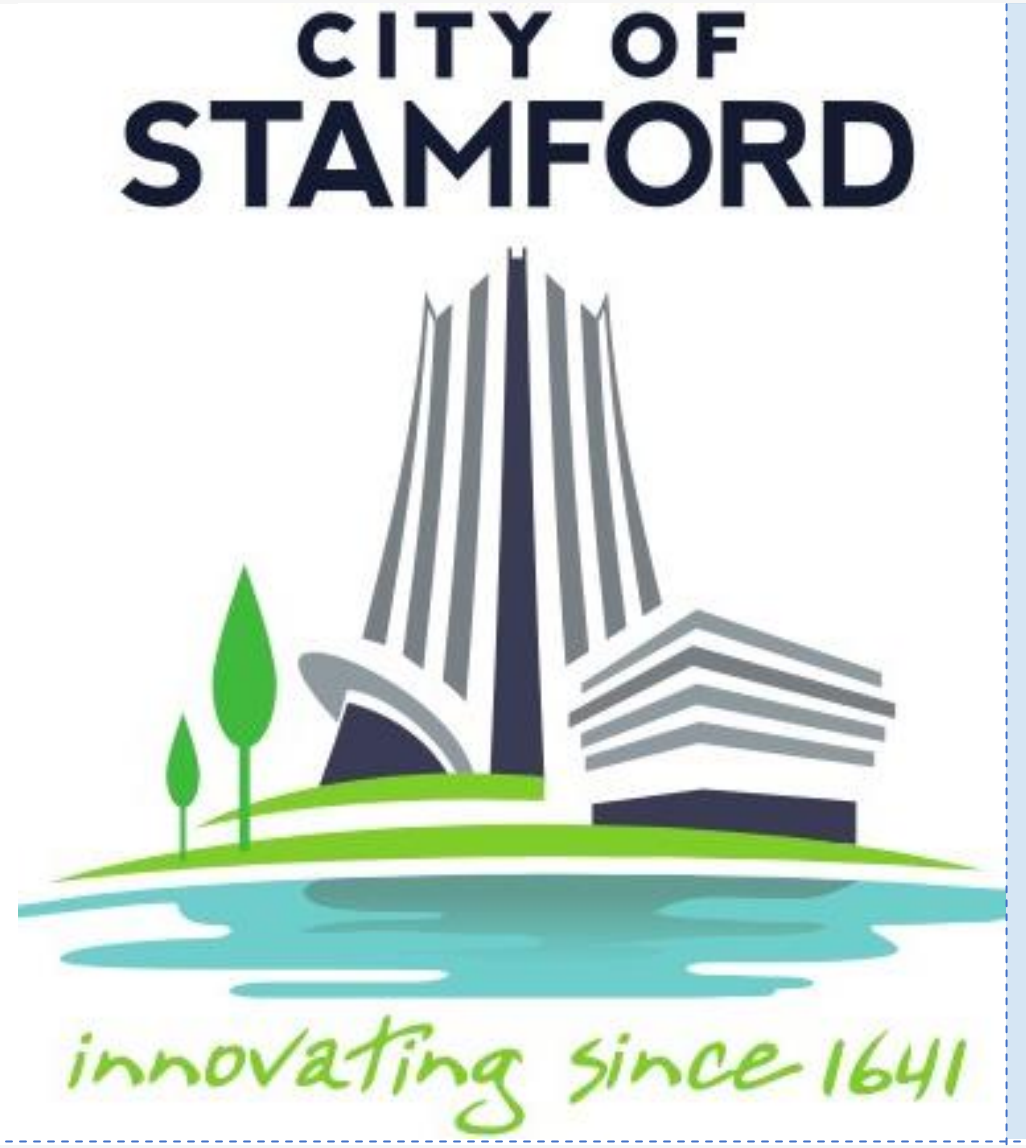
Mitigating the Impact of Severe Storms BOR Resolution: 4113

Office of Operations

June 20, 2022



City of Stamford: Community Profile

Stamford is a coastal community, with several rivers and streams flowing throughout the community.

The City is characterized by highly developed, lower elevations adjacent the shoreline, with suburban development sprawling northward away for the urban areas.

The Rippowam River flows south through the center of the City cutting through the suburban and urban areas before it eventually flows into Long Island Sound.

Three large waterbodies are also located in Stamford:

- North Stamford Reservoir,
- Samuel J. Bargh Reservoir, and
- Laurel Reservoir.

The highest elevation in Stamford is about 520 feet in the northern most areas bordering New York. With the southern area of Stamford being at, or close to sea level. The varying terrain of Stamford makes the City vulnerable to an array of natural hazards.

WESTCOG HMP, 2021, HMP-Annex-Stamford

City of Stamford: Community Profile

The Center for Land Use Education and Research (CLEAR) has developed a land cover dataset derived from 2016 satellite imagery to depict statewide land cover.

Table 2-1: Land Cover by Area

Land Cover Class	Acres	% of Total Land
Developed	11,068.1	45.01%
Turf & Grass	3,886.8	15.81%
Other Grasses	171.4	0.70%
Agricultural Field	129.8	0.53%
Deciduous Forest	7,574.1	30.80%
Coniferous Forest	401.0	1.63%
Water	677.7	2.76%
Non-Forested Wetland	15.2	0.06%
Forested Wetland	492.4	2.00%
Tidal Wetland	6.5	0.03%
Barren Land	168.1	0.68%
TOTAL	**24,591**	**100%**

Barren Land is defined by UConn CLEAR as mostly non-agricultural areas free from vegetation (such as sand and gravel, bare rock, mines and quarries), some urban areas, and some bare soil agricultural fields.

WESTCOG HMP, 2021, HMP-Annex-Stamford

City of Stamford: Climate

Climate Conditions:

- The temperature in Stamford typically varies from 24°F to 83°F and is rarely below 10°F or above 90°F.
- The warm season lasts from June 1 to September 15, with an average daily high temperature above 74°F.
- The hottest day of the year is July 20, with an average high of 83°F and low of 68°F.
- The cold season lasts from December 3 to March 12, with an average daily high temperature below 46°F.
- The coldest day of the year is January 29, with an average low of 24°F and high of 37°F

WESTCOG HMP, 2021, HMP-Annex-Stamford

City of Stamford: Climate

Precipitation:

• The wetter season lasts from March 31 to August 19, with a greater than 29% chance of a given day being a wet day.

• The chance of a wet day peaks at 36% on May 29. The smallest chance of a wet day is 22% on January 29.

• The most rain falls during the 31 days centered on June 3, with an average total accumulation of 3.8 inches.

• The least rain falls around February 6, with an average total accumulation of 2.0 inches.

• The snowy period of the year lasts from November 19 to April 5, with a sliding 31-day liquid equivalent snowfall of at least 0.1 inches. The most snow falls during the 31 days centered on January 26, with an average total liquid-equivalent accumulation of 0.7 inches.

• Winter-Season 2021/22, YTD = 20 Events (as of 6.01.2022)

WESTCOG HMP, 2021, HMP-Annex-Stamford

City of Stamford: Climate & Climate Change

Climate Change Current Conditions:

• Annual temperatures have been increasing in Connecticut and are projected to continue. By midcentury, the average annual temperature is projected to increase by 5 °F.

• Annual precipitation has been increasing statewide and is projected to continue to increase. By mid-century, annual precipitation is projected to increase by 8.5%, with the greatest increase (13.4%) occurring in the winter months.

• Extreme precipitation events are projected to increase in both frequency and magnitude. Based on this increase and the precipitation figures above, by 2050 Stamford can expect the 24-hour rainfall amount for a 50% annual-chance storm to be around 3.7 to 3.9 inches or greater.

• Despite overall increases in precipitation, drought risk is projected to increase, especially during summer, due to changing precipitation patterns and projected increases in potential plants taking up more water in hotter temperatures and longer growing seasons (evapotranspiration)

WESTCOG HMP, 2021, HMP-Annex-Stamford

City of Stamford: Drainage Basins & Hydrology

Stamford is divided among seven sub-regional watersheds as shown in Table 2-4. The majority of the sub-regional basins drain into Long Island Sound, with one basin draining into the Rippowam River basin, and another feeding the Mianus River basin. All the water that passes through Stamford eventually empties into Long Island Sound.

Table 2-4: Sub-Regional Drainage Basins

Drainage Basin	Overall Sub-regional Area (sq. mi)	Area within City (sq. mi)	Area within City (acres)	Percent of City
Rippowam River	23.53	17.03	10,898.89	44.41%
Mianus River	28.64	6.40	4,092.23	16.69%
Southwest Shoreline	11.54	7.34	4,699.36	19.14
East Branch Mianus River	5.39	3.76	2,403.62	9.81%
Noroton River	11.03	3.00	1,920.69	7.82%
Mill River	13.35	0.81	516.04	2.08%
Greenwich Creek	8.89	0.004	3.14	0.01%
Total	**n/a**	**38.344**	**24,800.97**	**99.96%**

Source: Connecticut Department of Energy & Environmental Protection GIS Data

City of Stamford: Drainage Basins & Hydrology

Reporting period 7/1/20 – 6/30/21 (full reporting year)

- 1,169 tons of liquids/solids removed from the 1,350 catch basins which were inspected and cleaned. That is 2,338,000 pounds of material, and is roughly equal to the weight of over seventeen (17) M1 Abrams tanks. Each tank weighs 62 metric tons (136,685.2lbs).

- 1,955 tons of material/debris collected and removed by City sweeper crews. Totals 3,910,000 lbs. and is equal to another 28 M1 tanks. This is material which would have otherwise been washed in to the MS4 system.

- Replaced 3,384 linear feet of stormwater piping as part of Street Patch and Resurfacing Capital project. Piping which was replaced was broken, damaged, collapsed, settled, or otherwise compromised. That is over ½ mile of underground, urban environment, pipe replacement.

Drainage & Related Infrastructure: Current Capacity

Reporting period 7/1/20 – 6/30/21 (full reporting year) – continued

- 566 Catch basin tops/sumps repaired and replaced as part of Street Patch Project.
- 70 Catch basin/Manhole/Piping issues repaired and replaced as a part of Citywide MH and Catch Basin Capital Project.

Reporting period 7/1/21- 6/20/22 (work ongoing and will be finalized 6/30/22)

- Preliminary data shows 2,356 inspections completed on 9,944 catch basins. Inspections include pumping and cleaning of catch basins sumps and documenting conditions of the structure.

Drainage & Related Infrastructure: Short Term Initiatives

Stormwater Management

- Suggest installation of signage on flood prone roads. This could include any city owned/maintained road located in the 100 year flood plain. Also to include roadways know to be historically flood prone. Refer to email I sent to previous Director McGrath / Frank Petise after Ida on 9/17/21. Also refer to GIS map illustrating known problem areas prepared by Cindy Barber from the Land Use Bureau.

- Suggest that public garages (Bell St., Bedford St. etc.) be opened to the public to park, free of charge, minimum 24 hours in advance of significant rainfall event. This is the procedure during snow emergencies, and should be considered in advance of flooding events as well. We should discuss the precipitation thresholds for this event – clearly during Ida, when over 8" was locally forecast, would be an appropriate time to employ this suggestion. This could have saved numerous cars and eliminated significant pollution sources from vehicle fluids.

Drainage & Related Infrastructure: Short Term Initiatives

Stormwater Management

- Public outreach (website, media, news outlets, press release, mobile message boards, etc.) to notify public of pending weather event. Administration to provide direction and advance warning. Coordinate with Director of Public Safety and EOC. Advance coordination with first responders PD/FD regarding contingency transportation plans.

- Operations personnel (Highways/Stormwater) in place prior to arrival of worst parts of the weather event. Numerous staff (myself included) rescued on way into work during Ida on evening of 9/1/21.

Drainage & Related Infrastructure: Long Term Initiatives

Stormwater Management

- Fully fund the capital project request by the Engineering Bureau to conduct a Citywide Drainage Study. (UPDATE – fully funded, 2022/23 Federal Grant ARP funding)
- Develop, prioritize, and budget a drainage capital improvement program based on information provided by the drainage study.
- BRIC grant requests from WPCA for stormwater pump station upgrades (previously discussed with BOR Operations Committee by WPCA)
- BRIC grant request from City/Land Use Bureau for Dannell Drive area and Cummings Park area.

Drainage & Related Infrastructure: Long Term Initiatives

Stormwater Management

- Requisition for purchase of new vacuum truck submitted by Vehicle Maintenance to Purchasing, 2/23/22. Purchase order issued, 4/4/22. New truck is being built. Anticipate delivery mid-2023. this will be the 4th vacuum truck in operation by the Stormwater Management Department.

- 2022-2023 approved operating budget for Stormwater management (2116) includes two additional equipment Operator/ Heavy Equipment Operator positions. The positions conduct the mandated work items related to MS4.

- Continue to identify areas where the MS4 stormwater system drains to WPCA sanitary infrastructure. Advocate to fully fund capital storm drainage construction budget requests from the Engineering Bureau to design and build these types of projects. Leroy Place project is an example.

SWPCA Responsibility for Facilities Impacted by Extreme Weather Events

- SWPCA Operates and Maintains the City owned Hurricane Barrier and its three (3) storm water pump stations that protect the South End from flooding caused by rainfall and extreme high tides
  - City reimburses SWPCA for the O&M costs for the Barrier and Pump Stations
  - City pays for capital improvements

- SWPCA's Water Pollution Control Facility (WPCF) is protected by the Hurricane Barrier from tidal floods, but is subject to very high wastewater flows from extreme wet weather.

- SWPCA's sanitary sewer system is subject to infiltration and inflow from groundwater and surface water that enters the sewer through cracks in the pipe and pipe joints, and illegal connection of building sump pumps, footer drains and roof leaders.

- SWPCA's collection system pump stations can be impacted by high flows, area flooding and power failure

SWPCA Ongoing Actions

- Infiltration and Inflow (I/I) Removal Program
  - Purpose is to remove ground water and storm water that enters sanitary sewer to reduce peak flow to WPCF
  - Conducted flow metering of sanitary sewer sub areas (Feb 2015 thru July 2016)
  - Ranked sub areas having highest I/I
  - Performed CCTV inspection of sewers, smoke and dyed water testing to locate sources of I/I
  - Have performed $400k to $500k each year of sewer lining, and sealing of leaking pipes and manholes
  - Currently designing next phase of sewer rehabilitation to be completed in FY 22-23

- Replace electrical equipment and emergency power generator at the Greenwich Avenue Pump Station
  - Elevated to protect against flooding from West Branch of Stamford Harbor
  - To be constructed this summer

SWPCA Proposed Short-term Initiatives

- Start design of needed improvements for the Cummings Park and Wampanu (West Beach) Storm Water Pump Stations

- Performed a hydraulic analysis of the WPCF and identified that the current hydraulic capacity of the treatment plant is 69 million gallons per day (MGD) at which flow will begin to overflow the aeration tanks' effluent channel. This is consistent with the design capacity of the Raw Sewage Pumping Station of 68 MGD.

SWPCA Proposed Long-term Initiatives

- Perform a Resiliency Study of WPCF and collection system pump stations
  - To provide protection from flooding
  - Identify need for an on-site emergency power generator
- Coordinate with City Engineering to evaluate future flows to Storm Water Pump Stations and adequacy of Pump Station capacity
- Coordinate with City Engineering and US Army Corps of Engineers to determine adequacy of Hurricane Barrier

Update on Funding Requests

Description	Amount	3/3/22 Status	6/20/22 Status
City-wide Drainage Study (2022/23 Capital Budget Request) – ARP Grant Funding	$500,000	Approved in 2022/23 budget.	Approved in 2022/23 budget.
Resiliency Study	$50,000	Appropriate, currently in Land Use	Appropriate, currently in Land Use
Study for the Coastal Stamford, FEMA Grant Request	$150,000	Pending approval	Approved. Award letter received, awaiting funds.
Flood Mitigation Assistance	TBD	$3.5 billion from this existing FEMA program can be used for projects that reduce or eliminate the risk of repetitive flood damage to buildings insured by the National Flood Insurance Program.	Application expected September 2022

SWPCA Proposed Long-term Initiatives

- Case study programs to study climate change prepared for ConnDOT: https://www.cakex.org/sites/default/files/documents/ctcasestudy.pdf
- Some sea level rise guidance to local governments is indicted here: https://sealevelrise.org/solutions/
- UConn studies provided here: https://circa.uconn.edu/sea-level-rise/
- Western Connecticut Council of Governments Multi-Jurisdiction Hazard Mitigation Plan Update: https://westcog.org/wp-content/uploads/2022/03/HMP-Annex-Stamford.pdf

Discussion

