Historic Courthouse Renovation
Planned Unit Development
Phase 1

Climate Resilience

Salem Planning Board
October 20, 2022

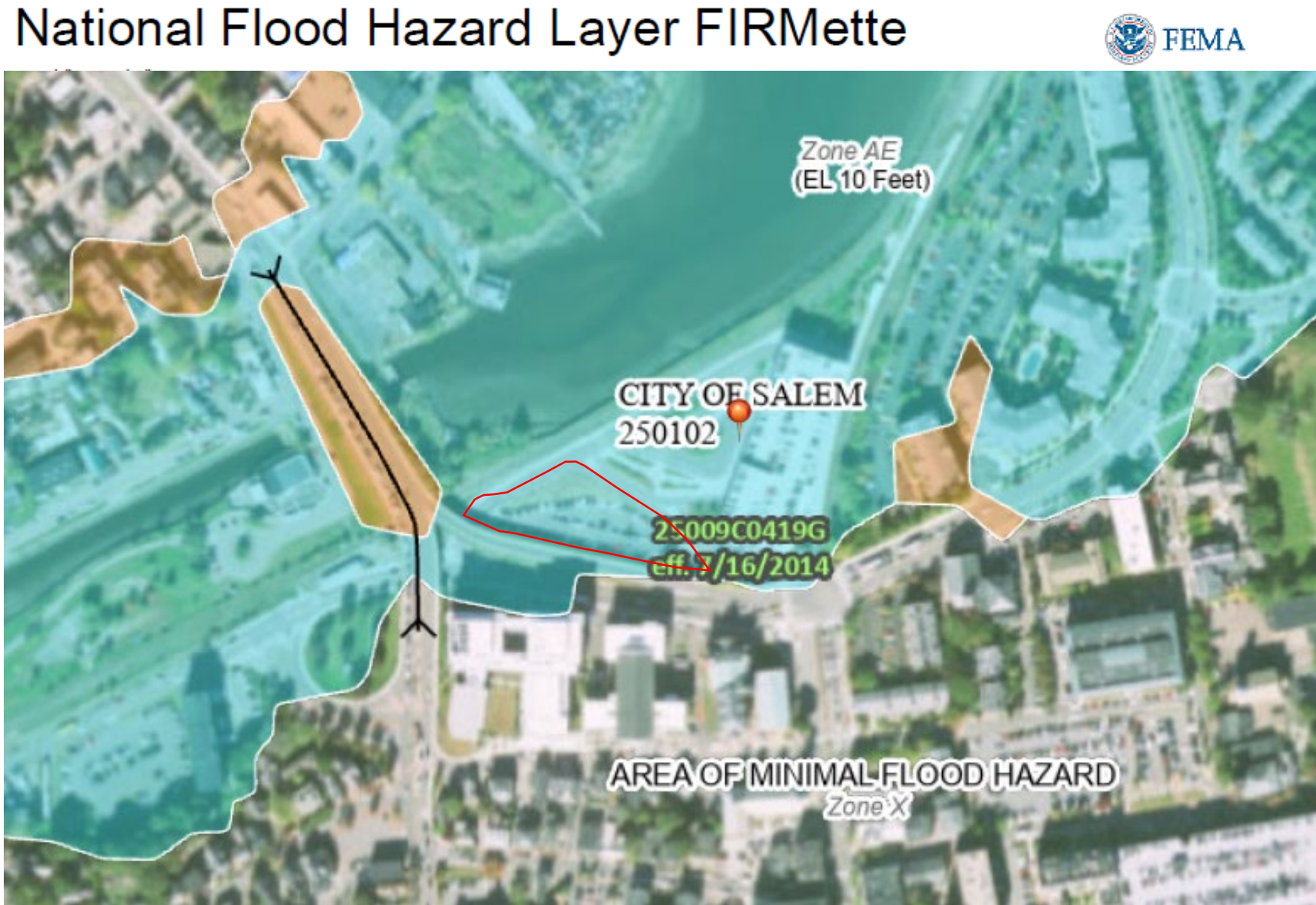
Agenda

- Current Flood Risk
- Future Flood Risk
- Resiliency Measures

Current Flood Risk

Present Day Flood Probability

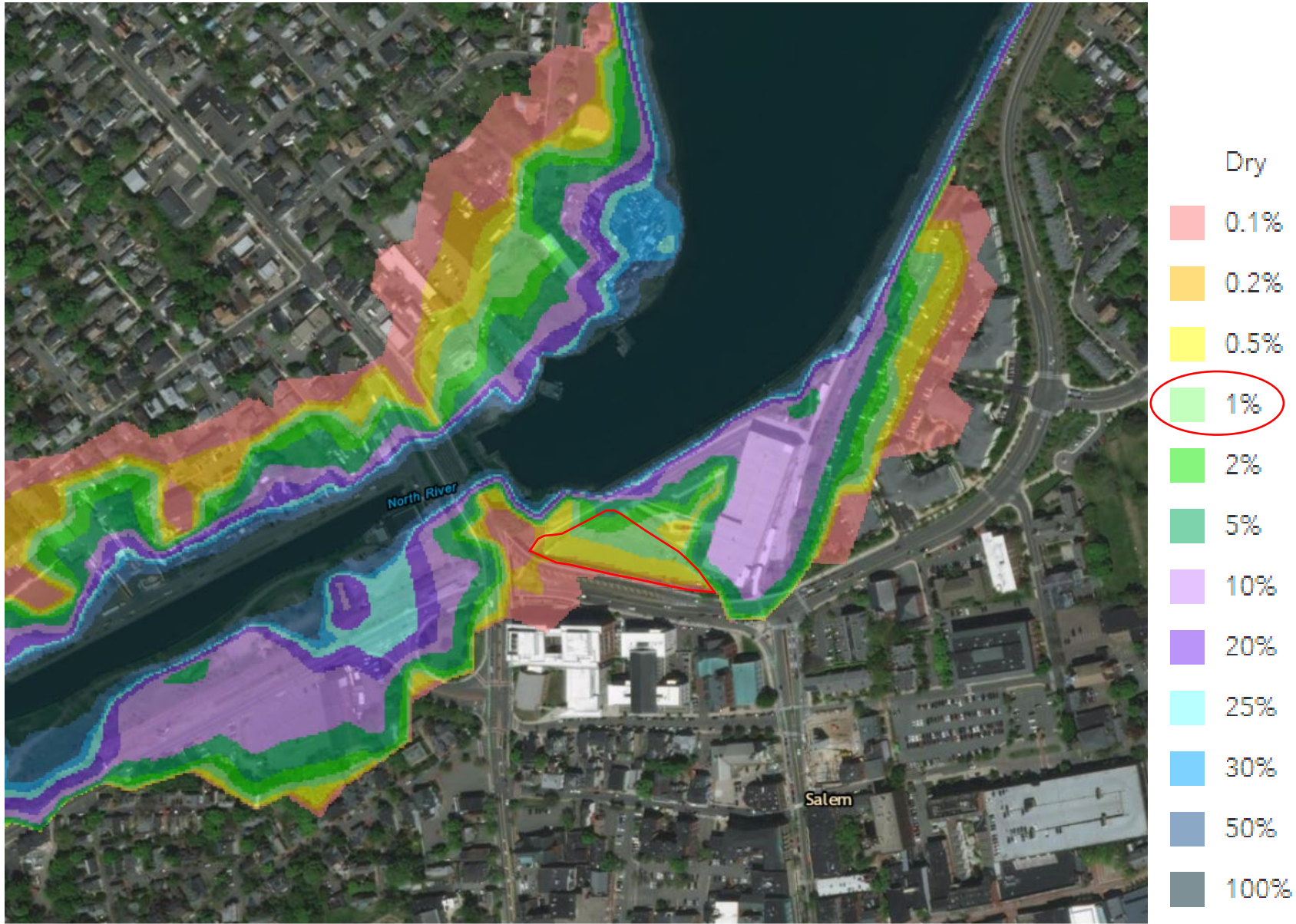
- The Site is currently subject to flooding from the 1% annual chance flood event (100-year flood).



Current Flood Risk

Present Day Flood Probability

- The Site is currently subject to flooding from events up to the 2% annual chance flood event (50-year flood).



Source: MassDOT Massachusetts Coastal Flood Risk Model (MC-FRM) https://massdot.maps.arcgis.com/home/search.html?q=MC-FRM%20salem

Current Flood Risk

Present Day Flood Depth

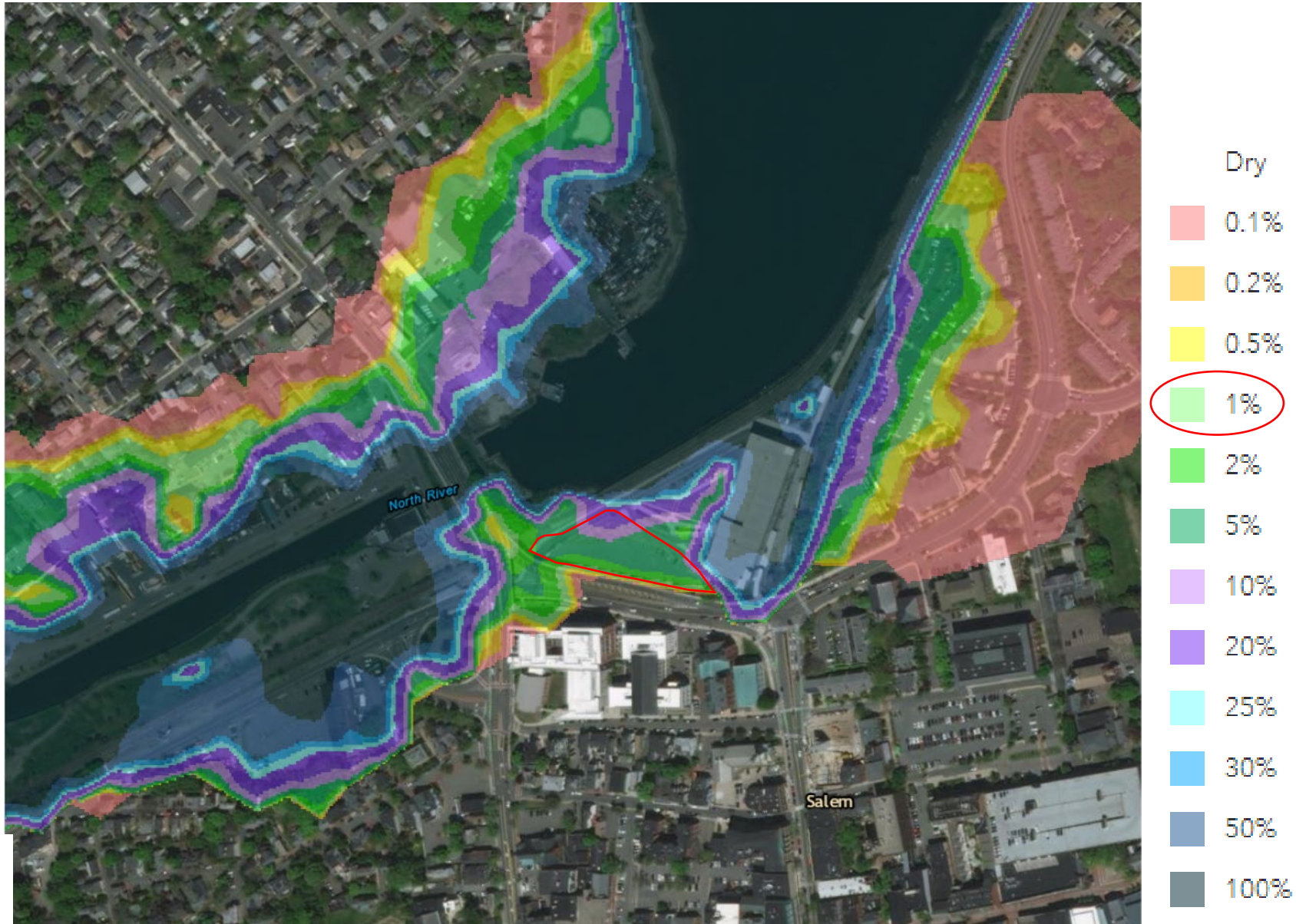
- The depth of flooding at the Site from the 1% annual chance flood event ranges from 1 foot to 3 feet.

Source: MassDOT Massachusetts Coastal Flood Risk Model (MC-FRM) https://massdot.maps.arcgis.com/home/search.html?q=MC-FRM%20salem

Future Flood Risk

2030 Flood Probability

- In 2030 most of the Site would be subject to flooding from up to the 5% annual chance flood event (20-year flood).



Source: MassDOT Massachusetts Coastal Flood Risk Model (MC-FRM) https://massdot.maps.arcgis.com/home/search.html?q=MC-FRM%20salem

Future Flood Risk

2030 Flood Depth

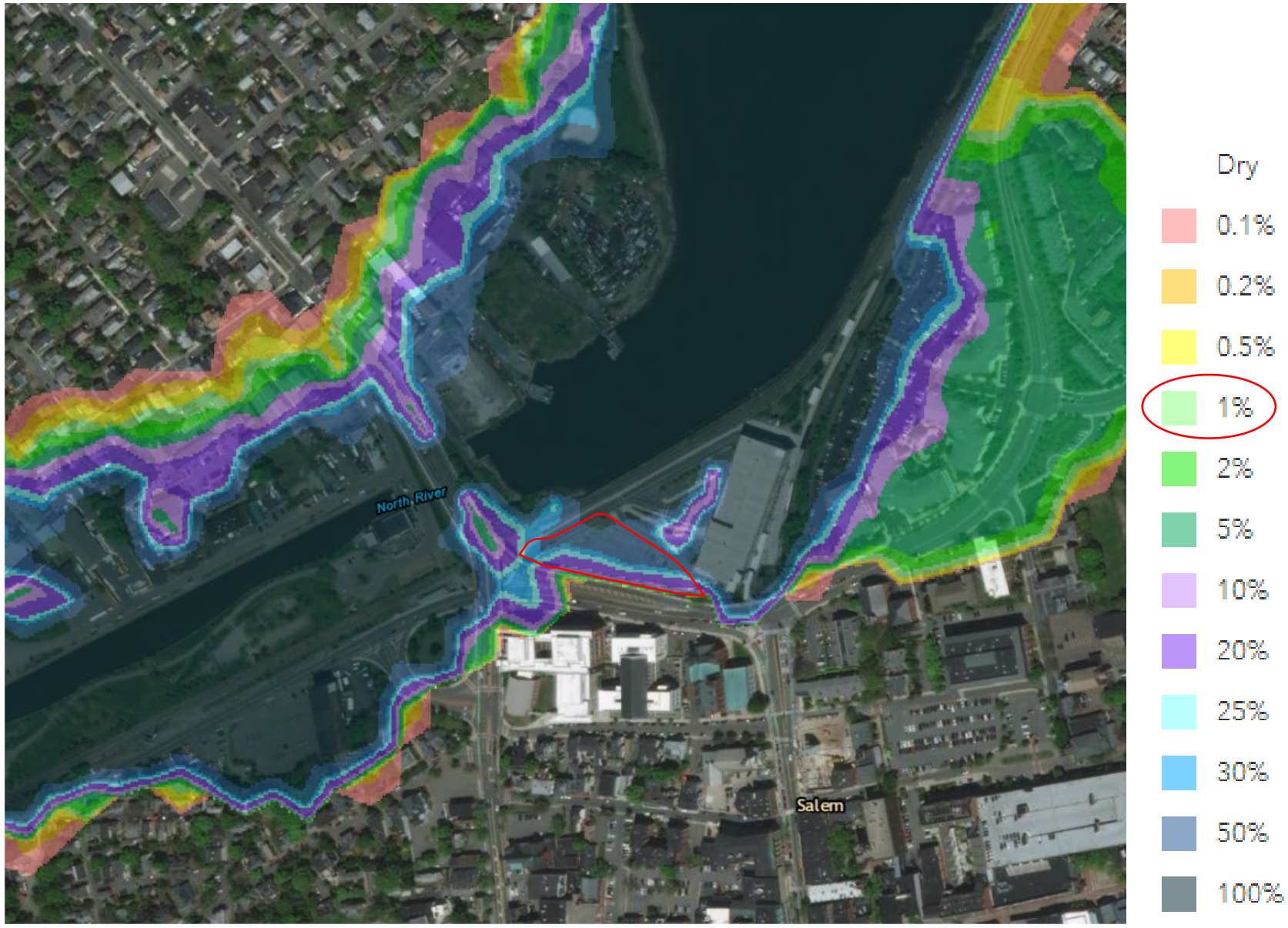
- In 2030 the depth of flooding at the Site from the 1% annual chance flood event would range from 1.5 feet to 4 feet.

Source: MassDOT Massachusetts Coastal Flood Risk Model (MC-FRM) https://massdot.maps.arcgis.com/home/search.html?q=MC-FRM%20salem

Future Flood Risk

2050 Flood Probability

- In 2050 most of the Site would be subject to flooding from the 50% annual chance flood event (2-year flood).



Source: MassDOT Massachusetts Coastal Flood Risk Model (MC-FRM) https://massdot.maps.arcgis.com/home/search.html?q=MC-FRM%20salem

Future Flood Risk

2050 Flood Depth

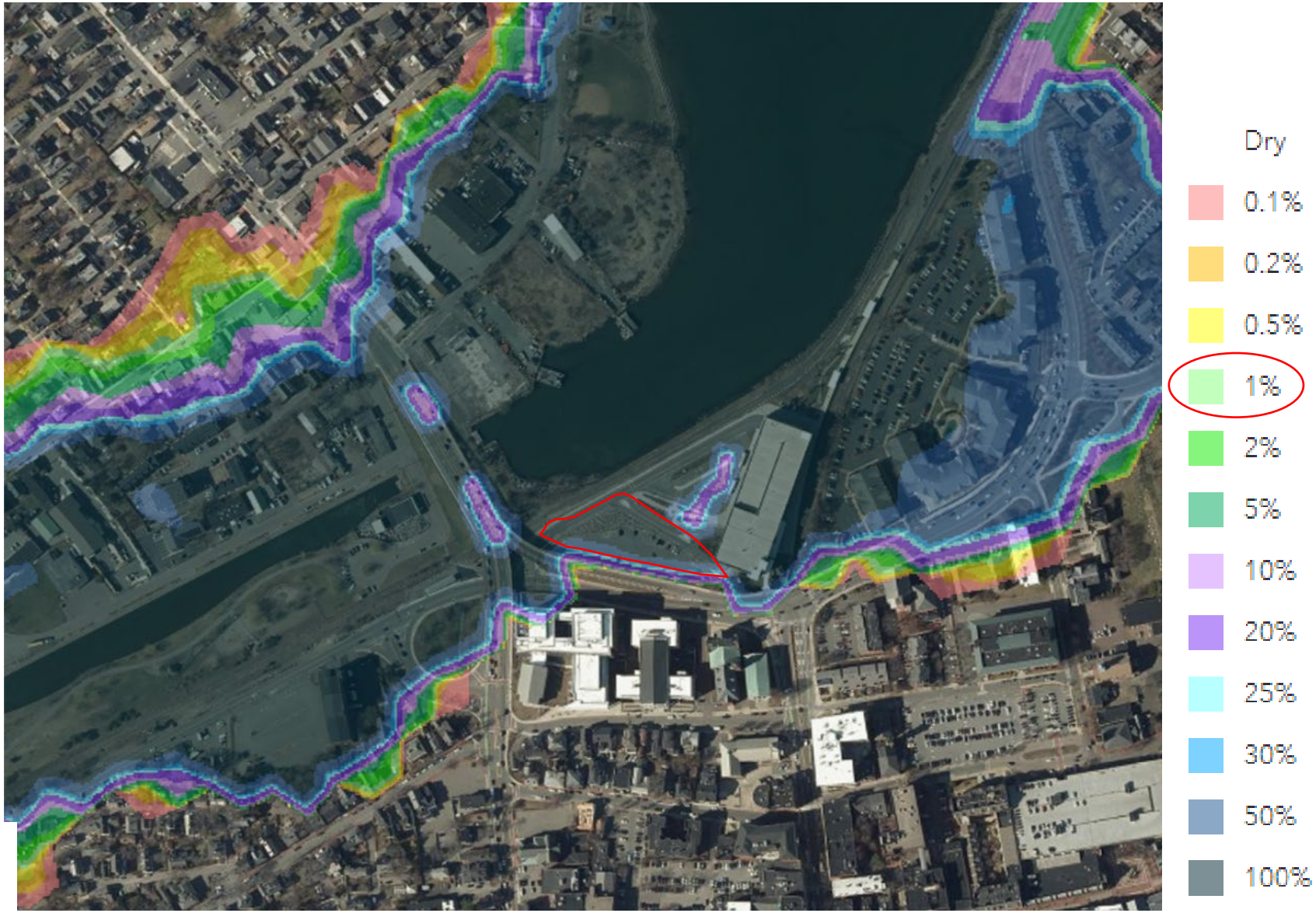
- In 2050 the depth of flooding at the Site from the 1% annual chance flood event would be from 3.5 feet to 10 feet.

Source: MassDOT Massachusetts Coastal Flood Risk Model (MC-FRM) https://massdot.maps.arcgis.com/home/search.html?q=MC-FRM%20salem

Future Flood Risk

2070 Flood Probability

- In 2070 most of the Site would be subject to flooding from the 100% annual chance flood event (1-year flood).

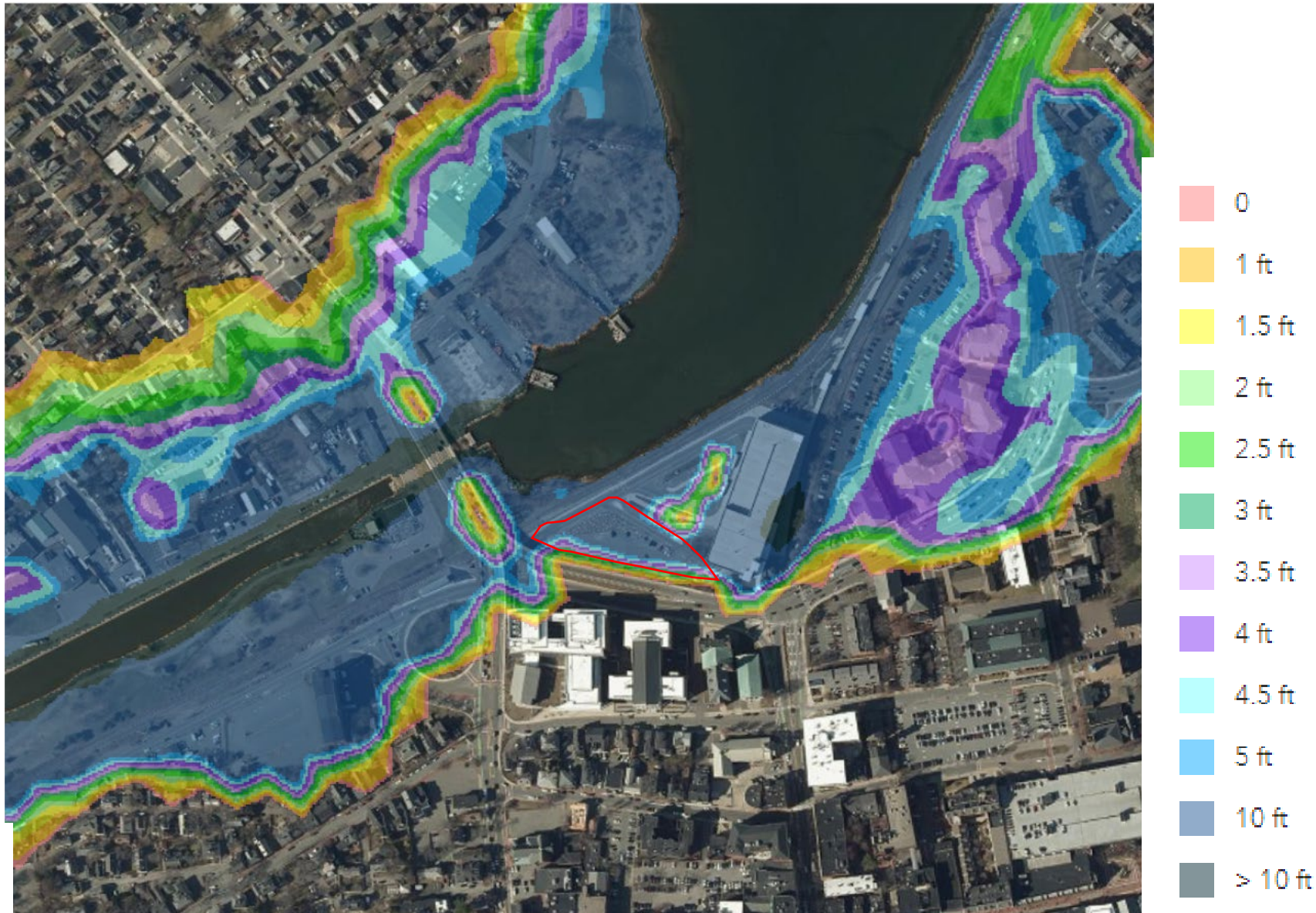


Source: MassDOT Massachusetts Coastal Flood Risk Model (MC-FRM) https://massdot.maps.arcgis.com/home/search.html?q=MC-FRM%20salem

Future Flood Risk

2070 Flood Depth

- In 2070 the depth of flooding at the Site from the 1% annual chance flood event would be up to 10 feet.



Source: MassDOT Massachusetts Coastal Flood Risk Model (MC-FRM) https://massdot.maps.arcgis.com/home/search.html?q=MC-FRM%20salem

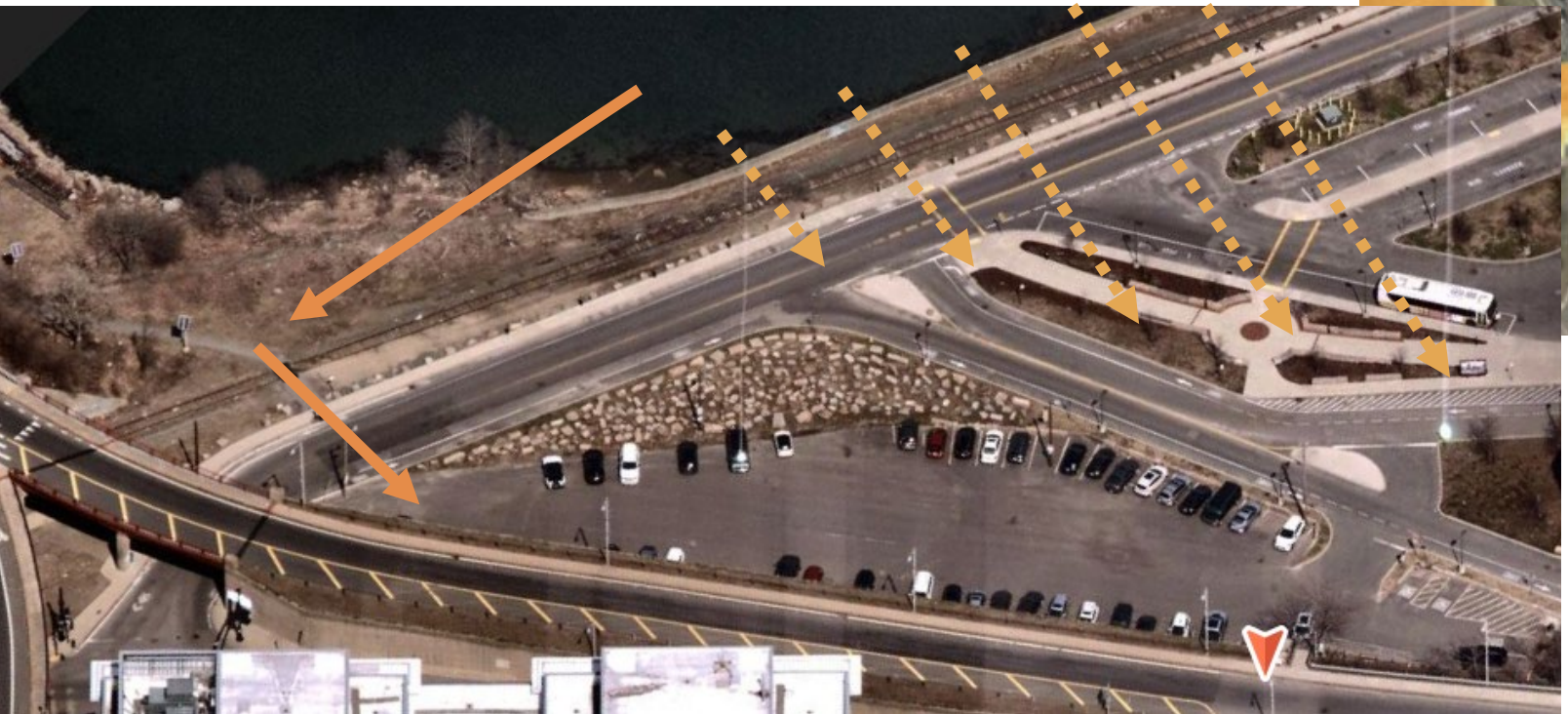
Future Flood Risk

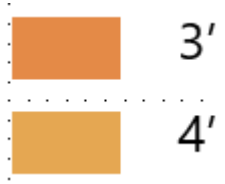
Tidal Flood Depth with Sea Level Rise

* Approximate SLR by 2070 modeled in MC-FRM

Future Flood Risk

Tidal Flood Pathway with Sea Level Rise





RMAT Sea Level Rise/Storm Surge & Extreme Precipitation

Projected Water Surface Elevation: Yes

Asset Name	Recommmended Planning Horizon	Recommmended Return Period	Max	Min	Area Weighted Average
			(ft - NAVD88)		
Residential Building	2050	2% (50-Year)	11.5	11.5	11.5
	2070		13.3	13.3	13.3

Projected Wave Action Water Elevation: Yes

Asset Name	Recommmended Planning Horizon	Recommmended Return Period	Max	Min	Area Weighted Average
			(ft - NAVD88)		
Residential Building	2050	2% (50-Year)	13.4	11.5	12.5
	2070		15.2	13.3	14.4

Projected Wave Heights: Yes

Asset Name	Recommmended Planning Horizon	Recommmended Return Period	Max	Min	Area Weighted Average
			(Feet)		
Residential Building	2050	2% (50-Year)	2.5	0	1.3
	2070		2.5	0	1.5

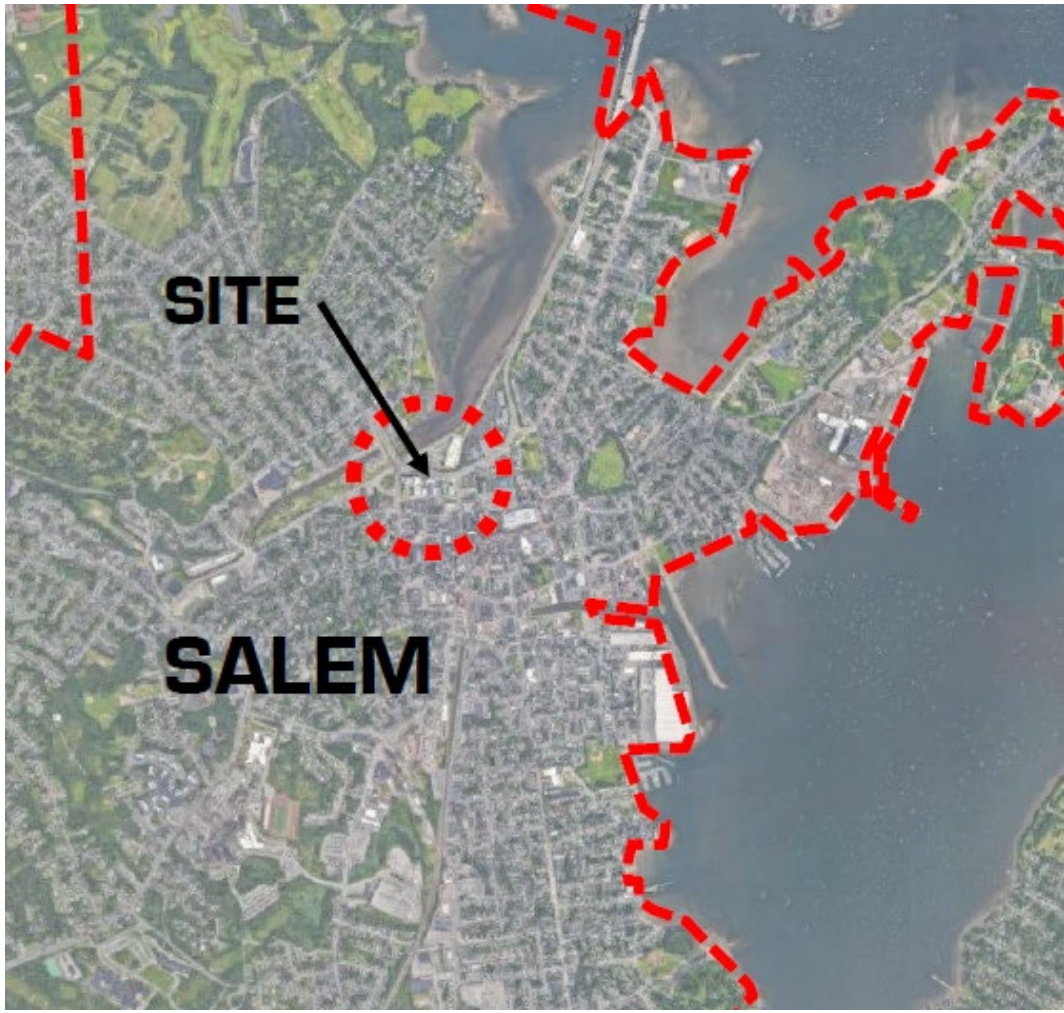
Tiered Methodology: Tier 2

Projected Total Precipitation Depth & Peak Intensity for 24-hr Design Storms: Yes

Asset Name	Recommended Planning Horizon	Recommended Return Period (Design Storm)	Projected 24-hr Total Precipitation Depth (inches)	Step-by-Step Methodology for Peak Intensity
Residential Building	2070	10-Year (10%)	6.8	Downloadable Methodology PDF

Planning for Resilience

- Resilience is:
  - "the capacity of a system to cope with a hazardous event or trend while maintaining its essential functions and ability to adapt"
- Resilience ≠ zero risk
- Climate scenarios are not set in stone
- Monitoring and evaluation
- Public/Private coordination



Current and Future Elevations

Tidal & Storm Datums	Current (NAVD88)	2070 Projection (+50" SLR)(NAVD88)
MHHW	4.8	8.9
HAT	7.0	11.2
1% Annual Chance Flood	10.0	Unknown
2% Annual Chance Flood	Unknown	13.3
Wave Action Water Elevation	Unknown	14.4

Project Elevations	Recommended (NAVD88)	Project Design (NAVD88)
Site Elevation Range	*6.0 – 10.0*	
Off-Site Protection Elevation	11.2	TBD
Lobby FFE	14.3	19.2
Bridge Street Existing Elevation	*18.0-28.0*	
Residential Units	15.3	30.0

MHHW = Mean Higher High Water
HAT = Highest Astronomical Tide
BFE = Base Flood Elevation
FFE = Finish Floor Elevation

Resilient Site and Building Elevations

Resilient Site and Building Elevations

Additional Resilience Measures

- Resilient Landscaping
- Floodproofing
- Stormwater Management
- Operations