

RESILIENT CONNECTICUT INNOVATIVE DESIGN WORKSHOP

CASE STUDIES:
FAIR HAVEN, DANBURY &
BRANFORD



May 15, 2023

PRESENTATION OUTLINE

RESILIENT CONNECTICUT

FAIR HAVEN

15 mins

- o Erik Mas and Sara Morrison

DANBURY

15 mins

- o Elsa Loehmann

BRANFORD

5 mins

- o Celicia Boyden

QUESTIONS & DISCUSSION

5 mins

RESILIENT FAIR HAVEN

CONTEXT + PROJECT GOALS

APPROX. 14,000 RESIDENTS

LOCATED BETWEEN THE MILL + QUINNIPIAC RIVERS, BORDERED BY DOWNTOWN, EAST ROCK, WOOSTER SQUARE, FAIR HAVEN HEIGHTS + QUINNIPIAC MEADOWS

CRITICAL ROADWAY CONNECTIONS VIA BRIDGES AND UNDERPASSES

AT RISK FOR COASTAL AND DRAINAGE RELATED FLOODING AS WELL AS VULNERABLE TO EXTREME HEAT BECAUSE OF DENSITY AND SOCIAL VULNERABILITY

- PROJECT GOALS:**
- 1 Develop strategies and implementable project concepts to reduce flood and heat risks
 - 2 Work with stakeholders in Fair Haven to develop strategies and projects
 - 3 Position projects for federal and state funding

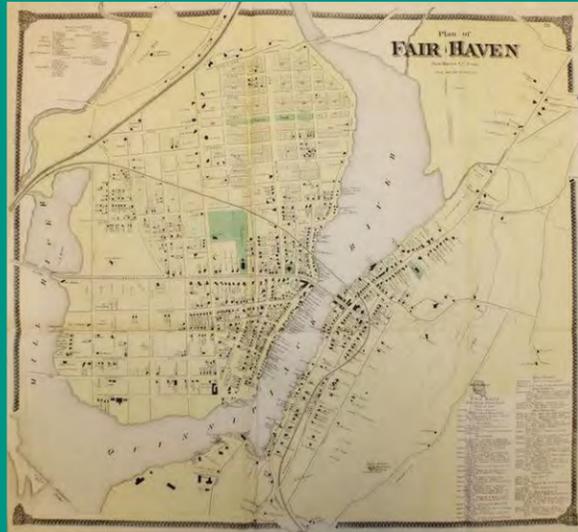
LEGEND

- Open Space
- Project Area

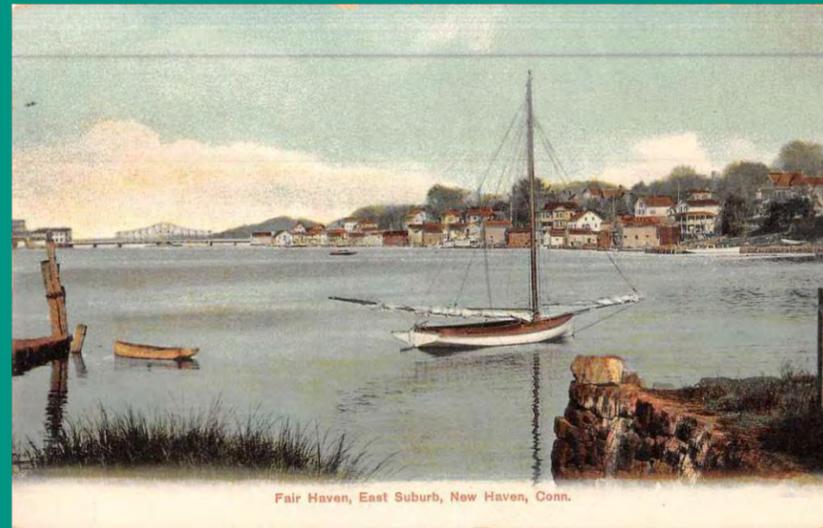


FAIR HAVEN HISTORICAL CONTEXT

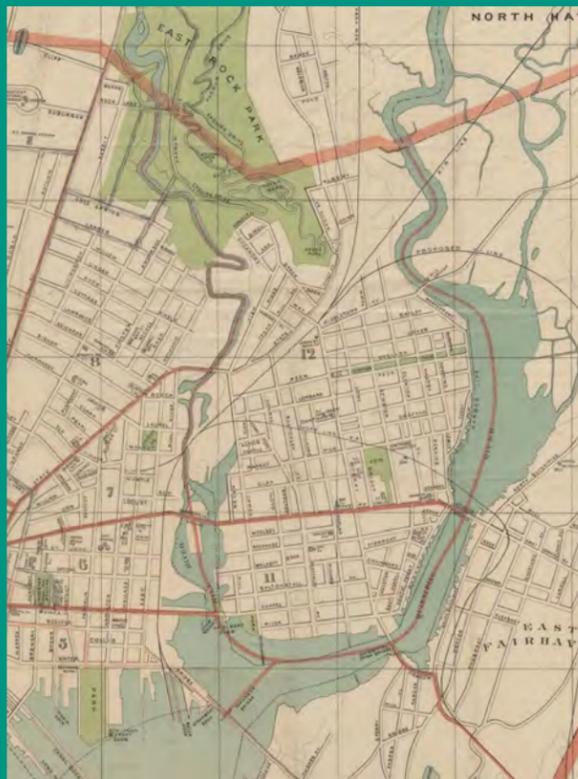
RESILIENT CONNECTICUT



1868



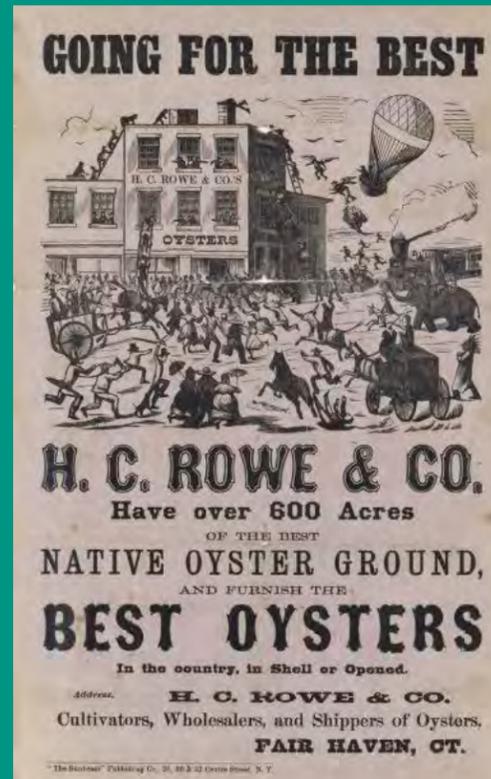
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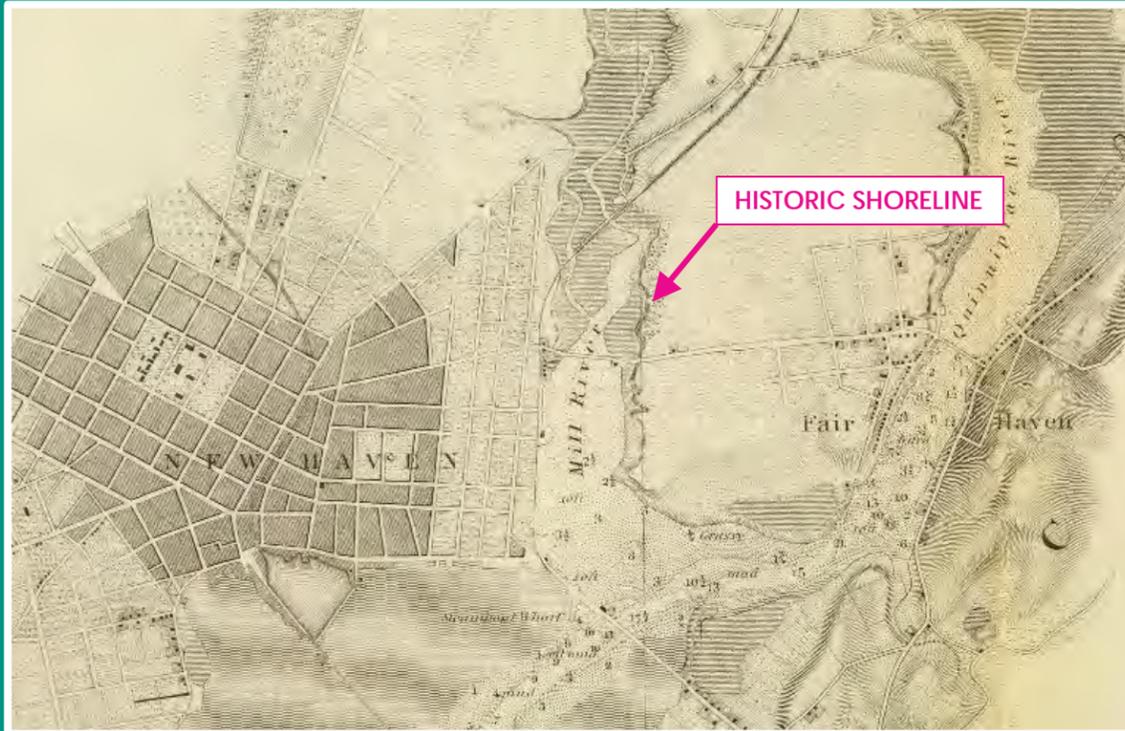
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- o The adjacent rivers and New Haven Harbor shaped the history and development of Fair Haven
- o Native American farming prior to founding by European settlers in the 17th century
- o Village originally formed to house industrial workers - oyster industry, manufacturing plants. Oyster industry and related waterfront businesses thrived through the 19th century.
- o 20th century - Large immigrant population by the 1930s, trend continued through the 1960s. Problems of industrialization. Close-knit community, strong cultural identity.
- o 21st century - Waterfront area (Front Street) has been redeveloped in past 20 years

FAIR HAVEN'S CHANGING SHORELINE

RESILIENT CONNECTICUT



1846



FAIR HAVEN FLOODING

RESILIENT CONNECTICUT



Superstorm Sandy, Humphrey St Underpass



December 23, Haven + Clay Street Intersection



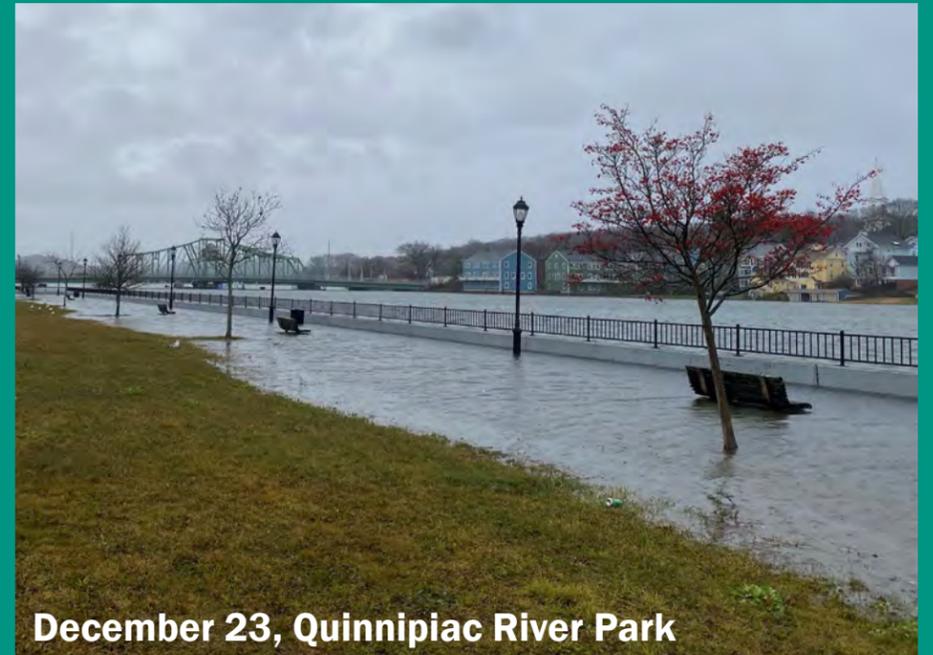
December 23, Lloyd Street Street end



December 23, Front Street Backyard Flooding



December 23, Criscuolo Park



December 23, Quinnipiac River Park

FAIR HAVEN EXTREME HEAT

RESILIENT CONNECTICUT



State Activates Extreme Heat Protocol, New Haven Cooling Centers Open

Cooling centers include city senior centers and all branches of the New Haven Free Public Library. Splash pads are another way to cool off.

Ellyn Santiago, Patch Staff
Posted Tue, Jul 19, 2022 at 11:23 am ET

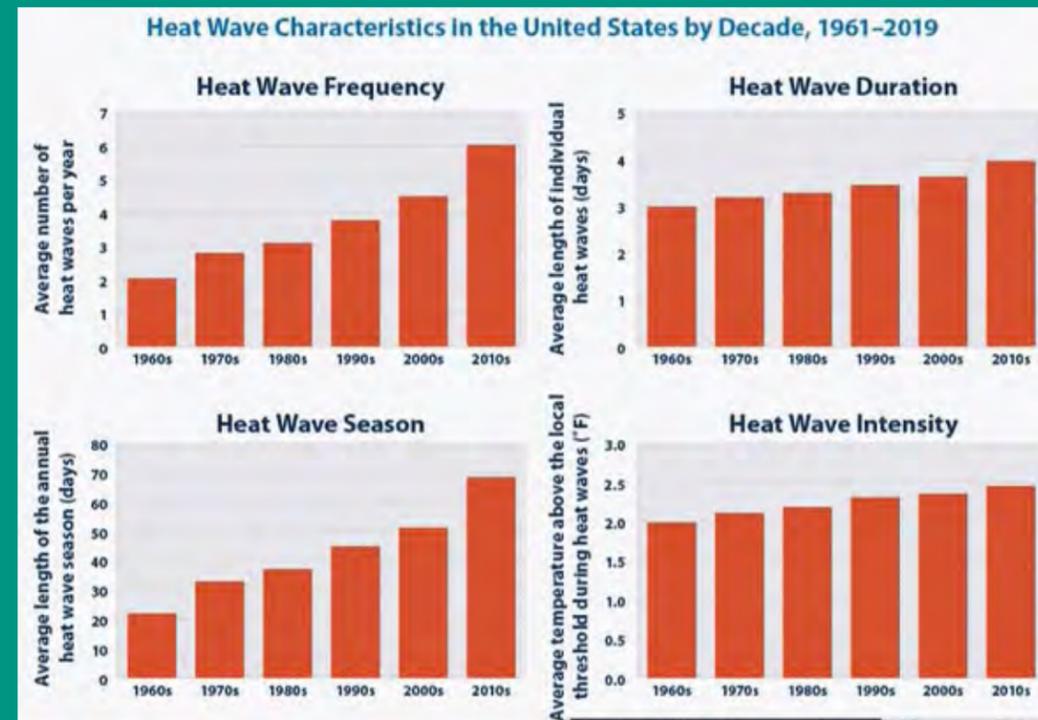
Reply



Lamont Activates CT's Extreme Weather Protocol Ahead of Forecasted Heat

Published August 1, 2022 - Updated on August 1, 2022 at 10:59 pm

f t e



- Widespread impervious surfaces
- Limited and disconnected green spaces/shade
- Vulnerable populations in the neighborhood
- Strategies to mitigate the impacts of extreme heat and heat islands within Fair Haven while enhancing quality of life



CURRENT + FUTURE CONDITIONS

RESILIENT CONNECTICUT

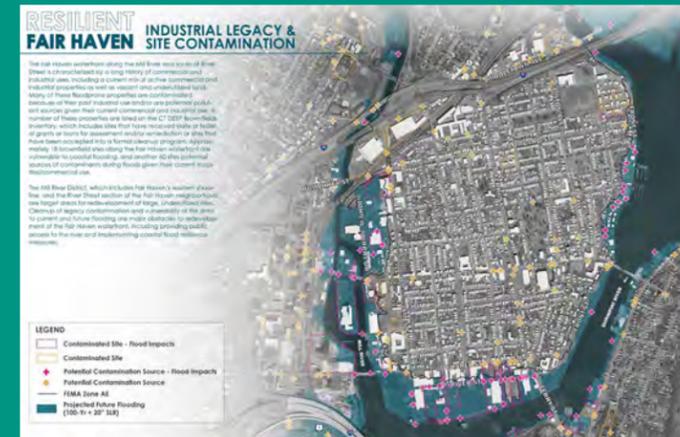
DEFINING THE RISKS



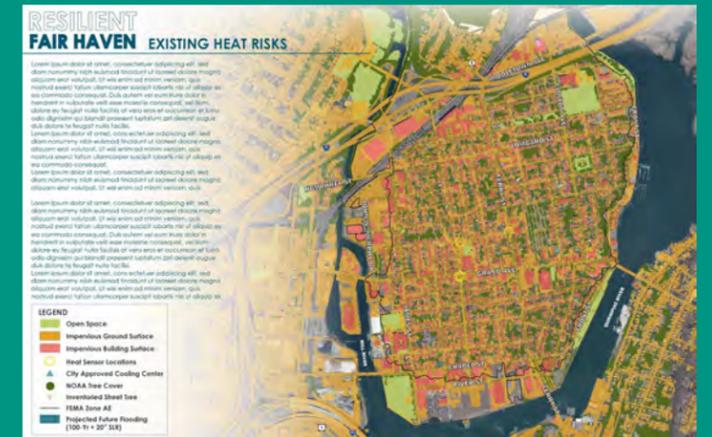
PRESENT + FUTURE FLOOD EXTENTS



PRESENT + FUTURE FLOOD DEPTHS



INDUSTRIAL LEGACY + CONTAMINATION



EXTREME HEAT VULNERABILITIES

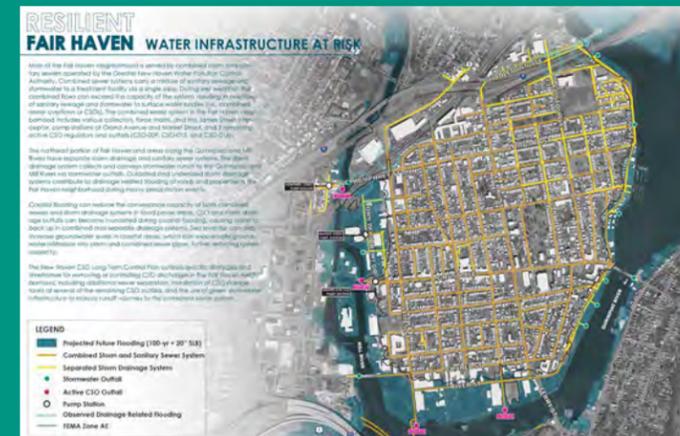
WHAT'S AT RISK?



BUILDINGS IMPACTED BY FLOODING



TRANSPORTATION INFRASTRUCTURE



WATER INFRASTRUCTURE



CRITICAL COMMUNITY ASSETS

CURRENT + FUTURE CONDITIONS

DEFINING THE RISKS

RESILIENT FAIR HAVEN PRESENT DAY FLOODING

VULNERABLE TO COASTAL AND DRAINAGE-RELATED FLOODING

WHAT IS A RECURRENCE INTERVAL AND AN ANNUAL EXCEEDANCE PROBABILITY?

Flooding is modeled for various storm events with various recurrence intervals as described in terms of annual exceedance probability (AEP), which is the probability of a storm event being equaled or exceeded in any given year.

10% AEP = 10-year storm event

2% AEP = 50-year storm event

1% AEP = 100-year storm event

MODELED COASTAL FLOODING:

- Western shore of Quinnipiac River: Along Front Street + Quinnipiac River Park
- Commercial/Industrial district along River Street
- Lower Mill River from Criscuolo Park north to Grand + Humphrey St
- Most of Ball Island and the western side of lower Mill River

OBSERVED DRAINAGE RELATED FLOODING

- Middletown Ave
- Railroad underpasses at Humphrey, James, Clinton, + Front
- John W. Murphy Drive

LEGEND

Coastal Flooding

- Present 10-yr Event
- Present 50-yr Event
- Present 100-yr Event

Drainage Related Flooding

- ▨ Observed Drainage Flooding
- FEMA Zone AE



RESILIENT FAIR HAVEN PROJECTED FUTURE FLOODING

WITH A WARMER AND WETTER CLIMATE, RAINFALL INTENSITY WILL INCREASE, AND SEA LEVELS WILL RISE, EXACERBATING COASTAL AND INLAND FLOODING.

WHAT IS ACCOUNTED FOR IN COASTAL FLOOD RISK MODELING?

- Maximum floodwater elevation, depth, and extent considering:
- Topography
- Storm surge
- Waves
- Tidal action
- Projected sea level rise (20 inches by the year 2050)

PROJECTED DRAINAGE RELATED FLOODING:

Storm drainage system modeling was not included in the project scope. Therefore, current and future drainage-related flooding depths and extents cannot be calculated for the Fair Haven neighborhood at this time.

LEGEND

Coastal Flooding

- Projected 10-yr Event
- Projected 50-yr Event
- Projected 100-yr Event
- FEMA Zone AE



RESILIENT FAIR HAVEN

INDUSTRIAL LEGACY & SITE CONTAMINATION

WATERFRONT AREAS HAVE LONG HISTORY OF COMMERCIAL + INDUSTRIAL USES, MANY OF WHICH ARE STILL ACTIVE

WHAT TYPES OF CONTAMINATION?

Many sites listed on the CT DEEP Brownfields Inventory which includes:

- Sites that have received state or federal grants or loans for assessment and/or remediation
- Sites that have been accepted into a formal cleanup program

HOW MANY SITES?

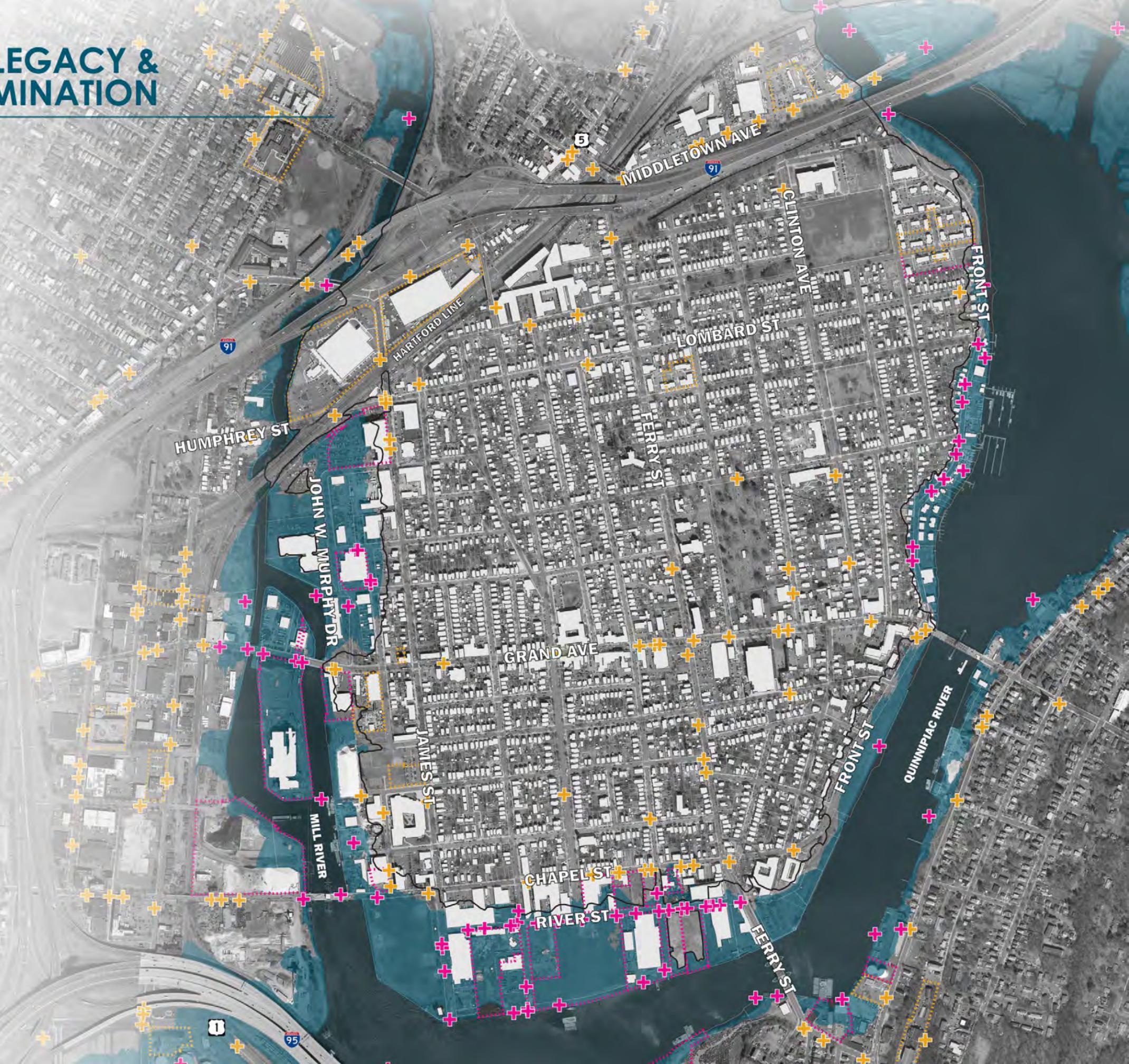
- 18 brownfield sites along the Fair Haven waterfront are vulnerable to coastal flooding
- 60 sites potential sources of contaminants during floods given their current industrial/ commercial use

MILL RIVER DISTRICT TARGET AREA FOR REDEVELOPMENT OF LARGE, UNDERUTILIZED SITES.

CLEANUP OF SITES IS MAJOR OBSTACLE TO REDEVELOPMENT INCLUDING PROVIDING PUBLIC ACCESS TO WATERFRONT AND IMPLEMENTING COASTAL FLOOD RESILIENCE MEASURES.

LEGEND

-  Contaminated Site - Flood Impacts
-  Contaminated Site
-  Potential Contamination Source - Flood Impacts
-  Potential Contamination Source
-  FEMA Zone AE
-  Projected Future Flooding (100-Yr + 20" SLR)



RESILIENT FAIR HAVEN

EXISTING HEAT RISKS

HEAT EXISTING CONDITIONS

- Impervious Ground Surface
- Impervious Building Surface
- Tree Canopy
- Open Space
- Heat Sensor Data
- Distributed Air Temperature Models
- Heat Projections

GREEN INFRASTRUCTURE MITIGATION + HEAT ADAPTATION SITING CRITERIA

- Vacant or Partially Vacant City-Owned Parcels
- Other Vacant Parcels
- Tree Canopy Percentages
- Buffers to Public Transit
- Walkability
- Buffers to School Parcels
- Percent Impervious
- Social Vulnerability Ranking

CRITERIA FOR POTENTIAL COOLING CENTER LOCATIONS

- Public Buildings
- Churches
- Schools
- Area Available in Buildings
- Building Accessibility
- Buffers to Public Transit
- Walkability
- Social Vulnerability Ranking

LEGEND

-  Open Space
-  Impervious Ground Surface
-  Impervious Building Surface
-  Heat Sensor Locations
-  City Approved Cooling Center
-  NOAA Tree Cover
-  Inventoried Street Tree
-  FEMA Zone AE
-  Projected Future Flooding (100-Yr + 20" SLR)



CURRENT + FUTURE CONDITIONS

RESILIENT CONNECTICUT

WHAT'S AT RISK?

RESILIENT FAIR HAVEN

BUILDINGS IMPACTED BY FUTURE FLOODING

FLOOD RELATED DAMAGE TO PHYSICAL STRUCTURES CAN RESULT IN:

- Physical damage to structures and their contents
- Human impacts such as residential displacement and injuries
- Direct business impacts
- Loss of function of (and access to) public and essential facilities

BUILDINGS IMPACTED

- 34** INDUSTRIAL
- 14** CITY OWNED
- 49** COMMERCIAL
- 52** RESIDENTIAL

LEGEND
Buildings Impacted By Future Flooding

-  Industrial Use
-  City Owned
-  Commercial / Mixed-Use
-  Residential Use
-  FEMA Zone AE
-  Projected Future Flooding (100-Yr + 20" SLR)



RESILIENT FAIR HAVEN

TRANSPORTATION INFRASTRUCTURE AT RISK

MAJOR IMPACTS TO CRITICAL ROADWAYS + TRANSPORTATION CORRIDORS INCLUDING LOCAL BUS SERVICE + BICYCLE LANES

ROADS + BRIDGES:

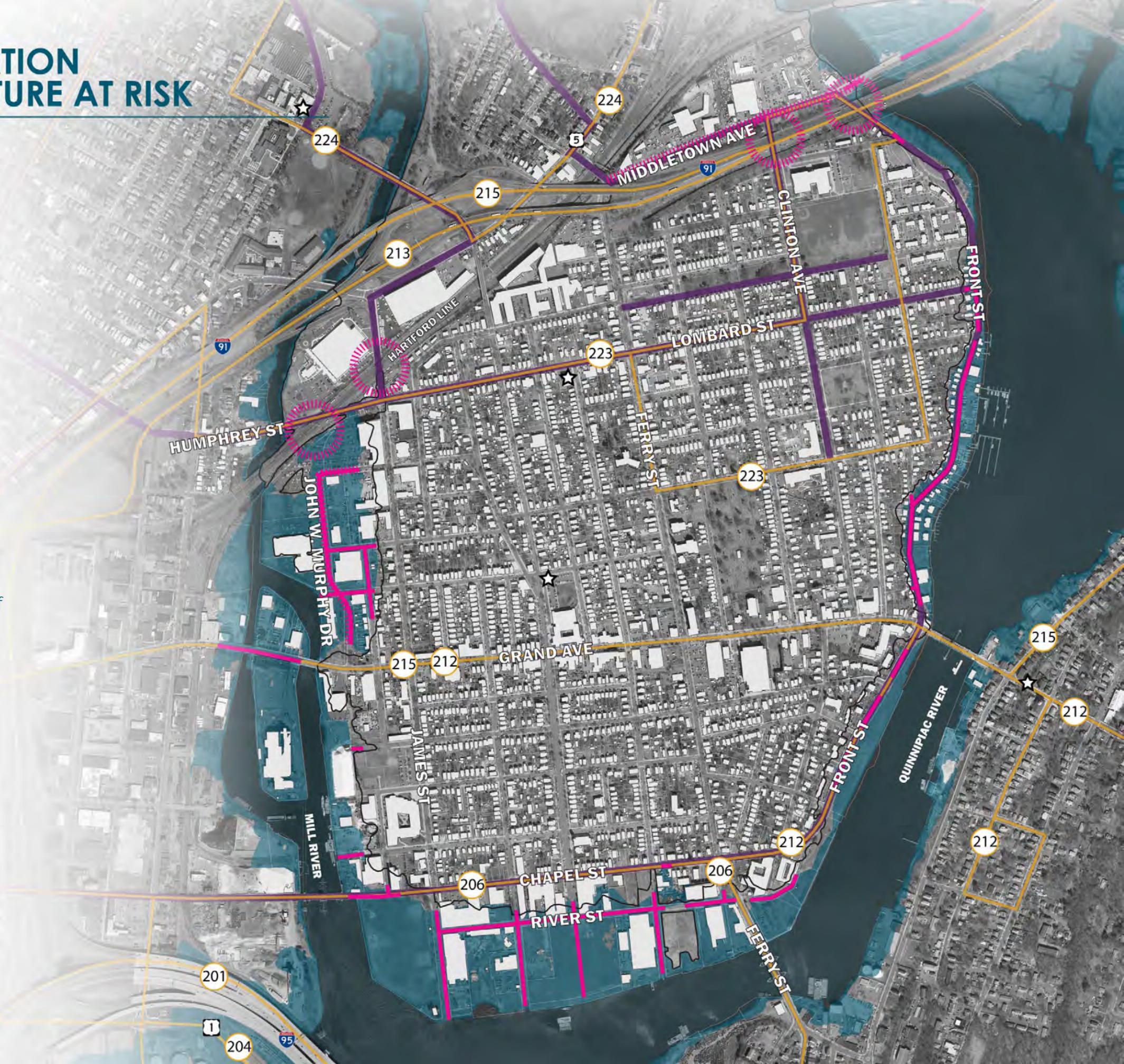
- Low-lying segments of several major roads along the Fair Haven shoreline (Front Street, River Street, John W. Murphy Drive) will be impacted by coastal flooding as well as many coastal street ends.
- Approaches to the bridges/water crossings at East Grand Avenue and Chapel Street are also predicted to experience flooding during this future event.

RAIL + INTERSTATE UNDERPASSES / CRITICAL LINKAGES:

- The railroad underpasses at Humphrey Street and James Street generally experience more significant flooding than the other impacted underpasses that serve Fair Haven.
- Notable as well is Middletown Avenue northeast of Fair Haven and a major connection to the Quinnipiac Meadows area.

LEGEND

- Projected Future Flooding (100-Yr + 20" SLR)
- Bus Route
- Dedicated Bike Lane
- Streets with Coastal Flood Risk
- Observed Drainage Flooding
- Emergency Response (Police, Fire Department, EMS)
- FEMA Zone AE



RESILIENT FAIR HAVEN

CRITICAL COMMUNITY ASSETS

CRITICAL COMMUNITY ASSETS ARE PARTICULARLY IMPORTANT TO THE SOCIAL RESILIENCE OF THIS COMMUNITY PROVIDING COMMUNITY COHESION, CHARACTER, AND QUALITY OF LIFE.

SEVERAL NATIONAL AND LOCAL HISTORIC DISTRICTS ARE LOCATED WITHIN FAIR HAVEN, REFLECTING THE AREA'S MARITIME AND INDUSTRIAL PAST AND EMPHASIS ON HISTORIC PRESERVATION.

Library / Post Office

- 01 FAIR HAVEN BRANCH LIBRARY
- 02 UNITED STATES POSTAL SERVICE

Emergency Response

- 01 NEW HAVEN POLICE DEPARTMENT
- 02 NEW HAVEN FIRE DEPARTMENT ENGINE 17
- 03 NEW HAVEN FIRE DEPARTMENT ENGINE 10/TRUCK 3
- 04 YALE NEW HAVEN HOSPITAL CENTER FOR EMS

Senior Center

- 01 ATWATER SENIOR CENTER
- 02 MARY WADE HOME

Healthcare Facility

- 01 COCENTRA URGENT CARE + DEPT. OF SOCIAL SERVICES CT
- 02 NEW HAVEN PHARMACY
- 03 PIONEER REHAB DBA + PHYSICAL THERAPY
- 04 FAIR HAVEN COMMUNITY HEALTHCARE
- 05 NEW HAVEN MEDICAL CENTER

School

- 01 FARNAM NEIGHBORHOOD HOUSE + NURSERY SCHOOL
- 02 ELM CITY COLLEGE PREPARATORY ELEMENTARY SCHOOL
- 03 FAMILY ACADEMY
- 04 LITTLE ESTRELLITAS LICENSED FAMILY HOME DAYCARE
- 05 JOHN S. MARTINEZ SCHOOL
- 06 COLD SPRING SCHOOL
- 07 FAIR HAVEN SCHOOL
- 08 TITI TANIA'S DAYCARE
- 09 AUNTIE ROSE CHILDCARE DEVELOPMENT CENTER
- 10 ALL SAINTS CATHOLIC ACADEMY
- 11 LITTLE SKY FAMILY CHILDCARE
- 12 TIA HILDA'S DAYCARE LLC
- 13 CLINTON AVENUE SCHOOL
- 14 BOSS BABY LEARNING + DAY CARE

Religious Center

- 01 STRAIGHTWAY CHURCH
- 02 GLESIA SALVACION Y VIDA ETERNA
- 03 IGLESIA CRISTIANA ESTRELLA RESPANDECIENTE DE JACOB
- 04 APOSTLE IMMIGRANT SERVICES
- 05 THE REDEEMED CHRISTIAN CHURCH OF GOD
- 06 IGLESIA DE DIOS PENTECOSTAL MI
- 07 IGLESIA BAUTISTA EL CALVARIO
- 08 CHURCH OF GOD OF PROPHECY
- 09 INSPIRATIONAL EVANGELISTIC
- 10 OUR LADY OF GUADALUPE PARISH
- 11 IGLESIA CRISTIANA DIOS DE PACTOS
- 12 IGLESIA CRISTIANA BETANIA AD
- 13 IGLESIA DE DIOS LA NUEVA JERUSALEN INC

Public Open Space

(Park, Urban Farm, Community Garden)

- 01 CRISCUOLO PARK
- 02 MILL RIVER TRAIL- OPEN SPACE
- 03 JOHN S. MARTINEZ SCHOOL- OPEN SPACE
- 04 ESMERALDA PARK
- 05 WOLCOTT & LLOYD COMMUNITY GREENSPACE
- 06 WOOLSEY ST COMMUNITY GARDEN
- 07 WOLCOTT & FERRY STREET FARM
- 08 FERRY STREET TRIANGLE
- 09 QUINNIPIAC RIVER PARK
- 10 FAIR HAVEN SCHOOL- OPEN SPACE
- 11 CLINTON AVE- OPEN SPACE
- 12 GRAND ACRES COMMUNITY GARDEN
- 13 LEWIS STREET PARK
- 14 CHATHAM SQUARE PARK
- 15 ENGLISH MALL
- 16 CLINTON PARK
- 17 QUINNIPIAC RIVER FRONT ST BOAT RAMP
- 18 DOVER BEACH
- 19 FERRY STREET FARM
- 20 STALLWORTH COMMUNITY GARDEN
- 21 CHABASO BAKERY GARDEN
- 22 MARKET & JAMES STREET FARM
- 23 COMMUNITY GARDEN-SHELTER & CLAY STREETS
- 24 FAMILY ACADEMY- OPEN SPACE
- 25 MILL RIVER TRAIL

LEGEND

- River Street Historic District
- Quinniac River Historic District
- Quinniac Avenue Historic District
- Public Open Space
- FEMA Zone AE



WHERE ARE WE NOW?

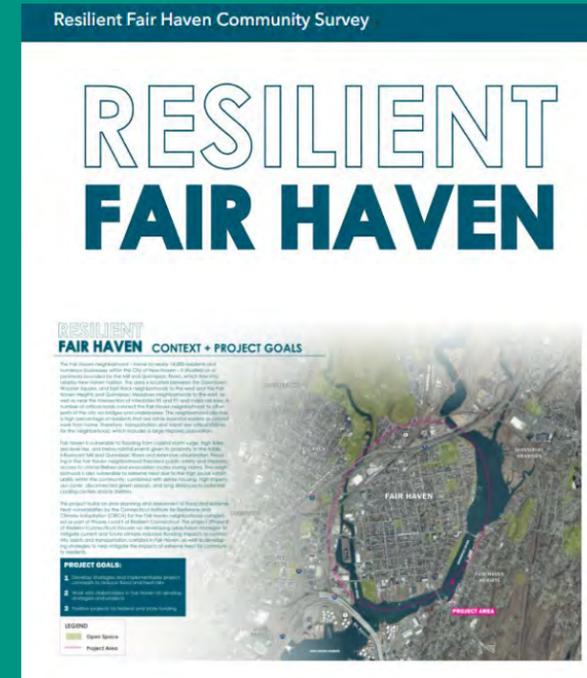
BILINGUAL ENGAGEMENT



FAIR HAVEN DAY – MAY 6



VIRTUAL COMMUNITY SURVEY



Survey QR Code

REFINEMENT OF FOCUS AREAS



RESILIENT CONNECTICUT

DEVELOPMENT OF ADAPTATION TOOLBOX + BEGINNING CONCEPT DESIGN

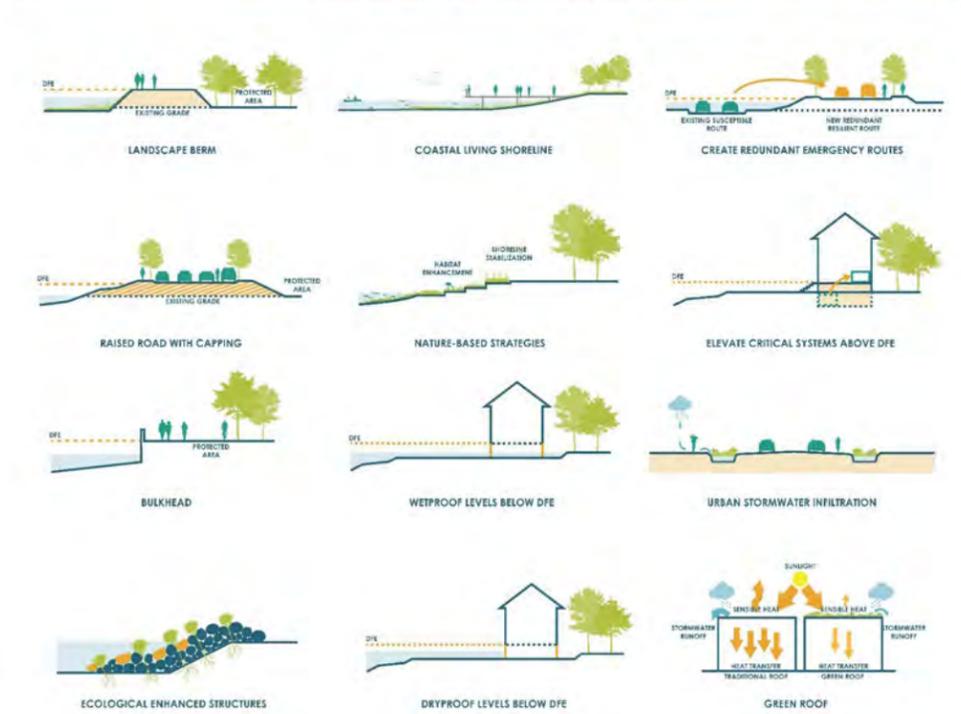
WHAT TYPES OF FLOODING DOES FAIR HAVEN EXPERIENCE?



HOW CAN WE ADAPT TO FUTURE FLOODING?



WHAT COULD ADAPTATION LOOK LIKE?



RESILIENT FAIR HAVEN – LESSONS LEARNED

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- Legacy site contamination, economic redevelopment objectives, and coastal flood risk pose unique challenges for adaptation solutions
- Involvement and buy-in from multiple municipal departments is critical
- Non-traditional community engagement approaches are more effective in socially vulnerable communities like Fair Haven

PROJECT CONTACTS

Sara Morrison, MLA, WEDG
smorrison@fando.com

Erik Mas, PE
emas@fando.com

WEBSITE

<https://resilientconnecticut.uconn.edu/resilient-fair-haven/>

RESILIENT DANBURY

PROJECT OVERVIEW

PROJECT EXTENT

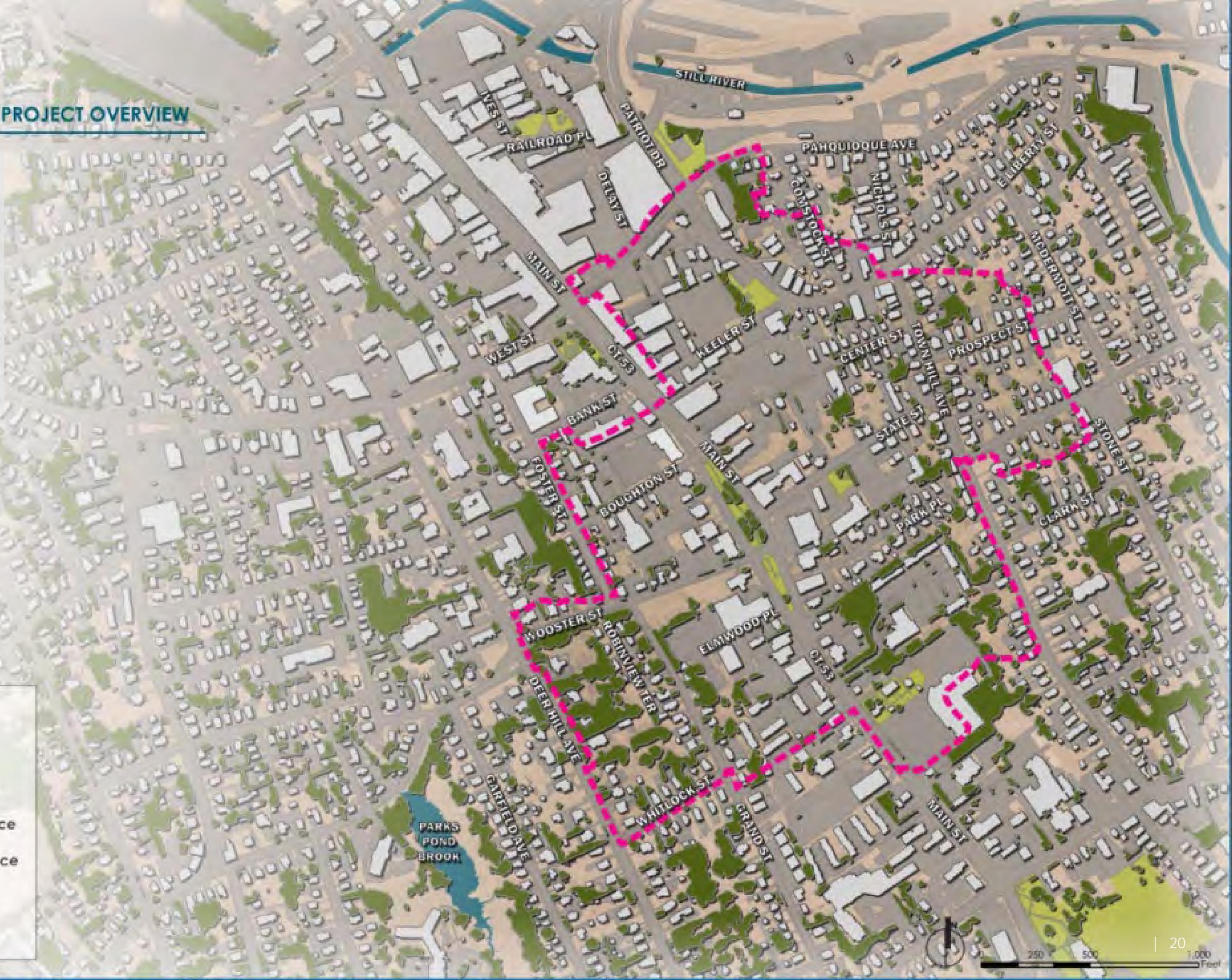
Deer Hill Ave. to Town Hill Ave.
Park Place to Pahquioque Ave.

1.25 square miles

Over 40 Community Buildings within project area

LEGEND

- Tree Cover
- Public Green Space
- Impervious Ground Surface
- Impervious Building Surface
- Pervious Surface
- Watershed Boundary

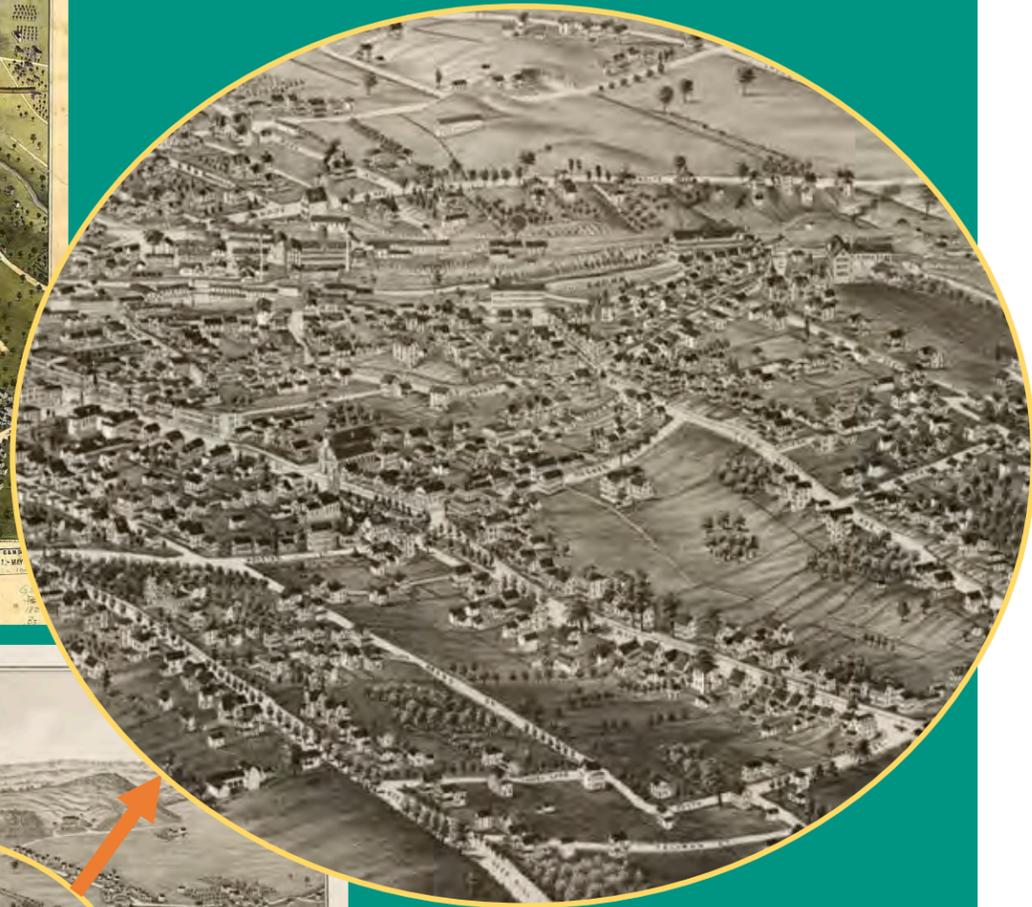
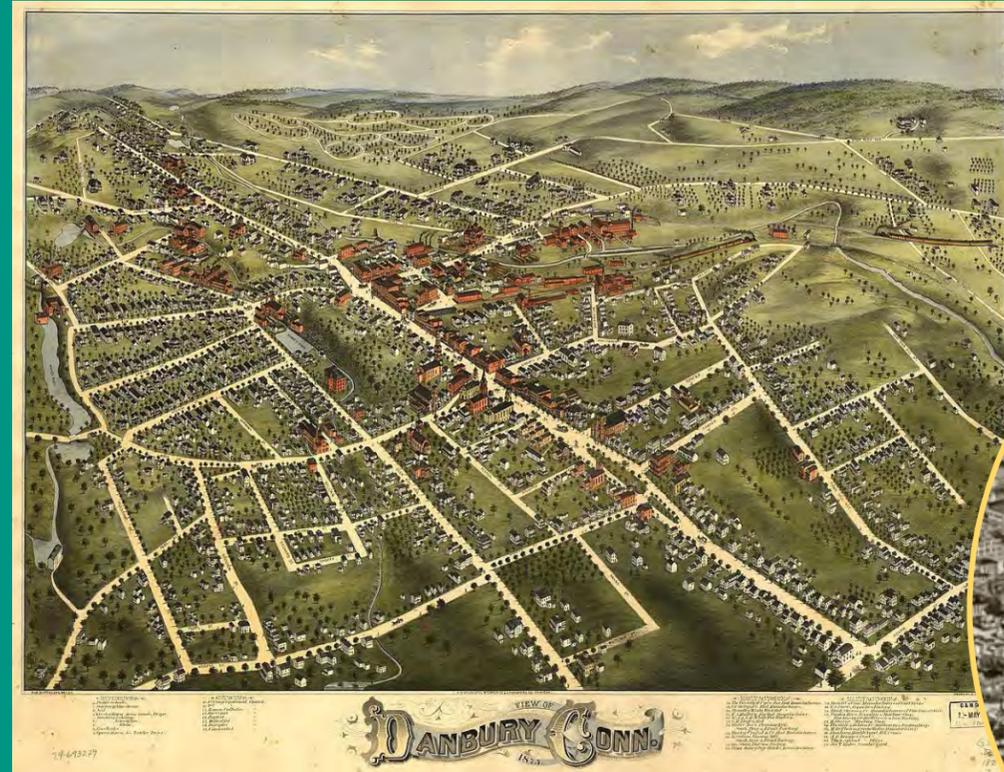


HISTORICAL CONTEXT + BACKGROUND

RESILIENT CONNECTICUT

Called Pahquioque by the Pahquioque Native Americans, meaning "cleared field."
Called "Swampfield" by first colonists.

East Ditch built in 19th century to convey waste and stormwater to the Still River



DOWNTOWN DANBURY CURRENT-DAY EAST DITCH FLOODING

RESILIENT CONNECTICUT



August 13th, 2001



September 16th, 2002



September 16th, 2002



June 2nd, 2022



June 2nd, 2022



June 2nd, 2022

CURRENT + FUTURE CONDITIONS

DEFINING THE RISKS

RESILIENT DANBURY

EXISTING DRAINAGE SYSTEM: FLOOD EXTENTS FOR CURRENT & FUTURE 1% (100-yr) ANNUAL CHANCE FLOOD EVENTS

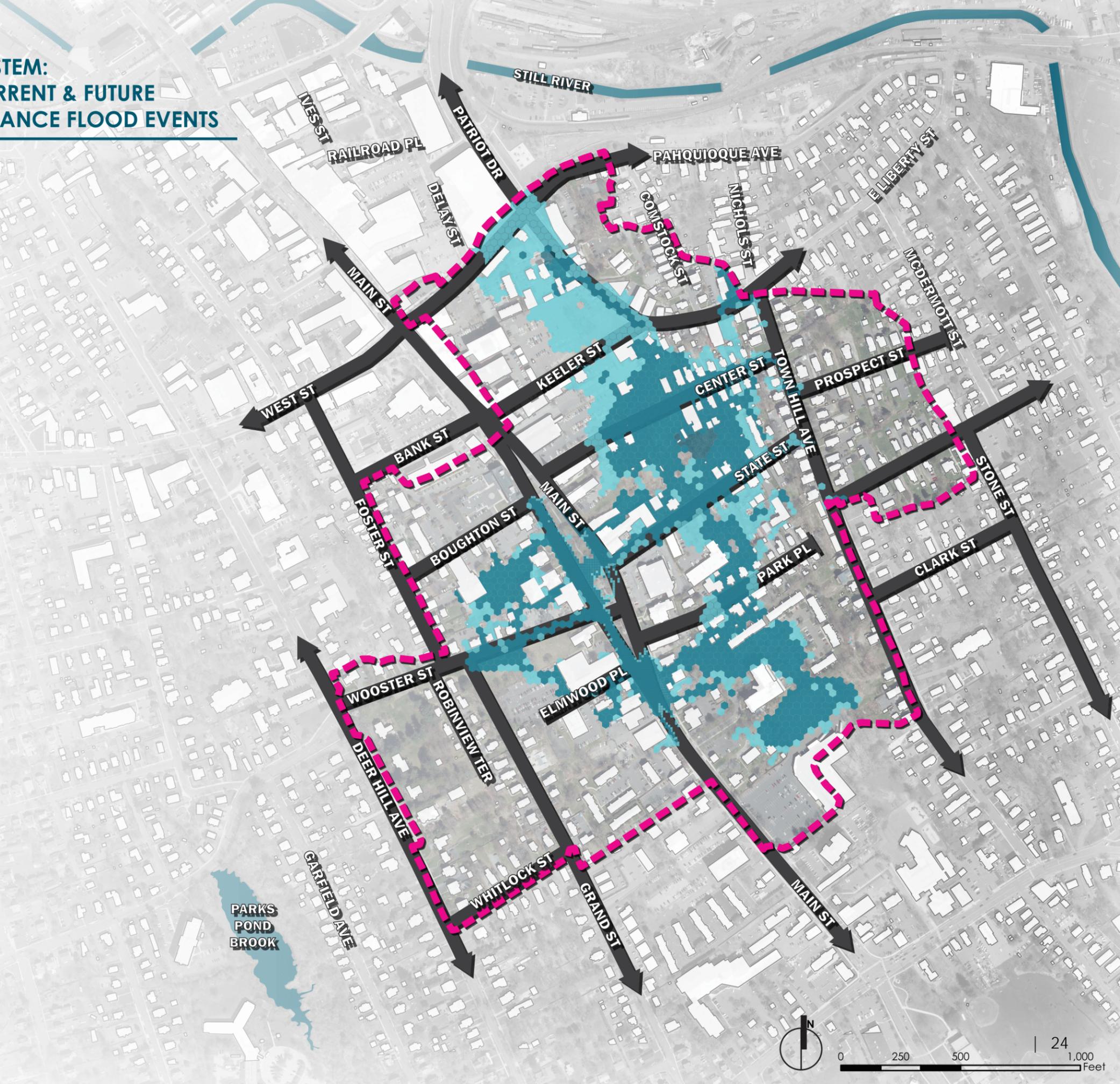
The maximum flooding extents for each recurrence interval were determined through PCSWMM modeling. The maximum flood extents for the 1% (100-year) annual chance of exceedance storm under current and future climate conditions are shown to the right.

The model results show major areas of surface flooding at the following locations:

- Center Street
- State Street
- Park Place
- The parking lot within the affordable housing complex just south of Park Place
- Southern Main Street
- Wooster Street near the Main Street Intersection
- Liberty Street Near the intersection with Pahquioque Avenue

LEGEND

-  Current 1% Annual Chance Flood
-  Future 1% Annual Chance Flood
-  Watershed Boundary
-  Roadways



PARKS
POND
BROOK

RESILIENT DANBURY

HEAT CONTRIBUTORS

EXISTING HEAT CONTRIBUTORS

- Limited of tree canopy and open space
- Impervious ground surface
- Impervious building surfaces
- Changing climate

LEGEND

-  Existing Cooling Centers
-  Proposed Cooling Centers
-  Tree Cover
-  Public Green Space
-  Impervious Ground Surface
-  Impervious Building Surface
-  Pervious Surface
-  Watershed Boundary



DANBURY WAR MEMORIAL



0 250 500 1,000 Feet

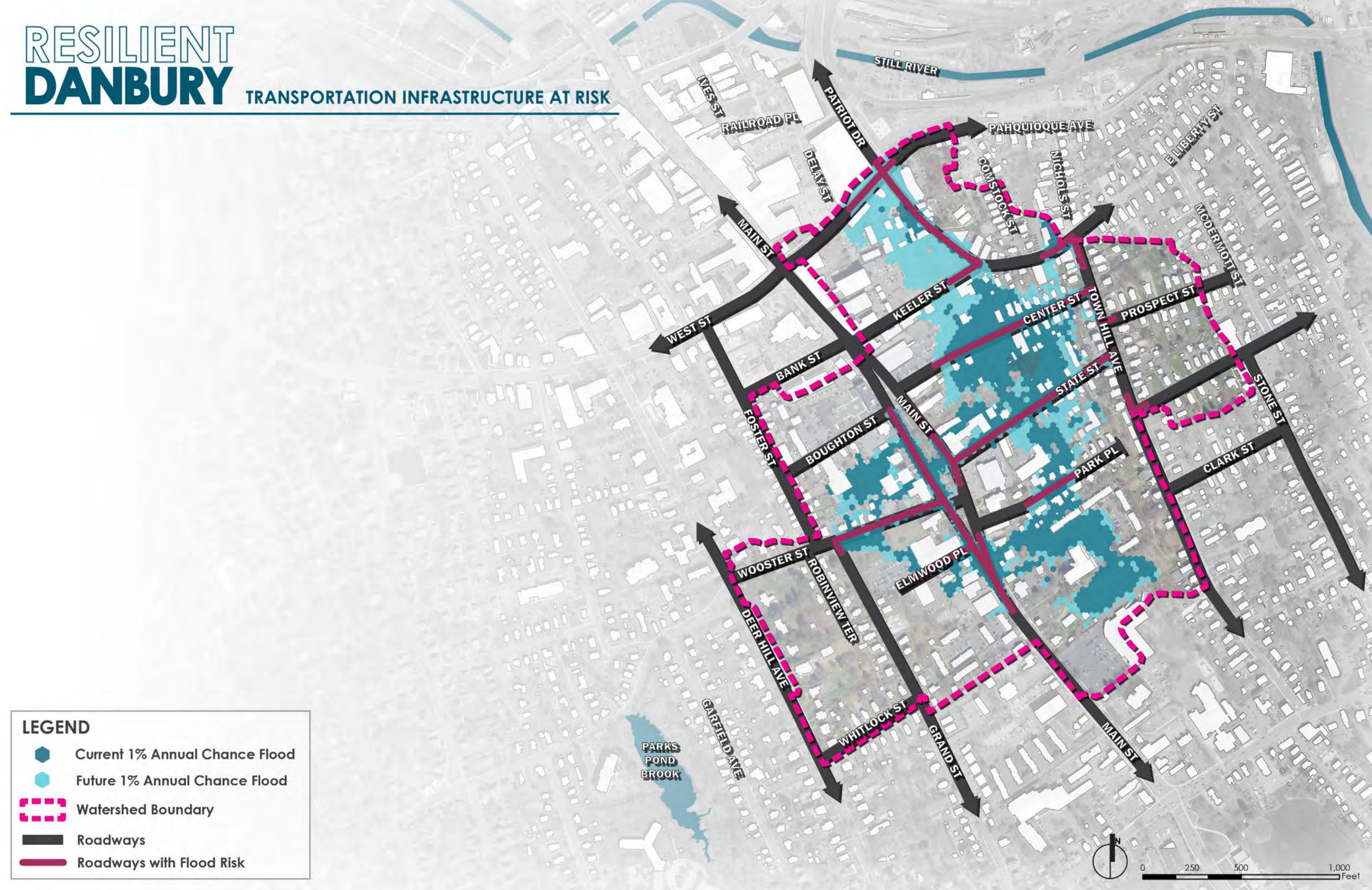
CURRENT + FUTURE CONDITIONS

RESILIENT CONNECTICUT

WHAT'S AT RISK?

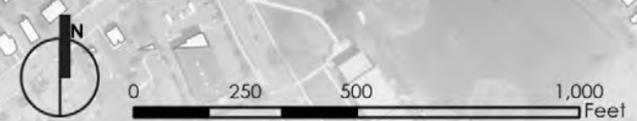
RESILIENT DANBURY

TRANSPORTATION INFRASTRUCTURE AT RISK



LEGEND

- Current 1% Annual Chance Flood
- Future 1% Annual Chance Flood
- Watershed Boundary
- Roadways
- Roadways with Flood Risk



RESILIENT DANBURY

COOLING CENTERS

EXISTING COOLING CENTERS

- New Street Shelter
- Danbury Public Library
- Danbury War Memorial

POTENTIAL COOLING CENTER

- Ice Rink

LEGEND

-  Existing Cooling Centers
-  Proposed Cooling Centers
-  Tree Cover
-  Public Green Space
-  Impervious Ground Surface
-  Impervious Building Surface
-  Pervious Surface
-  Watershed Boundary



DANBURY WAR MEMORIAL



RESILIENT DANBURY

CRITICAL COMMUNITY ASSETS

Downtown Danbury has several significant community amenities including public buildings such as City Hall and the Post Office, religious and community centers, as well as healthcare facilities and schools.

These critical community assets are detailed in the graphic to the right.

Library/ Post Office/City Hall

- 1 UNITED STATES POST OFFICE
- 2 PUBLIC LIBRARY
- 3 CITY HALL

Religious Center

- 1 UNIVERSAL CHURCH
- 2 ALL NATION BAPTIST CHURCH
- 3 ST. JAMES EPISCOPAL CHURCH
- 4 TEMPLE BETHEL
- 5 STRONG GOD CHURCH
- 6 EMANUEL ASSEMBLY-GOD CHURCH
- 7 GREATER MERCY TEMPLE CHURCH
- 8 SACRED HEART CHURCH
- 9 SEVENTH DAY ADVENTIST CHURCH

Community Center

- 1 LEBANON-AMERICAN CLUB
- 2 ECUADORIAN CIVIC CENTER
- 3 DANBURY COMMUNITY CENTER
- 4 OUR LADY OF APARECIDA PARISH - BRAZILIAN COMMUNITY CENTER

Affordable Housing

- 1 AFFORDABLE HOUSING
- 2 PROPOSED AFFORDABLE HOUSING

Healthcare Facility & Senior Center

- 1 COMMUNITY HEALTH CENTER OF DANBURY
- 2 PALACE VIEW SENIOR HOUSING
- 3 GREATER DANBURY COMMUNITY HEALTH CENTER
- 4 PHARMACY (WALGREENS)
- 5 PLANNED PARENTHOOD
- 6 GREATER DANBURY COMMUNITY HEALTH CENTER
- 7 ELMWOOD HALL SENIOR CENTER
- 8 DANBURY REGIONAL WIC NUTRITION PROGRAM / OLD JAIL

School/ Educational Centers

- 1 CENTER FOR EMPOWERMENT & EDUCATION
- 2 ST. PETER'S SCHOOL
- 3 SOUTH STREET SCHOOLS
- 4 SACRED HEART SCHOOL
- 5 HEAD START CENTER

Public Open Space

- 1 DANBURY CITY CENTER GREEN
- 2 DANBURY SKATE PARK
- 3 ELMWOOD PLACE

State of Connecticut

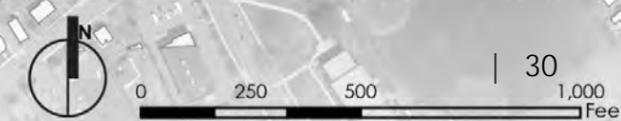
- 1 FAIRFIELD COUNTY COURTHOUSE
- 2 TRAIN STATION

Other

- 1 ICE RINK
- 2 MUSEUM AND HISTORICAL SOCIETY
- 3 GROCERY STORE (PRICE RITE)
- 4 CONNECTICUT LIGHT & POWER CO
- 5 BECKERIE & CO. FIRE ENGINE 9

LEGEND

-  Ex. Outfalls
-  Ex. Conduits
-  City of Danbury Parcels
-  Future Development Areas
-  Watershed Boundary
-  Roadways



DANBURY HEAT MAP

INSTRUCTIONS

1. Where do you go during extreme heat?

- Place a dot sticker for heat relief location
- **RED** for first,
- **BLUE** for second,
- **WHITE** for third most common

2. How do you get there?

- Draw your route on map
- **RED** for driving
- **BLUE** for taking public transit (e.g. bus, train)
- **GREEN** for walking

LEGEND

- ▲ Existing Cooling Centers
- ▲ Proposed Cooling Centers
- City of Danbury Parcels
- Watershed Boundary
- Roadways

Library/ Post Office/City Hall

- 1 UNITED STATES POST OFFICE
- 2 PUBLIC LIBRARY ▲
- 3 CITY HALL

Religious Center

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Community Center

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- 4 OUR LADY OF APARECIDA PARISH - BRAZILIAN COMMUNITY CENTER

Affordable Housing

- 1 AFFORDABLE HOUSING
- 2 PROPOSED AFFORDABLE HOUSING *Market*

Healthcare Facility & Senior Center

- 1 COMMUNITY HEALTH CENTER OF DANBURY
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- 3 SOUTH STREET SCHOOLS
- 4 SACRED HEART SCHOOL
- 5 HEAD START CENTER

Public Open Space

- 1 DANBURY CITY CENTER GREEN
- 2 DANBURY SKATE PARK
- 3 ELMWOOD PLACE

State of Connecticut

- 1 FAIRFIELD COUNTY COURTHOUSE
- 2 TRAIN STATION

Other

- 1 ICE RINK ▲
- 2 MUSEUM AND HISTORICAL SOCIETY
- 3 GROCERY STORE (PRICE RITE)
- 4 CONNECTICUT LIGHT & POWER CO
- 5 BECKERIE & CO, FIRE ENGINE 9



New Park

RESILIENT DANBURY WALKABILITY MAP

INSTRUCTIONS

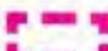
1. What are your most common walking routes?

- Draw walking routes on map and how often you walk it.
- **RED** for first,
- **BLUE** for second,
- **GREEN** for third most common route

2. Do you take the bus?

- Draw your bus route in **SILVER**
- Place a **YELLOW** dot sticker at your bus stop

LEGEND

-  City of Danbury Parcels
-  Watershed Boundary
-  Roadways

Library/ Post Office/City Hall

- ① UNITED STATES POST OFFICE
- ② PUBLIC LIBRARY
- ③ CITY HALL

Religious Center

- ① UNIVERSAL CHURCH
- ② ALL NATION BAPTIST CHURCH
- ③ ST. JAMES EPISCOPAL CHURCH
- ④ TEMPLE BETHEL
- ⑤ STRONG GOD CHURCH
- ⑥ EMANUEL ASSEMBLY-GOD CHURCH
- ⑦ GREATER MERCY TEMPLE CHURCH
- ⑧ SACRED HEART CHURCH
- ⑨ SEVENTH DAY ADVENTIST CHURCH

Community Center

- ① LEBANON-AMERICAN CLUB
- ② ECUADORIAN CIVIC CENTER
- ③ DANBURY COMMUNITY CENTER
- ④ OUR LADY OF APARECIDA PARISH - BRAZILIAN COMMUNITY CENTER

Affordable Housing

- ① AFFORDABLE HOUSING
- ② PROPOSED AFFORDABLE HOUSING

Healthcare Facility & Senior Center

- ① COMMUNITY HEALTH CENTER OF DANBURY
- ② PALACE VIEW SENIOR HOUSING
- ③ GREATER DANBURY COMMUNITY HEALTH CENTER
- ④ PHARMACY (WALGREENS)
- ⑤ PLANNED PARENTHOOD
- ⑥ GREATER DANBURY COMMUNITY HEALTH CENTER
- ⑦ ELMWOOD HALL SENIOR CENTER
- ⑧ DANBURY REGIONAL WIC NUTRITION PROGRAM / OLD JAIL

School/ Educational Centers

- ① CENTER FOR EMPOWERMENT & EDUCATION
- ② ST. PETER'S SCHOOL
- ③ SOUTH STREET SCHOOLS
- ④ SACRED HEART SCHOOL
- ⑤ HEAD START CENTER

Public Open Space

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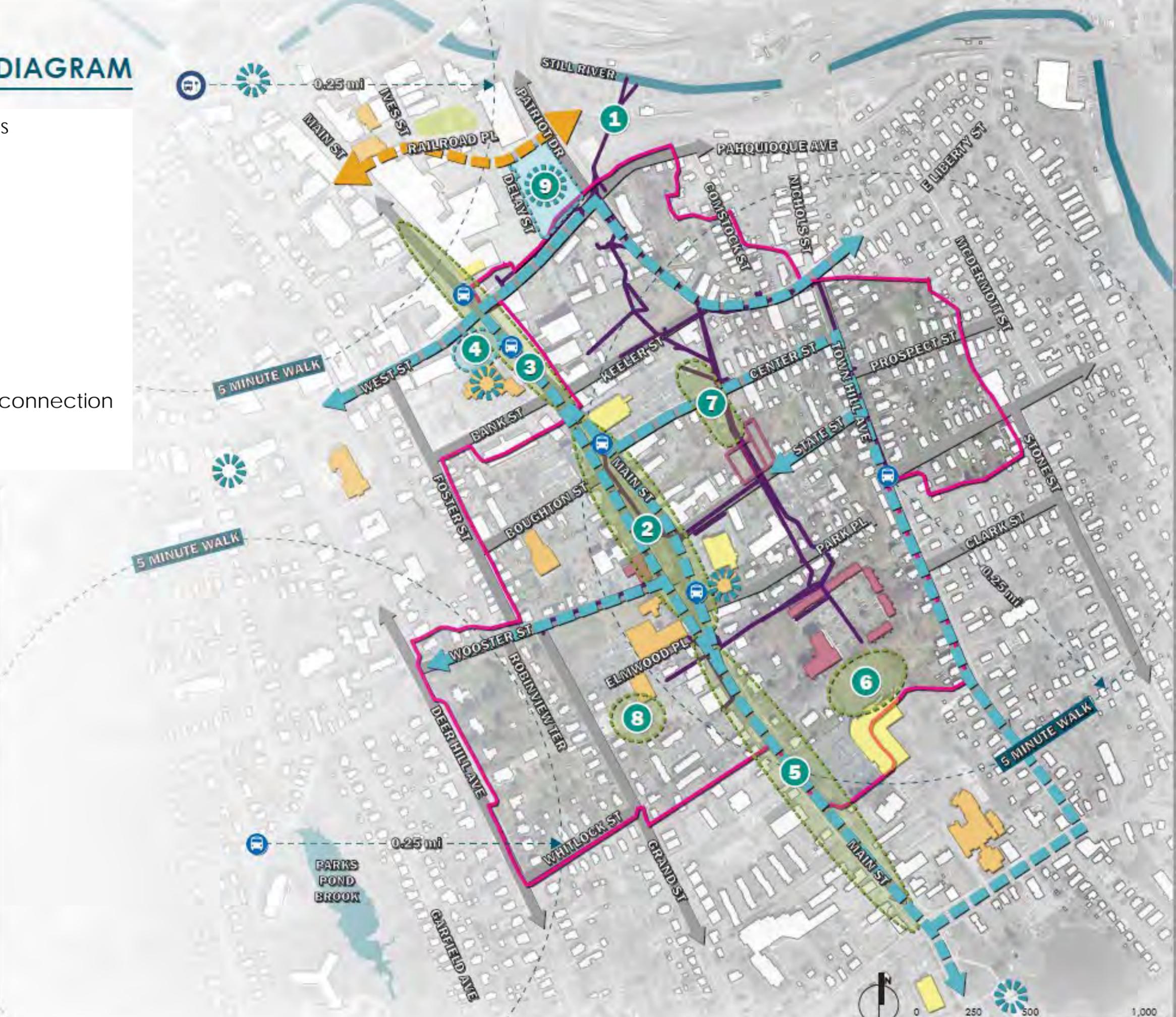


RESILIENT DANBURY CONCEPT DIAGRAM

- 1 Stormwater System Improvements
- 2 Increase Infiltration
- 3 Green Streets - Commercial
- 4 Retrofit Parking Lots
- 5 Green Streets - Urban
- 6 Raingarden
- 7 Green Infrastructure
- 8 Street shade and neighborhood connection
- 9 Ice Rink Cooling Center

LEGEND

- Proposed Market Rate Housing
- Affordable Housing
- Community Assets
- Important Retail Locations
- Green Infrastructure Improvements
- Cooling Infrastructure Improvements
- Heat Relief Locations
- Bus Stop
- Bus Transfer Station
- Drainage System Improvements
- Improved Pedestrian Connection
- Cooling Corridors
- Roadways
- Watershed Boundary



RESILIENT DANBURY – LESSONS LEARNED

- Local Stormwater Management Guidelines provide an opportunity to creatively / more aggressively manage stormwater management in flood prone, heavily developed areas.
- Start early to target the right community. Consider non-traditional approaches.
- Sometimes the solution means flooding cannot be eliminated, and other approaches are necessary.

PROJECT CONTACTS

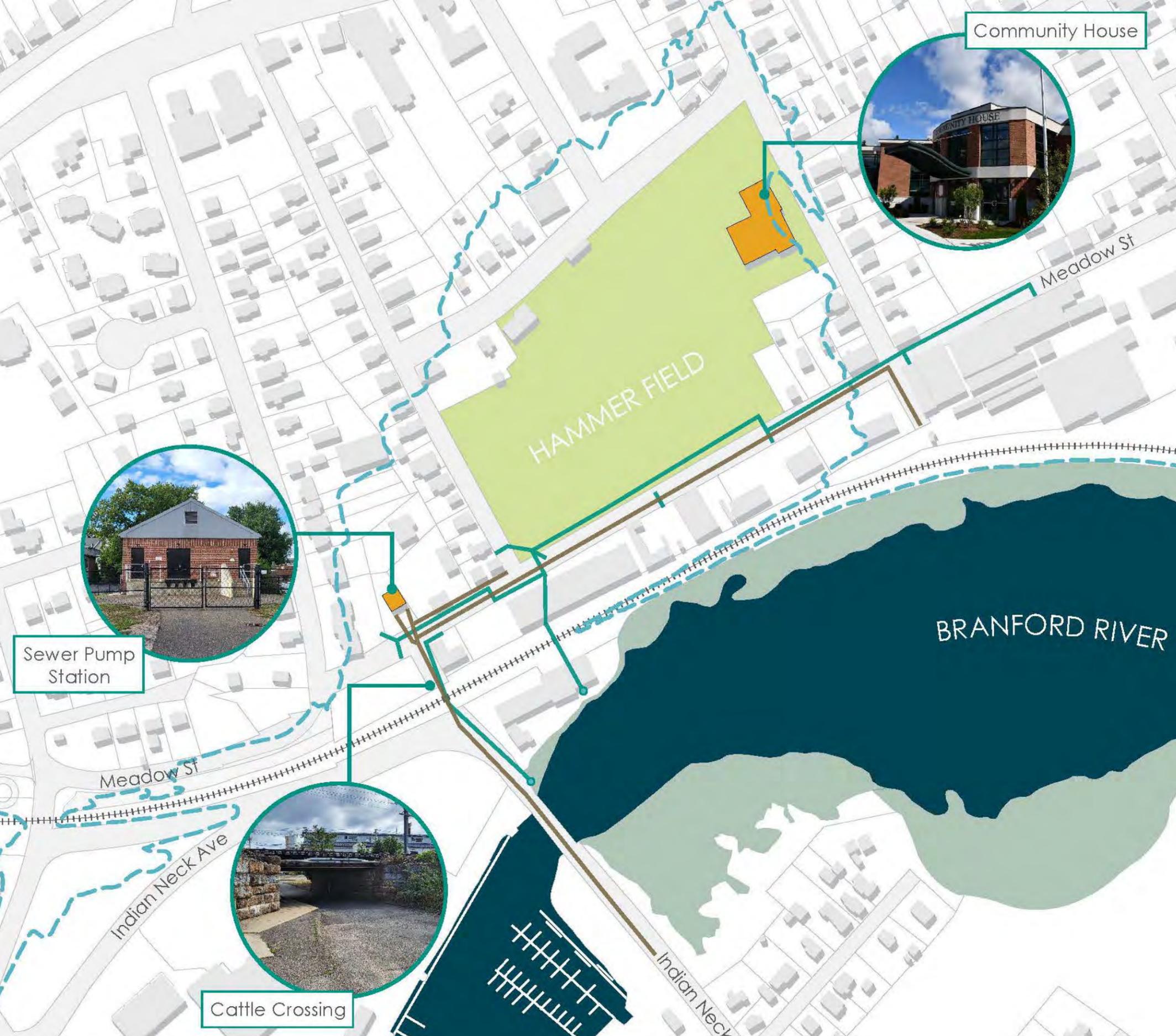
Elsa Loehmann, PE, WEDG
eloehmann@fando.com

Erik Mas, PE
emas@fando.com

WEBSITE

<https://resilientconnecticut.uconn.edu/resilient-danbury/>

RESILIENT MEADOW STREET



PROJECT GOAL

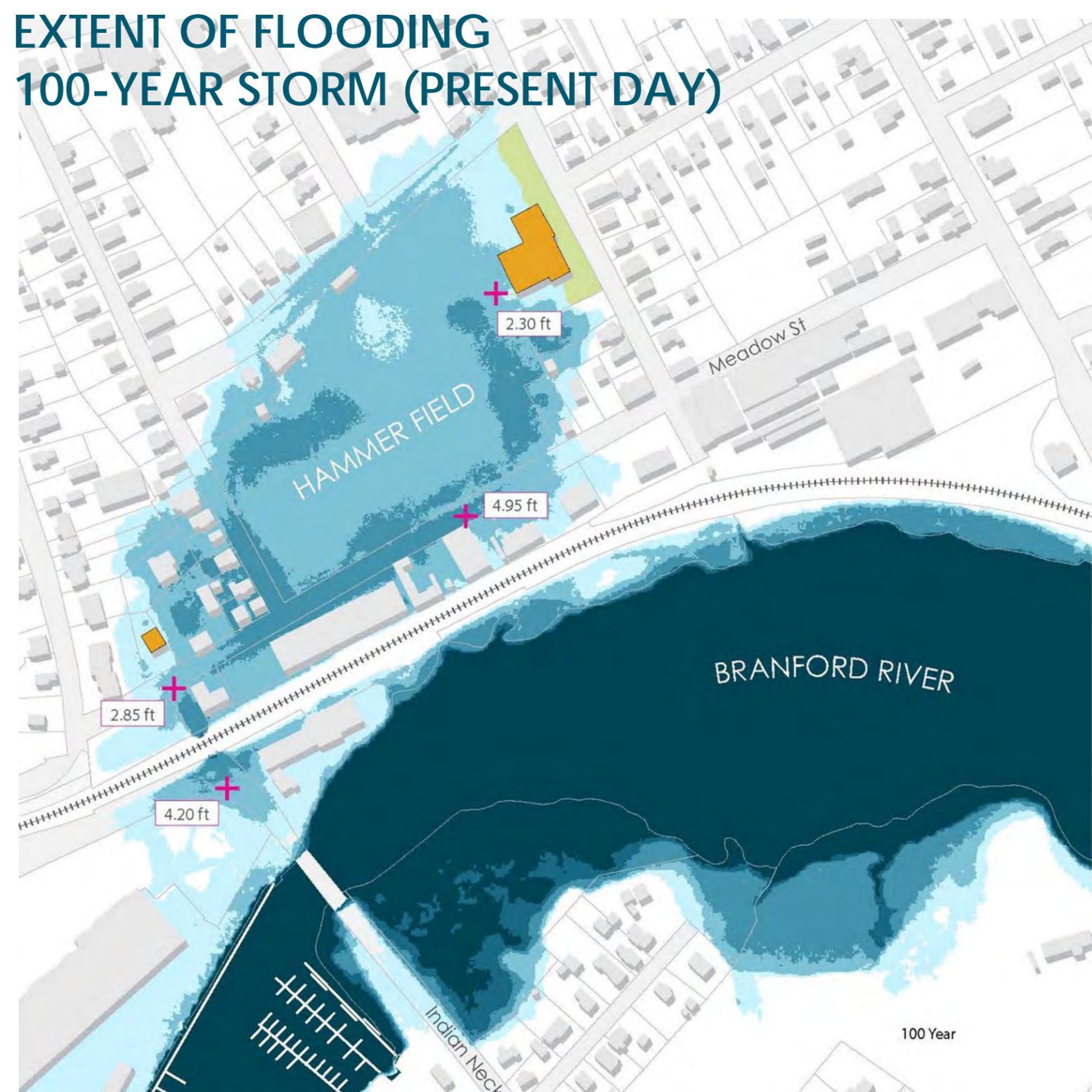
Reduce flood risk in Meadow Street neighborhood, north of Amtrak embankment

BRANFORD/RESILIENT MEADOW STREET – THE CATTLE CROSSING

RESILIENT CONNECTICUT



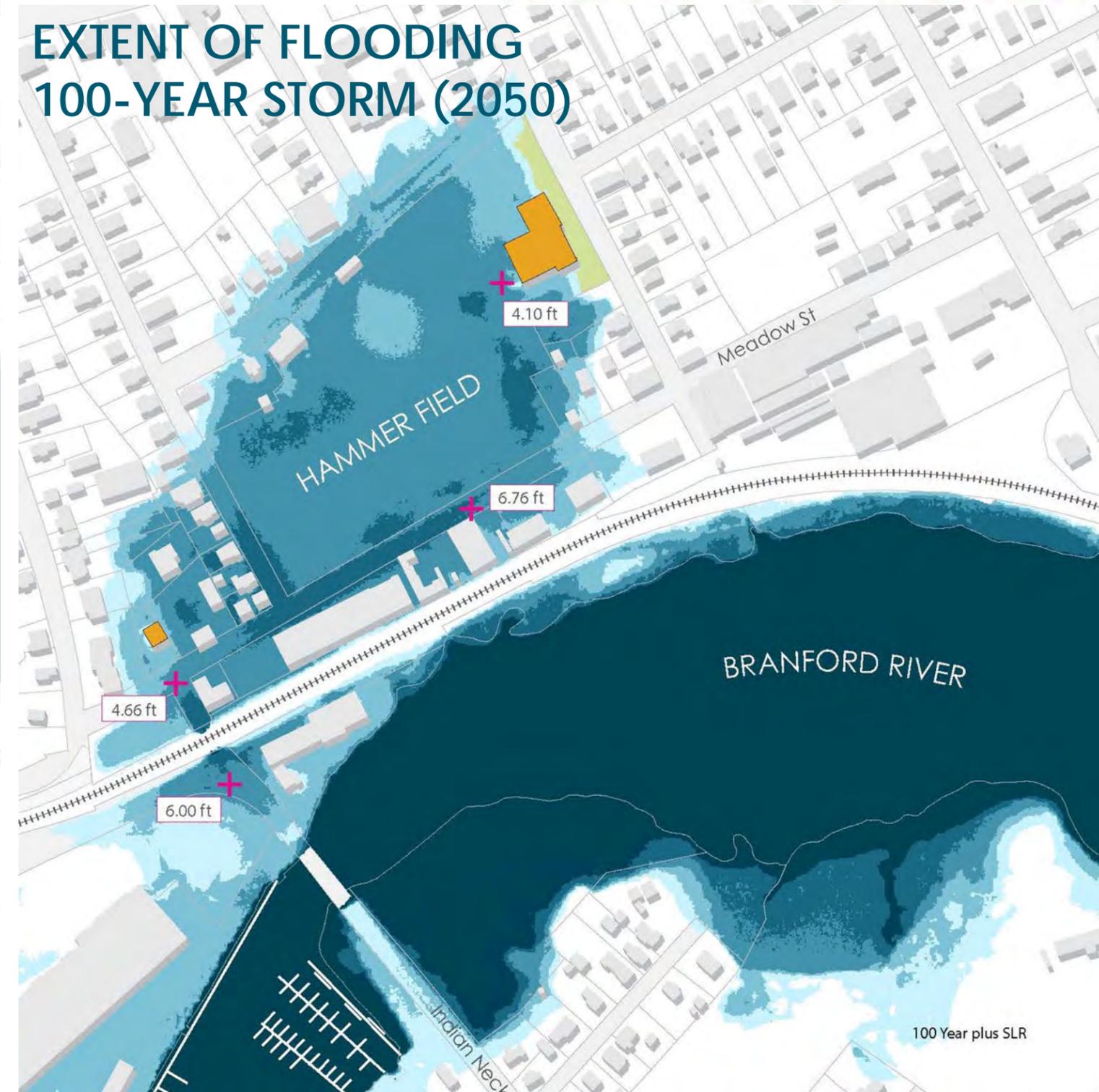
EXTENT OF FLOODING 100-YEAR STORM (PRESENT DAY)



100-YEAR RETURN STORM FLOOD MAPPING

RESILIENT MEADOW STREET

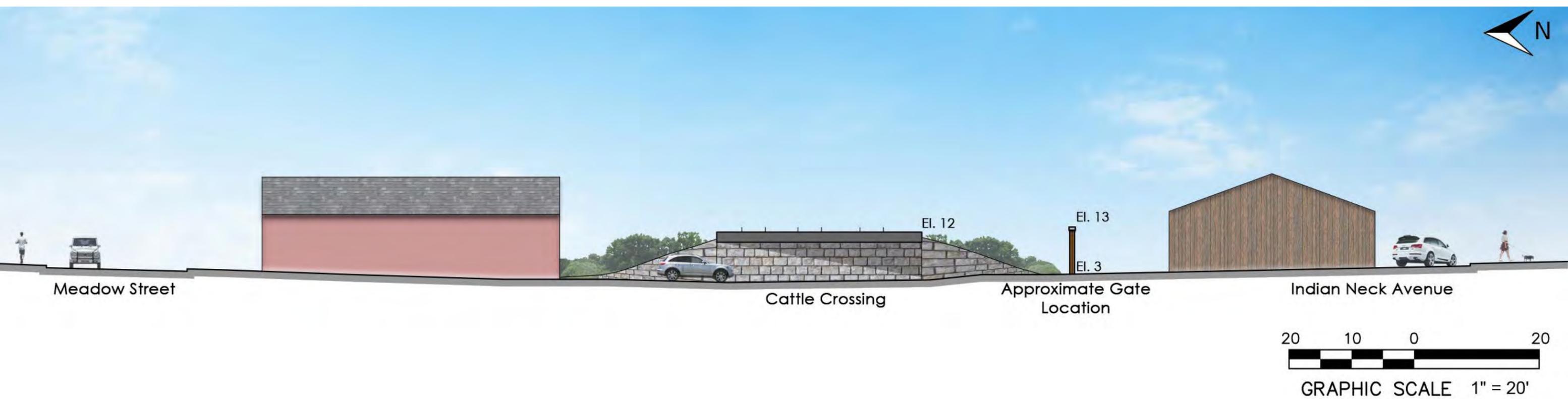
EXTENT OF FLOODING 100-YEAR STORM (2050)



OPTIONS CONSIDERED

RESILIENT MEADOW STREET

OPTIONS	ADVANTAGES	DISADVANTAGES
Flood Gate	Relatively low cost	Likely not eligible for FEMA funding Requires human operation to be deployed (applies to both)
Flood Gate with Flood Wall	Eligible for FEMA funding Approvable by FEMA to remove upland structures from regulated floodplain (LOMA)	Multi-million dollar project Major visual impact Conflicts with existing building and Amtrak embankment, requires Amtrak approval



FLOOD GATE & FLOODWALL

RESILIENT CONNECTICUT



RESILIENT MEADOW STREET CRITERIA TABLE

1. Based on long term cost effectiveness (benefits of the project divided by the cost of the project)
2. Amount of coordination with stakeholders required to build the project (i.e., Amtrak, utilities, private property owners, etc.). Including procuring easements for operation and maintenance
3. Access impacts include car and pedestrian travel access through the Cattle Crossing as well as access to existing utilities (i.e., sewer and drainage)
4. Confidence that mitigation action will act as designed. For example, it is unknown how well the Amtrak embankment will continue to act as a flood control measure. The Amtrak embankment could fail under certain storm conditions. This criteria also considers the ability to apply for a FEMA Letter of Map Revision (LOMR)
5. How quickly project will be constructed
6. Each of the matrix criteria are weighted based on their priority to the Town of Branford and feedback from project stakeholders

WEIGHTED COMPARATIVE ANALYSIS MATRIX						
ALTERNATIVE	MATRIX CRITERIA					OVERALL SCORE
	Capital Cost ¹	Impact to Amtrak/Private Property ²	Access Impacts ³	Effective Flood Control ⁴	Implementation Time Frame ⁵	
Criteria Weighting ⁶	3	1	2	3	2	
1. Flood Gate with Floodwall	2	1	3	3	1	2.2
2. Flood Gate	3	2	3	2	2	2.5
3. Closing the Cattle Crossing	3	2	1	2	2	2.1
4. Do Nothing	1	3	3	1	3	1.9

NOTE: ALL CRITERIAL WEIGHTING, RATINGS, AND SCORES ARE BASED ON A SCALE OF 1-3

BRANFORD/RESILIENT MEADOW STREET – LESSONS LEARNED

- FEMA funding doesn't necessarily result in less costs for the Town, flood gate will be less than the match required for a flood wall.
- FEMA mapping does not include future sea level rise, flood risk will worsen. (today's 100-year storm will be a 10-year storm in 2050)
- Previously eliminated alternative came back around for discussion in public meeting. Document past decisions and why previous alternatives were eliminated.

PROJECT CONTACTS

Celicia Boyden, MS, EIT
cboyden@fando.com

Dean Audet, PE
daudet@fando.com

WEBSITE

<https://resilientconnecticut.uconn.edu/branford-resilient-meadow-street/>

RESILIENT CONNECTICUT INNOVATIVE DESIGN WORKSHOP

QUESTIONS?