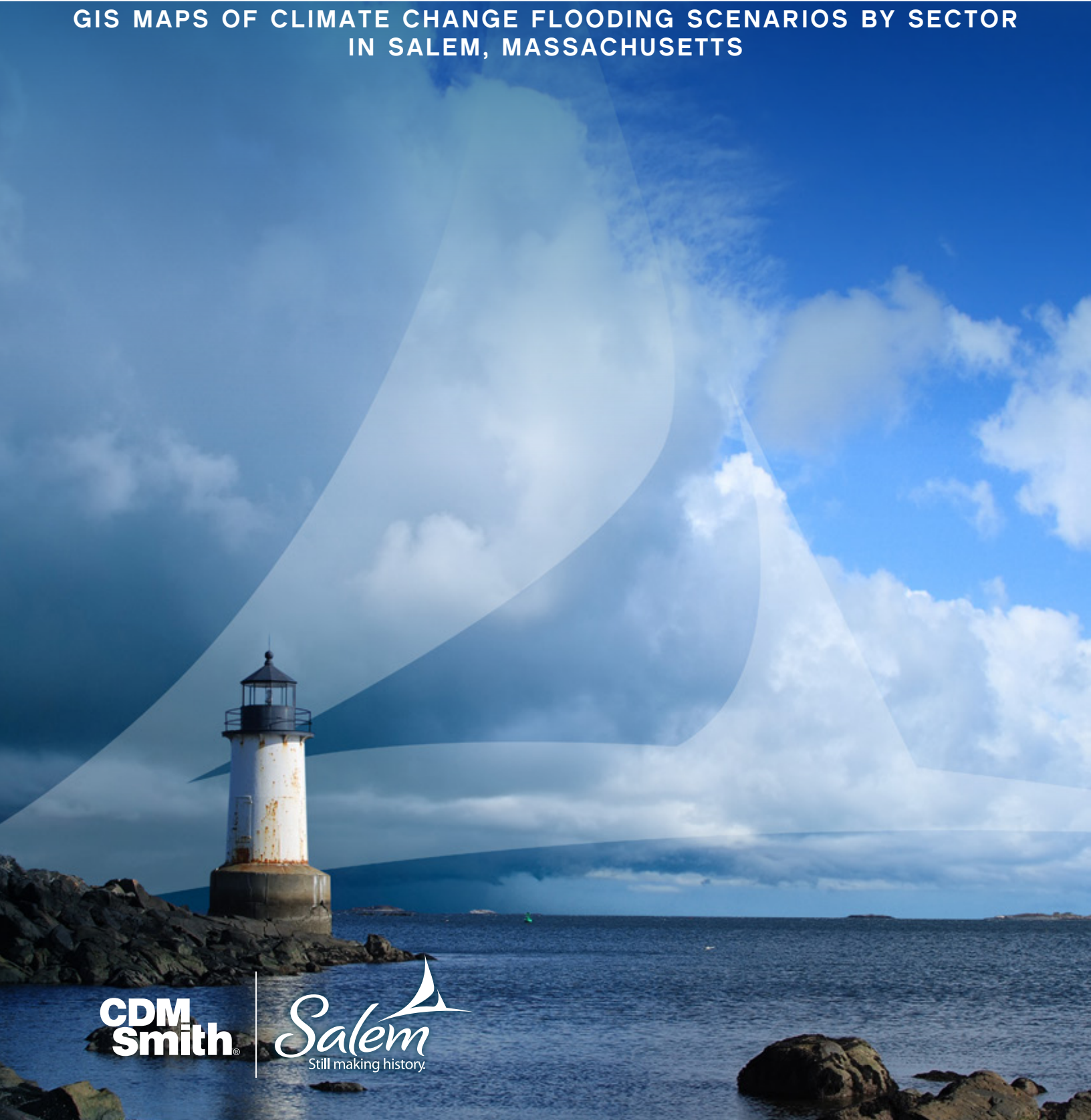


APPENDIX D

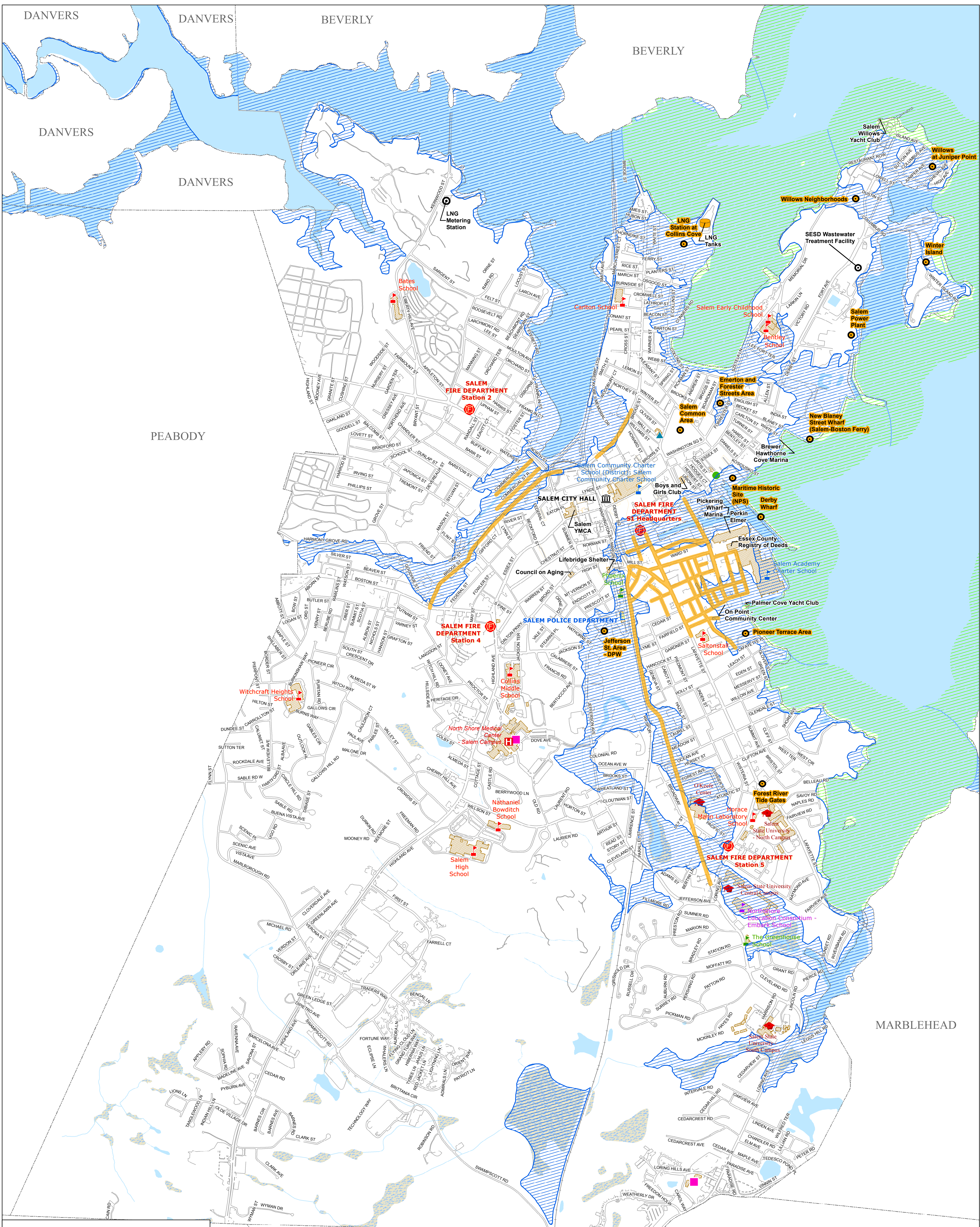


GIS MAPS OF CLIMATE CHANGE FLOODING SCENARIOS BY SECTOR IN SALEM, MASSACHUSETTS



**CDM
Smith**

Salem
Still making history.



Potential Flooding from Extreme Precipitation Events

- Areas Prone to Flooding
- Streets Prone to Flooding

FEMA Flood Zones*

- Flooding due to Precipitation
- Coastal High Hazard Flooding Area

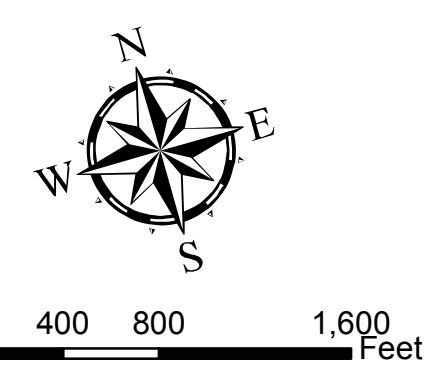
*NOTE: Flood zones are based on Future SFHAs (effective July 16, 2014).

Critical Buildings

- Local Police
- Fire Station
- Hospital with ER
- Assisted Living Facility
- Nursing Home
- Rest Home
- City Hall
- Public School
- Private School
- Charter School
- Collaborative Program
- College or University

Basemap

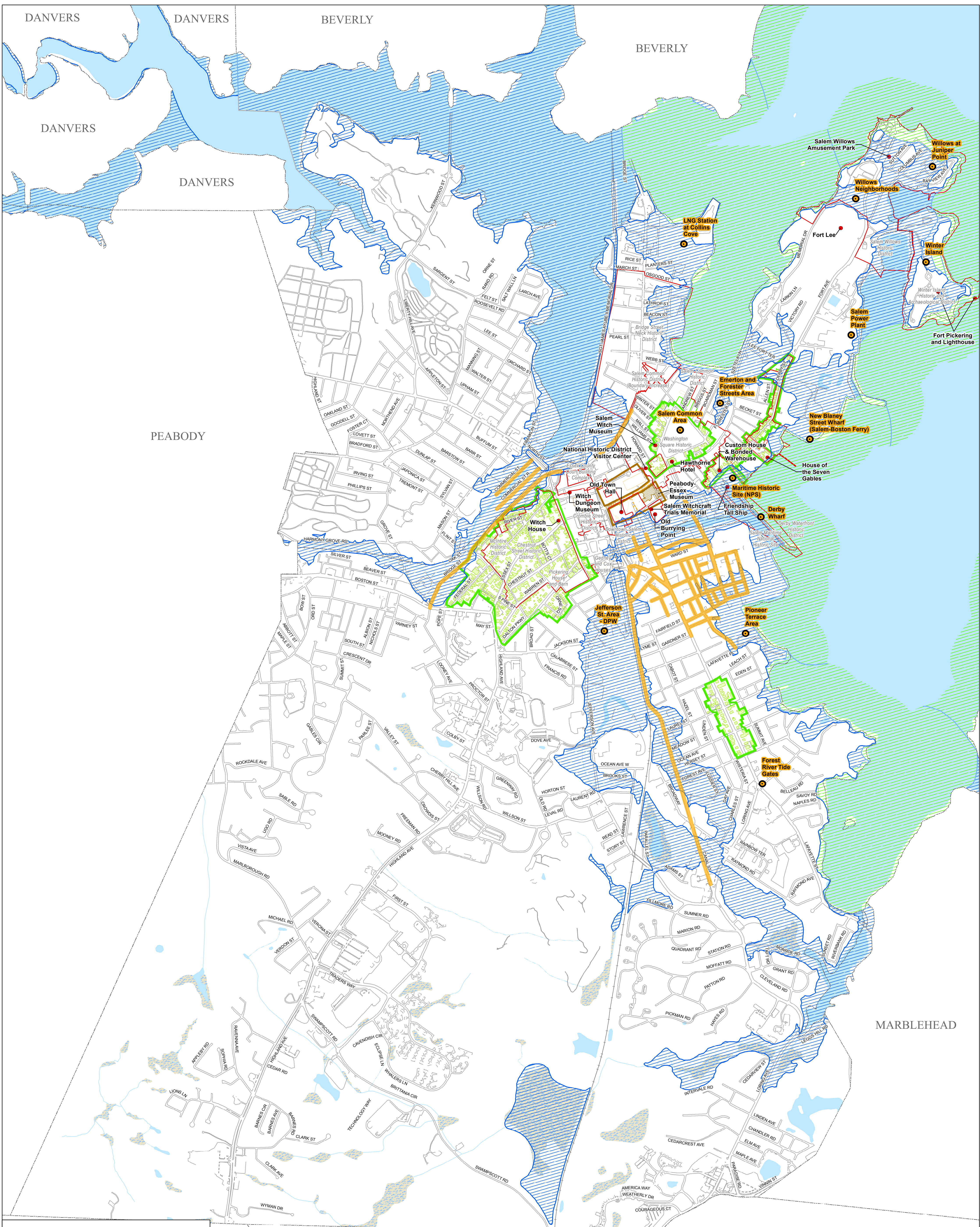
- Town Boundary
- Rail Line
- Edge of Pavement
- Perennial Stream
- Intermittent Stream
- Pond, Lake, Ocean
- Wetland



Source: City of Salem, FEMA, and MassGIS
 Coordinate System: NAD83 Mass. State Plane Mainland FIPS 2001 Feet

**Extreme Precipitation Events
 Critical Buildings: Services
 Climate Change Vulnerability Assessment
 and Adaptation Plan
 City of Salem, Mass.**





Potential Flooding from Extreme Precipitation Events

- Areas Prone to Flooding
- Streets Prone to Flooding

FEMA Flood Zones*

- Flooding due to Precipitation
- Coastal High Hazard Flooding Area

Critical Buildings

- Nat'l Register of Historic Places
- Preservation Restriction
- Local Historic District
- MRHP and LHD
- Historical and Cultural Sites

Basemap

- Town Boundary
- Rail Line
- Edge of Pavement
- Halloween Booths
- LHD Buildings
- Historic Districts
- Essex Street Mall
- Perennial Stream
- Intermittent Stream
- Pond, Lake, Ocean
- Wetland

SWAMPSCOTT

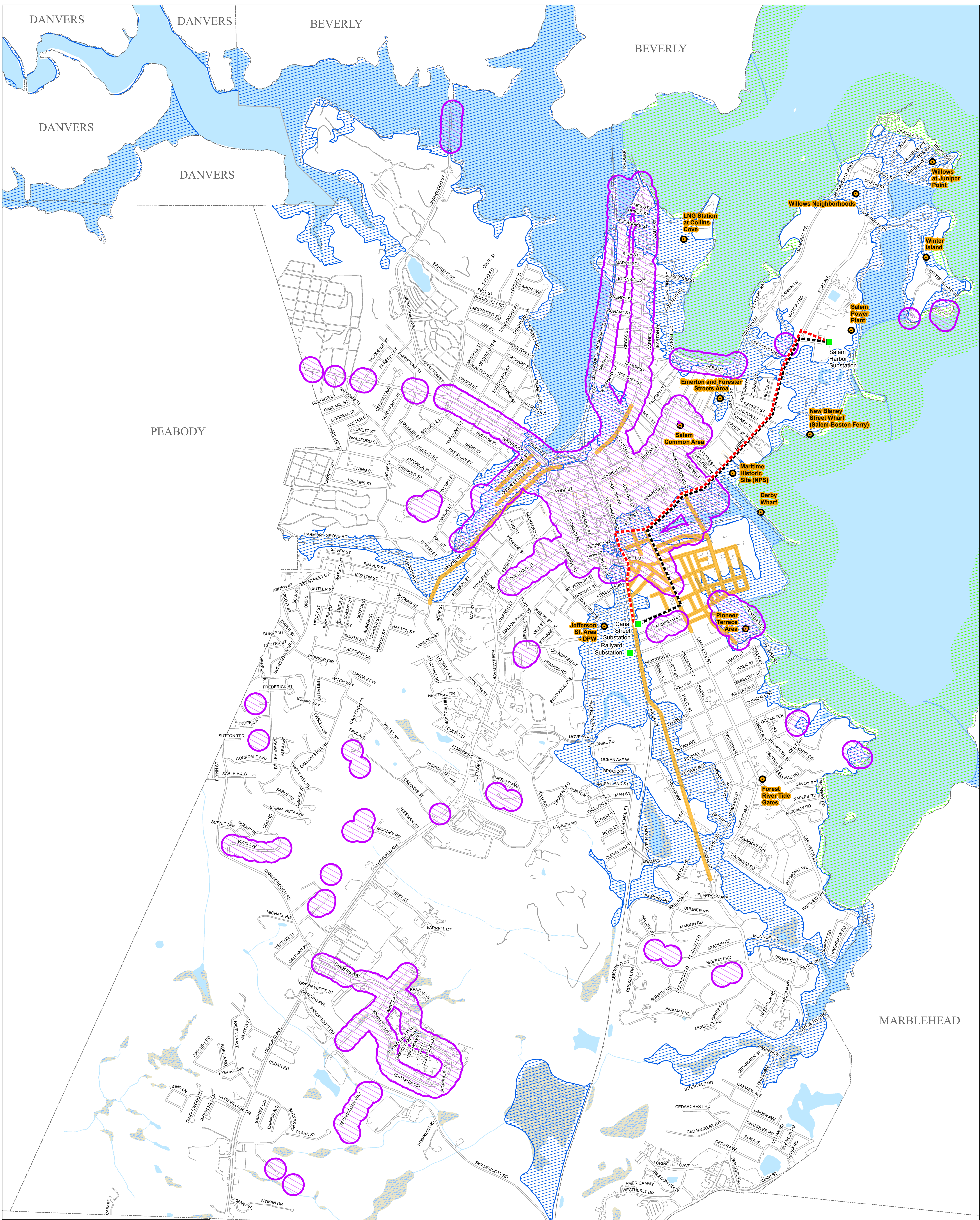
LYNN

0 400 800 1,600 Feet

Source: City of Salem, FEMA, and MassGIS
Coordinate System: NAD83 Mass. State Plane Mainland FIPS 2001 Feet

**Extreme Precipitation Events
Critical Buildings: Historic and Cultural
Climate Change Vulnerability Assessment
and Adaptation Plan
City of Salem, Mass.**

*NOTE: Flood zones are based on Future SFHAs (effective July 16, 2014).



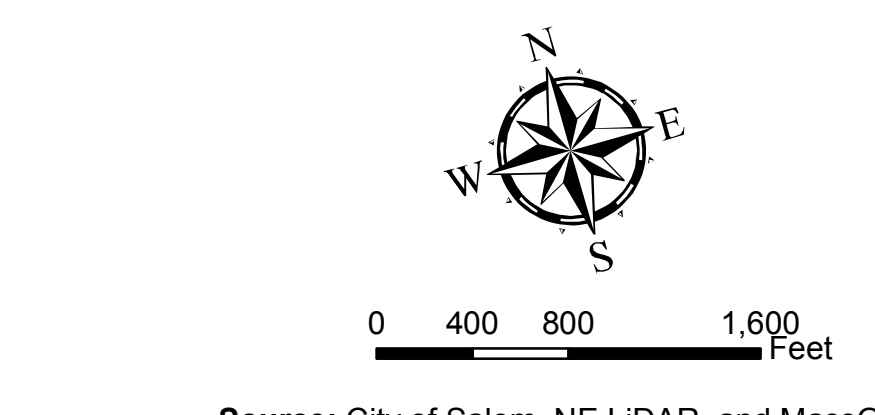
Potential Flooding from Extreme Precipitation Events

- Areas Prone to Flooding
- Streets Prone to Flooding

FEMA Flood Zones*

- Blue hatched: Flooding due to Precipitation
- Green hatched: Coastal High Hazard Flooding Area

<p>Electrical System</p> <ul style="list-style-type: none"> ■ Substations — Transmission Lines --- Direct Buried --- Duct Bank ▨ Buffer of Streetlights 	<p>Basemap</p> <ul style="list-style-type: none"> --- Town Boundary --- Rail Line --- Edge of Pavement — Perennial Stream — Intermittent Stream ■ Pond, Lake, Ocean ▨ Wetland
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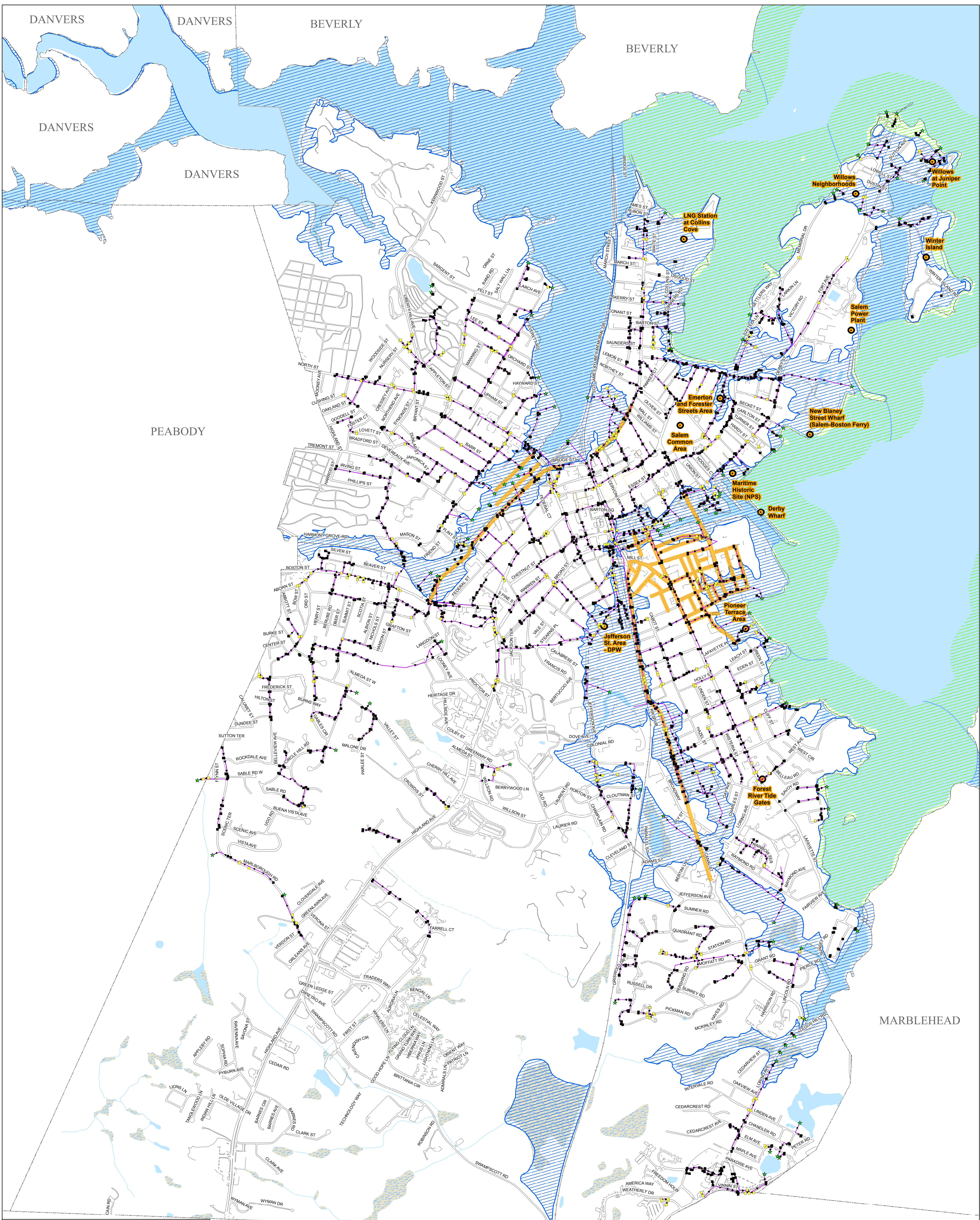


Extreme Precipitation Events: Electricity Climate Change Vulnerability Assessment and Adaptation Plan
City of Salem, Mass.

*NOTE: Flood zones are based on Future SFHAs (effective July 16, 2014).

Source: City of Salem, NE LIDAR, and MassGIS
 Coordinate System: NAD83 Mass. State Plane Mainland FIPS 2001 Feet





Potential Flooding from Extreme Precipitation Events

- Areas Prone to Flooding
- Streets Prone to Flooding

FEMA Flood Zones*

- Flooding due to Precipitation
- Coastal High Hazard Flooding Area

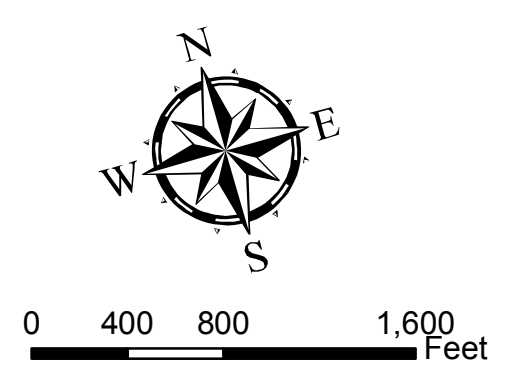
Drainage System Basemap

- ★ Outfall
- Catchbasin
- Pipe
- Town Boundary
- Rail Line
- Edge of Pavement
- Perennial Stream
- Intermittent Stream
- Pond, Lake, Ocean
- Wetland

LYNN

SWAMPSCOTT

MARBLEHEAD

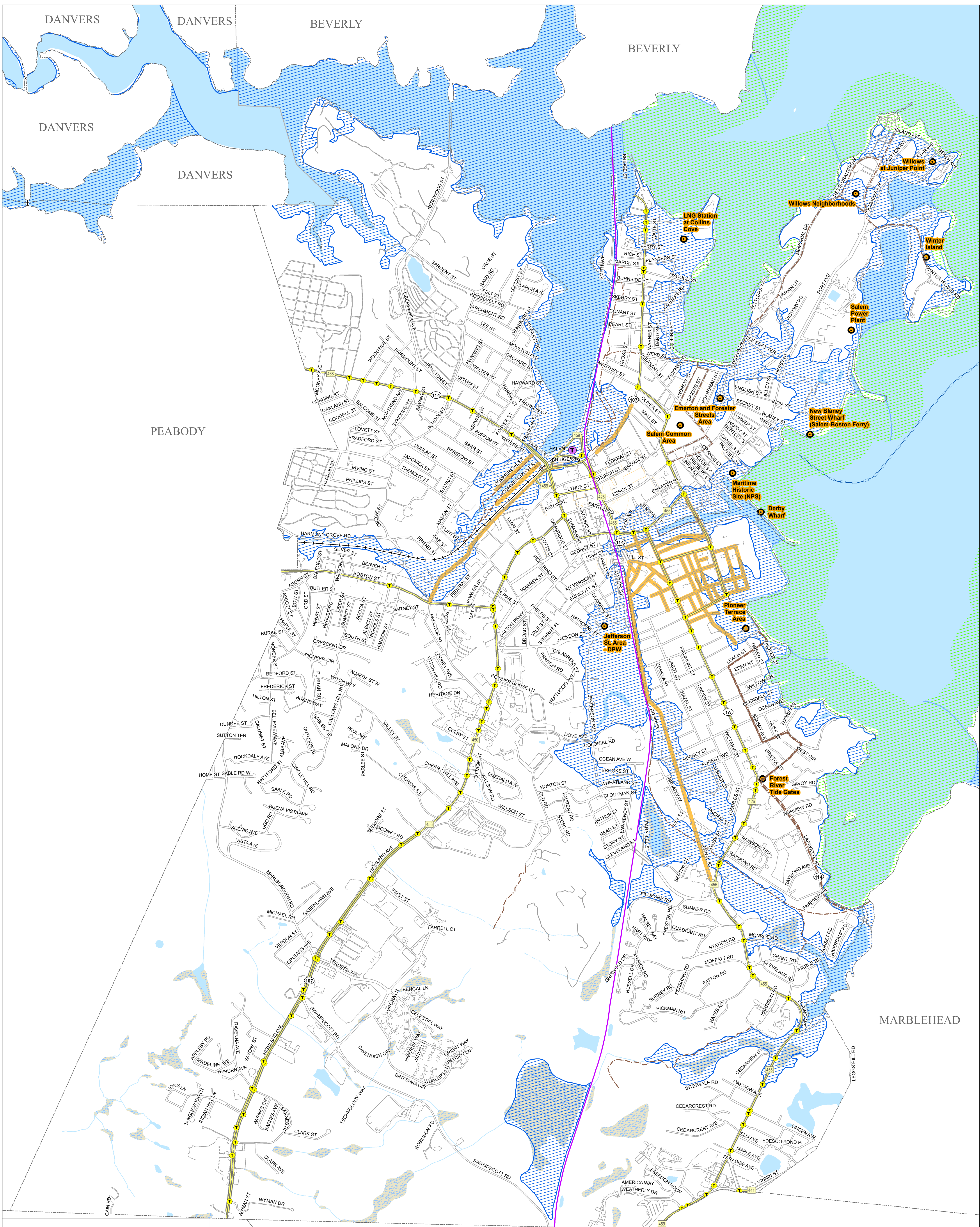


Extreme Precipitation Events: Stormwater Climate Change Vulnerability Assessment and Adaptation Plan
City of Salem, Mass.

*NOTE: Flood zones are based on Future SFHAs (effective July 16, 2014).

Source: City of Salem, NE LiDAR, and MassGIS
 Coordinate System: NAD83 Mass. State Plane Mainland FIPS 2001 Feet





Potential Flooding from Extreme Precipitation Events

- Areas Prone to Flooding
- Streets Prone to Flooding

FEMA Flood Zones*

- Flooding due to Precipitation
- Coastal High Hazard Flooding Area

MBTA Commuter Rail

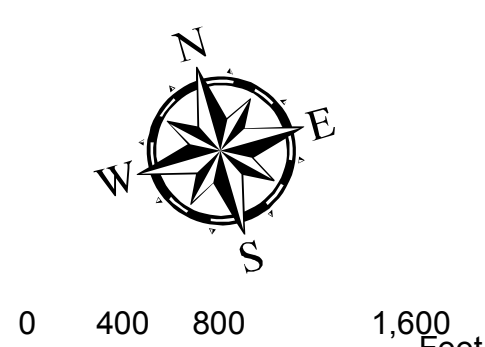
- Salem MBTA Station
- Operational Line
- Proposed Line

MBTA Bus and Ferry Service

- MBTA Bus Stop
- MBTA Bus Route
- Ferry Route

Basemap

- Town Boundary
- Rail Line
- Bike Path
- Edge of Pavement
- Perennial Stream
- Intermittent Stream
- Pond, Lake, Ocean
- Wetland

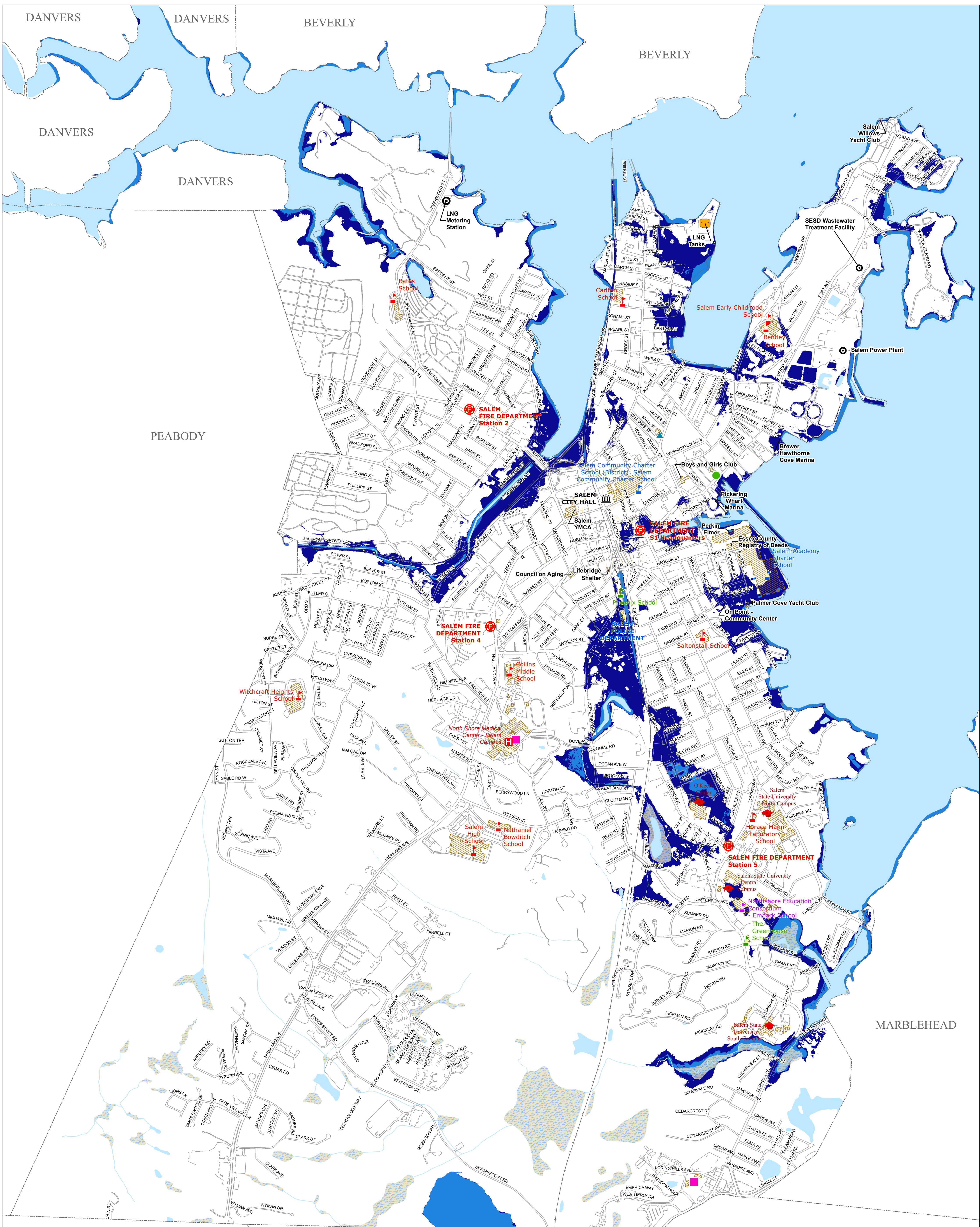


Extreme Precipitation Events: Transportation Climate Change Vulnerability Assessment and Adaptation Plan
City of Salem, Mass.

*NOTE: Flood zones are based on Future SFHAs (effective July 16, 2014).

Source: City of Salem, NE LIDAR, and MassGIS
 Coordinate System: NAD83 Mass. State Plane Mainland FIPS 2001 Feet





Sea Level Rise (Mean High High Water)

- 1998 Baseline Elevation (4.76')
- 2100 Elevation (9.03)*

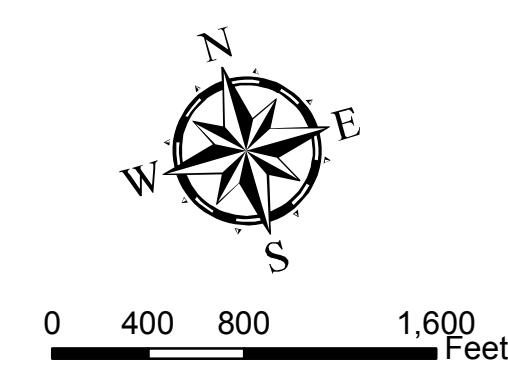
*NOTE: 2100 sea level elevation based on the NOAA Intermediate High projections.

Critical Buildings

- Local Police
- City Hall
- Fire Station
- Public School
- Hospital with ER
- Private School
- Assisted Living Facility
- Charter School
- Nursing Home
- Collaborative Program
- Rest Home
- College or University

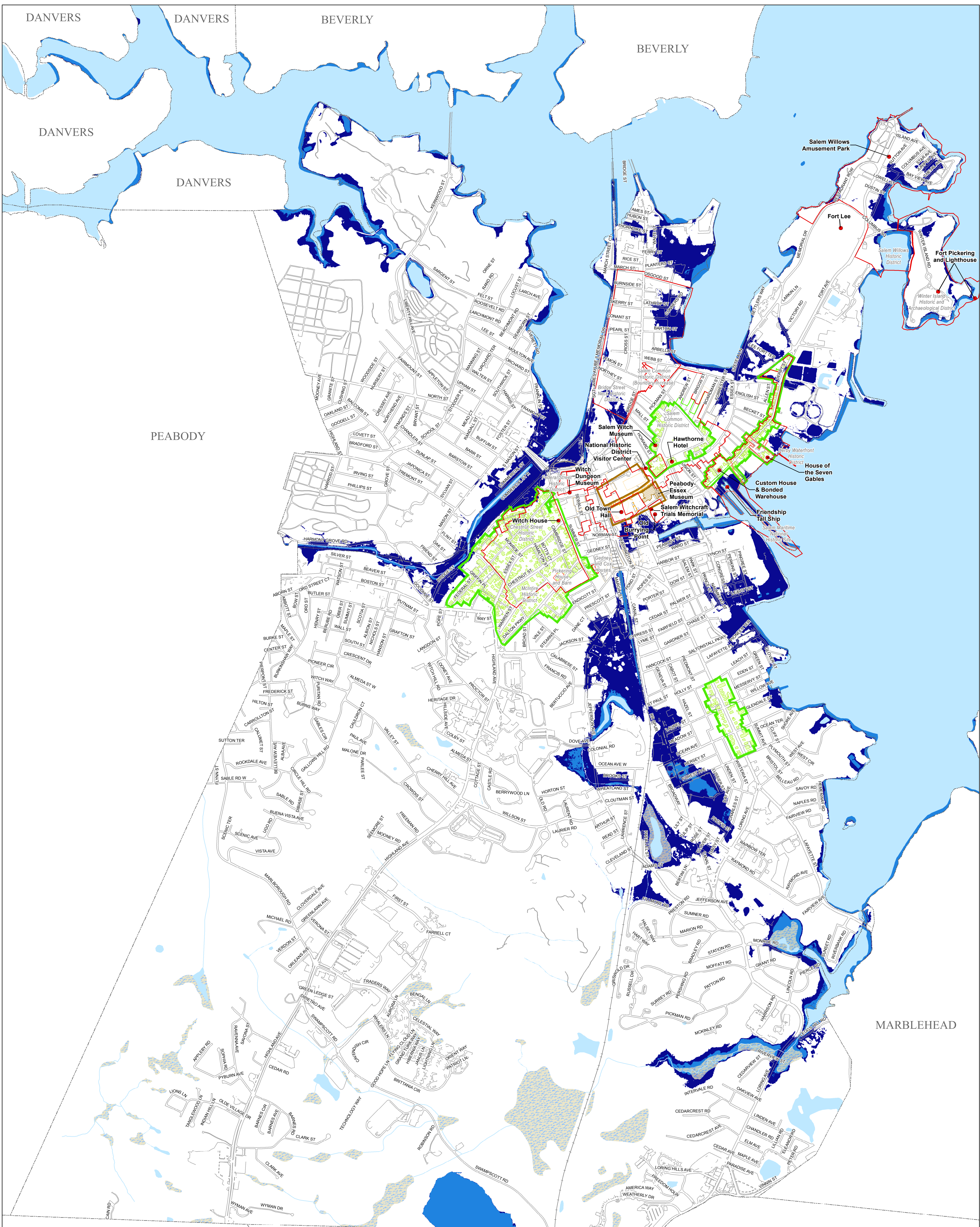
Basemap

- Town Boundary
- Rail Line
- Edge of Pavement
- Perennial Stream
- Intermittent Stream
- Pond, Lake, Ocean
- Wetland



Sea Level Rise Critical Buildings: Services Climate Change Vulnerability Assessment and Adaptation Plan City of Salem, Mass.





Sea Level Rise (Mean High High Water)

- 1998 Baseline Elevation (4.76')
- 2100 Elevation (9.03)*

*NOTE: 2100 sea level elevation based on the NOAA Intermediate High projections.

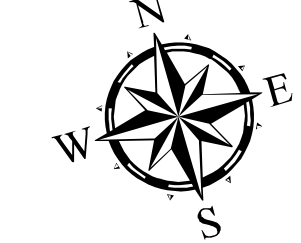
Critical Buildings

- Nat'l Register of Historic Places
- Preservation Restriction
- Local Historic District
- MRHP and LHD
- Historical and Cultural Sites

Basemap

- Halloween Booths
- LHD Buildings
- Historic Districts
- Essex Street Mall
- Town Boundary
- Rail Line
- Edge of Pavement

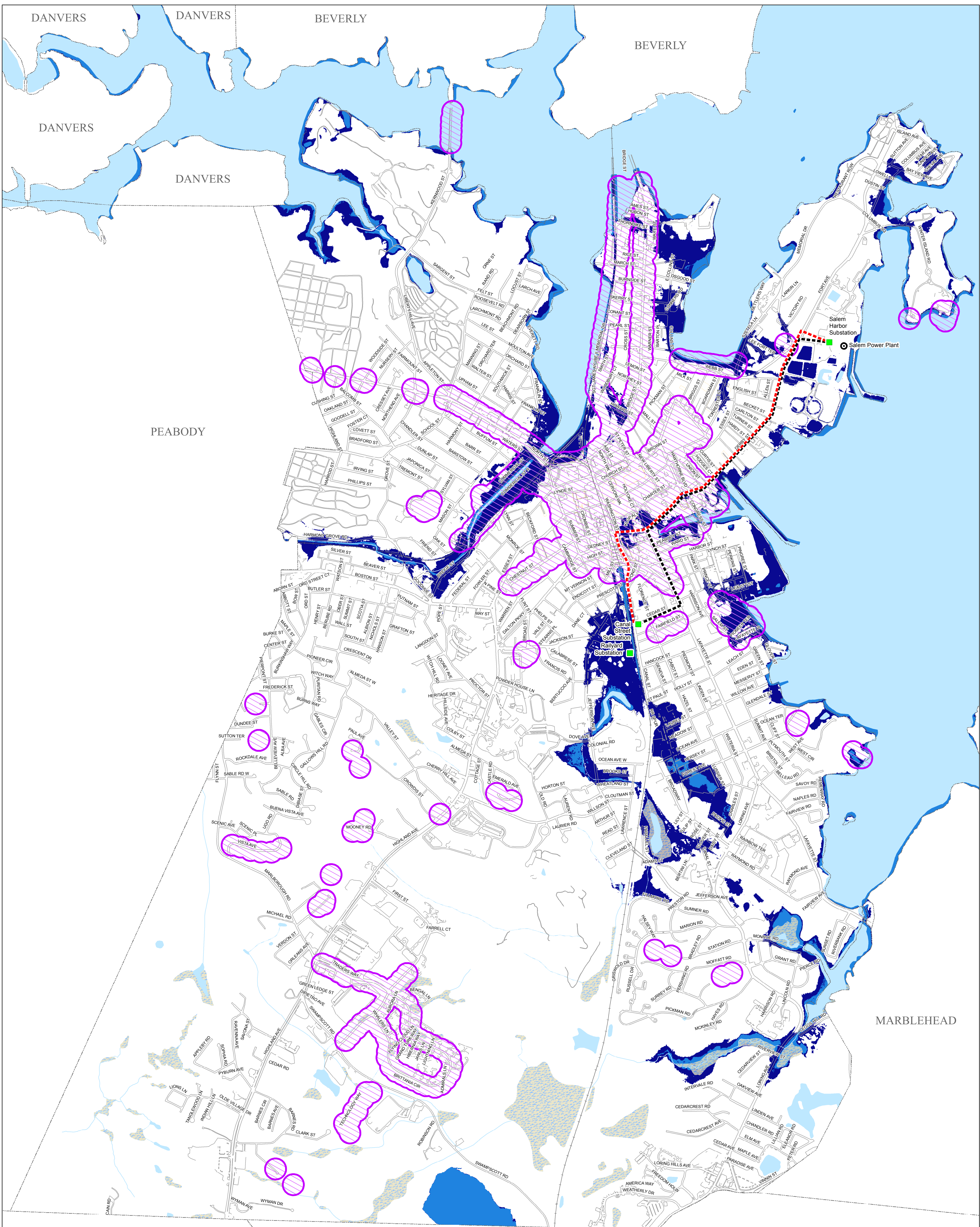
- Perennial Stream
- Intermittent Stream
- Pond, Lake, Ocean
- Wetland



0 400 800 1,600 Feet

Critical Buildings: Historic and Cultural Climate Change Vulnerability Assessment and Adaptation Plan City of Salem, Mass.

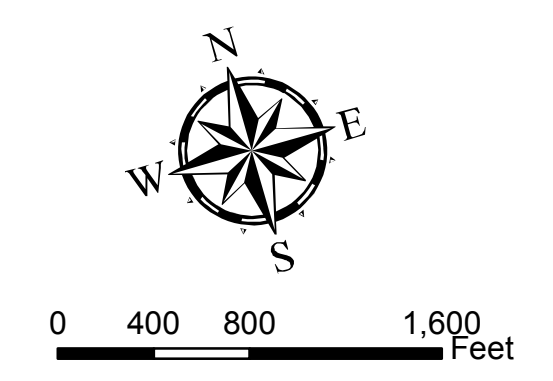




Sea Level Rise (Mean High High Water)

- 1998 Baseline Elevation (4.76')
- 2100 Elevation (9.03)*

Electrical System	Basemap
■ Substations	--- Town Boundary
--- Transmission Lines	--- Rail Line
--- Direct Buried	--- Edge of Pavement
--- Duct Bank	--- Perennial Stream
--- Buffer of Streetlights	--- Intermittent Stream
	--- Pond, Lake, Ocean
	--- Wetland

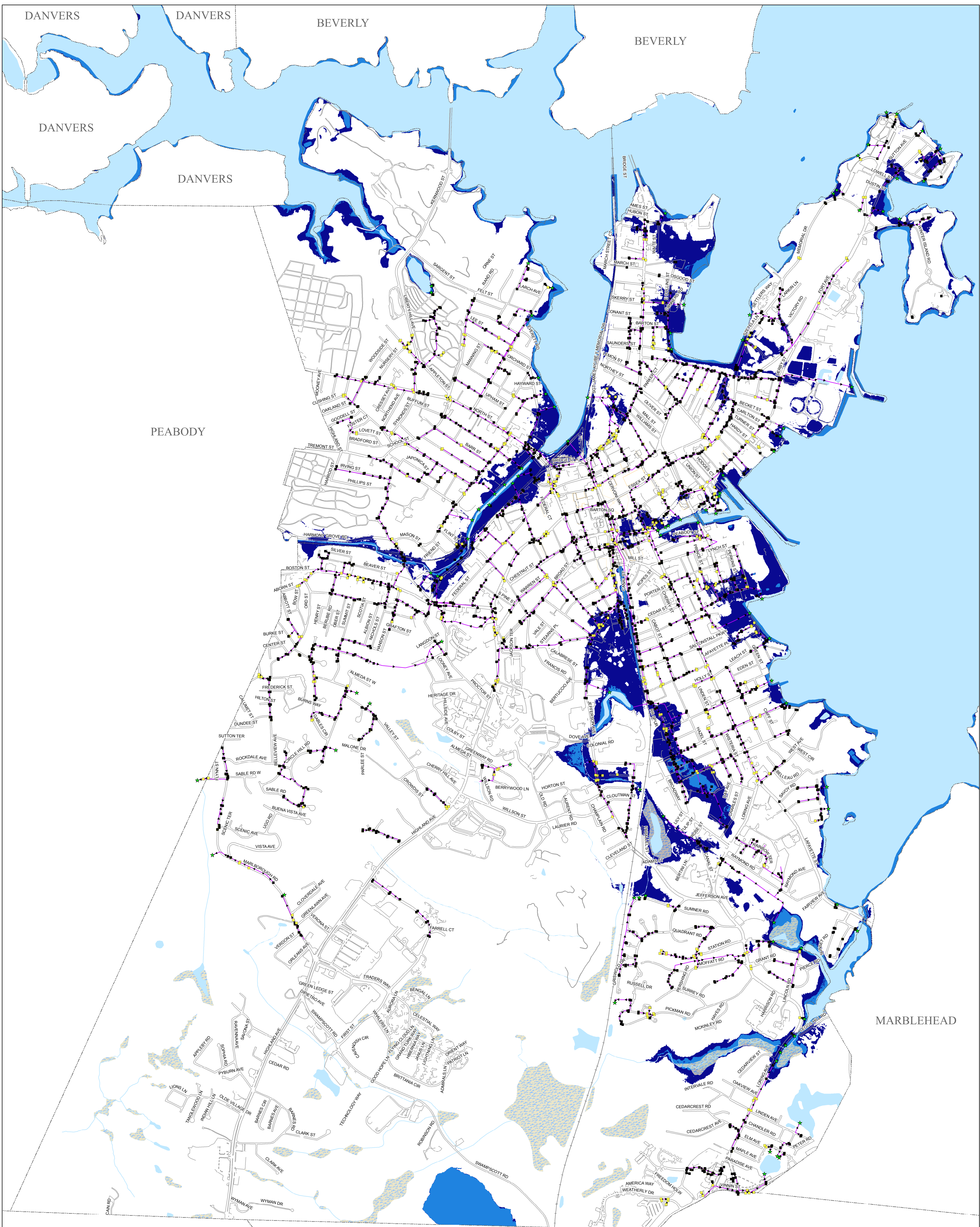


**Sea Level Rise: Electricity
Climate Change Vulnerability
Assessment and Adaptation Plan
City of Salem, Mass.**

*NOTE: 2100 sea level elevation based on the NOAA Intermediate High projections.

Source: City of Salem, NE LIDAR, and MassGIS
Coordinate System: NAD83 Mass. State Plane Mainland FIPS 2001 Feet

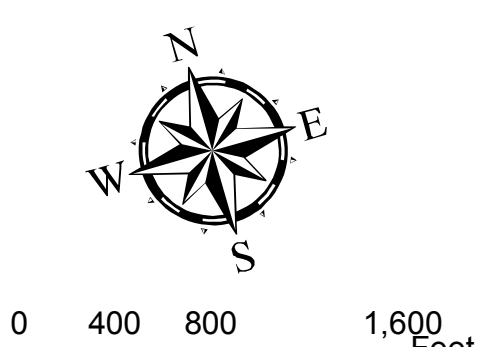




Sea Level Rise (Mean High High Water)

- 1998 Baseline Elevation (4.76')
- 2100 Elevation (9.03')*

Drainage System	Basemap	Perennial Stream
★ Outfall	--- Town Boundary	Intermittent Stream
● Catchbasin	— Rail Line	Pond, Lake, Ocean
— Pipe	— Edge of Pavement	Wetland

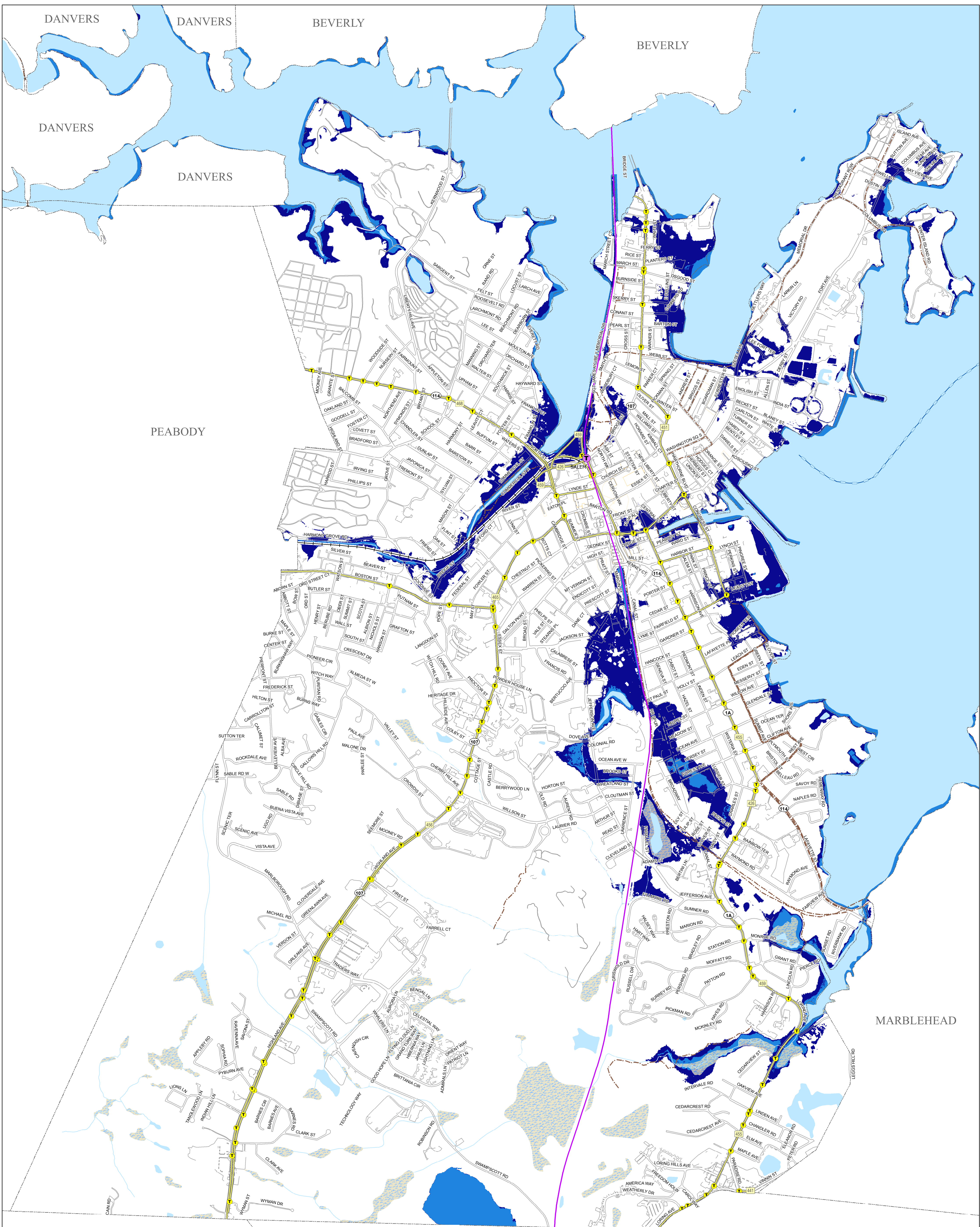


**Sea Level Rise: Stormwater
Climate Change Vulnerability
Assessment and Adaptation Plan
City of Salem, Mass.**

*NOTE: 2100 sea level elevation based on the NOAA Intermediate High projections.

Source: City of Salem, NE LiDAR, and MassGIS
Coordinate System: NAD83 Mass. State Plane Mainland FIPS 2001 Feet

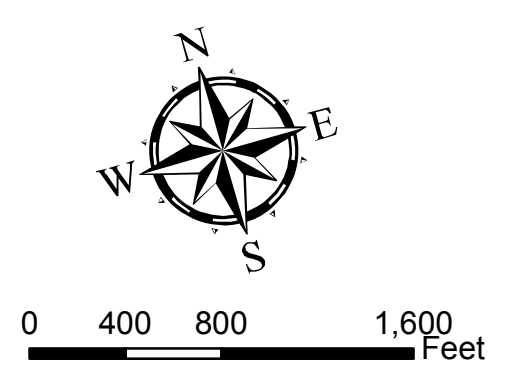




Sea Level Rise (Mean High High Water)

- 1998 Baseline Elevation (4.76')
- 2100 Elevation (9.03)*

<p>MBTA Commuter Rail</p> <ul style="list-style-type: none"> Salem MBTA Station Operational Line Proposed Line 	<p>MBTA Bus and Ferry Service</p> <ul style="list-style-type: none"> MBTA Bus Stop MBTA Bus Route Ferry Route 	<p>Basemap</p> <ul style="list-style-type: none"> Town Boundary Bike Path Rail Line Edge of Pavement Perennial Stream Intermittent Stream Pond, Lake, Ocean Wetland
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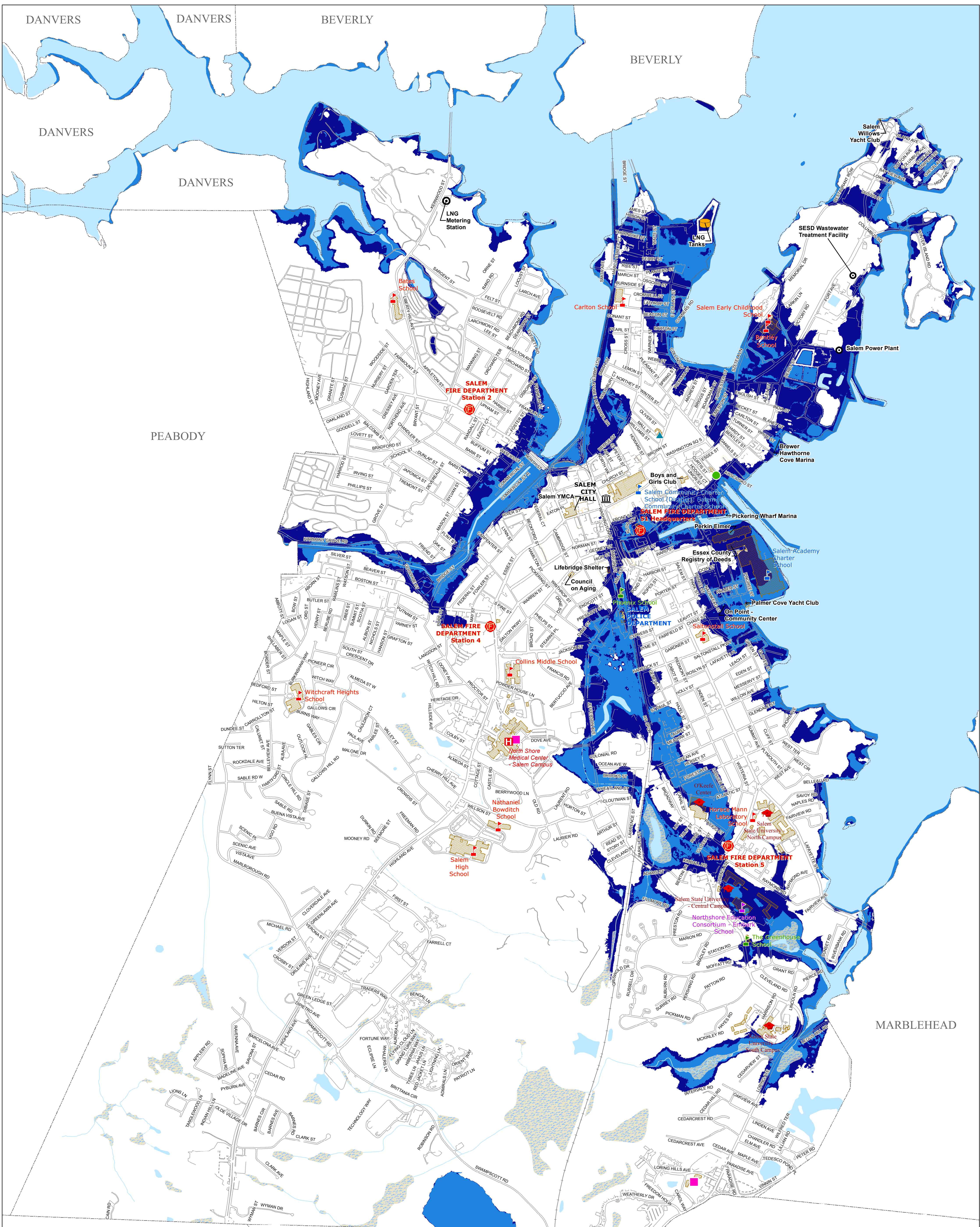


Sea Level Rise: Transportation Climate Change Vulnerability Assessment and Adaptation Plan City of Salem, Mass.

*NOTE: 2100 sea level elevation based on the NOAA Intermediate High projections.

Source: City of Salem, NE LIDAR, and MassGIS
 Coordinate System: NAD83 Mass. State Plane Mainland FIPS 2001 Feet





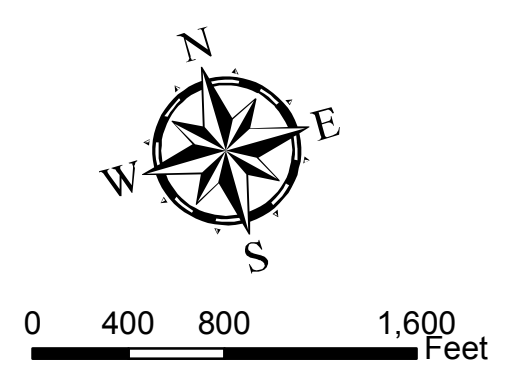
Storm Surge

- 1998 Baseline Storm Surge (8.8')
- 2100 Storm Surge with Sea Level Rise (13.03')*

*NOTE: 2100 sea level elevation based on the NOAA Intermediate High projections; storm surge is based on the levels from a current 100-year storm.

- Critical Buildings**
- P Local Police
 - F Fire Station
 - H Hospital with ER
 - A Assisted Living Facility
 - N Nursing Home
 - R Rest Home
 - C City Hall
 - S Public School
 - P Private School
 - C Charter School
 - C Collaborative Program
 - U College or University

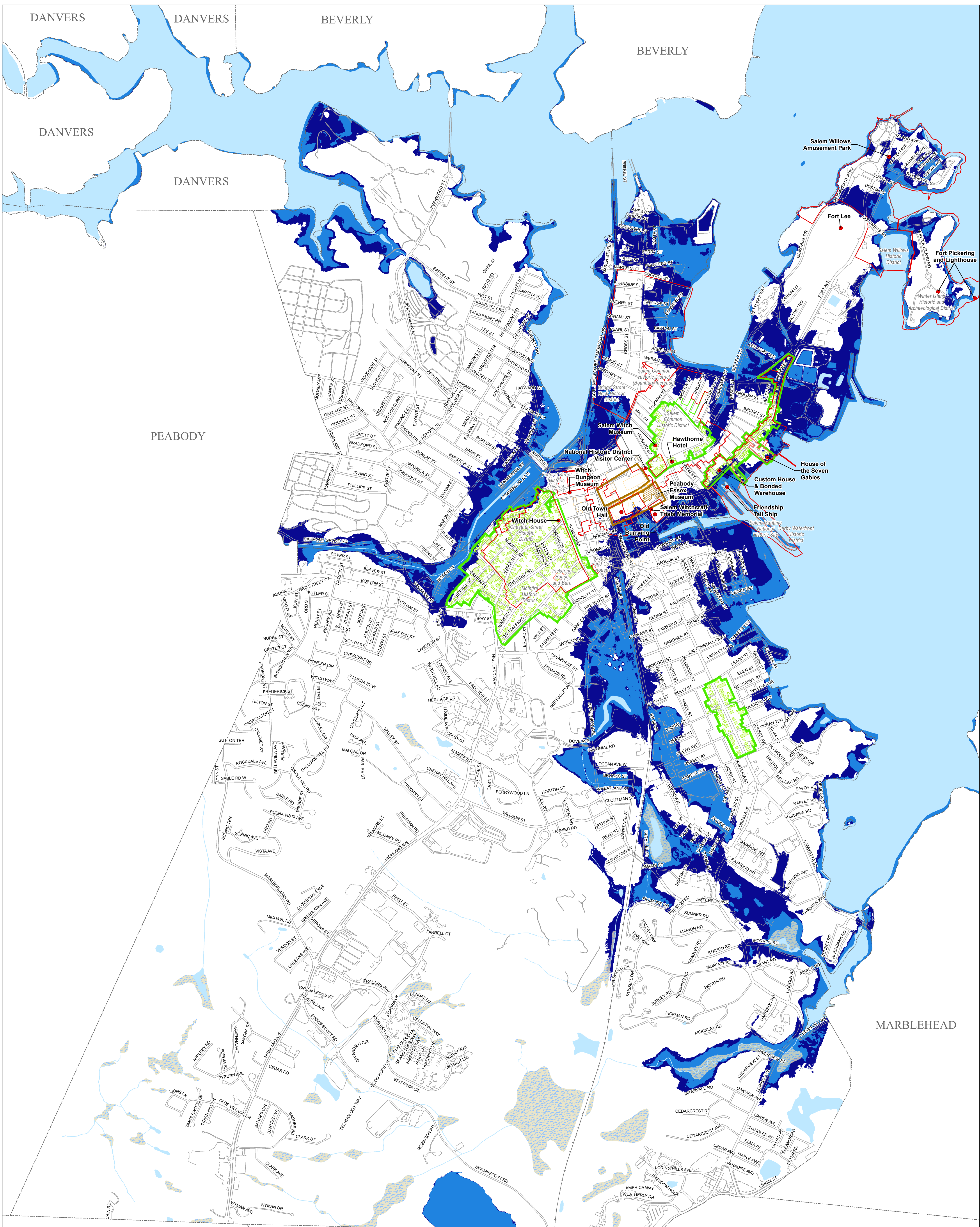
- Basemap**
- Town Boundary
 - Rail Line
 - Edge of Pavement
 - Perennial Stream
 - Intermittent Stream
 - Pond, Lake, Ocean
 - Wetland



Source: City of Salem, FEMA, and MassGIS
Coordinate System: NAD83 Mass. State Plane Mainland FIPS 2001 Feet

Sea Level Rise with Storm Surge
Critical Buildings: Services
Climate Change Vulnerability Assessment
and Adaptation Plan
City of Salem, Mass.





Storm Surge

- 1998 Baseline Storm Surge (8.8')
- 2100 Storm Surge with Sea Level Rise (13.03')*

*NOTE: 2100 sea level elevation based on the NOAA Intermediate High projections; storm surge is based on the levels from a current 100-year storm.

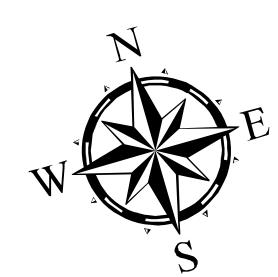
Critical Buildings

- Nat'l Register of Historic Places
- Preservation Restriction
- Local Historic District
- MRHP and LHD
- Historical and Cultural Sites

Basemap

- Town Boundary
- Rail Line
- Edge of Pavement
- Halloween Booths
- LHD Buildings
- Historic Districts
- Essex Street Mall

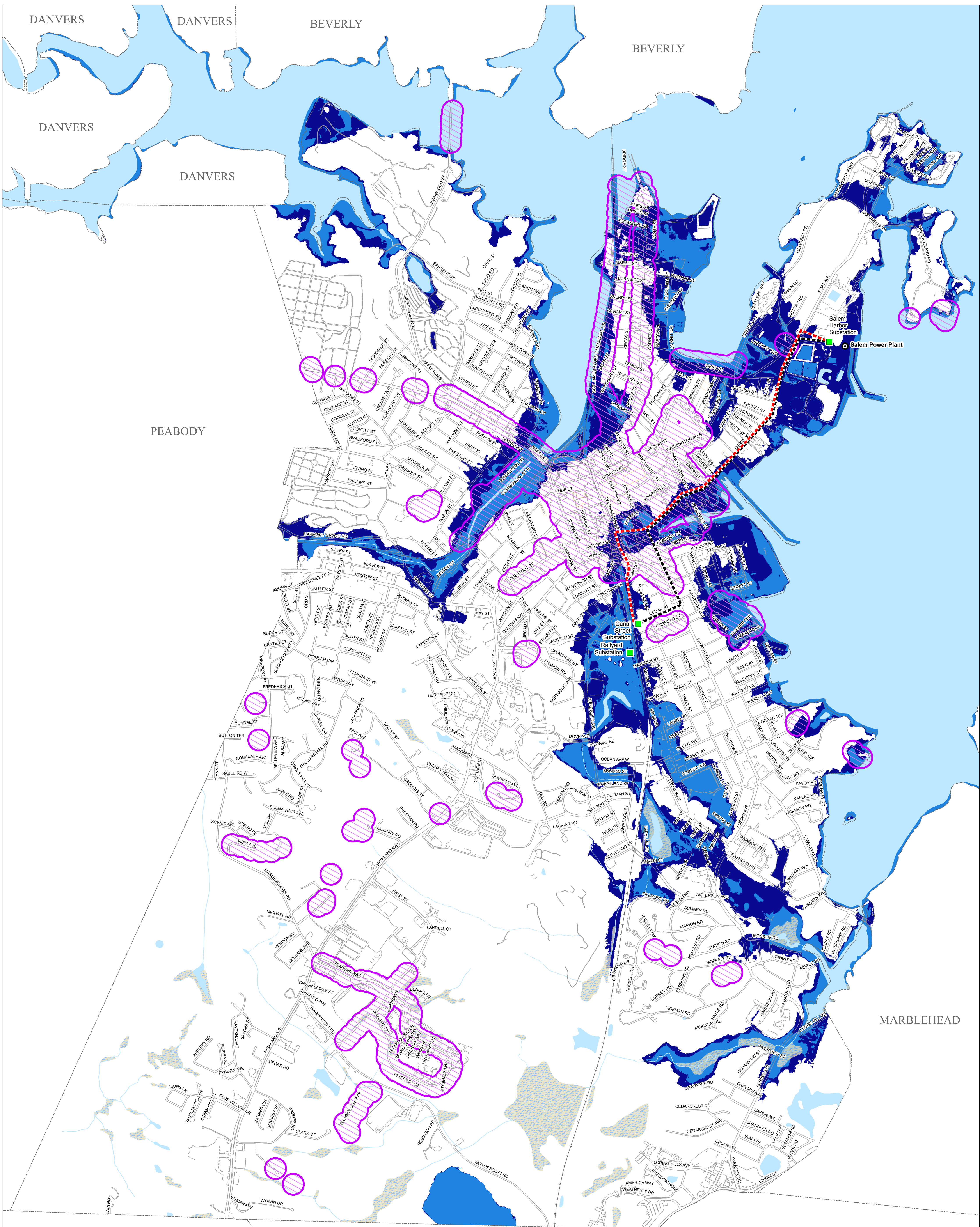
- Perennial Stream
- Intermittent Stream
- Pond, Lake, Ocean
- Wetland



0 400 800 1,600 Feet

Sea Level Rise with Storm Surge
Critical Buildings: Historic and Cultural
Climate Change Vulnerability Assessment
and Adaptation Plan
City of Salem, Mass.

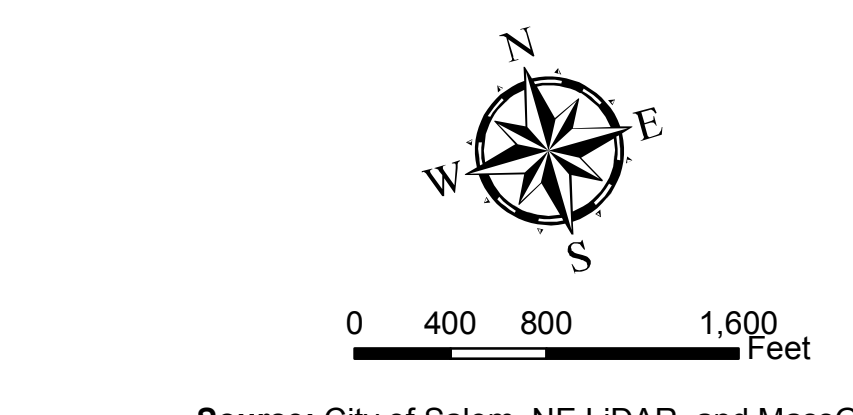




Storm Surge

- 1998 Baseline Storm Surge (8.8')
- 2100 Storm Surge with Sea Level Rise (13.03)*

Electrical System	Basemap	
■ Substations	--- Town Boundary	— Perennial Stream
— Transmission Lines	— Rail Line	— Intermittent Stream
--- Direct Buried	— Edge of Pavement	■ Pond, Lake, Ocean
--- Duct Bank		■ Wetland
■ Buffer of Streetlights		

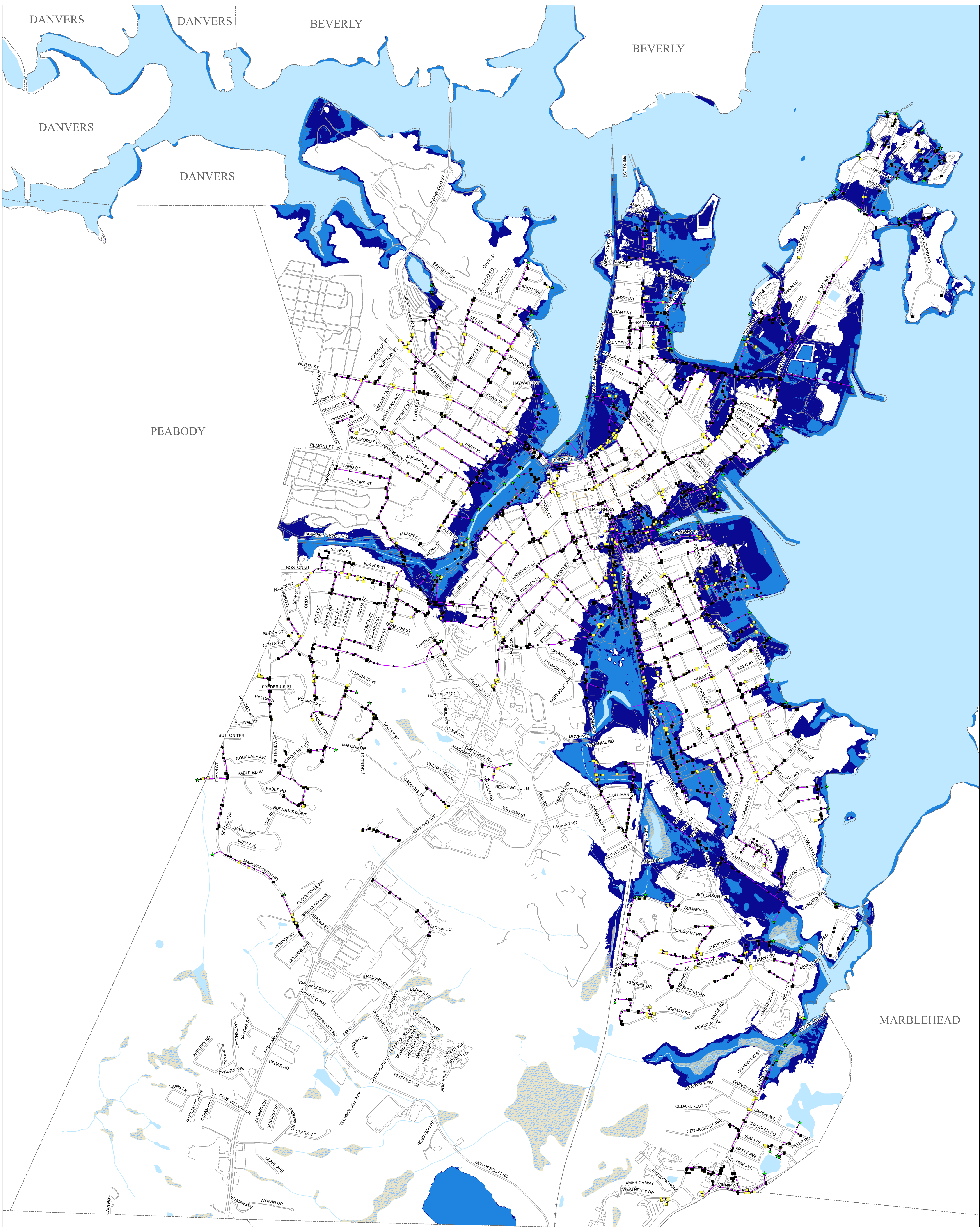


Sea Level Rise with Storm Surge: Electricity Climate Change Vulnerability Assessment and Adaptation Plan
 City of Salem, Mass.

*NOTE: 2100 sea level elevation based on the NOAA Intermediate High projections; storm surge is based on the levels from a current 100-year storm.

Source: City of Salem, NE LIDAR, and MassGIS
 Coordinate System: NAD83 Mass. State Plane Mainland FIPS 2001 Feet



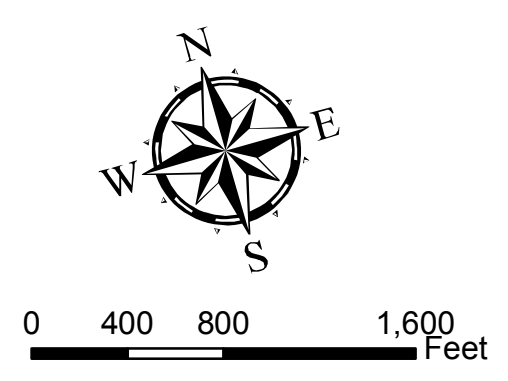


Storm Surge

- 1998 Baseline Storm Surge (8.8')
- 2100 Storm Surge with Sea Level Rise (13.03')*

Drainage System Basemap

- ★ Outfall
- Catchbasin
- Pipe
- Town Boundary
- Rail Line
- Edge of Pavement
- Perennial Stream
- Intermittent Stream
- Pond, Lake, Ocean
- Wetland

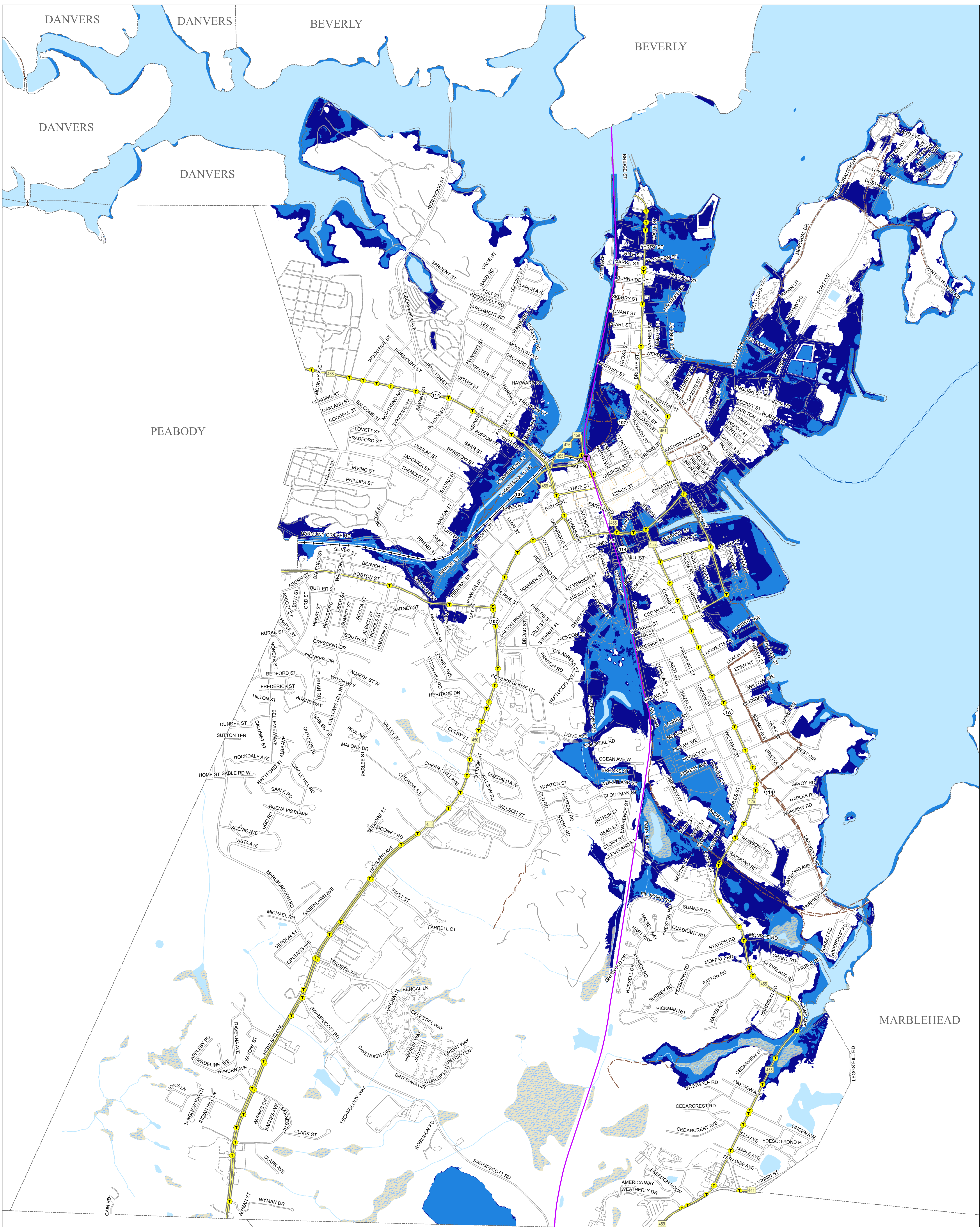


**Sea Level Rise with Storm Surge: Stormwater
Climate Change Vulnerability
Assessment and Adaptation Plan
City of Salem, Mass.**

*NOTE: 2100 sea level elevation based on the NOAA Intermediate High projections; storm surge is based on the levels from a current 100-year storm.

Source: City of Salem, NE LiDAR, and MassGIS
Coordinate System: NAD83 Mass. State Plane Mainland FIPS 2001 Feet

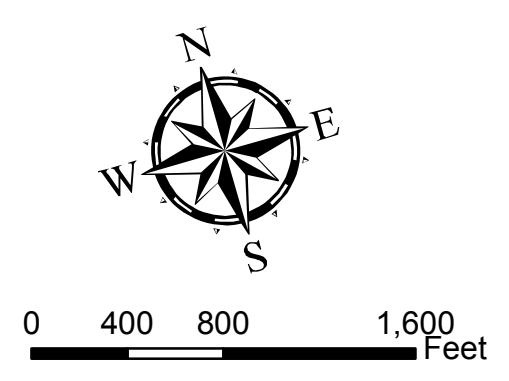




Storm Surge

- 1998 Baseline Storm Surge (8.8')
- 2100 Storm Surge with Sea Level Rise (13.03)*

<p>MBTA Commuter Rail</p> <ul style="list-style-type: none"> Salem MBTA Station Operational Line Proposed Line 	<p>MBTA Bus and Ferry Service</p> <ul style="list-style-type: none"> MBTA Bus Stop MBTA Bus Route Ferry Route 	<p>Basemap</p> <ul style="list-style-type: none"> Town Boundary Rail Line Bike Path Edge of Pavement Perennial Stream Intermittent Stream Pond, Lake, Ocean Wetland
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Sea Level Rise with Storm Surge: Transportation Climate Change Vulnerability Assessment and Adaptation Plan
City of Salem, Mass.

*NOTE: 2100 sea level elevation based on the NOAA Intermediate High projections; storm surge is based on the levels from a current 100-year storm.

Source: City of Salem, NE LiDAR, and MassGIS
 Coordinate System: NAD83 Mass. State Plane Mainland FIPS 2001 Feet

