INVESTMENT PROGRAM CLIMATE RISK ASSESSMENT AND MANAGEMENT

I. Basic Project Information

Project Title: Mahaweli Water Security Investment Program
Project Budget: $675 million
Location: Sri Lanka; **Provinces:** Central, Eastern, North Central and North Western
Sector: Irrigation and Water-based Natural Resources Management
Theme: Irrigation and Drainage
Brief Description: The investment program will invest in water infrastructure and institutional capacity to improve water use efficiency and productivity for irrigated agriculture and bulk drinking water supplies in the water scarce and post-conflict northern provinces. The infrastructure includes conveyance canals for transfer of water from the Mahaweli River Basin to the command area cascade tank systems and storage reservoirs (2) in North Central and North Western Provinces. The projected climate change conditions most relevant to the program are: (i) rise in air temperature leading to increased irrigation water demand and lower crop productivity (particularly paddy); (ii) increase in total annual precipitation resulting in increased total water availability, but with a seasonal shift in precipitation patterns with an increase in South West Monsoon (SWM) rainfall (Yala season) reducing Yala season irrigation demand and a decrease in North East Monsoon (NEM) rainfall (Maha season) increasing Maha season irrigation demand; and (iii) increase precipitation intensity resulting in increased flood risk to conveyance and storage infrastructure due to higher peak flood flows.

II. Summary of Climate Risk Screening and Assessment

A. Sensitivity of Project Component(s) to Climate/Weather Conditions and Sea Level

Program infrastructure components:	Sensitivity to climate/weather conditions and sea level:
1. Construction of Kalu Ganga-Moragahakanda Transfer Canal 2. Construction of Upper Elahera Canal 3. Construction of the North West Canal and reservoirs 4. Rehabilitation of Minipe Left Bank Canal and Anicut heightening 5. Improving System Efficiencies and Water Productivity 6. Strengthening Integrated Water Resource Management	1. Temperature rise could lead to increased crop evapotranspiration and therefore crop water and irrigation demand. 2. Changes in monsoonal rainfall patterns, with decline in NEM rainfall could increase irrigation water demand (due to lower effective rainfall therefore gap between crop water demand and soil moisture availability), and increased SWM rainfall may decrease irrigation water demand (due to higher effective rainfall). 3. Increase in rainfall intensity may result increased peak flood flows and therefore integrity of storage and conveyance infrastructure. 4. Increase rainfall variability, may increase the frequency of droughts

B. Climate Risk Screening

Risk screening is based on AWARE assessment (attached)

Risk topic	Description of the risk
1. Temperature increase 2. Precipitation increase 3. Precipitation decrease 4. Water availability 5. Wind speed increase 6. On-shore Category 1	The risks relevant to project design and implementation are: 1. Temperature increase and precipitation decrease could increase irrigation water demand by 5% to 10% and therefore increase water transfers and infrastructure design duties. 2. Temperature increase may also adversely impact on crop production, with paddy yields declining of the order of 10% per degree increase in mean growing season temperature. 3. Precipitation increase may result in an increase in flood intensity

storms	and frequency, and therefore impact on conveyance infrastructure (storage and cross structures) and irrigated lands. 4. Precipitation decrease in the NEM (Maha season) may increase irrigation water demand.

Climate Risk Classification
The AWARE classification of the project is High Risk, and risk topics are classified as: temperature increase – high; precipitation increase – high; flood – high; precipitation decrease – high; wind speed increase – medium; and on-shore Category 1 storms – high.

C. Climate Risk Assessment

Under the A2 scenario, average annual mean temperature within the Mahaweli Basin is projected to rise 1.8ºC by 2050s. Annual precipitation is projected to increase 85mm (4.2%). Precipitation in the December-April period (largely corresponding to the North-East Monsoon) is projected to decrease by 3.8% while an increase of 11% is projected for the May-November period (corresponding to the South-West Monsoon).

III. Climate Risk Management Response within the Project

The investment program will help better cope with climate variability and change through:

1. The construction of irrigation conveyance and water storage infrastructure to transfer water from the Mahaweli River Basin to water scarce northern provinces. The program outputs include the Kalu Ganga - Moragahakanda Transfer Canal, Upper Elahera Canal, North Western Province Canal and reservoirs (2), and rehabilitation of the Minipe Left Bank Canal and heightened anicut. The target indicator is the average annual transfer of 1,100 MCM of available excess water in the Mahaweli River to the target areas of the North Western Province Canal and North Central Province Canal, and supply of 320 MCM to the Minipe Left Bank command area, all with a combined irrigated area of 84,000 hectares. The infrastructure design incorporates a 10% design surcharge for potential increases in demand and peaks flows, which is within the likely range of climate change impacts.
2. Potential increases in irrigation water demand due to temperature rise and lower North-East monsoon rainfall will be mitigated through implementation of a range of climate adaptation measures identified in the two project water management components; Strengthening Integrated Water Resources Management (SIWRM) and Improving System Efficiencies and Water Productivity (ISEWP). The non-engineering adaptation measures include:
    - The SIWRM package will improve Mahaweli River Basin and Mahaweli scheme planning and management by: upgrading the scheme's simulation model/DSS, strengthening of MASL's capacity, capacity strengthening of the Water Management Panel (WMP) (multi-sector stakeholder committee responsible for scheme planning and management), and strengthening of water allocation and reservoir operation rules, for normal and drought operation.
    - The ISEWP package will improve water productivity through improved management of the irrigation systems and at the farm-level including:
        - Improved management of cascade irrigation systems, with improved planning and management of water allocation (issues), through improved monitoring, improved capacity of system operation (Department of Irrigation for main canals and Farmer Organisations of secondary and tertiary canals). These will be demonstrated in Tranche 1 in case systems (pilots) within the investment program's projects (3) and further expanded to other systems in the Mahaweli Scheme in Tranche 3.
        - Improved farm productivity and on-farm irrigation efficiency in Tranche 1 by development of pilot demonstrations within the case irrigation systems (above) and further promoted within Mahaweli Scheme in Tranche 3. The proposed improvement interventions for the pilot demonstrations include:

	▪ Adoption of new water technologies including the System of Rice Intensification and Alternate Wetting and Drying ▪ Promotion of lower water demanding and higher value field and vegetable crops and ▪ Promotion of new heat and drought tolerant rice varieties