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The Municipality of Kajiado

URBAN CLIMATE RISK PROFILE FOR MUNICIPALITY OF KAJIADO 2025

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Foreword

The Municipality of Kajiado is experiencing rapid urban growth alongside evolving climatic challenges that directly affect our residents, infrastructure, and natural environment. This Urban Risk Profile provides a comprehensive assessment of the exposure, vulnerability, and potential impacts of key climate hazards, including extreme heat, variable precipitation, river flooding, drought, and wildfires.

Our urban areas, particularly the Central Business District, informal settlements, and peri-urban agricultural zones, are increasingly vulnerable to climate-related risks. The findings presented here are based on the best available local and regional data, combined with projections for mid- and long-term climate scenarios.

This report is a critical tool for guiding planning, resource allocation, and implementation of climate adaptation and resilience strategies. By identifying hotspots and prioritizing high-risk urban elements and vulnerable populations, we can focus interventions to protect lives, livelihoods, and essential services.

I urge all stakeholders, including government departments, community groups, and development partners, to use this profile as a foundation for coordinated action. Together, we can strengthen The Municipality of Kajiado's resilience, safeguard our urban future, and ensure a sustainable, inclusive, and climate-resilient municipality.

James Saruni Ole Tono,

Municipal Manager,
The Municipality of Kajiado

Executive Summary

The Municipality of Kajiado is experiencing rapid urbanization alongside escalating climate risks. This Urban Climate Risk Profile was developed to provide a rapid assessment of climate-related hazards, their potential impacts on urban elements, and the vulnerability of populations, infrastructure, and natural systems. The **primary objective** is to guide evidence-based adaptation planning, prioritize interventions, and enhance the municipality's resilience to current and future climate conditions.

Five key hazards were identified: extreme heat, changes in precipitation patterns, fluvial (river) flooding, drought, and wildfires/bushfires. Across these hazards, urban populations, especially residents in informal settlements, vulnerable and marginalized groups, and peri-urban agricultural communities, face high to very high risks. Critical urban elements such as stormwater drainage systems, water supply infrastructure, transport networks, social infrastructure, and agricultural lands are similarly exposed.

The assessment highlights that flooding and extreme heat present the highest immediate and long-term risks, while drought and wildfires pose significant threats to peri-urban and agricultural systems. Risk levels are projected to intensify by 2050 and further by 2100 under high-emission scenarios.

Key recommendations to mitigate these risks include **enhancing drainage and water infrastructure, implementing climate-resilient urban planning, expanding early warning systems, promoting community-based adaptation, and protecting natural assets.** Coordinated, phased interventions are essential to safeguard lives, assets, and the municipality's sustainable development.

Table 1: Summary of Extreme Heat Risks for The Municipality of Kajiado

Categories	Risk Level				
	Current	2050 SSP2-4.5	2050 SSP5-8.5	2100 SSP2-4.5	2100 SSP5-8.5
Infrastructure & Services					
Stormwater Drainage	Medium	High	High	High	High
Water & Wastewater Management	High	Very High	Very High	Very High	Very High
Solid Waste Management	Medium	High	High	High	High
Transport and Mobility	Medium	High	High	High	High
Energy	High	Very High	Very High	Very High	Very High
Economic Infrastructure	High	High	High	Very High	Very High
Social Infrastructure	High	High	High	Very High	Very High
Emergency Services	Medium	High	High	Very High	Very High
Populations					
Urban Residents	High	Very High	Very High	Very High	Very High

Informal Settlement Residents	Very High	Very High	Very High	Very High	Very High
Vulnerable and Marginalized Groups	Very High	Very High	Very High	Very High	Very High
Natural Assets					
Urban Green Infrastructure	Medium	High	High	Very High	Very High
Urban Blue Infrastructure	Medium	High	High	Very High	Very High
Peri-urban and Agricultural Systems	High	Very High	Very High	Very High	Very High

Table 2: Summary of Changes in Precipitation Patterns Risks for The Municipality of Kajiado

Categories	**Risk Level**				
	Current	**2050 SSP2-4.5**	**2050 SSP5-8.5**	**2100 SSP2-4.5**	**2100 SSP5-8.5**
Infrastructure & Services					
Stormwater Drainage	Medium	High	High	High	High
Water & Wastewater Management	High	High	Very High	Very High	Very High
Solid Waste Management	Medium	Medium	High	High	High
Transport and Mobility	Medium	High	High	High	High
Energy	High	High	Very High	Very High	Very High
Economic Infrastructure	Medium	High	High	Very High	Very High
Social Infrastructure	Medium	High	High	Very High	Very High
Emergency Services	Medium	High	High	Very High	Very High
Populations					
Urban Residents	High	High	Very High	Very High	Very High
Informal Settlement Residents	Very High	Very High	Very High	Very High	Very High
Vulnerable and Marginalized Groups	Very High	Very High	Very High	Very High	Very High
Natural Assets					
Urban Green Infrastructure	Medium	High	High	Very High	Very High
Urban Blue Infrastructure	Medium	High	High	Very High	Very High
Peri-urban and Agricultural Systems	High	Very High	Very High	Very High	Very High

Table 3: Summary of Fluvial Flooding risks for The Municipality of Kajiado

Categories	Risk Level				
	Current	2050 SSP2-4.5	2050 SSP5-8.5	2100 SSP2-4.5	2100 SSP5-8.5
Infrastructure & Services					
Stormwater Drainage	High	High	Very High	Very High	Very High
Water & Wastewater Management	High	High	Very High	Very High	Very High
Solid Waste Management	High	High	High	High	Very High
Transport and Mobility	High	High	Very High	Very High	Very High
Energy	Medium	Medium	High	High	High
Economic Infrastructure	High	High	Very High	Very High	Very High
Social Infrastructure	High	High	Very High	Very High	Very High
Emergency Services	High	High	Very High	Very High	Very High
Populations					
Urban Residents	High	High	Very High	Very High	Very High
Informal Settlement Residents	Very High	Very High	Very High	Very High	Very High
Vulnerable and Marginalized Groups	Very High	Very High	Very High	Very High	Very High
Natural Assets					
Urban Green Infrastructure	Medium	Medium	High	High	High
Urban Blue Infrastructure	High	High	Very High	Very High	Very High
Peri-urban and Agricultural Systems	High	High	Very High	Very High	Very High

Table 4: Summary of Drought risks for The Municipality of Kajiado

Categories	Risk Level				
	Current	2050 SSP2-4.5	2050 SSP5-8.5	2100 SSP2-4.5	2100 SSP5-8.5
Infrastructure & Services					
Stormwater Drainage	Medium	Medium	High	High	High
Water & Wastewater Management	High	Very High	Very High	Very High	Very High
Solid Waste Management	Medium	Medium	High	High	High
Transport and Mobility	Medium	Medium	High	High	High
Energy	High	High	Very High	Very High	Very High

Economic Infrastructure	High	High	Very High	Very High	Very High
Social Infrastructure	High	High	Very High	Very High	Very High
Emergency Services	High	High	Very High	Very High	Very High
Populations					
Urban Residents	High	Very High	Very High	Very High	Very High
Informal Settlement Residents	Very High	Very High	Very High	Very High	Very High
Vulnerable and Marginalized Groups	Very High	Very High	Very High	Very High	Very High
Natural Assets					
Urban Green Infrastructure	High	Very High	Very High	Very High	Very High
Urban Blue Infrastructure	High	Very High	Very High	Very High	Very High
Peri-urban and Agricultural Systems	Very High	Very High	Very High	Very High	Very High

Table 5: Summary of Wildfires & Bushfires risks for The Municipality of Kajiado

Categories	**Risk Level**				
	Current	**2050 SSP2-4.5**	**2050 SSP5-8.5**	**2100 SSP2-4.5**	**2100 SSP5-8.5**
Infrastructure & Services					
Stormwater Drainage	Medium	Medium	High	High	High
Water & Wastewater Management	High	High	Very High	Very High	Very High
Solid Waste Management	High	High	High	Very High	Very High
Transport and Mobility	Medium	High	High	High	High
Energy	High	High	Very High	Very High	Very High
Economic Infrastructure	High	High	Very High	Very High	Very High
Social Infrastructure	Medium	High	High	Very High	Very High
Emergency Services	High	High	Very High	Very High	Very High
Populations					
Urban Residents	Medium	High	Very High	Very High	Very High
Informal Settlement Residents	Very High	Very High	Very High	Very High	Very High
Vulnerable and Marginalized Groups	Very High	Very High	Very High	Very High	Very High
Natural Assets					
Urban Green Infrastructure	High	Very High	Very High	Very High	Very High
Urban Blue Infrastructure	Medium	Medium	High	High	High
Peri-urban and Agricultural Systems	High	Very High	Very High	Very High	Very High

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List of Acronyms

CBD	Central Business District
CBO	Community-Based Organization
CGK	County Government of Kajiado
OWASCO	Olkejuado Water & Sewerage Company
GIS	Geographic Information System
KENHA	Kenya National Highways Authority
KERRA	Kenya Rural Roads Authority
KMD	Kenya Meteorological Department
KURA	Kenya Urban Roads Authority
KPLC	Kenya Power and Lighting Company
NCA	National Construction Authority
NDMA	National Drought Management Authority Act
NEMA	National Environment Management Authority
PWD	People With Disabilities
RCRA	Rapid Climate Risk Assessment
WRA	Water Resources Authority
LST	Land Surface Temperature
DEM	Digital Elevation Model
SPEI	Standardized Precipitation Evapotranspiration Index
SRTM	Shuttle Radar Topography Mission

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1. Context

1.1. Objective

This Urban Climate Risk Profile aims to guide evidence-based adaptation planning, prioritize interventions, and enhance the municipality's resilience to current and future climate conditions.

1.2. Urban Context

1.2.1. Geographic area

Kajiado Municipality is located within Kajiado Central Sub-County in Kajiado County. It encompasses an estimated area of 162.53 square kilometers, cutting across Ildamat and Dalalekutuk wards and spanning sub-locations such as Hospital, Majengo, Market, Inkiwachani, Iseuri, Esokota, and Oloyankalani.

The municipality's geographical coordinates range from 36° 43' 03.7" E to 36° 50'35.9" E in longitude and 01° 45' 15.6" S to 01° 53' 42.4" S in latitude. This is as shown in Maps 1, 2 and 3 below

Kajiado Municipality consists of four locations, each headed by chiefs. These locations are Kajiado Township, Sajiloni, Ildamat, and Oloyiankalani which consist of seven sub-locations headed by assistant chiefs. This administrative structure operates within the Central Division, overseen by the Sub-County Commissioner, and falls under the jurisdiction of Kajiado Central Sub-county.

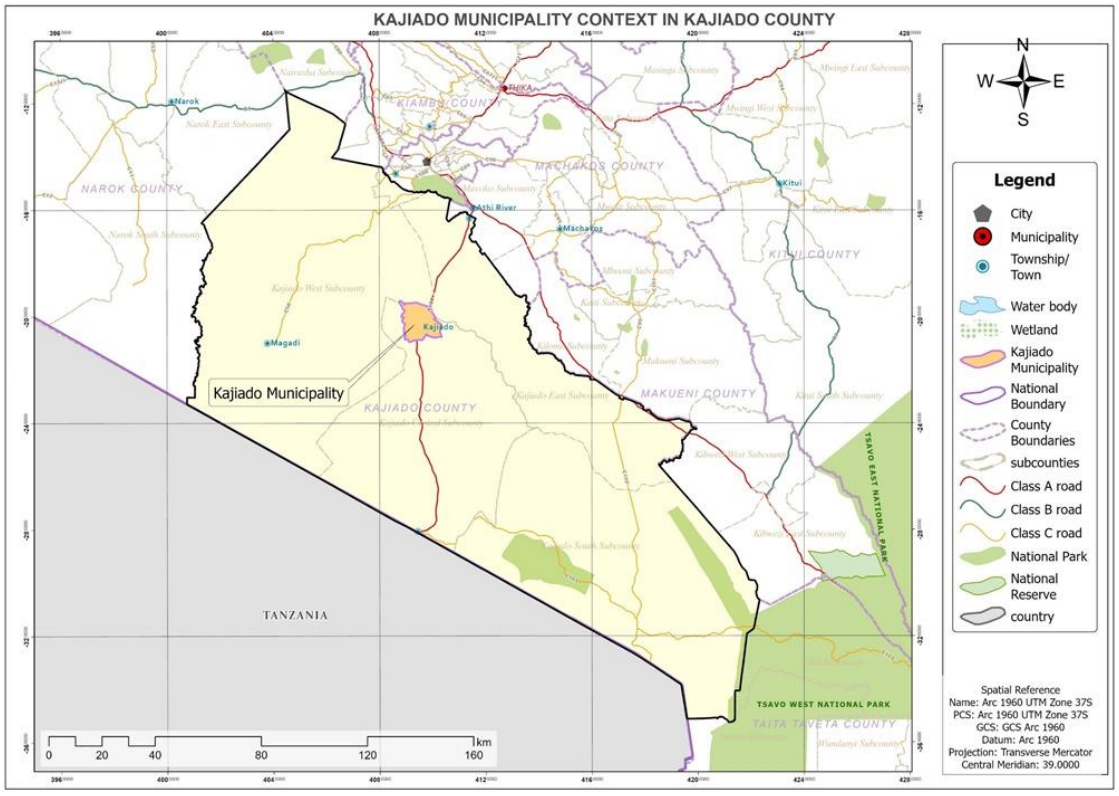


Figure 1: Kajiado Municipality Context in Kajiado County

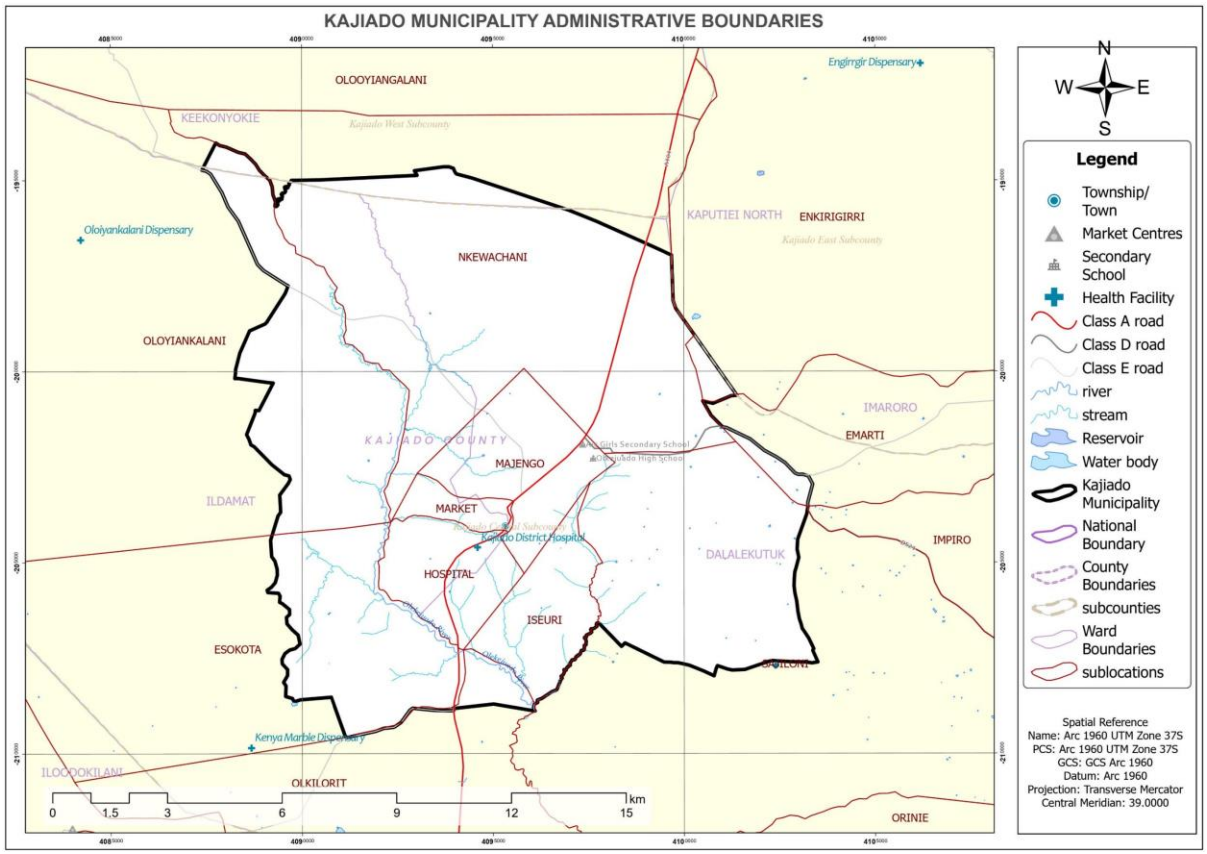


Figure 2: The Municipality of Kajiado Administrative Boundaries

1.2.2. Governance Structure

The governance structure of The Municipality of Kajiado operates within the devolved system of government established under the Constitution of Kenya, 2010, It was established on 6th December 2018 through the bestowal of a Municipal Charter granted by H.E. Joseph Ole Lenku, the Governor County Government of Kajiado, and transfer of functions through kenya gazette legal notice 1077 of 2024. The municipality is administered by a Municipal Board, which provides oversight and policy guidance, promoting efficient service delivery, public participation, and sustainable urban development.

Day-to-day operations are managed by the Municipal Manager, supported by the following directorates within Kajiado Municipality:

1. Directorate of Urban Planning, Development Control, and Environment – responsible for land use planning, building approvals, and environmental management within the municipality.
2. Directorate of Engineering and Disaster Management – oversees municipal infrastructure development, maintenance, and emergency preparedness.
3. Directorate of Community Services – facilitates social programs, public health initiatives, and citizen welfare projects.
4. Directorate of Finance and Corporate Services – manages municipal finances, human resources, procurement, and administrative support functions.

The governance framework emphasizes transparency, accountability, interdepartmental coordination, and citizen engagement in all decision-making processes, ensuring that municipal services are delivered efficiently and inclusively.

1.2.3. Socio-economic Context

The socio-economic context of Kajiado Municipality is shaped by its role as the administrative and commercial centre of Kajiado County, located along the Nairobi–Arusha highway and serving a growing urban population of over 30,126 residents according to the 2019 census. The town's economy reflects a mixed urban and peri-urban character, influenced by its strategic position near Nairobi and its hinterland.

Economic Activities:

- **Trade and Commerce:** Kajiado town functions as a trading hub for the surrounding rural and peri-urban areas, with local markets and retail businesses supporting income generation and employment for a diverse population.
- **Agriculture and Pastoralism:** The broader region around the municipality engages in agricultural production and livestock rearing, particularly pastoralist activities that remain integral to many households' livelihoods, reflective of the county's semi-arid conditions and Maasai cultural heritage.
- **Small-Scale Enterprises and Services:** Small and medium enterprises contribute to the local economy, with growth in service industries, retail outlets, and informal businesses responding to rising consumer demand.

Urban Growth and Infrastructure:

The Municipality has experienced rapid urbanization and population influx, partly due to migration from rural areas and its proximity to Nairobi, leading to increased demand for housing, services, and infrastructure. While infrastructure improvements such as road upgrades and market modernization have stimulated economic activities, challenges remain in urban planning, sanitation, water supply, and physical infrastructure, which affect quality of life and service delivery.

Social Dynamics:

The population of Kajiado Municipality is ethnically diverse, with significant representation from the Maasai community and other groups drawn by employment and business opportunities. Despite economic activity, parts of the population continue to confront unemployment, inadequate infrastructure, environmental stress, and informal settlements, shaping the town's socio-economic dynamics and underscoring the need for inclusive urban development planning

1.2.4. Economic Context

Kajiado town serves as the primary node within the municipality, functioning as a twin node comprising the urban core and the administrative core located at Kwa DC. The town's economic pulse is driven predominantly by commerce, with trade emerging as the main economic activity. Livestock and livestock products constitute the principal trading commodities, supported by the municipality's rich hinterland, strategic location along the Namanga–Nairobi highway, and proximity to both Nairobi, the national capital, and the Tanzania border.

The municipality hosts one major market, the **Kajiado Market**, which specializes in fresh produce and clothing. The economic landscape is diverse, encompassing retail and wholesale trading, fresh produce and cereal enterprises, supermarkets, and a vibrant financial sector. Key financial institutions include **Kenya Commercial Bank (KCB), Equity Bank, Cooperative Bank**, various **SACCOs**, and microfinance institutions.

Micro, Small, and Medium Enterprises (MSMEs) form a critical component of the local economy, spanning groceries, retail shops, wholesale outlets, supermarkets, water kiosks, bars, butcheries, milk vending, and artisan centers. The hospitality industry is also thriving, with establishments such as **Enchula, Kajiado Cultural Resort, Saab Royale**, and **Lerruat Lodge** serving as popular retreats and entertainment hubs.

Despite these strengths, notable gaps exist in the economic infrastructure. The municipality currently lacks a dedicated livestock market, and the existing slaughterhouse operates at a small scale. Plans for the future include establishing a modern abattoir and developing industries for value addition to animal products and by-products.

Industrial Sector

Kajiado Municipality's industrial sector comprises both light and heavy industries, which together contribute to its economic dynamism. **Light industries** include **juakali enterprises, welding and fabrication workshops, carpentry, milling, motor vehicle garages, milk cooling plants, tailoring**, and other small-scale operations, primarily concentrated in Kajiado town. **Heavy industries** include notable establishments such as **TATA Chemicals, Globsil** and **KEDA Ceramics**.

The municipality is endowed with mineral resources, including **sand, limestone, marble, and quartz**, which have attracted mining and processing activities in the hinterland, highlighting the region's significant industrial potential.

1.2.5. Land-use Context

Kajiado town is the main node in the Municipality. It presents itself as a twin node with the urban core and the administrative core, which is located at Kwa DC. The town's pulse is commerce, with trade emerging as the primary economic driver. Trade in livestock and livestock products emerges as the main trading activity within the municipality. This has been propelled by municipality's rich hinterland; strategic location along the Namanga Nairobi highway; and its close proximity to Nairobi Capital City and Tanzania border.

The Municipality has one major market place, the Kajiado market, specializing in the trade of fresh produce and clothing. The economic landscape is diverse, encompassing retail and wholesale trading, fresh produce and cereal enterprises, supermarkets, and a robust financial sector featuring institutions such as Kenya Commercial Bank (KCB), Equity Bank, Cooperative Bank, SACCOs, and various microfinance institutions

Micro, Small, and Medium Enterprise (MSME) activities range from groceries, wholesale, and super- markets to retail shops, water kiosks, bars, butcheries, shops, milk vendors and artisan centers. The hospitality industry thrives in the municipality with establishments like Enchula, Tumaini Resort, Saab Royale, and Lerruat Lodge emerging as popular retreat spots and entertainment hubs.

However, there are identified gaps in the economic landscape. Notably, there is no livestock market, and the existing slaughterhouse is small-scale. The proposed plan suggests the establishment of a modern abattoir and the introduction of industries for value addition to animal products and by-products.

Industry

The Municipality's industrial sector encompasses both heavy and light sectors that collectively con- tribute to its economic dynamism. Light industries operating within its boundaries include; Jua-kali enterprises, welding and fabrication workshops, carpentry, milling, motor vehicle garages, milk cooling plants, tailoring, and various others. These are mainly concentrated in Kajiado town. Heavy industries also exist within the municipality such as TATA Chemicals and

KEDA ceramics. The presence of minerals such as sand, limestone, marble, and quartz has attracted mining and processing in the hinterland, underscoring the region's significant industrial potential.

1.3. Key Stakeholders & Inclusiveness

The preparation of the Kajiado Municipality Urban Climate Risk Profile adopted an inclusive, participatory, and multi-stakeholder approach to ensure that diverse perspectives, knowledge systems, and priorities were integrated into the assessment. Recognizing that climate risks affect different groups in varied ways, the process emphasized collaboration across government institutions, private sector actors, civil society, and local communities.

Stakeholder Engagement Approach

Stakeholder engagement was undertaken through a combination of consultative meetings, technical workshops, key informant interviews, and validation forums. These engagements were designed to:

- Collect local knowledge on historical climate events and impacts
- Identify key urban systems, vulnerabilities, and priority risks
- Validate hazard, exposure, and risk findings
- Build consensus on priority adaptation actions

Special attention was given to ensuring representation of vulnerable and marginalized groups, including women, youth, persons with disabilities (PWDs), informal settlement residents, and pastoralist communities. This approach ensured that the Climate Risk Profile reflects both technical expertise and lived experiences.

Inclusiveness Considerations

Inclusiveness was a core principle throughout the process, guided by the need to promote equitable participation and climate justice. The following measures were adopted:

- **Representation of vulnerable groups:** Engagements deliberately included women groups, youth associations, Maasai elders, and community-based organizations (CBOs).
- **Participatory planning:** Community voices were incorporated in identifying risk hotspots and prioritizing adaptation solutions.
- **Accessibility:** Meetings were conducted in accessible locations and, where necessary, local languages were used to enhance participation.
- **Gender and social equity integration:** The assessment considered differentiated impacts of climate hazards across gender, age, and socio-economic status.

This inclusive approach strengthens ownership of the findings and enhances the likelihood of successful implementation of adaptation measures.

Stakeholder Mapping

Stakeholders were categorized based on their level of influence and interest in climate risk management within the municipality.

	High Interest	Low Interest
High Influence	**High Influence – High Interest** • County Governor – Kajiado County • County Executive Committee • County Government Departments (Water, Climate Change Unit, Disaster Risk Management, Agriculture, Lands & Planning) • Members of the County Assembly (MCAs) • Municipal Board • Municipal Manager – Kajiado Municipality • Council of Governors • State Department for Urban Development • National Disaster Management Authority (NDMA) • National Environment Management Authority (NEMA) • National Construction Authority (NCA) • Kenya Urban Roads Authority (KURA) • Kenya National Highways Authority (KENHA) • Kenya Meteorological Department (KMD) • Water Resources Authority (WRA)	**High Influence – Low Interest** • Kenya Rural Roads Authority (KERRA) • Ministry of Interior and National Administration (County Commissioner) • Olkejuado Water & Sewerage Company (OWASCO) • Kenya Power and Lighting Company (KPLC) • Media Houses (e.g., Bus Radio FM, Mayian FM) • Private infrastructure developers and contractors • Financial institutions and investors
Low Influence	**Low Influence – High Interest** • Local communities and residents • Residents' associations • Women and youth groups • Non-governmental organizations (NGOs) • Maasai elders and community leaders • Farmers and pastoralist groups • Community-based organizations (CBOs) • Environmental advocacy groups	**Low Influence – Low Interest** • Informal traders and small-scale businesses • Informal settlement residents (unorganized groups) • Persons with disabilities (PWDs) with limited representation • Marginalized and hard-to-reach populations

Figure 3: Stakeholder Mapping for The Municipality of Kajiado

2. Hazard Assessment

This section presents an assessment of the key climate hazards affecting Kajiado Municipality, focusing on their current occurrence, projected future trends, and potential impacts. The analysis identifies priority hazards based on their likelihood and severity, and examines relevant climate indicators and thresholds used to measure them. It further outlines current and future hazard levels under different climate scenarios, providing a basis for understanding how risks may evolve over time. This assessment forms a critical foundation for evaluating exposure, vulnerability, and ultimately informing targeted climate adaptation and resilience strategies within the municipality.

2.1. Key Climate Hazards

Table 6: Hazard Screening for The Municipality of Kajiado

Hazard	Hazard Likely (Y/N)	Significant Impact (Y/N)	High Priority (Y/N)	Key Hazard (Y/N)
Extreme heat	Yes	Yes	Yes	Yes
Changes in precipitation patterns	Yes	Yes	No	No
Fluvial (river) flooding	Yes	Yes	Yes	Yes
Drought (meteorological, hydrological)	Yes	Yes	Yes	Yes
Wildfires & bushfires	Yes	No	No	No

2.2. Climate Indicators and Hazard Thresholds

Table 7: Climate Indicators and Hazard Thresholds Selected for the Assessment

Key Hazard	Climate indicator	Data source	Threshold		
			Low	Medium	High
Extreme heat	No. days with heat index > 35°C (Mean)	World Bank Climate Change Knowledge Portal + MODIS land surface temperature(LST)	<5 days / season	5 -15 days / season	>15 days / season
Changes in precipitation patterns	No. of days per year with daily precipitation > 100mm	Kenya Meteorological Department + CHIRPS database	< 15 days	15 – 30 days	> 30 days
Fluvial (river) flooding	100 year return period flood depth	Aqueduct Flood(WRI) + STRM DEM	No flooding	NA	Flooding
Drought (meteorological, hydrological)	SPEI Drought Index	SPEI database	> -1.0	-1.0 to -1.5	<-1.5

Wildfires & bushfires	Fire Weather Index (FWI)	Think Hazard!	Low/Very Low	Medium	High/Very High

2.3. Current Hazard Levels and Climate Projections

The Municipality of Kajiado has experienced increasing temperatures and more variable rainfall patterns over recent decades. These changes have led to more frequent heat events, prolonged dry spells, and irregular but intense rainfall. Such trends have heightened the occurrence and severity of climate-related hazards, particularly droughts, floods, and heat stress.

These chronic climate changes are intensifying acute hazards. Higher temperatures contribute to worsening drought conditions and increased wildfire risk, while intense rainfall events elevate the likelihood of flooding. Periods of drought followed by heavy rains further compound these risks.

Climate projections indicate that these patterns will intensify in the future under both moderate and high-emission scenarios. Extreme heat and drought are expected to become more severe, while rainfall variability will continue to increase, resulting in heightened risks of flooding and other climate-related hazards across The Municipality of Kajiado.

Table 8: Current and future hazards levels for The Municipality of Kajiado

	Hazard Level				
Hazard	**Current (Baseline)**	**2050 SSP2-4.5**	**2050 SSP5-8.5**	**2100 SSP2-4.5**	**2100 SSP5-8.5**
Extreme heat	High	High	High	High	Very High
Changes in precipitation patterns	Medium	High	High	High	Very High
Fluvial (river) flooding	Medium	Medium	High	High	Very High
Drought (meteorological, hydrological)	Medium	High	Very High	Very High	Very High
Wildfires & bushfires	High	High	High	High	High

For this Urban Climate Risk Profile, hazard levels should be interpreted in accordance with the table below.

Table 9: Interpretation of hazard levels

Level	Interpretation
High	Hazard events that are likely to occur with high frequency and/or intensity
Medium	Hazard events that are likely to occur with moderate frequency and/or intensity
Low	Hazard events that are likely to occur with low frequency and/or intensity

2.4. Current and Future Hazard Impact Areas

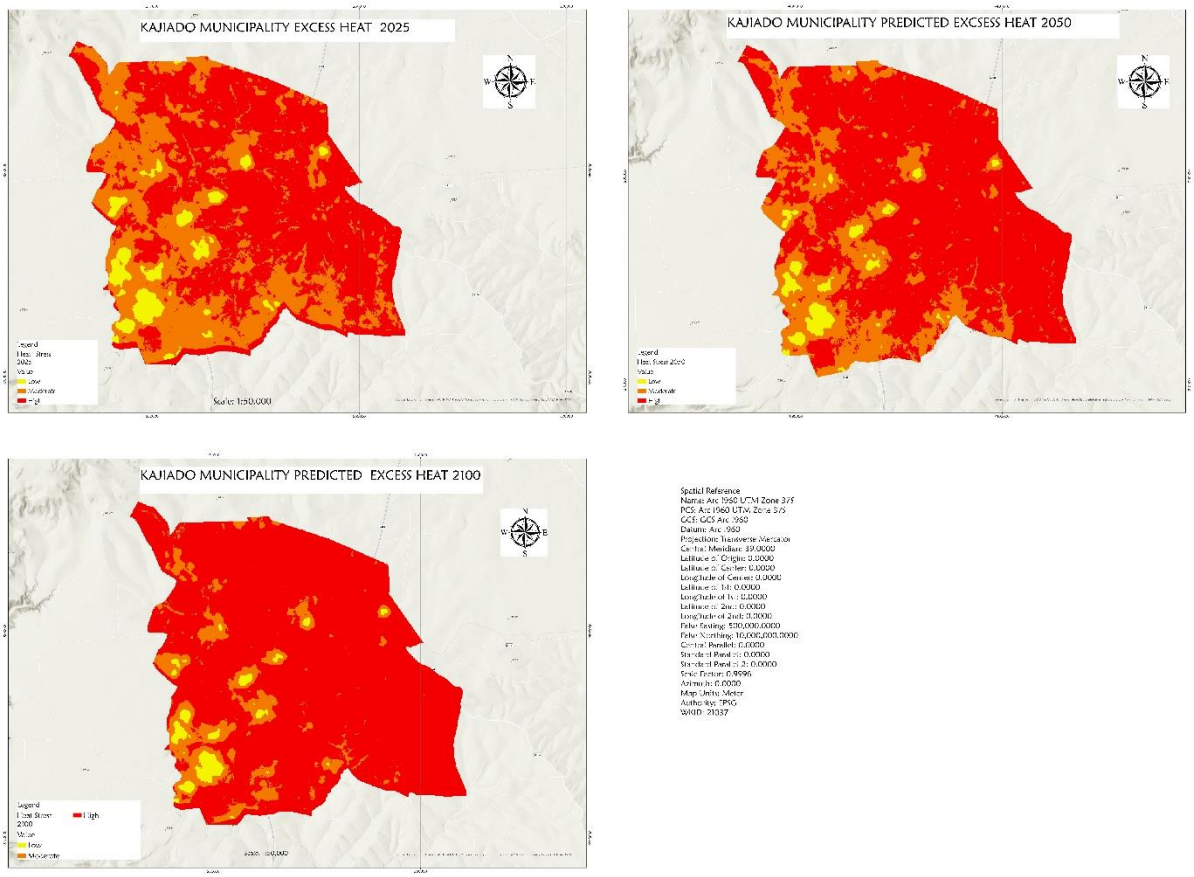
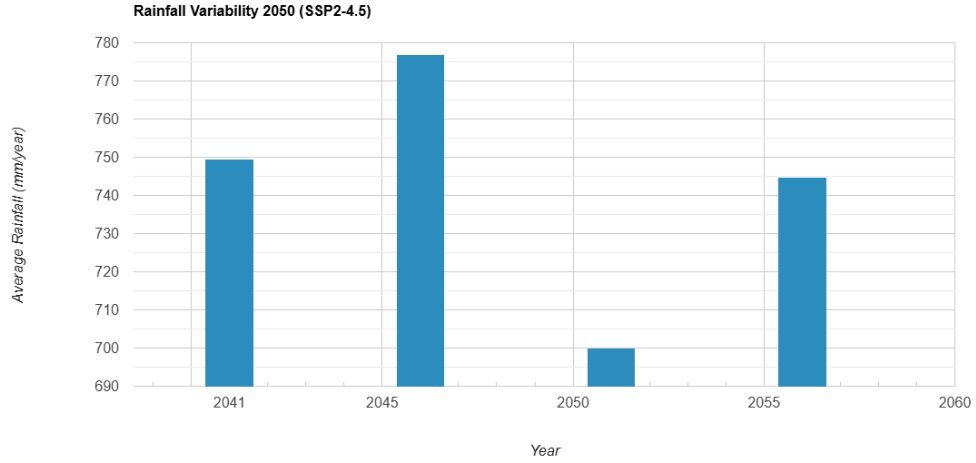
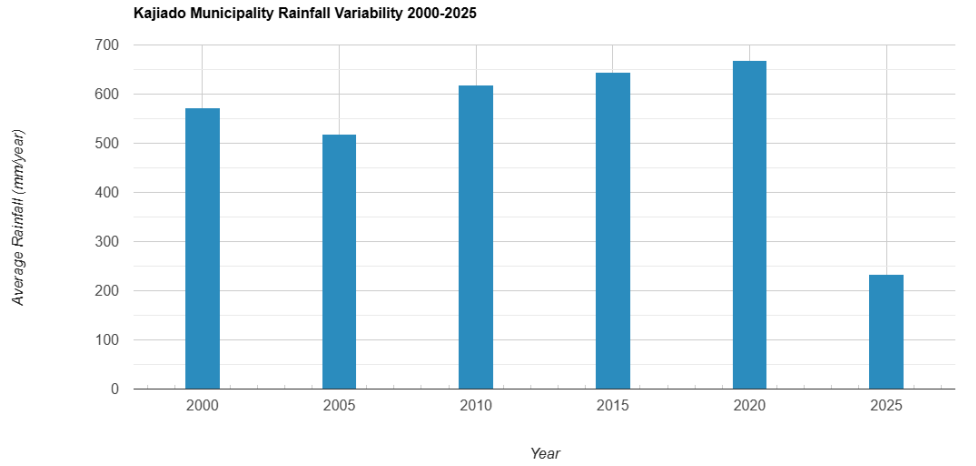


Figure 4: Extreme Heat Distribution Future Trends





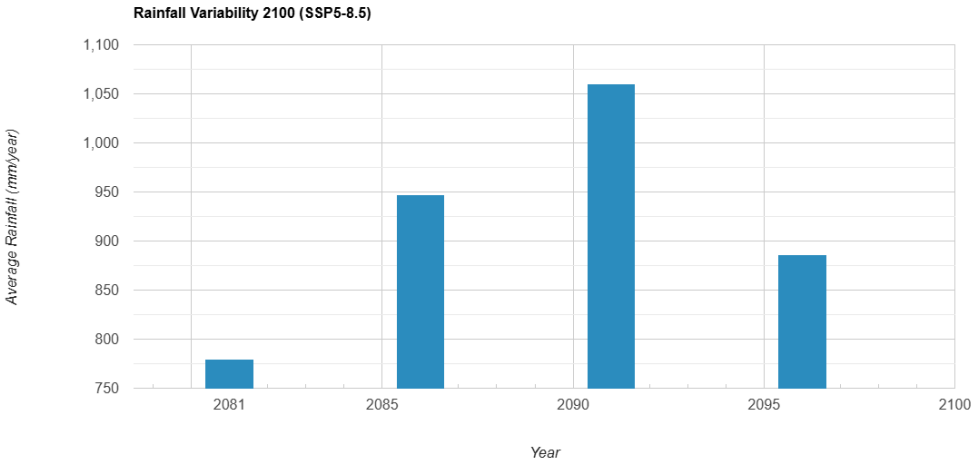


Figure 5: Changes in Precipitation Patterns

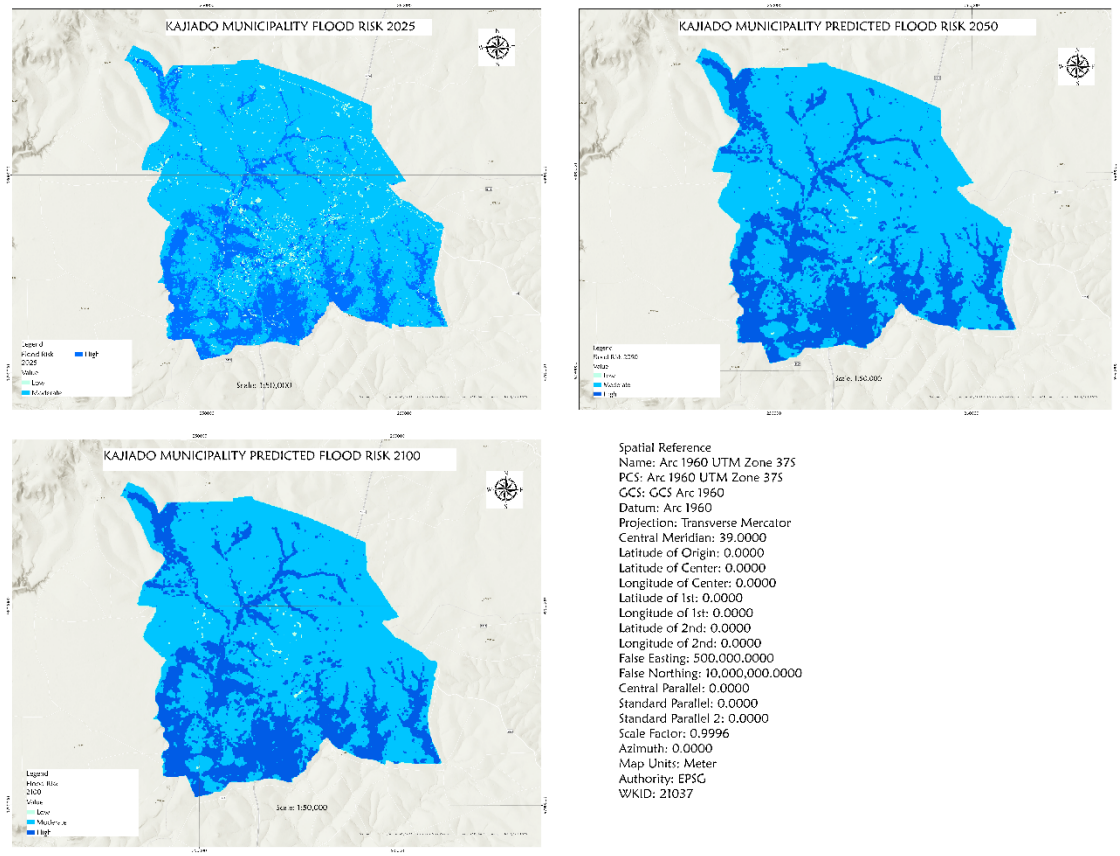


Figure 6: Modelled Fluvial (river) Flooding Hazard Scenarios

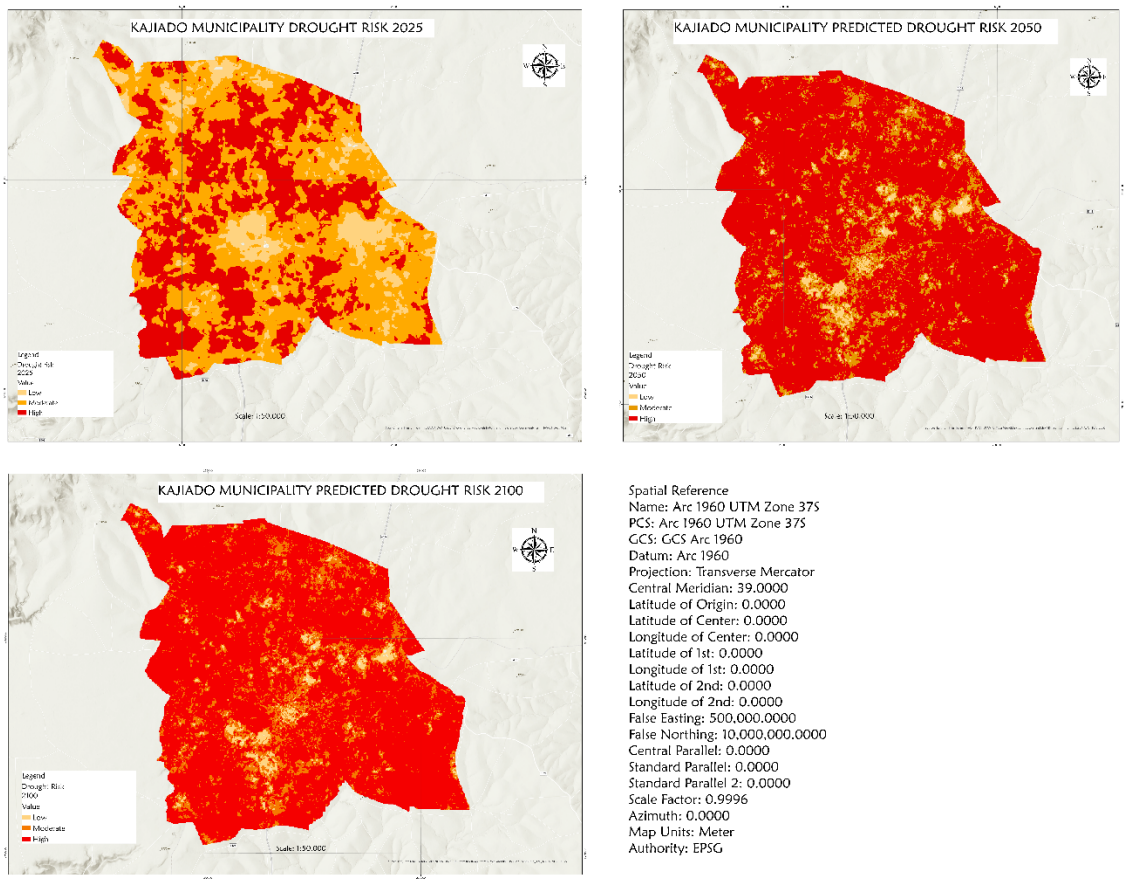


Figure 7: Drought Hazard Scenario

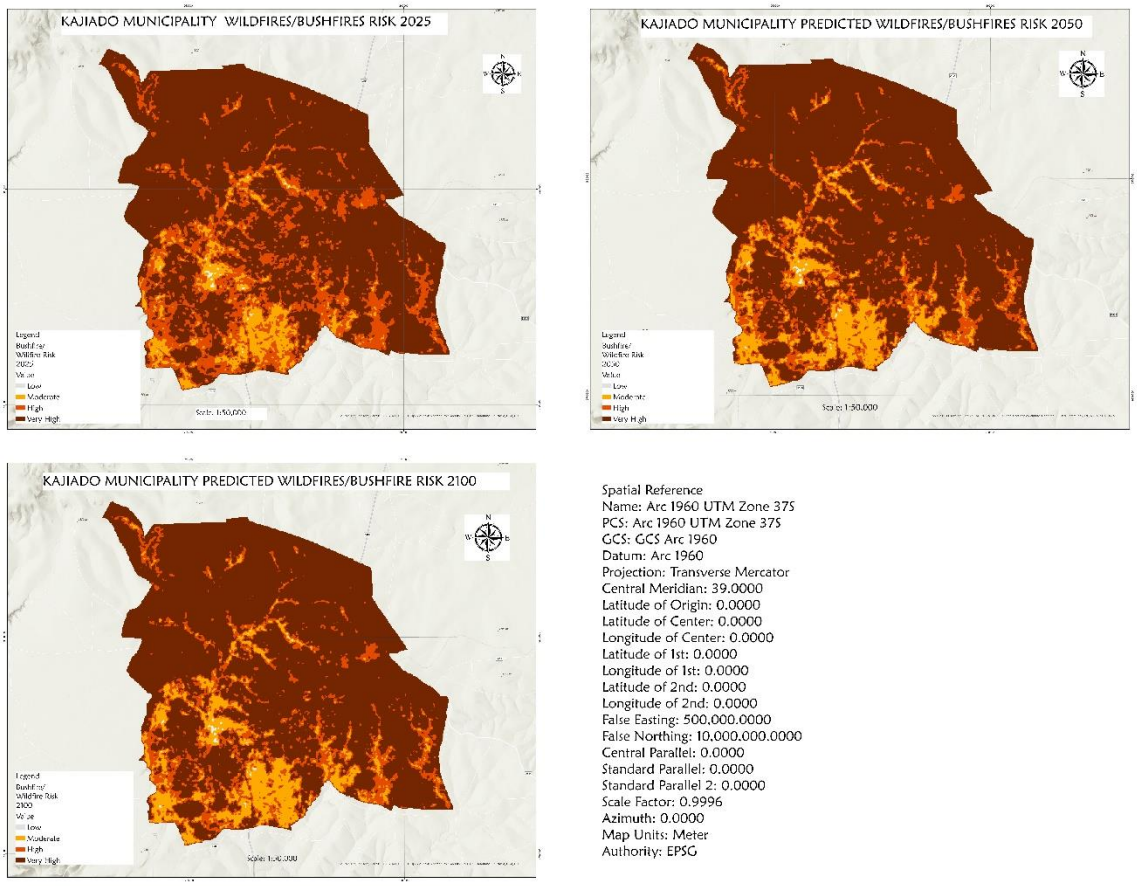


Figure 8: Wildfire and Bushfire Hazard Scenario

3. Exposure & Vulnerability Assessment

This section examines the extent to which key urban elements within The Municipality of Kajiado are exposed and vulnerable to identified climate hazards. It identifies critical infrastructure, populations, and natural systems at risk, and assesses their sensitivity and capacity to cope with climate impacts. By analyzing both exposure and vulnerability, the section provides a clearer understanding of potential impacts across different sectors, forming a basis for targeted risk reduction and climate resilience planning.

3.1. Urban Elements

Table 10: Urban Elements Inventory

Category	Subcategory	Included in the RCRA (Y/N)	Available in GIS format (Y/N)	Description
Infrastructure & Services				
Stormwater Drainage	Stormwater drainage conveyance network	Y	Y	Kajiado township CBD roads Along Namanga road
	Stormwater storage	N	N	N/A
Water & Wastewater Management	Pumping stations	N	N	N/A
	Groundwater abstraction	Y	N	Olosuyian borehole
	Water treatment facilities	N	N	N/A
	Water supply networks	Y	Y	OWASCO Water supply Network
	Sewer networks	N	N	N/A
	Wastewater treatment facilities	N	N	N/A
Solid Waste Management	Transfer facilities	Y	N	Skip bins in Saina, Market, Majengo and Shapashina
	Landfills and dump sites	Y	Y	Kajiado dump site
	Recycling centers	N	N	N/A
	Collection fleet	Y	N	One municipal Garbage Truck
Transport and Mobility	Road networks	Y	Y	CBD roads,Namanga road, Majengo and Saina roads
	Bridges	Y	Y	Olusuyian bridge, Kwa Dc Mukuru bridge
	Public transport networks (rail, bus, mini-bus, etc.)	Y	Y	Public Bus, Mini Bus (Matatu) Bodaboda and Taxi Services
	Transportation terminals	Y	Y	Tirati Ole Kina Bus Park
	Vehicle depots	N	N	N/A
	Non-motorized transport networks	Y	Y	Walkways and Pavements along CBD roads and Namanga Road.

Category	Subcategory	Included in the RCRA (Y/N)	Available in GIS format (Y/N)	Description
	Freight and logistics hubs	N	N	N/A
Energy	Energy power plants	N	N	N/A
	Poles and power lines	Y	Y	Kplc power lines along all roads within the municipality
	Transformers and substations	Y	N	Kajiado kplc Sub station
	Streetlighting	Y	Y	Along Edward Sokoine Road, Outerine road, Polong road, Namanga road
Economic Infrastructure	Markets	Y	Y	Kajiado Town Market, Sajiloni Market
	Businesses and commercial hubs	Y	N	Jua Kali, Kajiado Town Center, Sajiloni Town Center
	Industrial zones/parks and logistics parks	Y	Y	Demo Farm,
Social Infrastructure	Government buildings and service centers	Y	Y	County Government of Kajiado Head quarter Offices,Kajaido High court , Huduma Center, county commissioner offices,
	Education facilities	Y	Y	Masai National Polytechnic , UMMA university, Public and private primary and secondary schools
	Healthcare facilities	Y	Y	Kajiado level 5 Referral hospital, Saina dispensary , Kitengela Medical , St. chrispin Afya hospital, Sajiloni Dispensary, Esokota dispensary
	Public spaces	Y	Y	Imashon Public square,Ildamat stadium, KCB ground
	Faith-based buildings	Y	Y	ACK Tenebo House host several NGO offices
	Cultural and heritage assets	Y	Y	Ole Kango Cultural high street,Kajiado War Memorial Cemetery
Emergency Services	Fire stations	N	N	N/A
	Police stations	Y	Y	Kajiado Central police station
	Telecommunications networks	Y	N	Mobile Networks, Internet Networks, Fiber Optic Networks, Radio Broadcasting Networks
	Early warning systems	N	N	N/A

Category	Subcategory	Included in the RCRA (Y/N)	Available in GIS format (Y/N)	Description
	Disaster management centers and shelters	Y	N	Kenya Red Cross Society, National Drought Management Authority (NDMA)
	Evacuation routes	Y	Y	Namanga Highway and Edward Sokoine road are the primary evacuation routes
Populations				
Urban Residents	Population	Y	N	30,126 people as per the Kenya population and Housing Censes 2019
	Households	N	N	N/A
Informal Settlement Residents	Population living in informal settlements	Y	Y	N/A
	Households lacking land tenure	N	N	N/A
	Households / residents lacking access to basic services	Y	N	N/A
Vulnerable and Marginalized Groups	Low-income households	Y	Y	N/A
	Women-headed households	N	N	N/A
	Children and youth	N	N	N/A
	Elderly persons	N	N	N/A
	People with disabilities (PWD)	Y	N	N/A
	Homeless populations	N	N	N/A
	Unemployed or precariously employed workers	N	N	N/A
	Seasonal workers / migrant laborers	N	N	N/A
	Nomadic groups in peri-urban areas	N	N	N/A
	Urban refugees and migrants	N	N	N/A
	Minority ethnic groups in urban areas	N	N	N/A
Natural Assets				
Urban Green Infrastructure	Urban parks and gardens	Y	N	Imashon public square
	Green corridors	N	N	N/A
	Street landscaping	N	N	N/A
	Urban forests and forest reserves	N	N	N/A
Urban Blue Infrastructure	Natural wetlands	N	N	N/A
	Rivers	Y	Y	Olkejuado river

Category	Subcategory	Included in the RCRA (Y/N)	Available in GIS format (Y/N)	Description
	Riparian zones	Y	Y	Along Olkejuado river and steams within the municipality
	Lakes, ponds and reservoirs	N	N	N/A
	Coastal ecosystems	N	N	N/A
	Urban agriculture	N	N	N/A
Peri-urban and Agricultural Systems	Peri-urban agriculture	Y	Y	Large scale farming in Ildamat , Inkiwanjani and Enkorika
	Agroforestry systems	N	N	N/A
	Forests and forest reserves	N	N	N/A
	Protected areas and national parks	N	N	N/A
	Savannahs and rangelands	N	N	N/A

3.2. Exposure, Vulnerability, and Impacts of Climate Hazards on Urban Elements

For this Urban Climate Risk Profile, exposure and vulnerability levels should be interpreted in accordance with the table below.

Table 11: Interpretation of exposure and vulnerability levels

Level	Exposure Level Interpretation	Vulnerability Level Interpretation
High	Few or no critical urban elements lie within the hazard footprint or area of impact.	The urban element is vulnerable to the climate hazard due to high natural sensitivity – considering physical and non-physical characteristics – and limited adaptive capacity.
Medium	A moderate number or a mix of low- and medium-value urban elements are located within the hazard footprint.	The urban element is somewhat vulnerable to the climate hazard due to moderate sensitivity and adaptive capacity.
Low	A large number and high-value urban elements (e.g., critical infrastructure, dense neighborhoods, major economic assets) are located within the hazard footprint.	The urban element is minimally vulnerable to the climate hazard due to limited sensitivity and/or a high degree of adaptive capacity.

For this Urban Climate Risk Profile, the following matrix summarizes likely impacts on each urban element by combining the assigned exposure and vulnerability levels.

Table 12: Impact Matrix

		Vulnerability Level		
		Low	**Medium**	**High**
Exposure Level	**High**	Moderate	Major	Catastrophic
	Medium	Minor	Moderate	Major
	Low	Insignificant	Minor	Moderate

Table 13: Exposure, Vulnerability, and Impacts of Extreme Heat on Urban Elements

Hazard: Extreme heat

Category	Exposure (Description)	Exposure Level	Vulnerability (Description)	Vulnerability Level	Impact Level
Infrastructure & Services					
Stormwater Drainage	• Thermal expansion can affect expansion joints in lined drainages and reduce efficiency.	Medium	**Sensitivity:** • Aging drainage infrastructure. **Adaptive Capacity:** • Moderate maintenance programs and material upgrades.	Medium	Medium
Water & Wastewater Management	• Increased water demand and evaporation.	High	**Sensitivity:** • Limited storage and heat-sensitive infrastructure. **Adaptive Capacity:** • Partial adaptation with reservoirs and pumps.	High	High
Solid Waste Management	• Accelerated decomposition, odor, and pest issues.	Medium	**Sensitivity:** • Poorly covered facilities. **Adaptive Capacity:** • Moderate waste collection frequency and monitoring.	Medium	Medium
Transport and Mobility	• Roads, rails, and pavements deform under heat.	Medium	**Sensitivity:** • Asphalt softening, older roads. **Adaptive Capacity:** • Regular maintenance, shaded pathways.	Medium	Medium
Energy	• Increased electricity demand for cooling.	High	**Sensitivity:** • Grid stress, frequent outages. **Adaptive Capacity:** • Partial renewable energy and backup systems.	High	High
Economic Infrastructure	• Businesses and markets stressed by heat.	Medium	**Sensitivity:** • Minimal cooling infrastructure.	Medium	Medium

Category	Exposure (Description)	Exposure Level	Vulnerability (Description)	Vulnerability Level	Impact Level
			Adaptive Capacity: • Schedule adjustments and partial cooling.		
Social Infrastructure	• Schools and hospitals affected by heat.	Medium	**Sensitivity:** • Poor ventilation and limited AC. **Adaptive Capacity:** • Some air conditioning and shaded spaces.	Medium	Medium
Emergency Services	• Response stressed due to heat.	Medium	**Sensitivity:** • Personnel heat stress, limited vehicles. **Adaptive Capacity:** • Moderate training and emergency planning.	Medium	Medium
Populations					
Urban Residents	• Health risks from prolonged heat exposure.	High	**Sensitivity:** • Elderly and children most at risk. **Adaptive Capacity:** • Limited access to water and cooling centers.	High	High
Informal Settlement Residents	• High exposure in poorly built shelters.	High	**Sensitivity:** • Lightweight housing, lack of shade. **Adaptive Capacity:** • Very low.	Very High	Very High
Vulnerable and Marginalized Groups	• High exposure, limited resources.	High	**Sensitivity:** • Poverty, chronic illness. **Adaptive Capacity:** • Low access to support services.	Very High	Very High
Natural Assets					
Urban Green Infrastructure	• Trees stressed, reduced cooling.	Medium	**Sensitivity:** • Limited irrigation, high heat stress.	Medium	Medium

Category	Exposure (Description)	Exposure Level	Vulnerability (Description)	Vulnerability Level	Impact Level
			Adaptive Capacity: • Some community planting programs.		
Urban Blue Infrastructure	• Water bodies experience evaporation.	Medium	**Sensitivity:** • Small ponds/streams dry quickly. **Adaptive Capacity:** • Partial reservoir management.	Medium	Medium
Peri-urban and Agricultural Systems	• Crops and livestock heat stress.	High	**Sensitivity:** • Smallholder farms, limited irrigation. **Adaptive Capacity:** • Some drought-resistant crops and livestock management.	High	High

Table 14: Exposure, Vulnerability, and Impacts of Changes in Precipitation Patterns on Urban Elements

Hazard: Change in Precipitation Patterns

Category	Exposure (Description)	Exposure Level	Vulnerability (Description)	Vulnerability Level	Impact Level
Infrastructure & Services					
Stormwater Drainage	• Increased rainfall intensity overwhelms drains.	High	**Sensitivity:** • Aging systems, limited capacity. **Adaptive Capacity:** • Moderate upgrades in key areas.	High	High
Water & Wastewater Management	• Fluctuating supply; risk of overflow or shortages.	High	**Sensitivity:** • Storage and treatment plants stressed. **Adaptive Capacity:** • Some adaptive management systems.	High	High
Solid Waste Management	• Flooded waste sites can spread contamination.	Medium	**Sensitivity:** • Poorly managed dumps. **Adaptive Capacity:** • Limited contingency measures.	Medium	Medium

Category	Exposure (Description)	Exposure Level	Vulnerability (Description)	Vulnerability Level	Impact Level
Transport and Mobility	• Roads and bridges vulnerable to flooding or erosion.	High	**Sensitivity:** • Weak pavement, informal roads. **Adaptive Capacity:** • Partial road maintenance.	Medium	High
Energy	• Hydropower and distribution disrupted by storms.	High	**Sensitivity:** • Vulnerable lines and substations. **Adaptive Capacity:** • Some redundancies.	High	High
Economic Infrastructure	• Shops/markets affected by extreme rainfall.	High	**Sensitivity:** • Minimal flood protection. **Adaptive Capacity:** • Some insurance and relocation measures.	High	High
Social Infrastructure	• Schools/hospitals vulnerable to heavy rain.	High	**Sensitivity:** • Limited flood defenses. **Adaptive Capacity:** • Partial adaptations (raised structures).	High	High
Emergency Services	• Response hampered during heavy rainfall.	High	**Sensitivity:** • Limited mobility/resources. **Adaptive Capacity:** • Moderate preparedness and training.	High	High
Populations					
Urban Residents	• Homes and property exposed to heavy rains.	High	**Sensitivity:** • Poorly constructed housing. **Adaptive Capacity:** • Limited evacuation plans.	High	High
Informal Settlement Residents	• High exposure to flooding.	High	**Sensitivity:** • Vulnerable housing, poor drainage. **Adaptive Capacity:** • Very low.	Very High	Very High
	• Risk of displacement and waterborne disease.	High	**Sensitivity:** • Poverty, chronic illness.	Very High	Very High

Category	Exposure (Description)	Exposure Level	Vulnerability (Description)	Vulnerability Level	Impact Level
Vulnerable and Marginalized Groups			**Adaptive Capacity:** • Low.		
Natural Assets					
Urban Green Infrastructure	• Vegetation affected by erratic rainfall.	High	**Sensitivity:** • Limited irrigation and plant diversity. **Adaptive Capacity:** • Moderate community initiatives.	High	High
Urban Blue Infrastructure	• Rivers, streams, and ponds respond to heavy rainfall.	High	**Sensitivity:** • Flood-prone areas. **Adaptive Capacity:** • Some retention ponds.	High	High
Peri-urban and Agricultural Systems	• Crops and soil erosion from heavy rains.	Very High	**Sensitivity:** • Shallow soils, poor drainage. **Adaptive Capacity:** • Partial water management practices.	Very High	Very High

Table 15: Exposure, Vulnerability, and Impacts of Fluvial (river) flooding on Urban Elements

Hazard: Fluvial (river) flooding

Category	Exposure (Description)	Exposure Level	Vulnerability (Description)	Vulnerability Level	Impact Level
Infrastructure & Services					
Stormwater Drainage	• Floodwater may overwhelm drainage.	High	**Sensitivity:** • Limited capacity, blockages. **Adaptive Capacity:** • Some improvements in critical areas.	Medium	High
	• Risk of sewage overflow.	High	**Sensitivity:** • Aging infrastructure.	High	High

Category	Exposure (Description)	Exposure Level	Vulnerability (Description)	Vulnerability Level	Impact Level
Water & Wastewater Management			**Adaptive Capacity:** • Partial monitoring and emergency measures.		
Solid Waste Management	• Waste sites may be inundated.	High	**Sensitivity:** • Poor site management. **Adaptive Capacity:** • Moderate contingency plans.	High	High
Transport and Mobility	• Roads/bridges submerged.	High	**Sensitivity:** • Vulnerable bridges, low-lying roads. **Adaptive Capacity:** • Some alternative routes and maintenance.	High	High
Energy	• Floods can disrupt distribution lines.	Medium	**Sensitivity:** • Low-lying substations. **Adaptive Capacity:** • Limited backup systems.	Medium	Medium
Economic Infrastructure	• Shops and markets at risk of flooding.	High	• **Sensitivity:** • Low-lying commercial areas. **Adaptive Capacity:** • Limited insurance and floodproofing.	High	High
Social Infrastructure	• Schools/hospitals at risk.	High	**Sensitivity:** • Limited flood protection. **Adaptive Capacity:** • Evacuation plans in place.	High	High
Emergency Services	• Flooded roads limit response.	High	**Sensitivity:** • Limited mobility/resources. **Adaptive Capacity:** • Moderate preparedness.	High	High
Populations					
Urban Residents	• Exposure to river flood zones.	High	**Sensitivity:** • Housing in low-lying areas.	High	High

Category	Exposure (Description)	Exposure Level	Vulnerability (Description)	Vulnerability Level	Impact Level
			Adaptive Capacity: • Some early warning access.		
Informal Settlement Residents	• High exposure in floodplains.	High	**Sensitivity:** • Poor housing. **Adaptive Capacity:** • Very low.	Very High	Very High
Vulnerable and Marginalized Groups	• Higher risk of displacement/property loss.	High	**Sensitivity:** • Poverty, health vulnerability. **Adaptive Capacity:** • Very low.	Very High	Very High
Natural Assets					
Urban Green Infrastructure	• Riparian vegetation affected.	Medium	**Sensitivity:** • Erosion, tree loss. **Adaptive Capacity:** • Partial reforestation programs.	Medium	Medium
Urban Blue Infrastructure	• Rivers/streams overflow.	High	**Sensitivity:** • Flood-prone. **Adaptive Capacity:** • Partial retention measures.	High	High
Peri-urban and Agricultural Systems	• Flooding affects crops/livestock.	High	**Sensitivity:** • Low-lying farms. **Adaptive Capacity:** • Some flood adaptation measures	High	High

Table 16: Exposure, Vulnerability, and Impacts of Drought (meteorological, hydrological) on Urban Elements

Hazard: Drought (meteorological, hydrological)

Category	Exposure (Description)	Exposure Level	Vulnerability (Description)	Vulnerability Level	Impact Level
Infrastructure & Services					
Stormwater Drainage	• Reduced flow causes sediment buildup.	Medium	**Sensitivity:** • Sediment reduces efficiency. **Adaptive Capacity:** • Periodic cleaning programs.	Medium	Medium
Water & Wastewater Management	• Severe water shortages.	Very High	**Sensitivity:** • Limited storage, over-reliance on groundwater. **Adaptive Capacity:** • Some drought-resilient systems.	Very High	Very High
Solid Waste Management	• Dry conditions increase fire risk at dumps.	Medium	**Sensitivity:** • Open waste sites. **Adaptive Capacity:** • Partial monitoring and safety measures.	Medium	Medium
Transport and Mobility	• Heat and dust degrade roads.	Medium	**Sensitivity:** • Asphalt softening, unpaved roads dusty. **Adaptive Capacity:** • Regular maintenance.	Medium	Medium
Energy	• Hydropower affected; higher cooling demand.	High	**Sensitivity:** • Limited alternative energy sources. **Adaptive Capacity:** • Partial solar integration.	High	High
Economic Infrastructure	• Water-dependent businesses affected.	High	**Sensitivity:** • Minimal water backup. **Adaptive Capacity:** • Limited water-saving measures.	High	High
Social Infrastructure	• Schools/hospitals water shortages.	High	**Sensitivity:** • Limited storage/sanitation. **Adaptive Capacity:** • Partial adaptation measures.	High	High

Category	Exposure (Description)	Exposure Level	Vulnerability (Description)	Vulnerability Level	Impact Level
Emergency Services	• Water scarcity affects firefighting/health services.	High	**Sensitivity:** • Limited water access. **Adaptive Capacity:** • Partial contingency planning.	High	High
Populations					
Urban Residents	• Health and livelihood affected.	High	**Sensitivity:** • Dependence on piped water, vulnerable groups. **Adaptive Capacity:** • Some access to boreholes.	High	High
Informal Settlement Residents	• Extremely exposed to water scarcity.	High	**Sensitivity:** • Poor water access, poor sanitation. **Adaptive Capacity:** • Very low.	Very High	Very High
Vulnerable and Marginalized Groups	• High risk due to limited coping capacity.	High	**Sensitivity:** • Poverty, chronic illness. **Adaptive Capacity:** • Very low.	Very High	Very High
Natural Assets					
Urban Green Infrastructure	• Trees and vegetation stressed.	High	**Sensitivity:** • Lack of irrigation. **Adaptive Capacity:** • Some community initiatives.	High	High
Urban Blue Infrastructure	• Water bodies dry up.	High	**Sensitivity:** • Small reservoirs and streams. **Adaptive Capacity:** • Partial water management.	High	High
Peri-urban and Agricultural Systems	• Crops and livestock severely affected.	Very High	**Sensitivity:** • Rain-fed agriculture. **Adaptive Capacity:** • Limited drought-resistant crops.	Very High	Very High

Table 17: Exposure, Vulnerability, and Impacts of Wildfires and Bushfires on Urban Elements

Hazard: Wildfires and Bushfires

Category	Exposure (Description)	Exposure Level	Vulnerability (Description)	Vulnerability Level	Impact Level
Infrastructure & Services					
Stormwater Drainage	• Fire may damage infrastructure and clog drains.	Medium	**Sensitivity:** • Exposed above-ground pipes. **Adaptive Capacity:** • Partial maintenance and fire mitigation.	Medium	Medium
Water & Wastewater Management	• Fire may disrupt water supply for firefighting.	High	**Sensitivity:** • Limited access to water sources. **Adaptive Capacity:** • Some storage for emergencies.	High	High
Solid Waste Management	• Fires at dumps can spread rapidly.	High	**Sensitivity:** • Open waste sites, dry conditions. **Adaptive Capacity:** • Some monitoring and firebreaks.	High	High
Transport and Mobility	• Roads obstructed by fire or smoke.	Medium	**Sensitivity:** • Limited evacuation routes. **Adaptive Capacity:** • Partial emergency planning.	Medium	Medium
Energy	• Power lines may be damaged by fire.	High	**Sensitivity:** • Above-ground lines vulnerable. **Adaptive Capacity:** • Some fire-resistant infrastructure.	High	High
Economic Infrastructure	• Businesses affected by fire damage.	High	**Sensitivity:** • Minimal fire protection. **Adaptive Capacity:** • Some insurance coverage.	High	High
Social Infrastructure	• Hospitals and schools at risk.	Medium	**Sensitivity:** • Buildings with flammable materials.	Medium	Medium

Category	Exposure (Description)	Exposure Level	Vulnerability (Description)	Vulnerability Level	Impact Level
			Adaptive Capacity: • Moderate fire drills and safety measures.		
Emergency Services	• Firefighting capacity stressed.	High	**Sensitivity:** • Limited personnel/equipment. • **Adaptive Capacity:** Some community firefighting training.	High	High
Populations					
Urban Residents	• Exposure to wildfires near settlements.	Medium	**Sensitivity:** • Lack of fire-resistant housing. **Adaptive Capacity:** • Limited evacuation knowledge.	Medium	Medium
Informal Settlement Residents	• High exposure due to location and flammable housing.	High	**Sensitivity:** • Lightweight structures, poor spacing. **Adaptive Capacity:** • Very low.	Very High	Very High
Vulnerable and Marginalized Groups	• Higher risk of fire impact.	High	**Sensitivity:** • Poverty, mobility constraints. **Adaptive Capacity:** • Very low.	Very High	Very High
Natural Assets					
Urban Green Infrastructure	• Vegetation prone to fires.	High	**Sensitivity:** • Dry grasses/shrubs. **Adaptive Capacity:** • Some controlled burning and firebreaks.	High	High
Urban Blue Infrastructure	• Minor exposure to fire.	Medium	**Sensitivity:** • Minimal risk. **Adaptive Capacity:** • High.	Medium	Medium
	• Crops and livestock exposed to fire.	High	**Sensitivity:** • Dry fields, flammable materials.	Very High	Very High

Category	Exposure (Description)	Exposure Level	Vulnerability (Description)	Vulnerability Level	Impact Level
Peri-urban and Agricultural Systems			**Adaptive Capacity:** • Limited fire management.		

4. Climate Risk Assessment

This section is a summary of the overall climate risks to The Municipality of Kajiado's urban elements by combining the assessed hazard levels with the estimated impacts. Using the Risk Matrix, urban elements facing Very High, High, Medium, or Low risks are identified under current and future climate scenarios.

For this Urban Climate Risk Profile, the following matrix summarizes overall risk for each urban element by combining the assessed hazard level and the estimated impact level.

Table 18: Risk matrix

		Hazard Level		
		Low	**Medium**	**High**
Impact Level	**Catastrophic**	High	Very High	Very High
	Major	Medium	High	Very High
	Moderate	Low	Medium	High
	Minow	Low	Low	Medium
	Insignificant	Very Low	Low	Low

For this Urban Climate Risk Profile, risk levels should be interpreted based on the table below.

Table 19: Interpretation of risk levels

Level	Interpretation
Very High	Very high risks are unacceptable. Risk should be avoided, reduced or transferred. Immediate planning and implementation of risk reduction measures is required. Allocate resources and coordinate interventions to prevent or minimize impact.
High	High risks should be actively addressed. Develop and implement mitigation actions promptly. Monitor environmental indicators and ensure readiness of emergency or adaptation measures.
Medium	Medium risks should be managed. Plan and implement mitigation activities to reduce them to acceptable levels. Regularly review climate data and risk levels.
Low	Low risks are acceptable under current conditions. Minimal control or monitoring is needed, provided they remain stable and do not escalate.
Very Low	Very low risks are negligible in terms of likelihood and consequences. No immediate action is required beyond routine monitoring and periodic review.

4.1. Current and Future Climate Risks on Urban Elements

Table 20: Summary of Extreme Heat risks for The Municipality of Kajiado

	Time Horizon & Climate Scenario	Current	2050 SSP2-4.5	2050 SSP5-8.5	2100 SSP2-4.5	2100 SSP5-8.5
	Hazard Level					
Categories	**Impact**	**Risk Levels**				
		Current	**2050 SSP2-4.5**	**2050 SSP5-8.5**	**2100 SSP2-4.5**	**2100 SSP5-8.5**

Infrastructure & Services						
Stormwater Drainage	Medium	Medium	High	High	High	High
Water & Wastewater Management	High	High	Very High	Very High	Very High	Very High
Solid Waste Management	Medium	Medium	High	High	High	High
Transport and Mobility	Medium	Medium	High	High	High	High
Energy	High	High	Very High	Very High	Very High	Very High
Economic Infrastructure	Medium	High	High	High	Very High	Very High
Social Infrastructure	Medium	High	High	High	Very High	Very High
Emergency Services	Medium	Medium	High	High	Very High	Very High
Populations						
Urban Residents	High	High	Very High	Very High	Very High	Very High
Informal Settlement Residents	Very High	Very High	Very High	Very High	Very High	Very High
Vulnerable and Marginalized Groups	Very High	Very High	Very High	Very High	Very High	Very High
Natural Assets						
Urban Green Infrastructure	Medium	Medium	High	High	Very High	Very High
Urban Blue Infrastructure	Medium	Medium	High	High	Very High	Very High
Peri-urban and Agricultural Systems	High	High	Very High	Very High	Very High	Very High

Table 21: Summary of Changes in Precipitation Patterns risks for The Municipality of Kajiado

	Time Horizon & Climate Scenario	Current	2050 SSP2-4.5	2050 SSP5-8.5	2100 SSP2-4.5	2100 SSP5-8.5
	Hazard Level					
Categories	**Impact**	**Risk Levels**				
		Current	**2050 SSP2-4.5**	**2050 SSP5-8.5**	**2100 SSP2-4.5**	**2100 SSP5-8.5**
Infrastructure & Services						
Stormwater Drainage	Medium	Medium	High	High	High	High
Water & Wastewater Management	High	High	High	Very High	Very High	Very High

Solid Waste Management	Medium	Medium	Medium	High	High	High
Transport and Mobility	High	Medium	High	High	High	High
Energy	High	High	High	Very High	Very High	Very High
Economic Infrastructure	High	Medium	High	High	Very High	Very High
Social Infrastructure	High	Medium	High	High	Very High	Very High
Emergency Services	High	Medium	High	High	Very High	Very High
Populations						
Urban Residents	High	High	High	Very High	Very High	Very High
Informal Settlement Residents	Very High	Very High	Very High	Very High	Very High	Very High
Vulnerable and Marginalized Groups	Very High	Very High	Very High	Very High	Very High	Very High
Natural Assets						
Urban Green Infrastructure	High	Medium	High	High	Very High	Very High
Urban Blue Infrastructure	High	Medium	High	High	Very High	Very High
Peri-urban and Agricultural Systems	Very High	High	Very High	Very High	Very High	Very High

Table 22: Summary of Fluvial Flooding risks for The Municipality of Kajiado

	Time Horizon & Climate Scenario	Current	2050 SSP2-4.5	2050 SSP5-8.5	2100 SSP2-4.5	2100 SSP5-8.5
	Hazard Level					
Categories	**Impact**	**Risk Levels**				
		Current	**2050 SSP2-4.5**	**2050 SSP5-8.5**	**2100 SSP2-4.5**	**2100 SSP5-8.5**
Infrastructure & Services						
Stormwater Drainage	High	High	High	Very High	Very High	Very High
Water & Wastewater Management	High	High	High	Very High	Very High	Very High
Solid Waste Management	High	High	High	High	High	Very High
Transport and Mobility	High	High	High	Very High	Very High	Very High
Energy	Medium	Medium	Medium	High	High	High
Economic Infrastructure	High	High	High	Very High	Very High	Very High

Social Infrastructure	High	High	High	Very High	Very High	Very High
Emergency Services	High	High	High	Very High	Very High	Very High
Populations						
Urban Residents	High	High	High	Very High	Very High	Very High
Informal Settlement Residents	Very High	Very High	Very High	Very High	Very High	Very High
Vulnerable and Marginalized Groups	Very High	Very High	Very High	Very High	Very High	Very High
Natural Assets						
Urban Green Infrastructure	Medium	Medium	Medium	High	High	High
Urban Blue Infrastructure	High	High	High	Very High	Very High	Very High
Peri-urban and Agricultural Systems	High	High	High	Very High	Very High	Very High

Table 23: Summary of Drought risks for The Municipality of Kajiado

	Time Horizon & Climate Scenario	Current	2050 SSP2-4.5	2050 SSP5-8.5	2100 SSP2-4.5	2100 SSP5-8.5
	Hazard Level					
Categories	**Impact**	**Risk Levels**				
		Current	**2050 SSP2-4.5**	**2050 SSP5-8.5**	**2100 SSP2-4.5**	**2100 SSP5-8.5**
Infrastructure & Services						
Stormwater Drainage	Medium	Medium	Medium	High	High	High
Water & Wastewater Management	High	High	Very High	Very High	Very High	Very High
Solid Waste Management	Medium	Medium	Medium	High	High	High
Transport and Mobility	Medium	Medium	Medium	High	High	High
Energy	High	High	High	Very High	Very High	Very High
Economic Infrastructure	High	High	High	Very High	Very High	Very High
Social Infrastructure	High	High	High	Very High	Very High	Very High
Emergency Services	High	High	High	Very High	Very High	Very High
Populations						
Urban Residents	High	High	Very High	Very High	Very High	Very High

Informal Settlement Residents	Very High	Very High	Very High	Very High	Very High	Very High
Vulnerable and Marginalized Groups	Very High	Very High	Very High	Very High	Very High	Very High
Natural Assets						
Urban Green Infrastructure	High	High	Very High	Very High	Very High	Very High
Urban Blue Infrastructure	High	High	Very High	Very High	Very High	Very High
Peri-urban and Agricultural Systems	Very High	Very High	Very High	Very High	Very High	Very High

Table 24: Summary of Wildfires & Bushfires risks for The Municipality of Kajiado

	Time Horizon & Climate Scenario	Current	2050 SSP2-4.5	2050 SSP5-8.5	2100 SSP2-4.5	2100 SSP5-8.5
	Hazard Level					
Categories	**Impact**	**Risk Levels**				
		Current	**2050 SSP2-4.5**	**2050 SSP5-8.5**	**2100 SSP2-4.5**	**2100 SSP5-8.5**
Infrastructure & Services						
Stormwater Drainage	Medium	Medium	Medium	High	High	High
Water & Wastewater Management	High	High	High	Very High	Very High	Very High
Solid Waste Management	High	High	High	High	Very High	Very High
Transport and Mobility	Medium	Medium	High	High	High	High
Energy	High	High	High	Very High	Very High	Very High
Economic Infrastructure	High	High	High	Very High	Very High	Very High
Social Infrastructure	Medium	Medium	High	High	Very High	Very High
Emergency Services	High	High	High	Very High	Very High	Very High
Populations						
Urban Residents	Medium	Medium	High	Very High	Very High	Very High
Informal Settlement Residents	Very High	Very High	Very High	Very High	Very High	Very High
Vulnerable and Marginalized Groups	Very High	Very High	Very High	Very High	Very High	Very High
Natural Assets						

Urban Green Infrastructure	High	High	Very High	Very High	Very High	Very High
Urban Blue Infrastructure	Medium	Medium	Medium	High	High	High
Peri-urban and Agricultural Systems	High	High	Very High	Very High	Very High	Very High

4.2. Climate Risk Hotspots

Climate risk hotspots in The Municipality of Kajiado are concentrated in areas with high population density like the Central Business District (CBD), informal settlements such as Majengo, and low-lying or poorly drained urban wards such as Ildamat (e.g Shapashina) and Delalekutuk. Specifically:

- **Extreme heat and drought hotspots:** Densely populated CBD, Majengo, and peri-urban agricultural areas experience Very High risk due to limited adaptive capacity and high exposure.
- **Flooding and precipitation hotspots:** Wards adjacent to rivers such as Ildamat, streams, and low-lying neighborhoods e.g Lower Township and Saina are at Very High risk under future high-precipitation scenarios.
- **Wildfire hotspots:** Peri-urban areas and locations such as Inkiwanchani and Oloosuyian with dry vegetation, grasslands, and informal settlements are highly vulnerable, particularly under SSP5-8.5 projections.

Urban cores and informal settlements bear highest combined risk, followed by peri-urban agricultural zones. Adaptation planning should prioritize these areas for early warning, emergency response, water management and fire mitigation interventions.

5. What's Next?

5.1. Key Findings

The climate risk assessment identified five primary hazards, vulnerable populations, and critical urban elements with varying risk levels:

- **Key Hazards:** Extreme heat, Changes in precipitation patterns, Fluvial (river) flooding, Drought (meteorological, hydrological) and Wildfires & bushfires which are causing infrastructure degradation due to climate stress. Flooding and extreme heat are associated with higher risks in both current and future scenarios.
- **Populations Most at Risk:** Residents in informal settlements (Majengo, Lower Township, Saina), vulnerable and marginalized groups (elderly, children, low-income households), and urban residents in low-lying CBD and peri-urban areas.
- **Assets Most at Risk:** Stormwater drainage systems, water supply infrastructure, roads and bridges, hospitals, schools, and agricultural lands.
- **Trends Likely to Intensify:** Increased frequency and intensity of heatwaves, rainfall variability, prolonged drought periods, and expansion of informal settlements in hazard-prone areas by 2050 and 2100.

Table 25: Summary of Climate Risks Affecting Urban Elements for The Municipality of Kajiado

Category	List of Key Hazards		
	Current	**Mid-term (2050)**	**Long-term (2100)**
Infrastructure & Services			
Stormwater Drainage	Flooding (High)	Flooding (Very High)	Flooding (Very High)
Water & Wastewater Management	Drought (High)	Drought (Very High)	Drought (Very High)
Solid Waste Management	N/A	N/A	N/A
Transport and Mobility	Flooding (High), Heat (Medium)	Flooding (Very High), Heat (High)	Flooding (Very High), Heat (Very High)
Energy	Heat (Medium), Fire (Medium)	Heat (High), Fire (High)	Heat (Very High), Fire (High)
Economic Infrastructure	Flooding (Medium)	Flooding (High)	Flooding (High)
Social Infrastructure	Flooding (High), Heat (Medium)	Flooding (Very High), Heat (High)	Flooding (Very High), Heat (Very High)
Emergency Services	Flooding (Medium)	Flooding (High)	Flooding (High)
Populations			
Urban Residents	Heat (Medium), Flooding (Medium)	Heat (High), Flooding (High)	Heat (Very High), Flooding (Very High)
Informal Settlement Residents	Flooding (High), Fire (Medium)	Flooding (Very High), Fire (High)	Flooding (Very High), Fire (High)
Vulnerable and Marginalized Groups	Heat (Medium), Drought (Medium)	Heat (High), Drought (High)	Heat (Very High), Drought (Very High)
Natural Assets			
Urban Green Infrastructure	Heat stress (Medium)	Heat stress (High)	Heat stress (High)
Urban Blue Infrastructure	Flooding (Medium)	Flooding (High)	Flooding (High)
Peri-urban and Agricultural Systems	Drought (High), Fire (Medium)	Drought (Very High), Fire (High)	Drought (Very High), Fire (High)

Main Takeaways:

1. Flooding and heat are the critical hazards, especially for stormwater, transport, social infrastructure, and urban populations.

2. Informal settlements are particularly vulnerable to flooding, fire, and extreme heat, while peri-urban agricultural systems are at risk from drought and wildfires.
3. Risks are projected to intensify significantly by 2050 and further by 2100, stressing the need for early, medium-term, and long-term adaptation planning.

5.2. Climate Adaptation and Resilience Solutions

Table 26: Climate adaptation and resilience solutions recommended for The Municipality of Kajiado

Category	Recommended Solutions		
	Immediate	**Mid-term**	**Long-term**
Infrastructure & Services			
Stormwater Drainage	• Clear and maintain drains • Construct temporary retention ponds	• Upgrade drainage networks • Integrate flood-resilient road designs	• Build permanent retention ponds and flood storage systems • Expand climate-resilient infrastructure in hotspots
Water & Wastewater Management	• Protect boreholes and storage tanks • Promote water conservation	• Expand storage capacity and diversify water sources • Smart water monitoring systems	• Climate-resilient water treatment and distribution • Groundwater recharge programs
Solid Waste Management	• Community clean-up campaigns • Waste segregation awareness	• Construct flood-resilient waste collection points	• Integrate waste-to-energy solutions in urban planning
Transport and Mobility	• Repair and maintain critical roads • Temporary flood barriers	• Upgrade roads and bridges to climate-resilient standards • Develop alternative evacuation routes	• Climate-proof transport network • Public transport infrastructure adaptation
Energy	• Inspect and maintain substations • Fire prevention measures	• Distributed solar microgrids • Reinforce energy distribution	• Climate-resilient energy infrastructure • Expand renewable energy backup systems
Economic Infrastructure	• Conduct vulnerability audits • Temporary flood mitigation	• Elevate and retrofit high-risk structures • Business continuity plans	• Integrate climate risk into all urban development projects
Social Infrastructure	• Emergency water and cooling centers • Staff training for heat/flood	• Upgrade hospitals and schools with resilient designs • Backup water and energy	• Integrate climate adaptation into all social infrastructure projects
Emergency Services	• Equip emergency teams for heat/flood/fire • Community drills	• Expand disaster management centers • Early warning systems	• Institutionalize climate-smart emergency services and response
Populations			
Urban Residents	• Heat awareness campaigns • Evacuation drills	• • Community cooling centers • Water distribution	• Integrate adaptation into urban planning • Vulnerability mapping

Category	Recommended Solutions		
	Immediate	**Mid-term**	**Long-term**
Informal Settlement Residents	• Flood response planning • Fire safety awareness	• Flood-resilient housing upgrades • Shaded communal areas	• Relocation planning for high-risk areas • Infrastructure formalization
Vulnerable and Marginalized Groups	• Targeted assistance programs • Health support	• Adaptive livelihood programs • Heat/drought shelters	• Social safety nets • Long-term community-based adaptation
Natural Assets			
Urban Green Infrastructure	• Tree planting campaigns • Green shading for public spaces	• Expand urban parks • Drought-resistant landscaping	• Integrate urban green corridors • Ecosystem-based adaptation planning
Urban Blue Infrastructure	• Maintain rivers and small reservoirs • Prevent illegal encroachment	• Construct retention ponds and buffer zones • Wetland restoration	• Integrated urban water management • Floodplain protection
Peri-urban and Agricultural Systems	• Promote drought-tolerant crops • Firebreaks	• Climate-smart agriculture • Irrigation infrastructure	• Agroforestry and ecosystem restoration • Water storage expansion

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Annex N1. Data Sources

Page	Data	Data Source
19	Extreme heat distribution future trends	• World Bank Climate Change Knowledge Portal • Land surface temperature- MODIS
19	Precipitation patterns	CHIRPS Dataset
20	Flooding hazard scenarios	Aqueduct floods(WRI) and STRM digital elevation model.
20	Drought hazard scenarios	Standized precipitation evapotranspiration index(SPEI) database
21	Wildfire and bushfire scenarios	ThinkHazard!