CLIMATE CHANGE ASSESSMENT

I. Basic Project Information

Project Title: South Asia Subregional Economic Cooperation Port Access Elevated Highway Project
Project Cost: $360.2 million
Location: Colombo, Sri Lanka
Sector: Transport (Urban Roads and Traffic Management)
Theme: Inclusive economic growth, Environmentally sustainable growth
Brief Description: The proposed South Asia Subregional Economic Cooperation (SASEC) Port Access Elevated Highway Project includes the construction of 5.3 kilometers (km) of elevated toll highway between the New Kelani Bridge (NKB) and Galle Face in central Colombo with a ramp to the port and related facilities. About 1.4 km of the existing ground-level port access road will be upgraded to six lanes and a maritime facilitation center will be constructed outside the port boundary. The project will help alleviate traffic congestion in densely populated areas, and also improve connectivity between the potential economic hinterland along the expressway network and both the commercial center and international gateway in Colombo. The project will also support trade logistics facilitation to provide better logistics services for freight forwarders. The project is estimated to cost $360.2 million. The Government of Sri Lanka has requested a regular loan of $300 million from ADB's ordinary capital resources to help finance the project.

II. Summary of Climate Risk Screening and Assessment

1. Sri Lanka has a tropical maritime climate with two monsoon seasons. Mean annual temperature reaches 27 degrees Celsius (°C) in the lowlands and 15°C in the central highlands. Rainfall varies considerably, ranging from 1,000 millimeters (mm) in the northwestern and southwestern lowlands to a high of 5,000 mm in the central highlands.

2. The National Adaptation Plan for Climate Change Impacts for Sri Lanka for 2016–2025 (2016) adopted three modelling approaches to project climate change in Sri Lanka—general circulation models (GCM), regional climatic models (RCM), and statistically downscaled GCM models. The general consensus of these models includes (i) increased mean annual temperature by more than 3°C, (ii) increased precipitation by 2050, (iii) increased precipitation extremes related to monsoons, and (iv) warmer ocean.

3. Regional climate model projections likewise indicate consistent increases in both temperature and precipitation for Sri Lanka. The model predicts an increase of about 2°C–3°C by the end of the 21st century. This is consistent with the increase of about 0.0272°C per year in Hambantota from 1961 to 1990.[1] Likewise, in terms of precipitation, the model predicts an increase of 3.6%–11.0% in 2030, 15.8%–25% in 2050, and 31.3%–39.6% in 2080.

4. Although there were only 11 cyclonic storms and 8 severe storms that crossed Sri Lanka from 1881 to 2011, the country faces highly destructive wind actions during the North Indian cyclone season and the monsoon seasons annually. Because of the small size of the island, most of its areas, particularly the western coastline, are threatened by the adverse effects of cyclones and corresponding storm surges.

[1] KHMS Premalal et al. 2013. Vulnerability to Climate Change: Adaptation Strategies and Layers of Resilience, Climatic trends in Sri Lanka Agro-climatic Analysis, Research Report No. 15. Working Paper. ICRISAT, Patancheru, Telangana, India (funded by ADB).

5. Rising sea levels are very likely to have major impacts on coastal and low-lying communities in Sri Lanka as sea level-rise scenarios for Sri Lanka suggest a shoreline retreat of about 10 meters by 2050. At the moment, the most conservative climate change scenarios predict a rise in sea level of 40 centimeters by the end of this century.

A. Sensitivity of project component(s) to climate/weather conditions	
Project components 1. Elevated road 2. Ramps 3. Side canals	Design of project components need to focus on sensitive weather parameters that are subject to a wide variety of changing climate/weather conditions in the future such as increased temperature, increased intensity and frequency of precipitation, and storm surge.
B. Climate risk screening	
Risk topic	Description of the Risk
Temperature	Regional climate model projections for future temperature indicate consistent increases: 1.0°C–1.1°C in 2030, 1.3°C–1.8°C in 2050, and 2.3°C–3.6°C in 2080. The ensemble mean indicates a temperature increase of about 2.0°C–3.0°C by the end of the 21st century, with a high degree of agreement (high confidence) among the CMIP3 (Climate Model Intercomparison Project phase 3) models.
Precipitation and flooding	At least three Intergovernmental Panel on Climate Change (IPCC) climate scenarios (A2, A1B, and B1) agree that Sri Lanka precipitation is likely to increase over the three time periods: 3.6%–11.0% in 2030, 15.8%–25% in 2050, and 31.3%–39.6% in 2080. The ensemble mean from the general circulation models (GCMs) indicates a 5%–10% increase by the end of the 21st century, with low agreement. The rainfall projections therefore have low confidence.
Storm surge	An extract of the distribution of the storm surge heights around the coastline of Sri Lanka corresponding to a tropical cyclone of maximum sustained wind speed of 220 km per hour with an estimated recurrence interval of about 100 years, showed that in Colombo area, a storm surge of 1–2 m is possible.[2]
Summary of Climate Change Risks	*A- temperature increase and heatwave: Medium risk* *B- drought and water availability: Low risk* *C- increased frequency and intensity of precipitation: High risk* *D- increased flooding frequency and extent: High risk* *E- erosion of river banks: Low risk* *F- landslides in hilly regions: Low risk* *G- sea level rise and coastal inundation and salination: High risk* *H- increased frequency and intensity of tropical cyclones: Low risk*
Climate Risk Classification: ***Medium***	

[2] J.J. Wijutinge. 2013. Cyclones and Storm Surges Pose a More Frequent Threat than Tsunami. The Institution of Engineers Sri Lanka (IESL). November.

C. Climate Risk Assessment

As part of the initial environmental examination for the SASEC Port Access Elevated Highway Project, a section on climate risk and vulnerability assessment has been prepared. Under this section, key climate change risks identified were increase in temperature, increased frequency and intensity of rainfall and related flooding triggered by precipitation, and storm surge.

III. Climate Risk Management Response within the Project

The following measures have been incorporated in the design of the SASEC Port Access Elevated Highway in consideration of the identified climate risks:

1. Increase in pier height and volume from a standard of 5.2 m from ground level to a minimum of 10 m
2. Increase in ramp length because of higher clearance of the main line
3. Construction of new canals to help drain water from increasing rainfall levels at the ground level port access road

Adaptation Components	**Total Adaptation Cost** ($ million)
Pier	3.83
Ramp	3.34
Canal	0.48
Total	7.65

Details of Adaptation for Pier Component	**Total Adaptation Cost** ($ million)	**Percentage**
Additional concrete	1.42	37
Steel reinforcement	0.86	23
Prestressing with strand tendons	0.68	18
Formwork	0.52	13
Pier launching	0.34	9
Total	3.83	100

The total cost of climate adaptation measures for the SASEC Port Access Elevated Highway is $7.65 million, representing 2.55% of ADB's financing and 2.12% of the total project cost of $360.2 million.