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Stormwater Management Plan

City of Garfield

December 2021

Prepared for:

City of Garfield
County of Bergen
State of New Jersey

Prepared by:

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Introduction

This Municipal Stormwater Management Plan (MSWMP) documents the strategy for the City of Garfield ("the City") to address stormwater-related impacts. The creation of this plan is required by N.J.A.C. 7:14A-25 Municipal Stormwater Regulations.

This plan contains the required elements described in N.J.A.C. 7:8 Stormwater Management Rules. The plan addresses groundwater recharge, stormwater quantity, and stormwater quality impacts by incorporating stormwater design and performance standards for new major development, defined as projects that disturb one or more acre of land. These standards are intended to minimize the adverse impact of stormwater runoff on water quality and water quantity and the loss of groundwater recharge that provides baseflow in receiving water bodies. The plan describes long-term operation and maintenance measures for existing and future stormwater facilities.

Neither a "build-out" analysis, nor review of the Master Plan has been included in this Plan due to the fact that the City is largely built-out with only 78-acres (less than one square mile) of remaining vacant developable open space. Existing land use is shown in Exhibit 3.

The plan also addresses the review and update of existing ordinances and other planning documents to allow for project designs that include low impact development techniques. The final component of this plan is a mitigation strategy for when a variance or exemption of the design and performance standards is sought. As part of the mitigation section of the stormwater plan, specific stormwater management measures are identified to lessen the impact of existing development.

Goals

The goals of this MSWMP are to:

- reduce flood damage, including damage to life and property;
- minimize, to the extent practical, any increase in stormwater runoff from any new development;
- reduce soil erosion from any development or construction project;
- assure the adequacy of existing and proposed culverts and bridges, and other in-stream structures;
- maintain groundwater recharge;
- prevent, to the greatest extent feasible, an increase in nonpoint pollution;
- maintain the integrity of stream channels for their biological functions, as well as for drainage;
- minimize pollutants in stormwater runoff from new and existing development to restore, enhance, and maintain the chemical, physical, and biological integrity of the waters of the state, to protect public health, to safeguard fish and aquatic life and scenic and ecological values, and to enhance the domestic, municipal, recreational, industrial, and other uses of water; and

- protect public safety through the proper design and operation of stormwater basins.

To achieve these goals, this plan outlines specific stormwater design and performance standards for new development. Additionally, the plan proposes stormwater management controls to address impacts from existing development. Preventative and corrective maintenance strategies are included in the plan to ensure long-term effectiveness of stormwater management facilities. The plan also outlines safety standards for stormwater infrastructure to be implemented to protect public safety.

Stormwater Discussion

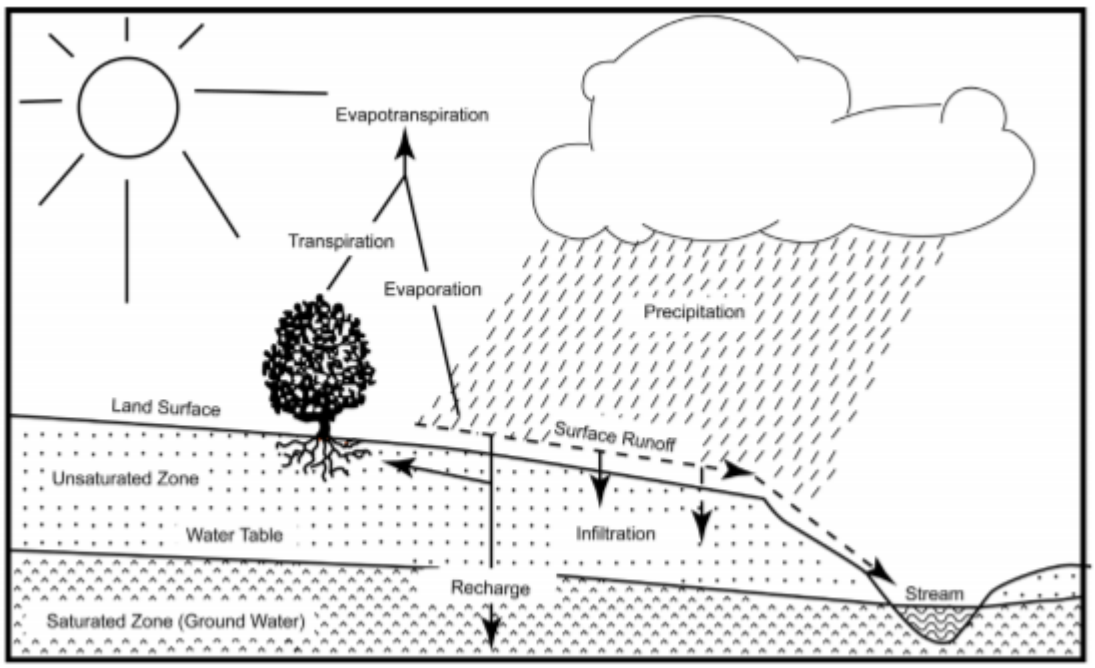
Land development can dramatically alter the hydrologic cycle (See Figure 1) of a site and, ultimately, an entire watershed. Prior to development, native vegetation can either directly intercept precipitation or draw that portion that has infiltrated into the ground and return it to the atmosphere through evapotranspiration.

Development can remove this beneficial vegetation and replace it with lawn or impervious cover, reducing the site's evapotranspiration and infiltration rates. Clearing and grading a site can remove depressions that store rainfall. Construction activities may also compact the soil and diminish its infiltration ability, resulting in increased volumes and rates of stormwater runoff from the site.

Impervious areas that are connected to each other through gutters, channels, and storm sewers can transport runoff more quickly than natural areas. This shortening of the transport or travel time quickens the rainfall-runoff response of the drainage area, causing flow in downstream waterways to peak faster and higher than natural conditions. These increases can create new and aggravate existing downstream flooding and erosion problems and increase the quantity of sediment in the channel.

Filtration of runoff and removal of pollutants by surface and channel vegetation is eliminated by storm sewers that discharge runoff directly into a stream. Increases in impervious area can also decrease opportunities for infiltration which, in turn, reduces stream base flow and groundwater recharge. Reduced base flows and increased peak flows produce greater fluctuations between normal and storm flow rates, which can increase channel erosion. Reduced base flows can also negatively impact the hydrology of adjacent wetlands and the health of biological communities that depend on base flows. Finally, erosion and sedimentation can destroy habitat from which some species cannot adapt.

Figure 1: The Hydrologic Cycle



Source: New Jersey Geological Survey Report GSR-32.

In addition to increases in runoff peaks, volumes, and loss of groundwater recharge, land development often results in the accumulation of pollutants on the land surface that runoff can mobilize and transport to streams. New impervious surfaces and cleared areas created by development can accumulate a variety of pollutants from the atmosphere, fertilizers, animal wastes, and leakage and wear from vehicles. Pollutants can include metals, suspended solids, hydrocarbons, pathogens, and nutrients.

In addition to increased pollutant loading, land development can adversely affect water quality and stream biota in more subtle ways. For example, stormwater falling on impervious surfaces or stored in detention or retention basins can become heated and raise the temperature of the downstream waterway, adversely affecting cold water fish species such as trout. Development can remove trees along stream banks that normally provide shading, stabilization, and leaf litter that falls into streams and becomes food for the aquatic community.

Background

Demographics

The City of Garfield encompasses approximately 2.21 square miles in western Bergen County, New Jersey. As of the 2010 United States Census, the city's population was 30,487, reflecting an increase of 2.4% from the 29,786 counted in the 2000 Census, which had in turn increased by 11.4% from the 26,727 counted in the 1990 Census. Garfield is the fifth most populous municipality in Bergen County and the seventy-third most populous municipality within the State of New Jersey out of 566 municipalities. Garfield is ranked the fourth most densely populated municipality in Bergen County, with over 14,524 residents living per square mile.

Since Garfield is an older, primarily developed community, increased stormwater runoff volumes and pollutant loadings have likely impacted the City's waterways. Dwelling units constructed since the 1980s implement some of the new performance standards and Best Management Practices (BMPs) to alleviate increased stormwater runoff and pollutant loadings.

The entire City of Garfield lies within the Metropolitan Planning Area (PA-1). This planning area, designated to areas that are considered Urban Redevelopment Areas, is not subject to groundwater recharge requirements.

Waterways

There are five (5) waterways within the City of Garfield:

1. Passaic River
   The Passaic River generally flows from north to south along the City's western border. The State assigns the river a Surface Water Quality Standard (SWQS) of FW2-NT/SE2 designation indicating a general surface water (FW2) and saline estuary (SE2) that does not support trout production or maintenance (NT). The Passaic River is tidal south of the Dundee Dam.

2. Saddle River
   The Saddle River flows northeast to southwest along the City's southeastern border. The river has a FW2-NT/SE3 designation indicating a general surface water (FW2) and saline estuary (SE3) that does not support trout production or maintenance (NT).

3. Fleischer Brook
   The Fleischer Brook, a tributary to the Passaic River, flows north to south through the western portion of the City. The brook also has a FW2-NT/SE2 designation.

4. Unnamed Tributary to the Passaic River

An unnamed tributary flowing south into the City from Saddle Brook is also designated FW2-NT/SE2. This tributary has been piped for the remainder of its connection to the Passaic River.

5. Dahnerts Lake
   Dahnerts Lake is onstream with the above referenced unnamed tributary and is also assigned a FW2-NT/SE2 designation.

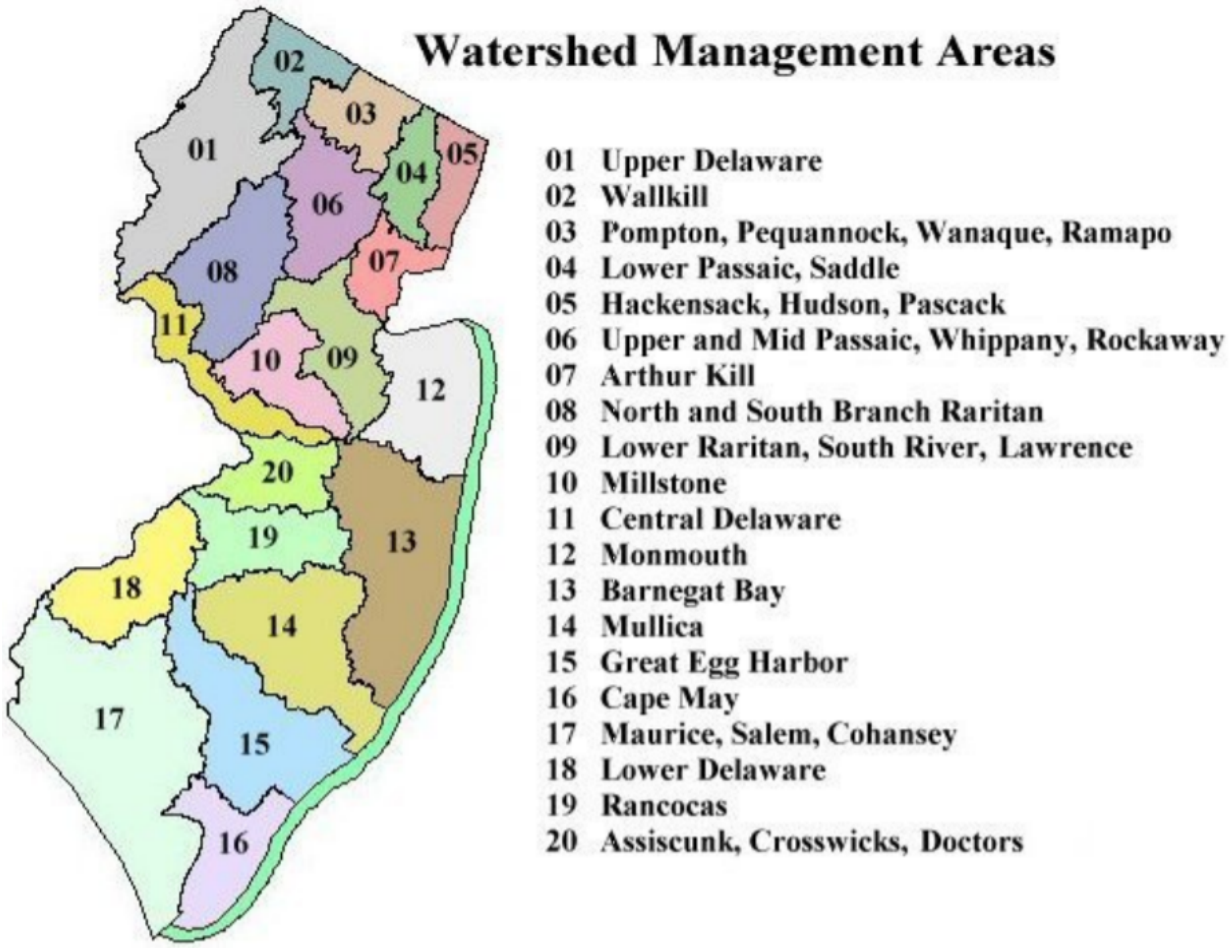
Exhibit 1 illustrates the above noted waterways in the City.

Exhibit 2 depicts the City boundary on the United States Geological Survey (USGS) Quadrangle Maps.

The City of Garfield lies within the Lower Passaic and Saddle Watershed Management Area (Area ID 4). See Figure 2, below for a map of all the NJ Watershed Areas.

The City does not contain any Category One (C1) waters or tributaries to Category One waters. Therefore the City also does not fall into any Special Water Resource Protection Areas.

Figure 2: NJ Watershed Management Areas



Water Quality

The City depends entirely on sanitary sewers which flow to the Passaic Valley Sewerage Commission in Newark, New Jersey. The sanitary sewers are separated from the stormwater systems. The City supplies approximately 40% to 50% of its potable water with wells located in the City, as well as in the City of Elmwood Park, while the Passaic Valley Water Commission supplies the remainder.

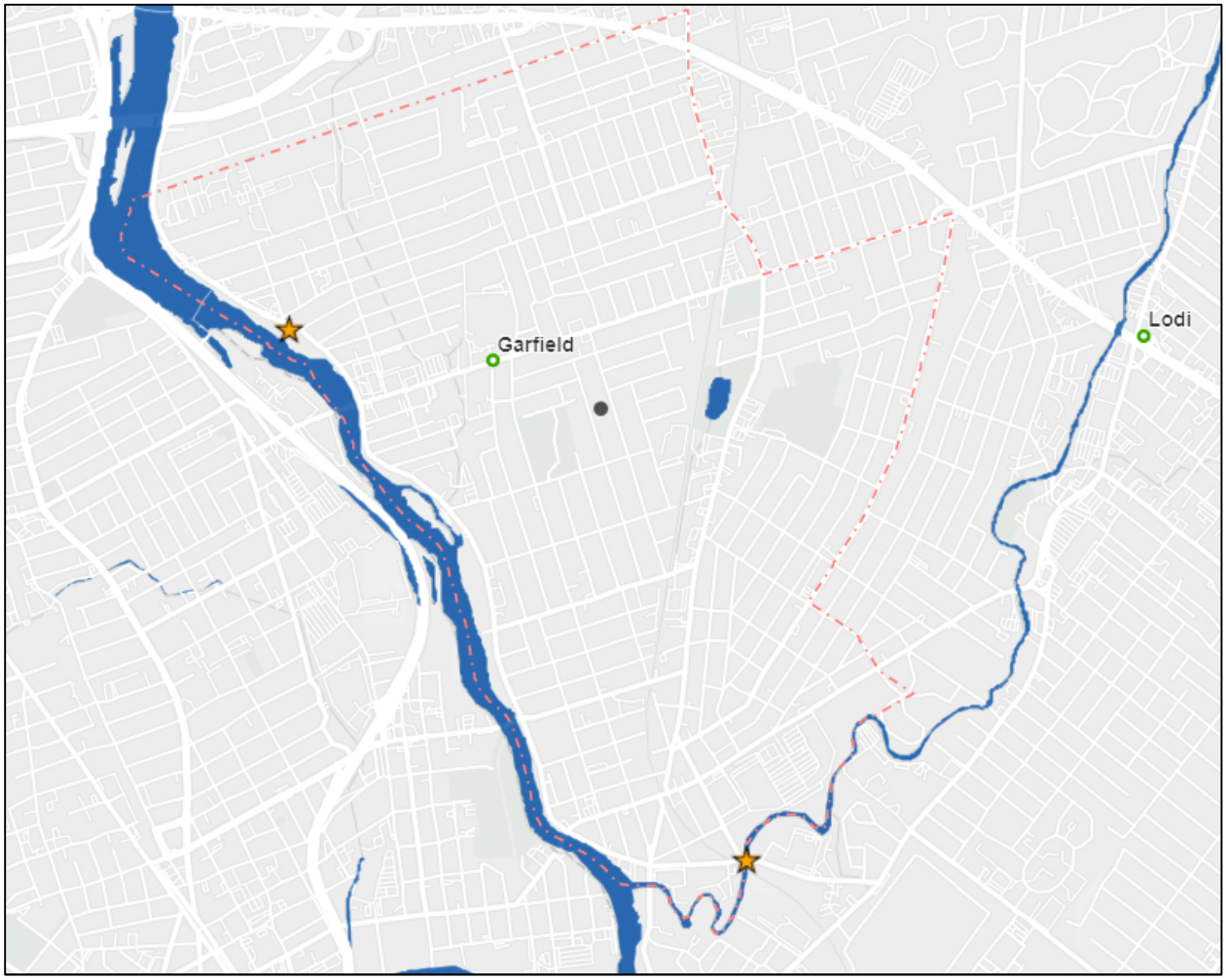
The New Jersey Department of Environmental Protection (NJDEP) has established an Ambient Biomonitoring Network (AMNET) to document the health of the state's waterways. There are over 800 AMNET sites throughout the state of New Jersey. These sites are sampled for benthic macroinvertebrates by NJDEP on a five-year cycle. Streams are classified as non-impaired, moderately

impaired, or severely impaired based on the AMNET data. The data is used to generate a New Jersey Impairment Score (NJIS), which is based on a number of biometrics related to benthic macroinvertebrate community dynamics.

There are two AMNET monitoring sites in the City of Garfield, as of data last updated 12/16/2020 by NJGIN. Located on River Road (Passaic River Site #AN0292) and Marcellus Place (Saddle River Site #AN0291), both sites were given an impairment rating of "fair" in the latest AMNET report.

In addition to the AMNET data, the NJDEP and other regulatory agencies collect water quality chemical data on the streams in the state. The data shows that the instream total phosphorus concentrations and fecal coliform concentrations of the Raritan River and Millstone River frequently exceed the state's criteria. This means that these rivers are impaired waterways and the NJDEP is required to develop a Total Maximum Daily Load (TMDL) for these pollutants for each waterway.

Figure 3: AMNET Monitoring Sites in the City of Garfield



A TMDL is the amount of a pollutant that can be accepted by a waterbody without causing an exceedance of water quality standards or interfering with the ability to use a waterbody for one or more of its designated uses. The allowable load is allocated to the various sources of the pollutant, such as stormwater and wastewater discharges, which require an NJPDES permit to discharge, and nonpoint source, which includes stormwater runoff from agricultural areas and residential areas, along with a margin of safety. Provisions may also be made for future sources in the form of reserve capacity. An implementation plan is developed to identify how the various sources will be reduced to the designated allocations. Implementation strategies may include improved stormwater treatment plants, adoption of ordinances, reforestation of stream corridors, retrofitting stormwater systems, and other BMPs.

The New Jersey Integrated Water Quality Monitoring and Assessment Report (305(b) and 303(d)) (Integrated List) is required by the Federal Clean Water Act to be prepared biennially and is a valuable source of water quality information. This combined report presents the extent to which New Jersey waters are attaining water quality standards and identifies waters that are impaired. Sublist 5 of the Integrated List constitutes the list of waters impaired or threatened by pollutants, for which one or more TMDLs are needed.

The Saddle River and the Passaic River within the City of Garfield are both included on Sublist 5 for unknown biological parameters.

Wellhead Protection Areas

The City of Garfield lies within a number of wellhead protection areas. A wellhead protection area is divided into three (3) tiers. The 2-year (Tier 1), 5-year (Tier 2) and 12-year (Tier 3) are intended to represent the time of travel (TOT) a groundwater contaminant in the zones could be expected to reach a municipal potable supply well. The NJDEP then prioritizes the investigation and remediation of contaminated sites within the 2 and 5-year tiers. Wellhead protection areas, required as part of the MSWMP, are shown in Exhibits 5 and 6.

Water Quantity

In addition to water quality concerns, the City of Garfield has exhibited water quantity concerns including flooding, stream bank erosion, and diminished base flow in its streams. Exhibit 8 shows the flood zones within the City as delineated by the Federal Emergency Management Association (FEMA). The entire western border of the City runs along the Passaic River and is within the 100-year floodplain with the 500-year floodplain extending into central parts of the City. The Passaic River is actually tidal from the Newark Bay up to the Dundee Dam. During severe rainfalls events the water can back up all the way to the dam. If the Passaic River water level is too high, it then results in the Saddle River also backing up. River Road is a major route in the City within the 100-year floodplain which exhibits drainage concerns and houses existing major developments.

Design and Performance Standards

The City of Garfield has adopted the design and performance standards for stormwater management measures as presented in N.J.A.C. 7:8-5 to minimize the adverse impact of stormwater runoff on water quality and water quantity and loss of groundwater recharge in receiving water bodies. The design and performance standards include the language for maintenance of stormwater management measures consistent with the stormwater management rules at N.J.A.C. 7:8-5.8 Maintenance Requirements, and language for safety standards consistent with N.J.A.C. 7:8-6 Safety Standards for Stormwater Management Basins.

The City has adopted the March 2020 version of the model stormwater control ordinance released by NJDEP. Final adoption after Bergen County review and comment occurred October 26, 2021.

During construction, City inspectors (or their representatives) will periodically observe the construction of all Major Development projects to ensure that the stormwater management measures are constructed and function as designed.

It should be noted that the according to the NJAC 7:8, development and redevelopment in the City is exempt from the groundwater recharge requirements of the new Stormwater Management Rules. The groundwater recharge requirement does not apply to projects within an "urban redevelopment area". The urban redevelopment area is defined, among other criteria, as previously developed portions of areas delineated on the State Plan Policy Map (SPPM) as the Metropolitan Planning Area 1 (PA1) designated centers, in which the City is located. Despite this, development and redevelopment projects in the City will be encouraged to implement groundwater recharge, where feasible. Exhibit 4 depicts the Groundwater Recharge Areas in the City.

Plan Consistency

Regional Stormwater Management Plan

The City of Garfield is not within a Regional Stormwater Management Planning Area. Therefore, this plan does not need to be consistent with any regional stormwater management plans (RSWMPs). If any RSWMPs are developed by the County of Bergen in the future, this MSWMP will be updated to be consistent with the criteria.

Residential Site Improvement Standards

This MSWMP is consistent with the Residential Site Improvement Standards (RSIS) at N.J.A.C. 5:21. The City of Garfield will utilize the most current update of the RSIS in the stormwater management review of residential areas. This MSWMP will be updated to be consistent with any future updates to the RSIS.

Soil Erosion and Sediment Control Standards

The City of Garfield's Stormwater Management Ordinance requires that all new development and redevelopment plans comply with New Jersey's Soil Erosion and Sediment Control Standards. During construction, City inspectors will periodically observe on-site soil erosion and sediment control measures and report any inconsistencies to the Bergen County Soil Conservation District. Immediate attention will be required by the contractors to remedy the situation.

Total Maximum Daily Loads

As mentioned previously, Sublist 5 of the NJDEP AMNET Integrated List constitutes the list of waters impaired or threatened by pollutants, for which one or more TMDLs are needed. The Saddle River and the Passaic River within the City of Garfield are both included on Sublist 5 for unknown biological parameters. The TMDL may not specifically apply to areas within the City of Garfield as a large area of these waterways are within other adjacent municipalities. The City will investigate to attempt to identify sources of these pollutants that may include areas of high wild life population.

Nonstructural Stormwater Management Strategies

The City of Garfield is in the process of reviewing its ordinance. Specifically, the below chapters have been identified to be reviewed for consistency and potential modifications to incorporate the most current nonstructural stormwater management strategies.

Chapter to be reviewed include, but are not limited to:

- Chapter 275: Site Plan Review
- Chapter 284 Stormwater Control
- Chapter 285: Stormwater Management Regulations
- Chapter 287: Streets and Sidewalks
- Chapter 341: Zoning

Revisions may include, but not be limited to, the following topics:

- Buffers
- Cluster Development
- Curbs and Gutters
- Drainage, Watercourses, and Flood Hazard Areas
- Driveways and Accessways
- Natural Features
- Nonconforming Uses, Structures, or Lots
- Off-site and Off-tract Improvements
- Off-street Parking and Loading
- Performance Standards
- Shade Trees

- Sidewalks
- Soil Erosion and Sediment Control
- Stormwater Runoff
- Streets

Once the ordinance text updates are completed, they will be submitted to the County of Bergen for review and approval. A copy will be sent to the NJDEP at the time of submission.

Land Use/Build-Out Analysis

As previously mentioned, a "build-out" analysis has not been included in this plan due to the fact that the City is largely built-out with only 78-acres of remaining developable open space, equating to approximately 5.5% of Garfield's total area. Existing land use is shown in Exhibit 3. Zoning Districts for the City of Garfield are shown in Exhibit 7.

Mitigation Plans

This mitigation plan is provided for any proposed development that may be granted a variance or exemption from the stormwater management design and performance standards. Any variance or exemption from the standards shall be subject to and conditioned upon the approval of an acceptable mitigation plan. Presented below is a hierarchy of options.

1) The applicant can select one of the following projects listed to compensate for the deficit from the performance standards resulting from the proposed project. More detailed information on the projects can be obtained from the City Engineer. Listed below are specific projects that can be used to address the mitigation requirement.

    a) Groundwater Recharge

        i) Retrofit an existing City-owned site and/or detention basin to provide an additional annual groundwater recharge. The retrofit must not reduce open space or recreational space. The retrofit must not compromise the utility of an existing parking area in any way.

        ii) Replace an existing deteriorated impervious parking area within the City with permeable paving to provide additional average annual groundwater recharge. The retrofit must not compromise the utility of an existing parking area in any way.

    b) Water Quality

        i) Retrofit an existing City-owned stormwater management facility to provide the removal of 80 percent of Total Suspended Solids (TSS) from the parking lot runoff.

        ii) Retrofit an existing City-owned parking area to provide the removal of 80 percent of TSS.

c) Water Quantity

i) Install stormwater management measures in an open space to reduce the peak flow from an upstream development on the receiving stream by 20 cubic feet per second (cfs), 35 cfs, and 100 cfs for the 2, 10, and 100-year storms respectively.

ii) Retrofit any existing City-owned public site or parking lot to reduce the peak flow from an upstream development on the receiving stream by 20 cubic feet per second (cfs), 35 cfs, and 100 cfs for the 2, 10, and 100-year storms respectively.

2) If a suitable site cannot be located in the same drainage area as the proposed development, as discussed in Option 1, the mitigation project may provide mitigation that is not equivalent to the impacts for which the variance or exemption is sought, but that addresses the same issue. For example, if a variance is given because the 80 percent TSS requirement is not met, the selected project may address water quality impacts due to a fecal impairment. Listed below are specific projects that can be used to address the mitigation option.

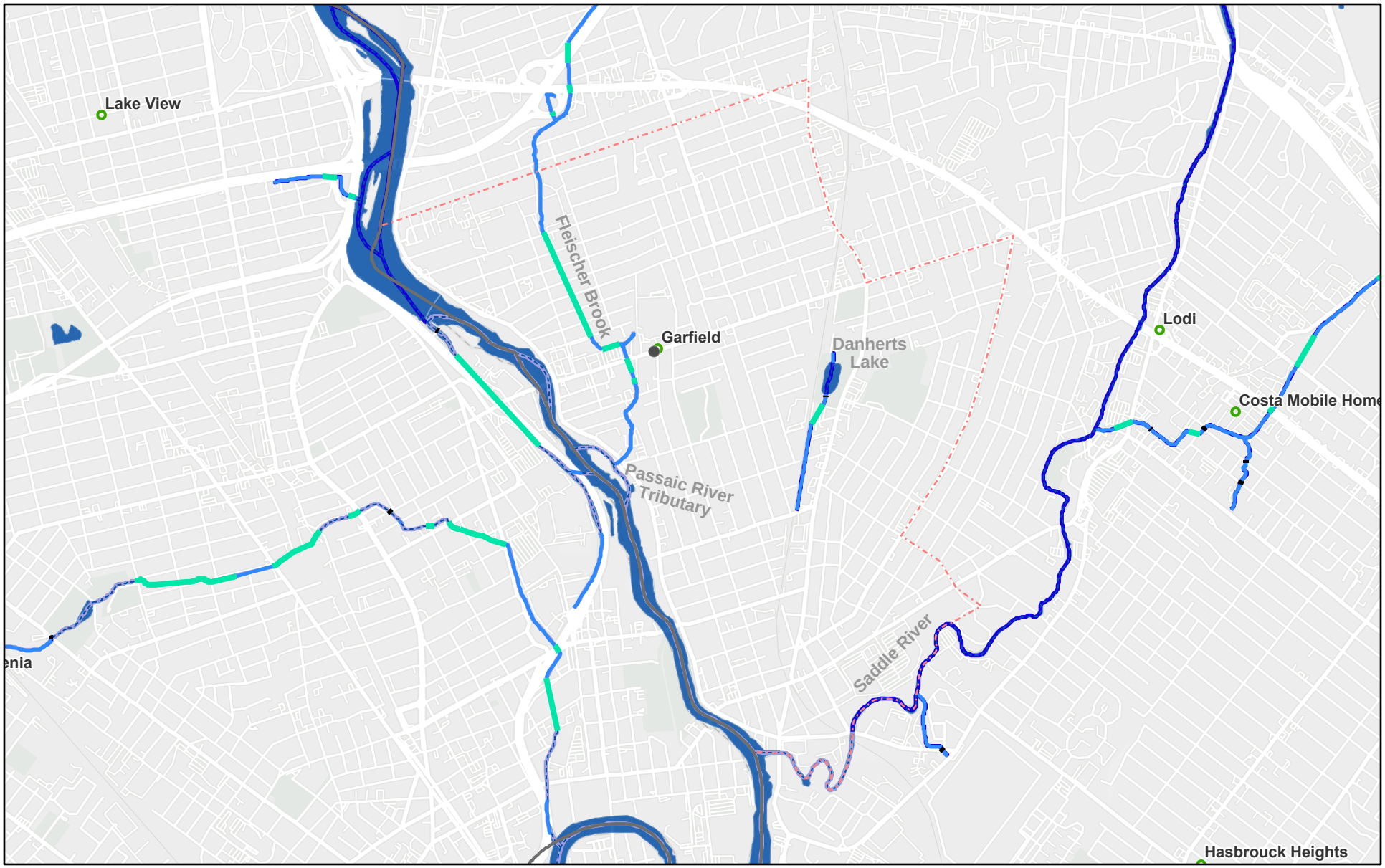
a) Water Quality

i) Re-establish a vegetative buffer along the shoreline to filter stormwater runoff from the high goose traffic areas.

ii) Provide goose management measures, including public education at the City's parks.

The City of Garfield may allow a developer to provide funding or partial funding to the municipality for an environmental enhancement project that has been identified in a MSWMP, or towards the development of a RSWMP. The funding must be equal to or greater than the cost to implement the mitigation outlined above, including costs associated with purchasing the property or easement for mitigation, and the cost associated with the long-term maintenance requirements of the mitigation measure.

Exhibit 1
Garfield City: Waterway Location Map



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Water Bodies
County Boundaries
Municipalities
Place Names

Streams
Stream/River
Artificial Path
Connector

Canal/Ditch
Pipeline

Surface Water Quality Classification
FW2-NT
FW2-NT/SE2
FW2-NT/SE3

1:36,112

0 0.23 0.45 0.9 mi

0 0.38 0.75 1.5 km

NYC OpenData, State of New Jersey, Esri, HERE, Garmin, SafeGraph, New Jersey Department of Environmental Protection

NYC OpenData, State of New Jersey, Esri, HERE, Garmin, SafeGraph, INCREMENT P, METI/NASA, USGS, EPA, NPS, US Census Bureau, USDA | NJDEP | NJDEP, Bureau of Energy and Sustainability Edition 20190327 | New Jersey Office of Information

Exhibit 2
Garfield City: USGS Quadrangle Map

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Municipalities

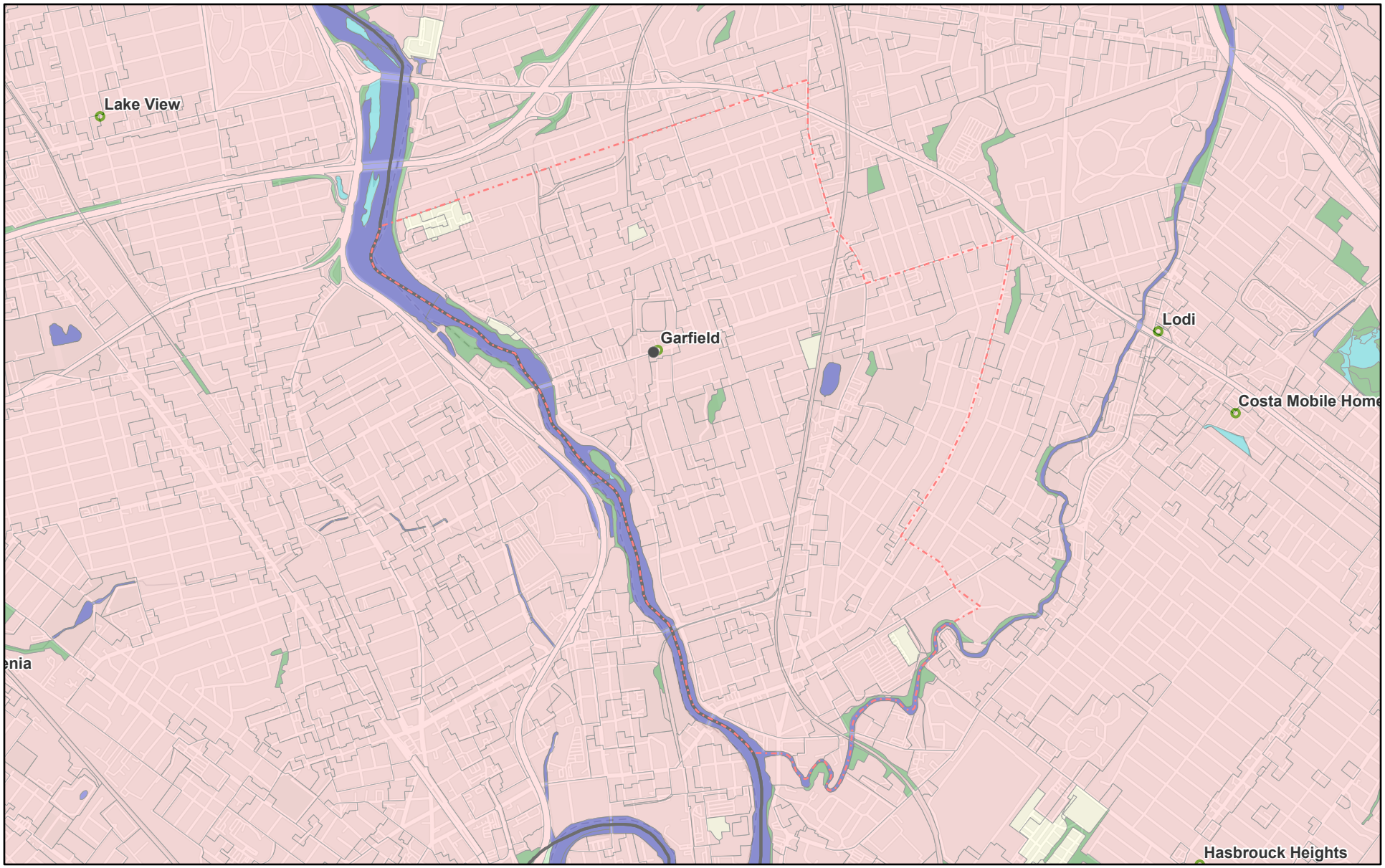
1:36,112

0 | 0.23 | 0.45 | 0.9 mi

0 | 0.38 | 0.75 | 1.5 km

NYC OpenData, State of New Jersey, Esri, HERE, Garmin, SafeGraph, INCREMENT P, METI/NASA, USGS, EPA, NPS, US Census Bureau, USDA

Exhibit 3
Garfield City: Land Use Map



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Municipalities

County Boundaries

Land Use 2012

AGRICULTURE

BARREN LAND

FOREST

URBAN

WATER

WETLANDS

Place Names

1:36,112

0 0.23 0.45 0.9 mi

0 0.38 0.75 1.5 km

NYC OpenData, State of New Jersey, Esri, HERE, Garmin, SafeGraph,

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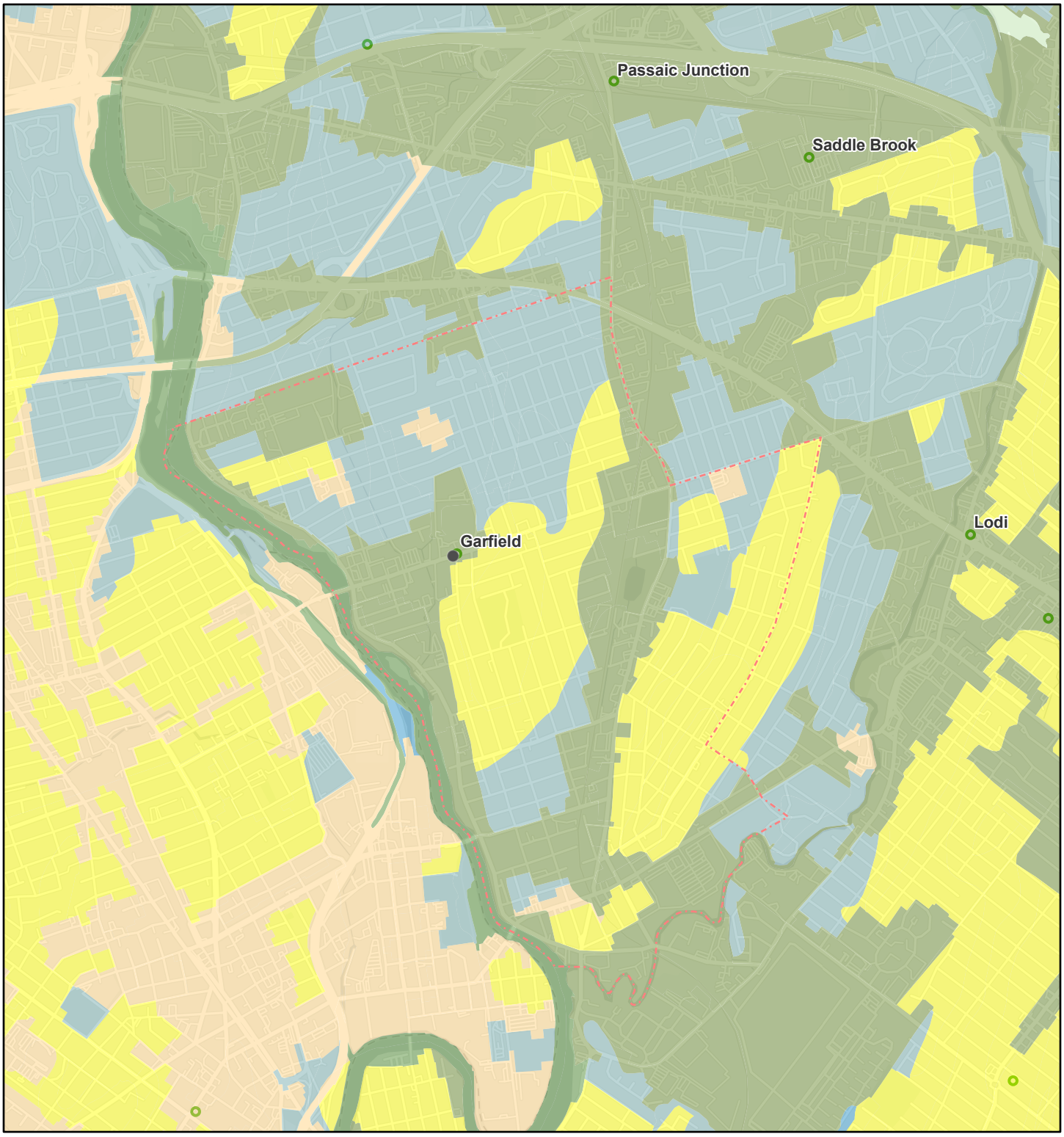
Exhibit 4
Garfield City: Groundwater Recharge Areas



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0 0.23 0.45 0.9 mi

0 0.38 0.75 1.5 km

Municipalities

Ground-Water Recharge Areas

16 to 23 in/yr

11 to 15 in/yr

8 to 10 in/yr

1 to 7 in/yr

0 in/yr

hydric soil

wetlands and open water

Place Names

NYC OpenData, State of New Jersey, Esri, HERE, Garmin, SafeGraph, INCREMENT P, METI/NASA, USGS, EPA, NPS, US Census Bureau, USDA

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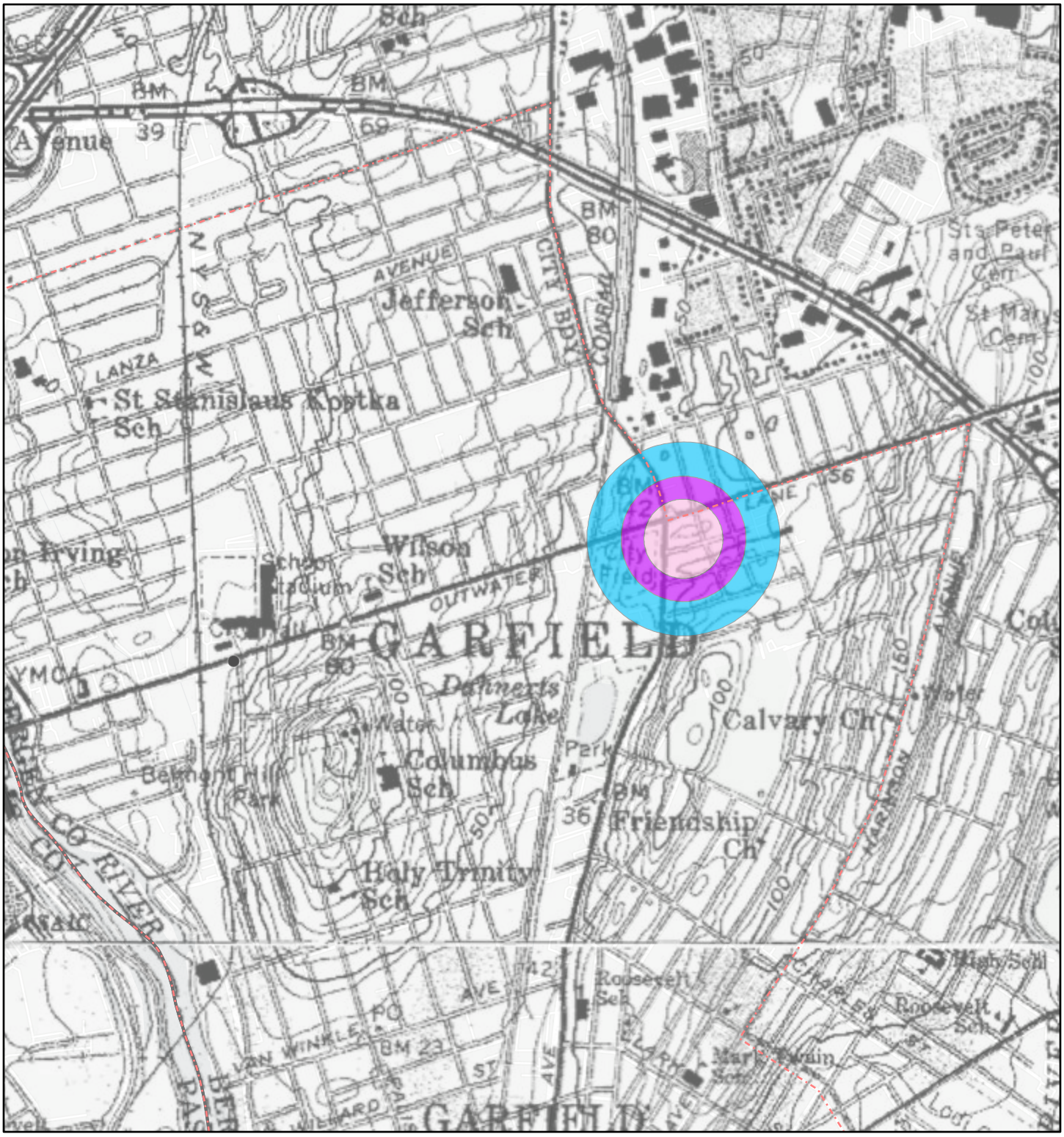
Exhibit 5
Garfield City: Well Head Protection Areas (Non-Community)



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0 0.17 0.35 0.7 km

Municipalities

County Boundaries

Well Head Protection Areas (Non-Community)

Tier 1: 2-Year

Tier 2: 5-Year

Tier 3: 12-Year

Esri Community Maps Contributors, NYC OpenData, State of New Jersey, Esri, HERE, Garmin, SafeGraph, INCREMENT P, METI/NASA, USGS, EPA, NPS, US Census Bureau, USDA

New Jersey Department of Environmental Protection

Exhibit 6
Garfield City: Well Head Protection Areas (Community)

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0 0.23 0.45 0.9 mi

0 0.38 0.75 1.5 km

Well Head Protection Areas (Community)

- Tier 1: 2-Year
- Tier 2: 5-Year
- Tier 3: 12-Year

NYC OpenData, State of New Jersey, Esri, HERE, Garmin, SafeGraph, INCREMENT P, METI/NASA, USGS, EPA, NPS, US Census Bureau, USDA

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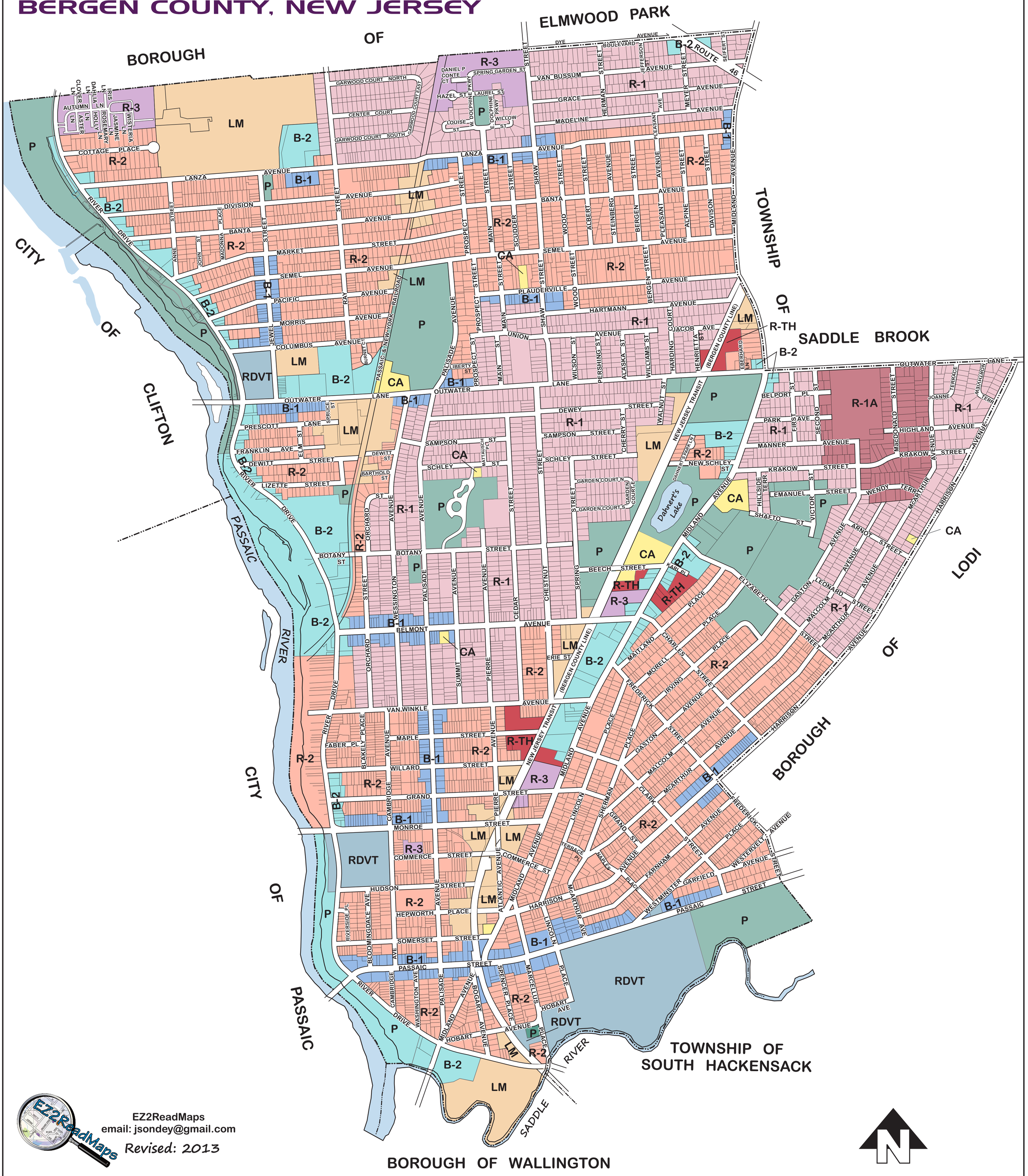
Zoning Map
CITY OF GARFIELD
BERGEN COUNTY, NEW JERSEY



EZ2ReadMaps
email: jsondey@gmail.com
Revised: 2013

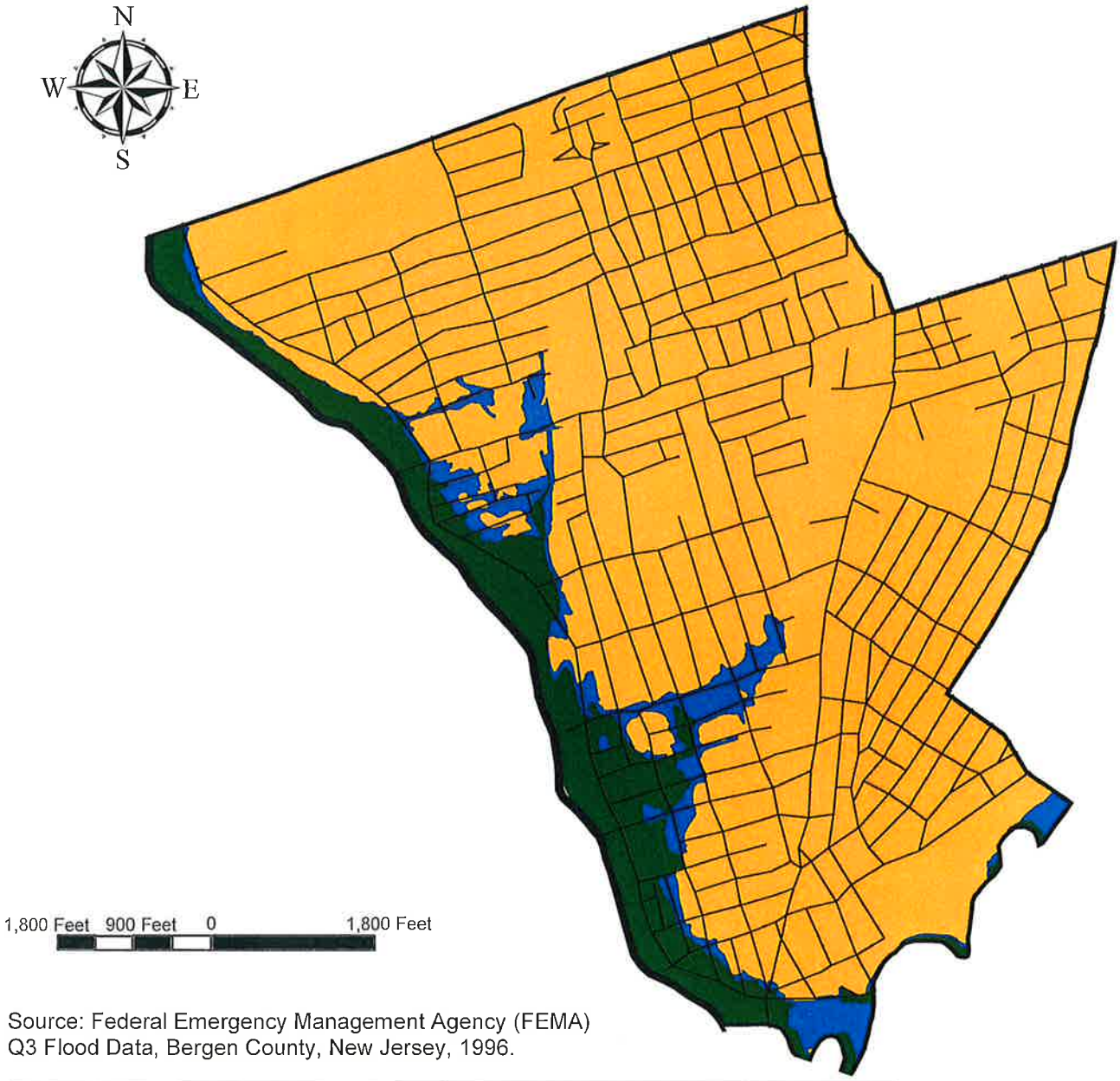
DISCLAIMER NOTE: Zoning Map created by EZ2ReadMaps is based upon a previous Master Plan by Burgis Associates, Inc. and is intended for general information purposes only. For specific Zoning/Lot requirements or questions please contact the Garfield Building Department directly.

0' 480' 960' 1920'
graphic scale in feet

LEGEND

R-1A 1-FAMILY, LOW DENSITY RESIDENTIAL	R-3 MULTIFAMILY, HIGH-RISE, HIGH DENSITY RESIDENTIAL	B-2 GENERAL RETAIL	P PARKLAND
R-1 1 & 2- FAMILY RESIDENTIAL	R-TH MULTIFAMILY, MEDIUM DENSITY RESIDENTIAL	LM LIGHT MANUFACTURING	RDVT REDEVELOPMENT AREAS
R-2 1 & 2 FAMILY, MULTIFAMILY, MEDIUM DENSITY RESIDENTIAL	B-1 NEIGHBORHOOD RETAIL	CA COMMERCIAL ANTENNAS	

Exhibit 8: City of Garfield Floodplain Map



Source: Federal Emergency Management Agency (FEMA)
Q3 Flood Data, Bergen County, New Jersey, 1996.

Legend

— Roads

ZONE

- 100IC - 100-year discharge contained in channel/culvert
- 500IC - 500-year discharge contained in channel/culvert
- A - 100-year flood; no base flood elevations determined
- AE - 100-year flood; base flood elevations determined
- AH - Flood depth of 1-3 feet (usually areas of ponding); average depth determined
- AO - Flood depth of 1-3 feet (usually sheet flow on sloping terrain); average depth determined
- FWIC - Floodway contained in culvert
- X - Areas outside 500-year floodplain
- X500 - Area of 500-year floodplain

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