



Heat Management Plan for Bloomington, Indiana

Hi! I'm Shawn Miya

- Environmental, Health and Safety field since 1998
- Pretreatment Coordinator for CBU for 5 years
- IU Lab Safety Specialist & Laser Safety Officer since 2015
- Master of Public Health, IU, December 2021
- Internship with IU School of Informatics – Researched Heat Management Plans
- Commission on Sustainability, May 2022
- Climate Change & Health Certificate, Yale School of Public Health, July 2022
- Bloomington resident for 20+ years

Topics

- Hazards of Extreme Heat
- Who's Vulnerable?
- 6 Elements of a Heat Management Plan
 - What interests you?
 - What are the capacities within your department or organization?
 - What will you need?
- Challenges
- Where do we go from here?
- Additional Information

Why is Heat Management Important?

- More than 1,300 people die in the US each year due to extreme heat which is more than any other extreme weather such as tornados and hurricanes
- June 2020, nearly 600 deaths in in the Pacific Northwest due to extreme heat
- More than 11,000 Americans have died from extreme heat since 1979
- Heat-related illnesses and deaths are preventable



Who is Vulnerable to Extreme Heat?

- People older than 65 years old have a diminished sweating ability
- Chronic Diseases - cardiovascular diseases, diabetes, respiratory diseases, renal diseases, mental disorders, etc.
- Medications - affects the ability to thermoregulate
- Children - smaller body mass to surface area ratio than adults and are more likely to become dehydrated than adults because they can lose more fluid quickly

Who is Vulnerable to Extreme Heat?

- Pregnant women – more likely to become dehydrated
- Low-income residents – can't afford air conditioning, must walk to work/bus stops
- Outdoor workers – construction, agriculture, utilities, mail carriers, etc.
- Athletes
- “Urban heat islands, combined with an aging population, poor air quality, and growing urbanization, are projected to increase the vulnerability of people to heat-related health impacts.”

Climate Change & Extreme Heat Events

City of Bloomington Climate Risk & Vulnerability Assessment:

By 2100, Bloomington will have an average increase:

- Temperature by 8 – 11 degrees
- 70 days above 95 degrees
- Warmer nighttime temperatures means that many people are unable to sufficiently cool down at night, which increases their risk of heat-related illnesses.



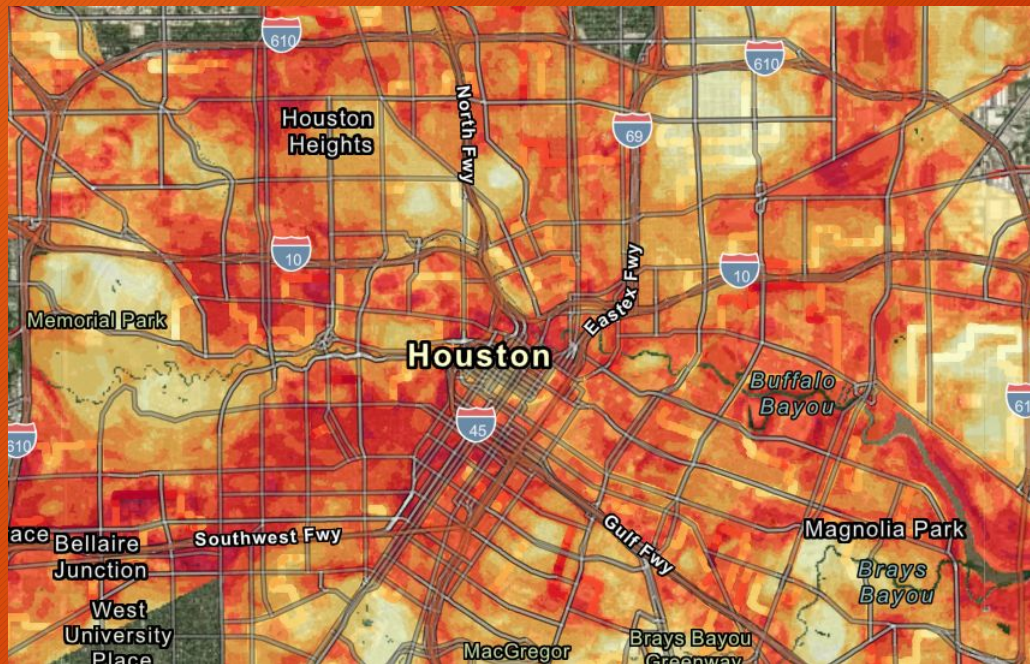


Mapping & Monitoring



Urban Heat Island Map

Temperature data is collected to create an Urban Heat Island Map. Allows communities to develop hyper-local descriptions of heat and strategize mitigation.

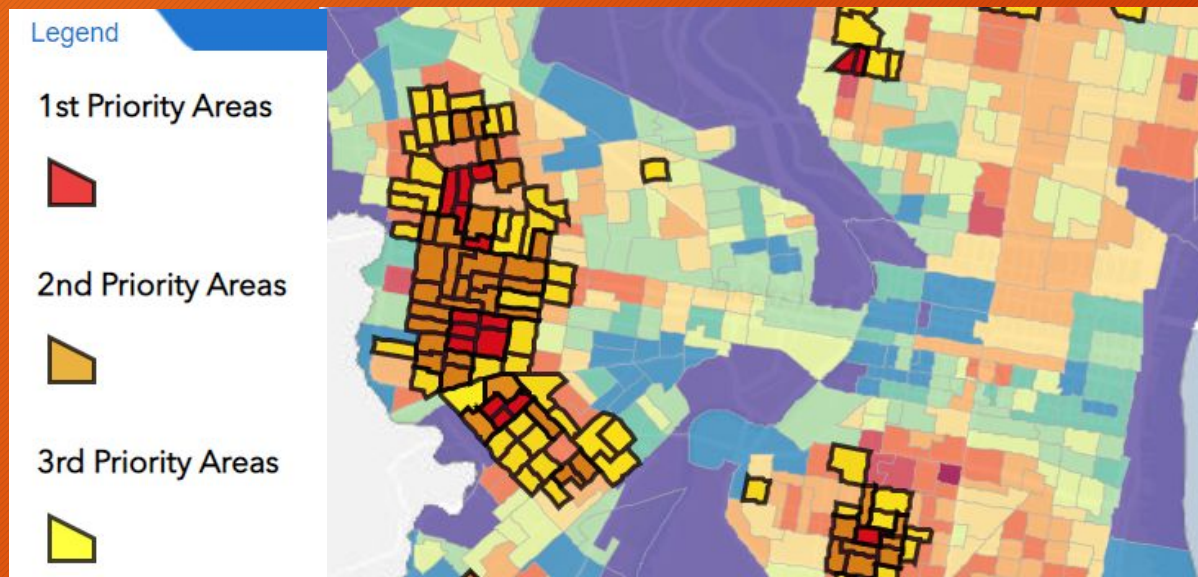


Source: Houston Harris Heat Action Team
<https://www.h3at.org>

Mapping & Monitoring



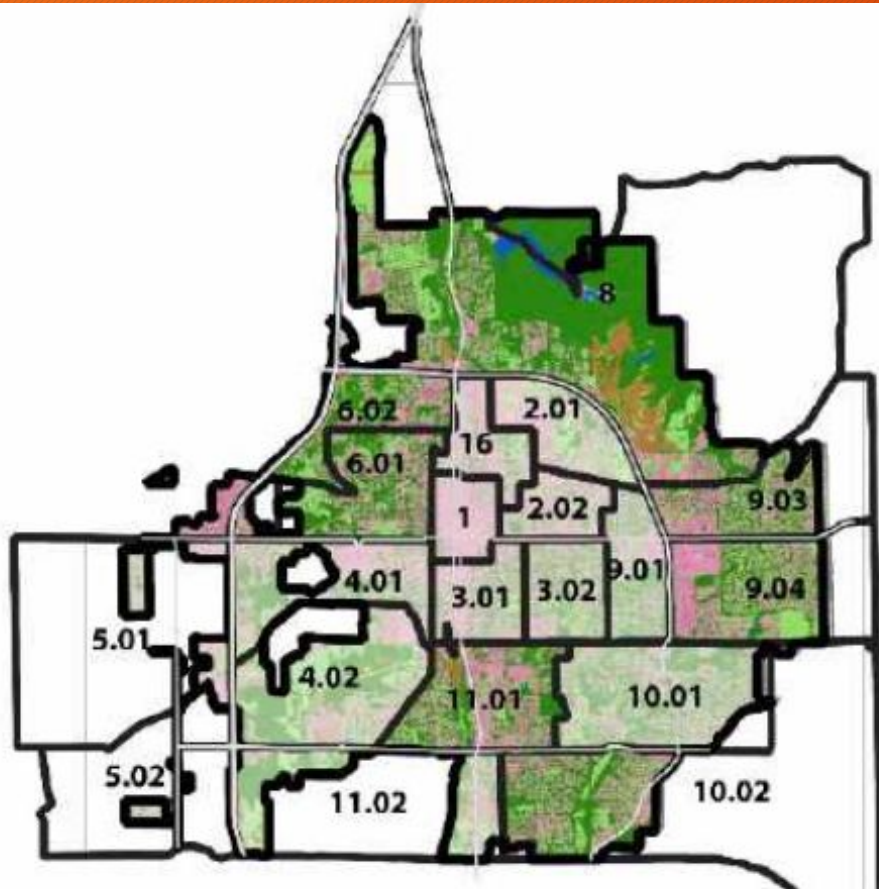
Heat Vulnerability Index Map



Source: Jason Hammer, MPH in collaboration with the Philadelphia Department of Public Health and Mayor's Office of Sustainability
<https://www.arcgis.com/apps/webappviewer/index.html?id=611a8271c62a47e7929213e7e6bde02a>

- Uses existing population and census data, natural and built environment data, and health factors data
- Identifies high-risk neighborhoods and populations to receive targeted messaging related to heat events and additional resources during extreme heat events.

Mapping & Monitoring



- Bloomington doesn't have an urban heat island map
- City's Urban Tree Canopy Assessment Summary Report illustrates impervious land cover (pink) within the City.
- To highlight concentrations of vulnerable populations, the census tracts with the highest vulnerabilities are shown with full color while all other census tracts have masked colors.



Mitigation - Green Infrastructure



Mitigation refers to physical changes in the urban environment to lower surface and air temperatures.

1. Green Infrastructure
2. Albedo & Shade
3. Design Implementation

Mitigation – Green Infrastructure



- Helps to reduce urban heat island effects by:
 - ✓ Shading building surfaces
 - ✓ Deflecting radiation from the sun
 - ✓ Releasing moisture into the atmosphere - increasing evapotranspiration rates decreases urban temperatures
- Co-benefit of stormwater management
- Many are listed in Bloomington's Climate Action Plan (CAP)



City of Chicago

Green Roofs -
CAP Pilot Project



Green Walls

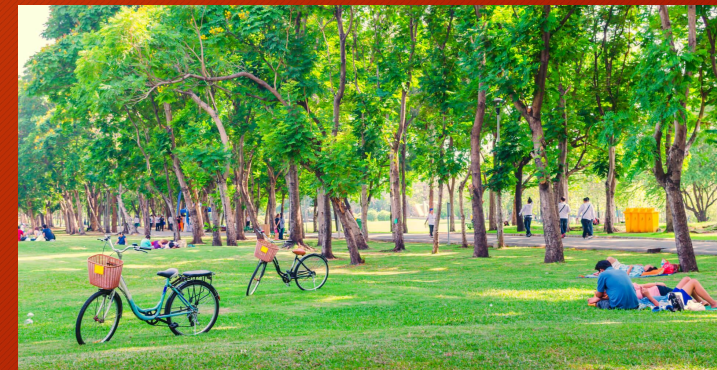
Mitigation – Green Infrastructure



Bioswales



Urban Agriculture

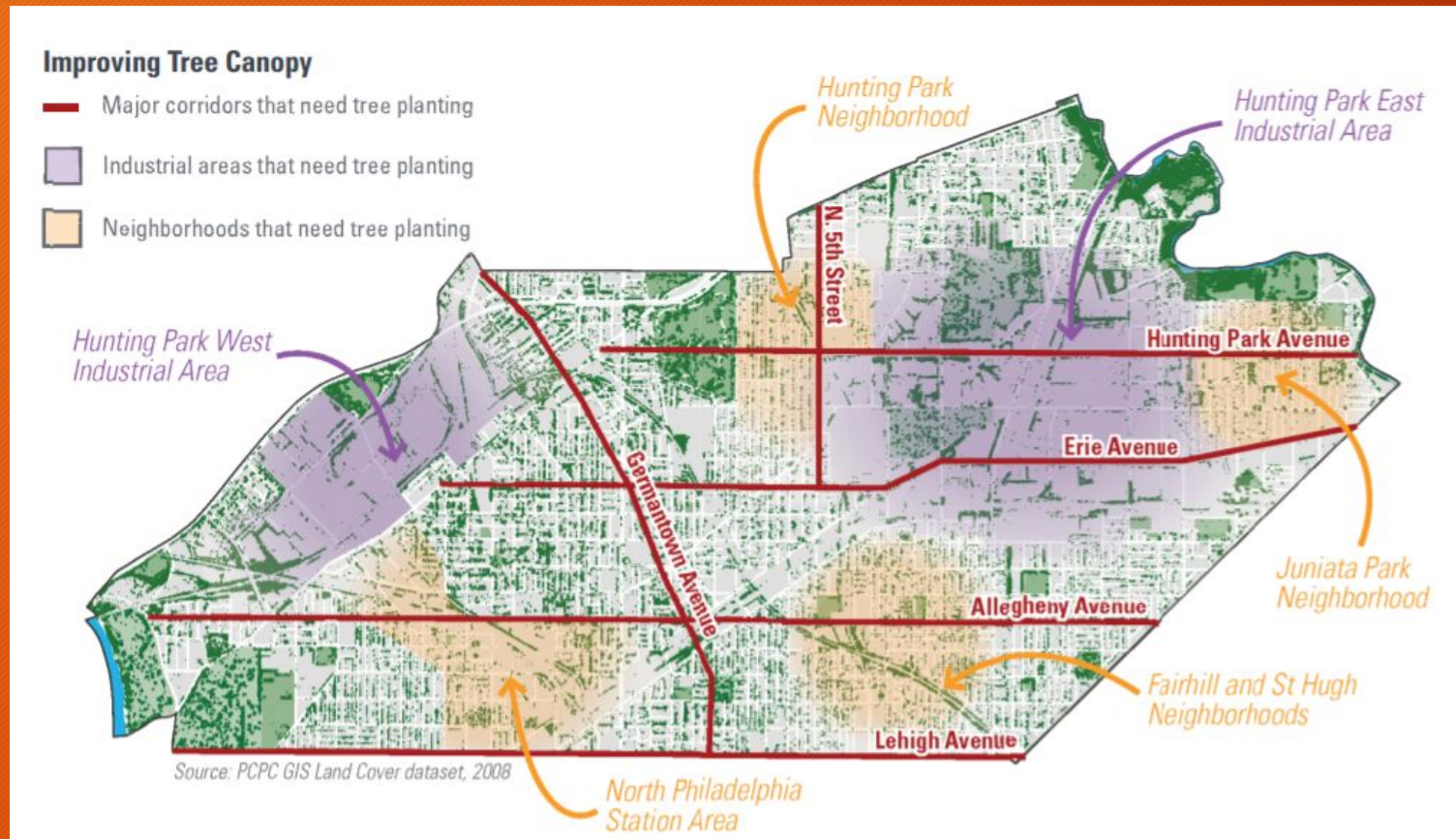


City Parks

Mitigation – Green Infrastructure



Tree Canopy Expansion Projects

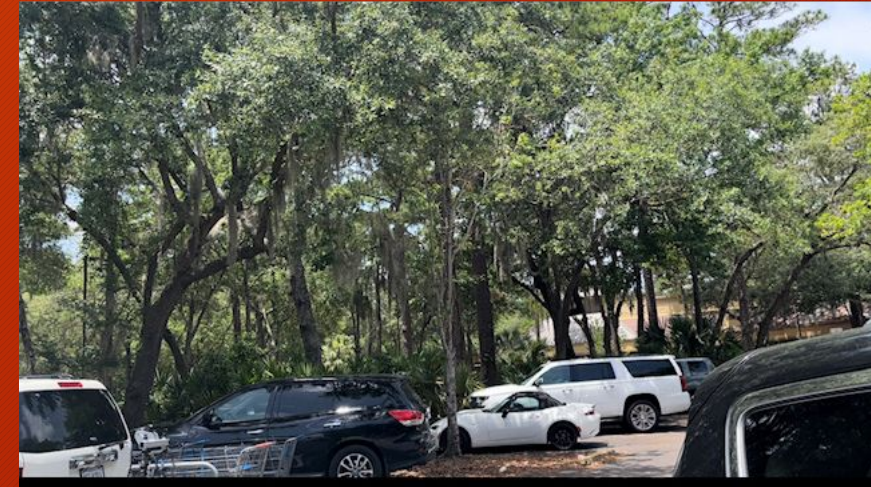


Source: Beat the Heat Hunting Park: A Community Heat Relief Plan

Mitigation - Green Infrastructure



Store parking lot Bloomington, IN vs. Hilton Head, SC

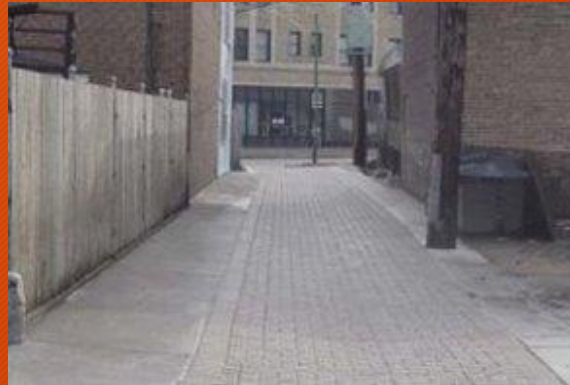


Mitigation – Green Infrastructure



Permeable Pavement

- Increases evapotranspiration
- Install in alleys, sidewalks, streets, parking lots



Alley in City of Chicago



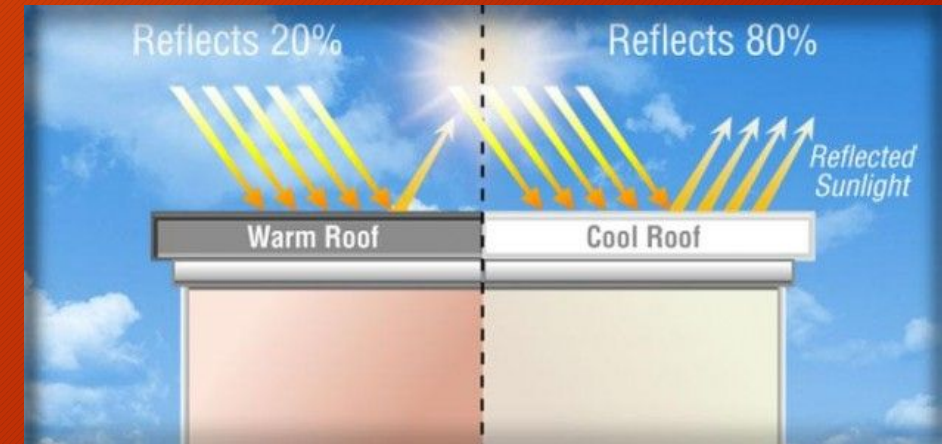
Driveway & Parking Area

Mitigation – Albedo & Shade



Cool Roofs

- Reduce cooling costs, cut energy usage, and lower greenhouse gas emissions
- Designed to reflect more sunlight than a conventional roof, absorbing less solar energy
- Conventional roofs can reach temperatures of 150°F or more on a sunny summer afternoon
- Under the same conditions a reflective roof could stay more than 50°F cooler



Source: Berkeley Lab

Mitigation – Albedo & Shade



Cool Roofs

- Can reduce internal building temperatures by up to 30%
- Improves comfort and safety in buildings without air conditioning, by reducing heat flow from the roof into the occupied space.
- Climate Action Plan Pilot Project



NYC Cool Roofs Program

<https://www1.nyc.gov/nycbusiness/article/nyc-coolroofs>

Mitigation - Albedo & Shade



Cool Streets

- Lower outside temperatures
- Lower surface temperatures, thereby cooling storm water and lessening the damage to local watersheds.



Thermal infrared (left) and visible (right) images of a road with light and dark segments. The infrared image shows that the light segment (bottom) is about 30°F cooler than the dark segment (top).

(Image courtesy of Larry Scofield, APCA)

Mitigation - Albedo & Shade



Cool Parking Lots



Emerald Cities reflective coating

Mitigation - Albedo & Shade



Shade Structures

- Improves thermal comfort
- Protects from UV rays



Mitigation - Design Implementation

Cool Corridors

- Create a network of cool corridors in vulnerable communities to facilitate movement from residents' homes to their places of employment, education and play.
- Incorporates most heat mitigation strategies:
 - Street trees
 - Shade structures
 - Permeable sidewalks
 - Bioswale
 - Cool street pavement



Mitigation - Design Implementation



- Bus stops
- Downtown areas

Mitigation



- What interests you?
- What ideas do you have?
- What mitigation strategies would you like to see installed in Bloomington? Where?



Adaptation



Refers to programs and policies that help residents adapt to hot weather or help residents prepare for an extreme heat event.

1. Cooling Indoor Environments
2. Education & Training

Adaptation - Cooling Indoor Environments



- Home Weatherization Programs
- Cooling Energy Assistance Programs
- AC Optimization Programs
- AC Purchase Assistance Programs

- Free Fan Distributions



Adaptation – Education & Training



- General Public Education Campaign
- Elderly Residents Education Campaign
- Heat Relief Network for Vulnerable Residents
- Assisted Living Facilities Training
- Home Health Aid Training
- Because a large portion of vulnerable populations cannot afford adequate air conditioning, outreach materials should include methods of cooling the body such as self-dousing and foot immersion



Adaptation



- What interests you?
- What ideas do you have?
- What adaptation strategies would you like to see implemented in Bloomington?



Community Engagement



Refers to how communities engage their residents in regards to extreme heat planning and activities.

Community Planning Meetings

- Develops awareness, agency and social cohesion in underrepresented communities
- Develops urban heat solutions and creates a common vision for a more thermally comfortable, cooler future
- Builds on strengthening relationships within and between neighborhoods, community based-organizations, decision-makers



Source: Beat the Heat: A Community Heat Relief Plan

Community Engagement



- Heat Relief Network – volunteer network of citizens who check on vulnerable neighbors during extreme heat events
- Urban Heat Island Mapping Program – volunteers collect heat data
- Volunteer Tree Planting Program
- Volunteer Cool Roof Installation Program



Source: CoolRoofs NYC



Source: www.H3AT.Org



Emergency Response



Refers to how cities plan for extreme heat events and the specific actions they take during an Extreme Heat Event

1. Communication
2. Infrastructure Augmentation
3. Plans & Protocols
4. Homeless Outreach Checks



Emergency Response



Communication

1. Guidance About Behavior Changes During Extreme Heat Event
2. Distributed Via Multiple Channels & Languages (Radio, TV, Websites, Flashing Road Signs, Social Media)
3. Alert System for Extreme Heat Events



Emergency Response



Infrastructure Augmentation

1. Open Cooling Centers & Cooling Center Location Map on Websites
2. No Utility Shutoffs
3. Free Bus Transportation
4. Increased Public Drinking Water Fountains



Emergency Response



Plans & Protocols

1. Emergency Heat Management Plan with department and organization specific actions during an Extreme Heat Event
2. Heat Emergency Protocols for Schools & Daycare Centers



Emergency Response



Homeless Outreach Checks

1. Provide information about resources (cooling center map, public drinking water map)
2. Health & safety checks – experiencing heat-related illness?
3. Provide bottled water





Leadership



Refers to steps taken by a city or county official or department that provides the framework or resources for heat mitigation and extreme heat emergency response

1. Ordinances - Cool Roofs, Green Area Ratio, Emergency Backup Generators for Assisted Living Facilities
2. Diversity of Stakeholders - University, Non-Profits, City Gov., County Gov.
3. Dedicated Employees or Office (Chief Heat Officers in LA and Miami)

What Does an Effective Heat Management Plan Look Like?

- Fewer heat-related illnesses and deaths
- Lower urban temperatures
- Each department and organization adequately fulfills all duties outlined in the Heat Management Plan during an Extreme Heat Event

Challenges

1. Heat-related illness data is not collected
2. Temperature thresholds for issuing a heat alert should be aligned with the temperature that heat-related illnesses increase (typically lower than NWS temperature thresholds)
3. Do we have the resources, manpower, and commitment to create and implement an effective Heat Management Plan?

Where Do We Go From Here?

- Monthly meetings
- Research available resources
- Create goals and timelines
- Community Outreach Meetings
- Draft Heat Management Plan by _____?

Additional Information

I will email this PowerPoint with:

1. Toolkits - public health, heat mitigation, policy development
2. Literature reviews

References

1. <https://www.scientificamerican.com/article/why-extreme-heat-is-so-deadly/>
2. <https://www.epa.gov/climate-indicators/climate-change-indicators-heat-related-deaths#:~:text=Some%20statistical%20approaches%20estimate%20that,set%20shown%20in%20Figure%201>
3. <https://www.climate.gov/news-features/understanding-climate/climate-change-global-temperature-projections>
4. <https://www.nature.com/articles/s41558-021-01092-9>
5. <https://toolkit.climate.gov/topics/human-health/extreme-heat>
6. <https://www.cdc.gov/disasters/extremeheat/index.html>
7. <https://www.energy.gov/energysaver/cool-roofs>