

## CLIMATE RISK ASSESSMENT AND MANAGEMENT REPORT

### I. Basic Project Information

<b>Project Title:</b> Second Integrated Road Investment Program
<b>Project Budget:</b> \$900 million
<b>Location:</b> Eastern Province, Northern Province, Uva Province, and Western Province, Sri Lanka
<b>Sector:</b> Transport (road transport)
<b>Theme:</b> Inclusive economic growth, Environmentally sustainable growth
<b>Brief Description:</b> The impact of the investment program will be improved connectivity between rural communities and socioeconomic centers in Sri Lanka. The outcome will be increased transport efficiency on project roads. The investment program will deliver two outputs: (i) improved road conditions between selected rural communities and socioeconomic centers (about 3,400 km of rural roads and 340 km of national roads); and (ii) enhanced capacity of road agencies. The investment program will cover four provinces: Eastern Province, Northern Province, Uva Province, and Western Province. The first tranche will finance the first slice of the identified projects.

### II. Summary of Climate Risk Screening and Assessment

**Increased precipitation/increased intensity of precipitation flooding.** The Eastern Province, Northern Province, and most of the Uva Province are located in the dry zone, which receives a mean annual rainfall of less than 1,750 millimeters (mm) with a distinct dry season from May to September. On the other hand, the Western Province is in the wet zone with a mean annual rainfall of over 2,500 mm. Even in the dry zone, due to recent changes in precipitation patterns, extreme heavy rains that are sometimes brought about by cyclones particularly on the east coast can cause disruption of road networks, decreased accessibility, erosion of roads and embankments, surface water drainage problems, slope failures, landslides, among others. Increased river flow resulting from precipitation and storminess may result in damages to bridges. Bridge/culvert capacities are reduced or exceeded, causing upstream flooding to occur. Coastal areas are particularly vulnerable to flood risks due to the additional risk of storm surge.

<b>A. Sensitivity of project component(s) to climate/weather conditions and sea level</b>	
Project component	Sensitivity to climate/weather conditions
Design of roads with respect to culvert, drainage, pavement, and retaining wall features.	Consider future risks of flooding and soil erosion. Design storm needs to be estimated based on projections of future climate scenarios.
<b>B. Climate Risk Screening</b>	
Risk topic	Description of the risk
Temperature (°C)	Annual mean temperature in Eastern, Northern, and Uva provinces is projected to increase by 0.5–1.0°C, and the increase is projected to be higher in Western Province. <sup>a</sup>
Precipitation (mm)	Annual precipitation in Eastern, Northern, and Uva provinces is projected to increase by at most 7.5%. The increase rate is higher in Northern Province while some areas in Eastern and Uva provinces may receive less rainfall. On the other hand, annual precipitation in the Western Province is projected to increase by about 15%–30%. <sup>a</sup>
Tropical cyclonic winds with storm surges and flooding	There is an increasing trend of losses and damages due to high winds/cyclones particularly in the north and east coast of Sri Lanka. Majority of incidents were reported in 2011 and 2013.
	<sup>a</sup> Ministry of Disaster Management. 2014. Disaster Management Program 2014–2018. Sri Lanka.

**Climate Risk Classification: Medium****C. Climate risk assessment**

1. Conduct hydrologic studies.
2. Identify roads located along the coastal road that have a history of flooding, erosion, and tsunamis.
3. Compile historical data of rural roads that have suffered erosion.
4. Compile historical record of road submergence, including high flood levels in all roads.
5. Review applicable national road design standards to address flooding, erosion, landslide, ground acceleration, and tsunami, and ensure these standards are incorporated in the first-level design.
6. Conduct transect walks and environment checklists on all roads to identify vulnerabilities and risks, and communicate with the design team.
7. During transect walks, conduct local consultations to validate findings and draw recommendations on road design and construction.
8. Prepare road-specific environmental management plans that detail road construction design and practices to address identified climate change risks.

**III. Climate Risk Management Response within the Project**

The investment program will invest \$40.1 million to address climate change risks by providing culverts, side drains, and retaining walls as well as by changing the pavement to concrete, representing about 5.2% of the total civil works cost. Details are provided in the table below. In addition, provisions have been made in the bidding documents for the contractor to prepare road-specific environmental management plans based on the final detailed design to address a range of issues, including climate related risks and vulnerabilities such as flooding, soil erosion, and landslides.

Province	Cost of Climate Adaptation Measures (\$ million)				Total
	Culvert	Drainage	Improvement to Inundated Road Section	Retaining Walls and Other Structures	
Northern	2.5	3.0	0.9	1.5	7.9
Eastern	1.0	1.7	6.0	0.5	9.2
Uva	6.5	0.75	7.0	3.0	17.25
Western	1.5	2.75	0.5	1.0	5.75
<b>Total</b>	<b>11.5</b>	<b>8.2</b>	<b>14.4</b>	<b>6.0</b>	<b>40.1</b>