ROYAL GOVERNMENT OF BHUTAN

MINISTRY OF AGRICULTURE AND FORESTS

ENVIRONMENTAL MANAGEMENT FRAMEWORK

Bhutan: Remote Rural Communities Development Project

August 2012
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### ACRONYMS AND GLOSSARY OF BHUTANESE TERMS

#### Acronyms

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<th>Description</th>
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<tr>
<td>ADB</td>
<td>Asian Development Bank</td>
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<tr>
<td>CA</td>
<td>Competent Authority</td>
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<td>Danida</td>
<td>Danish International Development Assistance</td>
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<tr>
<td>DAO</td>
<td><em>Dzongkhag</em> Agriculture Officer</td>
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<tr>
<td>DE</td>
<td><em>Dzongkhag</em> Engineer</td>
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<tr>
<td>DFEO</td>
<td><em>Dzongkhag</em> Forestry Extension Officer</td>
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<tr>
<td>DoFPS</td>
<td>Department of Forest and Park Services</td>
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<td>DoA</td>
<td>Department of Agriculture</td>
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<td>DoR</td>
<td>Department of Roads</td>
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<tr>
<td>DRDP</td>
<td>Decentralized Rural Development Project</td>
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<tr>
<td>DT</td>
<td><em>Dzongkhag Tshogdu</em></td>
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<tr>
<td>EA</td>
<td>Environmental Assessment</td>
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<tr>
<td>EAA</td>
<td>Environmental Assessment Act, 2000</td>
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<td>EC</td>
<td>Environmental Clearance</td>
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<td>ECOP</td>
<td>Environmental Codes of Practice</td>
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<td>EFRC</td>
<td>Environment Friendly Road Construction</td>
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<td>FNCA</td>
<td>Forest and Nature Conservation Act, 1995</td>
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<td>FNCR</td>
<td>Forest and Nature Conservation Rules, 2000</td>
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<td>FRC</td>
<td>Farm Roads Construction</td>
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<td>FRMC</td>
<td>Farm Road Management Committee</td>
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<td>FYP</td>
<td>Five-Year Plan</td>
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<td>GT</td>
<td><em>Dzongkhag Tshogdu</em></td>
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<tr>
<td>IPM</td>
<td>Integrated Pest Management</td>
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<td>ISD</td>
<td>Irrigation Scheme Development</td>
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<tr>
<td>LoU</td>
<td>Letter of Understanding</td>
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<tr>
<td>MoA</td>
<td>Ministry of Agriculture and Forests</td>
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<tr>
<td>MoU</td>
<td>Memorandum of Understanding</td>
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<tr>
<td>NECS</td>
<td>National Environment Commission Secretariat</td>
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<tr>
<td>NIP</td>
<td>National Irrigation Policy</td>
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<tr>
<td>Nu.</td>
<td><em>Ngultrum</em></td>
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<tr>
<td>PA</td>
<td>Protected Area</td>
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<tr>
<td>PAB</td>
<td>Pesticides Act of Bhutan, 2000</td>
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<tr>
<td>RECOP</td>
<td>Regulation for the Environmental Clearance of Projects, 2002</td>
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<td>RGoB</td>
<td>Royal Government of Bhutan</td>
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<td>RNR</td>
<td>Renewable Natural Resources</td>
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<tr>
<td>SEA</td>
<td>Strategic Environmental Assessment</td>
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<tr>
<td>WB</td>
<td>World Bank</td>
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<td>WUA</td>
<td>Water Users’ Association</td>
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<td>BHUTANESE TERMS</td>
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<tr>
<td><strong>Chathrim</strong></td>
<td>Act, rules and regulations, codes of conduct</td>
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<tr>
<td><strong>Dungkhag</strong></td>
<td>Sub District</td>
</tr>
<tr>
<td><strong>Dzongdag</strong></td>
<td>District Administrator</td>
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<tr>
<td><strong>Dzongkhag</strong></td>
<td>District</td>
</tr>
<tr>
<td><strong>Dzongkhag</strong></td>
<td>Administrative block</td>
</tr>
<tr>
<td><strong>Gup</strong></td>
<td>Elected head of a <strong>Dzongkhag</strong></td>
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<tr>
<td><strong>Ngultrum</strong></td>
<td>Bhutanese currency, pegged to Indian Rupee</td>
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<tr>
<td><strong>Sokshing</strong></td>
<td>Forest registered in a household’s name for collection of leaf litter for use in farmyard manure</td>
</tr>
<tr>
<td><strong>Tsamdo</strong></td>
<td>Land over which a community or household has customary grazing rights</td>
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<tr>
<td><strong>Tseri</strong></td>
<td>Slash and burn cultivation</td>
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EXECUTIVE SUMMARY

The Royal Government of Bhutan (RGoB) will be implementing the Improving Rural Livelihood Project (IRLP) with World Bank financing to support rural development activities based on the Dzongkhag plans formulated for the 10th Five Year Plan (July 2008 – June 2013). The project area would consist of 26 Gewogs with a population of 208,908 in six Dzongkhags of south-western and south-central Bhutan (Haa, Chukha, Samtse, Dagana, Trongsa and Wangdue). The 26 Goegs has an area of 5,060 square km of which 4,400 sq km is forest cover and 198 sq km is agriculture land. The project aims to enhance agriculture production systems and to create income generating opportunities for poor communities in the project area through improved access to rural infrastructure and introduction to better agricultural technologies.

The proposed project has two components: Rural Infrastructures and Agricultural Productivity, and Project Management and Institutional Support.

Component A - Rural Infrastructure and Agricultural Productivity. This component has three subcomponents: i) Rural Infrastructure, ii) Community Marketing and Productive Infrastructure, and iii) Improving Productive Assets of Existing Producers Groups.

Under Rural Infrastructure, the project will finance farm roads and irrigation schemes. Project will support improvement and maintenance of existing farm roads and/or construction of new farm roads. The irrigation schemes to be supported include small farmer’s managed community irrigation scheme (mainly rehabilitation, few new construction) as well as new technologies such as gravity fed pressure pipe system, sprinkler and drip irrigation. The project may also support Water Storage Structure in the form of rain-water harvesting pond and use of small pumps to supplement these structures.

Community, Marketing and Productive Infrastructure will include demand driven small-scale or micro-scale community infrastructure in the poorest communities within the project area. These may include drinking water, foot bridges, gravity ropeways, community schools, post-harvest storages, hydro-grinding mills, grading, processing and collection and marketing centers.

Improving Productive Assets of Existing Producers Group will support new screen house for National Seed Centre and diagnostic equipment for National Plant protection Centre, and will rehabilitate Citrus Orchards (368 ha in four districts) and rehabilitate Cardamom Plantation (275 ha in five districts). This subcomponent will also support: i) dairy production through 5 Milk-Producer Groups (30 hh each) in five districts, ii) poultry production through 4 Poultry Producer Groups (30 hh each) in four districts, iii) value adding activities and sustainable management of timber and non-timber forest products (NWFP) in 33 existing Community Forest Groups, iv) 10 demonstration pilots to raise farmer’s awareness of the availability of effective wildlife damage defense systems/technologies, and v) 18 demonstration pilots to raise farmer’s awareness of the availability of effective sustainable land management technologies, including terracing.
**Component B - Project management and institutional support.** This component would strengthen the capacity of the Ministry of Agriculture and Forests (MOAF) to effectively coordinate implementation.

Bhutan has well-preserved natural environment. Land use surveys of 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). The project *Dzongkhags* have a true forest coverage\(^1\) that is higher than or equal to the national average of 64.4 per cent. Among the project *Dzongkhags*, Dagana has the highest forest cover (nearly 80 %) and Samtse lowest with about 64% forest cover. Major forest types are subtropical broadleaf, warm broadleaf, cool broadleaf and coniferous forests.

The Jigme Singye Wangchuck National Park is the only protected area in the project area. The *Phobjikha* valley has been recognized as area of special conservation value. A biological corridor passes through Wangdue *Dzongkhag* that connects Jigme Singye Wangchuck National Park to Jigme Dorji National Park. However, the corridor does not pass through the project areas.

Most part of the project area is characterized by rugged and mountainous terrain, with river valleys. The project area elevation varies from 600 m to 5800 m. The young mountain, steep slopes and several fault lines make the landscape physically fragile. Landslides and erosions are natural and common, and are driven by high rainfalls during monsoon (June through September). Project area climate varies with the altitudes. The climate is subtropical (humid or dry) at lower altitude (below 1800 m), temperate in the middle altitude (between 1800m to 3500m), and, Alpine in the north or higher altitude (more than 3500 m). The project activities would be implemented mainly in the subtropical and temperate areas. Average annual rainfall in the project area ranges widely, from about 750 mm in some parts of Dagana and Wangdue to 5,000 mm in southern parts of Samtse (NSB 2009). The main rainfall period is summer monsoon (June through September), when 60 to 90 percent of annual rain falls. The monsoon brings heavy rains, high humidity, flash floods and landslides. The temperatures in the project area also vary according to elevation.

Agricultural land is limited. Agricultural land in project area covers only 198 square kilometer of the total area. River valleys with gentle slopes, flood plain and other plain areas are the main cultivated areas. Agriculture practice in the project area is largely traditional, manual and subsistence. Livestock is part and parcel of traditional agriculture system. Forest and livestock provide organic materials needed for land fertility.

Bhutan is very rich in physical and cultural sites. However, there is neither historical site nor any religious monument that is known or listed nationally or internationally in the project area (26 Gewogs). Local cultural sites of different types are found commonly in and around villages, settlements and along the travel routes.

Although the natural environment is more or less intact until now, the country including the project area, in recent times, is showing symptoms of increasing pressure on the environment mainly due to population growth, and infrastructure development, such as

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\(^1\) True forest coverage excludes area under scrub forest.
localized deforestation is occurring and overgrazing is happening, landslides and soil erosion, and flash floods events are increasing. In recent time, farmers and grazers have continued to face human-wildlife conflicts such as crop and livestock depredation.

Environmental concerns of the project are mainly related to the infrastructure works including Farm Roads, and Farmers Managed Irrigation Schemes. The project will support short farm roads of about 6 km length (in total about 34 km of farm road in all districts). The farm road improvement/maintenance will include surface improvement (gravelling) and drains, and may need little widening (typically 1.5 m or so) at few locations. Support to the community irrigation schemes include rehabilitation or improvement of existing community managed schemes (mainly improving side intakes and canal seepage control). Average length of the irrigation channel would be about 6 km, the channels are typically 1 m to 1.5 m wide and less than 1 m deep. The water storage facility/pond envisaged would be typically 20m long x 15 m wide x 2.5 m deep. These are all small scale infrastructures.

The environmental impacts from these infrastructure works varies according to the infrastructure type, size, and location. Highly significant, large extent, and/or irreversible adverse environmental impacts are not expected because: small-scale demand-driven community infrastructure, these will not be concentrated in a locality (but will be dispersed widely in six different districts), not-eligible if it is located in protected area and/or if it is environmentally sensitive (negative list), and environment-friendly techniques will be used in implementation of the subproject and activities. Overall, the project is likely to have moderate to low and site specific environmental risks. These impacts are readily manageable as mitigations for such impacts are known and already in practice in Bhutan or can be readily specified and implemented. The environmental issues related to construction of these infrastructures are: i) Landslide and soil erosion, ii) Loss and/or degradation of forest and vegetation, iii) Health & safety, and sanitation issues, and iv) Construction period disturbances. Mitigation for these impacts are already known and practised in Bhutan, for example proper spoil disposal/management, good alignment/site selection, providing retaining structures, use of plantation/bio-engineering, water management, avoid forest area as far as possible, ensure minimum tree cut and land clearance, no land clearance in high risk, provision facilities at labour camps (latrines, garbage pits, water), providing the safety items to workers (boots, hats, gloves and first-aid at work sites), appropriate storage of construction materials, water sprinkling at dusty sites, etc.

The activities under Improving Productive Assets of Existing Producer Groups are likely to be environmentally neutral as the support intends to help farmers to increase productivity making use of improved road access and irrigation. The project will be supporting Bhutan's environment-friendly agriculture policy, such as organic farming as far as possible (and IMP at the most), selecting/promoting/improving local higher yield crop variety, training and support for well-tested and already ongoing livestock support package, better/more efficient use of non-wood-forest-products, sustainable land uses (terracing), and locally developed and tested measures for protecting crops from wild-life. Use of low risk pesticide, WHO Category II at the most, for seed protection and for citrus disease control (as part of an IPM) is possible, in which case FAO and WHO guidelines will be followed. The high risk (i.e. WHO Category Ia and Ib) pesticides are banned/ineligible. Purchase, transport, storage and use of pesticides are strictly controlled by the state from centre.
Bhutan has reasonably sound environmental policies and regulations. The environmental provisions are scattered in many different acts, rules, directives and manuals as well as quality standards. For example, the forest regulation prohibits any construction, inside a Protected Areas (PA), except with written permission. In the core zone of PA only activity necessary for achieving conservation objective are permitted. Certain activities are strictly controlled. Chemical pesticides procurement/import, distribution and use is well controlled through a centralized system and is legally governed by The Pesticides Act of Bhutan, 2000. Activity within 50 m distance of a cultural site or sacred landscapes will require official clearance from the Ministry of Home and Cultural Affairs.

Bhutan environmental system requires all development projects/ activities acquiring environmental clearance (EC) from National Environmental Commission Secretariat (NECS) or Competent Authority (CA), unless an activity is exempted. A proponent applies for EC in a format. The EC application needs to contain: a) No Objection Certificates (NoCs), b) Environmental Information (EI). The EI need to include: potential adverse environment effects, compliance plan, a management plan (for avoiding, minimizing, or reducing impacts), and environmental and other benefits of the project. CA checks the EI and NoCs, as part of environmental screening. The screening may leads to one of three outcomes: (a) issuance of an EC; (b) requirement for further study (Environmental Assessment - EA); or (c) rejection of the application. Consultation with affected communities is expected to take place during the NoC and the EA process. The EC issuing agency is responsible for monitoring the compliance. NECS and/or CA are mandated for annual compliance monitoring.

The project activities are likely to trigger Environmental Assessment, Forestry Policies and the Pest Management of the World Bank, and Physical Cultural Resources Policies may be triggered for precautionary reasons.

Following agencies will be involved in the implementation of the project: Ministry of Agriculture and Forests (MOAF), Dzongkhag Administration, Dzongkhag Administration, Chiwog, Contractor, and Community/ Users. The National Environmental Commission Secretariat (NECS), MOAF, and District Environmental Committee (DEC) have environmental roles and mandates.

Following types of activities are not eligible for funding under the project.

- Subproject/ activity located in the protected area or area proposed for protection or area of known high conservation value, or nearby an area, which is known to be a critical wildlife habitat.

- Subproject/ activity in areas where land slope is more than 45 degree and/ or known high landslide/ erosion risk area.

- Subproject/ activity that lead to construction of dam / water retaining or diversion structure that is 10 m or more in height, or if it pose significant disaster risks in the event of breaks.
- subproject / activity that will require full Environmental Assessment by the Bhutan Environmental Assessment Act and Regulation

- 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

- Subproject/ activity that will lead to purchase/ use of pesticides that fall in WHO Class Ia and Ib, and any pesticide that are banned by RGoB (Annex 3 List of Permissible Pesticide).

- Any activity that may adversely impact nationally and/or internationally renowned/ listed cultural site (within 50 m of its premise).

Table below summarize project’s environmental steps in relation to subproject planning, design and implementation steps.

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<tr>
<th>Project step</th>
<th>Environmental step</th>
<th>remarks</th>
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<tr>
<td>Pre-feasibility and/or feasibility study (after Dzongkhag selects the concept for further consideration)</td>
<td>Collection of preliminary environmental information together with project pre-feasibility or feasibility field investigation. (by DEC) Obtain relevant NoCs. Preliminary analysis of subproject’s environmental risks and identification of probable mitigation / recommendations.</td>
<td>Pre-feasibility and/or Feasibility Report contains environmental section in which environmental situation of project site/immediate surroundings, potential risks to the subproject, and probable mitigations will be described. Report contains NoCs also.</td>
</tr>
<tr>
<td>Selection of subproject pre-feasibility or feasibility report for preparing Detailed Project Report (DPR).</td>
<td>Review the environmental information provided in the pre-feasibility or feasibility report, and carry out Initial Environmental Screening.</td>
<td>Initial Environmental screening will check: i) if the subproject is eligible, ii) if the subproject is exempted by Bhutan environmental laws from further environmental investigation, and iii) who is the Competent Authority for reviewing and issuing environmental clearance.</td>
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<tr>
<td>Preparation of subproject DPR by PCU/PMT on behalf of the community.</td>
<td>PCU/PMT also prepares EI as required by Bhutan law (if not exempted). NoCs are checked and if needed additional NoCs obtained.</td>
<td>EI needs to be prepared before DPR preparation so that environmental inputs go into DPR. EI and/or DPR also contain all NoCs.</td>
</tr>
<tr>
<td>Incorporation of environmental recommendation into subproject plan &amp; design, bids, contract/ MoU (supported and ensured by PMT)</td>
<td>Prior to finalization of DPR including bid documents or MoU.</td>
<td></td>
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<tr>
<td>Approval of DPR by PSC.</td>
<td>Obtain EC, if not exempted</td>
<td>Prior to DPR approval</td>
</tr>
<tr>
<td>Bidding and awarding contract or signing MoU</td>
<td>Brief prospecting contractors/implementer on environmental requirements</td>
<td>Prior to bidding or finalizing MoU</td>
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<td>--------------------------------------------</td>
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<tr>
<td>Construction mobilization order</td>
<td>Implementers prepares Site-Environmental Management Plan</td>
<td>Site-in-charge will approve the site-EMP before works at site begins</td>
</tr>
<tr>
<td>Supervision, and monitoring</td>
<td>DEC and/or PPD (by itself or engaging private/ NGO) carry out compliance monitoring every three month (to each EC required subprojects and sample of EC not required subproject). Environmental Audit during MTR and end of project</td>
<td>Monitoring report is shared with Dzongkhag and PMT, who will instruct site-in-charge and implementers for necessary actions. PMT and Dzongkhag follows up on implementation.</td>
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Inadequate capacity at various levels is a constraint in effective and efficient environmental management of the project. There is no environmental unit at the MOAF yet, and there is no environmental staff at the ministry or PPD. PPD of the ministry has been assigned the environmental CA function. DEC has an Environmental Officer deputed from NECS in recent times. At present, NECS and PPD both have not been able to carry out periodic monitoring. The DEC Environmental Officer is responsible not only for Dzongkhag's activities but also asked to support various line agencies. Dzongkhags’ and communities’ knowledge and insights of local environment is very good, but their ability to prepare documents that is required by the legislations and guidelines is very low. Contractors also lack capacity in preparing the construction site environmental management plan. In order to overcome the capacity weaknesses identified above, the project includes following capacity strengthening measures: Recruitment of a Environmental Specialist/consultant to support PMT, need-based hiring of additional short-term environmental consultants, tailored and targeted and need-based awareness, orientations and training, engaging private sector or NGO such as School Nature Clubs for certain type of environmental activities(for example monitoring), and funding special studies, if needed, during implementation. These activities are estimated to cost about Nu 9 million. The subproject specific environmental mitigation cost will be internalized within the subproject DPR.
CHAPTER 1. INTRODUCTION AND PROJECT DESCRIPTION

The Royal Government of Bhutan (RGoB) will be implementing the Improving Rural Livelihood Project (IRLP) with World Bank financing to support rural development activities based on the Dzongkhag plans formulated for the 10th Five Year Plan (July 2008 – June 2013). Given that there is high demand and need for the renewable natural resources (RNR) activities to enhance agriculture production systems and to create income generating opportunities for poor communities in the project area through improved access to rural infrastructure and introduction to better agricultural technologies. The project area would consist of 26 Gewogs in six Dzongkhags of south-western and south-central Bhutan (Haa, Chukha, Samtse, Dagana, Trongsa and Wangdue).

An assessment of the environmental consequences of the proposed project was necessary to understand the risks and to identify potential ways to avoid, minimize, mitigate and manage any adverse effects that might arise. Project envisages several small scale community infrastructures and activities spread far and wide in six different districts. As precise location of the potential subproject, an exact size are not-known during preparation, preparation of an Environmental Management Framework (EMF) for use during implementation, when subproject/activity location and size will be known, would be an appropriate approach.

1.1 Objective of the assessment

The overall objective of the current assignment is to prepare an Environment Management Framework (EMF) for the proposed project. Following are the specific objectives:

a. To carry out an environmental review of the project (component as well as activities) and identify potential environmental concerns/ issues related to each component and type of activity considering locations as well as construction & operation period risks.

b. To review environmental policy, acts/ regulations, guidelines and directives of Bhutan and the World Bank safeguard policies including Environmental Health and Safety Guidelines of IFC in order to identify applicable provisions in the proposed project.

c. To assess the environmental capacity of the institutions involved in the program, and to develop a plan for addressing the identified capacity gaps.

d. To prepare an Environmental Management Framework (EMF) for the proposed project based on the above analysis and assessment.

1.2 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, 10th FYP Main Document, RNR Sector 10th FYP documents, and relevant Dzongkhag and Dzongkhag 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, District Tshogdu (GT) members, and local villagers in the field. Field visits include visits to a few existing farm roads, an irrigation scheme, in Chhukha and Wangdue Dzongkhags. A stakeholder consultation was organized in Thimphu on 17 May 2012. See Annex 1 (List of officials and stakeholders met), and Annex 1 (List of Stakeholders met and Summary of Consultations).

1.3 Project Description

1.3.1 Location

The project area would consist of 26 Gewogs in six Dzongkhags of south western and south-central Bhutan including Haa, Chukha, Samtse, Dagana, Trongsa and Wangdue Dzongkhags. Figure 1 below shows the project location (six Dzongkhags and 26 Geogs).

Figure 1: Project Dzongkhags and Geogs

1.3.2 Project Objective

The key objectives of the proposed project are to enhance agriculture production systems and to create income generating opportunities for poor communities in the project area through improved access to rural infrastructure and introduction to better agricultural technologies.

These objectives would be achieved by improving access to roads, irrigation and marketing infrastructure, stimulating agriculture productivity growth, improving community and social
infrastructure and supporting development of employment opportunities in the selected Dzongkhags. Improvement in market access would be achieved by investments in marketing and road infrastructure. Social infrastructure of community demand would be improved based on set criteria. Agricultural productivity and rural incomes would increase through improved irrigation water supply, addressing issues related to production of essential commodities and farm land constraints, and by expanding production of main food produces. Employment opportunities would result from community engagement in farm and non-farm income generating activities. The composition of infrastructure investments would be governed by the provisions contained in the 10th Five-Year Plan (2008-2013) and anticipated provisions under the forthcoming 11th Five-Year Plan (2013-18).

1.3.3 Project components.

The project has three main components- Rural Infrastructure and Agricultural Productivity, Community Investments and Project Management and Institutional Support.

Component A. Rural Infrastructure and Agricultural Productivity. This component would finance combination of the improved access to markets and services with investments in rural roads, together with investments in irrigation, social infrastructure, post-harvest handling, storage, and processing to allow households to respond fully to the opportunities created by improved connectivity and productivity. This component would consist of five sub-components:

1. Rural Infrastructure

   • Farm Roads: Project would support construction of new Farm Roads and maintenance/improvement of existing Farm Roads. The maintenance support mainly includes surface improvement (gravelling) and drains. This will be implemented by Dzongkhag Agriculture Sector with support from Dzongkhag Engineer. Total length of road in five districts would be about 34 km, and average size of a contract is about US$ 500 K.

   • Irrigation Infrastructure: All irrigation schemes to be supported under the project would be Farmers Managed Community Irrigation schemes. Support will include mainly rehabilitation of existing irrigation schemes as well as a few new irrigation schemes. These are all small-scale schemes. Together with irrigation scheme, project may support new technologies such as gravity fed low pressure pipe systems and integration with micro irrigation (sprinklers and drip irrigation). The project may support Water Storage Structure in the form of rain-water harvesting pond and small water holding facility to supplement water during dry period. The project will also look into the potential for the use of small pumps to supplement these structures. This will be implemented by Dzongkhag Agriculture Sector with support from Dzongkhag Engineer. Average size of a contract will be US$ 30 K (maximum could be US$ 100K), and some contract could be very small community contract. It is expected that project would support about 67 irrigation schemes (serving up to 1,000 ha), 12 water storage structures, and about 60 ha of new irrigated land.

2. Community, Marketing and Productive Infrastructure

This will include demand driven small-scale or micro-scale community infrastructure in the poorest communities within the project area. The project will support the following type micro-subprojects: drinking water, foot bridges, gravity ropeways, electricity, community schools, basic health post structure and outreach clinics. Post-harvest storages and hydro-grinding mills can also
be supported such as storage, grading, processing and collection and marketing centers. A
subproject that cost more than US $ 20,000 would not be eligible under this category: size of the
civil work is normally under US$10K. About 100 micro-infrastructures are expected in selected
communities from 9 targeted Dzongkhags. This will be implemented by Dzongkhag (Dzongkhag
RNR Extension Officer with support from Dzongkhag Engineer).

3. Improving Productive Assets of Existing Producers Group

- At the centre, project will support new screenhouse for National Seed Centre (below
US$150K) and diagnostic equipment for National Plant protection Centre (below
US$100K). This will be implemented by MoAF.
- Rehabilitation of Citrus Orchards and Rehabilitation of Cardamom Plantation: The
project would support citrus replanting program through an area-wide approach for
about 368 ha in Chukha, Dagana, Samste and Trongsa districts. Existing citrus-
producer association will be supported for uprooting and destruction of infected trees
and provision of new seedling for replanting, and provision of protective gear for
chemical spraying. Cardamom-Producer Association will be supported with new
seedlings for cardamom replantation through area-wide approach in about 275 ha in
Haa, Chukha, Dagana, Samste and Trongsa districts. This will be implemented by
Dzongkhag Development Committee with support from Dzongkhag RNR Extension
Officer. One support would be smaller than US$ 30K.
- Dairy and Poultry: Project will support 5 Milk-Producer Groups (30 hh each) in Haa,
Chukha, Dagana, Samste and Trongsa by subsidized provision of two dairy cows per
hh with improved breeds, shed building, pasture fencing material, and milk measuring
and storage equipment. Project will support 4 Poultry Producer Groups (30 hh each)
in Chukha, Dagana, Samste and Trongsa by subsidized provision of 180 pullets per
household, bird housing material and other critical equipment. The dairy cows and
chicken will be procured by MoAF. The remaining, small goods packages (smaller
than US$ 3 to 5) will be procured by Dzongkhag Development Committee together
with Dzongkhag RNR Extension Officers (livestock officer).
- Wood and NWFP: Project will support 33 existing Community Forest Groups in Haa,
Chukha, Dagana, Samste, Trongsa and Wandue districts for value adding activities
and support to sustainable management of timber and non-timber forest products
(NWFP). This will be implemented by Dzongkhag Development Committee together
with Dzongkhag RNR Extension Officer (Forestry Officer). All contracts are very
small (less than US$10K).
- Wildlife Management Technologies: Project will support 10 demonstration pilots in
Haa, Chukha, Dagana, Samste and Wangdue district to raise farmer’s awareness of
the availability of effective wildlife damage defense systems. Implemented by
Dzongkhag Development Committee together with Dzongkhag RNR Extension
Officer (Agriculture Officer): purchase the energizer and fencing material\(^1\) from the
Plant Protection Centre.
- Sustainable Land management Technologies: Project will support to 18 demonstration
pilots covering about 558 ha of land to raise farmer’s awareness of the availability of
effective sustainable land management technologies, including terracing. Implemented by Dzongkhag Development Committee together with Dzongkhag RNR

\(^1\) the Wengkhar Research Centre and the National Post Harvest Centre under the coordination of the National Plant
Protection Centre has developed and tested wildlife damage mitigation. The Plant Protection Centre is the only
authorized supplier of this type of equipment.
Extension Officer (Agriculture Officer). Construction materials will be procured at Dzongkhag level, but contract implementation is done at Dzongkhag level. The expected civil works would be minor civil (usually less than US$10K).

Component B. Project management and institutional support. This component would strengthen the capacity of the Ministry of Agriculture and Forests (MOAF) to effectively coordinate implementation. This component would support: project management, capacity building, and monitoring and evaluation. The support includes: (i) project orientation as needed; (ii) baseline and completion surveys; (iii) preparation of case studies and best practice documentation; and (iv) a limited support for targeted research.
CHAPTER 2 – DESCRIPTION OF PROJECT AREA ENVIRONMENT

2.1 Country Overview

Bhutan is internationally reputed for its well-preserved natural environment. Stable political leadership, nature-reverent religious ethics, 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).

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 Dzongkhagographical area: eleven different vegetation zones have been identified in the country. 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. 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 Figure 2). The system, 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.

Map of the Protected Areas System of Bhutan

Figure 2: Protected Area of Bhutan
2.2 Project area environment overview

2.2.1 Protected area and Forest.

The Jigme Singye Wangchuck National Park is the only protected area in the project area. The Phobjikha valley, adjacent to the northwestern boundary of Jigme Singye Wangchuck National Park, has been recognized as area of special conservation value. 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 Phobjikha valley every winter (October to March). Areas of Athang and Phobji (partly in buffer zone) Gewogs in the southeastern part of the Wangdue Dzongkhag fall inside Jigme Singye Wangchuck National Park.

A biological corridor passes through Wangdue Dzongkhag that connects Jigme Singye Wangchuck National Park to Jigme Dorji National Park. However, the corridor does not pass through the project areas i.e. Athang Dzongkhag which is located in Wangdue Dzongkhag.

The forest cover in the project area is very good. The project Dzongkhags have a true forest coverage\(^2\) that is higher than or equal to the national average of 64.4 per cent. Among the project Dzongkhags, Dagana has the highest forest cover (nearly 80%) and Samste lowest with about 64% forest cover. Major forest types are subtropical broadleaf, warm broadleaf, cool broadleaf and coniferous forests. The natural environment of the project area is intact because of the good forest cover. Table below summarize land use (forest cover, agriculture land) in the project districts.

<table>
<thead>
<tr>
<th>Dzongkhag</th>
<th>Dzongkhags</th>
<th>Area Sq Km</th>
<th>Forest cover %</th>
<th>Agri area %</th>
<th>Livestock population</th>
<th>Livestock density</th>
<th>Forest Area Sq Km</th>
<th>Agri area Sq km</th>
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<td>61.7</td>
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</tbody>
</table>

\(^2\) True forest coverage excludes area under scrub forest.
Besides the wildlife and bird habitat, forest is important in the living of the project area people. Agriculture and livestock are the dominant livelihood activities in the project area, and forests have very important linkages with both agriculture and livestock practices. Forest is also helping to preserving fragile mountain/ hill slopes, conserving watershed, controlling erosion and land degradation, and maintaining local water sources.

### 2.2.2 Climate, water and hydrology

Project area climate varies with the altitudes and covers an area approximately 5,060 square kilometer. The climate is subtropical (humid or dry) in the south plains/foothills & at lower altitude (below 1800 m), temperate in the middle altitude (between 1800m to 3500m), and, Alpine in the north or higher altitude (more than 3500 m). The project activities would be implemented mainly in the subtropical and temperate areas. Average annual rainfall in the project area ranges widely, from about 750 mm in some parts of Dagana and Wangdue to 5,000 mm in southern parts of Samtse (NSB 2009). The rainfall is affected by monsoons. Monsoons bring between 60 and 90 percent of the project area rainfall. Project area experiences dry winter months (December through February) and almost no precipitation until March. The main rainfall months are June through September. The summer monsoon (June through September) brings heavy rains, high humidity, flash floods and landslides. The temperatures in the project area also vary according to elevation. Temperature in the subtropical areas varies typically from 29 to 35 degree Celsius during summer and 3 to 12 degree Celsius during winter, and in temperate zone it varies from 22 to 26 degree during summer and about 1 degree during winter.

The major rivers that run through the project area are Wang Chhu, Mangde Chhu, and Puna Tsang Chhu (or Sunkosh). These rivers offer good potential for hydropower development, and are nationally important. Besides, these bigger rivers, there are numerous local streams and springs which are used by local people for drinking, irrigation and other purposes (such as indigenous water mills, micro-hydropower schemes etc).

### 2.2.3 Topography, and Geology

Most part of the project area is characterized by rugged and mountainous terrain, with river valleys. The project area elevation varies from 600 m to 5800 m. The foothills and plains area are located in the southern parts of the project area. The main Boundary Thrust Fault and Central Boundary Thrust Fault lines run through parts of the project distracts and some of Dzongkhags. Some areas of Samtse, Chukha and Dagana Dzongkhags shows higher landslides and erosions risks around these fault lines.

<table>
<thead>
<tr>
<th>Samtse</th>
<th>Dungtoe</th>
<th>48.3</th>
<th>79.3</th>
<th>11.9</th>
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</table>
The young mountain, steep slopes and several fault lines make the landscape physically fragile. Landslides and erosions are natural and common in the given geological and topographic conditions, and are driven by high rainfalls during monsoon (June through September). In a locality, it is possible to identify areas of relatively higher risks of landslides and erosion and areas that have relatively lower risks.

2.2.4 Agriculture area, and agriculture practices

Agriculture has a dominant role in the livelihood and economy of the project area people. However agricultural land is limited. Agricultural land in project area covers only 198 square kilometer of the total area. River valleys with gentle slopes, flood plain and other plain areas are the main cultivated areas. Available land is under increasing competing demand.

Agriculture practice in the project area is largely traditional, manual and subsistence. Use of chemical fertilizer and pesticide is negligible or none. Depredation of crops by wildlife is a problem commonly complained by the local farmers. Depending on the availability of water and nature of land, farmers practice wetland (irrigated), dry-land (rain-fed), and shifting cultivation.

Livestock is part and parcel of traditional agriculture system. Forest and livestock provide organic materials needed for land fertility. Forest/vegetation covers are also important for regulating the availability of water for agricultural purpose. Agriculture development is hampered due to lack of irrigation, rough terrain, poor soil quality and limited number of arable lands.

2.2.5 Physical Cultural Resources

Bhutan is very rich in physical and cultural sites. Trongsa and Wangdue have one renowned Dzongs each, whereas other Dzongkhags does not. At the project sites in the 26 Gewogs, there are neither historical sites nor any religious monuments that is known or listed nationally or internationally, and that may be affected by any of the proposed sub-projects.

However, religious and/or cultural sites of local values are many in rural Bhutan. Local cultural sites of different types are found commonly in and around villages, settlements and along the travel routes. These could be temples, monastic institution, stupas, sacred natural features, dwelling place for deities, holy tree, cremation sites, etc.

2.2.6 Profile of the project districts

The six Dzongkhags (Haa, Chukha, Samtse, Dagana, Trongsa and Wangdue) proposed for this project has 26 Goegs with an area of 5,060 square km and a population of 208,908 (Census 2005). It has a forest cover of 4400 square kilometers and agriculture land of 198 Sq Km in the project Dzongkhags.

Haa Dzongkhag: Haa Dzongkhag has an area 1898.92 Sq km and has 6 Gewogs. The Dzongkhag is characterized by rugged and mountainous terrain, and communities are located in remote settlements. The Dzongkhag is topographically divided into north and south. Bji, Katsho, Eusu and Samar Geogs lies in the north while two Geogs Gakeyling and Sombaykha, and two villages of samar gewog namely Sektena and Fentena falls in the south which are separated from north by Tergola and Selala pass. It is located on the extreme western and north part of the country. The Dzongkhag experiences a cool summer with heavy rainfall and cold winter with snowfall.
Samtse Dzongkhag: Samtse Dzongkhag has good forest cover. Samtse about 64% of the total area is under forest cover and only 8% is under agricultural cultivation. Samtse lies in the sub-tropical monsoon climate zone. The monthly temperature ranges between 15 degree Celsius in winter to 30 degree Celsius in summer. Samtse receives an annual rainfall between 1500-4000 ml.

Chukha Dzongkhag: Chukha Dzongkhag covers an area of about 1,802 km2 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 estimated to be 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 km2. There is no protected area in this Dzongkhag.

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.

Dagana Dzongkhag: Dagana is one of the remotest Dzongkhags in the country. 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 62,000 and includes all types of 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.

Wangdue Dzongkhag: The second largest Dzongkhag in the country in terms of area, Wangduephodrang has a total area of approximately 4,038 km². 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.

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. 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 Ggewogs.
CHAPTER 3 – ENVIRONMENTAL ASSESSMENT AND MITIGATION

3.1 Existing Environmental Pressure

The country is strongly committed to ensuring a future where the natural environment is still intact. The strong political will for environmental conservation that exists in the country has translated into the policy resolution of maintaining at least 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. Country has also developed wide range of policies and acts for the protection and conservation of the environment, and for environmental management. Despite such policies and efforts, pressures are mounting due population growth, and infrastructure development. The eastern and southern Bhutan, where population density is high and human activity is more intense, localized deforestation is occurring and overgrazing is happening. There is increasing demand for forest products such as fuel-wood and house-building timber. The country and the project area, given its fragile mountain terrain and ecosystem, is highly vulnerable to natural disasters mainly in the form of landslides and soil erosion, and flash floods, as well as earthquake and Glacial Lake Outburst Floods. Roadblocks due to landslides are a recurrent phenomenon during the monsoons. Every year monsoon rains cause a number of floods and landslides, causing loss of human lives and damage to infrastructures and natural resources. In recent time, farmers and grazers have continued to face human-wildlife conflicts such as crop and livestock depredation.

3.2 Project Impact and Mitigation

3.2.1 Impacts of Infrastructure works

Environmental concerns of the project are mainly related to the infrastructure works. Wide variety of small rural infrastructure will be supported under the project, including Farm Roads, Farmers Managed Irrigation Schemes, community micro-infrastructure (drinking water, Foot Bridge, community marketing structures, simple storage and grading facility, collection and marketing facility etc).

*Size of the infrastructure:* Among the wide range of infrastructure, Farm Road and Community Irrigation Schemes are relatively bigger than other infrastructure envisaged under the project. Their potential size will help to understand potential risks in right perspective. There are about 8 to 9 farm roads with total length of about 34 km proposed under the project (in average a farm road would be about 6 km long). The maintenance support mainly includes surface improvement (gravelling) and drains, and may need little widening (typically 1.5 m or so) at few locations. Most of the irrigation schemes would be rehabilitation or improvement of existing community managed schemes (mainly improving side intakes and canal seepage control). Four, out of 26 different irrigation schemes project would likely to support, are new schemes. Total length of the 26 irrigation canal would be about 98 km, and these 26 schemes will irrigate about 2000 acres of land. Average length of the irrigation canal would be about 6 km, are typically 1 m to 1.5 m wide and less than 1 m deep. Project may support water storage structure to leverage intermittent flows in annual streams and could include rain-water harvesting pond, small water storage facility. The water storage facility/ pond envisaged would be typically 20m long x 15 m wide x 2.5 m deep. However, the water storage structure will not include dam or water barrier across river/ stream that is higher than 10 m or that is complex or pose risks of floods.
The environmental impacts from these infrastructure works varies according to the infrastructure type, size, and location. Overall, the project is likely to have moderate to low environmental risks. Highly significant, large extent, and/or irreversible adverse environmental impacts is not expected because:

- infrastructure works that the project will support are small-scale demand-driven community infrastructure
- these community infrastructures (subprojects/ activities) will not be concentrated in a locality, but will be located far and wide spreading thinly in six different districts,
- even the small-scale subproject/ activity is not-eligible under project, if it is located in protected area and/or if it is environmentally sensitive (negative list),
- Environment-friendly techniques will be used in implementation of the subproject and activities.

The small-scale infrastructure/activities may result moderate to low and site-specific adverse environmental impacts. These impacts are readily manageable as mitigations for such impacts are known and already in practice in Bhutan or can be readily specified and implemented. New farm roads and irrigation schemes are among the larger size subprojects envisaged under the project, and hence, pose higher environmental risk compared to other community infrastructure subprojects. Potential environmental impacts of other community infrastructures are expected to be low/ minimal. The direct impacts of the infrastructure development are likely to be within the construction area, such as right-of-way (RoW) or immediately adjacent lands, and at supplementary sites such as quarries from where materials are extracted for construction. The environmental effects are usually greatest within the construction; they are not necessarily confined to this area alone. Impacts may extend beyond the construction sites, particularly as a result of slope destabilization and poor cross-road drainage. The main environmental issues related to construction of these infrastructures are:

- **Landslide and soil erosion**: This is an issue in fragile mountain terrain of Bhutan when there is excavation and disposal of construction spoils. The risks vary as per the nature of construction site and scale of operation. Excavation may cause slope failures and haphazard disposal of excavated material may trigger erosion and landslides. Drain outfalls and water management is another factor related to landslide and soil erosion. The landslides and erosions may affect the agricultural land and forests as well as may in turn pose risk to the infrastructure built. Risk is higher during monsoon rainy season. The impacts are likely within the construction area or immediately adjacent lands, and at supplementary sites such as quarries from where materials are extracted for construction. Planning and construction of these infrastructures will follow environmentally friend techniques, such as proper spoil disposal/ management, good alignment/ site selection, providing retaining structures, use of plantation/bio-engineering, and water management.

- **Loss and/or degradation of forest and vegetation**: The project entails no activities related to forestry. The farm road and irrigation canal, in some places, may pass through forest area, including community forests and/or Tsamdo, and Sockshing. In this situation, clearing of vegetation or opening of small corridors of forest land will be necessary. Some of the other micro-infrastructure may also be located in the forest land or adjacent to it. This will lead to direct loss of forest land and vegetation. Loss / degradation may result indirectly from landslides and soil erosion. The impacts on forest are likely within the construction area or
immediately adjacent area, and at supplementary sites such as quarries from where materials are extracted for construction. Forest cover is very good, more than 64%, in the project districts. However, this is a concern as pressure on forest is increasing lately. Planning will try to avoid forest area as far as possible, subproject/activity will ensure minimum tree cut and land clearance, forest approval would be obtained which will include good practices (no land clearance in high risk), and the forest rule will be applied strictly.

- **Health & safety, and sanitation issues**: This is mainly an issue to the construction workers and persons at sites. Either personnel safety gears likely to be unavailability or workers may not use the safety item even when available. Bhutanese contractors are gradually improving performance in this regard, and now commonly provide the safety items like boots, hats, globe and first-aid at work sites. Quality of labour camps is also improving, with provision of latrines, pits for garbage, provision of water etc. The other safety concern is that human and animal may met an accident at work site/construction area if the sites are not fenced (or access not controlled).

- **Construction period disturbances**: Construction activities create short-term different disturbances from the noise, dusts, gathering of workers, and obstructions to movements of people and animals, etc. Disturbance to local infrastructures such as drinking water, foot trail, etc is also possible. The concentration activities in most of the micro-infrastructures, except farm road and irrigation, are likely to last less than a year, typically six month or so. Appropriate construction management, such as appropriate storage of construction materials, water sprinkling at dusty sites, etc, would reduce the disturbance to the minimum or to acceptable level.

All the project-related infrastructure activities put together are estimated to use less than 300 ha of land and much of this is expected to be outside forest and environment sensitive areas.

Annex 6 provides example of good environmental practice in road construction, many of these could be adapted to other construction activities.

### 3.2.2 Impacts of Improving Productive Assets of Existing Producer Groups

The agriculture productivity activities under Improving Productive Assets of Existing Producer Groups are likely to be environmentally neutral as the support intends to help farmers to increase productivity making use of improved road access and irrigation. The project will be supporting Bhutan's environment-friendly agriculture policy, such as organic farming as far as possible (and IMP at the most), selecting/promoting/improving local higher yield crop variety, training and support for well-tested and already ongoing livestock support package, better/more efficient use of non-wood-forest-products, sustainable land uses (terracing), and locally developed and tested measures for protecting crops from wild-life. Minor environmental concerns related to agricultural productivity activities and project approach is summarized in table below.

<table>
<thead>
<tr>
<th>Improving Productive Assets Activity</th>
<th>Potential environmental concern</th>
<th>Project approach</th>
</tr>
</thead>
<tbody>
<tr>
<td>Citrus replanting program through an area-wide approach: uprooting and</td>
<td>Potential of agro-biodiversity (local species) loss in the long-run due to promotion of higher yield or disease resistant species.</td>
<td>It is mostly rehabilitation. Higher yield and/or disease resistant variety would be selected from among the local variety. The National Biodiversity Centre (NBC) has an</td>
</tr>
<tr>
<td>destruction of infected trees and provision of new seedling for</td>
<td></td>
<td></td>
</tr>
<tr>
<td>replanting (368 ha in four districts).</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
New seedlings for cardamom re-plantation through area-wide approach in about 275 ha in five districts. One support would be smaller than US$ 30K

Project is likely to use low risk pesticide, as part of an IPM, for seed protection and for citrus disease control.

ongoing program for conservation of agro-biodiversity and genetic resources (including maintenance of gene bank). Most species are already conserved. Project will coordinate with NBC as required.

Pesticide use will follow FAO and WHO guidelines (as is the case at present). The high risk (i.e. WHO Category Ia and Ib) pesticides are banned/ ineligible.

Assistance to poultry and dairy farming groups to enable an increased productions: improved breeds, cow sheds, pasture fencing, milk measuring and storage, bird housing, etc

Health, hygiene and wastes management.

Project would support well-tested small-scale investment packages (sheds, quality equipment, productive breeds, and training) that takes into account of the health, hygiene and wastes issues.

Support Community Forest Groups and households for their wood and Non-Wood-Forest Products (NWFP) production and value addition activities.

Increased pressure on the community forests or private forest.

This will emphasize improving current practice in terms of higher efficiency and value-addition and hence likely to contribute positively. As owner (Community Forest Group) is involved, only sustainable harvest is expected.

Sustainable use of dry-lands through promotion of sustainable land management technologies, including terracing.

No concern

Contribute positively in maintaining soil and increasing water use efficiency.

Wildlife Management Technology (mitigation measures for crop damage by wildlife)

Adverse impacts on wildlife (injuries etc)

The project would support measures already tested in Bhutan (developed by the Wengkhar Research Centre and the National Post Harvest Centre under the coordination of the National Plant Protection Centre). This will help in reducing human-wildlife conflicts.

3.2.3 Natural Habitat, Pesticide and Cultural Sites

Natural Habitat Issues: There are two natural habitats and one biological corridor in the Project Dzongkhags. They are Phubjikha Blacknecked Crane roosting and Jigme Singye Wangchuck National Park (JSWNP) and a biological corridor. JSWNP falls in Trongsa Dzongkhag. The biological corridor starts from JSWNP and passes through Kazhi, Nyisho and Phobji Gewogs of Wangdue Dzongkhag touching the Jigme Dorji National Park toward the northern part of the country. None of the subprojects or activities is located in the natural habitat, and/ or dependent on the resources from these habitats. Hence, it is highly unlikely the project will cause any “significant” conversion or degradation of natural habitats.

Chemical Pesticide Issue: In general, the project would not support purchase of chemical pesticide. However, pesticide may be used in seed treatment, citrus disease control (control of greening vector) and in some RNR demonstration activities. As an induced impact, farmers may
tend to use chemical pesticide once better irrigation is available and access is improved. This is a more a long-term concern, beyond the project period and due to a number of reasons, including market links, beyond the project activity. Government of Bhutan's general approach is to promote organic agriculture. Hence, the procurement, distribution and use of pesticides in Bhutan are strictly controlled by the central government agency. The National Plant Protection Centre (NPPC), a government agency under MOAF, is the only agency with authority to import, distribute, and sale pesticide. Chemical pesticides are not available freely in the market. In the seed treatment (and RNR demonstration activities), pesticide is used by qualified and trained persons following standard FAO guidelines. High risk pesticides (including WHO Class Ia and Ib) are banned in Bhutan.

Though chemical control of citrus greening vector is least desired, there is no other option at present other than to follow 3-4 scheduled chemical sprays to ensure effective control of vectors and disease inoculums from spreading in the rehabilitated orchards. The chemical used for controlling citrus psyllids in Bhutan are: Dimethoate (2ml/L water) and Cypermethrin (0.5 ml/L water). These chemicals are in WHO Class II category. Chemical purchase will be done centralized by NPPC, and then provided to Geogs RNR offices. The use of pesticides will be done by farmers under the strict supervision of RNR extension agents and with proper protective gears. Bhutan has a very strong policy on organic agriculture and only allows those pesticides approved by WHO which are non hazardous to human beings and the environment.

Annex 9 Standard operating procedure (SOP) or protocol/guidelines/ directive for storage, distribution and use of pesticide in Bhutan.

**Physical Cultural Resources Issues**: Bhutan in general is rich in physical cultural resources. Cultural sites of different types are found commonly in and around villages, settlements and along the travel routes. There is chance that infrastructure subproject/ activities, such as excavation, disposal of wastes, etc could affect physical cultural site(s). The environmental screening and assessment will cover the issue and provide adequate measures to avoid and/or mitigate adverse impacts on the physical cultural resources. Bhutan environmental law requires that permit or No-Objection Certificate for any activity within 50 meters distance of a cultural site or sacred landscape. Besides, local body are empowered and mandated for the protection of cultural properties including temples, monastic institution and their religious treasures, stupas, sacred natural features, dwelling place for deities, etc.

**3.3 Impact on rivers**

Small Community Irrigation schemes will be supported under the project, and a few rain-water harvesting ponds for providing supplementary water during dry seasons. These irrigation schemes are small in scale, and traditional system built and operated by the farmers groups. Project support is mainly for the repair and maintenance of these schemes which have become defunct or extremely difficult for farmers to reconstruct due to landslides and/or floods. As part of productivity increase, the project will also support better water use and management, and irrigation efficiency. Hence, it is unlikely that project support would lead to additional water withdrawal from the source stream. Water quality may be affected slightly during repair and maintenance activities, for example turbidity of water may increase temporarily during time of civil works near the source. The effect is likely to be temporary and limited to the vicinity of the civil works, and unlikely to be noticeable beyond immediate downstream. Thus it is unlikely to affect water use in the downstream.
4.1 RGoB’s policies, regulations and guidelines

Bhutan has reasonably sound environmental policies and regulations. Bhutan’s environmental policies, legislation, and regulations pertaining to environmental assessment are relatively recent. The Constitution of the Kingdom of Bhutan requires RGOB to: a) protect, conserve and improve the pristine environment and safeguard the biodiversity of the country; (b) prevent pollution and ecological degradation; (c) secure ecologically balanced sustainable development while promoting justifiable economic and social development; and (d) ensure a safe and healthy environment; and to ensure that a minimum of sixty percent of Bhutan’s total land be maintained under forest cover for all time. The country has made significant progress in specific environmental management policy development as listed below (See Annex 2 for details).

- National Environment Protection Act 2007
- National Forest Policy, 1974 and 2011
- Land Act of Bhutan 2007
- National Environmental Strategy 1999
- 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
- National Environmental Protection Act of Bhutan, 2007
- Application for Environmental Clearance Guidelines^3
- Environmental Codes of Practices^4 (first published in 1999 and later revised in 2003/04)
- Pesticides Act of Bhutan, 2000
- Biodiversity Act of Bhutan, 2003
- Road Act 2004
- The Water Act of Bhutan 2011

In addition to the above and in the context of decentralized environmental management, the DT and GT 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, MoAF
- Farm Roads Construction Manual and Modules

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^3 There are eight sectoral guidelines, for Forestry Activities, Hydropower, Mines, Tourism, Highways and Roads, Industrial projects, Transmission and Distribution Lines, and urban Development.

^4 There are three ECoPs for Installation of Underground and Overhead Utilities, for storm Water Drainage System, and for Tourism Activities.
Details of the above mentioned policies, legislation and guidelines are provided in Annex 2.

Bhutan also has issued environmental quality standards related to ambient water quality, industrial effluent discharge, ambient air quality, industrial emission, sewerage effluent, workplace emission, vehicle emission, noise level limits.

4.2 Key Environmental Management Provisions

4.2.1 Environmental Assessment and Management

All development projects/ activities require acquiring environmental clearance (EC) from National Environmental Commission Secretariat (NECS) or Competent Authority (CA), unless an activity is exempted under the RECOP. Authority to issue EC, if a project proponent happens also to be a designated CA, defaults to NECS for that particular activity.

A proponent applies for EC in a format. The EC application needs to contain: a) No Objection Certificates (NoCs), b) Environmental Information (EI). The EI need to include the following information: i) potential adverse effects of the project on the environment, ii) compliance plan to comply with relevant guidelines and codes of practice, iii) a plan for avoiding, minimizing, or reducing impacts (management plan), and iv) environmental and other benefits of the project.

*Screening and assessment* CA checks the EI and NoCs, as part of environmental screening. The screening may leads to one of three outcomes: (a) issuance of an EC; (b) requirement for further study (Environmental Assessment - EA); or (c) rejection of the application. Full EA is required if a development activity is happens to be in the protected area.

Consultation with affected communities is expected to take place at two stages in the EA process: when the NoC is issued from the designated agency and during the preparation of the EA. Only the directly affected agency or people are consulted.

*Compliance monitoring.* The EC issuing agency is responsible for monitoring the compliance. The holder of the EC is responsible for monitoring and keeping record regularly. NECS and/or CA are mandated for annual compliance monitoring, which is announced and pre-informed. They are also empowered for unannounced or spot checking. These are rarely practiced.

4.2.2 Protected area and Forest

The Forest and Nature Conservation Act (FNCA) and the Forest and Nature Conservation Rules (FNCR) prohibit any construction, including motor roads, buildings, fences, or any other physical structures inside a Protected Areas (PA), except with written permission or authorization from the MoA. In the core zone of PA only activity necessary for achieving conservation objective are permitted. Certain activities, such as blasting, felling trees, quarrying, waste disposal, building structures, are strictly controlled within the forests. Land clearance is not permitted within 600 feet uphill and 300 feet downhill of the motor road, within 100 feet on either side of the banks or edge

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5 The scope of activities subject to this exemption is very limited (see Annex 2 of RECOP)

6 Format is suggested by the Application for Environmental Clearance Guidelines.
of rivers, streams or water courses kept as riparian reserve for conservation, and land with greater than 45 degree slope.

4.2.3 Chemical Pesticides

Bhutan emphasizes organic agriculture. Hence chemical pesticides procurement/import, distribution and use is well controlled through a centralized system and is legally governed by The Pesticides Act of Bhutan (PAB), 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. Integrated Pest Management guidelines are in place and are under implementation as a part and parcel of the National Plant Protection Center’s regular program. PAB (Articles 4 to 6) stipulate strict requirements for import, sale and use of pesticides. Permissible pesticide list has been prepared (Annex 3).

4.2.4 Physical Cultural Resources

Bhutan law has provisions for protection and conservation of physical cultural resources. 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 DT Chathrim 2002 mandates the DT to adopt and enforce regulations for designation and protection of monuments of cultural and historical importance in the Dzongkhag. The GT Chathrim 2002 mandates the GT to administer, monitor and review Dzongkhag plan activities, including maintenance and preservation of religious monuments that are not under the custody of monastic body or central agencies.

Summary Matrix Table: list of RGOb regulations/requirements for each project activities/implementing agencies with specific provisions in a matrix format.

<table>
<thead>
<tr>
<th>Activities</th>
<th>RGOb regulation requirement</th>
<th>Concerned agencies</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conceptual stage</td>
<td>Gewog Chathrim 2002</td>
<td>Chiwog and Gewog</td>
</tr>
<tr>
<td>First draft of the project feasibility report</td>
<td>EA Act 2000, NEPA 2007, Sectoral Guidelines for roads and farm road and RECOP</td>
<td>Dzongkhag Engineering Cell and Gewog representatives</td>
</tr>
<tr>
<td>The feasibility study report</td>
<td>If the farm road is less than 5 km, the farm road guidelines of Ministry of Agriculture and Forest is relevant If the farm is more than 5 km then the EA Act 2000, NEPA 2007, Sectoral guidelines for highways and RECOP is relevant</td>
<td>Less than 5 km farm road, MOAF is responsible for issuing the environmental clearance For more than 5 km farm road, National Environment Commission Secretariat of responsible</td>
</tr>
<tr>
<td>Implementation/construction</td>
<td>EA Act 2000 and</td>
<td>Monitoring and evaluation by</td>
</tr>
</tbody>
</table>
4.3 WB Safeguard policies applicable to the project

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 (OP/BP 4.01)*: This policy is applicable because the proposed project intends to support small-scale infrastructure civil works such as farm roads, community irrigation schemes, etc. These activities are likely to have adverse environmental effects, though limited in nature, such as landslides & erosion, dusts (air pollution), water quality & quantity, and human health & safety.

According to OP/BP 4.01, a proposed project may fall in one of the following category:

- Category A – likely to have high/significant environmental impacts.
- Category B - likely to have limited environmental impacts.
- Category C –likely to have minimal or no adverse environmental impacts.
- Category FI –if it involves investment of Bank funds through a financial intermediary, in sub-projects that may result in adverse environmental impacts.

Bank safeguard policy requires consultations at different stages. The government need to consult groups likely to be affected by the proposed project and local NGOs about the project's environmental aspects and takes their views into account. The Environmental Assessment (EA) or Environmental Management Framework (EMF) needs to be disclosed at public place accessible to project-affected groups and local NGOs and in a form and language understandable to key stakeholders.
Natural Habitats (OP/BP 4.04). Some of the subproject under the proposed project may indirectly (induced by project) have impacts on the known natural habitat such as protected area (buffer zones), on area proposed for protection/conservation, and/or on area of known high conservation value. The policy prohibits Bank support for project, which would lead to the significant loss or degradation of any critical natural habitats. There 12 Gewogs\(^7\) in the project area that touches protected area or buffer zone. Negative list (non-eligibility for project support) ensures that activities are not located in or dependent on resources from critical natural habitat.

Pest management (OP/BP 4.09): Improved irrigation and agriculture productivity enhancing activities may indirectly induce pesticide use in limited amount, and some demonstration activities at Dzongkhag RNR centre, such as seed protection, as well as citrus disease control may involve limited use, as part of an IPM, of low risk pesticide. The Bank does not finance formulated products that fall in WHO classes Ia and Ib. This policy may be trigger as a precautionary measure.

Forestry (OP/BP 4.36): Some of the infrastructure to be supported under the proposed project may be located in the community or government forest area, which mean possibility of tree loss and impacts on the forests. Hence this policy is applicable.

Physical Cultural Resources (OP/BP 4.11): It is possible that the small-scale community infrastructure under the proposed project are located close to a religious, cultural, historical, and archeological site, or a site of aesthetic or natural landscape value. This policy is applicable when any project or subproject/ activity involve significant scale excavation, earth moving, flooding, and any project in or near PCR site.

4.4 Institutions, environmental management and capacity

4.4.1 Implementing Agencies

Following agencies will be involved in the implementation of the project.

Ministry of Agriculture and Forests (MOAF). A Project Management Team (PMT), constituted at the MOAF, consisting of the full-time dedicated Project Director and part-time Component Coordinators is responsible for central coordination and execution, oversight, technical support and guidance. The PMT will be responsible for the overall project coordination and management, as well as financial management, environmental and social and procurement oversight, monitoring and evaluation. The PMT will be supported by technical contract staff for engineering design, geotechnical assessments community mobilization, and other specialties, as relevant. A Project Steering Committee (PSC) will be established to facilitate cross-sectoral coordination.

Dzongkhag Administration: Dzongkhag Tshogdu (DT), as the dzongkhag’s elected body will be responsible, in particular for implementation of the component on Infrastructure Development (Roads and Irrigation). The Dzongkhag Engineering staff will responsible for the prioritization, and for carrying out the survey, design, cost estimates and the preparation of bid documents. These documents will be submitted to the PMT for review and concurrence. The Dzongkhag Engineer, when necessary, will seek necessary technical backstopping from the PMT and DOA Engineering Division. The detailed technical works for rehabilitation of community infrastructure may be

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\(^7\) Dzongkhag is the village level administrative body.
delegated to Dzongkhag and site engineers with support, if needed, from Dzongkhag Engineer and PMT expert. Dzongkhag Engineer will provide necessary technical support for design of community micro-infrastructures, e.g. community marketing infrastructure, productive assets improvements etc. The Dzongkhag Engineering staff will be responsible for quality control and certification of the construction work.

*Dzongkhag Administration:* Dzongkhag is responsible for for implementation of community activities including improving community assets of existing user groups, establishing marketing and community infrastructure, and community investments. The *Dzongkhag Tshogde* (GT) will be the implementing entity with the *Gup* as the chief executive. The RNR Extension Staff based at the Dzongkhags will be responsible for facilitating the implementation. They will be supported through additional technical persons on need and demand basis. The Dzongkhag Planning Team will scrutinize requests received from the community or individuals consolidate chiog proposals and funding requests, help integrate these activities into their annual Dzongkhag plan, and be responsible for implementation, oversight and monitoring of such activities. The Dzongkhag Field Coordinators will coordinate and report. The GT will also liaise with other government and private agencies active in the respective project areas. The site engineer will be responsible for technical supervision of the community micro-infrastructures, but general monitoring will be done by the Dzongkhag Administration (*Gup/Gup Administrative Officer*) and Dzongkhag Agriculture Officer.

*Chiwog.* A small team consisting of the Dzongkhag Field Coordinators, Dzongkhag RNR staff and Tshogpa (village head) will be responsible for mobilization of communities at the Chiog level. Users committee, such as Water User Associations (WUAs) and Farm Road Users Committee will be responsible for operation and maintenance of these infrastructures.

*Contractor:* The construction of roads would be contracted out to private contractors through a competitive bidding process, and the Dzongkhag Engineering staff along with the contracted engineering consultants would oversee the contracting process.

*Community/ Users.* Implementation responsibility for community micro-infrastructures works rests with the *Dzongkhag Tshogde* (GT), Gup Administrative Officer and Dzongkhag RNR staff. A Memorandum of Understanding (MoU) with the users will be signed for implementing certain types of activities.

### 4.4.2 Environmental Roles of Relevant Agencies

*National Environmental Commission Secretariat (NECS):* Overall responsibility of the enforcing environmental assessment and management in the country lies with the NECS. However, various functions and responsibilities have been delegated to sectoral ministries and district authority. The NECS may not be directly involved in the environmental management of the proposed project, except in new farm road, given small scale activities envisaged, negative list avoiding even the small scale works if these happen to be environmentally sensitive, and delegation of authority. However, NECS may play a role in issuing environmental clearance for new farm road, occasional/surprise monitoring, and a central body providing guidance when needed.

*Ministry of Agriculture and Forest (MOAF).* MOAF is competent authority for certain type of project activities. As such it is responsible for issuing environmental clearances to those activities, and also carrying out periodic environmental compliance monitoring. Environmental Act and Regulations requires an Environmental Unit in the sectoral ministries. However, MOAF has yet to form such unit. Theer is no environmental staff at the MOAF at present.
**District Environmental Committee (DEC).** District Environmental Committee (DEC) consists of Dzongkhag planning officer, Dzongkhag forest officer, Dzongkhag land record officer, Dzongkhag agriculture officer, Dzongkhag environmental officer, and Dzongkhag engineer. District Environmental Officer is a NECS cadre deputed to district. DEC is responsible for issuing Environmental Clearance to the subproject/activity mandated to the committee and for periodic compliance of the subproject to which it issue EC. As part of its regular activities, NECS has given general orientation to DEOs before sending them to districts. These orientations focus mainly on Bhutan's environmental requirements.
CHAPTER 5 - ENVIRONMENTAL MANAGEMENT IN THE PROJECT

Environmental approach proposed for the project to emphasize early consideration of environmental risks and factors, avoidance of higher risks, and value-addition to the subprojects by timely environmental inputs. Hence, environmental steps and processes/procedures are closely linked with overall project steps, processes and procedures. The approach is based largely on the Bhutan environmental legislation, requirements, processes and procedures with some improvement based on practical experiences and considering World Bank policies. Project will follow the following environmental steps;

5.1 Negative List of subproject and activities

Any sub-project that falls within the negative list below will not be included under the project for funding.

- Subproject/activity located in the protected area or area proposed for protection or area of known high conservation value, or 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, OR subproject/activity that depend on resources from those areas.

- Subproject/activity in areas where land slope is more than 45 degree and/or known high landslide/erosion risk area.

- Subproject/activity that lead to construction of dam/water retaining or diversion structure that is 10 m or more in height, or if it present special design complexity or pose significant disaster risks if it breaks (e.g. downstream settlements, resources, etc and in zone of high seismicity or landslides & flood, including Glacial Lake Outburst Flood (GLOF).

- subproject/activity that will require full Environmental Assessment by the Bhutan Environmental Assessment Act and Regulation

- 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

- Subproject/activity that will lead to purchase/use of pesticides that fall in WHO Class Ia and Ib, and pesticide that are banned by RGoB (Annex 3 List of Permissible Pesticide in Bhutan)

- Any activity that may adversely impact nationally and/or internationally renowned/listed cultural site (within 50 m of its premise).

5.2 Environmental and subproject steps

Project will follow the following environmental steps closely linking with subproject planning, design and implementation steps.

- step 1: Preliminary Environmental Information and Analysis
- step 2: Environmental Screening and Assessment
- step 3: Environmental Recommendation and Subproject DPR
- step 4: Environmental Clearance
- step 5: Implementers Site-Environmental Management Plan
- step 6: Compliance and Final Monitoring

The project steps and environmental steps are linked as described in the table below.

<table>
<thead>
<tr>
<th>Project step</th>
<th>Environmental step</th>
<th>remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-feasibility and/or feasibility study (after Dzongkhag selects the concept for further consideration)</td>
<td>Collection of preliminary environmental information together with project pre-feasibility or feasibility field investigation. (by DEC) Obtain relevant NoCs. Preliminary analysis of subproject's environmental risks and identification of probable mitigation / recommendations.</td>
<td>Pre-feasibility and/or Feasibility Report contains environmental section in which environmental situation of project site/immediate surroundings, potential risks to the subproject, and probable mitigations will be described. Report contains NoCs also.</td>
</tr>
<tr>
<td>Selection of subproject pre-feasibility or feasibility report for preparing Detailed Project Report (DPR).</td>
<td>Review the environmental information provided in the pre-feasibility or feasibility report, and carry out Initial Environmental Screening.</td>
<td>Initial Environmental screening will check: i) if the subproject is eligible, ii) if the subproject is exempted by Bhutan environmental laws from further environmental investigation, and iii) who is the Competent Authority for reviewing and issuing environmental clearance.</td>
</tr>
<tr>
<td>Preparation of subproject DPR by PCU/PMT on behalf of the community.</td>
<td>PCU/PMT also prepares EI as required by Bhutan law (if not exempted). NoCs are checked and if needed additional NoCs obtained.</td>
<td>EI needs to be prepared before DPR preparation so that environmental inputs go into DPR. EI and/or DPR also contain all NoCs.</td>
</tr>
<tr>
<td></td>
<td>Incorporation of environmental recommendation into subproject plan &amp; design, bids, contract/ MoU (supported and ensured by PMT)</td>
<td>Prior to finalization of DPR including bid documents or MoU.</td>
</tr>
<tr>
<td>Approval of DPR by PSC.</td>
<td>Obtain EC, if not exempted</td>
<td>Prior to DPR approval</td>
</tr>
<tr>
<td>Bidding and awarding contract or signing MoU</td>
<td>Brief prospecting contractors/ implementer on environmental</td>
<td>Prior to bidding or finalizing MoU</td>
</tr>
<tr>
<td>Construction mobilization order</td>
<td>Implementers prepares Site-Environmental Management Plan</td>
<td>Site-in-charge will approve the site-EMP before works at site begins</td>
</tr>
<tr>
<td>Supervision, and monitoring</td>
<td>DEC and/or PPD (by itself or engaging private/ NGO) carry out compliance monitoring every three month (to each EC required subprojects and sample of EC not required subproject). Environmental Audit during MTR and end of Project.</td>
<td>Monitoring report is shared with Dzongkhag and PMT, who will instruct site-in-charge and implementers for necessary actions. PMT and Dzongkhag follows up on implementation.</td>
</tr>
</tbody>
</table>

### 5.3 Preliminary Environmental Information and Analysis

The project follows demand-driven approach. Initial concept of the project comes from the community, usually verbally, and pass through deliberations and scrutiny, first by respective Dzongkhag, and then by Dzongkhag. Once selected by Dzongkhag for further considerations, viability in the form of pre-feasibility and/or feasibility study is carried by a Dzongkhag team (which may consist of Dzongkhag sectoral staffs including engineer, forest officer, environmental officer, agriculture officer, planning officer etc). During the pre-feasibility and feasibility field investigation, the Dzongkhag team will check environmental risks by collecting environmental information of the subproject site and its surroundings: a checklist has been prepared to help in this process (Annex 4.) The team will observe the sites, make simple measurements and also discuss with the local people and stakeholders. The team will analyze the environmental risks, and identify possible measures for avoidance, minimization, or mitigation of the risks/impacts. These will be shared with the technical members of the team for consideration while detailing the subproject plans and designs. The pre-feasibility or feasibility report will contain environmental chapter summarizing the findings and recommendations.

### 5.4 Environmental Screening and Assessment

If the project is viable, the pre-feasibility/feasibility report will be sent to the PCU as a written proposal for funding support. PCU will review the report for technical soundness and costs in view of possible funding support, and if selected for funding, a team will be send to the field for preparing a Detailed Project Proposal. DPR is actually a proponent's responsibility. However, as community lack capacity, PCU/ PMT will prepare DPR on behalf of the community. At this stage, subproject proponent needs to prepare detailed Environmental Information (EI⁸) as required by the Bhutan environmental law, if the subproject does not fall in the exempted category. As the community lack capacity, they need to be supported in preparing the EI, and this could be best done by PMT prior to the DPR. The EI contains a simplified version of Site EMP, and all required NoCs. The EI feedbacks and recommendations needs to be incorporated into the DPR, and thus help internalize the subproject's environmental factors and adding value to the subproject. The simplified version of a site EMP may be prepared in a tabular format such as below.

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⁸ The content of EI, in Bhutan law is equivalent to limited EA or IEE in many other countries. Application for Environmental Clearance Guidelines provides format and guidance on preparation of EI, which includes simple EMP.
### Potential negative impacts (what, where, why, when and to what extent etc)

<table>
<thead>
<tr>
<th>Ways to mitigate (mitigation measures) – to avoid/ minimize/ manage.</th>
<th>Mitigation cost and responsibility</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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<td></td>
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</tr>
</tbody>
</table>

### 5.5 Environmental Recommendation and Subproject DPR.

The subproject DPR needs to internalize all relevant environmental recommendations, factors and mitigations into the plan, design, costs as well as in the contract clauses or MoU clauses. This may be supported and ensured by the environmental expert in the PMT prior to finalization of the DPR.

### 5.6 Environmental Clearance (EC)

The subproject DPR is approved by the PMT or Steering Committee. Before approval, environmental clearance (EC) needs to be obtained. NECS is the competent authority for certain type of subproject; where as PPD MoAF is mandated for EC for certain type of subproject (Annex 5). The EI is submitted to the concerned CA for obtaining EC. For the exempted subprojects EC is not required - however, DPR must contain all relevant NoCs and incorporate environmental recommendations made in the pre-feasibility/ feasibility (preliminary environmental analysis).

### 5.7 Implementers Site-Environmental Management Plan.

As recommended in the Application for Environmental Clearance Guidelines, Site-Environmental Management Plan will be prepared by the contractor or the implementer. The implementer will conduct a walkthrough together with local stakeholder including community, Dzongkhag, site-engineers, section officer etc before preparing implementers site-EMP. Site-in-charge will approve the site-EMP before works at site begins.

### 5.8 Compliance and Final Monitoring.

Regular supervision and quality control of the construction will be done by the site team (site engineer and section officer). NECS/DEC and/or PPD MOAF will carry out periodic environmental compliance monitoring⁹, as required by the Bhutan law, all subproject for which EC is required and on representative sample of those subproject for which EC is not required. Periodic compliance monitoring will be carried out once in three months in general(one monitoring midway of construction if construction period is three month or less, two monitoring if construction

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⁹ Periodic or surprise compliance monitoring is the responsibility of the Competent Authority issuing the Environmental Clearance.
period is three to six months, every three month for more than six-month construction period). Besides, final environmental monitoring for demobilization certification will also be carried out. Project resource, if necessary, will be made available to PPD MOAF for engaging private party or NGO in supporting the periodic compliance and final monitoring.

Two Environmental Audit will be carried out (one during Mid-Term Review and the other at the end of the project period) to assess quality of environmental performance.

5.9 Consultations and Grievance Addressing

Consultations are inbuilt in the subproject planning, design and implementation approach. Pre-feasibility and feasibility team will conduct and record consultations with the stakeholders including local body, communities, users such forest users committee or water-users committee, schools/ clubs and other stakeholders as part of the assessment. During construction, the site supervision team will consult regularly with the affected people/community as well as local stakeholders for their observations and feedbacks, and the periodic monitoring team from Dzongkhag or from PPD or from NECS or NGOs will also consult with these stakeholders.

For the grievances, the subproject implementation and/or supervision team at site will keep a feedback register and let the local stakeholder know that they may register their subproject related complaints or comments or suggestions. The subproject team will review these feedbacks and take appropriate actions. Complaints may also be registered at the Chiog/Dzongkhag, which is close to the site. The Dzongkhag will be take up these complaints with the subproject team and forwarded the complaint to Dzongkhag. Complainant has the option of filing the case with the Dzongkhag administration or even to court.
CHAPTER 6: INSTITUTIONAL ARRANGEMENT AND CAPACITY

6.1 Institutional Arrangement

Institutional arrangement for environmental management in the proposed project has been designed in harmony of existing institutional system in the country and overall project implementation arrangement. The institutional entity and their roles and responsibilities are as follows.

National Environment Commission Secretariat (NECS): NECS is involved only in the higher risks subprojects and those for which NECS is the Competent Authority (See Annex 5). In the subproject within its mandate, NECS will review the Environmental Clearance applications including subproject Environmental Information (EI) and issue or deny Environmental Clearance. NECS is also responsible, as an EC issuance entity, for periodic and spot check for environmental compliance. NECS, if necessary, may delegate some of these functions to other agency including to DEC. NECS, as an apex agency in environmental assessment in Bhutan, has a role of overall watch dog and also providing need-based guidance and coordination in matters related to environmental management.

PPD Ministry of Agriculture and Forests. PPD Ministry of Agriculture and Forest is responsible for screening subprojects under its jurisdiction, for which it is the Competent Authority (see Annex 5.) PPD will issue Environmental Clearance for the subproject for which it is the CA, and is also responsible for periodic environmental monitoring for compliance and final environmental monitoring.

Project Management Team (PMT). The role of PMT is overall oversight, coordination, and technical support. The environmental management related function of PMT include reviewing the environmental section of the pre-feasibility and feasibility studies, and checking the following: is the subproject eligible?, is it exempted from further environmental investigation?, is EI required for this? Who is the Competent Authority? PMT will be responsible for collecting detailed environmental information of subproject for which EI and EC is required, and preparing an EI as required by EAA, RECOP and Application Guidelines for Environmental Clearances. EI, where, required will be prepared prior to subproject DPR so that EI feeds into the DPR. PMT in coordination with DEC will also plan and organize environmental orientations, awareness, and training. PMT may enhance its capability by engaging environmental consultant for such services.

District/ Dzongkhag Environmental Committee (DEC). DEC will be responsible for collecting preliminary environmental information of subproject and its locality during pre-feasibility/feasibility stage. DEC will write environmental section of the pre-feasibility/feasibility report. DEC will ensure that all No Objection Certificates are obtained. DEC also supports subproject supervision team in supervising and recording environmental mitigation activities. DEC also will support site-supervision team in reviewing and approving Implementer's/ Contractor's Construction Site Environmental Management Plan.

Dzongkhag and local Community. During pre-feasibility/feasibility and during EI preparation stage, Dzongkhag and local community will help the DEC and/ or PMT in obtaining environmental information, share their observations and insights, concerns and suggestions, and in securing NOCs. During subproject implementation, they will observe the construction activity and report any non-compliance or grievances.
Implementer and/or Contractor. Application Guidelines for Environmental Clearance requires implementers and/or contractor to have Construction Site Environmental Management Plan. Implementer/contractor will prepare such plan and have it approved by Site-Incharge before beginning construction. Implementer/contractor will consult site supervision team, and Dzongkhag and community and conduct joint walk-through while preparing such plan.

6.2 Capacity assessment and strengthening

Consultations and interactions with various stakeholders including MoAF, DECs, NGOs and communities revealed that inadequate capacity at various levels is a constraint in effective and efficient environmental management of the project. Although Bhutan's environmental legislation requires ministries to establish an environmental unit, there is no environmental unit at the MOAF yet. PPD of the ministry has been assigned the environmental CA function. There is no environmental staff at the ministry or PPD. Capacity of NECS is adequate for the type of project envisaged under the project: but NECS staff are already overstretched. DEC has an Environmental Officer deputed from NECS in recent times. At present, NECS and PPD both have not been able to carry out periodic monitoring and spot check at desirable level. The DEC Environmental Officer is responsible not only for Dzongkhag’s activities but also asked to support various line agencies. The Environmental Officer is obviously very busy and overloaded. There is good awareness of environmental process at the Dzongkhag level due to orientations organized by NECS and projects. Dzongkhags’ and communities’ knowledge and insights of local environment is very good, but their ability to prepare documents that is required by the legislations and guidelines is very low. Contractors also lack capacity in preparing the construction site environmental management plan.

In order to overcome the capacity weaknesses identified above, the project includes following specific measures for strengthening capacity:

- Strengthen environmental competency through provision of human resources. Recruitment of an Environmental Specialist/consultant to support PMT in various environmental functions described in previous section. The specialists support may be needed more in the initial stage due to preparatory works, system/tools establishment, and orientations/training. The input could be gradually reduced. Communities and contractor may need to be trained or made aware in various activities assigned to them: this could be done through need-based support by hiring short-term consultants.

- Organizing targeted and need-based awareness, orientations and training tailored to the needs of different stakeholders including awareness to subproject community, practical training to contractors/implementers and site supervision team/staff, and orientations to project stakeholders at centre and districts.

- Engaging private sector or NGO or local organization such as School Nature Clubs for certain type of environmental activities, for example for monitoring and awareness raising in the project/subproject area.

- NECS and/or PPD MOAF may access project fund for engaging NGO or private sector for performing periodic compliance monitoring of project. Project may also support hiring short-term consultant, if needed; to support DECs in doing project's environmental management works.
• Reviewing environmental consequences and performance of already built similar structures for lesson learning purpose, dissemination of the lessons, and refining the approaches and guidelines.

### 6.3 Environmental Mitigation and Management Cost

Subproject level environmental mitigation cost will be internalized within the subproject DPR. The subproject preparation cost should also include any environmental study/assessment cost, and each subproject EI or EMP will have estimate for specific item-wise mitigation cost for the subproject. This will be reflected in the subproject DPR, and will be confirmed before approval of subproject DPR.

The cost of overall environmental management at project level includes oversight, monitoring, awareness/training/orientation, and capacity strengthening (such as provision of additional human resource/consultant and engaging private sector or / and NGOs). This is estimated below.

<table>
<thead>
<tr>
<th>Activity</th>
<th>Basis</th>
<th>Amount in Nu million</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strengthen environmental competency through provision of human resources from market (consultant/experts at PMT, and short-term consultants to support DEC or for special tasks as needed)</td>
<td>36 person month during project period (varies between Nu 60,000 to Nu 100,000 per month)</td>
<td>Nu 3 million</td>
</tr>
<tr>
<td>Need-based environmental awareness workshops, orientations, and training (targeted to construction team, site supervision staff, DEC members, and other directly involved persons including from centre)</td>
<td>Lump sum</td>
<td>Nu 1.5 million</td>
</tr>
<tr>
<td>Periodic monitoring for compliance checks and environmental awareness at community level (engaging NGOs or private sector, and other costs).</td>
<td>Lump sum</td>
<td>Nu 3 million</td>
</tr>
<tr>
<td>Activities for environmental system improvements (including consolidating environmental lessons, refining guidelines and updating information)</td>
<td>Lump sum</td>
<td>Nu 1.5 million</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td><strong>Nu 9 million</strong></td>
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</table>
ANNEX 1. LIST OF STAKEHOLDERS MET AND SUMMARY OF CONSULTATIONS

List of MOAF Officer attend the meeting held on 19th March 2012 at PPD conference hall.

1. Mr. Ugyen Dorji, MAP Coordinator, Horticulture Division, MOAF, ugdorji@moaf.gov.bt
2. Mr. Dorjee, Citrus Coordinator, DOA, dorjee1@moaf.gov.bt
3. Mr. Tenzin Drugyel, DOA, teedrugyel@gmail.com
4. Mr. Karma Tshetser, DOA, karmatshetser@gmail.com
5. Mr. Karma Tenzin, DOL, MOAF, karmatzenin@gmail.com
6. Dr. M.P. Timsima, NLEP, DOL, MOAF, timsinampdr003@gmail.com
7. Mr. Tenzin, DAMC, MOAF, decembrtenzy@gmail.com
8. Mr. Rinzin Dorji, Planning Officer, AFD, MOAF, rinzin_dorji08@yahoo.com
9. Mr. Sherab Wangchuk, Planning Officer, PPD, MOAF, sherabbt@moaf.gov.bt

Village Consultation meeting on Environment and Social held on April 25, 2012

Village: Thaphu
1. Mr. Sonam Tshering
2. Ms. Chador Dema
3. Ms. Chador Pelmo
4. Ms. Sangay
5. Mr. Nima Dorji
6. Mr. Kaka
7. Ms. Lhaden

Village: Lawa
1. Mr. Lhakpa
2. Mr. Passang Namgey
3. Mr. Nake
4. Mr. Duba
5. Mr. Dorji

Village: Lamga
1. Mr. Phub Tshering
2. Mr. Gyeltshen
3. Mr. Chorten Tshering
4. Mr. Phub Thinlay
5. Ms. Zhaber
6. Mr. Pemba Tshering
7. Ms. Ze Chun

Village: Rukha
1. Mr. Gyeltshen
2. Ms Kezang
3. Mr. Baychu
4. Mr. Panchen
5. Ms. Yeshi
6. Ms. Chokila
7. Ms. Kinga
8. Mr. Nima Wangdi  
9. Ms. Sangay  
10. Mr. Chador  
11. Ms. Ugyen Lham  
12. Mr. Kinzang Tshering  
13. Mr. Jambay Dorji  
14. Ms. Kelzang  
15. Mr. Sangay  
16. Mr. Phurba Tshering  
17. Mr. Penjore  
18. Mr. Nimchu

Village: Jarigang Zawa Chiwog  
1. Mr. Phuntsho  
2. Mr. Sangay Thinley  
3. Mr. Sherab Wangchuk (Tshogpa)  
4. Mr. Passang Dorji  
5. Mr. Pem Dorji  
6. Ms. Boem  
7. Ms Chador Wangmo  
8. Ms. Passang Dem  
9. Ms. Bidha  
10. Ms. Leki  
11. Ms. Dema  
12. Ms. Kinlay Zam  
13. Ms. Tenzin  
14. Ms. Pechum  
15. Mr. Phuchu  
16. Mr. Namgay  
17. Mr. Ugyen Dorji (Mangmi)  
18. Mr. Khandu Dorji (Gup)  
19. Ms. Chador Wangmo (Gedrung)  
20. Mr. Pralat Mahat (Dzongkhag Administration)  
21. Mr. Norbu Wangdi (Livestock office)  
22. Mr. Sonam Tobgay (Agriculture Officer)

SUMMARY OF CONSULTATIONS

A. Stakeholder Consultation in Thimphu on 17 May 2012

1. Venue: Meeting Hall, PPD, Ministry of Agriculture and Forests  
2. Time: 10:00 hrs to 1230 hrs  
3. Attendance- Following is the list of participants.

<table>
<thead>
<tr>
<th></th>
<th>Name</th>
<th>Contact details</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Mr. Rinzin Dorji,</td>
<td>Administration Finance Divison</td>
</tr>
<tr>
<td></td>
<td></td>
<td>MOAF</td>
</tr>
<tr>
<td>2</td>
<td>Mr. K.J. Themphel,</td>
<td>Social Forestry Division, MOAF</td>
</tr>
</tbody>
</table>


3. Programme

10:00 - 10:15  Introduction of participant, and opening remarks by PPD Chief Tenzin Chophel

10:15 - 10:30  Presentation on *ILRP Project Objectives and Components* by Shanti Devi, PPD

10:30 - 11:00  Presentation on Environmental and Social Management in ILRP by Nedup Tshering, Consultant

11:00 - 12:30  Discussions

4. Participants feedback, comments and suggestions.

The members thanked the World Bank members for the presentation on ESMF.

One of the members felt that the report in line with the Royal Government of Bhutan Policy and felt that some of the issues such as credit line and farm road needs to be discussed further. There are several farm roads all over the country and it has been difficult to maintain it. However, if the proposal is mainly on improving or maintaining the existing farm road, then the member felt that it is an important issue and is welcomed by the communities.

The members did not have specific issues related to the program. However, they felt that some of the issues related to communities program should be taken into consideration while implementing with the communities. It was suggested that the project coordinators should always consider to provide information to the communities before implementing the projects.

The Chairperson thanked the World Bank members for the presentation and hoped that the project will help the rural communities.

**Summary of the consultation meeting with the following villages: Rukha, Thaphu, Lawa, Lamga, Jari Zawa Chiwogs. (Wangdue and Chukha Dzongkhags)**

A total of 60 representatives attended the stakeholder meeting. Names of the representatives listed above. All the communities expressed their concern that in order to improve their livelihood the following development activities is important:
1. Access road such as farm road

2. Irrigation channel for paddy fields and kitchen gardens

3. Rural electricity connection so that the children can study at home

The Lawa, Lamga and Jari Zawa Chiwogs communities informed at the stakeholders meeting that most of the irrigation channel is not in working condition and serious repair or renovation is very crucial. The channels have not been used for more than 10 to 15 years and the land is almost none productive.

The communities felt that in order to improve their livelihood they need to concentrate on developing agricultural and dairy produce.

Once the irrigation channel is repaired or renovated, the community will initiate water care program by appointing water care takers in rotation basis and develop some rules and regulations based on their old tradition systems.

The communities will also organize in setting up Farmers Association Group (FAM) for improving their marketing strategy and also what types of cash crops to be initiated. They informed the stakeholders meeting that they already have good weather condition to grow all types of crops such as herbs, oranges, carrots and other vegetables that are much needed to the local towns in the region.

While developing FAM the communities felt that they would require some capacity building provided by the Ministry of Agriculture and Forests.

The communities also expressed their concern that they would require institutional capacity building for developing local and hybrid seeds and new agricultural practices.

The communities also felt that farm is equally important to improve their livelihood. Once the farm road is in place, the communities will access to education, health services and also to market their products. If there is no access road, the produce cannot be sold and it is difficult for them to take the products to the markets.

Further, the access road will also help them to improve the conditions of the community schools by being able to transport construction materials.

The Rukha and Thaphu villages also added that they have the tradition of fishing, which is in great demand amongst the people of Thimphu and Paro. Therefore, they felt that once they have farm road, such products can be delivered to the market immediately.

The community members will also of concern that there may be more landslides due to farm road but they felt that it is only temporary problem. These problems will be solved through institutes established such as FAM. The FAM will be responsible to maintain and improve the roadblocks due to landslides.

Some of the communities who did not have rural electrification, they were emphasizing that rural electricity is important for school going children to do their homework and improved hygiene. They also felt that rural electricity will give more time for the farmers to work late at night in their homes such as weaving and making non-forest products handicrafts etc.
In conclusion, all the villages felt that access road and irrigation channel is very important for improving their income and requests the government to provide them with such facilities.
National Forest Policy, 1974 and National Forest Policy 2011

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.

National Forest Policy 2011. Consultation with communities is required. Construction of road through the established community forest may loose the naturally or artificially grown forest resources, which were managed by community forest management group. So, the loss of resources may have to be compensated as per the guidelines.

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)\(^1\) mandatory for any project/activity that may have adverse impact(s) on the environment.

Based on the review of environmental information submitted by the project applicant, the National Environment Commission Secretariat (NECS) or the Competent Authority (CA)\(^2\) 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 programs/activities, contributes to the sustainable development of the Kingdom and the conservation of its natural and cultural heritage;

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\(^1\) 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.

\(^2\) 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.
(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.

**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.

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 program, 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 Dzongkhag 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 Dzongkhag 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 Dzongkhag level with respect to:

• administration, monitoring and review of all activities that are part of the Dzongkhag 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 bookkeeping 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.

**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.
ANNEX 3: LIST OF PERMISSIBLE PESTICIDES TO BE IMPORTED IN BHUTAN

Insecticide
1. Chlopyrifos 20 EC
2. Cypermethrin 10E
3. Dimethoate 30EC
4. Fevlerate 0.4D
5. Malathion 5D
6. Malathion 50 EC

Fungicide
1. Carboxin 75WP
2. Captan 50WP
3. Carbendazin 50WP
4. Copper Oxychloride 50WP
5. Hexaconazole 5EC
6. Mancozeb 75WP
7. Metalaxyl 8%
8. Propiconazole 25 EC
9. Sulfur 80WP
10. Tricylazole 25 WP

Herbicide
1. Glyphossate 41 SL
2. Metribuzin 70WP

Rodenticides
1. Zinc Phosphate 80W/W

Acaricides
1. Dicofol 18.5 EC

Non Toxic
1. Sticker/spreader (sandovit)
2. Tree spray oil (TSO)

Bio-pesticide
1. Trichoderma viride

Source: National Plant Protection Center, Department of Agriculture, MOAF, Thimphu
ANNEX 4. ENVIRONMENTAL CHECKLIST
(for information collection, risk identification, and analysis)

Will the subproject and/or activity likely to affect the following? Where, why, and to what extent? What can be done to avoid, minimize, or mitigate?

1. Protected Areas and known natural habitat (national parks, wildlife reserve, legally protected or area proposed for protection, unprotected but of known high conservation value) or biodiversity corridor, or nearby an area which is known to be a critical wildlife habitat, and those area that are listed as totally protected species in the FNCR.

2. Forest (national forest, reserve forest, religious forest, community forest, private forest – core forest or fringe forest)

3. Known route of wildlife or wild bird movement

4. High risk of landslides and erosion prone areas

5. Flood Prone / River Cutting / Low Lying Areas

6. Water Sources / Water Bodies such as pond, lakes, springs, drinking water sources etc.

7. Historical / religious / Cultural Sites such as monastery, temple, fort, palace, other religious sites, etc.

8. Aesthetically important places / valued natural landscapes / viewpoints

9. Local/ Community Infrastructures (Irrigation canal, water supply, foot trails, trails bridges, religious trees & resting places, electricity poles, telephone poles etc.)

10. Agricultural land, private property (land, house, structure), local resources, community forests, etc

11. Increased use of chemical pesticide and fertilizer

12. Risk of disaster (such as from dam break or from fire, or from accidental release of chemicals, etc).
ANNEX 5. ACTIVITIES EXEMPTED FROM ENVIRONMENTAL SCRUTINITY AND RELEVANT COMPETENT AUTHORITY FOR NON-EXEMPTED ACTIVITY (According to RECOP Annex 2)

A. Exempted Activities

Activities not requiring Environmental Clearance are:

- 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

**B. Relevant Competent Authority for Environmental Clearance**

- Application for Environmental Clearance of activities that are not listed below 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 Forest Management Unit (road construction, logging operations, reforestation)
- Forest sanitation operations

**Department of Agriculture**

- Irrigation channels
- Activities related to agricultural research and development

**Competent Authority: District Environmental Committee**

Construction of:
1. Power tiller road
2. Mule tracks
3. Private road less than 500 meters
4. Community School
5. RNR centres including staff quarters
6. Geog centres including staff quarters
7. Labour camps
8. Outreach clinic centers
9. Farm roads less than 5 km
10. Solid waste disposal
11. Rural Water supply schemes
ANNEX 6: GOOD ENVIRONMENTAL PRACTICE IN RURAL ROAD PLANNING AND CONSTRUCTION

(Each subproject will adapt this. Specific mitigations measures will be incorporated into the Detailed Subproject Report and bidding document of each subproject: the Detailed Report will be checked prior to finalization to ensure this as explained in Chapter 5. Monitoring described in Chapter 5 will check the implementation of the subproject specific mitigations.)

<table>
<thead>
<tr>
<th>S N</th>
<th>Potential environmental concern, issue and effect/ impact</th>
<th>Potential good practice for avoidance, minimization and mitigation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Site or road alignment may pass through cultivated and forested land resulting in a permanent loss of the resources. When the landowner has to part with his land, the environmental effects can amplify if proper operation and maintenance schedules are overruled.</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>2</td>
<td>Excessive extraction of local resources, such as wood, sand, soil, boulders, etc. Degradation of forests, erosion and landslide at steep slopes due to boulder, stone extraction. Change in rivet/stream ecosystem due to unchecked sand extraction.</td>
<td>Extract materials only on need basis. Avoid sensitive areas, such as steep slopes and water-ways.</td>
</tr>
<tr>
<td>3</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. Wrong alignment/site can trigger slope failure. Haphazard disposal of construction waste can disturb slopes. Improper drainage facilities can result in erosion and landslides.</td>
<td>Extract carefully and secure the top soil within 25 cm from the surface. Limit down grading of the road to 5%. If down grading exceeds 7%, 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>4</td>
<td>Wildlife habitats at forests, shrub land along road alignment or around sites are affected from the construction activities. Wildlife and human conflicts increase as wildlife might destroy the crops or attack the construction worker.</td>
<td>Avoid high biodiversity area to the extent possible. 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>Higher flow rate of surface water and water logging induce land slides, erosion (such as from drain) 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, and safe location If horizontal slope exceeds 5%, construction of flow control device necessary every 20m.</td>
</tr>
<tr>
<td>6</td>
<td>Impacts on protected areas and highly forested areas. Degradation of forest areas. Degradation of agricultural land.</td>
<td>Avoid protected areas or densely forested areas. 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.</td>
</tr>
<tr>
<td>7</td>
<td>Haphazard dumping of wastes along the road or elsewhere causing various environmental damages (erosion, loss of vegetation, deterioration of agricultural land etc).</td>
<td>Select safe spoil dumping sites. 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.</td>
</tr>
<tr>
<td>8</td>
<td>Unmanaged sanitary waste disposal creating health problems and public nuisance.</td>
<td>Proper sanitation area needs to be demarked. Labour camps with sanitation facility. Check for hygiene of work force.</td>
</tr>
<tr>
<td>9</td>
<td>Disturbance or damage to local infrastructure/facilities/resources (water supply, irrigation, trails).</td>
<td>Avoid as much as possible the crossing over such amenities. Reinstate if damage could not be avoided.</td>
</tr>
<tr>
<td>10</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 suitable. Sprinkler water to control dust. Consider construction of road at 50 m away from settlement. Enforce speed limit of vehicles and construct the road according to volume and size of traffic movement.</td>
</tr>
<tr>
<td>11</td>
<td>Unmanaged settlement, construction along the RoW.</td>
<td>Establish RoW properly and enforce its limits.</td>
</tr>
<tr>
<td>12</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. Out 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>14</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</td>
<td>Such damage cannot be avoided but can be minimized: select alignment or site carefully so that there is less scare seen or visual aesthetic is affected at the lowest; and mitigate through re-plantation of indigenous species and greenery development around the site.</td>
</tr>
<tr>
<td>S N</td>
<td>Potential environmental concern, issue and effect/ impact</td>
<td>Potential good practice for avoidance, minimization and mitigation</td>
</tr>
<tr>
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<td>-----------------------------------------------------------------</td>
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<td></td>
<td>will be visible from a distance.</td>
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</tr>
</tbody>
</table>


### ANNEX 7: SAMPLE FORMAT FOR ENVIRONMENTAL MONITORING DURING IMPLEMENTATION

**Subproject Name:** ……xbsv … Farm Road…………………………

**Location:**…………………………………… attach map: 1:50,000 topographic map and sketch

<table>
<thead>
<tr>
<th>Site/ place</th>
<th>Environmental risk/ issue/ concern due to subproject action/activity (What issue, and why-what action/ activity?)</th>
<th>Extent of the impacts/ current situation</th>
<th>Mitigation used or required (what is done or needs to be done?)</th>
<th>Recommendations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chainage 1+400 (Village csxfi of …Geog)</td>
<td>Loss of agricultural due to disposal of construction spoils/ stones</td>
<td>About 0.5 hectare of dry-cultivated land belonging to Mr.…… Millet has been affected partially. (Attached photo number …..)</td>
<td>Haphazard disposal needs to be controlled by use of log and/or stone barriers, and by hauling the spoils to safe tipping site.</td>
<td>Safe tipping site needs to be identified, disposal site plan prepared and agreed/approved by …….</td>
</tr>
<tr>
<td>Chainage 2+304 (Gairt of …..Geog)</td>
<td>Loss of tree and vegetation due to widening of farm road from 3 m to 4.5 m</td>
<td>About 100 m section of farm road goes through the forest of Gairt. It is a pine forest. About 50 pine trees need to be cut (estimated volume …cft). There is no protected species.</td>
<td>Tree cutting permit has not been received yet. Vegetation/ tree clearance should be strictly limited to the 4.5 m width.</td>
<td>Obtain tree permit from Forest Authority before tree cutting/ vegetation clearance. Clarify who owns the logs.</td>
</tr>
<tr>
<td>Chainage 3+000 (……xxcf ………)</td>
<td>Water hole / spring may be destroyed due to widening of the farm road and disposal of the construction spoils</td>
<td>Construction activity has not reached the place yet. The water source is used by the farmers for irrigating their land (by 10 farmers, to irrigate … ha of land)</td>
<td>Protect the source, and construct a channel to safely convey the water to traditional irrigation channel that exist.</td>
<td>To compensate the disturbance of water supply during construction in and around the water hole and irrigation channel, consult with farmers and possibly support in repairing the irrigation channel</td>
</tr>
<tr>
<td>Chainage 3+785 (….. scaxd………..)</td>
<td>Increased risks of landslides and soil erosion due to cutting of slopes, disposal of materials, and disposal of water including road side drains</td>
<td>……………</td>
<td>……………</td>
<td>……………</td>
</tr>
<tr>
<td>Chainage 4+015 (…. Xvx ….)</td>
<td>Holy pond ……</td>
<td>………..</td>
<td>Stupa………</td>
<td>………..</td>
</tr>
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<td>………</td>
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<tr>
<td>……..</td>
<td>……..</td>
<td>……..</td>
<td>Noise and dusts……….</td>
<td>…….....</td>
</tr>
<tr>
<td>……. (labour camp)</td>
<td>Pollution (latrines, garbage), water supply, bed</td>
<td>……..</td>
<td>Occupational safety</td>
<td>………..</td>
</tr>
</tbody>
</table>
**Subproject information**

i. **Subproject name, location:** .... Farm Road, ....Gaiurt Village, .... Geog, ....Dzongkhag (see attached Map 1:50,000 topographical map showing location).

ii. **Description of subproject activities** (summary)

**Objective:** .................

**Activities** .................

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**Check the following**

<table>
<thead>
<tr>
<th>Findings and recommendations</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>i. Eligibility of the subproject and/or its activity</strong>.</td>
</tr>
</tbody>
</table>

Following are ineligible (see Section 5.1 of the EMF): Subproject/activity located in and nearby or that depend on resources from the protected area or critical\(^3\) wildlife habitat (irrespective of whether or not legally protected; Subproject/activity in areas where land slope is more than 45 degree and/or known high landslide/erosion risk; Subproject/activity that lead to construction of dam/water retaining or diversion structure that is 10 m or more in height, or if it present special design complexity or pose significant disaster risks\(^4\) if it breaks; Subproject/activity that will require full EA; 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; Purchase/use of pesticides that fall in WHO Class Ia and Ib, and pesticide that are banned by RGoB (See EMF Annex 3 List of Permissible Pesticide in Bhutan); Activity that may adversely impact nationally and/or internationally renowned/listed cultural site (within 50 m of its premise).

**ii. Potential environmental risks.** Will the subproject and/or its activity likely to affect or be affected by the following. (ESMF Annex 4)

- Protected Areas and known natural habitat or biodiversity corridor, or a critical wildlife habitat, etc.
- Forests
- Known route of wildlife or wild bird movement

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\(^3\) 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

\(^4\) e.g. downstream settlements, resources, etc and in zone of high seismicity or landslides & flood, including Glacial Lake Outburst Flood (GLOF)
- High risk of landslides and erosion prone areas
- Flood Prone / River Cutting / Low Lying Areas
- Water Sources / Water Bodies such as pond, lakes, springs, drinking water sources etc
- Historical / religious / Cultural Sites
- Aesthetically important places /landscapes
- Local/ Community Infrastructures
- Agricultural land, private property
- Increased use of chemical pesticide and fertilizer
- Risk of disaster (such as from dam break or from fire, or from accidental release of chemicals, etc).

### iii. Check legal requirements (exempted from any environmental scrutiny? Need an EI or an EA as per RGOB legislation?)

### iv. Conclusion of the Environmental Screening

Not eligible because ………

Requires Environmental Information ………

No need for further environmental assessment, obtain NoL from the following.

Prepare site EMP considering the following risks…..

<table>
<thead>
<tr>
<th>Environmental Screening prepared by</th>
<th>Reviewed by</th>
</tr>
</thead>
<tbody>
<tr>
<td>:</td>
<td>:</td>
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<tr>
<td>Signature:</td>
<td>Signature:</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Approved by</th>
<th>Endorsed by</th>
</tr>
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<tbody>
<tr>
<td>Name:</td>
<td>Name:</td>
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<td>Signature:</td>
<td>Signature:</td>
</tr>
<tr>
<td>Date:</td>
<td>Date:</td>
</tr>
</tbody>
</table>

**Attached:** i) Topographical map 1:50,000/sketch of the subproject area with subproject location, and ii) photographs of the environmental sensitive sites.
ANNEX 9: STANDARD OPERATING PROCEDURE (SOP) OR PROTOCOL/GUIDELINES/DIRECTIVE FOR STORAGE, DISTRIBUTION AND USE OF PESTICIDE IN BHUTAN

Fertilizer: The National Soil Survey Centre is the responsible agency to distribute all type of fertilizer to the entire country. The process is as follows:

- Farmers submit requisition as per the soil test conducted by NSSC.
- Dzongkhag Agriculture extension requests to Ministry of Agriculture & Forest.
- Ministry of Agriculture & Forest requests NSSC to supply the goods.
- NSSC supplies the goods to Dzongkhag Agriculture extension.
- Dzongkhag Agriculture extension delivers the goods to the farmers.
- Farmers receive the goods and use them according to their needs.
Standard operating Procedures (SOP)

Pesticide/herbicide: The National Plant Protection Centre is the responsible agency to distribute all type of pesticides and herbicides to the entire country. The process is as follows:

1. **Farmers** send a request to **Dzongkhag Agriculture extension**
2. **Dzongkhag Agriculture extension** requests the Ministry of Agriculture & Forest
3. **Ministry of Agriculture & Forest** requests the National Plant Protection Semtokha
4. **National Plant Protection Semtokha** sends the requested pesticides to **Dzongkhag Agriculture extension**
5. **Dzongkhag Agriculture extension** distributes the pesticides to **Farmers**

The suppliers are local agent identified by the government and the handling and storage of these chemical are done by supplier.
Samples of Integrated Pest Management Extension Leaflets

Sample 1

<table>
<thead>
<tr>
<th>IPM Extension Leaflet No. 19</th>
<th>Crop: Tomato, Chilli, Maize, Peas</th>
</tr>
</thead>
<tbody>
<tr>
<td>15 July 2001</td>
<td></td>
</tr>
<tr>
<td>Bollworm</td>
<td></td>
</tr>
</tbody>
</table>

**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.
**Example 2**

<table>
<thead>
<tr>
<th>IPM Extension Leaflet No. 37</th>
</tr>
</thead>
<tbody>
<tr>
<td>15 July 2001</td>
</tr>
<tr>
<td>Rice Blast</td>
</tr>
</tbody>
</table>

**Crop : Rice**

**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 litter 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>Probenazole 8GR</td>
<td>Oryzemate</td>
<td>Systemic</td>
<td>12 kg/acre</td>
<td>Granules</td>
<td>-</td>
</tr>
<tr>
<td>Pyroquilon 5 GR</td>
<td>Coratop</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/1 litter of water</td>
<td>Foliar spray</td>
<td>II</td>
</tr>
</tbody>
</table>

Please note that five fungicides have a hazard classification following WHO. WHO Class Ia and Ib are not permissible.