

OUTPUT: RURAL ROAD IMPROVEMENTS – PROJECT ROAD SELECTION CRITERIA AND CLIMATE RESILIENT ROAD DESIGN

1. Since the major portion of the project outputs were designed under the ongoing Loan 2670-CAM: Rural Roads Improvement Project (Loan 2670), it was possible to achieve benefits in project design in several key areas. One of them is capacity building for the Ministry of Rural Development (MRD) to design the Project with a stronger ownership. In this process, MRD formulated road selection criteria, for road rehabilitation, improving from the design of Loan 2670. These criteria are described in the following paragraphs.

2. **Selection of Project Provinces.** Loan 2670 covers seven project provinces, to which MRD added two more priority provinces as the proposed project provinces. These nine provinces are Battambang, Kampong Cham, Kampong Chhnang, Kampong Speu, Kampong Thom, Pursat, Siem Reap, and Takeo. Here, MRD reached an internal consensus in selecting the project provinces as appropriate for the size of the Project.

3. **Total Project Road Length.** Total project road length to be rehabilitated was decided as approximately 729 kilometer (km). This was based on the availability of financing. To have a shortlist of 729 km of roads in length, MRD selected a long list of about 2,000 km, which was subject to a process of screening to arrive at the shortlist. The screening criteria are outlined in para. 4 below.

4. **Specific Criteria for Project Road Screening.** During the design of Loan 2670, the adopted criteria were simple. It focused on connectivity to already paved roads, roads with zero resettlement impacts, synergies with past, ongoing, and future projects supported by ADB in all sectors, and road of MRD's high priority. Also, these screening criteria were proposed by ADB for mutual agreement with MRD. However, designing the current project, based on the lessons learned during implementation of Loan 2670, MRD formulated the project road screening criteria in their own. The screening had several factors to be taken into consideration, as shown below:

- Candidate road should either connect to the existing paved national and provincial road network or rural roads being improved under Loan 2670, or paved roads for other sectors such as agriculture;
- Candidate road should support ADB's past, ongoing and future interventions for not only the roads sector, but provide the potential for higher economic growth by reducing transport costs for the movement of people and goods to agricultural area or markets;
- Candidate road should provide the potential for economic growth through easier access to employment opportunities;
- Candidate road should be sufficiently engineered at the outset to enable upgrading to a paved road standard to be achieved without widening the road and the existing road width of which should be at least 6 meters (m);
- Candidate road should possess widening of structures (bridges/culverts) is seen as a necessary intervention with a positive benefit;
- Candidate road should be consistent with MRD's priorities for rural development and decentralization;
- Candidate road should not require resettlement of roadside structures, market sites or communities;
- Candidate road should not produce a negative impact on the local indigenous people,
- Candidate road should not produce a negative effect on the environment, other than the effects that occur during the construction period, and which are to be

managed through an environmental management plan.

- Candidate road should not negatively affect cultural, archaeological or tourist sites. Improving access to these sites should be viewed as a benefit in the selection of the roads;
- Candidate road should achieve the economic threshold limit of 12% for the economic internal rate of return;
- Candidate road should be among the most highly trafficked rural roads within any particular province; and
- Candidate road should provide benefits for a large number of poor rural people living within the project area.

5. Based on the above criteria, MRD screened the project roads of 729 km for rehabilitation under the proposed project.

6. **Climate Resilient Road Design.** Generally, all 729 km of project roads will be designed to be climate resilient, during the detailed design. During the feasibility study of the proposed project three design features have been considered for the roads to be climate resilient. These were: (i) increasing embankment heights; (ii) providing cross drainage; and (iii) selecting embankment materials suitable for increased permeability. In addition to these, green planting has been considered for strengthening embankments for road sections that are exposed to higher risk of damage due to flooding.

7. Regarding increased embankment heights, an average 0.2 m preliminary design height above the conventional road design height has been adopted. However, this will be reconfirmed during the detailed design stage based on detailed hydrological data. As for cross drainage, the preliminary design has considered the adequacy of existing structures (pipe and box culverts, and small bridges of single span, as there are no larger bridges) and has included readjustments with additional structures for strengthening cross drainage. This again will be reconfirmed during detailed design while refurbishing the existing structures for their optimal use. For embankment materials, laterite has been considered to be adequate as cost optimal, given the other 2 design features of (i) and (ii) of para 6, to be reconfirmed during detailed design, especially for road sections that are exposed to higher risk of damage due to flooding.

8. Though there were about 15 locations of spillways in the proposed roads, due to the requirement of emergency access by beneficiaries during rainy season¹, adopting this feature was not considered.

9. During the preliminary design it has been noted the drawback of higher embankments in few sections of roads, as also observed in the ongoing project under Loan 2670, for road safety. In the Output: Rural Road Safety and Community Awareness Program, these critical sections will be treated with safety features, like guard rails, for a safer road environment. On the other hand, based on the statistics on major causes of road crashes in rural roads, user behavior is the key contributory factor, rather than the road environment. Also, it is observed that the project road sections are unlikely to have through traffic especially for softer modes. Therefore, additional activities have been included in this aforementioned Output to sustain the interventions for changing road user behavior in the long term. These are expected to achieve positive effects on increasing road safety on project roads.

¹ Most rural beneficiaries depend on access by motorcycles even during emergencies. Also, since they do not have alternate routes in most cases of road sections, disposing flood water over a spillway is not a safe option for access during the rainy season.