This PowerPoint presentation is made available as a virtual public meeting due to Coronavirus or COVID-19. Please submit questions or comments directly to the City Engineer. His email address is provided at the end of this presentation.

Thank-you
- Wash hands often for at least 20 seconds with soap and water
- Practice social distancing of at least 6 feet from anyone else
- Avoid touching eyes, nose or mouth when hands have not been washed
- Cover mouth and nose with cloth face cover when around people
- Cover coughs and sneezes with tissue or use your elbow (wash hands afterwards)

Slide: [http://pvc.dhingrapolymers.com/latest-update/basic-protective-meas](http://pvc.dhingrapolymers.com/latest-update/basic-protective-meas)
How does FEMA define Vulnerability?
Vulnerability

**Vulnerability** is the susceptibility to physical injury, harm, damage, or economic loss. It depends on an asset’s construction, contents, and economic value of its functions. Vulnerability assessment provides the extent of injury and damages that may result from a hazard event of a given intensity in a given area.
How is Vulnerability and Mitigation Related?

VULNERABILITY is the exposure to hazards

HAZARDS are sources of damage

MITIGATION contributes to damage reduction
As part of the City’s hazard mitigation program, vulnerability assessments and risk assessments were performed. Below are terminology to consider for Hazard Mitigation Assessments:

- **Hazard** is an act or phenomenon that has the potential to produce harm or other undesirable consequences to a person or thing. Hazards exist with or without the presence of people and land development. Earthquakes, hurricanes, tornadoes, and other geological events have been occurring for a very long time and the natural environment adapted to their impacts. Hazard identification is the process of identifying hazards that threaten the City.
Magnitude is a measure of the strength of a hazard event. The magnitude of a hazard is usually determined using technical measures specific to the hazard. For example, the United States uses the Saffir-Simpson scale, with a 1 to 5 categorization, to indicate the magnitude of hurricanes. This scale is based on the measure of a hurricane’s maximum sustained wind speed.

- **Exposure** is the people, property, systems, or functions that could be lost to a hazard. Generally, exposure includes what lies in the area the hazard could affect.
- **Risk** depends on all these factors: the hazard and magnitude; the vulnerability and exposure. Risk is the estimated impact that a hazard would have on people, services, facilities, and structures in a community. It refers to the likelihood of a hazard event resulting in an adverse condition that causes injury or damage.
Before any mitigation can be implemented, the potential damage from a site-specific natural hazard must be assessed. FEMA’s HAZUS software has been used by the City to assess natural hazards that have high risk of impacting the City. Heavy precipitation that causes localized flooding and high magnitude coastal storms/nor’ Easters and hurricanes where rain, wind, and storm surge can cause wide-spread exposure impacts to buildings, properties and people.
Risk and Vulnerability Assessments are Necessary

Participation by the City in community-wide hazard analysis is essential to assessments of natural hazard that may impact public and private sectors. Hazard analysis is necessary and consists of two types of assessments: Risk Assessments and Vulnerability Assessments.

Risk Assessments is defined as the process of measuring the potential loss of life, personal injury, economic injury, and property damage resulting from hazards. This process is accomplished by completing four steps, which are described in FEMA's planning guide entitled, “Understanding Your Risks: Identifying and Estimating Hazard Losses.”
Vulnerability Assessments evaluate how the identified hazards recorded in the risk assessment could affect the community. It is an in-depth analysis of the services, building functions, systems, infrastructure, and topographic site characteristics of the community to identify weaknesses and lack of redundancy that would delay recovery.

Vulnerability assessments also determine mitigation or corrective actions that can be designed and implemented to reduce high risk vulnerabilities and make the community more disaster-resistant and improve the capabilities of the City for faster recoveries.
There are four main steps to performing these assessments:

- Step 1: Identifying hazards
- Step 2: Profiling hazard events
- Step 3: Inventorying assets
- Step 4: Estimating losses
Step 1, is straightforward because primary hazards were easy to identify due to the history of the City’s impacts by flooding, hurricanes and various storms.

Step 2, hazard profiling is more difficult but very important and includes:

1) The location or geographical areas that would be affected.
2) The hazard extent (magnitude and/or severity). For hazards not geographically determined, like tornadoes, recorded intensities of previous events are used.
3) The probability, likelihood, or frequency of the event occurring.
4) Any past occurrences of the hazard events in or near the community.
**Step 3**, the City must consider how identified critical facilities, infrastructures, and services may be affected by each hazard used in the risk assessment and how to best mitigate impacts, losses and to prepare for and respond to disasters.

**Step 4**, estimating losses are difficult because it is not just the physical exposures to a hazard, but also the social and human dimensions that need to be captured.
Measuring and mapping vulnerability is necessary to reduce impacts through implementing hazard mitigation. The City’s susceptibility to natural hazards has many implications at the individual, household and community levels that may have potentially harmful outcomes - such as injuries, damage to housing and infrastructure, and destruction of businesses. It is therefore important to capture both the physical exposures and human and social dimensions.
When conducting a vulnerability assessment, the City considers questions related to risk and each hazard, such as:

- What kind of hazards can affect our community?
- How and when will flooding affect the need for evacuation?
- How will flooding affect critical infrastructures and key resources?
- How will strong winds affect overhead utilities (e.g., power lines) and older structures?
- How will debris be disposed of and affect local landfills?
- How will warning capabilities affect emergency response actions?
- How will the City address the need for round-the-clock operations following the disaster?
Some examples of critical infrastructure and key resources are listed below:

- Hospitals/medical centers/nursing homes
- Police and fire stations
- Emergency operation centers
- Evacuation shelters
- Schools and colleges
- Levees along the Elizabeth River
- Bridges and highways
- Commercial, industrial and retail facilities
- Water treatment and distribution
- Sewer treatment and collection
The Hazard Mitigation Strategy
Hazard Mitigation

“Mitigation” -
A sustained action taken to reduce or eliminate long-term risk to life and property from a hazard event

-or-

Any action taken to reduce future disaster losses
A hazard mitigation strategy provides direction for community’s efforts to reduce the potential losses identified in the risk assessment. When the strategy is implemented, it is based on existing local authorities, policies, programs, and resources. The approach has to be flexible enough to be expanded, reduced, and/or improved if existing conditions change. Benefit-cost analysis of proposed hazard mitigation actions will be helpful in establishing priorities for the strategy because such an analysis looks at the effectiveness of the actions with respect to their cost.
Hazard mitigation strategies to reduce specific risks can vary from very simple to complex. They are comprised of one or more hazard mitigation actions. The majority of hazard mitigation actions are often classified into six categories:

1) Prevention actions
2) Property protection
3) Public education and awareness
4) Natural resource protection
5) Critical facilities protection
6) Structural improvements
Prevention actions are intended to keep hazard risks from getting worse. They ensure that future developments do not increase hazard losses. Communities can achieve significant progress toward hazard resistance through prevention actions. Types (and examples) of prevention actions are:

1) Planning and zoning (Master Plan updates)
2) Open space preservation (more parks and recreation areas)
3) Storm water management (cleaning of ditches and design larger retention basins)
4) Coastal protection (building seawalls or bulkheads)
5) Capital improvement planning (no new infrastructures in hazard areas without hazard prevention design)
6) Building code amendments
Property protection actions include modifying buildings subject to hazard risk or their surroundings, rather than to try and prevent the hazard from occurring. A community may find these to be inexpensive actions because often they are implemented or cost-shared with property owners. These actions directly protect people and property at risk. Protecting a building does not have to affect the building’s appearance and is therefore a popular action for historic and cultural sites. Some examples of property protection are:

Acquisition, Relocation, Rebuilding, and Floodproofing.
Public education and awareness activities inform and remind people about hazardous areas and the actions necessary to avoid potential damage and injury. The public can be informed about hazard mitigation through several avenues. Some examples include:

- Providing hazard maps and other hazard information
- Providing a website for public review
- Outreach programs that provide hazard and mitigation information to people
- Asking business owners to provide hazard mitigation information to employees
- Mass mailings and notices to residents and property owners in specific, hazard-prone areas
Natural Resource Protection

Natural resource protection actions are intended to reduce the intensity of hazard effects as well as to improve the quality of the environment and habitats. Parks, recreation, and conservation areas are examples of areas to be enhanced and protected. Natural resource protection include:

• Erosion and sediment control
• Wetlands enhancement and protection
• Coastal restoration and protection
• Reforestation (more trees in parks)
Critical facilities protection is essential because critical facilities can have a huge effect on the scope of the damage as well as the ability of the community to respond and recover from a hazard event. Critical facilities include:

Essential facilities, such as police stations, fire stations, and hospitals that are vital to the response effort. Special facilities that house populations requiring special consideration, such as nursing homes and prisons. Facilities that can create secondary hazards, such as hazardous materials production or storage facilities.
Structural improvements directly protect people and property at risk. They are called “structural” because they involve construction of manmade structures to control hazards. Some examples of structural projects are dams, reservoirs, dikes, levees, seawalls, bulkheads, revetments, high flow diversions, spillways, buttresses, detaining walls, channel modifications, storm sewers, elevated roadways, and debris basins.
One set of criteria that is used for screening planning decisions is identified by the acronym STAPLE(E):

Social – Is the hazard mitigation strategy socially acceptable?

Technical – Is the proposed action technically feasible, and cost effective, and does it provide the appropriate level of protection?

Administrative – Does the community have the capability to implement the action, and is the lead agency capable of carrying out oversight of the project?

Political – Is the hazard mitigation action politically acceptable?
STAPLE(E)

Legal – Does the community have the authority to implement the proposed action?
Economics - Do the economic base, projected growth, and opportunity costs justify the hazard mitigation project?
Environment - Does the proposed action meet statutory considerations and public desire for sustainable and environmentally healthy communities? Is the proposed action in a floodplain or wetland or will it indirectly impact the natural and beneficial functions of a floodplain or wetland?
What are some of the Projects the City has Implemented?
Completed or Ongoing Mitigation Projects

- Elizabeth River and Arthur Kill Shoreline Stabilization
- Progress Street Flood Control
- Salt and Storage Facilities Upgrades
- Infectious Disease Control, Notifications and Vaccinations
- New Firehouse Construction
- Various Stormwater Management Projects
Completed or Ongoing Mitigation Projects

- Emergency Generators at Community Centers
- Storm and Sanitary Pump Station Rehabilitation and Upgrades
- Trumbull Street Stormwater Control Project
- South Street Flood Control Project
- Elizabeth River Levee Improvements
Questions/Comments?

All Questions and Comments can be emailed directly to the City Engineer - Daniel Loomis:
dloomis@elizabethnj.org

City’s Hazard Mitigation Website:
https://www.elizabethnj.org/444/Hazard-Mitigation

At the City’s website, you can access the Draft Updated Plan and the Current Plan before submitting questions or comments:

Current Plan:

Draft Updated Plan:
https://www.elizabethnj.org/DocumentCenter/View/1359/Elizabeth-HMP-Final-Draft-Updates---Feb2020