Tashkent New Gateway Hub International Airport, Uzbekistan

Climate Risk and Vulnerability Assessment

Vision Invest

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Making Sustainability Happen

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Executive Summary

1. Introduction

The Climate Change Impact Assessment (CCIA) for the Tashkent New Gateway Hub International Airport evaluates both:

- The impact of the Project on climate change, through its greenhouse gas (GHG) emissions.
- The impact of climate change on the Project, through exposure to future climate hazards.

The CCIA follows the European Commission Climate-Proofing Guidance (2021–2027) and the European Investment Bank (EIB) Project Carbon Footprint Methodology, incorporating Scope 1, Scope 2, and aviation-related Scope 3 (landing and take-off (LTO) cycle) emissions.

2. Greenhouse Gas (GHG) Emissions Impact of the Project

Operational GHG Emissions:

- The Project's scope 1 and 2 emissions, reflecting direct fuel use and purchased electricity are estimated at 58,800 tCO_2e per year for an airport handling 20 million annual passengers.
- The Project's scope 3 emissions from aircraft LTO cycles are substantially higher, estimated at 972,122 tCO_2e per year, with international flights contributing the majority of emissions.

Relative emissions associated with Scope 1 and Scope 2 sources are estimated at 29,400 tCO_2e per annum, while Scope 3 emissions attributable to aircraft landing and take-off (LTO) cycles are estimated at 486,061 tCO_2e per annum, based on an airport handling 20 million passengers annually (against a baseline of 10 million passengers annually).Significance of Emissions:

- Total direct emissions exceed the EIB significance threshold of 20,000 tCO_2e/year, requiring detailed analysis and mitigation.
    - The Project already includes the following mitigation measures:
        - An on-site solar PV plant, reducing grid electricity dependence.
        - Airport design aligned to LEED Silver standards, reducing energy and water consumption.
    - Additional mitigation is recommended, including:
        - High-efficiency HVAC systems.
        - Smart LED and adaptive airfield lighting.
        - Electrification of ground support equipment (GSE).
        - Advanced building management systems (BMS).
- Shadow Carbon Cost

  Applying EIB's shadow carbon price, the Project's annual Scope 1 and 2 emissions translate into escalating carbon-cost liabilities, starting at €13 million in 2029 and increasing over time.
- Alignment With Uzbekistan's National Climate Targets

The Project contributes 0.0186%–0.0192% to projected national GHG emissions through 2035. The contribution is small relative to the country's overall emissions intensity reduction target (50% reduction by 2035).

3. Climate Change Risks to the Project

The CCIA identifies flooding, extreme heat, extreme precipitation, and extreme cold as the highest-priority climate hazards due to high sensitivity and high exposure.

Table E.1: Summary of Project's inherent(i) and residual(r) risks mapped on the risk matrix

Likelihood	Impact				
	Insignificant	Minor	Moderate	Major	Catastrophic
Rare					
Unlikely		Extreme heat(r) Increased temperatures(r)			
Moderate		Extreme precipitation(r) Flooding(r) Extreme cold(r) Extreme wind(r)	Extreme heat(i) Increased temperatures(i) Extreme precipitation(i)		
Likely			Flooding(i) Extreme cold(i) Extreme wind(i)		
Almost certain					

- Flooding (High Risk → Medium Residual Risk)
  - Increasing extreme rainfall (up to 35.1% under SSP2-4.5 and 57.1% under SSP5-8.5) elevates the likelihood of surface flooding across the airport's flat terrain. Impacts include infrastructure damage and flight disruptions.
  - Key adaptations include expanded stormwater capacity, proactive weather monitoring, and drainage maintenance.
- Extreme Heat (High Risk → Low Residual Risk)
  - "Extreme Danger" heat-stress days are projected to rise by 167% (SSP2-4.5) to 771.9% (SSP5-8.5). This threatens worker safety, operational efficiency, and increases cooling demand.
  - Adaptations include workforce heat-stress protocols, shaded rest areas, cooling access, and rescheduling work to cooler periods.
- Increased Temperatures (High Risk → Low Residual Risk)

  - Higher temperatures reduce aircraft lift, increase fuel burn, and can soften asphalt runways. Cooling-degree-days are projected to increase up to 70.3%, increasing air-conditioning demand.
  - Adaptations include thermally resilient pavement design and adjusted takeoff scheduling.
- Extreme Precipitation (High Risk → Medium Residual Risk)
  - 24-hour extreme rainfall events (1:100 year) may rise by 14.4%–23.7%, increasing hydroplaning risk, braking distance, and runway closures.
  - Adaptations include grooved runways, enhanced drainage, and low-visibility procedures.
- Extreme Cold (High Risk → Medium Residual Risk)
  - Increased extreme cold intensifies icing of aircraft and runways, leading to delays and higher operational costs.
  - Adaptations include enhanced de-icing capacity and protective infrastructure.
- Extreme Wind (High Risk → Medium Residual Risk)
  - Increased wind may increasingly disrupt airport operations, leading to delays and operational losses.
  - Adaptations include aligning runways with prevailing wind directions, engineered barriers to reduce surface wind speeds, establish vegetation barriers to stabilise soil and limit wind erosion, and proactive monitoring weather forecasts and provide early warnings of extreme wind.

4. Overall Conclusion

The Tashkent New Gateway Hub International Airport will generate significant GHG emissions, primarily from aircraft movements. However, with planned and recommended mitigation measures, the Project can reduce its operational GHH emissions intensity and maintain compatibility with Uzbekistan's national climate commitments.

On the climate-risk side, flooding, heat, extreme precipitation, and extreme cold pose material risks to airport operations and infrastructure, but these can be effectively managed through the adaptation measures identified in the assessment.

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Acronyms and Abbreviations

5 Capitals	5 Capitals Environmental and Management Consulting
A_b	Absolute GHG emissions
B_e	Baseline GHG emissions
BESS	Battery energy storage system
BMS	Building management system
CCIA	Climate change impact assessment
CFE	Carbon footprint exercise
CH_4	Methane
CWHF	Central waste handling facility
CO_2	Carbon dioxide
CO_2e	Carbon dioxide equivalents
EHS	Environmental, health and safety
EIB	European Investment Bank
EP4	Equator Principles (Version 4)
ESIA	Environmental and social impact assessment
€/tCO_2e	Euros per tonnes of carbon dioxide equivalent
EU	European Union
FF	Fuel farm
gCO_2e/kWh	Grams of carbon dioxide equivalents per kilowatt hour
GDP	Gross domestic product
GHG	Greenhouse gas
GPS	Global positioning system
GSE	Ground support equipment
GWP	Global warming potential
HFCs	Hydrofluorocarbons
HVAC	Heating, ventilation and air conditioning
ICAO	International Civil Aviation Organization
IFC	International Finance Corporation
IFI	International Financial Institution
IPCC	Intergovernmental Panel on Climate Change
kgCO2e	Kilogrammes of carbon dioxide equivalents
kgCO2e/kWh	Kilogrammes of carbon dioxide equivalents per kilowatt hour
kgCO2e/Pax	Kilogrammes of carbon dioxide equivalents per passenger
kgCO2e/t	Kilogrammes of carbon dioxide equivalents per tonne
kgCO_2/LTO	Kilograms of carbon dioxide per landing–take-off cycle
kgN_2O/LTO	Kilograms of nitrous oxide per landing–take-off cycle
kgCH_4/LTO	Kilograms of methane per landing-take-off cycle

$ktCO_2e$	Kilotonnes of carbon dioxide equivalents
kWh	Kilowatt hour
LTO	Landing and take-off cycle
LED	Light-emitting diode
LEED	Leadership in Energy and Environmental Design
LVP	Low-Visibility Procedures
MAP	Million annual passengers
MJ	Megajoule
$MJ/(m^2 \cdot day)$	Megajoules per square meter per day
MRV	Measure, report, and verify
$MtCO_2e$	Million tonnes of carbon dioxide equivalents
MW	Megawatt
N_2O	Nitrous Oxide
NDC	Nationally Determined Contribution
NF_3	Nitrogen Trifluoride
Pax/year	Passengers per year
PFCs	Perfluorocarbons
PPE	Personal protective equipment
PV	Photovoltaic
R_e	Relative GHG emissions
SLR	SLR Sustainable Environmental Consultancy L.L.C S.O.C
SF_6	Sulphur Hexafluoride
SSP	Shared Socioeconomic Pathway
tCO_2e	Tonnes of carbon dioxide equivalent
TS-1 / Jet-A1 / RT	Aviation fuel types
WBCSD	World Business Council for Sustainable Development
WRI	World Resources Institute

1.0 Introduction

1.1 Background Information

The proposed Tashkent New Gateway Hub International Airport ('the Project') will be developed jointly by Vision Invest and Sojitz Corporation, appointed by the Ministry of Transport and Uzbekistan Airports of the Republic of Uzbekistan.

The Project is aimed at boosting tourism and accelerating economic growth in Uzbekistan and involves the design, construction, financing, operation, and maintenance of a new international airport in Tashkent city.

5 Capitals – Part of SLR (5 Capitals) has been engaged by the Client to undertake the independent assessment of potential environmental and social impacts, including this Climate Change Impact Assessment (CCIA).

1.2 Purpose and Scope of the CCIA

The purpose of this CCIA is to assess the following:

- The potential impacts of climate change on the Project.
- The potential impact of the Project's greenhouse gases (GHGs) emissions.
- The potential impacts of the Project on communities and priority ecosystem services that could be adversely affected by climate change.
- The potential impacts of the Project on Critical Habitat (if any) that serve as important sites for climate mitigation and adaptation.

The scope of this assessment is as follows:

- Conduct a desktop review of relevant Uzbekistani legislation, regulations, policies, and plans to understand the legislative and policy context within which the Project will be developed. (**Section 2**).
- Provide a brief description of the Project, highlighting components that are vulnerable to adverse climate change impacts and identifying significant sources of GHG emissions. (**Section 3**).
- Describe the approach and methodology of the CCIA (**Section 4**).
- Conduct a desktop review of the latest climate data to identify historical trends and projected climate changes under various climate change scenarios, including the climate hazards that could adversely affect the Project. (**Section 5** and **Appendix A**).
- Assess the impact of the Project on climate change by quantifying the Project's direct (Scope 1) and indirect (Scope 2) GHG emissions, expressed in tonnes of carbon dioxide equivalent (tCO_2e). Scope 3 emissions from aircraft landing and take-off (LTO) cycles will also be quantified (**Section 6**).
- Assess the impact of climate change on the Project by conducting sensitivity, exposure, and vulnerability analyses, as well as assessing the impact of key climate change variables on the Project (**Section 7**).
- Assess the impact of the Project on communities, priority ecosystem services, and sites of demonstrated importance to climate change adaptation and mitigation (**Section 8**).

2.0 Legal and Policy Framework

The following sections provides a brief overview of the policy and legislative context within which the Project will be developed and how the Project complies with and responds to the relevant policies and legislation (**Table** 2-1).

Understanding the policy and legislative context in which a project is developed is essential because it ensures the project aligns with national laws, regulatory requirements, and strategic policy priorities. This helps prevent compliance risks, avoids project delays, and ensures that environmental, social, and relevant climate-related obligations are met.

This framework includes Uzbekistan's climate-related legislation, policies, and plans, and relevant international guidelines and standards.

2.1 National Legislation

Table 2-1: Summary of the relevant national legislation

Title	Purpose	Relevance to Project
Law on Limiting Greenhouse Gas Emissions ZRU-1073, 2025[1]	The Law on Limiting Greenhouse Gas Emissions (ZRU-1073) establishes the legal basis for national emissions reductions. It embeds key principles such as the expansion of renewable energy, adherence to international climate commitments, transparent reporting, scientific rigor, and alignment with economic development. The law also defines and clarifies the responsibilities of relevant ministries in relation to emissions reduction, carbon trading, and monitoring activities.	The Project should, to the extent possible, comply with requirements of enterprises to limit, monitor, and report on GHGs.
Law No. ZRU-539 on Renewable Energy Sources, 2019[2]	The purpose of this Law is to support diversification of the national economy and reduce dependence on fossil fuels by promoting and regulating renewable energy. It covers both the deployment of renewable energy technologies and the manufacture of related equipment.	While most requirements are directed at the government, certain provisions also apply to renewable energy producers, and the Project will be required to comply with these.
Law on the Rational Use of Energy; and the Parliamentary Decree	The law promotes efficient and environmentally responsible energy use, supports energy-efficient technologies, ensures accurate measurement and accounting of energy, and establishes state oversight of energy production, consumption, and equipment.	While most requirements are directed at the government, certain provisions also apply to

[1] The Government of the Republic of Uzbekistan (2025) *Law on Limiting Greenhouse Gas Emissions ZRU-1073* (Link) [accessed 10 February 2026]

[2] The Government of the Republic of Uzbekistan (2019) *Law No. ZRU-539 on Renewable Energy Sources* (Link) [accessed 10 February 2026]

Title	Purpose	Relevance to Project
regarding the procedure of enforcing the Law on the Rational Use of Energy, 1997[3].		significant energy users and renewable energy producers, and the Project will be required to comply with these.

2.2 National Policies

Table 2-2: Summary of the relevant national policies

Title	Purpose	Relevance to Project
Nationally Determined Contribution of the Republic of Uzbekistan (NDC 3.0), 2025[4]	The purpose of Uzbekistan's Nationally Determined Contribution (NDC 3.0) is to outline the country's strengthened commitments to reducing GHG emissions and enhancing resilience to climate change impacts. Uzbekistan's updated NDC, submitted in 2025, commits the country to a 50% reduction in emissions-intensity per unit of GDP by 2035 compared to 2010 levels. According to the NDC, Uzbekistan's long-term decarbonisation of the economy will focus primarily on the rapid expansion of renewable energy and improvements in energy efficiency in the 2020s. In the 2030s, the focus will shift towards the transport sector targeting electrified transport systems. In the 2040s, the focus will be on hard-to-mitigate sectors of the economy.	The Project should, to every extent possible, try to align with Sections 5.4.1 and 5.4.2 of Uzbekistan's NDC 3.0. The compatibility of the proposed Project with Uzebkistan's national climate change commitments are assessed in **Section 6.2.2.3**.
On Measures to Implement a National Transparency System in the Transition to a 'Green' Economy in the Republic	The purpose of this policy is to accelerate the development of a green economy in the country, increasing the level of transparency in this area, whilst effectively and timeously implementing the tasks outlined in the measures to enhance the effectiveness of reforms aimed at transitioning the Republic of Uzbekistan to a "green" economy by 2030, referred to above.	Although the policy does not contain requirements specific to the Project, it should, to the extent possible, be compatible with the objectives of the policy, and in particular the

[3] The Government of the Republic of Uzbekistan (1997) *Law on the Rational Use of Energy; and the Parliamentary Decree regarding the procedure of enforcing the Law on the Rational Use of Energy* (Link) [accessed 10 February 2026]

[4] The Government of the Republic of Uzbekistan (2025) *Updated Nationally Determined Contribution of the Republic of Uzbekistan (NDC 3.0)*. (Link) [accessed 10 February 2026]

Title	Purpose	Relevance to Project
of Uzbekistan, 2024[5].		national GHG inventory.
National Action Plan for Climate Change and Natural Disaster Risks (Decree no.362), 2023[6].	The purpose of the Plan is to outline cross-sectoral measures to reduce Uzbekistan's vulnerability to climate-related and other natural hazards. It highlights risks from extreme rainfall, forest fires, and the structural sensitivity of dams and reservoirs. The plan focuses on strengthening institutional capacity for prevention and response, raising public awareness, attracting investment, and improving climate risk forecasting and monitoring. It supports interventions across sectors including health, buildings, agriculture, meteorology, government ministries, and financial institutions.	While most requirements are directed at the government, the Project should, where feasible, align with and support the adaptation measures outlined in the plan.
Uzbekistan 2030 Strategy, 2023[7].	The Uzbekistan 2030 Strategy sets long-term national development priorities with quantified targets across multiple sectors. It seeks to reduce the carbon intensity of the economy by 30% from 2010 levels, increase renewable energy to 40% of power generation, improve energy efficiency, transition public transport to low-carbon fuels, and establish an MRV system for all greenhouse gases to support emissions trading. Environmental commitments include creating 600,000 hectares of green space, rehabilitating more than 6,000 hectares of degraded mining land, and achieving near-complete national coverage of weather and flood early-warning systems. The strategy also promotes research into climate-resilient, high-yield crop varieties and improved water management to address growing water scarcity.	While most requirements are directed at the government, the Project should, where feasible, align with and support the objectives of the plan.
Development Strategy of New Uzbekistan for	The purpose of the Development Strategy of New Uzbekistan for 2022–2026 is to define the country's medium-term national reform agenda aimed at modernising state institutions, accelerating socio-economic development, and improving the well-being of the population.	Although this Strategy does not have any specific requirements for the Project, the Project should, to the extent possible,

[5] The Government of the Republic of Uzbekistan (2024) *On Measures to Implement a National System of Transparency in the Transition to a Green Economy in the Republic of Uzbekistan PP-213* (Link) [accessed 10 February 2026].

[6] The Government of the Republic of Uzbekistan (2023) *National Action Plan for Climate Change and Natural Disaster Risks (Decree no.362)* (Link) [accessed 10 February 2026].

[7] The Government of the Republic of Uzbekistan (2023) *Uzbekistan 2030 Strategy* (Link) [accessed 10 February 2026].

Title	Purpose	Relevance to Project
2022 to 2026, 2022[8]	The Strategy has been aligned with the objectives of transitioning to a "green" economy. Within the framework of seven key areas, 96 goals have been identified, each with a specific set of target indicators established. The seventh key priority area, 'Achieving Environmental Sustainability and Regional Development' relates most strongly to climate change, covering topics such as climate resilience, environmental protection, and green development, among other local ecological challenges.	ensure that it is compatible with the vision and strategic objectives, interventions, and actions of this decree, in particular Direction 7 'Achieving Environmental Sustainability and Regional Development'.
Concept of Environmental Protection in the Republic of Uzbekistan until 2030, 2019[9]	The Concept of Environmental Protection in the Republic of Uzbekistan until 2030 outlines a comprehensive long-term vision for the sustainable management of the country's natural environment and resources. Among its eight key strategic directions, it identifies international co-operation on climate action as a central priority. The Concept underscores the importance of addressing land degradation and water scarcity, tackling domestic climate challenges, and reducing GHG emissions in support of global mitigation efforts.	While most requirements are directed at the government, the Project should, where feasible, align with and support the objectives of the plan.
Strategy for the transition of the Republic of Uzbekistan to a Green economy in the period of 2019-2030, 2019[10]	The purpose of Uzbekistan's strategy for the Transition to a Green Economy for the period 2019–2030 is to guide the country toward a more resource-efficient, low-carbon, and climate-resilient development model by modernising its economic sectors and integrating environmental sustainability into national planning.	Although this Strategy does not have any specific requirements for the Project, the Project should, to the extent possible, ensure that it adheres to the specifications stipulated by Uzbekistan's MRV once it is publicly officiated.

[8] Development Strategy Centre (2022) *Development Strategy of the New Uzbekistan for 2022 — 2026*. (Link) [accessed 10 February 2026].

[9] The Government of the Republic of Uzbekistan (2019) *Concept of Environmental Protection in the Republic of Uzbekistan until 2030* (Link) [accessed 10 February 2026].

[10] The Government of the Republic of Uzbekistan (2019) *Strategy for the transition of the Republic of Uzbekistan to a Green economy in the period of 2019-2030* (Link) [accessed 10 February 2026].

2.3 International Guidelines and Standards

Table 2-3: Summary of the relevant international guidelines and standards

Title	Purpose	Relevance to Project
European Commission's Technical Guidance on the Climate Proofing of Infrastructure in the Period 2021-2027, 2021[11].	The EU Technical Guidance on the Climate Proofing of Infrastructure for 2021–2027 aims to ensure that all EU-funded infrastructure investments are consistent with the Union's climate objectives by integrating both climate change mitigation and adaptation considerations throughout project development. Its purpose is to help project promoters and investors assess whether projects align with the EU's 2030 and 2050 climate targets, identify and avoid climate-related risks, ensure energy-efficiency and "do no significant harm" principles, and strengthen the overall climate resilience of infrastructure across sectors such as transport, energy, water, buildings, and nature-based solutions.	This CCIA aligns with the guidance on climate mitigation and climate resilience provided in the guideline.
EP4, 2020[12].	The Equator Principles are a financial industry benchmark for assessing and managing social and environmental risks in project financing, including the requirements for climate change risk assessment and reporting on GHG emissions.	This CCIA aligns with the requirements of EP4, particularly Principle 2 and Annex A.
Recommendations of the TCFD, 2017[13].	Establishes recommendations for disclosing clear, comparable, and consistent information about the risks and opportunities presented by climate change.	This framework is used in **Section 7** to categorise the Project's climate-related risks and opportunities.
International Finance Corporation (IFC): Performance Standards on Environmental and Social Sustainability, 2012[14].	These standards cover the IFC's strategic commitment to sustainable development, as well as its approach to risk management. The standards cover guidance on how to identify risks and impacts, and are designed to help avoid, mitigate, and manage risks and impacts as a way of doing business in a sustainable way, including	This CCIA aligns with the requirements of these standards, and in particular Performance Standards 1, 3, 4, and 6.

[11] European Commission (2021) *Technical Guidance on the Climate Proofing of Infrastructure in the Period 2021-2027* (Link) [accessed 10 February 2026].

[12] Equator Principles Association (2020) *Equator Principles: EP4: July 2020* (Link) [accessed 10 February 2026].

[13] TCFD (2017) *Recommendations of the Task Force on Climate-related Financial Disclosures* (Link) [accessed 10 February 2026].

[14] International Finance Corporation (2012) *Performance Standards* (Link) [accessed 10 February 2026].

Title	Purpose	Relevance to Project
	stakeholder engagement and disclosure obligations of the client in relation to project-level activities.	
Environmental, Health, and Safety (EHS) General Guidelines, 2007[15].	These guidelines are the World Bank Group's technical reference documents with general and industry-specific examples of good international industry practice.	This CCIA broadly adheres with the requirements of **Section 1.1**.

[15] World Bank (2007) *Environmental, Health, and Safety General Guidelines* (Link) [accessed 10 February 2026].

3.0 Project Description

The following section provides a brief description of the Project, highlighting components that are potentially vulnerable to adverse climate change impacts and identifying significant sources of GHG emissions. For a more detailed project description, refer to the main ESIA report.

3.1 Project Location

Table 3-1 summarises the key characteristics of the Project area, including its location, nearby cities, and land uses both on-site and in the surrounding area.

Table 3-1: Key attributes of the Project's location

Item	Description
GPS coordinates	41.089537°N 69.209539° E
Nearest city	~23 km south of Tashkent city (**Figure** 3-1)
District	Urta-Chirchik and Kuyi-Chirchik districts
Province	Tashkent province
Extent	Site boundary: ~1,300 ha
On-site land uses	Predominantly agriculture (rice, cotton, pulse, vegetables, and fruit trees), with a small village in the northeast corner. There is also a network of drainage collectors and irrigation channels within the boundaries of the Project site.
Surrounding land uses	Predominantly agriculture to the north and west, with villages to the south and east. A main electrified railway line runs parallel to the eastern boundary, and a minor local road crosses the centre of the site with another in the southwest corner. The Chirchiq River is approximately 2 km to the east of the Project site.

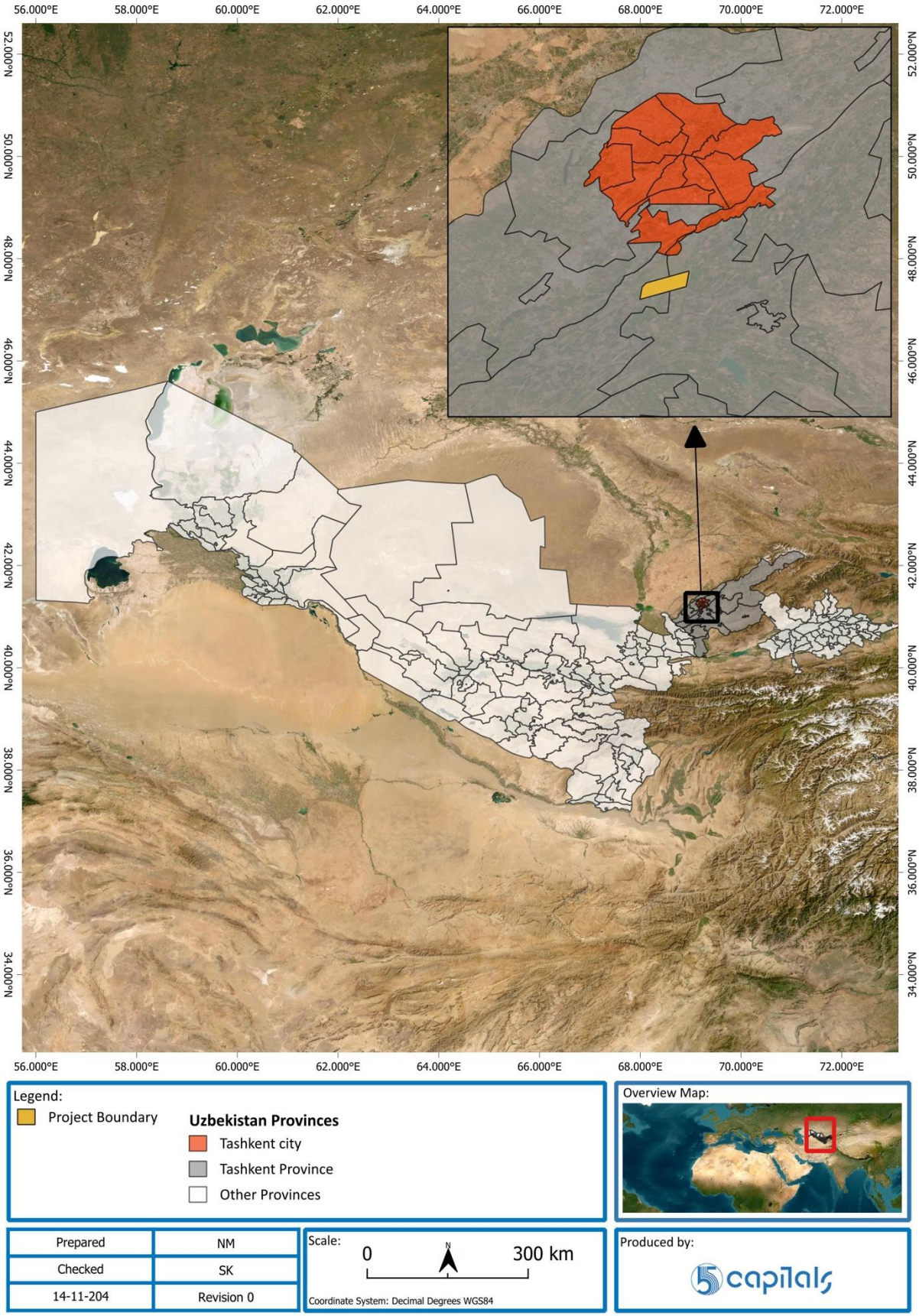


Figure 3-1: Project location

3.2 Project Activities

Table 3-2 summarises the key Project activities[16]. The layout of the Project is shown in **Figure** 3-2.

Table 3-2: Key Project activities

Item	Description
Runway	The paved length of the runway is approximately 4,000 m. The runway would be designed in accordance with the International Civil Aviation Organization (ICAO) Aerodrome Design Manual to accommodate Code 4E, and the occasional Code 4F aircraft.
Taxiways	The taxiways allow for the movement of aircraft between the runway, aprons, terminals, and hangers. The taxiway geometry would be designed in accordance with the ICAO Aerodrome Design Manual to accommodate Code 4E, and the occasional Code 4F aircraft.
Aprons	The aprons provide a dedicated space to park aircraft for the purpose of loading and unloading passengers, cargo or mail, fuelling, servicing, catering, over-night parking and/or maintenance. Several aprons are planned, including a commercial apron, cargo apron, presidential apron, and de-icing apron.
Engine run up facility	An engine run-up area (130 m x 100 m) has also been provided at the southeast end of the maintenance apron. An engine run-up is necessary after certain types of maintenance procedures are performed on an aircraft.
De-icing aprons	Due to the relative long taxi distance, de-icing/anti-icing operations will take place at dedicated de-icing aprons close to the departure thresholds.
Airside service roads	Airside service roads will provide access for ground support equipment (GSE). In addition, a perimeter access road (~6 m in width) will run along the airport's perimeter fence.
Landside Terminal Area	Main access to the Landside Terminal Area is provided by a one-way loop road. The Landside Terminal Area includes the following: • Passenger Terminal Building. • Passenger and employee parking. • Hotel (future plan). • Administration building.

[16] 5 Capitals (2025) *Tashkent New Gateway Hub International Airport Uzbekistan: Environmental & Social Impact Assessment: Scoping Report*.

Item	Description
	• Utility zone. • Terminal logistics area. • Airside/landside gates.
Landside Support Area	Main access to the Landside Support Area is provided by the Support Area Spine Road. The Landside Support Area includes the following: • Cargo handling facility. • Maintenance, repair, and overhaul operations. • Fuel farm. • Solid waste treatment. • Staff parking.
Electrical power supply	The Project's initial electrical demand is estimated at 21–39 megawatts (MW), increasing to approximately 45–70 MW during the final Project phase. The national grid will supply the majority of the required electrical power. Additional energy will be generated by the proposed on-site solar photovoltaic (PV) plant and battery energy storage system (BESS), to be located within the short-term parking area. The PV installation will have an installed capacity of 4,000 kilowatts peak. Any surplus generation will be directed to charging the on-site BESS or exported to the local grid.
Water supply	The initial water demand is estimated to be 1,310 m^3/day, increasing to 3,340 m^3/day in the final phase of the Project. At present, no bulk water supply infrastructure serves the area. Groundwater abstraction will therefore be implemented as an interim water-supply solution until such time as bulk services become available. The abstracted groundwater will be treated on-site through the Project's dedicated water treatment plant.
Wastewater	It is estimated that 1,060 m^3/day of wastewater will be generated during the initial stage, increasing to 2,700 m^3/day in the finale phase of the Project. At present, no bulk wastewater treatment facility serves the area. Most of the wastewater generated on-site will be treated on-site through the Project's dedicated wastewater treatment plant. Wastewater from incoming aircraft and contaminated runoff from the de-icing apron will be collected and treated off-site by a third-party contractor.

Item	Description
Solid waste	It is estimated that 15.9 tonnes of solid waste will be generated on a daily basis during the initial stage. Municipal solid waste will be transferred to the Central Waste Handling Facility (CWHF) for separation and temporary storage. The recyclable materials will be transported to recycling facilities, the organics to authorised composting site, and the residual waste to municipal sanitary landfill site (or co-generation plant). Hazardous waste will also be transferred to the CWHF for temporary storage. The hazardous waste will be collected and disposed by a third-party contractor.
Aviation fuel	The primary mode of supply of fuel to the airport will be via rail and the secondary mode of supply will be via road tanker A large Fuel Farm (FF) is to be located northwest of the main terminal building and runways. The FF consists of 13 vertical steel storage tanks and 34 horizontal tanks. The FF will be used to store different types of fuel, namely TS-1, Jet-A1 SSF, Jet-A1, Jet A-10 and RT. All fuel is supplied to the aircraft via fuel bowsers.

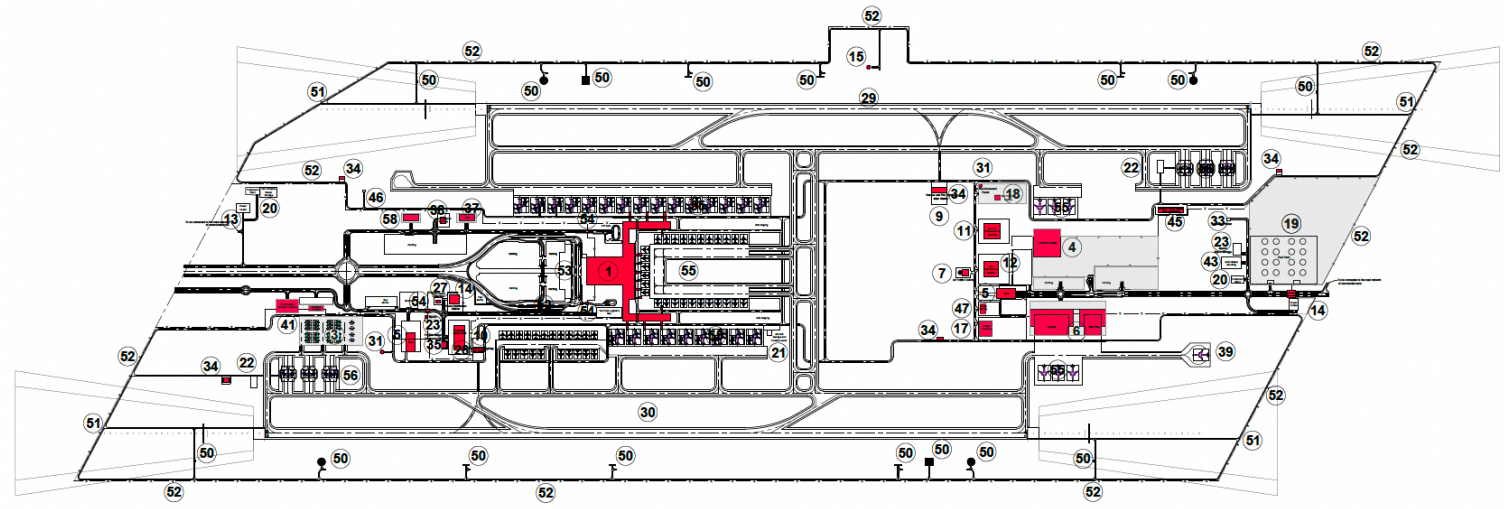
3.3 Project Timeframes

Table 3-3 presents the indicative timeframes for the construction, operation, and closure phases of the proposed Project. These timeframes are provisional and may be subject to change.

Table 3-3: Indicative Project timeframes[17]

Item	Description
Construction	2026 to 2030 (~42 months)
Operations	From 2029
Closure	There is no planned decommissioning and closure phase.

[17] *Ibid.*



LEGEND:

1. Passenger terminal (Including Presidential Apron)
2. Not Used
3. General Aviation facilities / Helipads (Including General Aviation Terminal, Not in EPC Scope)
4. Cargo terminals (Not in EPC Scope)
5. Gate
6. Aircraft maintenance facilties (Not in EPC Scope)
7. Air Traffic control (Shell & core)
8. Not Used
9. Rescue and Fire Fighting Main Station + AGL Substation (34)
10. Rescue and Fire Fighting Sub station
11. Airport maintenance facilities
12. GSE maintenance facilities (Shell & core)
13. Power Intake (1-nos)
14. Power Distribution Station (2-nos)
15. Doppler VHF Omni Directional Range (DVOR)
16. Not Used
17. In-flight Catering Facility (Not in EPC Scope)
18. Fire Training Facility (Not in EPC Scope)
19. Fuel Farm (Not in EPC Scope)
20. Wastewater Treatment Plant and Non-potable Water Storage (ug)
21. Aircraft Sewage and Potable Water
22. Glycol Storage
23. Spent Glycol Storage Facility
24. Not Used
25. Not Used
26. Common Utility Plant (Potable Water Storage + Fire Pump Room + Chiller Plant)
27. Solid Waste Collection
28. Not Used
29. Runway 1 (06L/24R)
30. Runway 2 (06R/24L)
31. Surface Movement Radar
32. Not Used
33. Weather Radar (Not in EPC Scope)
34. Airfield Ground Lighting Sub-Station (4 nos)
35. Potable Water Treatment Facility
36. Not Used
37. Hotel (Not in EPC Scope)
38. Administration Building + Secondary Data Centre + Main Operational Equipment Room + Main Equipment Room
39. Engine Run-Up Bay / Isolation pad
40. Not Used
41. Fixed Based Operator Facilties (Not in EPC Scope)
42. Not Used
43. Solid Waste Handling Facility
44. Not Used
45. Bowser Filling Station and Laboratory (Not in EPC Scope)
46. Bomb Disposal Unit
47. Meteo Facility
48. not used
49. not used
50. NavAids Equipment (Not in EPC Scope)
51. Crash Gate
52. Boundary Fence
53. Forecourt
54. Security Check Post
55. Apron
56. De-Icing Apron
57. not used
58. Training Center

Asset Not in EPC Scope

Figure 3-2: Project Masterplan for Phase 1 (February 2026)

4.0 Methodology

The following section outlines the methodology applied in this CCIA, which largely follows the European Commission (EU)'s Technical Guidance on Climate Proofing of Infrastructure (2021–2027) (hereinafter referred to as the EU's Technical Guidance")[18]. This guidance supports the integration of climate change mitigation and adaptation measures into infrastructure development. The climate-proofing process consists of two pillars, mitigation and adaptation, and two phases, screening and detailed analysis. The need for detailed analysis is determined by the screening phase, helping to minimise unnecessary administrative burden.

4.1 Climate Neutrality

Climate change mitigation focuses on decarbonisation, energy efficiency, energy savings, and the deployment of renewable energy[19].

As the Project's lifespan extends beyond 2050, it is essential to quantify its associated emissions and assess its alignment with net-zero and climate-neutral pathways. The assessment, therefore, aims not only to estimate the Project's potential GHG emissions but also to guide the integration of low-carbon solutions during planning and design. Early incorporation of climate-proofing measures is critical.

Figure 4-1 provides an overview of the climate-mitigation process for climate proofing, with each step described in the following sections.

[18] European Commission (2021) *Technical Guidance on Climate Proofing of Infrastructure (2021–2027)* (Link) [accessed on 04 February 2026].

[19] *Ibid*.

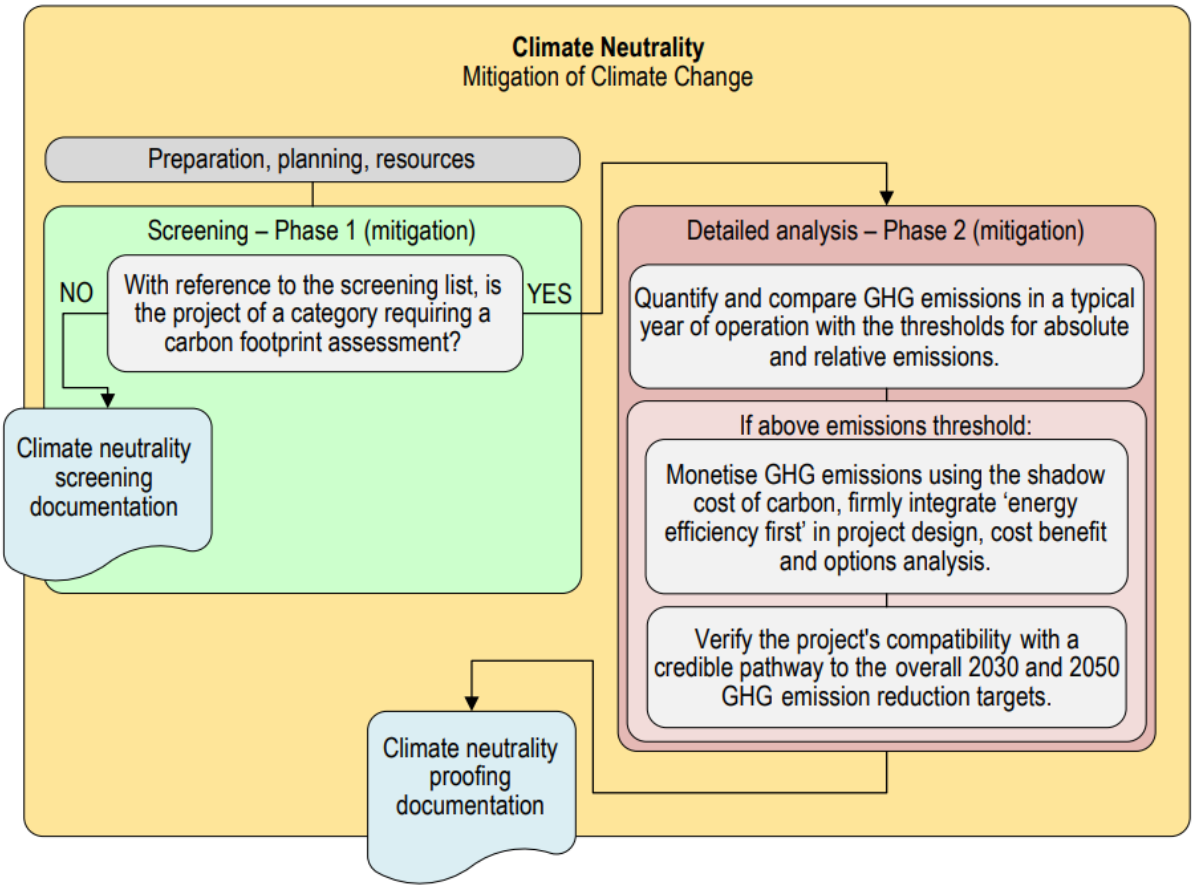


Figure 4-1: Overview of the climate neutrality process[20]

4.1.1 Phase 1: Screening

In Phase 1, the Project is screened using the criteria in EU Technical Guidance, which categorises projects into two groups. Projects in the first group are generally not expected to have a significant carbon footprint and therefore do not typically require a carbon footprint assessment. Projects in the second group are expected to have significant emissions, and a carbon footprint assessment is usually required.

4.1.2 Phase 2: Detailed Analysis

In Phase 2, the Project's GHG emissions are quantified for a representative operational year and compared against the predefined thresholds for absolute and relative emissions.

If the emissions exceed these thresholds, they are monetised using the shadow cost of carbon to inform project design, cost–benefit analysis, and options evaluation. The implications of carbon pricing for the Project are assessed in **Section 6.2.2.2**.

Additionally, where emissions exceed the thresholds, the Project's alignment with a credible pathway toward the 2030 and 2050 GHG-reduction targets is assessed. The general compatibility of the Project with these GHG reduction targets are assessed in **Section 6.2.2.3**.

[20] *Ibid* (pg. 19).

4.1.2.1 Methodology for Quantifying the Project's GHG Emissions

In line with the European Commission's Technical Guidance on Climate Proofing of Infrastructure (2021–2027), the Project's GHG emissions are quantified using the European Investment Bank's (EIB) Project Carbon Footprint Methodologies[21] (hereinafter referred to the "EIB Methodology").

This guideline is used to calculate the GHG emissions of investment projects financed by the EIB. The guideline is based upon the internationally recognised methodologies, including:

- Intergovernmental Panel on Climate Change (IPCC) *Guidelines for National Greenhouse Gas Inventories*.
- World Resource Institute (WRI) and World Business Council for Sustainable Development (WBCSD) *GHG Protocol Corporate Accounting and Reporting Standard*.
- International Financial Institutions (IFI) *Framework for a Harmonised Approach to Greenhouse Gas Accounting*.

4.1.2.2 GHGs Included in the Project's GHG Inventory

The GHGs to be included in a GHG emissions inventory include the seven gases listed in the Kyoto Protocol:

- Carbon dioxide (CO_2).
- Methane (CH_4).
- Nitrous oxide (N_2O).
- Hydrofluorocarbons (HFCs).
- Perfluorocarbons (PFCs).
- Sulphur hexafluoride (SF_6).
- Nitrogen trifluoride (NF_3).

All relevant emissions are converted to tonnes of carbon dioxide equivalent (tCO_2e) using the applicable Global Warming Potentials (GWPs).

Based on a review of the Project's emission sources (i.e., mobile and stationary combustion), only CO_2, N_2O, and CH_4 are considered in the assessment.

4.1.2.3 Project Boundaries

The project boundary defines the sources to be included in the GHG emissions assessment. The EIB Methodology applies the 'scope' categories from the WRI/WBCSD GHG Protocol Corporate Accounting and Reporting Standard. These include:

- **Scope 1: Direct GHG emissions:** Direct GHG emissions are physically emitted from sources that are operated by the project (e.g., emissions produced by the combustion of fossil fuels).
- **Scope 2: Indirect GHG emissions:** Scope 2 accounts for indirect GHG emissions associated with energy (e.g., electricity) consumed but not produced by the project.

[21] EIB (2023) EIB Project Carbon Footprint Methodologies: Methodologies for the assessment of project greenhouse gas emissions and emission variations (link) [accessed on 04 February 2026].

- **Scope 3: Other indirect GHG emissions:** Scope 3 emissions are all other indirect emissions that can be considered consequences of project activities (e.g. airplane emissions).

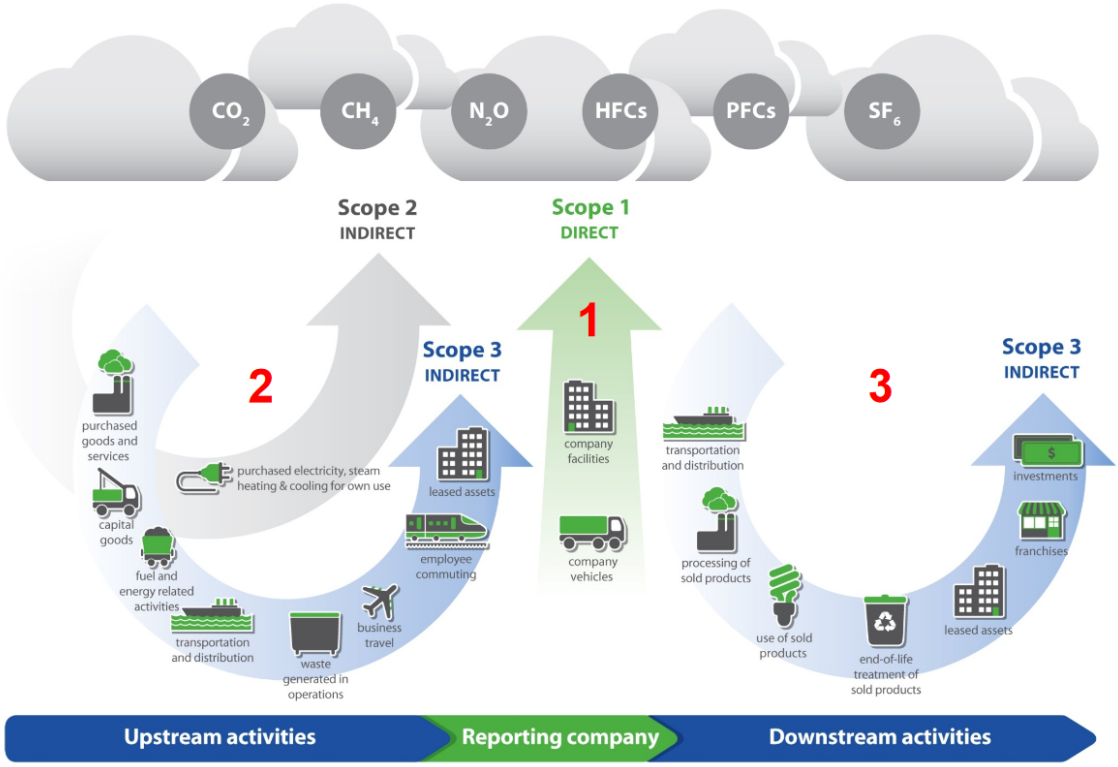


Figure 4-2: Overview of scope 1, scope 2, and scope 3 emissions across the value chain[22]

Presently, the EIB Methodology only requires the quantification of a project's Scope 1 and 2 emissions. For certain sectors where Scope 3 emissions are expected to be significant and can be estimated, Scope 3 emissions may be included.

In accordance with Annex 5 of the EIB Methodology which sets out a specific methodology calculating the carbon footprint of airports, this assessment has included the Scope 3 emissions from the landing and takeoff (LTO) cycle.

4.1.2.4 GHG Emissions Calculation Methodologies

Mobile Fossil Fuel Combustion

GHG emissions will be directly emitted by the combustion of fossil fuels in construction vehicles during the construction phase. The GHG emissions from mobile fossil fuel combustion is calculated using the following method[23]:

$$CO2e_{(t)} = Diesel\ fuel\ use_{(t)} * emission\ factor_{(kgCO2e/t)} * 1/1{,}000$$

[22] Greenhouse Gas Protocol (2011) Corporate Value Chain (Scope 3) Accounting and Reporting Standard (link) [accessed on 04 February 2026].

[23] EIB (2023) *EIB Project Carbon Footprint Methodologies: Methodologies for the assessment of project greenhouse gas emissions and emission variations* (Link) [accessed on 04 February 2026].

Fuel energy consumption data was estimated using a preliminary construction plant list, typical daily fuel use per unit (L/day), daily operating hours, monthly working days, and the duration of each project phase (earthworks, civil, structural, mechanical, electrical, and plumbing, and commissioning), while the diesel combustion emission factor was obtained from the EIB Methodology.

Purchased Electricity

GHG emissions will be indirectly emitted with the purchase of electricity for use in electrical equipment during the construction phase. The GHG emissions from purchased electricity is calculated using the following method[24]:

$$CO_2e_{(t)} = \text{Electricity use}_{(kWh)} * \text{country-specific emission factor}_{(kgCO2e/kWh)} * 1/1{,}000$$

Electricity consumption data was based on an average construction demand of ~5,500 MWh/year, extrapolated over the 3.5 year construction period, and including temporary facility loads (site offices, batching plant, and worker accommodation)., while the country-specific emission factor was obtained from the EIB Methodology.

Scope 1 and 2 Operational Emissions

During the operational phase, Scope 1 (direct) emissions will be emitted from the combustion of diesel and petrol fuel in airport-owned vehicles and ground support equipment, as well as Scope 2 (indirect) emissions from the purchase of electricity. Main uses of electricity include the heating, ventilation, and air-conditioning (HVAC) systems, and lighting, heating, and baggage systems.

The Scope 1 and 2 operational emissions are calculated using the following method[25]:

$$CO_2e_{(t)} = \text{Number of passengers}_{(pax/year)} * \text{default emission factor}_{(kgCO2e/pax)} * 1/1{,}000$$

The number of annual passengers was supplied by the Client, and the default emission factor for the Asia-Pacific region was obtained from the Airport Carbon Accreditation[26].

According to Annex 5 of the EIB methodology for airport carbon footprinting, operational Scope 1 and 2 emissions can be estimated using Airport Carbon Accreditation's per-passenger GHG emission averages when electricity or fuel consumption data are not available.

Scope 3 Landing and Takeoff Cycle

GHG emissions will be indirectly emitted with the landing and takeoff (LTO) cycle of aircraft at the proposed airport. The GHG emissions from fuel combustion of aircraft landing and taking off is calculated using the following method[27]:

[24] *Ibid*.

[25] *Ibid*.

[26] Airport Carbon Accreditation (2024) *Annual Report 2023-2024* (Link) [accessed on 04 February 2026]

[27] *Ibid*.

$$CO_2e_{(t)} = Aviation\ fuel\ use_{(t)} * {}_{(kgCO2e/t)} * 1/1{,}000$$

Aviation fuel use is estimated based on the projected annual number of aircraft movements, the indicative split between international and domestic flights, and the average LTO fuel consumption for each flight category. The default fuel use for average aircraft for the LTO cycle was obtained from Table 2 of the Intergovernmental Panel on Climate Change (IPCC)'s *Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories*[28], while the aviation fuel combustion emission factor was obtained from the EIB Methodology[29]. The indicative spilt between international and domestic flights is based on historical flight data from the existing Tashkent International Airport.

Excluded Emission Sources

Table 4-1 presents a summary of the GHG emissions sources excluded from the assessment, as well as the reason for the exclusion.

Table 4-1: GHG emissions excluded from the assessment

Phase	Emission source	Reasons for exclusion
Operational	SF_6 from electricity transmission and distribution.	Based on the author's experience and expertise with similar projects' these emissions are likely to be immaterial when compared to the emissions from purchased electricity.
Operational	CH_4, CO_2, and N_2O from on-site wastewater and sludge treatment.	Based on the author's experience and expertise with similar projects' these emissions are likely to be immaterial when compared to the emissions from purchased electricity.
Construction and operational	HFCs from refrigeration and air conditioning.	Based on the author's experience and expertise with similar projects' these emissions are likely to be immaterial when compared to the emissions from purchased electricity.
Construction and operational	Other indirect GHG emissions that can be considered consequences of project activities (i.e., upstream and downstream emissions).	The Client does not have operational control over these emission sources. Furthermore, under the EIB Methodology, quantifying scope 3 emissions is not required.
Construction	Land use change	The Project site consists mainly of cropland and is therefore unlikely to function as a significant carbon sink. Furthermore, under the EIB Methodology, quantifying GHG emissions from the construction phase is not required.

[28] IPCC (2016). *Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories: Aircraft Emissions* (Link) [accessed on 04 February 2026].

[29] EIB (2023) *EIB Project Carbon Footprint Methodologies: Methodologies for the assessment of project greenhouse gas emissions and emission variations* (Link) [accessed on 04 February 2026].

Calculation of Baseline and Relative Emissions

According to the EU Technical Guidance, the baseline emissions (B_e) are "*the emissions that would be generated under the expected alternative scenario that reasonably represents the emissions that would be generated if the project is not carried out.*" For the purposes of this assessment, it is assumed that, under the baseline (alternative-project) scenario, the Islam Karimov Tashkent International Airport (TAS) would continue operating at its current capacity (handling approximately 10 million passengers per annum, consistent with 2025 levels). The baseline emissions are calculated using the methodology outlined above for Scope 1 and 2 Operational Emissions and Scope 3 Landing and Takeoff Cycle.

The relative GHG emissions (R_e) represent the difference between the absolute emissions and the baseline emissions for a typical year of operation. The absolute GHG emissions (A_b) are the annual emissions estimated for an average year of operation for the Project (**Section 6.2.1.2**).

$$R_{e\ (tCO2e)} = A_{b\ (tCO2e)} - R_{b\ (tCO2e)}$$

4.1.2.5 GHG Emissions Assessment

In line with the EU's Technical Guidance, the Project's GHG emissions are assessed against three criteria:

- Pre-defined thresholds.
- The shadow cost of carbon.
- Compatibility with Uzbekistan's national GHG pathway to 2035.

Each of these criteria is described in more detail in the sections that follow.

Predefined Thresholds

The first criterion for assessing the Project's GHG emissions is against the predefined thresholds set out in the EU's Technical Guidance[30] - **Table** 4-2.

Table 4-2: Predefined thresholds

Type	Thresholds
Absolute emissions	Greater than 20,000 tCO_2e/year
Relative emissions	Greater than 20,000 tCO_2e/year

Shadow Cost of Carbon

The second criterion for assessing the Project's GHG emissions is the use of a shadow cost of carbon published by the EU **- Table** 4-3. This shadow cost is based on the best available evidence on the cost of meeting the 1.5°C temperature goal of the Paris Agreement. The shadow cost is measured in real terms and indicated in 2016 prices. The potential impacts of the shadow cost of carbon are assessed in **Section 6.2.2.2**.

[30] European Commission (2021) *Technical Guidance on Climate Proofing of Infrastructure (2021–2027)* (Link) [accessed on 04 February 2026].

Table 4-3: Shadow cost of carbon per year

Year	€/tCO_2e	Year	€/tCO_2e	Year	€/tCO_2e
2029	233	2037	444	2045	660
2030	250	2038	471	2046	688
2031	278	2039	498	2047	716
2032	306	2040	525	2048	744
2033	334	2041	552	2049	772
2034	362	2042	579	2050	800
2035	390	2043	606		
2036	417	2044	633		

Compatibility with Uzbekistan's National GHG Pathway to 2035

The third criterion for assessing the Project's GHG emissions is to confirm its compatibility with Uzbekistan's national GHG pathway to 2035. This assessment did not consider the European Union's 2030 and 2050 emission-reduction targets, as recommended in the EU's Technical Guidance, because Uzbekistan is not a member of the EU.

Uzbekistan is committed to reducing by 2035 the carbon intensity of the country's gross domestic party (GDP) by 50% against 2010 baseline[31]. Achieving this commitment is contingent on receiving international support.

In 2010, the country's national GHG emissions were calculated to be 200.1 million tonnes of carbon dioxide equivalents (MtCO_2e) without removals and 187.1 MtCO_2e with removals. From 2010 to 2022, the country's national GHG emissions without removals increased by 16.7% (28.8 MtCO_2e) to 209.6 MtCO_2e, and by 41% (58.6 MtCO_2e) to 201.2 MtCO_2e with removals. The increase in national GHG emissions over this period is attributed to rapid economic growth.

The energy sector accounted for 64% of national GHG emissions in 2022. The transport sector accounts for 15% of GHG emissions from fuel combustion. Road transport accounts for most GHG emissions from the transport sector (92.2%), followed by rail transport (1.8%), and aviation (0.3%).

To achieve a reduction in the carbon intensity of the country's economy, the NDC set out the following actions for the energy sector:

- Improving legislation governing the energy sector.
- Diversification of energy sources by increasing the contribution of renewable energy sources to more than 50% by 2030.
- Attracting investments in new energy projects through public-private partnership.
- Infrastructure improvement through the modernisation of existing energy facilities and power grid infrastructure.
- Improve energy efficiency and reduce energy intensity through policy and legislation reforms.

[31] Republic of Uzbekistan (2021). *Updated Nationally Determined Contribution of the Republic of Uzbekistan (NDC 3.0)* (Link) [accessed on 04 February 2026].

- Railway electrification and replacement of public transport fleet with clean fuels.

4.2 Climate Resilience

Airports are long-lived assets that may be exposed for many years to a changing climate, including increasingly frequent and severe extreme weather events[32]. The purpose of a climate resilience assessment is to identify significant climate risks and determine targeted adaptation measures, thereby reducing residual risk to an acceptable level. The climate resilience assessment is incorporated into the ESIA process as it will generally provide the broadest possibilities for selecting the optimal adaptation options.

Figure 4-3 provides an overview of the climate-resilience process for climate proofing, with each step described in the following sections.

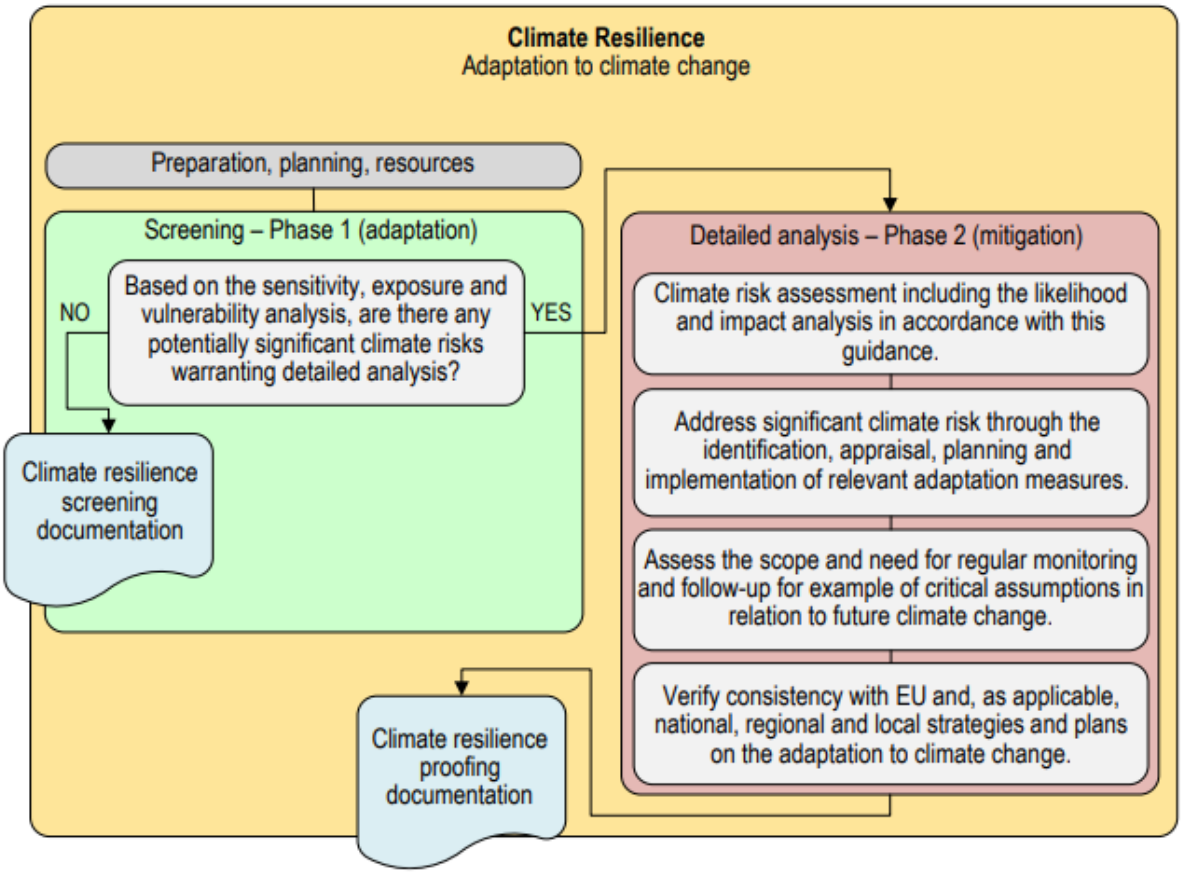


Figure 4-3: Overview of the climate resilience process[33]

4.2.1 Phase 1: Screening

In Phase 1, the vulnerability of the Project to climate change is analysed. The analysis is broken down into three steps:

- Sensitivity analysis.
- Analysis of current and future exposure.

[32] European Commission (2021) *Technical Guidance on Climate Proofing of Infrastructure (2021–2027)* (Link) [accessed on 04 February 2026].

[33] *Ibid* (pg. 29).

- Vulnerability analysis based on a combination of sensitivity and exposure.

4.2.1.1 Sensitivity Analysis

The purpose of the sensitivity analysis is to determine which climate-related hazards are relevant to the specific project type, regardless of its location. The IPCC defines a hazard as "*the potential occurrence of a natural or human-induced physical event or trend that may cause loss of life, injury, or other health impacts, as well as damage and loss to property, infrastructure, livelihoods, service provision, ecosystems and environmental resources.*[34]" The analysis takes a comprehensive view of the project, considering its various components and how it functions within the broader system or network. This includes:

- On-site assets and processes.
- Inputs (e.g., water, energy).
- Outputs (e.g., products, services).
- Access and transport links.

Each climate hazard is assigned a score of 'high', 'medium', or 'low' (see **Table** 4-4):

Table 4-4: Sensitivity scores

Sensitivity level	Description
High sensitivity	Climate hazard may have a significant impact on assets and processes, inputs, outputs and transport links.
Medium sensitivity	Climate hazard may have a slight impact on assets and processes, inputs, outputs and transport links.
Low sensitivity	Climate hazard has no (or an insignificant) impact.

4.2.1.2 Exposure Analysis

The purpose of the exposure analysis is to determine which climate hazards are relevant to the project's specific location, regardless of project type. In contrast to the sensitivity analysis, which focuses on the type of the project, the exposure analysis is concerned solely with the geographic context.

The assessment distinguishes between exposure to the current climate and exposure to future climate conditions. Historic and current climate data for the project location (and any alternative locations, where applicable) are used to evaluate existing and past climate exposure. Climate model projections are then applied to assess how exposure levels may change over time, with particular attention to shifts in the frequency and intensity of extreme weather events.

Each climate hazard is assigned a score of 'high', 'medium', or 'low'.

4.2.1.3 Vulnerability Analysis

The purpose of the vulnerability analysis is to identify potential significant hazards and associated risks, forming the basis for determining whether the project should proceed to the detailed risk assessment phase. This step typically highlights the most relevant hazards for further analysis, typically those ranked as 'high' and, where appropriate, 'medium', depending on the scoring scale.

[34] IPCC *Glossary* (Link) [accessed on 18 May 2026].

If the vulnerability analysis, with adequate justification, concludes that all vulnerabilities are low or insignificant, then no additional climate risk assessment may be required. In such cases, the screening process (Phase 1) is considered complete.

Once the sensitivity and exposure of each hazard have been assessed, the level of vulnerability can be determined by combining these two factors. The resulting vulnerabilities may then be plotted on a vulnerability matrix (**Table** 4-5) to highlight the most significant hazards and identify where more detailed analysis is required.

Table 4-5: Vulnerability matrix

Sensitivity	Exposure		
	High	**Medium**	**Low**
High	High	High	Moderate
Medium	High	Moderate	Low
Low	Moderate	Low	Low

4.2.2 Phase 2: Detailed Analysis

The risk assessment provides a more detailed analysis of the climate hazards and the potential impacts on the Project. It involves evaluating the likelihood and severity of impacts associated with the climate-related hazards identified during the screening or vulnerability analysis. The aim is to quantify the significance of the risks to the project in the current and future climate conditions.

4.2.2.1 Likelihood

This part of the analysis looks at how likely the identified climate hazards are to occur within a given timescale, which is typically the lifetime of the project - **Table** 4-6.

Table 4-6: Likelihood analysis

Term	Qualitative	Quantitative
Rare	Highly unlikely to occur	5%
Unlikely	Unlikely to occur	20%
Moderate	As likely to occur as not	50%
Likely	Likely to occur	80%
Almost certain	Very likely to occur	95%

4.2.2.2 Impact

This part of the analysis evaluates the consequences should an identified climate hazard occur, using a graded scale to assess the impact of each hazard - **Table** 4-7. This is often referred to as the severity or magnitude of impact. Consequences may relate to physical assets and operations (e.g., health and safety). The assessment also considers the adaptive capacity of the broader system in which the project operates.

Table 4-7: Impact analysis

Risk areas	Magnitude of consequence				
	1. Insignificant	**2. Minor**	**3. Moderate**	**4. Major**	**5. Catastrophe**
Asset damage/ Engineering/ Operational	Impact can be absorbed through normal activity.	An adverse event that can be absorbed by taking business continuity actions.	A serious event that requires additional emergency business continuity actions.	A critical event that requires extraordinary/ emergency business continuity actions.	Disaster with the potential to lead to shut down or collapse or loss of the asset/ network.
Safety and Health	First aid case.	Minor injury, medical treatment.	Serious injury or lost work.	Major or multiple injuries, permanent injury or disability.	Single or multiple fatalities.
Environment	No impact on baseline environment. Localised in the source area. No recovery required.	Localised within site boundaries. Recovery measurable within one month of impact.	Moderate harm with possible wider effect. Recovery in one year.	Significant harm with local effect. Recovery longer than one year. Failure to comply with environmental regulations/ consent.	Significant harm with widespread effect. Recovery longer than one year. Limited prospect of full recovery.
Social	No negative social impact.	Localised, temporary social impacts.	Localised, long-term social impacts.	Failure to protect poor or vulnerable groups. National, long-term social impacts.	Loss of social licence to operate. Community protests.
Financial (for single extreme event or annual average impact)	< 2% of turnover.	2-10% of turnover.	10-25% of turnover.	25-50% of turnover.	> 50% of turnover.
Reputation	Localised, temporary impact on public opinion.	Localised, short-term impact on public opinion.	Local, long-term impact on public opinion with adverse local	National, short-term impact on public opinion; negative	National, long-term impact with potential to affect the

Risk areas	Magnitude of consequence				
	1. Insignificant	2. Minor	3. Moderate	4. Major	5. Catastrophe
			media coverage.	national media coverage.	stability of the government.
Cultural Heritage and cultural premises	Insignificant impact.	Short term impact. Possible recovery or repair.	Serious damage with wider impact to tourism industry.	Significant damage with national and international impact.	Permanent loss with resulting impact on society.

4.2.2.3 Risks

Once the likelihood and impact of each hazard have been assessed, the significance of each potential risk can be determined by combining these two factors. The resulting risks may then be plotted on a risk matrix (**Table** 4-8) to highlight the most significant risks and identify where adaptation measures are required.

According to the IPCC, climate change risks arise from both the direct impacts of climate change and societal responses to these changes. Such risks may adversely affect lives, livelihoods, health and well-being, as well as economic, social, and cultural assets, infrastructure, services (including ecosystem services), ecosystems, and biodiversity[35].

The Task Force on Climate-related Financial Disclosures (TCFD) classifies climate-related risks into two broad categories, namely physical risks and transition risks[36].

- **Physical risks** result from climate change impacts that may affect projects directly or indirectly through supply chains. These are further subdivided into acute risks, associated with extreme weather events, and chronic risks, associated with longer-term climatic changes.
- **Transition risks** refer to the financial and reputational implications associated with the global shift towards a lower-carbon economy. The magnitude of these risks depends on the nature, pace, and direction of the transition. Transition risks are typically categorised into policy and legal, technological, market, and reputational risks.
- In addition, climate change mitigation and adaptation efforts may present **opportunities** for organisations, including enhanced resilience, cost savings, innovation, and access to new markets.

It should be noted that this CCIA did not evaluate transition risks, as the Project's operational GHG emissions fall below the 100,000 tCO_2e threshold specified under EP4, which triggers the requirement for a transition risk assessment (**Section 6.2.1.2**).

[35] IPCC *Glossary* (Link) [accessed on 18 May 2026].

[36] Task Force on Climate-related Financial Disclosures (2017). *Recommendations of the Task Force on Climate-related Financial Disclosures*. (Link) [accessed on 18 May 2026].

Table 4-8: Risk matrix

Likelihood	Impact				
	Insignificant	Minor	Moderate	Major	Catastrophic
Rare	Low	Low	Medium	High	Extreme
Unlikely	Low	Low	Medium	High	Extreme
Moderate	Low	Medium	High	Extreme	Extreme
Likely	Medium	High	High	Extreme	Extreme
Almost certain	High	High	Extreme	Extreme	Extreme

5.0 Description of the Affected Environment

The following section presents a brief description of the observed and projected changes in climate at the Project site. It is important to understand these changes as these are often the drivers of the climate hazards that pose a potential risk to the Project, as well as Project-affected communities, priority ecosystem services, and Critical Habitat (if any). This assessment considers two climate scenarios, specifically SSP2-4.5 ("middle of the road") and SSP5-8.5 ("fossil fuelled development").

5.1 Climate Baseline

Uzbekistan experiences an arid, continental climate marked by pronounced temperature variations both daily and seasonally[37]. Approximately 79% of the country consists of flat terrain dominated by semi-desert steppes and desert zones, including newly formed desert areas in the far west resulting from the desiccation of the Aral Sea. The remaining south-eastern regions, encompassing major cities such as Tashkent and Samarkand, also have a continental climate but are distinguished by the presence of high mountain ranges belonging to the Tien-Shan and Gissar-Alai systems.

Summers are long, hot, and dry, with average monthly temperatures reaching 27.2°C in the hottest month (July) and average daily maximums of around 35°C in many major cities. Winters are cold, with average monthly temperatures ranging from −1°C to −3°C between December and February for the 1991 to 2020 climatological period (**Figure** 5-1). Winter temperatures tend to be lower in the western regions, while the warmest conditions occur in the south near the borders with Turkmenistan and Afghanistan. Precipitation levels vary considerably across the country. Much of the west receives less than 100 mm annually, whereas parts of the east and southeast may receive up to 800 to 900 mm per year.

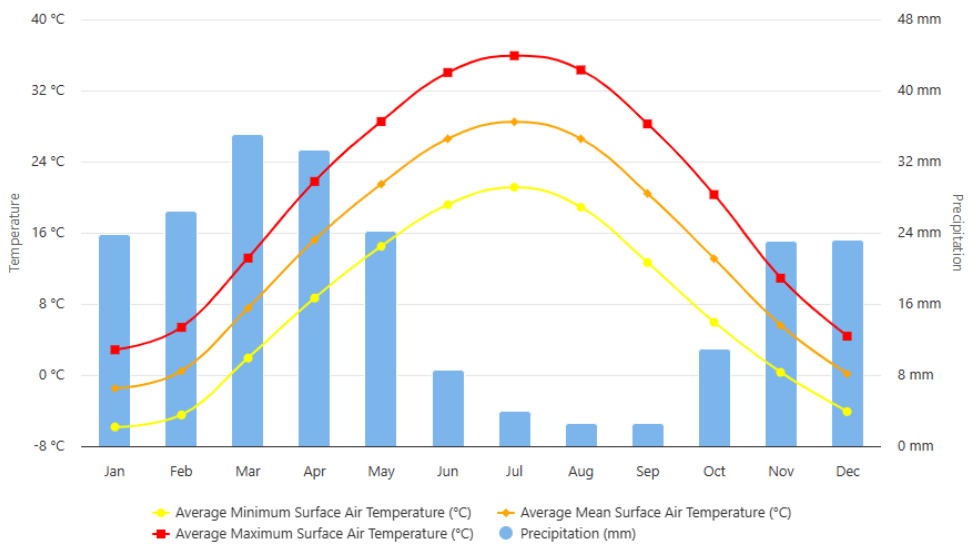


Figure 5-1: Monthly temperature and precipitation in Uzbekistan for the period 1991 to 2020[38].

[37] World Bank Group (2021) *Climate Risk Country Profile: Uzbekistan* (Link) [accessed on 04 February 2026].

[38] World Bank Group (2026) *Uzbekistan: Historical Climate* (Link) [accessed on 04 February 2026].

Average annual temperatures in Uzbekistan have increased steadily over the past century, despite year-to-year variability (**Figure** 5-2)[39]. Between 1950 and 2013, temperatures rose by about 0.27°C per decade, with average minimum temperatures increasing by 2.0°C and maximum temperatures by 1.6°C. The desiccation of the Aral Sea has contributed slightly to local warming in the surrounding region.

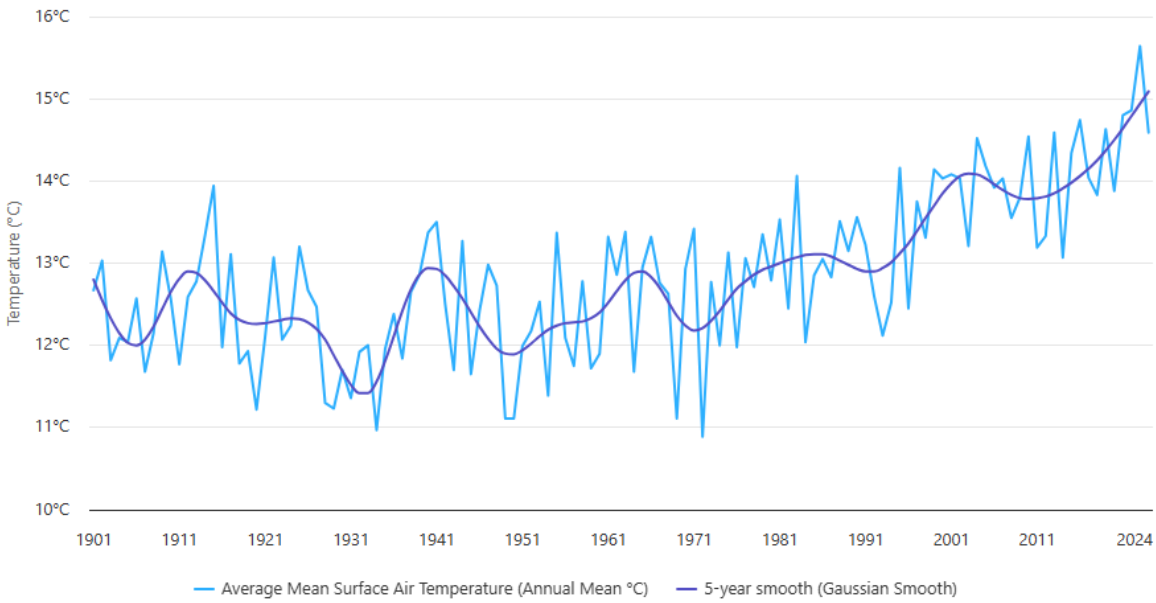


Figure 5-2: Observed changes in annual temperature in Uzbekistan for the period 1901 to 2024[40]

Unlike the clear warming trend, average annual precipitation in Uzbekistan has not shown statistically significant long-term change[41]. A slight overall decline was observed between 1950 and 2013. In the Tien Shan and Gissar-Alai mountain ranges, winter precipitation has increased marginally, offset by small decreases in other seasons. Multi-year dry and wet cycles are strongly influenced by the El Niño–Southern Oscillation.

5.2 Climate Projections

Table 5-1 provides an overview of the projected changes in key climate variables at the Project site under the SSP2-4.5 and SSP5-8.5 scenarios. All values represent the 50th-percentile outcomes.

[39] World Bank Group (2021) *Climate Risk Country Profile: Uzbekistan* (Link) [accessed on 04 February 2026].
[40] World Bank Group (2026) *Uzbekistan: Historical Climate* (Link) [accessed on 04 February 2026].
[41] World Bank Group (2021) *Climate Risk Country Profile: Uzbekistan* (Link) [accessed on 04 February 2026].

Table 5-1: Summary of projected changes in key climate variables

Variable	Projected Change	
Monthly mean temperature	Increase	Projected to increase by up to **15.7% (SSP2-4.5) and 25.8% (SSP5-8.5)** by 2075.
Monthly maximum temperature	Increase	Projected to increase by up to **11.6% (SSP2-4.5) and 19.1% (SSP5-8.5) cooling degree days** by 2075.
Number of hot days	Increase	Projected to increase by up to **68.2% (SSP2-4.5) and 104.8% (SSP5-8.5) cooling degree days** by 2075.
Monthly mean precipitation	Increase	Projected to increase by up to **7.5% (SSP2-4.5) and 12.4% (SSP5-8.5)** by 2075.
Extreme precipitation	Increase	Projected to increase by up to **14.4% (SSP2-4.5) and 23.7% (SSP5-8.5)** by 2075 for a 24-hour period (1-100-year event).
Monthly mean wind speed	Decrease	Projected to decrease by up to **1.0% (SSP2-4.5) and 1.6% (SSP5-8.5)** by 2075.
Extreme wind	Decrease	Projected to decrease by up to **2.7% (SSP2-4.5) and 3.9% (SSP5-8.5)** by 2075 for a 1-50-year event.
Monthly relative humidity	Decrease	Projected to decrease by up to **1.6% (SSP2-4.5) and 2.7% (SSP5-8.5)** by 2075.
Monthly solar radiation	Increase	Projected to increase by up to **0.3% (SSP2-4.5) and 0.6% (SSP5-8.5)** by 2075.
Cooling degree days	Increase	Projected to increase by up to **55.73% (SSP2-4.5) and 96.72% (SSP5-8.5)** by 2075
Heating degree days	Decrease	Projected to decrease by up to **41.2% (SSP2-4.5) and 70.3% (SSP5-8.5)** by 2075.
Modified discomfort index	Increase	'Extreme Danger Days' are projected to increase by up to **167.0% (SSP2-4.5) and 771.9% (SSP5-8.5)** by 2075.
Wind chill temperature	Increase	'Comfortable Days' are projected to increase by up to **0.04% (SSP2-4.5) and 0.05% (SSP5-8.5)** by 2075.

5.3 Climate-Related Natural Hazards

In terms of the global disaster risk rating, Uzbekistan is ranked 112 out of 191 countries. Uzbekistan's overall risk score is elevated primarily by its extremely high exposure to earthquakes, ranked joint second highest globally[42]. The country also falls within the top 20 worldwide for drought exposure and faces high wildfire hazard. In addition, Uzbekistan experiences above-average levels of flood risk. These scores are moderated by relatively low vulnerability levels and a moderate capacity to cope with hazards.

Table 5-2: Selected indicators from the INFORM 2019 Index for Risk Management for Uzbekistan[43]

Flood (0-10)	Tropical cyclone (0-10)	Drought (0-10)	Vulnerability (0-10)	Lack of coping capacity (0-10)	Overall Inform Risk Level (0-10)	Rank (1-191)
6.3	0.0	6.6	1.9	4.0	3.1	112

The IPCC defines hazards as the potential occurrence of "*a physical event that may cause loss of life, injury, or other health impacts, as well as damage and loss to property, infrastructure, livelihoods, service provision, and environmental resources*".[44]

Several potential hazards are identified for the Tashkent province in which the Project would be located. These hazards could negatively impact the Project. River flood, urban flood, landslide, and wildfire are assigned a high hazard rating, while water scarcity and extreme heat are assigned a medium hazard rating (**Table** 5-3). River flood and urban flood have been assigned a medium hazard rating, while cyclone has been assigned a very low hazard rating. These hazards are assessed in greater detail in the sections that follow.

Table 5-3: Overview of hazard risk for the Tashkent province[45]

Hazard type		Hazard rating	Description
	River flood	High	Presently, damaging and life-threatening river floods are expected to occur at least once in the next 10 years.
	Urban flood	High	Presently, damaging and life-threatening urban floods are expected to occur at least once in the next 10 years.

[42] World Bank Group (2021) *Climate Risk Country Profile: Uzbekistan* (Link) [accessed on 04 February 2026].

[43] *Ibid*.

[44] IPCC (2012). *Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation*. A Special Report of Working Groups I and II of the Intergovernmental Panel on Climate Change. Cambridge University Press, Cambridge, United Kingdom and New York, USA.

[45] Global Facility for Disaster Reduction and Recovery (2020) ThinkHazard! Tashkent (Link) [Accessed on 04 January 2026].

Hazard type		Hazard rating	Description
	Landslide	High	Presently, this area has rainfall patterns, terrain slope, geology, soil, land cover and (potentially) earthquakes that make localized landslides a frequent hazard phenomenon.
	Wildfire	High	Presently, there is greater than a 50% chance of encountering weather that could support a significant wildfire that is likely to result in both life and property loss in any given year.
	Water scarcity	Medium	Presently, there is up to a 20% chance droughts will occur in the coming 10 years.
	Extreme heat	Medium	Presently, there is more than a 25% chance that at least one period of prolonged exposure to extreme heat, resulting in heat stress, will occur in the next five years.
	Cyclone	Very low	Presently, there is less than a 1% chance of potentially-damaging cyclone-strength winds in the project area in the next 10 years.

6.0 The Impact of the Project on Climate Change

6.1 Phase 1: Screening

In line with the EIB Methodology described in **Section 4.1,** the initial step in the climate mitigation assessment involves screening the proposed Project against the categories listed in Table 4-2. Although airports are not explicitly identified, the Project is expected to fall within the second category, as its absolute emissions exceed 20,000 tCO_2e per year. Consequently, a more detailed analysis is required (see **Section 6.2**).

6.2 Phase 2: Detailed Analysis

In line with the EIB Methodology described in **Section 4.1**, the second step in the climate mitigation assessment involves the quantification (**Section 6.2.1**) and assessment (**Section 6.2.1.3**) of the Project's potential GHG emissions.

6.2.1 Project's Calculated GHG Emissions

6.2.1.1 Construction Phase

Mobile Fossil Fuel Combustion

GHG emissions from mobile fossil fuel combustion during the construction phase are calculated using the methodology outlined in **Section 4.1.2.4**. The analysis indicates that 14,514 tCO_2e will be emitted over a 3.5-year construction phase (**Table** 6-1), with an average of 4,147 tCO_2e per year.

Table 6-1: Calculated emissions from mobile fossil fuel combustion

Description	Units	Value
Total fossil fuel consumption[a]	L	5,375,552
Default emission factor[b]	$kgCO_2e/kWh$	2.7
Conversion	$tCO_2e/kgCO_2e$	0.001
Total GHG emissions	tCO_2e	14,514

Sources:
[a]Vision Invest.
[b]EIB (2023). *EIB Project Carbon Footprint Methodologies* (Link) [accessed on 04 February 2026].

Purchased Electricity

GHG emissions from purchased electricity during the construction phase are calculated using the methodology outlined in **Section 4.1.2.4**. The analysis indicates that 8,990 tCO_2e will be emitted over a 3.5-year construction phase (**Table** 6-2), with an average of 2,569 tCO_2e per year.

Table 6-2: Calculated emissions from purchased electricity

Description	Units	Value
Total electricity consumption[a]	kWh	19,250,000
Country-specific grid emission factor[b]	gCO_2e/kWh	467
Conversion	tCO_2e/gCO_2e	0.000001
Total GHG emissions	tCO_2e	8,990

Sources:
[a]Vision Invest.
[b]EIB (2023). *EIB Project Carbon Footprint Methodologies* (Link) [accessed on 04 February 2026].

6.2.1.2 Operational Phase

Scope 1 and 2 Emissions

Operational phase Scope 1 (direct) and Scope 2 (indirect) GHG emissions are calculated using the methodology outlined in **Section 4.1.2.4**. The analysis indicates that accommodating up to 20 million passengers per year would result in estimated emissions of 58,800 tCO_2e per year (**Table** 6-3).

Table 6-3: Calculated scope 1 and 2 GHG emissions

Description	Units	Value
Total number of passengers[a]	Pax/year	20,000,000
Average emissions per passenger[b]	$kgCO_2e$/pax	2.94
Conversion	$tCO_2e/kgCO_2e$	0.001
Annual GHG emissions	tCO_2e/year	58,800

Sources:
[a]5 Capitals (2025) *Tashkent New Gateway Hub International Airport Uzbekistan: Environmental & Social Impact Assessment: Scoping Report*.
[b]Airport Carbon Accreditation (2024) *Annual Report 2023-2024* (Link) [accessed on 04 February 2026].

As the Project's operational Scope 1 and Scope 2 emissions fall below the 100,000 tCO_2e/year threshold, this CCIA does not include an assessment of climate transition risks or an alternatives analysis as required under EP4.

Scope 3 Emissions – LTO Cycle

Operational phase Scope 3 (indirect other) GHG emissions are calculated for the LTO cycle using the methodology outlined in **Section 4.1.2.4**. The analysis indicates that GHG emissions resulting from the LTO cycle for up to 20 million passengers per year would result in estimated emissions of 972,122 tCO_2e per year (**Table** 6-4).

Table 6-4: Calculated scope 3 GHG emissions for the LTO cycle

Description	Units	Value
Avg. number of annual passengers[a]	Pax/year	20,000,000
Avg. number of annual flights (for 20 million pax)[b]	flights/year	125,984
Proportion of domestic flights[c]	%	1%
Avg. number of annual of domestic flights	flights/year	1,260
Avg. fuel consumption of domestic flights[d]	kg/flight	800
Conversion	t/kg	0.001
Annual fuel consumption of domestic flights	t/year	1,008
CO_2 emission factor[e]	$kgCO_2$/LTO	3,104
N_2O emission factor[e]	kgN_2O/LTO	0
CH_4 emission factor[e]	$kgCH_4$/LTO	0
CO_2 GWP[e]		1
N_2O GWP[e]		28
CH_4 GWP[e]		265
Conversion	$tCO_2e/kgCO_2e$	0.001
Annual GHG emissions from domestic flights	tCO_2e	3,914
Proportion of international flights	%	99%

Description	Units	Value
Avg. number of annual of international flights	flights/year	124,724
Avg. fuel consumption of international flight	kg/flight	2,500
Conversion	t/kg	0.001
Annual fuel consumption of international flights[d]	t/year	311,810
CO_2 emission factor[e]	$kgCO_2$/LTO	3,104
N_2O emission factor[e]	kgN_2O/LTO	0
CH_4 emission factor[e]	$kgCH_4$/LTO	0
CO_2 GWP[e]		1
N_2O GWP[e]		28
CH_4 GWP[e]		265
Conversion	$tCO_2e/kgCO_2e$	0.001
Annual GHG emissions from international flights	tCO_2e	968,208
Annual GHG emissions	tCO_2e/year	972,122

Sources:
[a]5 Capitals (2025) *Tashkent New Gateway Hub International Airport Uzbekistan: Environmental & Social Impact Assessment: Scoping Report*.
[b]Recalculated for 20 million passengers.
[c]Based on flight data from the existing Tashkent International Airport for the period 1 January to 21 December 2025.
[d]IPCC (2006). *Aircraft Emissions* (Link) [accessed on 04 February 2026].
[e]EIB (2023). *EIB Project Carbon Footprint Methodologies* (Link) [accessed on 04 February 2026].

6.2.1.3 Relative Emissions

Scope 1 and 2 Emissions

Relative GHG emissions (R_e) are calculated using the methodology outlined in **Section 4.1.2.4**. The analysis indicates that the Project, with an annual throughput of 20 million passengers, would lead to an increase in GHG emissions of approximately 29,400tCO_2e per year relative to the baseline scenario (10 million passengers per annum) for scope 1 and 2 emissions (**Table** 6-5).

Table 6-5: Calculated relative scope 1 and 2 GHG emissions

Description	Units	Absolute emissions (A_b)	Baseline emissions (B_e)
Total number of passengers[a]	Pax/year	20,000,000	10,000,000
Average emissions per passenger[b]	$kgCO_2e$/pax	2.94	2.94
Conversion	$tCO_2e/kgCO_2e$	0.001	0.001
Annual GHG emissions	tCO_2e/year	58,800	29,400
Relative emissions (R_e)	tCO_2e/year		29,400

Sources:
[a]5 Capitals (2025) *Tashkent New Gateway Hub International Airport Uzbekistan: Environmental & Social Impact Assessment: Scoping Report*.
[b]Airport Carbon Accreditation (2024) *Annual Report 2023-2024* (Link) [accessed on 04 February 2026].

Scope 3 Emissions – LTO Cycle

Relative GHG emissions (R_e) are calculated using the methodology outlined in **Section 4.1.2.4**. The analysis indicates that the Project, with an annual throughput of 20 million passengers, would lead to an increase in GHG emissions of approximately 486,061 tCO_2e per year relative to the baseline scenario (10 million passengers per annum) for scope 3 emissions – LTO cycle (**Table** 6-6).

Table 6-6: Calculated relative scope 3 GHG emissions for the LTO cycle

Description	Units	Absolute emissions (A_b)	Baseline emissions (B_e)
Avg. number of annual passengers[a]	Pax/year	20,000,000	10,000,000
Avg. number of annual flights (for 20 million pax)[b]	flights/year	125,984	62,992
Proportion of domestic flights[c]	%	1%	1%
Avg. number of annual of domestic flights	flights/year	1,260	630
Avg. fuel consumption of domestic flights[d]	kg/flight	800	800
Conversion	t/kg	0.001	0.001
Annual fuel consumption of domestic flights	t/year	1,008	504
CO_2 emission factor[e]	$kgCO_2$/LTO	3,104	3,104
N_2O emission factor[e]	kgN_2O/LTO	0	0
CH_4 emission factor[e]	$kgCH_4$/LTO	0	0
CO_2 GWP[e]		1	1
N_2O GWP[e]		28	28
CH_4 GWP[e]		265	265
Conversion	$tCO_2e/kgCO_2e$	0.001	0.001
Annual GHG emissions from domestic flights	tCO_2e	3,914	1,957
Proportion of international flights	%	99%	99%
Avg. number of annual of international flights	flights/year	124,724	62,362
Avg. fuel consumption of international flight	kg/flight	2,500	2,500
Conversion	t/kg	0.001	0.001
Annual fuel consumption of international flights[d]	t/year	311,810	155,905
CO_2 emission factor[e]	$kgCO_2$/LTO	3,104	3,104
N_2O emission factor[e]	kgN_2O/LTO	0	0
CH_4 emission factor[e]	$kgCH_4$/LTO	0	0
CO_2 GWP[e]		1	1
N_2O GWP[e]		28	28
CH_4 GWP[e]		265	265
Conversion	$tCO_2e/kgCO_2e$	0.001	0.001
Annual GHG emissions from international flights	tCO_2e	968,208	484,104
Relative emissions (R_e)	tCO_2e/year		486,061

Sources:
[a]5 Capitals (2025) *Tashkent New Gateway Hub International Airport Uzbekistan: Environmental & Social Impact Assessment: Scoping Report*.
[b]Recalculated for 20 million passengers.
[c]Based on flight data from the existing Tashkent International Airport for the period 1 January to 21 December 2025.
[d]IPCC (2006). *Aircraft Emissions* (Link) [accessed on 04 February 2026].
[e]EIB (2023). *EIB Project Carbon Footprint Methodologies* (Link) [accessed on 04 February 2026].

6.2.2 GHG Emissions Assessment

6.2.2.1 Predefined EIB Methodology Thresholds

The initial criterion for evaluating the Project's GHG emissions involves comparing them against the predefined thresholds established in the EIB Methodology. As the Project's estimated Scope 1 and Scope 2 emissions exceed 20,000 tCO_2e, these emissions are classified as significant.

Existing Mitigation Measures

The Project has incorporated several design and operational measures to reduce Scope 1 and Scope 2 emissions. These measures include:

- Installation of an on-site solar PV facility to generate renewable electricity and offset grid-supplied power consumption, thereby reducing Scope 2 emissions.
- Designing and constructing the airport to achieve LEED Silver certification. LEED-certified facilities are engineered and operated to reduce energy and water consumption, optimise the use of natural resources, and minimise overall environmental impacts at the local, regional, and global scales.

Recommended Mitigation Measures

In addition to the existing mitigation measures, the following measures are strongly recommended:

- **Procurement of smart, high-efficiency heating, ventilation, and air-conditioning (HVAC) systems**, which constitute the largest energy loads within airport infrastructure. Smart HVAC technologies enable dynamic adjustment of heating and cooling in response to fluctuating passenger volumes, thereby improving overall energy efficiency. Projected changes in extreme temperature conditions, including both cold and heat events, should be considered in the design and sizing of HVAC systems.
- **Implementation of smart and high-efficiency lighting systems**, including LED fixtures, motion-activated sensors, daylight-harvesting controls, and adaptive lighting for runways and taxiways to minimise unnecessary energy consumption.
- **Electrification of ground support equipment (GSE)**, such as baggage tractors, tugs, and service vehicles, where technically and operationally feasible. This transition reduces fossil-fuel use and provides the co-benefit of improved local air quality.
- **Incorporation of an advanced building management system (BMS)** to enable real-time monitoring, control, and optimisation of electricity use across terminals, runways, and auxiliary facilities.
- **Optimisation of baggage handling systems** through the increased use of high-efficiency motors and automated technologies to reduce operational energy demand.
- Development of an **Energy and Carbon Management Plan** for the operational phase to enhance energy efficiency and reduce GHG emissions. The plan should include a baseline assessment, identification of energy and carbon reduction measures, a clear implementation framework, and provisions for monitoring, reporting, and verification.

6.2.2.2 Shadow Cost of Carbon

The second criterion for evaluating the Project's GHG emissions involves calculating the cost of carbon of the Project - **Table** 6-7. The cost of carbon is based on the Project's potential Scope 1 and 2 emissions (**Table** 6-3) and the shadow cost of carbon published by the EIB up until 2050 (**Table** 4-3). The annual cost of carbon is then discounted using an economic discount rate of 5% to convert future carbon costs into their future present value so they can be compared consistently over the full project lifetime.

Table 6-7: Calculated shadow cost of the Project's carbon emissions

Year	Shadow cost (€/tCO_2e)	GHG emissions (tCO_2e)	Total cost of carbon (€)	Discount rate (%)	Discounted carbon costs (€)
2029	233	58,800	€13,700,400	5%	€13,048,000
2030	250	58,800	€14,700,000	5%	€14,000,000
2031	278	58,800	€16,346,400	5%	€15,568,000
2032	306	58,800	€17,992,800	5%	€17,136,000
2033	334	58,800	€19,639,200	5%	€18,704,000
2034	362	58,800	€21,285,600	5%	€20,272,000
2035	390	58,800	€22,932,000	5%	€21,840,000
2036	417	58,800	€24,519,600	5%	€23,352,000
2037	444	58,800	€26,107,200	5%	€24,864,000
2038	471	58,800	€27,694,800	5%	€26,376,000
2039	498	58,800	€29,282,400	5%	€27,888,000
2040	525	58,800	€30,870,000	5%	€29,400,000
2041	552	58,800	€32,457,600	5%	€30,912,000
2042	579	58,800	€34,045,200	5%	€32,424,000
2043	606	58,800	€35,632,800	5%	€33,936,000
2044	633	58,800	€37,220,400	5%	€35,448,000
2045	660	58,800	€38,808,000	5%	€36,960,000
2046	688	58,800	€40,454,400	5%	€38,528,000
2047	716	58,800	€42,100,800	5%	€40,096,000
2048	744	58,800	€43,747,200	5%	€41,664,000
2049	772	58,800	€45,393,600	5%	€43,232,000
2050	800	58,800	€47,040,000	5%	€44,800,000

6.2.2.3 Compatibility with Uzbekistan's National GHG Pathway to 2035

The third criterion for assessing the Project's GHG emissions is to confirm its compatibility with Uzbekistan's national GHG pathway to 2035. In the NDC, Uzbekistan committed to reducing the carbon intensity of the country's GDP by 50% against 2010 baseline.

In 2010, the carbon intensity of Uzbekistan's GDP was 3.05 kilotonnes of CO_2-equivalent per million $ of GDP (ktCO_2e per million $ GDP) - **Table** 6-8[46]. Based on the NDC commitment of a 50% reduction in carbon intensity by 2035[47], the projected value decreases to 1.53 ktCO_2e per million $ GDP. This corresponds to an average reduction of approximately 0.61

[46] ClimateWatch (2025) *Historical GHG Emissions* (Link) [accessed on 04 February 2026].

[47] Republic of Uzbekistan (2021) *Updated Nationally Determined Contribution of the Republic of Uzbekistan (NDC 3.0)* (Link) [accessed on 04 February 2026].

$ktCO_2e$ per million $ GDP per year between 2010 and 2035[48]. Projected changes in national GHG emissions were estimated using the average annual GDP growth from 2010 to 2023 ($5,579 million per year) together with the annual decline in GDP carbon intensity. Based on these projections, the Project's contribution to national carbon intensity was calculated to range from 0.0186% in 2029 to 0.0192% in 2035.

Table 6-8: Calculated contribution of the Project GHG emissions to Uzbekistan's national GHG pathway to 2035

NDC commitments ($ktCO_2e$/ million $ GDP)[a]	Projected changes in GDP (million $)	Projected changes in GHG emissions ($ktCO_2e$)	Project's Scope 1 and 2 Emissions ($ktCO_2e$)	Contribution of Project to projected changes in GHG emissions ($ktCO_2e$)	Percentage change with contribution of Project's scope 1 and 2 emissions
3.05	60,816	185,490			
2.99	66,396	198,457			
2.93	71,975	210,743			
2.87	77,554	222,348			
2.81	83,134	233,273			
2.75	88,713	243,517			
2.68	94,292	253,081			
2.62	99,872	261,963			
2.56	105,451	270,165			
2.50	111,030	277,687			
2.44	116,610	284,527			
2.38	122,189	290,687			
2.32	127,768	296,167			
2.26	133,348	300,965			
2.20	138,927	305,083			
2.14	144,506	308,521			
2.07	150,085	311,277			
2.01	155,665	313,353			
1.95	161,244	314,748			
1.89	166,823	315,463	58.8	315,522	0.0186%
1.83	172,403	315,497	58.8	315,556	0.0186%
1.77	177,982	314,850	58.8	314,909	0.0187%
1.71	183,561	313,523	58.8	313,582	0.0188%
1.65	189,141	311,515	58.8	311,574	0.0189%
1.59	194,720	308,826	58.8	308,885	0.0190%
1.53	200,299	305,456	58.8	305,515	0.0192%

Sources:
[a]ClimateWatch (2025) *Historical GHG Emissions* (Link) [accessed on 04 February 2026].

[48] ClimateWatch (2025) *Historical GHG Emissions* (Link) [accessed on 04 February 2026].

7.0 The Impact of Climate Change on the Project

7.1 Phase 1: Screening

In accordance with the EIB Methodology outlined in **Section 4.2**, the climate resilience assessment begins with a vulnerability analysis. This step aims to identify significant hazards and associated risks, providing the basis for determining whether the project should advance to a detailed risk assessment. The vulnerability analysis highlights the hazards most relevant for further consideration (**Section 7.2**), typically those rated as 'high' and, where appropriate, 'medium', depending on the scoring framework.

7.1.1 Sensitivity Analysis

Table 7-1 presents a summary of the outputs of the sensitivity analysis. The climate-related hazards which were considered in the analysis were identified from ThinkHazard! (see **Section 5.3**) and other credible, online sources.

The sensitivity analysis indicates that on-site assets and processes are most vulnerable to flooding, landslides, wildfires, extreme cold, and, to a lesser extent, extreme heat, wind and precipitation. Inputs show high sensitivity to water scarcity, with moderate sensitivity to flooding, landslides, wildfires, extreme wind, and extreme cold. Outputs exhibit consistently high sensitivity across nearly all climate hazards except water scarcity, reflecting broad exposure of operational outcomes to climate extremes. Access and transport links are most affected by flooding, with moderate sensitivity to landslides and extreme precipitation, but demonstrate low sensitivity to most other hazards.

Table 7-1: Outputs of the sensitivity analysis

Themes	Hazards							
	Flood	Landslide	Wildfire	Water scarcity	Extreme heat	Extreme wind	Extreme precipitation	Extreme cold
On-site assets and processes	High	High	High	Low	Medium	Medium	Medium	High
Inputs (e.g., water and energy)	Medium	Medium	Medium	High	Low	Medium	Medium	Medium
Outputs (e.g., products and services)	High	Medium	Medium	Low	High	High	High	High
Access and transport links	Medium	Medium	Medium	Low	Low	Low	Medium	Medium

Themes	Hazards							
	Flood	Landslide	Wildfire	Water scarcity	Extreme heat	Extreme wind	Extreme precipitation	Extreme cold
Highest across four themes	High	High	High	High	High	High	High	High

7.1.2 Exposure Analysis

Table 7-2 presents a summary of the outputs of the sensitivity analysis. The exposure analysis shows that, under the current climate, hazards such as extreme heat, extreme precipitation, and extreme cold pose a medium level of exposure, while flooding presents a medium exposure and all other hazards remain low. Under future climate conditions, exposure increases significantly, with flooding, extreme heat, extreme wind, extreme precipitation, and extreme cold all reaching high exposure levels, and wildfire rising to medium exposure. When considering the highest score across current and future conditions, these same hazards, namely flooding, extreme heat, extreme wind, extreme precipitation, and extreme cold represent the greatest potential exposure, while landslides and water scarcity remain low, and wildfire remains at a medium exposure level.

Table 7-2: Outputs of the exposure analysis

Exposure	Hazards							
	Flood	Landslide	Wildfire	Water scarcity	Extreme heat	Extreme wind	Extreme precipitation	Extreme cold
Current climate	Medium	Low	Low	Low	Medium	Medium	Medium	Medium
Future climate	High	Low	Low	Low	High	Medium	High	High
Highest score	High	Low	Low	Low	High	Medium	High	High

7.1.3 Vulnerability Analysis

Table 7-3 presents a summary of the outputs of the vulnerability analysis. The combined sensitivity–exposure assessment indicates that hazards with both high sensitivity and high exposure, namely flooding, extreme heat, extreme precipitation, and extreme cold, represent the most critical risks for the project. These hazards, together with extreme wind, are assessed in greater detail in **Section 7.2**. Hazards with high exposure, but low sensitivity, such as landslides, wildfires, and water scarcity, pose comparatively lower overall risk. These risks, will therefore, not be considered further in this assessment. The project's exposure to landslides is low due to its generally gentle topography. Wildfire risk is also low,

as surrounding rivers and canals act as natural firebreaks. Water scarcity is considered low given the typically modest water demand of airports and the availability of multiple potential water sources.

Table 7-3: Outputs of the vulnerability analysis

Sensitivity	Exposure		
	High	Medium	Low
High	Flood; extreme heat; extreme precipitation; extreme cold.	Extreme wind	Landslide; wildfire; water scarcity.
Medium			
Low			

7.2 Phase 2: Detailed Analysis

In accordance with the EIB Methodology outlined in **Section 4.2**, the second phase of the climate-resilience assessment entails a more detailed examination of climate-related risks (and potential opportunities). The sections that follow present an assessment of those risks previously identified as having high sensitivity and exposure in the vulnerability assessment.

7.2.1 Flooding

Risk description	Projected increases in extreme precipitation (up to 35.1% under SSP2-4.5 and 57.1% under SSP5-8.5 by 2075) are likely to elevate the risk of flooding. Airports are particularly vulnerable to surface water accumulation and localised flooding due to their characteristically flat topography. Flooding at the airport could result in damage to buildings and critical infrastructure, potentially requiring significant additional capital expenditure for repairs or upgrades. Furthermore, inundation of runways or other operational areas may disrupt flight operations, preventing take-offs and landings and leading to associated revenue losses.		
Likelihood	Likely	Likelihood	Moderate
Impact	Moderate	Impact	Minor
Inherent risk rating	High	Residual risk rating	Medium
Adaptation/ mitigation measures	Capacity of stormwater infrastructure should be based on projected changes in extreme precipitation. Monitor weather reports and integrate flood warnings into operational decision making to allow for proactive response. Conduct regular maintenance, particularly before the wet season, to ensure drains and attenuation features remain free of debris and sediment.		

7.2.2 Extreme Heat

Risk description	Projected increases in extreme heat (with “Extreme Danger Days” expected to rise by up to 167% under SSP2-4.5 and 771.9% under SSP5-8.5) are likely to heighten the risk of heat stress among airport personnel. Employees working airside are particularly vulnerable due to the predominantly outdoor nature of their duties and the additional radiant heat generated by extensive hardened surfaces such as runways, aprons, and taxiways. Exposure to extreme heat can lead to heat stress, adversely affecting employee health and well-being, and in severe cases may result in heat-related mortality. Elevated temperatures may also reduce workforce productivity and contribute to increased operational costs through additional cooling requirements, increased medical incidents, and potential disruptions to work schedules.		
Likelihood	Moderate	Likelihood	Unlikely
Impact	Moderate	Impact	Minor
Inherent risk rating	High	Residual risk rating	Low
Adaptation/ mitigation measures	Provide airside personnel with training to recognise the symptoms of heat stress, as well as guidance on appropriate hydration and rest practices. Monitor weather forecasts regularly and issue alerts to employees during periods of extreme heat. Equip airside staff with suitable personal protective equipment (PPE) designed to reduce heat exposure. Ensure that cool, potable drinking water is readily accessible to employees whenever feasible. Where possible, reschedule labour-intensive outdoor tasks to cooler periods of the day to minimise heat exposure. Monitor weather reports and integrate extreme heat warnings into operational decision making to allow for proactive response.		

7.2.3 Increased Temperatures

Risk description	Projected increases in both ambient and extreme heat, with maximum temperatures expected to rise by up to 11.6% under SSP2-4.5 and 19.1% under SSP5-8.5 by 2075, are likely to reduce aircraft performance and increase operational disruptions. Higher temperatures decrease air density, resulting in reduced aircraft lift and diminished engine thrust. Consequently, aircraft require longer takeoff distances and may experience increased fuel consumption under high-temperature conditions. Elevated temperatures can also soften or deform airport runways, particularly those surfaced with asphalt. Such degradation has previously led to flight delays, temporary closures, and reduced operational throughput, as seen during heatwave-induced runway damage events in Europe and the United States. These impacts not only disrupt flight schedules but also result in financial losses and

	additional capital expenditure for runway repairs and infrastructure upgrades. Moreover, increases in cooling degree days by up to 41.2% under SSP2-4.5 and 70.3% under SSP5-8.5 by 2075, are likely to increase the demand on heating, ventilation, and air conditioning systems, thereby increasing energy consumption and operational costs.		
Likelihood	Moderate	Likelihood	Unlikely
Impact	Moderate	Impact	Minor
Inherent risk rating	High	Residual risk rating	Low
Adaptation/ mitigation measures	Provide airside personnel with training to recognise the symptoms Ensure that selection of runway and pavement materials take into consideration the projected change in temperature. Where possible, reschedule departures during the cooler periods of the day. Monitor weather forecasts and provide advanced warning of upcoming periods of extreme heat, allowing for operational modifications.		

7.2.4 Extreme Precipitation

Risk description	Projected increases in extreme precipitation, up to 22.1% under SSP2-4.5 and 36.3% under SSP5-8.5 for the 24-hour, 100-year return event, are likely to create hazardous takeoff and landing conditions. Heavy precipitation can significantly reduce braking effectiveness through hydroplaning, increase stopping distances, and generate unsafe approach conditions. In addition, intense rainfall events may necessitate the application of low-visibility procedures and, in severe cases, lead to temporary operational shutdowns. The delay or cancellation of flights during episodes of extreme rainfall can also impose substantial financial consequences, including lost revenue, increased operational expenditures, and considerable inconvenience for passengers.		
Likelihood	Moderate	Likelihood	Moderate
Impact	Moderate	Impact	Minor
Inherent risk rating	High	Residual risk rating	Medium
Adaptation/ mitigation measures	Design of surface water drainage system must take projected changes in climate into consideration. Where financially and technically feasible, Sustainable Drainage Systems (SuDS) should be integrated into the design. Undertake routine maintenance, particularly ahead of the wet season, to prevent blockage of drainage channels. Runways should be grooved to enhance traction and promote rapid water runoff.		

Risk description	Projected increases in extreme precipitation, up to 22.1% under SSP2-4.5 and 36.3% under SSP5-8.5 for the 24-hour, 100-year return event, are likely to create hazardous takeoff and landing conditions. Heavy precipitation can significantly reduce braking effectiveness through hydroplaning, increase stopping distances, and generate unsafe approach conditions. In addition, intense rainfall events may necessitate the application of low-visibility procedures and, in severe cases, lead to temporary operational shutdowns. The delay or cancellation of flights during episodes of extreme rainfall can also impose substantial financial consequences, including lost revenue, increased operational expenditures, and considerable inconvenience for passengers.
	Monitor weather forecasts and provide advanced warning of upcoming periods of extreme precipitation, allowing for operational modifications. Develop and implement low-visibility procedures (LVPs) during intense rainfall events. Where required, procure water-removal equipment (e.g., pumps and sweepers) and ensure that personnel are adequately trained for rapid mobilisation.

7.2.5 Extreme Cold

Risk description	Projected increases in extreme cold are likely to intensify icing on both aircraft and ground infrastructure. The accumulation of ice on aircraft surfaces, engines, and sensors can reduce lift, increase aerodynamic drag, and impair critical safety systems, making safe takeoff unlikely without prior de-icing. These conditions consequently increase operational costs and contribute to delays due to the mandatory de-icing of aircraft before departure. Extreme cold also increases the likelihood of runway icing, creating hazardous takeoff and landing conditions. Ice-covered runways diminish braking effectiveness and elevate the risk of runway excursions or overruns. Managing these conditions, including runway de-icing and associated operational adjustments, further increases airport operating costs and exacerbates disruption during cold-weather events.		
Likelihood	Likely	Likelihood	Moderate
Impact	Moderate	Impact	Minor
Inherent risk rating	High	Residual risk rating	Medium
Adaptation/ mitigation measures	Develop and implement aircraft de-icing and anti-icing procedures. Monitor weather forecasts and provide advanced warning of upcoming periods of extreme cold, allowing for operational modifications. Maintain adequate de-icing equipment and trained personnel.		

	During periods of extreme cold, adjust flight schedules to account for longer turnaround times needed for de-icing operations and runway treatment. Where required, install heating elements, insulated housing, or protective covers for vulnerable equipment such as radars, sensors, and power systems.

7.2.6 Extreme Wind

Risk description	Projected increases in extreme wind are likely to increasingly disrupt airport operations. Strong winds can affect aircraft alignment during take-off and landing, raising the risk of aborted landings or runway excursions, and may lead to delays, diversions, cancellations, and associated operational losses. Extreme winds can also trigger sandstorms, reducing visibility and making take-off and landing unsafe, resulting in delays, diversions, or temporary closures. In addition, abrasive sand can damage aircraft and airport infrastructure over time, increasing maintenance costs and further operational impacts.		
Likelihood	Moderate	Likelihood	Moderate
Impact	Moderate	Impact	Minor
Inherent risk rating	High	Residual risk rating	Medium
Adaptation/ mitigation measures	Where feasible, align runways with prevailing wind directions to minimise crosswind exposure. Where feasible, use natural or artificial barriers to reduce surface wind speeds. Where possible, vegetation barriers (e.g., tress, shrubs, and grass) to stabilise soil and reduce wind erosion. Monitor weather forecasts and provide advanced warning of upcoming periods of extreme wind, allowing for operational modifications.		

8.0 The Impact of the Project on Communities, Priority Ecosystem Services, and Sites of Demonstrated Importance to Climate Change Adaptation and Mitigation

In accordance with the requirements of IFC Performance Standards[49], this CCIA also considers the implications of climate change for:

- **Communities that are already impacted by climate change, which may experience an acceleration and/or intensification of impacts due to Project activities:** The Project is expected to have a negligible impact on nearby farmers, who are already vulnerable to climate-related stresses, provided that the following conditions are met:
    - Stormwater is effectively managed on-site so that runoff does not contribute to downstream flooding.
    - Groundwater abstraction remains within sustainable limits and does not lower groundwater levels to the extent that it impairs the functioning of farmers' boreholes.
- **Impacts on priority ecosystem services which may be exacerbated by climate change:** The Project site has been almost entirely altered from its natural state and is therefore unlikely to provide significant ecosystem services to the surrounding communities. This impact is, therefore, deemed to be negligible and has not been assessed further in this CCIA.
- **Forest areas and marine and coastal habitats that are vulnerable to the effects of climate change or which contribute to climate change mitigation:** The Project site has been almost completely transformed from its natural condition and contains no forested areas. In addition, it lies inland and at a significant distance from the coast. This impact is, therefore, deemed to be negligible and has not been assessed further in this CCIA.
- **Sites of demonstrated importance to climate change adaptation for either species or ecosystems:** The Project site has been almost entirely converted from its natural state and is therefore unlikely to offer critical habitat for any species or ecosystems. This impact is, therefore, deemed to be negligible and has not been assessed further in this CCIA.

[49] International Finance Corporation (2012). *Performance Standards*. (Link) [accessed 10 February 2026].

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Appendix A Climate Variable Projections

Tashkent New Gateway Hub International Airport, Uzbekistan Climate Risk and Vulnerability Assessment

Vision Invest

SLR Project No.: 777.V02406.00001

30 June 2026

5 capitals
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A.1 Temperature Variables

Table A-1 below summarises projected changes in key temperature variables under **SSP2-4.5** and **SSP5-8.5** scenarios for the time periods **2025, 2050, and 2075** for the median value (**50th percentile**)[50]. A detailed breakdown of the projected changes for each variable is provided in the sections below.

Table A-1: Summary of changes in temperature variables

Climate variable	Description of projected change	Baseline	Projected change under SSP2-4.5			Projected change under SSP5-8.5			Associated hazards
			2025	2050	2075	2025	2050	2075	
Monthly mean temperatures (Section A.1.1)	Mean **monthly temperatures** are projected to increase for all three time periods up to 25.8%. The rate of this **increase** rises with each successive period. SSP5-8.5 mirrors this trend, with greater temperature increases.	14.9°C	+4.6°C	+10.9°C	+15.7°C	+5.1°C	+14.3°C	+25.8°C	Extreme heat Wildfire
Maximum Monthly Temperature (Section A.1.2)	Mean **maximum temperatures** are projected to increase for all three time periods up to 19.1%. The rate of this **increase** rises with each successive period. SSP5-8.5 mirrors this trend, with greater temperature increases.	21.0°C	3.4%	8.1%	11.6%	3.8%	10.6%	19.1%	Extreme heat Wildfire

[50] Clim.Systems (2021). *Climate Insights*. (Link) [accessed on 5 February 2026].

Climate variable	Description of projected change	Baseline	Projected change under SSP2-4.5			Projected change under SSP5-8.5			Associated hazards
			2025	2050	2075	2025	2050	2075	
Number of hot days (Tmax > 35°C) (Section A.1.3)	The number of very hot days are projected to increase for all three time periods up to 104.8%. The rate of this **increase** rises with each successive period. SSP5-8.5 mirrors this trend, with greater temperature increases.	50.9 days	21.9%	50.3%	68.2%	24.2%	63.4%	104.8%	Extreme heat Wildfire
Monthly Solar Radiation (Section A.1.4)	**Monthly solar radiation is** projected to increase for all three time periods up to 0.6% relative to the baseline. This indicates that the demand for **energy required for cooling** facilities is projected to **increase.**	16.4 MJ/(m^2*day)	0.1%	0.2%	0.3%	0.1%	0.3%	0.6%	
Cooling Degree Days (Section A.1.5)	**Cooling degree days are** projected to increase for all three time periods up to 70.3% relative to the baseline. This indicates that the demand for **energy required for cooling** facilities is projected to **increase.**	1,085.7°C day/ year	+11.6%	+28.1%	41.2%	+12.9%	+37.3%	+70.3%	Cooling capacity demand
Heating Degree Days	**Heating degree days are** projected to decrease for all three time periods up to	1,843.2 °C day/ year	-6.8%	-15.7%	-22.1%	-7.5%	-20.2%	-34.9%	Heating capacity demand

Climate variable	Description of projected change	Baseline	Projected change under SSP2-4.5			Projected change under SSP5-8.5			Associated hazards
			2025	2050	2075	2025	2050	2075	
(Section A.1.6)	34.9% relative to the baseline. This indicates that the demand for **energy required for heating** facilities is projected to **decrease.**								
Modified Discomfort Index – Extreme Danger Category (Section A.1.7)	The **modified discomfort index's 'Extreme Danger' category** is projected to increase across all three assessment periods, with an increase of up to 771.9% relative to the baseline. This indicates that **heat stress–inducing** conditions are expected to **worsen** substantially in the future, particularly under the SSP5-8.5 scenario by 2075.	2.0% (probability)	+34.8%	+100.9%	+167.0%	+96.9%	+374.6%	+771.9%	Heat stress
Wind Chill temperature – Comfortable Category (Section A.1.8)	The **wind chill temperature's 'comfortable' category** is projected to increase across all three assessment periods, with an increase of up to 0.05% relative to the baseline. This indicates that **the region is likely to experience wilder winters and reduction in extremely**	99.95% (Probability)	+0.04%	+0.04%	+0.04%	+0.04%	+0.04%	+0.05%	Extreme heat Wildfire

Climate variable	Description of projected change	Baseline	Projected change under SSP2-4.5			Projected change under SSP5-8.5			Associated hazards
			2025	2050	2075	2025	2050	2075	
	cold events, particularly under the scenario by 2075.								

A.1.1 Monthly Mean Temperature

Monthly mean temperature refers to the average temperature of a location over the course of a year. Understanding projected changes in monthly mean temperature is crucial, as significant increases could adversely affect avionics, sensors, and ground equipment, as well as employee well-being.

Figure A-1 presents the projected change in monthly mean temperature for the 2025, 2050 and 2075 time periods relative to the historical baseline (2005)[51]. Under the SSP2-4.5 scenario, monthly mean temperature is projected to increase by 4.6%, 10.9%, and 15.7% for the 2025, 2050 and 2075 time periods respectively. Under the SSP5-8.5 scenario, monthly mean temperature is projected to increase by 5.1%, 14.3%, and 25.8% for the 2025, 2050, and 2075 time periods respectively.

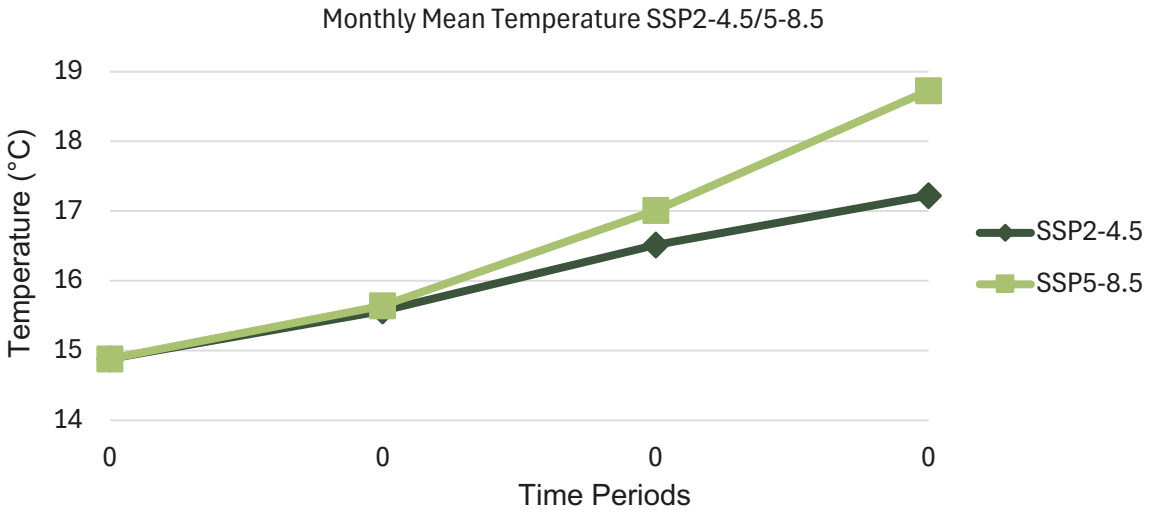


Figure A-1: Projected change in monthly mean temperature under the SSP2-4.5 and SSP5-8.5 scenarios for the 2025, 2050, and 2075 time periods

A.1.2 Monthly Maximum Temperature

Monthly maximum temperature refers to the maximum temperature of a location over the course of a year. Understanding projected changes in monthly maximum temperature is crucial, as significant increases could adversely affect avionics, sensors and ground equipment, as well as employee well-being.

Figure A-2 presents the projected change in monthly maximum temperature for the 2005, 2025, 2050 and 2075 time periods relative to the historical baseline (2005)[52]. Under the SSP2-4.5 scenario, maximum monthly temperature is projected to increase by 3.4%, 8.0% and 11.6% for the 2025, 2050 and 2075 time periods respectively. Under the SSP5-8.5 scenario, monthly maximum temperature is projected to increase by 3.8%, 10.6% and 19.1% for the 2025, 2050, and 2075 time periods respectively.

[51] Clim.Systems (2021). *Climate Insights*. (Link) [accessed on 5 February 2026].
[52] *Ibid*.

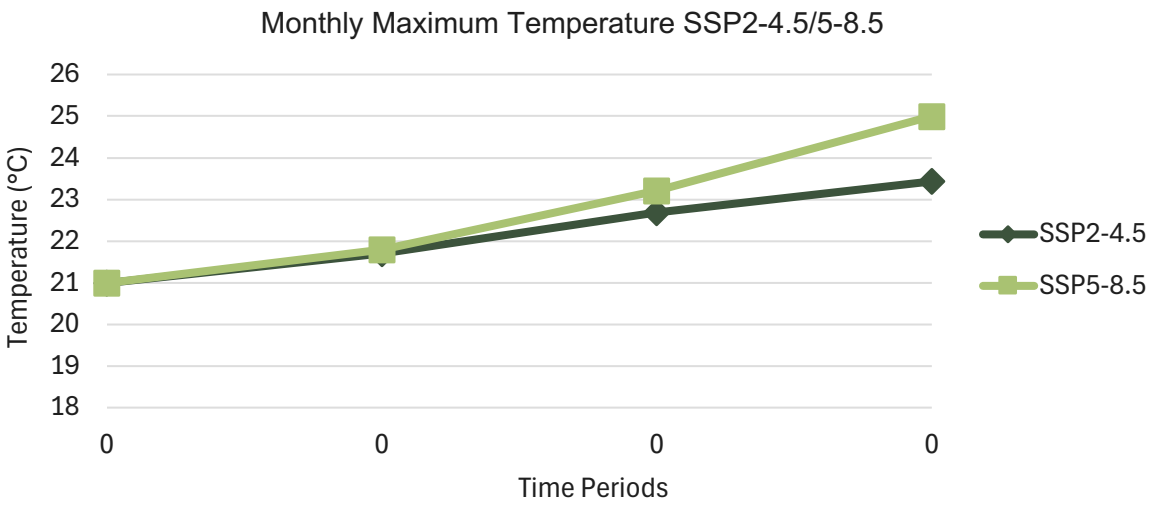


Figure A-2: Projected change in maximum monthly temperature under the SSP2-4.5 and SSP5-8.5 scenarios for the 2025, 2050, and 2075 time periods

A.1.3 Number of Hot Days (T_{max} > 35°C)

The average number of very hot days refers to the number of days in a given year a threshold temperature is exceeded. For this assessment, the threshold temperature of 35°C was applied.

Figure A-3 presents the projected change in the number of hot days for the 2025, 2050 and 2075 time periods relative to the historical baseline (2005)[53]. Under the SSP2-4.5 scenario, the number of hot days is projected to increase by 21.9%, 50.3% and 68.2% for the 2025, 2050 and 2075 time periods respectively. Under the SSP5-8.5 scenario, the number of hot days is projected to increase by 24.2%, 63.37% and 104.8% for the 2025, 2050, and 2075 time periods respectively.

[53] *Ibid*.

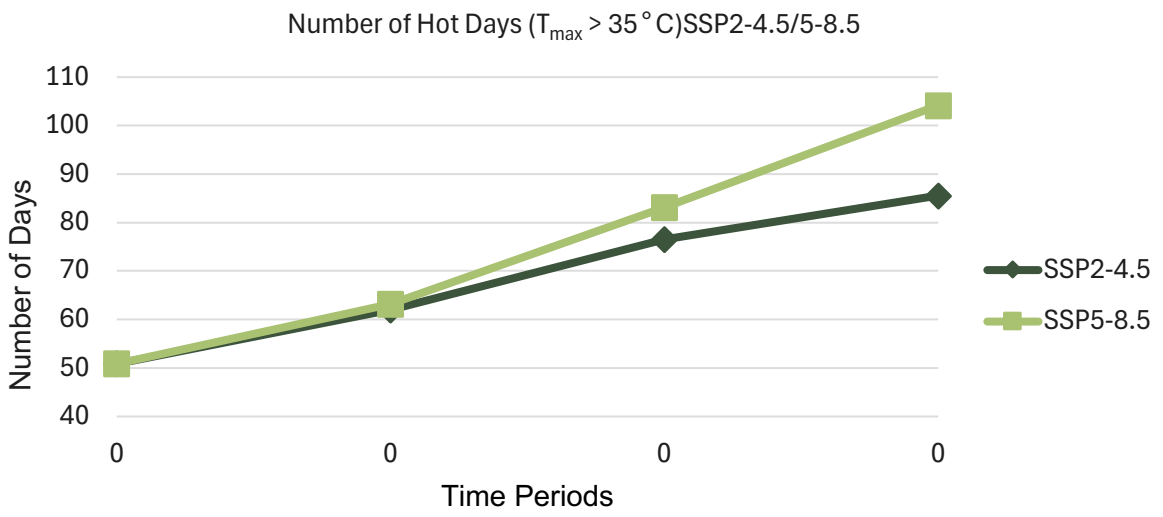


Figure A-3: Projected change in the number of hot days (T_{max} > 35°C) under the SSP2-4.5 and SSP5-8.5 scenarios for the 2025, 2050, and 2075 time periods

A.1.4 Monthly Solar Radiation

Monthly solar radiation refers to the energy emitted by the sun that reaches Earth's surface in the form of light and heat. Understanding projected changes in solar radiation is important for airport planning and operations, as higher levels of solar energy can influence airfield temperatures, affect aircraft performance during take-off and landing, and increase heat stress for passengers and ground staff.

Figure A-4 presents the projected change in monthly solar radiation for the 2025, 2050 and 2075 time periods relative to the historical baseline (2005)[54]. Under the SSP2-4.5 scenario, monthly solar radiation is projected to increase by 0.1%, 0.2%, and 0.3% for the 2025, 2050 and 2075 time periods respectively. Under the SSP5-8.5 scenario, monthly solar radiation is projected to increase by 0.1%, 0.3%, and 0.6% for the 2025, 2050, and 2075 time periods respectively.

[54] *Ibid*.

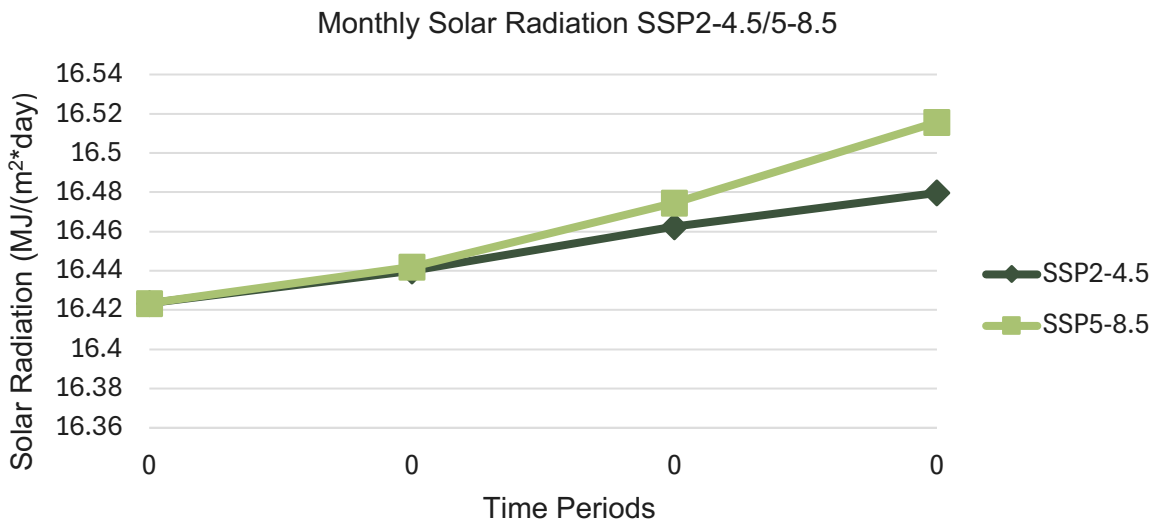


Figure A-4: Projected change in monthly solar radiation for the SSP2-4.5 and SSP5-8.5 scenarios for the 2025, 2050, and 2075 time periods

A.1.5 Cooling Degree Days

Cooling degree days refers to a measure of how much and for how long outdoor temperatures exceed a specific baseline temperature, typically indicating the demand for cooling in buildings and other facilities. Understanding projected changes in cooling degree days is important for airport planning and operations, as increasing cooling degree day values signal higher temperatures that can elevate cooling requirements in terminals, air-traffic control towers, and other critical airport buildings.

Figure A-5 presents the projected change in cooling degree days for the 2025, 2050 and 2075 time periods relative to the historical baseline (2005)[55]. Under the SSP2-4.5 scenario, cooling degree days are projected to increase by 11.6%, 28.1%, and 41.2% for the 2025, 2050 and 2075 time periods respectively. Under the SSP5-8.5 scenario, cooling degree days are projected to increase by 12.9%, 37.3%, and 70.3% for the 2025, 2050, and 2075 time periods respectively.

[55] *Ibid*.

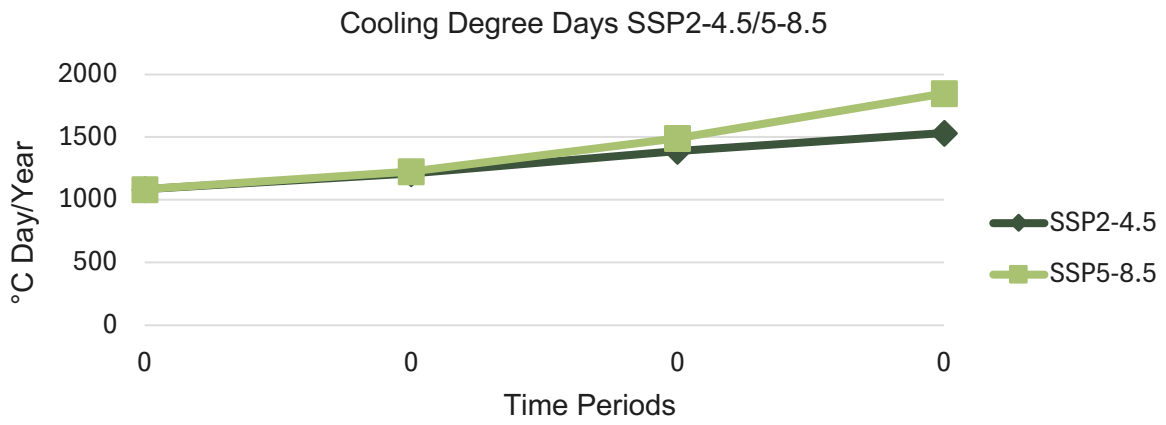
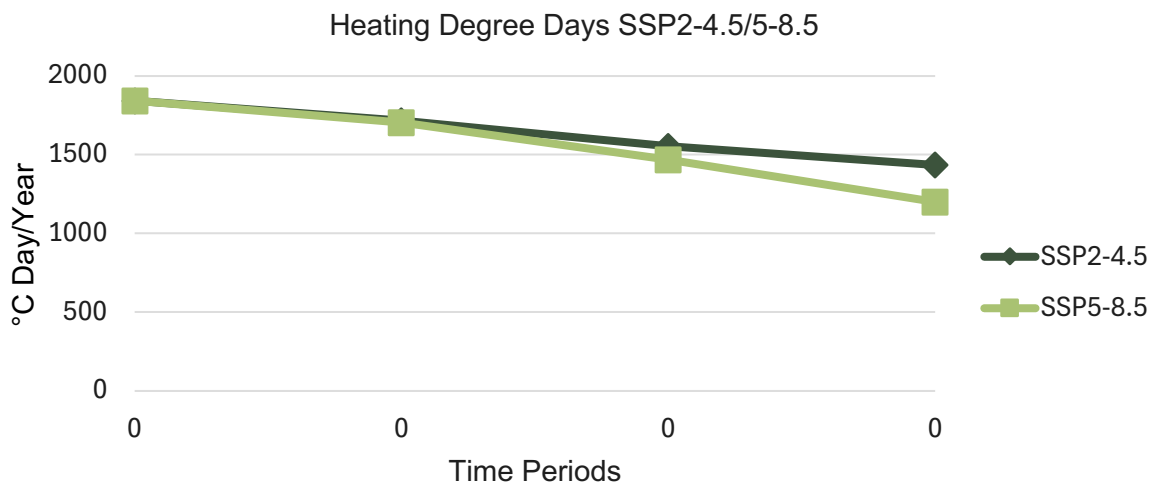


Figure A-5: Projected change in cooling degree days for the SSP2-4.5 and SSP5-8.5 scenarios for the 2025, 2050, and 2075 time periods

A.1.6 Heating Degree Days

Heating degree days refers to a measure of how much and for how long outdoor temperatures fall below a specific baseline temperature, typically indicating the demand for heating in buildings and other facilities. Understanding projected changes in heating degree days is important for airport planning and operations, as decreasing heating degree days generally signal warmer conditions that may reduce heating requirements in terminals, air-traffic control towers, maintenance hangars, and other airport buildings.

Figure A-6 presents the projected change in heating degree days for the 2025, 2050 and 2075 time periods relative to the historical baseline (2005)[56]. Under the SSP2-4.5 scenario, heating degree days are projected to decrease by 6.8%, 15.7%, and 22.1% for the 2025, 2050 and 2075 time periods respectively. Under the SSP5-8.5 scenario, heating degree days are projected to decrease by 7.5%, 20.2%, and 34.9% for the 2025, 2050, and 2075 time periods respectively.



[56] *Ibid.*

Figure D-6: Projected change in heating degree days for the SSP2-4.5 and SSP5-8.5 scenarios for the 2025, 2050, and 2075 time periods

A.1.7 Modified Discomfort Index

Modified discomfort index refers to a measure that combines temperature and humidity to assess the level of thermal discomfort experienced by people under outdoor or indoor conditions. Understanding projected changes in the Modified Discomfort Index is important for airport planning and operations, as increases in Modified Discomfort Index values signal rising heat-and-humidity stress that may affect the comfort and safety of passengers, ground crews, and personnel working in terminals, air-traffic control towers, and maintenance facilities.

Figure A-7 presents the projected change in Modified Discomfort Index for the 2025, 2050, and 2075 time periods for a range of discomfort levels (“No”; “Caution”; “Extreme Caution”; “Danger”; and “Extreme Danger”) relative to the historical baseline (2005) for the SSP2-4.5 scenario[57]. The projections indicate a shift towards extreme heat and discomfort days, with the probability of ‘Extreme Danger’ event rising significantly from 2005 to 2075.

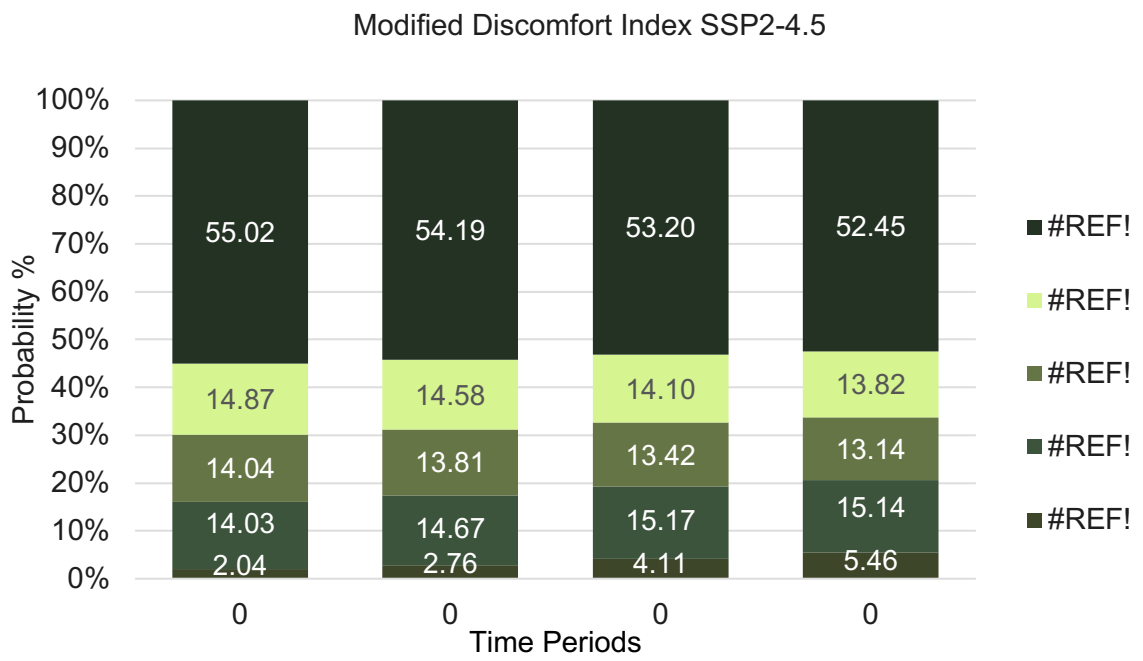


Figure A-7: Projected change in modified discomfort index for the SSP2-4.5 scenario for the 2025, 2050, and 2075 time periods

Figure A-8 presents the projected change in Modified Discomfort Index for the 2025, 2050, and 2075 time periods for a range of discomfort categories (“No”; “Caution”; “Extreme Caution”; “Danger”; and “Extreme Danger”.) relative to the historical baseline (2005) for the SSP5-8.5 scenario[58]. The projections indicate a shift towards extreme heat and discomfort days, with the probability of ‘Extreme Danger’ event rising significantly from 2005 to 2075.

[57] *Ibid.*

[58] *Ibid.*

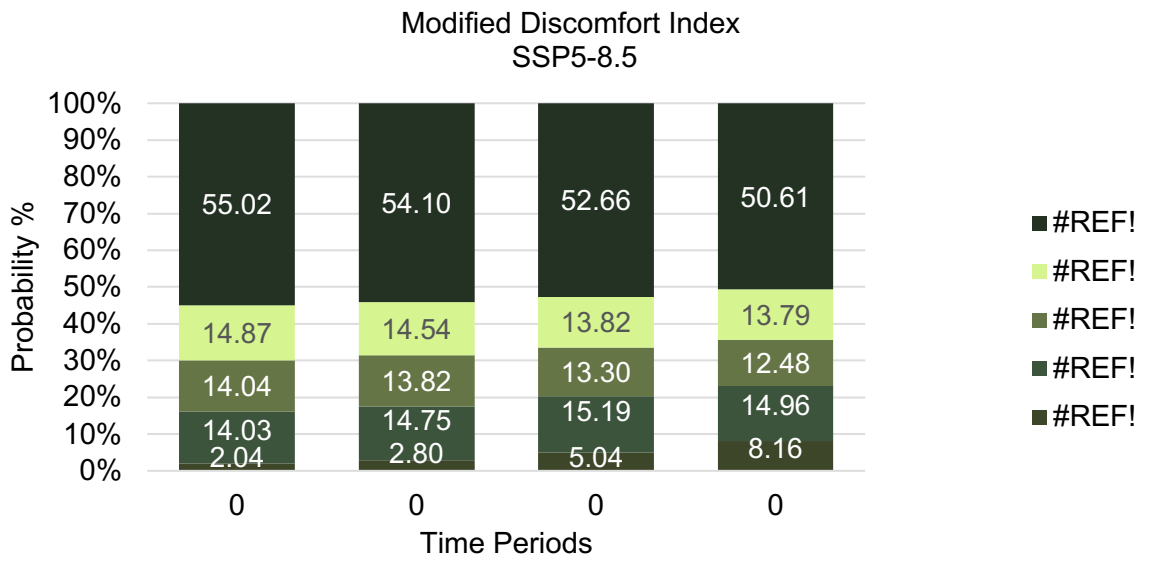


Figure A-8: Projected change in heating degree days for the SSP5-8.5 scenario for the 2025, 2050, and 2075 time periods

A.1.8 Wind Chill Temperature

Wind chill temperature refers to a measure that combines air temperature and wind speed to estimate how cold conditions feel to human skin, reflecting the accelerated heat loss caused by moving air. Understanding projected changes in wind chill temperature is important for airport planning and operations, as lower wind chill values signal heightened cold-stress conditions that may affect the comfort and safety of passengers, ground crews, and personnel working on exposed areas such as aprons, runways, and taxiways.

Figure A-9 presents the projected change in Wind Chill Temperature for the 2025, 2050, and 2075 time periods for a range of wind chill categories (“Frosty”; “Very Cold”; “Cold”; “Cool”; and “Comfortable”.) relative to the historical baseline (2005) for the SSP2-4.5 scenario[59]. The Projections indicate a shift to warmer conditions, reflected by a 0 probability of experiencing days classified as ‘Frosty’, ‘Very Cold’ or ‘Cold’ and an increase in the probability of experiencing conditions classified as ‘Comfortable’.

[59] *Ibid*.

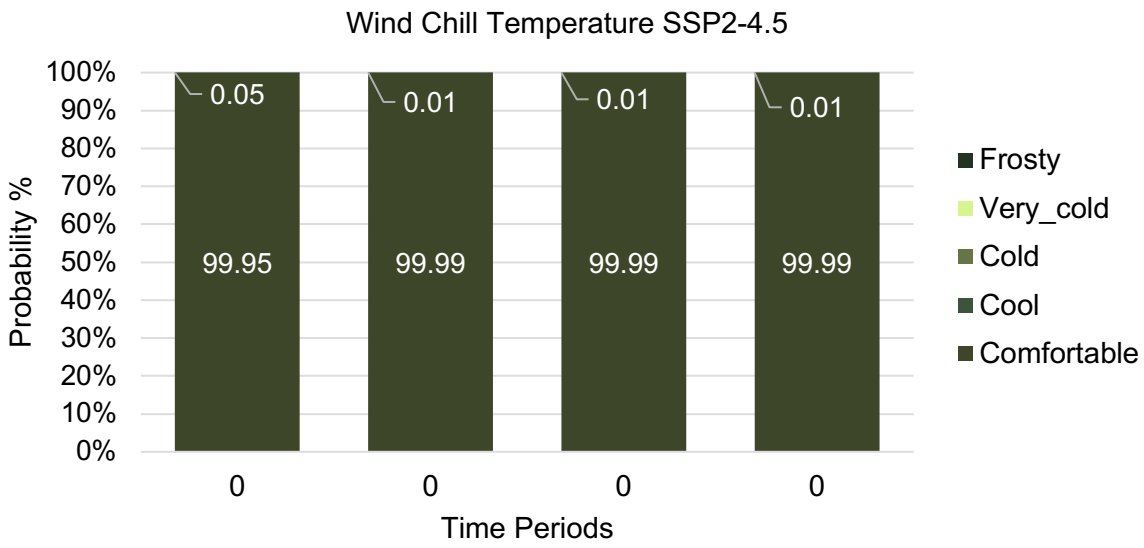


Figure A-9: Projected change in wind chill temperature for the SSP2-4.5 scenario for the 2025, 2050, and 2075 time periods

Figure A-10 presents the projected change in Wind Chill Temperature for the 2025, 2050, and 2075 time periods for a range of wind chill categories ("Frosty"; "Very Cold"; "Cold"; "Cool"; and "Comfortable".) relative to the historical baseline (2005) for the SSP5-8.5 scenario[60]. The Projections indicate a shift to warmer conditions, reflected by a 0 probability of experiencing days classified as 'Frosty', 'Very Cold' or 'Cold' and an increase in the probability of experiencing conditions classified as 'Comfortable'.

[60] *Ibid*.

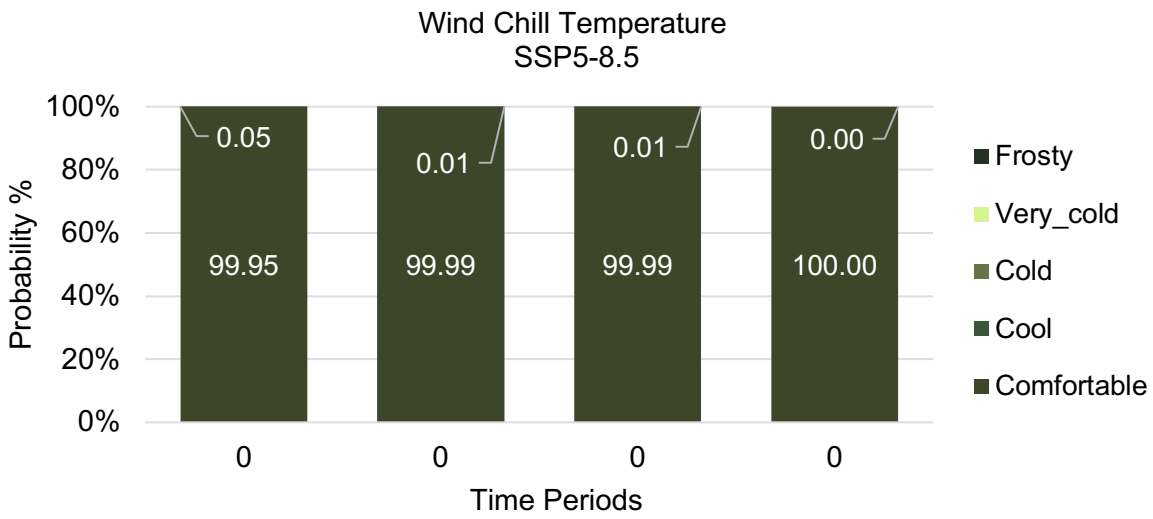


Figure A-10: Projected change in wind chill temperature for the SSP5-8.5 scenario for the 2025, 2050, and 2075 time periods

A.2 Precipitation Variables

Table A-2 below summarises projected changes in key precipitation variables under SSP2-4.5 and SSP5-8.5 scenarios for the time periods 2025, 2050, and 2075 for the medium value (50th percentile)[61]. A detailed breakdown of the projected changes for each variable is provided in the sections below.

Table A-2: Summary of changes in precipitation variables

Climate variable	Description of projected change	Baseline	Projected change under SSP2-4.5			Projected change under SSP5-8.5			Associated hazards
			2025	2050	2075	2025	2050	2075	
Monthly mean precipitation (Section A.2.1)	**Monthly mean precipitation** is projected to increase for all three time periods by up to 12.4% relative to the baseline. This indicates that precipitation is projected to **moderately increase** as we approach 2075.	418.2 mm	+2.2%	+5.2%	+7.5%	+2.5%	+6.8%	+12.4%	Flood events
Extreme Precipitation over a 24-hour period – 1–100-year flood event. (Section A.2.2)	**Extreme precipitation over a 24-hour (1–100-year flood event)** is projected to **increase** across all three assessment periods, with increases of up to 23.7% relative to the baseline. This indicates that extreme precipitation events are projected to **moderately**	44.2 mm	+4.3%	+10.0%	+14.4%	+4.7%	+13.1%	+23.7%	Flood events

[61] *Ibid.*

Climate variable	Description of projected change	Baseline	Projected change under SSP2-4.5			Projected change under SSP5-8.5			Associated hazards
			2025	2050	2075	2025	2050	2075	
	increase as we approach 2075.								
Monthly mean relative humidity (Section A.2.3)	**Monthly mean relative humidity** is projected to decrease for all three time periods by up to 2.7% relative to the baseline. This indicates that precipitation is projected to **moderately increase** as we approach 2075	53.7%	-0.5%	-1.1%	-1.6%	-0.5%	-1.5%	-2.7%	Drought events

A.2.1 Monthly Mean Precipitation

Monthly mean precipitation refers to the average amount of precipitation (rain, snow, sleet etc.) that falls in a specific area over the course of a year. Understanding projected changes in mean monthly precipitation is crucial, as both increases and decreases can adversely affect projects differently, such as through flood events or water scarcity.

Figure A-11 presents the projected change in monthly mean precipitation for the 2025, 2050 and 2075 time periods relative to the historical baseline (2005)[62]. Under the SSP2-4.5 scenario, monthly mean precipitation is projected to increase by 2.2%, 5.2%, and 7.5% for the 2025, 2050 and 2075 time periods respectively. Under the SSP5-8.5 scenario, monthly mean precipitation is projected to increase by 2.5%, 6.8%, and 12.4% for the 2025, 2050, and 2075 time periods respectively.

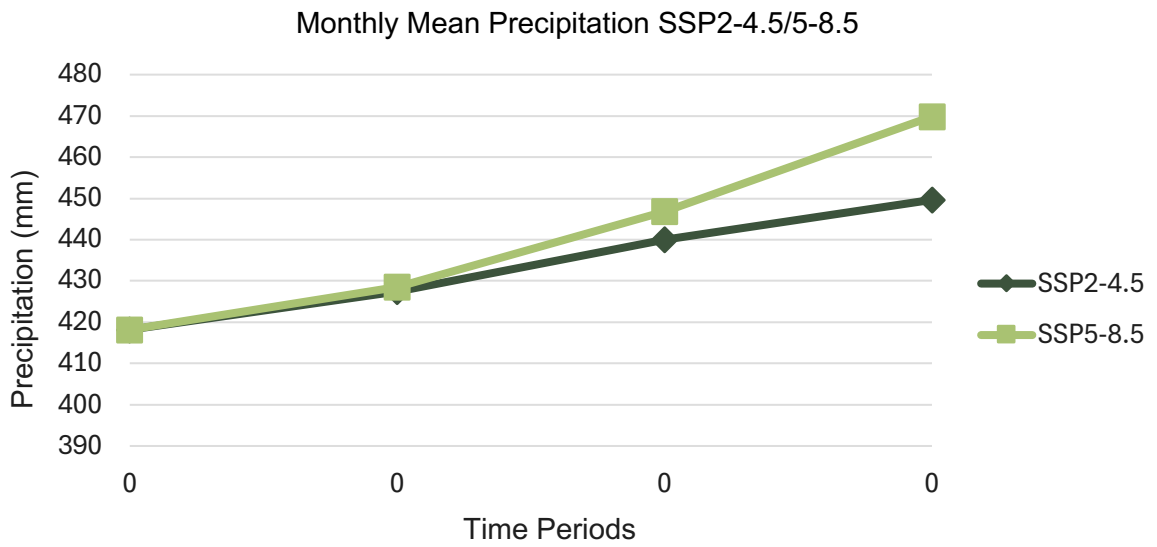


Figure A-11: Projected change in monthly mean precipitation for the SSP2-4.5 and SSP5-8.5 scenarios for the 2025, 2050, and 2075 time periods

A.2.2 Extreme Precipitation

Extreme precipitation over a 24-hour period refers to instances where a location receives significantly more precipitation over a 24-hour period than is typical for that area. It can also be defined as the top 1% of the heaviest precipitation events based on historical events. Understanding changes in daily extreme precipitation is crucial because such events can threaten human health, damage infrastructure, and delay flights.

Figure A-12 presents the projected change in daily extreme precipitation for the 2025, 2050 and 2075 time periods for a range of recurrence intervals (1:2; 1:5; 1:10; 1:25; 1:50; 1:100; 1:200; 1:500; 1:1,000) relative to the historical baseline (2005) for the SSP2-4.5 scenario[63]. All three time periods record an increase for all recurrence intervals (between 3.3% and 22.1%) for the 50th percentile.

[62] *Ibid.*

[63] *Ibid.*

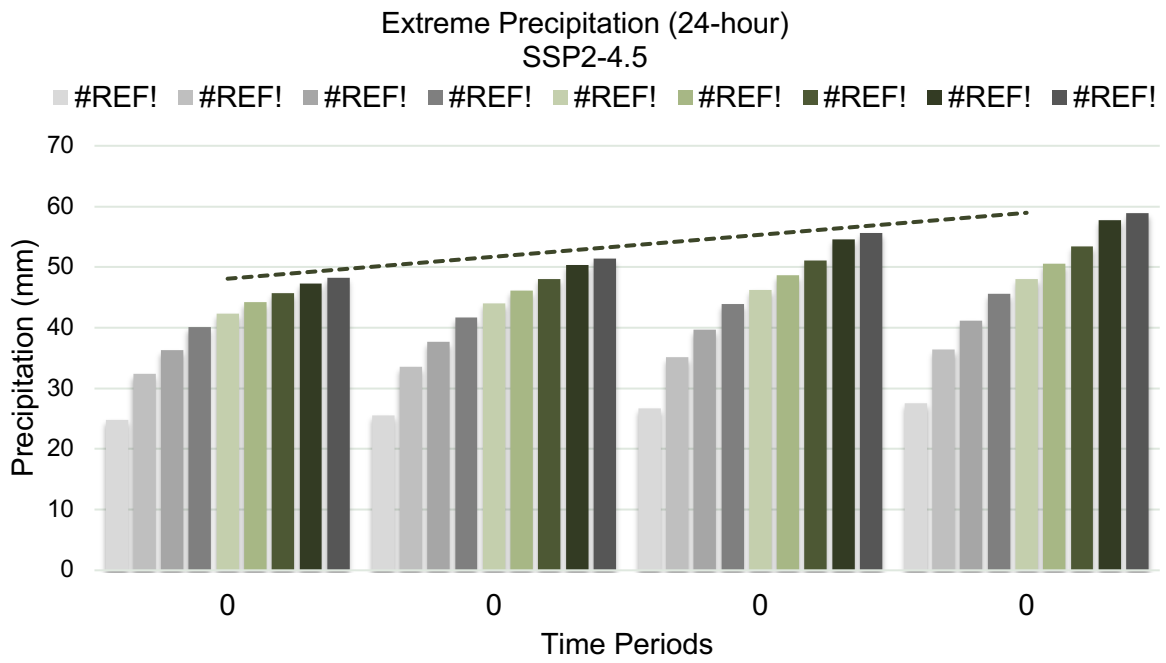


Figure A-12: Projected change in extreme precipitation over a 24-hour period for a range of recurrence intervals for the SSP2-4.5 scenario

Figure A-13 presents the projected change in daily extreme precipitation for the 2025, 2050 and 2075 time periods for a range of recurrence intervals (1:2; 1:5; 1:10; 1:25; 1:50; 1:100; 1:200; 1:500; 1:1,000) relative to the historical baseline (2005) for the SSP5-8.5 scenario. All three time periods exhibit an increase for all recurrence intervals (between 3.6% and 36.3%).

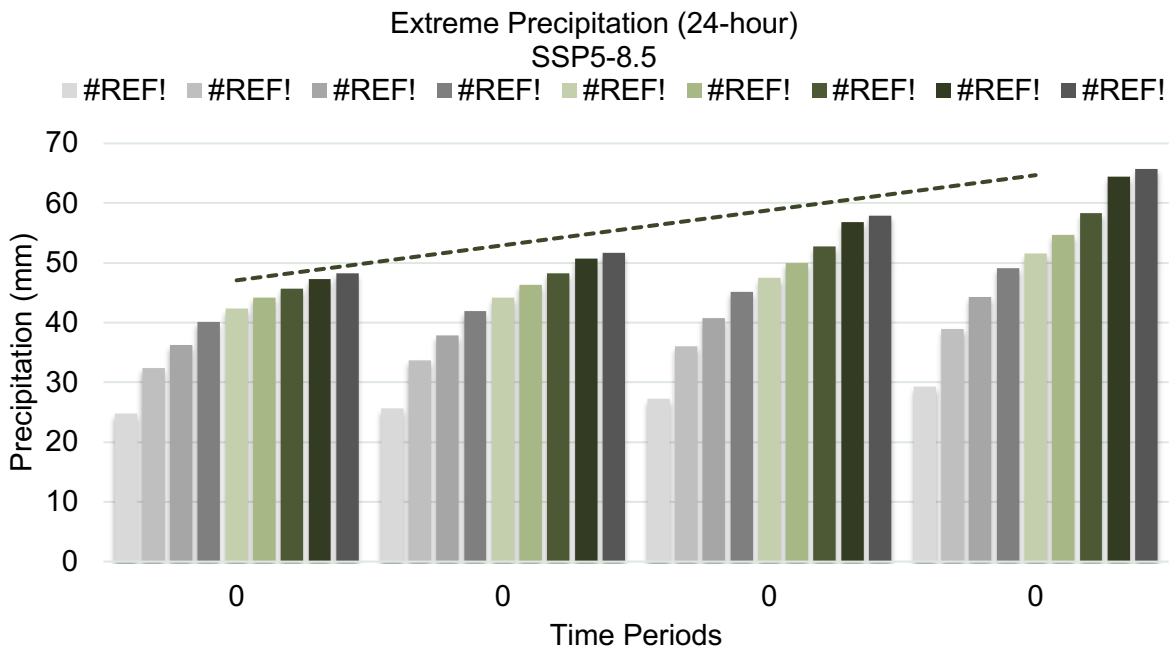


Figure A-13: Projected change in extreme precipitation over a 24-hour period for a range of recurrence intervals for the SSP5-8.5 scenario

A.2.3 Monthly Realtive Humidity

Relative humidity refers to the amount of moisture present in the air compared to the maximum amount of moisture the air can hold at a given temperature. It is important to understand projected changes in relative humidity as unusually high or low humidity levels can influence human comfort, aircraft performance, and the integrity of airport infrastructure.

Figure A-14 presents the projected change in monthly relative humidity for the 2025, 2050 and 2075 time periods relative to the historical baseline (2005)[64]. Under the SSP2-4.5 scenario, monthly humidity is projected to decrease by 0.5%, 1.1%, and 1.6% for the 2025, 2050 and 2075 time periods respectively. Under the SSP5-8.5 scenario, monthly humidity is projected to decrease by 0.5%, 1.49%, and 2.7% for the 2025, 2050, and 2075 time periods respectively.

[64] *Ibid.*

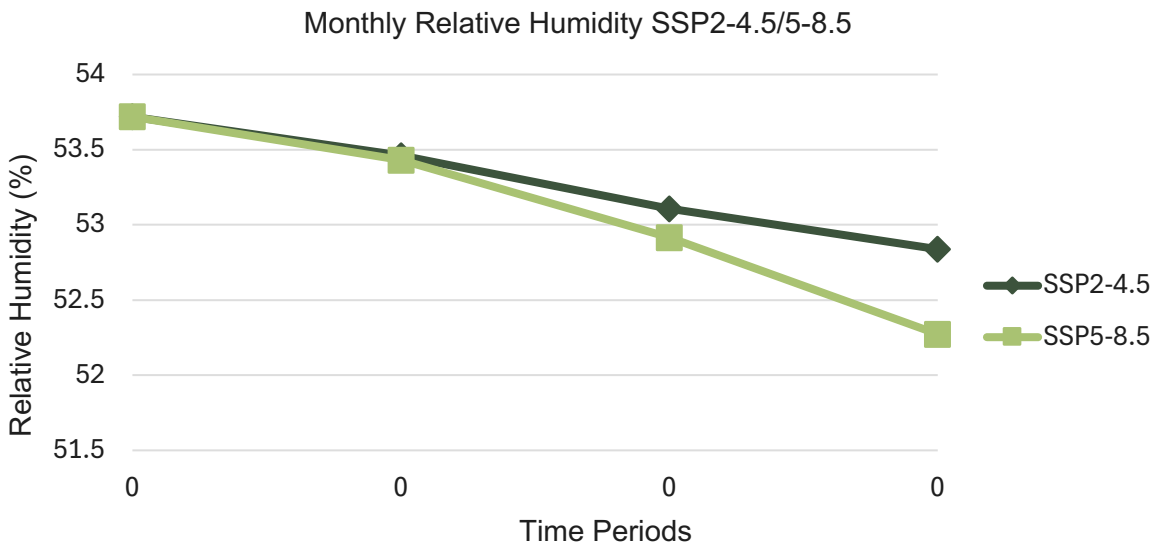


Figure A-14: Projected change in monthly relative humidity for the SSP2-4.5 and SSP5-8.5 scenarios for the 2025, 2050, and 2075 time periods

A.3 Wind Speed Values Variables

Table A-3 below summarises projected changes in key wind speed variables under SSP2-4.5 and SSP5-8.5 scenarios for the time periods 2025, 2050, and 2075 for the medium value (50th percentile)[65]. A detailed breakdown of the projected changes for each variable is provided in the sections below.

Table A-3: Summary of changes in wind speed variables

Climate variable	Description of projected change	Baseline	Projected change under SSP2-4.5			Projected change under SSP5-8.5			Associated hazards
			2025	2050	2075	2025	2050	2075	
Monthly mean wind speed (Section A.3.1)	**Monthly mean wind speed** is projected to decrease for all three time periods by up to 1.6% relative to the baseline. This indicates that wind speed is projected to **slightly decrease** as we approach 2075.	2.3 m/s	-0.3%	-0.7%	-1.0%	-0.3%	-0.9%	-1.6%	Potential need for longer take-off and landing distances
Extreme wind speed – 1–50-year event. (Section A.3.2)	**Extreme wind speed (1–100-year event)** is projected to **decrease** across all three assessment periods, with decreases of up to 3.9% relative to the baseline for 1-50-year wind speed events. This indicates that extreme wind speeds are projected to **slightly decrease** as we approach 2075.	65.2 km/h	-1.0%	-2.7%	-1.3%	-0.5%	-3.9%	-3.9%	Potential need for longer take-off and landing distances

[65] *Ibid.*

A.3.1 Monthly Mean Wind Speed

Wind speed is defined as the rate at which air moves one location to another, typically induced by differences in atmospheric pressure and temperature. Understanding wind speed projections is essential, as an increase in wind speed could lead to flight delays.

Figure A-15 presents the projected change in monthly mean wind speeds for the 2025, 2050 and 2075 time periods relative to the historical baseline (2005)[66]. Under the SSP2-4.5 scenario, monthly mean wind speeds are projected to decrease by 0.3%, 0.7%, and 1.0% for the 2025, 2050 and 2075 time periods respectively. Under the SSP5-8.5 scenario, monthly mean wind speeds are projected to decrease by 0.3%, 0.9%, and 1.6% (21.1% to +24.2%) for the 2025, 2050, and 2075 time periods respectively.

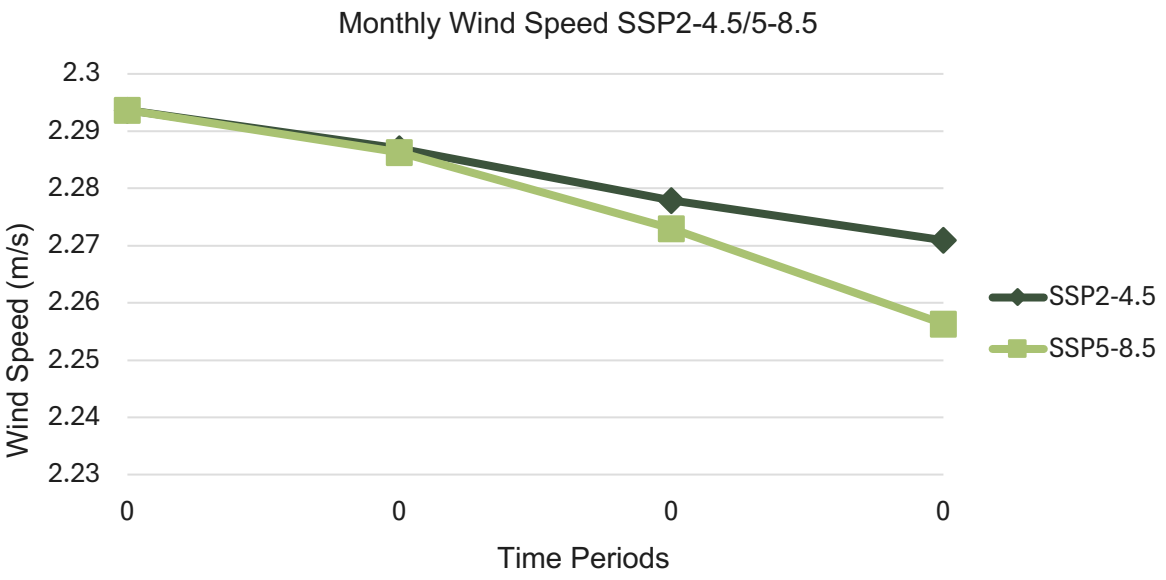


Figure A-15: Projected change in monthly mean wind speed for the SSP2-4.5 and SSP5-8.5 scenarios for the 2025, 2050, and 2075 time periods

A.3.2 Extreme Wind Speed

Extreme wind speed refers to wind speeds that exceed the typical conditions for a particular area. Understanding changes in extreme wind speeds are crucial, as they can pose significant risks to both human health, incoming and outgoing flights, and airport infrastructure. Additionally, extreme wind speeds can be associated with extreme weather events, such as thunderstorms and cyclones.

Figure A-16 presents the projected change in extreme wind speeds for the 2025, 2050, and 2075 time periods for a range of recurrence intervals (1:2; 1:5; 1:10; 1:25; 1:50; 1:100; 1:200; 1:500; 1:1,000) relative to the historical baseline (2005) for the SSP 2-4.5 scenario[67]. All three time periods record a decrease for all recurrence intervals (between 3.6% and 0.3%) for the 50th percentile.

[66] *Ibid.*

[67] *Ibid.*

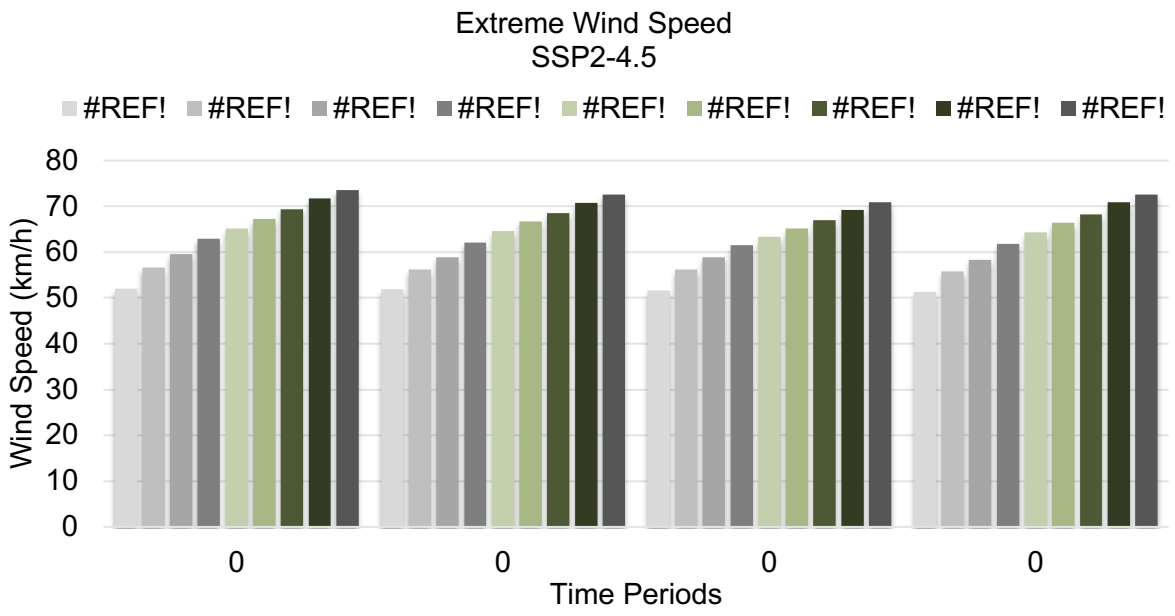


Figure A-16: Projected change in extreme wind speed for the SSP2-4.5 scenario for a range of recurrence intervals for the 2025, 2075, and 2075 time periods.

Figure A-17 presents the projected change in extreme wind speeds for the 2025, 2050, and 2075 time periods for a range of recurrence intervals (1:2; 1:5; 1:10; 1:25; 1:50; 1:100; 1:200; 1:500; 1:1,000) relative to the historical baseline (2005) for the SSP 5-8.5 scenario. All three time periods record a decrease for all recurrence intervals (between 4.4% and 0.6%) for the 50th percentile.

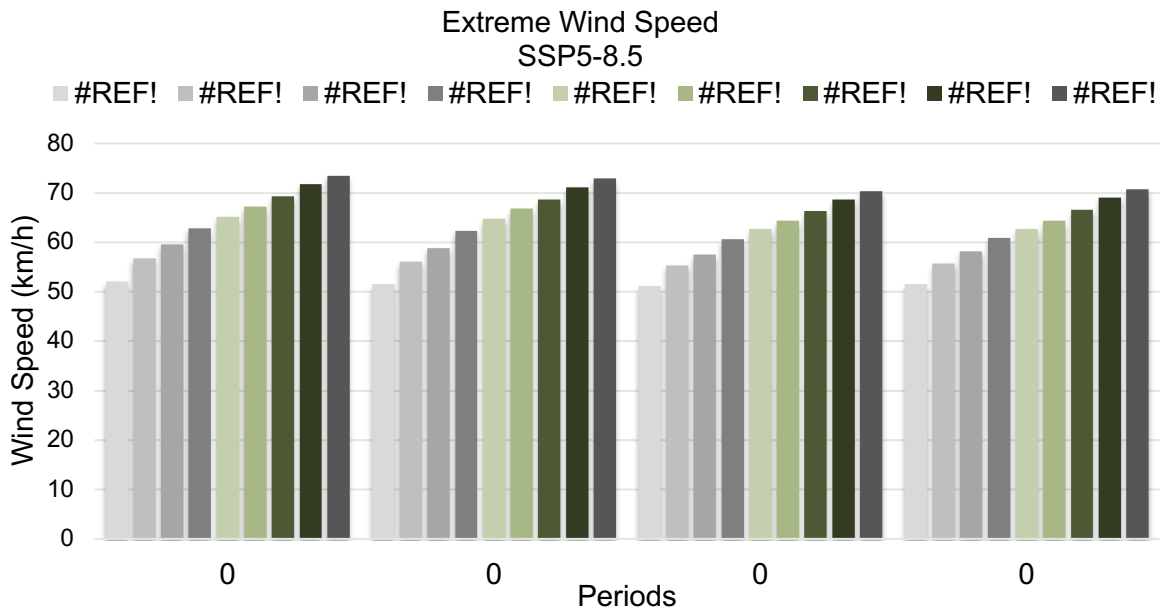


Figure A-17: Projected change in extreme wind speed for the SSP5-8.5 scenario for a range of recurrence intervals for the 2025, 2075, and 2075 time periods.

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