

Draft 2022 Hackensack Meadowlands Floodplain Management Plan

Prepared in conformity with

The National Flood Insurance Program
Community Rating System
Activity 510 Guidelines

for

The New Jersey Sports & Exposition Authority
One DeKorte Park Plaza
Lyndhurst, New Jersey

October 2022

Table of Contents

1. INTRODUCTION.....	6
1.1 BACKGROUND	6
1.2 PLAN PREPARATION.....	8
1.3 MEETINGS OF THE PLANNING COMMITTEE	9
2. PUBLIC OUTREACH	10
2.1 STRATEGY	10
2.1.1 Public Meetings.....	10
3. Clay Avenue (Lyndhurst);.....	11
4. Polito Avenue and Rutherford Avenue (Lyndhurst);.....	11
5. BJ's Wholesale Club ditch (East Rutherford);	11
6. Bergen Logistics (Rutherford);.....	11
8. East Riser Tide Gates;.....	11
9. West Riser Tide Gates;.....	11
10. East Rutherford Tide Gates;.....	11
11. Rutherford Tide Gates;	11
2.1.2 Outreach to Residents Using Multiple Media	11
2.1.3 Flooding Questionnaire	12
2.2 RESPONSES	13
2.2.1 NJSEA Flooding Assistance for Property Owners	13
3. COORDINATION	23
3.1 MEETINGS WITH MUNICIPALITIES.....	23
3.2 COORDINATION WITH REBUILD BY DESIGN	24
3.3 COORDINATION WITH BERGEN COUNTY.....	25
3.4 BERGEN COUNTY BACKFLOW PREVENTER	25
3.5 RUTGERS SCIENCE AND TECHNICAL ADVISORY PANEL (STAP)	27
3.6 FEMA FLOOD INSURANCE STUDY	27
3.7 NEW JERSEY DEPARTMENT OF ENVIRONMENTAL PROTECTION STORMWATER RULES.....	28
3.8 NEW JERSEY DEPARTMENT OF TRANSPORTATION AND NEW JERSEY DEPARTMENT OF ENVIRONMENTAL PROTECTION	29
3.9 NJSEA MASTER PLAN	29
3.10 NJSEA FLOODPLAIN MANAGEMENT PROJECTS IMPLEMENTED SINCE 2005	31

3.10.1	<i>Palmer Terrace Tide Gate and Asia Place Ditch Cleanout (2007)</i>	31
3.10.2	<i>Route 17 Project (2009 - 2010)</i>	31
3.10.3	<i>Moonachie and Bashes Creek Tide Gates (2010)</i>	31
3.10.4	<i>West Riser Tide Gate (2014)</i>	31
4.	HAZARD ASSESSMENT	32
4.1	SPECIAL FLOOD HAZARD AREA.....	32
4.2	REPETITIVE LOSS AREAS.....	34
4.3	AREAS NOT MAPPED ON FIRM THAT HAVE FLOODED IN THE PAST	36
4.4	OTHER SURFACE FLOODING IDENTIFIED IN OTHER STUDIES	36
4.5	HISTORICAL FLOODING ASSESSMENT.....	36
4.5.1	<i>Hurricane Sandy and the Hackensack Meadowlands District</i>	39
4.6	FUTURE FLOOD ASSESSMENT.....	41
	42
4.6.1	<i>Changes in Floodplain Development and Demographics</i>	44
4.6.2	<i>Sea Level Rise</i>	44
4.6.3	<i>Sea Level Rise and Climate Change Studies</i>	48
4.7	EXISTING FLOOD PROTECTION INFRASTRUCTURE	49
4.7.1	<i>East Riser Tide Gate</i>	50
4.7.2	<i>West Riser Tide Gate</i>	50
4.7.3	<i>East Rutherford Tide Gate</i>	51
4.7.4	<i>Rutherford Tide Gate</i>	51
4.7.5	<i>Bashes Creek Tide Gate</i>	52
4.7.6	<i>Moonachie Creek Tide Gate</i>	52
4.7.7	<i>Frank's Creek Tide Gate</i>	53
4.7.8	<i>Losen Slote Pump Station</i>	53
5.	ASSESSING THE PROBLEMS	54
5.1	VULNERABILITY TO ASSESSED HAZARDS	54
5.2	FLOOD HAZARDS.....	54
5.2.1	<i>Life Safety and the Need for Warning and Evacuating Residents and Visitors</i>	54
5.2.2	<i>Public Health, Including Health Hazards to Individuals from Flood Waters and Mold</i>	54
5.2.3	<i>Critical Facilities and Infrastructure</i>	55
5.3	REVIEW OF HISTORICAL DAMAGE TO BUILDINGS	55
5.3.1	<i>Repetitive Loss Area Analysis (RLAA)</i>	56
5.4	ASSESSMENT OF NATURAL FUNCTIONS	57
5.5	ASSESSMENT OF DEVELOPMENT AND REDEVELOPMENT	58
5.6	FUTURE FLOOD ASSESSMENT.....	59

6. GOALS	60
7. REVIEW OF MITIGATION ACTIVITIES	60
7.1 FLOODPLAIN MANAGEMENT/HAZARD MITIGATION ACTIVITIES	60
7.1.1 Preventive Activities	60
7.1.2 Property Protection Activities	60
7.1.3 Natural Resource Protection Activities	61
7.1.4 Emergency Services	61
7.1.5 Structural Projects	61
7.1.6 Public Information Activities	61
7.2 HAZARD MITIGATION ACTIVITIES FOR BERGEN AND HUDSON COUNTY	61
7.3 REGULATORY REVIEW	67
7.4 ADDITIONAL POTENTIAL FLOOD HAZARD PROJECTS	68
8. ACTION PLAN	71
9. PLAN ADOPTION	75
10. PLAN MAINTENANCE	76
10.1 IMPLEMENTATION	76
10.2 EVALUATION	76
10.3 PLAN UPDATES	77
11. APPENDICES	78

Appendix A – Public Meeting Documentation

Appendix B – Municipal Meeting Documentation

Appendix C – Tide Gates and Inundation Maps

List of Figures

Figure 1 – Aerial Imagery of the Meadowlands District	6
Figure 2 – Flooding Questionnaire.....	12
Figure 3 - Aerial Map of Clay Avenue	14
Figure 4 – Flooded Parking Lots adjacent to Wetlands near Clay Avenue	14
Figure 5 – New 12” Culvert under Clay Avenue.....	15
Figure 6 – Aerial Map of Polito Avenue	16
Figure 7 – Flooding at Inlets on Polito Avenue at the Intersection with Rutherford Avenue	16
Figure 8 – Ditch System at Polito Avenue	17
Figure 9 –East Rutherford Ditch at BJ’s Wholesale Club	17
Figure 10 – Aerial Map of East Rutherford Ditch/BJ’s Wholesale Club	18
Figure 11 – Culvert with Floatables under NJ Transit Tracks.....	19
Figure 12 – East Rutherford Ditch Maintenance	20
Figure 13 – East Rutherford Ditch after Maintenance	20
Figure 14 – Aerial Map of Rutherford Tide Gates/Bergen Logistics	21
Figure 15 – Flooding at Bergen Logistics	21
Figure 16 – Upstream View of Vegetation and Debris at Rutherford Tide Gate.....	22
Figure 17 – Upstream view of Rutherford Tide Gate after Clearing Debris	22
Figure 18 – FEMA Floodplain - Special Flood Hazard Areas	33
Figure 19 – Repetitive Loss Areas	35
Figure 20 – Inundation Footprint in 2050 (2 Ft Sea Level Rise Projection)	43
Figure 21 – Inundation Footprint in 2100 (3 Ft Sea Level Rise Projection)	43
Figure 22 – Major District Tide Gates Location Map	49
Figure 23 – East Riser Tide Gate Downstream Face	50
Figure 24 – West Riser Tide Gate Downstream Face	50
Figure 25 – East Rutherford Tide Gate Downstream	51
Figure 26 – Rutherford Tide Gate Downstream Face	51
Figure 27 – Bashes Creek Tide Gate Downstream Face	52
Figure 28 – Moonachie Creek Tide Gate Downstream Face	52
Figure 29 – Frank’s Creek Tide Gate Downstream Face	53
Figure 30 – Losen Slote Pump Station Downstream Face	53

List of Tables

Table 1 – Summary of Flooding Questionnaire	13
Table 2 – Municipality Meeting Dates	23
Table 3 – History of Hurricane Surges at the Battery, New York City	38
Table 4 – History of Nor’easter Surges at the Battery, New York City	38
Table 5 – New Jersey Sea-Level Rise above the Year 2000 (1991-2009 Average) Baseline (Ft)*	46
Table 6 – Occupancy Class of Repetitive Loss Structures in the Meadowlands District	56
Table 7 –NFIP Policies, Claims and Repetitive Loss Statistics	56
Table 8 – List of Municipal Flood Hazard Projects from the County Hazard Mitigation Plans.....	62
Table 9 – List of Potential Flood Hazard Projects in the Meadowlands District.....	69
Table 10 – Floodplain Management Action Items.....	71

1. INTRODUCTION

1.1 Background

The Hackensack Meadowlands District (the “District”) contains a unique mix of land uses consisting of wetlands, water bodies, transportation routes (railroad facilities, bus/truck terminals and an airport), industrial, commercial and retail facilities, hotels and motels, residential, public and quasi-public services, communication and utilities (power stations, transmission lines, radio and television antennas), landfills and undeveloped open lands.

The 30.3-square-mile Hackensack Meadowlands District includes portions of 14 municipalities in Bergen and Hudson County. There are ten municipalities in Bergen County (Carlstadt, East Rutherford, Little Ferry, Lyndhurst, Moonachie, North Arlington, Ridgefield, Rutherford, South Hackensack and Teterboro) and four municipalities in Hudson County (Jersey City, Kearny, North Bergen and Secaucus). The District is bordered by Route 46 to the north; Routes 1 and 9 (also known as Tonawalla Avenue) and the freight lines owned by Norfolk Southern and CSX Corp. (the former Conrail Main line) to the east; the Port Authority of New York and New Jersey’s Trans-Hudson (PATH) commuter rail lines and the Pulaski Skyway to the south; and Route 17, the Pascack Valley rail line and the Kingsland rail line to the West. The majority of the District is comprised of low lying areas subject to tidal inundation or flooding during severe storm events.

The New Jersey Sports and Exposition Authority (NJSEA) is a regional planning and zoning agency for the 30.3 square mile Hackensack Meadowlands District.

The NJSEA has adopted land use regulations as well as floodplain management regulations. These regulations are codified in the New Jersey Administrative Code (N.J.A.C. 19:4-1.1, et. seq.). The NJSEA also performs construction code plan review of proposed development in accordance with

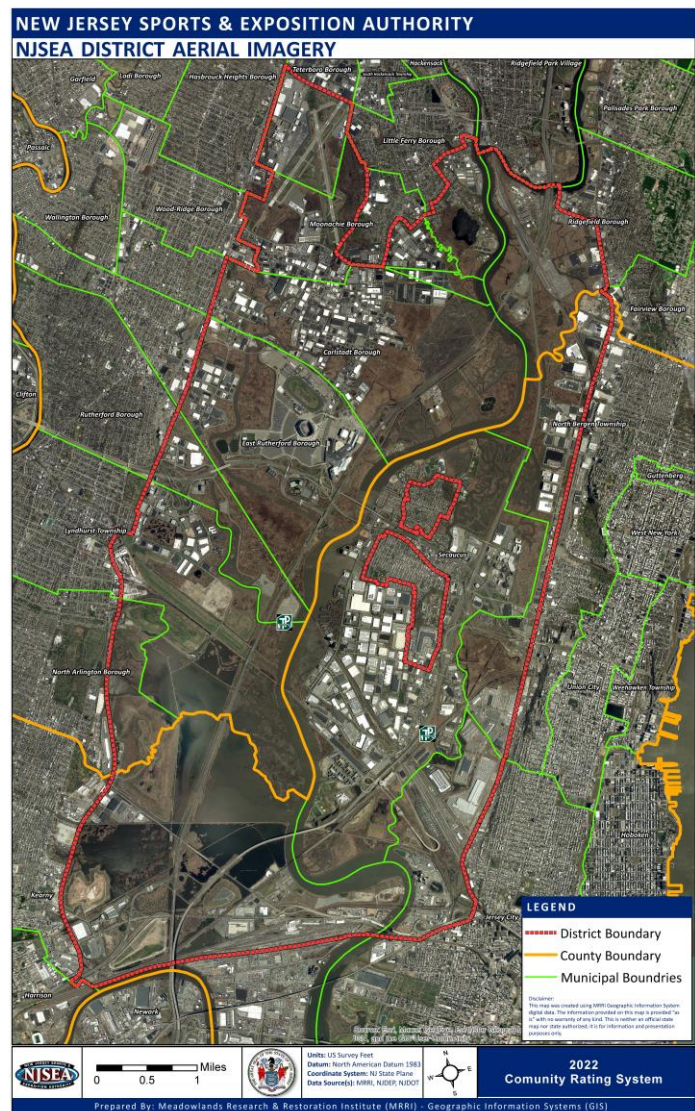


Figure 1 – Aerial Imagery of the Meadowlands District

the New Jersey Uniform Construction Code (NJUCC). Therefore, all development applications are reviewed in a comprehensive manner from the planning/zoning stage to construction.

All of the municipalities which comprise the Hackensack Meadowlands District are well informed of every development application. All zoning certificate approvals are sent to the Hackensack Meadowlands Municipal Committee, which is a board of Mayors or designees from each of the 14 municipalities. As such, there is a unique and cohesive partnership between the NJSEA and the 14 municipalities in the District.

Prior to the late 1960s, the typical approach to flooding in the United States focused on constructing flood-control structures, such as dams, levees and seawalls, and providing disaster relief to victims when flooding occurred. This approach did little to discourage unwise development near waterways, and may actually have encouraged such development in some instances. At the same time, due to the high risk and seasonal nature of flooding, insurance companies were unable to provide affordable flood insurance that was affordable to most Americans. Under these circumstances, government expenditures on flood disaster relief rose steadily over the years.

In 1968, the U.S. addressed the escalating cost of flood disaster relief by creating the National Flood Insurance Program (NFIP). The NFIP, administered by the Federal Emergency Management Agency (FEMA), is a voluntary partnership between local communities and the federal government. The NFIP provides federally backed flood insurance within communities that adopt and enforce floodplain regulations. Specifically, all communities that participate in the NFIP must adopt and enforce minimum standards for managing construction and development in designated “special flood hazard areas.” Communities that achieve a higher level of safety and protection than provided by the minimum standards can participate in the NFIP’s Community Rating System (CRS) to obtain discounts on flood insurance premiums.

The NJSEA participates in the CRS on behalf of the 14 municipalities within the Hackensack Meadowlands District. Property owners and tenants in the Hackensack Meadowlands District are entitled to a flood insurance discount due to the continued efforts by the NJSEA to exceed the minimum program requirements.

The NJSEA has participated in the CRS program since 1992. Originally, the discount obtained was only the minimum of 5 percent as the District was classified as a Class 9 community. The percentage discount derives from a point process based on community implemented floodplain management activities. Through the years, the NJSEA has been able to increase its rating through additional CRS activities as well as changes to the CRS program and point system itself. With the implementation of additional activities, the flood insurance premium discount has also increased, first to 10 percent as a Class 8 community, and then to the current rate of 15 percent based on the current Class 7 rating for the District.

For CRS purposes, there are three categories of repetitive loss communities. The categories are based on the number of properties in the community’s repetitive loss list. As defined by the NFIP,

a repetitive loss is strictly defined as an NFIP-insured structure that has had at least 2 paid flood losses of more than \$1,000 each in any 10-year period since 1978. The Hackensack Meadowlands District is classified as Category C, a community with 50 or more repetitive loss properties that have not been mitigated. It was not until Hurricane Irene in 2011 and Hurricane Sandy in 2012 that the District was classified as a Category C. There were only 6 repetitive loss properties in the District prior to these storms. After these storms, the number of repetitive losses increased to 110.

As a Category C community, the NJSEA is required to either prepare and adopt a floodplain management plan or prepare and adopt a repetitive loss area analysis for all repetitive loss areas. It was determined that the preparation of a district-wide Floodplain Management Plan (the “Plan”) would be applicable and benefit the entire District.

The NJSEA’s goal in preparing the district-wide Floodplain Management Plan is to maintain the 15 percent flood insurance discount and to examine additional projects to potentially increase the rating while comprehensively addressing the flooding that occurs in the District.

1.2 Plan Preparation

This Plan follows the guidelines for flood planning presented by FEMA for the CRS program. The initial step is to organize the planning process and the offices/people involved.

Credit points are earned if the office responsible for the community’s land use and comprehensive planning is actively involved in the floodplain management planning process. As previously noted, the NJSEA is the regional planning and zoning agency for the District, and the Land Use Management Division within the NJSEA oversees all zoning and planning within the District.

While the NJSEA prepared the Floodplain Management Plan, it is important to recognize that the District is very unique since portions of 14 municipalities are included within the District’s boundary. Therefore, input is required from the 14 constituent municipalities to understand specific flooding concerns and stormwater improvement projects that have subsequently been designed/budgeted by each municipality to mitigate the flooding. This Plan includes feedback from each municipality, as well as the related projects budgeted to address flooding issues.

Additional credit is earned if the planning process is conducted through a committee composed of staff from those NJSEA departments that implement or have expertise in the following activities:

- Preventive measures (e.g., codes);
- Property protection (e.g., elevation);
- Natural resource protection;
- Emergency services;
- Structural flood control projects; and
- Public Information.

The Floodplain Management Planning Committee consists of the following members from the NJSEA, who have expertise in all of the above activities, with the exception of emergency services:

- Jeffrey Zielinski, PE, LEED AP, CFM - Senior Engineer, CRS Coordinator – Solid Waste Operations
- Fawzia Shapiro, PE, PP, CFM, CME - Assistant Chief Engineer – Land Use Management
- Thomas Marturano, PE - Director – Solid Waste Operations
- Cheryl Rezendes, AICP - Principal Planner – Land Use Management
- Teresa Doss - Director – Natural Resource Management, Co-Director – Meadowlands Research & Restoration Institute

1.3 Meetings of the Planning Committee

The Planning Committee was required to meet a sufficient number of times to involve the members in the following key steps of the planning process, which consist of Chapters 4 through 8 of this report.

Due to the COVID-19 pandemic and resulting limits on public gatherings, the meetings were held both virtually and in person during 2021. The committee meetings were held in person during 2022. The Committee met on a monthly basis to discuss the topics below during the preparation of the Plan.

- Assess the hazard;
- Assess the problem;
- Set goals;
- Review possible activities; and
- Draft an action plan.

Conference calls and/or virtual meetings were also held with each constituent municipality between 2021-2022 in order to involve and obtain feedback from each municipality. The agendas for each municipal meeting are provided in Appendix B. The meetings were well attended and included mayors, municipal, managers, town engineers, construction officials, emergency management officials, and the department of public works.

The Planning Committee also held a meeting with the Bergen County Division of Planning and Engineering for County input. Due to scheduling conflicts, a meeting could not be coordinated between the Planning Committee and the Hudson County Division of Engineering. However, since this Plan is an ongoing document, a meeting with Hudson County will be scheduled in the near future and the Plan will be updated accordingly based on the feedback provided.

Public meetings were also held in person at the NJSEA facility to involve the public, including residents, business owners, property owners, stakeholders, and tenants in the District.

Eighteen meetings were held between the Planning Committee and the constituent municipalities, Bergen County, and the public in order to collect input and prepare the Plan.

2. PUBLIC OUTREACH

2.1 Strategy

The strategy for involving the public in the preparation of this Plan emphasized the following elements:

- Conduct public meetings to invite the public's input;
- Attempt to reach as many residents as possible using multiple media sources; and
- Use a survey/questionnaire asking the public to identify previously flooded properties and mitigation measures already installed.

2.1.1 Public Meetings

The NJSEA invited the public to comment throughout the planning process and held three public meetings to assist in the preparation of this plan. These meetings were open to the District's constituent municipalities, stakeholders, property owners, tenants, and the public, to seek input and to collect, log, and assess flooding incidents and concerns for further review. The public meetings were held in the Meadowlands Environment Center located at 2 DeKorte Park Plaza, Lyndhurst, New Jersey. Notice of these public meetings were published in The Record and The Star-Ledger newspapers. The public notices were emailed to the Mayor and Council, clerk, and construction official for each constituent municipality. The Public Notice was also emailed to a diverse group of stakeholders, the press, and other interested parties. Approximately 130 notification emails were sent to encourage attendance at the public meetings.

The Public Notices for each meeting, attendance sheets, and the PowerPoint presentations shown to attendees are included in Appendix A.

The first public meeting was held on June 1, 2022. The purpose of this meeting was to introduce the Floodplain Management Plan process to the public. The agenda included the following items:

1. Introduction;
2. Summary of the NJSEA's relationship with FEMA and the NFIP;
3. Ongoing initiatives that the NJSEA implements and performs;
4. Summary of the NJSEA services/planning tools to District municipalities regarding flooding/flood control;
5. Objectives of the Floodplain Management Plan and Process;
6. Outline of the Floodplain Management Plan and its Process;
7. Distribute Flooding Questionnaire;
8. Questions/comments; and
9. Discuss date for next meeting.

The second public meeting was held on August 10, 2022. The agenda included the following items:

1. Plan update since June 1, 2022 meeting;
2. Inspection of flooding incidents in the District;
3. Clay Avenue (Lyndhurst);
4. Polito Avenue and Rutherford Avenue (Lyndhurst);
5. BJ's Wholesale Club ditch (East Rutherford);
6. Bergen Logistics (Rutherford);
7. Tide gate inspections – present map with location, inspection form and photos;
8. East Riser Tide Gates;
9. West Riser Tide Gates;
10. East Rutherford Tide Gates;
11. Rutherford Tide Gates;
12. Importance of elevation certificates;
13. Address flooding through NJSEA zoning regulations;
14. Repetitive loss areas; and
15. Questions/closing statements.

The third public meeting was held on October 5, 2022. This purpose of this meeting was to introduce the draft Floodplain Management Plan to the public. The agenda included the following items:

1. Review of NJSEA's relationship with FEMA and the NFIP;
2. Objectives of the Floodplain Management Plan and process;
3. Review of CRS 10 step process for a credited Floodplain Management Plan;
4. Overview of Assessing the Problem (Step 5);
5. Goals established by the Floodplain Management Planning Committee (Step 6);
6. Overview of possible activities to mitigate the flood hazard (Step 7);
7. Present the Action Plan (Step 8);
8. Living Document/Annual Floodplain Management Plan Updates (Step 10); and
9. Questions/closing statements

2.1.2 Outreach to Residents Using Multiple Media

A Floodplain Management page is maintained on the NJSEA's website (<https://www.njsea.com/floodplain-management/>) to keep the public informed about planning activities and to solicit input.

The address of the website was publicized in social media releases, on the main NJSEA landing page and the 14 municipalities were encouraged to provide the information on their municipal website. The site provided the public with information on the plan development process, the Planning Committee, a flooding questionnaire and drafts of the plan. The NJSEA will keep the website active after the plan's completion to keep the public informed about mitigation projects and future plan updates.

2.1.3 Flooding Questionnaire

A Flooding Questionnaire was developed by the Planning Committee. The basis for the questions on the form included research into similar questionnaires used throughout the country by communities cooperating with FEMA efforts. The questionnaire was also circulated within the NJSEA for input from the Authority's engineers, planners, inspectors and construction code plan examiners. These questionnaires are used to document and collect flooding data in the District and to perform inspections and assessments.



2022 Flooding Questionnaire

Hackensack Meadowlands Regional Floodplain Management Plan
FEMA's Community Rating System (CRS) Requirement to Maintain 15% Flood Insurance Discount

Property Address _____
Municipality _____
Contact Information:
Name _____
Email Address _____
Company Name (if applicable) _____

- Has your building or property been flooded since 2016? () Yes () No
If "yes", please complete this entire questionnaire.
If "no", please complete questions 7-9.
- What were the dates of the flood(s)? Please list the month(s) and year(s) of the last three occurrences.

- Where did you get water, and how deep did it get?
() In basement _____ feet deep
() In crawl space _____ feet deep
() Over first finished floor _____ feet deep
() On land only _____ feet deep
() Water kept out of building by sandbagging, sewer valve or other measure
() Other _____
- What do you feel was the cause of your flooding? Check all affecting your building.
() Storm sewer backup () Sump pump failure/power failure
() Standing water next to building () Tidal flooding
() Saturated ground/leaks in basement walls () After rainfall event
() Overbank flooding from _____ Creek/River
() Other _____
- Have you installed any flood protection measures on your property?
() Sump pump () Back up power system/generator
() Tide gate/inline tide gate () Waterproofed walls
() Regraded property to keep water away from the building
() Other _____
- When did you move into or occupy the building (month and year)? _____
- What type of foundation does your building have?
() Slab () Crawlspace () Basement
- Do you have flood insurance? () Yes () No

Please upload any photos of the flooding incident(s) if available (please use JPG or PNG format only).

Figure 2 – Flooding Questionnaire

The questionnaire requested that the public provide information on flooding impacts to their properties, including possible causes and possible solutions. The questionnaire was also converted into an online survey and placed on the NJSEA website. The municipalities in the Hackensack Meadowland District were encouraged to provide a link to the questionnaire on their municipal websites. The Flooding Questionnaire was also promoted via social media. Hard copies of the questionnaire were available at the NJSEA administrative office.

2.2 Responses

A summary of the flooded properties identified by the flooding questionnaires is provided below:

Flooding Location	Municipality
Thumann's	Carlstadt
Polito Ave	Lyndhurst
Valley Brook Avenue	Lyndhurst
Clay Avenue	Lyndhurst
Broad Street	Carlstadt
13 th Street	Carlstadt
Grand Avenue	Moonachie
West Commercial Avenue	Moonachie
Avenue C/Moonachie Avenue	Moonachie

Table 1 – Summary of Flooding Questionnaire

While the flooding questionnaire has been effectively publicized at the public meetings and at all fourteen municipal meetings, the NJSEA received minimal comments and/or completed questionnaires. This can be attributed to a combination of the effects of the pandemic, the NJSEA's monitoring of eight key tide gates in the District, which provide significant tidal protection to upstream properties, and minimal flooding issues over the last year.

2.2.1 NJSEA Flooding Assistance for Property Owners

Drainage engineers from the NJSEA are available to provide assistance to property owners who are suffering from flooding issues. Several examples of flooding incidents inspected by the NJSEA are detailed below:

Clay Avenue (Township of Lyndhurst)

The property owner located off Polito Avenue in Lyndhurst contacted the NJSEA regarding rising water elevation within the wetland area on their property, which impacts access to their radio tower equipment. Stormwater from the surrounding properties on Wall Street West and Clay Avenue, as well as stormwater from portions of Valley Brook Avenue, are discharged into this wetland area, which is controlled by a culvert that crosses Clay Avenue.

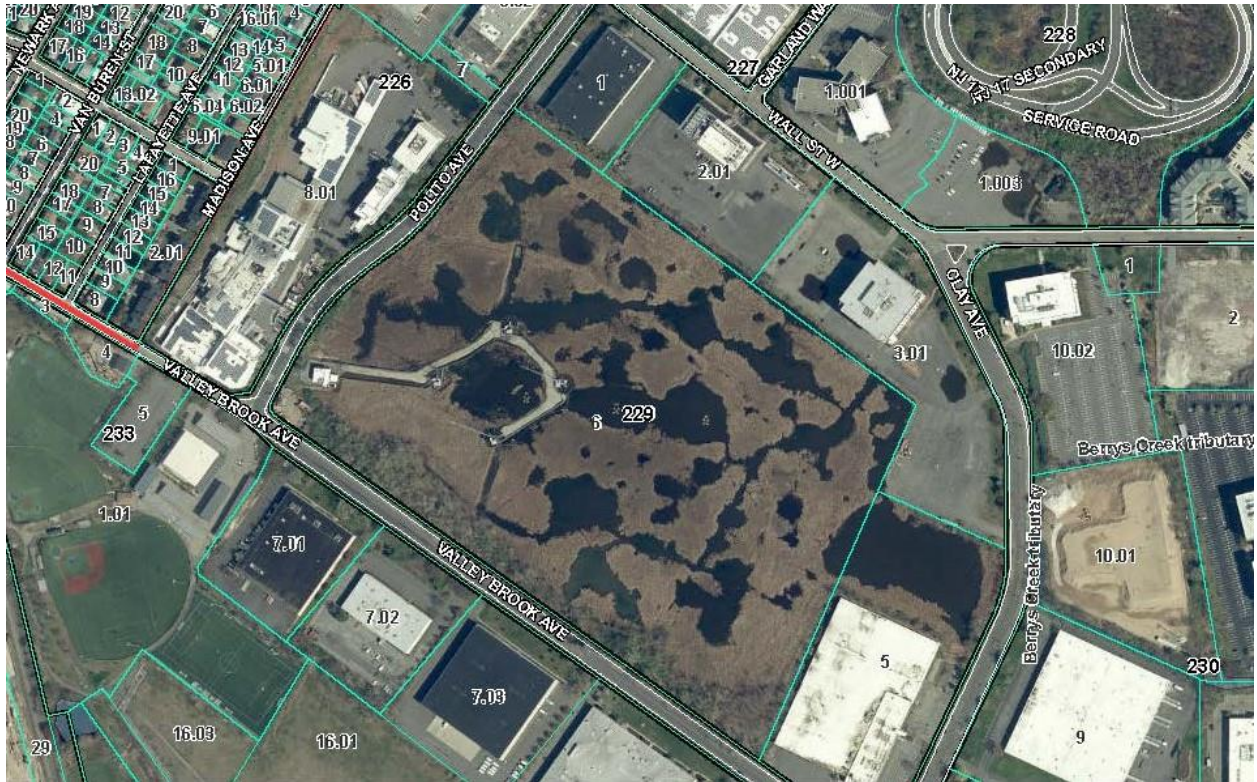


Figure 3 - Aerial Map of Clay Avenue

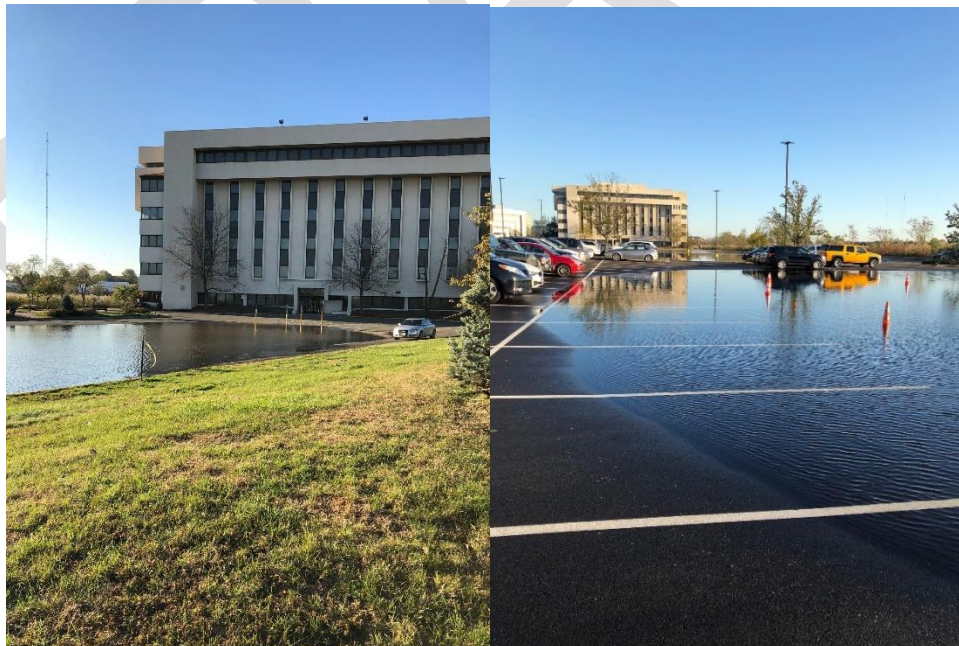


Figure 4 – Flooded Parking Lots adjacent to Wetlands near Clay Avenue

A water main break occurred in November 2020, which flooded portions of Valley Brook Avenue, Polito Avenue, and Clay Avenue, as well as the parking lots for the properties surrounding the wetland parcel. The water elevation in the wetland area increased and appeared to backup through storm pipes and into the upstream parking lots for the adjacent properties. The outlet pipe for the wetlands area appeared to be blocked, resulting in an extended period of flooding for the surrounding properties.

The NJSEA and Township of Lyndhurst inspected the flooded areas and determined that the outlet pipe for the wetlands area was most likely blocked. The Lyndhurst Township Engineer and Department of Public Works (DPW) authorized the installation of a 12-inch pipe in Clay Avenue that runs parallel to the existing outlet pipe. To date, this temporary culvert has maintained the water elevation in the wetland area, while provided a functioning outlet to prevent flooding of upstream areas.



Figure 5 – New 12” Culvert under Clay Avenue

Polito Avenue (Township of Lyndhurst)

Flooding occurs routinely at the intersection of Polito Avenue and Rutherford Avenue/Route 17. Inlets on the west side of Polito Avenue flood during minor rain events and surcharge during high tide events. The roadway flooding occurs frequently and orange cones are typically placed next to the inlets/flooded area to alert motorists.

The NJSEA discussed this flooding issue with the Lyndhurst Township Engineer. The inlets on Polito Avenue appear to flow to a ditch system on the south side of Rutherford Avenue in front of the existing hotel property (Polito Avenue, Route 17, Garland Way) and eventually to Berry's

Creek. There are no tide gates for the ditch systems around this area because these areas are classified as tidal wetlands. Therefore, the storm sewers in this area are tidally influenced. In addition, the ditch systems are overgrown and could be silted.

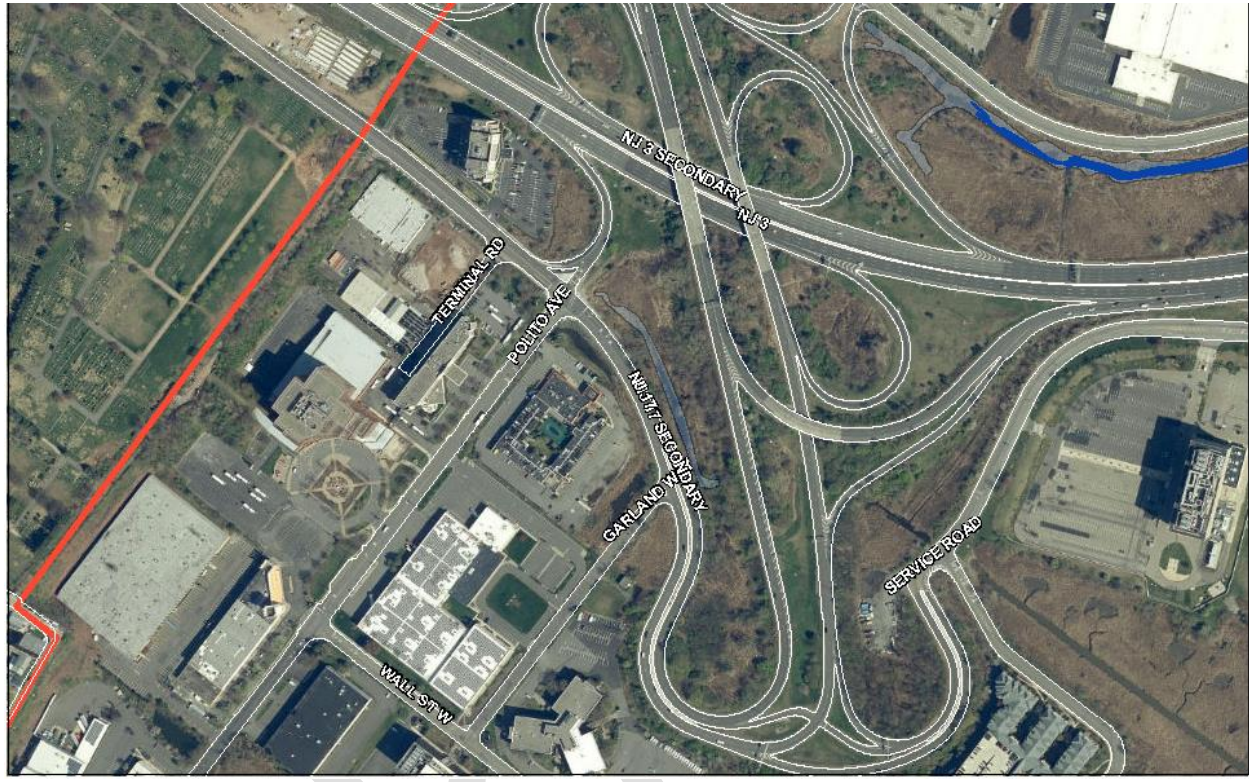


Figure 6 – Aerial Map of Polito Avenue



Figure 7 – Flooding at Inlets on Polito Avenue at the Intersection with Rutherford Avenue

The NJSEA recommends the installation of a check valve or one-way flap gate inside the Polito Avenue inlets to prevent tidal waters from backing through the pipes and ponding at the roadway inlets.

Survey data, including pipe size, pipe material, pipe inverts, and grate elevations, are required to determine the appropriate location for a check valve or flap gate at the pipe/inlet. Also, milling and repaving is required for a portion of the southbound side of Polito Avenue to correct the asphalt pavement that has deteriorated due to the standing water condition.



Figure 8 – Ditch System at Polito Avenue

East Rutherford Ditch adjacent to the BJ's Wholesale Club (Borough of East Rutherford)

In November 2016, the NJSEA was contacted by the Borough Engineer of East Rutherford, Glenn Beckmeyer, regarding ongoing flooding issues along DuBois St by the BJ's Wholesale Club.



Figure 9 –East Rutherford Ditch at BJ's Wholesale Club

The NJSEA subsequently scheduled an inspection of the area with the Borough Engineer and the property owner of the BJ's site. At this time, it was noted that in addition to the flooding on DuBois St, the parking lot of the BJ's was frequently flooded and portable pumps were being used to remove the water. In addition, the edge of the BJ's parking lot near the drainage ditch had

been compromised with both the guiderail and the edge of paving starting to collapse into the drainage ditch.



Figure 10 – Aerial Map of East Rutherford Ditch/BJ's Wholesale Club

As the initial response, the East Rutherford tide gate located at the end of the East Rutherford drainage ditch where it meets Berry's Creek was inspected to verify if it was functioning properly. After an on-site inspection and review of past water surface levels from sensors on the tide gate, it was determined that this tide gate was indeed functioning as intended and not the cause of the upstream flooding.

In follow-up meetings, the NJSEA identified a downstream culvert under NJ Transit tracks as a potential choke point for the stormwater runoff, as well as obstructions in the ditch itself including fallen trees, vegetation and accumulated sediment.



Figure 11 – Culvert with Floatables under NJ Transit Tracks

The NJSEA and NJ Transit inspected the culvert under the railroad tracks. This area was discovered to be filled with floatables (bottles, miscellaneous plastics, etc.) and other debris that impeded the flow of the ditch. NJ Transit then cleared out this area. The NJSEA also coordinated with Bergen County Operations to remove other obstructions in the ditch, including trees, branches and built up sediment.

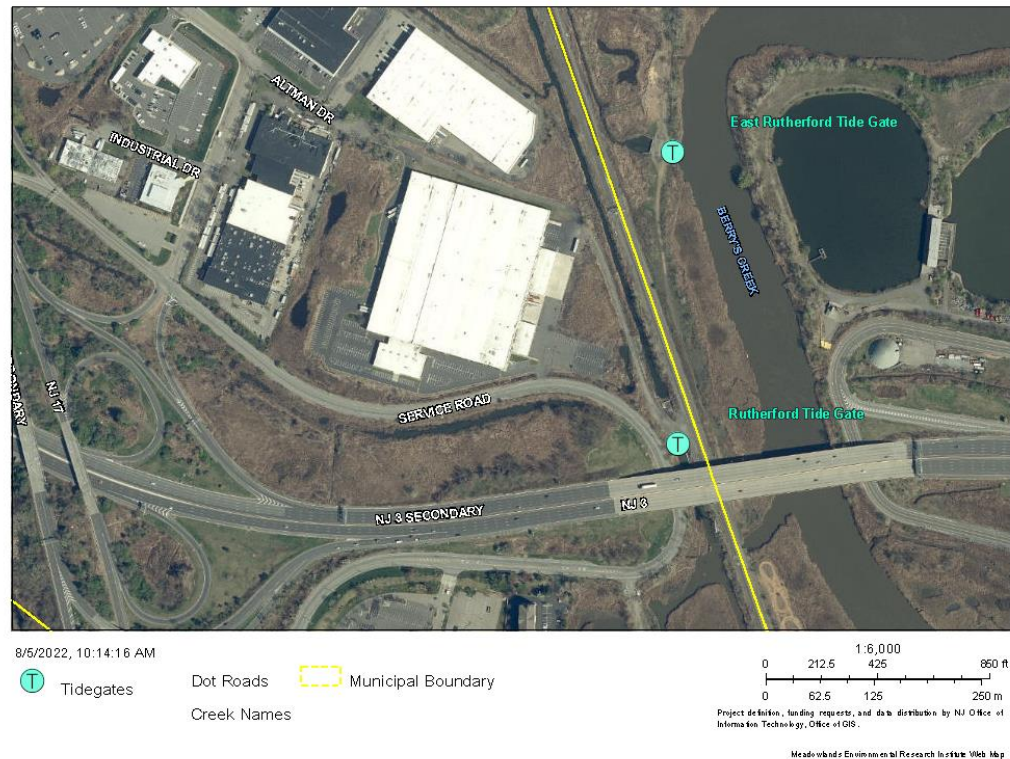
Since this maintenance operation, DuBois St and the BJ's Wholesale Club parking lot have had drastically reduced instances of flooding to the point where BJ's no longer requires the portable pumps and has rebuilt the parking lot along the ditch.



Figure 12 – East Rutherford Ditch Maintenance



Figure 13 – East Rutherford Ditch after Maintenance

Bergen Logistics (Borough of Rutherford)**Figure 14 – Aerial Map of Rutherford Tide Gates/Bergen Logistics**

In late August 2021, the NJSEA was contacted by the property owner for Bergen Logistics in regards to ongoing flooding issues on their property. This property is located in close proximity to the Rutherford Tide Gate. The property owners stated that they regularly maintained the onsite drainage ditches and were concerned that the flooding may be related to the tide gate.

**Figure 15 – Flooding at Bergen Logistics**

The NJSEA reviewed the logs from the sensors on the tide gates and detected a few anomalies and then proceeded with a field inspection of both the subject property and the tide gates. The drainage ditches around the site were filled with water, so it was difficult to determine their condition at the time. Upon arriving at the tide gate, it became readily apparent

that its functional capabilities were impeded by both debris that had accumulated at the trash rack and subsequent vegetation that had quickly grown on this debris.



Figure 16 – Upstream View of Vegetation and Debris at Rutherford Tide Gate

After the site inspection, the NJSEA reached out to Bergen County Operations to have them clear out debris from the trash rack of the Rutherford Tide Gate. It was not until late November that the access agreement was finalized with NJ Transit as train tracks run adjacent to the Rutherford Tide Gate, but shortly after its execution, Bergen County was able to mobilize their equipment to

clear the debris from the trash rack. Once the tide gate was restored to full functionality, the water level in the drainage ditches surrounding the Bergen Logistics site dropped quickly, and the flooding issue was alleviated. In the future, this process will be able to proceed more quickly now that an access agreement is already in place.



Figure 17 – Upstream view of Rutherford Tide Gate after Clearing

3. COORDINATION

The District's drainage problems have been studied over the years, and there are existing plans, studies, and reports on flooding that have been prepared and have resulted in flood protection projects by municipalities and other agencies. There also may be flood protection activities being considered or implemented by other agencies.

This CRS planning step credits the incorporation of other plans and other agencies' efforts into the Floodplain Management Plan. Other agencies and organizations must be contacted to determine if they have studies, plans, or information pertinent to the Floodplain Management Plan. For the purposes of the CRS Credit, coordinate means to:

- Contact the agency or organization and keep a record of the contact;
- Ask for data or information related to the hazard;
- Ask if the agency or organization is doing anything that might affect flooding or properties in flood-prone areas; and
- Offer the agency or organization an opportunity to be involved in the planning effort, such as by attending a committee meeting or commenting on the draft plan.

3.1 Meetings with Municipalities

The NJSEA organized virtual meetings and/or conference calls with each of the 14 constituent municipalities in the District to discuss local flooding issues and projects that have been implemented or those scheduled for implementation to address flooding issues. The meeting agendas can be found in [Appendix B](#) and a list of the dates of each meeting is noted in [Table 2](#).

Municipality	Meeting Date
Little Ferry	March 31, 2021
Kearny	April 1, 2021
Jersey City	April 14, 2021
Ridgefield	April 23, 2021
Secaucus	May 6, 2021
East Rutherford	May 13, 2021
Carlstadt	May 14, 2021
Rutherford	May 18, 2021
Teterboro	May 19, 2021
North Bergen	May 17, 2022
North Arlington	June 2, 2022
Lyndhurst	July 14, 2022
Moonachie	July 21, 2022
South Hackensack	August 3, 2022

Table 2 – Municipality Meeting Dates

3.2 Coordination with Rebuild by Design

As noted on the NJDEP Rebuild by Design Meadowlands website, on June 2, 2014, the United States Department of Housing and Urban Development (HUD) announced that a design concept for the Meadowlands area, near Little Ferry, Teterboro, Moonachie, and Carlstadt, was selected as a winner of HUD's Rebuild by Design competition. HUD allocated \$150 million to design and construct a project to reduce flooding risk and enhance resiliency in the Meadowlands area.

The NJSEA has been working with the NJDEP and AECOM on the Rebuild by Design Meadowlands Project and has been involved in the process since March 2016. The NJSEA staff participated in 26 executive steering committee meetings and 15 citizen advisory group meetings, as well as multiple conference calls and virtual meetings to discuss project specifics.

The Rebuild by Design Meadowlands projects include the Losen Slote Force Main and Liberty Street Pumping Station and the East Riser Ditch Channel and Pump Station. These projects have federal funding and are scheduled to be completed by 2025.

The Losen Slote Force Main and Liberty Street Pumping Station improvements are located within Moonachie and Little Ferry, but outside of the Hackensack Meadowlands District. The Losen Slote system transitions from open channel to underground pipes and open channel again to the Hackensack River. A pump station and force main is proposed within municipal roads to a discharge point at the Losen Slote open channel. The pump station/force main system will bypass a bottleneck in the existing pipe system that currently results in upstream flooding. While this project is located mostly outside of the District, the Losen Slote channel does flow through the District and mitigating this upstream flooding will benefit the District.

Improvements related to the portion of the Losen Slote Force Main and Liberty Street Pumping Station project within the District include the construction of an outfall structure on Losen Slote Creek, rip rap stream bank protection, and the removal of the downstream decommissioned tide gate structure to allow better flow within the stream. Since these improvements will be located on private properties that are within the jurisdiction of the NJSEA, the NJSEA reviewed the plans and subsequently issued a Letter of Acceptability noting that the proposed work is consistent with the District's zoning regulations.

The NJSEA has reviewed preliminary plans for the East Riser Ditch pump station and channel improvements and these improvements are located within the District.

The East Riser Ditch flows in a southerly direction from Moonachie Avenue (Borough of Moonachie) to the tide gate/trash rack system at Starke Road (Borough of Carlstadt) before its confluence at Berry's Creek. Trash racks are located on the north/upstream side of Starke Road and the East Riser tide gate is located on the south/downstream side of Starke Road. Culvert crossings are located at Amor Avenue, at a railroad bridge, and West Commercial Avenue to convey the ditch flow from Moonachie Avenue to Starke Road.

The East Riser Ditch tide gate and trash rack are maintained by Bergen County. During high tide conditions, the tide gates close to prevent tidal water from flowing upstream into the East Riser Ditch. Routine maintenance of the trash rack area is very important, as excessive debris would block water from flowing downstream. Also, if the East Riser Ditch tide gates were not operating properly, then the ditch would be subject to tidal flows that could inundate all adjacent low lying areas. A heavy storm event coinciding with a high tide is also concerning, as the closed tide gates increase the likelihood of the water surface elevation in the ditch overtopping the banks and flowing onto low elevation adjacent properties. Currently, portions of the East Riser Ditch have heavy vegetation or silt build-up, resulting in reduced storage capacity.

Based on the NJSEA's review of the preliminary drawings and subsequent discussions with the NJDEP, the East Riser Ditch pumping station will be located on the upstream side of Starke Road in the Borough of Carlstadt. The pump station will convey flow downstream of the East Riser tide gates, which will remain undisturbed, and into Berry's Creek via a force main. The pump station will decrease flooding impacts by pumping floodwaters when the tide gates are closed and/or when the water elevation in the ditch reaches a design elevation threshold, thereby reducing the water surface elevation in the ditch. This will allow additional drainage capacity in the ditch and prevent ditch banks from overtopping and will prevent low point areas upstream of storm outfalls from flooding.

Channel improvements are also proposed for the East Riser Ditch, which will have a positive impact for Carlstadt and Moonachie properties that are either located adjacent to the ditch or convey stormwater to the ditch. The channel improvements are proposed to begin on the south side of the Moonachie Avenue Bridge over the East Riser Ditch and will extend downstream to the trash rack area at Starke Road, spanning approximately 4,100 feet through the ditch. The ditch channel will be widened and deepened, and accumulated sediment and overgrown vegetation will be removed to improve water conveyance in the ditch. These activities, in combination with the proposed pump station, will decrease flooding impacts for a significant portion of Moonachie and Carlstadt.

The NJDEP has submitted a zoning certificate application and related plans to the NJSEA for the pump station improvements. It is the NJSEA's understanding that an application and plans for the channel improvements will follow shortly.

3.3 Coordination with Bergen County

The NJSEA organized a conference call with the Bergen County Division of Engineering on July 20, 2022, to discuss local flooding issues. The meeting agenda can be found in Appendix B.

3.4 Bergen County Backflow Preventer

Based on our discussions, Bergen County has received funds from the FEMA Hazard Mitigation Grant Program to install inline backflow preventers within existing pipes and inlets in various locations throughout Bergen County. These backflow preventers stop tidal waters from backing up through the drainage systems and flooding upstream areas during tidal events. Several

locations for the proposed work are within the District, as detailed below, and this work will be moving forward in the latter stages of 2022, with all work completed by 2023. All of the project sites are located within the tidal flood hazard area of the Hackensack River, as per FEMA mapping.

Riverside Avenue (Borough of Little Ferry)

A storm system located at the end of Riverside Avenue in Little Ferry discharges directly into the Hackensack River and is not protected by a tide gate to prevent tidal waters from surcharging through the storm system. The proposed work includes the in-kind replacement of the terminal pipe section, including construction of a flared end section and installation of a Tideflex inline backflow preventer within the 30-inch outlet pipe at this tidally influenced area.

Gates Road (Borough of Little Ferry)

A storm system located within Gates Road in Little Ferry discharges directly into the Hackensack River. This area is tidally influenced and the inlets at Gates Road surcharge during high tide conditions. The proposed work includes the in-kind replacement of the terminal pipe section, including the construction of a concrete headwall and installation of a Tideflex inline backflow preventer within the 30-inch outlet pipe. Sediment and debris removal is required at the pipe outlet, as well as the installation of a reno mattress scour hole to prevent silting/sedimentation into the River.

Meadow Lane (Borough of Carlstadt)

A storm system located at the end of Meadow Lane in Carlstadt discharges to the Moonachie Creek. The pipes at the upstream inlet, located at the end of the cul-de-sac, are silted and require maintenance. The proposed work includes the installation of a Tideflex inline backflow preventer within the existing 24-inch storm pipe at this location. An inlet, located on the south side of Meadow Lane (within an industrial property), is proposed to be replaced with a precast inlet and section of new pipe to accommodate a Tideflex inline backflow preventer. This storm system also flows to the Moonachie Creek and the proposed work includes the installation of reno mattress protection at the pipe outlet to prevent scour. Other inlets, located within an industrial property on the north side of Meadow Lane, are also proposed to be equipped with inline backflow preventers at the existing pipes. Collectively, these improvements will lessen flooding conditions at Meadow Lane and on the adjacent properties.

East Joseph Street (Borough of Moonachie)

The storm system within East Joseph Street terminates at the Losen Slote channel. Proposed work in this location includes the installation of a Tideflex inline backflow preventer within the existing 24-inch storm pipe and removal of sediment and debris at the outfall. Flood protection at this tidally influenced area will have a positive impact on the surrounding residential neighborhood.

Congress Drive (Borough of Moonachie)

A storm system located in Congress Drive discharges beyond the cul-de-sac and into a ditch that drains to the Losen Slote channel. The proposed work includes the installation of a Tideflex inline backflow preventer within the existing 18-inch storm pipe and sediment/debris removal at the outfall. These improvements will lessen flooding impacts for the industrial properties on Congress Drive and portions of State Street in Moonachie.

Empire Boulevard Terminus (Borough of Moonachie)

The proposed drainage improvements include the installation of Tideflex inline backflow preventers for multiple pipes (12-inch PVC, 42-inch X 66-inch elliptical RCP, 30-inch RCP) located at the Empire Boulevard terminus. These pipes discharge into a stone lined ditch that flows to the Losen Slote channel. The multiple pipes to be equipped with the backflow preventers are part of the main storm sewers systems that drain portions of Empire Boulevard, State Street, and Horizon Boulevard in Moonachie. These drainage improvements will lessen flooding impacts for industrial properties in the area.

3.5 Rutgers Science and Technical Advisory Panel (STAP)

In 2015, the New Jersey Science and Technical Advisory Panel (STAP) was assembled by Rutgers University on behalf of the New Jersey Climate Change Alliance. The Panel includes research universities, federal agencies, and science professionals that organized to identify and evaluate current science on sea level rise (SLR) specific to New Jersey and to provide practical options for public and private sector practitioners. STAP released a report in 2016 entitled “Assessing New Jersey’s Exposure to Sea-Level Rise and Coastal Storms: Report of the New Jersey Climate Adaptation Alliance Science and Technology Advisory Panel.” STAP released a follow-up report in 2019 to update the 2016 version, including SLR projection ranges based on low, moderate, and high greenhouse gas emissions scenarios through 2150. The 2019 STAP report is entitled “New Jersey’s Rising Seas and Changing Coastal Storms: Report of the 2019 Science and Technical Advisory Panel”. The 2019 Report is considered the most recent reference in the series and a summary of the 2019 Report is located in Chapter 4.6.2 of this Plan.

3.6 FEMA Flood Insurance Study

A significant portion of the District is comprised of low lying areas located within the FEMA Special Flood Hazard Area (SFHA), which are subject to inundation by the one percent annual chance flood (100-year flood). Approximately 77% of the District is located within the SFHA, and the majority of the District, approximately 75 percent, lies within FEMA’s Special Flood Hazard Zone AE.

The NJSEA Floodplain Management Zoning Regulations (Subchapter 9), dated August 19, 2019, require that new construction and substantial improvement of any residential, commercial, industrial or other nonresidential structure located in an area of special flood hazard shall have the lowest floor, including basement, together with the attendant utilities and sanitary facilities, as well as all electrical, heating, ventilating, air conditioning, and other equipment, elevated at or

above the base flood elevation (published FIS/FIRM) plus one foot, the best available flood hazard data elevation plus one foot, or as required by ASCE/SEI 24-14, Flood Resistant Design and Construction, Table 2-1, whichever is more restrictive.

Effective FIRMs and Preliminary FIRMs are reviewed in order to determine the applicable and most restrictive base flood elevation. Effective and Preliminary FIRMS are available at the NJSEA Office and NJSEA staff is available to assist in determining the most restrictive base flood elevation for development purposes.

The Flood Insurance Study (FIS) for Bergen County, dated August 28, 2019, includes detailed data regarding recent tropical events, including Hurricane Floyd (September 1999), Hurricane Irene (August 2011), and Hurricane Sandy (October 2012). Additional data regarding these storm events is located in Chapter 4.5 (Historical Flooding Assessment) of this Plan.

3.7 New Jersey Department of Environmental Protection Stormwater Rules

The New Jersey Department of Environmental Protection (NJDEP) published a revised set of stormwater regulations that affected land development practices within the state. The revisions required the use of decentralized green infrastructure practices and provided a more objective review process for projects. The new rule amendments went into effect on March 2, 2021. The NJ Stormwater Management Rules at N.J.A.C. 7:8 are incorporated by reference, as amended or supplemented, within the Hackensack Meadowlands District Zoning Regulations at N.J.A.C 19:4-8.6. Therefore, compliance with the current Stormwater Management Rules is required in the District.

Previous regulations required the use of nonstructural stormwater management strategies to “the maximum extent practicable.” The new rules eliminate this subjective language and instead provide a clearly articulated, mathematically-based set of standards for stormwater design compliance.

A second component to the new rule is the change in permitted stormwater modeling criteria. Infiltration of captured stormwater through best management practices (BMPs) is now permitted in engineering calculations. This change results in smaller stormwater BMPs, thus maximizing developable area on a site.

These new stormwater rules require that major development projects meet the groundwater recharge, stormwater runoff quality and quantity standards through the use of green infrastructure. Green infrastructure is widely recognized to be a cost-effective and resilient approach to managing stormwater while simultaneously providing environmental, social, and economic benefits. These benefits include reduction in urban heat island effect, decreased energy use, removal of pollutants from the air through greater utilization of vegetation, beautification of public spaces, and increased property values.

Green infrastructure more effectively maintains or mimics natural hydrology and provide environmental benefits by infiltrating precipitation to replenish groundwater and stream base flow, evapotranspiring and evaporating precipitation to reduce stormwater discharge volume, and intercepting precipitation to reduce runoff and erosion. Because of these aspects of green infrastructure, the discharge of stormwater downstream of a green infrastructure system is reduced in comparison to the discharge that would occur if that same stormwater was managed using a traditional detention basin. In addition to the benefits noted above, this volume reduction directly improves the quality of the discharge and helps to prevent flooding.¹

3.8 New Jersey Department of Transportation and New Jersey Department of Environmental Protection

The NJSEA coordinates with the New Jersey Department of Transportation (NJDOT) regarding projects within the District. As an example, the NJDOT and NJSEA are currently reviewing a proposed project for Route 7. The NJDOT will be utilizing federal funds for a roadway project that includes improvements along Route 7 from its interchange with the Newark-Jersey City Turnpike (Township of Kearny) to the portion of Route 7 adjacent to the Arlington Memorial Park and Cemetery (Borough of North Arlington). The improvements are proposed to mitigate tidal and storm surge flooding conditions within this section of Route 7. The proposed work includes raising the roadway profile for Route 7 and addressing related impacts to drainage systems and other roadway conditions. The road profile is proposed to be raised a maximum of 3.5-feet, where feasible, to address existing flooding conditions. While the project is still in the design phase, the NJSEA has held multiple meetings with the NJDOT to determine project impacts within the District.

In addition to coordination with the NJDOT, the NJSEA also holds quarterly virtual meetings with the NJDEP to discuss the review of development applications in the District that are under review by both agencies. NJDEP reviewers from various departments attend these quarterly meetings with NJSEA Land Use Management staff. These meetings allow reviewers from both agencies to discuss project specifics and details, including potential issues, violations, and review status/timelines. Staff from both agencies are able to collaborate on important development issues that impact the District.

3.9 NJSEA Master Plan

The NJSEA Floodplain Management Plan has been prepared to complement and enhance the goals of the Hackensack Meadowlands District Master Plan. The NJSEA's Hackensack Meadowlands District Master Plan Update 2020 provides a series of goals and objectives to guide future development and preservation efforts in the District, including a goal to increase the security and resiliency of the District and its neighboring areas by mitigating hazards and risks. The Master Plan's implementation strategy for this goal includes the evaluation of non-structural

¹ New Jersey Green Infrastructure Municipal Toolkit, <https://gitoolkit.njfuture.org/nj-stormwater-rules/#rule-overview>

strategies to address flooding impacts and to promote a resilient and sustainable District (Chapter 9 - Sustainable Meadowlands: A Guide to Resiliency). Some Master Plan strategies, as detailed below, are related to comprehensive planning, overlay zones, the floodplain regulations, construction codes and setbacks/buffers.

Comprehensive Planning

In order to increase resiliency of the District, the NJSEA will identify areas in the District that may be targeted for increased levels of protection. The NJSEA will assess vulnerabilities and select responsive strategies to incorporate within future amendments to the District Zoning Regulations. The adoption of the NJSEA Floodplain Management Plan is an important component in the implementation of the NJSEA's floodplain management planning objectives.

Overlay Zones

Overlay zones could be identified for specific vulnerable areas to allow supplementary regulations to apply to that area, which are in addition to the existing regulatory requirements of that zone. As an example, a "sea-level rise overlay zone" could be introduced to require increased finished floor freeboard above a base flood elevation, increased setbacks from a waterway, or limiting new development within an area targeted for increased levels of protection.

The Floodplain Regulations

The District's floodplain management regulations set forth procedures and engineering and planning standards used by the NJSEA to review and approve or disapprove development applications or use of land within the District. Future considerations may include enhanced freeboard requirements between finished floors and base flood elevations to reduce impacts from flooding to protect life and property.

Construction Codes

The NJSEA is responsible for construction code plan review of proposed development within the District in accordance with the New Jersey's Uniform Construction Code (NJ UCC). Construction codes can be used to promote resilient design by maximizing the ability of structures to withstand flooding. Design requirements are routinely used to reduce flooding impacts to coastal development. Building retrofit measures can include elevation of the structure or finished floor, dry or wet flood-proofing, or demolition. Future considerations may include requiring more restrictive construction code requirements in areas at risk from sea-level rise.

Setbacks/Buffers

The District zoning regulations specify minimum buffers that require certain distances be maintained from waterways. Fill, structures, and impervious pavements are not permitted within a required waterway buffer since these buffers include natural landscapes that may reduce flood

impacts, provide water quality benefits through existing vegetation, and provide important habitats. The NJSEA will review development applications to continue to ensure that sufficient setbacks/buffers are maintained from drainage ditches, creeks and waterways.

3.10 NJSEA Floodplain Management Projects Implemented Since 2005

The recent projects listed below have been implemented in keeping with the NJSEA's goal of planning and managing to effectively reduce the impact of flooding in the region. These examples demonstrate the NJSEA's ability to collaborate, plan, effectively manage and complete projects that benefit the District as a whole:

3.10.1 Palmer Terrace Tide Gate and Asia Place Ditch Cleanout (2007)

This flood control project included the restoration of several drainage systems in the Boroughs of Carlstadt and Moonachie between Washington Avenue and Gotham Parkway. NJSEA engineers designed the improvements, including a new tide gate on Palmer Terrace in Carlstadt and 4,500 linear feet of ditch cleanout (Asia Place ditch system). This \$340,000 project serves to better manage tidal impacts on industrial and commercial properties west of Washington Avenue.

3.10.2 Route 17 Project (2009 - 2010)

This flood control project, which was undertaken to relieve flooding on Route 17 in the Boroughs of East Rutherford and Rutherford, was a joint effort involving the NJSEA, County of Bergen, and the New Jersey Department of Transportation (NJDOT). The first phase of the project included the installation of a dozen culverts, and the installation of new tide gates (Rutherford and East Rutherford tide gates) to better control tidal flow from the Hackensack River. The project also included the clearing of a drainage ditch that conveys runoff from Route 17 and adjacent properties to the new tide gates. Another phase of the project included the NJDOT installation of drainage pipes at the Route 17 low point and upgrading the existing roadway stormwater system. These collective improvements, at a cost of \$5.5 million, help to minimize tidal flooding and storm surges from flowing upstream to the highway and from impacting commuters, businesses, and residents in the area.

3.10.3 Moonachie and Bashes Creek Tide Gates (2010)

This flood control project included the installation of two new tide gates in Borough of Carlstadt located near the Hackensack River at the Bashes Creek and Moonachie Creek culverts that cross under the New Jersey Turnpike's Western Spur. These improvements, at a cost of \$414,000, help to address tidal surges from impacting the industrial area located east of Washington Avenue. The tide gates were outfitted with solar-powered sensors that allow NJSEA scientists to remotely monitor the gates' operations.

3.10.4 West Riser Tide Gate (2014)

This flood control project, located along the West Riser Ditch on the border of the Boroughs of Moonachie and Wood-Ridge, included the installation of a new tide gate structure with a trash rack system to replace the original 1977 structure. The \$1,249,800 project was partially funded

by a \$551,800 grant from the Port Authority of New York and New Jersey (PANYNJ), with the NJSEA funding the remaining balance. This project helps to better protect residential (including the mobile home communities in the District), commercial, and industrial properties in Moonachie, Carlstadt, Wood-Ridge and Teterboro, including the Teterboro Airport, from daily tidal flooding from the Hackensack River.

4. HAZARD ASSESSMENT

In assessing the hazards, the committee reviewed, analyzed and summarized data collected about the natural hazard that the District faces. This step focuses on the sources, frequency, extent, and causes of flooding.

4.1 Special Flood Hazard Area

As the Hackensack Meadowlands District encompasses the low-lying areas along the Hackensack River, a large percentage of the District is located within the Special Flood Hazard Area. Out of an overall area of 19,405 acres in the District, the Special Flood Hazard Area encompasses 14,991 acres or 77% of the entire District.

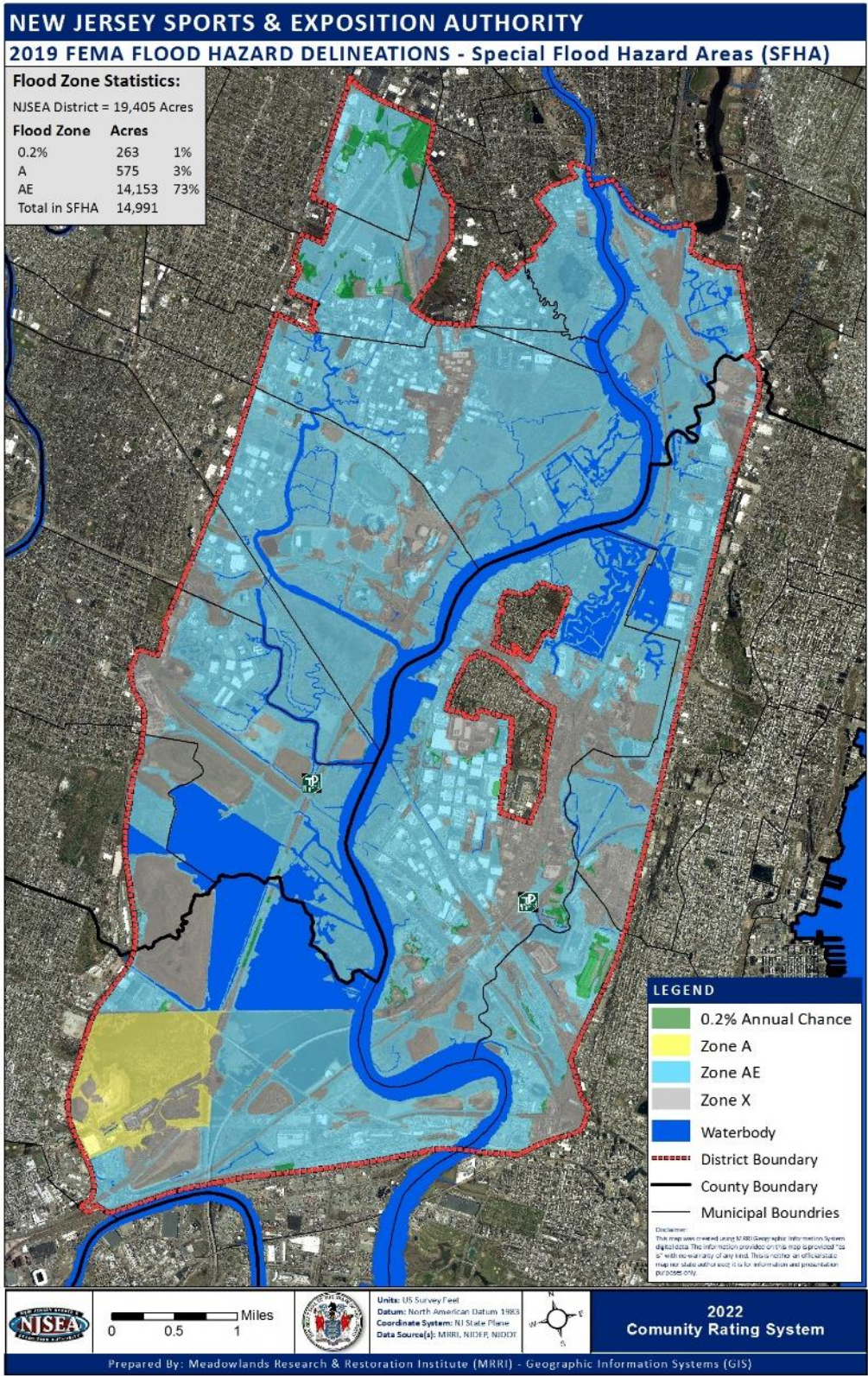


Figure 18 – FEMA Floodplain - Special Flood Hazard Areas

4.2 Repetitive Loss Areas

The Hackensack Meadowlands District is classified as Category C, a community with 50 or more repetitive loss properties that have not been mitigated. Note that prior to 2011-2012, which were the years of Hurricane Irene and Hurricane Sandy, there were only 6 repetitive loss properties in the District. After these storms, there were 110 repetitive loss properties.

Due to privacy concerns, FEMA does not allow the identification of individual repetitive loss properties. Therefore, a general summary of the repetitive loss areas is provided in the Plan.

There are a cluster of commercial and industrial repetitive loss properties in the Borough of Carlstadt in the vicinity of Paterson Plank Road and Broad Street that experienced tidal flooding from Berry's Creek and its tributaries. Also in Carlstadt, there are scattered individual commercial properties that experienced tidal flooding from other water bodies, including the East Riser Ditch, Peach Island Creek and Moonachie Creek. These are mainly properties that were constructed prior to the establishment of the Hackensack Meadowlands District and related zoning regulations, with the first floor elevation below the FEMA base flood elevation in the area.

In the Town of Kearny, there is only one repetitive loss property that experienced tidal flooding from the Kearny Marsh and the Hackensack River. Similar to the Carlstadt properties, this property was also constructed prior to the establishment of the Hackensack Meadowlands District, with the first floor elevation below the FEMA base flood elevation in the area.

There is a large cluster of residential repetitive loss properties in the Borough of Little Ferry that experienced tidal flooding from Depeyster Creek. There are also a small number of industrial properties included in this area. The repetitive loss areas of Little Ferry also include a commercial property in close proximity to the Hackensack River, which was the direct cause of the tidal flooding affecting the property. The buildings on these properties were constructed prior to the establishment of the Hackensack Meadowlands District, with the first floor elevation below the FEMA base flood elevation in the area.

In the Borough of Moonachie, there are also several clusters of repetitive loss areas. These are older commercial, industrial and residential properties constructed prior to the establishment of the Hackensack Meadowlands District, with the first floor elevation below the FEMA base flood elevation in the area. The repetitive loss areas in Moonachie were influenced by tidal flooding due to multiple drainage systems, including the Asia Place Ditch, Berry's Creek and its tributaries, Losen Slote and the East Riser Ditch.

In Borough of Ridgefield, there is only one commercial repetitive loss property that experienced tidal flooding from Bellman's Creek. This property was also constructed prior to the establishment of the Hackensack Meadowlands District, with the first floor elevation below the FEMA base flood elevation in the area.

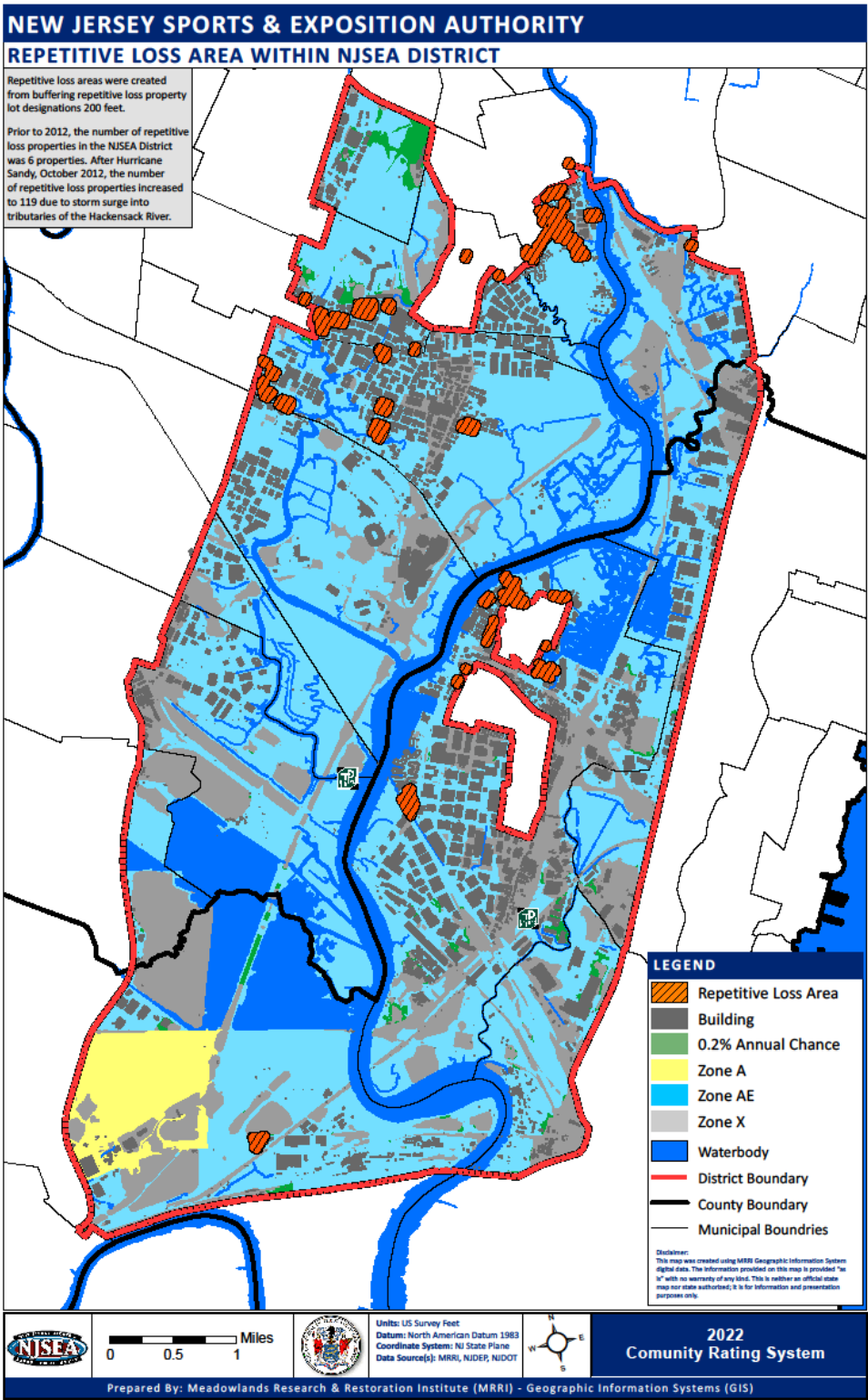


Figure 19 – Repetitive Loss Areas

There are multiple large clusters of residential repetitive loss properties in Town of Secaucus that experienced tidal flooding due to the Hackensack River and its impact on Mill Creek and the Acorn Road Ditch adjacent to those properties. There are also a small number of commercial properties included in this area. The repetitive loss areas of Secaucus also include a commercial property in close proximity to the Hackensack River which was the direct cause of the tidal flooding which affected it. The buildings on these properties were mainly constructed prior the establishment of the Hackensack Meadowlands District, with the first floor elevation below the FEMA base flood elevation in the area.

4.3 Areas Not Mapped on FIRM That Have Flooded in the Past

NJSEA staff has reviewed reports of known flooding areas, information from the constituent municipalities and the results of the flooding questionnaire. From an analysis of this information, it has been concluded that the Flood Insurance Rate Maps for the Meadowlands District do not contain any obvious omissions of areas in the District that are subject to flooding.

4.4 Other Surface Flooding Identified In Other Studies

As the majority of the Hackensack Meadowlands District is located within the FEMA Special Flood Hazard Area, the areas of historical flooding identified in other studies are contained within the boundaries of the SFHA.

4.5 Historical Flooding Assessment

The Flood Insurance Study for Bergen County, dated August 28, 2019, developed by FEMA under the Department of Homeland Security, includes significant information on historic flooding relevant to the Meadowlands District. According to the report, flooding in Bergen County can occur during any season of the year as New Jersey lies within the major storm tracks of North America. The worst storms, according to FEMA, have occurred in late summer or early fall when tropical disturbances (hurricanes) are most prevalent. Recent tropical events include Hurricane Floyd (September 1999), Hurricane Irene (August 2011), and Hurricane Sandy (October 2012).

Hurricane Floyd originally made landfall in Cape Fear, North Carolina as a Category 2 hurricane on September 16, 1999. The storm crossed over North Carolina and southeastern Virginia before briefly entering the western Atlantic Ocean. The storm reached New Jersey on September 17, 1999 as a tropical storm. Record breaking flooding from rainfall exceeding 14 inches was recorded throughout the State of New Jersey. Some locations in Bergen County experienced rainfall amounts up to 10 inches. A Federal Emergency Declaration was issued on September 17, 1999. Overall damage estimates for Hurricane Floyd in Bergen County were estimated at over \$100 million.

Having earlier been downgraded to a tropical storm, Hurricane Irene came ashore in Little Egg Inlet in Southern New Jersey on August 28, 2011. In anticipation of the storm Governor Chris Christie declared a state of emergency on August 25th, with President Obama reaffirming the declaration on August 27th. Mandatory evacuations were ordered throughout the State of New

Jersey. Wind speeds were recorded at 75 mph and rainfall totals reached over 10 inches in many parts of the state. Extensive flooding throughout Bergen County caused damage to homes, businesses, and public infrastructure. The flooding was exacerbated by high water levels in reservoirs and wetlands as a result of previous heavy rains. Over 1 million customers lost power during the storm. Overall damage estimates for the State of New Jersey came to over \$1 billion, with over 200,000 homes and buildings being damaged. The county received more than \$48 million in federal loans and grants to cover the storm damages.

Hurricane Sandy came ashore as an immense tropical storm in Brigantine, New Jersey, on October 29, 2012. Although rainfall was limited to less than 2 inches within Bergen County, wind gusts were recorded up to 76 mph. A full moon made the high tides 20 percent higher than normal and amplified the storm surge. The New Jersey shore suffered the most damage. Seaside communities were damaged and destroyed up and down the coastline. Although protected from severe waves, the Bergen County shoreline within New York-New Jersey Harbor experienced record storm surge elevations. Some 2.7 million households within New Jersey lost power. Initial reports suggest that 72,000 homes and businesses statewide were damaged or destroyed by the storm. Governor Chris Christie declared a state of emergency on October 31. Hurricane Sandy was estimated to cost the State of New Jersey over \$36 billion.

Flooding is generally the result of heavy rainfall produced by hurricanes moving up the coast, large frontal storms from the west and south, and local thunderstorms. In September 1999, floods of unprecedented magnitude were caused by Hurricane Floyd in the highly urbanized basins of northeastern New Jersey. The storm resulted in a record discharge on Ho-Ho-Kus Brook of 4,670 cubic feet per second (cfs) at the U.S. Geological Survey (USGS) gauge No. 01391000 located at Ho-Ho-Kus, New Jersey. The second highest discharge on record was caused by a Hurricane Irene on August 28, 2011 with a discharge of 4,230 cfs.

The flood of record on the Hackensack River occurred on April 16, 2007. The USGS gauge located on the Hackensack River at New Milford, New Jersey (01378500) recorded a flow of 11,600 cfs with an associated gauge height of 12.36 feet. This flow of record is much higher than the estimated 1% annual chance of exceedance peak flow on the Hackensack River at this location. The next highest discharge of 10,500 cfs occurred during Hurricane Irene. The discharge measured following Hurricane Floyd in September 1999 was 9,760 cfs.

The incidence of high reservoir stage and local stream flooding does not normally occur coincidentally. The small local streams will peak and recede rapidly, whereas the reservoir levels will typically lag behind these peaks and be dependent upon the water supply regulation in effect at the time.

The principal flooding in southern Bergen County results from the tidal stages of Newark Bay which affect the Hackensack River and Passaic River, and in turn Bellman's Creek, Overpeck Creek and Wolf Creek.

The largest historical tide was produced by the hurricane of September 3, 1821. On the basis of old street maps and newspaper accounts, it has been concluded that the surge produced by that hurricane was approximately 10 to 11 feet. However, the surge peak occurred at the time of a low astronomical tide, and mean sea level for September 1821 was approximately 1.5 feet below present mean sea level for August. Consequently, such a hurricane surge on a high astronomic tide would now produce a tide of approximately 14 feet in elevation. Although the 1821 hurricane was weaker than other historic storms, its track, just inland from the Atlantic shore, and its forward speed were conducive to critical storm surge conditions.

Previous studies of the records have shown that the most important hurricane surges of interest in the study area are those of 1821, 1938, 1944, 1954, 1955 (Connie), 1960 (Donna), 1971 (Doria), and Hurricane Sandy in 2012. Hurricane Diane in 1955 and Tropical Storm Agnes in 1972 failed to produce major surges, although they resulted in heavy rainfall in several eastern states.

Important hurricane surges at the Battery, New York, from 1926 to 2012 are presented below:

Date	Surge Height (feet)*
October 2012 (Sandy)	9.4
September 1960 (Donna)	5.3
September 1944	5.0
August 1971	4.2
September 1938	4.1
August 1954	3.1
August 1955	3.1

**Net surge, exclusive of predicted tide*

Table 3 – History of Hurricane Surges at the Battery, New York City

Extratropical cyclones or northeasters are far more frequent in the area than hurricanes and may produce severe surges. Winds in the northeasters blow in a direction that is conducive to surge generation along the 80 or 90 miles of continental shelf off of New York Bight. Important northeaster surges at the Battery, New York, from 1926 to 1976 are presented below:

Date	Surge Height (feet)*
November 1950	8.5
November 1953	5.4
November 1932	5.3
December 1974	5.2
November 1968	5.0
February 1927	4.6
March 1962	4.3
January 1944	4.2

**Net surge, exclusive of predicted tide*

Table 4 – History of Nor'easter Surges at the Battery, New York City

The 1950 northeaster failed to produce the highest recorded tide (8.9 feet in elevation produced by Hurricane Donna in 1960) because its surge peak occurred at a low astronomic tide. While the surge peak produced by Hurricane Donna was only 5.3 feet, it occurred practically in coincidence with a high astronomic tide.

Storm-tide flooding in the area depends not only on the storm-tide elevation, but also on the location of the area. Flooding of areas located near the mouth of the Hackensack and Passaic Rivers depends on the tide crest elevation. Flooding of 28 areas located further inland depends not only on the tide crest elevation at Newark Bay, but also on the duration of the storm surge, as the tide propagates through the river and its system of tidal streams. Due primarily to the storage available in the system, a high storm-tide elevation created by a hurricane may be less critical to tidal flooding than a comparatively lower storm-tide of longer duration, such as those produced by northeasters. Therefore, the frequency distribution of high tide elevations in the Hackensack Meadowlands District must be obtained through separate routing of tides of either kind, with prescribed frequencies of occurrence at the mouth. The elevations thus obtained for each area are then used in a joint frequency analysis.²

The significant land development in the Hackensack Meadowlands District, which has occurred in the last 75 years, has changed the elevation-frequency distribution. This development has produced a general increase of water-surface elevations for comparable return periods. This effect tends to increase with the distance from the mouth of the Hackensack River.

The NJSEA concurs with the FEMA position that flooding along the streams within several of the communities is due, in part, to backwater, which is created by the inadequate storm drains, culverts, and narrow channels in the floodplain. In addition, because some communities within Bergen County have highly congested areas, even minor flooding causes damage to both public and private property.

4.5.1 Hurricane Sandy and the Hackensack Meadowlands District

Hurricane Sandy wreaked havoc on Bergen and Hudson Counties with surges that registered approximately 4 to 5 feet above average high tide. The Hurricane Sandy Inundation (2012) Map in Appendix C, shows water elevation levels and storm surge depths as recorded by the Meadowlands Research & Restoration Institute (MRRI) sensor at the Barge Club Marina monitoring station in the Hackensack River in Carlstadt. Coastal communities in New Jersey sustained significant damage and there was wide-spread destruction as a result of the storm. Although protected from severe waves, the Bergen County shoreline within the Hudson-Raritan Estuary experienced record storm surge elevations propelled by Sandy's strong winds. Hudson County municipalities in the District also experienced flooding from the tidal surge. Some 2.7 million households within New Jersey lost power. Sandy was estimated to have cost the State of New Jersey over \$36 billion.

² US Department of Homeland Security, Flood Insurance Study Number 34003CV001B, Bergen County, New Jersey (All Jurisdictions), Revised: August 28, 2019

MRRI maintains sensors at 17 monitoring stations throughout the District that has continuously monitored the region's air, soils and water for more than 15 years. The data, collected in real-time, includes measurements of water levels along the Hackensack River and its marshes, as well as the concentration of fresh and salt water and turbidity. During Sandy, the unprecedented sea surge overtopped all flood control structures, riverbanks, creek banks and berms in the Meadowlands District. MERI lost important field monitoring equipment during the storm; however, three sensors, located at River Barge Park in Carlstadt, East Riser Tide Gate in Berry's Creek, and the Moonachie Tide Gate located in marsh land along the Hackensack River near Exit 18W of the New Jersey Turnpike remained operational. These sensors collected invaluable data that tells the story of Sandy in the Meadowlands District. The NJSEA believes this to be the only monitoring data collected during Sandy within the Meadowlands.

While the sea surge's full force hit shortly after midnight on October 30, it had been building for at least 10 hours beforehand, according to MRRI's measurements. On October 29 at 2:00 p.m., the average low tide measured in the District was elevation 3 feet (NAVD88), which is equivalent to an average high tide. The Hackensack River is tidally influenced and is thus impacted by both the ocean's tides and rainfall events. Shortly before 6:30 p.m., MRRI sensors measured the water level in the Hackensack River at above elevation 5 feet (NAVD88) and rising. At 8:00 p.m., the NOAA monitoring station at Sandy Hook was seriously damaged and ceased to transmit water levels, making it increasingly difficult to predict and communicate the storm's path. At about the same time that NOAA lost its monitoring equipment, the sea surge began to rapidly increase in strength, bolstered by unrelenting winds of 60 to 80 miles per hour.

The surge lasted six hours, from approximately 8:00 p.m. on October 29 to approximately 2:00 a.m. on October 30. During this time, MRRI recorded average water level elevations of 8.6 feet (NAVD88) at River Barge Park Marina and 9.5 feet (NAVD88) at the Moonachie Creek tide gate, with periodic tidal surges measuring well above 10 feet. The water rushing in from the Atlantic Ocean was so high that it overtopped the New Jersey Turnpike, which stands at elevation 10 to 11 feet (NAVD88), from approximately north of Exit 15W in Kearny to just north of Exit 18W in Carlstadt. The eight-foot storm surge inundated the majority of land in the District.

MRRI's data further showed that the salinity levels in the Hackensack River almost doubled during the storm, confirming that it was ocean water that caused the Hackensack River to overflow its banks. Turbidity levels, which measure the result of turbulence in the water column on the Hackensack River, were also extremely elevated.

Hurricane Sandy resulted in a churning sea roiling extremely fast through Newark Bay, up the Hackensack River and ultimately into the Meadowlands, where many of the businesses and residential areas along the River are built on land as low as approximately elevation 3 feet (NAVD88). These areas are protected by a 28-mile system of berms (the naturally occurring or manmade mounds or walls of earth or sand) and 29 tide gates and pump stations that provide flood protection in the range of elevation 5 to 5.7 feet (NAVD88). During Sandy, these flood control structures were overtopped and/or breached by the storm's surging floodwaters. While it is not unheard of for berms in the District to be overtopped during high intensity storms, the

severity and extent of flooding during Sandy could be considered a warning of future occurrences as climate change results in sea level rise.

4.6 Future Flood Assessment

The effects of climate change, including more intense rainfall and increasing sea-level rise (SLR), are impacting the District. Hurricane Sandy most recently exposed the District's vulnerability to coastal flooding when low-lying areas within the District were inundated by coastal storm surge. However, inland flooding due to high intensity rainfall events is more common and happens more frequently than coastal flooding. Inland flooding can include moderate precipitation falling over several days or heavy precipitation falling over a short time period or other circumstances in which drainage ditches and creeks overflow due to rainfall/runoff. The District's vulnerabilities to flooding may worsen over time due to the effects of climate change and sea level rise.

The 2019 Science and Technical Advisory Panel (STAP) Report, which is discussed in more detail in Chapter 4.6.2 of this Plan, notes that New Jersey coastal areas are likely (at least a 66% chance) to experience SLR of 0.5 to 1.1 feet between 2000 and 2030, and 0.9 to 2.1 feet between 2000 and 2050. With regards to SLR rates, the 2019 STAP Report estimates that New Jersey coastal areas are likely (at least a 66% chance) to experience average SLR rates of 0.2 to 0.5 in/year over 2010–2050.

Figures 20 and 21 below depict the inundation footprint in 2050 based on a 2-foot sea level rise projection and the inundation footprint in 2100 based on a three-foot sea level rise projection. These maps show the areas within the District that will be impacted by the SLR projections.³

Regarding coastal storms, the 2019 STAP Report concludes that higher sea-levels will increase the baseline for flooding from high tides and coastal storms. Regarding tropical storms and related intensity and precipitation, the STAP Report notes that maximum wind speeds and rate of precipitation are likely to increase. With regards to tidal flooding, the frequency of high tides exceeding the current high-tide flood threshold will continue to increase with sea-level rise.

³ Hackensack Meadowlands District Master Plan Update 2020, February 2020 An Update To The 2004 Master Plan, Prepared by the New Jersey Sports and Exposition Authority

Figure 20- Inundation Footprint in 2050 (2 Ft Sea Level Rise Projection)

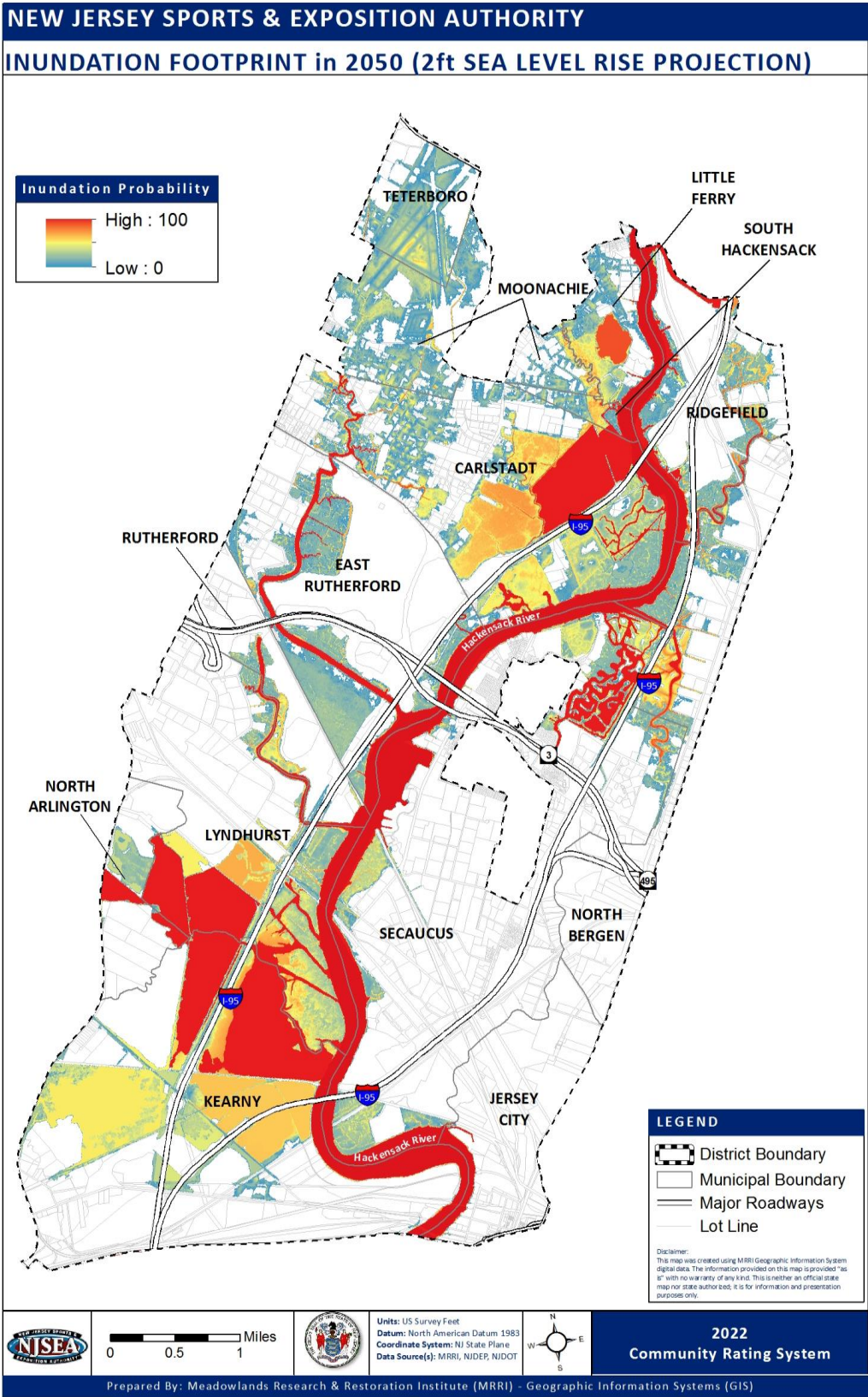
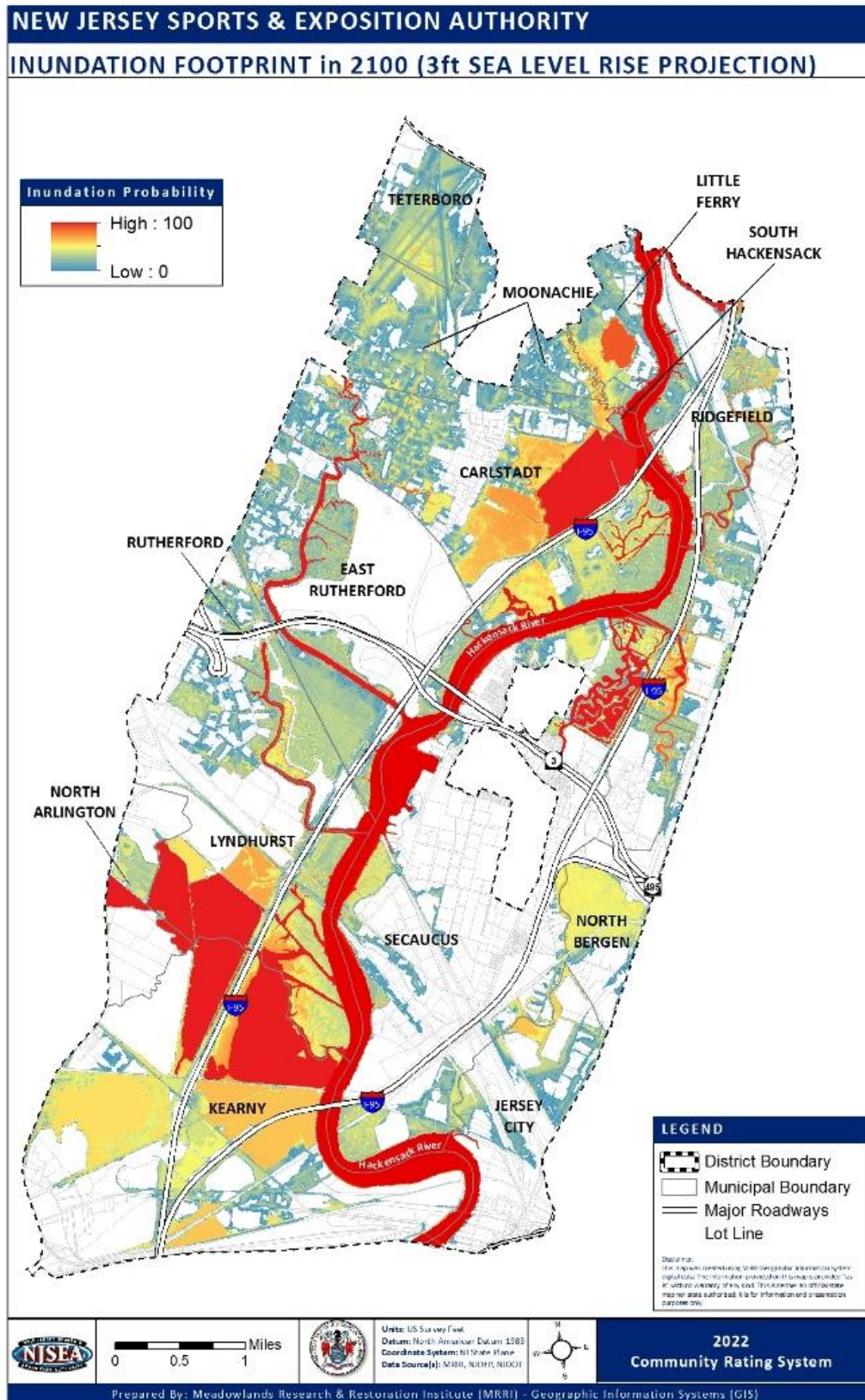


Figure 21 – Inundation Footprint in 2100 (3 Ft Sea Level Rise Projection)



4.6.1 Changes in Floodplain Development and Demographics

As previously indicated, the Hackensack Meadowlands District is predominantly built-out. Due to existing development and current regulations, there is little vacant land available for new development. The NJSEA will continue to enforce the existing development standards and maintain its open spaces and natural features. This is critical to maintaining permeable surfaces and limiting stormwater runoff.

As sea levels rise, the Hackensack Meadowlands District could become more vulnerable to impacts from flooding. The overall impacts of flooding on the community depends on how effectively the NJSEA and the constituent municipalities mitigate current vulnerabilities and plan for future conditions. This Floodplain Management Plan is a guide for the NJSEA to implement FEMA policies, including floodplain management initiatives and mitigation strategies within the District.

4.6.2 Sea Level Rise

New Jersey's climate is changing. Over the last century, New Jersey experienced rising temperatures, increased rainfall, more frequent extreme weather events, and rising sea levels.⁴ Increases in local sea level are the result of a combination of global, regional, and local changes. These changes are the result of increasing greenhouse gases in the atmosphere due to human activities, such as the burning of fossil fuels, agriculture, and land clearing. At the global scale, sea level is rising. Measured at tide gauges on every continent and by satellites in orbit, global average sea level has risen approximately seven to eight inches since 1900, with about three of those inches occurring since 1993.⁵ The observed global increase is the result of several factors, including the melting of glaciers, ice caps and ice sheets; the thermal expansion of ocean water as it warms; and changes in land water storage. In some regions of the world, land is rising faster than sea level, and the rate of local sea level rise is slowing as a result. In other regions, where land is subsiding, local sea level is increasing faster than the global average.

In New Jersey and the northeastern United States, sea level rise rates are increasing faster than the global average. In Atlantic City, sea level has risen by an average rate of 1.5 inches per decade,

⁴ New Jersey Department of Environmental Protection, <https://www.nj.gov/dep/climatechange/data.html>

⁵ Sweet, W.V., R. Horton, R.E. Kopp, A.N. LeGrande, and A. Romanou, 2017: Sea level rise. In: Climate Science Special Report: Fourth National Climate Assessment, Volume I [Wuebbles, D.J., D.W. Fahey, K.A. Hibbard, D.J. Dokken, B.C. Stewart, and T.K. Maycock (eds.)]. U.S. Global Change Research Program, Washington, DC, USA, pp. 333-363, doi: 10.7930/J0VM49F2.

which is approximately double the global rate.⁶ Sea level rise rates in New Jersey are increased by land subsidence associated with natural sediment compaction and groundwater withdrawal.⁷

In response to a stakeholder engagement process between 2012 and 2014, Rutgers University, on behalf of the New Jersey Climate Adaptation Alliance, convened a Science and Technical Advisory Panel (STAP) to help identify alternatives for practitioners to enhance New Jersey's resilience to regional sea level rise, coastal storms, and flood risk.⁸ The STAP's goal is to identify and evaluate current science on sea level rise and to provide useful, practical options for public and private sector practitioners. The findings of the STAP panel were published in a report entitled "Assessing New Jersey's Exposure to Sea-Level Rise and Coastal Storms: Report of the New Jersey Climate Adaptation Alliance Science and Technology Advisory Panel," and dated October 2016. The 2016 Report was innovative in that a panel of scientists and practitioners was set up to offer practical application of the STAP Report findings to the state and local decision-making agencies.

The New Jersey Department of Environmental Protection (NJDEP) requested an update to the 2016 Report to reflect the most current scientific data available. Rutgers University, following the same process as that used in the preparation of the 2016 Report, prepared a report entitled "New Jersey's Rising Seas and Changing Coastal Storms: Report of the 2019 Science and Technical Advisory Panel," dated November 2019. The key updates to the 2016 STAP Report include: making available historic sea-level rise (SLR) information for New Jersey to provide a frame of reference for future projections; updating information on ice sheet dynamics; expanding consideration of tidal flooding; and expanding consideration of storm tide-related flooding.⁹ The 2019 STAP Report also includes SLR projection ranges for low, moderate, and high greenhouse gas emissions scenarios through 2150.

Subsequently, the NJDEP prepared the report, "Sea-Level Rise Guidance for New Jersey," dated June 2021. The NJDEP Guidance acknowledged that the SLR science for New Jersey is the 2019 STAP Report and the Guidance recommends utilizing SLR projections from the 2019 STAP Report

⁶ New Jersey Department of Environmental Protection, <https://www.nj.gov/dep/climatechange/data.html>

⁷ Miller, K. G., Kopp, R. E., Horton, B. P., Browning, J. V., Kemp, A. C., & Al, M. E. T. (2013). Earth's Future -A geological perspective on sea-level rise and its impacts along the U.S. mid-Atlantic coast Earth's Future, 3–18.

⁸ Kopp, R.E., A. Broccoli, B. Horton, D. Kreeger, R. Leichenko, J.A. Miller, J.K. Miller, P. Orton, A. Parris, D. Robinson, C.P. Weaver, M. Campo, M. Kaplan, M. Buchanan, J. Herb, L. Auermuller and C. Andrews. 2016. Assessing New Jersey's Exposure to Sea-Level Rise and Coastal Storms: Report of the New Jersey Climate Adaptation Alliance Science and Technical Advisory Panel. Prepared for the New Jersey Climate Adaptation Alliance. New Brunswick, New Jersey.

⁹ Kopp, R.E., C. Andrews, A. Broccoli, A. Garner, D. Kreeger, R. Leichenko, N. Lin, C. Little, J.A. Miller, J.K. Miller, K.G. Miller, R. Moss, P. Orton, A. Parris, D. Robinson, W. Sweet, J. Walker, C.P. Weaver, K. White, M. Campo, M. Kaplan, J. Herb, and L. Auermuller. New Jersey's Rising Seas and Changing Coastal Storms: Report of the 2019 Science and Technical Advisory Panel. Rutgers, The State University of New Jersey. Prepared for the New Jersey Department of Environmental Protection. Trenton, New Jersey.

based on a moderate greenhouse gas emissions scenario to aid in decision-making when considering planning, mitigating for, and adapting to SLR.

The following is a summary of the STAP Outcomes, as noted in the 2019 STAP Report:

Table 5 – New Jersey Sea-Level Rise above the Year 2000 (1991-2009 Average) Baseline (Feet)*

		2030	2050	2070			2100			2150		
				Emissions								
	Chance SLR Exceeds			Low	Mod	High	Low	Mod	High	Low	Mod	High
Low End	> 95% chance	0.3	0.7	0.9	1	1.1	1.0	1.3	1.5	1.3	2.1	2.9
Likely Range	> 83% chance	0.5	0.9	1.3	1.4	1.5	1.7	2.0	2.3	2.4	3.1	3.8
	~50 % chance	0.8	1.4	1.9	2.2	2.4	2.8	3.3	3.9	4.2	5.2	6.2
	<17% chance	1.1	2.1	2.7	3.1	3.5	3.9	5.1	6.3	6.3	8.3	10.3
High End	< 5% chance	1.3	2.6	3.2	3.8	4.4	5.0	6.9	8.8	8.0	13.8	19.6

*2010 (2001-2019 average) Observed = 0.2 feet

The following is an excerpt of the STAP conclusions on SLR, as noted in the 2019 Report:

1. From 1911 (the start of the Atlantic City tide-gauge record) to 2019, sea-level rose 17.6 inches (1.5 feet) along the New Jersey coast, compared to a 7.6-inch (0.6 feet) total change in the global mean sea-level.
2. Over the last forty years, from 1979-2019, sea-level rose 8.2 inches (0.7 feet) along the New Jersey coast, compared to a 4.3-inch (0.4 feet) change in global mean sea-level.
3. New Jersey coastal areas are likely (at least a 66% chance) to experience SLR of 0.5 to 1.1 feet between 2000 and 2030, and 0.9 to 2.1 feet between 2000 and 2050. It is extremely unlikely (less than 5% chance) that SLR will exceed 1.3 feet by 2030 and 2.6 feet by 2050.
4. While near-term SLR projections through 2050 exhibit only minor sensitivity to different emissions scenarios (<0.1 feet), SLR projections after 2050 increasingly depend upon the pathway of future global greenhouse gas emissions.

Under a *moderate-emissions scenario*, roughly consistent with current global policies, coastal areas of New Jersey are *likely* (at least a 66% chance) to see SLR of 1.4 to 3.1 feet between 2000 and 2070, and 2.0 to 5.2 feet between 2000 and 2100. It is *extremely unlikely* (less than a 5% chance) that SLR will exceed 3.8 feet by 2070 and 6.9 feet by 2100.

In addition to the magnitude of SLR, the STAP also evaluated local rates of SLR in response to practitioner interest. SLR rates are especially important in determining whether ecological systems and habitats, such as marshes, will be able to adapt to rising seas. Left unconstrained by nearby development, these ecological systems — important for services, such as flood control — could collapse, or they could adapt to SLR by migrating inland or retaining sediment. Additionally, the rate of SLR is also an important consideration in the design and management of nature-based

solutions for coastal protection (United States Army Corps of Engineers, 2015), which, depending on site-specific conditions, may reduce flood exposure as sea levels rise.

The STAP has reached the following conclusions on rates of SLR:

1. Over the last forty years, from 1979-2019, sea-level rose at an average rate of 0.2 in/year along the New Jersey coast, compared to an average rate of 0.1 in/year in global mean sea-level.
2. New Jersey coastal areas are likely (at least a 66% chance) to experience average SLR rates of 0.2 to 0.5 in/year over 2010–2050. It is extremely unlikely (less than 5% chance) that average SLR rates will exceed 0.7 in/year over 2010–2050.
3. Rates of SLR are increasingly dependent upon global greenhouse gas emissions later in the 21st century.

Under a *moderate-emissions scenario*, coastal areas of New Jersey are *likely* (at least a 66% chance) to see SLR rates of 0.2 to 0.8 in/year over 2060-2100. It is *extremely unlikely* (less than a 5% chance) that SLR rates will exceed 1.3 in/year over 2060-2100.

The STAP *likely* ranges of SLR estimates are consistent with recent SLR guidance proposed by an interagency working group that included the National Oceanic and Atmospheric Administration (NOAA), the United States Army Corps of Engineers (USACE), the United States Geological Survey (USGS), and other agency and academic partners (Sweet et al., 2017).

Coastal Storms

Higher sea-levels will increase the baseline for flooding from high tides and coastal storms (i.e., tropical cyclones and extratropical cyclones) and, therefore, the impacts of coastal storms. STAP members concluded that there was no clear basis for planning guidance for New Jersey to deviate from the most recent examinations of the issues by the New York City Panel on Climate Change (Orton et al., 2019) and by the Intergovernmental Panel on Climate Change (IPCC), including the IPCC's conclusions regarding the need for further research to understand regional changes in future tropical cyclones and extratropical cyclones (Collins et al., 2019).

Tropical Cyclones

The STAP deliberations focused on three issues with respect to tropical cyclones: frequency, intensity and precipitation:

- Frequency: Most studies do not project an increase in the global frequency of tropical cyclones (*medium agreement, medium confidence*).
- Intensity: Maximum wind speeds will *likely* increase (*medium- to high-confidence*).
- Precipitation: Rate of precipitation during tropical cyclones is *likely* to increase (*high confidence*).

Changes in the frequency, intensity (wind speed), and tracks of tropical cyclones remain an area of active research, and the STAP concluded there is no definitive consensus regarding such changes specific to New Jersey.

Extratropical Cyclones

Frequency: The global frequency of extratropical cyclones is not likely to change substantially. There is some evidence for a decrease in frequency of extratropical cyclones over the North Atlantic as a whole, but not near the coast (Bengtsson et al., 2006; Chang et al., 2013; Colle et al., 2013; Zappa et al., 2013).

Changes to extratropical storm tracks in the North Atlantic are possible (Roberts et al., 2017), but have not been reliably established (Stocker et al., 2013). Changes in the frequency, intensity (wind speed), precipitation rate, and tracks of extratropical cyclones remain an area of active research, and the STAP concluded that, at this time, there is no definitive consensus regarding such changes.

Tidal Flooding

The number of days that New Jersey residents have experienced high-tide floods in the absence of an associated storm has increased in recent years. High-tide flooding can have detrimental impacts on infrastructure and community function in the absence of a major storm. Over 2007-2016, there was an average of 8 high-tide flood events in Atlantic City, NJ, with annual event totals ranging between 4 events in 2007 and 18 events in 2009. This frequency has grown from an average of less than one high-tide flood event per year in the 1950's (Sweet et al., 2018). The frequency of high tides exceeding the current high-tide flood threshold will continue to increase with sea-level rise. For example, based on the *likely* range of SLR projections, Atlantic City will experience 17-75 days per year of expected high-tide flooding per year in 2030, and 45-255 days per year of expected high-tide flooding in 2050.

4.6.3 Sea Level Rise and Climate Change Studies

In 2021, the U.S. Environmental Protection Agency (USEPA) awarded three grants to the NJSEA's Meadowlands Research and Restoration Institute (MRRI) to study sea level rise and climate change vulnerability in the District, and to manage long-term land use. The three grants total \$547,000.

Work related to one grant includes identifying marshes in the District that can contend with future sea level rise, which will enable stakeholders and coastal managers to properly assess wetland acquisitions, restorations, and conservation. Also, detailed data studied by MRRI regarding terrain in the District and land cover, as well as updated data on Meadowlands hydrology and natural resources, will aid the NJSEA's Land Use and stormwater departments.

Another grant will allow MRRI to study Sawmill Creek's potential to provide more habitat and isolate carbon dioxide under changing climate conditions and sea level rise. Sawmill Creek is a tidal marsh, located in Lyndhurst, North Arlington and Kearny, that has undergone ecological changes due to man-made causes. MRRI's work will enable development of possible restoration strategies for the Sawmill Creek Wildlife Management Area.

The third grant will allow MRRI to utilize drone technology to monitor berms for breaches, to support tide gate inspections, possible ditch de-snagging efforts, and mapping the District's natural resources and waterways.

4.7 Existing Flood Protection Infrastructure

A tide gate is a device that allows water to flow downstream, but prevents water from flowing in the opposite direction. While there are many different types of designs for tide gates in the Hackensack Meadowlands District, the main purpose of all tide gates is to prevent the tide from flowing upstream through tributaries of Hackensack River and reduce the incidences of tidal flooding. Tide gates are a critical component of flood protection for large areas of the District.

As these structures are important to the protection of many properties, the NJSEA monitors the water levels at the major tide gates in real time through the use of pressure sensors located both upstream (landside) and downstream (riverside) of the tide gates, which are used to record the water surface elevations on both sides. This system records the data every 15 minutes and transmits it through cellular service, and it is powered by solar panels. This data can be used to remotely determine if there are unexpected variations in the water surface elevations, which can be indicative of a debris build up constricting flow, a tide gate wedged open by a large piece of debris, etc. If unusual activity is detected, NJSEA staff will perform an in-person inspection of the tide gate to verify if any corrective action is required. This water surface elevation data for the tide gates is publicly accessible on the MRRI website.

The map above shows the location of 8 major tide gates in the District. Appendix C contains more detailed maps of the individual tide gate drainage areas. This drainage area information is derived from 2014 LiDAR data with GIS mapping applied to delineate the drainage divides.

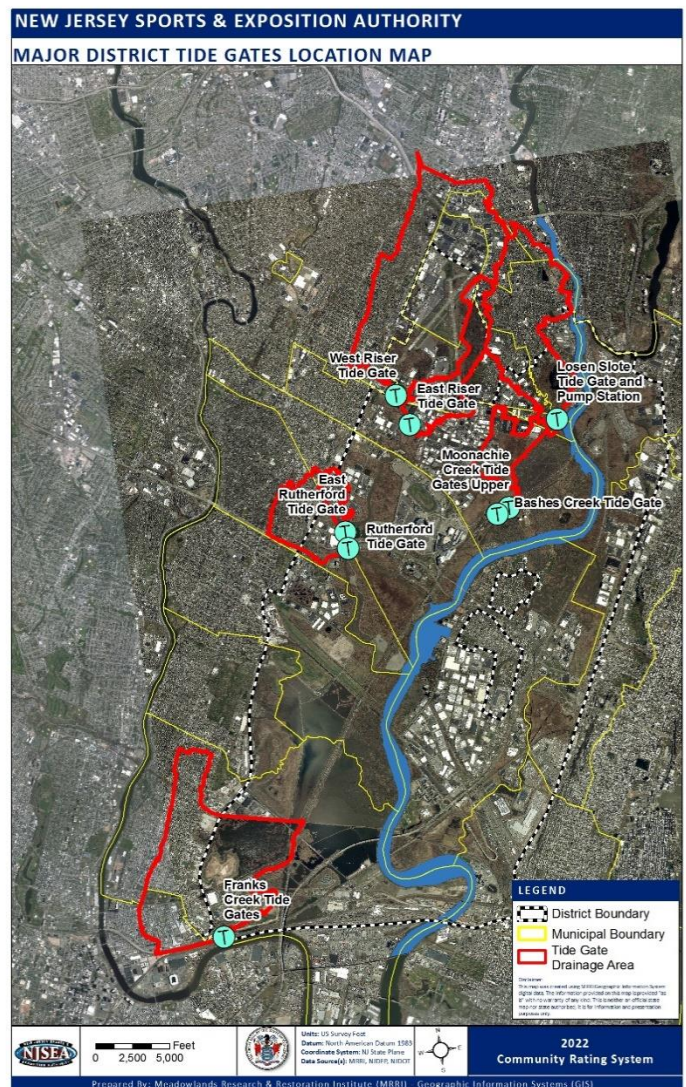


Figure 22 – Major District Tide Gates Location Map

4.7.1 East Riser Tide Gate

The East Riser Tide Gate was constructed in 1981. It is located in Borough of Carlstadt and spans Starke Road. As part of the Rebuild by Design project, a pump station is being added at this tide gate. The area upstream of this tide gate, which is protected from tidal influence, is approximately 500 acres. On the riverside, this tide gate consists of 4 metal flap gates, and the upstream side includes a trash rack system.



Figure 23 East Riser Tide Gate Downstream Face

Bergen County Operations is responsible for the maintenance of this tide gate. Once the pump station is constructed, the Carlstadt DPW will assume maintenance responsibilities for that portion.

4.7.2 West Riser Tide Gate

The West Riser Tide Gate was constructed in 2014 with joint funds from the NJSEA and Port Authority of New York and New Jersey. They replaced the original structure which was built in 1977. It is located in the Borough of Moonachie. The area upstream of this tide gate, which is protected from tidal influence, is approximately 2,100 acres. On the riverside, this tide gate consists of 4 flap gates, and the upstream side includes a trash rack system.



Figure 24 West Riser Tide Gate Downstream Face

This tide gate has a catwalk over it for access and maintenance purposes. Maintenance of this tide gate is a combined operation involving the Moonachie Department of Public Works and Bergen County Operations. The Moonachie DPW performs the day-to-day maintenance, while Bergen County provides the long arm excavator to clear larger amount of debris at the trash racks as needed.

4.7.3 East Rutherford Tide Gate

The East Rutherford Tide Gate was constructed as part of the Route 17 improvements project in 2009-2010 as a joint effort involving the NJSEA, Bergen County, and the NJDOT. It is located in the Borough of East Rutherford at the downstream end of the East Rutherford Ditch at the confluence with Berry's Creek. The area upstream of this tide gate, which is protected from tidal influence, is approximately 100 acres. On the riverside, this tide gate consists of 5 Tideflex check valves, which are often referred to as duck-bills from their unique appearance, and the upstream side includes a trash rack system.



Figure 25 East Rutherford Tide Gate Downstream Face

Bergen County Operations is responsible for the maintenance of this tide gate.

4.7.4 Rutherford Tide Gate

The Rutherford Tide Gate was also constructed as part of the Route 17 improvements project in 2009-2010. It is located in the Borough of Rutherford at the downstream end of the Rutherford Ditch at the confluence with Berry's Creek. The area upstream of this tide gate, which is protected from tidal influence, is approximately 450 acres. On the riverside, this tide gate consists of 6 metal flap gates, and the upstream side includes a trash rack system.



Figure 25 Rutherford Tide Gate Downstream Face

Bergen County Operations is responsible for the maintenance of this tide gate. As this tide gate is located adjacent to an NJ Transit rail line, an access agreement with NJ Transit has been secured.

4.7.5 Bashes Creek Tide Gate

The Bashes Creek Tide Gate was constructed in 2010 in conjunction with the Moonachie Creek Tide Gate. It is located in the Borough of Carlstadt at the culvert where Bashes Creek crosses under the New Jersey Turnpike's Western Spur. These tide gates replaced a previous tide gate, which had been removed along the bank of the Hackensack River. The area upstream of this tide gate, which is protected from tidal influence, is approximately 300 acres. On the riverside, this tide gate consists of 1 metal flap gate, and the upstream side includes a trash rack system.



Figure 26 Bashes Creek Tide Gate Downstream Face

The New Jersey Sports and Exposition Authority is responsible for the maintenance of this tide gate.

4.7.6 Moonachie Creek Tide Gate

The Moonachie Creek Tide Gate was constructed in 2010 in conjunction with the Bashes Creek Tide Gate. It is located in the Borough of Carlstadt at the culvert where Moonachie Creek crosses under the New Jersey Turnpike's Western Spur. These tide gates replaced a previous tide gate, which had been removed along the bank of the Hackensack River. The area upstream of this tide gate, which is protected from tidal influence, is approximately 300 acres. On the riverside, this tide gate consists of 2 metal flap gates, and the upstream side includes a trash rack system.



Figure 27 Moonachie Creek Tide Gate Downstream Face

The New Jersey Sports and Exposition Authority is responsible for the maintenance of this tide gate.

4.7.7 Frank's Creek Tide Gate

The Frank's Creek Tide Gate was constructed in the mid-1900s. It is located in the Town of Kearny adjacent to multiple rail lines. This tide gate is connected to the Passaic River through a culvert which runs underneath the rail lines. The area upstream of this tide gate, which is protected from tidal influence, is approximately 1,800 acres. On the riverside, this tide gate consists of 2 metal flap gates, and the upstream side includes a trash rack system.



Figure 28 Frank's Creek Tide Gate Downstream Face

The Kearny Department of Public Works is responsible for the maintenance of this tide gate.

4.7.8 Losen Slote Pump Station

The Losen Slote Pump Station is a high capacity pump station that was constructed in 1999 to replace a 100-year old wooden tide gate. It is located in the Borough of Little Ferry near the confluence of Losen Slote with the Hackensack River. The area upstream of this tide gate, which is protected from tidal influence, is approximately 1,100 acres, and the upstream side includes a trash rack system.



Figure 29 Losen Slote Pump Station Downstream Face

The Little Ferry Department of Public Works is responsible for the maintenance of this tide gate.

5. ASSESSING THE PROBLEMS

In order to assess the problems, the planning committee members collected and summarized data on what is at risk. This step looks at the impact of those hazards on the community.

5.1 Vulnerability to Assessed Hazards

This section provides a profile and vulnerability assessment for the flood hazard in order to quantify the impact of flood events in the Hackensack Meadowlands District. For the purpose of this Floodplain Management Plan, tidal flooding is the main type of flooding affecting the District, but urban/stormwater flooding and sea level rise are also elements of concern.

5.2 Flood Hazards

A flood is the inundation of normally dry land resulting from the rising and overflowing of a body of water. They can develop slowly over a period of days or develop quickly, with disastrous effects that can be local and impact a specific neighborhood or community or regional and affect entire river basins and multiple counties. Floods are frequent and costly natural hazards in New Jersey in terms of human hardship and economic loss, particularly to communities that lie within flood-prone areas. As detailed previously, the majority of the Hackensack Meadowlands District lies within the Special Flood Hazard Area and the Hackensack River is the main source of the floodwaters.

5.2.1 Life Safety and the Need for Warning and Evacuating Residents and Visitors

The NJSEA is very unique since the District encompasses portions of 14 distinct municipalities. Each municipality includes departments that coordinate and organize to provide emergency/ life safety assistance, including the municipal police department, fire department, emergency squad, Office of Emergency Management (OEM), and public works. While each municipality has its own plan in place for warning systems and evacuation protocols, the NJSEA provides key data to assist municipalities in the decision making process during a flood event.

The Meadowlands Research and Restoration Institute (MRRI) provides a water level alert system and flood prediction maps to first responders and the general public. The email and text based alerts are sent to District municipalities when water levels reach 5.5-feet above sea level and continue to be relayed as the levels rise. The interactive web-based flood prediction maps include the parts of the District that may flood from sea surge levels of 4 to 8 feet, and the maps can be found on the MRRI website. The water level alert system, in combination with the monitoring of eight key tide gates in the District, as discussed in Chapter 4.7 of this Plan, provide useful data for municipalities to make important life safety decisions, including sending warning alerts to residents and businesses, as well as evacuation decisions.

5.2.2 Public Health, Including Health Hazards to Individuals from Flood Waters and Mold

The impact of the hazards on life, health, and safety from flooding incidents is dependent upon several factors, including the severity of the event and whether or not adequate warning time is provided to residents. Impacts may not be limited to only those who reside in a defined flood hazard zone but also by others who may be affected by the secondary impacts of a flood hazard

event, such as those at risk while traveling in flooded areas or access to emergency services being compromised during a flood event.

Another health hazard includes exposure to pathogens such as mold. As a result of flooding, mold has the potential to develop and endanger the health of individuals in the District, especially those with already compromised immune systems and other vulnerable populations, including infants, children, elderly, and pregnant women. The degree of this impact varies and is not strictly quantifiable. Molds can grow in as short a period as 24-48 hours in wet and damp areas of buildings that have not been cleaned after flooding. Very small mold spores can easily be inhaled, creating the potential for allergic reactions, asthma episodes and other respiratory problems. Buildings should be properly cleaned and dried out to safely prevent mold growth.¹⁰

Floodwaters can also contain or contribute to multiple other health hazards. They can be contaminated by pollutants such as sewage, human and animal feces, pesticides, fertilizers, oil, asbestos, and rusting building materials. Other common public health risks associated with flood events include unsafe food, contaminated drinking and washing water, mosquitos and animals, carbon monoxide poisoning, secondary hazards associated with re-entering/cleaning flooded structures, and mental stress and fatigue.

Current loss estimation models are not particularly well equipped to measure public health impacts. The most appropriate level of mitigation for these impacts is to be aware that they can occur, educate the public on prevention, and be prepared to deal with these vulnerabilities in responding to flood events.

5.2.3 Critical Facilities and Infrastructure

Multiple vulnerabilities to critical facilities and infrastructure in the Hackensack Meadowlands District were exposed due to flooding associated with Hurricanes Irene and Sandy. The flooding resulted in loss of power to portions of the District that hampered both emergency response and disabled vital utility systems such as water service, sanitary sewer pumps and stormwater pumps.

5.3 Review of Historical Damage to Buildings

FEMA Region 2 provided a list of properties with NFIP policies, past claims and multiple claims – repetitive loss properties (RL) and severe repetitive loss properties (SRL). According to the data provided, the NFIP Repetitive Loss File contains losses reported from individuals who have flood insurance through the Federal Government. A property is considered a repetitive loss property when there are two or more losses reported which were paid more than \$1,000 for each loss. The two losses must be within 10 years of each other and be at least 10 days apart. Only losses since 1/1/1978 that are closed are considered.

¹⁰ United States Environmental Protection Agency, www.epa.gov/mold/brief-guide-mold-moisture-and-your-home

FEMA designates as Severe Repetitive Loss (SRL) any NFIP-insured single-family or multi-family residential building:

1. That has incurred flood-related damage for which four or more separate claims payments have been made, with the amount of each claim (including building and contents payments) exceeding \$5,000, and with the cumulative amount of such claims payments exceeding \$20,000; or
2. For which at least two separate claims payments (building payments only) have been made under such coverage, with the cumulative amount of such claims exceeding the market value of the building.

In both instances, at least two of the claims must be within 10 years of each other, and claims made within 10 days of each other will be counted as one claim. In determining SRL status, FEMA considers the loss history since 1978, or from the building's construction if it was built after 1978, regardless of any changes in the ownership of the building. The term "SRL property" refers to either an SRL building or the contents within an SRL building, or both.

The tables below summarize the NFIP policies, claims and repetitive loss statistics for the Hackensack Meadowlands District.

Occupancy Class	Total Number of Repetitive Loss Properties
Residential	83
Mobile Home	1
Commercial	18
Industrial	8
Meadowlands District	110

Table 6 – Occupancy Class of Repetitive Loss Structures in the Meadowlands District

Municipality	# of Policies	# of Claims	Total Loss Payments	# of RL Properties
Meadowlands District	1,416	845	\$70,554,745	110

Table 7 –NFIP Policies, Claims and Repetitive Loss Statistics

5.3.1 Repetitive Loss Area Analysis (RLAA)

A repetitive loss area analysis was performed to enhance the information in this plan to support targeted outreach and more effective floodplain management for the community. The repetitive loss area includes both repetitive loss properties, as determined by FEMA, and properties that may undergo repetitive flood damage but are not technically considered repetitive loss properties by the NFIP. Properties that may undergo repetitive flood damage but are not classified as NFIP RLs or SRLs can occur for a variety of reasons, including the following:

- Property owners may not have flood insurance. Only properties within the floodplain and with a federally backed mortgage are required to carry flood insurance.

- The flood damage may not meet the minimum \$1,000 threshold necessary for repetitive loss, but the property may still undergo recurring flood damage.
- Owners of a flooded property may choose not to file a claim, even if the owner has flood insurance.

In the Hackensack Meadowlands District, the repetitive loss properties are located within the FEMA floodplain. The cause of repetitive flooding at these properties is commensurate with the flood risk reflected on the current preliminary and/or effective FIRMs for the community. In the vast majority of cases, the repetitive loss properties were affected by tidal flooding incidents. In a small number of cases, there are multiple causes of flooding, as homes in the floodplain also experience stormwater flooding caused by issues related to local topography and drainage issues related to the low relative elevation of outfalls with respect to water surface elevations at high tide.

5.4 Assessment of Natural Functions

Wetlands have important values and perform beneficial functions. The District Master Plan Update 2020 notes that wetlands provide benefits in various ways, including fish and wildlife values, environmental quality values and socio-economic values.

Examples of fish and wildlife values of wetlands include: fish and shellfish habitat and nutrient sources; waterfowl and other bird feeding and nesting habitat; and other wildlife habitat.

Examples of environmental quality values of wetlands include: aquatic productivity; water quality improvement; filter pollution; sediment trapping; shoreline erosion protection; flood peak reduction; and velocity reductions.

Examples of socio-economic values of wetlands include: flood control; wave damage protection; groundwater recharge; water supply; recreation; aesthetics and scenic viewsheds; and education and scientific research.

Most of the wetlands in the District are brackish and tidally inundated, and dominated either by common reed (*Phragmites australis*) or smooth cordgrass (*Spartina alterniflora*). These brackish marshes are subject to a wide range of salinity levels. The largest concentration of these wetlands is located in Carlstadt and Lyndhurst. Freshwater wetlands also exist within the District, particularly within the 286-acre Kearny Freshwater Marsh.

The NJSEA has been working to preserve and restore wetlands for decades in an ongoing effort to promote resiliency and habitat protection. In order to maintain natural buffer areas between the Hackensack River watershed and developed areas, the NJSEA continues to acquire critical tracts of wetlands. An additional benefit to such wetland preservation within the floodplains of the Hackensack River is the increased area of wetlands and marshes available to help dissipate the effects of storm events, tidal flows, and sea level rise. According to the US EPA, an acre of wetland can store between 1 and 1.5 million gallons of floodwater. Every remaining parcel of

wetlands in the District, in many cases inclusive of adjoining upland areas, contains value, not only for wildlife habitat, but also for their functionality to accommodate floodwater storage and projected marsh migration. To date, approximately 3,500 acres of wetlands have been preserved and/or restored, three-quarters of which are owned by the NJSEA or the Meadowlands Conservation Trust (MCT), providing significant floodwater storage capacity and habitat protection.

The Meadowlands Conservation Trust Act of 1999 (N.J.S.A. 13:17-87) led to the creation of the MCT, a New Jersey State agency that is in, but not of, the NJSEA. The MCT was formed to acquire and preserve environmentally sensitive land and to enhance the environment of the District and the Hackensack River watershed. The NJSEA provides administrative and technical support to the MCT.

Nearly 1,000 acres of sensitive lands are preserved and managed by MCT, including the 16-acre Skeetkill Creek Marsh Park in Ridgefield, which was donated to the MCT by the New Jersey Meadowlands Commission (NJMC), predecessor to the NJSEA, in 2008, and the 587-acre Richard P. Kane Natural Area (Kane Tract) in Carlstadt and South Hackensack, which was acquired by the MCT in 2005.¹¹

5.5 Assessment of Development and Redevelopment

The NJSEA's *Hackensack Meadowlands District Master Plan Update 2020 (Master Plan)* provides a comprehensive analysis of demographics in the Meadowlands District and beyond. The Plan examines population, housing, employment and the economy and provides projections for the future.

With regards to land use trends, the District land uses can be broadly classified as natural areas, developed areas, and other areas.

- A. Natural areas consist of the District's waterways, wetlands, areas, and parklands. A significant portion of the District's land area is classified as wetlands and the prevalence of these natural areas within the District continues to be the leading influence on the NJSEA's land use policies.
- B. Developed areas consist of lands improved with buildings and related pavement and structures. This classification includes the Residential, Commercial Office, Commercial Retail, Hotels and Motels, Industrial, Industrial/Commercial Complex, Meadowlands Sports Complex, Public/Quasi Public Services, Transportation, and Utility categories.

¹¹ *Hackensack Meadowlands District Master Plan Update 2020*, February 2020 An Update To The 2004 Master Plan, Prepared by the New Jersey Sports and Exposition Authority

Developed areas comprise approximately half of the District's land area and industrial land uses comprises the largest active land use category. The many transportation routes throughout the District, as well as the District's proximity to New York City and various ports and freight lines, have established the District as a major industrial sector. There has been an increase in land area in the District that is dedicated to industrial uses; and warehouse and distribution uses comprise the majority of land use applications under review by the NJSEA. Office buildings have been demolished throughout the District in response to the market demands for more industrial space.

Residential uses are located within established residential neighborhoods in Little Ferry, Moonachie, and Secaucus, which existed prior to the formation of the District. The growth of residential uses within the District has been one of the dominant land use trends over the last decade, with a total of 3,895 new residential units occupied on the District since 2004. The residential units are located within multi-family mid-rise housing developments in Secaucus, East Rutherford, and Lyndhurst.

- C. Other areas consist of lands that cannot be classified as either a natural or developed area, and include the vacant land, altered land, and transitional land categories.

The Master Plan provides a build-out analysis (Chapter 3 Land Use) that takes into account new buildings and building footprint expansions that have been constructed and received occupancy certification between January 2004 and December 2018. This analysis is a useful assessment of development and redevelopment in the District. Specifically, 3,895 residential units have been constructed as of 2018; 1,172,274 square feet of commercial space has been constructed; 165,550 square feet of office space has been constructed; 4,737,105 square feet of industrial/warehouse space has been constructed; and 436 hotel rooms have been constructed.

Based on the data reviewed in the Master Plan and present economic indicators, warehousing and distribution uses continue to be the predominant active land use presence in the District. With regards to future development impacts on the watershed and natural floodplain functions, the District regulations, including the floodplain management regulations and required stream setbacks/buffers, will continue to apply to development applications reviewed by the NJSEA in order to protect these important environmental features within the District.

5.6 Future Flood Assessment

The historical flooding in the Hackensack Meadowlands District is well documented and serves as a guideline for future events. However, as the sea level rises, the District will become more vulnerable to impacts from flooding. The overall impacts of flooding on the community will be contingent on how effectively the NJSEA and its constituent communities mitigate current vulnerabilities and plan for future conditions, as well as how the global community unites to combat sea level rise on a macro scale. This Floodplain Management Plan is one of many tools that can be used to help plan for future conditions.

6. GOALS

This Floodplain Management Plan is a guide that can be used to implement FEMA policies, including floodplain management initiatives and mitigation strategies within the District. The effectiveness of a floodplain management plan is assessed by determining how well its goals are achieved. Over the course of the various Floodplain Management Plan Committee meetings, the Committee reviewed the goals from the 2005 Floodplain Management Plan and discussed potential new goals to determine how the NJSEA could increase resiliency and mitigate damage from future storm events. The following is a list of the goals established by the Committee for the 2022 Floodplain Management Plan:

1. Reduce impacts from flooding to protect life and property and strengthen critical facilities and infrastructure to withstand severe flooding events.
2. Protect and preserve environmental resources and maintain their natural ability to increase flood protection and community resilience.
3. Promote public education on flood hazards, measures for flood safety, and loss reduction.
4. Continue to foster collaboration to create a flood-hazard-resilient community.
5. Monitor, evaluate, and map the evolving flood hazard area.

7. REVIEW OF MITIGATION ACTIVITIES

The Floodplain Management Plan reviews activities that could prevent or reduce the severity of the problems previously described in Chapter 5. There are multiple broad categories of activities which cover specific actions as detailed in the sections below.

7.1 Floodplain Management/Hazard Mitigation Activities

7.1.1 Preventive Activities

Preventive activities keep flood problems from getting worse. The use and development of flood-prone areas is limited through planning, land acquisition, or regulation.

- Floodplain Mapping And Data;
- Planning And Zoning;
- Open Space Preservation;
- Stormwater Management ;
- Floodplain Regulations ;
- Drainage System Maintenance; and
- Building Codes.

7.1.2 Property Protection Activities

Property protection activities are usually undertaken by property owners on a building-by-building or parcel basis.

- Relocation;
- Retrofitting;
- Acquisition;

- Building elevation;
- Insurance; and
- Tide Gates.

7.1.3 Natural Resource Protection Activities

Natural resource protection activities preserve or restore natural areas or the natural functions of floodplain and watershed areas.

- Wetlands protection;
- Water quality improvement;
- Erosion and sediment control;
- Natural area preservation;
- Natural area restoration; and
- Natural functions protection.

7.1.4 Emergency Services

Emergency services measures are taken during an emergency to minimize its impact.

- Hazard threat recognition;
- Critical facilities protection;
- Hazard warning; and
- Post-disaster mitigation actions.

7.1.5 Structural Projects

Structural projects keep floodwaters away from an area with a tide gate, levee or other flood control measures.

- Tide Gates;
- Channel modifications;
- Levees/floodwall; and
- Storm drain improvements.

7.1.6 Public Information Activities

Public information activities advise property owners, potential property owners, and visitors about the hazards, ways to protect people and property from the hazards, and the natural and beneficial functions of local floodplains.

- Map information;
- Library;
- Outreach projects;
- Technical assistance;
- Real estate disclosure; and
- Environmental education.

7.2 Hazard Mitigation Activities for Bergen and Hudson County

Both the 2020 Bergen County Multi-Jurisdictional Hazard Mitigation Plan and the 2020 Hudson County Hazard Mitigation Plan have been reviewed for all flood related hazards. The following

chart displays a summary of the objectives of the constituent municipalities and categorizes them into specific floodplain management or hazard mitigation activities:

Table 8 – List of Municipal Flood Hazard Projects from the County Hazard Mitigation Plans

Objective Statement	Preventive Activities	Property Protection	Natural Resource Protection	Emergency Services	Structural Projects	Public Information Activities
Carlstadt						
Conversion of Borough-wide Communication System				✓		
Design and Construct Drainage and Roadway Improvements					✓	
Purchase and Install an Emergency Warning System				✓		
Acquisition of property for public parking use during hazardous flooding events.		✓				
Purchase equipment to strengthen emergency response time for Carlstadt				✓		
Improve communications with radios				✓		
Purchase equipment to strengthen ability to travel through floodwaters during and after hazards				✓		
Coordinate with County for enhanced mapping of topography and watershed	✓					✓
Purchase Portable generators and portable pumps				✓		
Design and Construct Roadway Elevations					✓	
East Rutherford						
Feasibility study into flood protection measures	✓					
Flood Proof Critical Facilities		✓				
Develop a Shelter Needs list and Response Plan				✓		
Prepare a Hurricane Plan to guide the preparation and response to Hurricane conditions	✓					
Install approved secondary traffic control devices at applicable intersections				✓		
Clean all catch basins and stormwater management lines					✓	
Purchase and install generators at three public schools/shelters Schools within the Borough				✓		
Purchase and Install generators at Marietta Parkway Pump Station				✓		
Upgrade Emergency Equipment				✓		
Install Pump Stations at Existing Tide Gates					✓	
Mitigate Repetitive Loss and Severe Repetitive Loss Properties		✓				
Install Generator Hookups in Traffic Lights		✓				

Objective Statement	Preventive Activities	Property Protection	Natural Resource Protection	Emergency Services	Structural Projects	Public Information Activities
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Little Ferry						
Purchase and Install New Pump Stations along the Hackensack River at the Main Street Drainage Station and the Bergen Turnpike Pump Station					✓	
Continue to Improve Stormwater Management Along Public Ditch					✓	
Develop an Open Space Preservation Plan	✓					
Transfer of Development Rights		✓	✓			
Expand and Enhance Public Education and Outreach Programs on Hazards						✓
Stream Corridor Restoration					✓	
Elevation of RL and SRL Structures		✓				
Construct Levees, Floodwalls, and Berms along the Hackensack River					✓	
Acquisition of an Emergency Generator				✓		
Purchase and Install Generator at Main Street Stormwater Pump Station				✓		
Emergency Generator at Willow Lake Storm Water Pump Station				✓		
Self-cleaning Grate at Stormwater Pump Station					✓	
Expand the Capacity of Willow Lake					✓	
Acquire and Demolish Repetitive Loss (RL) and Severe Repetitive Loss (SRL) Properties, Especially Properties Located on Slopes, Ditches, and Creeks		✓				
Elevate and Floodproof Repetitive Loss (RL) and Severe Repetitive Loss (SRL) Properties, with a focus on the "Main St Corridor"		✓				
Install Stormwater Pump Station and Check Valve Within the Industrial Ave/Gates Road Area					✓	
Purchase and Install a Generator at St. Margaret's Church				✓		
Mitigate all Critical Facilities to the 500-year Floodplain Regulations		✓				
Purchase Portable Generators and Pump Stations				✓		
Install a Redundancy for Communication Systems				✓		
Install a Pump Station Notification System				✓		
Purchase Emergency Equipment Including Street Barricading and Messaging Boards				✓		

Objective Statement	Preventive Activities	Property Protection	Natural Resource Protection	Emergency Services	Structural Projects	Public Information Activities
Purchase Evacuation Equipment				✓		

Lyndhurst						
Mitigate Repetitive Loss and Severe Repetitive Loss Properties		✓				
Purchase and Install Folding Stop Signs and Battery Backups at Traffic Intersections				✓		
Construction of permanent flood walls or levees					✓	
Clean out Storm Sewer Pipes					✓	
Add Redundant Communication System				✓		
Improve Existing Siren/PA System				✓		
Add AM Radio Station for Emergency Information				✓		
Moonachie						
Purchase and Install Generators for Pump Stations, Airport, and DPW facility in addition to Mobile Generators for Traffic Lights				✓		
Improve Emergency Communications Throughout the Borough				✓		
Purchase and Install a Solar-powered Electronic Message Board				✓		
Purchase Mobile generators				✓		
Purchase and Install Generators for the pump stations				✓		
Coordinate with the County for installation and purchase of generator hook-ups for traffic signals				✓		
Purchase High-water Rescue Vehicles				✓		
Remove Boilers from School Basement		✓				
Dredge and Desnag Riser Ditch and Berry's Creek					✓	
Set up a System to Notify Residents Through Sirens				✓		
Construct a Berm Along the East Riser Ditch					✓	
Purchase and Install Radios for Emergency Vehicles				✓		
Purchase Emergency Equipment (large dump truck, 4x4, portable radios, barricades, cones, chainsaws)				✓		
Purchase Jet Vac Truck		✓				
North Arlington						
Portable generators for pump stations				✓		
Riverine & Stormwater Flooding – Inspection of Catch Basins and Storm sewer lines		✓				

Objective Statement	Preventive Activities	Property Protection	Natural Resource Protection	Emergency Services	Structural Projects	Public Information Activities
Installation of an Audio Warning System				✓		
Purchase and Install a Stand-by generator – DPW Garage				✓		
Installation of an Emergency Generator at DPW Building				✓		
Ridgefield						
Purchase Additional Anchorage of Outdoor Emergency Communications and PA System and Upgrade Sirens				✓		
Provide Public Outreach on Hazard Mitigation through the Health Day Fair, School Outreach, and Other Information Materials						✓
Review and revise local ordinance using FEMA guidance	✓					
Acquire, Elevate, or Floodproof Structures in Flood-prone Areas, with a Focus on Repetitive Loss (RL) and Severe Repetitive Loss (SRL) Properties near Overpeck Creek and Wolf Creek		✓				
Inspect Water and Sewer Lines with Cameras		✓				
Replace Deteriorating Water and Sewer Lines					✓	
Purchase Mobile Pumps to Assist During Power Outages				✓		
Provide Ongoing Stormwater Maintenance and Education on Littering						✓
Purchase a Variable Message Sign to Assist with Evacuations				✓		
Assist Homeowners Acquire Funding to Build Seepage Pits/Drywells		✓				
Rutherford						
Rutherford/East Rutherford Drainage System Restoration					✓	
Reverse 911 System				✓		
Acquire or Elevate Repetitive Loss (RL) and Severe Repetitive Loss (SRL) Properties		✓				
Improve Stormwater Infiltration Rate	✓					
Coordinate with the New Jersey Department of Transportation, U.S. Army Corps of Engineers, and New Jersey Department of Environmental Protection to dredge and de-sag channels, ditches, and streams.					✓	
Purchase Moveable Barriers				✓		
Purchase Jet Vac Truck				✓		
Develop Redundant Emergency Operations Command Center				✓		
Purchase Additional Variable Message Signs				✓		
Purchase a Siren Alert System				✓		

Objective Statement	Preventive Activities	Property Protection	Natural Resource Protection	Emergency Services	Structural Projects	Public Information Activities
Purchase and Install Pump Station at the Rutherford Tide Gate					✓	
Coordinate with Teterboro Airport for Emergency Planning				✓		
South Hackensack						
Stream/Ditch Restoration					✓	
Purchase Emergency Equipment				✓		
Purchase and Install Back-up Generators for Traffic Lights				✓		
Purchase and Install Generators for Critical Facilities				✓		
Teterboro						
Industrial Avenue Stormwater Pump Station					✓	
East Riser Ditch Restoration					✓	
West Riser Ditch Stream Cleaning					✓	
Purchase Mobile Generators for Traffic Lights				✓		
Develop an Engineering Study for Pump Station					✓	
Construct 70-FT Utility Poles throughout the Borough					✓	
Implement East Riser Tide Gate Improvements					✓	
Increase Capacity and Install Pump Station in West Riser Ditch					✓	
Connect the Vincent Place Pump Station to the West Riser Ditch					✓	
Jersey City						
Update Flood Damage Prevention Ordinance	✓					
Wet Weather Pumping Stations					✓	
Flood Modeling	✓		✓			
Flood Risk Awareness						✓
Resiliency Parks Feasibility			✓			
Critical Facilities in Floodplain		✓				
Kearny						
Generators for Critical Facilities				✓		
Upgrade Tide Gates					✓	
Electric Alarm Systems at Pumping Stations				✓		
Repetitive Loss Properties		✓				
North Bergen						
Proposed stormwater diversion along culvert south of 91st Street					✓	

Objective Statement	Preventive Activities	Property Protection	Natural Resource Protection	Emergency Services	Structural Projects	Public Information Activities
Mitigating flood prone properties		✓				
Critical Facility Outreach		✓				
Secaucus						
Repetitive Loss Properties		✓				
Hackensack River Waterfront Flood Wall					✓	
Check Valves on Collection System Discharges					✓	
Critical Facility Outreach		✓				

As the Meadowlands District is comprised of 14 constituent municipalities, there are a myriad of activities being proposed to improve the resilience of the region from flooding hazards.

The most common activities across the municipalities include the installation or upgrades to communication systems and warning systems. These emergency services activities are crucial to life and safety issues for the residents and workers in the municipalities to allow time for flood preparation or evacuation. Other emergency services activities shared across many municipalities are the purchasing of generators for various critical infrastructure components. There are also structural activities common across the municipalities such as ditch maintenance and drainage system maintenance and improvements.

While there are many proposed activities, not all of them can be initiated immediately based on available funding. The municipalities are focused on the projects that are economically feasible and will aid in the resiliency of their communities.

7.3 Regulatory Review

In keeping with the Master Plan's resiliency strategies, the NJSEA is tasked with assessing vulnerabilities within the District in order to select responsive strategies to incorporate within future amendments to the District Zoning Regulations.

The NJSEA Floodplain Management Zoning Regulations (Subchapter 9), dated August 19, 2019, require that new construction and substantial improvement of any residential, commercial, industrial or other nonresidential structure located in an area of special flood hazard, shall have the lowest floor, elevated at or above the base flood elevation (published FIS/FIRM) plus one foot, the best available flood hazard data elevation plus one foot (currently the Preliminary FIRM maps), or as required by ASCE/SEI 24-14, Flood Resistant Design and Construction, Table 2-1, whichever is more restrictive. Adherence to the floodplain regulations provide an additional level of flooding protection for future development in the District.

After Hurricane Sandy, FEMA released Preliminary FIRMS that reflect the most current scientific data regarding the likelihood of flooding resulting from the 100 year base flood, which is a flood having a one percent chance of being equaled or exceeded in any given year. While the Preliminary FIRMS were already under development prior to Hurricane Sandy, the impacts of Sandy showed that the then-effective FIRMS did not reflect current coastal flood hazard risks. Moonachie, Little Ferry and Carlstadt were significantly impacted from flooding due to Sandy and the Preliminary FIRMS list the base flood elevation in these areas as 8 feet (NAVD88). It is important to note that most buildings/low elevation properties that sustained major damage due to Hurricane Sandy were constructed/developed prior to the establishment of the Hackensack Meadowlands District (1968) and the corresponding zoning regulations. Prior to 2012, there were less than 10 repetitive loss properties in the District, and that number increased to 110 post-Sandy.

As noted in previous sections of this Plan, one goal of the floodplain management plan is to reduce impacts from flooding to protect life and property. To that end, a future amendment to the District zoning regulations may include added freeboard requirements of 2-3 feet above the base flood elevation to provide more flooding protection for future development. However, any amendments to the District zoning regulations will follow the established State of New Jersey rulemaking process, including public notice and public hearing requirements.

7.4 Additional Potential Flood Hazard Projects

The Hackensack Meadowlands District is a unique mix of natural and developed areas that are intersected by major transportation corridors. Due to the proximity to major transportation routes, redevelopment and reuse of available land are prevalent in the area and have resulted in the District's economic hub status. While the District is mostly comprised of industrial land uses, there is also a residential component that needs to be considered with regards to flood resiliency. As such, flood resiliency and related floodplain management projects have been contemplated by the 14 constituent municipalities, both Bergen County and Hudson County, the NJSEA, and other state agencies. The table below includes a list of potential projects/activities that will impact flood resiliency for the District, including municipal projects that have been proposed subsequent to the publishing of the 2020 Bergen County Multi-Jurisdictional Hazard Mitigation Plan and the 2020 Hudson County Hazard Mitigation Plan. The table also includes potential infrastructure projects that could assist with flood mitigation for the District. Some projects may not be economically feasible at this time. However, their inclusion in the Floodplain Management Plan is important, as funding may become available in the future or grants may be obtained to move forward with these resiliency projects/activities.

Table 9 – List of Potential Flood Hazard Projects in the Meadowlands District

Potential Flood Hazard Project	Preventive Activities	Property Protection	Natural Resource Protection	Emergency Services	Structural Projects	Public Information Activities
Bergen County Backflow Preventers					✓	
Rebuild by Design Meadowlands					✓	
Maintenance of Drainage Ditches and Tide Gates					✓	
Monitoring of Water Levels along the Hackensack and Tributaries		✓				
Surveying/Mapping of Stormwater Infrastructure in the Rights-of Way	✓					
Drone Surveys of Drainage Ditches	✓					
Blue Acres/Green Acres		✓				
Broad Street Tide Gates					✓	
Replacement of Peach Island Creek Tide Gate					✓	
Berm Enhancement - Elevating, Replacing or Adding Berms to an Elevation to Prevent Regular Flooding (16 miles in length at an average of 5 ft high)					✓	
Upgrading the storm sewer systems in the District					✓	
Route 7 Drainage Improvements - Install Pump Stations and Bulkheads and Re-grade to Prevent Future Flooding					✓	
Install Water Tight Sanitary Manhole Covers In District to Prevent Debris from Entering the Sanitary System					✓	
Surge Protection Gate at Paterson Plank Rd and Berry's Creek to Close Off Berry's Creek During Any Specific Event					✓	
Tide Gate Installation at Bellman's Creek to Protect Sections of North Bergen					✓	
Mitigation Improvements for West Side Ave, North Bergen - Raise Roadway Elevation, Construct Berms and/or Protective Structures					✓	
Berm Construction Along Sachs Creek					✓	
Improvements to Make Penhorn Creek Tide Gate/Pump Station Operational and Pipe to Hackensack River					✓	
Berm Enhancement Along Penhorn Creek					✓	

Potential Flood Hazard Project	Preventive Activities	Property Protection	Natural Resource Protection	Emergency Services	Structural Projects	Public Information Activities
Berm Enhancement Along Berry's Creek in Rutherford/East Rutherford - Raise Elevation of Berm Along Berry's Creek to Elevation 10					✓	
Purchase of Repetitive Loss Properties to be Used as Open Space			✓			
Change Profile of Low Elevation Roads - Raise Elevation of Low Lying Roads to Prevent Future Flooding					✓	
Installation of Pump Station at West Riser Tide Gates					✓	
Installation of Pump Station at East Rutherford Tide Gates					✓	
Installation of Pump Station at Rutherford Tide Gates					✓	
Secaucus Huber Street Floodwall					✓	

8. ACTION PLAN

The previous section presented a wide range of possible floodplain management activities to address the goals established by the Planning Committee. This section presents an Action Plan that describes which activities are recommended to be implemented, who is responsible for implementing the activity, the timeline for completing the activity and the funding source. While there are many potential activities listed in the prior section, the Planning Committee recognizes that many of these projects are not economically feasible with available funds. While funding issues are usually the largest impediment to implementing projects, due to the unique features of the Meadowlands District, environmental factors and permitting also often play an outside role in the feasibility of projects.

The Floodplain Management Action Items table below lists the Floodplain Management Plan's proposed flood mitigation initiatives. The Action Items are limited to activities that have already secured full funding. In addition to proposed projects with definitive schedules, the Planning Committee identified several ongoing floodplain management activities. These initiatives are completed either annually or updated continuously. While these initiatives have become part of the NJSEA's responsibilities for the CRS program, their importance warrants the regular reporting of their successful completion during each recertification period to ensure the current level of floodplain management is maintained.

Table 10 – Floodplain Management Action Items

Action Item Recommendations	Responsible Party for Implementation	Estimated Timeline	Funding Source	FMP Goals Met
Bergen County Backflow Preventers	Bergen County	Installation Beginning in Fall 2022. Completion in 2023.	Federal Grant Funding (HMGP)	1
Rebuild By Design	AECOM	Completion by 2025	HUD Grant	1, 4
Maintenance of Drainage Ditches	Municipalities, Bergen Co., Hudson Co., Turnpike Authority	Ongoing	Municipal Operating Budgets	1, 5
Maintenance of Tide Gates	Municipalities, Bergen Co., Hudson Co., Turnpike Authority	Ongoing	Municipal Operating Budgets	1, 5
Monitoring of Water Levels along the Hackensack & Tributaries	NJSEA (MRRI)	Ongoing	NJSEA Operating Budget	3, 4, 5

Action Item Recommendations	Responsible Party for Implementation	Estimated Timeline	Funding Source	FMP Goals Met
Surveying/Mapping of Stormwater Infrastructure in the Rights-of Way	NJSEA (MRRI)	Ongoing	NJSEA Operating Budget	5
Drone Surveys of Drainage Ditches	NJSEA (MRRI)	Completion by 2027	NJSEA Operating Budget	2, 5
Blue Acres/Green Acres	Municipalities, Bergen Co., Hudson Co., NJSEA	Ongoing	State of NJ	2, 3, 4
Broad Street Tide Gates	Carlstadt	Beginning in 2023	Federal Grant Funding	1
Wetland Acquisition	NJSEA, Meadowlands Conservation Trust	Ongoing	MCT Funding	2

Bergen County Backflow Preventers

Bergen County has secured a grant to install inline backflow preventers within existing pipes and inlets in various locations throughout Bergen County. These backflow preventers stop tidal waters from backing up through the drainage systems and flooding upstream areas during tidal events. Several locations for the proposed work are within the District, and this work will be moving forward at the end of 2022.

Rebuild by Design Meadowlands

Refer to Chapter 3 for a description of Rebuild by Design Meadowlands.

Maintenance of Drainage Ditches and Tide Gates

While the maintenance of drainage infrastructure has been indicated as an activity by the municipalities, other governmental agencies are often also involved, mainly Bergen County, Hudson County and the New Jersey Turnpike Authority. Due to the geographical locations of the drainage infrastructure – many are directly positioned on a municipal boundary – there is often more than one party involved in the maintenance projects. There are also easements that have been granted to the Counties and Turnpike Authority which detail their responsibilities for the infrastructure in certain locations. In addition, the larger agencies possess the heavy equipment required to perform more intensive maintenance, so they often work in conjunction with the local municipalities.

Monitoring of Water Levels along the Hackensack and Tributaries

The NJSEA continues to maintain, update and upgrade equipment that monitors water levels. This ensures that timely warning can be provided to first-responders and residents when water levels rise during tidal events, or heavy rains and storms. The state-of-the-art data collection instruments are stationed at tide gates, in the marshes and in the Hackensack River and relay information to the NJSEA via satellite. The information gathered is relayed to out-of-state servers to ensure that data is available to the public even during power outages in the Meadowlands area. The active monitoring of water levels allows the NJSEA to alert the municipalities and general public regarding potential flooding events. The Agency maintains twelve (12) water level sensors that can be accessed by the public in real time.

The MRRI Real-Time Water Level Alert System originates from the continuous water level sensor network in the Hackensack River. When water levels exceed 4.5 feet above sea level, alerts are broadcast as emails and/or text messages to subscribers and new elevations are broadcasted until the waters recede. The system includes an automated warning to all emergency responders in the District in the advent of a major, six-foot flood.

Surveying/Mapping of Stormwater Infrastructure in the Rights-of Way

Much of the existing drainage infrastructure within the Meadowland District predates the existence of the NJSEA (or its predecessor agencies). Due to this fact, there are large portions of the District in which the infrastructure within the Rights-Of-Way is unmapped. This results in an inexact delineation of drainage basins within the District. Locating inlets and their inverts and determining pipe sizes in the drainage networks would identify drainage/stormwater infrastructure issues that create or contribute to flooding. In many cases, this information has already been collected by municipalities or other organizations, but it is difficult to effectively use in its current piecemeal form. MRRI has an established GIS database and would be able to update their publicly available maps with this survey information of the drainage infrastructure, which would be of great benefit to municipal Departments of Public Works and design engineers working on development projects in the District.

Drone Surveys of Drainage Ditches

The NJSEA annually inspects the large drainage ditches and tide gates which are responsible for draining large portions of the Meadowlands District and adjacent municipalities. However, due to access issues, only key study points can actually be inspected in person for the ditches, and generally the downstream ends of the tide gates are not completely visible. An aerial drone with video recording capabilities would be used to fly these ditches and tide gates. In this manner, the complete length of a ditch would be available for review. Hazards which constrict or block the flow in the drainage ditches, such as fallen trees, debris or sedimentation, would be easily identified from the aerial view. The areas in need of maintenance would be noted, and a plan would be put forth to address the issues. Note that MRRI has personnel approved by the FAA for

unmanned aerial vehicles and has obtained a waiver for the no fly zones in proximity of the Teterboro and Newark Airports.

Blue Acres/Green Acres¹²

The Green Acres Program serves as the real estate agent for the Department of Environmental Protection, acquiring land - much of which has been offered for sale by property owners - that becomes part of the system of state parks, forests, natural areas, and wildlife management areas. Green Acres works with the DEP's divisions of Parks and Forestry, Fish and Wildlife, and the New Jersey Natural Lands Trust to determine which lands should be preserved. Green Acres does not own the land it acquires; instead land is assigned to the divisions for management. Land and easement interests in land can be acquired not only by purchase but also by donation and bequests.

Green Acres administers the Inland Blue Acres funding for acquisition of land in the floodplains of various rivers to reduce repetitive flooding. Since its inception in 1995, DEP Blue Acres has worked to better protect public safety and the environment by relocating New Jersey families whose homes are subject to repeated flooding and acquiring property for use as natural flood storage, parks, and community open space. Through Blue Acres, homeowners whose homes are storm-damaged or vulnerable to flooding have the option to sell. The program makes both families and communities more resilient to climate change.

Broad Street Tide Gates

The storm drain outfalls at the intersection of Broad Street and 20th Street in Carlstadt are to be rehabilitated to mitigate drainage issues in the area. Outfall protection and gabion baskets will be upgraded and duck-bill tide gates will be installed on the outfall pipes. In addition, the underground storm drain system from 20th Street to 13th Street will also be rehabilitated to increase its current capacity. This may be through cleaning or replacement/upgrade of the underground storm drain pipes.

Wetlands Acquisition

In order to maintain natural buffer areas between the river and the developed areas, the NJSEA and Meadowlands Conservation Trust continue to acquire critical tracts of wetlands. To date, more than 3,000 acres of wetlands has been acquired to help dissipate storm events and tidal flows.

¹² New Jersey Department of Environmental Protection, <https://www.nj.gov/dep/greenacres/state.html>

9. PLAN ADOPTION

Formal resolution from the NJSEA Board for the adoption of the 2022 FMP.

DRAFT

10. PLAN MAINTENANCE

To be useful, the Floodplain Management Plan must be dynamic, and the planning must be ongoing. As implementation proceeds, the plan must remain fluid in order to accommodate any changes to hazard conditions as well as potential changes to goals and objectives. There must be an evaluation and update process for the FMP to ensure that the action items are proceeding and that any changes are captured in the plan.

10.1 Implementation

This Floodplain Management Plan is intended to be a dynamic document, adapting to changes in flood hazards and the needs of the Hackensack Meadowlands District. The effectiveness of the FMP depends on its implementation and incorporation of its action items among the constituent communities of the District. The action items provide a framework for activities that can be implemented over the next five years.

The CRS Coordinator for the District will be responsible for monitoring the plan and ensuring that the Floodplain Management Plan Committee will meet at least twice per year to aid with the yearly plan evaluation. The original members of the committee will remain, unless they wish to be replaced. A like representative will replace them.

10.2 Evaluation

The evaluation of the FMP is an assessment of whether the planning process and actions have been effective, if the FMP goals are being reached and whether changes are needed. The FMP will be evaluated on an annual basis to determine the effectiveness of the actions, and to reflect changes that may affect priorities or available funding. The Planning Committee will meet twice per year and include the following topics:

- Summary of any flood hazard events that occurred during the performance period and the impact these events had on the Hackensack Meadowlands District;
- Review of mitigation success stories;
- Review of continuing public involvement;
- Analyze the progress made for the objectives of the action plan;
- Recommendations for new projects;
- Changes in or potential for new funding options; and
- Impact of any other planning programs or initiatives that involve flood-related hazard mitigation.

The CRS Coordinator will prepare an annual progress report to document action updates to the FMP based on the twice per year plan review meetings. The progress report will continue to be publicly available and will cover the following items:

- Posted on the NJSEA floodplain management webpage;
- Provided to the local media through a press release;
- Presented to the NJSEA Board of Commissioners to inform them of the progress of mitigation initiatives implemented during the reporting period; and

- Provided as part of the CRS annual re-certification package.

10.3 Plan Updates

The NJSEA intends to update the FMP on a 5-year cycle in conjunction with the CRS program. At a minimum, updates to the FMP will include the following elements:

- The update process will be convened through the FMP Planning Committee.
- The action plan will be reviewed and revised to account for any initiatives completed, dropped, or changed and to account for changes in the risk assessment or new policies identified under other planning mechanisms.
- The risk assessment will be reviewed and updated using the best available information and technologies.
- The public will be given an opportunity to comment on the update prior to adoption.
- The NJSEA Board of Commissioners will adopt the updated plan.

11. APPENDICES

Appendix A – Public Meeting Documentation

Appendix B – Municipal Meeting Documentation

Appendix C – Tide Gates and Inundation Maps

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APPENDIX A



We Bring the World to New Jersey

PUBLIC NOTICE
May 13, 2022

Hackensack Meadowlands District Floodplain Management Plan

Please take notice that the New Jersey Sports and Exposition Authority (NJSEA) is in the process of preparing an update to the Hackensack Meadowlands District Floodplain Management Plan, as required through the agency's participation in the National Flood Insurance Program (NFIP) Community Rating System (CRS).

CRS is a voluntary incentive program administered by the Federal Emergency Management Agency (FEMA) that rewards communities engaging in flood mitigation activities that exceed the minimum NFIP program requirements. The Hackensack Meadowlands District has participated in the CRS program since 1992. The NJSEA maintains a CRS Class 7 rating based on specific agency-implemented floodplain management activities, which results in annual flood insurance discounts for insured properties within the District. Specifically, the floodplain management activities implemented by the NJSEA qualify flood insurance policy holders in the District for a 15 percent discount in the premium costs for NFIP policies issued or renewed in Special Flood Hazard Areas.

The NJSEA welcomes your participation in the District Floodplain Management Plan update process and will be offering opportunities through public meetings over the coming months to contribute in this important initiative. These public meetings are open to the District's constituent municipalities, stakeholders, property owners, and the public to seek input and to collect, log, and assess flooding incidents and concerns for further review.

The first public meeting will be held on Wednesday, June 1, 2022 at 10AM in the Commission Meeting Room of the NJSEA, One DeKorte Park Plaza, Lyndhurst, New Jersey.

Please contact the NJSEA Offices at 201-460-1700 prior to the hearing if special requirements are needed under the Americans with Disabilities Act (ADA). If there are any questions, please contact Fawzia Shapiro or Jeffrey Zielinski at 201-460-1700 during regular business hours.

Sincerely,

Sara J. Sundell, P.E., P.P.
Director of Land Use Management



New Jersey Sports & Exposition Authority

Hackensack Meadowlands Floodplain Management Plan

Public Meeting Sign In

Date: Wednesday, June 1, 2022
Start Time: 10:00 a.m.
Location: Meadowlands Environment Center, Two DeKorte Park Plaza

NAME	ORGANIZATION	TELEPHONE	E-MAIL
Diana Fambury	Meadowlands Chamber	201 960 7189	delfambury@optimum.net
Bill Sheehan	Hackensack Riverkeeper	201-968-0808	
Andrew Lathin	Re-Town Tech	201-410-2646	alathin@re-town.com
Dan ORTEGA	ELEC Local 825	551-222-9089	DORTEGA@electrics.org
Alex Kowenhoven	Prologis	443 520 9779	akowenhoven@prologis.com
Jesse Ikenburg	Prologis	—	jkenburg@prologis.com
Sarah Rutherford	Prologis	—	s.rutherford@prologis.com
Frank Hoeslin	K&L	201 228 4400	Frank.Hoeslin@klo.com
Razana Marley	Secaucus		RMarley@secaucus.net
Jennifer Modi	Secaucus	201 617 5913	jmodi@secaucus.net
Mark Saponis	Township of Lyndhurst	201 266-2350	marks@lyndhurstnj.org
Michele Lanza	Hackensack Riverkeeper	201 916 0073	michele@njriverkeeper.org



New Jersey Sports & Exposition Authority Hackensack Meadowlands Floodplain Management Plan Public Meeting Sign In

Date: Wednesday, June 1, 2022

Start Time: 10:00 a.m.

Location: Meadowslands Environment Center, Two DeKorte Park Plaza

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HACKENSACK MEADOWLANDS FLOODPLAIN MANAGEMENT PLAN

First Public Meeting

New Jersey Sports and Exposition Authority
June 1, 2022



AGENDA

- Introduction
- NJSEA relationship with FEMA and the NFIP
- Ongoing NJSEA Initiatives
- NJSEA services/planning tools for District municipalities regarding flooding/flood control
- Floodplain Management Planning Process
- Flooding Questionnaire
- Questions/Comments
- Next Steps

NJSEA RELATIONSHIP WITH FEMA AND NFIP

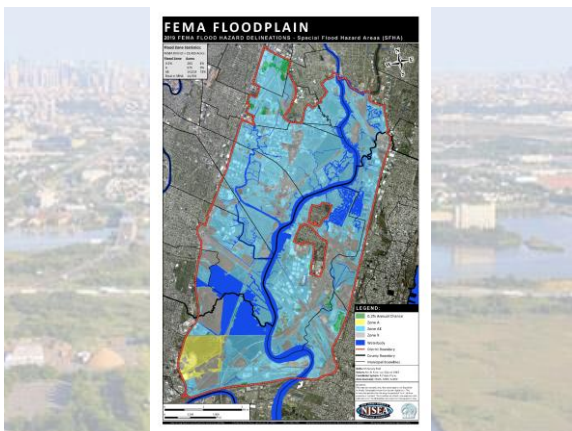
The update of the Hackensack Meadowlands District Floodplain Management Plan is required to continue participation in the National Flood Insurance Program (NFIP) Community Rating System (CRS).

NJSEA RELATIONSHIP WITH FEMA AND NFIP

- The NJSEA participates in the CRS program on behalf of District residents, property owners, businesses, and constituent municipalities.
- CRS is a voluntary incentive program administered by the Federal Emergency Management Agency (FEMA) that rewards communities engaging in flood mitigation activities that exceed the minimum NFIP program requirements.
- The NJSEA has participated in the CRS program since 1992. The NJSEA maintains a CRS Class 7 rating based on the agency-implemented floodplain management activities, which results in annual flood insurance discounts for insured properties within the District.
- Flood insurance policy holders in the District qualify for a 15 percent discount in the premium costs for NFIP policies issued or renewed in Special Flood Hazard Areas.

ONGOING NJSEA INITIATIVES

- Chief Engineer review and signature on elevation certificates for all new buildings and additions
- On-site library of FIRM maps and other FEMA guidance document
- Monitoring/inspection of main drainage ditches, tide gates, and pump stations with the appropriate municipal professionals
- Inspection of flooding incidents and access to NJSEA staff engineers to discuss drainage/flooding issues
- Open space preservation throughout the District through the Meadowlands Conservation Trust
- Collaboration with MRRI (Meadowlands Research and Restoration Institute)



NJSEA SERVICES AND PLANNING TOOLS

- Tide Gate Monitoring System
- Water Level Alert System and Flood Prediction Maps
- NJSEA Staff Engineers and Certified Floodplain Managers to provide Flood Control Assistance
- Shared Equipment Pool

OUTLINE OF THE PLAN AND ITS PROCESS

- Step 1:** Organize to Prepare Plan
- Step 2:** Involve the Public
- Step 3:** Coordinate
- Step 4:** Assess the Hazard
- Step 5:** Assess the Problem

OUTLINE OF THE PLAN AND ITS PROCESS

- Step 6:** Set Goals
- Step 7:** Review Possible Activities
- Step 8:** Draft the Action Plan
- Step 9:** Adopt the Plan
- Step 10:** Implement, Evaluate and Revise



We Bring the World to New Jersey

PUBLIC NOTICE

July 21, 2022

Hackensack Meadowlands District Floodplain Management Plan

Please take notice that the New Jersey Sports and Exposition Authority (NJSEA) is in the process of preparing an update to the Hackensack Meadowlands District Floodplain Management Plan, as required through the agency's participation in the National Flood Insurance Program (NFIP) Community Rating System (CRS).

CRS is a voluntary incentive program administered by the Federal Emergency Management Agency (FEMA) that rewards communities engaging in flood mitigation activities that exceed the minimum NFIP program requirements. The Hackensack Meadowlands District has participated in the CRS program since 1992. The NJSEA maintains a CRS Class 7 rating based on specific agency-implemented floodplain management activities, which results in annual flood insurance discounts for insured properties within the District. Specifically, the floodplain management activities implemented by the NJSEA qualify flood insurance policy holders in the District for a 15 percent discount in the premium costs for NFIP policies issued or renewed in Special Flood Hazard Areas.

The NJSEA welcomes your participation in the District Floodplain Management Plan process and is scheduling a public meeting to update all attendees on the Plan status and flooding related topics, including a presentation on tide gates within the District and how these tide gates protect upstream areas. This public meeting is open to the District's constituent municipalities, stakeholders, property owners, and the public.

The public meeting will be held on Wednesday, August 10, 2022 at 10AM in the auditorium of the NJSEA Environment Center, Two DeKorte Park Plaza, Lyndhurst, New Jersey.

Please contact the NJSEA Offices at 201-460-1700 prior to the hearing if special requirements are needed under the Americans with Disabilities Act (ADA). If there are any questions, please contact Fawzia Shapiro or Jeffrey Zielinski at 201-460-1700 during regular business hours.

Sincerely,

Sara J. Sundell, P.E., P.P.

Director of Land Use Management

Date:	8/10/22
Start Time:	10:00 a.m.
Location:	Meadowlands Environment Center, Two DeKorte Park Plaza

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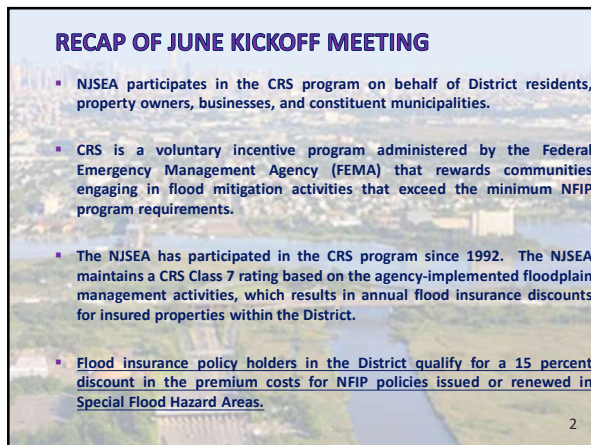
**HACKENSACK MEADOWLANDS
FLOODPLAIN MANAGEMENT PLAN**

Second Public Meeting

New Jersey Sports and Exposition Authority
August 10, 2022








RECAP OF JUNE KICKOFF MEETING

- NJSEA participates in the CRS program on behalf of District residents, property owners, businesses, and constituent municipalities.
- CRS is a voluntary incentive program administered by the Federal Emergency Management Agency (FEMA) that rewards communities engaging in flood mitigation activities that exceed the minimum NFIP program requirements.
- The NJSEA has participated in the CRS program since 1992. The NJSEA maintains a CRS Class 7 rating based on the agency-implemented floodplain management activities, which results in annual flood insurance discounts for insured properties within the District.
- Flood insurance policy holders in the District qualify for a 15 percent discount in the premium costs for NFIP policies issued or renewed in Special Flood Hazard Areas.

2



RECAP OF JUNE KICKOFF MEETING

The update of the Hackensack Meadowlands District Floodplain Management Plan is required to continue participation in the National Flood Insurance Program (NFIP) Community Rating System (CRS).

3

PLAN UPDATE

- Coordination with all 14 constituent municipalities to discuss flooding concerns and seek input on budgeted stormwater management projects or improvements that can be included as activities in the FMP.
- Bergen County Department of Planning and Engineering
- Upcoming discussion with Hudson County Division of Engineering
- Rebuild By Design Meadowlands
 - Losen Slote force main
 - Liberty Street pumping station
 - East Riser Ditch pumping station
 - East Riser Ditch channel improvements
- All projects and initiatives, as well as the RBD Meadowlands projects, contribute to ongoing NJSEA efforts to maintain the 15% flood insurance discount through the implementation of those various floodplain management activities.

4

FLOODING INCIDENTS IN THE DISTRICT

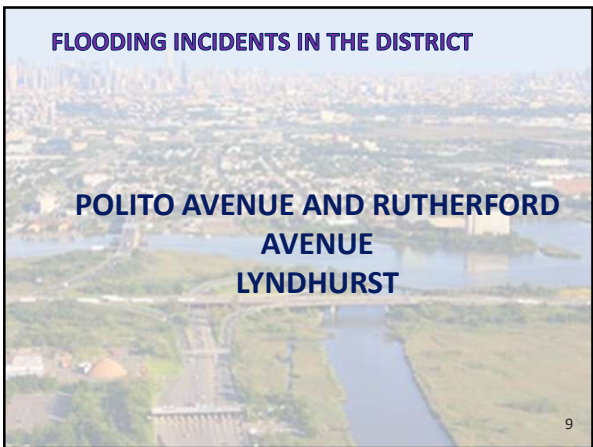
CLAY AVENUE AND WALL STREET WEST LYNDHURST

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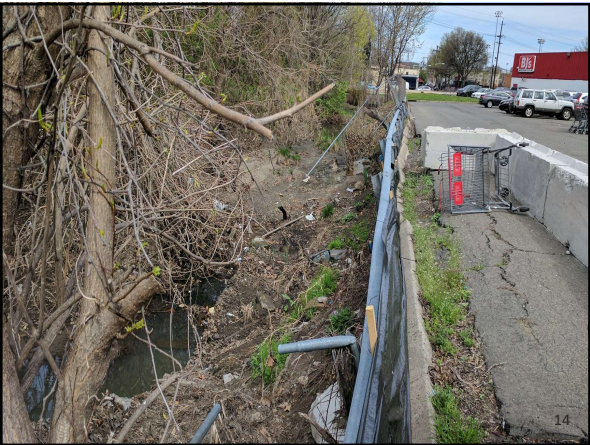










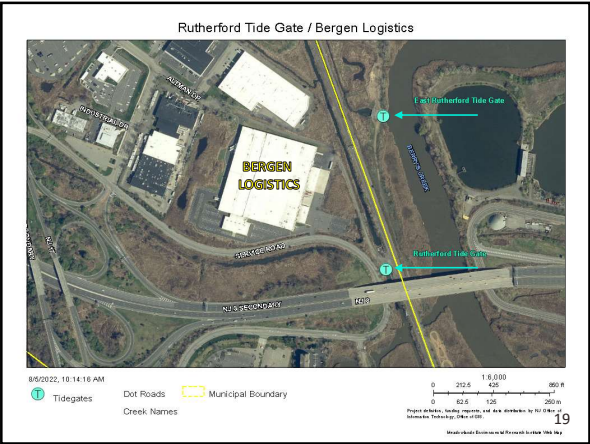










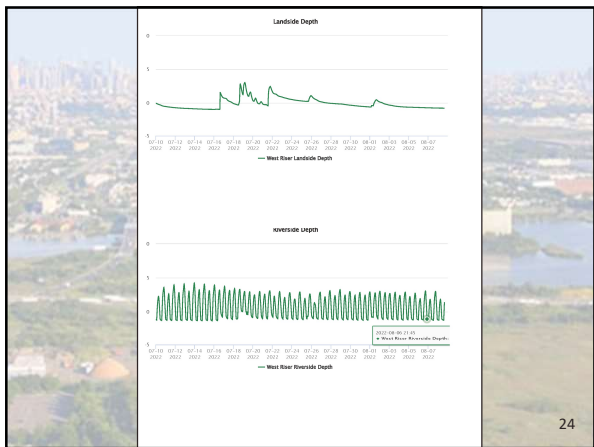


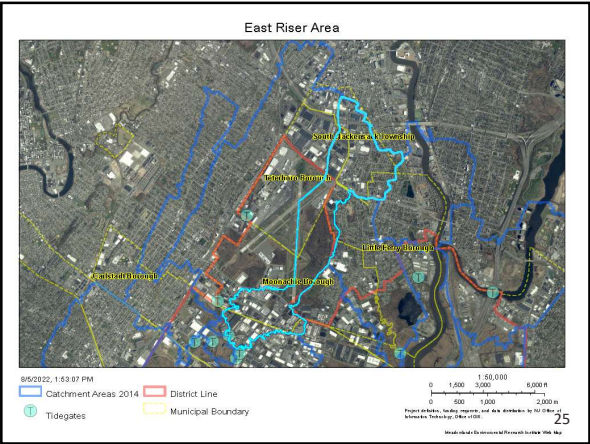


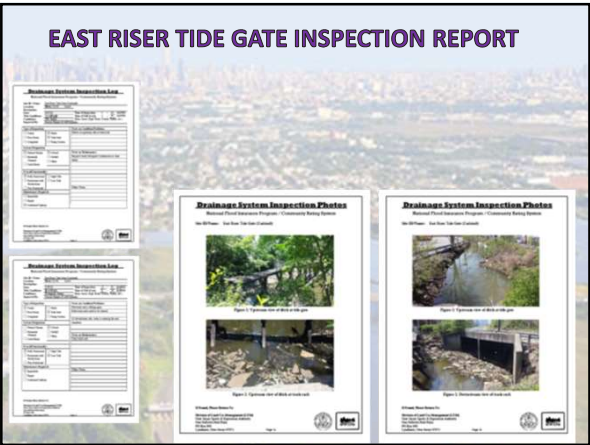




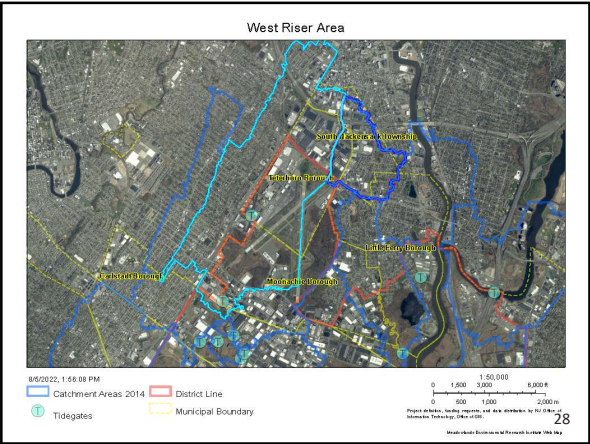


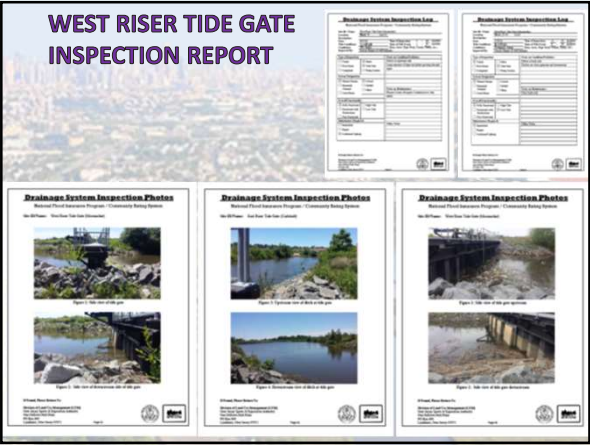




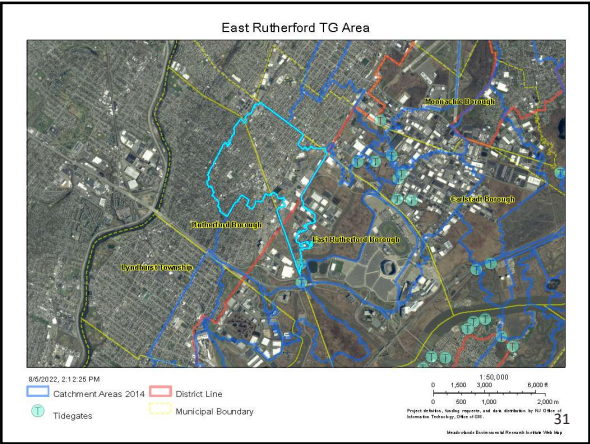


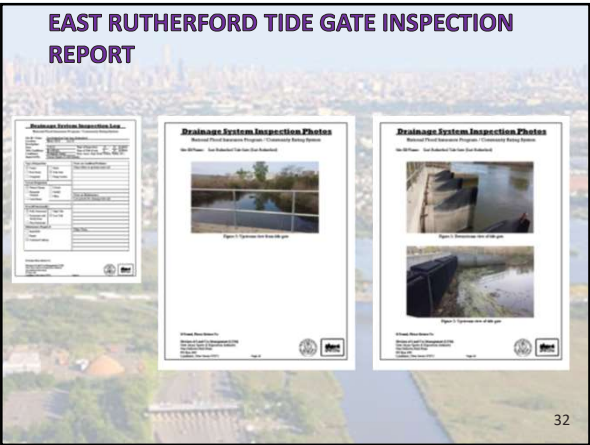




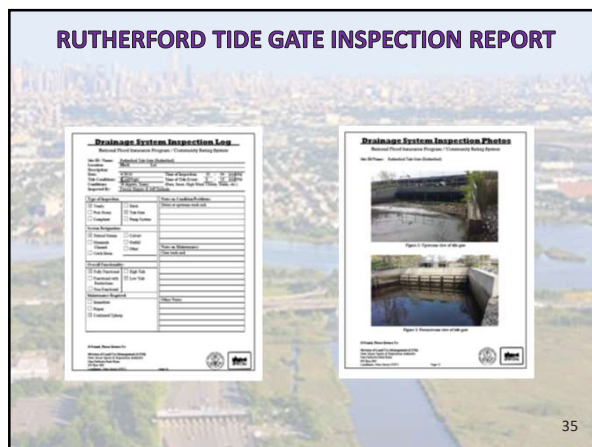
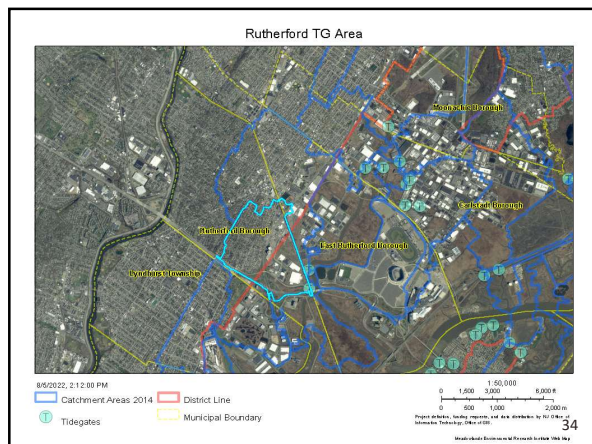












ELEVATION CERTIFICATE form with sections for project information, elevation data, and community notes. Includes a table for elevation data and a section for community notes.

Blank lines for additional information or notes.

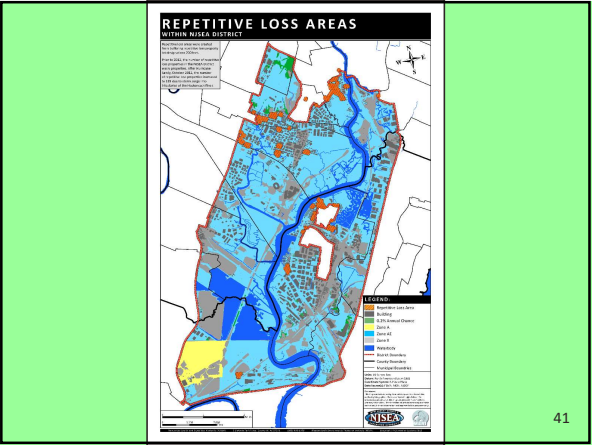
FINISHED FLOORS FOR NEW CONSTRUCTION IN THE DISTRICT							
Address/Building ID	Municipality	Year TCO/CT	BFE (Feet)	FIRM Notes	FF	Datum	General Notes
210 Clay Avenue	Lyndhurst	2022	8	Prelim	13.5*	NAVD88	non-residential
2701 Route 3 East	N. Bergen	2022	8	Prelim	11*	NAVD88	non-residential
1631 Paterson Plank Rd	Secaucus	2022	8	Effective & Prelim	9	NAVD88	residential
145 Industrial Ave/Bldg 2	Little Ferry	2021	8	Effective & Prelim	12.3*	NAVD88	non-residential
145 Industrial Ave/Bldg 1	Little Ferry	2021	8	Effective & Prelim	12.3*	NAVD88	non-residential
1 Terminal Rd/Life Storage	Lyndhurst	2021	8	Prelim	9.1	NAVD88	non-residential
192-266 Paterson Plank Rd	Carlstadt	2021	8	Prelim	11*	NAVD88	hotel
205 Chubb Ave/dock addition	Lyndhurst	2019	8	Prelim	9.5*	NAVD88	non-residential
320 Paterson Plank Rd	Carlstadt	2019	8	Prelim	9	NAVD88	non-residential
932 Paterson Plank Road	E. Rutherford	2021	8	Prelim	12*	NAVD88	non-residential
430 Harmon Meadow Blvd	Secaucus	2020	8	Effective & Prelim	10.6*	NAVD88	non-residential
316 Twentieth Street	Carlstadt	2019	8	Prelim	9	NAVD88	non-residential
5 Ethel Blvd.	Carlstadt	2019	8	Prelim	14.98*	NAVD88	non-residential
290 Secaucus Rd addition	Secaucus	2019	10.1	Prelim	11.5	NGVD1929	non-residential
405 Murray Hill Parkway	E. Rutherford	2018	9.06	Prelim	13.48*	NGVD1929	non-residential
1 High Tech Way	Secaucus	2018	10.1	Prelim	12.1*	NGVD1929	school
46 Whelan Rd.	E. Rutherford	2018	9	Prelim	10.4	NGVD1929	non-residential
200 Riverside Station Blvd.	Secaucus	2018	9	Effective	14.1*	NGVD1929	Residential
300 Park Plaza Drive Bldg 200	Secaucus	2018	9	Effective & Prelim	11.2*	NGVD1929	Residential
46 Meadowlands Parkway	Secaucus	2018	9.1	Prelim	10.1	NGVD1929	non-residential
290 Paterson Plank Road	Carlstadt	2018	9	Prelim	10.1	NGVD1929	hotel
120 Chubb Avenue	Lyndhurst	2018	9	Effective	10.9	NGVD1929	residential
405 Murray Hill Parkway	E. Rutherford	2018	9.06	Prelim	13.48*	NGVD1929	non-residential
1 County Road (Bldg B)	Secaucus	2018	10.1	Prelim	14.3*	NGVD1929	non-residential
1 County Road (Bldg A)	Secaucus	2018	10.1	Prelim	14.1*	NGVD1929	non-residential

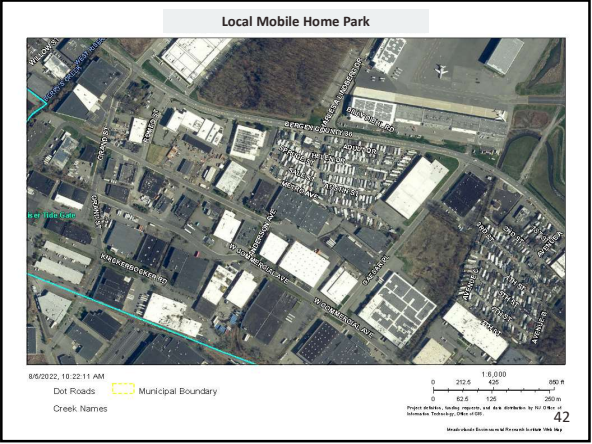
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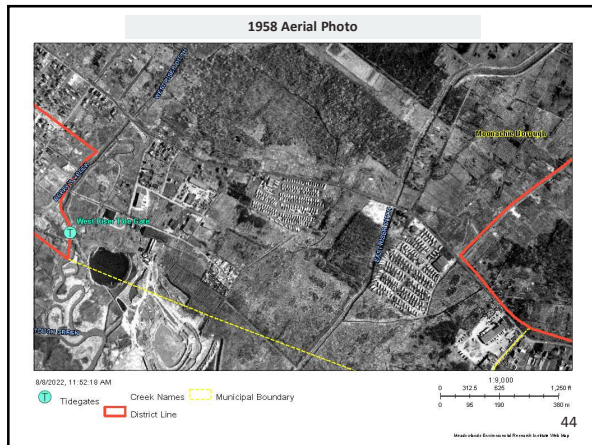
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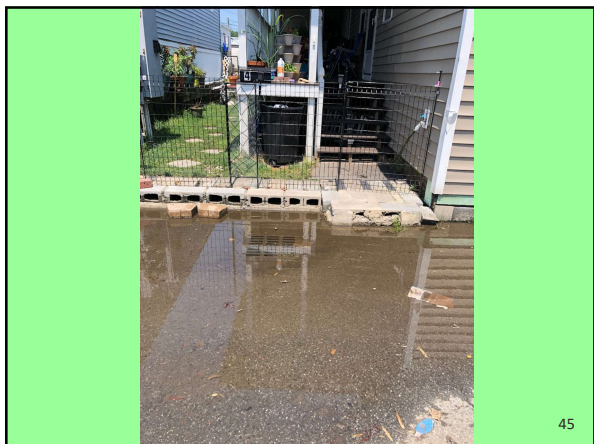


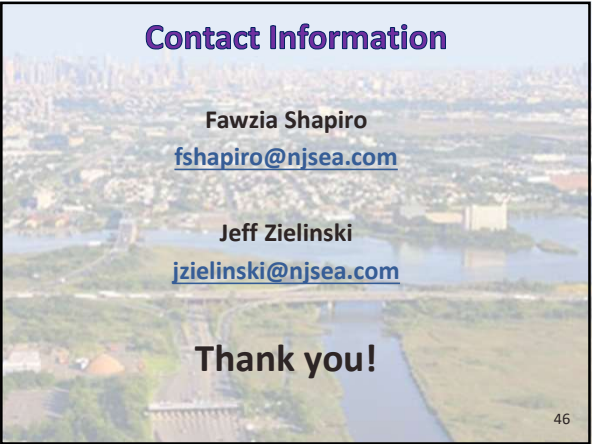












Contact Information

Fawzia Shapiro
fshapiro@njsea.com

Jeff Zielinski
jzielinski@njsea.com

Thank you!

46



We Bring the World to New Jersey

PUBLIC NOTICE
September 19, 2022

Hackensack Meadowlands District Floodplain Management Plan

Please take notice that the New Jersey Sports and Exposition Authority (NJSEA) is in the process of preparing an update to the Hackensack Meadowlands District Floodplain Management Plan, as required through the agency's participation in the National Flood Insurance Program (NFIP) Community Rating System (CRS).

CRS is a voluntary incentive program administered by the Federal Emergency Management Agency (FEMA) that rewards communities engaging in flood mitigation activities that exceed the minimum NFIP program requirements. The Hackensack Meadowlands District has participated in the CRS program since 1992. The NJSEA maintains a CRS Class 7 rating based on specific agency-implemented floodplain management activities, which results in annual flood insurance discounts for insured properties within the District. Specifically, the floodplain management activities implemented by the NJSEA qualify flood insurance policy holders in the District for a 15 percent discount in the premium costs for NFIP policies issued or renewed in Special Flood Hazard Areas.

The NJSEA welcomes your participation in the District Floodplain Management Plan process and has scheduled a public meeting to update all attendees on the Plan status and to present the draft Plan, which is available for review on the NJSEA website at www.njsea.com/public-notices/. This public meeting is open to the District's constituent municipalities, stakeholders, property owners, and the public.

The public meeting will be held on Wednesday, October 5, 2022, at 10:00 AM in the auditorium of the NJSEA Environment Center, Two DeKorte Park Plaza, Lyndhurst, New Jersey.

Please contact the NJSEA Offices at 201-460-1700 prior to the hearing if special requirements are needed under the Americans with Disabilities Act (ADA). If there are any questions, please contact Fawzia Shapiro or Jeffrey Zielinski at 201-460-1700 during regular business hours.

Sincerely,

Sara J. Sundell, P.E., P.P.
Director of Land Use Management

APPENDIX B



We Bring the World to New Jersey

2021 Floodplain Management Plan Meeting Agenda

Carlstadt, NJ

May 14, 2021

9:00 AM – 10:00 AM

Zoom Meeting ID: 934 6725 6954

Passcode: 375242

<https://negliaengineering.zoom.us/j/93467256954?pwd=K0ZTUWwrZGtRdjJRckljamUcktwZz09>

1. Introduction
2. Main goal
 - Keep 15 % reduction on flood insurance premiums
 - 196 active policies per CRS records
3. Survey Questionnaire
 - Hard copy attached
 - Electronic version located at:
 - <https://www.njsea.com/>
 - “Flooding Questionnaire for the 2021 Floodplain Management Plan”
 - Place a link on Carlstadt website and/or Carlstadt social media account?
4. List of Bergen County All-Hazard Mitigation Plan projects
 - Summary attached
 - In District?
 - Still moving forward?
 - Dedicated funding source?
 - Municipal expenditures for maintenance of tide gates
5. Any additional projects which have their own dedicated funding source
6. Map of the District – Carlstadt boundary
 - Attached
 - With Sea Surge Flood Maps
7. Hurricane Irene and Superstorm Sandy
 - Impacts
 - Mitigation efforts
8. Repetitive Loss Area Map
 - Attached



We Bring the World to New Jersey

2021 Floodplain Management Plan Meeting Agenda
East Rutherford, NJ
May 13, 2021
10:00 AM – 11:00 AM
Call in: 800-563-3954
Code: 4604273

1. Introduction
2. Main goal
 - Keep 15 % reduction on flood insurance premiums
 - 48 active policies per CRS records
3. Survey Questionnaire
 - Hard copy attached
 - Electronic version located at:
 - <https://www.njsea.com/>
 - “Flooding Questionnaire for the 2021 Floodplain Management Plan”
 - Place a link on East Rutherford website and/or East Rutherford social media account?
4. List of Bergen County All-Hazard Mitigation Plan projects
 - Summary attached
 - In District?
 - Still moving forward?
 - Dedicated funding source?
 - Municipal expenditures for maintenance of tide gates
5. Any additional projects which have their own dedicated funding source
6. Map of the District – East Rutherford boundary
 - Attached
 - With Sea Surge Flood Maps
7. Hurricane Irene and Superstorm Sandy
 - Impacts
 - Mitigation efforts
8. Repetitive Loss Area Map
 - Attached



We Bring the World to New Jersey

2021 Floodplain Management Plan Meeting Agenda
Jersey City, NJ
April 14, 2021
11:00 AM – 12:00 PM
Call in: 800-563-3954
Code: 4604273

1. Introduction
2. Main goal
 - Keep 15 % reduction on flood insurance premiums
 - 5 active policies per CRS records
3. Survey Questionnaire
 - Hard copy attached
 - Electronic version located at:
 - <https://www.njsea.com/>
 - “Flooding Questionnaire for the 2021 Floodplain Management Plan”
 - Place a link on Jersey City website or Jersey City social media account?
4. List of Hudson County All-Hazard Mitigation Plan projects
 - Summary attached
 - In District?
 - Still moving forward?
 - Dedicated funding source?
 - Municipal expenditures for maintenance of tide gates
5. Any additional projects which have their own dedicated funding source
6. Map of the District – Jersey City boundary
 - Attached
 - With Sea Surge Flood Maps
7. Hurricane Irene and Superstorm Sandy
 - Impacts
 - Mitigation efforts
8. Repetitive Loss Area Map
 - Attached



We Bring the World to New Jersey

2021 Floodplain Management Plan Meeting Agenda

Kearny, NJ

April 1, 2021

10:00 AM – 11:00 AM

Call in: 800-563-3954

Code: 4604273

1. Introduction
2. Main goal
 - Keep 15 % reduction on flood insurance premiums
3. Survey Questionnaire
 - Hard copy attached
 - Electronic version located at:
 - <https://www.njsea.com/>
 - “Flooding Questionnaire for the 2021 Floodplain Management Plan”
 - Place a link on Kearny website? Social Media?
4. List of Hudson County All-Hazard Mitigation Plan projects
 - Summary attached
 - In District?
 - Still moving forward?
 - Dedicated funding source?
 - Municipal expenditures for maintenance of tide gates
5. Any additional projects which have their own dedicated funding source
6. Map of the District – Kearny boundary
 - Attached
 - With Sea Surge Flood Maps
7. Hurricane Irene and Superstorm Sandy
 - Impacts
 - Mitigation efforts
8. Repetitive Loss Area Map
 - Attached

2021 Floodplain Management Plan Meeting Agenda
Little Ferry, NJ
March 31, 2021
9:30 AM – 10:30 AM
Call in: 800-563-3954
Code: 4604273

1. Introduction
2. Main goal
 - Keep 15 % reduction on flood insurance premiums
3. Survey Questionnaire
 - Hard copy attached
 - Electronic version located at:
 - <https://www.njsea.com/>
 - “Flooding Questionnaire for the 2021 Floodplain Management Plan”
 - Place a link on Little Ferry website?
4. List of Bergen County All-Hazard Mitigation Plan projects
 - Summary attached
 - In District?
 - Still moving forward?
 - Dedicated funding source?
 - Municipal expenditures for maintenance of tide gates
5. Any additional projects which have their own dedicated funding source
6. Map of the District – Little Ferry boundary
 - Attached
 - With Sea Surge Flood Maps
7. Hurricane Irene and Superstorm Sandy
 - Impacts
 - Mitigation efforts
8. Repetitive Loss Area Map
 - Attached



We Bring the World to New Jersey

2022 Floodplain Management Plan Meeting Agenda
Lyndhurst, NJ
July 14, 2022
10:00 AM – 11:00 AM
Call in: 800-563-3954
Code: 4604273

1. Introduction
2. Main goal
 - Keep 15 % reduction on flood insurance premiums
 - 26 active policies per prior CRS records
3. Survey Questionnaire
 - Hard copy attached
 - Electronic version located at:
 - <https://www.njsea.com/>
 - “Flooding Questionnaire for the 2022 Floodplain Management Plan”
 - Place a link on Lyndhurst website or Lyndhurst social media account?
4. List of Bergen County All-Hazard Mitigation Plan projects
 - Summary attached
 - In District?
 - Still moving forward?
 - Dedicated funding source?
 - Municipal expenditures for maintenance of tide gates/pump stations
5. Any additional projects which have their own dedicated funding source
6. Map of the District – Lyndhurst boundary
 - Attached
 - With Sea Surge Flood Maps
7. Hurricane Irene, Superstorm Sandy and Tropical Storm Ida
 - Impacts
 - Mitigation efforts
8. Repetitive Loss Area Map
 - Attached



We Bring the World to New Jersey

2022 Floodplain Management Plan Meeting Agenda
Moonachie, NJ
July 21, 2022
10:00 AM – 11:00 AM
Call in: 800-563-3954
Code: 4604273

1. Introduction
2. Main goal
 - Keep 15 % reduction on flood insurance premiums
 - 173 active policies per prior CRS records
3. Survey Questionnaire
 - Hard copy attached
 - Electronic version located at:
 - <https://www.njsea.com/>
 - “Flooding Questionnaire for the 2022 Floodplain Management Plan”
 - Place a link on Moonachie website or Moonachie social media account?
4. List of Bergen County All-Hazard Mitigation Plan projects
 - Summary attached
 - In District?
 - Still moving forward?
 - Dedicated funding source?
 - Municipal expenditures for maintenance of tide gates/pump stations
5. Any additional projects which have their own dedicated funding source
6. Map of the District – Moonachie boundary
 - Attached
 - With Sea Surge Flood Maps
7. Hurricane Irene, Superstorm Sandy and Tropical Storm Ida
 - Impacts
 - Mitigation efforts
8. Repetitive Loss Area Map
 - Attached



We Bring the World to New Jersey

2022 Floodplain Management Plan Meeting Agenda
North Arlington, NJ
June 2, 2022
11:00 AM – 12:00 PM
Call in: 800-563-3954
Code: 4604273

1. Introduction
2. Main goal
 - Keep 15 % reduction on flood insurance premiums
 - 0 active policies per prior CRS records
3. Survey Questionnaire
 - Hard copy attached
 - Electronic version located at:
 - <https://www.njsea.com/>
 - “Flooding Questionnaire for the 2022 Floodplain Management Plan”
 - Place a link on North Arlington website or North Arlington social media account?
4. List of Bergen County All-Hazard Mitigation Plan projects
 - Summary attached
 - In District?
 - Still moving forward?
 - Dedicated funding source?
 - Municipal expenditures for maintenance of tide gates/pump stations
5. Any additional projects which have their own dedicated funding source
6. Map of the District – North Arlington boundary
 - Attached
 - With Sea Surge Flood Maps
7. Hurricane Irene, Superstorm Sandy and Tropical Storm Ida
 - Impacts
 - Mitigation efforts
8. Repetitive Loss Area Map
 - Attached



We Bring the World to New Jersey

2022 Floodplain Management Plan Meeting Agenda

North Bergen, NJ

May 17, 2022

1:00 PM – 2:00 PM

Call in: 800-563-3954

Code: 4604273

1. Introduction
2. Main goal
 - Keep 15 % reduction on flood insurance premiums
 - 63 active policies per CRS records
3. Survey Questionnaire
 - Hard copy attached
 - Electronic version located at:
 - <https://www.njsea.com/>
 - “Flooding Questionnaire for the 2022 Floodplain Management Plan”
 - Place a link on North Bergen website or North Bergen social media account?
4. List of Hudson County All-Hazard Mitigation Plan projects
 - Summary attached
 - In District?
 - Still moving forward?
 - Dedicated funding source?
 - Municipal expenditures for maintenance of tide gates/pump stations (Penhorn Creek Pump Station)
5. Any additional projects which have their own dedicated funding source
6. Map of the District – North Bergen boundary
 - Attached
 - With Sea Surge Flood Maps
7. Hurricane Irene, Superstorm Sandy and Tropical Storm Ida
 - Impacts
 - Mitigation efforts
8. Repetitive Loss Area Map
 - Attached



We Bring the World to New Jersey

2021 Floodplain Management Plan Meeting Agenda
Ridgefield, NJ
April 23, 2021
10:30 AM – 11:30 AM
Call in: 800-563-3954
Code: 4604273

1. Introduction
2. Main goal
 - Keep 15 % reduction on flood insurance premiums
 - 17 active policies per CRS records
3. Survey Questionnaire
 - Hard copy attached
 - Electronic version located at:
 - <https://www.njsea.com/>
 - “Flooding Questionnaire for the 2021 Floodplain Management Plan”
 - Place a link on Ridgefield website or Ridgefield social media account?
4. List of Bergen County All-Hazard Mitigation Plan projects
 - Summary attached
 - In District?
 - Still moving forward?
 - Dedicated funding source?
 - Municipal expenditures for maintenance of tide gates
5. Any additional projects which have their own dedicated funding source
6. Map of the District – Ridgefield boundary
 - Attached
 - With Sea Surge Flood Maps
7. Hurricane Irene and Superstorm Sandy
 - Impacts
 - Mitigation efforts
8. Repetitive Loss Area Map
 - Attached



We Bring the World to New Jersey

2021 Floodplain Management Plan Meeting Agenda
Rutherford, NJ
May 18, 2021
10:00 AM – 11:00 AM
Call in: 800-563-3954
Code: 4604273

1. Introduction
2. Main goal
 - Keep 15 % reduction on flood insurance premiums
 - 4 active policies per CRS records
3. Survey Questionnaire
 - Hard copy attached
 - Electronic version located at:
 - <https://www.njsea.com/>
 - “Flooding Questionnaire for the 2021 Floodplain Management Plan”
 - Place a link on Rutherford website and/or Rutherford social media account?
4. List of Bergen County All-Hazard Mitigation Plan projects
 - Summary attached
 - In District?
 - Still moving forward?
 - Dedicated funding source?
 - Municipal expenditures for maintenance of tide gates
5. Any additional projects which have their own dedicated funding source
6. Map of the District – Rutherford boundary
 - Attached
 - With Sea Surge Flood Maps
7. Hurricane Irene and Superstorm Sandy
 - Impacts
 - Mitigation efforts
8. Repetitive Loss Area Map
 - Attached



We Bring the World to New Jersey

2021 Floodplain Management Plan Meeting Agenda
Secaucus, NJ
May 6, 2021
10:00 AM – 10:00 AM
Call in: 800-563-3954
Code: 4604273

1. Introduction
2. Main goal
 - Keep 15 % reduction on flood insurance premiums
 - 564 active policies per CRS records
3. Survey Questionnaire
 - Hard copy attached
 - Electronic version located at:
 - <https://www.njsea.com/>
 - “Flooding Questionnaire for the 2021 Floodplain Management Plan”
 - Place a link on Secaucus website or Secaucus social media account?
4. List of Hudson County All-Hazard Mitigation Plan projects
 - Summary attached
 - In District?
 - Still moving forward?
 - Dedicated funding source?
 - Municipal expenditures for maintenance of tide gates
5. Any additional projects which have their own dedicated funding source
6. Map of the District – Secaucus boundary
 - Attached
 - With Sea Surge Flood Maps
7. Hurricane Irene and Superstorm Sandy
 - Impacts
 - Mitigation efforts
8. Repetitive Loss Area Map
 - Attached



We Bring the World to New Jersey

2022 Floodplain Management Plan Meeting Agenda
South Hackensack, NJ
August 3, 2022
10:00 AM – 11:00 AM
Call in: 800-563-3954
Code: 4604273

1. Introduction
2. Main goal
 - Keep 15 % reduction on flood insurance premiums
 - 25 active policies per prior CRS records
3. Survey Questionnaire
 - Hard copy attached
 - Electronic version located at:
 - <https://www.njsea.com/>
 - “Flooding Questionnaire for the 2022 Floodplain Management Plan”
 - Place a link on South Hackensack website or South Hackensack social media account?
4. List of Bergen County All-Hazard Mitigation Plan projects
 - Summary attached
 - In District?
 - Still moving forward?
 - Dedicated funding source?
 - Municipal expenditures for maintenance of tide gates/pump stations
5. Any additional projects which have their own dedicated funding source
6. Map of the District – South Hackensack boundary
 - Attached
 - With Sea Surge Flood Maps
7. Hurricane Irene, Superstorm Sandy and Tropical Storm Ida
 - Impacts
 - Mitigation efforts
8. Repetitive Loss Area Map
 - Attached



We Bring the World to New Jersey

2021 Floodplain Management Plan Meeting Agenda
Teterboro, NJ
May 19, 2021
11:00 AM – 12:00 PM
Call in: 800-563-3954
Code: 4604273

1. Introduction
2. Main goal
 - Keep 15 % reduction on flood insurance premiums
 - 7 active policies per CRS records
3. Survey Questionnaire
 - Hard copy attached
 - Electronic version located at:
 - <https://www.njsea.com/>
 - “Flooding Questionnaire for the 2021 Floodplain Management Plan”
 - Place a link on Teterboro website and/or Teterboro social media account?
4. List of Bergen County All-Hazard Mitigation Plan projects
 - Summary attached
 - In District?
 - Still moving forward?
 - Dedicated funding source?
 - Municipal expenditures for maintenance of tide gates
5. Any additional projects which have their own dedicated funding source
6. Map of the District – Teterboro boundary
 - Attached
 - With Sea Surge Flood Maps
7. Hurricane Irene and Superstorm Sandy
 - Impacts
 - Mitigation efforts
8. Repetitive Loss Area Map
 - Attached



We Bring the World to New Jersey

2022 Floodplain Management Plan Meeting Agenda

Bergen County, NJ

July 20, 2022

11:00 AM – 12:00 PM

Microsoft Teams

or

Call in: 469-551-3591

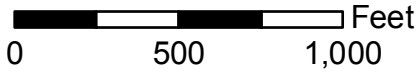
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1. Introduction
2. Main goal
 - Keep 15 % reduction on flood insurance premiums
 - 775 active policies per prior CRS records
3. Survey Questionnaire
 - Hard copy attached
 - Electronic version located at:
 - <https://www.njsea.com/>
 - “Flooding Questionnaire for the 2022 Floodplain Management Plan”
 - Place a link on Bergen County website or Bergen County social media account?
4. Discussion of Bergen County drainage/flood control projects
 - In District?
 - Still moving forward?
 - Dedicated funding source?
5. Map of the District – Boundary
 - Attached
6. Hurricane Irene, Superstorm Sandy and Tropical Storm Ida
 - Impacts
 - Mitigation efforts
7. Repetitive Loss Area Map
 - Attached

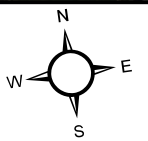
APPENDIX C

MAJOR DISTRICT TIDE GATES LOCATION MAP

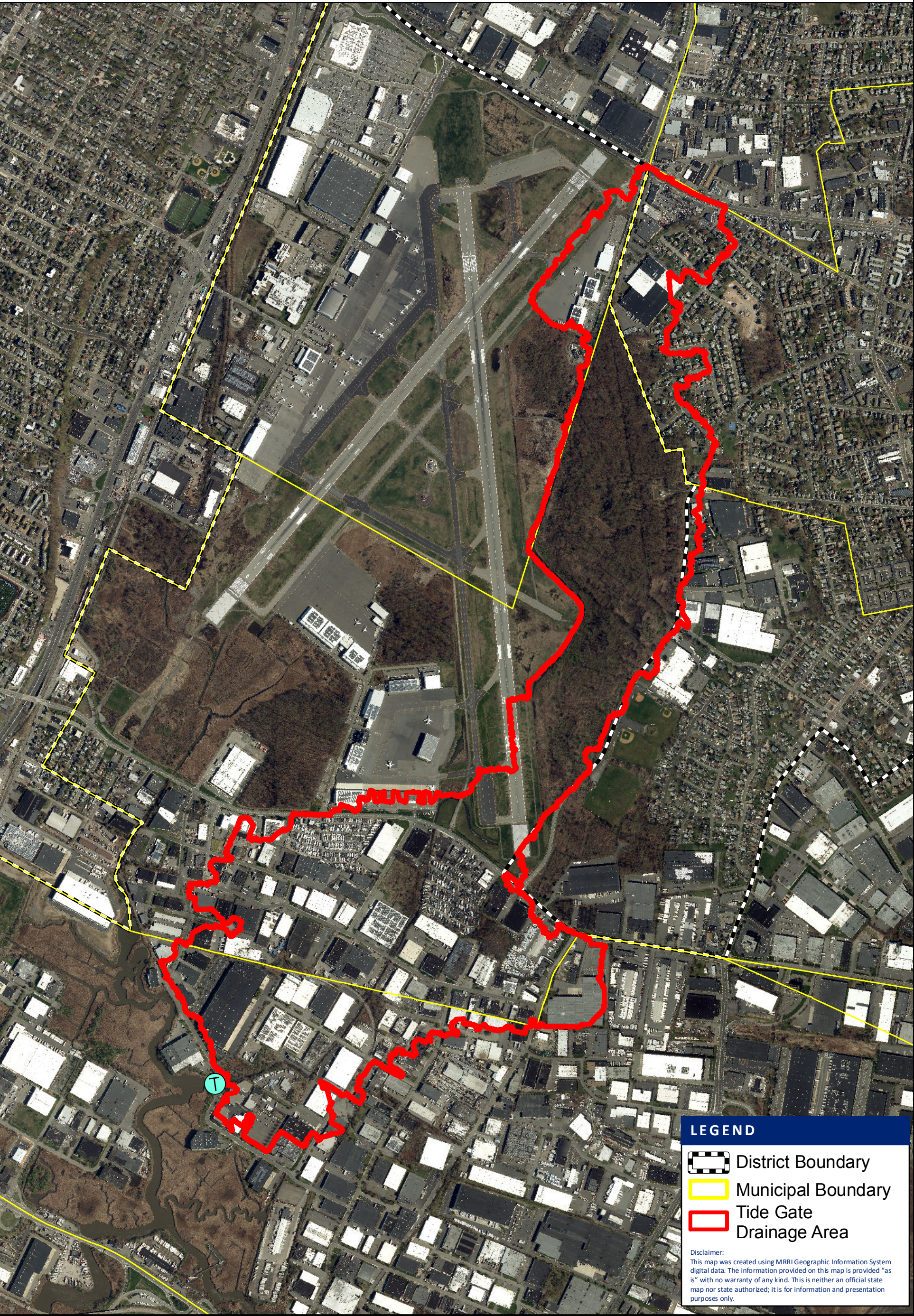




Units: US Survey Feet
Datum: North American Datum 1983
Coordinate System: NJ State Plane
Data Source(s): MRRI, NJDEP, NJDOT



2022
Community Rating System



LEGEND

- District Boundary
- Municipal Boundary
- Tide Gate Drainage Area

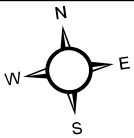
Disclaimer:
This map was created using MRRI Geographic Information System digital data. The information provided on this map is provided "as is" with no warranty of any kind. This is neither an official state map nor state authorized; it is for information and presentation purposes only.



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Units: US Survey Feet
Datum: North American Datum 1983
Coordinate System: NJ State Plane
Data Source(s): MRRI, NJDEP, NJDOT



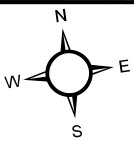
2022
Community Rating System



0 250 500 Feet



Units: US Survey Feet
Datum: North American Datum 1983
Coordinate System: NJ State Plane
Data Source(s): MRRI, NJDEP, NJDOT



2022
Community Rating System



LEGEND

District Boundary

Municipal Boundary




Tide Gate Drainage Area

Disclaimer:
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LOSEN SLOTE TIDE GATE DRAINAGE AREA MAP



LEGEND

-  District Boundary
-  Municipal Boundary
-  Tide Gate Drainage Area

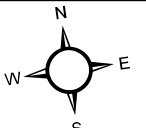
Disclaimer:
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Units: US Survey Feet
Datum: North American Datum 1983
Coordinate System: NJ State Plane
Data Source(s): MRRI, NJDEP, NJDOT



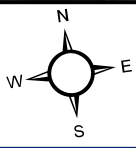
2022
Community Rating System



0 500 1,000 Feet




Units: US Survey Feet
Datum: North American Datum 1983
Coordinate System: NJ State Plane
Data Source(s): MRRI, NJDEP, NJDOT





2022
Community Rating System



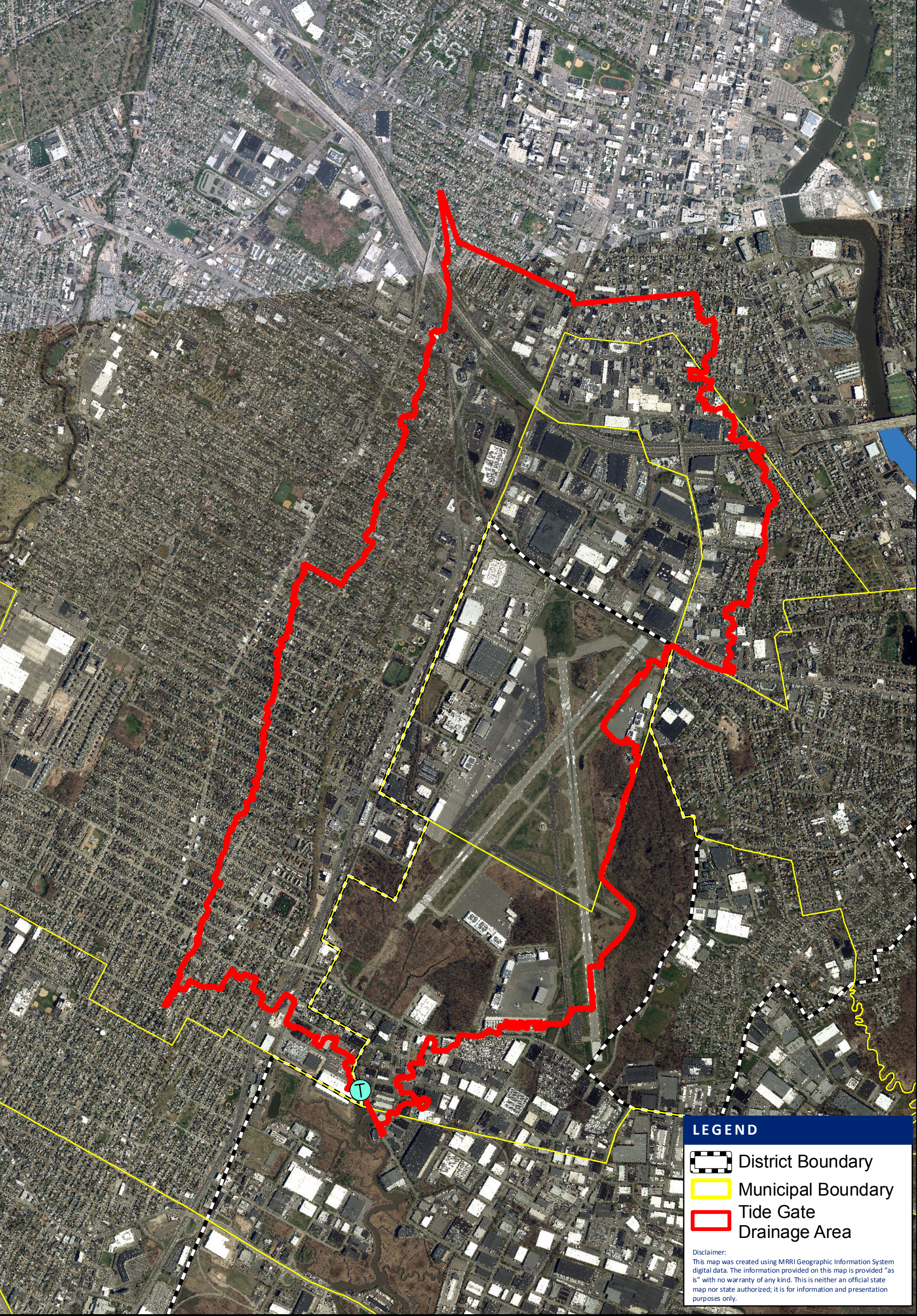
LEGEND

 District Boundary




 Municipal Boundary

 Tide Gate Drainage Area

Disclaimer:
This map was created using MRRI Geographic Information System digital data. The information provided on this map is provided "as is" with no warranty of any kind. This is neither an official state map nor state authorized; it is for information and presentation purposes only.



LEGEND

-  District Boundary
-  Municipal Boundary
-  Tide Gate Drainage Area

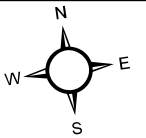
Disclaimer:
This map was created using MRRI Geographic Information System digital data. The information provided on this map is provided "as is" with no warranty of any kind. This is neither an official state map nor state authorized; it is for information and presentation purposes only.



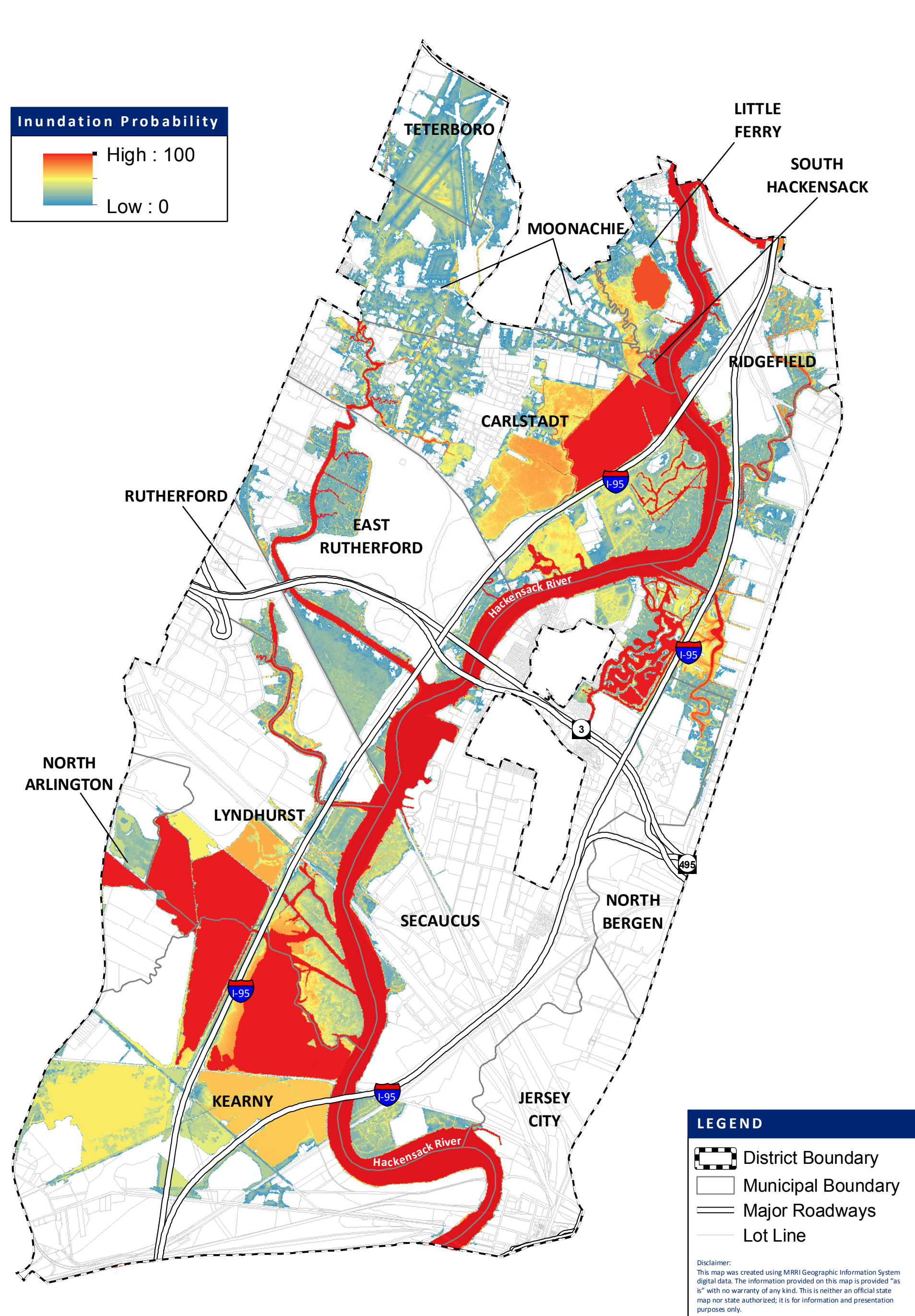
0 1,000 2,000 Feet



Units: US Survey Feet
Datum: North American Datum 1983
Coordinate System: NJ State Plane
Data Source(s): MRRI, NJDEP, NJDOT



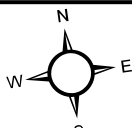
2022
Community Rating System



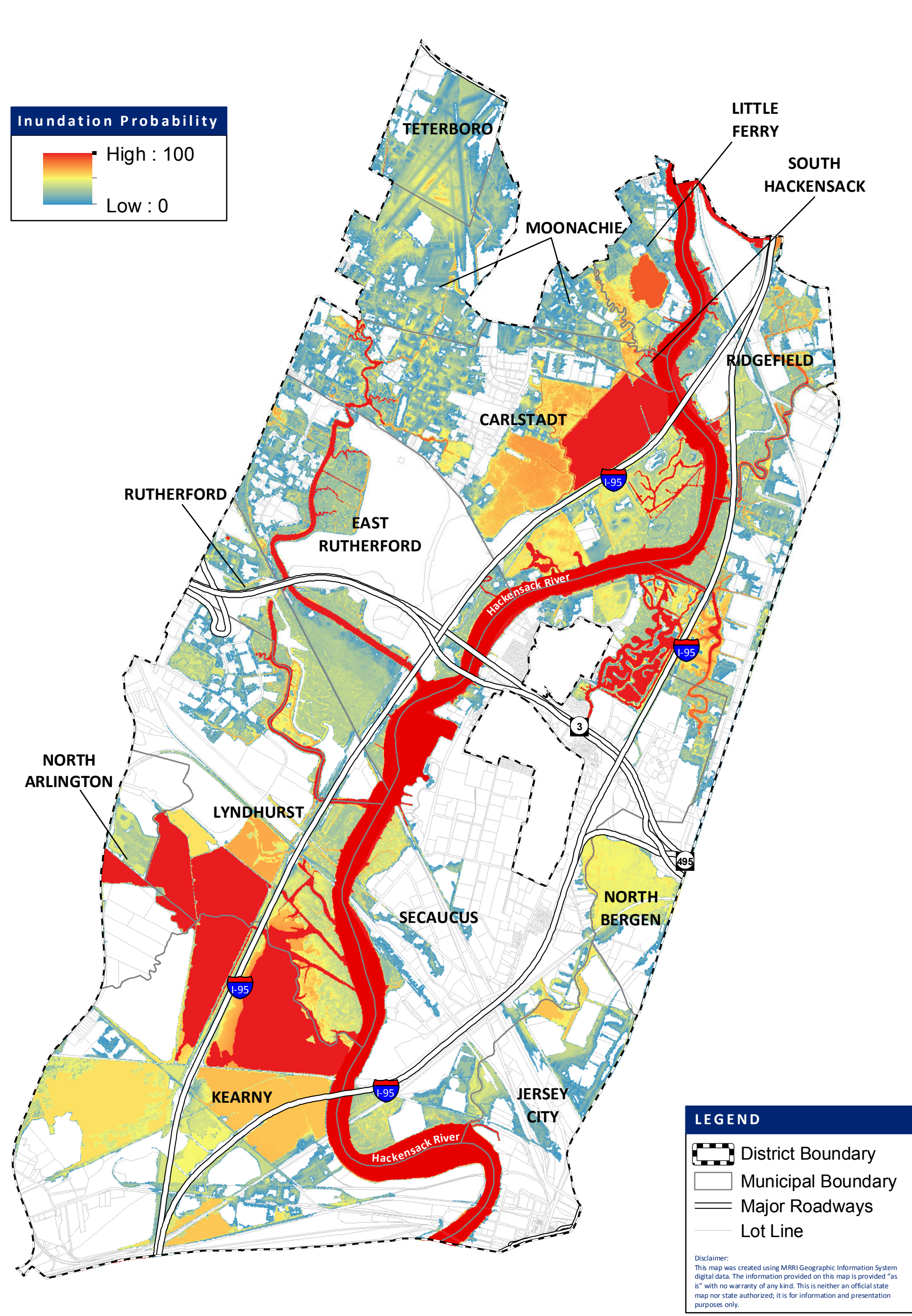
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Units: US Survey Feet
Datum: North American Datum 1983
Coordinate System: NJ State Plane
Data Source(s): MRRI, NJDEP, NJDOT



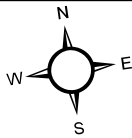
2022
Community Rating System



0 0.5 1 Miles



Units: US Survey Feet
Datum: North American Datum 1983
Coordinate System: NJ State Plane
Data Source(s): MRRI, NJDEP, NJDOT



2022
Community Rating System

HACKENSACK MEADOWLANDS DISTRICT MASTER PLAN 2020

HURICANE SANDY INUNDATION (2012)

