Project Climate Risk Assessment and Management Report

I. Basic Project Information

Project Title: Additional Financing of the National Motorway M-4 Gojra–Shorkot–Khanewal Section Project
Project Budget: $273 million
Location: Jhang and Khanewal, Punjab province, Pakistan
Sector: road transport (non-urban)
Theme: Inclusive economic growth and regional cooperation
Brief Description Pakistan Motorway M-4 forms a key part of CAREC corridor 5 and 6 and Pakistan's National Trade Corridor which connects both eastern and southern Pakistan with Central Asia Republics and PRC. The proposed additional financing will fund the construction of a 64 kilometer (km) four-lane access controlled motorway from Shorkot to Khanewal in Punjab province, which is the last missing link of Motorway M-4. The project will facilitate north-south connectivity, improve quality and efficiency of road transport services, and promote inclusive economic growth. The proposed Shorkot–Khanewal section of motorway M-4 is a four-lane access-controlled road facility with shoulders of 3.65 m. The design speed is 120 km per hour; the maximum grade is 4%. The scope of construction work includes earthwork, asphalt concrete pavement, bridges, crossing structures (underpasses and pipe culverts), interchanges, weigh bridges, toll plaza and multi-purpose service areas, and roadside improvements and safety engineering features such as traffic signs, road markings, traffic barriers, guardrails, and road lighting. Two multi-span girder bridges crossing the Ravi River and the Sidhnai Channel will be constructed, with an overall bridge length of 225 meter and 245 meter, respectively.

II. Summary of Climate Risk Screening and Assessment

1. **Flooding.** The project region has experienced recurring major flood events in the recent past.
2. **Rising temperatures.** Climate model projections agree that seasonal temperatures will increase by over 2˚C in the project location. This indicates a relatively low degree of uncertainty that temperatures will increase in the region.

A. Sensitivity of project component(s) to climate/weather conditions and sea level	
Project component • Construction of a 64 kilometer four-lane access controlled motorway with asphalt pavement	Sensitivity to climate/weather conditions • High summer temperature at times; • Intensity and frequency of heavy rainfall events cause flood.
B. Climate Risk Screening	
Risk topic • Flood • Water Availability	Description of the risk • The project is located in a region which has experienced recurring major flood events in the recent past. The flooding is mainly due to proximity to the inland watercourses • The project is located in a region where there may be future water stress (2020s–2050s) caused by high seasonal temperatures coincide with relatively low rainfall.
Climate Risk Classification: *Medium*	

C. Climate risk assessment

GIS analysis indicates that some regions of the project target area may be at moderate risk to flooding (refer to the attached GIS map). Based on the design of the previous section Faisalabad to Gojra, it is expected that motorway design parameters of the current Shorkot–Khanewal section can mitigate climate variability-related impacts.

III. Climate Risk Management Response within the Project

Climate change risks and mitigation measures were considered in the project design. The road embankment is sufficiently high (average embankment height is 3–4 m, which increases to 5–6 m near subways and drainage structures and 6–7 m near bridges) to withstand sheet flows of highest floods. The design provides adequate cross drainage structures and hydraulic structures over perennial water channels as well as canals and rivers. The design of these structures took into account increasing trend of 100-year recurrence-interval flood discharges. The impact of temperature on asphaltic pavement layers has been mitigated by adopting pavement specifications suitable for the climate in the project area—the mean maximum temperature of 41°C in summer and minimum temperature of 4°C in winter.

For the project road a total of about 4.5% ($12,050,390 of the civil works cost of $266,000,000) will be spent on addressing (adaptation) climate change risks. Design measures that have been taken to address climate change risks are:

- Relatively higher embankments because of drainage crossings
- Drainage ditch as required along the Motorway
- Increased clearance of bridges
- Revised design of Ravi Bridge and Sidhnai Channel for 100 year Flood
- Raised (profile) embankments between Ravi and Sidhnai
- Rip-Rap between Ravi and Sidhnai Bridge and other areas adjacent to canals / drains etc.
- 3-Cell culvert between Ravi and Sdihnai to provide passage for flood waters
- Bridges (10m) instead of Box-Structures