoring

<table>
<thead>
<tr>
<th>Impact Prediction</th>
<th>Observation/Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>M</td>
</tr>
</tbody>
</table>

### Operation Phase

<table>
<thead>
<tr>
<th>Project Undertaking</th>
<th>Baseline Information</th>
<th>Possible Impact</th>
<th>Field Analysis</th>
<th>Impact Prediction</th>
<th>Observation/Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operation of traffic Maintenance works</td>
<td>Traffic volume</td>
<td>Road safety</td>
<td>Accidents resulting in hospitalization/loss of life</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Traffic volume</td>
<td>Air Pollution</td>
<td>Traffic generating significant dust and vehicular exhaust</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Condition of the forest in vicinity</td>
<td>Illegal harvesting of forest resources</td>
<td>Condition of forest in vicinity of road alignment</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Local fauna including endangered species</td>
<td>Illegal hunting and trapping of wildlife</td>
<td>Illegal hunting</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Natural drainage pattern</td>
<td>Disturbance to natural drainage</td>
<td>Formation of water logs</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Topography/slope/slope stability measures adopted in construction</td>
<td>Slope instability</td>
<td>Landslides</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Erosion or gully development</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Debris falling or being washed on farmland</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Social Components

<table>
<thead>
<tr>
<th>Component</th>
<th>Baseline Information</th>
<th>Possible Impact</th>
<th>Impact Prediction</th>
<th>Observation/Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Resource Use</td>
<td>Forestry</td>
<td>Existing forests nearby the alignment and other components of the road</td>
<td>Local communities affected due to acquisition of their forest land</td>
<td></td>
</tr>
<tr>
<td>Component</td>
<td>Baseline Information</td>
<td>Possible Impact</td>
<td>Impact Prediction</td>
<td>Observations/Comments</td>
</tr>
<tr>
<td>----------------------------</td>
<td>--------------------------------------------------------------------------------------</td>
<td>----------------------------------------------------------------------------------</td>
<td>-------------------</td>
<td>------------------------</td>
</tr>
<tr>
<td>Agriculture</td>
<td>Existing cropping pattern and agricultural practices</td>
<td>Conflict for the use of forestry resources between locals and in-migrants</td>
<td>I</td>
<td></td>
</tr>
<tr>
<td>Water supply and use</td>
<td>Existing water supply system</td>
<td>Disturbance to agricultural production</td>
<td>M</td>
<td></td>
</tr>
<tr>
<td>Land use by migrants</td>
<td>Changing land use pattern</td>
<td>Acquisition of land and property</td>
<td>S</td>
<td></td>
</tr>
<tr>
<td>Health</td>
<td>Existing medical facilities/ Prevailing disease type and number of complains</td>
<td>Possibility of introduction of new communicable diseases</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Socio-Economic</td>
<td>Population/De</td>
<td>In-migration affecting the local social and economic conditions</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Community Infrastructure</td>
<td>Possibility of flow of migrants</td>
<td>Acquisation of public infrastructure</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Existing Public infrastructure and that might be affected by</td>
<td>Local public infrastructure unable to cope with increased population</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Employment/Income</td>
<td>Existing occupation/availability of skilled and unskilled labourers</td>
<td>Less employment opportunity to locals</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cultural Heritage</td>
<td>Existing important sites in the area</td>
<td>Site of historical / cultural/ architectural / archaeological importance being disturbed</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
## ANNEX 13

### Overview of Institutional Mechanisms for Environmental Management

<table>
<thead>
<tr>
<th>ACTIVITY PHASE</th>
<th>NECS, MOA (DOA/EU), DYT</th>
<th>(2) DEC, CONSULTANTS</th>
<th>(3) CONTRACTORS</th>
<th>(4) LOCAL AUTHORITIES</th>
<th>COMMUNITIES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-Construction: Project Identification &amp; Pre-feasibility Studies, Environmental Screening, Initial Social Assessment</td>
<td>Preparation of ToR: Establish coordination committees, Screening, Scoping</td>
<td>Environmental &amp; social activities: Conduct field survey, Conduct EA Study, Conduct social assessment, Identify potentially affected persons, Identify potential compensatory, resettlement &amp; rehabilitation requirements, Involve user groups and potentially affected persons in information gathering and verification of data</td>
<td>Construction</td>
<td>Conduct public consultation, Enable &amp; encourage local resident inputs, Seek feedback from GYT, DYT, Assess project request &amp; GYT programs, Ensure people’s awareness about the project, Identify resettlement requirements, Participate in power tiller road, irrigation channels and RNR center alignment planning</td>
<td>Identify major issues of public concern regarding project</td>
</tr>
<tr>
<td>Feasibility Study: Environmental Assessment Social Assessment</td>
<td>Review and approval of ToR for EIA (if required)</td>
<td>Conduct EIA/SIA Study: Preparation of ToR for EIA (if required), Collect baseline data, Ensure continuing public consultation &amp; participation, Mobilize GYT &amp; communities, Identify &amp; predict impacts, Prescribe/develop mitigation measures with local inputs, Prepare EIA/SIA report &amp; submit to MoA, NEC</td>
<td>Conduct EMP &amp; other impact mitigation, Assure EMP compliance regarding appropriate labor management, social service delivery &amp; dispute resolution, Involve GYT &amp; DYT</td>
<td>Monitor labor, social service delivery &amp; conflict resolution procedures</td>
<td>Participate in public hearings &amp; enable public participation &amp; community consultation, Strengthen people’s awareness to increase involvement &amp; reduce community anxieties, Continue periodic local involvement in all E&amp;S planning activities</td>
</tr>
<tr>
<td>Engineering Design</td>
<td>Review detailed design and accord technical sanction</td>
<td>Monitor EMP &amp; other impact mitigation</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Annex 13, continued:

<table>
<thead>
<tr>
<th>ACTIVITY PHASE</th>
<th>NECS, MOA (DOA/EU)/DYT</th>
<th>(2) DEC, CONSULTANTS (Environmental, Social, Legal, Technical/Engineering, etc.)</th>
<th>(3) CONTRACTORS (Construction)</th>
<th>(4) LOCAL AUTHORITIES (GYT, DYT)</th>
<th>COMMUNITIES (CBOs, NGOs, LCF, user groups)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Project Appraisal &amp; Approval</td>
<td>Review/Approve of EIA Determine the loss of properties &amp; entitlement awards/compensation Supervise monitoring &amp; management of power tiller road, irrigation channels and RNR center construction</td>
<td>Conduct Survey &amp; Design Prepare EMP Prepare SAP Implement EMP &amp; SAP Establish &amp; maintain support activities (in health, education &amp; other services &amp; infra-structural facilities for laborers &amp; communities)</td>
<td>Participate in design of power tiller road, irrigation channels and RNR center alignment, etc Co-ordinate between contractors &amp; other concerned agencies Supervise &amp; Monitor EMP Recommend HRD training &amp; other rehabilitation actions</td>
<td>Mediate any conflicts between local people &amp; project Supervise &amp; monitor EMP, SAP &amp; RAP implementation Enable &amp; encourage a sense of public ownership of the road Tripartite MoU to be prepare</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>IMPLEMENTATION</th>
<th>Contract awarding</th>
<th>Construction</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Contract awarding</td>
<td>Contract consultants &amp; contractors Manage financial accounting Prepare work schedule Monitor &amp; review reports Encourage contractors to employ local laborers Check the ToRs &amp; ensure that social &amp; environmental action plans are followed</td>
<td>See that environmental damages are avoided or mitigated See that beneficial impacts are taken identified and enhanced</td>
<td>Assure local laborers &amp; stakeholders participate in construction &amp; implementing EMP &amp; SAP Manage labor arrangements</td>
<td>Monitor local laborer employment, especially potentially affected peoples &amp; vulnerable groups Monitor project activities</td>
</tr>
</tbody>
</table>

continued→
### Annex 13, continued:

<table>
<thead>
<tr>
<th>ACTIVITY PHASE</th>
<th>NECS, MOA (DOA/EU)/DYT</th>
<th>(2) DEC, CONSULTANTS Environmental, Social, Legal, Technical/Engineering, etc.</th>
<th>(3) CONTRACTORS Construction</th>
<th>(4) LOCAL AUTHORITIES GYT, DYT</th>
<th>COMMUNITIES CBOs, NGOs, LCF, user groups</th>
</tr>
</thead>
<tbody>
<tr>
<td>Monitoring Compliance Monitoring</td>
<td>Monitor technical works Monitor social &amp; environmental works</td>
<td>Prepare monitoring report for client (MoA) Conduct impact monitoring</td>
<td>Maximize employment of local laborers</td>
<td>Assist in the monitoring of consultants Participate in monitoring</td>
<td>Assure information flow on participatory monitoring Compliance with MoU.</td>
</tr>
<tr>
<td>Operations &amp; Maintenance</td>
<td>Conduct post-construction evaluation</td>
<td>Observe power tiller road, irrigation channels and RNR center maintenance &amp; compliance with contract norms Monitor appropriate power tiller road, irrigation channels and RNR center safety measures Assess social and cultural norms Assess impact of project on total life</td>
<td>Maximize employment of local laborers Employ local petty contractors for patchwork Employ locals/migrants in construction to reduce unemployment</td>
<td>Monitor local employment Monitor resolution of claims &amp; other outstanding matters Facilitate employment of affected persons in maintenance works Promote sense of ownership of power tiller road, irrigation channels and RNR center Participate in power tiller road, irrigation channels and RNR center audit</td>
<td>Facilitate conflict resolution between contractors &amp; other stakeholders Assess local employment situation</td>
</tr>
<tr>
<td>Post-Construction Monitoring</td>
<td>Involve in-house consultants Conduct post-construction impact assessment</td>
<td>Observe socio-cultural life &amp; ameliorate changes Observe direct &amp; indirect impact of project in total life</td>
<td></td>
<td></td>
<td>Participate in impact monitoring activities</td>
</tr>
</tbody>
</table>
Annex 14: Guidelines for Preparing an Environmental Management Plan (EMP) for ‘B’ Category Sub-Projects subjected to LEA (Limited Environmental Assessment)

**Introduction:** Provide a description of the work, including the location, context. Include a table showing the contract packaging, if any.

**Project Description:** Describe the various elements of the work proposed to be undertaken in the sub-project. Include a table giving details of the proposed work components.

**Major Findings Of The LEA:** Describe in brief, the major findings of the LEA undertaken. The description, which can be provided in a tabular format, should include (unless irrelevant) the respective impacts of the sub-project on:

- Ambient air quality;
- Water quality, water bodies, groundwater and drainage pattern in the sub-project area;
- Land use, soil quality, inundation;
- Ambient noise environment;
- Flora and fauna of the locality and the surrounding;
- Human use values;
- Cultural properties;
- Resettlement;
- Induced development, etc., and,
- Any other significant environmental impacts associated with the sub-project.

**Environmental Management Measures Proposed:** Provide in the following tabular format, the various mitigation/management measures proposed in the sub-project to mitigate all issues identified in the LEA. List the measures distinctly as per the stages of the project, say, (a) pre-construction, (b) construction, and (c) operation.

*Table 1: Environmental Management Plan*

<table>
<thead>
<tr>
<th>Environmental Impact/Issue</th>
<th>Mitigation Measures</th>
<th>Reference to Contract Documents</th>
<th>Location</th>
<th>Time Frame</th>
<th>Responsibility</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Implementation</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Environmental Monitoring Plan:** The purpose of the monitoring plan is to ensure that the envisaged purposes of the sub-project are achieved and result in desired benefits to the target population. To ensure the effective implementation of the EMP, it is essential that an effective monitoring programme be designed and carried out. The broad objectives of the monitoring are:

- To evaluate the performance of mitigation measures proposed in the EMP
To evaluate the adequacy of Limited Environmental Assessment
To suggest improvements in management plan, if required
To enhance environmental quality
To satisfy the legal and community obligations.

The environmental monitoring plan for the sub-project may be furnished in the following tabular format.

**Table 2: Environmental Monitoring Plan**

<table>
<thead>
<tr>
<th>Environmental component</th>
<th>Project Stage</th>
<th>Monitoring</th>
<th>Institutional responsibility</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Parameter</td>
<td>Special Guidance</td>
</tr>
</tbody>
</table>

**Performance Indicators:** The physical, biological and social components identified as of particular significance in affecting the environment at critical locations need to be suggested as Performance Indicators, and can be listed listed separately in a table. For each performance indicator, threshold values should be indicated. For example, if ambient air quality and water quality are considered as performance indicators, the threshold values may be provided in a tabular format as given below. (Note that there can be any other, and any number of other performance-indicators). It is also important to specify the method of measurement/testing for each of the performance indicators.

**Table 3: Ambient Air Quality Standards**

<table>
<thead>
<tr>
<th>Pollutants</th>
<th>Sensitive Area</th>
<th>Industrial Area</th>
<th>Residential Rural &amp; Other Area</th>
<th>Method of measurement</th>
</tr>
</thead>
</table>

**Table 4: Standard Drinking Water Specification**

<table>
<thead>
<tr>
<th>Substance or Characteristic</th>
<th>Requirement (Desirable Limit)</th>
<th>Undesirable Effect Outside the Desirable Limit</th>
<th>Permissible Limit in the Absence of Alternate Source</th>
<th>Methods of Testing</th>
</tr>
</thead>
</table>

**Reporting Arrangements:** Describe in a tabular format, as given below, the schedule of Reporting on environmental compliance. For each action proposed in the EMP, reporting requirement should be specified, and reporting formats prepared (a single format may include reporting requirements on several EMP actions). The table should specify the frequency of reporting at each level. The reporting should be separate for the (a) pre-construction, (b) construction and the (c) operation stages of the sub-project. The items of reporting as per the EMP, and the schedules may be separately presented in the Table for the above stages of the sub-project. Attaching all the formats for reporting on environmental compliance is required.
**Table 5: Reporting Arrangements and Schedule**

<table>
<thead>
<tr>
<th>Stage of Construction</th>
<th>Format No.</th>
<th>Item</th>
<th>Contractor</th>
<th>Engineers</th>
<th>Line Departments</th>
<th>MoA</th>
<th>WB</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Implementation and Reporting to Engineer</td>
<td>Supervision</td>
<td>Reporting to Line Departments</td>
<td>Oversee/Field Compliance Monitoring</td>
<td>Report to MoA</td>
</tr>
</tbody>
</table>

**Institutional Arrangements:** Describe the organizational requirements identified to implement the EMP. If the organizational capacity is sufficient for implementing the EMP, provide description of the roles and responsibilities of the key persons involved.

**Training:** If training (on implementation and monitoring of the EMP) is required, provide details of the training programme in the following tabular format.

**Table 6: Proposed Training Program**

<table>
<thead>
<tr>
<th>Training Module</th>
<th>Target Group</th>
<th>Subject(s) Covered in the Training Module</th>
<th>Method of Training</th>
<th>Time Frame</th>
</tr>
</thead>
</table>

**Logistical Support Required:** Describe in brief any other logistic support required to successfully implement the EMP. These may include vehicles, testing kits, pollution measuring instruments, etc.

**Bill of Quantities:** Describe in tabular format the bill of quantities for each item of the environmental conservation/protection/enhancement measures.

**Budget for Implementing the EMP:** Provide the detailed budget for implementing each and every aspect of the EMP (during pre-construction, construction and operation stages of the sub-project). A format for EMP Budget is given below.

**Table 7: Environmental Budget**

<table>
<thead>
<tr>
<th>Component</th>
<th>Stage</th>
<th>Item</th>
<th>Unit</th>
<th>Unit Cost</th>
<th>Quantity</th>
<th>Total Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>(A) Mitigation / Enhancement costs</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Measure 1</td>
<td>Construction</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Measure 2</td>
<td>Construction</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Measure 3</td>
<td>Operation</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Sub-Total (A): Mitigation / Enhancement Costs</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(B) Monitoring costs</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Component</td>
<td>Stage</td>
<td>Item</td>
<td>Unit</td>
<td>Unit Cost</td>
<td>Quantity</td>
<td>Total Cost</td>
</tr>
<tr>
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<td>----------</td>
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</tr>
<tr>
<td>Air, etc.</td>
<td>Construction</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Operation</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sub-Total (B): Monitoring Costs</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(C) Training &amp; Other Costs</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Training &amp; Mobilisation Costs</td>
<td>C/O</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Additional Studies</td>
<td>Operation</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Facilities and Equipment</td>
<td>C/O</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Advocacy and policy making</td>
<td>Operation</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(C) Training &amp; Other Costs</td>
<td></td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

Total Costs (A+B+c)

Contingency @ r%

TOTAL BUDGETED COSTS

Specifications for Environmental Enhancement Works: Describe in detail the specifications for (a) material, (b) work and (c) workmanship for each item of the environmental mitigation or enhancement measure. If required, describe a particular activity by its sub-components. For example, specifications for landscape works will include (a) the Scope of work, (b) the materials, (c) the supply and substitution, (d) the packaging, (e) marking, (f) planting of saplings, (g) shrub planting In planter beds, (h) turfing with grasses, (i) maintenance for each item of work, (j) nursery stack, (k) protective fencing, and (l) completion of work, etc.

Appendices: Provide additional information as necessary to implement the EMP. These appendices may include (a) spaces identified for landscaping works, (b) list of recommended borrow areas, (c) list of recommended quarry areas, (d) Reporting Formats, and (e) list of locations where protective measures are necessary.

Drawings: Provide typical and specific drawings, as necessary to implement the EMP. The drawings provided should be adequate for the purpose of construction (sketches are not intended).
Annex 15: EMF Implementation Schedule for a typical subproject

<table>
<thead>
<tr>
<th></th>
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</thead>
<tbody>
<tr>
<td>1. Project Identification</td>
<td></td>
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<tr>
<td>2. Preliminary Investigation</td>
<td></td>
<td></td>
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<tr>
<td>3. Multi-disciplinary feasibility study &amp; EA</td>
<td></td>
<td></td>
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<tr>
<td>4. Design &amp; Preparation of EA report (EMP)</td>
<td></td>
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<tr>
<td>5. Submission of EC application and EA Report</td>
<td></td>
<td></td>
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<tr>
<td>6. Review of EA report</td>
<td></td>
<td></td>
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<tr>
<td>7. Issue of EC</td>
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<tr>
<td>8. Preparation of Bid Documents</td>
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<tr>
<td>9. Advertisement of Tender</td>
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<tr>
<td>10. Selling of Tender Documents</td>
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<tr>
<td>11. Bid Opening &amp; Evaluation</td>
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<tr>
<td>12. Award and Signing of Contract</td>
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<tr>
<td>13. Preconstruction Meeting</td>
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<td>--------------------------------------</td>
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<tr>
<td>1 Start of Construction</td>
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<tr>
<td>4 Daily Monitoring (GYT &amp; Site Engineer)</td>
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<tr>
<td>5 Periodic Monitoring (DEC)</td>
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<tr>
<td>7 Periodic Monitoring (DoA/NECS)</td>
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<td></td>
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<tr>
<td>8 Completion &amp; Submission of Compliance Report</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8 Evaluation of EMP/MoU Implementation</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
## Annex 16: Estimated cost for EMF for DRDP

<table>
<thead>
<tr>
<th>Work description</th>
<th>Unit Cost (Nu. in million)</th>
<th>Total Cost (Nu. in million)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Consultants Conduct EA study, detail EIA, develop EMP and prepare EIA report for farm road sub-projects (for approximately 35 schemes)</td>
<td>0.08</td>
<td>2.8</td>
</tr>
<tr>
<td>Personnel Will be funded from normal RGOB budget</td>
<td>-</td>
<td>-</td>
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<tr>
<td>EA Process Will be funded from normal RGOB budget</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Training Community, GYT, DYT, MoA environmental management training over 2 years</td>
<td>1.76</td>
<td>3.52</td>
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<tr>
<td><strong>Total</strong></td>
<td></td>
<td><strong>6.32</strong></td>
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</table>