



# Resilient South Norwalk

## CURRENT & FUTURE CONDITIONS ANALYSIS

TECHNICAL MEMORANDUM



## PROJECT TEAM

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FHI

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*Chair- Sustainability & Resilience Committee*

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# BACKGROUND & CONTEXT



Water Street , Hurricane Ida, 2021  
*Photo Credit, NBC Connecticut*

### South Norwalk

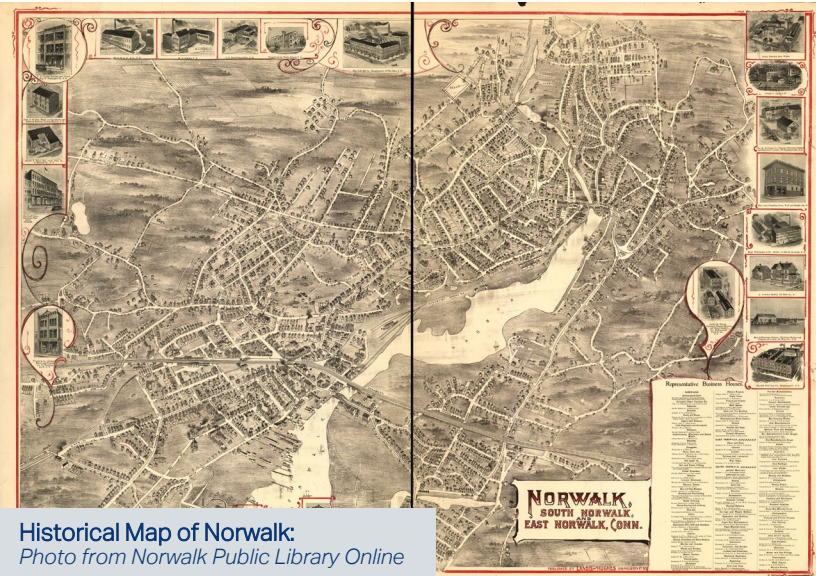
South Norwalk is a neighborhood within the City of Norwalk, located South of Route 95 and adjacent to the Norwalk Harbor at the mouth of Norwalk River and Long Island Sound. Norwalk has a long history of settlement and connection to the Norwalk River beginning in 1640. South Norwalk was originally settled as 'Old Well', was chartered in 1870, and then merged with Norwalk and incorporated in 1913 as a taxing district within the larger city.

With an industrial history "manufacturing firearms, buttons, shoes, cloth and hats", South Norwalk felt the effect of the decline of manufacturing in the 1950's and has been working to bring economic recovery since that time.

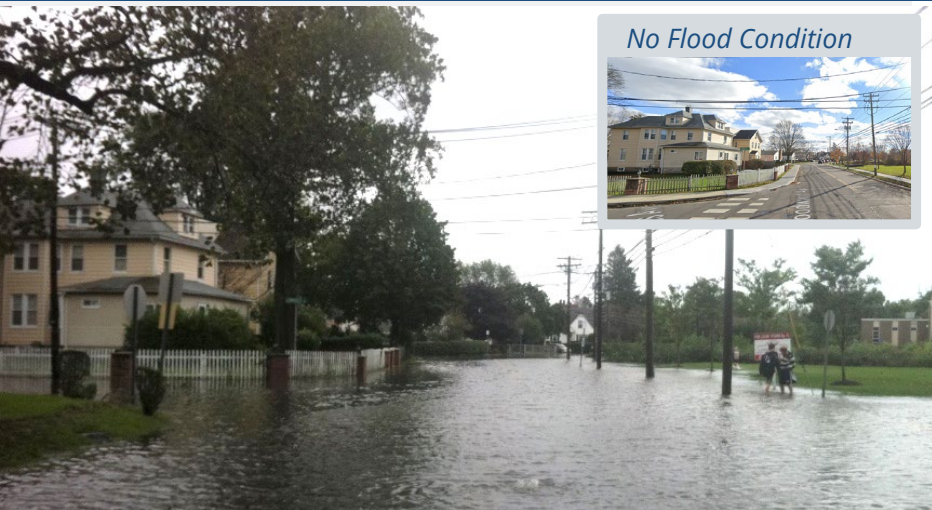
Building on the convenient location of the historic South Norwalk train station, the area has expanded their housing and apartment supply within the Transit Oriented Development (TOD) district, attracting new residents and vitality into this part of Norwalk. As the city strives to grow, Norwalk was rated #29 in 2023 for 'Best Places to Live for Families" in the nation by Fortune Magazine. Together with many other development and planning efforts, South Norwalk is preparing for a vibrant future for the community.



South Norwalk Train Station:  
Photo taken by AECOM



Historical Map of Norwalk:  
Photo from Norwalk Public Library Online



**FIGURE 1: Woodward Ave & Lowndes Ave, Looking South:**  
*Hurricane Irene, 2011 Photo from local resident*

### South Norwalk Today

South Norwalk contains a blend of residential housing and industrial uses, with dense development, areas of unshaded, impervious surfaces and areas of flooding from the harbor and Sound.

With the study area's close-proximity to the Norwalk Harbor waterfront, several key roadways in the project area, such as Water Street and Woodward Avenue currently experience chronic flooding throughout the year and have been heavily inundated with water during significant storms in the past decade. Figure 1 & 2 show evidence of flooding along roadways during Hurricane Irene in 2011 and Hurricane Ida in 2021.

With climate change projected to increase the temperatures within urban environments and intensify the severity of flooding events, this study aims to assess the vulnerability of South Norwalk to future climate events and target resilient solutions that could promote climate relief in this community.



**FIGURE 2: Burritt Ave & Day St, Looking South:**  
*Hurricane Ida, 2021 Photo from Connecticut Post*



**O'Neill's Mural : "Thank You for Visiting Historic South Norwalk":**  
*Photo taken by AECOM*

### Role of CIRCA + Initial Project Phases

CIRCA is a multi-disciplinary research center based on collaboration between the University of Connecticut (UConn), and the State of Connecticut Department of Energy and Environmental Protection (CT DEEP) to address climate action and research within the state. Other partners involved in research and findings include the National Oceanic and Atmospheric Administration (NOAA), the Governor’s Council on Climate Change (GC3), the Center for Land Use Education and Research (CLEAR), and the CT Department of Housing, among others.

CIRCA’s key project is **Resilient Connecticut**, which is a multi-phase collaborative effort between CIRCA, state agencies, regional councils of governments (COGs), municipalities, and the public to better understand coastal flooding risk in Fairfield and New Haven Counties. Specifically, Resilient Connecticut seeks to promote coordination with different levels of government and develop implementable plans and projects to communities most in need. CIRCAS expanded list of goals are outlined in the “PERSISTS” acronym.

### Resilient Connecticut Phases

#### Phase I

- Created an inventory and assessment of past and present resilience and adaptation efforts.

#### Phase II

- Assessed regional risk and vulnerability for 51 municipalities in two pilot areas of New Haven and Fairfield Counties.

#### Phase III (CURRENT PHASE)

- Phase III selected from the identified ROARs to solicit planning level studies to further evaluate and develop strategies to address identified vulnerabilities in 7 communities.



### Resilient Connecticut Phase II

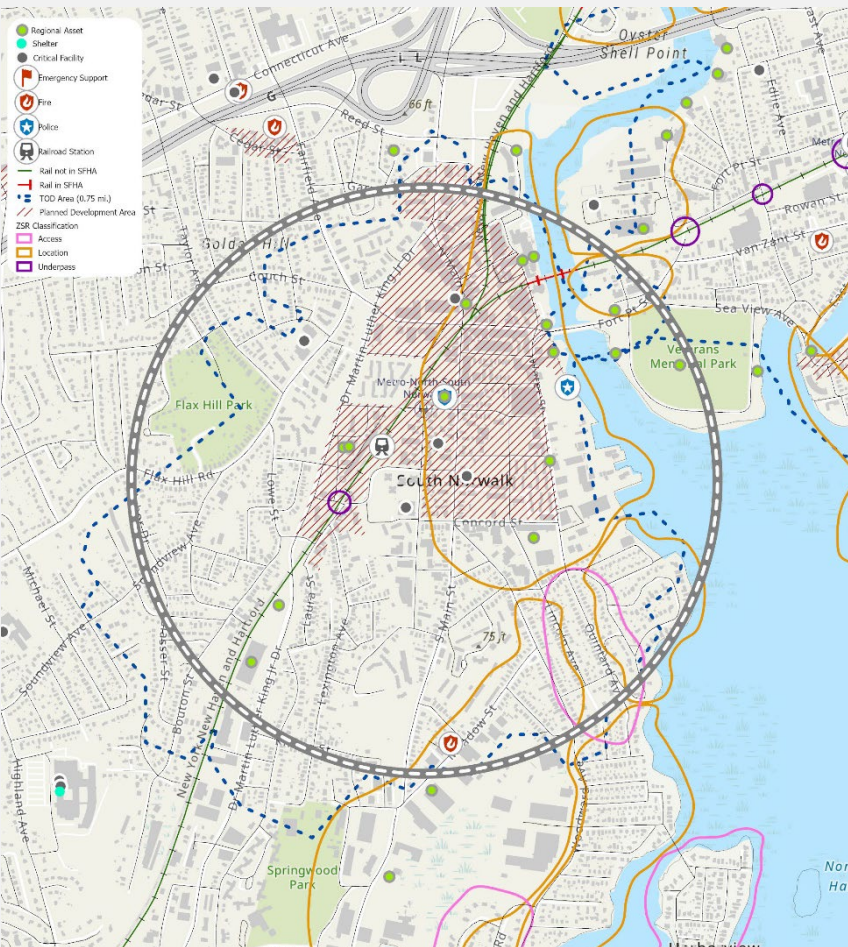
#### Regional Adaptation/Resilience Opportunity Areas

Name: South Norwalk  
Location: Norwalk

Considerations	Characteristics of Area
Flood Vulnerability	●●●●○
Heat Vulnerability	●●●●○
Social Vulnerability	●●●●○



With a focus on heat, flood, and social vulnerabilities, the goal for this study in South Norwalk is to develop implementable projects and actions through stakeholder and community input, which will establish resilient corridors that lessen impacts of climate change within the study area in South Norwalk.



### The Inclusion of South Norwalk in Resilient Connecticut

The partnership between CIRCA and its pilot project communities was designed to address an array of climate-related vulnerabilities, provide the communities with actionable plans, and establish a roadmap for other Connecticut communities facing similar natural hazards.

The City of Norwalk, Connecticut, located within Fairfield County, is one of seven selected Resilience Opportunity Areas (ROARs) prioritized during the Phase II Resilient Connecticut program. The South Norwalk study area, as summarized within the CIRCA Phase II report:

- Is adjacent to the shorelines of Norwalk Harbor and Long Island Sound, subject to the effects of higher tides and storm-related flooding
- Includes Environmental Justice (E) communities
- Is in proximity to the Norwalk Train Station and planned TOD developments
- The study limits were centered along the roadway corridors of Day Street and Water Street to the north and Meadow Street and Woodward Avenue to the south, including the neighborhoods of Harbor Shores and Village Creek further south.

- Has large sectors of impervious pavement and reduced tree canopy

# PROJECT UNDERSTANDING





## South Norwalk Study Area

The South Norwalk study area contains a blend of residential, commercial, marine and industrial uses. A large portion of the study area is concentrated with impervious surfaces and heavy commercial activity along the marina limits water access for residents.

Soundview Landing, located between Water Street and Day Street, recently completed the construction of several new multi-family residences. The restoration of Ryan Park and elevation of the intersection at Raymond St and Day Street were included in the efforts of this development and have set an exciting precedent for future roadway improvements in this area.

The southern study area includes a mix of single-family residential properties and industrial warehouse facilities. Harbor Shores and Village Creek neighborhoods are located along the waterfront to the East and South of Woodward Avenue, with large factories situated to the West of Woodward Avenue along the Village Creek saltmarsh. Woodward Park, adjacent to the Village Creek saltmarsh, is the only public green space in this area and includes an existing sanitary sewer pump station.

In addition, several single-family properties are located on Lawrence Street and within the northern segment of Meadow Street. To the south of this residential neighborhood, Meadow Street transitions to heavy industrial land use, which intersects the West side of the Village Creek saltmarsh. The South Norwalk fire station is located within this area, as well as the future location of a proposed elementary school for the local South Norwalk neighborhood



### Visual Existing Conditions

- 1 Overlook of Norwalk Harbor inlet from Longshore Drive
- 2 Wide distance between homes and warehouses along Woodward Ave
- 3 Overlook of Village Creek Marshland from Meadow St. Industrial Buildings
- 4 Busy Neighborhood Intersection at Burritt Ave & Water Street
- 5 New Housing Developments on Water and Day Streets
- 6 Water's edge at Norwalk Harbor along Water St.

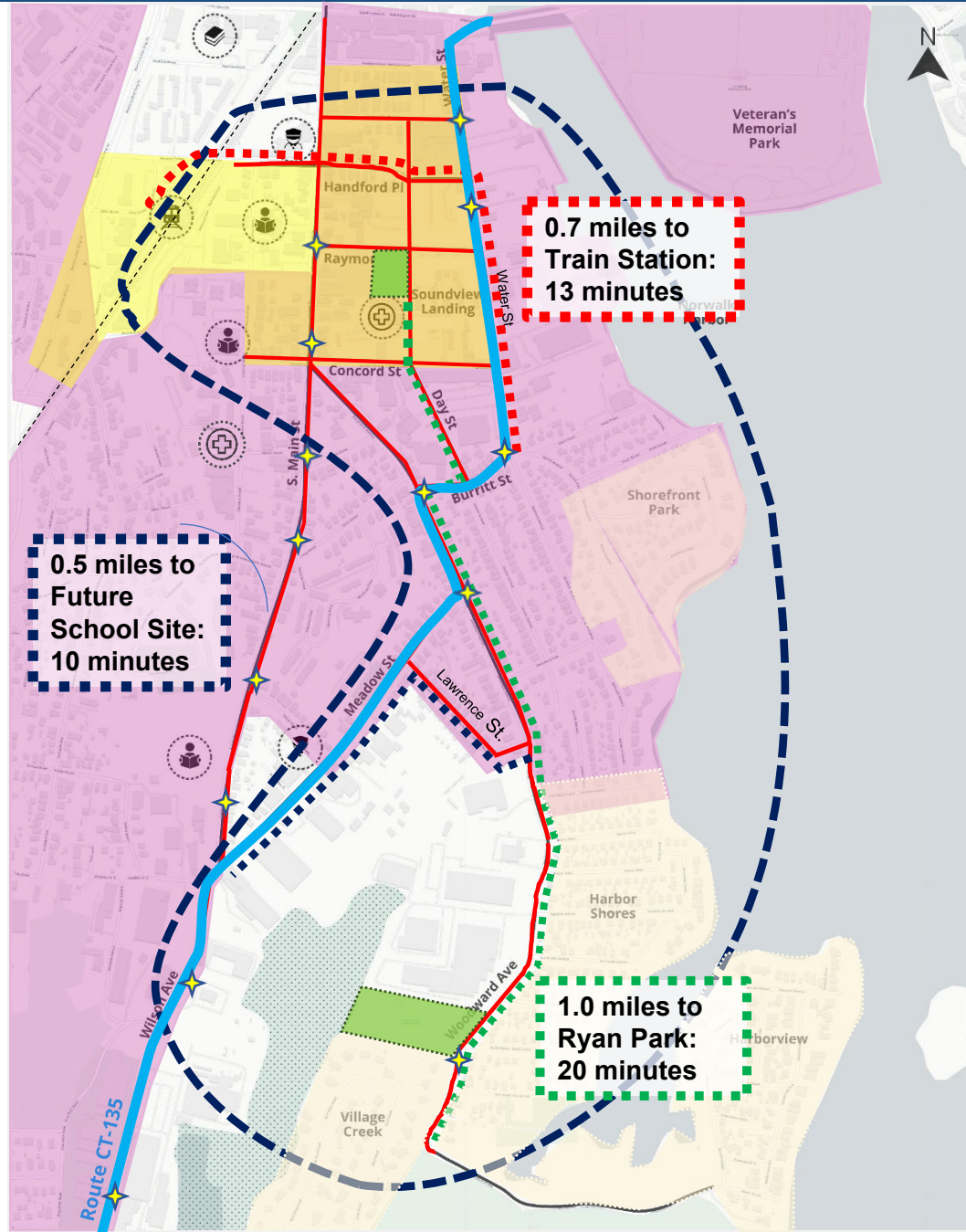


### Community Connectivity

Throughout the project limits, the roadway corridors, bus routes, sidewalks, and the train station provide a series of connection links for the community. The project area is only about 1.5 miles from north to south and Route 136 bisects through the center.

The majority of the existing emergency centers are located within the northern portion of the project area and there are only two public parks within the area, Ryan Park at the north and Village Creek park to the south.

<b>Map Key</b>		<b>Emergency Centers</b>	
	Project Area		Transit: South Norwalk Train Station
	Study Corridors		Public Safety: South Norwalk Police Station & Norwalk Fire Department
	Route CT 136		Health Centers: Community Center of Norwalk & Norwalk Community Health Center
	Example		Schools: Side-by-Side Charter School, Columbus Magnet School, and (Future Meadow St) School Development
	Pedestrian Route		Library: South Norwalk Public Library
	'So No' Station Design District		
	Neighborhood Assoc.		
	Public Open Space		
	Environmental Justice Community (CT DEEP EJ Home)		
	Bus Stops		



## Community Connectivity: Pedestrians

### SOUTH NORWALK



#### Become a NorWALKer!

#### EXPLORE HISTORIC SOUTH NORWALK

This neighborhood has it all: waterfront views, shopping, dining, transit, and more!

##### Loop 1

Turn left out of the SoNo Square parking lot onto Water St. At the stop sign, turn right onto Burritt Ave. Right onto Woodward Ave. Follow Woodward to the stop light. Turn right on South Main St. and head past the Norwalk Police Department. Turn right onto Washington St. Right onto Water St. and return to the parking lot.

##### Loop 2

Turn left out of the SoNo Square parking lot onto Water St. Right on Hanford Pl. Hanford Pl. becomes Monroe St. Follow to the end, and turn right onto Doctor Martin Luther King Jr Dr. Turn right on Washington St. Walk under the railroad overpass and continue on Washington St. Right on Water St. and return to the parking lot.

##### Loop 3

Turn left out of the SoNo Square parking lot onto Water St. Right on Hanford Pl. Hanford Pl. becomes Monroe St. Follow to the end, and turn right onto Doctor Martin Luther King Jr Dr. Continue walking past the Webster parking lot and movie theater. Turn right on North Main St. Left on Ann St. and follow the sidewalk to the stop sign by the Maritime Aquarium's parking garage. Turn right on North Water St. and pass by the Aquarium and IMAX theater. Continue straight to Water St. and return to the parking lot.

##### Loop 4

Turn left out of the SoNo Square parking lot onto Water St. At the stop sign, turn right onto Burritt Ave. Right onto Woodward Ave. Follow Woodward to the stop light. Turn right on South Main St. Left on Monroe St. Right on Doctor Martin Luther King Jr Dr. Right on North Main St. Left on Washington St. Right on Water St. and return to the parking lot.

### SOUTH NORWALK

### SOUTH NORWALK



#### PROCEED WITH CAUTION WHEN FOLLOWING NORWALKER ROUTES!

The Healthy for Life Project is not responsible for any injuries or accidents that may occur while following NorWALKer routes. Consult your doctor before beginning an exercise program. Use pedestrian crosswalks when available, obey all traffic laws, and if no sidewalks exist, walk against traffic. Wear proper footwear and reflective gear, and bring water with you while walking. Have fun!

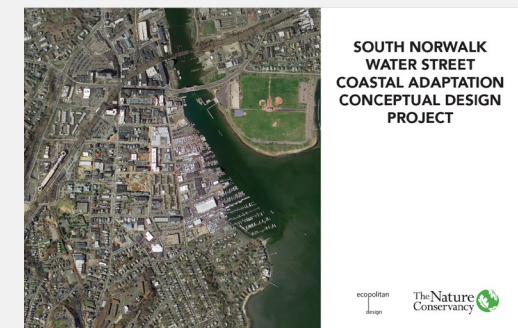
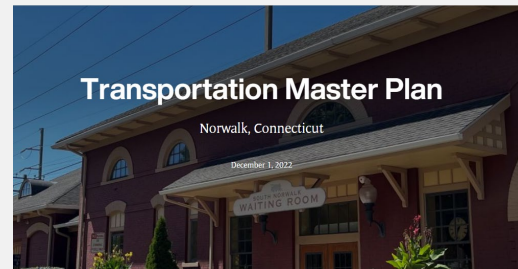
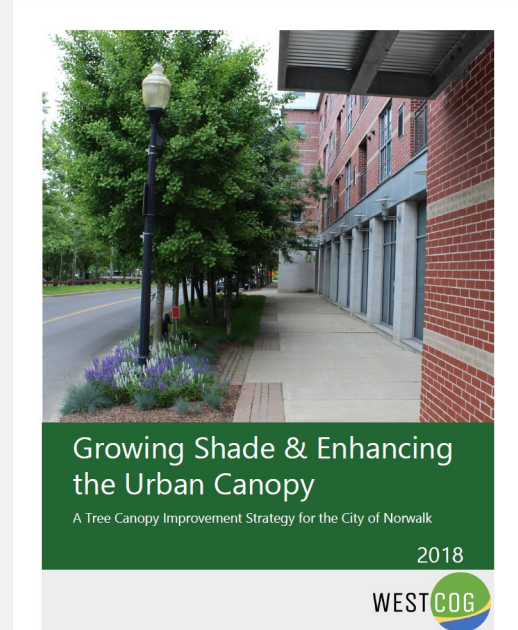
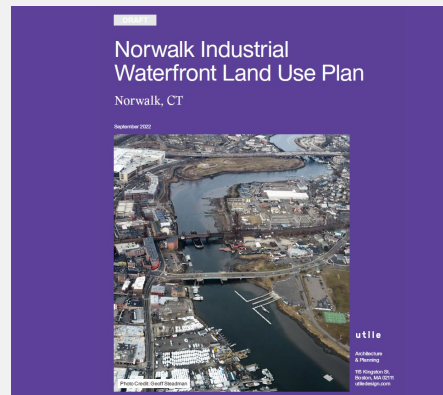
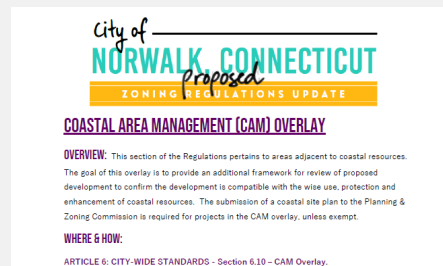
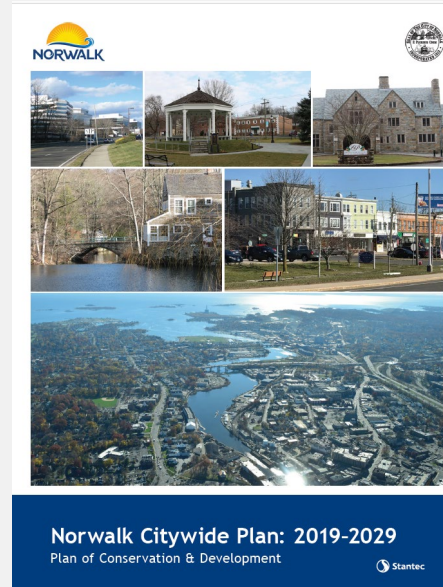
## Current City Planning in Project Area

Working with the City, AECOM reviewed existing city plans associated with the study area with the goal of implementing resilient solutions that could compliment progressive projects already in motion from local government. The plans reviewed included:

- [Norwalk Harbor Management Plan \(2009\)](#)
- [South Norwalk TOD Redevelopment Plan \(2016\)](#)
- [‘Norwalk Industrial Waterfront Land Use Plan’](#)
- [New Norwalk Proposed Zoning Regulations \(2023\)](#)
- [The Norwalk Transportation Master Plan \(2023\)](#)
- [Norwalk City-wide Plan of Conservation and Development \(2019\)](#)
- [Ecopolitan/TNC Water Street Coastal Resiliency and Greenway Plan \(2018\)](#)
- [West COG Multi-Jurisdiction Hazard Mitigation Plan Update \(2021\)](#)
- [Norwalk Redevelopment SoNo Wharf / Harbor Loop Trail \(2023\)](#)

Several key planning efforts are currently underway or have recently been completed. An example of the key efforts include the Norwalk Industrial Waterfront Land Use Plan, which reviewed policy through the perspective of water-dependent land uses, economic development, and capital projects along Water Street. Also, The Norwalk Transportation Master Plan, which is being completed this year, will bring insights into the future planning of the public roadway and transit infrastructure.

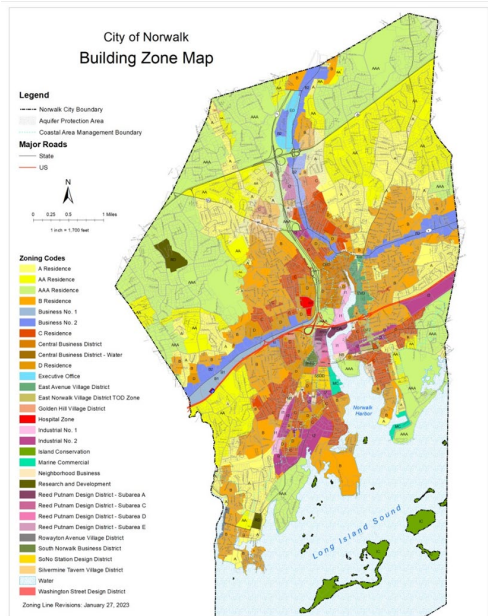
As part of the planning process comments were solicited from stakeholders and the community through meetings with City of Norwalk Planning Department, the Advisory Committee meetings, and three Public Workshops.



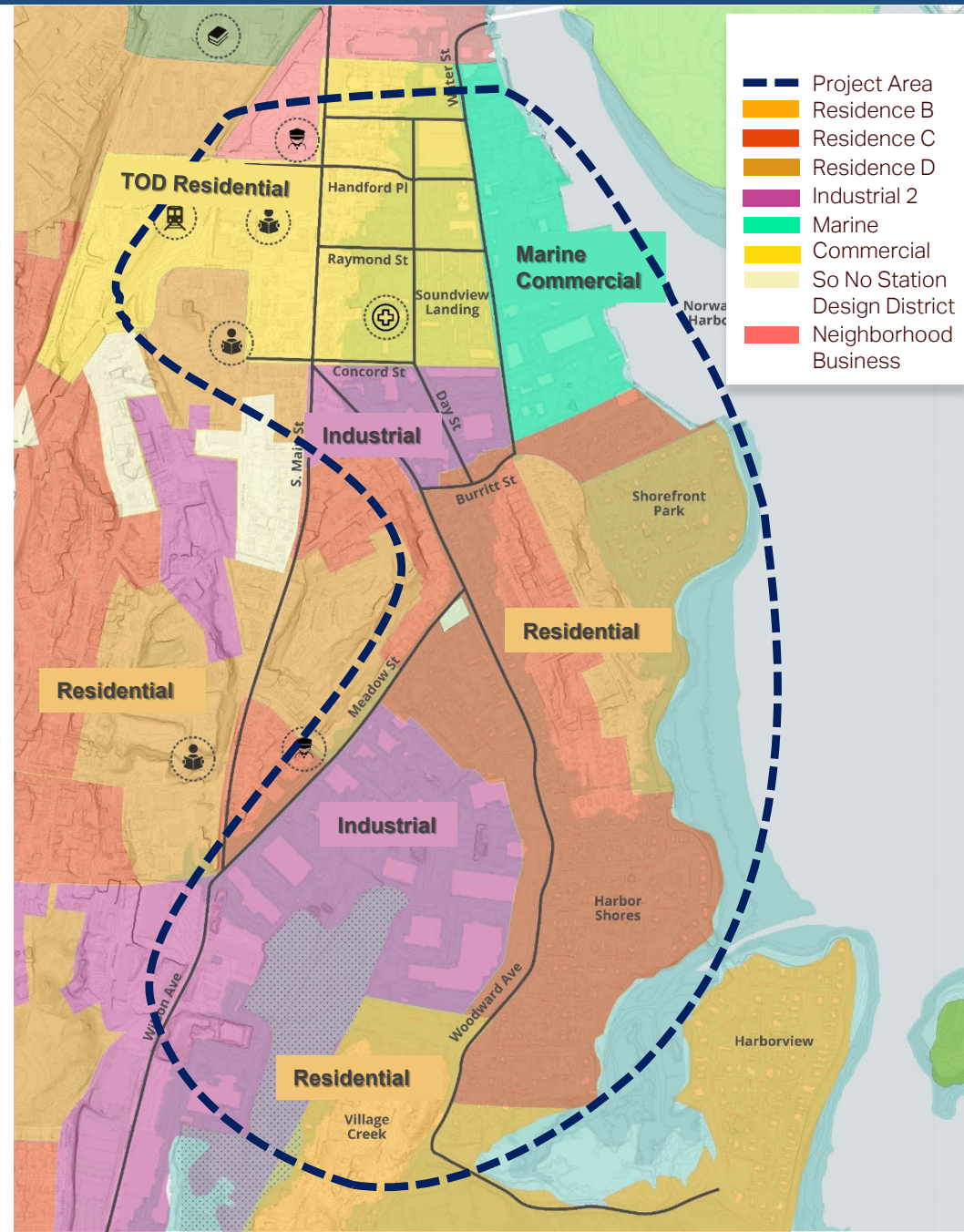
### City Of Norwalk Building Zone Map, 2023

Starting in 2019 with the release of the [2019 Citywide Plan \(POCD\)](#), the City of Norwalk started to reevaluate the zoning codes for the city. According to the City of Norwalk Webpage, the current zoning regulations have not been updated for nearly 40 years.

Considering the rapid changes that the city has experienced in recent years, local government has started to engage the public in conversations about how to update land use codes that govern the city.



Our study area in South Norwalk is densely populated and contains a mix of residential and industrial zones along the coastline of Norwalk Harbor and Village Creek. This zoning map was released on January 27<sup>th</sup> of this year.



CURRENT & FUTURE CONDITONS



Woodward Ave.  
Photo Credit, AECOM

### Climate Change Vulnerability (CCVI) Heat Scoring

Tools developed by CIRCA were used to help identify heat impacts within the project area. One of these tools, the Climate Change Vulnerability Index (CCVI) is an index-based spatial model that identifies community vulnerability to flood, wind, and heat-related impacts of climate change. The CCVI characterizes areas based on an equation using sensitivity plus exposure, minus adaptive capacity. The equation can be defined as:

**Exposure**

The degree of stress that a certain aspect is going through with climate vulnerability. The includes changes such as the magnitude and frequency of extreme events.

+

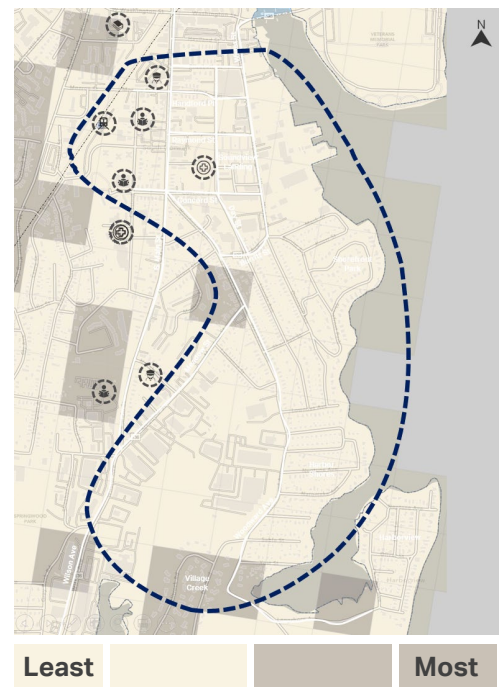
**Sensitivity**

The degree to which a built, natural, or human system will be impacted by changes in climate conditions

-

**Adaptive Capacity**

The ability of a system to adjust to changes, manage damages, take advantage of opportunities, or cope with consequences.





## Climate Change Vulnerability (CCVI) Heat Scoring

The combined score of the exposure, social, and adaptive capacity datums determines the overall vulnerability score.

Based on this analysis, neighborhoods that are particularly at risk within our project area are shown in darker brown, including Harbor Shores, Meadow Street, parts of Shorefront Park, and lower Water Street adjacent to Soundview Landing



**Vulnerability Score** =

=

**Exposure** + **Sensitivity** - **Adaptive Capacity**

Heat risks disproportionately affect some people and communities more than others. Examples of some populations that are more vulnerable to heat impacts, are pregnant women, children and newborns who are less able to regulate their body temperature, and older adults or people with chronic health issues. Additionally, people who take regular medications, live alone, or have limited mobility can be disproportionately at risk.

\*Maps provided with CIRCA Climate Change Vulnerability Index (CCVI), <https://resilientconnecticut.uconn.edu/>

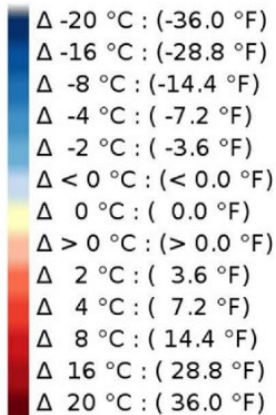


### Landsat-8 Thermal Infrared Sensor Data

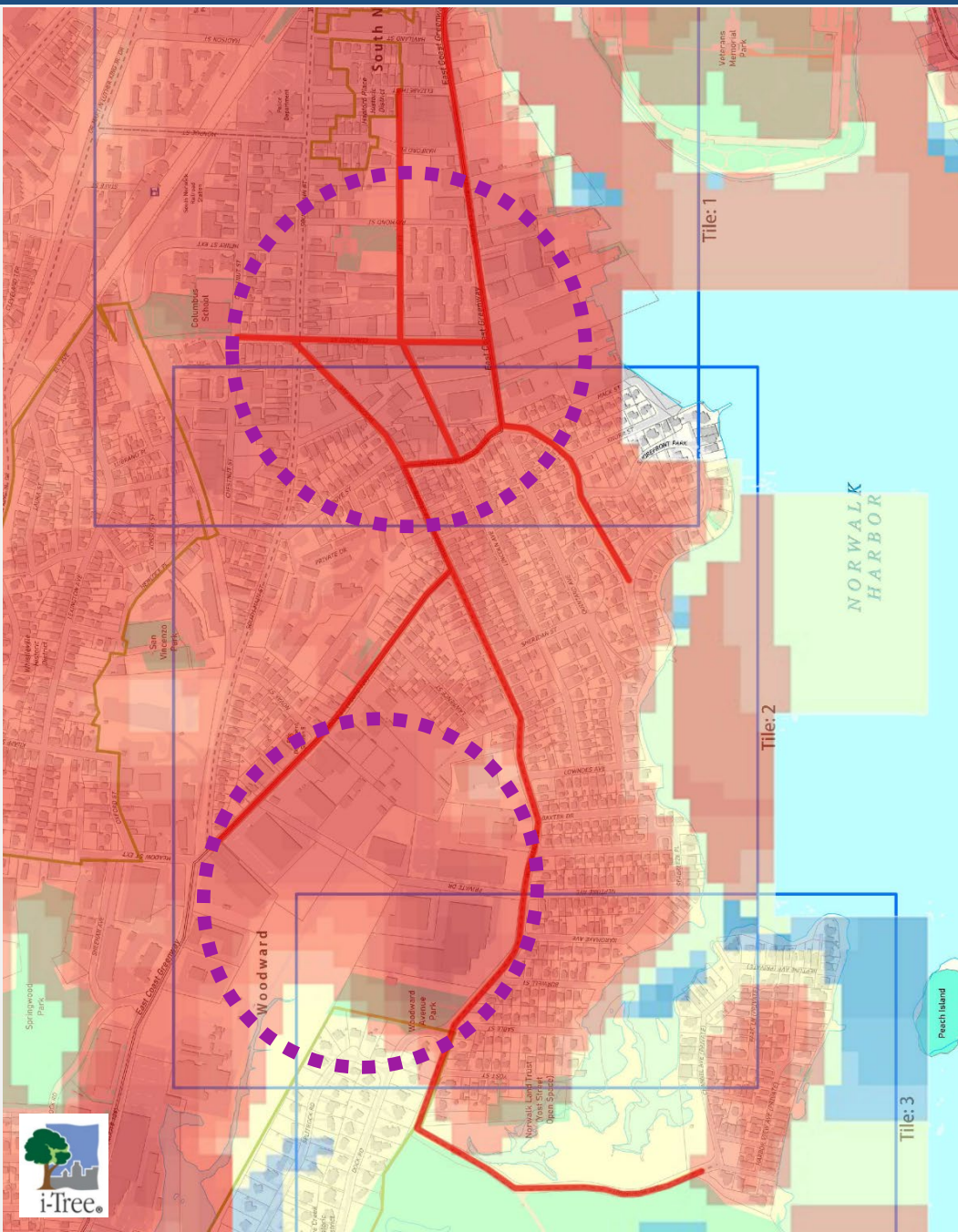
In addition to reviewing the CCVI score, our team also explored land surface temperature derived from Landsat-8 Thermal Infrared Sensor Data. This data was collected and analyzed using a public mapping software called [i-Tree Landscape](#).

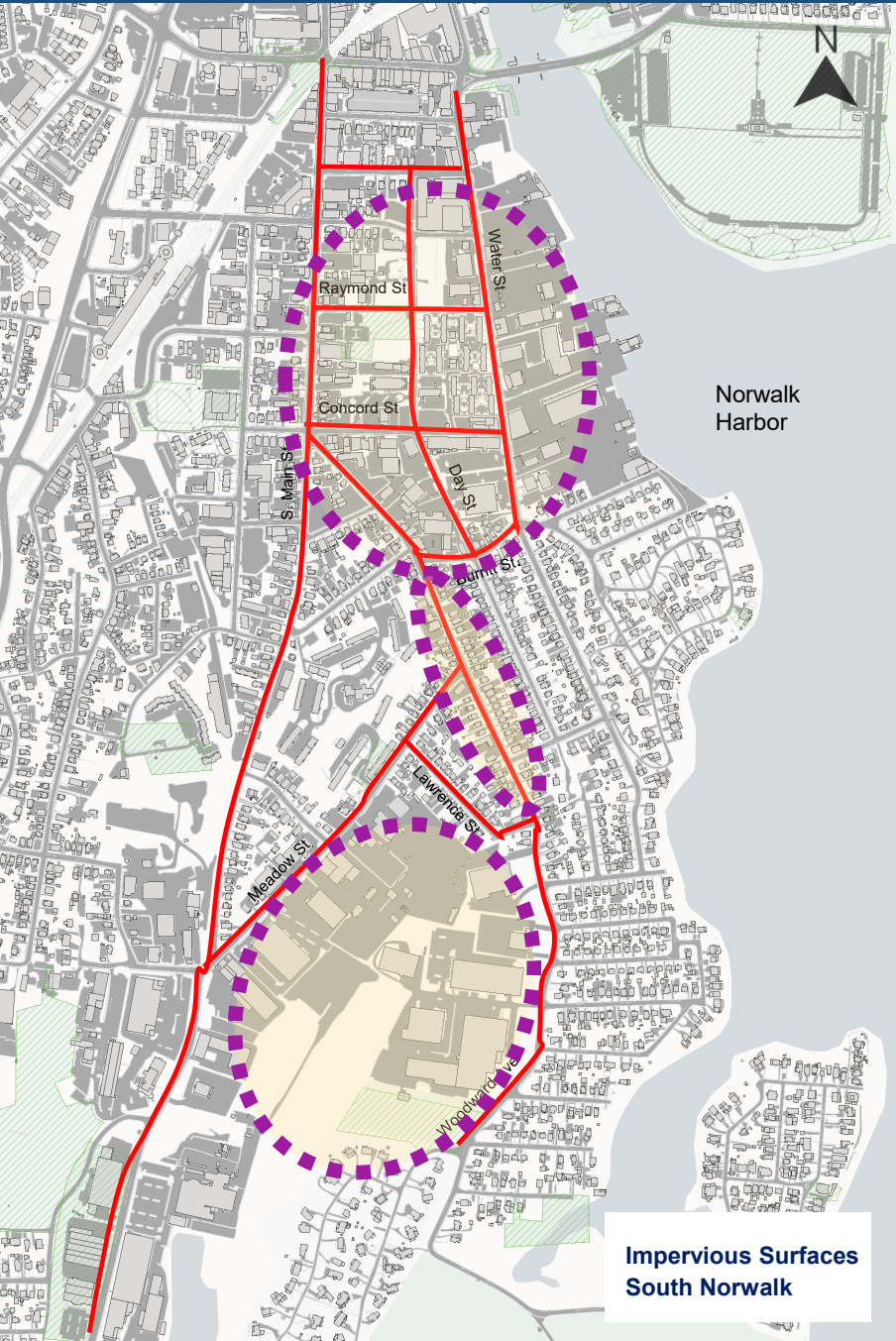
Temperature values shown on the following map demonstrate the differences between the median surface temperature for each Landsat scene. For more detailed information on how these values are calculated please see the [Landsat-8 Handbook](#) (2019).

The analysis of this data revealed more finite land surface temperature information, which allowed us to pinpoint the neighborhoods with the highest heat impact. Areas with higher industrial uses and impervious surfaces, demonstrate the highest heat impacts within the study area. These areas also coincide with lack of shade trees and green space.



Areas Impacts Most highly





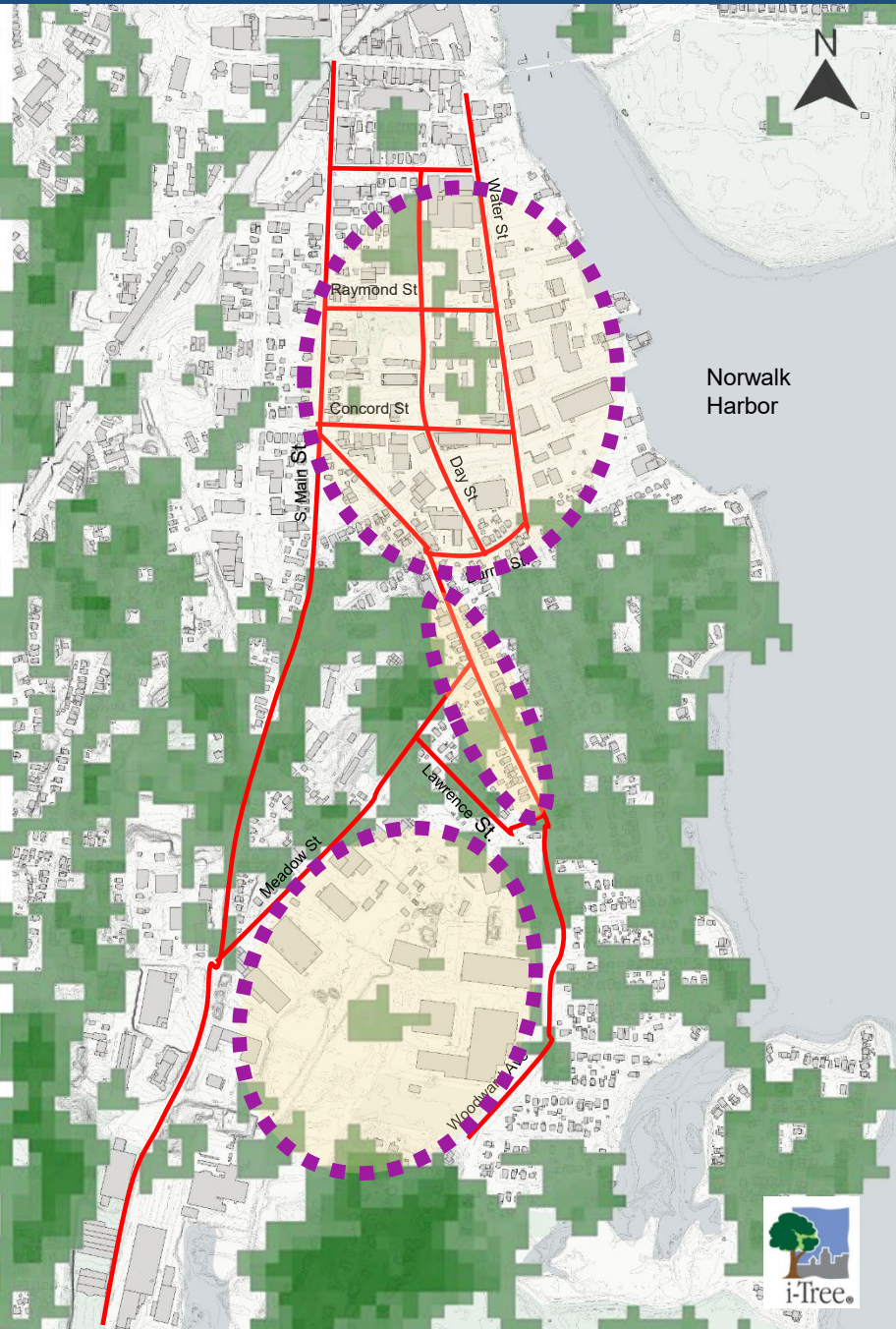
### Impervious Surfaces

Several area throughout South Norwalk is have excessive impervious surface. This map identifies areas of highest impact. We aim to focus on these key areas to reduce the effects of heat within the study area. This data was compiled from orthoimagery shared by the City of Norwalk in 2016.

- Focus Areas
- Study Corridors
- Impervious Surfaces
- Public Green Space

*\*Compiled from 2016 orthoimagery from City of Norwalk GIS Data*

**Impervious Surfaces South Norwalk**



### Tree Canopy Coverage

Urban tree canopy naturally combats extreme heat by cooling the land surface. The focus areas identified in the previous figure similarly demonstrate areas with limited tree canopy. This data was collected from the public tree canopy assessment tool, i-Tree, which calculates canopy density in 30 square meter cells.

The lack of tree canopy is evident within the two highlighted focus areas, in association with the industrial land uses within these to areas of the project site.

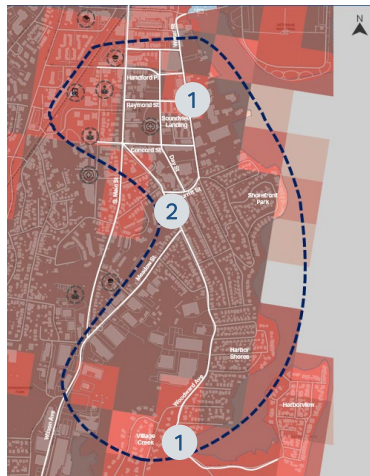



### Sample Heat Locations

Based off the CCVI scoring and impervious surfaces data collected, environmental factors impacting heat sensitivity were compiled in three representative locations within South Norwalk.

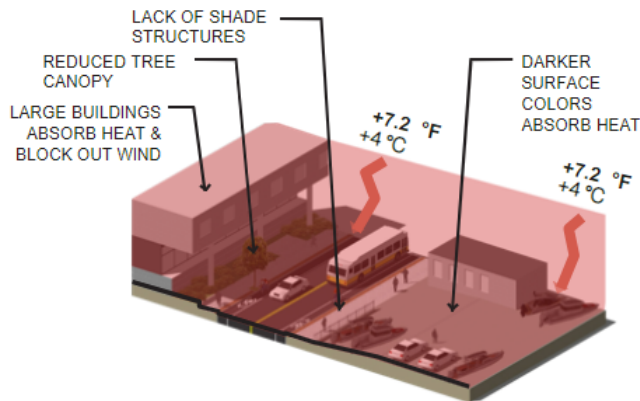
The three locations include 1) Upper Water Street, demonstrating

marine-industrial impervious pavement factors contributing to heat, 2) Upper Woodward Ave, highlighting heat vulnerability characteristic within residential communities throughout the southern portion of our study area, and 3) Longshore Drive, illustrating the positive impacts of wetlands and green space on heat in this location.

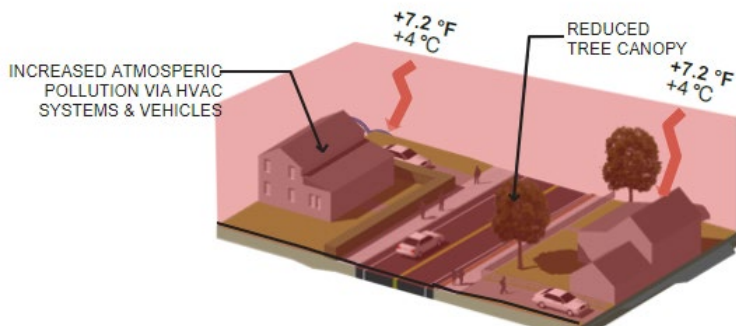


 TEMPERATURE OVER AVERAGE REGIONAL TEMPERATURES DURING A HEAT WAVE EVENT

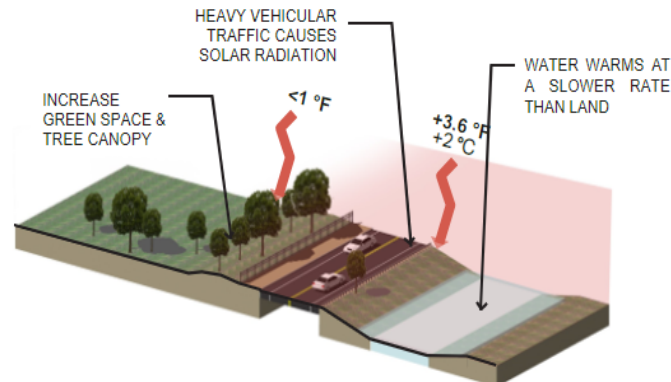
**1** Upper Water Street: Multi-family residential and marine/industrial land use



**2** Upper Woodward Ave: Single family residential Neighborhood



**3** Longshore Drive: Roadway and Wetlands





- **South Norwalk Branch** (10 Washington Street) - Thursday: 10 AM - 5:30 PM.
- **The Norwalk Police Department Community Room** (1 Monroe Street). Open 24 hours a day, seven days a week.

## Existing City Efforts

The City of Norwalk has three Cooling Centers, including two within the study area at the South Norwalk Library Branch.



**City of Norwalk Facebook Post**  
Posted on July 6, 2023

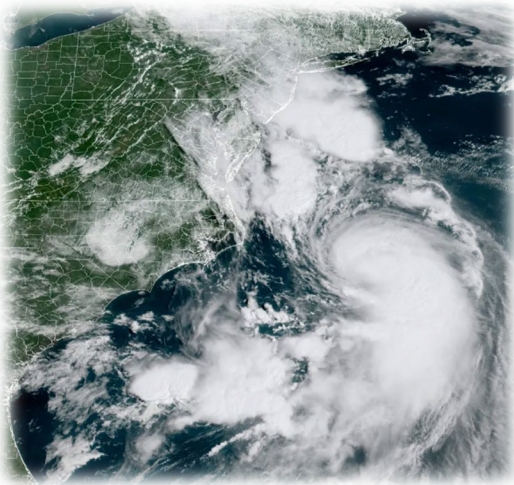
"Today, July 6, 2023, Mayor Rilling announced that cooling centers are available throughout the community, as heat index values are expected to reach a high of 95 degrees today. The hot temperatures and high humidity can potentially cause heat-related illness, especially for vulnerable populations. The City encourages everyone to stay hydrated and limit strenuous exercise outdoors today.

Homes without air conditioning can be much hotter than outdoor temperatures. Anyone in need of a place to get out of the heat can go to one of the following cooling centers across Norwalk and can also call 2-1-1 to locate their nearest cooling center..."

## Source of Flooding

Several factors contribute to the source of flooding in South Norwalk. The following issues are contributing factors to current and future flooding and have been considered in our study's approach:

1) Storm surge and higher tides from Norwalk Harbor and Long Island Sound 2) inadequate capacity flow of the existing drainage system, and 3) an increase in precipitation amounts and frequency of storms



### Inland Overflow from Tidal Waters + Storm Surge

The shape of the coastline affects storm surge. Water from a storm will get trapped along the coastline and travel inland to create potential flooding.



### Stormwater Infrastructure

Most of the study area is located within the 100-year storm floodplain, however this area does not take into consideration storm surge or drainage infrastructure problems.

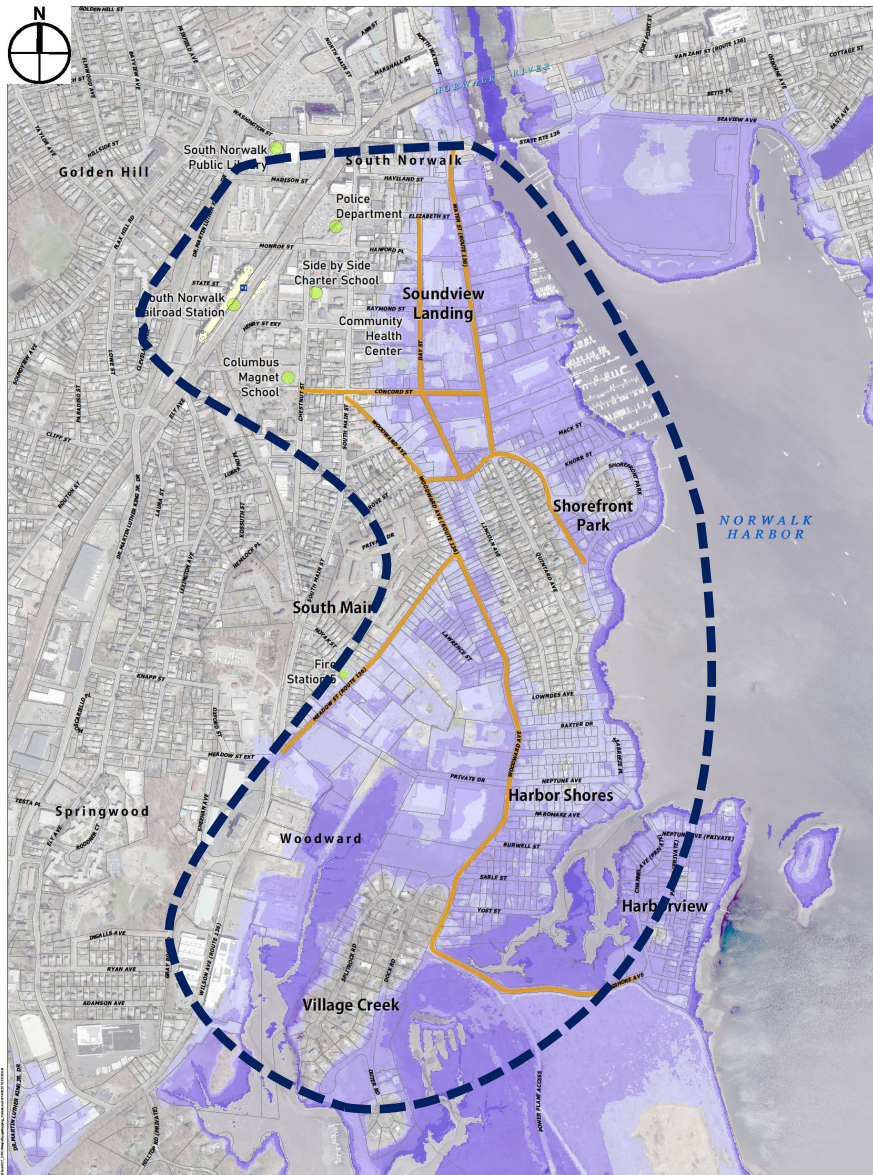


### Extreme Rainfall

As extreme rainfall becomes more frequent in the future, stormwater systems will need to become more robust to accommodate increased capacity.

### Present Day 100-year Storm Flood Depth

The following figures illustrate flood maps based upon the 100-year flood limits, as modeled by CIRCA. This map demonstrates the impact of a 100-year storm at high tide in the current day.

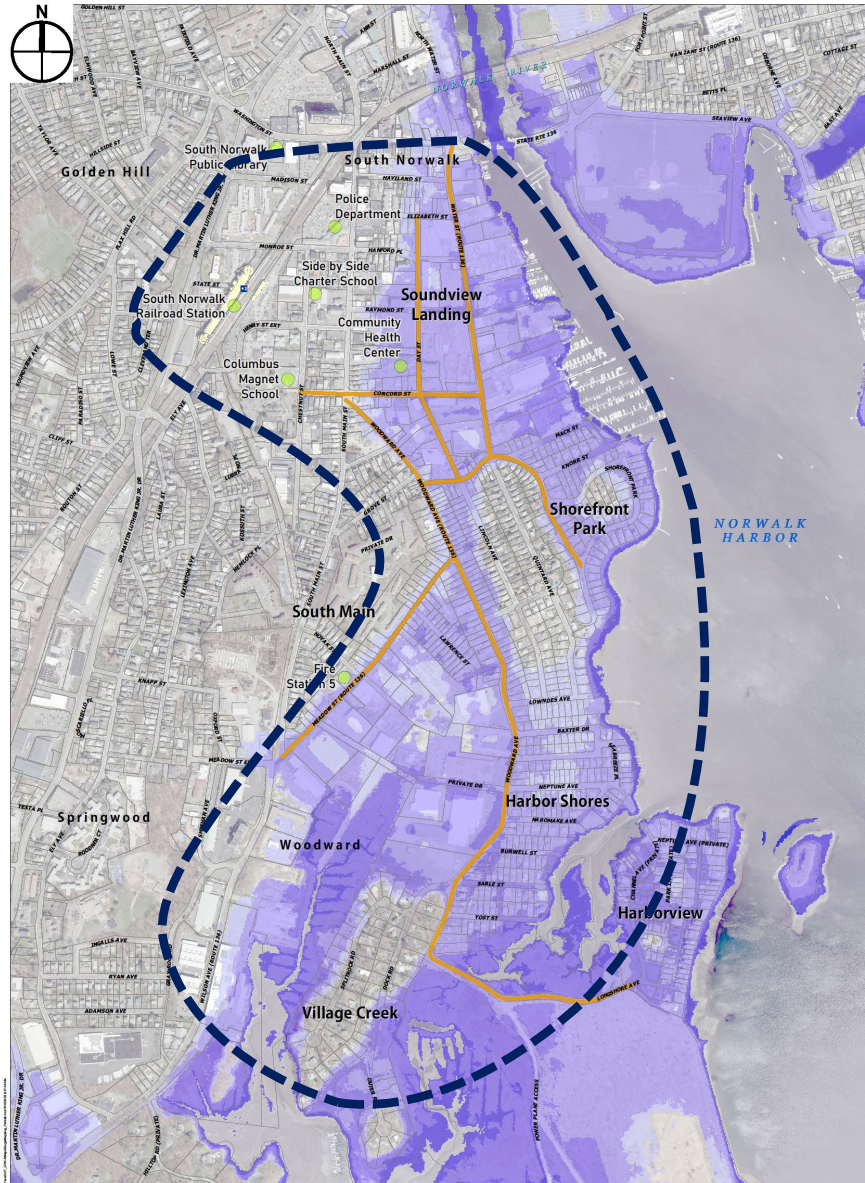


#### Present Day Flood Depth



\*Source: City of Norwalk, CTDEEP, CTECO | Date of Photo: 2019



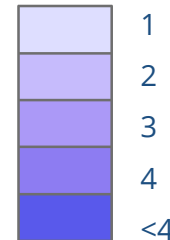


### Future 2050 100-year Storm Flood Depth

The adjacent map demonstrates the impact of a 100-year storm at high tide predicted for 2050. During a future extreme storm event:

- Average precipitation expected to increase about 8%, or 4 inches per year
- Sea level is projected to rise 20 inches

### Future Flood Depth



-  Key Corridors
-  Parcel Lines

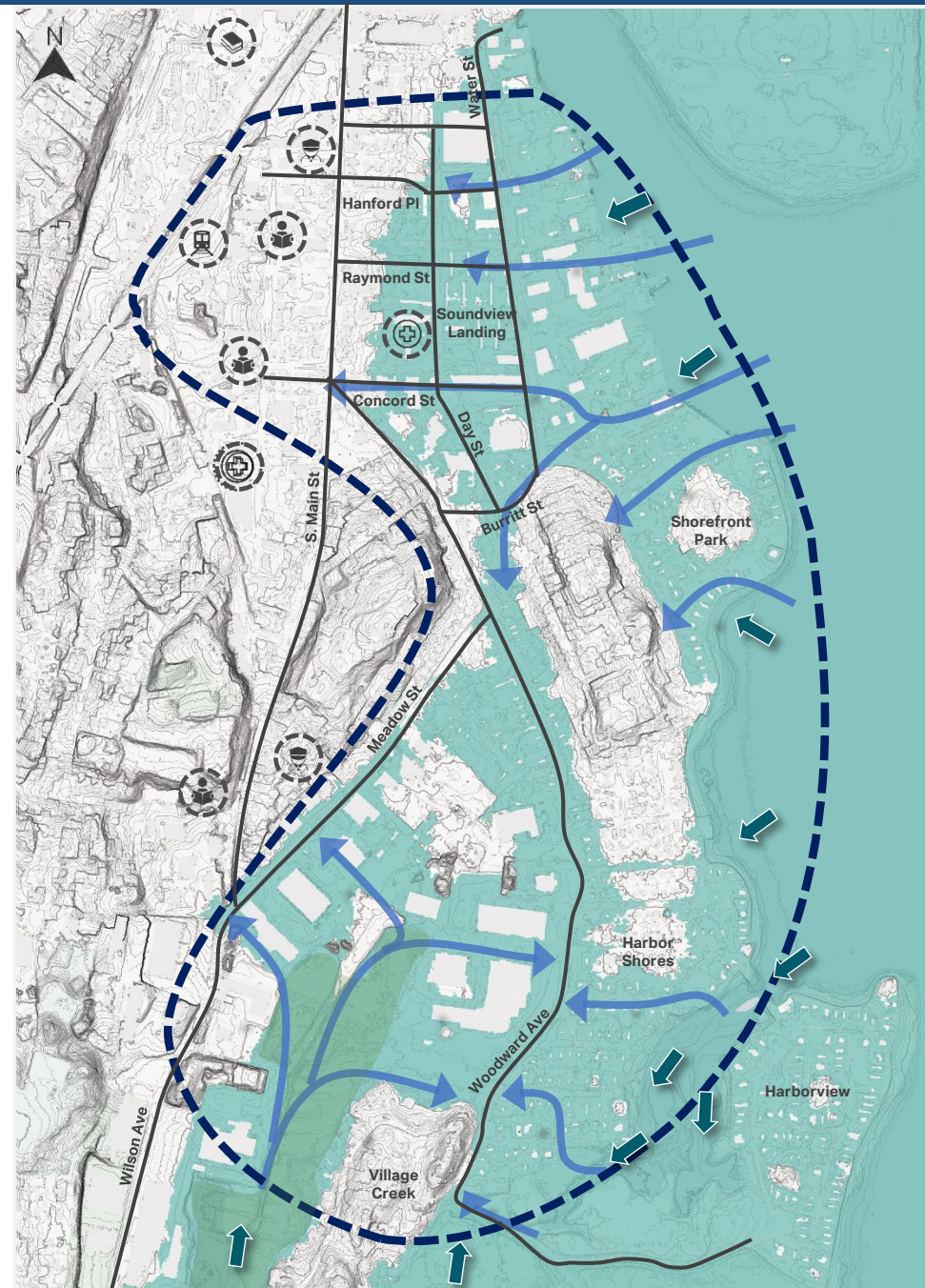
\*Source: City of Norwalk, CTDEEP, CTECO | Date of Photo: 2019

### Present Day 100-year Storm Flood Elevation & Flood Pathway Analysis

In addition to analyzing flood depth values, flood levels by storm elevation were studied throughout the project area in order to determine dominant flood pathways.

The adjacent graphic shows flooding to elevation 9.38 based on NAVD88 data and highlights flood pathway locations from Norwalk Harbor and Village Creek that contribute to the present-day flooding within the study area.

Based on this information key flood pathways for this study were identified by examining the direction of waterflow at each elevation above sea level. This study revealed that flooding primarily enters from the lower region of Woodward Ave, the Norwalk Harbor and Village Creek saltmarsh, and the marina along Water St. These flood pathways also correspond with fragments of the coastline most vulnerable to the impacts of storm surge, which could likely exacerbate flooding impacts.

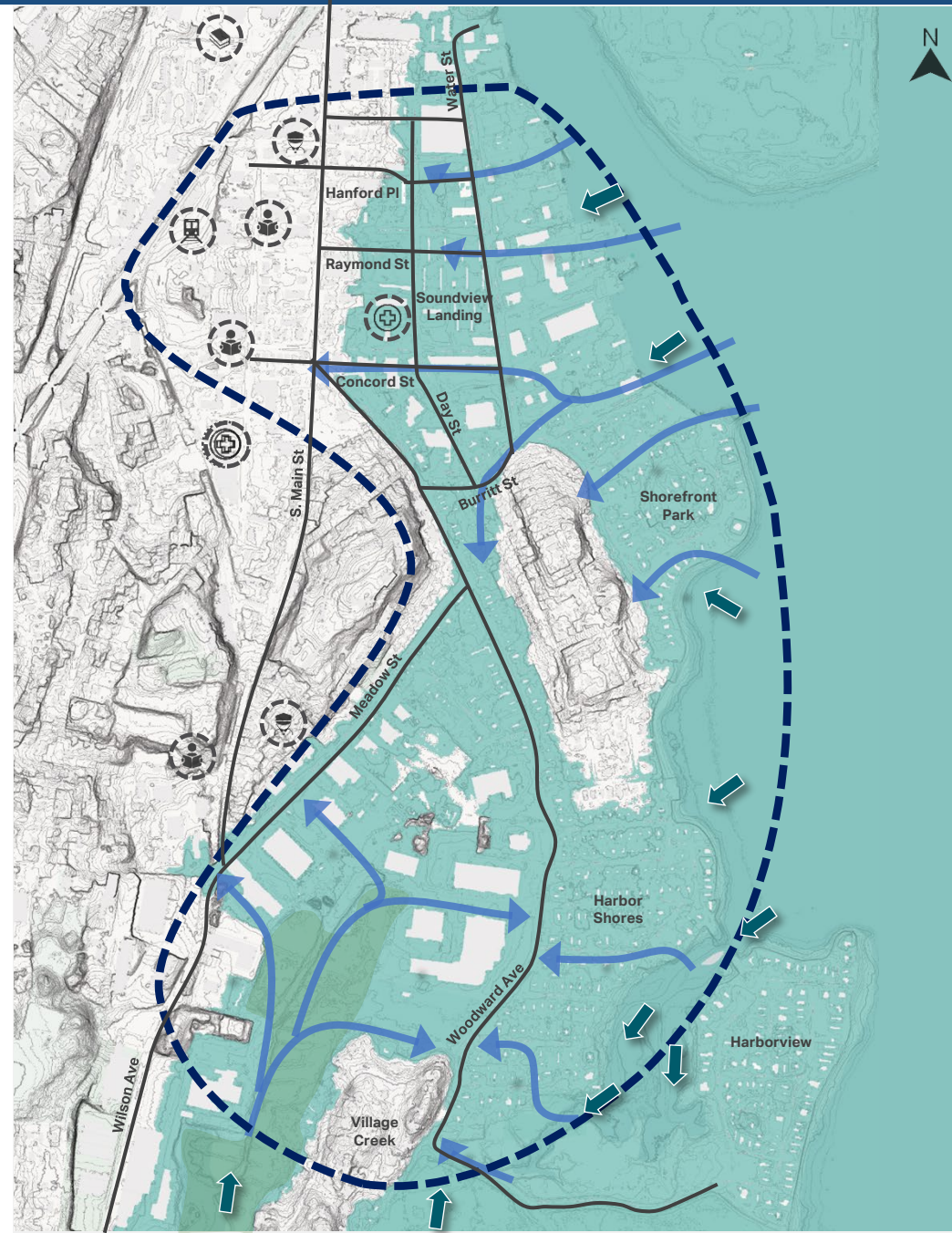








- Project Area
- Study Corridors
- Flood Pathways
- Storm Surge Direction
- Designated Marshlands
- 1% Annual Storm Present Day Elevation 9.38 NAVD88

### Future 2050 100-year Storm Flood Elevation & Flood Pathway Analysis

During a major future storm event flood pathways will strengthen in the south along Woodward Avenue, inundating the surrounding neighborhoods. In the northern end of our study area, flooding would travel upland gradually towards South Main and upper Woodward Avenue.

In 2050, small changes in mean sea level will have a big impact on the frequency of flooding. We can expect current day 'minor', 'moderate' and 'major' flooding thresholds to occur much more often.



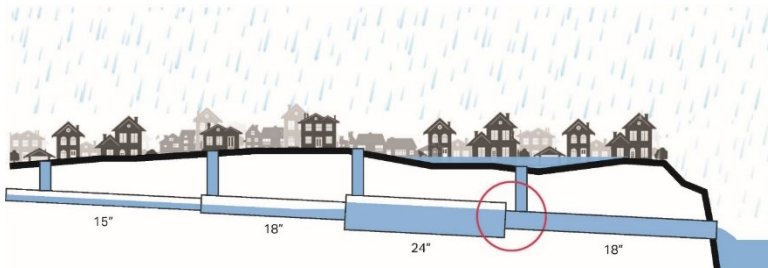
-  Project Area
-  Study Corridors
-  Flood Pathways
-  Storm Surge Direction
-  Designated Marshlands
-  1% Annual Storm Projected for 2050 with 20" Sea Level Rise  
*Elevation 10.88 NAVD88*

### Upland Flooding & Stormwater Infrastructure Issues

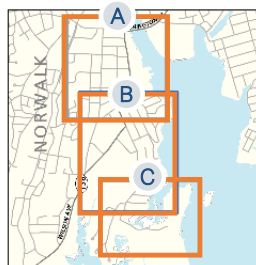
Lack of pipe capacity and undersized pipes also play a potential role in the flooding of South Norwalk.





From a design standpoint, each consecutive pipe in a drainage system should get larger. This issue may be due to lack of space or inconsistent updates to the pipe structure. When there is not enough capacity, water can back up within the drainage pipes and the surface water isn't able to adequately drain from within the inlets.

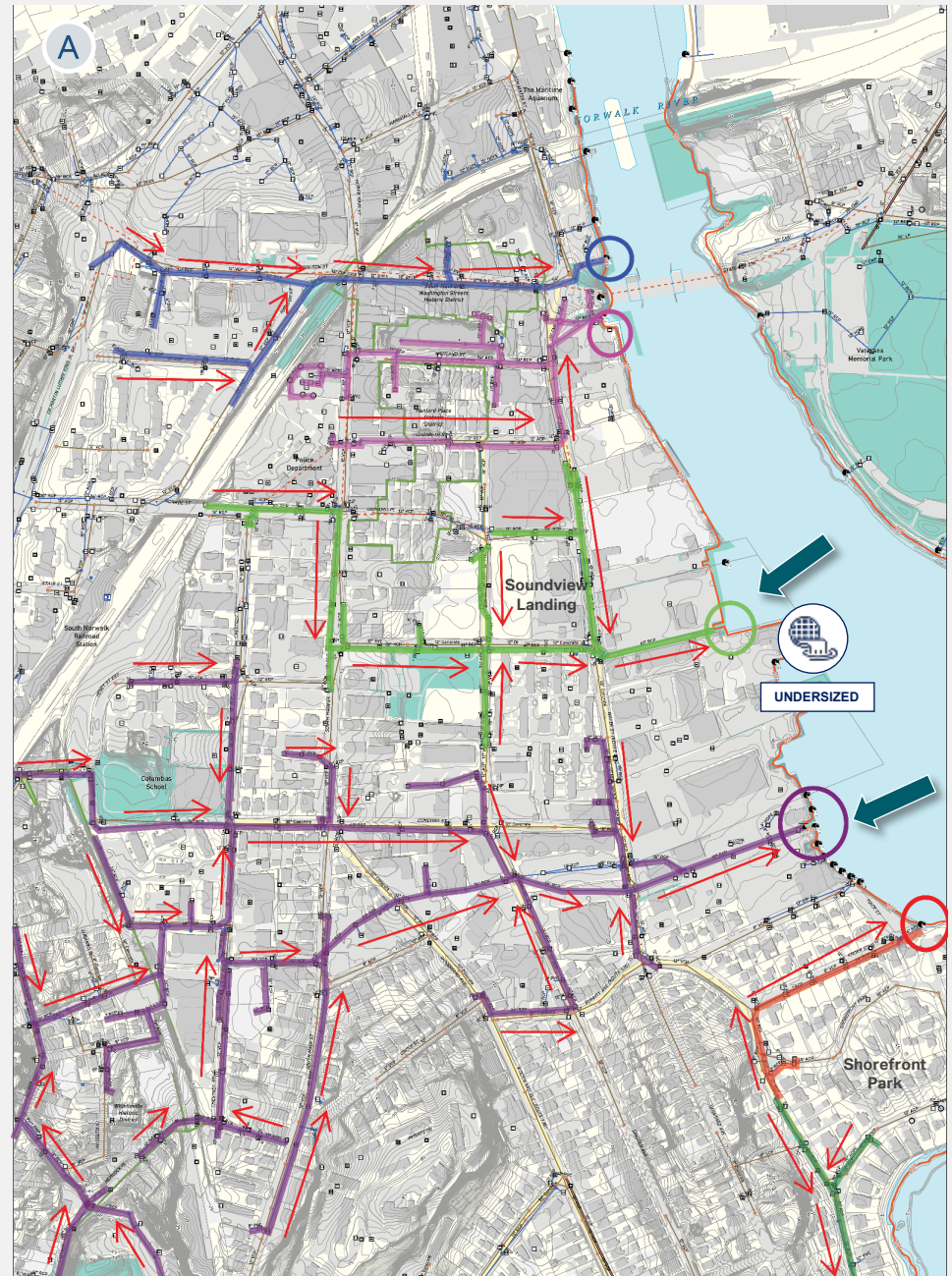
The following map shows pipe networks for the northern portion of the study area, starting from the train station and Soundview Landing to Shorefront Park. Undersized pipes have been identified at the intersection of Raymond St and Water St.



**Pipe Capacity:** The volume of water that can flow freely through a pipe



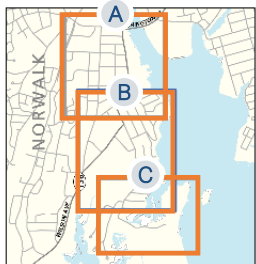
-  Outfalls
-  Undersized Pipes at Outfalls
- UNDERSIZED**
-  Direction of pipe flow
-  Storm surge direction







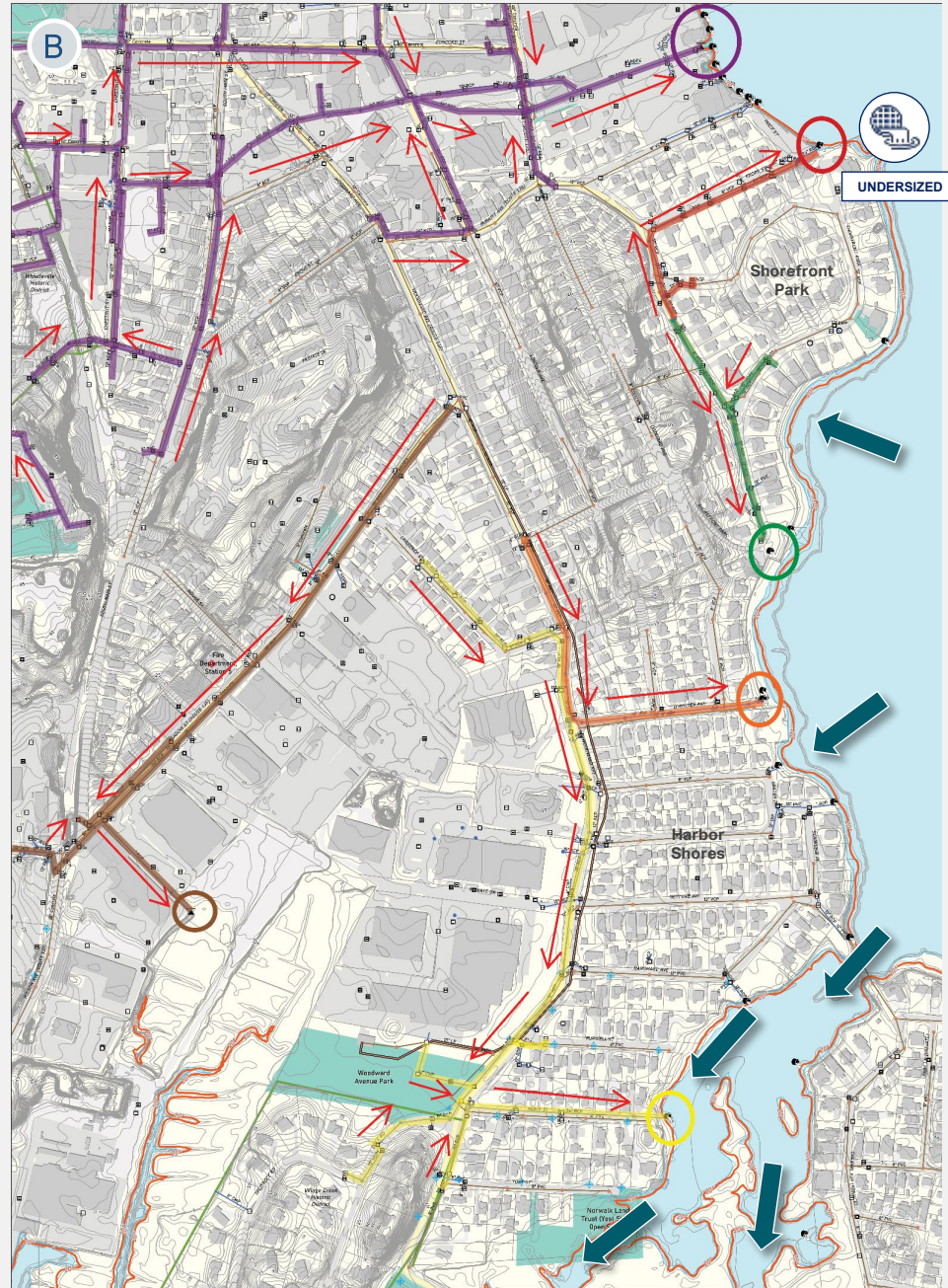
\*Source: City of Norwalk, CTDEEP, CTECO | Date of Photo: 2019

### Upland Flooding & Stormwater Infrastructure Issues

The following map shows pipe networks for the central portion of the study area from the Shorefront Park neighborhood to Harbor Shores and Meadow Street. Undersized pipes have been identified at the outfall location off Mack Street off Burritt Ave in Shorefront Park.



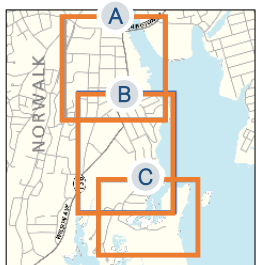
-  Outfalls
-  Undersized Pipes at Outfalls
-  Direction of pipe flow
-  Storm surge direction







\*Source: City of Norwalk, CTDEEP, CTECO | Date of Photo: 2019

### Upland Flooding & Stormwater Infrastructure Issues

The following map shows pipe networks for the southern portion of the study area, starting in Harbor Shores and moving towards Village Creek and Harborview. No undersized pipes were identified in this area, although Harborview does not have a stormwater treatment system on record.



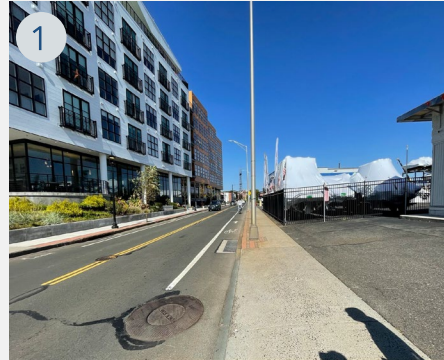
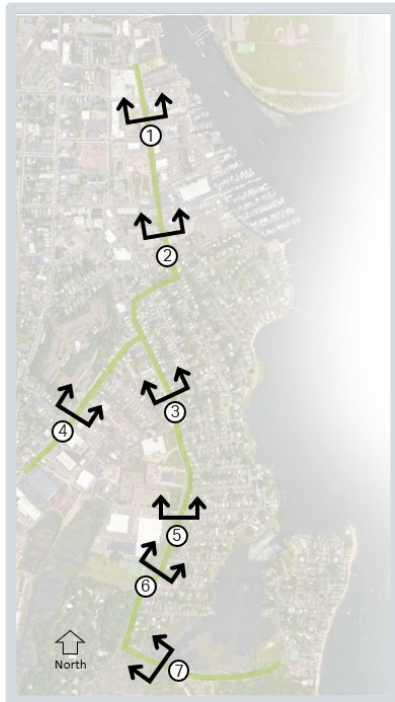
-  Outfalls
-  Undersized Pipes at Outfalls
-  Direction of pipe flow
-  Storm surge direction

\*Source: City of Norwalk, CTDEEP, CTECO | Date of Photo: 2019

### 2050 Flood Scenario: North to South

A series of representative locations were selected within the study area and were compared current and future flood limits to better understand how the 100-year flood would potentially impact these zones on an intimate and site-specific scale. The locations represent a mix of land use conditions to assess varied scenarios for the next phase of study exploring adaptation and mitigation options.

In order to easily visualize flooding impacts throughout South Norwalk, a series of axonometric views were created of sections along key roadways and were overlaid with future flood depth levels onto the existing conditions.



**North End of Water St:** Multi-family residential and marine/industrial land use



**South End of Water St:** Private business mix with waterfront municipal/ public lots



**North Woodward Ave:** Single family residential neighborhood



**Meadow St:** Industrial land use with adjacent single family residential



**South Woodward Ave:** Industrial warehouse & single family residential



**Lower Woodward Ave:** Open space public recreational area & single family residential



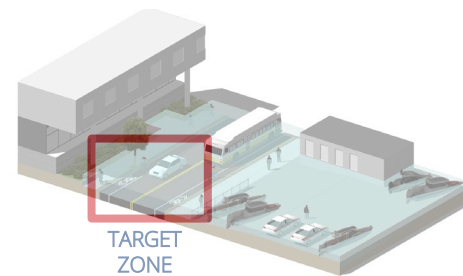
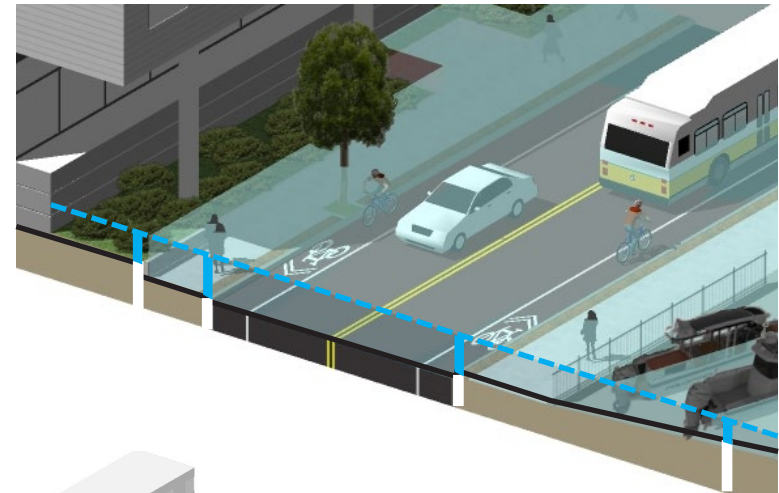
**Longshore Drive:** Protected open space, wetlands, & evacuation route

## 1 2050 Flood Scenario on Upper Water Street

The first focus area of seven is the intersection of Raymond Street and Water Street in the northern region of our study area. This location shows multi-family residential and marine-industrial land uses. This roadway currently experiences frequent flooding, and in the case of a future 100-year storm event, this location could experience up to 5-to-6 feet of flooding depth in the roadway.



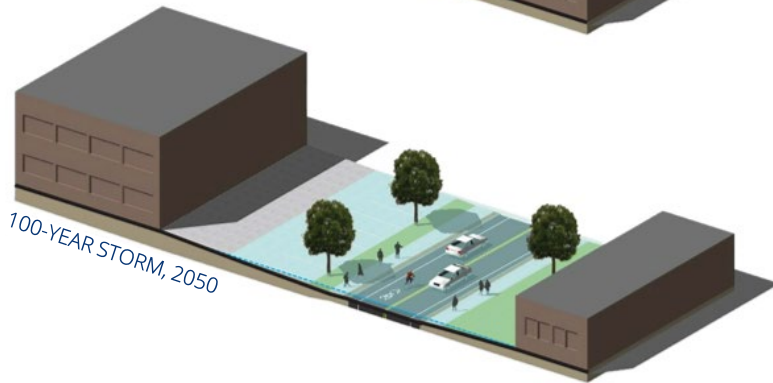
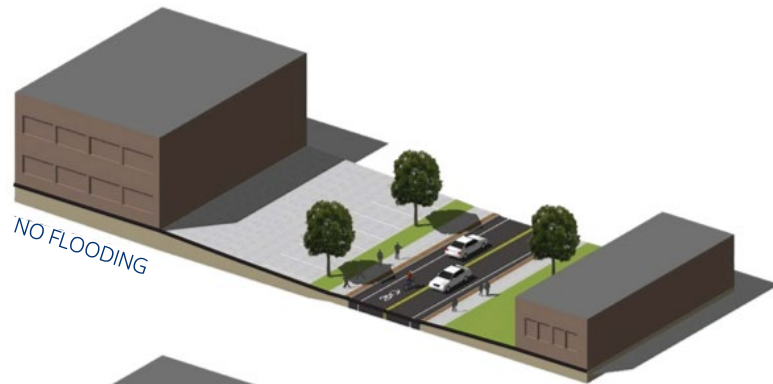
*Approx. Road Elevation 5.0*



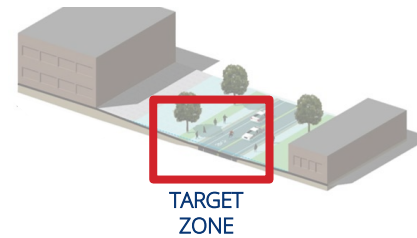


## 2 2050 Flood Scenario on Lower Water Street

The second focus area is located adjacent to the intersection of Water St and Burritt Avenue. This location includes waterfront municipal and commercial land uses. This roadway currently experiences frequent flooding and in the case of a future 100-year storm event this location could experience up to 3-to-4 feet of flooding depth in the roadway.



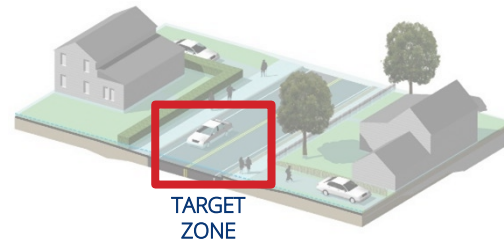
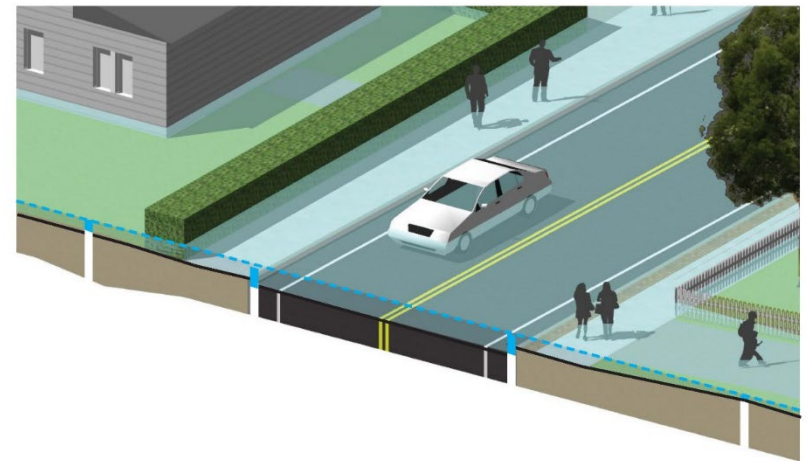
Approx. Road Elevation 7.0



## 3 2050 Flood Scenario on Upper Woodward Ave

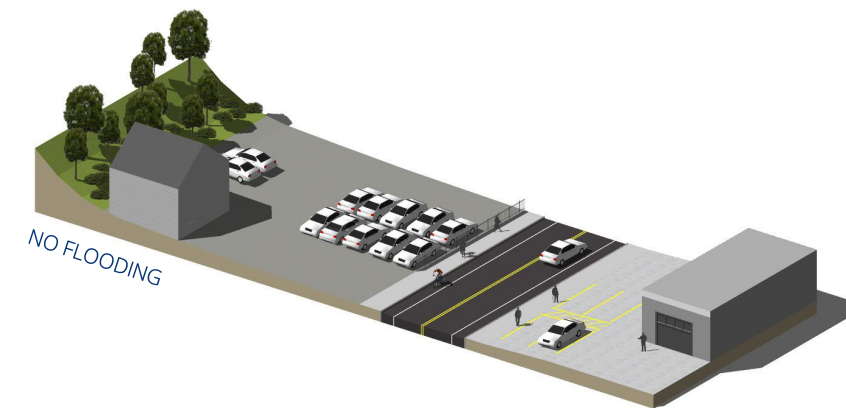
The third focus area is adjacent to the intersection of Lawrence St with upper Woodward Avenue. This location includes single-family residential land use. This roadway currently experiences frequent flooding and in the case of a future 100-year storm event this location could experience up to 2 to 3 feet of flooding depth in the roadway.

*Approx. Road Elevation 8.0*

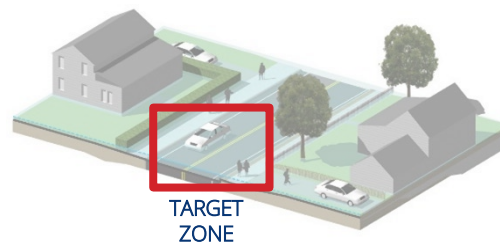
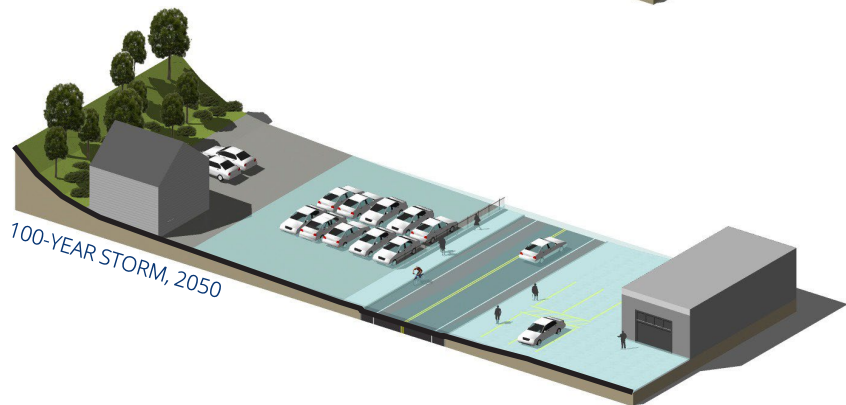
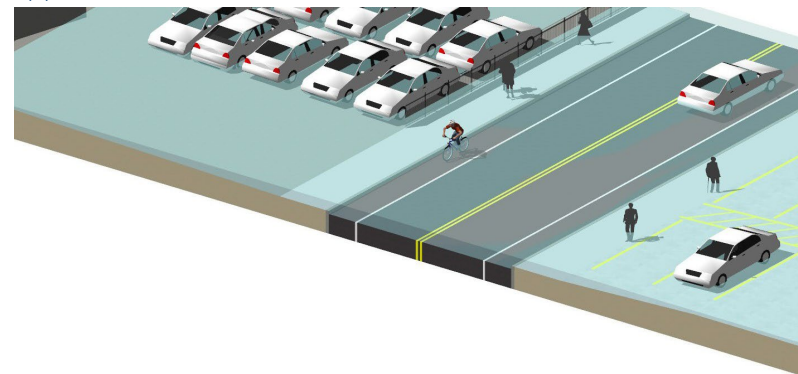


## 4 2050 Flood Scenario on Meadow Street

The fourth focus area was taken just before the intersection of Novak St with Meadow St. This location includes industrial land use with adjacent single-family residential. This roadway currently experiences infrequent flooding and in the case of a future 100-year storm event this location could experience up to 1 to 2 feet of flooding depth in the roadway.

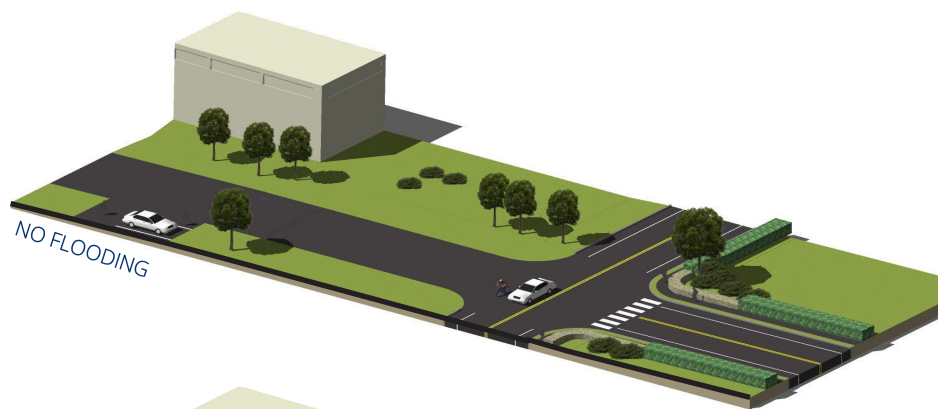


*Approx. Road Elevation 9.0*

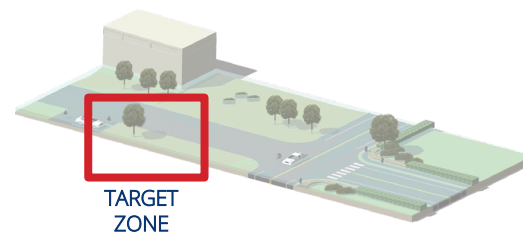
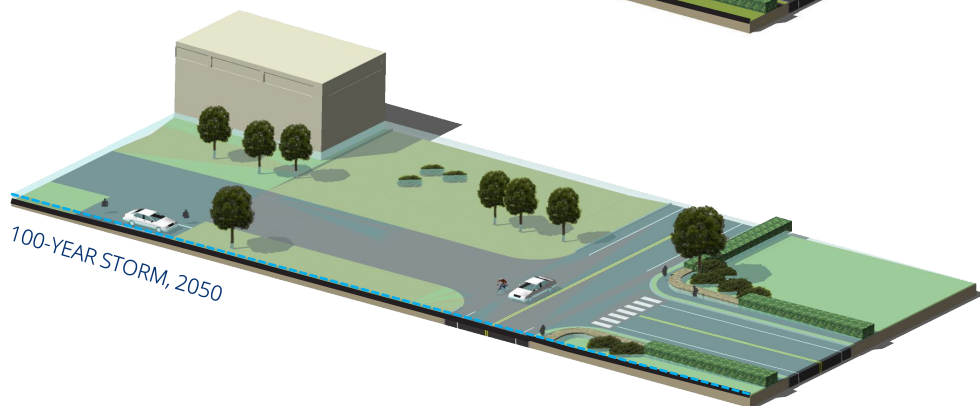
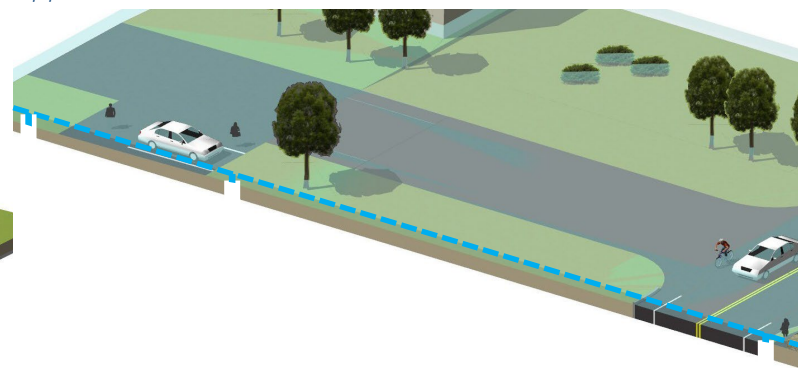


## 5 2050 Flood Scenario on Woodward & Neptune Street

The fifth focus area was taken at the terminus of Neptune Avenue onto Woodward Ave. This location includes industrial warehouse and single-family residential land uses. This roadway currently experiences frequent flooding and in the case of a future 100-year storm event this location could experience up to 3 to 4 feet of flooding depth in the roadway.

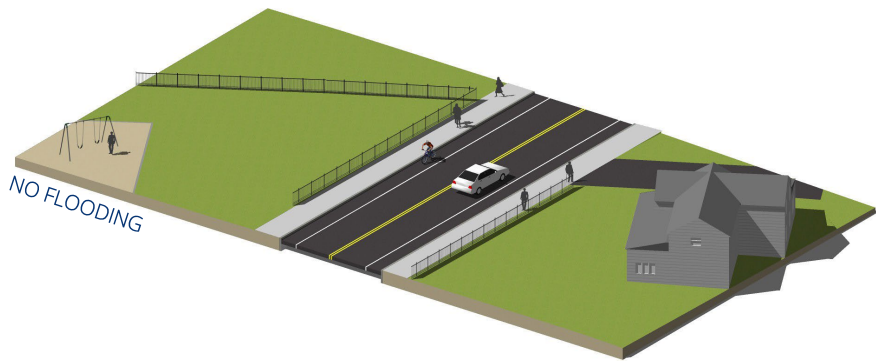


*Approx. Road Elevation 7.0*

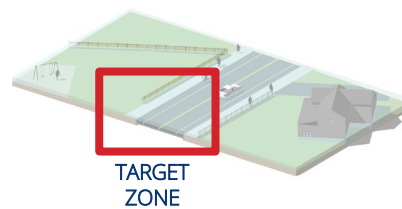
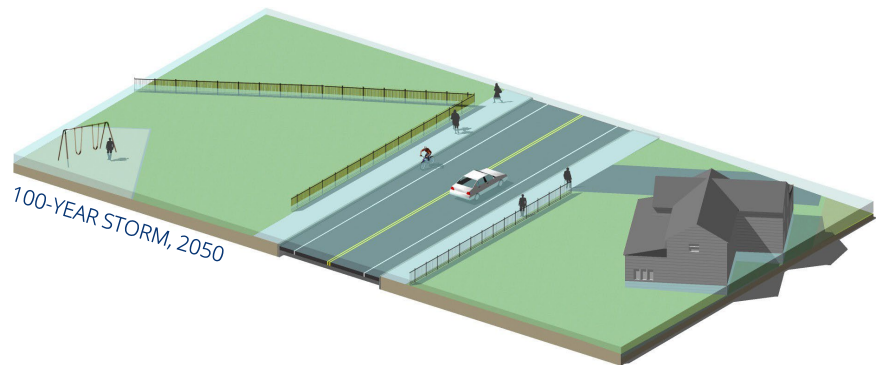
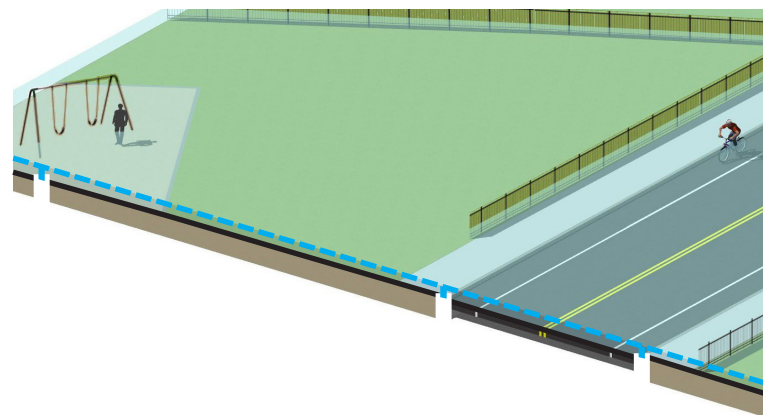


6 **2050 Flood Scenario on Lower Woodward Ave**

The sixth focus area was taken at Woodward Ave Park on lower Woodward Avenue. This location includes residential and recreational parkland land use. This roadway currently experiences frequent flooding and in the case of a future 100-year storm event this location could experience up to 3 to 4 feet of flooding depth in the roadway.

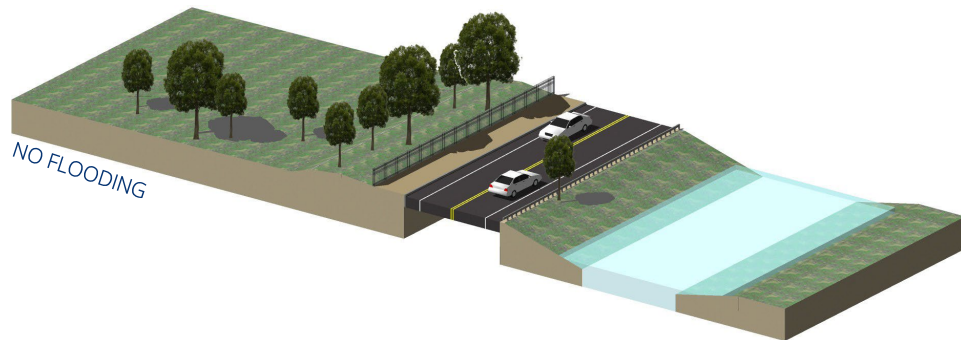


*Approx. Road Elevation 7.0*

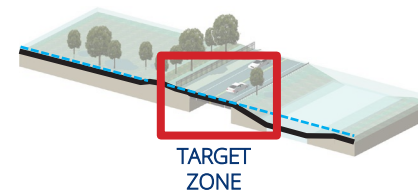
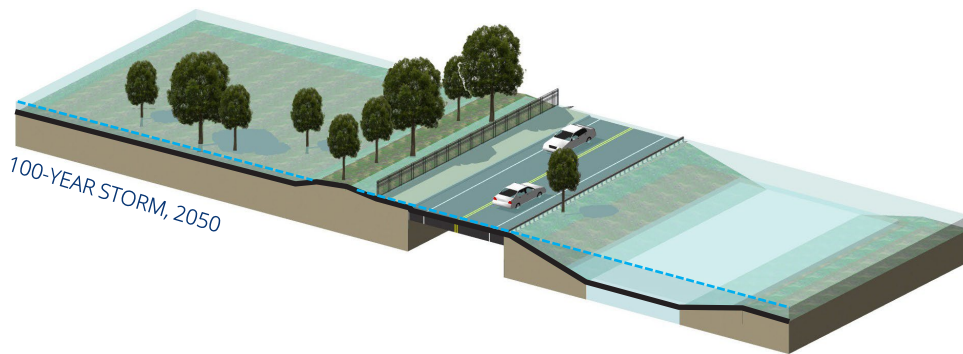
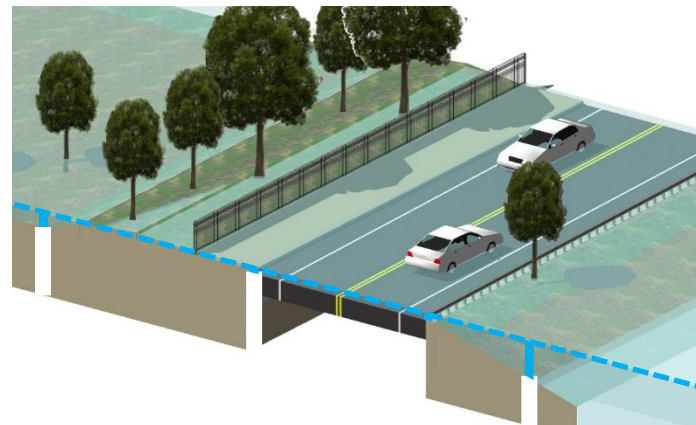


## 7 2050 Flood Scenario on Longshore Drive

The seventh focus area was taken at along Longshore Drive heading towards Harborview. This location includes protected open space and wetland land use. This roadway currently experiences frequent flooding and in the case of a future 100-year storm event this location could experience up to 3 to 4 feet of flooding depth in the roadway.



*Approx. Road Elevation 7.0*





John H. Ryan Park. Raymond St, South Norwalk  
Photo taken by AECOM

## Conclusion Summary

The Resilient South Norwalk project is a unique opportunity to build resilience through actionable solutions while simultaneously developing a replicable approach for addressing the many flood-prone underpasses along the Connecticut shoreline.

A review of the existing conditions at the study area and roadway corridors has confirmed the vulnerability echoed by the community. The roadway currently experiences flooding as a result of intense rain events, and the flooding can be further exacerbated when a storm system is accompanied by a storm surge, which hinders the functionality of the existing drainage network. Additionally, climate change will continue to increase the frequency with which the community experiences intense rainfall events and systems producing storm surges. By middle of the century Norwalk could experience 20 more days annually with 1 inch of rain or more and an additional 1.6 feet of sea level rise.

The impacts of climate change will also place a greater strain on the community's existing drainage and flood control systems and increase the likelihood for underpass flooding within the study area.

The impacts of extreme heat are also significant for the community along the study corridors. Large areas of higher land surface temperatures are clearly located along corridors that serve as pedestrian links between destination locations, as well as pedestrian routes to bus stops and the train station.



Hurricane Diane, 1955, Historical Photos:  
Photo Credit: Connecticut Post

## References:

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*Multi-Resolution Land Characteristics (MRLC) Consortium. 2011, <https://www.mrlc.gov/>. | locally collected high resolution maps of tree canopy. Land cover is calculated in 30-meter cells.*

"Norwalk Public Library History Room." 1 Jan. 2023, [norwalkpl.catalogaccess.com/](https://norwalkpl.catalogaccess.com/).

"Public Spaces, Impervious Surfaces, Town Utilities, & Town Zoning." 1 Jan. 2023, [gis-norwalk.opendata.arcgis.com/](https://gis-norwalk.opendata.arcgis.com/). | *Compiled from 2016 Ortho-imagery from City of Norwalk GIS Data. Data used to create Impervious surface, utility maps, and town zoning*

"The Flood of 1955 in Connecticut." 1 Jan. 2015, [www.ctpost.com/](http://www.ctpost.com/). Accessed 1 Jan. 2022.