



Infrastructure

Ensuring a reliable supply of potable water, wastewater services, and stormwater drainage, as well as viable means of providing community connectivity via roads, bridges, and energy supplies are essential to keeping Gloucester in operation — the community's lifelines. Climate change and its compounding impacts undoubtedly pose a major threats to these infrastructure systems and services.

A significant portion of the City's critical infrastructure is located in flood zones and therefore very vulnerable to climate change impacts, mainly flooding due to sea level rise, extreme storms and storm surge. These key infrastructure include Gloucester High School, a National Grid electrical substation, seawalls, stormwater systems, low-lying roads, several City pump stations, and particularly the City's Water Pollution Control Facility on Essex Avenue.

Maintenance of these systems will continue to be critical; at the same time, improvements must simultaneously enhance their adaptive capacity. Implementing innovative nature-based solutions, building systems back-up and/or redundancy, and promoting low-impact developments are some of the key changes and improvements the City will continue exploring to ensure the City's critical infrastructures and facilities are prepared for climate change impacts.

Goals

1. Critical utilities, systems, and infrastructure are improved and enhanced to withstand climate stressors.
2. Infrastructure improvement projects evaluate potential climate change impacts using best available local climate data, and incorporate adaptation measures, particularly green infrastructure measures or nature-based solutions, where applicable.



Gloucester Harbor

What's been done so far?

Shoring Up the City's Critical Infrastructure. To date, the City has worked to find solutions to shore up these key sites by taking protective measures. This includes protective infrastructure at Gloucester High School and the City's Water Pollution Control Facility (WPCF). The WPCF Flood Resilience Project consists of a flood resilience system to protect the wastewater facility from flooding during extreme storm events. The project will also



Photo of Flooding at Gloucester High School in 2018
@suepalkafox5dc

restore a coastal bank and landscaped areas. The GHS project will protect the High School grounds from near-term storms, such as the 2018 flooding of the parking lot and adjacent fields and will mitigate future flood risk to the site's buildings. These projects ensure protection of the City's critical infrastructure into the future.

Protecting the Harbor from Flooding.

Gloucester is, first and foremost, a fishing community. Fishing and other water-dependent industries rely on access to the City's shoreline. The



Gloucester Harbormaster's Office

protection of coastal marine and fishing infrastructure from future flooding and storms is vitally important. It is equally important to invest in the economic development of marine dependent uses on the Harbor.

The Gloucester Municipal Harbor Plan is a strategic document to support the existing economic base of the harbor front and expand economic development opportunities, including both marine water-dependent and supporting uses of harbor properties. Development opportunities will be informed by clear resilience strategies to minimize risks to operations and assets, and maximize access to public and private investments.

The current update to the City's Harbor Plan is underway at the time of publishing this CARP. The City and consultant team are working closely with work being undertaken by the Office of Coastal Zone Management (CZM), to develop coastal resilience strategies to protect infrastructure needed to secure harbor assets and support the economic strategy.

11 Develop measures and guidelines to enhance resilience of infrastructure in floodplains including seawalls, floodproofing, wet floodproofing, elevating, and potential relocation.



Sphere of Influence:
City



Implementation Partners:

- Coastal residents
- Coastal businesses and property owners
- U.S. Coast Guard
- United States Army Corps of Engineers
- **Government and Municipal Bodies:** Harbor Plan Committee, Mayor's Office, Planning Board, Conservation Commission, Open Space and Recreation Plan Committee, Board of Health
- **City Departments:** DPW, Engineering, Planning, Building, Harbormaster, Public Safety, Health



Funding Sources:

- MassDEP
- Green Communities
- EPA
- MVP
- CZM

Next Steps:

- Consider micro and macro solutions for protecting Gloucester's coastal infrastructure.
- Identify specific opportunities for updating and/or making recommendations for new resilient infrastructure design standards for example, upgrade the City's wastewater treatment facility using resilient building methods.
- Consider long term plans for relocation, decommissioning or switching to alternatives where long term resilience measures are not possible.
- Consider how renewables and energy efficiency technologies can enhance the operational capacity of the City's critical infrastructure.

Improving Equity:

- Ensure robust engagement to solicit community's feedback on priorities and needs associated with infrastructure improvements, particularly where relocation of sites is involved.

Co-benefits:

Improved resilience of the built environment.

Cost savings associated with reduced number of infrastructure projects needing repair or maintenance.

Measure of Success:

Investments in local infrastructure updates.

12 Continue to assess and upgrade stormwater discharge system and drainage capacity.



Sphere of Influence:
City



Implementation Partners:

- **Government and Municipal Bodies:** Mayor's Office, Board of Health
- **City Departments:** DPW, Engineering, Planning, Building



Funding Sources:

- MassDEP
- Green Communities
- EPA
- MVP
- CZM

Next Steps:

- Develop evaluation criteria for stormwater infrastructure and system improvements. Incorporate climate projections into the evaluation process.
- Conduct a systematic review of each stormwater infrastructure system and asset using the evaluation criteria established above.
- Develop a database of assets and systems for management and ongoing monitoring and inspection.

Improving Equity:

- Prioritize infrastructure located in EJ communities and identified climate vulnerable areas.

Co-benefits:

Minimized infrastructure damage or failure that could result in disruption of the City's operations and business services.

Reduced risks associated with flooding, property damages, and public safety.

Measure of Success:

Percentage of stormwater and drainage infrastructure assessed, repaired, or upgraded.

13 Pursue projects that will improve water quality, reliability of water supply, and management. Consider incorporating renewable energy technologies where feasible.



Sphere of Influence:
City



Implementation Partners:

- EEA Municipal Vulnerability Preparedness program
- FEMA
- U.S. Army Corp of Engineers
- MA Coastal Zoning Management (CZM)
- **Government and Municipal Bodies:** Mayor’s Office, Board of Health
- **City Departments:** DPW, Engineering, Planning, Building, Health



Funding Sources:

- Green Communities
- MVP
- ARPA
- FEMA BRIC grant
- MassDEP Gap Funding

Next Steps:

- Work with applicable City departments to identify opportunities for updates and projects.
- Research best practices and case studies of projects being piloted or utilized for similar infrastructure types and based on similar climate change projections and considerations for Gloucester.
- Identify specific opportunities and pursue grant funding.

Improving Equity:

- Prioritize EJ communities and climate vulnerable areas.
- Ensure robust engagement to solicit community’s feedback on priorities and needs associated with infrastructure improvements.

Co-benefits:

Improved environmental quality, protection of associated natural systems and waterways.

Increased community resilience, public health and safety.

Increased resilience of the built environment.

Measure of Success:

Improvements in water quality metrics regularly monitored by the City’s Health and Engineering Departments

Additional Strategies for Infrastructure

Strategy	Realm of Influence
<p>I4 Consider a municipal facility or property that can be utilized as a demonstration site for feasibility of nature-based solutions (such as installation of green roofs, pervious surface conversion, etc.).</p>	<p>City</p>
<p>I5 Provide educational materials for coastal businesses and property owners on resilient site management to minimize the impact of flooding.</p>	<p>Residents/ Businesses</p>
<p>I6 Advocate for improvements of the existing grid infrastructure, and better understanding of its vulnerability and capacity in responding to climate change impacts.</p>	<p>State/Federal/ Regional</p>