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People's Adaptation Local Physical and Land Use Development plan for Homa Bay Municipality

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Akiba Mashinani Trust (AMT)

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EXECUTIVE SUMMARY

The People's Adaptation Plan for Sofia informal settlement is a ten-year spatial and development framework guiding sustainable urban growth, infrastructure upgrading and climate adaptation in one of Homa Bay Municipality's most vulnerable neighbourhoods. Occupying 1.45 km² along the Lake Victoria shore, the settlement shelters about 4 873 residents in 1 990 households. Its demography is youthful over half of residents are aged 15–34, and 37 % of households are single-person units while livelihoods are predominantly informal: self-employment (18.9 %), casual labour (7.9 %) and petty trade (5.5 %) sustain most families, with only 6.2 % of residents in formal jobs. Household incomes are low; many earn less than KES 6 000 per month, and women head 37 % of households and make up almost 90 % of the informal workforce. Service provision is inadequate: fewer than one-third of homes have piped water and most rely on kiosks, vendors or shallow wells, while 93.7 % use pit latrines that overflow during floods. Roads are largely unpaved, drainage is poor and waste management is informal. Climate hazards intensify these stresses; seasonal droughts and rising temperatures dry up shallow wells, reduce water supply and heighten heat stress, whereas intense rainfall causes flash flooding and water-logging, with flood depths exceeding 0.5 m that erode unpaved roads, submerge houses and contaminate water sources. Women, youth, elders, low-income tenants and informal workers many without secure tenure or savings are particularly vulnerable to these impacts.

To confront these intertwined socio-economic and environmental challenges, the plan adopts a locally led adaptation and upgrading model that prioritises in-situ improvement over relocation. It combines densification of safer areas with targeted upgrading of high-risk clusters and employs participatory methods household enumeration, participatory mapping, infrastructure surveys and a rapid climate risk assessment to integrate community knowledge with statutory planning. Over 21 000 households were consulted across all 13 sublocations of Homa Bay Municipality to map flood hotspots and prioritise interventions. Phased actions span multiple sectors. In water, sanitation and hygiene, the plan calls for immediate repair of broken pipelines, restoration of non-functional kiosks, construction of temporary communal toilets and installation of 1 000–2 000 L rainwater tanks; medium-term measures include building permanent ablution blocks, fitting kiosks with backup storage and solar pumps, and piloting biodigesters, while long-term interventions extend the sewer network and create decentralised wetlands for wastewater treatment. In housing, it promotes resilient building techniques such as raised plinths and stabilised blocks, regularisation of tenure and incremental upgrading. For roads and drainage, youth brigades will clear drains, place sandbags and organise monthly clean-ups; subsequent phases will introduce permeable pavements, vegetated swales, elevated footpaths and retention basins, culminating in a settlement-wide drainage network, slope stabilisation and paved primary roads. Energy and communication initiatives involve installing solar-powered high-mast lights, repairing existing lights, setting up community patrols for safety, establishing early warning systems via SMS, WhatsApp and sirens, and creating safe charging hubs with underground cabling. Health and social services will be enhanced through clinics with elevated floors, rainwater harvesting and backup power, deployment of mobile health teams during floods and establishment of a community resource centre for training and emergency shelter. Livelihood diversification supports youth and women's cooperatives in poultry farming, waste collection and regulated water vending, along with climate-smart urban farming (kitchen gardens, sack farming) and markets with cold storage. Green infrastructure interventions tree planting, rain gardens, bioswales, wetlands restoration and the creation of community parks and green corridors will mitigate runoff and heat while providing recreation and biodiversity.

Implementation will be governed by a formalised Sofia Adaptation Committee (SAC) comprising community representatives, which will select projects, coordinate fundraising and liaise with authorities. Residents will be involved in planning, construction and maintenance. The county government will provide technical oversight, allocate budgets and integrate projects into the County Integrated Development Plan, while national agencies supply climate data and regulatory guidance, and NGOs, CBOs, private sector and academic institutions offer participatory planning support, micro-finance, technical expertise and innovations. Financing relies on a blended approach: community contributions of labour, materials and small levies calibrated via wealth-ranking with exemptions for vulnerable households; earmarked county funds and advocacy for climate-adaptation budgeting; and external resources from national programmes such as the Financing Locally Led Climate Action programme, global climate funds, bilateral donors, private-sector partnerships and philanthropic foundations. A robust monitoring and evaluation system will use community-defined indicators across WASH, housing, mobility, energy, health, ecosystem services, livelihoods and governance, supported by baseline and periodic surveys, participatory GIS mapping, digital dashboards, joint monitoring missions and story-based methods, with semi-annual review meetings and annual learning forums for adaptive management. Through this detailed, data-driven and community-rooted roadmap, the People's Adaptation Plan aims to transform Sofia into a safer, more inclusive and climate-resilient settlement over the next decade.

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1.1 Background and Rationale

1.1.1 Background and Socio-Economic Context

Sofia is one of the oldest and most densely settled informal settlements in Homa Bay Municipality. The settlement is characterized by overcrowding, insecure tenure, and substandard housing, with most homes built from iron sheets, mud, and timber. Livelihoods are predominantly informal, with many households depending on fishing, fish processing and vending, casual labour, small-scale trade, and boda boda transport. Income levels are low, and poverty is widespread, with families struggling to meet daily needs. Access to basic services such as water supply, sanitation, drainage, and waste management remains inadequate, increasing everyday vulnerability.

1.1.2 Climate Risk Factors (based on RCRA findings)

According to the Rapid Climate Risk Assessment (RCRA, 2025) conducted in Homa Bay Municipality's Informal Settlements, Sofia's proximity to Lake Victoria and its position along seasonal drainage lines make it highly prone to flooding, urban heat, and periodic droughts. The RCRA identifies recurrent inundation of homes and roads during intense rainfall events, with recorded flood depths exceeding 0.5 meters in some zones. These floods contaminate water sources and accelerate the spread of cholera, diarrhea, and malaria. During dry periods, the RCRA notes that declining lake levels and rising temperatures reduce water availability and fish catch, undermining household food security and incomes.

1.1.3 Adaptation Challenges

Despite this high exposure, the RCRA and field consultations highlight limited adaptive capacity. Drainage infrastructure is poorly developed, causing stagnant water that damages houses and roads. Housing structures are fragile and not designed to withstand repeated flooding or heat stress. Sanitation coverage remains low, and most residents lack improved toilets or reliable waste disposal. There are no settlement-level early-warning systems or disaster-preparedness mechanisms, meaning residents react to rather than anticipate climate shocks. Weak institutional coordination and scarce financial resources further deepen the community's vulnerability.

1.1.4 Need for a Locally-Led Adaptation Plan

Previous interventions in Homa Bay have often been top-down and generic, providing limited benefit to informal settlements like Sofia that face distinct climatic and socio-economic pressures. Findings from the *Rapid Climate Risk Assessment (RCRA, 2025)* conducted in Homa Bay Municipality's informal settlements show that vulnerability is highly localised hazards such as flooding, heat stress and drought vary block by block depending on drainage, elevation, and housing conditions. This evidence underscores the need for an adaptation approach that is context-specific and community-anchored.

A locally-led adaptation plan is therefore essential to place residents' voices, knowledge and priorities at the centre of climate-resilience planning, in line with Kenya's County Climate Change Act (2023) and the global *Principles for Locally Led Adaptation (LLA)*. Such a plan ensures that adaptation actions are grounded in community realities, responsive to RCRA-identified risks, and sustainable in the long term.

Sofia residents have already demonstrated resilience through informal coping strategies raising house plinths, digging makeshift drains, elevating latrines, and forming neighbourhood savings groups to manage flood or health emergencies. While these efforts reflect strong adaptive capacity, they remain fragmented and reactive, lacking external support or integration with formal planning. The People's Adaptation Plan therefore seeks to build upon these local innovations, combine them with scientific and policy frameworks, and establish a structured pathway for sustained, inclusive resilience building.

This context highlights the urgent need for a people-driven framework that bridges community action and institutional support, addressing Sofia's immediate vulnerabilities while laying the foundation for long-term resilience. The following section outlines the objectives of the People's Adaptation Plan, which provide the foundation for guiding interventions in Sofia.

1.2 Objectives of the People's Adaptation Plan

The People's Adaptation Plan for Sofia aims to:

1. Identify and assess the specific climate risks facing Sofia and prioritize effective interventions.
2. Ensure adaptation actions are community-led, reflecting local knowledge and priorities.
3. Strengthen the resilience of vulnerable groups through targeted strategies in housing, livelihoods, and services.
4. Align adaptation strategies with county and national development plans for integrated implementation.
5. Mobilize resources and establish a clear framework for financing and execution of adaptation actions.

1.3 Principles Guiding the Process

The development of the People's Adaptation Plan for Sofia is anchored in core principles that ensure inclusivity, fairness, and sustainability. These principles not only shape the design of interventions but also guide their implementation and monitoring.

1.3.1 Participation and Inclusion

The planning process was participatory and inclusive, ensuring that all community members including women, youth, the elderly, and persons with disabilities were actively engaged at every stage. It followed a locally led approach beginning with community sensitization meetings to introduce the adaptation planning process and mobilise residents.

This was followed by a series of mapping and numbering exercises, where residents jointly identified plots, infrastructure, and environmental risks. Household enumerations were then conducted by enumerators local data collectors recruited directly from Sofia. These enumerators were trained community members, predominantly women and youth, who gathered socio-economic and spatial data, administered surveys, and facilitated settlement profiling. Their participation strengthened trust, ensured gender balance, and built local technical capacity for continued data collection and monitoring.

After data collection, a sequence of validation and consultation meetings was held to review findings, confirm accuracy, and refine priorities. Participatory mapping exercises and focus group discussions helped residents identify risks, assets, and opportunities in their settlement. Disaggregated participation data confirmed that women and youth formed the majority of contributors, ensuring that vulnerable voices guided decision-making and that the final People's Adaptation Plan reflected genuine community ownership.

1.3.2 Equity and Justice

Adaptation measures deliberately target social inequalities by prioritizing the needs of the most marginalized households. Interventions are designed to ensure equitable benefits across Sofia, preventing a situation where better-off residents or those in safer locations disproportionately benefit from resources while the most vulnerable remain exposed.

1.3.3 Local Knowledge and Innovation

The plan integrates local coping strategies and indigenous practices that residents have relied on for decades. Elders and long-term community members contributed traditional methods for dealing with floods, such as raising house plinths, digging makeshift drainage channels, and collective labour for clearing blocked waterways. These practices are blended with modern approaches to ensure both cultural relevance and technical effectiveness.

1.3.4 Resilience Building

Beyond physical infrastructure, the process emphasizes long-term resilience by strengthening social capital, local governance, and institutional capacity. Training, capacity building, and support to community-based organizations form part of the adaptation strategies, ensuring that residents are equipped to manage climate impacts over time.

1.3.5 Accountability and Transparency

The adaptation process will remain transparent, with regular feedback loops between community representatives, county government, and implementing partners. Mechanisms for community monitoring and reporting are embedded to allow residents to hold decision-makers accountable for resource use, project progress, and results.

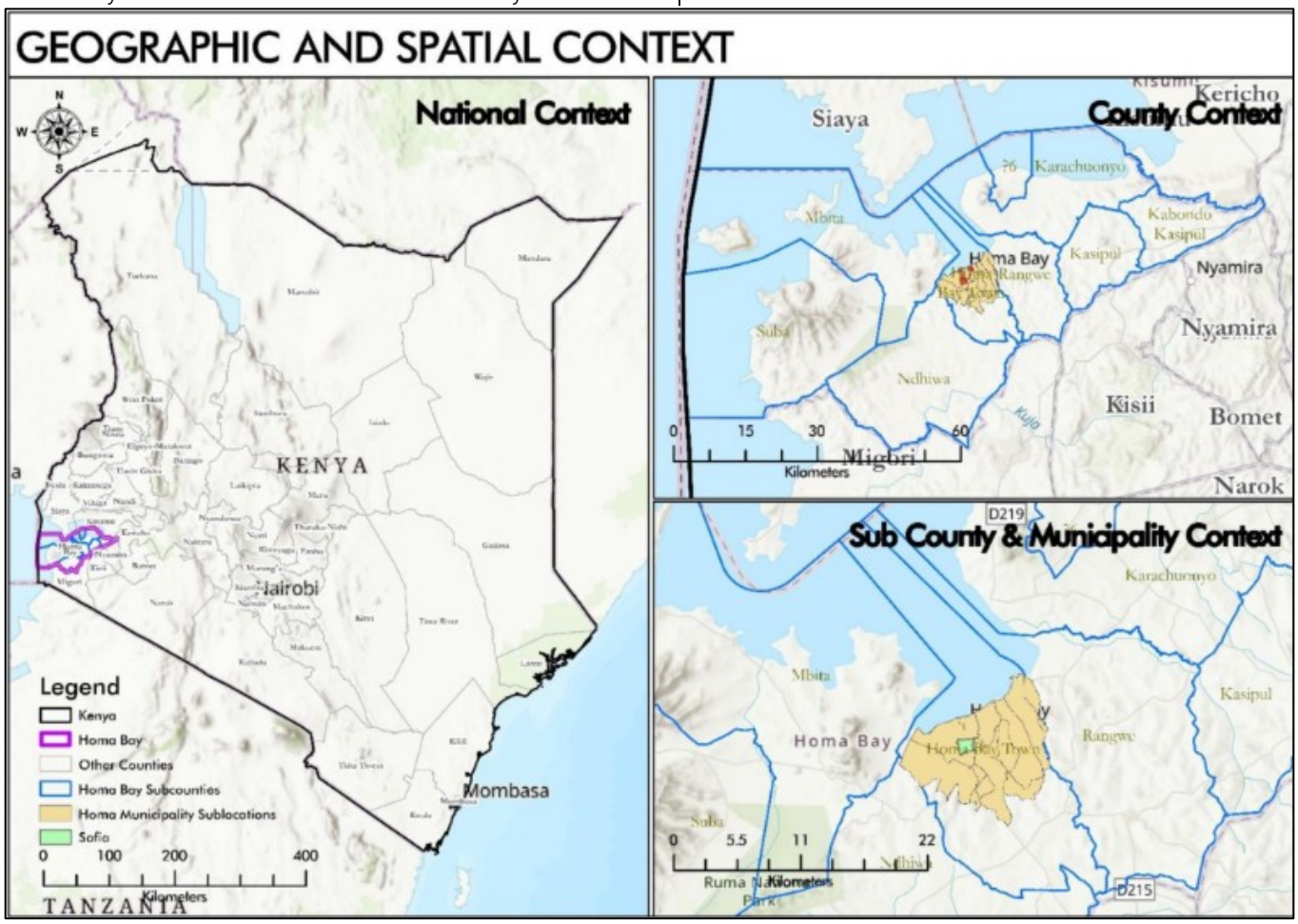
1.3.6 Sustainability

All interventions are designed for environmental, social, and economic sustainability. This includes promoting nature-based solutions such as tree planting and wetland restoration, creating livelihood opportunities through green jobs, and fostering community ownership of projects. These measures ensure that adaptation benefits extend to future generations.

1.4 Geographic and Administrative Scope

1.4.1 Geographic Boundaries

Sofia Informal Settlement is located within **Arujo Sub-location of Homa Bay Municipality**, in close proximity to Homa Bay town. The settlement is bisected by the **Homa Bay–Rongo Highway**, which serves as a major transport corridor and influences both accessibility and exposure to risks. To the south, Sofia borders the **Raila Odinga Stadium** and the neighbouring informal settlement of **Shauri Yako**. The settlement extends across low-lying terrain, with natural drainage paths running through it, contributing to recurrent flooding during heavy rainfall.



Map 1: Locational Context of Sofia

A map of Sofia delineates its extents, showing the major highway, stadium, settlement clusters, and adjoining areas. These spatial features illustrate both the opportunities for connectivity and the challenges posed by unplanned growth along key infrastructure corridors.

1.4.2 Administrative Context

Administratively, Sofia falls under **Homa Bay Municipality** within Homa Bay County. The settlement is part of **Arujo Sub-location** in **Arujo Ward**. Governance is shared across multiple levels:

- **County Government of Homa Bay** – Responsible for land use planning, infrastructure provision, and climate action, with adaptation strategies integrated into the County Integrated Development Plan (CIDP).
- **Homa Bay Municipal Board** – Oversees urban development and service delivery within the municipality, including informal settlements such as Sofia.
- **Local Administration** – Chiefs and assistant chiefs at the sub-location and village levels mobilize residents, resolve disputes, and link communities to higher levels of government.
- **Community-Based Organizations (CBOs) and Settlement Committees** – Represent community voices, support participatory planning, and facilitate implementation of local initiatives.

Decision-making in Sofia is participatory but largely informal, often coordinated through settlement committees, CBOs, and grassroots leaders. For the purposes of this People's Adaptation Plan, the **unit of focus is the entire Sofia settlement**, while recognizing its strategic position within Homa Bay town and along the municipality's major highway corridor.

1.5 Alignment with County, National and Global Frameworks

1.5.1 County Level

1.5.1.1 Homa Bay County Integrated Development Plan (CIDP 2023–2027)

The CIDP is the County's five-year development blueprint, setting out priorities for social, economic, and infrastructural transformation. It emphasizes improved access to clean water and sanitation, sustainable land use, affordable housing, enhanced health services, and disaster risk reduction as key development drivers. The plan also prioritizes urban resilience and inclusive growth, recognizing the challenges faced by rapidly expanding informal settlements in Homa Bay town.

The Sofia People's Adaptation Plan is directly aligned to these priorities. By proposing climate-resilient WASH interventions, including reliable water supply and improved sanitation, the plan responds to the CIDP's call for expanded access to essential services. The upgrading of drainage systems within Sofia helps reduce flood risks, thereby advancing the CIDP's objective of disaster risk management. Furthermore, the adaptation plan's emphasis on resilient housing addresses the CIDP's affordable housing goal, ensuring that vulnerable communities are not left behind in urban transformation. By embedding climate risk management in service delivery and housing improvements, the Sofia plan strengthens the county's overall resilience agenda while ensuring that the needs of marginalized informal settlement residents are at the core of implementation.

1.5.1.2 Homa Bay County Climate Change Act (2023)

The Homa Bay County Climate Change Act (2023) provides a legal framework for mainstreaming climate change considerations into all county development processes. It establishes the County Climate Change Fund (CCCF) and the Ward Climate Change Planning Committees (WCCPCs) to ensure that communities directly participate in identifying, prioritising, and financing locally led climate adaptation actions. The Act institutionalises public participation, accountability, and resource allocation for climate interventions at the ward level, enabling community-driven investments to access devolved financing.

The Sofia People's Adaptation Plan operationalises this Act by identifying community-prioritised adaptation projects that can be integrated into the CCCF pipeline. Actions such as improving drainage, enhancing flood preparedness, promoting climate-resilient housing, and piloting green infrastructure directly respond to the Act's provisions on resilience building and climate-proofed infrastructure. Additionally, the plan strengthens collaboration between local groups and WCCPCs, ensuring that women, youth, and other vulnerable groups who are central to the Sofia process benefit equitably from the County Climate Change Fund.

1.5.1.3 Homa Bay County Climate Change Action Plan (CCCAP)

The County Climate Change Action Plan provides a framework for identifying, prioritizing, and responding to climate risks at the county level. It recognizes Homa Bay's vulnerability to recurrent flooding, prolonged droughts, rising lake levels, and increasing temperatures. The CCCAP emphasizes the need for localized, community-driven adaptation measures, promoting nature-based solutions such as reforestation, watershed management, and wetland protection, alongside climate-resilient infrastructure and livelihoods diversification. It also calls for inclusive participation to ensure that adaptation measures reflect the needs of vulnerable populations such as women, youth, the elderly, and persons with disabilities.

The Sofia People's Adaptation Plan builds directly on these principles and priorities. It identifies flooding and poor drainage as key climate hazards within the settlement and proposes practical interventions such as improved drainage systems, sustainable solid waste management, and green infrastructure to reduce flood risks. Tree planting and community-based wetland restoration initiatives within and around Sofia align with the CCCAP's promotion of nature-based solutions. The plan also reflects the CCCAP's focus on community-led action, as its priorities were derived from participatory consultations and mapping exercises involving women, youth, and other vulnerable groups. By embedding local knowledge into climate risk planning and linking interventions to county-wide climate goals, the Sofia plan becomes a localized expression of the CCCAP, ensuring that the county's climate strategies are realized at the grassroots level.

1.5.1.4 Homa Bay Municipality Local Physical and Land Use Development Plan (LPLUDP)

The LPLUDP provides the statutory spatial framework guiding growth, service delivery, and land use management within Homa Bay Municipality. It establishes zoning regulations, infrastructure corridors, and development control measures to ensure orderly urban expansion and improved access to services. A key priority of the LPLUDP is the upgrading of informal settlements, recognizing their rapid growth, lack of infrastructure, and heightened vulnerability to environmental and climate risks. The plan emphasizes integration of informal settlements into the broader municipal spatial structure,

promoting improved connectivity, enhanced drainage systems, safe housing, and climate-proofed public amenities.

The Sofia People's Adaptation Plan operationalizes these spatial objectives at the settlement level. It focuses on embedding climate-resilient infrastructure such as improved drainage and flood management systems directly into Sofia's urban fabric, thereby reducing disaster risks consistent with the LPLUDP's provisions. Housing interventions within the adaptation plan, including safer building practices and incremental upgrading, align with the LPLUDP's emphasis on promoting sustainable and dignified housing options for informal residents. The adaptation plan also supports municipal goals for improved mobility by recognizing the influence of the Homa Bay–Rongo Highway, which cuts through Sofia, and integrating proposals for safer pedestrian access and flood-resilient road connections. By directly translating municipal land use and infrastructure strategies into a community-specific adaptation framework, the Sofia plan ensures that informal settlement resilience is not pursued in isolation, but as part of a coherent municipal development pathway.

1.5.2 National Level

1.5.2.1 Climate Change Act (2016)

The Climate Change Act is Kenya's primary legal framework for addressing climate change. It establishes the institutional and regulatory basis for mainstreaming climate considerations into all levels of governance and development planning. The Act provides for the creation of the National Climate Change Council, County Climate Change Units, and mechanisms for integrating adaptation and mitigation into policies, plans, and budgets. It also emphasizes the importance of public participation and mandates both national and county governments to enhance climate resilience, reduce vulnerability, and promote sustainable development.

The Sofia People's Adaptation Plan embodies the provisions of this Act by ensuring that climate change adaptation is embedded directly into local development planning at the settlement level. By identifying key climate hazards such as recurrent flooding, poor drainage, and heat stress, and proposing concrete community-led interventions, the plan reflects the Act's requirement that climate risks be considered in all levels of planning. The process of preparing the plan which involved participatory consultations with residents, including women, youth, and vulnerable groups gives effect to the Act's emphasis on inclusivity and public participation. Furthermore, by aligning its strategies with county-level structures such as the Homa Bay County Climate Change Action Plan, the Sofia plan strengthens the link between national legal frameworks and grassroots adaptation. In doing so, it demonstrates how a vulnerable informal settlement can operationalize the Act's intent, ensuring that climate governance is not confined to higher levels of administration but is lived and applied at the community level.

1.5.2.2 National Climate Change Action Plan (NCCAP 2018–2022)

The NCCAP provides Kenya's national roadmap for addressing climate change, setting out both mitigation and adaptation priorities across key sectors. On adaptation, it identifies water resources management, climate-resilient infrastructure, sustainable human settlements, food and nutrition security, and disaster risk reduction as priority areas. The plan emphasizes mainstreaming climate change into development planning, building resilience in vulnerable communities, and strengthening institutional capacity at both national and county levels.

The Sofia People's Adaptation Plan reflects and advances these national priorities at the settlement level. Flood risk management is a key NCCAP priority, and the Sofia plan addresses this through proposals for improved drainage systems, sustainable solid waste management, and flood-resilient housing. Water security is another national adaptation priority, and the plan responds by promoting climate-resilient WASH systems, rainwater harvesting, and community-led management of water infrastructure. In line with NCCAP's call for resilient human settlements, the Sofia plan identifies housing improvements and safe building practices as crucial adaptation measures. It also strengthens disaster risk reduction by incorporating community-based preparedness, early warning, and resilience-building initiatives tailored to the settlement's context.

Importantly, the Sofia plan is grounded in community participation, which the NCCAP highlights as central to successful adaptation. The extensive consultations, participatory mapping, and inclusion of marginalized groups in decision-making ensure that adaptation measures are not only technically sound but socially relevant. By translating NCCAP's sectoral priorities into concrete actions within an informal settlement, the Sofia plan illustrates how national climate action goals can be localized to address the vulnerabilities of Kenya's most at-risk communities.

1.5.2.3 National Adaptation Plan (NAP 2015–2030)

The National Adaptation Plan (NAP) sets out Kenya's medium- to long-term strategy for building resilience to climate change across all sectors of the economy. It identifies priority adaptation actions in agriculture, water, health, environment, infrastructure, and human

settlements, with a strong focus on protecting vulnerable communities. The NAP emphasizes enhancing adaptive capacity at both national and local levels, promoting climate-smart development, and ensuring that adaptation measures are gender-responsive and inclusive of marginalized groups.

The Sofia People's Adaptation Plan is a practical expression of the NAP's priorities within the context of an informal urban settlement. By focusing on housing resilience, drainage improvements, and climate-proofed WASH infrastructure, the plan responds directly to the NAP's call to strengthen adaptation in human settlements and infrastructure systems. The plan also supports water sector priorities by proposing community-led water management solutions and rainwater harvesting systems to address scarcity during dry spells. In livelihoods, the NAP calls for diversification and strengthening of climate-resilient income sources; the Sofia plan contributes by promoting alternatives beyond fishing and small-scale trading, which are highly sensitive to climate variability.

Equally, the NAP stresses the importance of inclusivity, particularly integrating women, youth, and vulnerable populations in adaptation planning and implementation. The Sofia plan embeds this by ensuring participatory processes shaped its priorities and by explicitly targeting the most at-risk groups for support. In doing so, the settlement-level plan translates the NAP's national strategy into localized, community-driven action, ensuring that Kenya's long-term adaptation vision is realized on the ground where vulnerabilities are most acute.

1.5.2.4 Kenya National Disaster Risk Management Strategy (2023)

The Kenya National Disaster Risk Management Strategy (2023) provides a unified national framework for disaster risk governance by shifting focus from emergency response to proactive prevention, preparedness, and resilience-building. The strategy mandates counties to integrate disaster risk reduction into planning and budgeting, enhance coordination between national and county institutions, and promote community-based disaster management structures. It also calls for strengthening early-warning systems, improving data sharing, and investing in public awareness and capacity building to reduce loss of life and property from climate-related disasters.

The Sofia People's Adaptation Plan directly applies this framework by promoting the establishment of settlement-level disaster management committees, which will coordinate early-warning systems, conduct awareness campaigns, and develop evacuation and response protocols for flood and health emergencies. It also supports collaboration between Sofia residents, the County Emergency Operations Centre (EOC), and agencies such as the Kenya Red Cross and Kenya Meteorological Department to enhance information flow and preparedness. Through these actions, Sofia contributes to Kenya's goal of building resilient communities that can anticipate and effectively respond to disasters rather than react after they occur.

1.5.2.5 Kenya Vision 2030 and the Big Four Agenda

Kenya Vision 2030 is the country's long-term development blueprint, aiming to transform Kenya into a newly industrialized, middle-income nation by 2030. It is anchored on three pillars: economic, social, and political. Under the social pillar, Vision 2030 prioritizes improved housing, expanded access to water and sanitation, poverty reduction, and enhanced resilience to environmental risks. Within the urban sector, it emphasizes planned urban growth, upgrading of informal settlements, and provision of infrastructure and services to support equitable urbanization.

The Sofia People's Adaptation Plan contributes to these aspirations by directly addressing the vulnerabilities of one of Homa Bay's largest informal settlements. Its proposals for climate-resilient housing, reliable water and sanitation infrastructure, and improved mobility align with Vision 2030's social pillar objectives of providing dignified housing and improved living conditions for all Kenyans. By integrating adaptation into settlement upgrading, the plan also supports the environmental sustainability goals embedded in Vision 2030, particularly in ensuring that urban development incorporates risk reduction and resilience-building.

Complementing Vision 2030, the Big Four Agenda (2017–2022) was introduced as a medium-term acceleration framework to fast-track development. It identified four priorities: affordable housing, food security, universal healthcare, and manufacturing. The Sofia People's Adaptation Plan resonates strongly with three of these. First, on affordable housing, it proposes climate-resilient building practices and settlement upgrading that improve both safety and affordability for vulnerable residents. Second, on food security, it emphasizes livelihood diversification and climate-resilient food systems to reduce reliance on fisheries and small-scale trade that are increasingly affected by climate variability. Third, on universal healthcare, the plan addresses the public health risks linked to flooding, poor sanitation, and climate-sensitive diseases by prioritizing resilient WASH systems and better health service access within the settlement.

By grounding its actions in the lived realities of Sofia residents while aligning with national development blueprints, the People's Adaptation Plan ensures that the benefits of Vision 2030 and the Big Four Agenda are extended to those at the margins of urban growth. It

demonstrates how long-term national goals can be localized and translated into concrete resilience-building measures in informal settlements.

1.5.2.6 National Water and Sanitation Investment and Financing Plan (2023)

The National Water and Sanitation Investment and Financing Plan (NWSIFP, 2023) aims to accelerate universal access to clean water and sanitation by 2030 through innovative financing mechanisms and sustainable infrastructure investments. The plan promotes climate-resilient water and sanitation systems, emphasising the need for decentralised solutions, efficient use of water resources, and partnerships between public, private, and community actors. It underscores the importance of targeting underserved and vulnerable areas such as informal settlements where access to safe water and sanitation remains low.

The Sofia People's Adaptation Plan aligns strongly with the NWSIFP by prioritising rainwater harvesting, rehabilitation of water kiosks, construction of communal ablution blocks, and decentralised wastewater treatment systems. These interventions are designed to improve public health, reduce contamination during floods, and secure reliable water access even during dry periods. Moreover, by advocating for county–community partnerships and exploring micro-financing options for household WASH improvements, the plan demonstrates how locally led adaptation can operationalise the national investment agenda at the settlement scale.

1.5.2.7 National Climate Change Response Strategy (2010)

The National Climate Change Response Strategy (2010) provides the overarching policy direction for Kenya's climate response, outlining the need to integrate climate change adaptation and mitigation across all sectors of development. It identifies priority action areas such as water, agriculture, human settlements, and disaster risk reduction, and calls for institutional coordination between national and county governments to enhance resilience at both policy and community levels.

The Sofia People's Adaptation Plan translates this national strategy into action at the community scale by integrating climate considerations into local spatial planning, service delivery, and livelihood systems. It promotes adaptation measures that address the main hazards identified in the Rapid Climate Risk Assessment (RCRA, 2025) flooding, drought, and heat stress while ensuring that interventions are inclusive, gender-responsive, and locally owned. Through participatory planning, the Sofia plan contributes to the national strategy's goal of achieving sustainable, climate-resilient urban development that safeguards the wellbeing and productivity of vulnerable populations.

1.5.3 Global Level

1.5.3.1 Paris Agreement (2015) and Kenya's Nationally Determined Contributions (NDCs)

The Paris Agreement is the landmark international treaty adopted in 2015 under the United Nations Framework Convention on Climate Change (UNFCCC). It commits all signatory countries to limit global warming to well below 2°C above pre-industrial levels and to pursue efforts to limit warming to 1.5°C. Alongside mitigation, the Agreement emphasizes adaptation, resilience, and financial support for vulnerable populations disproportionately affected by climate change.

Kenya's Nationally Determined Contributions (NDCs), submitted under the Paris Agreement, place strong emphasis on adaptation as a national priority. The NDCs identify key areas such as enhancing water security, strengthening climate-resilient agriculture, promoting sustainable urban systems, and protecting vulnerable communities from the impacts of climate change. They call for locally led, inclusive strategies to ensure that adaptation benefits reach the most vulnerable populations, including those living in informal settlements.

The Sofia People's Adaptation Plan advances Kenya's commitments under the Paris Agreement and NDCs by localizing adaptation within a highly vulnerable urban settlement. By proposing resilient WASH infrastructure, the plan directly supports the NDC goal of ensuring water security under increasing climate stress. Proposals to diversify livelihoods and improve housing resilience contribute to the NDC's focus on sustainable urban systems and poverty reduction under climate stress. The plan's participatory approach, involving residents of Sofia in hazard identification and action prioritization, embodies the Paris Agreement's call for inclusive and bottom-up adaptation.

By demonstrating how international climate commitments can be realized at the grassroots, the Sofia People's Adaptation Plan provides a practical model of how local actions in informal settlements directly contribute to global goals. It ensures that Kenya's obligations under the Paris Agreement are not abstract, but are operationalized where climate impacts are most severe and where resilience-building is most urgently needed.

1.5.3.2 United Nations Sustainable Development Goals (SDGs)

1.5.3.3 SDG 13: Climate Action

The Sofia People's Adaptation Plan aligns with several global commitments under the 2030 Agenda for Sustainable Development, translating international principles into locally led adaptation and resilience-building within Homa Bay Municipality's informal settlements.

1.5.3.4 SDG 1: No Poverty

This goal aims to end poverty in all its forms by enhancing resilience among the poor and those vulnerable to climate-related shocks. The Sofia plan contributes to SDG 1 by promoting household-level climate resilience through locally led water, sanitation, and housing upgrades that reduce exposure to disasters, improve living conditions, and strengthen income stability for low-income families.

1.5.3.5 SDG 3: Good Health and Well-being

The plan supports SDG 3 by reducing health risks linked to poor sanitation, flooding, and pollution. Actions such as improved drainage, flood-proofed toilets, and climate-resilient health services help prevent outbreaks of cholera, malaria, and other water- and vector-borne diseases.

1.5.3.6 SDG 6: Clean Water and Sanitation

SDG 6 emphasizes ensuring availability and sustainable management of water and sanitation for all. Informal settlements like Sofia face major deficits in WASH infrastructure, worsened by climate variability. The People's Adaptation Plan responds by proposing climate-proofed WASH systems community-managed water infrastructure, improved sanitation facilities, and flood-resilient drainage networks directly advancing SDG 6 while protecting public health from climate-sensitive diseases.

1.5.3.7 SDG 9: Industry, Innovation, and Infrastructure

The plan advances SDG 9 by investing in basic infrastructure such as resilient drainage, renewable energy, and sustainable transport corridors. Integrating climate-smart technologies like solar-powered lighting and water pumping demonstrates how innovation can reduce vulnerability and enhance productivity in informal urban areas.

1.5.3.8 SDG 11: Sustainable Cities and Communities

SDG 11 calls for inclusive, safe, resilient, and sustainable cities, with a specific focus on upgrading informal settlements. The Sofia People's Adaptation Plan contributes to this goal by improving resilient housing, access to essential services, and safer public spaces. It integrates green and blue infrastructure into settlement upgrading restoring drainage corridors, stabilising slopes, and developing community parks thereby operationalising the global goal of inclusive urbanisation.

1.5.3.9 SDG 13: Climate Action

SDG 13 urges urgent action to combat climate change and its impacts. Sofia's plan directly implements this through the Rapid Climate Risk Assessment (RCRA, 2025) and adaptation actions addressing flooding, heat, and drought. It enhances local adaptive capacity by combining community knowledge with data-driven planning, demonstrating how local action drives national and global climate ambitions.

1.5.3.10 SDG 17: Partnerships for the Goals

The plan reinforces SDG 17 by fostering partnerships among community organisations, county departments, local universities, and development partners. Through capacity-building, co-financing mechanisms, and participatory governance, it builds shared accountability and cross-sector collaboration to sustain adaptation outcomes.

1.5.3.11 Sendai Framework for Disaster Risk Reduction (2015–2030)

The Sendai Framework is the global blueprint for reducing disaster risks and building resilience to hazards. It identifies four key priorities: understanding disaster risk; strengthening disaster risk governance; investing in disaster risk reduction for resilience; and enhancing disaster preparedness for effective response and "building back better" in recovery. The framework emphasizes that risk reduction must be locally grounded, inclusive, and integrated into broader development planning.

The Sofia People's Adaptation Plan reflects the spirit and priorities of the Sendai Framework. By identifying and documenting the settlement's exposure to flooding, poor drainage, and climate-related health risks, the plan advances the first priority of understanding risk. Community consultations, participatory mapping, and inclusion of vulnerable groups in planning ensure that risk

knowledge is not only technical but rooted in local experience.

The second priority, strengthening governance, is supported by the plan's integration with county and municipal institutions, ensuring that disaster risk reduction is embedded in Homa Bay's urban governance structures. By prioritizing investments in drainage systems, WASH infrastructure, and resilient housing, the plan speaks directly to Sendai's third priority of investing in risk reduction for resilience. Finally, by proposing community-based early warning systems, preparedness mechanisms, and locally owned adaptation measures, the plan aligns with Sendai's fourth priority of enhancing preparedness and building back better.

Through this alignment, the Sofia plan ensures that disaster risk reduction is not abstract but woven into everyday urban resilience, demonstrating how global frameworks can be translated into practical actions in a vulnerable informal settlement.

1.5.3.12 Locally Led Adaptation (LLA) Principles

The *Locally Led Adaptation Principles*, endorsed by global partners such as the Global Center on Adaptation, recognize that adaptation is most effective when decision-making power and resources are devolved to local communities. The principles emphasize equity, inclusivity, local knowledge, transparency, and long-term capacity-building as central to climate resilience. They call for adaptation planning to shift from top-down approaches to models that empower communities to identify, design, and implement solutions based on their lived realities.

The Sofia People's Adaptation Plan is built entirely around these principles. Its foundation lies in community-led processes: residents participated in consultations, focus groups, and participatory mapping to identify their own climate hazards, risks, and priorities. By centering voices of women, youth, the elderly, and other marginalized groups, the plan ensures that adaptation benefits are equitably distributed and that the most vulnerable are not left behind.

The plan also integrates local knowledge and innovation, capturing indigenous coping mechanisms and community practices such as informal drainage channels and collective neighbourhood initiatives that can be strengthened through formal support. Transparency and accountability are embedded by ensuring that residents are informed and engaged at each stage, with mechanisms proposed for them to monitor implementation and hold authorities accountable. Finally, by proposing capacity-building initiatives and sustainable livelihood interventions, the Sofia plan aligns with the LLA principle of fostering long-term local agency and ownership rather than dependency.

Through this lens, the Sofia People's Adaptation Plan does more than propose projects it embeds a governance model where climate resilience grows from the ground up. In doing so, it positions Sofia not just as a beneficiary of adaptation, but as a driver of resilience that contributes to global best practice on locally led action.

1.6 Methodology

The Sofia People's Adaptation Plan was shaped through a community-driven and policy-compliant process that combined participatory data collection with technical analysis. Throughout, local residents especially women, youth, elders and persons with disabilities worked alongside county officers, technical experts and partner organisations.

1.6.1 Stakeholder mobilisation and training.

The process began with mobilisation through local leaders, settlement representatives and grassroots networks. Volunteers were recruited and trained as enumerators, mappers and facilitators; across the municipality, 298 local enumerators received training in mapping, household numbering and survey administration. This investment built local capacity and ensured that data collection was credible and trusted.

Photo 1: Community training session on mapping and numbering in Arujo

1.6.2 Settlement mapping and household numbering.

Trained teams undertook a systematic mapping and numbering exercise in Sofia. Every structure residential, commercial or mixed-use was mapped and assigned a unique identifier. This produced a verifiable database of building types, land uses and occupancy status, highlighting service gaps and informal housing clusters.

1.6.3 Household enumeration.

Using the mapping as a guide, the same teams conducted a door-to-door enumeration. Structured questionnaires captured socio-economic conditions, household demographics, livelihoods and access to services. Enumeration provided a comprehensive baseline for identifying vulnerable groups and informed evidence-based decision-making.

Photo 2: Mapping, Numbering and Household enumerations ongoingIntegrated community visioning, participatory mapping and climate-risk profiling.

Building on the enumeration data, a single community workshop was held to co-produce the climate-risk profile and future vision for Sofia. Mobilised participants gathered in a setting that ensured representation of women, men, youth, elders and persons with disabilities. The day began with a plenary introduction, after which residents broke into thematic groups covering livelihoods, WASH, housing and land, environment and climate, and social services facilitated by Akiba Mashinani Trust (AMT) and SUEZ consultants. Within each group, participants shared lived experiences, told stories of past floods or droughts, and identified sector-specific challenges and aspirations. At the same time, residents engaged in hands-on mapping: large printed base maps of Sofia were spread out, and community members marked flood-prone areas, eroded slopes, blocked drains and insecure lanes. Different colours and symbols were used to note desired improvements such as new water kiosks, tree-planting sites and a formal market. Technical facilitators helped digitise these community maps and overlay them with climate-risk data (hydrological models, flood depth estimates) derived from the Rapid Climate Risk Assessment, ensuring that scientific analysis and local knowledge were combined. This integrated event produced a shared vision for Sofia's resilience, a spatial understanding of hazards and aspirations, and a community-endorsed list of priority interventions. *(more details of this activity in section 4.1 and 4.2)*

1.6.4 Sublocation-level situational-analysis validation.

The draft situational analysis was validated at a workshop convened at the Arujo sublocation level part of the wider municipal planning process. Although the meeting covered the entire sublocation, Sofia residents participated as Arujo representatives to confirm that findings reflected their lived realities. They reviewed the enumeration results, hazard maps and priority proposals, and provided final input to ensure accuracy and fairness.

1.6.5 Cross-sectoral synthesis and integration.

Data from mapping, enumeration, participatory visioning and climate-risk profiling were synthesised across sectors WASH, housing, livelihoods, health, energy and environment to build a holistic picture of vulnerability and resilience. The participatory methodology ensured that information was contextually accurate and locally validated, while technical modelling and mapping aligned the outcomes with county planning frameworks and climate science. This synthesis underpins the Sofia People's Adaptation Plan, ensuring its strategies are rooted in evidence, inclusivity and community ownership.

2 COMMUNITY PROFILING

This section draws on data generated through locally led household enumerations conducted in Sofia as part of the community-driven profiling process. The enumeration exercise was designed and implemented by trained local residents including women and youth who collected detailed information on households, livelihoods, service access, and vulnerability conditions across the settlement. Their involvement ensured that the data reflect residents' lived realities, strengthened local capacity for evidence-based planning, and reinforced community ownership of the adaptation process.

Findings from these enumerations provide a comprehensive understanding of Sofia's demographic structure, socio-economic patterns, and exposure to climate-related risks. The results form the basis for identifying priority actions and for linking community-level evidence to county planning and investment frameworks.

2.1 Demographic & Socio-Economic Overview

2.1.1 Population Size & Composition

Sofia settlement is one of the most densely populated informal settlements within Homa Bay Municipality. It covers a land area of 1.45 km² and hosts an estimated 4,873 residents, yielding a density of approximately 3,360 persons per km². This density is significantly higher than the municipal average, reflecting the compact nature of informal housing, limited open spaces, and high demand for accommodation close to the urban core.

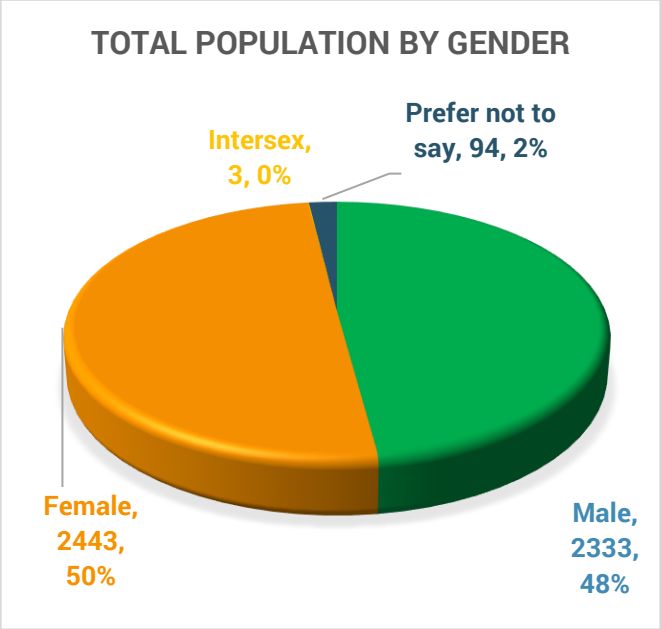


Figure 1: Total Population by Gender

The settlement comprises 1,990 households, with an average household size of 2.4 persons, smaller than both the municipal and county averages. This reduced size is linked to the prevalence of single-person households and young nuclear families.

Household structure reveals important social dynamics:

37% (≈745 households) are single-person households, indicative of a large number of youth and migrants living alone, often in rented units. 27% are nuclear families, reflecting young couples with children.15% are single-parent households, predominantly female-headed, a group that faces additional social and economic pressures.

The remaining share comprises extended or composite households, often accommodating relatives temporarily or pooling resources to share rent.

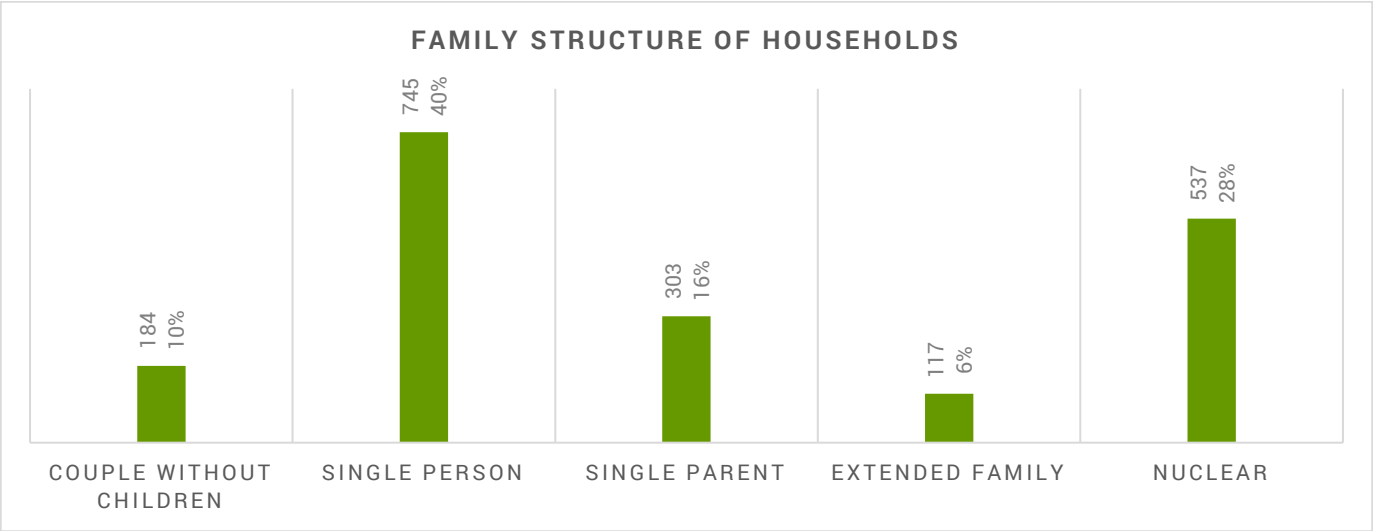


Figure 2: Family structure of households

Age distribution underscores the settlement's youthfulness: 34.7% of households include members aged 20–24 years, a cohort largely engaged in casual work, petty trade, or unemployed. 32% of households have members aged 25–29 years, often transitioning into family responsibilities but with limited income security. 21.3% of households include adolescents aged 15–19 years, many still in school or vocational training.

The elderly (≥60 years) represent only 4% of residents, approximately 183 individuals.

Overall, youth aged 15–34 account for about 54% of Sofia's population, forming a critical social and economic base. This demographic bulge has implications for labour supply, education, housing demand, and service provision.

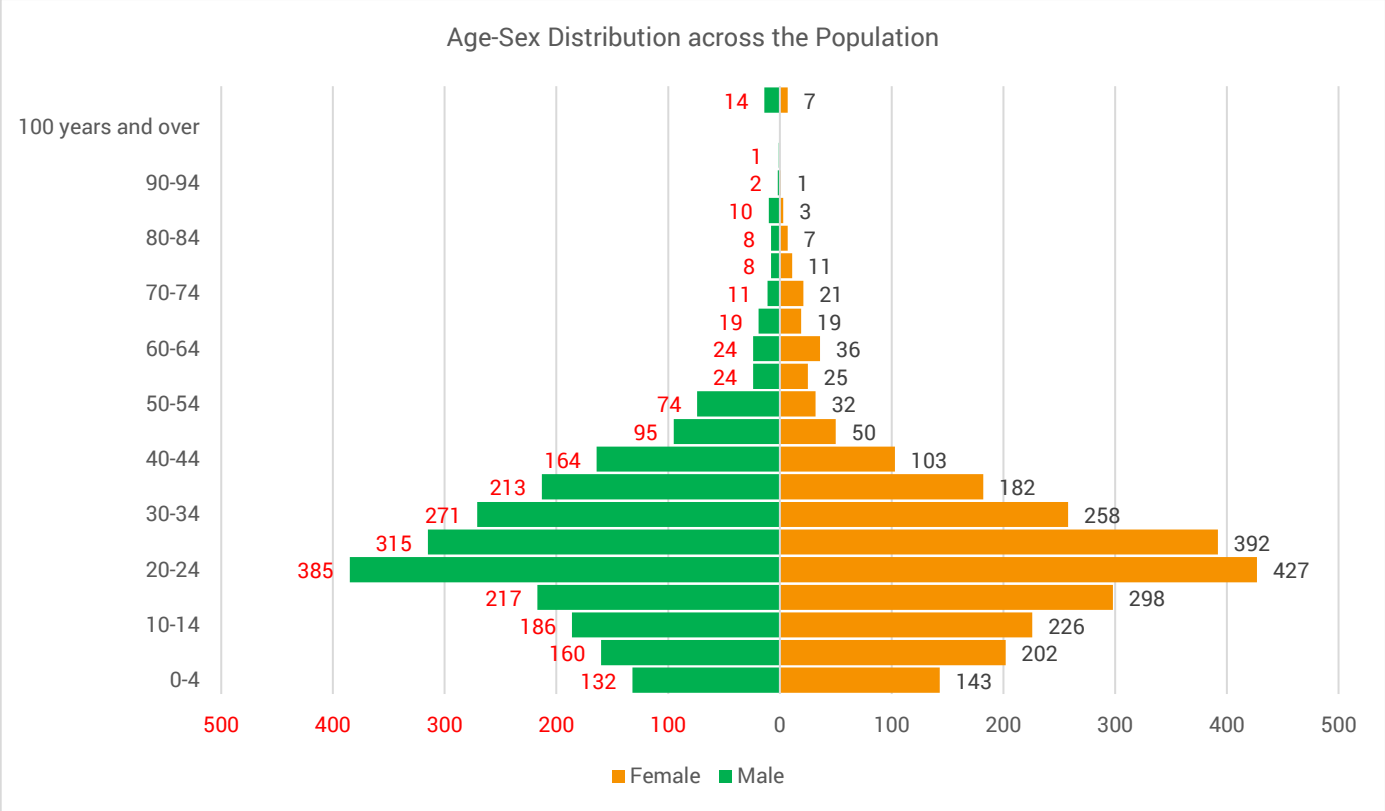


Figure 3: Age-Sex Distribution across the Population

Key Demographic Indicators

Indicator	Value
Total population (2025 est.)	4,873
Land area	1.45 km²
Population density	3,360 persons/km²
Total households	1,990
Average household size	2.4 persons
Single-person households	37%
Nuclear families	27%

Single-parent households	15%
Households with members aged 20–24 years	34.7%
Elderly (≥60 years) share	4%
Youth (15–34 years) share	54%

Table 1: Key Demographic Indicators

2.1.2 Socio-Economic Indicators

The socio-economic landscape of Sofia is defined by heavy reliance on informal employment and low, irregular incomes. Out of the estimated 4,873 residents, the majority participate in fragile economic activities that offer little security. Around 18.9% of residents are self-employed in small businesses such as kiosks, street vending, or freelance services, while 7.9% depend on casual labor in construction and other daily wage activities. A smaller share of 6.2% hold formal jobs in sectors like teaching, health care, or clerical work, whereas 5.5% are engaged in trade-related occupations such as shopkeeping or petty commerce. Only 2.6% of residents work in agriculture or fishing, reflecting the limited availability of land and the settlement's distance from the lakeshore. Artisanal work, including tailoring, carpentry, and mechanical repairs, accounts for 1.8% of the workforce.

A large proportion of the settlement's population remains economically inactive. Dependents, mainly children, account for 20.3% of residents, while another 20.1% are full-time students. Unemployment is high at 13.7%, and a further 8.4% of residents declined to disclose their employment status, a category that may conceal informal or irregular sources of income.

Income levels highlight the precariousness of most households. Approximately 34% earn between KES 4,001 and 8,000 per month, with nearly half of these falling in the lower 4,001–6,000 range. Eleven% of households live on less than KES 2,000 monthly, placing them at the highest risk of poverty and food insecurity. At the other end of the spectrum, only 10% of households report incomes above KES 10,000 per month, representing a small group with relative economic stability. Alarmingly, 12% of households report no income at all, while another 12% declined to disclose their earnings, indicating reliance on remittances, community support, or undisclosed informal activities.

Educational opportunities remain limited within the settlement. Although there is a high proportion of school-age children, the land allocated for education is inadequate, forcing many pupils to attend schools outside Sofia. This increases commuting costs for families and exposes children to unsafe or flood-affected routes during the rainy season.

Gender disparities further shape the socio-economic conditions in Sofia. Over one-third of households (37.14%) are female-headed, reflecting both the resilience of women and their heightened vulnerability in a male-dominated property regime. Women make up 89.9% of the informal workforce and 57% of the unemployed, underscoring their concentration in precarious, low-income activities. Access to property and land ownership is also heavily skewed: only 31.61% of landowners are women, reflecting systemic barriers to asset ownership and secure tenure.

Housing tenure patterns reinforce economic fragility. Nearly two-thirds of households (60.7%) live as tenants, while 29.4% are homeowners and 5.3% reside in family-owned homes. Among homeowners, 86.8% hold formal title deeds, but 12.1% lack secure documentation, limiting their ability to invest confidently in long-term improvements. For tenants, high rent-to-income ratios leave little room for savings or adaptation investments, perpetuating cycles of economic stress.

2.1.3 Vulnerable Groups

The interplay of demographic pressures, insecure livelihoods, and entrenched socio-economic inequalities produces several groups within Sofia settlement that face heightened vulnerability.

Youth represent the largest share of the population, with those aged 15–34 years making up more than half of all residents. Yet they also constitute the majority of the unemployed, accounting for 59.6 percent of those without work. The scarcity of formal jobs and the absence of widespread vocational training opportunities leave young people highly exposed to economic shocks and social unrest. Many turn to informal activities such as street vending or casual labor, sometimes conducted in environmentally risky areas like drainage corridors or flood-prone open spaces, thereby compounding both their personal risk and the settlement's exposure to hazards.

The elderly, while forming only about 4 percent of Sofia's residents, are particularly vulnerable. Most older residents spent their working years in informal or low-paying jobs and therefore lack pensions or reliable savings. Many depend on children or extended family for support. Combined with poor health, social isolation, and inadequate housing, these circumstances heighten their susceptibility to extreme heat, flooding, and disease outbreaks. Their limited mobility also constrains their ability to evacuate or access services during emergencies.

Women and female-headed households carry a disproportionate share of hardship. Women are heavily concentrated in the informal sector, often in poorly paid and unstable occupations, and bear primary responsibility for water collection, cooking, and caregiving. These roles increase exposure to indoor air pollution from charcoal and firewood and make them particularly affected by water shortages or contamination. Land and housing insecurity remains a persistent challenge, as most female-headed households rent accommodation and have little capacity to invest in resilient housing. Social vulnerabilities

are compounded by the risk of gender-based violence, which can escalate after disasters when social support networks weaken.

Low-income households are another critical vulnerable group. About 11 percent of households in Sofia earn less than KES 2,000 per month, while an additional 12 percent report no income at all. Such households struggle daily with food insecurity, inability to pay for healthcare or education, and dependence on external assistance. When floods, heatwaves, or disease outbreaks occur, these families are pushed deeper into poverty, often resorting to negative coping mechanisms such as child labor or withdrawing children from school.

2.1.4 Economic Activities

The economic life of Sofia is dominated by informal enterprises and small-scale livelihoods, reflecting the settlement's limited space for structured commerce and formal employment. The largest share of residents, about 18.9%, rely on self-employment and petty trade. These activities include running kiosks, food vending, tailoring, and other home-based businesses. Their success depends heavily on open-air markets and foot traffic, making them highly sensitive to disruptions from heavy rains, flooding, and extreme heat, which reduce customer numbers and damage stock.

Casual labour provides income for another 7.9% of residents, primarily through daily wage work in construction, domestic service, loading and unloading goods, or street hawking. Such employment is unstable and earnings fluctuate, often declining sharply during climate disruptions or wider economic downturns. Trade-oriented occupations employ 5.5% of residents, typically through small retail shops, wholesale stalls, or local market outlets. Poor infrastructure, especially unpaved or flood-prone roads, restricts reliable access to markets and reduces opportunities for expansion.

Formal employment remains limited, accounting for only 6.2% of residents. Teachers, civil servants, and health-care workers form this group, with many commuting outside the settlement for work. Their ability to deliver services is undermined during floods, which frequently disrupt mobility and attendance. Agriculture and fishing now represent a marginal livelihood for only 2.6% of residents. A few households engage in small-scale farming on the settlement's fringes or fishing in Lake Victoria. However, rising water temperatures, algal blooms, pollution, and erratic rainfall patterns threaten both fish stocks and agricultural productivity, discouraging long-term reliance on these activities.

Finally, artisanal work accounts for 1.8% of the workforce, including tailoring, carpentry, and handicrafts. These trades are typically home-based and vulnerable to shifts in disposable household income and access to local markets.

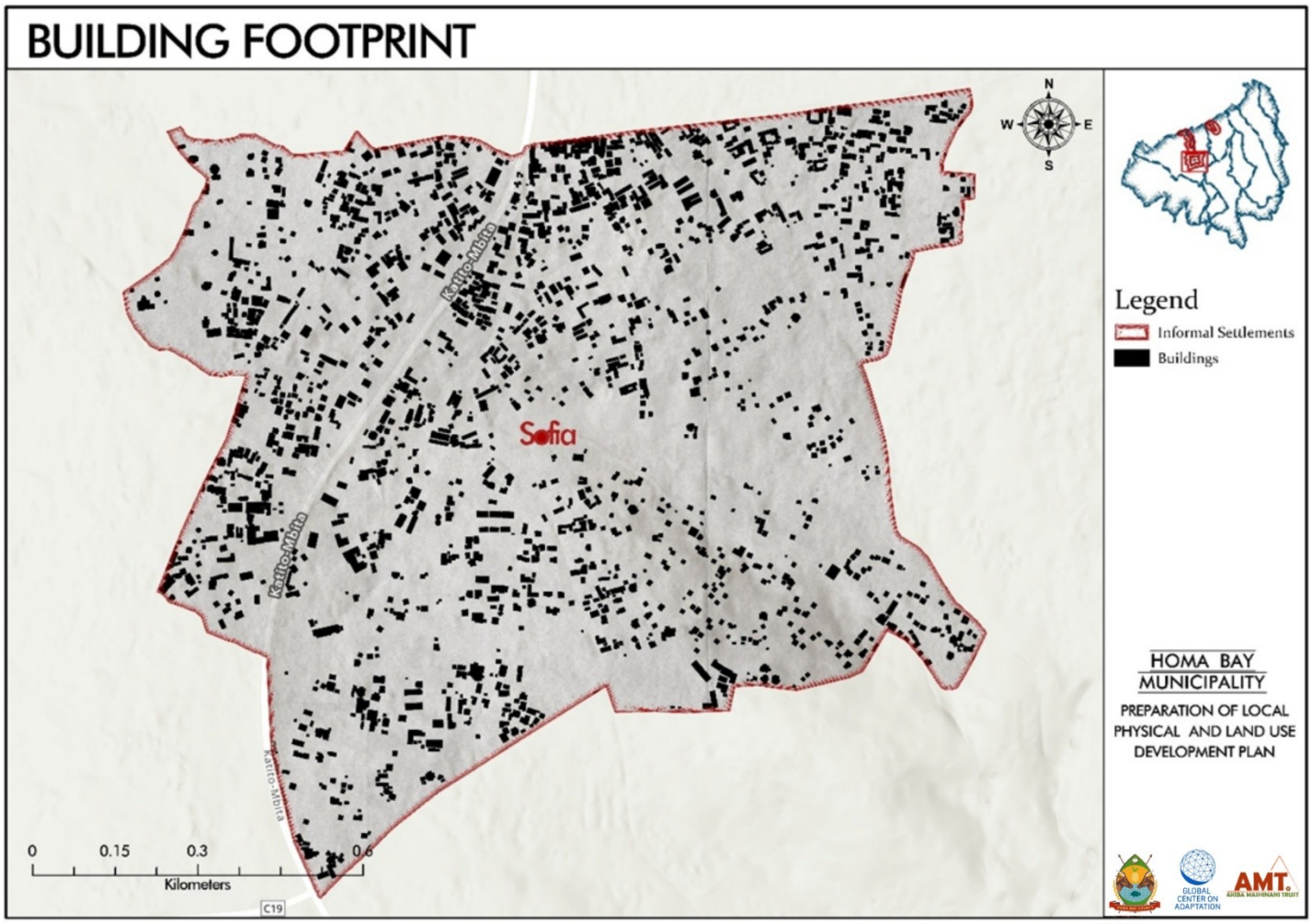
2.2 Settlement Patterns

2.2.1 Nature of the Settlement

Sofia is one of the two major informal settlements within the Arujo sub-location of Homa Bay Municipality, the other being Shauri Yako. Although it occupies only 11% of Arujo's land area, Sofia accommodates about 35% of the sub-location's households, underscoring its role as a densely populated residential hub.

Across the wider municipality, formal housing accounts for 71.7% of all settlements, yet in Arujo the picture is reversed: 61.6% of households live in unplanned areas such as Sofia and Shauri Yako. This high concentration of informality reflects the inability of formal housing markets to provide affordable accommodation, particularly for low-income residents.

The growth of Sofia has been shaped by rural-to-urban migration and the scarcity of affordable housing within formal estates. Migrants are attracted to the settlement due to its low entry costs, proximity to employment opportunities in Homa Bay town, and access to essential services. In addition, students from nearby institutions such as Tom Mboya University and the Kenya Medical Training College (KMTC) increasingly rent rooms in Sofia because purpose-built school accommodation is limited, and the settlement offers cheaper housing within walking distance of campus facilities.



Map 2: *Building Footprint*

Unregulated densification has led to overcrowded plots, narrow and winding footpaths, and the near absence of planned open spaces. Encroachments into road reserves are common, increasing infrastructural risks while constraining future upgrading and service delivery efforts.

2.2.2 Housing Types and Conditions

Sofia exhibits a more diverse housing profile than other informal settlements in Homa Bay such as Shauri Yako and Makongeni. While a considerable part of the settlement retains informal, single-storey structures, parts of Sofia have formal housing and multi-storey apartments. The settlement is also less congested than its neighbours, with relatively wider access ways and pockets of organized residential layouts.

Tenure arrangements highlight the dominance of rental housing. Approximately 60.7% of households are tenants, 29.4% are homeowners, and 5.3% reside in family-owned houses. A smaller share of 1.2% are caretakers and 0.1% squatters. Monthly rent ranges between KES 2,610 and 3,432, depending on household income, with almost half of all households (46.88%) spending more than 30% of their income on rent, underscoring the burden of housing costs in the settlement.

Photo 3: *Walling and Roofing in Sofia*

Housing quality varies across Sofia. In its more formalized areas, buildings are constructed with permanent materials such as stone walls, reinforced concrete, and iron-sheet or tiled roofing. Several plots host multi-storey rental apartments. Roughly 66% of homes have walls that are cement plastered or made of brick, and 61% have cement or concrete flooring. However, a significant portion of housing remains substandard: around 27% of households still live in structures with makeshift metal sheet walls, which offer poor insulation and become dangerously hot during dry spells, while also rusting and collapsing under prolonged rainfall. A minority of households have simple earthen floors or weak timber framing, which accelerates dampness and mould growth during floods.

The northern side of Sofia and the strip bordering Shauri Yako are predominantly informal. Here, structures are built with timber frames, iron-sheet roofing, and mixed masonry, often lacking robust foundations. These informal clusters face higher risks of floodwater intrusion, erosion, and storm damage, particularly during heavy rainfall events documented in the Rapid Climate Risk Assessment (RCRA, 2025). Inadequate drainage and poor building orientation also trap heat, intensifying discomfort during the dry season. Such vulnerabilities not only compromise living conditions but also exacerbate public health risks as damp homes promote vector-borne and respiratory diseases and constrain future upgrading and service delivery efforts.

Photo 4: *State of a Building in Sofia*

Access to basic services within housing remains uneven, and these disparities significantly shape climate vulnerability. Only 31.2% of households are connected to piped water from HOMAWASCO, while the majority rely on informal and unprotected sources such as kiosks, shallow wells, or vendors. During dry spells and rising temperatures, these sources frequently dry up or become contaminated, forcing residents to purchase water at inflated prices and increasing the risk of water-borne diseases.

Electricity connectivity is relatively better, reaching 73.5% of households, but power outages are common during storms and floods, disrupting safety and communication. Sanitation is heavily reliant on pit latrines, used by 93.7% of households, many of which flood or overflow during heavy rains, polluting surface water and spreading disease. Similarly, solid-waste disposal is predominantly informal, with 87.4% of households dumping waste in open areas or drains. The accumulation of solid waste obstructs water flow and blocks drainage channels, intensifying flooding during extreme rainfall events documented in the Rapid Climate Risk Assessment (RCRA, 2025).

In terms of living space, 68.79% of households occupy one person per room, 10.05% share two persons per room, and 0.4% accommodate more than five individuals in a single room. Although Sofia is less congested than other settlements in Homa Bay, overcrowding persists in informal clusters, where limited space and low rents attract low-income families. Overcrowded rooms and poor ventilation amplify heat stress during dry seasons and increase health vulnerability during flood events, when damp, poorly ventilated housing fosters respiratory and vector-borne diseases.

2.2.3 Land Use & Spatial Organization

Land use in Sofia is dominated by residential development, with most of the settlement built up into densely occupied plots. Continuous subdivision of land has produced narrow lanes and compact housing clusters especially on the northern section, leaving little room for vegetation, drainage corridors, or designated community spaces. This dense morphology, coupled with limited pervious surfaces, exacerbates surface-water runoff and localized flooding during heavy rainfall events, as identified in the Rapid Climate Risk Assessment (RCRA, 2025). The absence of tree cover and green buffers further intensifies urban heat-island effects during the dry season.

Commercial activity is present but limited in terms of planned allocation. Within Sofia, this includes small-scale trade, local eateries, and informal markets, as well as several more established enterprises such as Hotel Dalawa, Amboss Hotel, and Almaiza Supermarket. Instead of formal commercial zones, most businesses operate informally along main roads and within residential plots, often as kiosks, shops, or home-based enterprises. While these activities support local livelihoods, their placement along drainage paths and road edges increases exposure to floodwater and limits safe pedestrian and vehicular movement during storms. A few areas exhibit mixed-use patterns where small-scale trade is integrated with housing, but these remain scattered rather than formally designated.

Public facilities occupy only a marginal share of space. Educational institutions, health services, and community facilities are insufficient to meet the needs of a rapidly growing population. Consequently, many children and youth attend schools outside the settlement, and residents depend on neighboring areas for health and administrative services. The limited availability of safe,

accessible public spaces also constrains the establishment of temporary evacuation sites or green corridors that could serve as flood-mitigation zones.

Vacant or undeveloped land is rare, with almost all plots already built up or in use. The absence of reserved open spaces or green buffers limits opportunities for drainage infrastructure upgrades, storm-water retention, or climate-adaptive landscaping. Encroachment on riparian margins and blocked drainage swales have been observed in several clusters, contributing to recurrent flooding and soil erosion.

Spatially, the settlement has expanded northwards and eastwards into sloping and low-lying areas that are more prone to flooding and erosion. Building footprints often follow informal tracks and footpaths rather than planned road alignments, creating irregular layouts that trap runoff and hinder drainage. This morphology not only channels storm water into vulnerable zones but also restricts access for emergency vehicles and disaster-response teams during flood events. Roads within the settlement are predominantly earth-surfaced, which quickly deteriorate during rains, reducing mobility and isolating residents in the most flood-prone sections.

2.2.4 Land Ownership and Tenure

Access to land in Sofia is closely tied to tenure status, gender dynamics, and household income, all of which directly influence vulnerability to climate impacts. The settlement is predominantly rental in nature, with 60.7% of households living as tenants. While this provides affordable accommodation for many low-income families, it also creates insecure occupancy and discourages tenants from investing in permanent, flood-resistant, or climate-resilient housing improvements. Many rental structures are poorly maintained and located in low-lying or flood-prone areas, leaving tenants more exposed to waterlogging and structural damage during heavy rains.

Homeownership is reported by 29.4% of households, and among these, the majority (86.8%) hold formal title documents that provide a degree of protection and confidence in property rights. However, the remainder lack secure papers, leaving them vulnerable to land disputes, evictions, or exclusion from compensation when land is targeted for infrastructure upgrades or redevelopment. This insecurity discourages climate-proof investments such as drainage improvements, elevation of plinths, or conversion to durable materials, thereby perpetuating exposure to flood and erosion risks.

The Rapid Climate Risk Assessment (RCRA, 2025) highlights tenure insecurity as a major barrier to adaptation, particularly in informal clusters bordering Shauri Yako and the lakeshore. Residents in these zones often face overlapping claims and lack legal recourse when floods or infrastructure works affect their properties, making them less likely to rebuild with resilient standards or engage with formal planning processes.

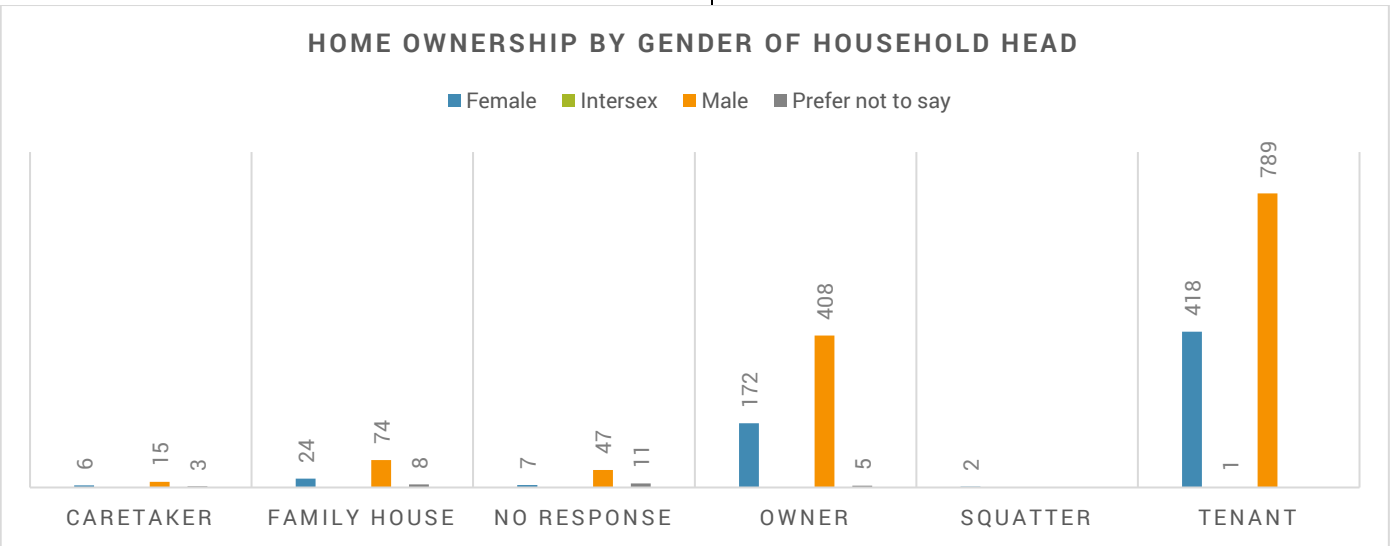


Figure 4: Home ownership by Gender of Household Head

Gender disparities in land access remain striking. While some women inherit or hold ancestral land, most female-headed households are tenants on privately owned plots. Only 31.61% of women in Sofia report ownership of land, reflecting systemic barriers to land acquisition, inheritance, and documentation. This imbalance reduces women's capacity to secure loans, invest in adaptive housing, or participate fully in land-based decision-making. As the RCRA notes, such gendered tenure constraints intensify vulnerability, since women often responsible for water, sanitation, and household care bear the brunt of flooding and drought impacts.

Addressing tenure insecurity and gender inequality in land ownership is therefore essential for building long-term climate resilience in Sofia. Strengthening land administration, promoting inclusive titling, and expanding access to the County Climate Change Fund (CCCF) for both tenants and female-headed households can help

ensure that adaptation measures benefit all residents, not just formal landowners.

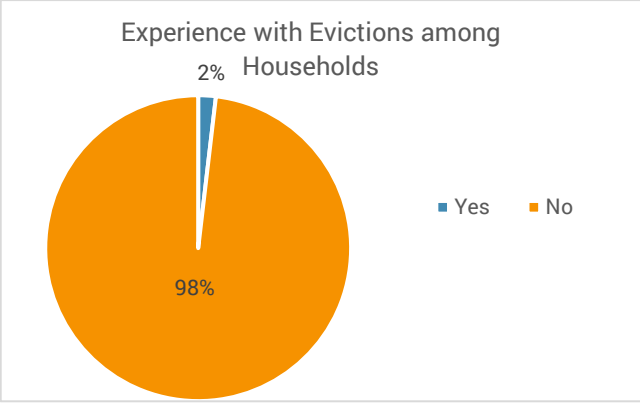


Figure 5: Experience with Evictions among Households

A small but notable 1.8% of households have faced eviction threats, most often due to failure to pay rent, unresolved land disputes, or displacement linked to infrastructure development. Without secure tenure, residents in such situations live under constant uncertainty, limiting their willingness to invest in housing quality or long-term adaptation measures.

2.3 Livelihood Systems and Vulnerabilities

2.3.1 Primary Livelihoods

Livelihoods in Sofia are diverse but remain dominated by informal activities that are highly sensitive to economic fluctuations and climate shocks. The largest share of residents, about 18.9%, engage in self-employment or micro-enterprise. This includes running kiosks, small shops, food vending, hairdressing, tailoring, and other home-based businesses. These activities depend heavily on roadside markets and pedestrian traffic, making them particularly vulnerable to disruption during floods or heatwaves when customer movement declines and stock is damaged.

Casual labour provides livelihoods for about 7.9% of residents. Most work as daily wage earners in construction, portering, or domestic service. Their income is inconsistent, fluctuating with seasonal labour demand, and often sharply reduced during adverse weather conditions that slow construction or outdoor activities. Trade and retail employ around 5.5% of the population, primarily through market stalls, hawking, and small-scale trading in goods such as vegetables, fish, and second-hand clothing. While these activities are critical for household survival, poor road conditions and frequent flooding impede market access and limit profitability.

Formal employment remains modest, accounting for 6.2% of residents. Those employed in this category include teachers, healthcare workers, and municipal staff, most of whom work outside the settlement. Agriculture and fishing play only a minor role in the settlement's economy, involving about 2.6% of residents. Small household gardens supplement food consumption, while artisanal fishing in Lake Victoria provides limited income. These activities are increasingly undermined by erratic rainfall, declining fish stocks, pollution, and rising lake temperatures.

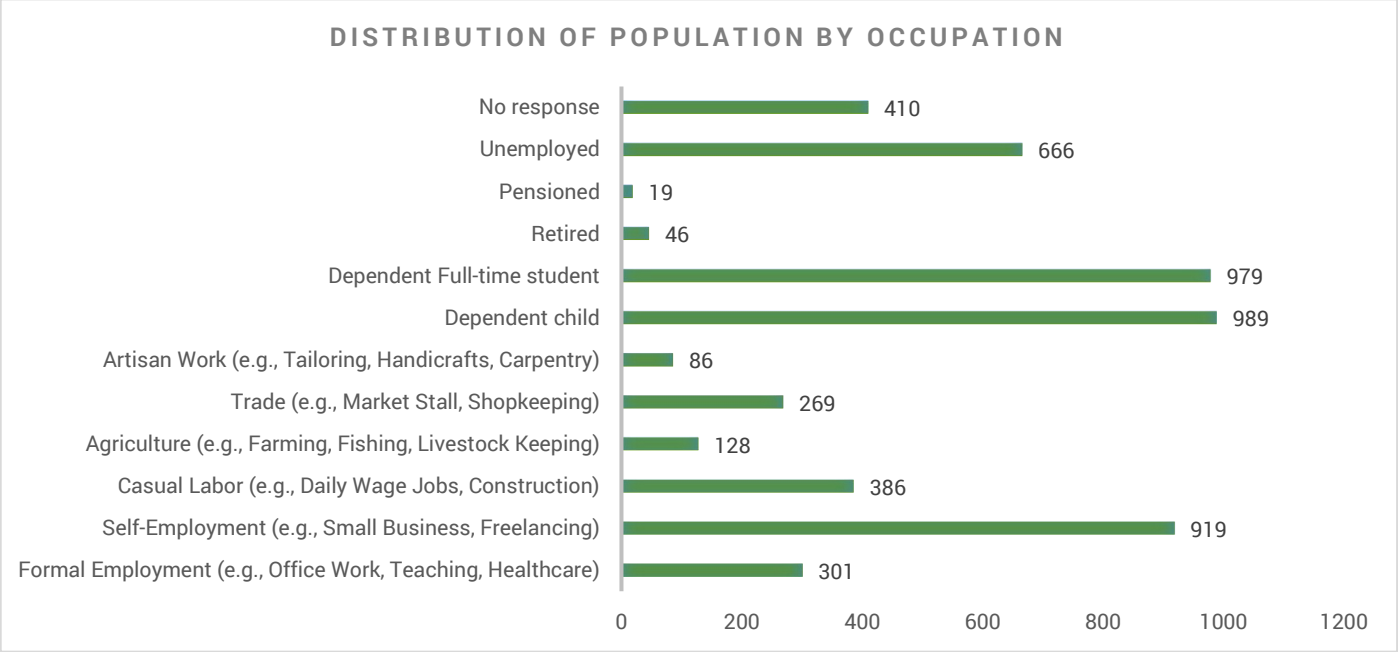


Figure 6: Distribution of Population by Occupation

Artisanal work supports about 1.8% of the population, primarily through carpentry, metalwork, and handicrafts. These trades are typically home-based and rely on local purchasing power, which fluctuates with broader economic and climate-related stresses.

The largest single group, however, is the economically inactive or dependent population, estimated at about 40%.

This group includes children, full-time students, retirees, and individuals who did not disclose their occupation. Their dependence places additional strain on working-age household members and magnifies the effects of income disruptions during floods, droughts, or economic downturns.

2.3.2 Vulnerability of Livelihoods

The livelihoods that sustain most households in Sofia are highly sensitive to climate variability and environmental stress, as confirmed by the Rapid Climate Risk Assessment (RCRA, 2025) conducted in Homa Bay Municipality's informal settlements. The RCRA identifies flooding, prolonged dry spells, temperature extremes, and degraded environmental conditions as the key drivers of livelihood vulnerability across these communities factors that directly affect incomes, food security, and household stability.

Informal traders and service providers are particularly exposed to flooding and drainage problems. Heavy rains quickly turn earthen roads into mud, impeding movement of goods and people and cutting off access to markets or workplaces. When floods inundate homes or roadside kiosks, merchandise is damaged, perishable goods spoil, and small traders lose several days of income. The repeated losses from even minor flood events push many informal workers deeper into debt or force them to rely on high-interest credit to restock.

Rising temperatures further undermine livelihoods by reducing productivity and discouraging outdoor work. Vendors, hawkers, and boda-boda operators endure direct sun exposure that leads to dehydration and heat exhaustion. Higher temperatures also elevate refrigeration costs for perishable products, eroding already thin profit margins for small businesses.

Public-health challenges compound these stresses. Flooded pit latrines and uncollected waste contaminate surface water and create recurrent diarrheal outbreaks. Illness and caregiving demand translate into lost working days and higher medical expenses, both of which drain fragile household budgets. The RCRA links poor sanitation and stagnant water to spikes in malaria and typhoid following every major rainfall event in low-lying clusters of Sofia.

For households dependent on Lake Victoria's fisheries, the RCRA highlights additional climate-driven pressures: fluctuating lake levels, intensified storms, and declining water quality reduce catch yields and endanger fishers' safety. Pollution and algal blooms diminish fish stocks, while limited access to preservation and cold-chain facilities exacerbates post-harvest losses. These effects ripple through the settlement's fish-trading economy, cutting off a critical source of employment and income.

Gender inequalities amplify livelihood risks. Women dominate fish vending, vegetable trading, and household water management activities acutely affected by flood contamination and water scarcity. When fish stocks decline or markets close due to flooding, women experience sharp income losses yet have fewer financial buffers to recover. The RCRA stresses that such gendered disparities restrict adaptive capacity and deepen socio-economic inequality during climate shocks.

2.3.3 Social Safety Nets and Support Systems

Residents of Sofia rely on a mix of informal and formal mechanisms to cushion themselves against livelihood shocks and emergencies. Extended family and kinship networks remain the most important source of assistance, providing both financial and social support. These networks account for about 11.4% of funding for medical expenses, making them the second-largest source after household savings. However, when climate events affect entire communities at once, the ability of relatives to provide meaningful help is quickly diminished.

Community savings groups, or chamas, also operate within the settlement. These rotating savings and credit associations allow members to access small loans for business or household needs. Yet their contribution to major costs, such as medical bills, is minimal, with only 0.6% of households reporting that they financed medical expenses through chamas. This suggests that while they provide short-term financial relief, their reach and capacity remain limited.

Harambees and community fundraisers continue to play a role in times of crisis. These collective mobilisations cover about 1.8% of medical expenses, and are usually activated in response to emergencies such as illness, bereavement, or sudden financial shocks. Their effectiveness depends on community goodwill and prevailing economic conditions, which can be strained during prolonged hardship.

In addition, some households benefit from public assistance and remittances. Government cash transfers, particularly for the elderly, provide a lifeline for vulnerable groups, while remittances from relatives working outside Sofia supplement household budgets. Data indicating that 12% of households report no income suggests that many in this category survive largely on external transfers, whether from family members or state programmes.

2.3.4 Access to Resources

Access to resources that underpin livelihoods in Sofia remains uneven, with disparities in credit, training, and basic services shaping overall vulnerability. Formal financial services are largely absent within the settlement,

and most households cannot meet the requirements for bank loans or microfinance facilities. As a result, residents depend heavily on informal arrangements such as community savings groups and short-term borrowing from relatives or neighbors. These mechanisms provide only small amounts of capital and often lack the scale needed to support significant livelihood expansion or investment in resilience measures.

Skills training opportunities are limited. While a small number of residents access vocational courses through local institutions or church-based programmes, most youth and adults lack structured pathways to acquire technical skills that would increase their employability. This gap leaves many confined to casual labor and petty trade, perpetuating cycles of low income and economic insecurity.

Access to productive resources such as land and secure premises for business is also constrained. Many traders operate from temporary structures or roadside stalls without tenure rights, making them vulnerable to eviction or loss of stock during enforcement actions. Women, in particular, face barriers in both land ownership and access to credit, reducing their ability to expand businesses or improve housing.

In addition, linkages to government or NGO programmes that provide social protection, training, or enterprise support are inconsistent. Households that do not benefit from such initiatives rely almost exclusively on fragile informal systems, leaving them more exposed during economic or environmental shocks.

2.4 Infrastructure and Services Baseline (WASH, Housing, Roads, Drainage, Energy, Health)

2.4.1 Water, Sanitation, and Hygiene (WASH)

Water access in Sofia is diverse but remains unreliable, costly, and highly sensitive to climate variability. Only 31.2% of residents receive piped water directly from HOMAWASCO, while the majority rely on alternative sources such as water vendors (12.3%), communal taps (11.4%), rainwater harvesting (10.6%), kiosks (8.7%), tankers (8.7%), and natural sources such as rivers and streams (6.8%). These alternatives particularly kiosks and vendors are often unregulated and expensive, with 25.5% of households spending more than 30% of their income on water.

During prolonged dry spells and rising temperatures, as highlighted in the Rapid Climate Risk Assessment (RCRA, 2025), these informal water sources become unreliable or dry up entirely, forcing residents to depend on contaminated shallow wells or expensive trucked water. Conversely, intense rainfall and flooding frequently damage water kiosks and pipelines, interrupting supply and contaminating surface and groundwater. Distance to reliable water points and limited household storage capacity heighten this vulnerability, leaving many residents exposed to recurrent water scarcity and waterborne diseases such as cholera, dysentery, and typhoid.

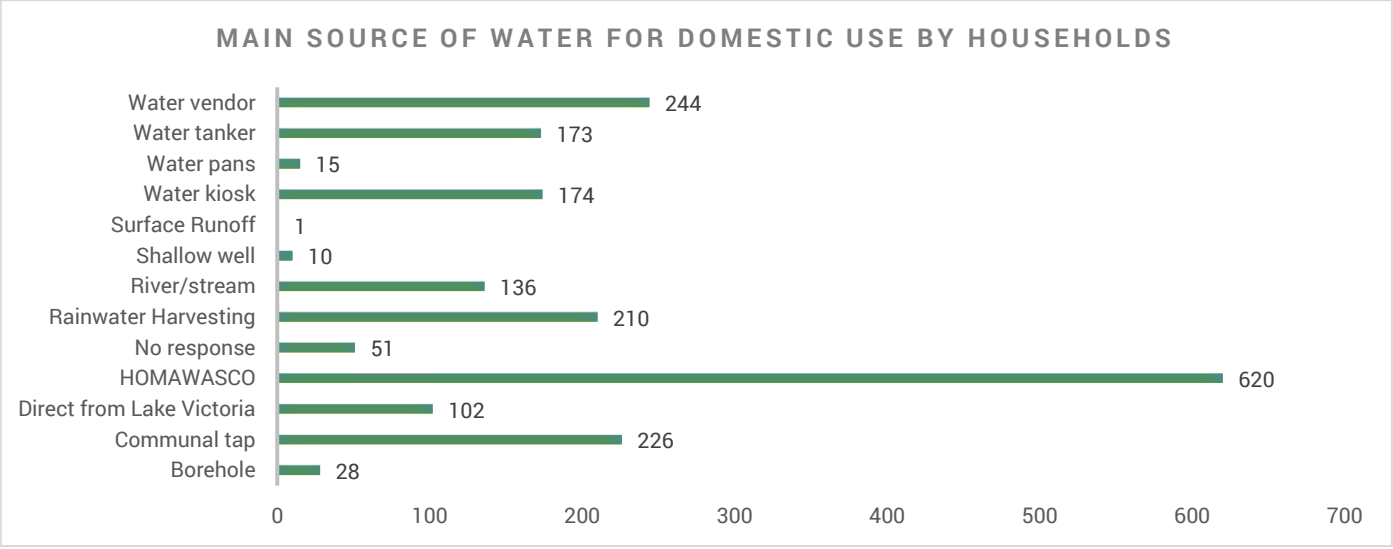


Figure 7: Main Source of water for domestic use by Households

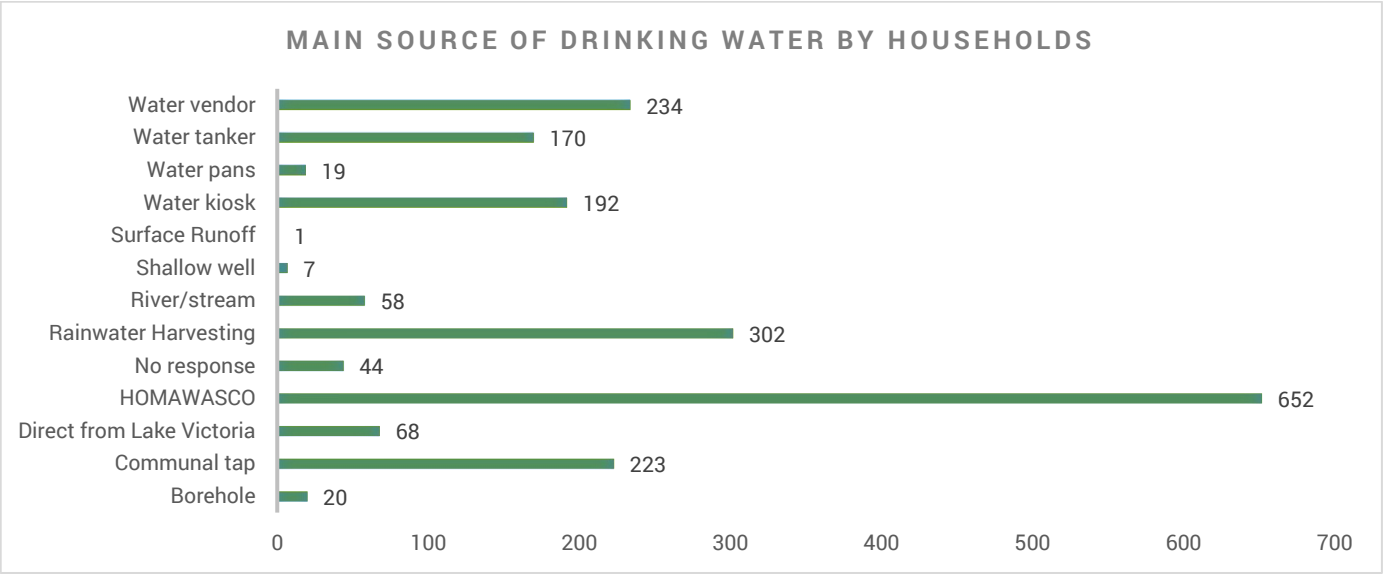


Figure 8: Main Source of drinking water by Households

Sanitation facilities are dominated by pit latrines, used by 93.7% of households. Most are shared, unlined, and poorly located, making them extremely vulnerable to flooding and groundwater contamination. During heavy rains, many latrines overflow, spreading effluent into surrounding compounds and drainage channels, thereby compounding health risks and contributing to cholera outbreaks. Access to improved sanitation remains extremely limited: only 5.2% of households use flush toilets connected to a sewer, while 0.7% have flush toilets not connected to a proper septic system. A small fraction (0.3%) still practices open defecation, mostly in low-lying zones that become inundated during floods.

Solid waste management is equally inadequate. A majority (87.4% of households) dispose of waste informally dumping into open spaces, drains, or near watercourses. During heavy rainfall, this waste is washed into drainage systems and Lake Victoria, clogging channels and intensifying flooding while also polluting surface water. The accumulation of waste around homes further worsens heat retention and sanitation conditions, especially during dry seasons when organic waste decomposes quickly under high temperatures, attracting vectors and pests.

Photo 5: Solid Waste Dispersal on the Road

2.4.2 Housing and Shelter

Housing in Sofia reflects a mix of informality and gradual formalization, with significant implications for climate resilience. Large portions of the settlement consist of single-storey iron-sheet dwellings built with minimal foundations and little spacing between structures. These units dominate the northern side of the settlement and the strip bordering Shauri Yako, where unregulated subdivision has produced dense clusters that restrict air circulation, drainage, and emergency access. Such compact layouts exacerbate heat accumulation during dry seasons and floodwater stagnation during heavy rains, as highlighted in the Rapid Climate Risk Assessment (RCRA, 2025).

Overcrowding remains common not only because plots are small but also because many dwellings are subdivided into very tight rooms that lack adequate ventilation. These conditions heighten indoor heat stress and increase the risk of respiratory and vector-borne diseases when humidity rises after floods. The absence of storm-resistant materials and secure foundations makes informal structures especially prone to leakage, collapse, and rapid deterioration during prolonged rainfall or strong winds.

In contrast, some pockets of Sofia show signs of incremental upgrading, featuring permanent materials such as masonry walls and concrete floors, and even a few multi-storey rental apartments. While still a minority, these investments demonstrate residents' willingness to improve housing quality where tenure is secure and income allows. They also illustrate the potential for climate-resilient construction techniques, such as raised plinths, reinforced walls, and improved roofing, which can reduce flood impacts if scaled across the settlement.

Tenure patterns reinforce the economic pressures facing households. Rent remains a major burden, with 46.88% of

households spending more than 30% of their monthly income on accommodation. This limits households' capacity to adopt resilient construction practices, install drainage improvements, or retrofit homes with heat-reducing features like ventilation and insulation. For tenants, insecurity of occupancy discourages investment in durable materials, leaving them dependent on short-term coping measures rather than long-term adaptation.

2.4.3 Roads and Transport

The transport network in Sofia is shaped by a clear hierarchy but constrained by poor surface quality and lack of drainage. The Homa Bay–Rongo Road, a major arterial route, cuts directly through the settlement, providing the primary connection to Homa Bay town and regional destinations. This road is the main formal corridor and is critical for student commuters, workers, and traders moving goods in and out of the settlement.

On the western edge of Sofia, a collector road links the Homa Bay–Mbita arterial with the Homa Bay–Rongo arterial, running through Sofia and Shauri Yako. This road defines the settlement's boundary and provides an important secondary route, channeling traffic between the two main arterials while also serving adjacent residential and commercial activities.

The majority of the internal road network consists of local access roads and footpaths. These are mostly earthen, narrow, and poorly serviced, with little provision for drainage. During rainy periods, they become muddy and, in some cases, impassable, isolating households from the arterial and collector roads. This disrupts daily activities, including access to schools, markets, health facilities, and employment opportunities.

Given the poor conditions of local access roads, boda-boda motorcycles have become the dominant mode of transport within Sofia. They are able to navigate narrow tracks and waterlogged areas, but their reliance increases household transport costs and limits the efficient movement of goods. For students and workers, transport is often unreliable and unsafe, while emergency response is severely hindered by the lack of properly engineered roads.

Sofia's road system reflects the contrast between formal regional connectivity and local inaccessibility. While the arterial and collector roads provide external linkages, the settlement's dependence on informal local access roads perpetuates high costs, reduced mobility, and isolation during floods. Upgrading local roads to all-weather standards, improving drainage, and establishing pedestrian pathways are essential for strengthening mobility and resilience.

2.4.4 Drainage Systems

Sofia largely lacks a formal, engineered stormwater drainage network. In most parts of the settlement, stormwater is channeled through natural streams, shallow depressions, and informal swales that double as drainage lines. These natural routes are frequently encroached upon by housing, access roads, and footpaths, leading to blockages and localized flooding during heavy rainfall.

Engineered or grey drainage systems exist only along a few tarmacked roads. The Homa Bay–Rongo arterial and the road separating Raila Odinga Stadium from the settlement (heading north toward Arunda) are equipped with lined drains and culverts. These provide limited stormwater control along the highway corridors but do not extend into the residential fabric of Sofia. Beyond these sections, most collector and local access roads rely on unlined swales or simply allow water to flow along the road surface. In many places, local access routes and footpaths have no drainage provision at all, leaving them especially prone to erosion and waterlogging.

Flood-prone zones are concentrated along the southeastern and eastern edges of the settlement. Here, the combination of lower elevations and steep upstream catchments funnels runoff into built-up areas, intensifying flood risk. Community feedback indicates that stormwater frequently drains along road swales such as the C19 road, contributing to downstream erosion and flooding. Hydraulic modelling from the Climate Risk Assessment confirmed that peak flood depths can exceed 50 cm along the main flow paths, although these are generally away from major permanent structures. Nevertheless, seasonal rains regularly cause road washouts, soil erosion, and property damage, particularly in areas where drainage is absent or obstructed.

2.4.5 Energy Access

Energy access in Sofia is relatively high for lighting but remains unsustainable and climate-vulnerable for cooking. About 73.5% of households are connected to the national electricity grid, while 21.1% rely on solar power for household lighting. The remaining 5.4% depend on candles, kerosene lamps, or battery-powered torches sources that provide minimal illumination, pose fire hazards, and impose recurrent costs on low-income families. Although grid connectivity is comparatively strong, power outages are frequent during storms and floods, as noted in the Rapid Climate Risk Assessment (RCRA, 2025), disrupting lighting, safety, and communication.

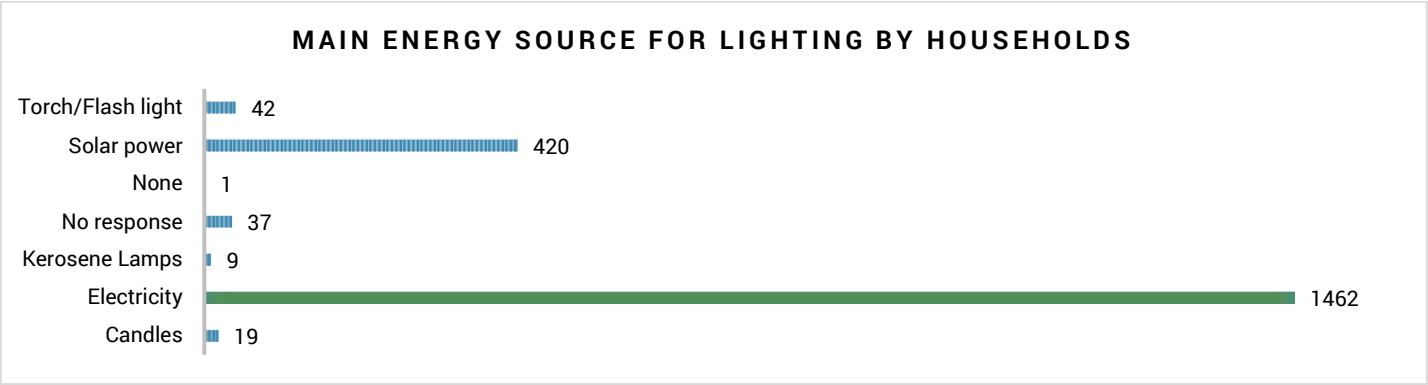


Figure 9: Main energy source for Lighting by Households

Cooking practices are overwhelmingly dependent on biomass fuels, dominated by charcoal (43.7%) and firewood (19.9%), while 5.7% of households use improved charcoal stoves. This means that more than half of Sofia's residents rely primarily on wood-based fuels. The use of biomass for cooking has significant climate, environmental, and health implications. Charcoal production contributes to deforestation and land degradation in nearby rural areas, exacerbating regional climate stress through loss of carbon sinks. Within the settlement, burning charcoal and firewood in poorly ventilated iron-sheet dwellings generates indoor air pollution and heat accumulation, increasing the prevalence of respiratory illness and heat stress especially among women and children who spend more time indoors.

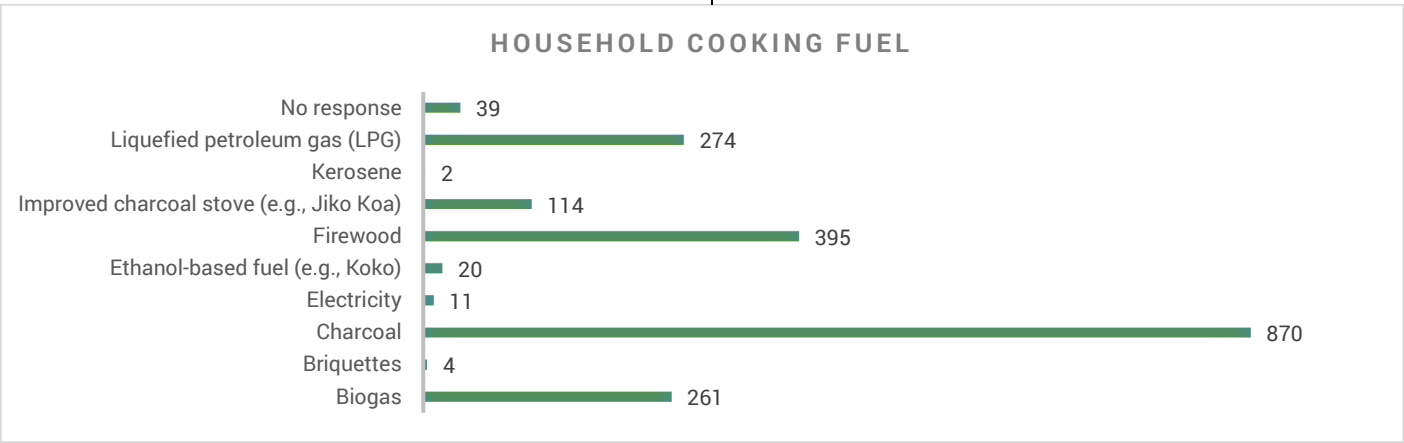


Figure 10: *Household Cooking fuel*

Cleaner energy options such as liquefied petroleum gas (LPG), biogas, or modern energy-efficient cookstoves remain rare due to high upfront costs, limited distribution networks, and inconsistent supply chains. The RCRA identifies this dependency on unsustainable fuels as both an environmental driver of emissions and a social barrier to resilience, locking households into costly and unhealthy energy cycles.

Expanding access to affordable, renewable, and climate-resilient energy systems is therefore critical. Transitioning households to LPG, solar-powered cookstoves, or mini-grid solutions would reduce exposure to indoor pollution, lessen deforestation pressures, and enhance energy reliability during floods or power disruptions. Additionally, promoting community-managed solar lighting and clean-energy cooperatives can strengthen local ownership and reduce the gendered burden of energy insecurity.

While electricity access for lighting in Sofia is relatively strong compared to other informal settlements, the continued reliance on charcoal and firewood underscores an urgent need for a sustainable energy transition that aligns with Kenya's National Energy Policy (2018), the Homa Bay County Climate Change Act (2023), and the RCRA (2025) recommendations for low-carbon and health-safe energy solutions.

2.4.6 Health Infrastructure and Services

Health service provision in Sofia is uneven and climate-sensitive, both in terms of availability and accessibility. Public hospitals are the primary providers of care, serving about 68% of households, while 13.3% seek treatment at private hospitals and 5.3% depend on community clinics for basic services. Only a small proportion of residents rely on pharmacies or traditional healers (3.6%). However, most health facilities that serve Sofia's population are located outside the settlement, creating long travel distances and physical barriers, particularly during the rainy season when access roads are flooded or eroded.

The Rapid Climate Risk Assessment (RCRA, 2025) highlights that flooding and poor drainage frequently disrupt mobility and health service delivery in informal settlements like Sofia. During intense rainfall, impassable roads and stagnant water delay emergency evacuations and limit outreach by health personnel. In contrast, heat stress and water scarcity during dry seasons heighten the prevalence of dehydration, respiratory illness, and vector-borne diseases such as malaria and dengue. This dual exposure to flooding and heat extremes increases the overall disease burden and stretches already limited health resources.

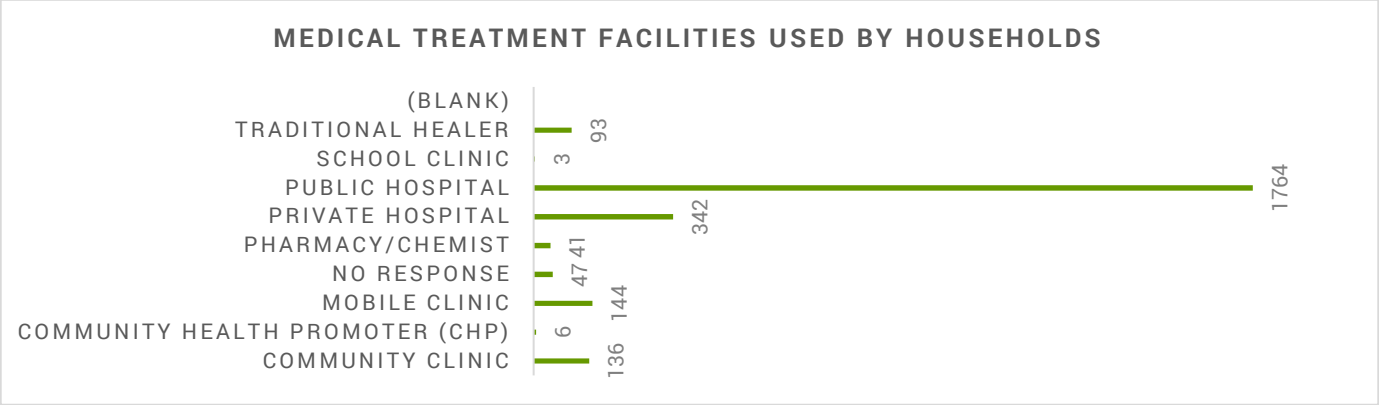


Figure 11: Health facilities used by the households

Health financing is another major vulnerability. Medical expenses are overwhelmingly paid out-of-pocket, with 79.3% of households using personal savings to cover costs. Support from relatives accounts for 11.4%, while 2.6% rely on loans and 1.8% turn to community fundraising or harambees during emergencies. The low uptake of health insurance leaves most residents financially unprepared for disease outbreaks, accidents, or climate-related emergencies such as flood-induced injuries and waterborne epidemics.

Accessibility remains a persistent challenge. About 55% of households are within a 30-minute walk of a health centre, but 28% report travel times exceeding one hour. Long travel distances and inadequate road infrastructure discourage preventive care and delay treatment for acute conditions. These delays worsen during floods, when inundated roads and blocked drainage isolate households, especially in low-lying zones of northern Sofia. Limited mobility also restricts the delivery of emergency supplies, vaccines, and mobile clinic services during extreme weather events.

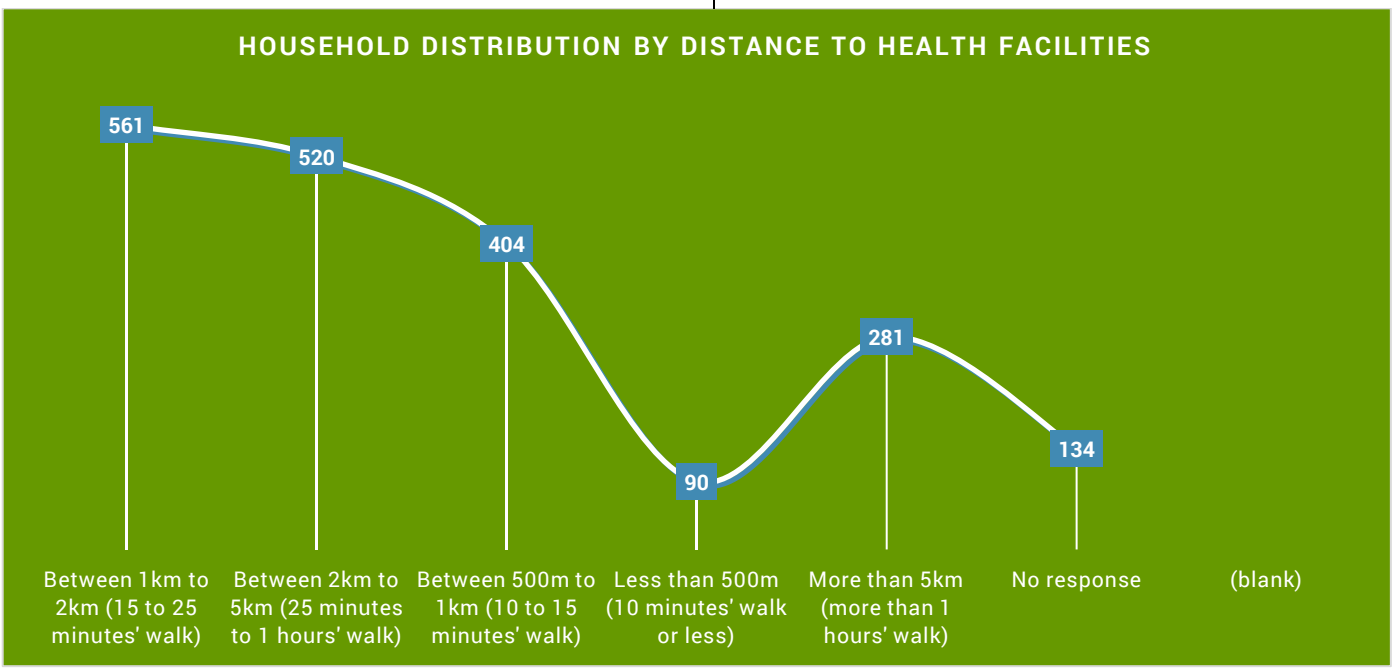


Figure 12: Household Distribution by Distance to Health Facilities

The combination of low insurance coverage, high out-of-pocket costs, and poor physical access means that healthcare remains a heavy financial burden for many households. This situation reduces resilience to climate-sensitive diseases such as malaria, cholera, and diarrhoeal infections, which are expected to intensify under conditions of flooding and rising temperatures.

2.5 Land Use and Physical Planning Analysis

2.5.1 Existing Land Use Overview

Sofia's land use composition reflects the characteristics of a dense informal settlement where residential and small-scale commercial functions dominate, leaving very little room for public facilities or green areas. Broad land-use estimates derived from the Arujo survey provide useful insights but should be read with caution, as the data primarily came from developed compounds. As such, the percentages highlight general patterns but do not represent the full distribution of all parcels within the settlement.

Residential uses form the bulk of the settlement, with high densities driven by the subdivision of plots into small rental units. These units are typically clustered in multi-tenant compounds, while more formal housing and multi-storey apartments are beginning to emerge in parts of the settlement closer to arterial roads.

Commercial land use accounts for an estimated ~3.8%, concentrated along main roads and intersections. These include kiosks, small shops, and local markets that serve both residents and neighboring settlements. Mixed-use development represents about ~2.2%, generally in the form of home-based enterprises or buildings where ground floors host shops and upper floors provide accommodation.

Educational land use is very limited, estimated at ~0.96%, which is inadequate given the large youth population.

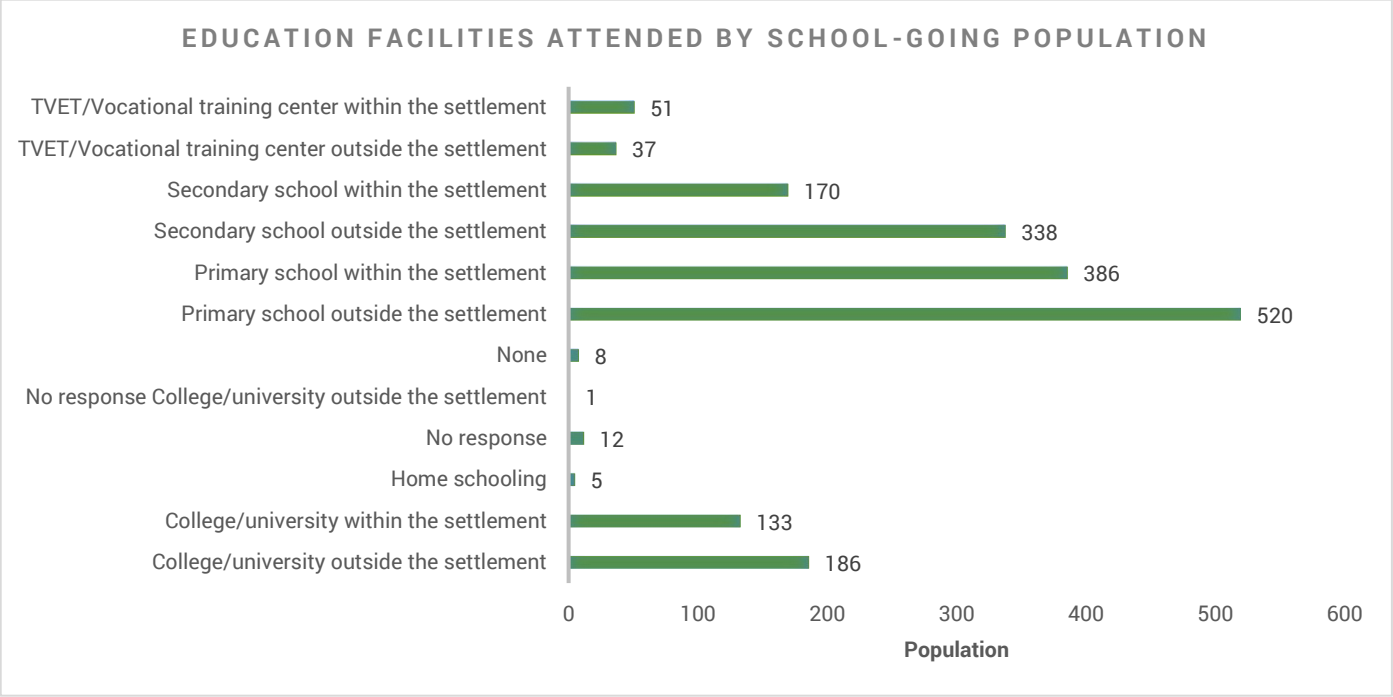


Figure 13: Education facilities attended by the school going population

Industrial activities are almost absent, covering only about ~0.32%, leaving little scope for local manufacturing or small-scale processing. Public purpose and utility use each occupy around ~2.47%, with plots used for churches, community halls, health posts, and water points. Vacant or undeveloped land is extremely scarce, estimated at less than 0.2%, underscoring the near-total build-up of the settlement and the challenges of identifying space for future expansion or open areas.

The current land-use pattern is heavily skewed towards residential and commercial uses. This imbalance constrains the provision of schools, healthcare facilities, recreational areas, and climate buffers such as open green spaces. It also reflects the organic, demand-driven expansion of the settlement in the absence of structured planning controls.

2.5.2 Settlement Morphology and Spatial Patterns

The morphology of Sofia has developed through unplanned and organic growth rather than structured planning controls. Plot shapes are irregular, and building layouts follow the alignment of existing footpaths, access tracks, and natural drainage lines rather than a formal street grid. This has produced a fragmented settlement structure, where housing clusters, informal commercial activities, and community facilities are interwoven without a coherent spatial order.

The central core of Sofia is the most densely developed, with closely packed housing units and multi-tenant compounds. Small kiosks and shops are integrated within these residential blocks, illustrating the settlement's

reliance on informal mixed-use patterns to meet daily needs. These businesses provide essential services to residents but operate without supporting infrastructure such as service lanes, designated loading areas, or waste collection points.

Towards the fringes of the settlement, growth has spread onto sloping ground and into shallow depressions. These edge areas are less consolidated, with a mix of permanent and semi-permanent structures, and often coincide with zones more exposed to erosion and seasonal flooding. Encroachment into riparian corridors and natural drainage ways is particularly evident along the eastern and southern edges, where natural water flows intersect with built-up plots.

The lack of planned open space or continuous public corridors further limits spatial connectivity within Sofia. While there are pockets of vacant land, these are isolated rather than linked into a connected network. This absence of structured public space reduces opportunities for safe pedestrian movement, assembly points, or future integration of green corridors that could enhance environmental management and settlement resilience.

2.5.3 Land Tenure and Ownership Constraints

The land tenure system in Sofia is dominated by rental arrangements, reflecting both the settlement's affordability for low-income households and the limited opportunities for secure ownership. Out of all households, approximately 60.7% are tenants, renting space in multi-tenant compounds or subdivided plots. This high reliance on rental housing provides access to accommodation but discourages long-term investment in durable construction or infrastructure, since tenants lack security of tenure and landlords are often reluctant to commit to major upgrades.

Homeownership is reported by 29.1% of households, but this group is divided between those with and without formal documentation. About 25.5% of households own their homes with valid title deeds, while another 3.6% are owners without documentation, leaving them vulnerable to disputes, eviction, or exclusion from formal service provision. A further 5.3% live in family-owned or ancestral homes, where rights of occupation are socially recognized but may not be formally registered.

Other tenure forms are much less common. Roughly 1.2% of households reside as caretakers, while 0.1% are squatters. These small but important categories illustrate the settlement's layered tenure system, where even marginal arrangements play a role in providing shelter.

Although land disputes are not widespread, with only 1.8% of households reporting eviction threats, the potential impact of even a small number of conflicts can be significant. Uncertainty over ownership or rights of occupation can stall infrastructure projects, complicate upgrading efforts, and create insecurity for households already struggling with limited resources.

Women's land rights remain constrained. While a small proportion of women inherit or retain ancestral land, the majority of female-headed households live as tenants rather than owners. This disparity highlights persistent barriers to women's access to property and secure tenure, which in turn reduces their ability to invest in resilient housing or leverage land as a productive asset.

2.5.4 Physical Planning Gaps and Challenges

Sofia's development has occurred outside the framework of formal planning, creating a number of structural and service-related challenges. Informal land subdivisions and unregulated construction dominate the settlement, obstructing the provision of adequate road widths, drainage corridors, and public spaces. The absence of a cadastral plan or clear spatial framework means that growth has been reactive and piecemeal, rather than coordinated or guided by long-term objectives.

The shortage of land reserved for public facilities intensifies service congestion. Schools, health centers, and markets are limited in number and often overcrowded, forcing many residents to seek services outside the settlement. Utilities such as water points and electricity poles have been installed informally, often without coordination or consideration of hazard exposure, creating additional risks during floods and storms.

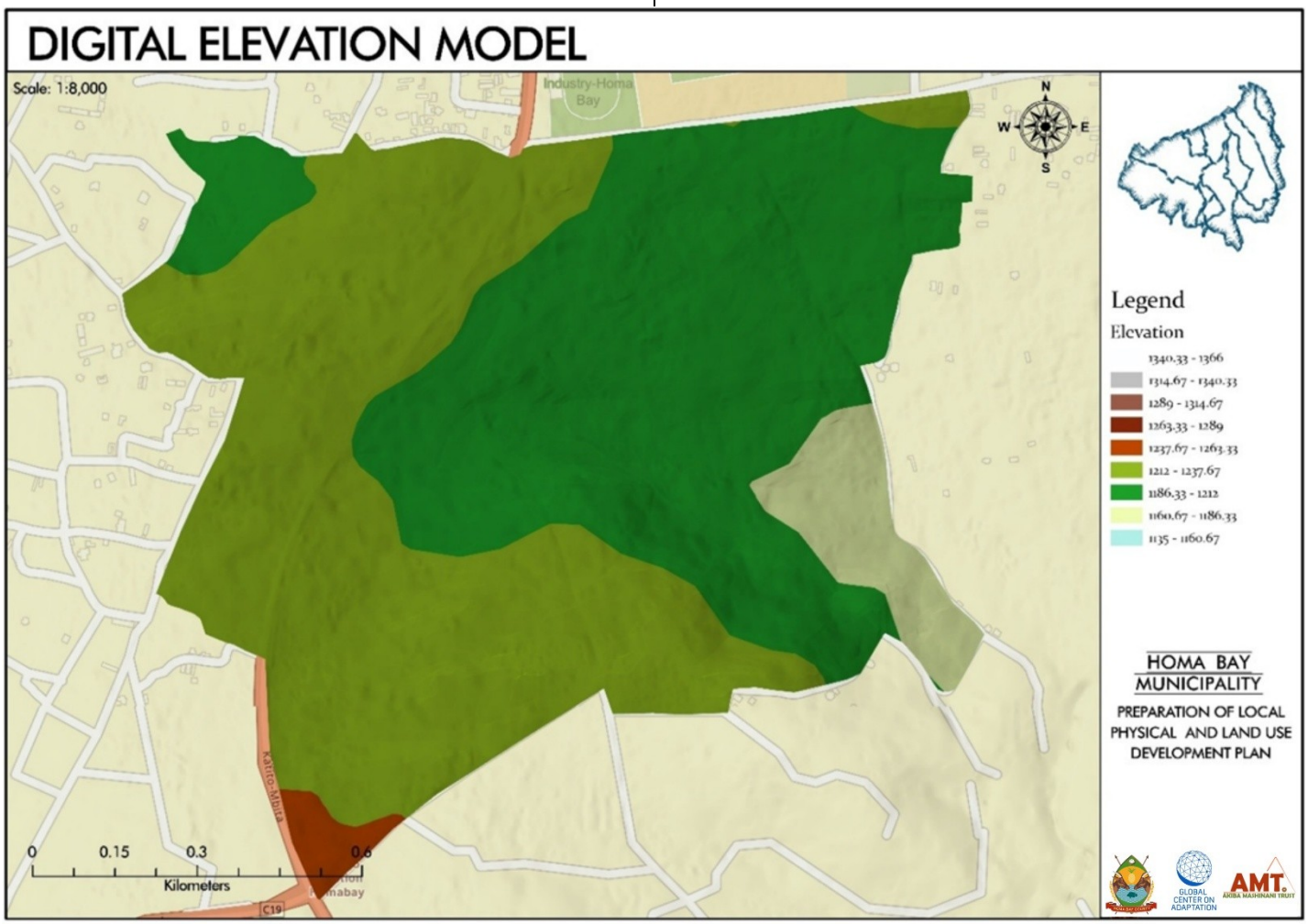
Infrastructure provision has lagged behind rapid population growth. Most access routes remain earthen, prone to erosion and flooding. Reliable stormwater drainage is absent outside a few arterial corridors, leaving the settlement vulnerable to recurrent inundation. Water supply systems are inadequate, sanitation heavily dependent on shared pit latrines, and energy for cooking continues to rely largely on charcoal and firewood, with cleaner options beyond the reach of most households.

Environmental pressures further compound planning gaps. Settlement expansion has encroached into riparian corridors, wetlands, and sloping ground, intensifying risks of flooding, erosion, and soil degradation. Deforestation linked to firewood collection and land clearing has reduced natural buffers, leaving residents more exposed to climate shocks.

Finally, data and governance gaps constrain effective interventions. The absence of updated spatial data makes it difficult to track growth patterns or identify priority areas for intervention. Weak enforcement of building regulations, often linked to unclear or contested land rights, allows non-compliant construction to persist. At the same time, limited community involvement in planning undermines the development of locally appropriate solutions and reduces the effectiveness of governance structures.

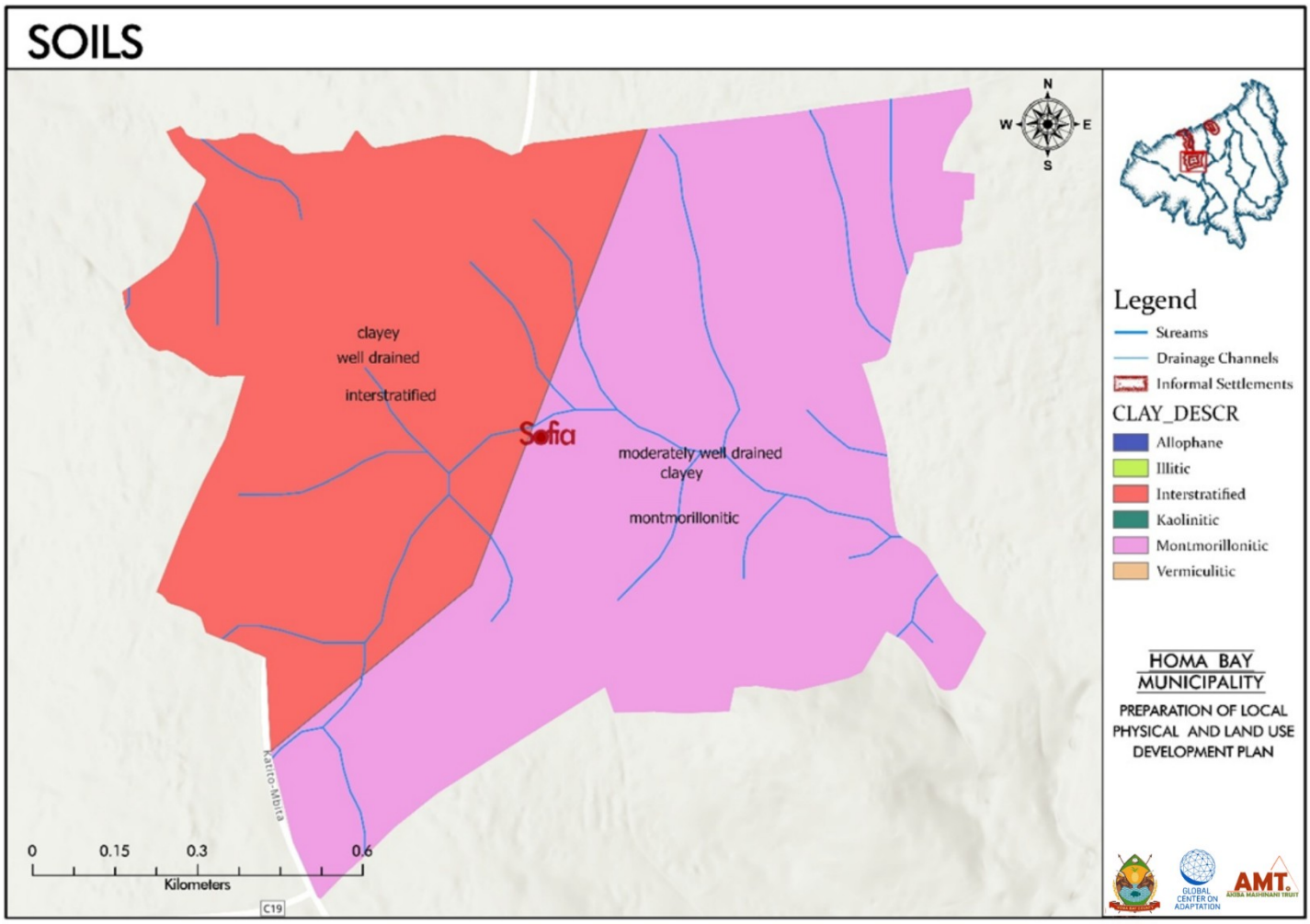
2.5.5 Environmental Constraints and Land Suitability

Sofia's physical environment presents a number of natural constraints that shape both current vulnerabilities and future development options. The settlement sits on gently undulating terrain, with natural drainage channels that converge toward the southeastern and eastern edges. These low-lying areas are inherently flood-prone, collecting runoff from higher ground and concentrating floodwaters during heavy rains. They are best preserved as buffer zones or greenways to reduce flood risk and provide space for stormwater management.



Map 3: *Digital Elevation Model*

Soils within the settlement are generally light and erosion-prone, particularly in areas where vegetation has been cleared to make way for housing. Expansion into sloping ground has accelerated this degradation, creating further instability. Closer to Lake Victoria, the water table is shallow, which increases the risk of latrine seepage into groundwater and undermines the stability of building foundations.



Map 4: *Soil Types*

The limited supply of vacant land makes careful allocation even more critical. Future development should prioritize vertical densification on safer ground, rather than continued horizontal expansion into drainage lines, wetlands, or unstable slopes. Preserving natural drainage pathways and riparian buffers is essential to avoid compounding existing hazards.

Environmental considerations extend beyond flooding and erosion. The dominance of iron-sheet roofing across much of the settlement amplifies the urban heat island effect, raising indoor temperatures and intensifying heat stress for residents. Increasing tree cover, expanding shaded public areas, and encouraging the use of reflective or insulated roofing materials would help mitigate this effect while improving overall habitability.

2.6 Local Governance and Existing Community Structures

2.6.1 Governance Framework

Sofia is administratively located within Homa Bay Municipality, which in turn falls under the jurisdiction of Homa Bay County Government. Governance at the municipal level is overseen by the Municipal Board, which is mandated to guide planning, service delivery, and local development in line with county priorities. The 2010 Constitution of Kenya introduced devolved governance, granting municipalities the authority to prepare local plans and budgets. Within this framework, the Local Physical and Land Use Development Plan (LPLUDP) currently underway provides a platform to integrate climate adaptation measures into settlement-level planning and infrastructure upgrading.

At the community scale, administrative leadership is exercised through area chiefs and village elders, who handle everyday administrative issues, mediate local disputes, and serve as a link between residents and county or municipal authorities. These informal structures remain important in managing settlement affairs, especially in contexts where municipal presence is limited.

National policy instruments also shape governance in Sofia. The National Urban Development Policy (NUDP) emphasizes integrated strategies for transport, housing, water, and sanitation while calling for inclusive and climate-resilient urban development. In practice, however, implementation at the settlement level is constrained by overlapping institutional mandates, limited financial resources, and weak enforcement capacity. As a result, while the policy framework is supportive of integrated, community-driven planning, its impact on informal settlements like Sofia remains uneven.

2.6.2 Community Organizations and Leadership

Residents of Sofia organize themselves through a variety of formal and informal structures that provide social support and collective voice. Community-based organizations (CBOs) are particularly active, including women's savings groups, youth associations, and faith-based groups. These organizations mobilize resources for household needs, run clean-up campaigns, and support vulnerable members. They also contribute to environmental management, especially around shared water points and drainage channels.

At the settlement scale, committees and local governance bodies coordinate with municipal and county officials. Often elected or appointed by residents, these committees represent community interests in discussions on infrastructure projects, disaster response, and dispute resolution. They are an important link between the community and the municipal board, even if their capacity is sometimes constrained by resources.

Informal networks remain central to everyday life in Sofia. Neighborhood associations, chamas, and occupational groups such as fishermen's collectives or market vendors' associations play vital roles in mutual support and resource pooling. Harambees (community fundraisers) are common, especially for emergencies like medical bills or funerals.

Leadership in the settlement also includes local elders, faith leaders, and respected business owners, who provide moral authority, mediate disputes, and mobilize residents for collective activities. Though informal, their influence at the grassroots level is strong and often complements or substitutes for formal government structures.

In addition, political leaders play a significant role in shaping development outcomes. Sofia falls within Arujo Ward, represented by a Member of County Assembly (MCA) who sits in the Homa Bay County Assembly. The MCA is directly responsible for advocating forward-level development funds and prioritizing Sofia in county budgeting and infrastructure projects. Beyond the ward, Sofia is part of Homa Bay Town Constituency, represented by a Member of Parliament (MP) at the national level. The MP influences broader resource mobilization and can support larger-scale development and upgrading efforts in the settlement. Both the MCA and MP serve as important channels through which residents engage with county and national governments, though their effectiveness often depends on political will, alignment with county priorities, and the strength of community advocacy.

2.6.3 Participation in Decision-Making

Public participation in Sofia is framed by Kenya's constitutional and legal requirements, which oblige county governments to involve residents in planning and budgeting processes. Within Homa Bay County, this mandate is coordinated through the Directorate of Stakeholder Management and Public Participation in the Department of Governance, Administration, Communication and Devolution. This directorate provides the formal structure for citizen engagement, although the quality of participation often depends on the resources available and the inclusivity of the methods applied.

In Sofia, residents have been actively engaged in participatory activities linked to ongoing planning processes. Community members took part in the Rapid Climate Risk Assessment (RCRA, 2025) validation workshop, during which they mapped flood-prone areas and identified vulnerable groups. They also attended a sub-location-level validation meeting, where findings were presented and community inputs were incorporated into planning discussions. These events provided residents a platform to articulate local risks and priorities while validating technical findings with lived experiences.

Under the Homa Bay County Climate Change Act (2023), communities are formally represented in Ward Climate Change Planning Committees (WCCPCs) multi-stakeholder bodies responsible for identifying, prioritising, and monitoring climate-adaptation investments financed through the County Climate Change Fund. Although Sofia residents have contributed to informal consultations and adaptation planning under the People's Adaptation Plan, their direct participation in the WCCPC structures remains limited, largely because the committees are still in early stages of operationalisation and awareness of their mandate is low. Strengthening links between Sofia's community groups, local leaders, and the WCCPC will be essential to ensure that community priorities and data from the People's Adaptation Plan inform county-level budgeting and implementation.

Despite these efforts, participation in decision-making remains uneven. Women, youth, and tenants who form the majority of Sofia's population often feel excluded from discussions dominated by male landowners and local elites. For tenants especially, the absence of land ownership reduces their influence over land-use and physical-planning decisions, even though they are the principal residents of the settlement.

To achieve more meaningful engagement, participation processes in Sofia must become more inclusive and accessible. This includes holding meetings in venues that are easy to reach, scheduling sessions that accommodate working populations and caregivers, and using targeted outreach to ensure that women, youth, and marginalised groups are represented. Partnerships with community-

based organisations, schools, faith institutions, and the Ward Climate Change Planning Committee can extend participation beyond traditional forums, building trust and ensuring broader ownership of planning outcomes.

2.6.4 Conflict Resolution Mechanisms

Conflicts in Sofia generally arise from issues of land ownership, tenant–landlord relations, and competition for limited resources such as water points. These disputes reflect both the high tenancy rates within the settlement and the scarcity of space, which intensifies contestation over land use and services.

At the grassroots level, village elders, area chiefs, and the Nyumba Kumi initiative play a central role in mediating disputes and maintaining social order. Nyumba Kumi a community policing structure that groups approximately ten households under a local cluster leader facilitates neighbour-to-neighbour accountability and early conflict resolution. Together with elders and chiefs, Nyumba Kumi leaders handle minor disagreements between tenants and landlords, as well as boundary or inheritance disputes among residents. While their authority is widely respected, their decisions are not legally binding and are often influenced by traditional hierarchies or local politics.

Settlement committees and community-based organizations (CBOs) also intervene in conflict resolution. Acting as neutral arbiters, they provide a platform for residents to voice grievances and facilitate collective solutions, particularly in cases where municipal authorities are slow to respond. These bodies often leverage community trust and social networks, which enables them to resolve disputes informally and prevent escalation.

For more complex or contentious land-related claims, residents may turn to formal courts or the National Land Commission. However, such cases are rare due to the high costs, bureaucratic procedures, and lengthy timelines involved. Many households lack the resources to pursue formal legal action, preferring instead to rely on local mediation.

Strengthening conflict resolution structures in Sofia requires bridging the gap between informal mechanisms and formal institutions. Training local committees, providing legal support for vulnerable groups, and establishing clearer linkages with municipal authorities could improve fairness and transparency. Integrating these mechanisms into broader planning and upgrading initiatives would also help address tenure insecurity and foster cooperation around shared goals, including climate-resilient development

3 CLIMATE RISK ASSESSMENT & VULNERABILITY ANALYSIS

3.1 Climate Hazard Identification

3.1.1 Definition of Climate Hazards

The climate of Homa Bay Municipality is characterized by a bimodal rainfall pattern with a short dry season between January and February and two rainy seasons in March–May and October–December. In this environment, the Sofia settlement is exposed to two principal climate hazards:

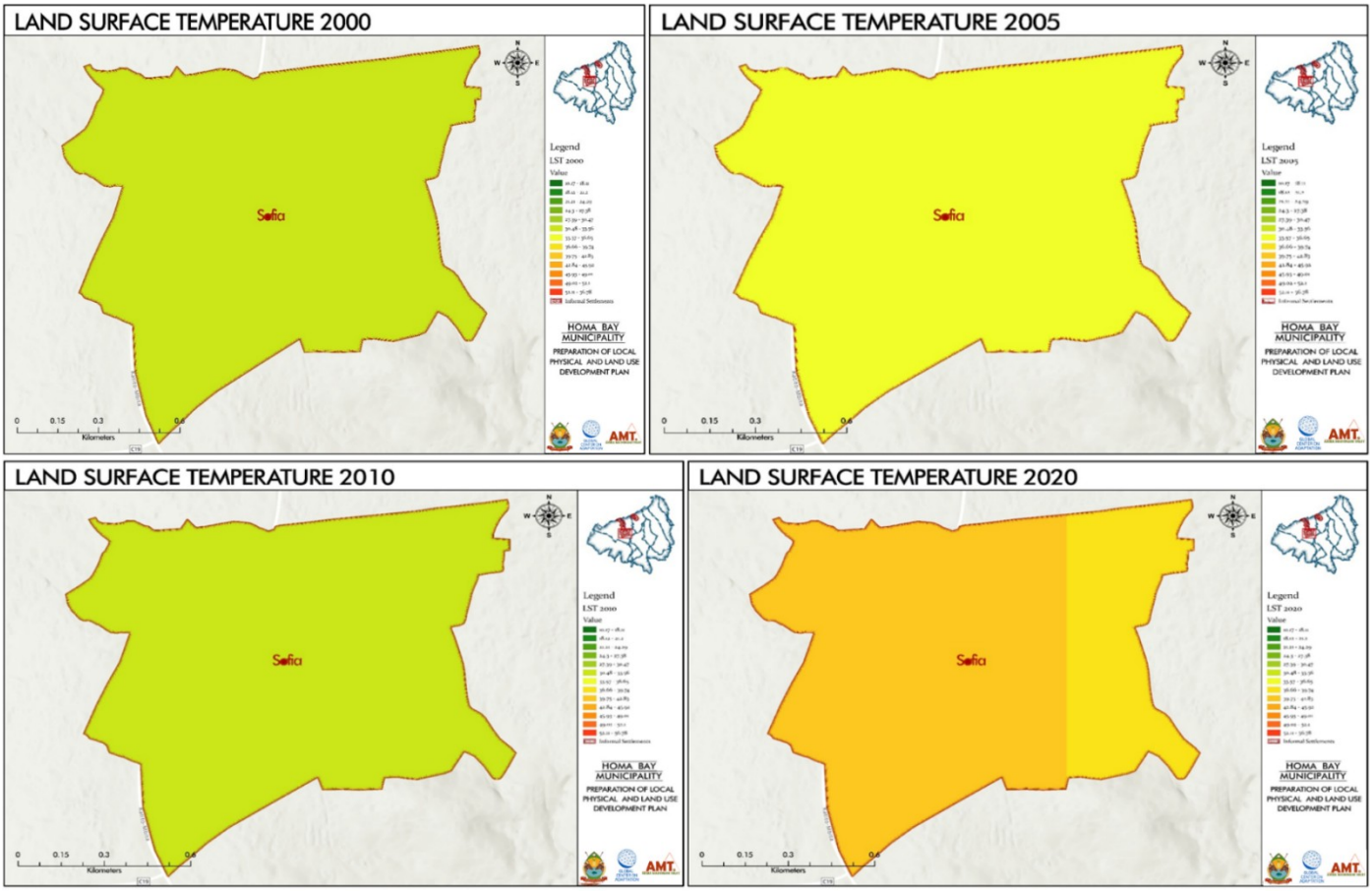
Drought and heat stress – Prolonged dry spells occur during the January–February season and intermittently during the year. Rising temperatures have increased the number of days above 35 °C, exacerbating heat stress. Extended drought reduces soil moisture, dries seasonal streams, lowers shallow groundwater levels and forces residents to travel farther for water. Heat waves also reduce indoor comfort in metal-roofed houses and heighten the risk of fire.

Flash flooding and waterlogging – Intense rainfall events following dry periods lead to rapid surface runoff. Steep slopes and compacted soils, combined with inadequate drainage, cause stormwater to accumulate in low-lying areas of Sofia. Floods result in water depths exceeding half a meter in some channels, severe erosion of unpaved roads and slopes, and inundation of houses built in flood-prone zones. Flood waters remain for several days due to poor drainage, disrupting mobility and contaminating water sources.

3.1.2 Hazards Identification Based on Data

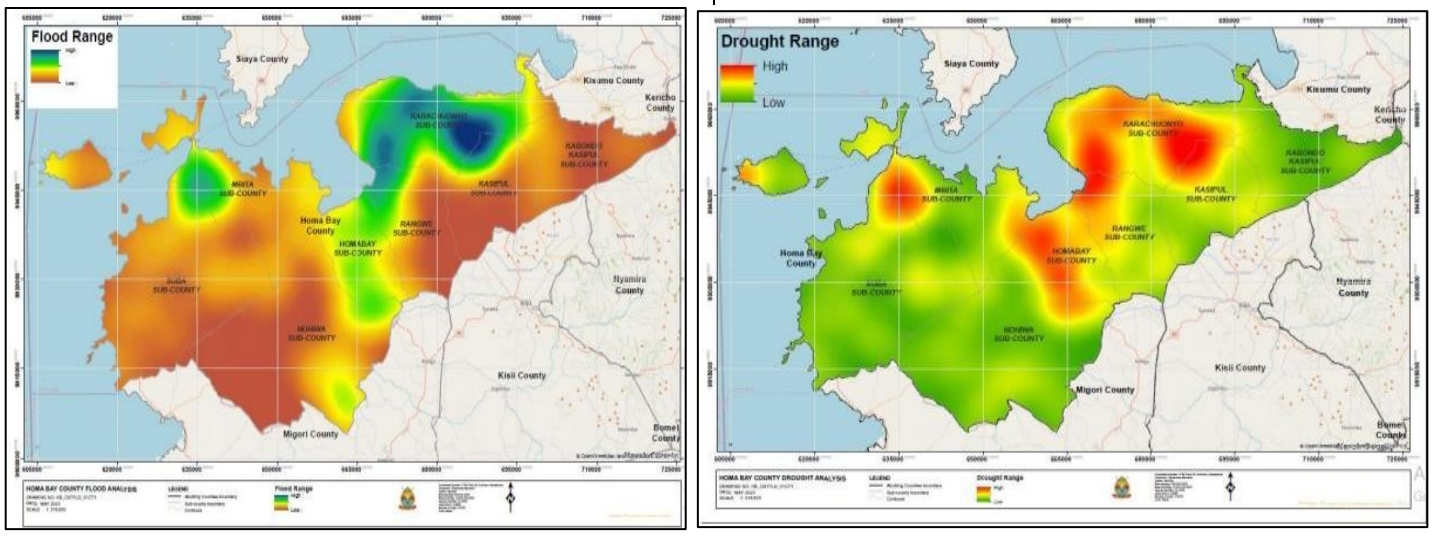
Hazard identification combined hydrometeorological data, a hydrologic/hydraulic study and participatory mapping undertaken with Sofia residents. Key findings include:

Rainfall and temperature trends: Between 1981 and 2022, annual rainfall in Homa Bay County increased by about 12 mm (≈1 %) but exhibited significant variability. The hottest dry season (January–February) has warmed by around 0.3 °C. Climate models project increased rainfall of 40–50 mm by 2035 and up to 120 mm by 2050 and a rise in heatwaves under high-emission scenarios.



Map 5: Land surface temperature trends in Sofia from 2000-2020

Flood hazard zones: Sofia covers roughly 1.45 km² and is spatially dispersed over a small hill. The northern plateau is elevated and drains well, while the south-eastern quadrant slopes downward toward seasonal streams and the C19 road. Participatory maps and hydraulic modelling delineated flood hotspots in the south-eastern catchment where runoff concentrates. Peak flood depths exceed 0.5 m in major flow paths during 1-in-10-year storms, though the deepest flows occur away from existing houses.



Map 6: Flood range in Homa Bay County. Source: Participatory Climate Risk Assessment Report, 2023)

Drought hazard zones: Households on the higher plateau rely heavily on piped water and shallow wells. Only about 31 % of households are connected to the piped water system, and more than half of these connections experience frequent interruptions. During droughts, boreholes and rainwater storage tanks dry up, forcing residents to purchase expensive water or fetch it from Lake Victoria. Distance from the lake limits access during dry spells.

3.1.3 Impact Analysis of Hazards

Flood impacts:

Erosion and infrastructure damage: Unpaved roads (around 89 % of Sofia's network) become channels for runoff. The C19 road acts as a drainage path but its shoulders erode, undermining access to the city. Floodwater inundates houses constructed with corrugated iron sheets and mud walls, damaging assets and increasing indoor humidity.

Contamination and health risks: Communal pit latrines (≈94 % of households) overflow, mixing human waste with stormwater and contaminating shallow wells and surface water. Residents report skin infections, diarrhea diseases and malaria outbreaks following floods.

Mobility and service disruption: Flooded roads prevent boda boda drivers and emergency vehicles from reaching the settlement. Market access is cut off, disrupting food supply and income generation. Children miss school because roads are impassable and schools outside the settlement cannot be reached safely.

Drought and heat impacts:

Water scarcity: Reduced stream flow and groundwater recharge force households to depend on water vendors and Lake Victoria. Women and girls spend hours queueing at the few available water kiosks; water prices rise during dry spells. Limited rainfall reduces rainwater harvesting, as few households can afford storage tanks.

Livelihood losses: Kitchen gardens and livestock, vital sources of nutrition and supplementary income, die off from lack of water. Small-scale agriculture becomes increasingly risky and less productive. Fishing incomes decline because heat-induced algal blooms and fish die-offs in Lake Victoria disrupt catches.

Heat stress: Houses constructed from metal sheets trap heat, making indoor temperatures unbearable during heat waves. Prolonged exposure to high temperatures exacerbates dehydration and exhaustion, particularly for elderly residents and those with health conditions.

3.2 Vulnerability Analysis

3.2.1 Vulnerable groups in Sofia

The vulnerability assessment considered social demographics, livelihoods and socio-economic status:

Women and female-headed households: Women shoulder domestic care responsibilities, water collection and subsistence farming. Approximately 37 % of households in Sofia are female-headed. Only about 32 % of women own land, limiting their ability to use land as collateral or invest in improvements. Roughly 90 % of economically active women work in the informal sector, which offers low pay and no social protection. Gender-based violence increases during crises, and access to legal aid and healthcare remains limited.

Youth: People aged 15–24 make up roughly 34 % of the population. Youth unemployment is extremely high about 59.6 % of unemployed persons fall within this cohort. Limited job opportunities and unstable incomes hinder their ability to invest in resilient housing or savings. Out-migration seeking work increases competition for limited housing and stresses infrastructure in Sofia.

Elderly residents: Although only about 4 % of residents are over 60, older adults face heightened vulnerability due to chronic health conditions, limited mobility and small social networks. Many elderly residents lack pensions because of long-term informal employment, leaving them dependent on family members or neighbors for support.

Low-income and tenant households: Half of households earn less than 6 000 Ksh per month, and around 60 % of families rent rather than own their homes. Nearly 47 % of tenants spend more than 30 % of income on rent. Limited disposable income restricts the ability to invest in resilient housing, and insecure tenure discourages improvements.

Informal workers and small traders: Formal employment accounts for only about 6 % of jobs; most residents rely on informal trading, fishing and casual labour. Livelihoods are exposed to climate variability: storms damage fishing equipment, heat increases fish spoilage, and floods disrupt roadside businesses and small kiosks.

3.2.2 Key socio-cultural vulnerabilities

Sofia's social fabric reflects deep inequalities and systemic barriers that amplify climate impacts:

Gender inequality: Women are underrepresented in decision-making and land ownership. They have limited access to credit and financial services. Time spent on water collection and childcare reduces their capacity to engage in income-generating activities or community planning. Cultural norms often exclude them from technical training and disaster preparedness programmes.

Youth marginalization: A lack of youth-focused vocational training or employment schemes leaves young people underemployed and disengaged. Unstable livelihoods lead to coping strategies such as informal boda boda services, which are themselves vulnerable to flood-related road disruptions.

Poverty and food insecurity: Low household incomes intersect with high food prices. Floods and droughts reduce local crop yields and fish catches, driving up the cost of staple foods such as vegetables and fish. Households can rarely absorb these price shocks, increasing reliance on remittances and debt.

Health inequities: Access to healthcare is limited; 28 % of residents travel over an hour to reach a clinic. Floods make these journeys longer, while droughts increase the incidence of waterborne and vector-borne diseases. Women bear additional health burdens linked to pregnancy, maternal care and exposure to indoor pollution from charcoal stoves.

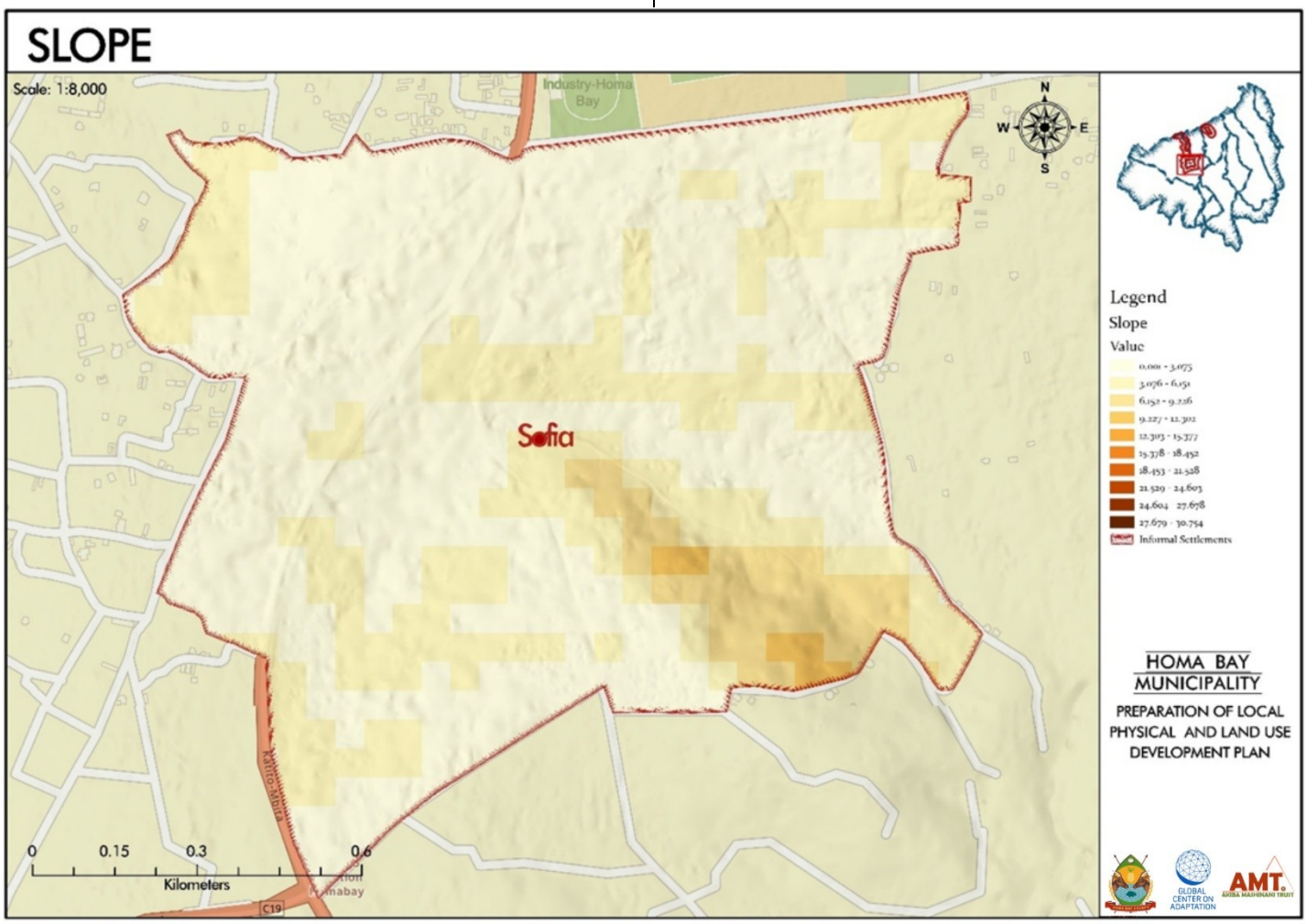
3.3 Exposure and Sensitivity Mapping

3.3.1 Spatial and Environmental Characteristics

Sofia is geographically distinct among Homa Bay's informal settlements:

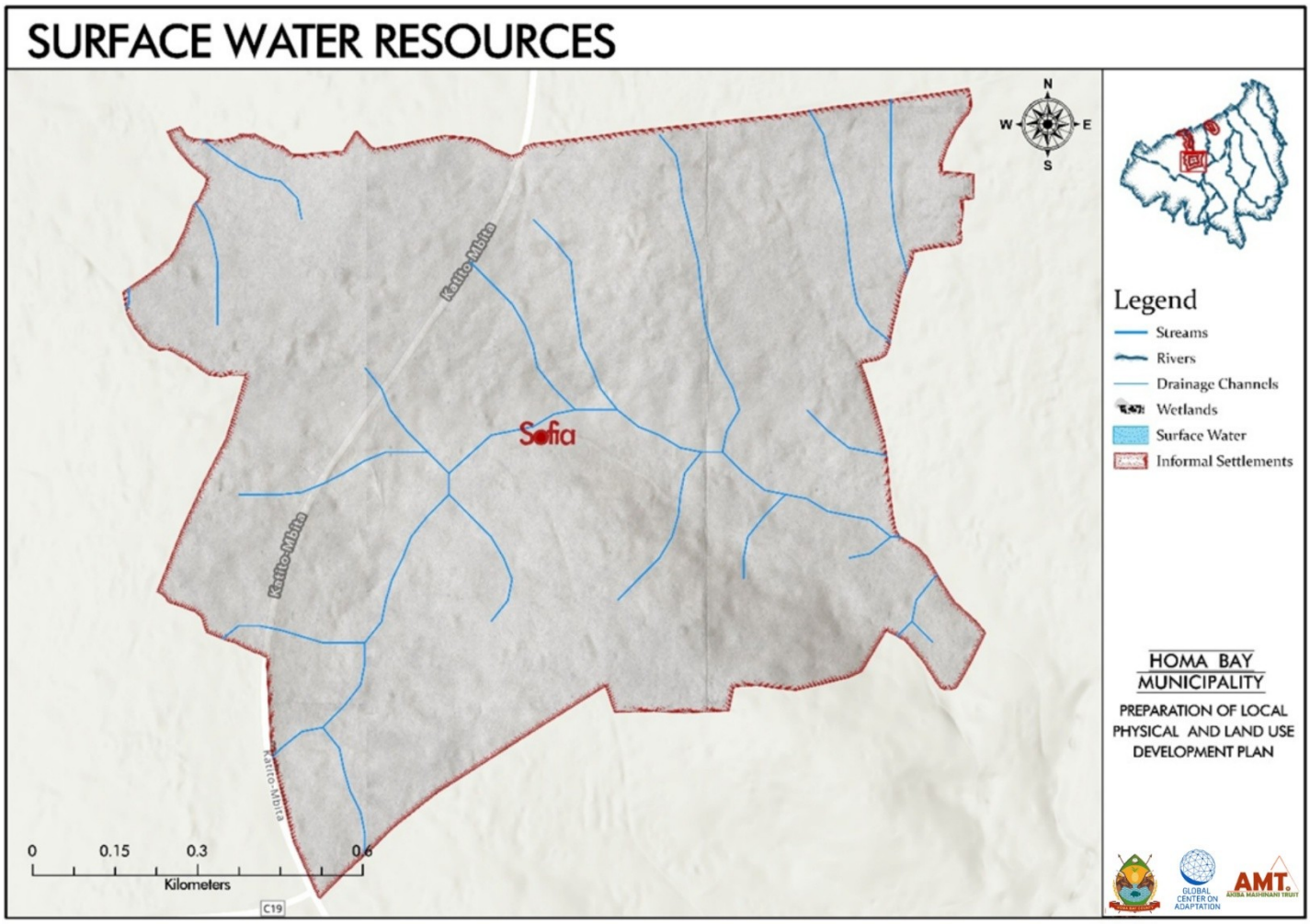
Area and layout: With an area of roughly 1.45 km², Sofia is the most spatially dispersed informal settlement. Housing clusters occupy the north-west, while the south-eastern portion contains vacant or vegetated land. The north-western plateau is relatively flat and less flood-prone; the south-eastern slope drains toward low-lying areas. The C19 road, running along the eastern boundary, divides the settlement and serves as a conduit for runoff.

Topography and soils: The north-western plateau comprises stable interstratified clayey soils well suited for construction. The south-eastern areas are underlain by montmorillonitic clays that swell when saturated and crack when dry, making structures prone to subsidence and landslides. Slopes and gullies direct runoff into narrow channels, increasing flow velocities and erosion.



Map 7: Slope of Sofia

Hydrology: Sofia's proximity to Lake Victoria provides potential water resources but also influences the microclimate. Seasonal streams cross the settlement; during heavy rains they overflow, while in dry seasons they dry out completely. Groundwater levels fluctuate seasonally, and shallow wells are vulnerable to contamination during floods.



Map 8: *Surface Water Drainage*

Vegetation and green spaces: Vegetation cover is patchy. Some tree belts exist along drainage lines and around housing clusters, providing limited shade and soil stability. However, rapid in-migration and the demand for building materials have reduced tree cover, exposing soils to erosion.

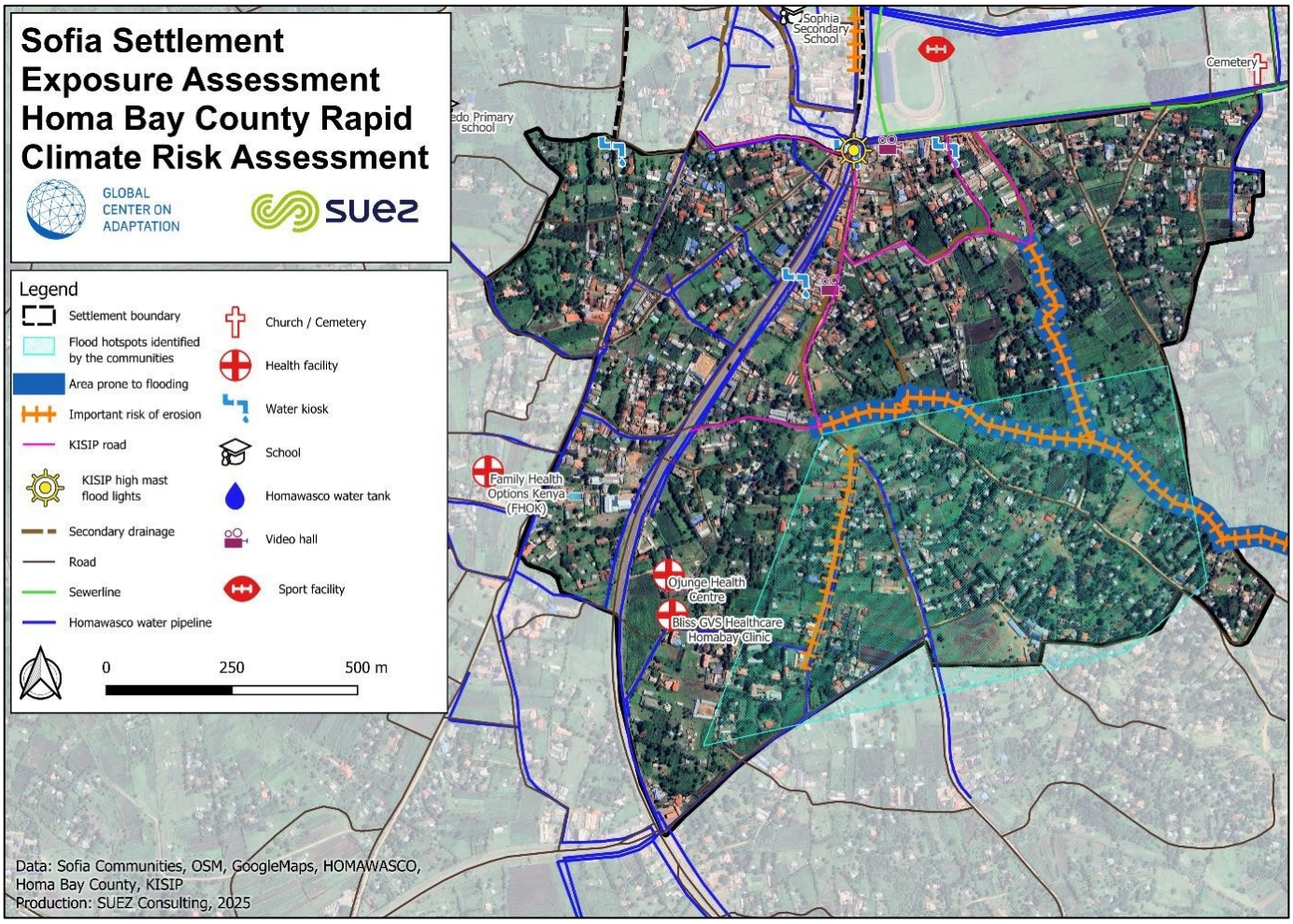
3.3.2 Asset Exposure

The mapping exercise identified the following assets and their sensitivities:

Asset/Land Use	Location & Condition	Sensitivity and Exposure
Housing	Scattered clusters mostly in the north-west; predominantly single-storey; constructed from corrugated iron sheets and mud bricks.	Highly sensitive to flooding and heat. Metal roofs absorb and radiate heat, making houses uncomfortable during heat waves. Walls and foundations deteriorate when exposed to floodwater, especially on unstable soils in the south-east.
Road and Mobility Network	Approximately 89 % of internal roads are unpaved earth or gravel. C19 road bisects the settlement and connects to Shauri Yako.	Highly exposed to erosion and waterlogging; roads become impassable during rains, delaying emergency response and increasing transport costs.
Water infrastructure	About 31 % of households have piped water; supply disruptions affect over 52% of connections. Water kiosks are limited, and some households rely on private vendors or shallow wells.	Extremely sensitive to drought and contamination. Plastic pipes crack in heat; floods damage exposed pipelines and contaminate wells.
Sanitation facilities	Communal pit latrines serve about 93.7 % of households. There is no sewer system.	Highly exposed to overflow during floods, causing contamination of surface water and the lake; poor sanitation exacerbates waterborne diseases.

Energy infrastructure	Around 73.5 % of households are connected to the grid; about 21 % use solar power.	Vulnerable to storm-related outages; theft and vandalism reduce reliability of solar installations.
Health and Education	Few facilities exist within the settlement. Residents travel long distances to schools and clinics, mainly located in Shauri Yako or Homa Bay town.	Access is highly sensitive to road conditions and extreme weather; floods impede travel, while heat affects attendance and learning environment.
Livelihood infrastructure	No formal market exists within Sofia. Informal businesses operate along roadsides. Fishing and small-scale agriculture occur on the fringes.	Markets lack sheltered spaces and drainage, leaving goods exposed to floods. Fishing equipment is damaged by storms; gardens and livestock suffer during drought.
Natural assets	Scattered vegetation, small wetlands and seasonal streams.	Provide limited ecosystem services such as shade, erosion control and infiltration but are degraded by encroachment and waste dumping.

Table 2: Asset Exposure and Sensitivity



Map 9: Sofia exposure map (Source: SUEZ Consulting, 2025)

Photo 6: Impacts of flood along a road in the south of Sofia (©Google Street View, November 2021)

3.4 Sensitivity to Climate Change Impacts

3.4.1 Community Assets and Sectors Sensitive to Climate Variability

Water supply systems: Ageing piped networks and limited storage capacity make water supply extremely sensitive to climatic variability. During droughts, supply shortages force households to purchase expensive water. During floods, pipes burst and wells become contaminated. The high chemical content of Lake Victoria during rains reduces trust in the piped supply, pushing households to rely on unregulated sources.

Sanitation: Heavy reliance on communal pit latrines means flooding events can quickly turn into public health crises. Overcrowded facilities and the absence of a sewer system amplify disease risks.

Housing and land: Many houses are located on flood-prone slopes with unstable clay soils. Poor construction materials, inadequate foundations and lack of elevation exacerbate sensitivity to floods. Insecure tenure discourages investing in resilient structures or relocating to safer areas.

Mobility network: Earthen roads deteriorate quickly under heavy rainfall, making transport unreliable. Motorcycles the primary means of transport are costly during floods. Narrow informal pathways hamper emergency response and restrict access to health services.

Livelihoods and food security: Fishing, small-scale trading and urban agriculture are sensitive to climatic shocks. Lake warming leads to fish die-offs, reducing supply and income. Floods damage roadside stalls and spoil goods. Droughts reduce crop yields and pasture, increasing food prices. Approximately 18.9 % of residents are self-employed, indicating that shocks directly threaten household income.

Health and education: Health facilities are stretched and poorly equipped to handle climate-induced disease outbreaks. Long travel distances to clinics and schools mean disruptions during floods and heat waves. Women shoulder the majority of health care and education responsibilities, amplifying their vulnerability.

Energy and waste: Electricity supply is inconsistent, and solar panels are vulnerable to theft. Illegal dumping obstructs drainage, heightening flood risk and spreading toxins. Waste management lacks capacity; 87.4 % of households report dumping waste illegally.

3.5 Interactions Between Hazard, Exposure, and Vulnerability

The climate risk faced by Sofia results from the intersection of hazards, the spatial exposure of assets and the socio-economic vulnerability of residents:

Hazard–Exposure interaction: Floods interact with flood-prone topography and poorly drained infrastructure. Low-lying areas, unpaved roads and informal pathways act as channels for runoff. Houses built on unstable soils experience structural failures. Droughts interact with limited water infrastructure; supply shortages are more acute for households far from Lake Victoria or without piped connections.

Hazard–Vulnerability interaction: Flood and drought impacts are magnified by socio-economic vulnerabilities. Households with low incomes cannot afford to elevate houses, repair roofs or relocate to safer sites. Women and youth face high unemployment and limited savings, constraining adaptation options. Households depending on rainfed agriculture or fishing experience income loss during climatic extremes.

Exposure–Vulnerability interaction: The spatial distribution of assets determines who is most at risk. Tenants often occupy cheaper, flood-prone plots because more stable land is unaffordable. Women's unequal access to land and decision-making power exacerbates their exposure. Youth without education or formal employment remain in precarious occupations that are highly sensitive to climatic events.

These interactions form a triangular risk framework where interventions must address all three components hazard mitigation, reduction of exposure through land-use planning and infrastructure, and vulnerability reduction through social protection and livelihood diversification.

3.6 Capacity to Adapt

3.6.1 Community Adaptive Capacity

Community members have developed adaptive strategies despite limited resources:

Physical measures: Residents install gabions, sandbags and earth bunds around homes to divert runoff and stabilize soils. Some households elevate foundations

using stones or tires. A few households practice rainwater harvesting using improvised gutters and containers during rainy seasons.

Social networks: Informal support systems exist within the settlement. Neighbours share water and food during shortages, provide child care, and contribute labour for drainage clearing. Women's groups and youth savings groups engage in small-scale savings and lending to cope with emergencies.

Livelihood diversification: Some residents diversify income sources by combining fishing, boda boda services, casual labour and petty trading. However, diversification opportunities are limited by market access and capital constraints.

Community initiatives: Occasional clean-up campaigns target clogged drains and illegal dumping sites. Residents petition local government for infrastructure improvements, though responses are often slow.

Despite these efforts, adaptation capacity is limited by low incomes, insecure tenure, limited climate information, and inadequate technical knowledge. There is little awareness of county-level climate finance programmes or training opportunities

3.6.2 Governance and institutions

Several policy and planning frameworks exist at county and municipal levels:

Legal frameworks: The Homa Bay County Climate Change Act (2022) establishes a Climate Change Committee and a Steering Committee to coordinate climate actions. The Act provides for the creation of a Climate Change County Fund to support adaptation projects. The County Climate Change Action Plan (2023–2027) outlines sectoral priorities, including tree planting, irrigation expansion, flood protection and early warning systems.

Preparedness plans: The El Niño Inter-Agency Preparedness Plan guides pre- and post-El Niño interventions such as dyke construction and early warning systems. A participatory climate risk assessment report integrates community mapping into planning.

Urban development plans: The County Integrated Development Plan and the Municipality's Integrated Development Plan integrate climate considerations into urban planning, emphasizing slum upgrading, climate-smart agriculture, green spaces and infrastructure development. Programmes like the Kenya Informal Settlements Improvement Project (KISIP2) aim to upgrade infrastructure in informal settlements.

Institutional weaknesses: While the policy framework is comprehensive, implementation gaps are significant. Plans seldom address the specific needs of informal settlements. Responsibilities are fragmented across departments (environment, climate change, disaster management, urban planning and housing), hampering coordination. Local chiefs appointed by the national government allocate land without adhering to planning guidelines, leading to settlement in flood-prone zones. Early warning systems and real-time hazard monitoring are weak. Residents are often unaware of adaptation funds or initiatives.

3.6.3 Barriers to adaptation

Financial barriers: Climate finance at county level is insufficient relative to the scale of adaptation needs. National funds prioritise mitigation; only a small portion supports locally led adaptation. Households lack access to credit and insurance; high rental costs and low incomes limit savings for resilience investments.

Information and capacity barriers: Lack of disaggregated data on hazards and vulnerability impedes evidence-based planning. There are no effective early warning systems for floods or droughts. Technical expertise within municipal departments is limited, and staff turnover hampers continuity. Community members lack awareness of climate programmes and training opportunities.

Governance and coordination barriers: Overlapping mandates lead to jurisdictional conflicts between national, county and municipal governments. Settlement-level leadership is not integrated into formal planning. Enforcement of planning regulations (e.g., riparian buffers) is weak.

Social barriers: Deep-seated gender norms restrict women's participation in planning. Youth and disabled persons are marginalised. Poverty and inequality reduce the ability to recover from shocks.

Infrastructure barriers: The absence of reliable roads, drainage, water and sanitation systems constrains adaptation. Urban development often neglects informal settlements, and housing upgrades are hindered by insecure tenure.

3.7 Climate Vulnerability Index (CVI) and Risk Prioritization

3.7.1 Composite Vulnerability Scoring

To synthesize the diverse aspects of vulnerability, a Climate Vulnerability Index was constructed. Each vulnerability dimension social, economic, geophysical, infrastructure and institutional was assigned a weight reflecting its relative importance (25 %, 20 %, 20 %, 20 % and 15 % respectively). Indicators included demographic composition, poverty rates, employment type, soil stability, access to basic services, and institutional capacity.

For Sofia, the scoring results are summarized below:

Dimension	Key Indicators	Score (1 = low, 4 = very high)	Interpretation
Social vulnerability	Proportion of women, proportion of elderly, poverty rate, prevalence of female-headed households	1.7	Social vulnerability is comparatively low because the population is younger than in other settlements and the proportion of elderly is small. However, gender inequality and poverty among women remain significant concerns.
Economic vulnerability	Percentage of households in informal sector, self-employment rate, proportion earning <6 000 Ksh	2.5	Economic vulnerability is moderate. Informality (≈93.8 % of the workforce) and low incomes limit coping capacity, but diversifying activities across fishing, trading and small-scale farming offers some resilience.
Geophysical vulnerability	Topography, soil type, hydrology, proportion of land highly exposed to flood/erosion	1.0	Geophysical vulnerability is low compared with neighboring settlements. Stable soils in the north and a dispersed urban form reduce overall exposure. About 31.5 % of land is highly exposed to flood and erosion, concentrated in the south-east.
Infrastructure vulnerability	Access to piped water, sewer connections, road conditions, housing materials, electricity, waste management	3.0	Infrastructure vulnerability is high. Limited water and sanitation infrastructure, unpaved roads, substandard housing and weak waste management increase sensitivity to hazards.
Institutional vulnerability	Quality of governance, availability of adaptation plans, implementation of policies, coordination across levels	3.0	Institutional vulnerability is high due to fragmented coordination, limited implementation of plans, weak enforcement of land use regulations and low awareness of adaptation funds among residents.
Overall CVI (weighted)	Weighted sum of scores	≈2.2	Sofia's overall vulnerability is considered **low to medium** relative to other settlements in Homa Bay. However, high infrastructure and institutional scores indicate critical areas for intervention.

Table 3: Composite Vulnerability Scoring

The vulnerability index indicates that investments should prioritise improving infrastructure and strengthening institutions, while social and geophysical factors currently pose less risk.

3.7.2 Risk Prioritization and Community Consultation

Risk prioritization integrated the CVI with hazard exposure and community perceptions. Participatory workshops revealed that residents ranked floods as their most pressing risk due to frequent disruption of transport, contamination of water and market losses. Droughts were also highlighted, especially for households reliant on small-scale farming, fishing and informal water sources. Youth and persons with disabilities emphasized the absence of a local market and the difficulty of accessing distant services. Women stressed the heavy burden of water collection and the impacts of floods on childcare and livelihood activities.

Community input shaped the weighting of different vulnerabilities. For example, the high infrastructure score reflects residents' concerns about water supply, sanitation and roads, while the high institutional score stems from

their perception of limited government responsiveness. In contrast, the relatively low geophysical score aligns with residents' recognition that certain areas (e.g., the north-west) are less flood-prone and potentially suitable for new housing developments if serviced appropriately.

3.8 Risk Scenarios and Projected Climate Change Impacts

3.8.1 Risk Scenarios

Drawing on historical events, climate projections and community narratives, three plausible risk scenarios for Sofia were developed:

Early-season flash flood: After a prolonged dry spell, the first heavy rainfall of the rainy season triggers flash flooding. Runoff flows down eroded slopes, overtops the C19 road, inundates homes in the south-east and damages roadside businesses. Pit latrines overflow, contaminating shallow wells. Residents temporarily relocate to higher ground. Emergency response is delayed due to impassable roads.

Multi-year drought with heat waves: Successive years of below-average rainfall and above-average temperatures strain water supplies. Streams dry up; piped water outages last weeks. Water prices quadruple as boreholes dry. Kitchen gardens fail; livestock die; fish catches decline due to algal blooms. Health impacts include dehydration and increased cases of heat stroke, particularly among elderly residents. Women spend several hours per day fetching water, reducing time for income activities.

Compound flooding and erosion: Cumulative land degradation and illegal dumping clog drainage. A series of storms saturates soils and causes landslides on montmorillonitic clays. Houses built on slopes shift or collapse. Evacuation routes are blocked by debris. Recovery is prolonged because household savings are depleted and there is limited insurance coverage.

3.8.2 Project Climate Change Impacts

Climate projections for eastern Africa suggest that Sofia is likely to face warmer and wetter conditions overall, but with greater variability. Specific projections include:

Increased intensity of rainfall events: Extreme one-day rainfall is projected to rise by 4 % in the short term and up to 8 % by mid-century under high-emission scenarios. Although modest, this increase can elevate peak flood depths and velocities by approximately 2–5 %, placing additional stress on drainage systems and housing in flood-prone areas.

Longer dry spells and more heat days: The number of days with temperatures exceeding 35 °C is expected to climb from a historical average of 10 days to 15 days under moderate emissions scenarios and up to 20 days under high-emission scenarios. Dry spells may lengthen by up to 27 %. These trends can intensify water shortages, heat stress and demand for energy.

Stable but managed lake levels: Lake Victoria's level is not expected to decline significantly in the near future; dam management practices will continue to control levels. However, heavy rainfall can cause lake overflow, while drought can reduce inflows from tributaries. Both extremes influence the quality and reliability of Sofia's water supply.

Implications for Sofia: Without adaptation, climate change could aggravate Sofia's risk profile. Floods may become slightly deeper and more destructive, overwhelming the limited drainage infrastructure. Droughts will intensify competition for water, increasing prices and time spent collecting water. Heat waves will exacerbate health risks and reduce the productivity of labour. If infrastructure and institutional capacity remain weak, the settlement's current low-medium vulnerability could shift toward medium-high over the coming decades.

4 VISIONING & COMMUNITY PRIORITIZATION

4.1 Community-Driven Visioning Workshops

4.1.1 Engagement Process

The Sofia community visioning workshop was held at Amboss Hotel, a centrally located venue chosen for its accessibility and familiarity to participants. Mobilization was carried out through local leaders, settlement representatives, and grassroots networks, ensuring wide representation from women, men, youth, older persons, and persons with disabilities. This deliberate approach created an inclusive platform where all social categories were represented.

The day began with registration and introductions, during which facilitators outlined the workshop objectives and emphasized that the process was community-driven. After the plenary opening, participants were divided into thematic breakout groups based on the sectors most relevant to Sofia's resilience and development. These groups covered agriculture and food systems, trade and livelihoods, health and sanitation, environment and climate change, housing and land, and social services including youth and education. Each group was guided by trained facilitators and local mobilizers who encouraged open dialogue and ensured quieter voices were also heard.

The breakout sessions allowed participants to share experiences, challenges, and aspirations in smaller peer settings, making it easier for women, youth, and marginalized residents to speak freely. Storytelling was a key technique, with elders recounting long-term changes such as shifting rainfall patterns, and youth highlighting contemporary struggles like unemployment and lack of safe spaces. After group discussions, participants reconvened in a plenary session where each group presented its findings and priority aspirations. This created a sense of collective purpose and enabled cross-learning across themes. The plenary also allowed participants to debate and validate shared priorities, ensuring the vision reflected a broad consensus.

By the close of the day, the process had achieved more than consultation – it fostered collective ownership of the adaptation agenda. Participants not only voiced their concerns but also shaped a shared direction for Sofia's future.

4.1.2 Focus Areas for Visioning

The Amboss Hotel workshop highlighted several high-level focus areas for Sofia's future resilience and development, reflecting the synthesis of discussions across all thematic groups:

Water, Sanitation, and Health (WASH): Across groups, access to clean and affordable water was ranked as the most urgent need. Residents envisioned a future where every household had reliable water access and where sanitation facilities eliminated open dumping. Health was linked closely to water and waste issues, with participants aspiring for better community clinics and systems to prevent disease outbreaks.

Flood Management and Environmental Protection: Every group emphasized the need to manage flooding and restore the environment. Residents spoke of building drainage systems, planting trees to reduce runoff, and rehabilitating the lakeshore as both a protective buffer and a green community asset.

Housing and Secure Tenure: Housing quality and land security were recurring themes. Participants saw a future of resilient, permanent housing with reduced overcrowding. They also raised the need for land recognition and secure tenure arrangements, allowing families to safely invest in home improvements.

Livelihoods, Trade, and Economic Resilience: Discussions highlighted the vulnerability of Sofia's economy, heavily reliant on fishing and informal trade. Residents envisioned a formalized market with shelter, cold storage for fish, and opportunities to diversify into crafts, small businesses, and digital services. The goal was to create a more climate-resilient local economy that sustains households even during climate shocks.

Community Services and Public Spaces: Groups underscored the absence of safe public spaces. The vision includes multipurpose community centers, youth facilities, and safe, well-lit lanes. These were seen as vital for social cohesion, security, and resilience during disasters.

4.1.3 Documentation and Reporting

All inputs from the visioning workshops were carefully documented to ensure the community's voice translated into actionable plans. During the sessions, facilitators took detailed notes on flip-charts and notebooks, capturing key discussion points, stories, and ideas raised by participants. The maps and charts produced by each focus group (such as hand-drawn community maps and lists of priorities) were collected at the end of the workshop. In the plenary debrief, community representatives themselves summarized their group's vision and priorities, which helped verify that the note-takers had captured everything accurately.

After the workshops, the facilitation team compiled the results into a structured report. This report organized community inputs by theme (e.g. water issues, proposed solutions, responsible parties mentioned) and by priority level (urgent needs vs. long-term aspirations). Photographs of the mapping exercises and flipcharts were included to visually preserve the community's work. The use of direct quotes from participants in the notes helped maintain the authentic voice of residents in the documentation.

4.2 Participatory Mapping of Aspirations and Risks

4.2.1 Mapping Process

As a core part of the visioning exercise, Sofia residents participated in a hands-on mapping process to identify both the settlement's risks and its aspirations for the future. This participatory mapping took place in small groups during the workshop. Each group was provided with a large-scale base map of Sofia – essentially a printed satellite image of the settlement – laid out on a table. Armed with marker pens and stickers, community members gathered around the map to annotate it with their local knowledge.

The process began with orienting everyone to the map: participants pointed out familiar landmarks such as the main road, the school, the church, the lake shoreline, and other reference points. Once comfortable, they started marking locations that corresponded to key issues or assets. For risks, residents drew attention to flood-prone zones (circling areas that always get submerged in heavy rains), places with serious erosion, and spots where drainage was consistently clogged. For instance, the southern part of Sofia with narrow roads and no drainage was shaded on the map, noting it as highly vulnerable to flooding. Participants also marked where critical infrastructure was lacking – such as pathways with no street lighting (these were flagged, recognizing them as security risk areas especially for women at night) and stretches without water points or with broken water pipes.

Simultaneously, the mapping exercise captured community aspirations. Using a different color, residents indicated where they would like to see improvements or new amenities. One group sketched a symbol for a water kiosk in the northern zone of Sofia, signifying the need for a reliable water source there. Another group drew a small tree icon on an open slope at the edge of the settlement, imagining a tree-planting project to curb runoff. The prospective site of a local market was identified near the main road – participants outlined an area and labeled it "Proposed Sofia Market," aligning with their vision of a formal marketplace. In total, the collaborative maps became spatial wish-lists combined with hazard maps.

Crucially, the mapping was not a top-down exercise; the residents themselves decided what to mark and how to represent it, while facilitators provided gentle guidance and answered questions. By the end of the session, each focus group had produced a rich map of Sofia layered with insights.

Photo 7: Community mapping exercise during the workshop with the Sofia community

These community-generated maps were later collected by the project's technical team. The information was then digitized using GIS software – effectively translating the hand-drawn knowledge into geospatial data that could be incorporated into formal planning maps. This digital integration allowed the team to overlay community inputs with scientific data (like elevation models or flood risk maps), ensuring that the final plan's mapping of Sofia reflects both local knowledge and technical analysis. The participatory mapping process was empowering for residents: it quite literally put the community's perspectives on the map of their own settlement, making their priorities visible and concrete.

4.2.2 Tools and Techniques

A variety of participatory tools and techniques were employed to facilitate effective community mapping and visioning in Sofia. The primary tool was the community map itself – large printed maps of the settlement that residents could draw on. Different colored markers and stickers were used to distinguish types of information: for example, one color for problem areas (hazards, broken

infrastructure) and a different color for proposed solutions or resources. Participants also had access to sticky notes to write short labels or comments that were then attached to specific map locations. This proved useful in cases where an explanation was needed, such as noting "floods knee-high here" at a marked spot or "new water tank?" at a proposed intervention site.

Beyond mapping, the workshops incorporated interactive dialogue techniques. Focus group discussions acted as a tool for surfacing detailed local knowledge and lived experiences. Facilitators from AMT and SUEZ guided conversations using prompting questions and simple scenario-based exercises. For example, participants were asked: "Imagine it is the peak of the rainy season and heavy rainfall has cut off the access road – what happens in Sofia and how do people respond?" This exercise helped residents articulate not only the immediate impacts of extreme weather (such as blocked mobility or contaminated water sources) but also the coping mechanisms they currently use and what additional measures they felt were needed.

The combination of tactile, visual, and interactive techniques ensured that everyone – regardless of literacy, age, or background – could contribute meaningfully to mapping Sofia's risks and aspirations. By blending maps, symbols, storytelling, and scenarios, the process captured both the physical realities of the settlement and the social dynamics of how people adapt to climate stressors.

4.2.3 Collaboration

The participatory mapping and visioning in Sofia were truly collaborative endeavors, bringing together community knowledge and external support in partnership. At the heart of this collaboration were the Sofia residents themselves – the process treated them as experts of their own environment. Their intimate understanding of every alley, flooding spot, service gap, and community dynamic formed the primary data for planning.

Working alongside the residents were facilitators from both Akiba Mashinani Trust (AMT) and SUEZ Consulting. AMT, with its long-standing experience in community mobilization, played a central role in linking with settlement leaders and organizing participants. SUEZ Consulting complemented this by providing technical facilitation in each breakout group, helping residents translate their lived experiences into actionable proposals and linking them to broader climate resilience concepts.

Local government representatives, including planners and public works officers from Homa Bay County, also participated as partners rather than authority figures. Their role was primarily to listen and observe, though they responded to technical questions when needed – for example, a HOMAWASCO representative explained why certain areas of Sofia faced irregular supply. Their presence demonstrated official recognition of the process and helped build mutual trust: the community saw that leaders were taking their concerns seriously, while officials gained insights into realities that cannot be captured by reports alone.

The Global Center on Adaptation (GCA), as a project partner, provided overarching technical guidance on the process design. Although their role during the sessions themselves was limited, their presence reinforced the link between Sofia's locally led planning and broader adaptation frameworks. GCA's involvement helped ensure that the process met principles of best practice for community-driven adaptation, while leaving space for residents, AMT, and SUEZ to lead the hands-on facilitation.

This multi-actor collaboration ensured that the outcomes of Sofia's mapping and visioning workshops were both grounded in community realities and shaped with technical rigor. The approach combined local expertise, facilitation skills, and planning knowledge in a way that empowered residents while building strong connections with institutions that will be critical for implementation.

4.3 Strategic Planning Opportunities

Sofia's adaptation and development strategy must build on its strengths such as its strategic location along the Homa Bay–Rongo arterial road and its growing role as a hub for students and workers while addressing long-standing deficits in planning, infrastructure, and services. Several strategic opportunities emerge from the settlement's current conditions.

One opportunity lies in the redevelopment of key commercial nodes into formalized mixed-use centers. Markets, kiosks, and roadside shops could be upgraded into multi-storey complexes that combine retail and residential uses, with flood-resilient ground floors, green roofs, and integrated drainage systems. This would strengthen the local economy while improving environmental management.

The regularization of tenure presents another critical entry point. Secure land rights whether through community land trusts, joint titling, or incremental tenure upgrades would encourage residents and landlords to invest in permanent structures and infrastructure. Strengthening women's tenure rights in particular would enhance social equity and improve the quality of housing and services.

Integrating green infrastructure and open spaces into the settlement layout is also essential. Protecting and restoring natural drainage corridors as greenways, establishing small pocket parks and community gardens, and promoting tree planting or agroforestry would reduce flood risks, mitigate heat, and provide much-needed recreational spaces.

A more resilient transport network is needed to improve connectivity within and beyond Sofia. Upgrading key access roads to all-weather standards, introducing pedestrian and bicycle pathways, and using permeable paving materials would reduce seasonal isolation and enhance mobility. Ensuring that these networks connect directly to evacuation routes and emergency service facilities would strengthen disaster preparedness.

Decentralized water and sanitation solutions offer practical ways to address infrastructure gaps. These include widespread rainwater harvesting, communal water storage tanks, and the introduction of elevated eco-toilets or small-scale biodigester systems. Where feasible, pilot sewerage systems could be tested to serve clusters of multi-storey housing.

Finally, livelihood diversification and skills development can support economic resilience. Training programmes in green jobs such as solar installation, waste recycling, and agro-processing would create new employment opportunities for youth. Support for micro-enterprises that can operate indoors or online would also reduce exposure to climate-related disruptions that typically undermine outdoor trading activities.

Together, these strategic interventions provide a roadmap for guiding Sofia toward a more resilient, inclusive, and livable settlement.

4.4 Identification of Priority Areas of Intervention (Short, Medium, Long-Term)

4.4.1 Short-Term Interventions

Short-term interventions represent immediate, low-cost measures that directly respond to Sofia's most pressing vulnerabilities. These actions, achievable within the first two years, are designed to deliver visible improvements, build community trust in the adaptation process, and lay a foundation for medium- and long-term resilience.

4.4.1.1 Water and Sanitation (WASH)

Water scarcity was identified as the most urgent challenge. Residents emphasized that despite being an urban settlement, they often spend hours and significant money fetching water from uncertified vendors. Short-term interventions include:

Emergency repair of Homawasco infrastructure and restoration of non-functional kiosks, ensuring equitable distribution across the settlement.

Provision of 1000–2000L communal water storage tanks at the school, church, and other central locations to support rainwater harvesting during rainy months. These tanks will serve as buffer systems during blackouts or drought periods.

Community training sessions on water purification and safe handling methods (chlorination, boiling, solar disinfection) to prevent disease outbreaks.

Construction of temporary public toilets at Sofia Market and in central areas, reducing open defecation and ensuring dignity, especially for women vendors.

Establishment of temporary decentralized waste collection points closer to households, stopping the use of the cemetery as a dumping ground.

"Water is more important than even the roads – without it, we suffer the most."

These interventions ensure basic water and sanitation services are secured quickly, reducing disease risk and cutting household expenditure on water.

4.4.1.2 Drainage and Environment

Flooding during rains was identified as a frequent stressor, particularly in Arunda and Mathare zones. Poor drainage and clogged pathways contribute to stagnant water, which breeds mosquitoes and hampers mobility. Short-term measures include:

Immediate drain clearing and trenching organized by youth groups, supported with tools and oversight from County maintenance teams.

Placement of sandbags, earth bunds, and temporary trenches in identified high-risk flood paths to redirect water away from homes.

Launch of monthly clean-up campaigns involving residents, schools, and women's groups to keep drainage channels free of plastic waste and debris.

These quick actions not only reduce the impact of flooding but also foster a stronger sense of collective responsibility for keeping Sofia clean and safe.

4.4.1.3 Energy and Security

Frequent power outages and poorly lit areas create insecurity, particularly for women, children, and traders returning home after dark. To address this, the community prioritized:

Installation of solar-powered high-mast streetlights at strategic nodes such as the market, pathways near water points, and public toilet blocks.

Youth-led initiatives to repair or replace existing faulty lights, ensuring low-cost, community-based maintenance.

Formation of community patrol groups that operate during blackouts, in coordination with the County administration and police.

"When the lights go off, insecurity rises – women fear moving at night."

These actions make Sofia safer and enable longer trading hours, contributing to both resilience and livelihoods.

4.4.1.4 Digital Economy and Communication

Sofia's youth raised concerns about the lack of affordable connectivity and reliable early warning systems. Short-term priorities include:

Formation of WhatsApp and SMS-based early warning groups, linking with the Kenya Meteorological Department and Red Cross for real-time weather alerts.

Engagement of landlords to provide shared Wi-Fi to tenants as a low-cost, stop-gap solution while longer-term digital centers are explored.

These initiatives ensure timely access to critical climate information and provide new channels for community organization.

4.4.1.5 Livelihoods and Cooperatives

The community identified livelihoods as both a vulnerability and an opportunity. Many youth and women's groups are unorganized or under-resourced, limiting their potential to access county and NGO support. Short-term actions include:

Organizing youth and women's groups into registered cooperatives to pilot small-scale poultry farming, waste collection services, and regulated water vending.

Disseminating information on available county support programs and NGO opportunities using trusted channels such as churches, barazas, and schools.

By creating cooperatives early, Sofia builds the organizational capacity to manage future projects and access funding opportunities.

4.4.2 Medium-Term Interventions

Medium-term interventions require more planning, technical support, and resources than quick wins, but they promise to deliver lasting improvements to Sofia's resilience. These interventions, achievable within a three to five-year horizon, tackle the root causes of vulnerability and strengthen essential services and livelihoods.

4.4.2.1 Water and Sanitation (WASH)

Residents placed heavy emphasis on sustainable water and sanitation systems to improve health, reduce costs, and enhance dignity. Priorities include:

Construction of permanent ablution blocks with toilets and showers at Sofia Market and two other densely populated zones. Each block will feature separate facilities for men, women, and persons with disabilities, with onsite water points for hygiene.

Equipping kiosks with backup storage tanks and solar-powered pumping systems to ensure consistent supply even during power blackouts.

Pilot decentralized biodigester systems, managed by community sanitation committees, to provide environmentally safe waste treatment.

Routine waste collection services coordinated with the County, including scheduled trucks and strategically located skip bins, to eliminate illegal dumping and reduce blocked drains.

These measures will significantly improve hygiene, lower disease risks, and create jobs in waste management.

"We need toilets in the market and waste points close to our homes – not dumping in the cemetery."

4.4.2.2 Irrigation and Urban Agriculture

Food insecurity is rising due to limited space and unpredictable rainfall. To address this, Sofia residents identified small-scale climate-smart farming as a medium-term strategy:

Household-level kitchen gardens, sack farming, and rooftop gardens supported through community training.

Youth cooperatives managing small-scale drip irrigation projects linked to boreholes, ensuring year-round urban farming.

This not only improves nutrition but also creates new income streams for youth and women.

4.4.2.3 Energy

Reliable energy access underpins both security and livelihoods. Residents prioritized:

Establishment of solar kiosks offering affordable charging, refrigeration, and lighting services.

Expansion of solar-powered street lighting to cover all high-traffic lanes and public spaces, reducing insecurity and enabling longer business hours.

These investments build resilience against frequent blackouts while reducing dependence on unreliable grid electricity.

4.4.2.4 Drainage and Environment

Climate change impacts, especially flooding and heat, remain pressing challenges. Sofia's plan includes:

A **settlement-wide drainage upgrade** with lined channels, culverts, and community monitoring to ensure sustainability.

A tree planting initiative to plant at least 200 trees along roads and open spaces over five years, reducing heat stress and stabilizing soils.

Early warning and health campaigns to raise awareness about managing malaria, pneumonia, and heat-related illnesses during extreme weather.

This integrated approach directly reduces vulnerability to floods, heat, and disease.

4.4.2.5 Livelihoods and Skills Development

Economic resilience is critical for adaptation. Community proposals focused on diversifying and strengthening livelihoods:

Skills training workshops on tailoring, carpentry, urban farming, and fish processing to create new income opportunities.

Expansion of table-banking groups for women to strengthen local businesses and savings culture.

Construction of a solar-powered cold storage facility for fish by year 4, reducing post-harvest losses and improving incomes for fishing households.

"When fish spoil, we lose money. Cold storage means we can save today's catch for tomorrow's market."

4.4.2.6 Digital Economy

Residents highlighted the need for affordable internet access and digital inclusion:

Creation of a **community digital hub** equipped with Wi-Fi, computers, and training rooms for education and business use.

Collaboration with the County ICT office to install **public hotspot zones** for affordable access to online services and emergency information.

This supports both education and livelihoods while strengthening access to climate information.

4.4.2.7 Urban Planning and Housing

The community emphasized governance and better housing conditions:

Pilot **in-situ housing upgrades**, focusing on better roofing, improved ventilation, and safer layouts to reduce exposure to heat and floods.

4.4.2.8 Recreation and Public Space

Social cohesion and youth engagement were highlighted as priorities:

Opening of the nearby stadium for regular community and youth activities, ensuring access to safe recreation.

Development of **community reading rooms, multipurpose halls, and shaded playgrounds** for children to reduce risks of playing on roads.

4.4.2.9 Security

To complement lighting and community patrols, residents called for:

Establishment of a **police post near Sofia** to strengthen law enforcement and improve response times during emergencies.

4.4.2.10 Cooperatives

Community cooperatives are seen as the backbone of resilience. Medium-term priorities include:

Expansion of youth- and women-led cooperatives into climate-smart enterprises such as waste recycling, poultry feed production, and composting.

Training on governance, financial management, and disaster preparedness to ensure these cooperatives are sustainable and impactful.

4.4.3 Long-Term Interventions

Long-term interventions are **transformative actions** designed to address systemic vulnerabilities and secure Sofia's place in the wider urban framework. These measures require sustained investment, policy support, and multi-year coordination, but they represent the community's deepest aspirations for resilience, dignity, and inclusion.

4.4.3.1 Water and Sanitation (WASH)

Sofia residents aspire to a future where every household enjoys safe, affordable, and reliable water and sanitation services. Long-term priorities include:

Full integration into the municipal sewerage network, ensuring waste is safely treated and public health risks from pit latrines and open disposal are eliminated.

Phased rollout of **household water connections**, in addition to kiosks, so families no longer rely exclusively on vendors.

Construction of a **local water booster station or elevated tank**, providing steady supply even to high-lying parts of the settlement.

These steps will permanently resolve water scarcity and sanitation challenges, aligning Sofia with the standards of other formal urban neighbourhoods.

4.4.3.2 Housing and Land Tenure

Security of tenure and durable housing are at the heart of community aspirations. Residents stressed that without secure land rights, investments in homes remain risky. Long-term actions include:

Settlement-wide land tenure regularization, with certificates of occupancy or leases that provide households with legal security.

A **large-scale housing upgrading program** under county and national frameworks, promoting permanent, heat-resilient structures with better layouts to reduce crowding and improve airflow.

Selective relocation of households in the most hazard-prone pockets, carried out voluntarily and with compensation, converting vacated land into greenways and drainage reserves.

By securing tenure and upgrading housing, families gain confidence to invest in long-term improvements, reducing vulnerability to floods, heat, and storms.

4.4.3.3 Urban Infrastructure

To ensure mobility, service delivery, and emergency access, Sofia's roads and infrastructure will be comprehensively integrated into the municipality's systems:

Paving of all major access roads, complete with drainage, footpaths, and lighting to improve connectivity and safety.

Integrated road networks designed with climate resilience in mind incorporating drains, safety signage, and lighting to withstand storms and reduce accidents.

Expansion of transport corridors to accommodate emergency services like ambulances and fire engines.

This infrastructure transformation will remove Sofia's physical isolation and allow services to reach residents more reliably.

4.4.3.4 Livelihoods and Trade

Economic empowerment was a core theme in the community vision. By the long term, Sofia envisions thriving, formalized economic spaces:

Construction of the Sofia Market, equipped with solar-powered cold storage, sheltered stalls, sanitation facilities, and a rainwater harvesting roof. This will stabilize incomes for fishers, vendors, and small traders while protecting goods from heat and rain.

Establishment of a multipurpose community center, serving as a training hub, cooperative office, and emergency shelter. Designed with backup solar power and elevated foundations, the center will function as a lifeline during disasters and a hub for learning and empowerment during normal times.

These facilities anchor economic and social resilience, linking livelihoods to climate-smart infrastructure.

4.4.3.5 Environment and Recreation

The community envisions a greener, healthier Sofia with abundant public spaces:

Large-scale urban greening planting trees in every homestead, along streets, and in open spaces to provide shade, reduce indoor heat stress, and absorb runoff.

Conversion of underused parcels into parks, community gardens, and social halls, giving residents safe places to gather, learn, and relax.

Development of **climate-resilient community shelters**, incorporating passive cooling designs to reduce indoor overheating during heatwaves.

Together, these measures will enhance climate regulation, improve mental and physical well-being, and foster community cohesion.

4.4.3.6 Cooperatives

By year ten, cooperatives are expected to evolve into well-structured organizations managing Sofia's resilience assets:

Mature cooperatives running climate-smart enterprises, such as solar energy kiosks, waste recycling ventures, poultry farms, and composting businesses.

Investment in **shared resilience infrastructure**, including solar-powered lighting, raised poultry units, and flood barriers.

Active role in **disaster preparedness and response**, serving as first responders during floods, storms, or drought-related crises.

Cooperatives will be the backbone of local adaptation, ensuring continuity beyond donor projects.

4.4.3.7 Capacity and Education

The long-term vision emphasizes continuous investment in human capital to sustain progress:

Institutionalized climate education in local schools, embedding resilience and environmental stewardship into the curriculum.

Continuous leadership training for youth and women, preparing them to take on greater roles in governance and project management.

4.5 Criteria for Prioritizing Adaptation Options

With numerous adaptation ideas generated during the visioning process and refined through post-meeting synthesis, it became essential to agree on a clear set of criteria to determine which interventions would be prioritized first and how resources should be allocated. These criteria were discussed with community representatives during the consultation workshop and subsequently applied by facilitators and technical partners to ensure interventions were realistic, inclusive, and climate-responsive.

The criteria used were equity, feasibility, relevance to climate risks, co-benefits, and social/political acceptability. Each is detailed below, with reference to the interventions identified for Sofia.

4.5.1 Equity Check

Equity was the foremost consideration in prioritizing interventions for Sofia. The community and facilitators agreed that the adaptation plan had to **deliver the greatest benefits to the most vulnerable households and groups**: women, children, the elderly, persons with disabilities, and low-income families living in hazard-prone areas. By applying this lens, interventions were designed to reduce inequalities and ensure that resilience-building was inclusive and just.

Water and Sanitation (WASH): Women and children often bear the heaviest burden in fetching water, sometimes waking as early as 5 a.m. to avoid long queues at kiosks or buying from uncertified vendors at inflated prices. For this reason, **restoring Homawasco pipelines, rehabilitating kiosks, and providing communal water tanks** were prioritized as equity interventions. These measures directly reduce physical strain, save money, and improve health outcomes for vulnerable groups.

Similarly, **public sanitation blocks** were designed with universal access features, including ramps, handrails, and separate facilities for women and men. This ensures dignity and safety for elderly residents, mothers with young children, and persons with disabilities who struggle with current inadequate facilities.

Safety and Security: Streetlights were strategically planned for **unsafe paths, markets, and residential clusters where elderly residents live alone**, reducing risks of crime and accidents at night. Women emphasized that lighting is not only about convenience but also about protection, as insecurity is highest during power blackouts.

Flood and Environmental Risks: Equity mapping exercises facilitated by AMT and SUEZ highlighted that **low-lying clusters such as Arunda and Mathare** experience the heaviest impacts of flooding. Poorer households in these areas often face repeated damage to property, higher exposure to disease, and loss of livelihoods during heavy rains. For this reason, **drainage improvements and targeted tree planting** were prioritized there before other parts of Sofia.

Livelihoods: Economic interventions were also filtered through an equity lens. **Poultry cooperatives, table-banking schemes, and fish cold storage facilities** were prioritized because they directly support small-scale traders, women vendors, and fishing households who are highly exposed to income fluctuations during climate shocks.

In essence, the equity check guaranteed that Sofia's adaptation plan is **pro-poor, pro-women, and pro-vulnerable**, closing gaps between those most at risk and those relatively less affected. It ensures that adaptation does not reinforce inequalities but instead uplifts those who face the steepest challenges under climate change.

4.5.2 Feasibility of Implementation

Feasibility was another guiding criterion, ensuring that proposed actions could realistically be delivered within the community's capacity, available resources, and institutional support. Interventions were sequenced based on ease of implementation, cost, and technical requirements.

Short-Term (0–2 years): Quick wins such as monthly clean-ups, youth-led trenching and sandbagging in flood-prone areas, and formation of WhatsApp/SMS early warning groups were prioritized. These require minimal financial input, rely on community labour, and deliver immediate visible benefits.

Medium-Term (2–5 years): Projects like ablution blocks, solar kiosks, and the fish cold storage facility were considered feasible within a few years, provided there is moderate support from county departments, NGOs, and cooperatives. They need structured planning and investment but remain achievable with local partnerships.

Long-Term (5+ years): Large infrastructure works such as settlement-wide sewerage extension, full paving of access roads, and land tenure regularization were acknowledged as necessary but highly resource-intensive. These require technical studies, budget mobilization, and strong policy backing, making them longer-term priorities.

By balancing **quick, visible actions with medium-term upgrades and long-term systemic changes**, the plan remains both **ambitious and realistic**, ensuring momentum is maintained while preparing for larger investments.

4.5.3 Direct Link to Identified Climate Risks

The prioritization process emphasized selecting interventions that directly reduce Sofia's most pressing climate risks: flooding, drought, extreme heat, and disease-related shocks. Each chosen action was mapped to one or more of these risks, ensuring relevance and impact.

Flooding: Settlement-wide drainage upgrades, short-term trenching, and sandbag placement were prioritized for flood-prone clusters like Arunda and Mathare. Tree planting along roads and open spaces also reduces surface runoff and stabilizes soils.

Drought and Water Scarcity: Repairing Homawasco pipelines, reactivating kiosks, and equipping them with solar pumping systems directly secure water access. Rainwater harvesting tanks at schools, churches, and public buildings provide backup supply during prolonged dry periods.

Extreme Heat: Housing upgrades that improve ventilation, planting of shade trees, and the long-term development of climate-resilient shelters reduce household exposure to rising temperatures. Community spaces such as green parks and shaded playgrounds also provide relief.

Disease Outbreaks: Poor waste management and inadequate sanitation were identified as amplifiers of cholera, malaria, and pneumonia. Interventions such as ablution blocks, waste collection points, monthly clean-ups, and health awareness campaigns directly tackle these risks.

Livelihood Shocks from Climate Stress: The fish cold storage facility, solar kiosks, and cooperative-led poultry farming reduce vulnerability to economic disruption caused by storms, drought, and erratic weather.

By ensuring every priority intervention is directly linked to at least one major climate risk, the Sofia People's Adaptation Plan remains firmly grounded in **climate resilience rather than generic development upgrades**.

4.5.4 Co-benefits of Interventions

During prioritization, interventions that generated **multiple social, economic, and environmental benefits** were ranked higher than those addressing only a single issue. This approach ensures that every investment maximizes value and strengthens resilience on several fronts at once.

Sofia Market Development: Beyond improving trade, the market integrates cold storage to reduce post-harvest fish losses, rainwater harvesting for supplementary water supply, and secure stalls that empower women vendors and youth entrepreneurs.

Solar-Powered Streetlights: These not only improve night-time security but also extend trading hours, support safer movement during floods, and reduce dependence on unreliable grid power.

Tree Planting and Greening: Trees reduce surface runoff and flooding risks, provide shade that lowers indoor and outdoor heat stress, beautify the settlement, and improve local air quality.

Community Digital Hubs: These serve as learning and business incubation spaces for youth, provide affordable internet, and act as communication nodes for early warning systems during climate emergencies.

Ablution Blocks and Waste Systems: While primarily addressing sanitation, these facilities also improve health outcomes, reduce environmental pollution, and create jobs in management and maintenance.

By emphasizing interventions with **layered benefits**, Sofia's adaptation plan stretches limited resources further, ensuring every action contributes to resilience, livelihoods, and social well-being simultaneously.

4.5.5 Social and Political Acceptability

For interventions to succeed, they must be broadly accepted by the community and aligned with the priorities of local authorities. In Sofia, acceptability was a key factor in sequencing actions, ensuring that proposed solutions could gain traction without resistance.

Water and Sanitation: Projects such as repairing Homawasco lines, reactivating kiosks, and constructing ablution blocks enjoyed unanimous community support. They respond to universally felt needs and carry little social controversy, making them among the most acceptable interventions.

Market Development and Community Center: These proposals received strong political backing from county

leaders because they address visible economic and social needs while creating symbols of progress. Their dual function boosting livelihoods and serving as community hubs made them highly acceptable across groups.

Public Lighting and Drainage: Solar-powered streetlights and drainage upgrades were welcomed by residents because they improve everyday safety and reduce flood-related damage. Their simplicity and direct impact made them easy to endorse politically and socially.

Sensitive Interventions: Some actions, such as potential relocation of households from the most hazard-prone zones, were recognized as more contentious. To safeguard acceptability, these were framed as voluntary, negotiated processes with compensation and alternative housing options, rather than compulsory measures.

Transparent Engagement: County officers, AMT, and SUEZ emphasized open dialogue and consistent communication during and after the Amboss Hotel workshops. Post-workshop synthesis sessions allowed facilitators to test political viability, adjust framing, and ensure proposed interventions reflected both community aspirations and institutional realities.

In short, interventions were prioritized not only for their technical value but also because they were socially embraced by residents and politically realistic for authorities to support and implement.

4.6 Capacity Building

Capacity building is central to sustaining Sofia's adaptation plan. It focuses on equipping community members, technical officers, academic partners, and government institutions with the skills and knowledge to manage and maintain interventions while reducing reliance on external support. The approach emphasizes both community empowerment and institutional strengthening, ensuring that climate adaptation becomes embedded in local governance and planning systems.

At the community level, training programmes will strengthen technical and organizational skills. Youth and women will be trained in plumbing, masonry, carpentry, and facility maintenance to ensure rapid repairs of water, drainage, and sanitation systems. Leadership and project management sessions will build the capacity of adaptation committee members to plan activities, maintain financial records, and report progress. Hygiene and climate-awareness campaigns will accompany new infrastructure to promote proper sanitation practices, rainwater harvesting management, and climate-smart urban farming. Routine community dialogues and demonstration sites such as urban farms, model homes, and drainage pilot projects will serve as hubs for continuous learning and innovation.

At the institutional and governance level, capacity-building efforts will extend beyond community representatives to include county planners, municipal technical officers, and academic partners such as Tom Mboya University (TMU). Joint training sessions will focus on participatory monitoring, integration of climate data into spatial and development planning, and use of risk mapping tools to inform project design. These sessions will also strengthen understanding of the Homa Bay County Climate Change Act (2023) and its implementation mechanisms, ensuring that officials can translate local adaptation experiences into policy and budget decisions.

Collaborations with TMU and other academic institutions will help document lessons from Sofia's adaptation process and integrate them into curricula and applied research programmes, fostering a new generation of urban planners and climate specialists grounded in community-led approaches. Exchange visits to other counties implementing adaptation projects will expose both community and technical staff to best practices and encourage peer learning.

Capacity will further be built for resource mobilization, including proposal writing, financial management, and donor engagement. A "Donor and Partner Roundtable" will serve as a practical forum where both county and community representatives pitch adaptation projects to development partners, demonstrating ownership and partnership readiness.

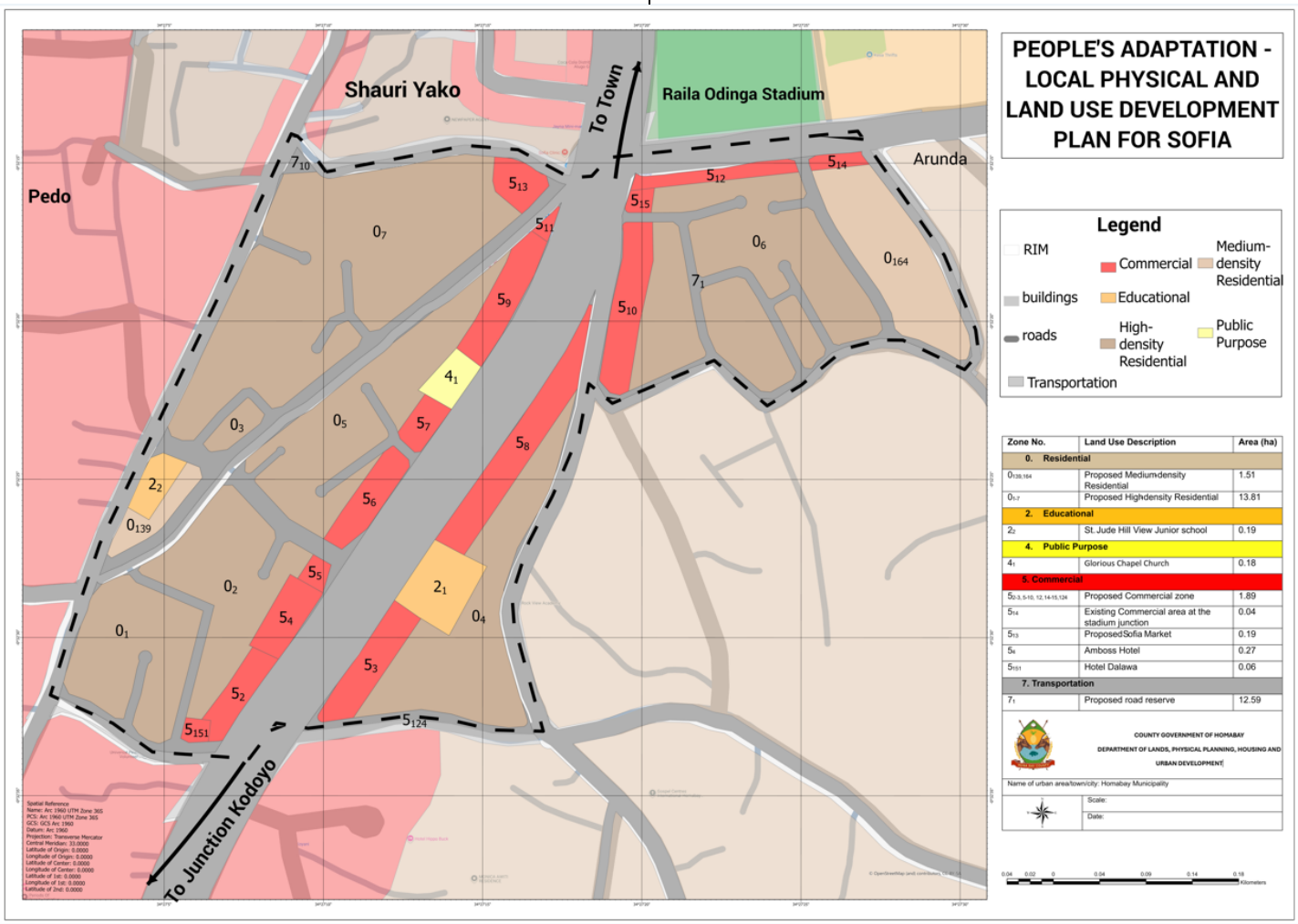
Capacity building is framed as a continuous and adaptive process. After each project phase, review sessions will assess progress, identify emerging skill needs, and refine training materials. This dual approach community capacity enhancement and institutional strengthening ensures that Sofia's adaptation plan remains sustainable, locally driven, and fully embedded in Homa Bay's governance and academic systems.

5 INTERVENTION STRATEGIES FOR CLIMATE RESILIENCE

5.1 5.1 Introduction and Rationale

Sofia's vulnerability to floods, heatwaves, drought and erosion calls for integrated intervention strategies that address immediate climate risks while laying the foundation for long-term resilience. The settlement's topography, insecure land tenure, iron-sheet housing and limited infrastructure amplify exposure to shocks. The community's dependence on informal livelihoods, weak drainage and limited water and sanitation services heighten this vulnerability.

To respond, the Sofia People's Adaptation Plan applies a spatially grounded climate-risk framework that links social, environmental and infrastructural needs to defined planning zones. The land use plan below provides a spatial vision for Sofia's climate-resilient transformation organising the settlement into residential, commercial, green, and community facility zones while integrating drainage corridors, access roads and open spaces as the backbone of adaptation.



Map 10: Proposed Land Use Plan for Sofia Informal Settlement

The plan ensures that future interventions are risk-sensitive and spatially coherent.

Together, the land use plan and sectoral interventions provide a unified framework that links local knowledge, hazard mapping and policy commitments under the Homa Bay Municipality Local Physical and Land Use Development Plan. They guide where and how Sofia can safely densify, where to prioritise drainage and green corridors, and how to integrate adaptation investments across sectors.

5.2 5.2 Summary of Climate Risks

Hazard	Spatial distribution	Primary impacts	Vulnerable assets
Flooding & surface runoff	Flooding is less severe in Sofia than in Makongeni or Shauri Yako, yet heavy rainfall causes runoff along the C19 road and from the eastern slope into the settlement's southern lowlands. Hydraulic studies show peak flood depths exceeding 0.5 m in the main flow path, though away from existing buildings; residents identified swales along C19 and southern unpaved roads as flood pathways.	Damage to unpaved roads, erosion of gullies and swales, contamination of water points; temporary isolation of houses in the southern zone.	Unpaved roads, shallow drains, exposed water and sewer pipelines, trees, homes built on steep slopes; St Paul's Mission Hospital (south-west of Sofia) is within the flood zone and is at risk of inundation during intense storms.
Heat stress & urban heat islands	Houses constructed of corrugated iron sheets absorb and radiate heat. The northern plateau benefits from breezes but the compact southern zone retains heat.	Indoor heat discomfort, increased risk of dehydration and heat-related illnesses, especially for children and the elderly; exacerbated by lack of shade and impermeable surfaces.	Residences with metal roofs, community gathering spaces, schools and clinics lacking trees or shading.
Drought & water scarcity	Seasonal droughts lead to reduced supply from municipal pipelines and reliance on shallow wells or Lake Victoria.	Interruptions to household water supply; reduced sanitation and increased health risks.	Households reliant on kiosks and illegal connections; public facilities also experience water shortages.
Erosion & landslides	The eastern slopes of Sofia drain towards the lowlands; lack of formal drains and vegetation leads to gulley erosion.	Undermining of house foundations, blockage of informal paths, exposure of pipelines.	Houses on steep slopes, unprotected road shoulders, swales along C19 road.

Table 4: Summary of Climate Risks

5.3 Water, Sanitation and Waste Management

5.3.1 Climate-proofed water supply

Objective: Safeguard critical water infrastructure against floods, droughts, and other climate risks, ensuring a reliable and secure supply across the settlement.

Key considerations and actions

- Reinforce and protect existing pipelines. Water mains that traverse flood-prone swales, particularly near the C19 road and southern lowlands, should be secured by elevating them on reinforced supports or burying them at appropriate depths with protective sleeves. Flexible joints should be incorporated to withstand shifting soils and erosion pressures during storms.
- Expand the HOMAWASCO network westwards. At present, formal supply lines only cover the eastern portion of the settlement. The plan should extend piped distribution to the western side, where households are currently underserved, while also installing new HOMAWASCO-managed water kiosks to ensure equitable access.
- Promote rainwater harvesting at household and community level. Rooftop collection systems (gutters and storage tanks) should be scaled up, with training for women and youth groups on installation and maintenance. These systems will reduce pressure on

piped water during droughts and can act as emergency reserves during supply interruptions.

- **Develop community kiosks on higher ground.** Additional water points should be located on the northern plateau to ensure accessibility during floods and to shorten walking distances during heatwaves.
- **Establish regular inspection and maintenance regimes.** HOMAWASCO, in collaboration with community water committees, should carry out routine inspections of pumps, pipes, and kiosks before and after rainy seasons. Climate-risk monitoring (e.g., pre-emptive reservoir drawdown before storms) should be incorporated into operational procedures.

5.3.2 Sanitation improvements

Objective: Strengthen sanitation infrastructure and practices in Sofia to reduce climate-related health risks, prevent contamination, and improve environmental quality.

Key considerations and actions

- **Climate-resilient latrines.** Upgrade pit latrines to ventilated improved pit (VIP) models with raised platforms in all flood-prone zones. Priority should be given to densely populated rental clusters and shared compounds in the southern lowlands, where overflow and contamination risks are greatest.
- **Expansion of the sewer system.** Extend the existing sewerage network, which currently only serves the urban core, to reach Sofia. This will progressively connect high-density clusters and key community nodes, reducing reliance on unsafe pit latrines and septic systems.
- **Decentralised wastewater treatment.** Establish a community-scale treatment facility on municipal land close to the lakeshore, using constructed wetlands or other nature-based solutions. This will process effluent from high-density clusters and reduce the direct discharge of untreated waste into Lake Victoria.
- **Solid waste management.** Introduce a waste segregation and collection system tailored to the settlement. This should include:
    1. clearly marked community bins placed at strategic locations such as roadside junctions, and public gathering spaces,
    2. waste skips in the proposed Sofia market
    3. a designated waste transfer point on higher ground outside flood-prone areas,
    4. training programmes for households and youth groups on composting organic waste and repurposing plastics into saleable products.
- **Community engagement and awareness.** Integrate hygiene education campaigns with the rollout of sanitation improvements, emphasising handwashing, safe waste disposal, and household-level waste separation.

5.3.3 Hygiene and behavioural change

Launch hygiene campaigns focusing on handwashing, menstrual health and safe food handling. Use churches and health facilities as outreach points.

Establish climate-sensitive school health clubs to promote water conservation and waste reduction.

5.4 Housing and Shelter Upgrading

Objective: Improve the safety, comfort, and affordability of housing in Sofia by promoting climate-resilient construction, encouraging incremental upgrading, and fostering security of tenure.

Key considerations and actions

- **Resilient building materials.** Promote the use of stabilized interlocking blocks, compressed earth blocks, and other affordable alternatives that provide better thermal insulation and are more resistant to erosion than corrugated iron sheets. Local training and demonstration units can showcase these technologies, encouraging adoption across households. This also supports local value chains and job creation.
- **House elevation and drainage.** Provide technical guidance for raising floor levels of homes in the southern lowlands by at least 0.3–0.5 m above predicted flood depths, incorporating plinth beams to strengthen foundations. Along key runoff corridors such as the C19 road, encourage stone pitching and the installation of vegetated swales to channel stormwater away from structures and reduce erosion risks.
- **Cooling interventions.** Promote passive cooling strategies, including improved ventilation openings, reflective roofing paint, and planting trees around houses. Encourage layouts such as verandas, wide eaves, and courtyards that reduce indoor heat stress and improve natural airflow.
- **Incremental housing.** Support a phased approach to upgrading whereby residents can progressively improve their homes starting with stronger foundations, roofing, or sanitation based on available resources. Provide design templates and technical support to ensure that even small-scale improvements contribute to resilience.
- **Social housing initiatives.** Provide social housing schemes within designated upgrading zones. These can deliver affordable, well-serviced units for vulnerable groups while reducing pressure on flood-prone lowlands. Partnerships with county housing programmes and private developers can align financing and design standards.
- **Tenure security.** Work with county authorities to regularize tenure in for residents without ownership

documents through occupancy certificates and incremental recognition of land rights. Secure tenure encourages residents to invest in resilient housing and provides access to credit for upgrading.

5.5 Roads, Drainage and Transport

Objective: Strengthen road and mobility infrastructure in Sofia to improve year-round accessibility, reduce flood-related disruptions, and integrate sustainable transport solutions.

Key considerations and actions

- Upgrading key roads. Improve the C19 road and southern access routes by paving with permeable surfacing that allows infiltration and reduces runoff. Install linear roadside drains to guide stormwater into controlled outlets. Regular desilting and the formation of community maintenance committees will ensure long-term functionality.
- Expansion and rehabilitation of drainage networks. Construct reinforced concrete channels along primary roads and vegetated swales along secondary and footpaths to manage surface runoff. All drains should discharge into retention basins or infiltration trenches, avoiding direct discharge into Lake Victoria to minimize sediment and waste loading.
- Slope stabilization. Protect the eastern slope through bioengineering measures such as planting vetiver grass, bamboo, and soil-binding shrubs to reduce gulley formation. Introduce check dams or bench terracing in areas with steep gradients to slow runoff and reduce erosion risks.
- Footbridge and pathway improvements. Construct raised pedestrian pathways and small bridges over drainage swales, particularly in the southern clusters and near public service nodes, to safeguard mobility during heavy rains and floods.
- Urban mobility integration. Collaborate with municipal authorities to extend public transport routes into underserved areas of Sofia. Ensure new or improved bus stops are placed on elevated ground and fitted with weather-protective shelters.
- Support for non-motorised transport. Develop designated walkways and cycle paths along key corridors to provide safe, low-cost mobility options. Where possible, these routes should link to green corridors established under nature-based flood measures.
- Boda boda infrastructure. Construct a boda boda shed at the Stadium Junction, designed with weather protection, drainage, and solar lighting. Additional smaller sheds should be considered at key junctions to support livelihoods, improve safety, and decongest road verges.

5.6 Energy and Communication Resilience

Objective: Ensure that Sofia has a reliable, safe, and climate-resilient energy and communication network to support daily life, emergency response, and long-term adaptation.

Key considerations and actions

- Reliable and safe electricity. Replace exposed overhead power lines with insulated cabling or underground systems in erosion-prone areas. Retrofit existing poles with reinforced bases and relocate those at risk of being swept away by flooding or landslides. Incorporate regular inspection and maintenance schedules to prevent failures during storms.
- Solar street and public lighting. Expand solar lighting along major paths, trading areas, and public open spaces to improve security and maintain functionality during blackouts. High-mast floodlights to be installed at central nodes such as Sofia market, roadside junctions, and key public gathering points. All systems should be designed to withstand high winds, heavy rains, and flooding.
- Early warning systems. Establish a community-based alert network using multiple channels: SMS alerts through mobile phones, locally installed sirens at strategic points, and a link with community radio for real-time dissemination of warnings. The system should be linked to data from the Kenya Meteorological Department and embedded in settlement-level disaster management committees.
- Community communication hubs. Equip designated community centres with solar-powered charging stations and public address systems to serve as focal points for information, coordination, and emergency response. Due to limited available land, collaboration with local churches can provide space for hosting these hubs, as churches are widely accessible and trusted gathering points within the settlement.

5.7 Health and Social Services

Objective: Enhance the resilience of health and social service delivery in Sofia by flood-proofing facilities, strengthening waste management, and ensuring continued access during climate shocks.

Key considerations and actions

- Flood-proof health facilities. Upgrade local health facilities by raising floor levels above projected flood heights, installing elevated pathways, and ensuring wheelchair-accessible ramps. Incorporate backup power systems (e.g., solar with battery storage or generators) and rainwater harvesting units to guarantee continuous services during storms and droughts.

- **Medical waste management.** Establish secure, flood-resistant storage units for medical waste to prevent contamination during heavy rains. Train health workers on segregation, storage, and safe disposal of infectious and non-infectious waste, and link facilities with county-approved collection and disposal systems.
- **Cool shelters and green courtyards.** Retrofit waiting areas with shaded courtyards, tree planting, and improved ventilation to reduce heat stress for patients and caregivers. Incorporating greenery also improves air quality and provides mental comfort for patients.
- **Outreach and mobile clinics.** Deploy mobile health teams during extreme events to reach households cut off by floods. Services should include first aid, maternal care, and vaccination. In times of disaster, partnerships with local churches and other accessible compounds can provide temporary health camps and staging grounds for emergency services.

5.8 Ecosystem-Based Adaptation and Green Infrastructure

Objective: Enhance Sofia's resilience to flooding, erosion, and heat stress through ecosystem restoration and the integration of green infrastructure across the settlement.

Key considerations and actions

- **Riparian buffer restoration.** Establish 10–30 m vegetated buffers along seasonal streams in the southern parts of Sofia. Plant indigenous grasses, shrubs, and trees to stabilize banks, filter runoff, and reduce erosion. Enforce no-build zones along these drainage corridors, while gradually relocating encroaching structures to safer areas.
- **Tree planting and urban greening.** Launch a settlement-wide tree planting campaign using drought-tolerant and fast-growing species such as Acacia, Neem, and Moringa. Prioritize open spaces, school compounds, church grounds, and market areas for shade and microclimate cooling. Encourage households to adopt kitchen gardens, rooftop gardens, and vertical greening for both food production and local climate regulation.
- **Rain gardens and bioswales.** Introduce vegetated depressions along roadsides, courtyards, and public spaces to capture stormwater and improve infiltration. Pilot projects can be established near key road junctions or community gathering areas to demonstrate effectiveness, with potential for scaling across the settlement.
- **Wetland rehabilitation.** Restore degraded wetlands and ponds in the southern lowlands to function as natural retention areas, reduce flood peaks, recharge groundwater, and provide biodiversity habitats. These spaces can also double as community recreation areas if properly managed.

5.9 Livelihood Diversification and Social Protection

Objective: Strengthen household incomes and safeguard vulnerable groups in Sofia through diversified livelihoods, resilient marketplaces, and social protection mechanisms.

Key considerations and actions

- **Skills training and micro-enterprise.** Partner with Homa Bay polytechnics and vocational centres to provide training in masonry, carpentry, plumbing, tailoring, and urban agriculture. Youth and women's groups should be prioritised, with modules incorporating climate-resilient techniques such as water-efficient construction, sustainable farming, and waste recycling enterprises.
- **Market infrastructure development.** Construct a dedicated market in Sofia built to municipal standards. The market should include raised trading platforms, shading structures, proper drainage, and designated waste points. Secure storage units for vendors will reduce losses during floods, while integrated micro-credit facilities and cooperatives can support traders to diversify income streams during climate shocks.
- **Savings and insurance schemes.** Encourage the formation of community savings groups and introduce micro-insurance products that protect households against losses from floods, droughts, and health emergencies. Link these schemes with cooperatives and SACCOs to improve uptake and sustainability.
- **Food security initiatives.** Promote urban farming methods such as sack gardens, vertical gardens, poultry rearing, and aquaponics. Demonstration plots can be set up on school grounds, church compounds, and community centres to encourage replication at the household level.

5.10 Institutional and Governance Strengthening

Objective: Build strong, inclusive, and well-coordinated governance systems to drive the implementation of Sofia's People's Adaptation Plan and ensure long-term sustainability.

Key considerations and actions

- **Participatory planning structures.** Formalize the **Sofia Adaptation Committee** as the central coordinating body. Ensure representation of women, youth, persons with disabilities, and minority groups. This committee will oversee local implementation, liaise with county departments, and coordinate community maintenance of new infrastructure.
- **Land use and zoning enforcement.** Collaborate with the municipal planning office to update zoning maps based on flood and hazard assessments. Ensure that future construction avoids floodways, steep slopes, and other

high-risk zones. Identify and plan safe relocation sites for households living in the most exposed areas.

- Capacity building for government officials. Train county engineers, planners, health officers, and settlement administrators on climate-resilient design, risk-sensitive land use planning, and community engagement. Encourage peer-learning exchanges with other counties that have successfully implemented informal settlement upgrading and climate adaptation projects.
- Resource mobilization. Develop funding proposals targeting sources such as the Financing Locally Led Climate Action (FLLoCA) programme, international climate funds, and public-private partnerships. Organize donor and partner roundtables to present the adaptation plan using municipal halls or, where public space is limited, church compounds and community centres as venues

6 INSTITUTIONAL FRAMEWORK & ROLES

Sofia's adaptation journey requires strong institutions, clear roles and effective coordination to sustain the interventions outlined in Chapter 5. The institutional framework should build on existing community structures while aligning with county and national planning systems. This chapter delineates stakeholder responsibilities, outlines coordination mechanisms and explains how adaptation actions will be embedded in development planning and budgeting.

6.1 Stakeholder Roles & Responsibilities

A diverse range of actors will be involved in implementing the adaptation interventions. Clarifying their mandates helps to reduce duplication, increase accountability and leverage complementary strengths.

Stakeholder	Key Roles & Responsibilities
Sofia Adaptation Committee (SAC)	The SAC will be formalised as the primary coordinating body. It will represent all segments of the community, including women, youth, persons with disabilities, elders and minority groups. Key tasks include guiding implementation, prioritising projects, managing community maintenance funds, facilitating consultations, and liaising with county departments and service providers.
Community members & neighbourhood associations	Residents will participate in monitoring and maintenance. They will mobilise labour for drainage cleaning, house elevation, tree planting and other works; engage in savings groups, social housing cooperatives and micro-enterprise ventures; and monitor compliance with climate-resilient construction standards.
County government (Municipal Board and relevant departments)	County offices in planning, infrastructure, housing, public health, water and environment will provide technical support, supervise construction and allocate budget lines for Sofia interventions. They will mainstream adaptation into county integrated development plans (CIDPs) and annual budgets, and ensure enforcement of zoning and building regulations.
National agencies (e.g., Kenya Meteorological Department, Water Services Regulatory Board)	Provide climate data, early warning services, technical guidelines and compliance oversight for water supply, sanitation and energy interventions. They will also support capacity building of county and community actors.
Non-governmental organisations (NGOs) and Community-Based Organisations (CBOs)	Offer expertise in participatory planning, livelihoods development, micro-finance and disaster risk management. They will facilitate training programmes, assist in resource mobilisation and support MEL processes.
Private sector partners & academic institutions	Supply materials and technical know-how for resilient construction, renewable energy, water supply and waste management. Universities and polytechnics will support research, training and innovation pilots.

Table 5: Stakeholder Roles & Responsibilities

6.2 Coordination Mechanisms

Effective coordination will ensure coherence across sectors and levels of governance during the implementation of Sofia's People's Adaptation Plan. The plan will leverage existing county structures and promote inclusive collaboration through the following mechanisms:

1. Community Implementation Committee (CIC):

The CIC will bring together representatives from community groups, youth and women's associations, resident committees, and local leaders, working in close coordination with the Ward Climate Change Planning

Committee (WCCPC) established under the *Homa Bay County Climate Change Act (2023)*. This linkage ensures that Sofia's priorities are integrated into county climate-finance and planning systems.

2. Inter-agency coordination forum:

A quarterly forum bringing together the CIC, county departments (planning, public works, environment, housing, health, and education), national agencies, NGOs, and private-sector partners. The forum will track implementation progress, align activities, share data, and resolve emerging bottlenecks.

3. Technical Working Groups (TWGs):

Issue-specific TWGs will be formed around key adaptation themes water and sanitation, housing and infrastructure, energy and communications, ecosystem services, and livelihoods. Each TWG will comprise technical experts, CIC representatives, and county officials who will guide design standards, oversee procurement, and assure quality.

4. Community Liaison Officers (CLOs):

A network of trained community volunteers will serve as two-way communication links between the CIC and residents. CLOs will disseminate information, mobilise community participation, and capture feedback from the ground.

5. County/Municipal Secretariat for Adaptation Coordination:

To strengthen day-to-day implementation, a small Adaptation Secretariat will be established within the County Department of Lands, Physical Planning, Housing and Urban Development, working in collaboration with the Municipality. The Secretariat will coordinate daily follow-up of adaptation activities, monitor progress, manage communication between actors, facilitate data collection for M&E, and spearhead resource mobilisation and partnership development. This structure will not replace existing committees but rather enhance their efficiency, ensuring continuous technical and administrative support for both county and community initiatives.

6. Integration with existing governance forums:

Adaptation discussions and progress reporting will be embedded within Ward Climate Change Committee, Municipal Board, and community baraza platforms. This approach avoids duplication of structures, strengthens local ownership, and aligns Sofia's adaptation actions with the wider *Homa Bay Municipality Local Physical and Land Use Development Plan (LPLUDP)* and *County Climate Change Fund (CCCF)* framework.

6.3 Integration with Development Planning & Budgeting

To sustain the adaptation interventions, Sofia's plan must be embedded within county and national planning instruments:

1. **County Integrated Development Plan (CIDP) alignment:** The interventions on water supply, sanitation, housing, transport, energy, health, ecosystem services and livelihoods will be integrated into the CIDP programmes for infrastructure, land use planning and social services. This will ensure long-term resource allocation and policy support.
2. **Annual development plans & budgets:** The SAC, in partnership with county departments, will advocate for budget provisions for climate-resilient infrastructure, social housing, early warning systems, livelihood programmes and monitoring activities. Participatory budgeting sessions will allow community priorities to influence expenditure.
3. **Zoning and land-use plans:** Updated zoning based on hazard and risk assessments will guide settlement expansion and protect riparian corridors, floodways and steep slopes. Development control will be enforced through county bylaws and community monitoring.
4. **National programmes & funds:** Sofia will tap into national initiatives such as the Financing Locally Led Climate Action (FLLoCA) programme, the National Drought Contingency Fund and housing finance schemes. Proposals will be jointly prepared by the SAC and county department

7 MONITORING, EVALUATION, AND LEARNING (MEL)

Robust monitoring, evaluation and learning processes are essential to ensure that Sofia's adaptation actions remain responsive, effective and sustainable. This chapter sets out community-defined indicators, describes appropriate MEL tools and methodologies and outlines feedback loops for adaptive management.

7.1 Community-Defined Indicators

Indicators should be simple, measurable and meaningful to residents while aligning with county and national reporting requirements. They will capture both quantitative and qualitative dimensions across sectors:

Sector	Sample Indicators
Water & Sanitation	Number of households connected to expanded HOMAWASCO water lines; proportion of homes with functioning rainwater harvesting systems; number of VIP latrines and sewer connections; frequency of water service interruptions.
Housing & Shelter	Percentage of houses constructed or upgraded using resilient materials; number of households with raised floor levels; occupancy rate of social housing units.
Transport & Drainage	Kilometres of roads upgraded with permeable surfaces; proportion of drainage channels functioning during rainfall events; number of boda boda sheds constructed.
Energy & Communication	Number of solar street lights installed; households benefiting from reliable electricity; functioning early warning sirens and SMS alert coverage.
Health & Social Services	Number of health facilities with flood-proof upgrades; attendance at outreach clinics during extreme events; reported cases of water-borne diseases.
Ecosystem & Green Infrastructure	Area of riparian buffers rehabilitated; number of trees planted and surviving after one year; area of restored wetlands.
Livelihoods & Social Protection	Number of participants in skills training; proportion of households in savings groups; households adopting urban farming; value of loans disbursed to micro-enterprises.
Governance	Number of SAC meetings held; representation of women and vulnerable groups in decision-making; amount of funding mobilised for adaptation projects.

Table 6: Community-Defined Indicators

Qualitative indicators will include community perceptions of safety during floods, satisfaction with services, and trust in governance structures. Participatory tools such as focus group discussions, storytelling and photo diaries will capture lived experiences

7.2 MEL Tools & Methodologies

A mix of quantitative and qualitative methods will be used to monitor and evaluate progress:

Baseline and periodic surveys: Collect data on households' socio-economic conditions, infrastructure status, health outcomes and perceptions before interventions begin and at regular intervals thereafter.

Community mapping & participatory GIS: Residents will map hazard zones, drainage networks, water points and infrastructure upgrades. Comparative maps over time will show physical improvements and emerging risks.

Digital monitoring platforms: Mobile applications and GIS dashboards will store data on service provision, maintenance schedules, and early warning alerts. Community members can report issues via smartphone or SMS hotlines.

Joint monitoring missions: SAC members, county officials and technical experts will conduct joint site visits to inspect infrastructure (e.g., pipelines, latrines, roads), evaluate maintenance needs and confirm compliance with design standards.

Story-based methods: Seasonal diaries, storytelling sessions and Most Significant Change narratives will allow residents to share their experiences of climate shocks and adaptation benefits. These narratives will complement quantitative data and guide qualitative learning.

Cost–benefit analyses: For selected interventions (e.g., drainage channels, rainwater harvesting, social housing), periodic evaluations will compare costs with benefits such as reduced flood damages, health improvements and livelihoods gains.

Flexible planning: Implementation schedules and budgets will allow for course corrections. For example, if monitoring reveals that drainage capacity is insufficient under heavier rains, additional infiltration trenches or retention basins can be built; if a livelihood programme fails to attract participants, training content can be revised.

Knowledge management: Documentation of processes, decisions and outcomes will be maintained by the SAC and county officials. A repository (digital and paper) will ensure that knowledge is accessible to future committees and external partners.

Outcome: A well-designed MEL system will ensure accountability, enable continuous learning and allow Sofia's adaptation plan to evolve in response to new climate risks, socio-economic changes and community feedback. It will strengthen confidence among residents, authorities and funders that interventions are delivering tangible benefits and that the plan remains relevant over time.

7.3 Feedback Loops & Adaptive Management

MEL findings must feed into decision-making in a timely and systematic manner. Adaptive management will be anchored on the following mechanisms:

Regular review meetings: TWGs and the SAC will convene semi-annually to review monitoring data, evaluate progress, and identify necessary adjustments. Findings will be presented in accessible formats and discussed with the wider community.

Annual learning forums: An annual learning forum will bring together stakeholders from Sofia and neighbouring settlements, county departments, national agencies and NGOs. Successes, challenges and lessons will be shared; new knowledge (e.g., on climate projections, innovative materials) will be incorporated; and priorities for the coming year will be agreed.

8 FINANCING THE ADAPTATION PLAN

This section lays out the principles and strategies for financing the adaptation plan, ensuring that the necessary resources are mobilized, allocated, and managed in a transparent and equitable manner. The financing strategy should be structured to address immediate, short-term needs as well as long-term resilience goals. In developing this section, it is crucial to emphasize sustainable, inclusive financing practices while aligning local, county, and external resources with the overall climate adaptation objectives.

8.1 Community Contributions

Implementation of Sofia's People's Adaptation Plan will require diverse and sustainable financing sources. A balanced strategy that blends community efforts, county budget allocations and external funding will ensure interventions are executed and maintained over time. All financing will be managed transparently, equitably, and in alignment with county development planning cycles.

Before mobilising contributions, the plan will be preceded by a community communication and sensitisation campaign. This campaign led jointly by the Community Implementation Committee (CIC) and supported by Akiba Mashinani Trust (AMT) and the Municipal Secretariat for Adaptation Coordination will inform residents about the adaptation process, its objectives, and the expected benefits for each household. It will also explain the roles of different actors, outline how residents can participate, and clarify what forms of technical or financial support will be provided by partners.

Through barazas, posters, radio messages, and focus-group discussions, this campaign will build trust, encourage inclusive participation, and ensure all community members understand how their contributions link to tangible resilience outcomes.

8.1.1 Identification of Local Contributions

Contributions may include in-kind labour (e.g., clearing drainage, tree planting), donation of locally available materials (stones, sand for constructing swales or latrine slabs) and small financial contributions through savings groups or a community adaptation fund. The Sofia Adaptation Committee (SAC) will conduct participatory wealth ranking to ensure contributions are calibrated according to ability to pay.

8.1.2 Mechanisms for Contribution

Structured mechanisms such as community savings groups, rotating credit associations, and adaptation levies collected through market fees or water kiosks can mobilise funds for maintenance. Labour contributions will be organised through communal work days and youth employment schemes. Households benefiting from social housing or improved water supply can commit to modest service fees to fund operation and maintenance.

8.1.3 Equity and Inclusivity Considerations

To ensure fairness, exemption or reduced contributions will be granted to vulnerable households elderly, persons with disabilities, female-headed households and extremely low-income families. A transparent register of contributions will be maintained by the SAC and publicly displayed. Redistribution of benefits (e.g., from community gardens or compost sales) will help cross-subsidize vulnerable households.

8.2 County Budget Alignment

Aligning adaptation activities with county planning and budgeting processes is essential for long-term sustainability.

8.2.1 Linkage to County Development Plans

The SAC and county planning department will ensure that priority interventions expanding water lines, upgrading drainage and roads, social housing schemes, solar lighting, early warning systems and green infrastructure are incorporated into the County Integrated Development Plan (CIDP), municipal spatial plans and sectoral plans for water, housing, transport and environment.

8.2.2 Budgeting for Adaptation

County budget estimates will allocate funds for climate-resilient infrastructure, maintenance, community capacity building and monitoring. Departments will mainstream climate adaptation into recurrent and development budgets, reducing reliance on ad-hoc funding. Multi-year budget commitments will support phasing of major projects such as sewer extension and ecosystem restoration.

8.2.3 Advocacy for Climate Budgeting

The SAC will work with civil society and ward development committees to advocate for increased county budgetary allocations for adaptation. Evidence on cost savings from prevention of flood damages and improved health outcomes will support advocacy. The county will adopt participatory budgeting approaches to incorporate community priorities in climate allocations.

8.3 External Funding

External funding will complement community and county resources, enabling implementation of larger or innovative projects.

8.3.1 Diversification of Funding Sources

To secure the long-term sustainability of Sofia's adaptation plan, it is critical to avoid reliance on a single donor or funding stream. Diversifying financing sources ensures continuity, reduces risks from sudden funding cuts, and enables different types of interventions to be supported.

Key sources of external financing include:

1. National programmes. The Sofia Adaptation Committee (SAC), with county support, will tap into programmes such as Financing Locally Led Climate Action (FLLoCA) and other national climate or resilience funds that directly support community-driven adaptation.
2. Global climate funds. Dedicated climate facilities such as the Green Climate Fund (GCF), the Adaptation Fund, and the Global Environment Facility (GEF) provide significant opportunities for larger-scale projects such as resilient housing, flood control, or green infrastructure.
3. Bilateral and multilateral donors. Agencies like the World Bank, African Development Bank, UN-Habitat, and bilateral partners (e.g. EU, JICA, USAID) can provide grants or concessional financing for interventions in WASH, transport, and governance.
4. Private sector and CSR. Partnerships with water utilities, renewable energy companies, and ICT providers can help co-finance infrastructure such as water kiosks, solar lighting, and communication hubs. Corporate social responsibility programmes can also fund small-scale but high-impact community projects.
5. Philanthropy and foundations. International and local foundations focusing on climate resilience, social protection, and informal settlements can provide flexible grants to strengthen community capacity, social housing pilots, or livelihood diversification.

How to identify suitable funding opportunities:

Align proposals with the goals of the adaptation plan (e.g. reducing flood risk, improving housing, enhancing health services) so that financing is clearly linked to community priorities.

Regularly scan for open calls and funding windows, using county departments, accredited entities, and NGO partners to share information.

Assess funding opportunities against three criteria:

1. Relevance – does the source fund projects in line with Sofia's adaptation needs?
2. Accessibility – are the requirements realistic for the SAC and county to meet?
3. Leverage potential – can the funds attract or combine with other financing (e.g. private sector co-financing)?

8.3.2 Strategic Alignment with Donors

Securing external financing requires more than submitting proposals; it depends on ensuring that Sofia's adaptation priorities are presented in ways that clearly resonate with donor interests. Strategic alignment with donors will strengthen the likelihood of funding, build trust, and create long-term partnerships.

Key approaches include:

- Tailoring proposals to donor priorities. Each funding body has specific focus areas such as urban climate resilience, informal settlement upgrading, WASH, gender inclusion, nature-based solutions, or governance reforms. Proposals from the Sofia Adaptation Committee (SAC) will highlight how local interventions such as resilient housing, expanded drainage, or social protection schemes advance these global and national priorities.
- Maintaining a donor mapping system. The SAC, with county support, will develop and update a database of potential donors and financing windows. This mapping will link donor focus areas, eligibility requirements, and application timelines with Sofia's adaptation objectives, making it easier to match proposals to the right opportunities.
- Building relationships. Donors are more likely to fund projects when they trust local actors and see consistent communication. The SAC will actively engage donors through roundtables, progress updates, and transparent reporting, creating a reputation for reliability.
- Understanding donor requirements. Each donor has its own standards for project design, financial management, monitoring, and reporting. The SAC will invest in training to understand these requirements and ensure that proposals and implementation plans meet them from the outset.

- **Long-term engagement.** Beyond single projects, the SAC will cultivate relationships that position Sofia as a consistent partner in resilience programming. This includes aligning with donor timelines, providing timely reports, and demonstrating measurable impact.

8.3.3 Co-Financing and Partnerships

Adaptation financing is most effective when resources are pooled from different actors. By combining grants, loans, and private investment, Sofia can maximize the impact of limited resources and ensure wider ownership of interventions. Co-financing also reduces the financial burden on any single partner and creates space for innovation and efficiency.

8.3.3.1 Key approaches include:

- **Blended financing models.** Sofia will explore models that combine grants from donors, concessional loans from development banks, and investments from the private sector. This mix ensures that large projects, such as resilient housing or major drainage works, can be implemented without over-reliance on one source.
- **Public–private partnerships (PPPs).** Specific interventions such as social housing schemes or energy infrastructure lend themselves to PPPs. Here, the county provides land or regulatory support, while private developers contribute capital and technical expertise, with both sharing long-term management responsibilities.

Sector-specific co-financing.

1. **Early warning systems** may be co-financed with telecommunications companies that supply SMS platforms or digital infrastructure.
2. **Urban greening and green corridors** can attract corporate sponsorship under corporate social responsibility (CSR) programmes.
3. **Water kiosks and sanitation facilities** could be delivered through partnerships with water utilities and local entrepreneurs.
4. **Partnerships with NGOs and CBOs.** Civil society organizations bring both technical expertise and access to small and medium funding windows. Collaborating with them can enable pilot projects that are later scaled with larger financing.
5. **Identifying opportunities.** The Sofia Adaptation Committee (SAC) will actively scan for co-financing opportunities, including donor requirements that mandate local cost-sharing, and will prepare "investment cases" to present to potential partners.

8.4 Tracking and Transparency Mechanisms

Financial accountability and transparency are crucial for building trust among funders, county government, and community beneficiaries. A clear and inclusive system for tracking financial flows will also encourage continued investment in the Sofia People's Adaptation Plan.

8.4.1 Clear Financial Reporting

- The Sofia Adaptation Committee (SAC) will establish simple but effective accounting procedures, maintaining separate accounts for community contributions, county allocations, and external donor funds.
- Quarterly financial reports will summarize income, expenditures, and balances, and these will be shared through community forums, SAC notice boards, and digital platforms.
- For larger projects, annual financial audits will be carried out, with external audits commissioned for donor-funded projects to ensure compliance with international standards.

8.4.2 Use of Digital Tools for Monitoring

- Digital payment platforms, such as mobile money services, will be used to transparently collect and disburse funds, reducing risks of mismanagement.
- An online dashboard or mobile application, managed by the SAC with technical support from county IT officers, will track project budgets, expenditures, and progress indicators.
- GIS-based tools can be integrated to link financial spending with geographic locations of interventions (e.g. roads, water kiosks, housing upgrades), enabling spatial transparency.
- The platforms will be designed to be user-friendly and accessible, ensuring that community members, county officials, and external donors can all view updates in real time.

8.4.3 Independent Oversight Mechanisms

- An independent financial oversight committee will be established, made up of respected community members, county finance officers, and civil society representatives.
- This committee will conduct regular reviews of project accounts and oversee the implementation of financial audits.
- For high-value or externally funded projects, third-party audits will be mandatory, reinforcing donor confidence.
- Transparent oversight processes will help build trust, reduce suspicion, and encourage ongoing investment.

8.4.4 Stakeholder Engagement in Monitoring

- Annual stakeholder review meetings will be held, bringing together residents, county departments, NGOs, and donors to discuss financial reports and progress.
- Community participation tools such as scorecards and participatory public expenditure tracking (PET) will allow residents to directly assess efficiency and value for money.
- Vulnerable groups including women, youth, and persons with disabilities will be deliberately included in oversight committees and review forums to ensure equitable participation.
- Feedback loops will be established, where community observations are integrated into future planning and budgeting decisions.

Outcome:

A transparent, participatory, and technology-enabled financial monitoring system will ensure that Sofia's adaptation interventions are funded efficiently, resources are used appropriately, and accountability is maintained. This will strengthen stakeholder confidence and support the long-term sustainability of the plan

9 IMPLEMENTATION ROADMAP

The implementation roadmap provides a phased plan for rolling out Sofia's People's Adaptation Plan. Actions are prioritized based on urgency, resource requirements, and feasibility.

9.1 Phasing of Actions (Immediate, Mid-Term, Long-Term)

Sector	Intervention	Specific Locations	Lead Actors	Short Term (0–2 yrs)	Medium Term (2–5 yrs)	Long Term (5–10+ yrs)
Water & Sanitation	Protect and elevate HOMAWASCO pipelines	C19 road swales; southern lowlands	SAC, HOMAWASCO, County Water Dept.	✓		
	Expand HOMAWASCO water kiosks to underserved western clusters	Western part of Sofia	HOMAWASCO, SAC	✓	✓	
	Install household & community rainwater tanks with training	Settlement-wide	SAC, NGOs, Women & Youth Groups	✓		
	Construct decentralised wastewater treatment wetlands	Municipal/lowland land	County Water Dept., SAC, NGOs		✓	
	Expand sewer system beyond urban core into Sofia	Settlement-wide	County Water Dept., SAC		✓	
Housing & Shelter	Training on resilient building materials (blocks, earth)	Community training centres	County Housing Dept., NGOs	✓		
	Build demonstration houses showcasing resilient design	Designated upgrading zones	SAC, NGOs, Housing Dept.	✓		
	Raise plinths/floor levels in flood-prone houses	Southern clusters	Community, SAC	✓	✓	
	Implement incremental housing upgrades	Entire settlement	Residents, SAC	✓	✓	
	Roll out social housing pilots	Identified upgrading zones	County Housing Dept., Private sector		✓	
	Scale-up social housing projects	New serviced sites	County Govt., Developers			✓
	Tenure regularisation and occupancy certification	Settlement-wide	County Land & Planning Dept.		✓	

Roads & Drainage	Desilting and routine maintenance of drains	C19 road, paths	Community drainage teams	✓	✓	
	Pilot permeable paving and vegetated swales	Key east–west paths	County Public Works, SAC	✓		
	Construct raised pedestrian footpaths & small bridges	Southern clusters, swales	SAC, Public Works	✓		
	Develop retention basins & infiltration trenches	Discharge points	County Public Works		✓	
	Complete settlement-wide drainage network	Settlement-wide	County Govt., SAC		✓	
	Slope stabilisation (vetiver, shrubs, check dams)	Eastern slopes	Env. Dept., SAC	✓	✓	
	Pave primary access roads (C19 and connectors)	Main corridors	County Public Works, SAC		✓	
	Complete robust road/drainage systems	Entire settlement	County Govt.			✓
Energy & Communication	Install solar street lights on main paths & public spaces	Key junctions, paths	Energy Dept., SAC	✓		
	Establish community charging hubs (solar)	Central nodes	SAC, NGOs, Energy firms	✓		
	Set up SMS-based early warning alerts	Settlement-wide	SAC, ICT Dept., Telecom firms	✓		
	Install community sirens in public spaces	Gathering points	SAC, Churches, ICT Dept.	✓		
	Pilot underground cabling in erosion-prone zones	Near Got Abuor Hill, slopes	Energy Utility		✓	
	Expand integrated early warning systems	Settlement-wide	SAC, ICT Dept.		✓	
Health & Social Services	Elevate floors of clinics, improve accessibility ramps	Local clinics/centres	Health Dept., SAC	✓		
	Install backup power & rainwater harvesting at clinics	Health centres	SAC, NGOs	✓		
	Improve medical waste handling & secure storage	Clinics	Health Dept., SAC	✓		
	Upgrade waiting areas with green courtyards & shade	Health facilities	Health Dept., SAC	✓		
	Deploy mobile health outreach teams	Flooded areas	Health Dept., NGOs	✓	✓	

	Expand clinics and health volunteers' network	Settlement-wide	County Health Dept.		✓	
	Establish community resource/health centre	Central Sofia	County Govt., SAC			✓
Ecosystem & Green Infrastructure	Tree planting campaigns (drought-tolerant species)	Settlement-wide	SAC, Env. Dept., Schools, Churches	✓		
	Create rain gardens & bioswales	Roadsides, courtyards	Env. Dept., SAC	✓		
	Restore wetlands and lowland depressions	Southern lowlands	Env. Dept., SAC		✓	
	Enforce stream riparian buffers	Along streams	County Env. Dept., SAC		✓	
	Expand green corridors & urban forests	Settlement-wide	Env. Dept., SAC			✓
Livelihoods & Social Protection	Provide vocational training (masonry, tailoring, etc.)	Youth centres	Polytechnics, SAC	✓		
	Establish savings groups & micro-finance linkages	Entire settlement	SAC, MFIs, NGOs	✓		
	Construct Sofia Market to municipal standards	Central Sofia	County Trade Dept., SAC		✓	
	Diversify enterprises & food production initiatives	Community hubs	SAC, NGOs		✓	
	Develop large-scale market and storage hubs	Growth areas	County Govt., SAC			✓
Governance & Institutions	Formalise Sofia Adaptation Committee (SAC)	Settlement-wide	County Govt., SAC	✓		
	Integrate risk & hazard data into zoning maps	Planning office	County Planning Dept.	✓		
	Implement bylaws to enforce risk-sensitive planning	Entire settlement	County Govt., SAC		✓	
	Secure climate financing & mainstream in county budget	County level	County Govt., SAC		✓	
	Institutionalise MEL & regular evaluations	SAC, County	County Govt., SAC		✓	✓
	Full integration of adaptation into municipal planning	Municipality-wide	County Govt.			✓

Table 7: Implementation matrix

9.2 Mechanisms for Effective Implementation

9.2.1 Collaboration and Coordination

Implementation of Sofia's adaptation plan will depend on well-structured collaboration among community members, county authorities, utilities, NGOs, and private sector partners. A **phased collaboration plan** will be developed, specifying when and how each stakeholder group engages during different project stages.

Joint design and co-implementation. For example, during the extension of sewer lines, HOMAWASCO engineers, county public works officers, and community representatives will jointly map alignment routes, design access points, and agree on connection strategies. This ensures technical feasibility while addressing community concerns such as land use, accessibility, and affordability.

Activation of coordination platforms. The mechanisms outlined in Chapter 6 including the inter-agency coordination forum, technical working groups (TWGs), and community liaison officers (CLOs) will be activated for each intervention phase. These platforms will facilitate rapid problem-solving, harmonize technical standards, and prevent duplication.

Clear roles and responsibilities. County departments will provide oversight and technical expertise, NGOs will support mobilisation and training, while community members will contribute labour, local knowledge, and monitoring.

This layered coordination ensures that all actors remain aligned, decisions are transparent, and implementation progresses smoothly across sectors.

9.2.2 Capacity Building for Implementation

Sustained capacity development is essential to enable both communities and institutions to implement, operate, and maintain adaptation measures. Training and knowledge-sharing will be embedded at each stage of implementation.

Community-level training. Residents, especially women and youth, will be equipped with skills in resilient construction techniques (e.g., interlocking blocks, raised plinths), basic plumbing and drainage maintenance, financial management for savings groups, and monitoring of local infrastructure. These skills will ensure local ownership and reduce dependence on external contractors.

Capacity building for county officials. Staff from planning, housing, health, water, and environment departments will be trained in participatory planning, resilient design principles, climate risk data management, and monitoring, evaluation and learning (MEL).

Peer-to-peer learning. Exchange visits will be organised with other informal settlements and counties that have implemented similar adaptation measures, creating platforms for practical learning. This horizontal sharing will also build solidarity and inspire innovation.

On-the-job mentoring. Technical partners (e.g., NGOs, universities) will provide direct support during early project phases, mentoring local artisans, technicians, and SAC members to ensure standards are met.

9.2.3 Accountability Mechanisms

Strong accountability systems will guarantee that resources are used transparently, standards are upheld, and community trust is maintained.

Performance-based agreements. Contractors, NGOs, and private partners will sign performance contracts or memoranda of understanding (MoUs) outlining timelines, deliverables, and quality standards. Payments will be tied to milestones and verified completion.

Community monitoring tools. Residents will participate in oversight through community scorecards, participatory expenditure tracking, and social audits. These tools will capture user satisfaction, identify weaknesses, and hold implementers accountable in real time.

Government oversight. County and national oversight bodies will review procurement processes, enforce compliance with quality and environmental safeguards, and ensure that legal requirements are met.

Transparent reporting. Quarterly financial and progress reports will be published and presented at public forums, ensuring that both funders and community members are updated. Annual review meetings will consolidate lessons and adjust implementation strategies.

Feedback loops. Complaints and grievances raised by residents will be formally recorded, addressed by the SAC, and escalated to county authorities where necessary.

By embedding accountability in every stage of implementation, the plan ensures transparency, builds community confidence, and increases the willingness of donors and partners to continue supporting adaptation efforts.

9.3 Risk Mitigation and Contingency Planning

Objective: To outline strategies for managing risks and unexpected challenges that may arise during the implementation of the adaptation plan.

9.3.1 Risk Identification

Risks are expected to vary across **time horizons** and **intervention sectors**. They include:

9.3.1.1 Short-Term (0–2 years)

1. Low community participation or resistance to relocation/changes.
2. Inadequate technical capacity for resilient construction or drainage works.
3. Procurement delays and mismanagement.
4. Extreme floods disrupting early-phase works (e.g. drainage pilots).
5. Mistrust or lack of coordination between SAC and county departments.

9.3.1.2 Medium-Term (2–5 years)

1. Funding shortfalls for scaling up interventions.
2. Land disputes during sewer extension, housing upgrades, or market construction.
3. Slow integration of adaptation priorities into county budget cycles.
4. Political changes at county/national level that shift priorities.
5. Community fatigue if visible results are not achieved quickly.

9.3.1.3 Long-Term (5–10+ years)

1. Withdrawal of major donors or reallocation of funds.
2. Economic downturn reducing county allocations.
3. Rapid population growth intensifying demand for services.
4. Climate hazards exceeding current projections (e.g., more intense floods, prolonged droughts).
5. Weak institutional memory due to staff turnover in county and SAC.

9.3.2 Mitigation Strategies

Cross-cutting mitigation measures will be embedded across all phases:

- Regular **risk assessments** at the beginning of each implementation phase.
- Use of **participatory planning** to secure community ownership.
- **Capacity building** for contractors, artisans, and county officers to ensure technical quality.
- Embedding **Monitoring, Evaluation and Learning (MEL)** to track risks dynamically.

9.3.2.1 Phase-Specific Strategies:
9.3.2.2 Short-Term

1. **Community buy-in:** Run targeted sensitisation and awareness campaigns before works begin.
2. **Technical training:** Immediate training for local artisans on resilient construction and for drainage committees on maintenance.
3. **Climate-smart scheduling:** Time construction works around rainfall patterns to avoid disruption.
4. **Coordination checks:** Activate TWGs and CLOs from Chapter 6 to streamline communication.

9.3.2.3 Medium-Term

1. **Financial resilience:** Diversify funding sources tap FLLoCA, GCF, bilateral donors, CSR, and foundations.
2. **Land management:** Use participatory mapping and dialogue to resolve land disputes, especially for sewer and housing projects.
3. **Policy continuity:** Formalise adaptation actions into county and municipal plans to protect against political changes.
4. **Incentives:** Maintain momentum by showcasing quick wins (e.g. community tree planting) alongside bigger projects.

9.3.2.4 Long-Term

1. **Sustained financing:** Secure multi-year funding agreements and build a reserve fund.
2. **Scenario planning:** Use updated climate data to adjust projections and designs.
3. **Institutional resilience:** Document processes and build institutional memory through handover notes and training.
4. **Population planning:** Strengthen land-use enforcement to manage settlement expansion.

9.3.3 Contingency Planning

Contingency planning ensures that critical interventions can proceed even under stress.

9.3.3.1 Funding delays/withdrawals

- Stagger projects into smaller, fundable modules.
- Build community savings schemes and reserve funds for essential maintenance.
- Activate co-financing arrangements with private firms or NGOs.

9.3.3.2 Partner withdrawal

- Maintain a roster of alternative partners (NGOs, CBOs, academic institutions).
- Cross-train SAC members and county officials to reduce reliance on external expertise.

9.3.3.3 Extreme climate events

- Pre-position emergency supplies and equipment (sandbags, pumps, water tanks).
- Link early warning systems with emergency response teams.
- Have flexible project timelines to pause/resume safely after shocks.

9.3.3.4 Procurement or contractor failure

- Include penalty clauses in contracts.
- Use performance bonds and phased payments tied to verified milestones.
- Keep a vetted shortlist of alternative contractors.

9.3.3.5 Feedback loops:

- Monthly SAC monitoring meetings to detect risks early.
- Quarterly reviews with county government and donors.
- Community scorecards and grievance redress channels to capture resident concerns.

9.3.4 Flexibility and Adaptability

Adaptability is critical to keep the plan relevant under changing conditions.

- "Learning by doing." Each project phase will be treated as a pilot, with lessons rolled into subsequent phases.
- Flexible phasing. Interventions will be modular and scalable (e.g. starting with pilot wetlands before full-scale decentralised treatment).
- Regular reviews. Annual SAC-community meetings and five-year strategic reviews will allow revisions of priorities and budgets.
- New data integration. Updated flood maps, climate projections, or socio-economic data will directly inform modifications to projects.
- Inclusive governance. Vulnerable groups will be included in monitoring and decision-making to ensure responsiveness to diverse needs.

10 CONCLUSION

The People's Adaptation Plan (PAP) for Sofia informal settlement outlines an ambitious yet community-driven pathway for transforming one of Homa Bay municipality's most vulnerable neighbourhoods into a climate-resilient, inclusive and sustainable urban area by 2035. Through a locally led process grounded in participation, equity and local knowledge, residents, county officials and partners developed a cross-sectoral roadmap that addresses the settlement's social, economic and environmental challenges while aligning with county, national and global policy frameworks.

A decade of inclusive planning and climate resilience. Sofia's precarious conditions youthful demographics, widespread informal livelihoods and inadequate service provision are compounded by recurrent climate hazards such as droughts, heatwaves and flash flooding. These stresses undermine livelihoods, health and housing, with women, youth, elders and low-income tenants especially at risk. The PAP responds by centring participation and inclusion; enumerations, mapping exercises and visioning sessions were led by community members, particularly women and youth, ensuring that the plan reflects lived realities and indigenous coping strategies. Equity and justice principles guide interventions so that vulnerable households receive priority assistance and do not bear disproportionate burdens of adaptation. This participatory approach builds trust, strengthens social capital and lays the foundation for sustained community ownership of adaptation.

Integrated interventions across sectors. The plan proposes a suite of phased actions that cut across water, sanitation and hygiene (WASH); housing; mobility and drainage; energy; health and social services; livelihoods; and green infrastructure. These interventions address immediate needs while laying groundwork for long-term resilience. For WASH, the plan calls for repairing water pipelines, expanding HOMAWASCO's piped network to underserved western zones, promoting household and community rainwater harvesting, installing water kiosks on elevated ground and introducing regular maintenance regimes. Sanitation improvements include raising and upgrading pit latrines, extending the sewer network, constructing decentralised wastewater treatment wetlands and establishing waste segregation and composting systems. In housing, resilient building materials, elevated plinths and passive cooling strategies (ventilation, reflective roofs and tree planting) are paired with tenure regularisation and incremental upgrading.

Mobility and drainage improvements are phased: youth brigades will initially clear drains and organise clean-ups, followed by the installation of permeable pavements, vegetated swales, elevated footpaths and retention basins, culminating in a settlement-wide drainage network and paved primary roads. Energy and communication resilience measures combine solar-powered high-mast lights, repaired lighting networks, safe charging hubs and early warning systems with a push to transition households from charcoal and firewood to cleaner fuels such as LPG and solar cookstoves. Health and social services will be strengthened through elevated clinics with rainwater harvesting and backup power, mobile health teams during floods and a community resource centre for training and emergency shelter. Livelihood diversification initiatives support women and youth cooperatives in poultry farming, waste collection and regulated water vending, and encourage climate-smart urban agriculture and markets with cold storage. Ecosystem-based adaptation tree planting, rain gardens, bioswales, wetlands restoration and the creation of pocket parks and green corridors both mitigates runoff and heat and provides recreational and economic opportunities.

Collaborative governance and financing. To oversee implementation, the plan establishes a formalised Sofia Adaptation Committee (SAC) comprising community representatives. This committee will prioritise projects, coordinate fundraising and liaise with county and municipal authorities. Residents will participate in planning, construction and maintenance, while the county government offers technical oversight and integrates projects into the County Integrated Development Plan. A blend of financing sources community contributions (with exemptions for vulnerable households), county budget allocations, national programmes such as the Financing Locally Led Climate Action programme, global climate funds, private-sector partnerships and philanthropic foundations ensures sustainability. A robust monitoring and evaluation framework uses community-defined indicators across WASH, housing, mobility, energy, health, ecosystems, livelihoods and governance, supported by baseline surveys, participatory GIS mapping, digital dashboards and story-based methods. Semi-annual

reviews and annual learning forums will facilitate adaptive management.

Towards a resilient and inclusive Sofia. The PAP positions Sofia as a model for locally led adaptation in informal settlements. By integrating climate-resilient infrastructure, diversified livelihoods, social services and green spaces, the plan addresses the underlying drivers of vulnerability poverty, insecure tenure, exposure to hazards and exclusion from formal planning. Success will hinge on sustained political commitment, adequate funding, capacity-building and accountability. As climate risks intensify and urbanisation accelerates, the experiences of Sofia will offer lessons for other communities across Kenya and beyond. The plan underscores that building resilience is not merely a technical exercise but a social and political process that empowers residents to shape their own future. Through collective action, transparent governance and adaptive learning, Sofia can transform from a high-risk informal settlement into a thriving, inclusive and climate-resilient neighbourhood over the next decade.

ANNEXES

Summary Sheet

Settlement	SOFIA
Context	In the northwestern part of Homa Bay Municipality, adjacent to Lake Victoria. Covering about 1.45 square kilometres, it is home to approximately 4,873 residents. The settlement's growth and environmental challenges are closely tied to its location near the lake, which exposes it to flooding and fluctuating water levels.
Hazards	Drought   Flood
Exposure	Houses, roads, water infrastructure
	Vulnerability
Social	• Women at the frontline of climate stress In Sofia, climate change deepens existing gender inequalities. Women often juggle income generation with unpaid care duties, while also shouldering the burden of securing essential resources like water, tasks made harder by drought and flooding. Long collection times impact their safety and well-being. Female-headed households (37%) face major barriers: just 31.6% own land, and 89.9% work in the informal sector, where jobs are unstable and low-paying. These constraints limit their ability to adapt. • Youth and Elderly: A double-edged vulnerability Though older adults make up only 4% of Sofia's population, they face severe climate risks due to poor health, limited income, and weak support networks. Meanwhile, youth dominate demographically, but face high unemployment (59.6% for ages 15–24), low income (27% earn <6,000 Ksh/month), and unstable livelihoods, undermining their ability to cope with climate shocks despite physical resilience.
Economic	• Lake based activities, highly vulnerable to lake warming Fishing and small-scale trading, is increasingly impacted by rising lake temperatures and erratic weather patterns. In recent years, massive fish die-offs, due to warming waters which have significantly disrupted livelihoods dependent on Lake Victoria. Additionally, storms and heavy rains frequently damage fishing equipment, further threatening household income. • Precarious Livelihoods, high climate exposure Formal employment is scarce (6.2%), while most residents rely on informal, often unstable, income sources. Self-employment accounts for just 18.9%, the lowest among the three settlements. Informal businesses, many of which operate roadside, are especially exposed to climate risks like flooding, causing repeated damage and loss of income.
Geophysical	• Topography: Elevation patterns that shape exposure Sofia's topography significantly impacts its climate vulnerability. The low-lying southeastern areas are particularly vulnerable to flooding and waterlogging due to the varied terrain with slopes which creates challenges for construction and drainage. While the higher, more stable northwestern zones are better suited for planned development. • Beneath the Surface: How Sofia's Soils Influence Climate Risks Sofia's soil types create uneven vulnerability across the settlement. The eastern areas, dominated by montmorillonitic clay soils, make them susceptible to landslides and structural damage. In contrast, the western regions, with more stable interstratified clayey soils, are better suited for construction. This disparity increases the vulnerability of the southeastern, steeper zones to erosion and instability, exacerbated by changing climate conditions.

	• Hydrology: Water dependency & seasonal variability Influenced by its proximity to Lake Victoria and seasonal streams, Sofia is vulnerable to flooding and waterlogging. In parallel, groundwater, especially vital in the settlement's drier areas, is susceptible to seasonal fluctuations and climate change, particularly during dry spells, making Sofia highly exposed to both flooding and water scarcity • Drainage: A system overwhelmed by climate extremes Sofia's drainage infrastructure is insufficient, particularly in the low-lying southeastern areas, where poorly maintained systems and clogged flow paths worsen flooding. The lack of effective drainage increases the risk of waterlogging and flood damage, while the higher areas, though less prone to flooding, still face infrastructure challenges. Improved drainage is crucial to reducing Sofia's flood vulnerability.
Infrastructure	• Water Infrastructure: inadequate access & climate pressure 31.2% of households are connected to piped water, 52.3% endure frequent outages, especially during dry spells and aging, heat-sensitive plastic pipes struggle to meet rising demand. As a result, the community remains vulnerable to both drought and flooding, all while water costs stay high. • Sanitation Systems: overburdened & unsanitary
	Sanitation is a major concern, with 93.7% of households relying on communal pit latrines. The lack of a reliable sewer system makes the area highly vulnerable to flooding, which is increasingly common due to climate change. Flooding mixes waste with water sources, raising the risk of waterborne diseases. • Mobility Networks: Impassable roads & delayed service responses With 89.3% of roads unpaved, Sofia's transport system is prone to disruptions during heavy rainfall, which is expected to increase with climate change. • Housing Conditions: Overcrowded & climate-exposed With a density of 3,360 people per km², Sofia endures extreme overcrowding that strains basic services and limits space for adequate homes. Nearly half of all households (47%) spend over 30% of their income on rent, leaving little for repairs, while many dwellings are built from substandard materials. This combination of high expenditures, cramped living conditions, and fragile structures sharply raises the risk of damage and displacement as floods and heatwaves grow more frequent. • Energy Systems: unreliable & risk-prone While 73.5% of households have electricity, the energy infrastructure is vulnerable to climate-induced power outages. Solar power, used by 21.1% of households, offers some resilience but faces issues with theft and vandalism, making it unreliable during extreme weather events. • Waste Management: Poor disposal & drain blockages Illegal dumping is common in Sofia (87.4% of households), clogging drainage systems and worsening flooding. Climate change intensifies this risk, as more frequent and severe storms lead to waste-contaminated water, increasing health risks. • Essential Services: Strained health & education access Access to essential services in Sofia is severely constrained. 28% of residents travel over an hour for healthcare, and students face similarly long commutes due to the scarcity of local schools. Flooding often renders roads impassable, disrupting both medical care and education, and heightening the community's vulnerability as extreme weather events become more frequent.
Institutional	• Financial Barriers: Insufficient funding & misallocation Climate finance in Kenya is still facing challenges, with a significant shortfall in meeting the USD 62 billion needed for NDC targets. Over 80% of funds are directed to mitigation, neglecting key sectors like water management and disaster risk reduction in informal settlements. Poor coordination and transparency further hinder effective resource allocation. • Organizational Barriers: Coordination challenges & capacity gaps Fragmented coordination between agencies delays climate action. In Homa Bay, inadequate data systems and weak early warning mechanisms reduce the ability to address hazards. • Governance Barriers: Weak local governance & power struggles Weak municipal governance and overlapping authority between national and local levels reduce climate resilience, particularly in informal settlements. National control over key sectors and fragmented local leadership hinders effective climate adaptation efforts.

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- Community-driven Adaptation Actions: Local Solutions with Limited Impact

Residents take individual, but these efforts lack broader coordination and formal support. While resourceful, these initiatives need scaling and institutional backing to address larger climate risks effectively.
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<tr><td>Exposure score</td><td>Approximately 31.5% of Sofia's surface area is highly and directly exposed to flooding and erosion. Based on flood hotspot mapping by community members and findings from the hydrological and hydraulic study, an estimated 0.458 km² out of the settlement's total 1.455 km² falls within zones classified as highly and directly exposed to climate-related hazards.

Exposure scoring: 1</td></tr>
<tr><td>Vulnerability score</td><td>
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<tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>Sofia</td><td>1.7</td><td>2.5</td><td>1</td><td>3</td><td>3</td><td>2.2</td></tr>
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<tr><td>Risk score</td><td>Risk = Low</td></tr>
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People’s Adaptation Local Physical and Land Use Development Plan for Homa Bay Municipality - 2025-2035