Game of Heat Adaptation Strategies and Estimated Costs

	Heat Adaptation Strategy	Cost Estimate	Key Implementation Considerations *(aside from funding)*
	Physical Strategies		
PH1	**Build a solar or wind farm to increase the city's renewable portfolio**	**$500,000** per acre of solar ($$$) **$3 million** per 2MW wind turbine ($$$)	• Land acquisition • Environmental regulations and permitting • Renewable energy integration into the grid
PH2	**Undertake weatherization improvements on city buildings as part of standard maintenance cycles** *Weatherization improvements can significantly reduce energy consumption and optimize energy efficiency of city buildings and demonstrate leadership. Reducing energy consumption across the city will reduce greenhouse gas emissions. More energy efficient buildings in the city also have the co-benefit of lowering peak energy demand making power outages less common.*	**$100,000** per building ($)	• Building prioritization (More public facing? Least efficient?)
PH3	**Paint the sides of light rail transit rails white** *White rails will absorb less heat than the typical dark metal rails. A coat of white paint along each side of the rail can reduce the temperature of the rails by 50°F which will reduce the risk of buckling in extreme heat. This improves the safety of the local transportation system and reduces the possibility of delays.*	**$50,000** per 10,000 linear foot of two (parallel) running rails ($)	• May need repainting over time
PH4	**Add solar PV and storage to an asset to reduce grid power reliance** Note: Cost is for a 5kW system and storage	**$36,000** ($)	• Backup power storage • Renewable energy integration into the grid

PH5	**Install diesel generators in individual buildings for backup power** *Diesel generators can provide power for short amounts of time in the event of a power outage. This can be useful for buildings that require electricity for safety or health purposes. This would require the building owner to have fuel on hand to run them. Generators require regular testing and the staff time to complete these tests and maintain records. This is a less than ideal situation for the local environment and health of the city residents. Diesel fuel is a dirty fuel, contributing to local air pollution and increasing health impacts on children, seniors, and people with respiratory illnesses.*	**$20,000** per commercial generator ($)	• Cost for operation and maintenance (O&M), such as required regular testing and record keeping and associated labor • Annual fuel supply • Increased greenhouse gas emissions, local air pollutants, and associated health impacts (i.e., exacerbated respiratory illnesses)
PH6	**Integrate sensors throughout the city and into city-managed weather stations to monitor the Urban Heat Island effect** *Urban heat islands, or areas where the air temperature can be up to 22°F higher than in surrounding areas, can be identified using additional sensors on the city weather stations. By better understanding where in the city this phenomenon is occurring, the city can better tackle issues of localized increased energy consumption, compromised human health conditions, and poor air and water quality. This can help prioritize programs on heat management moving forward.*	**$2,000** per sensor ($)	• Cost for operation and maintenance (O&M), such as regular calibration and cleaning of sensors to ensure accuracy and repair/ replacement following sensor damage or end of life • Program monitoring and costs
PH7	**Add shading structures to popular city and tourist destinations** *City residents and tourists can be exposed to direct sun when visiting the city's popular destinations, which can exacerbate heat-related illnesses. By providing shading structures, individuals are more comfortable and less likely to fall ill to the heat.*	**$6,000** per shading structure ($)	• Cost of operations and maintenance (O&M), including regular cleaning and repair • Potential for vandalism due to public nature of structures
PH8	**Collect and preserve rainwater to feed back into the river during times of low flow** Heat can impact local water levels and quality due to increased evaporation off of surface water bodies. Through rainwater harvesting, the city can reduce its reliance on the local river during times of low flow and can feed that water back into the river when needed.	**$15,000** for a 5,000 gallon cistern ($)	• Cost of operations and maintenance (O&M) of rainwater harvesting materials, including equipment cleaning, repair, and pump replacement • Lack of water quantity in times of drought

	Design Guidelines		
D1	**Create a city green design guidance document** *A city green design guidance document will show developers how to utilize green, energy-efficient, and healthy design components into their design build projects in the city. As development is projected to continue in the city, green design can lessen the impacts to the environment and the health of the city moving forward. Also, more energy efficient buildings in the city have the co-benefit of lowering peak energy demand potentially reducing likelihood of power outages.* Note: Costs are to hire a consultant to develop design criteria.	**$150,000** ($$)	• Policy change • Developer buy in • City staff time to track and ensure policy is implemented correctly • Policy review and update at a regular interval (e.g., 5 years)
D2	**Establish resilience design criteria for transit and other transportation systems to withstand extreme heat, such as installing AC in signal or communications boxes** *Integrating resilience into transit and transportation design can reduce damage to infrastructure, delay in travel times, and also potential injuries associated with transit failure. This will benefit the city's transit lines, roadways, and the populations that rely on them daily.* Note: Costs are to hire a consultant to develop design criteria.	**$150,000** ($$)	• City staff time to track and ensure policy is implemented correctly • Policy review and update at a regular interval (e.g., 5 years)
D3	**Establish requirement for cool roofs on new city buildings or new developments over a specified size** *Cool roofs reflect more sunlight and absorb less heat, reducing local air temperatures. This reduces heat impacts in urban heat islands. Cool roofs can also lower indoor temperatures, requiring less cooling and lower electricity bills.*	**$15,000** ($)	• Policy change • Developer, elected officials, and community buy in • City staff time to track and ensure policy is implemented correctly

D4	**Establish requirement to use cool paving materials for new sidewalks and parking lots (or other large expanses of hard surface) in heat island affected areas** *Cool paving materials are designed to reflect more sunlight and absorb less heat, reducing local air temperatures. This will help reduce heat impacts to assets and populations located in urban heat islands. One tradeoff is cool pavement materials can require more energy to manufacture than conventional pavement materials.*	**$15,000** ($)	• Policy change • Developer, elected officials, and community buy in • Increased energy for manufacturing • City staff time to track and ensure guidance is used correctly • Policy review and update at a regular interval (e.g., 5 years) • Cost for operation and maintenance (O&M) of cool pavements, such as regular cleaning to retain solar reflectance
D5	**Require that new development manage on site the annual increase in runoff volume from the natural land cover condition to the post-developed condition using green infrastructure** *Green infrastructure reduces dense concentrations of pavement, buildings, and other surfaces that absorb and retain heat. This can reduce urban heat islands, as well as better manage stormwater and reduce flooding in the city.*	**$15,000** ($)	• Policy change • Developer buy in • City staff time to track and ensure policy is implemented correctly • Policy review and update at a regular interval (e.g., 5 years)
	Budget Process		
B1	**Include extreme heat tolerance as an evaluation criterion in the capital planning/budgeting allocation process** *Considering materials and construction measures that withstand or reduce extreme heat with city capital planning or budget allocation will promote the longevity of those structures. They would also require less maintenance and associated labor.*	**$15,000** ($)	• Political will and process to update budget allocation process • Projection data availability and credibility • How to address already built structures' longevity

B2	**Develop a monitoring approach to track use of city funds for extreme heat management purposes** *By tracking funding, the city can better identify efficiencies for heat programs. This is also important when justifying heat preparedness and management initiatives to better understand the cost-benefit analysis of being proactive about projected climate conditions.*	**$15,000** ($)	• Operational monitoring and costs City Budget Department's ability to manage program
	Programs		
PR1	**Expand existing tree planting program to increase tree canopy coverage (by 25% or 5,000 trees)** *Trees lower surface and air temperatures by providing shade and increased evapotranspiration. When planted in strategic locations (i.e. near impervious surfaces), trees can be an effective heat island mitigation strategy. Other co-benefits include the potential for reduced energy use if shading a building, improved air quality, enhanced stormwater management, reduced pavement maintenance, and an overall improved public realm and quality of life. Focus should be on drought tolerant species.* Note: Cost includes initial tree planting as well as ongoing maintenance and upkeep.	**$700,000** per 1,000 trees ($$$)	• Cost for operation and maintenance (O&M) can be significant because of regular pruning and watering of trees, removal and replacement of dead trees, and pest control • Parks Department ability to manage program • Operational monitoring and costs
PR2	**Support and develop Community Resilience Hubs which support residents and coordinate resource distribution and services before, during or after a natural hazard event** *Resilience Hubs serve to reduce vulnerability and risk of the community, while also reducing greenhouse gas emissions and supporting social equity. Hubs can serve to meet community-specific needs and reduce strain on emergency shelters, by shifting responsibility from the local government onto community organizations and residents.* Note: Costs are to install solar and associated storage system, print post-disaster materials, stock emergency water and food supply, and install charging stations for cell phones and medical equipment in one Hub.	**$287,000** per site ($$)	• Community buy-in/ will • Upfront costs • Operational monitoring and costs

PR3	**Develop program to prepare transit passengers during heat waves with hydration options, such as the provision of water bottles or installation of water fountains at stations and add shading to unshaded transit stops along with heat health signage** *Transit passengers are often exposed to weather conditions that individual passenger car drivers are not. They have to wait for the bus or train in the heat and often in the direct sun. If the transit vehicles' air conditioning systems malfunction, transit passengers also have to suffer through uncomfortable conditions once on the vehicle. By providing hydration and shading options, passengers are more comfortable and less likely to fall ill to the heat. By reducing the incidence of heat-related illnesses amongst transit riders, service interruptions are reduced.* Note: Cost would include program development and coordination ($10,000), water bottle purchasing (20 cents unit; 10,000 = $2,000), purchase of water fountains ($400 unit; 30 = $12,000) and purchase and install of shading structures ($6,000 unit; 30 = $180,000)	**$200,000** ($$)	• Citizen awareness of program • Language barriers • Operational monitoring and costs
PR4	**Undertake feasibility study for a microgrid to enable the city to maintain power during blackouts (and supply renewable energy during standard operation)** *A microgrid is a discrete energy system consisting of distributed energy sources and loads capable of operating in parallel or independently from the main power grid. This provides energy security for communities, government, and other entities that may require electricity when there are issues with the main grid. This would benefit locations, such as a hospital, where uninterrupted electricity is absolutely necessary to keep medical equipment functioning.*	**$100,000** ($)	• Energy utility buy-in and support
PR5	**Flush the Water Treatment Plant's distribution system** *Flushing the water distribution system and treatment plant is a safe way to remove contaminants following a low-pressure event that could result from a power outage or high demand. This helps protect the city population from potentially harmful contaminants that could lead to diarrheal illness.*	**$55,000** ($)	• Period of time without water access • Provision of clean (i.e., water bottles) to community during flushing • Dedicated staff during flush periods • Operational monitoring and costs

PR6	**Work with local utility to develop / increase take up of energy demand response programs** *Energy demand response programs help reduce or shift electricity usage during peak periods by providing users financial incentives to use less electricity at those times. This reduces stress on the grid and therefore the risk of a power outage. This also forces end-users to evaluate their energy usage and often reduce their overall consumption as associated greenhouse gas emissions. The city's role would be to help promote the program and increase uptake.*	**$40,000** ($)	• Community buy in/ awareness of program • Operational monitoring and costs
PR7	**Establish a cool roof incentive program** *Cool roofs are designed to reflect more sunlight and absorb less heat, reducing local air temperatures. By offering incentives to businesses and residents, cool roofs would be more attainable and would likely increase in number throughout the city. This will help reduce heat impacts to assets and populations located in urban heat islands near new cool roofs. Cool roofs can be vegetated or simply painted white. Cool roofs can also lower indoor temperatures, requiring less cooling and lowering electricity bills.*	**$15,000** ($)	• Determining incentive levels (target vulnerable populations, in UHIs?) • Operational monitoring and costs
PR8	**Provide educational materials through a public outreach campaign on reducing heat exposure and heat-related illness symptoms** *Public awareness is essential to reducing the mortality and morbidity rates associated with heat-related illness. By reducing the incidence of these illnesses, it should also reduce the burden on the local healthcare system to care for these individuals. Materials can cover a basic overview of how to identify symptoms of heat-related illness in yourself and others, as well as how to reduce exposure to extreme heat.*	**$30,000** ($)	• Citizen access to materials • Citizen awareness of program • Language barriers • Operational monitoring and costs

PR9	**Create a green jobs training program** *To encourage green job growth, the City can create a training program to develop relevant skills for the industry. The cost for the program would be subsidized by a local solar company.* Note: Costs include time for employee to organize and run program; all other training costs would be subsidized by the solar power company.	**$30,000** ($)	• Student awareness of program • Funding from solar company may only focus on solar job skills • Need to grow additional green job opportunities for graduates • Operational monitoring and costs
PR10	**Deliver staff training at senior centers, hospitals, schools, resilience hubs, and sports centers on how to identify and respond to heat-related illness** *Providing training on heat-related illness symptoms to staff at locations with high-risk populations could reduce the amount of time before a patient begins to receive treatment, which could mean life or death.* Note: Costs include training at 1 senior center, 1 hospital, 1 school, 1 resilience hub, and 1 sport center (5 locations) twice a year (10 trainings at $2,000 apiece).	**$20,000** ($)	• Language barriers • Operational monitoring and costs
PR11	**Begin a residential weatherization incentive program** *Weatherization improvements can significantly reduce energy consumption and optimize energy efficiency of residential buildings. This will reduce energy costs for residents and city greenhouse gas emissions.*	**$30,000** ($)	• Community buy in/ awareness of program • Level of subsidies for target populations • Operational monitoring and costs
PR12	**Develop a heat wave response program, including establishing local threshold for a heat alert, creating a hotline and alert system** *Heat wave alert systems can be activated at an established temperature threshold to notify city residents when to reduce outdoor activity, take preventative measures, and/or seek shelter. This would reduce heat exposure, reducing the incidence of heat-related illnesses. This should also reduce the burden on the local healthcare system. A potential barrier to these programs is that not all populations may have access if alerts are only in English or low-income if alerts only come through inaccessible technology (i.e. television, cell phone).*	**$10,000** to establish ($)	• Citizen access to communication devices (cell phones, internet) • Language barriers • Operational monitoring and costs

PR13	**Open public buildings such as libraries as cooling centers and provide free transportation to these facilities** *Cooling centers offer an air conditioned public space to offer temporary relief from extreme heat conditions. This reduces heat exposure of vulnerable populations without regular access to air conditioning or shelter, such as homeless and low-income populations. Reducing heat exposure to these populations will reduce the incidence of heat-related illnesses in the city. Cooling centers will require city staff and law enforcement to manage and keep the areas safe for all.* Note: Costs are to staff cooling centers, provide bottled water, and additional fuel costs for air conditioning.	**$10,000** ($)	• Community awareness of program • Ability for residents to travel to cooling centers (access to transit, car, etc.) • Safety concerns • Health concerns of large populations in small area • Operational monitoring and costs
PR14	**Write a grant proposal that enables you to access additional funding for adaptation strategy implementation** *Increase your city budget for adaptation strategies by applying to a state or federal resilience grant program and access an additional $250,000.*	**$10,000** ($)	• Upfront costs • Grant restrictions on how money can be spent
	Planning		
PL1	**Develop a Combined Climate Mitigation and Climate Resilience Plan with Equity at the core of the plan development** *A Climate Mitigation and Resilience Plan would provide a city with the roadmap and framework to prioritize and organize their actions to mitigate and adapt to climate change. It is important that the plan takes equity into account to be effective. These are often public facing documents with stakeholder involvement.* Note: Costs are to hire a consultant to develop plan.	**$200,000** ($$)	• Political will • Stakeholder involvement

PL2	**Update the local hazard mitigation plan to take heat risk into account** *Hazard mitigation plans focus on emergency scenarios to reduce the damage and reconstruction associated with extreme weather. These plans often focus on natural disasters like flooding or earthquakes, but often also impact stressors such as drought. Cities should consider the changing frequency and intensity of extreme heat events as they have the ability to cause major and recurring damage to infrastructure and populations.* Note: Costs are to hire a consultant to update plan.	**$100,000** ($)	• Political will • Projection data availability and credibility
PL3	**Revise health and safety plan requirements for extreme heat events for industries employing outdoor workers (construction, transit, agriculture etc.) to reduce exposure (i.e. modifying construction schedules to focus on night and early morning man hours)** *Simple changes to health and safety plans, such as shifting construction schedules to avoid the hottest parts of the day, mandatory water breaks, and temperature thresholds for outdoor labor, could greatly reduce the number of heat-related illnesses among this population. Reduces burdens on employers and local healthcare facilities.*	**$10,000** ($)	• Local industry buy in • Potentially slower construction times or agricultural output with reduced daytime work hours
PL4	**Incorporate green streets into city transportation plans for new streets and street upgrades** *Green streets can incorporate a wide variety of design elements including street trees and permeable pavements. Coordinating green infrastructure installation with broader transportation improvements can significantly reduce the amount of heat-absorbing impervious surfaces in a city, as well as the cost of stormwater management.*	**$10,000** ($)	• Political will • City and developer knowledge of green street design and maintenance
PL5	**Develop a nutrient management plan to reduce agro-chemical runoff into the river** *To avoid contamination of the river water upon which certain assets depend, especially in high-heat periods, the City can develop a nutrient management plan to combat agrochemical runoff into the river.*	**$10,000** ($)	• Local farmer buy-in • Cost for operation and maintenance (O&M) once the plan is implemented, such regular soil testing.

Note: All costs provided are estimates developed for the purpose of the game only. Where possible, they are derived from reports and case studies. They are illustrative only, and will vary greatly depending on location, exact design of strategy, permitting requirements, construction costs and vulnerability of the asset (among other variables).

Game of Heat - Mapping of Adaptation Strategies to Assets

The following strategies apply to all assets (or most, as noted in parentheses):

Buildings/Built Environment

- PH4: Add solar PV and storage to an asset to reduce grid power reliance (NB: this strategy doesn't apply to Rivers and Trees assets)
- D1: Create a city green design guidance document
- D3: Establish requirement for cool roofs on new city buildings or new developments over a specified size
- D5: Require that new development manage on site the annual increase in runoff volume from the natural land cover condition to the post-developed condition using green infrastructure
- B1: Include extreme heat tolerance as an evaluation criterion in the capital planning/budgeting allocation process
- PR6: Work with local utility to develop / increase take up of energy demand response programs (NB: this strategy doesn't apply to Rivers and Trees assets)
- PR7: Establish a cool roof incentive program (NB: this strategy doesn't apply to Roadways, Riverwalk, Rivers, and Trees assets)
- PH1: Build a solar or wind farm to increase the city's renewable portfolio

People Focused

- PR2: Support and develop Community Resilience Hubs which support residents and coordinate resource distribution and services before, during or after a natural hazard event (NB: this strategy doesn't apply to Rivers and Trees assets)
- PR8: Provide educational materials through a public outreach campaign on reducing heat exposure and heat-related illness symptoms
- PR9: Create a green jobs training program
- PR12: Develop a heat wave response program, including establishing local threshold for a heat alert, creating a hotline and alert system
- PL2: Update the local hazard mitigation plan to take heat risk into account
- PL3: Revise health and safety plan requirements for extreme heat events for industries employing outdoor workers (construction, transit, agriculture etc.) to reduce exposure (i.e. modifying construction schedules to focus on night and early morning hours) (NB: this strategy doesn't apply to River and Trees assets)

Research/Information Strategies

- PH6: Integrate sensors throughout the city and into city-managed weather stations to monitor Urban Heat Island effect
- B2: Develop a monitoring approach to track use of city funds for extreme heat management purposes

Local Government and Budget

- PR14: Write a grant proposal that enables you to access additional funding for adaptation strategy implementation
- PL1: Develop a Combined Climate Mitigation and Climate Resilience Plan with Equity at the core of the plan development

The following strategies apply to specific assets

Asset	Specific Adaptation Strategies
Power Plant	• PR4: Undertake feasibility study for a microgrid to enable the city to maintain power during blackouts (and supply renewable energy during standard operation) • PH4: Add solar PV and storage to an asset to reduce grid power reliance • PH5: Install diesel generators in individual buildings for backup power • D4: Establish requirement to use cool paving materials for new sidewalks and parking lots (or other large expanses of hard surface) in heat island affected areas
Senior Center	• PH4: Add solar PV and storage to an asset to reduce grid power reliance • PH5: Install diesel generators in individual buildings for backup power • PR10: Deliver staff training at senior centers, hospitals, schools, resilience hubs, and sports centers on how to identify and respond to heat-related illness
Hospital	• PH4: Add solar PV and storage to an asset to reduce grid power reliance • PH5: Install diesel generators in individual buildings for backup power • PR4: Undertake feasibility study for a microgrid to enable the city to maintain power during blackouts (and supply renewable energy during standard operation) • PR10: Deliver staff training at senior centers, hospitals, schools, resilience hubs, and sports centers on how to identify and respond to heat-related illness • D4: Establish requirement to use cool paving materials for new sidewalks and parking lots (or other large expanses of hard surface) in heat island affected areas
Emergency Services (Police/Fire)	• PH2: Undertake weatherization improvements on city buildings as part of standard maintenance cycles • PH5: Install diesel generators in individual buildings for backup power • PR4: Undertake feasibility study for a microgrid to enable the city to maintain power during blackouts (and supply renewable energy during standard operation) • D4: Establish requirement to use cool paving materials for new sidewalks and parking lots (or other large expanses of hard surface) in heat island affected areas
Public Housing – The Townhomes	• PH4: Add solar PV and storage to an asset to reduce grid power reliance • PH5: Install diesel generators in individual buildings for backup power • PR11: Begin a residential weatherization incentive program • D4: Establish requirement to use cool paving materials for new sidewalks and parking lots (or other large expanses of hard surface) in heat island affected areas
Public Transit Route	• PH3: Paint the sides of light rail transit rails white • D2: Establish resilience design criteria for transit and other transportation systems to withstand extreme heat, such as installing AC in signal or communications boxes • D4: Establish requirement to use cool paving materials for new sidewalks and parking lots (or other large expanses of hard surface) in heat island affected areas PR3: Develop program to prepare transit passengers during heat waves with hydration options, such as the provision of water bottles or installation of water fountains at stations and add shading to unshaded transit stops along with heat health signage
Rural Area	• PR4: Undertake feasibility study for a microgrid to enable the city to maintain power during blackouts (and supply renewable energy during standard operation) • PH5: Install diesel generators in individual buildings for backup power • PH8: Collect and preserve rainwater to feed back into the river during times of low flow • PL5: Develop a nutrient management plan to reduce agro-chemical runoff into the river

Water Treatment Plant	• PR4: Flush the Water Treatment Plant's distribution system • PH4: Add solar PV and storage to an asset to reduce grid power reliance • PH5: Install diesel generators in individual buildings for backup power • PH8: Collect and preserve rainwater to reduce reliance on river water and feed back into the river during times of low flow • D4: Establish requirement to use cool paving materials for new sidewalks and parking lots (or other large expanses of hard surface) in heat island affected areas
Roadways	• D2: Establish resilience design criteria for transit and other transportation systems to withstand extreme heat, such as installing AC in signal or communications boxes. • D4: Establish requirement to use cool paving materials for new sidewalks and parking lots (or other large expanses of hard surface) in heat island affected areas PL4: Incorporate green streets into city transportation plans for new streets and street upgrades
Private Office Building Complex	• PH4: Add solar PV and storage to an asset to reduce grid power reliance • PH5: Install diesel generators in individual buildings for backup power • D4: Establish requirement to use cool paving materials for new sidewalks and parking lots (or other large expanses of hard surface) in heat island affected areas
Public Library	• PH2: Undertake weatherization improvements on city buildings as part of standard maintenance cycles • PH4: Add solar PV and storage to an asset to reduce grid power reliance • PH5: Install diesel generators in individual buildings for backup power • D3: Establish requirement for cool roofs on new city buildings or new developments over a specified size • D4: Establish requirement to use cool paving materials for new sidewalks and parking lots (or other large expanses of hard surface) in heat island affected areas PR13: Open public buildings such as libraries as cooling centers and provide free transportation to these facilities
Riverwalk	• PH7: Add shading structures to popular city and tourist destinations
Riverfront Residences	• PH4: Add solar PV and storage to an asset to reduce grid power reliance • PH5: Install diesel generators in individual buildings for backup power • PR11: Begin a residential weatherization incentive program
Data Center	• PH4: Add solar PV and storage to an asset to reduce grid power reliance • PH5: Install diesel generators in individual buildings for backup power • D4: Establish requirement to use cool paving materials for new sidewalks and parking lots (or other large expanses of hard surface) in heat island affected areas
High-income Housing – Burns Estates	• PH4: Add solar PV and storage to an asset to reduce grid power reliance • PR11: Begin a residential weatherization incentive program • PH5: Install diesel generators in individual buildings for backup power
Airport	• PH4: Add solar PV and storage to an asset to reduce grid power • PH5: Install diesel generators in individual buildings for backup power reliance • D4: Establish requirement to use cool paving materials for new sidewalks and parking lots (or other large expanses of hard surface) in heat island affected areas
Stadium	• PH4: Add solar PV and storage to an asset to reduce grid power reliance • PH5: Install diesel generators in individual buildings for backup power • D4: Establish requirement to use cool paving materials for new sidewalks and parking lots (or other large expanses of hard surface) in heat island affected areas
Public School / Daycare	• PH2: Undertake weatherization improvements on buildings as part of standard maintenance cycles • PH4: Add solar PV and storage to an asset to reduce grid power reliance • PH5: Install diesel generators in individual city buildings for backup power • D3: Establish requirement for cool roofs on new city buildings or new

	developments over a specified size • D4: Establish requirement to use cool paving materials for new sidewalks and parking lots (or other large expanses of hard surface) in heat island affected areas PR10: Deliver staff training at senior centers, hospitals, schools, resilience hubs, and sports centers on how to identify and respond to heat-related illness • PR13: Open public buildings such as libraries as cooling centers and provide free transportation to these facilities
Trees	• PR1: Expand existing tree planting program to increase tree canopy coverage (by 25% or 5,000 trees)
River	• PL5: Develop a nutrient management plan to reduce agro-chemical runoff into the river. • PH8: Collect and preserve rainwater to reduce reliance on river water and feed back into the river during times of low flow