Appendix E:

RESILIENCE ACTIONS

2023



RESILIENT SALEM























System Area	Action Category	Identified Problem	Exacerbation by Climate Change	Suggested Actions	Possible Solution	Geography	Action Type	Populations Addressed	on: Low	Estimated Cost: \$, \$\$, \$\$\$ \$\$\$\$	Organizati	Organizati	Funding	Critical Next Steps
Built System	Critical Maintenance and Upgrades	Aging infrastructure requiring repairs	More intense precipitation events stress infrastructure	Decommission aging infrastructure and replace with modern, decentralized water storage tanks	Decommission aging infrastructure and replace with modern, decentralized water storage tanks	Citywide	Infrastruct ure Improvem ents		High	\$\$\$\$\$	City Engineeri ng, Water & Sewer Departme nt, Streets Departme nt	OEM	DEP, OEM, DOT infrastructu re grants	Cost Estimates and Comprehensi ve Plans. Secure funding through grants and bonds.
Built System	Maintenance and Upgrades	Flooding of Pump Stations: Wastewater Treatment Facilities, Town Bank Pumping Station, Keasbey Creek Pumping Station	Risk of extreme weather events, potential for facility flooding	Explore flood mitigation options for the pumps.	Ensure timely repair of City's water facilities and explore mitigation measures.	Citywide	Infrastruct ure Improvem ents		High	\$\$\$	City Engineeri ng Departme nt, Water and Sewer Departme nt	OEM	DEP, OEM	Conduct a safety audit, and establish regular maintenance protocols. Implement flood miitgation measures

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Built System	Critical Maintenance and Upgrades	Sewer system overload from sump pumps connected to sanitary system			Disconnect sump pumps from sanitary system; encourage alternate drainage solutions; replace necessary pumps	Citywide	Infrastruct ure Improvem ents		High	\$\$\$	City Engineeri ng Departme nt, Water and Sewer Departme nt	OEM	Infrastructu re grants	Hire a consultant to study the sanitary/sew er system and determine location of sump pumps that are (illegally) connected to the system.
Built System	Maintenance and Upgrades	Chestnut Street Bridge Over Salem	is expected to increase the	Support on-going maintenance and update processes by providing the most up date flood mapping data.	Partner with County and State Inspection program to implemnent annual maintenance. Mapping of up to date flooding for long term drainage solutions	Citywide	Infrastruct ure Improvem ents	,	High	\$\$\$	ng, Streets	Departme nt of	Municipal bonds	Prioritize fundging to areas most vulnerable to flooding for immediate drainage improvemen ts.

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Built System	Infrastructure Improvements	Relocation of vulnerable emergency shelters (Salem High School)	areas prone to	Relocate vulnerable emergency shelters to safer locations	Identify all emergency shelters and prioritize the top five that require relocation. Identify and evaluate viable locations in the city for the vulnerable shelters. Determine the feasibility and timeline to relocate vulnerable shelters.	Citywide	Infrastruct ure Improvem ents	Citywide	High	, ,			Plan and execute the relocation of vulnerable emergency shelters to safer locations outside flood hazard areas.

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Built System	Infrastructure Improvements		is expected to increase which can put critical assets at	Design and develop a detailed database of all utilities including age, capacity, location and annual maintenance requirements.	Utilities, community assets, emergency facilities. Site- or building-level adaptation may include: • Elevating critical mechanical systems, including emergency and backup generators • Dry floodproofing which involves constructing flood barriers and/or shields around critical equipment, systems, or areas • Retrofitting pump stations • Relocating critical facilities should effective mitigation interfere with operations • Additional asset-specific study will be required to determine the most appropriate and cost-effective way of reducing risk at each priority asset.		Infrastruct ure Improvem ents	Population	High	\$\$\$	City Engineer, Streets Departme nt, Economic Developm ent, Fire Departme nt, Water & Sewer	Departme nt of Public Works, Office of Emergenc y Managem	Federal Grants, Municipal Bonds	Conduct asset-specific studies to determine the best risk reduction strategies for each priority asset.

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Built System	Green Infrastructure	Stomwater and drainage capacity is limited		infrastructure practices such as rain gardens, bioswales, and subsurface stormwater retention/detention in	Review all public works projects and determine where green infrastructure can be utilized in development projects across city departments.	City wide	Infrastruct ure Improvem ents	Population	High Priority	\$\$\$	City Engineer,	Agencies	Grants, Municipal Bonds	Develop a comprehensi ve plan for the construction and integration of green infrastructur e practices across the city.

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Built System	Water Management	water management practices	_	project to utilize Green Stormwater Infrastructure in design	Identify locations where Green Stormwater Infrastructure can easily be installed for minmal cost and maximum immediate impact.	City wide, but with a focus on flood prone neighborhoo ds	Infrastruct ure	General Population	Medium	\$	City Engineer,	Agencies	State Grants, Federal Grants	Develop a comprehensi ve stormwater management plan that encourages sustainable water management practices.
Built System	Green Infrastructure	limits infiltration	will cause more precipitation	subsurface stormwater retention/detention. Utizile Permeable Pavement in lieu of	Review all public works projects and determine where green infrastructure can be utilized in development projects across city departments.	Citywide	Infrastruct ure Improvem ents	General Population	Low	\$\$	Engineer, Street Departme	Green Team,	Municipal Budget, State Grants	Identify areas and projects suitable for the installation of green infrastructur e and begin implementat ion alongside road and park projects.

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Built System Infrastructure Improvements	management system along Grieves Parkway, York Street, Salem	precipitation events, making effective management of stormwater	Stormwater management system upgrade and improvement along Grieves Parkway, York Street, Salem Manor Complex, and Keasbey Creek.	Update and maintain the stormwater infrastructure, including pumps, dredging	Flooding areas	Infrastruct ure Improvem ents	Population	Medium		City, NJDEP	NJDEP	Stormwater mapping and needs assessment

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Natural System Open S Stormy Manag	water n gement ir	nanagement nadequate to lecrease the risk	storms will increase flooding.	comprehensive stormwater	Identify specific existing open spaces that could benefit from stormwater management projects.	City wide, but with a focus on flood prone areas	Policy & Governan ce	Citywide	High	Engineer, Streets Departme nt	Planning Board,	NJDEP	Feasibility study

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Natural System	Cooling Centers in Recreation Facilities	residents, especially seniors and children, to extreme heat	Increased frequency and intensity of heatwaves, leading to health risks and discomfort	heat during heatwaves	Designate certain recreation facilities as cooling centers during extreme heat events	Identify suitable facilities, equip them with cooling equipment, establish protocols for opening them during heatwaves	Citywide	Vulnerable	High	\$	Streets Departme nt, Economic	Public Works,	Preparedne	Ensure facilities are ready for use during heatwaves, and coordinate with relevant agencies for activation.
Natural System	Programing for Vulnerable Populations	Limited access to cool indoor spaces during heatwaves, posing health risks	intensity of	Children and Seniors in Air-Conditioned Spaces	Offer indoor recreational and educational programs in air- conditioned facilities during heatwaves	Develop a schedule of activities, outreach to community organizations , ensure accessibility	Citywide	Vulnerable	High	\$	County Departme nt of Facilities Managem ent	Senior Centers,	Municipal Budget, Community Grants	Develop and publicize program schedules, and engage with local organizations for program delivery.

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Natural System	Programing for Vulnerable Populations	Limited access to water activities during heatwaves, posing health risks		Outdoor Recreation for children in Water-based activities	Reopen the pool and/or provide a spray park for youth	Work with community organization and the County to secure land for a spray park and pool. Negotiate with YMCA to reopen pool.	Citywide	Vulnerable	High	\$\$\$	City	Organizati ons	Munipal Budget, Community Grants	Identifiy areas for possible spray park/pool. Coordinate with County and Community Organization s on partnership.
Natural System	Tree Planting Programs	Lack of urban tree canopy contributing to heat island effect	Increased urban heat island effect, leading to higher temperatures in the city	Increase tree planting and expand the urban tree canopy	Reactivate the shade tree commission to expand tree planting initiatives in parks and recreational areas	suitable	Citywide, Parks and Recreatio nal Areas	Vulnerable	High	\$	City Engineer, Streets Departme nt	Departme nt of Public	Municipal Budget, Tree Planting Grants	Plan tree planting events, engage the community, and establish maintenance practices for planted trees.

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Natural System	Local Food Growing	Food insecurity and limited access to fresh, locally- grown produce	Climate impacts on food supply chains, emphasizing the need for local food production	Identify locations that can become community gardens where residents can grow local produce.	areas. Create a	Provide garden plots, gardening education, and support for community- led initiatives	Citywide, Parks and Recreatio nal Areas	Vulnerable	High	\$	Streets Departme nt	Gardening Clubs,	Municipal Budget	Prepare garden areas, allocate plots, and provide educational resources for gardeners.
Natural System		Flooding and stormwater runoff	Increased frequency and severity of heavy rainfall events, leading to flooding	and redirecting stormwater runoff	Install rain barrels and stormwater capture systems in recreation facilities	Assess suitable locations, install systems, and educate the community on their benefits	Citywide, Parks and Recreatio nal Areas	Citywide	Low	\$	Streets Departme nt, County Departme nt of Facilities Managem ent	Departme nt of Public Works, Environm ental Agencies,	Municipal Budget	Identify priority sites for installation, procure equipment, and initiate community awareness campaigns.

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Natural System	Community	Lack of awareness	Climate change	Promote awareness	Organize educational	Collaborate	Citywide,	Citywide	High	\$	City Board	Local	Municipal	Develop and
	Education and	about climate	exacerbating	about climate change	workshops and	with local	Recreatio				of	Schools,	Budget,	deliver
	Workshops	change and	risks, making	and resilience strategies	community events	experts,	nal				Education	Environm	Community	educational
		resilience	education and	in schools and through	focused on climate	schools, and	Facilities				, City	ental	Grants	programs,
		strategies	awareness	City policies. Connect	change and resilience.	community					Council	Groups,		outreach to
			crucial	how unsustainable	Create a short list of five	organizations						Communit		community
				solutions can exacerbate	things everyone can do	to host						у		organizations
				flooding and harm the	to increase the	workshops						Associatio		, and ensure
				community in other	community's resiliency to	on climate						ns		accessibility.
				ways.	future climate events.	change								
						adaptation,								
						disaster								
						preparedness								
						, and								
						sustainable								
						practices								

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Natural System	Heat-Resilient Landscaping	Urban areas lacking green spaces and shade	Increased urban heat island effect, making shaded green spaces essential	where planting heat	Implement heat-resilient landscaping in parks and recreational areas	heat-tolerant	Recreatio	Areas lacking tree cover and in urban heat islands	Medium	\$	Streets Departme nt, City Council,	Departme nt of	Environme ntal Grants	Using the heat island map develop priority areas for tree planting and shade areas.

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Natural System	Emergency Preparedness Training	Lack of emergency preparedness skills among community members	of climate-	program that trains key	Offer emergency preparedness training and drills	Develop and conduct emergency response training programs for community members of all ages	Citywide, Recreatio nal Facilities	City Stair	High		Emergenc y Managem	Budget, Emergency Preparedne ss Grants	
											Mangeme nt, Red Cross		

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Natural System	Resilient Park Design	design for climate resilience	impacts on	Identify parks that need to be redesigned to be more climate resilient	Work with landscape architects to redesign park layouts, integrate flood-resilient features, and enhance overall park resilience	Parks and Recreational Areas		Recreation areas	low		City Engineer, County Departme nt of Facilities Managem ent,	Departme nt of Public Works, Landscape Architects , Environm ental Consultan ts	Landscape Improveme nt Grants, Green Acres Program Local Governmen	

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Natural System	Renewable Energy Installations	Dependence on non-renewable energy sources	Climate change impacts on energy resources and the need for sustainability	technologies in the	Install renewable energy systems in recreation facilities	Identify suitable sites for solar panels or wind turbines, conduct energy audits, and implement renewable energy installations	Recreatio nal Facilities	Citywide	Medium	\$\$\$	City Engineer, County Departme nt of Facilities Managem ent, Streets Departme nt	nt of Public Works, Energy Efficiency Agencies, Renewabl e Energy	-	Assess energy needs, select suitable sites, and install renewable energy systems.
Natural System	Create Recreation Department	Addresses lack of coordination of actions relating to parks and recreation	impacts parks		Create a Recreation and Parks Department	Citywide with focus on parks and recreational facilities	Policy & Governan ce	Citywide	Medium		Economic Developm	Departme nt of	Municipal Budget, State Green Acre funds	Budget Review

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	members have expressed a need to know more about what they can do to reduce climate-related risk on their own properties and also contribute to reduced climate	strategies to enhance the city's resilience to climate risks and hazards, including strategies for	support residents and developers in incorporating more resilient practices into buildings during construction or renovations / retrofits.	Guidelines can sometimes be used to test higher standards that could be later integrated into regulation to help build resilient improvements at scale. Promote the guidelines positively so residents understand the benefit.	Citywide	Policy & Governan ce	High	Citywide	\$\$	City Engineer, Economic Developm ent	Council, Planning		

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Governance Flooding of contamina sites		sites are at risk of flooding and have an unknown risk of exposure to groundwater rise, which may mobilize contaminants. Contaminated sites and brownfields often blight communities, but can provide significant opportunity	state-managed databases to provide more complete information on resilience-related factors (e.g., Brownfields inventory, Known contaminated site list, include detail on contaminant type, remedial design). Coordinate and align state funding programs	Explore resilience-related higher standards on contaminated sites for remediation and redevelopment. Study the impacts of climate-related hazards, such as groundwater rise, on risks posed by various types of site contamination. Based on the outcomes, conduct a climate-related risk assessment on contaminated and remediated sites		Policy & Governan ce	High	City wide with special attention to those in flood prone areas	\$\$	Engineer	Departme nt of Public Works, Office of Emergenc gy Managem ent	NJEDA Hazardous Discharge Site Remediatio n Fund (HDSRF),	Map out the contaminate d sites that are at risk.

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Governance Resilience standards sho be adopted by the City for development flood hazard areas	economic and	is expected to increase the risk of extreme	standards by the City for development in flood hazard areas	Adopt resilience standards for development in flood hazard areas	City wide with particular attention to flood and hazard prone areas.	Policy & Governme nt	Citywide		Engineer	,		Using available mapping, develop standards that meet the regulations. See ordinance example.

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Social System	Infrastructure Improvements	Vulnerable Critical Assets	in disaster prone areas need additional resilience	detailed database of all utilities including age, capacity, location and annual maintenance requirements. Share the database with relevant	including emergency and backup generators •Dry floodproofing which involves constructing		Infrastruct ure Improvem ents	High Priority	General Populatio n	\$\$\$	Streets Departme nt, Economic Developm ent	Office of Emergenc y	Federal Grants, Municipal Bonds	Conduct asset-specific studies to determine the best risk reduction strategies for each priority asset.

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Social System	Infrastructure Improvements	Emergency Shelters located in vulnerable areas	Residents in areas prone to flooding or other hazards are at a greater risk of experiencing repetitive	be appropriately located.	Using the CCRHVA to target emergency shelters and prioritize the top five that require relocation. Identify and evaluate viable locations in the city for the vulnerable shelters. Determine the feasibility and timeline to relocate vulnerable shelters.		Infrastruct ure Improvem ents	High Priority	Vulnerabl e Populatio ns	\$\$\$		Housing & Economic Developm ent Division of Planning, Office of Emergenc y Managem ent	Grants, Municipal Bonds	Plan and execute the relocation of vulnerable emergency shelters to safer locations in flood hazard areas.
Natural System	Flooding	Poor drainage systems	Climate change is expected to increase the frequency and severity of precipitation events	guidelines and strategies for flood prone areas that incorporates green infrastructure and promotes resilience with a focus on stormwater	engineers to identify opportunities to install green infrastructure to	City wide, but initially a focus on flood prone neighborhoo ds	Policy & Governan ce	High Priority	Citywide	\$\$\$	City Engineer, Streets Departme nt, County Departme nt of Public Works	Agencies	Federal Grants, Municipal Bonds	Identify and prioritize areas most vulnerable to flooding for immediate drainage system improvemen ts.

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Governance	Open Space Stormwater Management	Inadequate stormwater management increasing the risk of flooding.	frequent and	for flood-prone areas that incorporate green infrastructure features and promote resilience. Develop a comprehensive stormwater management plan that incorporates existing open space for stormwater storage, utilizes green	Identify existing, municipally owned, open spaces, for example parks, that could benefit from stormwater management projects. Survey flood prone areas, and work with city engineers to identify opportunities to install green infrastructure to improve the resiliency of the drainage systems in flood prone areas.	City wide	Policy & Governan ce	High priority	Planning	\$\$	Engineer, County Departme nt of	Sustainabl e	Competitiv e Grant Program,	Identify and prioritize areas most vulnerable to flooding for immediate drainage system improvemen ts.

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Natural System Water Manag	gement op st	pen space for cormwater nanagement	Effective management of stormwater in open space will become more important with the increased prevalence and severity of precipitation events		Determine locations where rain gardens can be installed to collect water for possible reuse in irrigation. Develop strategies for increasing the use of native plants and vegetation in parks and open spaces to increase resiliency to major storm events.	Citywide	Infrastruct ure	High	Citywide		City Engineer, Streets Departme nt and County Departme nt of Public Works		budget, environme ntal	Identify areas where raingardens can be installed to collect water for possible reuse. Develop strategies for the use of native plants and vegetation.

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Governance	Lack of Training and staffing	equipment for many Departments	When critical departments aren't fully staffed or trained it has an effect on the response that can be expected during an emergency or disaster.	Adequate equipment and appropriate training can be critical for emergency response efforts during climaterelated disasters	Develop a plan to acquire necessary equipment for City Departments. Establish ownership and maintenance procedures. Inventory equipment needs for the next five years across departments responding to climate related disasters and identify opportunities for joint procurement.	Citywide	Implemen tation	High Priority	Local Municipali ty. Dedicate staff time for coordinati ng joint procurem ent for large equipmen t purchases .		Emergenc y Managem	Departme nt of	Municipal Budget, State Grants	Create a database of all equipment needs for the City. Consider sharing equipment. Create a database of all personnel that need training or have certifications /licenses.

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Governance	Adopt requirements for heat mitigation	Inefficient policies to address urban heat island effect lacking requirements for mitigation on public properties and/or new/redevelopment.	increases the risk of extreme heat which contributes to	possibility of implementing a requirement for public properties to	Heat Mitigation ordinance adoption. Further exploration to establish the most effective requirements for inclusion.	Citywide with attention to larger development s	Policy and Ordinance s		City wide for developer s	\$\$,	Departme nt of	State Grants	Explore implementin g a requirement for public properties to incorporate heat mitigation features into any new design. Partner with County.
Governance	Adopt policies to protect Historic Resources	Historic resources at risk.	Climate change increases the risk of extreme weather that threaten historic resources	Resilient design guidelines and post	Further exploration of Resilient design guidelines and post diaster review for historic properties.	Citywide with focus on historic districts	Policy and Ordinance s	•	Citywide	\$\$	Planning Board, Economic Developm ent	Engineer,	n State and Federal Grants	Coordinate with County and local Historic Preservation Groups to research creating guidelines

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Governance	Mitigation options for Repetative Flood loss properties	Repetative Flood Loss Properties	Climate change will cause more precipitation events, making repetative property loss due to flood more frequent	relocation alternatives: Mitigation Options: Elevating buildings Floodproofing structures Sealing basements Relocating utilities Improving stormwater management Implementing green infrastructure Constructing flood barriers or levees Relocation Alternatives: Property acquisition and buyout programs Zoning and land use	Identify properties susceptible to repetative flood damage. For both mitigation and relocation, it's important to conduct thorough risk assessments, cost-benefit analyses, and community consultations. Policies should be established in coordination with local, state, and federal agencies, including emergency management and environmental protection agencies, to ensure that strategies are effective and equitable.	areas	Governme nt	_	Citywide	\$\$\$	Economic Developm ent, City Engineer			Identify landowners within areas of repetative flooding and partner with State to create program for mitigation and/or relocation