City of Rensselaer Natural Resources Inventory



Prepared by the City of Rensselaer Planning Department

Adopted June 2021

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Hudson River Estuary Program







Introduction

The City of Rensselaer is uniquely situated amid a number of waterfront communities in the Hudson River Valley. Local history pre-dates European settlement and has been strongly influenced by waterways, which have provided opportunities for commerce and transportation. Populations indigenous to the Hudson River Valley include the Lenape, Wappinger, and Mahican branches of the Algonquins.¹ The Mahicans settled and traded in the current Albany-Rensselaer area, known then as Petuquapoern and Juscumcatick, until it was colonized by the Dutch in 1609.²

The successful Dutch and British colonization of the area was rooted heavily in the natural features of the region. The region offered numerous opportunities for profit and the foundations of wealth through the fur trade. It also provided a basis for long term settlement by means of agricultural production. This eventually led to a landlord-tenant dynamic rooted in the practice of share-cropping. The land on the eastern shore of the Hudson River, now Rensselaer County, successfully yielded a grain output which made its way down the Hudson River and across the Atlantic Ocean back to Great Britain. Local grain production for feudal landholders resulted in the establishment of the earliest Dutch settlement in the Hudson River Valley, the hamlet of Greenbush. Greenbush was home primarily to farms and a brewery.³

Many of the natural resources that shaped the landscape of this early American style of development are still present. Greenbush was eventually chartered as the City of Rensselaer in 1897. The industrializing landscape in the City of Rensselaer provided railways and smoke stacks where riverfront commerce and agricultural production once was. The landlocked portions of the County in East and North Greenbush have maintained a large agricultural sector. Modern Rensselaer continues to uphold a significant industrial presence but is also home to locally significant habitats and ecosystems, which are discussed in this report.

⁻

¹ Alfieri, J.; Berardis, A.; Smith, E.; Mackin, J.; Muller, W.; Lake, R.; Lehmkulh, P. (June 3, 1999). "The Lenapes: A study of Hudson Valley Indians" (PDF). Poughkeepsie, New York: Marist College. Archived from the original (PDF) on March 13, 2016. Retrieved November 2, 2020.

² George Baker Anderson (1897). "History of Greenbush, New York". D. Mason and Company. Retrieved November 2, 2020

³ Leitner, Jonathan (2016). "Transitions in the Colonial Hudson Valley: Capitalist, Bulk Goods, and Braudelian". Journal of World-Systems Research. 22 (1): 214–246. doi:10.5195/jwsr.2016.615. Retrieved January 4, 2017.

Rensselaer's forests, meadows, wetlands, streams, and shorelines are natural assets that can help shape and improve the quality of life for residents. Not only are these habitats abundant for wildlife and fish, they also provide many vital benefits to people. These ecosystems help to keep the City's air and water clean, moderate temperature, filter pollutants, and absorb floodwaters. They also present opportunities for outdoor recreation and education, and create the scenery and sense of place that is unique to the community. If the natural resources in the City are not accounted for as Rensselaer plans for its future, the opportunities to preserve and enhance these benefits may go unaddressed entirely.

This Natural Resources Inventory asks – How can we shape the locale of the City to improve resiliency and the quality of life in Rensselaer in the face of climate change? How can we reduce emissions? Improve air quality and water quality? Promote absorption of floodwaters and moderation of temperatures through natural and engineered methods? Sustain biodiversity? Reduce and filter sources of pollution that may harm residents and ecosystems?

Land-use planning is instrumental to balancing future growth and development with protection of natural resources. Identifying important natural resources is the first step in proactive environmental planning and informed decision-making. This Natural Resources Inventory identifies and describes the naturally occurring resources located in Rensselaer, including topography, geology and soils, water resources, and habitat, as well as recreation areas, land uses, and climate conditions and projections. By bringing this information together in one place, the NRI can cultivate a better understanding and appreciation of the community's natural resources and set the stage for a wide range of planning and conservation applications. The NRI provides a foundation for comprehensive and open space planning, zoning updates, identifying critical environmental areas, climate adaptation strategies, and other municipal plans and policies for Rensselaer. The NRI can also inform land stewardship and conservation provide a City that is well-adapted to the real threats of climate change.

A well-adapted Rensselaer will be one that takes action to implement policies and procedures that consider climate threats without compromising the viability of the City's redevelopment. Thus, the goal of the Natural Resources Inventory (NRI) is to collect, visualize, and interpret the City's natural resources in order to provide a basis for sustainability and resiliency to be fully incorporated into Rensselaer's long term planning. This report seeks to use the data collected on the City's natural resources to

determine best practices for preserving and enhancing the City's natural features wherever possible.

Data and Methods

Mapping for the City of Rensselaer NRI was completed in 2020 with technical assistance through the NYSDEC Hudson River Estuary Program, Cornell University, and Rensselaer Land Trust (RLT). All maps were created by Rick Lederer-Barnes of Upstate GIS. Rick is an Independent GIS Specialist and Environmental Planner with over 15 years of experience; Rick's primary focus has been on geospatial analysis and high quality mapping for both private organizations and municipalities throughout the Northeast. These maps display data from federal, state, and county agencies, non-profit organizations including the Rensselaer Land Trust and The Nature Conservancy, and prior planning efforts by the City of Rensselaer. Several maps include data from Rensselaer Land Trust's Land Conservation Plan: 2018-2030. They also draw on extensive studies at both the county and city level by local ecologist Dr. David Hunt, who helped interpret information from the Conservation Plan for the NRI and also conducted new research regarding special habitats in the City of Rensselaer. The original source and publication year of data sets are included on each map, and are described in the report. All maps were produced using ESRI ArcGIS Pro v 2.6 Geographic Information Systems (GIS) software.

Information on the maps comes from different sources, produced at different times, at different scales, and for different purposes. Most of the GIS data were collected or developed from remote sensing data (i.e., aerial photographs, satellite imagery) or derived from paper maps. For these reasons, GIS data often contain inaccuracies from the original data, plus any errors from converting it. Therefore, maps created in GIS are approximate and best used for planning purposes. They should not be substituted for site surveys. Any resource shown on a map should be verified for legal purposes, including environmental review. Information provided by the maps can be enhanced by local knowledge, and the NRI should be updated every 10 years as new data become available.

The NRI report was written based on a template from the Hudson River Estuary Program, with assistance from Ingrid Haeckel of the NYSDEC Hudson River Estuary Program and Cornell University; Ketura Vics, Director of Planning and Development for the City of Rensselaer; and Daniel Madigan, a graduate intern through the University at Albany. An important data source for the NRI was the Rensselaer County Land Conservation Plan (2018), which was prepared by the Rensselaer Land Trust to

identify key lands in Rensselaer County for conservation and to assist the conservation efforts and land use decisions of partner organizations and municipalities in Rensselaer County. RLT selected five resource targets that are essential to Rensselaer County's physical and biological health, economy, and quality of life: water resources, ecological resources, agricultural resources, scenic areas, and areas offering climate resiliency to biodiversity. RLT then used a GIS analysis to score areas for each of these resource targets, and used the results to identify County-level priority areas for conservation based on these targets. The results of the plan for all these resources may be viewed in greater detail using the <u>online Conservation Plan story map</u>.

The NRI project team sought to incorporate public outreach throughout the project. The goal of public outreach for this project is to allow residents to participate in the creation of a report that will help shape the city's long term goals as they pertain to community safety and climate resiliency. Public outreach was solicited throughout the planning process while creating the content of this inventory through meetings with the City of Rensselaer Planning Commission, public information sessions available in person and via Zoom web conferencing, and through the City of Rensselaer Planning website, where all draft maps were posted with a public comment submission form. The City held three public information meetings, continually updated the Planning Commission at meetings, and solicited feedback on local priorities for climate action to be which can be found in *Appendix D*. The Inventory was adopted by the Planning Commission on May 27th, 2021 to be used in the review of all projects henceforth.

How to Use this Report

The NRI is a valuable land use planning tool as well as educational resource that documents aspects of the City's diverse natural resources and conservation and recreation assets. The inventory provides an essential tool for the Common Council, local Planning and Zoning Boards, Building and Codes Department, and Public Works Department by officially identifying sensitive land, water, and recreation resources. It discusses development considerations for the Planning and Zoning Boards, laying a foundation for land-use planning and decision-making, zoning considerations and municipal policy guidance, as well as environmental conservation. The NRI also integrates recommendations for actions from the New York State Climate Smart Communities (CSC) certification framework to help provide structured action items for local planning. The CSC Certification Program helps local governments take action to reduce the emission of greenhouse gasses and prepare for climate change by offering incentives to complete action items that are designed to enhance sustainability and resilience. The Climate Smart Communities action items are discussed at the end of each

section with respect to the questions posed in the introduction. Each chart uses the following terminology to address how each CSC action contributes to the overall environmental and ecological health and sustainability of Rensselaer; they are referred to as "local climate goals" –

- Improve resilience ("resilience")
- Reduce emissions ("emissions")
- Improve air quality ("air quality")
- Improve water quality ("water quality")
- Improve absorption of floodwaters ("absorption")
- Moderate temperatures ("temperature")
- Sustain/promote biodiversity ("biodiversity")

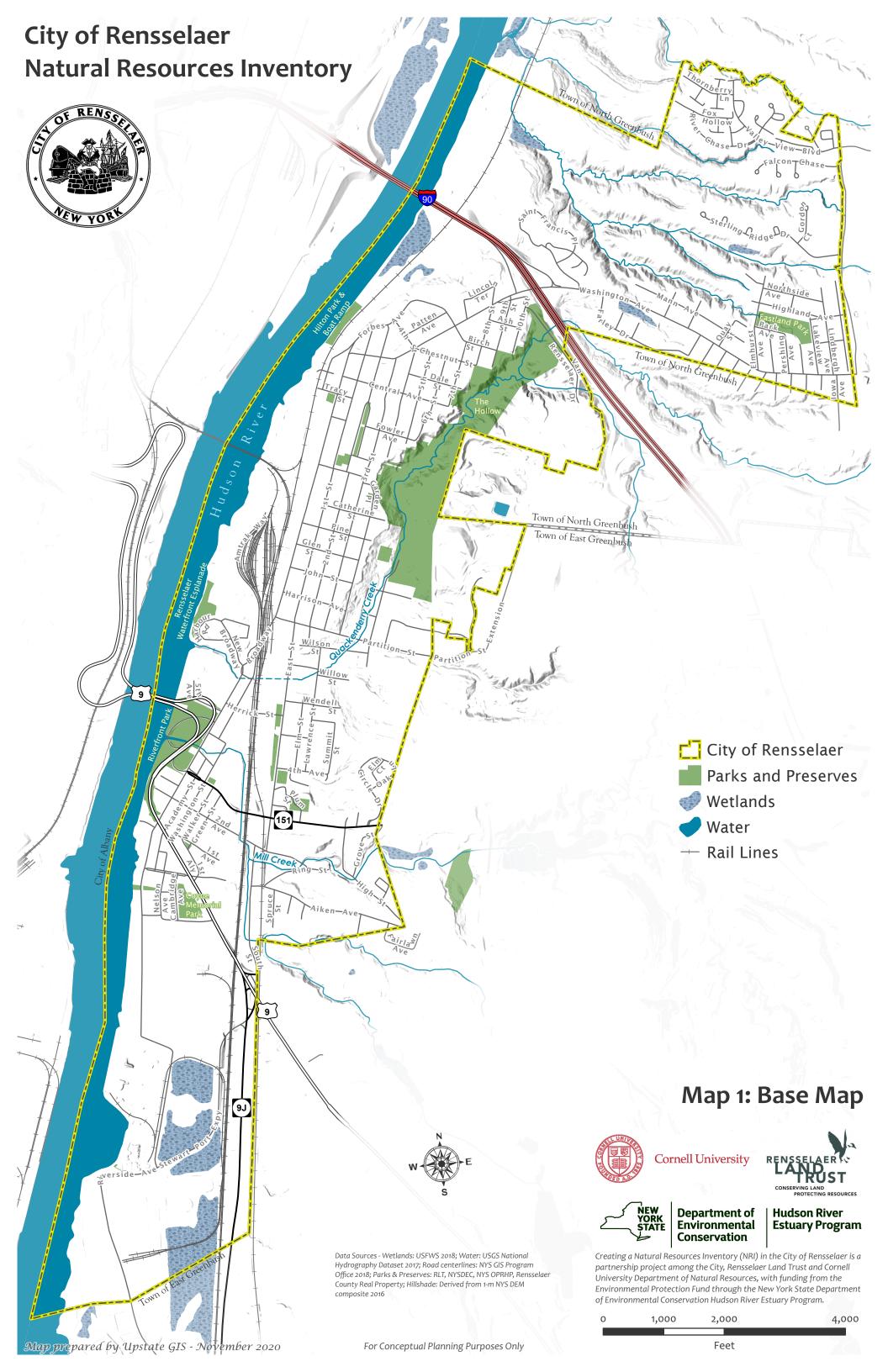
In addition, the NRI provides property owners, developers and their consultants with information they may need in considering the impact their project may have on the City's natural resources. It can be used to address natural resources during project planning and design and to help expedite review and approval of their endeavors. It can also be used as a general reference for landowners to understand resources that may occur on their property and to inform stewardship. This report will be fully incorporated into all long-term land use plans produced through the City's Planning Department. It is important to keep in mind that the NRI is best suited for municipal scale planning but may be used as a screening tool at the site-scale to raise questions or identify the need for additional site assessment. The maps are not intended to provide site-specific accuracy and should not be used as a primary source for land use decision-making but may identify where further site assessments are needed.

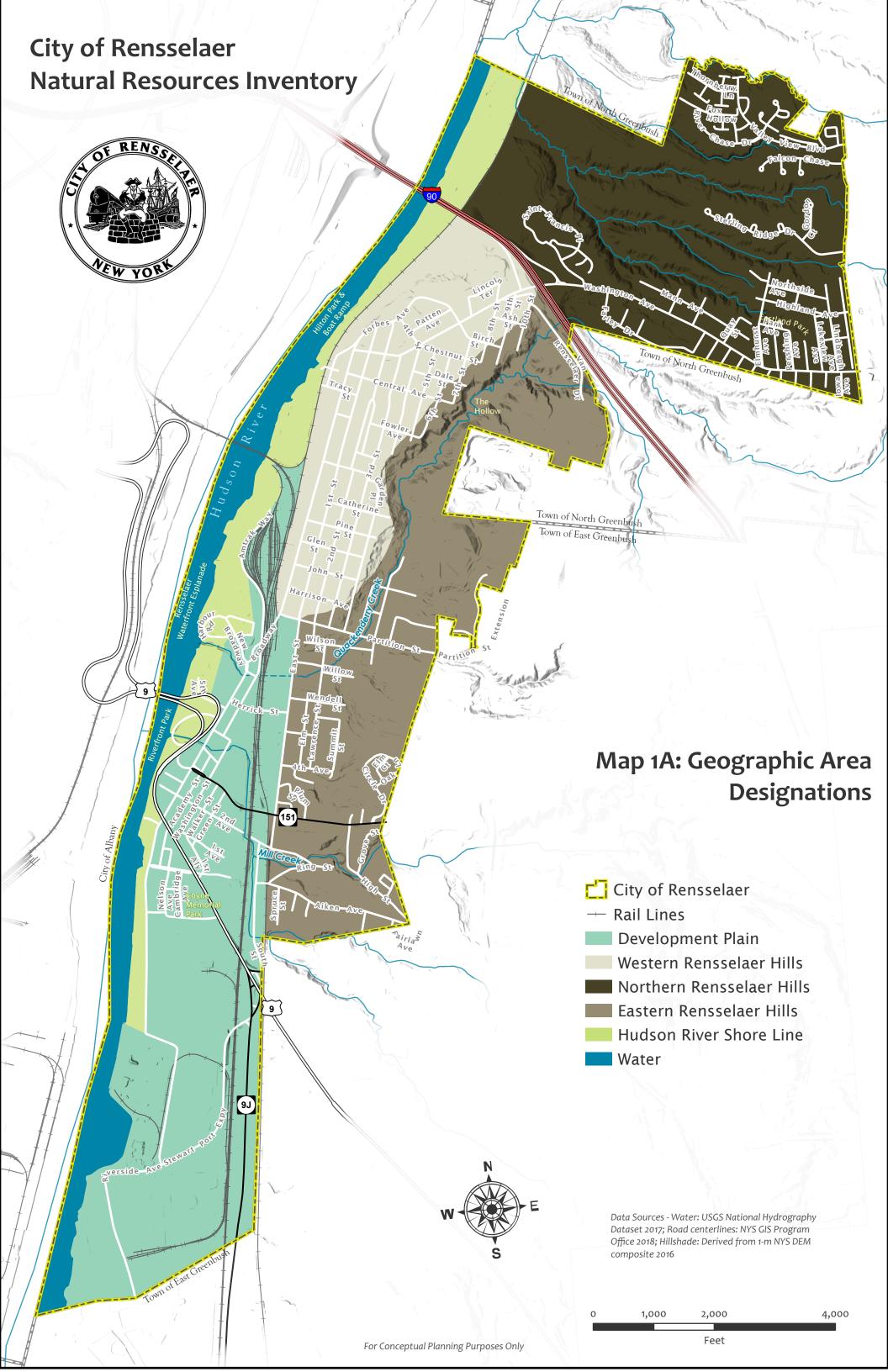
The NRI maps are available as PDFs at https://www.rensselaerplanning.com/natural-resource-inventory and physical copies are available by request from the City Planning Department. The PDF maps allow for ease of navigation with the ability to zoom in to an area of interest.

Many of the data sets shown in the NRI maps are available for more detailed viewing through online interactive maps. These include:

Hudson Valley Natural Resource Mapper

- DECinfo Locator
- Discover GIS Data NY
- National Map
- Web Soil Survey
- TNC Resilient Land Mapping Tool
- Hudson River Flooding Decision Support System
- Scenic Hudson Sea Level Rise Mapper
- Scenic Hudson Protecting the Pathways
- Rensselaer County Land Conservation Plan story map





Section 1: Geographic Location

This section provides a brief overview of the natural and built environment in the City of Rensselaer through four (4) different maps: Map 1 (Base Map), Map 1A (Geographic Area Designations), Map 2 (Aerial View, during growing season), Map 2A (Aerial View, during dry season).

Base Maps (Map 1 and Map 1A)

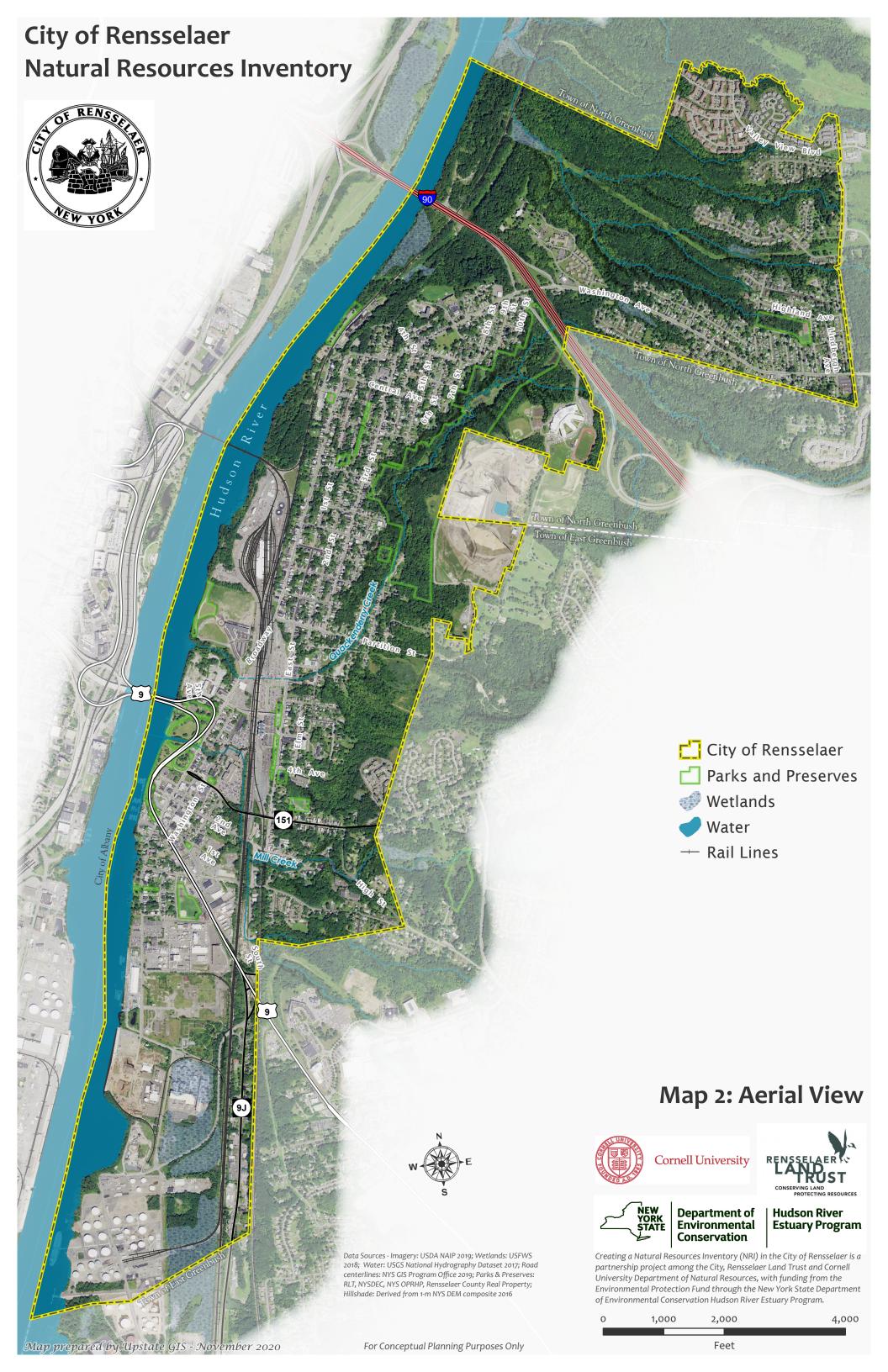
The Base Map (Map 1) is the foundation for the Natural Resources Inventory map series. It shows municipal boundaries, roadways, railroads, topographic relief, streams, and waterbodies. Map 1 shows the City of Rensselaer located on the eastern shore of the Hudson River across from the New York State capitol, Albany. The Geographic Areas Designations Map (Map 1A) shows the City clustered into five (5) distinct geographic areas based on both the natural and built environment. Each area was defined based on distinctive natural features such as creeks and ravines and also manmade features such as major arterials (i.e. highway bridges and rail lines) and residential grids. Distinguishing features of both the natural and built environment are introduced in this section and are discussed at length throughout the NRI.

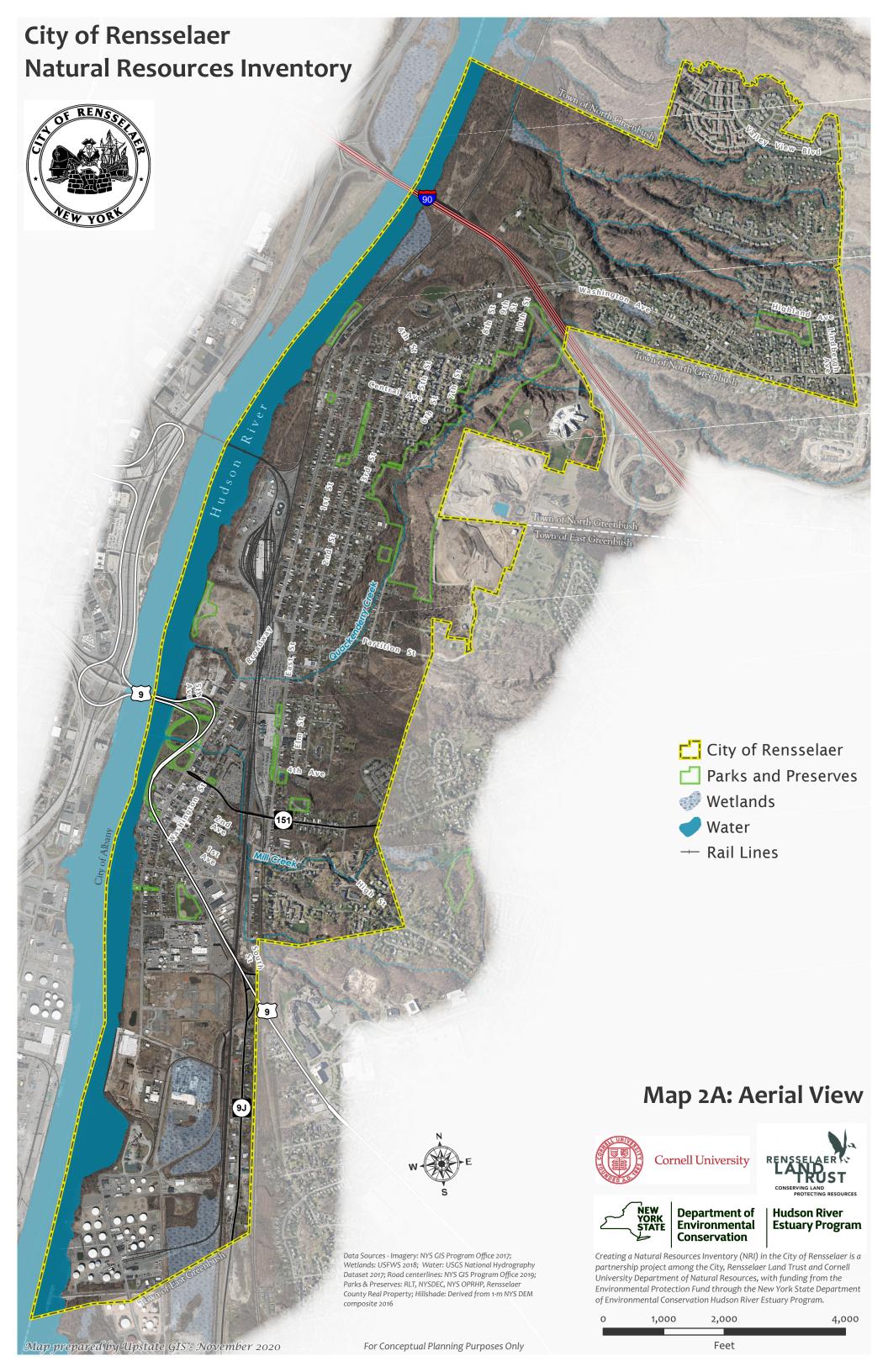
Table 1: Geographic Areas in Rensselaer Shown on Map 1A

Geographic Area	Location	Features
Northern Rensselaer Hills ("northern hills")	the I-90 Bridge. The I-90 Bridge acts as the southern boundary and the Amtrak rail lines act as the western boundary. The area extends to the municipal lines of neighboring town	Forested area with steep slopes and rivers and streams running through the non-residential portions on the map. The suburban style residential streets and cul-de-sac style neighborhoods are the distinguishing aspects of the built environment in this area.
Western Rensselaer Hills ("western hills")	Area of the City that is south of the I-90 Bridge, east of the Amtrak rail lines, north of Partition Street, and west of the Hollow	

	Preserve/Quackenderry Creek.	distinguishing features of the built environment in this area.
Eastern Rensselaer Hills ("eastern hills"; "residential grid")	The area of the City that is south of the I-90 Bridge, east of the residential grid, north of Aiken Avenue, and west of the municipal boundary line.	The forested ravine known locally as "the Hollow" and Quackenderry Creek running through it are the most distinguished natural features of the Eastern Hills. The high priority ecological area is primarily in the Southern Development Plain, but is shown to creep into the Eastern Hills near Ring Street and Aiken Avenue as well as on the border of Partition Street and the Western Hills. The built environment in this area varies greatly, including single family homes, multifamily homes, the Rensselaer Public Library, and the Amtrak Rail station. The rail station is the most distinguished feature of the built environment in the Eastern Hills.
Hudson River Shoreline ("the shoreline"; "the riverfront"; "the waterfront")	Area defined by the Hudson River on the westernmost point, running from the municipal boundary to the north and bound by the city's industrial zone to the south. The eastern boundary of the waterfront is defined by the Amtrak rail lines until they reach the maintenance facility, the boundary continues to	The waterfront is the most significant natural feature in the City. The built environment in this area varies and includes both single and multifamily homes, high density residential developments, three bridges (one for rail purposes, one multimodal bridge for a major arterial, and one automobile bridge for a major arterial), a boat

	follow the waterfront development at DeLaet's Landing (just south of the Amtrak maintenance facility), and below there, it follows Broadway until it reaches Riverside Avenue.	· · · · · · · · · · · · · · · · · · ·
Southern Rensselaer Development Plain ("southern plain"; "development plain")	Area primarily defined by Broadway, the City's industrial zone, and the City's commercial zone. The Development Plain is bound by the Hudson River shoreline on the west, the Western Hills on the north, and both the Eastern Hills and municipal boundary to the east.	features of the Southern Plain. The industrial and commercial zones, including many bulk fuel storage tanks and a significant amount of paved and impervious surfaces, are the most





Aerial Views (Map 2 and Map 2A)

The Aerial View Maps (Maps 2 and 2A) give a bird's-eye view of Rensselaer. Map 2 shows the City during the growing season (with trees leafed out) using 2019 aerial imagery from the USDA NAIP program. Map 2A shows the City in the early spring before leaf-out using 2017 orthoimagery from the New York State GIS Program Office. Both maps can serve as a reference for comparison with features shown on other maps in the Natural Resources Inventory. Together, this set of maps is able to show the steep hills, lush tree cover, and largely uninterrupted waterfront that complements the city's industrial landscape. For more detailed, interactive viewing of aerial imagery dating back to 1994, users can visit the Discover GIS Data NY website at https://orthos.dhses.ny.gov/.

The aerial maps illustrate general natural features such as open bodies of water, forests, streams, rivers and wetlands. Specifically, Mill Creek and Quackenderry Creek are meandering streams that flow through the City into the Hudson River; a concentration of wetlands is located in the industrial zone near County Route 9J. Map 2 also shows general features of the built environment such as rail lines, industrial infrastructure (bulk fuel storage tanks in the southernmost portion of the development plain), residential grids in the western hills, cul-de-sacs to the north. These features are discussed in more detail on other maps in the inventory.

Section 2: Climate

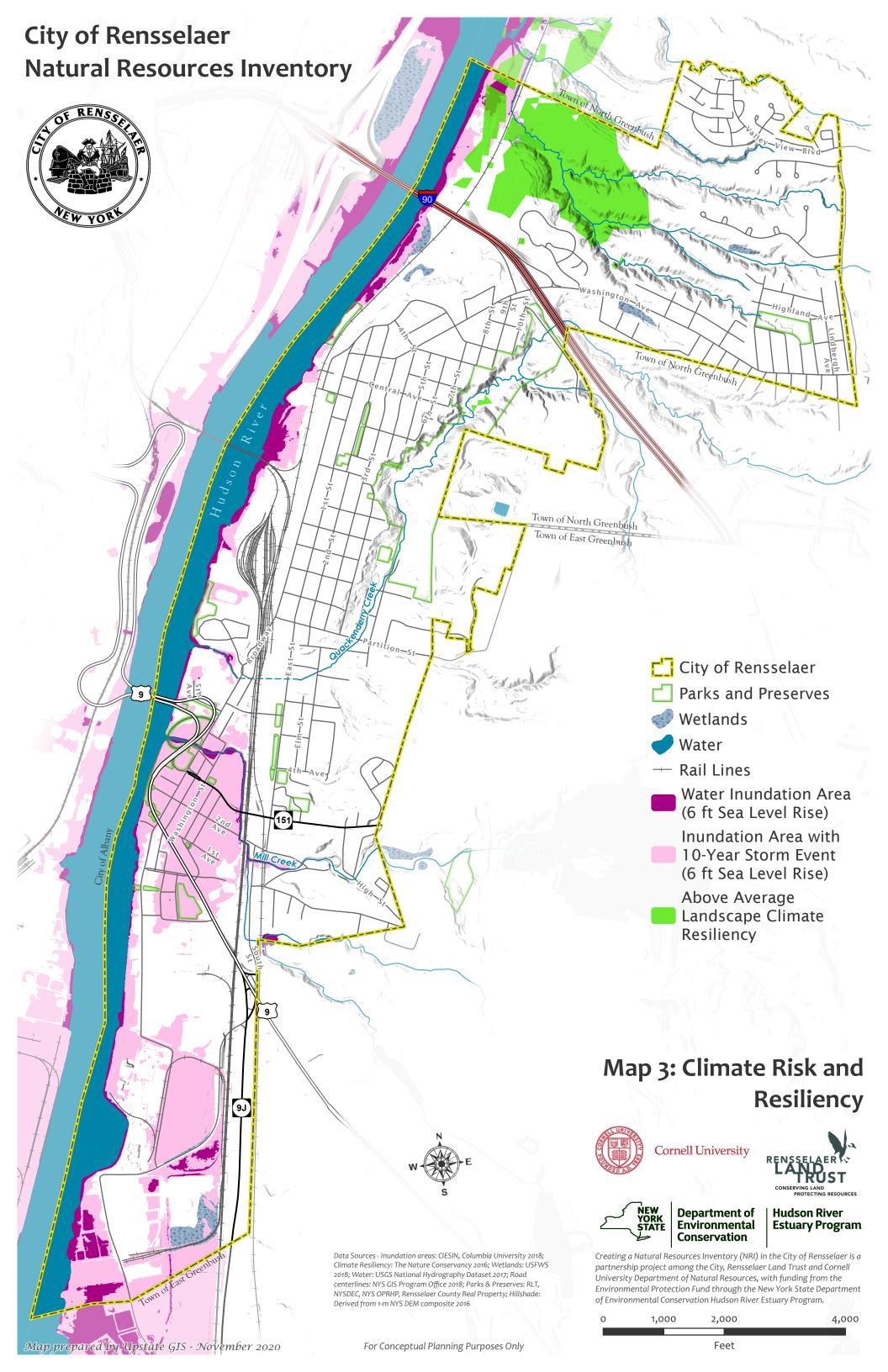
Local data show steady and rapid changes in our climate that reflect global trends. Trends in temperature, precipitation, and sea level rise pose significant hazards in the City of Rensselaer. It is vital for City decision-makers to understand these trends and the related climate hazards facing the region and to plan for future conditions as well as the best practices for community preparedness to address them. This inventory presents natural resources currently contributing to community safety and climate resilience. For example, the City's wetlands and forests help to offset greenhouse gases and sequester carbon sequestration while also air quality. This section presents general climate information prepared for Hudson Valley communities by the DEC Hudson River Estuary Program.⁴ This section will discuss best practices for the natural and built environment to preserve and enhance air and water quality, moderate temperatures, absorb floodwaters, and improve/conserve biodiversity in order to enhance the capability of our natural features to increase community resilience to climate change. These best practices should help inform the planning and policy decisions that inform future project opportunities.



Image 1: Rensselaer's Hudson Riverfront at DeLaet's Landing. Photo taken by Relentless Awareness.

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⁴ Zemaitis, Libby. Working Toward Climate Resilience: General Climate Information Prepared for Hudson Valley Communities. DEC Hudson River Estuary Program, 2018.



Climate Risk and Resiliency (Map 3)

The implications of changes in the local climate and the data used to determine these changes are the focus of this section. Trends in temperature, precipitation, and sea level rise (SLR) provide the basis for projections of the City's climate through the end of the century. The climate risk and resiliency map shows modeling for water inundation that would result from the high projection of SLR⁵ amid a 10-year storm in the City. Specifically, Map 3 exhibits three key features: water inundation area in the event of six feet (72 inches) of sea level rise, inundation area with a ten-year storm event (in the event of six feet of sea level rise), and areas in the City with above average landscape climate resiliency.

The SLR modeling was produced by the Stevens Institute of Technology and simulates the impact on water levels produced by sea level rise, tides, and storm surge, as well as contributions from tributaries flowing into the Hudson.⁶ It is important to note that estimates for future flood zones do not account for projected changes in precipitation patterns. A wide range of different sea level rise and flood scenarios can be visualized using an associated interactive online mapping tool called the Hudson River Flood Impact Decision Support System.⁷ Scenic Hudson's Sea Level Rise Mapper is a similar tool available to view future sea level rise inundation scenarios.⁸ The map illustrates the vital need to begin planning for SLR and increasing flood risk; best practices to prepare for these events is discussed at the end of Section 3.

When considering future areas at risk of inundation identified in Map 3, it is important for local agencies to understand what constitutes inundation and why it is so important to plan and prepare for. The National Oceanic & Atmospheric Administration (NOAA) identifies and defines four distinct flood categories, they are shown below.⁹

Minor	Minimal or no property damage, but possibly some public threat
Flooding	(e.g., inundation of roads).
Moderate	Some inundation of structures and roads near stream, evacuations of

⁵ Six feet is the DEC's high range projection for SLR, which assumes rapid ice melt from Greenland Ice Sheet. DEC considers the high projection very unlikely to occur by 2100, but relatively certain to occur sometime after 2100 due to warming that is already locked into that atmosphere.

⁶ Orton, P. M., F. R. Conticello, F. Cioffi, T. M. Hall, N. Georgas, U. Lall, A. F. Blumberg, and K. MacManus (2018). Flood hazard assessment from storm tides, rain and sea level rise for a tidal river estuary, Natural Hazards, 1-29, doi:10.1007/s11069-018-3251-x.

⁷ Hudson River Flood Impact Decision Suppot System, http://www.ciesin.columbia.edu/hudson-river-flood-map/

⁸ http://www.scenichudson.org/slr/mapper

Abshire, K. (2019, November 26). National Weather Service Directives System (1166158165 875030397 M. Mullusky, Ed.). Retrieved December 12, 2020, from https://www.nws.noaa.gov/directives/sym/pd01009050curr.pdfy

Flooding people and/or transfer of property to higher elevations.

Major Extensive inundation of structures and roads, significant evacuations of people and/or transfer of property to higher elevations.

Flooding which equals or exceeds the highest stage or discharge.

Record Flooding

Flooding which equals or exceeds the highest stage or discharge observed at a stage) given site during the period of record. The highest stage on record is not necessarily above the other three flood categories – it may be within any of them or even less than the lowest, particularly if the period of record is short (e.g., a few years).

According to NOAA, inundation occurs with moderate, major, and record flooding. Predictably, much of the area identified in Rensselaer for inundation in the event of six feet of sea level rise is along the Hudson River Shoreline. Additional areas are interspersed throughout the City in the southernmost portion of the Development Plain and are consistently shown to abut creeks and wetlands. The inundation area in the event of a 10-year storm is shown to have a much larger footprint. It spans the entirety of the shoreline and also includes the bulk of the development plain (i.e. the Port, the Amtrak Rail Yard, and downtown). These areas are already within the 100-year floodplain (1% annual chance of flooding), but will experience increased probability of annual flood risk as sea level rises.

Additionally, climate change is causing profound changes in the natural world and threatens species and ecosystems. Map 3 shows that the City has an area of "above average" climate resilience for biodiversity in the Northern Hills bordering North Greenbush. Modeling for climate resilience comes from the Nature Conservancy's *Resilient Sites for Terrestrial Conservation*¹⁰ and *Resilient and Connected Landscapes*¹¹ projects and is based on three primary attributes of resilient landscapes:

- **Geodiversity** reflects unique combinations of geology, elevation, and landforms. Ecosystem and species diversity relate strongly to their associated geophysical settings. Conserving a range of physical environments will in turn protect a diversity of plants and animals under both current and future climates.
- Complex topography is important because it creates a range of temperature and
 moisture options for the species, providing a variety of local microclimates.
 Factors that create microclimates include slope, aspect (i.e., north vs southfacing), shade, and proximity to waterbodies.

¹⁰ Anderson, M.G., M. Clark, and A. Olivero Sheldon. 2012. Resilient Sites for Terrestrial Conservation in the Northeast and Mid-Atlantic Region. The Nature Conservancy, Eastern Conservation Science.

¹¹ Anderson, M.G., Barnett, A., Clark, M., Prince, J., Olivero Sheldon, A. and Vickery B. 2016. Resilient and Connected Landscapes for Terrestrial Conservation. The Nature Conservancy, Eastern Conservation Science, Eastern Regional Office. Boston, MA.

Connected landscapes are places that allow species to move and disperse, and
processes like water movement can occur unimpeded. Maintaining a connected
area in which species can move ensures that the area can adapt to climate
change.

Sites that have diverse physical environments, complex topography, and connected habitats are places most likely to support a diversity of plants, animals, and habitats today and in the future. The above-average resilience value of the forested Northern Hills area is not surprising, since this area supports many of the City's highest quality habitats today, which are described throughout the report. Forest conservation in this area could support a broader climate adaptation strategy in the City. Because this modeling is focused on the resilience of natural systems, it excludes the developed areas of the city. Resilience of developed areas should be evaluated in terms of the ability of the built environment to withstand future hazards from sea level rise, flooding, and heat waves. The projections in the section below identify climate trends that the city should be taking action to prepare for.

Climate Projections

Responding to Climate Change in New York State (the ClimAID Report), written in 2011 and updated in 2014, is the current authoritative source for climate projections for New York State. ClimAID translated Intergovernmental Panel on Climate Change (IPCC) scenarios into more robust regional-scale predictions incorporating local data inputs and expert knowledge. Rensselaer is located within the ClimAID climate region 5. Note that models are inherently uncertain and simply present a range of possible scenarios to assist people and communities plan for the future. Future climate changes in Rensselaer could exceed or fall short of these projections. Looking towards the future there are three prominent climate trends that will affect Rensselaer and the region:

- Increasing temperatures
- Shifting precipitation patterns
- Sea level rise (SLR)

The illustrations below use data from the ClimAID Report to discusses these climate change projections for Region 5, where the City of Rensselaer is located.

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Horton, R., D. Bader, C. Rosenzweig, A. DeGaetano, and W.Solecki. 2014. Climate Change in New York State: Updating the 2011 ClimAID Climate Risk Information. New York State Energy Research and Development Authority (NYSERDA), Albany, NY. Available at www.nyserda.ny.gov/climaid

1. Increasing Temperature

AIR TEMPERATURE PROJECTIONS FOR REGION 5

	Baseline 1971-2000	2020s	2050s	2080s	2100
Annual average air temperature	50°F	52.3 - 53.2°F	54.5 - 56.2°F	55.6 - 59.7°F	56.1 - 61.4°F
Increase in annual average	-	2.3 - 3.2°F	4.5 - 6.2°F	5.6 - 9.7°F	6.1 - 11.4°F

Table 2: Air Temperature Projections for Region 5

HEAT WAVE PROJECTIONS FOR REGION 5

	Baseline 1971-2000	2020s	2050s	2080s	2100
# Days per year above 90°F	10	26 - 31	39 - 52	44 - 76	*
# Days per year above 95°F	1	2 - 4	3 - 10	6 - 25	*
# Heat waves per year	1	3 - 4	5 - 7	6 - 9	*
Average # days of each heat wave	4	5	5 - 6	5 - 7	*
# Days per year ≤ 32°F	155	127 - 136	104 - 119	84 - 109	*

New York has experienced particularly rapid changes to the regional climate in the last century and this trend is projected to continue through the 21st century. Global average temperature has been rising in unison with increasing input of insulating greenhouse gases, driving changes to regional and local climate. Warming atmospheric temperature alters the water cycle, leading to more extreme precipitation, short-term drought and severe storms.

Since 1970 average annual temperature in the City of Rensselaer has increased by 2°F and winter temperature has increased by 5°F. These increases are above both the national and global increase in annual temperature during the same period. Current projections see an additional increase of about 4-6°F in the coming decades and up to 11°F by 2100.

Impact of Increasing Temperature on Region 5

Increasing annual temperatures will lead to more frequent, intense, and long-lasting heat waves during the summer, posing a serious threat to human health and increased electricity demand from air conditioning, leading to higher energy costs and the risk of electricity blackouts. Heat waves are a particular concern for cities such as Rensselaer, where the urban heat-island effect can further exacerbate high temperatures. By midcentury, the City could experience three to 10 days above 95 degrees annually, and five to seven heat waves that last one to two days longer than average.

2. Precipitation.

Table 3: Precipitation Projections for Region 5

PRECIPITATION PROJECTIONS FOR REGION 5

	Baseline 1971-2000	2020s	2050s	2080s	2100
Total annual precipitation	51"	52" - 54.5"	53" - 57"	53.5" - 58.5"	53.5" to 61.5"
% Increase in annual precipitation	-	2 - 7%	4 - 12%	5 - 15%	5 - 21%
# Days with precipitation > 1"	10	14 - 15	14 - 16	15 - 17	*
# Days with precipitation > 2"	1	3 - 4	4	4 - 5	*

Precipitation has become more variable and extreme, whereas total rainfall has changed only marginally. The amount of rain falling in heavy downpour events increased 71% from 1958 to 2012 in the Northeast. Projections indicate total annual precipitation could increase as much as 12% by mid-century and 21% by 2100. Overall, New York State models project more dry periods intermixed with heavy rain and decreased snow cover in winter.

Impact of Shifting Precipitation Patterns on Region 5

The precipitation patterns exhibited here are expected to elevate flood risk. This may increase inundation frequency for public infrastructure such as the City's combined sewer system, which often becomes overwhelmed during heavy rains.

3. Sea Level Rise Projections (Shown on Map 3)

Global sea level is rising due to various factors, including thermal expansion from warmer water temperatures and melting of land-based ice. The Hudson River is connected to and influenced by the sea; therefore, it experiences tides and is rising with global sea level. Since 1900, sea level in New York Harbor has risen 13 inches. More concerning, the rate at which it is rising is increasing (from 2000 to 2014 the average rate was 6.8 millimeters per year compared to 4.6 millimeters per year from 1990 to 2014). Projections for additional sea level rise along the Hudson River range from one to 9 inches by year 2020 and five to 27 inches by mid-century. It is possible that Rensselaer could experience as much as 71 inches of sea-level rise by the end of the 21st century if rapid ice melt from the Greenland ice sheet continues.

The Community Risk and Resiliency Act (CRRA) was signed into law in New York in 2014 to advance planning for climate resilience and was amended in 2019 by the Climate Leadership and Community Protection Act to expand the list of climate

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¹³ Melillo, Jerry M., Terese (T.C.) Richmond, and Gary W. Yohe, Eds., 2014: Climate Change Impacts in the United States: The Third National Climate Assessment. U.S. Global Change Research Program, 841 pp. doi:10.7930/J0Z31WJ2. https://nca2014.globalchange.gov/

hazards to be considered and the permit programs covered by the law. DEC has officially adopted sea-level rise projections (*Table 4: New York State Sea Level Rise Projections for the Mid-Hudson region (Kingston to Troy)*) and published guidance for flood risk management¹⁴ and using natural and nature-based measures to reduce flood risk.¹⁵ In addition, the NYS Department of State has published model local laws to increase community resiliency.¹⁶

In *Table 4*, below, "Low" signifies the lower end of model forecasts, while "high" signifies the upper end over the range of different model formulations and initialization scenarios.

Table 4: New York State Sea Level Rise Projections for the Mid-Hudson region (Kingston to Troy)

Time Interval	Low Projection	Low-Medium Projection	Medium Projection	High-Medium Projection	High Projection
2020s	1 inch	3 inches	5 inches	7 inches	9 inches
2050s	5 inches	9 inches	14 inches	19 inches	27 inches
2080s	10 inches	14 inches	25 inches	36 inches	54 inches
2100	11 inches	18 inches	32 inches	46 inches	71 inches

Impact of Sea Level Rise on Region 5

Sea level is projected to rise dramatically over the course of the 21st century and modeling indicates that some low-lying areas along Rensselaer's waterfront will be subject to increased frequency of flooding and in some locations inundation by the Hudson River. This is a significant long-term threat to waterfront development and infrastructure, including the combined sewer system. The majority of the southern plain is also a floodplain and the primary area that Map 3 shows to be at risk for inundation in the event of 6-feet of sea level rise and a 100-year storm. It is imperative that the City plan to improve resilience in this area and lead by example for future developments; also, as opposed to new construction, the City should promote redevelopment of the buildings currently in the floodplain to prevent impacting the floodplain area negatively.

In addition, some natural areas along the Hudson River shoreline in the City are projected to be inundated over time, which may result in the creation of new tidal

¹⁴ New York State Flood Risk Management Guidance, NYS Department of Environmental Conservation. 2020. https://www.dec.ny.gov/docs/administration_pdf/crrafloodriskmgmtgdnc.pdf

¹⁵ Using Natural Measures to Reduce the Risk of Flooding and Erosion, NYS Department of Environmental Conservation and NYS Department of State, 2020. https://www.dec.ny.gov/docs/administration_pdf/crranaturalmeasuresgndc.pdf

¹⁶ Model Local Laws to Increase Resilience, NYS Department of State, 2019. https://www.dos.ny.gov/opd/programs/resilience/index.html

wetlands and other tidal habitats. Tidal wetlands play a critical function in the estuary as habitat for young fish and invertebrates and help to clean water and buffer shorelines from wave action and strong storms. Minimizing future development in natural areas at risk of future inundation and designing public waterfronts to allow for these changes will ensure that tidal wetlands have room to adapt to rising sea levels.¹⁷ This strategy will also reduce risks to the community and property owners in the changing Hudson River flood zone.

Section 2: Climate Discussion and Implications

The climate projections for temperature, precipitation, and sea level rise for Rensselaer should inform the development of plans and policies that will protect the City's residents and natural resiliency features from these impacts. It is imperative that action is taken to conserve and protect forested and natural areas of the city that are contributing to climate resilience by absorbing stormwater, reducing runoff and flooding, reducing the risk of slope erosion, and providing habitat for wildlife to move and adapt to changing conditions.

The City will prioritize strategies to conserve areas of high climate resiliency in the Northern Hills and along the Hudson River shoreline where possible and seek to work together with land owners to do so. The ecological value of engineered shorelines can also be enhanced through Sustainable Shoreline strategies that will contribute to resilience. In the developed areas of the City, urban heat island effect and increasing flood risk can affect quality of life, health, and safety for residents because downtown is a floodplain. Table 5: Proposed Local Action Framework for CSC Certification in Response to Section 2, below, discusses the CSC actions that will be pursued on a local level to help mitigate the impacts of climate change. The CSC actions are aligned with the local climate goals identified in the Introduction (resilience, emissions, air quality, water quality, absorption, temperature, biodiversity).

Table 5: Proposed Local Action Framework for CSC Certification in Response to Section 2

Action #	CSC Action	Local Climate Goal	Other Notes
7.1	Conduct a vulnerability assessment	Resilience	Priority Action, May be funded under CSC grant program

Tabak, Nava, and Sacha Spector. *Protecting the Pathways: A Climate Change Adaptation Framework for Hudson River Estuary Tidal Wetlands*. Scenic Hudson, May 2016,

https://www.scenichudson.org/sites/deafult/files/protecting-the-pathways.pdf

¹⁸ Hudson River Sustainable Shorelines, https://www.hrnerr.org/hudson-river-sustainable-shorelines

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7.2 & 7.4	7.2 Develop a climate resilience vision and goals (v3: Climate Resilience Vision) and 7.4 Develop climate adaptation strategies (v3: Climate Adaptation Strategies)	Resilience	Priority Action, May be funded under CSC grant program
7.8	Require shade structures and features in public spaces	Temperature	Hazard Mitigation
7.13	Conserve natural areas for species migration and ecosystem resilience (v3: Conservation of Natural Habitats)	Resilience Biodiversity	Emergency Preparedness
7.10	Create or update a watershed assessment to identify flooding and water quality priorities (v3: Watershed Assessment)	Resilience Water quality Absorption Biodiversity	Hazard Mitigation
7.20	Require consideration of sea-level rise in planning coastal development	Resilience Absorption	Hazard Mitigation
7.19	Extend areas in which the two-foot freeboard requirement applies	Resilience Absorption	Emergency Preparedness
7.16	Use green infrastructure to manage stormwater in developed areas	Resilience Water quality Absorption	Emergency Preparedness
7.12	Conserve, revegetate and reconnect floodplains and buffers in riparian areas (v3: Restoration of Floodplain & Riparian Buffers)	Water Quality Absorption	
7.18	Use natural, nature-based or ecologically enhanced shoreline protection	Resilience Biodiversity Water Quality	Hazard Mitigation
7.24	Encourage xeriscaping	Biodiversity Air Quality Temperature Absorption	
8.11	Adopt energy benchmarking requirements for privately owned buildings	Temperature	Action is related to NYSERDA Clean Energy Communities High Impact Actions
9.1	Create a climate change education, outreach, and engagement program, focusing on mitigation and adaptation	Resiliency Water Quality Absorption Temperature Biodiversity Emissions Air Quaility	Priority Action

3.31	Implement an energy or GHG	Air Quality Temperature	Hazard
3.31	management system	Emissions	Mitigation
12.1	Reduce GHG emissions from government owned facilities	Air Quality Temperature	Hazard Mitigation
		Emissions	
12.2	Reduce GHG emissions from government owned vehicles	Air Quality Temperature	Hazard
		Emissions	Mitigation
12.4	Reduce waste volume from local government operations	Air Quality Temperature	Hazard
		Emissions	Mitigation
2.5	Develop a government operations climate action plan	Resiliency Absorption	Priority
		Water Quality	Action, May be
		Temperature	funded under
		Biodiversity	CSC Grant
		Emissions	Progam
		Air Quality	
	Develop a community climate action plan	Resiliency	
2.6		Absorption	Priority
		Water Quality	Action, May be
		Temperature	funded under CSC Grant
		Biodiversity Emissions	
		Air Quality	Progam
		Emissions	
3.1	Conduct energy audits of local	Temperature	Priority Action
3.1	government buildings	Air Quality	
			Action is
3.32	Adopt an energy benchmarking requirement for government-owned buildings		related to
		Emissions	NYSERDA
		Temperature	Clean Energy
		Air Quality	Communities
			High Impact
			Actions
3.7	Adopt a green building standard for local government buildings and facilities	Emissions	
		Temperature	
		Air Quality	
		Absorption (?)	

Section 3: Physical Setting

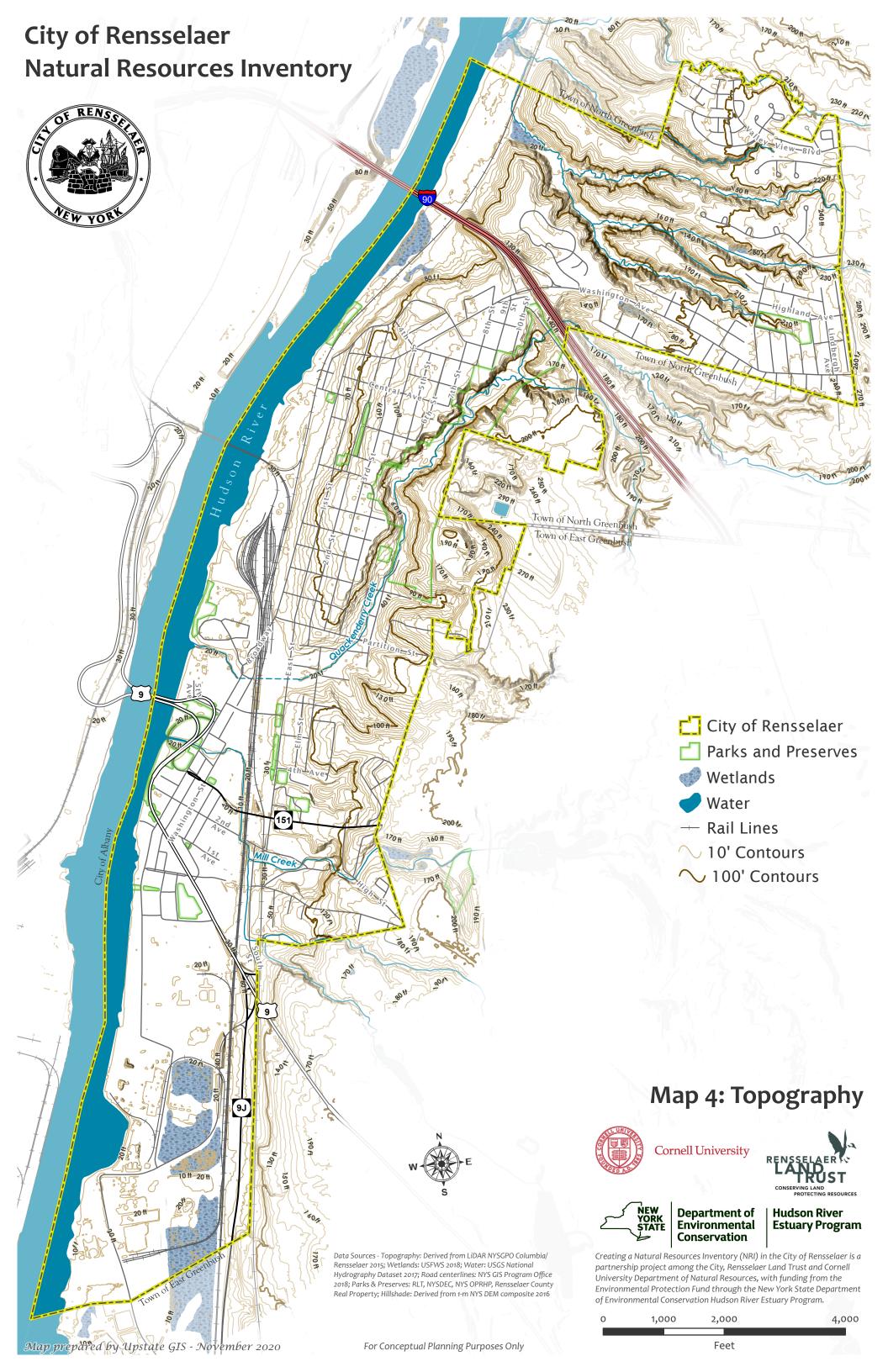
Maps in this section show aspects of the City's physical environment including topography, slopes, bedrock geology, surficial geology, and soils. All are important considerations in the planning and design of a land development project and to better understand the nature of ecological communities. The land in Rensselaer rises from sea level along the Hudson to elevations upwards of 240 feet at the highest point. Elevation and elevation change affect the design and placement of site improvements, stormwater drainage, and unconstrained lands. Low-lying areas are generally prone to flood events, so identifying site elevation and break in elevation highlights the potential existence of sensitive environmental features like floodplains or wetlands.



Image 2: Rensselaer's physical setting as seen from Albany. Photo by Luke Parsnow Photo. 19

region/health/2019/10/09/rensselaer-county-asking-doh-to-monitor-air-quality-

 $^{^{19}}$ Spectrum News. (2019, October 9). Luke Parsnow Photo [Photograph]. County Asking DOH to Monitor Rensselaer Air Quality. https://spectrumlocalnews.com/nys/capital-

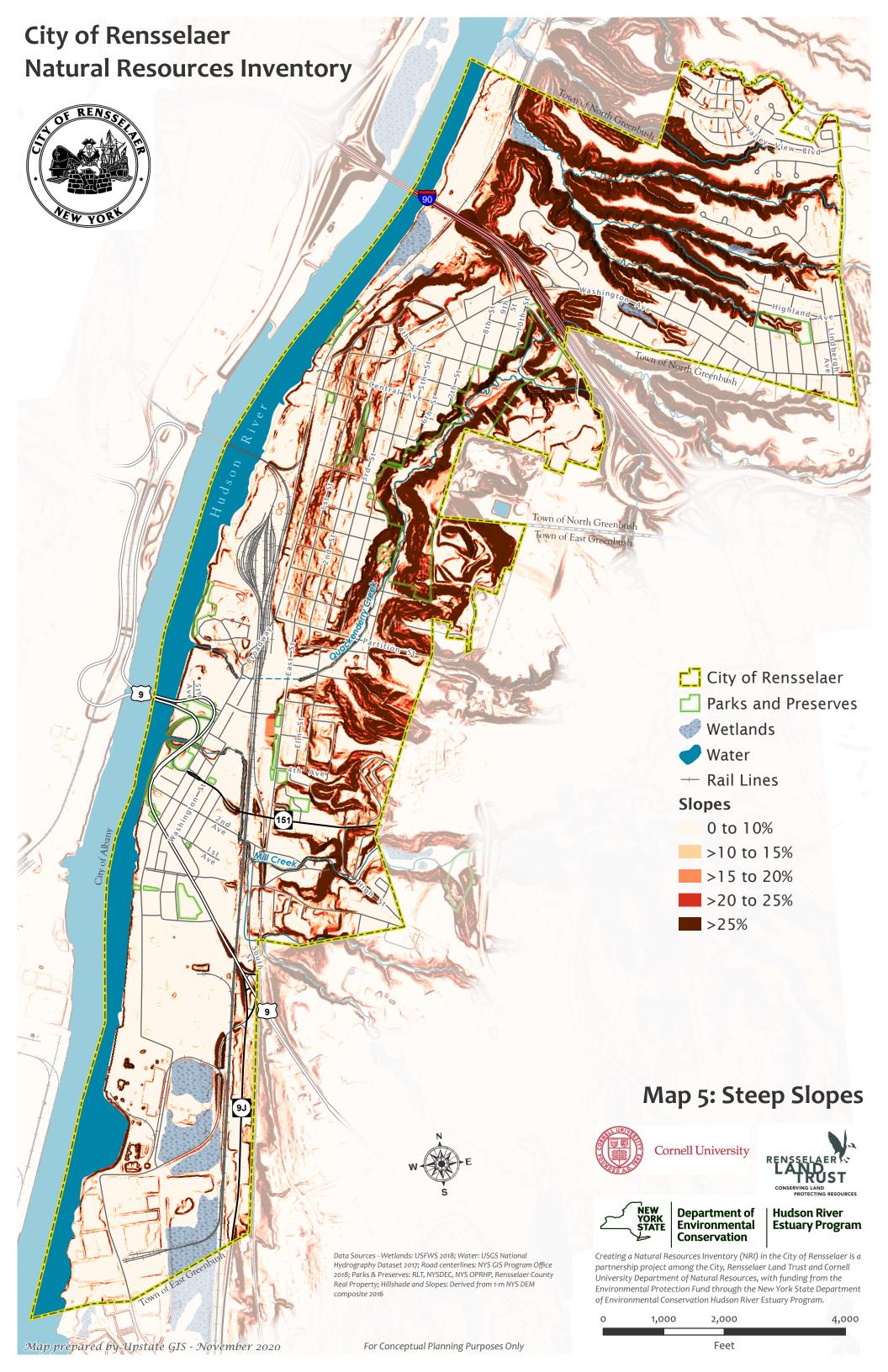


Topography (Map 4)

Map 4 exhibits the City of Rensselaer's topography with 10-ft contours derived from a NYS 1-meter composite digital elevation model. Topography reflects differences in the underlying geology and is an important factor in determining site suitability for new development. Map 4 shows that the Shoreline and Development Plain create a relatively flat area. The Eastern, Western, and Northern Hills are shown to have great variations in topography. North of I-90, the land ranges in elevation from sea level to nearly 250 feet. The land east of the rail lines rises abruptly forms plateaus 240 feet above sea level and also exhibits large ravines. The land between the ravines is mostly flat and these ravines drain to a wetland just east of the rail lines near the shoreline. In the Western Hills, elevations range from sea level to 170 feet. The land gradually escalates from sea level along the Hudson River, but begins to rise abruptly along 1st and 2nd Streets where elevations range from about 70 to 170 feet. In the Development Plain, the land is mostly flat. Much of this area is roughly 20 to 30 feet above sea level. Currently, this area of the City presents the most suitable land for development.



Image 3: Isolated Image of Rensselaer's Topography in Designated Geographic Areas; Clip from Map 1A



Steep Slopes (Map 5)

Slope is defined as the vertical change in elevation over a given horizontal distance. For example, a 10% slope is one that rises 10 feet over a horizontal distance of 100 feet. The Steep Slope map is derived from a NYS 1-meter composite digital elevation model. These slopes are indicated on the map by shades of orange and red, with darker shades indicating steeper slopes.

The Steep Slopes Map includes the following slope classes, based on the National Soil Survey Manual:²⁰

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<10% (nearly level to gently sloping)

10 – 15% (strongly sloping)

15 – 20% (steep)

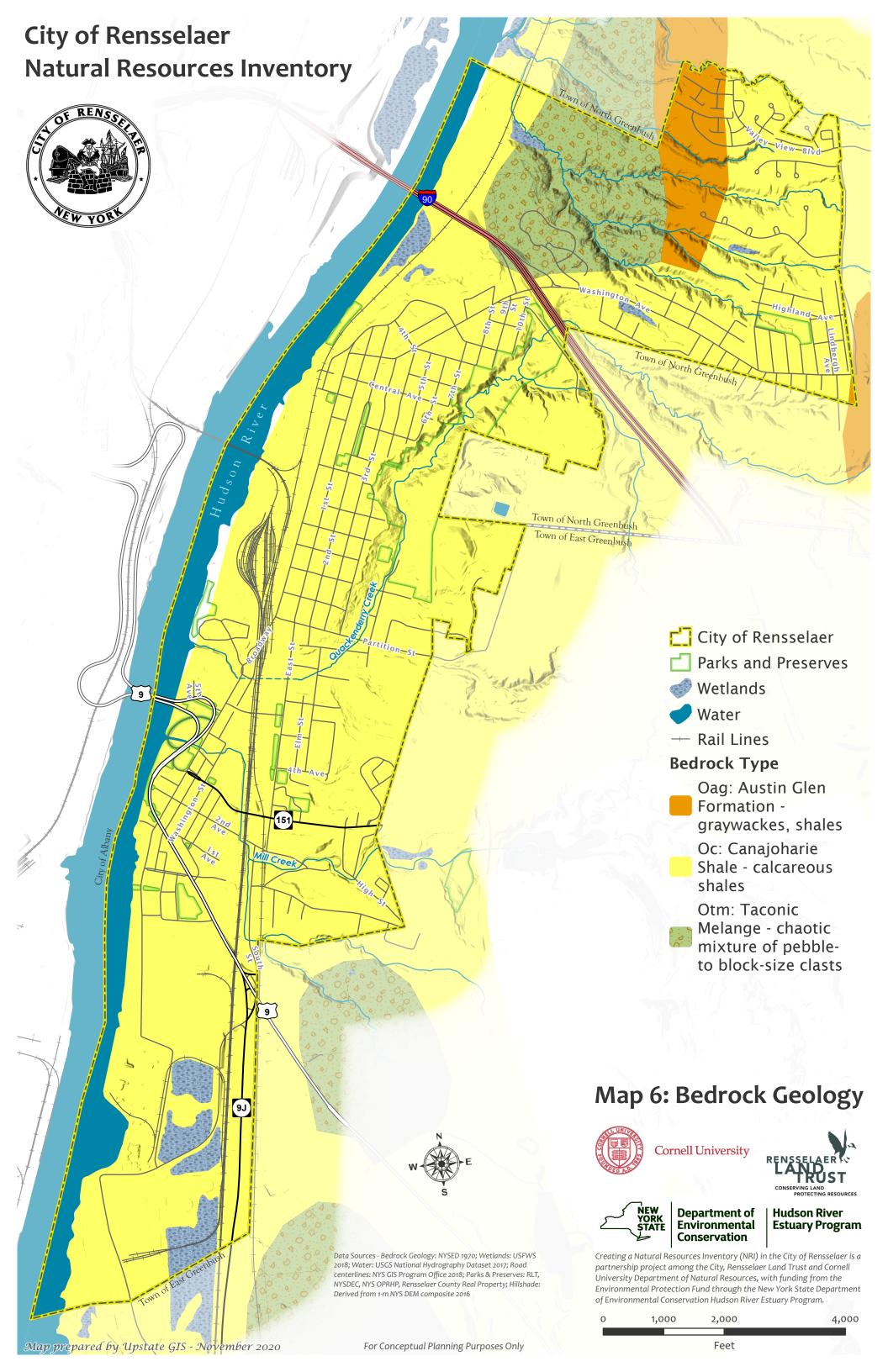
20 – 25% (steep)

Over 25 % (very steep)
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Steep slopes pose significant limitations to development and are among the most sensitive environmental features in the landscape. Map 5 shows that in every geographic area of the City, there are very steep slopes directly adjacent to areas of 0-10% sloping. The Northern and Western Hills have the most distinct slopes. Both areas have waterways running along the base of these slopes. In the Northern Hills, these are shown to drain to wetlands before reaching the Hudson River; there are also wetlands abutting steep slopes on Washington Avenue, near the North Greenbush municipal boundary and just south of Highland Avenue, where there is shown to be a park. This is Eastland Park, also known as Lakeview Avenue Park. In the Western Hills, steep slopes on either side of the Quackenderry Creek create a ravine that is also shown to be a park. This is known locally as "The Hollow". The very steep slopes south of the Hollow and Partition Street are undeveloped, but were at one point mined for gravel and in the years thereafter, operated as construction and debris landfill. This is discussed later in the report. Continuing south along the eastern municipal boundary, slopes are shown with residential roads nestled between them. High Street is situated at the top of a slope. At High Street, Mill Creek is dammed at a plateau and where the slope begins to steepen, there is a waterfall. On the Hudson River Shoreline, steep slopes appear to be remnants of a seawall which was built along the River, but no longer remains. In the Western Hills, there are variations in topography which have

²⁰ Ditzler, C., K. Scheffe, and H.C. Monger (eds.). *Soil Survey Manual*. USDA Handbook 18. Government Printing Office, 2017, Washington, D.C.

resulted in steep slopes interspersed throughout plateaus. The plateaus enabled the development of the current residential grid. The City's steep slopes are natural feature that have played a very significant role in shaping the built environment of the City. They will continue to influence the City and its future development by posing both opportunities in terms of viewsheds and constraints in terms of feasibility for new construction and the risk associated with it. Sensitive areas are defined in the City's zoning code as areas that include features such as steep slopes, wetlands, floodways, forests and unique habitat. This is discussed further in Section 6.



Bedrock Geology (Map 6)

Bedrock is the solid rock that lies beneath the soil and subsoil.²¹ Bedrock geology influences many environmental factors, including topography, groundwater resources, and mineral resources.²² Geologic properties also strongly influence soil properties, as well as groundwater and surface water chemistry, which in turn influence the establishment of ecological communities. The New York State Museum has mapped general bedrock geology for New York State at a 1:250,000 scale.²³ *Table 6*, below, describes the geology units shown on the Bedrock Geology Map.

Table 6: Bedrock Geology Units in the City of Rensselaer, NY.

Code	Bedrock Unit	Primary Materials	Geologic Age
Oag	Austin Glen Formation	graywacke, shale	Middle Ordovician
Otm	Taconic Melange	chaotic mixture of pebbleto block-size clasts in a pelitic material	Middle Ordovician
Oc	Canajoharie Shale	black shales	Middle Ordovician

Map 6 shows the City of Rensselaer is predominantly underlain by sedimentary shales and graywacke. Both originate from the Ordivician period, approximately 450 million years ago. At that time, what is now Rensselaer was located close to the equator and sediments forming the City's bedrock were deposited in a tropical sea. The bedrock consists of dark-gray to black, fine-grained, thin- and straight-bedded shales, rather calcareous [(calcium-rich)] toward base.²⁴ A small area of Taconic "melange" of limestone conglomerate and greywacke-shale rock, originating from submarine gravity slides during this same period, Map 6 shows it in the ravines in the Northern Hills.²⁵

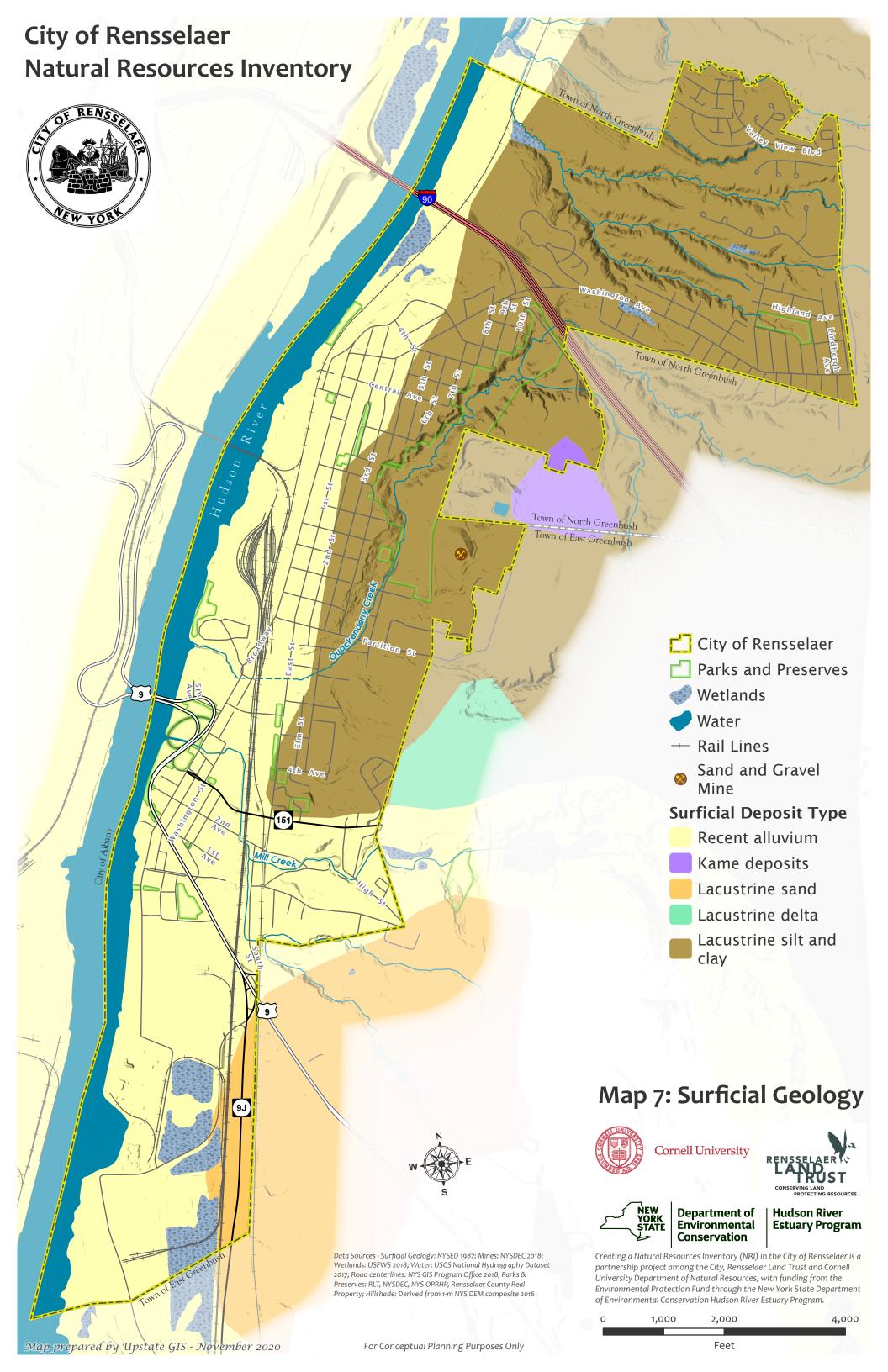
²² Haeckel, I., and L. Heady. *Creating a Natural Resources Inventory: A Guide for Communities in the Hudson River Estuary Watershed*. New York State Department of Environmental Conservation and Cornell University, 2014.

National Geologic Map Database, Canajoharie Shale, https://ngmdb.usgs.gov/Geolex/UnitRefs/CanajoharieRefs_823.html

²¹ Rafferty, J. "Bedrock." Encyclopedia Britannica, 2019.

²³ Fisher, D. W., Y. W. Isachsen, and V. L. Rickard. *Geologic Map of New York: Hudson-Mohawk Sheet*. New York State Museum and Science Service, Map and Chart Series No. 15, 1970. http://www.nysm.nysed.gov/research-collections/geology/gis.

²⁵ USGS Geologic Unit Database, Taconic Melange, https://mrdata.usgs.gov/geology/state/sgmc-unit.php?unit=NYOtm%3B2



Surficial Geology (Map 7)

Surficial geology refers to unconsolidated sediments lying above the bedrock. The weathering of both bedrock and surficial geology deposits along with organic matter, water, and air is responsible for the slow process of soil formation. The properties of these "parent materials" strongly influence resulting soil chemistry, nutrients, and texture. The surficial geology of Rensselaer largely reflects the retreat of glaciers following the last ice age. A giant ice sheet blanketed the area during the Wisconsin Stage of the Pleistocene Epoch, about 21,000 years ago. Glacial ice, as much as 5,000 feet thick, scoured the landscape and deposited boulders, sand, and gravel in its path. Glacial meltwater turned the Hudson Valley into vast Lake Albany, and left behind beaches, deltas, and deposits of silt and clay.

The Surficial Geology Map displays information from statewide maps produced by the New York State Geological Survey.²⁶ This map, like the one for bedrock geology, was developed at a scale of 1:250,000 and is best used as a general reference. The following types of surficial materials are mapped in and around the City of Rensselaer:

- Recent Alluvium (modern stream deposits)
- Lacustrine Silt and Clay (fine-grained deposits deposited in glacial lakes)
- Lacustrine Delta (sand and gravel deposits often underlain by finer-grained sand and silt/clay)
- Lacustrine Sand (fine to medium sand often underlain by silt or clay deposits)
- Kame Deposit (mound-like hill of poorly sorted drift, mostly sand and gravel, deposited at or near the terminus of a glacier)

Recent Alluvium deposits originating from past flood events along the Hudson River occur in the Southern Development Plain, the Western Hills, and the Shoreline in DeLaet's Landing (PDD), and the C-1, MU-1, MU-2, R-2, I-1, and I-2 zones. They are associated with the large unconsolidated aquifer underlying the Hudson River floodplain.

Lacustrine silt and clay predominate the Eastern Hills and originate from glacial Lake Albany deposits. Lacustrine silt underlies the R-1, R-2, OS, PDD, I-2, and MU-1 zoning districts. These deposits may pose risk for landslides. The upper Hudson River estuary corridor is in fact one of the areas with highest potential for landslides in New York,

²⁶ Caldwell, D. H., and R. J. Dineen. *Surficial Geologic Map of New York, Hudson-Mohawk Sheet.* New York State Geological Survey, 1987.

where steep slopes occur atop ancient glacial lake clay deposits.²⁷ Landslide susceptibility on glacial lake deposits becomes significant on slopes of 10 degrees or higher. Steep slopes with similar surficial geology along the Normans Kill in the nearby Town of Bethlehem have experienced a series of landslides in recent decades, most recently in 2015.²⁸ Causes or triggers of landslides on marginally stable slopes can be both naturally occurring or human induced and include three (3) primary factors: water saturation of the ground; loading, or increased weight at the top or high end of the slope; and taking away soil or removing mass from the bottom.²⁹



Image 4: Lake Albany; Illustration by Chris Light

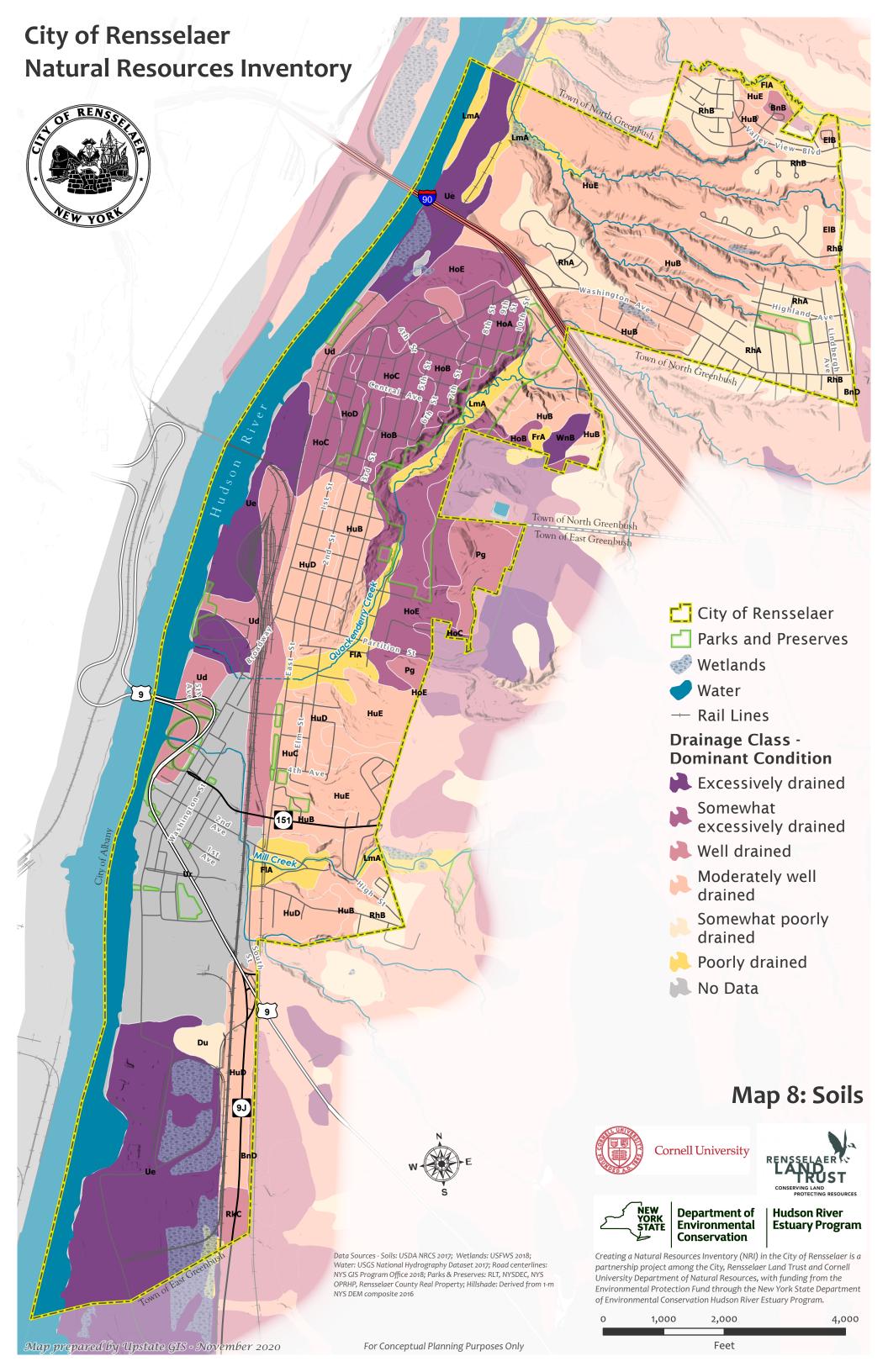
²⁷ 3.14.1 Landslide Profile. *New York State Hazard Mitigation Plan*. New York State Department of Homeland Security and Emergency Services, 2014. http://www.dhses.ny.gov/recovery/mitigation/plan.cfm

²⁸ Normans Kill Riparian Corridor Study. Prepared for Audubon New York by Albany County Department of Economic Development, Conservation and Planning, 2007, Albany, NY. https://hudsonwatershed.org/wp-content/uploads/2013/01/Normans-Kill-report.pdf

²⁹ New York State Hazard Mitigation Plan. NYS Department of Homeland Security and Emergency Services, 2014, Albany, NY. http://www.dhses.ny.gov/recovery/mitigation/plan.cfm

³⁰ Light, C. (2014, July 15). Glacial Lakes Albany, Champlain, Hitchcock, Winsooski, & Merrimack [Illustration].

https://commons.wikimedia.org/wiki/File:Glacial_Lakes_Albany,_Champlain,_Hitchcock,_Winsooski,_%26_Merrimack.jpg



Soils (Map 8)

Soils are the foundation for the establishment of natural communities of plants and animals as well as for critical ecological processes from decomposition and nutrient cycling to the water cycle. Soil characteristics including reaction (acidity or alkalinity), drainage, soil texture, depth to bedrock, and slope inform the natural habitats that become established in a particular area.³¹ Soils also play a fundamental role in determining suitability for land uses. Soil characteristics determine the potential for agricultural production as well as vulnerability to flooding, soil erosion or instability, and efficiency at filtering pollutants and wastes. Consideration of soil properties is important for planning and designing drainage systems; siting of structures; assessing requirements for constructing foundations, basements, and roads; and determining the feasibility of excavation; among other uses.³²

The *Soil Survey of Rensselaer County*³³ includes detailed soil maps for the entire county along with descriptions of soil types and tables of chemical, hydrologic, and structural characteristics of the soils for various human uses. It's important to note that county soil maps are only approximate; any soil unit may contain "inclusions" of up to 2 acres of soil types different from the mapped unit. The soil data may also be viewed online using the USDA Natural Resources Conservation Service (NRCS) Web Soil Survey. The soil survey report is available for download in PDF format on the NRCS website. *Table 7: Soils of the City of Rensselaer, NY* lists soil types found in Rensselaer along with selected soil characteristics, such as soil code, soil unit name, drainage class, and depth to bedrock, based on tabular information provided in the county soil survey.

The Soils Map shows the soil units from the county *Soil Survey* symbolized by natural drainage class. Refer to *Table 7* for additional characteristics associated with each soil unit.

Soil drainage class indicates the possible presence of wetlands, and is a particularly important factor to consider in the evaluation of proposed development. Somewhat poorly drained soils are good indicators of possible wetland areas and poorly drained

³¹ Heady, L., and G. Stevens. *Biodiversity Assessment Guidebook*, Hudsonia Ltd, 2018.

³² Haeckel, I., and L. Heady. 2014. Creating a Natural Resources Inventory: A Guide for Communities in the Hudson River Estuary Watershed. *New York State Department of Environmental Conservation and Cornell University*, 2014.

³³ Work, Ralph. Soil Survey of Rensselaer County, New York, USDA Soil Conservation Service, 1988. Available
at

and very poorly drained soils are indicators of probable wetland areas.³⁴

Hydric soils form under conditions of saturation, flooding, or ponding long enough during the growing season to develop anaerobic conditions in the upper part. Soils classified as hydric are commonly referred to as wetland soils, and largely correspond to poorly and very poorly drained soil classes.

Hydrologic Soil Group is based on a soil's runoff potential. Group A soils have the highest infiltration capacity and lowest runoff potential, while Group D soils have the lowest infiltration capacity and highest runoff potential.

Depth to bedrock is another important soil characteristic to consider in land use planning. Soil depth influences suitability for septic and other wastewater treatment systems, as well as the siting of buildings and roads. Shallow soils (<20 inches to bedrock) are often associated with steep slopes, increasing susceptibility to erosion. Shallow soils are also less capable of filtering pollutants draining to surface and groundwater supplies.

Table 7: Soils of the City of Rensselaer, NY

Code	Soil Unit Name	Drainage Class	Hydric Class	Hydrologic Soil Group	Depth to Bedrock (inches)
BnB	Bernardston- Nassau complex, undulating	Well drained	non- hydric	C/D	<20
BnD	Bernardston- Nassau complex, hilly	Well drained	non- hydric	C/D	<20
Du	Dumps, landfill	Somewhat poorly drained	non- hydric		>60
ElB	Elmridge very fine sandy loam, 3 to 8 percent slopes	Moderately well drained	predomi nantly non- hydric	В	>60
FlA	Fluvaquents- Udifluvents complex, 0 to 3	Poorly drained	partially hydric	A/D	>60

³⁴ Kiviat, E. and G. Stevens. *Biodiversity Assessment Manual for the Hudson River Estuary Corridor*. New York State Department of Environmental Conservation, 2001.

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	percent slopes				
НоА	Hoosic gravelly sandy loam, 0 to 3 percent slopes	Somewhat excessively drained	non- hydric	A	>60
НоВ	Hoosic gravelly sandy loam, 3 to 8 percent slopes	Somewhat excessively drained	non- hydric	A	>60
НоС	Hoosic gravelly sandy loam, rolling	Somewhat excessively drained	non- hydric	A	>60
HoD	Hoosic gravelly sandy loam, hilly	Somewhat excessively drained	non- hydric	A	>60
НоЕ	Hoosic gravelly sandy loam, steep	Somewhat excessively drained	non- hydric	A	>60
HuB	Hudson silt loam, 3 to 8 percent slopes	Moderately well drained	non- hydric	C/D	>60
HuC	Hudson silt loam, 8 to 15 percent slopes	Moderately well drained	non- hydric	C/D	>60
HuD	Hudson silt loam, hilly	Moderately well drained	non- hydric	C/D	>60
HuE	Hudson silt loam, steep	Moderately well drained	non- hydric	C/D	>60
LmA	Limerick silt loam, 0 to 3 percent slopes	Poorly drained	predomi nantly hydric	B/D	>60
Pg	Pits, gravel	Well drained	non- hydric		>60
RhA	Rhinebeck silt loam, 0 to 3 percent slopes	Somewhat poorly drained	predomi nantly non- hydric	C/D	>60
RhB	Rhinebeck silt loam, 3 to 8 percent slopes	Somewhat poorly drained	predomi nantly non- hydric	C/D	>60
RkC	Riverhead fine sandy loam, rolling	Well drained	non- hydric	A	>60
Ud	Udorthents, loamy	Well drained	non- hydric	В	>60

Ue	Udorthents, sandy	Excessively drained	predomi nantly non- hydric	A	>60
Ur	Urban land		non- hydric		>60
W	Water		non- hydric		>60

Map 8 predominantly shows moderately well drained soils and somewhat poorly-drained soils in the Northern Rensselaer Hills. Moderately well-draining soils are located on the slopes of the ravines flowing through this geographic designation. The somewhat poorly-draining soils are largely located in the more level areas. These drainage classes are coded as HuB, HuC, HuD, HuE, RhA, and RhB, and all refer to Hudson and Rhinebeck Silt loams. Moderately well-draining silt loam is typically very stable and presents a suitable medium for vegetation. The moderately well-draining soils in this area are largely undeveloped, stable, vegetated, and effectively filter pollutants, presenting a strong context for ecological resilience in the event of a storm. In westernmost area of the Northern Hills, where the elevation is low, soils are poorly drained closest to the streams draining into the Hudson River and are associated with wetlands. A few hundred feet from the shoreline, the soils are elevated nearly 10 ft. and are typically dry and drain excessively. However, the soils along the shore, north of I-90 are poorly drained.

The Soils Map shows that aside from the portion of poorly draining soil north of I-90, the Hudson River Shoreline is comprised of mainly excessively-draining and well-draining soils. This geographic area designation has a mix of developed and undeveloped areas. The drainage class of the soils are coded as Ud, and Ue, and are associated with sand and loam. However, this area is a floodplain, and these soils, if left undeveloped, or developed sustainably, would promote floodwater absorption.

Map 8 shows the Western Hills are somewhat excessively-drained and moderately well-drained soils. Somewhat excessively-drained soils including HoE, HoA, HoB, and HoC span between Macnaughton Avenue and I-90 and are associated with gravelly sand loam. There are moderately well-drained soils spanning between Partition Street and Macnaughton Avenue, including HuB and HuD, a silty loam. The soils in the Western Hills safely underlie development as both offer stability (especially because of their drainage class), effectively filter pollutants, and promote floodwater absorption in the event of a flood or storm.

The Eastern Hills present the most diverse soil drainage of any other geographic

designation in Map 8. The majority of the of the soils are excessively to moderately-well draining silt, gravel, and loam, as well as a combination of all three in some areas. The Eastern Hills have developed areas in its southern area, near Partition Street, and the school near I-90. However, the majority of this area designation remains undeveloped with steep slopes buffering the Quackenderry creek. Most of the soils buffering the creek at the base of the steep slopes are poorly draining fluvaquents-udifluvents and silt loam.

The Soils Map shows the Development Plain as hosting soils largely altered by development from cut and fill. A well-draining loamy soil, coded as Ud, is present in the Plain's northern most area, near the rail junction and DeLaet's Landing. South this part of the Plain contains no data because this is the most developed part of the City. Further south in the Light Industrial District (I-1) there are two types of soil drainage classes. A poorly drained soil associated with dumps and landfills, coded as Du, near the wetland cluster. Spanning nearly the entirety of I-1 is an excessively-drained sandy soil, coded as Ue, another urban soil class. Aside from the poor draining soils near the wetlands, the soils in the Development Plain drain relatively well, providing stable ground, an effective pollutant filter, and they promote floodwater absorption. The area in Map 8 with "no data" is largely developed and in a floodplain; the floodplain poses significant risks for new development.

Section 3: Physical Setting Discussion and Implications

Rensselaer is defined by highly variable topography and steep slopes as well as soils that present both risks and opportunities in many different capacities. Overall, the physical setting here lends itself to potential risks such as shoreline erosion. Conversely, there are opportunities that exist solely because of natural features. For example, impressive view sheds are made possible by our slopes and soils because they have a very stable footing for which resulted in past development and is stable for future development. Because of this, it is imperative to preserve soil function especially where the well-drained soils provide benefits such as filtering pollutants and promoting floodwater absorption. ³⁵ *Table 8: Proposed Local Action Framework for CSC Certification in Response to Section 3* shows local actions which can be taken to reduce the impact of human activity and climate change on the natural resources of the physical setting in Rensselaer. The chart identifies one CSC action that will be pursued on a local level and aligns them with the local climate goals identified in the Introduction (resilience, emissions, air quality, water quality, absorption, temperature, biodiversity).

Table 8: Proposed Local Action Framework for CSC Certification in Response to Section 3

Action #	CSC Action	Local Climate Goal	Other Notes
6.19	Preserve natural areas through zoning or other regulations	Resilience Biodiversity Air Quality Absorption	

Section 3 presents information that does not directly relate to many CSC actions. Building on Action 6.19, it's imperative to protect Rensselaer's steep slopes from erosion and potential for landslides. This can be done through the implementation of overlay zones which restrict development or mandate additional measures to mitigate any potential impacts that construction may have on the natural environment where slopes are steepest. Additionally, in order to reduce stormwater runoff, green infrastructure practices should be required based on soil qualities.

³⁵ Natural Resources Conservation Service. (n.d.). Soil Quality | NRCS. Www.Nrcs.Usda.Gov. Retrieved March 18, 2021, from

https://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/technical/nra/rca/?cid=nrcs143_014198

Section 4: Water Resources

Streams and watersheds; water quality classifications and assessments; floodplains and aquifers; stream habitats and infrastructure; and wetlands together comprise this section. All of the land in the City of Rensselaer drains to the Hudson River Estuary. Mill Creek and Quackenderry Creek are the primary tributaries flowing through the City though much of the land in the City drains through smaller unnamed streams. Some of the City's original drainage patterns have been altered through burial of small streams and development of the City's storm sewer infrastructure. The protection of the City's water resources and those of the Hudson River and its estuaries in general, are fundamental to the protection and progress of the City's sustainability efforts.

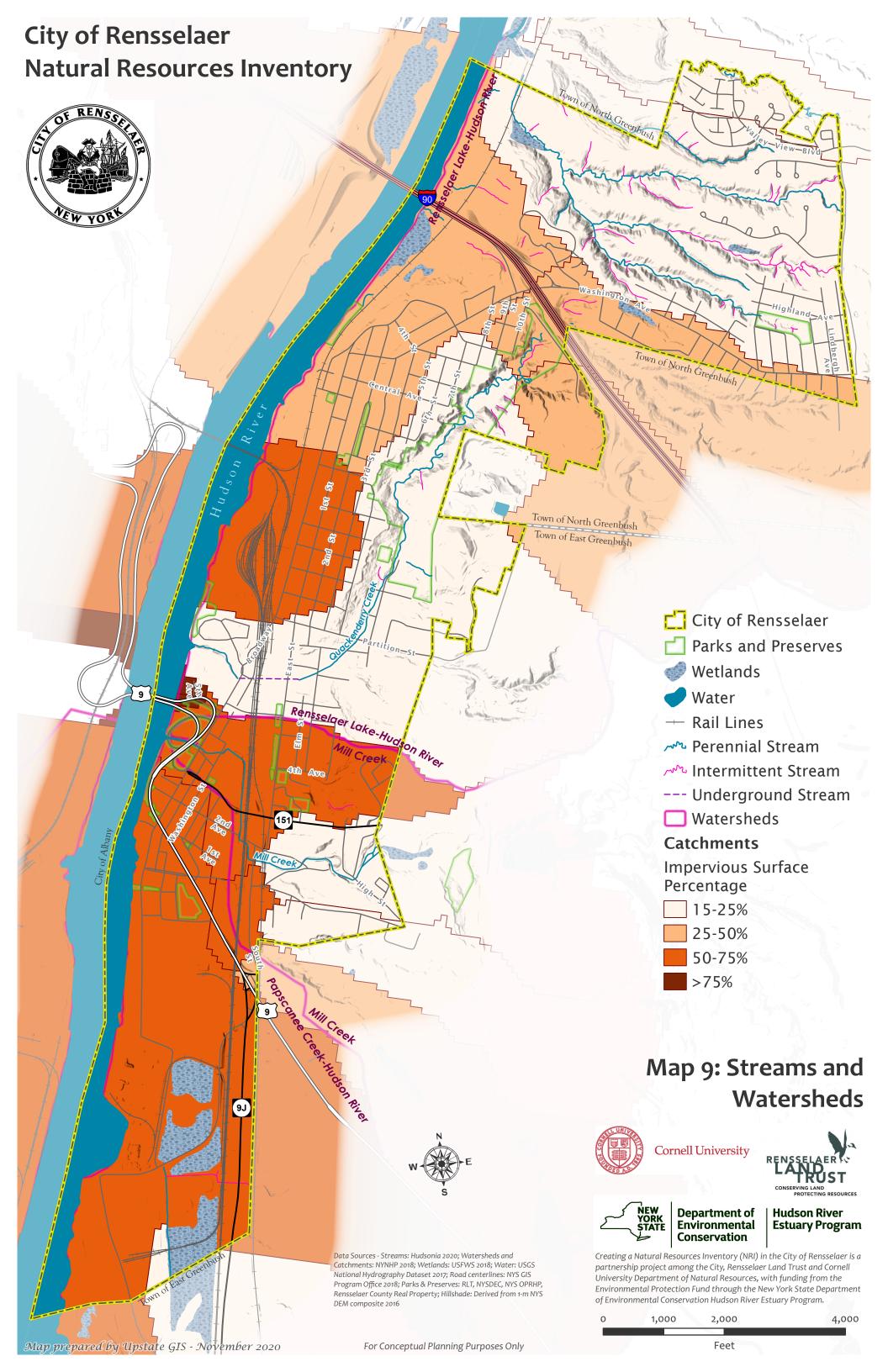
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Image 5: Watershed diagram; photo by Long Tom Watershed Council

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³⁶ Long Tom Watershed Council. (n.d.). A watershed example [Illustration]. https://www.longtom.org/about-ltwc/watershed-diagram/



Streams and Watersheds (Map 9)

A watershed is the area of land from which all water drains into a particular stream, river, lake or other waterbody. These drainage areas are typically divided by high points on the land such as ridges and hills, though storm sewer systems in urban areas have sometimes altered the natural drainage pattern. The smallest watersheds are often referred to as catchments, which are nested within larger subwatersheds, watersheds, and basins. There is a strong relationship between land use in a watershed and the quality of water in receiving streams, wetlands, and other waterbodies.

The Streams and Watersheds map (Map 9) shows watersheds and smaller catchment areas in the City of Rensselaer from the USGS National Hydrography Dataset and the NYNHP Riparian Opportunities Assessment for New York State, respectively. Streams were mapped through remote sensing by Hudsonia Ltd. and classified for intermittent or perennial flow. In urban areas like Rensselaer, watersheds and streams paths have typically been altered over time, and many streams have been placed in pipes/culverts and buried. Storm sewer systems (and wastewater systems) often change the natural path of water, altering subwatershed boundaries by collecting stormwater in one catch basin and conducting it through underground pipes to other subwatersheds. This results in the natural topographic watershed divides shown on the map and suggests that these may not reflect actual drainage patterns in the City.

The City's streams, creeks, stormwater runoff, and floodwaters all drain to the Hudson River Estuary. Flowing at the base of steep slopes in the ravines throughout the City, Mill Creek and Quackenderry Creek are the primary tributaries flowing through the City. Much of the City's land, however, drains through smaller unnamed streams directly to the Hudson River, and some of the City's original drainage patterns have been altered through burial of small streams and development of the City's storm sewer infrastructure.

Map 9 shows that Mill Creek enters Rensselaer from East Greenbush in the east and flows through the Western Hills until reaching the rail lines, where it begins to flow north. Mill Creek continues westward nearing the north end of Washington Avenue, then drains into the Hudson River. Mill Creek is a designated DEC Class C stream. Classification C is for water that support fisheries and are suitable for non-contact activites. The majority of the Mill Creek watershed is located in North Greenbush and East Greenbush. It extends into Rensselaer just south of Route 151.

Renssealer-Lake Hudson River watershed is located in the northern portion of the city and includes areas of Rensselaer and Albany counties draining directly to the Hudson River. Within the City of Rensselaer an unnamed stream drains this area, flowing westward through the ravines of the Northern Hills into the Hudson River. Map 9 shows the Quackenderry Creek entering the City at the Hollow near the eastern municipal boundary and flowing in a southwesterly direction until the Creek turns west near Partition Street and empties into the Hudson River north of Route 9. Quackenderry Creek is a designated Class C Stream. It is buried in pipes for about 1,000 ft where it crosses beneath the rail lines.

The Papscanee Creek-Hudson River watershed covers the entire southern portion of Rensselaer. The extent of this watershed lies south of Route 151, east of the rail lines and extends to the southern-most area of the City. Unlike the other two watersheds in Rensselaer, this watershed does not have a major stream coursing through the City. Rather, it drains directly to the Hudson River. This watershed contains some large wetlands located west of Route 9J, which drain south into Papscanee Creek and the Hudson River.

Land cover is closely linked to the health of a watershed and the water quality of its surface and subsurface waters. While the location and configuration of impervious surfaces (e.g. roofs, pavement, and other development) in a watershed does matter, some studies strongly suggest that there are critical thresholds of impervious cover in a landscape. Specifically, researchers have demonstrated that where watersheds exceed 10% impervious surface cover, the probability of stream degradation greatly increases.^{37 38} Conversely, the percentage of tree canopy cover in a watershed is a metric associated with watershed health. The Watersheds Map shows percent impervious cover for watershed catchment areas within the City of Rensselaer based on data developed for the Statewide Riparian Opportunities Assessment. Canopy cover and impervious cover percentages for the larger watersheds located in the City are summarized in *Table 9: Watershed Land Cover in the City of Rensselaer* and were calculated based on the 2016 National Land Cover Database.

³⁷ National Research Council, Committee on Reducing Stormwater Discharge Contributions to Water Pollution. 2008. Urban Stormwater Management in the United States. Water Science and Technology Board, Division of Earth and Life Studies of the National Research Council. National Academies Press, Washington D.C., pp 529. http://www.epa.gov/npdes/pubs/nrc_stormwaterreport.pdf

³⁸ Walsh C.J., A.H. Roy, J.W. Feminella, P.D. Cottingham, P.M Groffman, and R.P Morgan III. 2005 The Urban Stream Syndrome: Current Knowledge and the Search For A Cure. Journal of the North American Benthological Society, 24(3):706-723 pp18

 Table 9: Watershed Land Cover in the City of Rensselaer

Watershed	Acres within the	% Canopy	% Impervious	
vvatersneu	City	Cover	Cover	
Renssealer Lake-Hudson	1,450	46%	43%	
River	1,450	40 /0	43 /0	
Mill Creek	231	23%	52%	
Papscanee Creek-Hudson	497	18%	56%	
River	47/	10 /0	JU /0	

Water Quality Classifications and Assessment (unmapped)

DEC designates the "best uses" that a waterbody should support, which forms the basis for New York State <u>Protection of Waters</u> regulations. Waterbodies are classified by the letters A, B, C, or D for freshwater. The letter classifications and their best uses are described in regulation NYS regulation 6 NYCRR Part 701. For more information about classifications, see the DEC's webpage on <u>Water Quality Standards and</u> Classifications.³⁹

All mapped waterbodies in the City of Rensselaer are Class C, suitable for fishing and for fish propagataion and survival. At the time of writing, Class C waterbodies are not subject to the stream protective provisions of the <u>Protection of Waters</u> regulations in Article 15 of the Environmental Conservation Law,⁴⁰ which regulates the bed and banks of protected streams. Local protection efforts can play an important role in comprehensive watershed protection.

Waterbody Monitoring and Assessment

DEC monitors water quality through several routine statewide monitoring programs and publishes assessments that describe the quality of water resources. A waterbody's assessment results, compared with its classification, provides an understanding of its health and can lead to the designation of a stream or waterbody as impaired. These results are reported in waterbody fact sheets in the New York State <u>Waterbody Inventory/Priority Waterbodies List</u> (WI/PWL).

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³⁹ "Water Quality Standards and Classifications." NYS Department of Environmental Conservation. https://www.dec.ny.gov/chemical/23853.html

⁴⁰ "Protection of Waters Program." NYS Department of Environmental Conservation. https://www.dec.ny.gov/permits/6042.html

Hudson River⁴¹

The Hudson River in Rensselaer is classified as impaired for fish consumption and stressed for aquatic life, recreation, and aesthetics. It is also suspected to be stressed for habitat/hydrology. The following overview of impairment in the upper tidal Hudson River and ongoing research and restoration efforts is provided from the WI/PWL fact sheet.

Overview

Fish consumption in this portion of the Lower Hudson is impaired by elevated levels of priority organics (PCBs, dioxin), heavy metals (cadmium), and other toxics that are primarily the result of past industrial discharges. A significant decline in the Hudson River fisheries, most notably American shad, in recent years has resulted in concerted efforts to assess the possible causes of the decline to determine strategies to restore the fish stocks. The suspected causes of the decline include over-fishing, habitat loss and increased populations of predatory species. At the same time, increased recreational use of the Hudson River has spurred efforts to further improve water quality to support public bathing in the river.

Fish Consumption Advisories

Fish consumption in the Lower Hudson is impaired due to a NYSDOH health advisory that recommends eating no gizzard shad, channel catfish or white catfish, and no more than one meal per month of American eel, Atlantic needlefish, bluefish, carp, goldfish, largemouth bass, smallmouth bass, rainbow smelt, striped bass, walleye, white catfish and white perch because of elevated levels of PCBs. Advisories along this lower reach are also in place for blue crab that recommend eating no more than six crabs per week, and discarding hepatopancreas (mustard, liver, or tomalley), and cooking liquid. In addition to PCBs, the blue crab advisory also reflects concern about contamination by dioxin and cadmium. The contamination is considered to be the result of past industrial discharges, particularly PCB discharges in the Upper Hudson River. (For more information, see the Upper Hudson River WI/PWL Report.) These restrictions have severely affected what had been at one time thriving commercial fishing industries.

Toxics

Ongoing efforts to address the widespread contamination by PCBs, dioxin and other toxic chemicals in New York Harbor and the Hudson River include the Contamination

Hudson River (1301-0002) WI/PWL Fact Sheet, 2008. https://www.dec.ny.gov/data/WQP/PWL/1301-0002.pdf

Assessment and Reduction Project (CARP), a landmark monitoring effort bringing together federal, state and non-government partners in a determined effort to reduce contamination within the NY/NJ Harbor Estuary, particularly as it relates to dredged material management. CARP has identified and quantified major sources of contaminants of concern to the NY/NJ Harbor and Hudson Estuary. A series of numerical models have also been developed and calibrated to simulate movement of contaminants through the estuary and to predict the concentrations of these contaminants in water, sediment, and biota in future years under a variety of scenarios. The CARP data and modeling products are being used to identify which contaminants require load reductions (through Total Maximum Daily Loads) to meet appropriate water quality criteria and to develop sediment remediation strategies in connection with the U.S. Army Corps of Engineers' Hudson-Raritan Comprehensive Restoration Program and the Harbor Estuary Program's Regional Sediment Management strategy.

Hudson River Fisheries

New York fisheries biologists have documented that American shad spawning stock have become smaller and younger and mortality has increased to excessive and unacceptable levels. Throughout the Atlantic Coast waters, shad stocks are at historic lows and, along with several other important marine species, are in need of dedicated restoration efforts. The suspected causes of this decline include over-fishing, habitat loss, entrainment/impingement at power generating plants on the river, increased populations of predatory species and increased competition for food sources. NYSDEC recently announced a new set of initiatives aimed at developing a better understanding of the Hudson estuary ecosystem and restoring the threatened fisheries. This effort will focus on continuation of American shad monitoring programs, reduction of shad mortality at water intakes, control of bycatch of shad during commercial fishing for other species, identification and restoration of critical spawning and nursery habitats, and continued ecosystem studies to understand the effects of predators and invasive species.

Water Quality Sampling

NYSDEC Rotating Intensive Basin Studies (RIBS) Routine Network monitoring (water chemistry) of the Hudson River in Glenmont, Albany County, is conducted annually at the PSEG raw water intake. In addition, when RIBS Intensive Network monitoring is conducted in a targeted basin every five years, additional sampling methods are employed to gain an overall assessment of water quality. The most recent Intensive Network monitoring was conducted during 2003. Water column sampling revealed

water temperature to be the only parameter of concern. Biological (macroinvertebrate) sampling was assessed as moderately impacted using multiplate samplers, however higher flow conditions might have influenced these results. Toxicity testing of the water column showed no significant mortality or reproductive impacts.

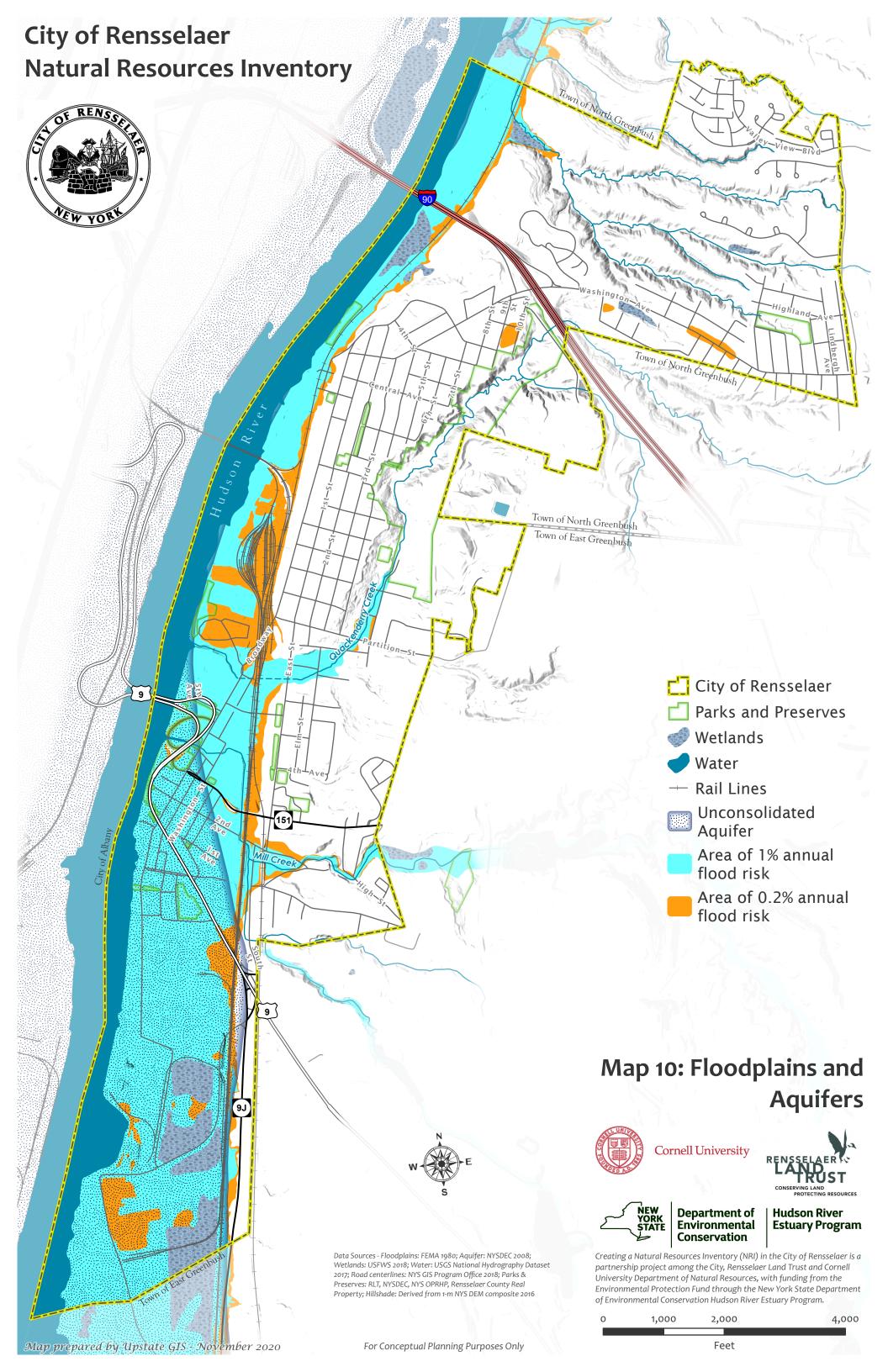
Biological (macroinvertebrate) sampling reveals an apparent decline in water quality from Albany to Hudson/Catskill during the 1990s. Sites in this reach were assessed as slightly impacted in 1991 and moderately impacted in 1998 and 2002. At this point the trend remains unexplained. One suspected cause for the apparent decline is the recent increase in wet-weather flows and the impact of urban runoff and CSO-related impacts from the Albany Pool municipal communities. The sampling results may also reflect habitat impacts and other influences affecting the fishery in the Hudson. Further monitoring to assess the level and source of impacts is recommended.

Mill Creek

The lower mile of Mill Creek is considered included in the WI/PWL assessment for the Hudson River. DEC stream biomonitoring of macroinvertebrates taken near the mouth of Mill Creek in Rensselaer was assessed as moderately impacted, noted as likely the result of urban runoff and/or municipal/industrial sources. Upstream of Rensselaer, Mill Creek is assessed as having no known impacts, and supports wild populations of native brook trout.

Quackenderry Creek

Quackenderry Creek is not assessed in the WI/PWL. However, DEC stream biomonitoring of macroinvertebrates in 2005 assessed the mouth of the stream as moderately impacted, while an upstream sample taken in the Hollow was classified as slightly impacted.



Floodplains and Aquifers (Map 10)

Floodplains are low-lying areas next to streams and rivers that are inundated during overbank flows that result from heavy precipitation or snowmelt events. They are a vital part of a river system and provide many critical functions. When left in a natural state, floodplains provide the space streams need to expand, contract, and sometimes change course, and can buffer people and infrastructure from flood hazards. The location of floodplain boundaries can change over time and in response to climate change, changes in land use in and around the floodplain and in the surrounding watershed, obstructions in the floodway, stream projects (including dams and levees), and natural stream processes.

Floodplains are a hazardous area for building structures and pose risks to the safety of residents. The Floodplains and Aquifers Map shows Special Flood Hazard Areas (SFHAs) mapped by the Federal Emergency Management Agency (FEMA). SFHAs are regulatory boundaries generated in order to set policy rates for the National Flood Insurance Program (NFIP). SFHAs are the best available mapping for floodplains, but are based on flood modeling and are not necessarily identical to a river's geomorphic floodplain. The City adopted a Flood Damage Prevention Law in response to revisions to the National Flood Insurance Program, effective October 1, 1986. The law states that "Rensselaer finds that the potential and/or actual damages from flooding and erosion may be a problem to the residents of the City of Rensselaer and that such damages may include destruction or loss of private and public housing, damage to public facilities, both publicly and privately owned, and injury to and loss of human life." The law continues to explain that it was adopted "in order to minimize the threat of such damages and to achieve the purposes and objectives hereinafter set forth" Additionally, the Building and Zoning Administrator (BZA) is the local floodplain administrator. The local law enables the BZA to grant or deny development permit applications based on anticipated floodplain impact. The City requires all development within the SFHA boundaries to obtain a flood hazard development permit.

SFHA boundaries delineate areas deemed at the highest risk of flooding during a 1% annual chance flood event, or what has been referred to as the "100-year flood." Regulatory agencies and flood mitigation experts are discouraging the use of the "100-year flood" moniker as it is statistically misleading and can lead to a false sense of security. The 1% annual chance flood has a 1% probability of occurring in any given year, regardless of any floods or droughts in previous years. In fact, the 1% annual chance flood can happen multiple times with a single calendar year. SFHA maps also

delineate the 0.2% annual chance flood hazard areas ("500-year flood"). Areas outside the SFHA can still be at risk of flooding.

Map 10 shows NFIP digital Q3 Flood Data, which were developed by scanning existing hard copy Flood Insurance Rate Maps developed in the 1980s. FEMA has recently updated many flood hazard maps across the country to reflect physical changes in floodplains, new data, and improved modeling capabilities. However, as of 2021, FEMA has not yet completed digital remapping for Rensselaer County.

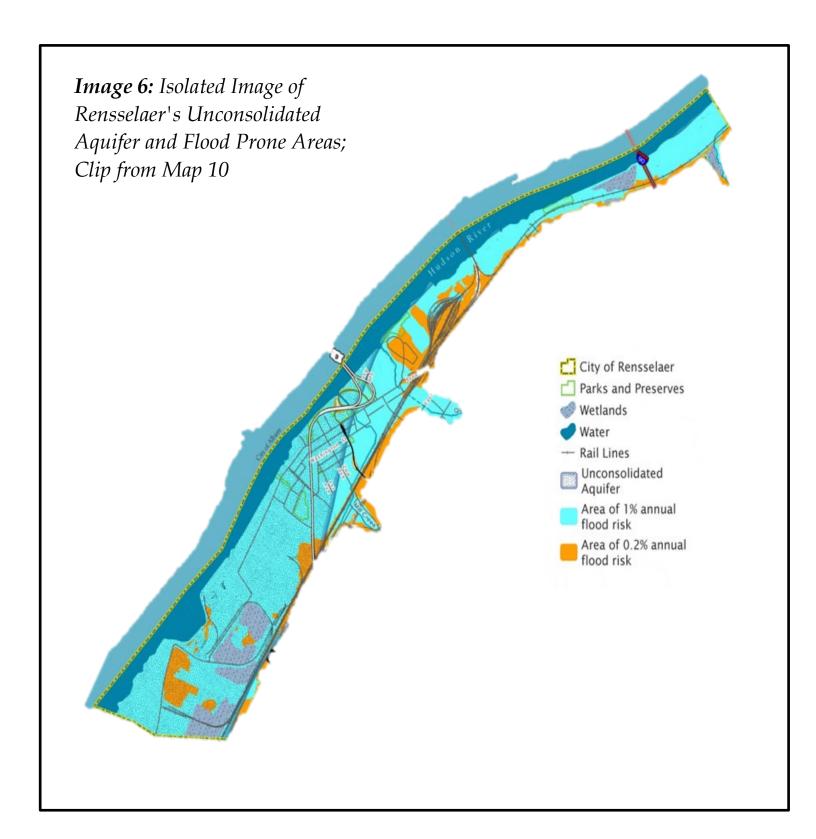
Much of the City of Rensselaer's Hudson River shoreline west of the railroad and south of the Amtrak Station, including the Southern Development Plain, lies within the 1% flood hazard area. Some additional flood zones extend east of the rail lines along Quackenderry and Mill Creek and their tributaries.

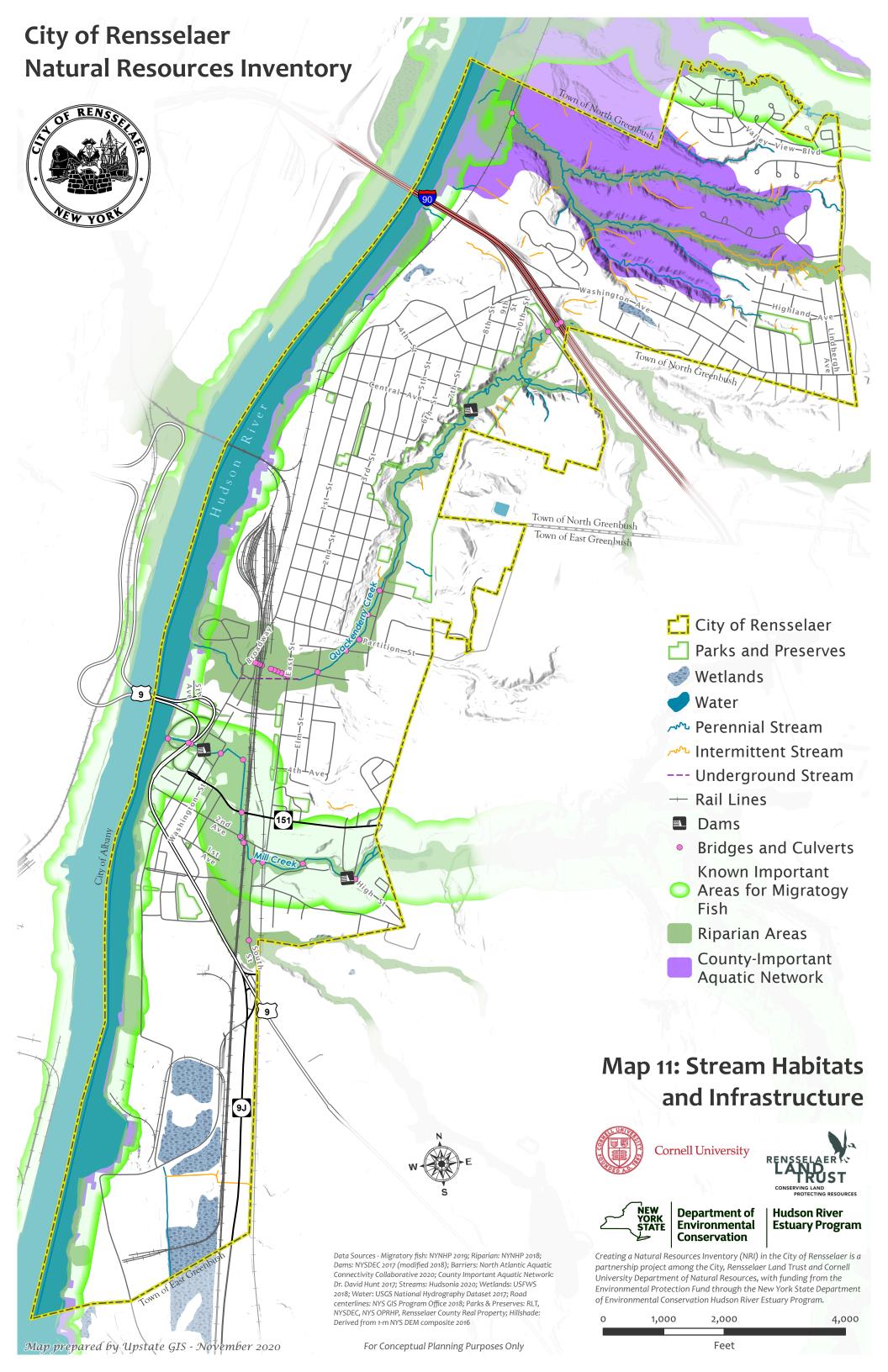
While outdated, SFHA mapping is a valuable tool, but it is important to note that the flood zones are only estimates based on the data and modeling technology available at the time of mapping, and they typically omit floodplains located along smaller streams. Due to the unpredictable nature of some kinds of floods, they often omit areas subject to flooding from localized drainage problems, including undersized culverts, ice jams, sheet flooding down a slope, and erosion hazards due to infrastructure. Climate change is furthermore changing precipitation patterns and increasing flood frequency in the Hudson Valley – annual rainfall occurring in heavy downpour events across the Northeast increased 74% between the periods of 1950-1979 and 1980-2009. Eee the Climate section for more information.

Aquifers

Unconsolidated aquifers are unconsolidated deposits of sand and gravel that are capable of storing large quantities of water. For this reason, they are often sources of public water supply. Aquifers also provide important base flow to streams during dry periods of the year. The Floodplains and Aquifers Map displays unconsolidated aquifers in the City of Rensselaer that were mapped at a scale of 1:250,000 by the US Geological Survey in partnership with the NYSDEC. The mapping is based on surficial geology shown in a previous section of this report. Map 10 shows the City's Southern Development Plain is underlain by a high yield aquifer located between Route 9J and the Hudson River.

⁴² Horton, R., D. Bader, C. Rosenzweig, A. DeGaetano, and W.Solecki. "Climate Change in New York State: Updating the 2011 ClimAID Climate Risk Information." New York State Energy Research and Development Authority (NYSERDA), 2014, Albany, NY. www.nyserda.ny.gov/climaid





Stream Habitats and Infrastructure (Map 11)

From the Hudson River to small tributary creeks that feed it, the City of Rensselaer's streams are important habitats supporting a diversity of life. Dams, culverts, and other infrastructure to manage streams play an important role in determining connectivity and access to stream habitat for fish and other aquatic species. Known habitat values and infrastructure are illustrated in the Stream Habitats and Infrastructure Map.

Streams may be classified on the basis of flow as perennial, intermittent, or ephemeral. Perennial streams flow continuously throughout years with normal precipitation. Intermittent streams only flow during certain times of the year, fed by groundwater and runoff from rainfall and snowmelt. Ephemeral streams (not mapped) only flow after rainfall. Despite their seasonal nature, intermittent and ephemeral streams provide many of the same functions and values as larger perennial streams. They provide seasonal refuge and spawning habitat for small fish, habitat for macroinvertebrates that drift downstream to feed larger fish and organisms, and support nutrient cycling and flood control processes, among other benefits. They also play a vital role in dissipating stream energy during storms and reducing erosion and downstream flood impacts. In urban areas, however, many intermittent streams have been buried. In addition to lost ecological functions, buried streams may be ongoing sources of localized flooding and other issues.

Mill Creek and Quackenderry Creek are perennial streams traversing the City of Rensselaer. The mouths of these streams are also tidally influenced from the Hudson River. The Hudson River in Rensselaer is a large tidal river. In addition to these perennial streams and rivers, there are many intermittent streams throughout the City, which were mapped for the NRI by Hudsonia Ltd.

Riparian areas

Riparian areas are areas adjacent to streams, wetlands, and other waterbodies and generally include the floodplain. Riparian areas are sensitive transition zones between land and water and are vital to stream physical processes, habitat, and water quality. They support unique soil and vegetation characteristics that are strongly influenced by proximity to water. Naturally vegetated riparian areas help clean water by intercepting runoff and filtering sediment and nutrients. They can attenuate flooding by slowing down and absorbing floodwaters. Forested riparian buffers are especially valuable, providing organic matter that supports the in-stream food web and shade that keeps water cool. They also support unique, diverse habitats and frequently serve as wildlife

travel corridors. Protecting existing vegetated riparian buffers and restoring degraded ones can help protect streams and improve wildlife habitat, water quality and storm resiliency.

The riparian areas shown were mapped by the New York Natural Heritage Program based on digital elevation data, wetlands, and the 50-year flood zone. They help identify additional flood-prone areas beyond FEMA flood hazard areas, though they are not a substitute for official FEMA mapping. Note that the riparian areas were developed through modeling and have not been field verified. Nevertheless, they can provide a starting point to inform land use and stream protection efforts.

Riparian areas are mapped along the City's Hudson River shoreline, Mill Creek, Quackenderry Creek, and in the North Rensselaer Hill ravines. The City can use this information to identify opportunities for conservation or restoration of riparian areas. The Hudson River Estuary Program's "Trees for Tribs" initiative offers free consultation and native trees and shrubs for qualifying streamside buffer planting projects in the estuary watershed.

Known Important Areas for Migratory Fish

At least six migratory fish species occur in the City of Rensselaer. The City's Hudson River habitats support spawning of American shad, river herring (alewife and blueback herring), striped bass, and NY-threatened shortnose sturgeon. In addition, American eel occur along the full length of Mill Creek from Rensselaer to North Greenbush. Eel may also occur in Quackenderry Creek and other unnamed tributaries in the City, which have not been sampled. American eel is in decline throughout much of its range, and though eels are able to bypass certain dams, culverts, and other aquatic barriers, they rely on aquatic connectivity along streams to complete their life cycle and return to the sea to spawn. Shad, herring, and striped bass spend most of their time in coastal waters and return to the fresh water of the Hudson River each spring to spawn before returning back to ocean waters. Shortnose sturgeon migrate annually between the Hudson River's saltwater and brackish habitats to freshwater areas north of Coxsackie for spawning. The important areas were mapped by the New York Natural Heritage Program based on DEC fisheries data and include upstream habitat and stream adjacent areas that support the health of stream habitats used by migratory fish.

Important Aquatic Network.

The Rensselaer County Land Conservation Plan includes the City of Rensselaer as part of the Hudson River aquatic network, a highest-priority (Tier 1) area for ecological resources in the County. Aquatic networks are defined as stream systems with a high percentage of native aquatic plant and animal species, in good condition (especially with good water quality and unimpeded water flow), plus the most essential surrounding areas required to maintain those stream systems. The Hudson River aquatic network includes the Hudson River, its shoreline, floodplain, and connected natural areas. In the City, these connected areas include the Northern Rensselaer Hills, which is drained by small streams that flow into the Hudson. The Hudson River provides habitat for freshwater tidal animals and plants, and the associated areas contribute to maintaining Hudson River habitats; all together these form a County-significant aquatic network.

Stream Infrastructure

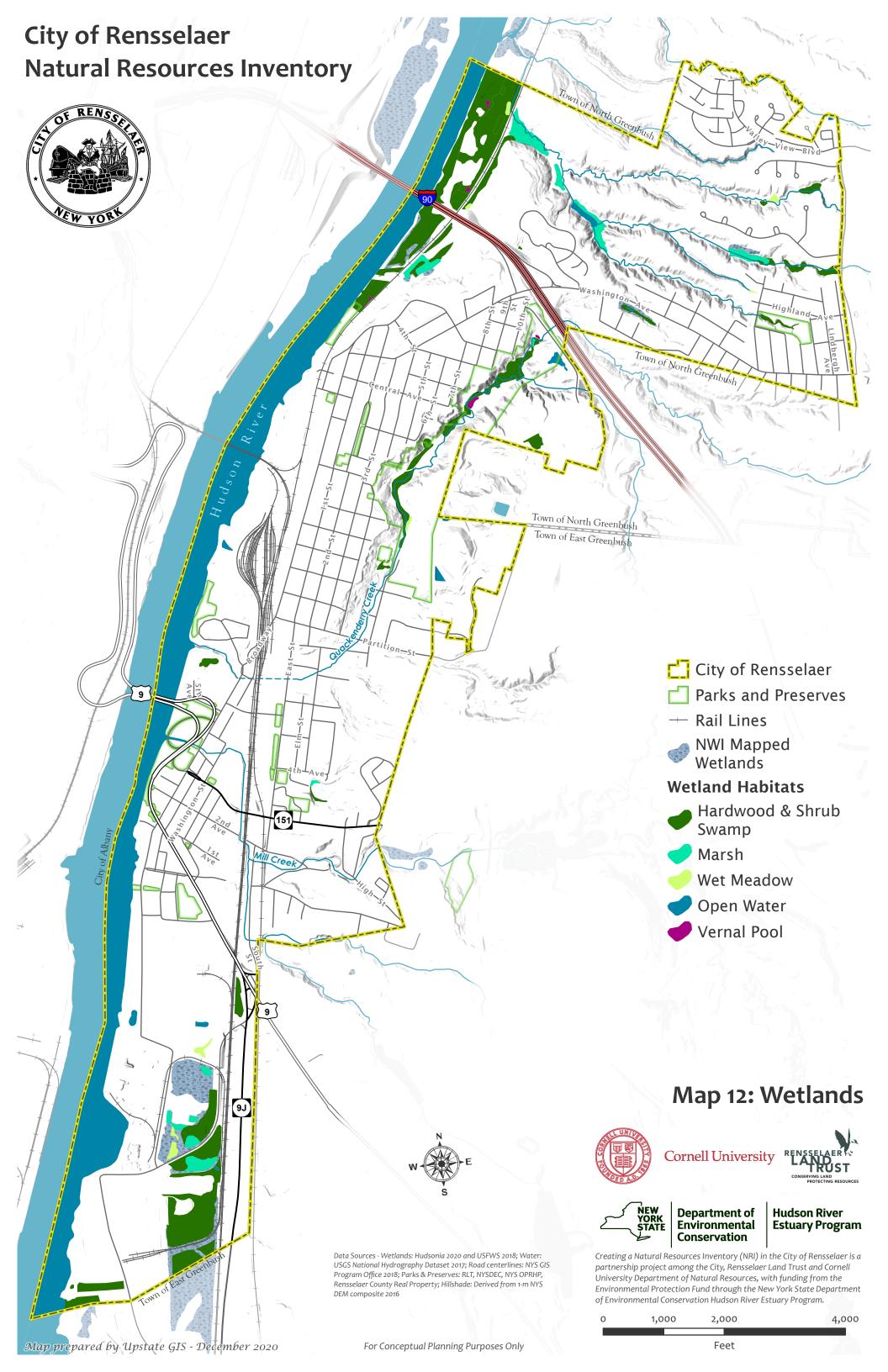
Infrastructure in streams, such as dams, culverts, and bridges, can isolate and severely limit the range of fish and other aquatic organisms that use stream corridors and decrease available habitat. Dams and culverts can present physical barriers and can also become impassable by changing water quality (e.g. temperature) and quantity (e.g. creating high velocity). Dams can also impede downstream water flow. In addition to impacts on fish and other aquatic life, stream barriers can also have serious effects on local flooding and water quality. Streams flowing into undersized culverts can flood upstream and, in some cases, overtake and wash out a road during heavy precipitation or snowmelt.

Dam locations in Map 11 are provided from the New York State Inventory of Dams. While the DEC tries to maintain an accurate inventory, this data should not be relied upon for emergency response decision-making. Note that assessments by the DEC Hudson River Estuary Program in trial watersheds indicate that perhaps two to three times as many barriers exist than are recorded in the NYS Inventory of Dams. The map shows three dams located in the City of Rensselaer: two along Mill Creek and one on Quackenderry Creek. The Office of the New York State Comptroller reported that the Quackenderry Creek Dam is a local government owned dam. DEC's 2017 inspections of the dam did not reveal any deficiencies, indicating that despite its high hazard classification, the dam is operating safely.

Road-stream crossing data for bridges and culverts are provided from the North Atlantic Aquatic Connectivity Collaborative (NAACC), a network focused on improving aquatic habitat connectivity. A formal inventory and assessment of road-stream crossings has not yet been completed in the City; thus, mapped bridges and

culverts are shown based on modeling. Some of these are likely to be significant aquatic barriers.

Protecting and restoring vegetated stream buffers and restoring free-flowing streams where possible can be effective actions to conserve and restore stream habitat. Bridges, open-bottom culverts and similar structures that completely span the waterway and associated floodplain/ riparian area generally have the least potential impacts on stream hydrology, floodplains, and habitat. The City should explore technical assistance and grants available from the NYSDEC Hudson River Estuary Program to assess and prioritize known aquatic barriers for removal or mitigation.



Wetlands (Map 12)

Wetlands are areas saturated by surface or groundwater sufficient to support distinctive vegetation adapted for life in saturated soil conditions.⁴³ In addition to providing critical habitat for many plants and animals, wetlands help to control flooding and reduce damage from storm surge, recharge groundwater, filter and purify surface water, and provide recreation opportunities. Freshwater tidal wetlands along the Hudson River provide habitat for rare plants and young fish and also help purify wastewater and improve water quality. The upland buffer area surrounding a wetland is essential to its survival and function; both may diminish when a wetland is surrounded by pavement, buildings, and pollution-generating or other incompatible land uses.⁴⁴

The Wetlands Map shows the U.S. Fish and Wildlife Service's National Wetlands Inventory (NWI) and more detailed Wetland Habitats mapped by Hudsonia Ltd. for the City of Rensselaer. Note that no regulatory DEC Freshwater Wetlands are currently mapped in the City. NWI maps often underestimate wetland area and omit smaller and drier wetlands. Hudsonia used a combination of map analysis (including topographic and soil maps), aerial photo interpretation, and field observations by Dr. David Hunt to map wetland habitats. The Wetland Map is suitable for general land use planning, but unsuitable for detailed planning and site design or for jurisdictional determinations. It is not a substitute for site visits and formal wetland delineation.

Hudsonia mapped wetland habitats in the City of Rensselaer including hardwood & shrub swamp, vernal pool, wet meadow, and marsh. A swamp is a wetland dominated by woody vegetation including trees and shrubs (a shrub swamp is dominated primarily by shrubs). A vernal pool is a small, shallow, seasonally flooded wetland that is isolated from streams or other waterbodies. A wet meadow is an area of seasonally saturated or flooded soils dominated by herbaceous vegetation. A marsh is a wetland dominated by herbaceous vegetation that stays saturated/flooded most of the time. In addition to these wetland habitats, riverine habitat and constructed ponds are shown as open water in Map 12.

^{43 &}quot;Wetlands." NYS Department of Environmental Conservation. https://www.dec.ny.gov/lands/305.html

⁴⁴ *Planner's Guide to Wetland Buffers for Local Governments*. Environmental Law Institute, 2008, Washington, DC. www.eli.org/sites/default/files/eli-pubs/d18_01.pdf

In addition, Dr. David Hunt identified examples of freshwater intertidal shore, freshwater intertidal mudflats, and freshwater tidal marsh along the City's northern Hudson River shoreline (see maps 14 and 16). Although small, these communities' restricted distribution in Rensselaer County make their occurrences here County-significant. The City's freshwater intertidal shore is in fact one of the best examples of this community type in Rensselaer County. Tidal wetlands are areas consistently inundated by water during at least some tide stages. There are many different types of tidal wetlands depending on the vegetation present and the depth of water during high and low tides.

Most wetlands in the City are located either in the Hudson River floodplain or adjacent to streams (riparian wetlands) in the Hollow and the North Rensselaer Hills. Dr. David Hunt visited these sites in the field and described them in his report, found in *Appendix B* and summarized in the Important Biodiversity Areas section of the report. It is likely that many more wetlands originally occurred in Rensselaer, especially tidal wetlands, and were filled over time as the City and port area were developed. Some wetlands in the industrial area of the City have been artificially created for environmental remediation. Knowing the existence of local wetlands enables the City to proactively plan to conserve this critical part of our life support system.

Little is known about the wildlife present in the City's wetlands, but it is likely that a variety of common wetland species are present. In addition, American black duck (a high priority species of greatest conservation need in NY) and NY-threatened least bittern have been documented in Hudson River marsh habitat nearby in the Town of East Greenbush and these species may be present in Rensselaer.

State and federal laws protect some but not all wetlands. The New York State Freshwater Wetlands Act generally regulates activities in and around large wetlands, including a 100-foot adjacent area.⁴⁵ To be protected, a wetland must generally be at least 12.4 acres and appear on the NYS Freshwater Wetlands Map. None of the wetlands in the City of Rensselaer currently appear on the NYS regulatory map. The U.S. Army Corps of Engineers regulates wetlands of all sizes in New York under section 404 of the Clean Water Act.⁴⁶ To be protected, wetlands must be connected to a navigable waterway or "Waters of the United States." It is also important to recognize

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⁴⁵ "Freshwater Wetlands Program." NYS Department of Environmental Conservation. http://www.dec.ny.gov/lands/4937.html

⁴⁶ "Section 404 of the Clean Water Act." United States Environmental Protection Agency. https://www.epa.gov/cwa-404

that upland buffer areas around wetlands play an essential role in protecting wetland habitat and water quality, but in most cases they have no formal protection. Local governments can extend protection to these areas under home rule.

Map 12 shows the distribution of four types of wetland habitats identified in the City. Hardwood & shrub swamp are scattered throughout the city and appear to be consistently proximate to steep slopes. This is exhibited north of County Route 151 but below 4th Avenue, along the Quackenderry Creek in the Western Rensselaer Hills, and in the easternmost point of the northern hills. The northern portion of the City's waterfront on either side of the rail lines near the I-90 Bridge are also shown to be hardwood & shrub swamp. Vernal pools are located in the Hudson River floodplain and along Quackenderry Creek. Marsh habitats are found in the development plain together with the hardwood & shrub swamp. There is also marsh between County Route 151 and 4th Avenue and creekside in the Northern Rensselaer Hills. The NWI wetlands just south of the I-90 Bridge are shown to be a mix of hardwood & shrub swamp and marsh as well. Wet Meadow habitats are primarily shown in the development plain wetlands. They have a very small presence in the Northern Hills, as well.

Section 4: Water Resources Discussion and Implications

Planning for the conservation of the water resources discussed in this section is essential to the sustainable growth of Rensselaer. Doing so will maintain critical habitats, improve water quality, offer additional means of flood control, and can ensure that as the city develops, we contribute to the health of the Hudson River Estuary. There are policy measures, planning measures, and building practices that the city can employ to promote watershed conservation and sustainable development, particularly in our floodplain. Actions that can be taken to protect our water resources include but are not limited to improving vegetative buffers along streams, wetland protection, restoration, and enhancement projects, and ensuring that all new development uses green infrastructure where possible to reduce the risk of runoff and flooding. The Development Plain and Shoreline are prioritized because of their floodplain status and the likelihood of new construction. The chart below discusses the CSC actions that will be pursued on a local level and aligns them with the local climate goals identified in the Introduction (resilience, emissions, air quality, water quality, absorption, temperature, biodiversity).

Table 10: Proposed Local Action Framework in Response to Section 4

Action #	CSC Action	Local Climate Goal	Other Notes
7.10	Create or update a watershed assessment to identify flooding and water quality priorities (v3: Watershed Assessment)	Resilience Water Quality Absorption	
7.16	Use green infrastructure to manage stormwater in developed areas	Absorption Water Quality Resilience Biodiversity	Hazard Mitigation
7.20	Require consideration of sea-level rise in planning coastal development	Resilience Absorption Water Quality	Emergency Preparedness
7.21	Right-size bridges and culverts, and remove unnecessary and hazardous dams	Resilience Absorption Water Quality	
7.12	Conserve, revegetate and reconnect floodplains and buffers in riparian areas (v3: Restoration of Floodplain & Riparian Buffers)	Resilience Absorption Water Quality Biodiversity	
7.3	Review existing community plans and projects to identify climate adaptation strategies and policies or	Resilience Absorption Water Quality	Priority Action, May be funded

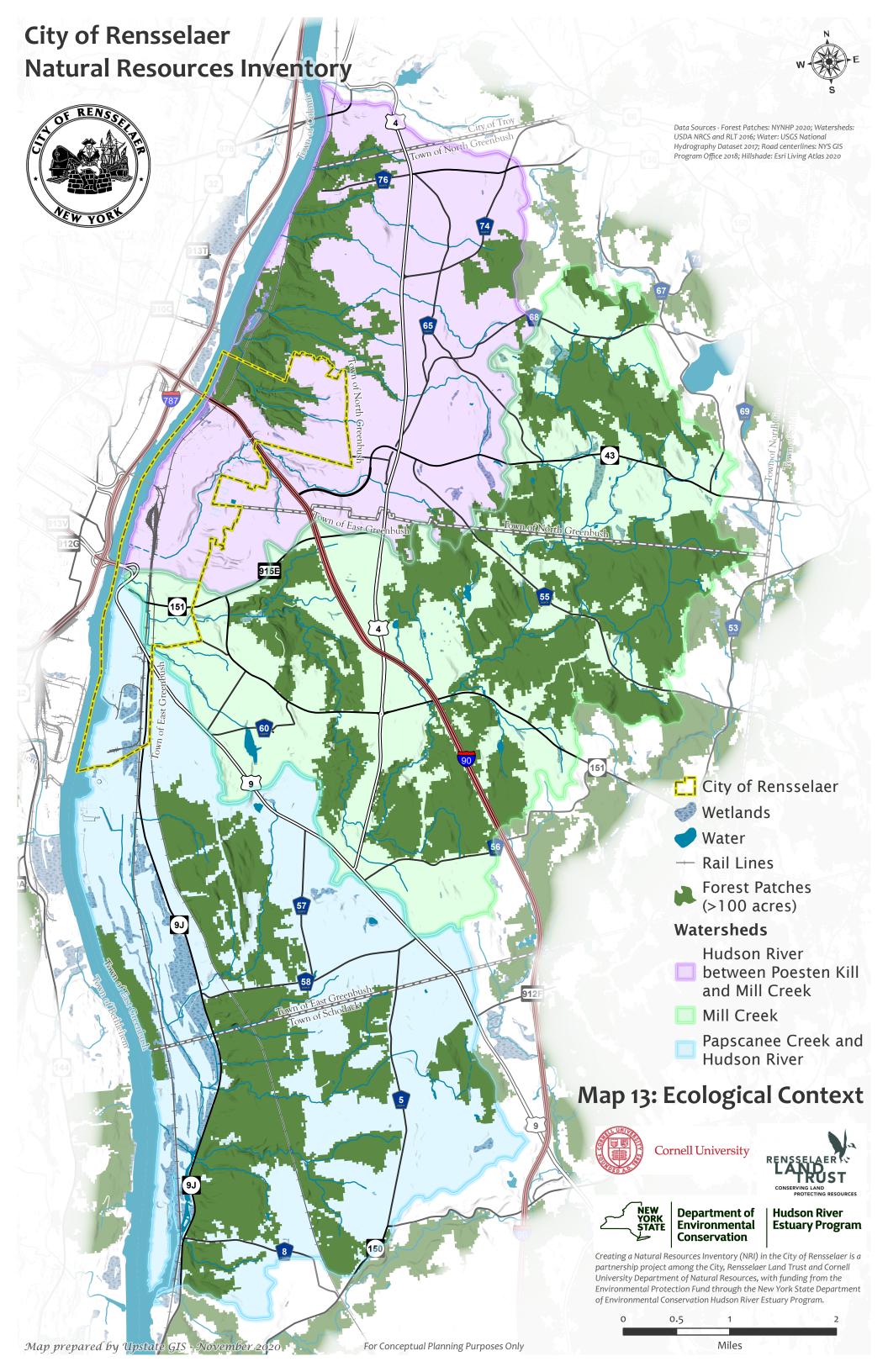
	projects that may decrease	Temperature	under CSC
	vulnerability (v3: Climate Smart	Air Quality	Grants
	Resiliency Planning)	Emissions	Program
		Biodiversity	
714	Facilitate a strategic relocation of uses	Resilience	Emergency
7.14	that are not water dependent from flood prone areas	Water Quality Absorption	Preparedness
7.18	Use natural, nature-based or ecologically enhanced shoreline protection	Resilience Water Quality Absorption Biodiversity	Hazard Mitigation
7.13	Conserve natural areas for species migration and ecosystem resilience (v3: Conservation of Natural Habitats)	Resilience Water Quality Absorption Biodiversity	
7.25	Implement a source water protection program	Water Quality Absorption	
7.23	Implement a water conservation and reuse program	Resilience Water Quality Absorption	
7.15	Promote community flood prevention strategies through the National Flood Insurance Program Community Rating System	Resilience Absorption Water Quality	Hazard Mitigation
7.1	Create or update a watershed assessment to identify flooding and water quality priorities (v3: Watershed Assessment)	Resilience	Hazard Mitigation

Section 5: Habitats and Wildlife

This section describes the major ecological features in the City of Rensselaer including large forests and watersheds. Understanding the ecological context of features can illuminate how land uses in one place are connected to the surrounding area, with broader implications to the environment. Maps in this section include Ecological Context; Habitats; Forests; and Important Biodiversity Areas.

RLT's Land Conservation Plan for Rensselaer County identified the Hudson River shoreline and associated lands in the City of Rensselaer as high-priority conservation areas for multiple resource targets. The Hudson River shoreline is a high-priority scenic area, and the shoreline and associated floodplain are a high-priority area for climate resiliency for biodiversity. Dr. Hunt's assessment Hudson River shoreline and floodplain confirmed the high quality and ecological significance of these features. There are two forested areas in the City at least 100 acres in size – the Hudson River floodplain forest and Northern Rensselaer Hills. These two locations along with an area called "The Hollow" are mentioned elsewhere in the report as well. All three locations were given special attention in Dr. Hunt's study called *Ecological Assessment of Three Natural Areas in the City of Rensselaer* and summarized in this section of the report.

Hudsonia Ltd., a Hudson Valley science-based non-profit, mapped ecologically significant habitats in the City using funding from the Hudson River Estuary Program. They utilized a combination of map analysis, aerial photo interpretation, and field observations by Dr. Hunt to produce a habitats map that shows the ecological values of areas in the City that had not been studied before. *Table 11* identifies the significant habitats in the City. *Table 12* lists species of conservation concern that have been identified in or near Rensselaer.



Ecological Context (Map 13)

The **Ecological Context Map** helps illustrate the major ecological features in the City of Rensselaer extending beyond the City's borders, including large forests and watersheds. Understanding the ecological context of features in the City can illuminate how land uses in one place are connected to the surrounding area, with broader implications to the environment.

The Upper Hudson River Estuary is a Significant Biodiversity Area and a globally-significant example of a large tidal river. Connections to upper watersheds, the Atlantic Ocean, and the changing tides make the coastal and shoreline zones of the Hudson River Estuary a dynamic area. While much of the Hudson River Estuary is salty (ocean water) or brackish (ocean and freshwater mix), areas generally north of Poughkeepsie are entirely freshwater, supporting rare natural communities such as freshwater tidal marsh and swamp. While the City supports a very limited extent of tidal wetlands today, they were probably once common in the City's low-lying areas.

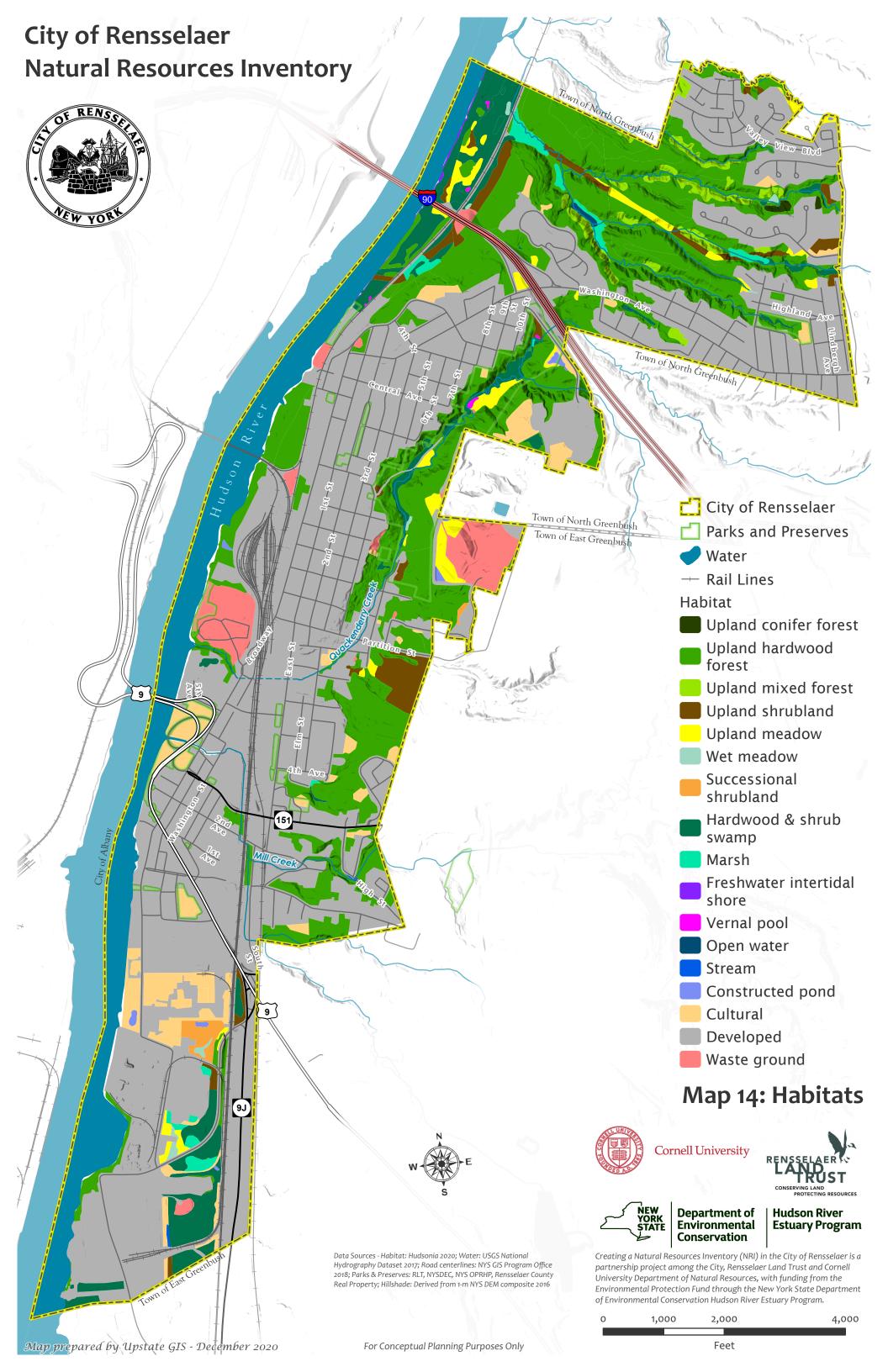
At the county level, The Land Conservation Plan for Rensselaer County identified the Hudson River Shoreline and associated lands in the City of Rensselaer as high-priority conservation areas for multiple resource targets. The Hudson River shoreline is a high-priority scenic area, and the shoreline and associated floodplain are a high-priority area for climate resiliency for biodiversity. Dr. David Hunt's reconnaissance of the City's Hudson River shoreline and floodplain confirmed the high quality and ecological significance of these features at a county scale.

The City lies at the receiving end of watersheds and streams draining from several neighboring municipalities in Rensselaer County. Land cover and land uses throughout those watershed areas influences the water quality and habitat of the City's streams. The Ecological Context Map shows this broader watershed context including the Mill Creek and Quackenderry Creek watersheds and the catchment areas of smaller tributaries draining directly to the Hudson River.

The map also illustrates large forests at least 100 acres in size in the City and surrounding area. There are two forest patches in the City meeting this threshold, the Hudson River floodplain forest and Northern Rensselaer Hills. Both are located along the northern boundary and extending into the Town of North Greenbush, divided by the railroad line. East of the railroad, the Northern Rensselaer Hills measures over 1,000 acres, protecting steep slopes and fragile glacial clay soils described in the Surficial

Geology section. West of the railroad the Hudson River Floodplain contains a 100-acre forested area along the Hudson River shoreline. These are the most ecologically significant upland area of the City, and are described in further detail in relation to the maps that follow.

Whether addressing larger water quality issues in the City's main streams or working to preserve an important large forest area, intermunicipal collaboration may be necessary to achieve larger environmental restoration or conservation goals.



Habitats (Map 14)

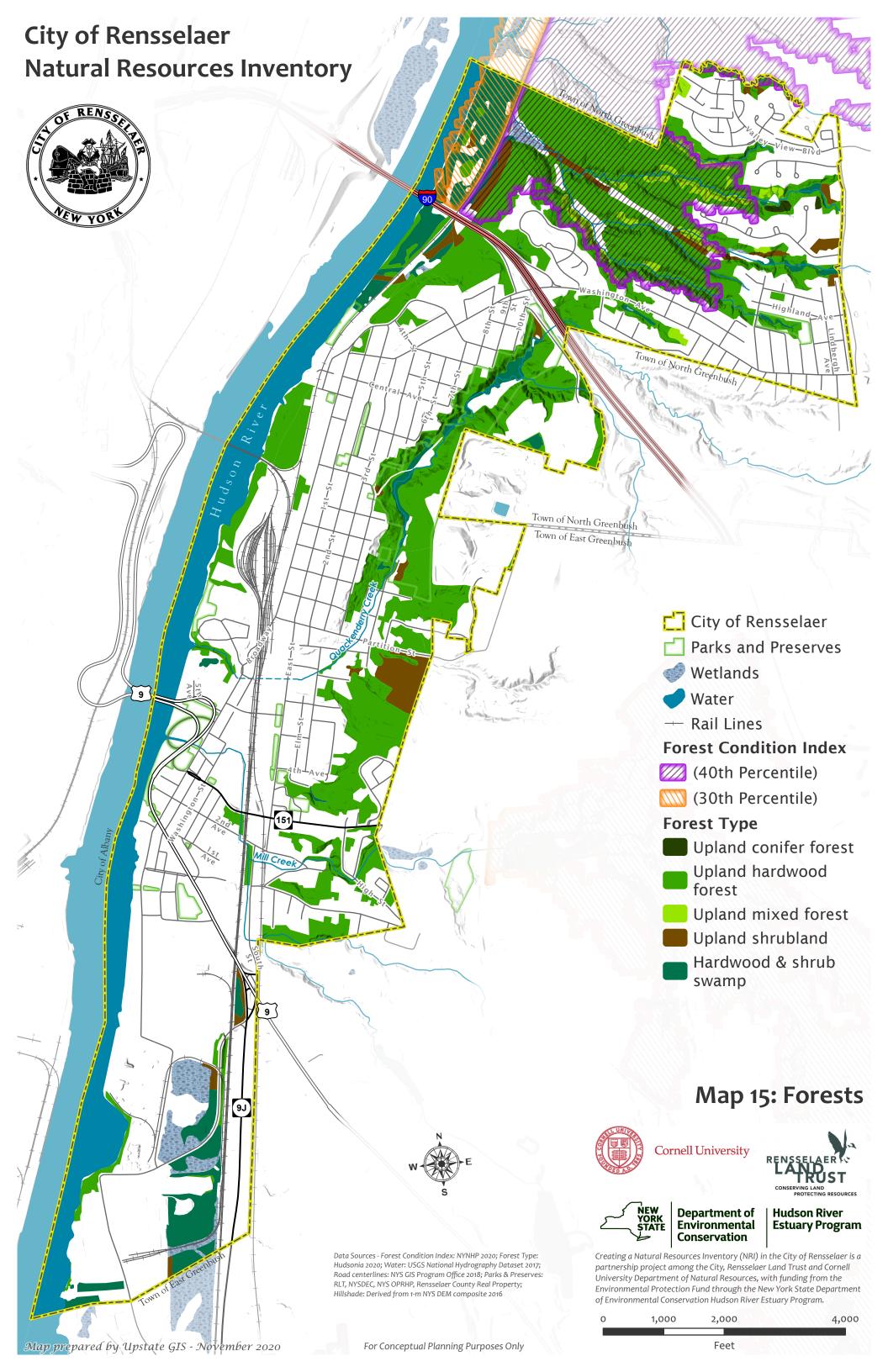
In 2020, Hudsonia Ltd., a Hudson Valley science-based non-profit mapped ecologically significant habitats in the City of Rensselaer, with funding from the Hudson River Estuary Program. Hudsonia used a combination of map analysis (including topographic, geology, and soil maps), aerial photo interpretation, and field observations by Dr. David Hunt to map habitats. The resulting map illuminates the ecological values of areas that hadn't been studied before. The habitat map was carefully prepared but is only partially field-verified and should be confirmed on the ground for the purpose of environmental review. Boundaries of wetlands and other habitats depicted are only approximate.

The Habitat Map shows seventeen mapped habitat types, listed in *Table 11* and described in habitat profiles provided in *Appendix A*. Excluding the Hudson River, 839 acres in the City were mapped as habitat. Upland hardwood forest is the most common habitat type mapped. The Important Biodiversity Areas map illustrates some additional habitat information provided by Dr. David Hunt from his assessment of two large natural areas in the City containing particularly high quality habitat occurrences.

Table 11: Significant Habitats in the City of Rensselaer

Habitat	code	acres
Upl	and Habitats	
Upland hardwood forest	uhf	458.9
Upland mixed forest	umf	14.6
Upland conifer forest	ucf	0.4
Appalachian oak hickory forest	aoh	12
Chestnut oak forest	cof	3.1
Floodplain forest	ff	44.8
Hemlock-northern hardwood forest	hnh	14.3
Maple-basswood rich mesic forest	mbf	17.4
Shale cliff and talus community		
Clay bluff community		
Successional northern hardwoods	sns	0.9
Successional southern hardwoods	ssh	2.5
Successional shrubland	sus	43
Successional old field	sof	5.7
Upland meadow	um	26.2
Waste ground	wg	50.3

Cultural	С	71.7
Mowed lawn	ml	0.8
Development	d	1376.6
Wet	land Habitats	
Hardwood swamp	hs	46.6
Red maple-hardwood swamp	rmh	0.2
Vernal pool	vp	0.7
Freshwater intertidal shore	fis	1.6
Freshwater tidal marsh	ftm	0.1
Marsh	ma	9.4
Shallow emergent marsh	sem	2
Reedgrass marsh	rgm	5.3
Wet meadow	wm	1.7
Oligotrophic pond	op	1.2
Open water	ow	0.1
Constructed Pond	ср	3.1
Seep/spring		
Stro	eam Habitats	
Hudson River		202.6 acres
Stream	str	0.8 acres
Perennial stream		10.4 miles
Intermittent stream		4.1 miles
Rocky headwater stream		2.1 miles
Marsh headwater stream		0.3 miles



Forests (Map 15)

Forests of all sizes provide numerous benefits, from wildlife habitat and clean water to temperature moderation during hot summer months. Though each forest's value is relative to the surrounding landscape, in general, larger and more connected forests provide higher quality habitat and greater ecological benefits than smaller ones.

The Hudson Valley Forest Condition Index maps and prioritizes large forest patches based on a variety of ecological values. The index is based on forest cover data from the 2016 National Land Cover Database, which was analyzed to identify forests unfragmented by major roads, railroads, and non-forest habitat, with a minimum patch size of 100 acres. The forest patches were then scored for 22 metrics related to forest condition, connectivity, stress, habitat, and other ecosystem values. These component metrics were summed to create the index and ranked according to percentile of all forest patches in the estuary watershed.⁴⁷

The City of Rensselaer's forests are small compared to surrounding areas of Rensselaer County; however, sizeable patches of forest habitat persist in the Hollow and in the ravines on the northern boundary of the City extending into the Town of North Greenbush. The latter is the most ecologically significant upland area of the City. East of the railroad, the forest measures over 1,000 acres and contains significant examples of Appalachian oak hickory forest and maple basswood rich mesic forest (see Map 15). This forest is classified in the 40th percentile of all forests in the Hudson Valley region according to the Forest Condition Index. West of the railroad there is an additional 119acre forested area directly along the Hudson River shoreline, including significant examples of floodplain forest (see Map 15). The latter forest is classified in the 30th percentile of all Hudson Valley forests and ranks in the top 1% for riparian habitat protected and in the top 5% for wetland protection. Large forest patches such as these provide habitat for some forest interior species as well as relatively broad corridors for wildlife to move and plants to disperse. In addition to these large forests, the Hollow supports a moderate-sized forest with significant examples of riverside/lakeside bluff and shale talus slope woodland. The ecological assessment of these three forested areas by Dr. David Hunt revealed they contain county-important examples of mature forest, notable for large tree size and limited recent disturbance. See the Ecological Assessment section below for more information.

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⁴⁷ Conley, A. K., E. Cheadle, and T. G. Howard. *Updating Forest Patches and a Patch Assessment for the Hudson Valley*. New York Natural Heritage Program, State University of New York College of Environmental Science and Forestry, 2019, Albany, NY. www.nynhp.org/forest-patches

The presence of large forested buffers along Quackenderry Creek and the unnamed stream to the north provide especially valuable water quality protection and wildlife habitat benefits. Forested stream corridors are particularly favored travel routes for many species. The riparian corridor along the unnamed stream on the City's northern boundary is also highlighted as an Important Aquatic Network in the Stream Habitat Map.

Regardless of size or habitat values, all forests and areas of tree canopy cover in Rensselaer help to manage stormwater, moderate temperature, reduce energy consumption, and improve air quality, among other ecological benefits. Even individual street trees can provide substantial cooling benefits during hot summer days. Maintaining and enhancing the City's urban forest can offset the need for costly engineered infrastructure solutions to stormwater management and lower utility expenses for cooling in addition to the myriad other benefits provided by trees.

Wildlife records from the 2005 NYS Breeding Bird Atlas⁴⁸ including survey blocks spanning the City of Rensselaer and neighboring towns documented several forest-interior bird species of conservation concern that may utilize the City's forest habitats. These include NY-Species of Greatest Conservation Need such as scarlet tanager, wood thrush, and Louisiana waterthrush, a species often found in riparian corridors. Further study may yield additional records for forest wildlife in the City.

Beyond fragmentation, the greatest threats to New York's forests today are from overabundant deer and the introduction of tree diseases, forest pests, and other invasive species inadvertently brought in by people through landscaping and international commerce. Hemlock woolly adelgid and emerald ash borer have already done much damage in nearby towns, and are expected to eventually kill most large trees of these common species in the region. Also, oak wilt, a fungal disease which can quickly kill oak trees, is in nearby Schenectady County. The DEC Division of Lands and Forests has further information about Forest Health Issues and preventative measures to reduce the spread of pests, such as using locally-sourced firewood.⁴⁹ The Capital/Mohawk Partnership for Regional Invasive Species Management⁵⁰ (PRISM) works to promote education, prevention, early detection and control of invasive species and is helping communities to prepare for and respond to this threat. Guiding future development to minimize forest fragmentation and loss will help minimize the spread of invasive

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⁴⁸ New York State Breeding Bird Atlas. http://www.dec.ny.gov/animals/7312.html

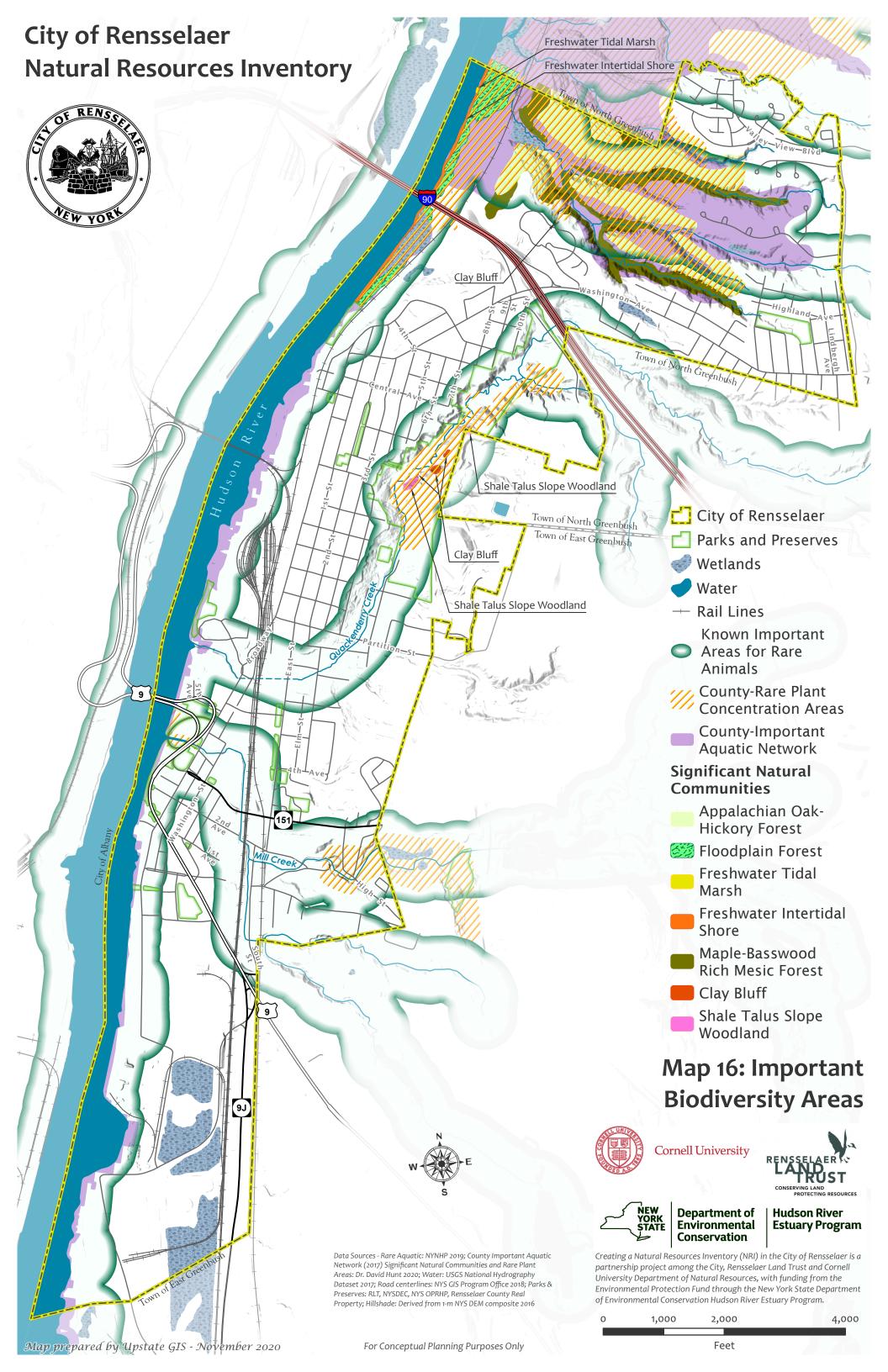
⁴⁹ Forest Health. https://www.dec.ny.gov/lands/4969.html

⁵⁰ Capital/Mohawk Partnership for Regional Invasive Species Management. http://www.capitalmohawkprism.org/

species into interior forests and conserve important habitats in the City.



Image 7: The Hollow Preserve; Photo courtesy of the Times Union



Important Biodiversity Areas (Map 16)

The Important Biodiversity Areas Map highlights the most significant ecological features in the City of Rensselaer based on state and county assessments and a 2020 ecological assessment of the City's major natural areas by Dr. David Hunt. Note that additional study may reveal other important occurrences in the City.

Known Important Areas for Rare Animals

The New York Natural Heritage Program (NYNHP) has identified important areas for sustaining populations of rare animals based on documented occurrences.⁵¹ These areas include the specific locations where a species has been observed, the adjacent habitat, as well as areas critical to maintaining the habitat. Proactive planning that considers wildlife movement patterns and the connectivity of their habitats will contribute to the long-term survival and persistence of these rare species. ⁵²

Important areas in the City of Rensselaer for the following species are shown in Map 15. A complete list of species of conservation concern known from the City is shown in *Table 12*.

Alewife floater is a state-rare mussel documented near Rensselaer in the Hudson River. Populations of these mussels have declined dramatically since exotic zebra mussels were introduced to the Hudson River Estuary in the 1990s. These and other freshwater mussels are furthermore threatened by habitat loss and fragmentation, especially from dams; siltation and sedimentation from dams, altered river flows, and surface run-off.

Cobra clubtail, in the dragonfly family, inhabits large river systems with ample mud substrates and is documented near the Hudson River in Rensselaer. Other nearby occurrences of rare dragonflies include umber shadowgragon and russettipped clubtail. Dragonflies are sensitive to water contamination, hydrological alteration, and other impacts from surrounding upland development.

Migratory fish species including NY-endangered shortnose sturgeon and SGCN such as river herring and striped bass utilize the City's Hudson River habitats for spawning. Migratory American eel is present in Mill Creek.

⁵¹ New York Natural Heritage Program and New York State Department of Environmental Conservation, Biodiversity Databases [accessed July 2020], Important Areas Digital Data Set, 2018, Albany, NY.

⁵² To request more detailed species data, visit http://www.dec.ny.gov/animals/31181.html or contact NaturalHeritage@dec.ny.gov

Wood turtle is a NY-Special Concern species occurring along low gradient perennial streams that also spends time in adjacent forests and grasslands. Wood turtles are threatened by habitat loss, stream degradation, nest predation, and the pet trade.

Note: Rare animals may occur in more locations than are currently known by NYNHP or DEC. The DEC Region 4 Office in Schenectady should be contacted at (518) 357-2355 with any concerns or questions about the presence of protected species in the City of Rensselaer.

Table 12, on the following pages, lists species of conservation concern that have been recorded in or near Rensselaer, NY. The information comes from the New York Natural Heritage Program (NYNHP) biodiversity databases, the <u>1990-1999 New York Amphibian</u> and Reptile Atlas (NYARA), and the 2000-2005 New York State Breeding Bird Atlas (NYBBA). Species from the NYBBA are included in the table if they were documented in Atlas blocks including the City. The table only includes species listed in New York as endangered (at the New York State and/or federal level), threatened, special concern, rare, Species of Greatest Conservation Need (SGCN), or a Hudson River Valley Priority Bird species recognized by Audubon New York. Generalized primary habitat types are provided for each species, but for conservation and planning purposes, it's important to recognize that many species utilize more than one kind of habitat. More information on animals, plants, and ecological communities http://guides.nynhp.org. Note: Additional rare species and habitats may occur in the City of Rensselaer.

 Table 12: Species of Conservation Concern in the City of Rensselaer, NY

			NY Sta		Cor	iserva	tion	
Common Namo		General Habitat	Hudson River Valley Priority Bird	Species of Greatest Conservation Need xx = high priority	Special Concern	Threatened	Endangered	Data Source
Birds		T	1			ı	ı	
American black duck	Anas rubripes	wetland	x	xx				NYBBA
American goldfinch	Spinus tristis	young forest, shrubland	x					NYBBA
American kestrel	Falco sparverius	meadow	х	х				NYBBA
American redstart	Setophaga ruticilla	forest	х					NYBBA
American woodcock	Scolopax minor	young forest, shrubland	x	х				NYBBA
Baltimore oriole	Icterus galbula	forest	х					NYBBA
belted kingfisher	Megaceryle alcyon	lake, stream	х					NYBBA
black-and-white warbler	Mniotilta varia	forest	x					NYBBA
blue-winged warbler	Vermivora pinus	young forest, shrubland	x	х				NYBBA
Bobolink	Dolichonyx oryzivorus	grassland	x	xx				NYBBA
chestnut-sided warbler	Setophaga pensylvanica	young forest, shrubland	х					NYBBA
chimney swift	Chaetura pelagica	urban	х					NYBBA
Cooper's hawk	Accipiter cooperii	forest	х		х			NYBBA
downy woodpecker	Picoides pubescens	forest	х					NYBBA
eastern kingbird	Tyrannus tyrannus	young forest, shrubland	x					NYBBA
eastern meadowlark	Sturnella magna	grassland	х	XX				NYBBA
eastern towhee	Pipilo erythrophthalmus	young forest, shrubland	х					NYBBA
eastern wood-pewee	Contopus virens	forest	х					NYBBA

				NYS C	onsei Status		n	
Common Name	Scientific Name	General Habitat	Hudson River Valley Priority Bird	Species of Greatest Conservation Need xx = high priority	Special Concern	Threatened	Endangered	Data Source
Birds (continued)	<u>, </u>	,						
field sparrow	Spizella pusilla	young forest, shrubland	x					NYBBA
<u>least bittern</u>	Ixobrychus exilis	wetland	х	x		NY		NYBBA
least flycatcher	Empidonax minimus	forest	х					NYBBA
Louisiana waterthrush	Seiurus motacilla	forest	х	x				NYBBA
northern flicker	Colaptes auratus	forest	х					NYBBA
peregrine falcon	Falco peregrinus	cliff	х	x			NY	NYBBA
rose-breasted grosbeak	Pheucticus ludovicianus	forest	x					NYBBA
ruffed grouse	Bonasa umbellus	young forest, shrubland	х	x				NYBBA
scarlet tanager	Piranga olivacea	forest	х	x				NYBBA
sharp-shinned hawk	Accipter striatus	forest	х		x			NYBBA
Veery	Catharus fuscescens	forest	х					NYBBA
willow flycatcher	Empidonax trailli	young forest, shrubland	х					NYBBA
wood thrush	Hylocichla mustelina	forest	x	х				NYBBA
yellow-throated vireo	Vireo flavifrons	forest	х					NYBBA
Reptiles								
wood turtle	Clemmys insculpta	stream		xx	x			NYARA
Fish								
Alewife	Alosa pseudoharengus	coast		х				NYSDEC
American eel	Anguilla rostrata	stream		xx				NYSDEC
American shad	Alosa sapidissima	coast		xx				NYSDEC
blueback herring	Alosa aestivalis	coast		x				NYSDEC

shortnose sturgeon	Acipenser brevirostrum	coast		x		US, NY	NYNHP
Mussels	Mussels						
alewife floater	Anodonta implicata	coast		xx		NY , US	NYNHP
Insects							
cobra clubtail	Gomphus vastus	coast		x			NYNHP

Important Aquatic Network. The Hudson River aquatic network includes the Hudson River, its shoreline, floodplain, and connected natural areas in the City of Rensselaer, including the forested ravines in the northern part of the City. It is identified as a highest priority (Tier 1) ecological resource in the Rensselaer County *Land Conservation Plan*⁵³ and is described further under Stream Habitats.

County-Rare Plant Concentration Areas. Rare plant concentration areas are broadly defined as sites with generally five or more plant species that are rare in Rensselaer County. Dr. Hunt defines a rare plant species as one that has 100 or fewer locations, or less than 10,000 individuals, in Rensselaer County; or a species that has been documented in the County in the past but has not been seen since before 1980. Among these rare species, those that have 20 or fewer locations, or less than 3,000 individuals, in the County are given the highest conservation priority. (Plant species that are rare in New York State are by definition also rare in the County.) Rare plant concentration areas are often found in rare or uncommon natural community types.

The city's rare plant concentration areas coincide with areas underlain by calcium-rich bedrock, which tends to support rare plants and uncommon natural communities:

- Buffering Mill Creek near the eastern boundary of the city
- Buffering Quackenderry Creek near Central Avenue and the City's eastern boundary
- In the ravines at the northern end of the city

Significant Natural Communities. In summer 2020, an ecological assessment of the 60-acre "Hollow" and a 350-acre private parcel on the City's northern boundary was completed by ecological consultant Dr. David Hunt, who also assisted with verifying the Hudsonia map of habitats for the City. Dr. Hunt identified 21 natural community

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⁵³ Winter, J., J. Tolisano, R. Lederer-Barnes, M. Batcher, and N. Conrad, *Rensselaer Land Trust Land Conservation Plan:* 2018 to 2030. Rensselaer Land Trust, Troy, NY, 2018. Available at https://www.renstrust.org/protect/county-conservation-plan.

types in the City, which are listed in *Table 13* and described further in *Appendix B*. Seven of these are identified on Map 16 as significant examples of natural communities that have high biodiversity value for Rensselaer County, and thus are worthy conservation targets. Factors contributing to the significance of a natural community are large size, intact condition (i.e., little disturbance, full range of native species, few invasive species) and natural condition of the surrounding landscape. Links to online guides with illustrated descriptions and conservation and management guidance are provided.

- Appalachian Oak-Hickory Forest
- Floodplain Forest
- Freshwater Tidal Marsh
- Freshwater Intertidal Shore
- Maple-Basswood Rich Mesic Forest
- Clay Bluff
- Shale Talus Slope Woodland

Table 13: Significant Natural Communities in Three Major Natural Areas in the City of Rensselaer

Community System	Community Sub- System	Natural Community	The Hollow	Hudson River Floodplain	Northern Rensselaer Hills
Terretrial	Forested Uplands	Maple-basswood- rich mesic forest	х	х	х
Terretrial	Forested Uplands	beech-maple mesic forest	х		х
Terretrial	Forested Uplands	Appalachian oakpine forest	х		х
Terretrial	Forested Uplands	Appalachian oak- hickory forest	х		х
Terretrial	Forested Uplands	Chestnut oak forest	х		х
Terretrial	Forested Uplands	Hemlock-northern hardwood forest			х
Terretrial	Forested Uplands	Successional northern hardwoods			х
Terretrial	Forested Uplands	Successional southern hardwoods	х	х	х

Community System	Community Sub- System	Natural Community	The Hollow	Hudson River Floodplain	Northern Rensselaer Hills
Terretrial	Barren/Woodlands	Shale talus slope woodland	х		
Terretrial	Open Uplands	Shale cliff and talus			х
Terretrial	Open Uplands	Riverside sand/gravel bar	x		х
Terretrial	Open Uplands	Cobble shore	x		
Terretrial	Open Uplands	Riverside/Lakeside bluff (clay bluff)	х	x	х
Terretrial	Open Uplands	Successional old field	х	x	х
Terretrial	Open Uplands	Successional shrubland	х	x	х
Terretrial	Open Uplands	Successional northern sandplain grassland		x	
Palustrine	Forested-mineral soil wetlands	Floodplain forest	х	х	
Palustrine	Forested-mineral soil wetlands	Red-maple hardwood swamp			х
Palustrine	Forested-mineral soil wetlands	Vernal pool	х	x	x
Palustrine	Open-mineral soil wetlands	Shallow emergent marsh	x	x	х
Palustrine	Open-mineral soil wetlands	Shrub swamp	x		х
Palustrine	Open-mineral soil wetlands	Riverside mudflats	x		
Riverine	Natural stream	Rocky headwater stream	x	x	x
Riverine	Natural stream	Marsh headwater stream	x	x	x
Riverine	Natural stream	Intermittent stream	х		x
Riverine	Natural stream	Spring	X	x	х
Estuarine	Estuarine subtidal	Tidal river		x	
Estuarine	Estuarine intertidal	Freshwater intertidal shore		x	
Estuarine	Estuarine intertidal	Freshwater intertidal mudflats		x	
Estuarine	Estuarine intertidal	Freshwater tidal marsh		x	

The assessment below is a summary of the report prepared by Dr. David Hunt; it was written by John Winters of the Rensselaer Land Trust.

Ecological Assessment of Three Natural Areas in the City of Rensselaer Summary of report by Dr. David Hunt



Image 8: The Hollow Preserve; Photo courtesy of the Times Union

The Rensselaer Land Trust contracted with Dr. David Hunt, Ecological Intuition and Medicine, to conduct field surveys, identify biological features, and assess the ecological significance of natural areas in the City of Rensselaer. Dr. Hunt chose three sites that he thought were the most intact natural areas within the City and the most likely to contain the most important examples of ecological features significant at the County level:

- 1) The Hollow is the largest city-owned park in the City, about 58 mostly wooded acres in the eastern half of the City south of I-90.
- 2) The flat forested area along the Hudson River north and south of I-90 and west of the railroad tracks, which Dr. Hunt names the Hudson River Floodplain Rensselaer (referred to as the Hudson Floodplain in this summary).

3) The forested area of deep ravines and steep ridges in the northern part of the City, east of the railroad tracks and north of I-90, which Dr. Hunt names the Northern Rensselaer Hills.

Dr. Hunt notes that the latter two areas can be seen from the I-90 bridge over the Hudson River. As one travels east over the river from Albany, the scenic qualities and riverside setting of these undeveloped forested areas contrast with urban Albany and give one the sense that Rensselaer County has a special rural feel.

At all three sites, Dr. Hunt found a very high diversity of natural ecological community types in good condition, including mature forests with very large trees, and many County-rare plants. (Natural community types can be thought of as different types of habitats or ecosystems, each with their own set of plants and animals.) A summary of Dr. Hunt's findings follows here, and Map 16, Important Biodiversity Areas, shows the location of rare plant concentration areas and significant natural communities. Dr. Hunt's full report to the Rensselaer Land Trust, including maps and full community and rare plant lists, is available from the City of Rensselaer.

The Hollow

The Hollow, comprising both the City-owned parkland and surrounding land, is an essentially undeveloped forested natural area centered on a deep valley of Quackenderry Creek in the eastern part of the City of Rensselaer. The roughly 70-acre site is dominated by relatively mature forests and Quackenderry Creek, which has carved a wide valley with steep side slopes.

The Hollow is ecologically diverse and significant, with 21 different natural community types and 17 County-rare plant species. Of the 21 natural community types, most of The Hollow is covered by forest communities such as maple-basswood rich mesic forest, beech-maple mesic forest, and Appalachian oak-pine forest. On the eastern side of The Hollow, the steep slopes with dry well-drained soils support two uncommon community types: shale talus slope woodland with hop hornbeam, basswood and other trees; and clay bluff in two relatively large patches above Quackenderry Creek with few trees and dominated by shrubs and herbs. These two community types are of sufficiently intact ecological condition to be considered County-significant; and the clay bluff is one of the best three examples of its community type known in Rensselaer County. (Dr. Hunt uses the term riverside/lakeside bluff for the clay bluffs to match the community classification used by the New York Natural Heritage Program.)

The various forest communities growing on 25 acres of steep slopes and secluded stream terraces at The Hollow, especially on the east side, have many large mature trees; 14 tree species have at least one large tree. The largest measured is a

cottonwood at 130 cm dbh (diameter at breast height), and there are oak, walnut, and maple trees with 100 cm or more dbh. Together these forest communities form a County-important mature forest complex. (Mature forest complexes are one kind of restricted ecosystem complex, i.e., an assemblage of community types with a restricted range in the County.)

Of the 17 County-rare plant species found at The Hollow, the rarest is yellow grass (*Hypoxis hirsute*); this plant is known only from one other site in Rensselaer County. The yellow grass here is very vulnerable: Only one individual plant was seen, near the property boundary with the adjacent landfill. The next two rarest species here are early buttercup (*Ranunculus fascicularia*) and heart-leaved golden Alexanders (*Zizia aptera*). The number and rarity of rare plants in The Hollow warrant its mapping as a rare plant concentration area for the County.

Quackenderry Creek contains a diversity of aquatic macroinvertebrates, especially caddisflies, which are indicators of good water quality.

Hudson River Floodplain Rensselaer (Hudson Floodplain)

The Hudson Floodplain is a 64-acre forested area along the Hudson River in the northwestern part of the City of Rensselaer. Occupying a low-level terrace formed by alluvial deposits, the site has closed forest canopy extending all the way to the river shoreline, plus open shoreline areas and some wetlands.

The Hudson Floodplain is ecologically diverse and significant, with 16 different natural community types and 13 County-rare plant species. Of the 16 natural community types, the most prevalent is floodplain forest, which is sufficiently large and ecologically intact to be considered County-significant. Three other uncommon community types that occur in this site are restricted to the Hudson River: freshwater intertidal shore, freshwater intertidal mudflats, and freshwater tidal marsh. Although small at this site, these communities' restricted distribution in Rensselaer County make their occurrences here County-significant. The floodplain forest and freshwater intertidal shore here are among the two or three best examples of those respective community types known in Rensselaer County.

The floodplain forest growing on 25 acres of the Hudson Floodplain has many large mature trees; 12 tree species have at least one large tree. The largest measured is a cottonwood at 220 cm dbh (diameter at breast height), and there are basswood and maple trees with 90 cm dbh. The floodplain forest here constitutes a County-important mature forest complex.

Of the 13 County-rare plant species found at the Hudson Floodplain, the rarest is Bush's sedge (*Carex bushii*). Rare in New York, this plant is known only from one

other site in Rensselaer County. Here it was found in an open sandy area along an ATV trail network; while this habitat may have been created or maintained by ATV use, the plant is in a limited and vulnerable location. The next three rarest species here are long-beaked sedge (*Carex sprengelii*), Gray's sedge (*Carex grayi*), and wild bergamot (*Monarda fistulosa*). The number and rarity of rare plants warrants the Hudson Floodplain being mapped as a rare plant concentration area for the County.

Northern Rensselaer Hills

The Northern Rensselaer Hills, at 273 acres, is the largest contiguous forest in the City of Rensselaer, extending into the Rensselaer Tech Park in the Town of North Greenbush. The site is an old low terrace of the Hudson River with sand and clay sediment deposits. The terrace has been heavily eroded by numerous streams, leaving many narrow ridges alternating with deep ravines. To the east are dense residential subdivisions, leaving only a narrow forested buffer to the steep slopes and streams immediately below. The steep slopes have apparently been unsuitable for development and logging in the past, and thus support relatively mature forest. The west edge of the site is a long, sharp, linear escarpment of the old lakeplain, the bottom of which abuts the current Hudson River floodplain.

The Northern Rensselaer Hills is ecologically diverse and significant, with 21 different natural community types and 18 County-rare plant species. Among the 21 natural community types, drier areas on upper slopes and ridges support forests such as Appalachian oak-hickory forest, maple-basswood mesic forest is common in the valleys between ridges, and hemlock-Northern hardwood forest occurs in narrow bands on north-facing ravine slopes. On steep dry slopes in a few locations are clay bluffs, an open community type with few trees and dominated by shrubs and herbs. The maple-basswood forest and Appalachian oak-hickory forest here are both large and in intact enough condition to be considered County-significant. The restricted distribution of clay bluffs in the County makes its occurrence here County-significant. The Appalachian oak-hickory forest here is one of the best four examples of its community type known in Rensselaer County.

The various forest communities growing on 157 acres of steep slopes and secluded stream terraces at the Northern Rensselaer Hills have many large mature trees; 23 tree species have at least one large tree. The largest measured are a white oak at 160 cm dbh (diameter at breast height), a cottonwood at 150 cm dbh, and a red oak and false shagbark hickory at 100 cm dbh or more. The forests in this area constitute a County-important mature forest complex.

Of the 18 County-rare plant species found at the Northern Rensselaer Hills, the rarest is lopseed (*Phyrma leptostachya*); this plant is known only from two other sites in Rensselaer County. The lopseed here is vulnerable: The plants were seen in only one small area near the National Grid powerline right-of-way. Two other species here that

are very rare in the County are early buttercup (*Ranunculus fascicularia*) and woodland milkweed (*Asclepias exaltata*). The number and rarity of rare plants warrants the Northern Rensselaer Hills being mapped as a rare plant concentration area for the County, and the most significant one in the City of Rensselaer.

Mature Forest Complexes at All Three Sites

Each of the three sites surveyed have large areas of mature forests with very large trees: 157 acres at Northern Rensselaer Hills, 25 acres at the Hudson Floodplain, and 25 acres at The Hollow. These are the three largest mature forest complexes known in Rensselaer County. (The 15 mature forest complexes mapped for the Rensselaer County Conservation Plan range from one to 24 acres.) These three sites are three of the four locations of mature forest complexes known in the County outside of the Rensselaer Plateau. While the Rensselaer Plateau might be expected to have the largest mature forests in the County, almost all the Plateau's forests were cut at one time and only small areas now have mature forest. In this corner of the most developed part of the County, however, the steep ravines contributed to keeping relatively large areas uncut for longer periods.

Larger Ecological Features

The Hudson River Floodplain Rensselaer and Northern Rensselaer Hills together are part of two larger County-significant ecological features identified in the Rensselaer County Conservation Plan: the Hudson River aquatic network and the Rensselaer Tech Park Forest.

The Hudson River aquatic network includes the Hudson River in all the riverfront municipalities of the County from the Troy Dam south, plus the Hudson River's shore, floodplain, and connected streams, wetlands and natural uplands. In the City of Rensselaer, these connected areas include the floodplain and the woods and ravines in the northern part of the city from which streams flow into the Hudson. The Hudson Floodplain site is part of the best forested buffer for this aquatic network, part of a natural riparian buffer. The Northern Rensselaer Hills, along with adjacent forests in North Greenbush, are one of only two wide forested areas draining directly into the Hudson River. The Hudson River provides habitat for freshwater tidal animals and plants and the associated areas included in the aquatic network contribute to maintaining Hudson River habitats.

The Rensselaer Tech Park Forest includes the forested areas north of I-90, the largest within the City, and extends into the Rensselaer Tech Park and environs in North Greenbush for a total of 1,082 acres. This forest is County-significant as a forested landscape, a roadless block (unfragmented forest block), and a forest-interior area. The Rensselaer Tech Park Forest represents one of the largest forest landscapes and forest-interior areas close to downtown Albany.

Field observations confirmed many qualities within the forest-interior area of the City of Rensselaer's Northern Rensselaer Hills that seem "atypical" for a "city". A visitor gains a sense of seclusion here, with no sight of human structures and few signs of human visitation. Even the noise of the nearby interstate and traffic on Washington Avenue are obscured at the base of the deepest ravines, shielded by the multiple tall ridges.



Image 9: The Hollow Preserve; Photo courtesy of the Times Union

Section 5: Habitats and Wildlife Discussion and Implications

Preservation and conservation of the natural resources contributing to the health of the habitats and wildlife identified in Section 5 are vital when considering what measures Rensselaer prioritizes in response to climate threats. The City and its residents benefit from the health and biodiversity of our local ecosystems, including the Hudson River Estuary. There are policy measures, planning measures, and building practices that the city can employ to promote habitat conservation. Actions that can be taken to protect our habitats and wildlife include but are not limited to designating critical environmental areas under SEQR or creating and maintaining a street tree inventory; additionally, the NRI will be used by the Planning Commission to determine the potential impact of all new development on local habitats and ecosystemts. The chart below discusses the CSC actions that will be pursued on a local level and aligns them with the local climate goals identified in the Introduction (resilience, emissions, air quality, water quality, absorption, temperature, biodiversity).

Table 14: Proposed Local Action Framework in Response to Section 5

Action #	CSC Action	Local Climate Goal	Other Notes
6.18	Develop a local forestry or tree planting project or program	Resilience Air Quality Temperature Emissions Biodiversity Absorption	
6.19	Preserve natural areas through zoning or other regulations	Biodiversity Air Quality Temperature Absorption	
7.13	Conserve natural areas for species migration and ecosystem resilience (v3: Conservation of Natural Habitats)	Biodiversity Resilience Absorption	
7.12	Conserve, revegetate and reconnect floodplains and buffers in riparian areas (v3: Restoration of Floodplain & Riparian Buffers)	Biodiversity Resilience Water Quality	Hazard Mitigation
7.18	Use natural, nature-based or ecologically enhanced shoreline protection	Resilience Water Quality Biodiversity	Hazard Mitigation

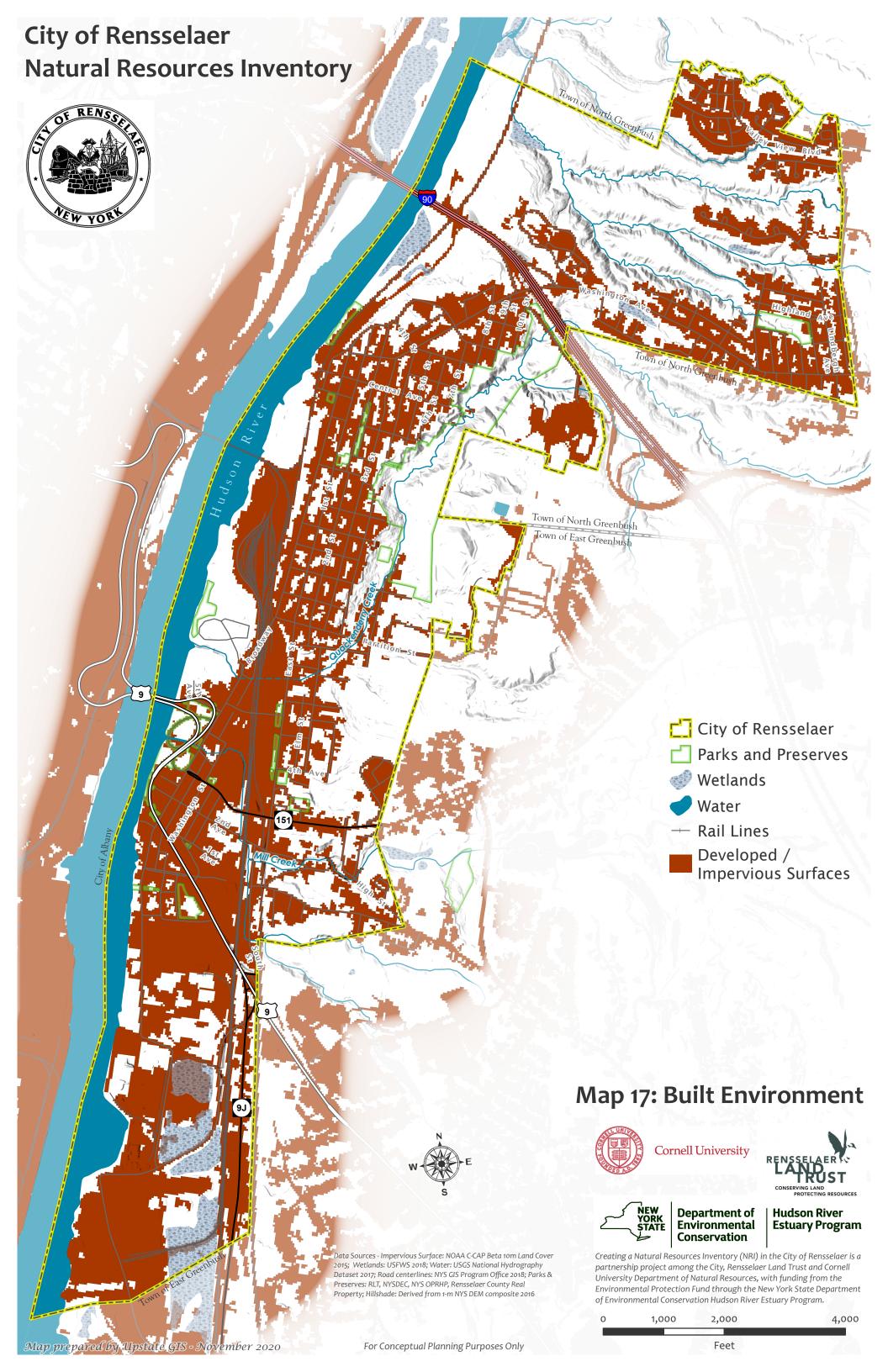
Section 6: Land Use

This section highlights the City's built environment; environmental remediation and permitted facilities; and conservation and recreation areas. The built environment map shows the areas of the City that are developed or impervious, the amount of which is substantial. Consequently, the report makes clear that it is important that natural resources that capture and retain stormwater, such as wetlands, are conserved and that, as Rensselaer continues to develop, green infrastructure is heavily incorporated into new construction.

There are several charts listing environmental remediation and permitted facilities and a subsection that describes government programs that address them. The conservation and recreation map subsection features a list of City parks.



Image 10: Veteran's Memorial Bridge on Broadway in Rensselaer



City of RENSSELAER Zoning **Zoning Update 2012** CENTRAL AVE IN LEGISLATION AVE City of RENSSELAER own of **NORTH** Town of Legend Historic Overlay District **Proposed Zoning** General Commercial (C-1) Light Industrial (I-1) Industrial (I-2) Downtown Mixed-Use (MU-1) Waterfront Mixed-Use (MU-2) Open Space and Conservation (OS) Planned Development District (PDD) Residential District #1 (R-1) Residential District #2 (R-2) 500 1,000 2,000 3,000 Map Prepared By: Bergmann associates architects // engineers // planners June 2012

Local Zoning Districts (Map 17) and Built Environment (Map 17A)

The Local Zoning Map (Map 17) shows that Rensselaer has nine distinct districts and one historic overlay district which encompasses two different areas on the southern waterfront. The districts correspond with § 179-5 of the City of Rensselaer Zoning Ordinance, which was adopted by the Common Council in 2012.

The Built Environment Map (Map 17A) uses data produced by the NOAA CCAP program from 2015-2017 land cover data to show developed and impervious surfaces. These surfaces primarily include pavement (such as roadways, parking lots, the Amtrak Railyard), buildings (such as homes/apartments, commercial/retail), and industrial facilities. Undeveloped areas are assumed to be open spaces or sites that have been cleared for future development, such as the property just north of the Dunn-Memorial Bridge and onramp. Map 17A does not depict developed "open space", such as lawns.

Table 15: Purpose and Intent of City of Rensselaer Zoning Districts

	Zoning District	Purpose and Intent
		Promote owner-occupied buildings and provide for areas within the City of Rensselaer that encourage lower-density residential property development
R-1	R-1 Single Family Residential	Encourage development and continuous use of lands for single-family homes that keep in character with existing neighborhoods located within these portions of the City
		Maintain a sustainable approach to residential development and the associated costs of service
		To ensure that future residential and commercial development respects the scale and character of existing neighborhoods in the City Provide a mix of housing options including
R-2	Residential, High Density	single-family and two-family homes in structures originally intended for two or more families, which preserve the historic nature of existing neighborhoods
		Provide for a walkable, pedestrian-oriented environment built around single-family and two-family residential dwellings on small City lots

		To promote well-designed large- and small-scale commercial development along the US Routes 9 and 20 corridor Provide a welcoming gateway into the City of
		Rensselaer through design standards that encourage consistent building design, facade materials, and structure orientation
C-1	General Commercial	Encourage signage that is consistent with the scale, context and materials established through design standards
		Create a pedestrian-oriented environment through building orientation, position of safe pedestrian accommodations including an interconnected network of sidewalks, landscaping, and rear or side lot parking development.
		To accommodate a mix of higher-density residential and commercial uses that will encourage a vibrant, walkable central core consistent with the historic character for the City Encourage both horizontal and vertical mixing of residential units with retail, restaurants, entertainment, and other commercial uses in order to create an active street life, enhance the vitality of businesses, and reduce vehicular traffic
		Retain a pedestrian-friendly scale to encourage walkability
MU- 1	Downtown Mixed-Use	Preserve the integrity of historically significant buildings
		Encourage new buildings and uses that are harmonious with the historic character of buildings, streets, and public spaces
		Encourage infill development Encourage carefully designed public spaces, on
		commercial and public properties and within the public right-of-way, that enhance the City's
		identity and encourage greater interaction among residents and visitors
		Strengthen connections between the train station, waterfront and the central business district

MU- 2	Waterfront Mixed-Use	Capitalize on the City of Rensselaer's waterfront and convenient access to water and rail transportation by encouraging a mix of residential, commercial, and public uses All private development, where applicable, in the Waterfront Mixed-Use District shall include public access directly adjacent to the water in the form of a twenty-five-foot easement from the mean high tide, which may be waived by the Planning Commission in cases which the City does not feel access is appropriate for reasons of public health, safety or welfare Encourage the horizontal and vertical mixing of residential units with retail, restaurants, entertainment and other commercial uses in order to create an active waterfront, enhance the vitality of businesses, reduce vehicular traffic and create a pedestrian-friendly waterfront Encourage building design, wayfinding, and signage that enhances the proximity of the Hudson River without diminishing views Promote public access to the waterfront and incorporate pedestrian amenities into site design
I-1	Light Industrial	Provide for areas in the City where light industrial uses have primarily been concentrated and to encourage future light industrial development. Light industrial uses must respect adjacent transitional areas through the incorporation of buffers, design guidelines, and compliance with performance standards
I-2	Industrial	Provide for areas where industrial uses have historically been concentrated and will be continued into the future Industrial operations, which are largely tied to the City's southern waterfront, must respect adjacent transitional areas through the incorporation of buffers, design guidelines, and compliance with performance standards
os	Open Space Conservation	Preserve the historic, scenic, recreational and environmental value of officially designated parkland, environmentally sensitive areas,

		heavily wooded areas, and other open spaces, which may or may not be accessible by the public Provide areas for the development of new passive and active parks, multi-use trails, and small-scale environmental interpretive sites
	PDD Planned Development District	Provide for the creation of a flexible zoning district to accommodate major new development or redevelopment efforts within the City of Rensselaer
PDD		Provides the mechanisms necessary to ensure compatibility among varied land uses, promote innovative and efficient land uses, and encourage quality site planning and design practices
		Intends to encourage a diversity of uses in a unified plan while ensuring adequate standards relating to public health, safety and general welfare of the public
		Preserve, maintain, and enhance the integrity of designated areas within the City that are historically significant or contain significant historic structures
		Provides a process for reviewing proposed alterations and restorations of historically significant structures
HOD Historic Overlay I	Historic Overlay District	Outlines a process for ensuring new development is consistent with the character of established historic districts and areas
		Identifies a means to deter demolition, inappropriate alterations, and neglect of historic or architecturally significant sites
		Fosters civic and community pride in local history and architectural beauty represented in the City's historic neighborhoods and buildings

Current Land Uses

The developed areas in the Northern Hills are mainly R-1 neighborhoods with single family homes. There are two PDDs, which are newly constructed townhomes and duplexes. These neighborhoods are known locally as Sterling Ridge and the Mansions. In the Western and Eastern Hills, the built environment is a large mix of single and two family homes. Either side of Broadway is zoned as MU-1.

The residential grid in the Western and Eastern Hills are zoned R-2. Notable developments in the Eastern and Western Hills include the Broadway Fire Station, Rensselaer Junior Senior High School, the Doane Stuart School, St. John's Church, the Boys and Girls Club, the St. Paul's Center, and the Bath Historic Overlay District.

Map 17 shows that MU-1 and C-1 zones cover the Development Plain. Map 17A shows that a large majority of this geographic area is impervious. The aerial view of the Development Plain (Maps 2A) shows that the impervious surfaces are largely pavement that fills the space between buildings with major arterials, parking lots, and the downtown street grid. Many of the buildings in the Development Plain are deeply set back from pedestrian amenities such as sidewalks and have surface level parking completely surrounding the facility. The updated zoning code is not permissive of this style of commercial development, as it requires 20% of all new development to be pervious. South and west of Route 9J, in the Development Plain, there is shown to be a mix of pervious and impervious surfaces in the Industrial Zone.

While the entire Industrial Zone is developed, there are wetlands which have been protected and enhanced as part of environmental remediation efforts and the site of the former Bayer Aspirin manufacturing facility, known locally as BASF, which is currently unoccupied with intermittent areas of green space. The former BASF site is not anticipated to remain green space, as it is likely it will be developed in the coming years. Notable institutions in the Development Plain include City Hall, the Rensselaer Police Department, the Fort Crailo Historic Site and Historic Overlay District, and the Amtrak Rensselaer Station.

The Shoreline is shown to be largely undeveloped. The majority of developed/impervious surfaces shown in this geographic area are roads, paved pathways, and parking lots. Notable sites along the shoreline include the Rensselaer Riverfront Park (also the trailhead for the Albany-Hudson Electric Trail [AHET]), DeLaet's Landing, the Kiliaen's Landing GEIS Study Area (see *Appendix C* for map of study area), and the Albany Yacht Club. There are also underutilized public spaces and

waterfront overlooks in the Fort Crailo District that should be considered in future planning efforts. The Kiliaen's Landing GEIS Study Area is the primary cluster of properties that the MU-2 zoning was written for. The Rensselaer Riverfront Park is not only the AHET trailhead, it is the beginning of our waterfront trail. The Rensselaer multi-use waterfront trail is being designed to connect with the public esplanade at DeLaet's Landing and from there, travel north along the Hudson River to the municipal boundary. Eventually, the waterfront trail is slated to run along the Hudson River for the length of the Rensselaer County Waterfront. Map 17A also reflects the observations from Map 3 – the developed portions of the city are located where the topography and sloping is the flattest, but there are single and multi-family homes woven throughout the steep slopes and plateaus at every end of the city.

The City's existing Open Space Zone encompasses parcels of land, such as the Hollow and most of the Northern Hills, which are undeveloped and are best kept that way. Permitted uses in the Open Space district are as follows: boat launch, cemeteries, open space, outdoor recreation and entertainment, and public swimming pools. There are no existing conservation or waterway protection overlay zones. It is imperative that this be explored and implemented in order to ensure the preservation of Rensselaer's natural resources as the City develops.

Future Land Uses

Typical of many cities, particularly geographically-compact cities, Rensselaer is generally built-out with very few large tracts of undeveloped land. The resulting mass of impervious surfaces generates excessive runoff, which can be detrimental to the quality of Rensselaer's streams and in a greater context, the Hudson River estuary as a whole. As Rensselaer continues to develop, the City can act to both encourage low impact development and also reduce existing pavement for better drainage to reduce flooding risk through sustainable and efficient stormwater management design. New York State's Stormwater Management Design Manual ("the Manual") should be referred to as a standard when the City considers new municipal and private development projects. The purpose of the Manual is to:

- protect the waters of the State of New York from the adverse impacts of urban stormwater runoff
- provide design standards on the most effective stormwater management approaches including: Incorporation of green infrastructure achieved by infiltration, groundwater recharge, reuse, recycle, evaporation/evapotranspiration through the use of green infrastructure

- techniques as a standard practice; Design and implementation of standard stormwater management practices (SMPs); Implementation of a good operation, inspection, and maintenance program
- To improve the quality of green infrastructure and SMPs constructed in the State, specifically in regard to their performance, longevity, safety, ease of maintenance, community acceptance and environmental benefit.⁵⁴

Each of these intents aligns with the City's goals to improve stormwater management practices and hold government and private business to the same standard. In addition, Using existing frameworks such as that of the Climate Smart Communities program and creating policies or design standards which promote the use of green infrastructure with all new development can help improve the health of Rensselaer's water quality and can promote absorption where it is needed the most. It is imperative that the City take action to implement these measures prior to the anticipated influx of new development that waterfront communities across the country are experiencing. The two geographic areas with the most realistic development potential in the City are the Shoreline and the Development Plan.

The Hudson River Shoreline

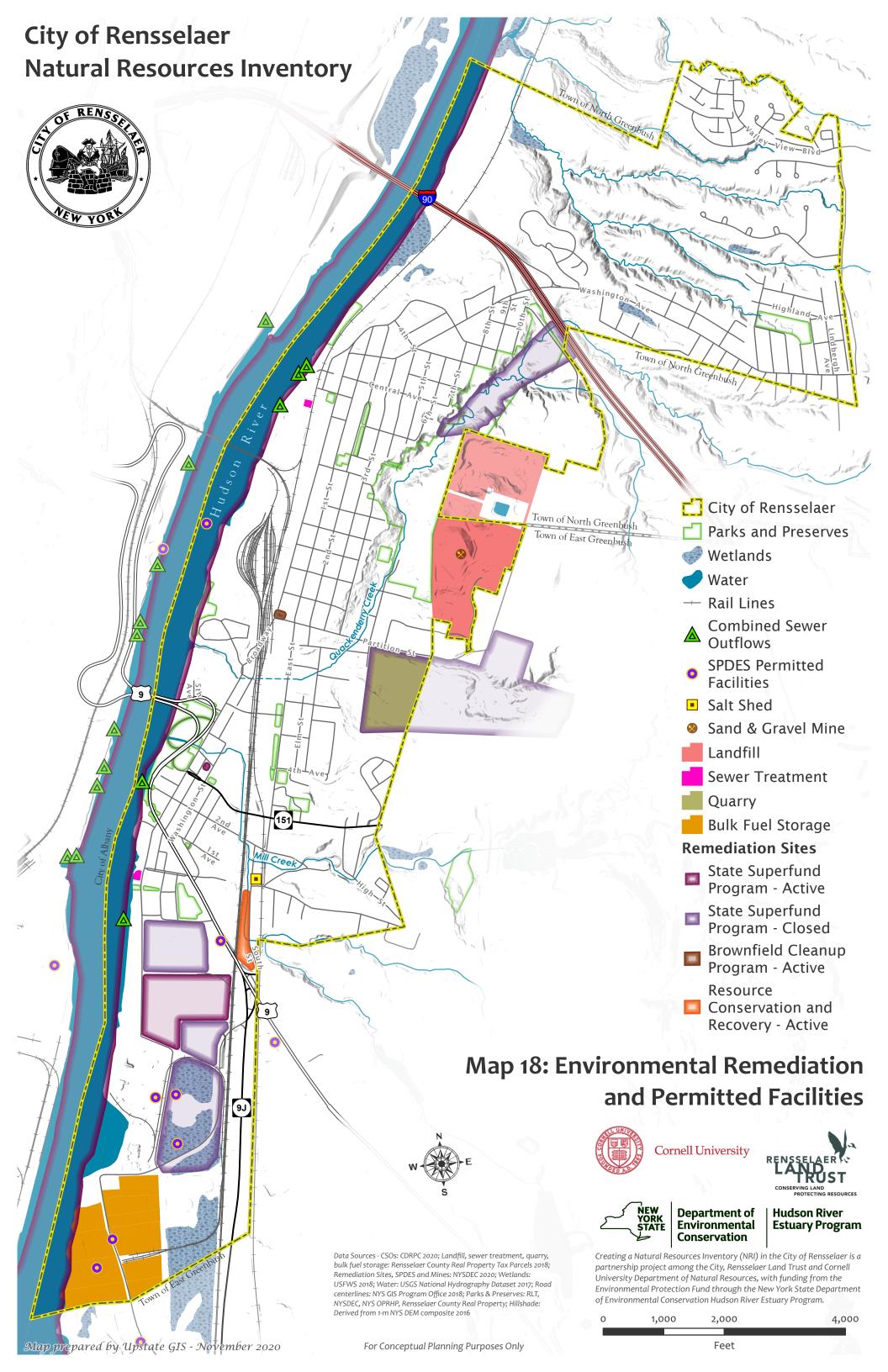
Rensselaer recognizes that attractive, sustainable development of its Hudson River waterfront is critical to the future of the City as a desirable place to live and work. As early as the 1980's, Kiliaen's Landing and other waterfront sites within the City have been the subject of numerous land use studies and development proposals. As a result of the Local Waterfront Revitalization Program (LWRP) update (July 2011), the City rezoned its waterfront areas to promote and encourage desirable development. The Kiliaen's Landing Generic Environmental Impact Statement (GEIS) laid the foundation for the future development of an approximately 75-acre area located adjacent to Hudson River. The Kiliaen's Landing Study Area encompasses the entirety of the Hudson Riverfront in Rensselaer that is north of the Livingston Avenue Bridge. With the recent groundbreaking of the DeLaet's Landing project, a significant waterfront project less than one mile south of the Kiliaen's Landing Study Area, the continued growth of the City and renewed interest by the general population provide numerous opportunities for revitalized urban living in Rensselaer.⁵⁵

⁵⁴ NYS Department of Environmental Conservation. (2015, January). New York State Stormwater Management Design Manual. https://www.dec.ny.gov/docs/water_pdf/swdm2015chptr01.pdf ⁵⁵ Clough Harbor Associates. (2018). Kiliaen's Landing GEIS. City of Rensselaer Planning Department.

The Southern Rensselaer Development Plain

As mentioned throughout this report and as exhibited in Map 3 (Climate Risk and Resiliency), the Development Plain is in an area that is in a 100-year flood plain. Being in a 100-year flood plain can be prohibitive of new development; this is largely due to the costs of insurance through the Federal Emergency Management Agency's (FEMA) National Flood Insurance Program (NFIP). The NFIP designates areas having a 1% chance of flood inundation as Special Flood Hazard Areas (SFHA). Homes and businesses in a SFHA with mortgages from government-backed lenders are required to have flood insurance.⁵⁶ In order for development to occur in the flood plain, newly constructed buildings must be raised out of the flood plain. Construction of buildings that are above the flood plain often creates new impervious surfaces which then must also be mitigated or they are otherwise not permissible. The impact that the 100-year flood plain has on development potential speaks to the importance of reducing the impervious surfaces in the Development Plain. While universal standards and mandated measures are primarily enforceable through local policy, the powers granted to local Planning Commissions by New York State combined with the site plan review considerations the City of Rensselaer Zoning Ordinance allow for this body to request or require more stringent stormwater mitigation measures for new development. In § 179-75(C)(5) of the Zoning Ordinance, adequacy of stormwater and drainage facilities is explicitly mentioned. While the Planning Department and the Common Council are able to enact planning and policy measures, review and accountability standards for new construction and redevelopment projects are invaluable for areas such as the Development Plain and are consistent with the goals identified in Section 1 of this report. The Planned Development District at DeLaet's Landing is an excellent example of stormwater mitigation and new construction. The first building, a 96 unit apartment building, sits atop a stormwater retention system that collects and filters runoff. The second building, which is slated for 84 residential units and a pool, will employ pervious pavement and silt fencing to help drain and filter stormwater runoff. These buildings, having utilized SUDS, are an excellent example of how new development can help reduce flooding city center and can be used by the Planning Commission as a precedent.

⁵⁶ Flood Insurance | FEMA.gov. (2021, January 8). Federal Emergency Management Agency. https://www.fema.gov/flood-insurance



Environmental Remediation and Permitted Facilities (Map 18)

State and federal agencies regulate many types of facilities to maintain environmental quality and public health. The New York State Department of Environmental Conservation (DEC) has created an online web map, the DECinfo Locator,⁵⁷ which provides digital access to regularly updated DEC documents and public data about the environmental quality of specific sites. They are also shown on the Environmental Remediation and Permitted Facilities Map.

SPDES Permit Sites

New York's State Pollutant Discharge Elimination System (SPDES) program is intended to control of surface wastewater and stormwater discharges in accordance with the Clean Water Act. Permits are required for constructing or using an outlet or discharge pipe (i.e. a "point source") discharging wastewater to surface waters or ground waters of the state and disposal systems such as a sewage treatment plant.⁵⁸

The table below includes SPDES Permit Sites.

Table 16: SPDES Permit Sites in the City of Rensselaer

SPDES Permit #	Name of Permitted Facility	
NY0006220	CENEX TERMINALS	
NY0026026	RENSSELAER -C COMBINED SEWER OVERFLOWS	
NY0028444	APEX OIL - RENSSELAER TERMINAL	
NY0028843	SPRAGUE OPERATING RESOURCES LLC	
NY0212369	GORMAN TERMINALS LLC	
NY0212580	Rensselaer Engineered Fuels Mechanical Biological	
IN 10212500	Treatment Solid Waste Processing Facility	
NY0212946	INDUSTRIAL CHEMICALS & SOLVENTS FACILITY	
NY0241148	AMRI RENSSELAER	
NY0242586	RENSSELAER COGEN FACILITY	
NY0267546	EMPIRE POWER PLANT	
NY0271489	BESICORP-EMPIRE RECYCLED NEWSPRINT	
1 1 1 0 2 / 1 4 0 9	FACILITY	

⁵⁸ "State Pollutant Discharge Elimination System (SPDES) Permit Program." NYS Department of Environmental Conservation. https://www.dec.ny.gov/permits/6054.html.

⁵⁷ DECInfo Locator, https://www.dec.ny.gov/pubs/109457.html

Descriptions of each permitted facility and its operations are below.

APEX Oil and CENEX Terminals (SPDES Permit #'s: NY0006220, NY0028444) - Petroleum manufacturing company that is a subsidiary of APEX Oil. Apex Oil Company, Inc. provides wholesale distribution, storage and transportation of petroleum products including asphalt, kerosene, fuel oil, diesel fuel, heavy oil, gasoline and marine bunkers.⁵⁹

City of Rensselaer CSO (SPDES Permit #: NY0026026) - The Capital District Regional Planning Commission has taken the lead in organizing a consortium to develop a comprehensive inter-municipal Phase I Long-Term Control Plan (LTCP) for Combined Sewer Overflows (CSO: overflows from combined storm & sanitary sewers) discharging into the Hudson River Estuary. The participating Albany Pool communities are the Albany Water Board; the cities of Cohoes, Rensselaer, Troy and Watervliet; and the Village of Green Island. Each community currently has its own State Pollutant Discharge Elimination System (SPDES) permit. The Albany & Rensselaer County Sewer Districts are also partners in the consortium. The Albany Pool of the Hudson River currently has 92 Combined Sewer Overflow points. There are 7 CSOs in the City, down from 12 in recent years. Combined sewer systems are designed to discharge directly to surface bodies of water such as rivers, estuaries, and coastal waters during wet weather when total flows exceed the capacity of the combined sewer system or the treatment plant. In 2007, the Pool Communities began working together to develop a joint Long <u>Term Control Plan.</u> The plan was created to study the current health of the Hudson River, identify programs and projects that will aid in the clean-up of the river, and through a sophisticated modeling system and post construction testing program, and demonstrate the effectiveness of the program. Working with the Department of Environmental Conservation, the Pool communities will implement more than 50 projects and programs that will significantly improve the water quality of the Hudson River and its tributaries.⁶⁰

Sprague Operating Resources (SPDES Permit #:NY0028843) - Independent natural gas supplier.⁶¹

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⁵⁹ A. (n.d.). About Apex Oil. Retrieved December 07, 2020, from https://apexoil.com/about-apex/

⁶⁰ Daley, M. (2019, May 30). Albany Pool Communities Combined Sewer Overflow Long Term Control Plan. Retrieved December 07, 2020, from https://cdrpc.org/programs/water-quality/combined-sewer-overflow-cso

⁶¹ Sprague Energy. About. (n.d.). Retrieved December 07, 2020, from https://www.spragueenergy.com/about

Gorman Terminals (SPDES Permit #: NY0212369) – The largest deep-water asphalt terminal on the East Coast, a rail facility terminal, an asphalt emulsion-manufacturing plant, transportation facilities and pavement preservation services.⁶²

Rensselaer Engineered Fuels (SPDES Permit #: NY0212580) – Technology, products, and services include: food waste digesters, data analytics tools, and sophisticated facilities for processing municipal solid waste.⁶³

Industrial Chemicals and Solvents Facility (AMRI) (SPDES Permit #'s: NY0212946, NY0241148) – A global contract research and manufacturing organization that partners with the pharmaceutical and biotechnology.⁶⁴

Rensselaer CoGen Facility (SPDES Permit #: NY0242586) – A 104-megawatt nameplate capacity electric power generation combined cycle facility. The facility uses a Westinghouse combustion turbine, Zurn heat recovery steam generator, and a Mitsubishi steam turbine, and has dual-fuel capability using natural gas or fuel oil. Rensselaer interconnects into the New York Independent System Operator in Zone F.CCI acquired Rensselaer in 2012.⁶⁵

Empire Power Plant (SPDES Permit # NY0267546) – A 635-MW combined cycle natural gas turbine power plant.⁶⁶

BesiCorp - Empire Recycled Newsprint Facility (SPDES Permit #NY2711489) -a cogeneration/newspaper recycling company.⁶⁷

NYS DEC Permitted Bulk Storage Facilities⁶⁸

The NYS DEC has developed permitting programs which address bulk storage of storage of petroleum and hazardous substances/chemicals; these programs include

⁶² G. (n.d.). Materials. Retrieved December 07, 2020, from http://www.gormanroads.com/

⁶³ B. (n.d.). About: BioHiTech. Retrieved December 07, 2020, from https://renewables.biohitech.com/about

 $^{^{64}}$ Å. (2018, May 01). About Us. Retrieved December 07, 2020, from https://www.amriglobal.com/about-us/

⁶⁵ Power Assets. (n.d.). Retrieved December 07, 2020, from https://www.cci.com/assets/power

⁶⁶ Empire Generating. (n.d.). Retrieved December 07, 2020, from https://www.ecpartners.com/portfolio/empire-gen-holdings-inc

⁶⁷ Cannistraci, C. (2000, July 20). Empire, Besicorp present plans for Rensselaer. Retrieved December 07, 2020, from https://www.dailyfreeman.com/news/empire-besicorp-present-plans-for-rensselaer/article_94494d04-8ad7-5751-931f-81d55ff1af28.html

⁶⁸ N. (2020). Bulk Storage Facilities in New York State, Energy & Environment (pp. 1-19630) (United States, New York State Department of Environmental Conservation, Division of Environmental Remediation). Albany, New York: NYS DEC.

Petroleum Bulk Storage (PBS), Chemical Bulk Storage (CBS), and Major Oil Storage Facility (MOSF) permits. Across the state, there have been instances of spills of petroleum or chemicals that have caused groundwater contamination including some public water supplies. These programs were designed to prevent improper handling and storage of such materials, which can result in these spills that threaten the environment or pose health and safety risks to nearby persons. These programs requirements have been developed to account for the safe storage and handling of these materials, inspection programs to verify that these requirements are being met, and enforcement procedures to require that violations be corrected and deter future noncompliance.

The DEC has records for sites which hold permits that are active, inactive, and unregulated or closed. While not all of these facilities are not shown on the Map 18, they are inventoried in this report. The charts below identify the number of active permits based on the site type as defined by DEC as of 2020.

Petroleum Bulk Storage Facility 69

These locations are regulated under the NYS Petroleum Bulk Storage (PBS) program, which applies to facilities that store more than 1,100 gallons of petroleum in aboveground and underground storage tanks.⁷⁰ Sites with Petroleum Bulk Storage permits are listed below.

Table 17: Facilities with Active Petroleum Bulk Storage Permits in the City of Rensselaer

Site Type Name	Program Facility Name	Address
Apartment	MICHELI CONTRACTING	95 LAWRENCE ST
Building/Office Building	CORP.	95 LAWKENCE 51
Manufacturing (Other		
than	AMRI - RENSSELAER	33 RIVERSIDE AVENUE
Chemical)/Processing		
Manufacturing (Other	RENSSELAER IRON &	
than	STEEL INC.	35 RIVERSIDE AVENUE
Chemical)/Processing	STEEL INC.	

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⁶⁹ N. (2020). Bulk Storage Facilities in New York State, Energy & Environment (pp. 1-19630) (United States, New York State Department of Environmental Conservation, Division of Environmental Remediation). Albany, New York: NYS DEC.

⁷⁰ "Bulk Storage of Chemicals, Petroleum, and Liquefied Natural Gas." NYS Department of Environmental Conservation. https://www.dec.ny.gov/chemical/287.html.

Manufacturing (Other than Chemical)/Processing	V ZAPPALA & CO INC	BROADWAY & FIFTH AVE
Municipality (Incl. Waste Water Treatment Plants, Utilities, Swimming Pools, etc.)	CITY OF RENSSELAER D.P.W.	25 WILLOW ST
Other	COMPUTER SCIENCE CORPORATION	327 COLUMBIA TURNPIKE
Other	FORBES AVE PUMP STATION	FORBES AVE
Other	POLSINELLO FUELS INC.	241B RIVERSIDE AVE
Other	RENSSELAER COGEN	39 RIVERSIDE AVENUE
Other	S.A. DUNN & COMPANY	209 PARTITION STREET EXTENSION
Other	WALTER S PRATT & SONS INC	317 COLUMBIA ST
Other Wholesale/Retail Sales	ALBANY YACHT CLUB INC.	75 BROADWAY
Retail Gasoline Sales	651 - ARUNA PRAKASH	50 COLUMBIA ST
Retail Gasoline Sales	652 - AMAN ONE INC	69 COLUMBIA ST
Retail Gasoline Sales	LUKOIL # 58780	1208 WASHINGTON AVENUE
Retail Gasoline Sales	POLSINELLO FUELS, INC	241 RIVERSIDE AVE
Retail Gasoline Sales	RENSSELAER ONE STOP CORP	9 THIRD AVE
Retail Gasoline Sales	STEWART'S SHOP # 262	12 PARTITION STREET
Trucking/Transportation /Fleet Operation	A R G TRUCKING CORP.	161 RIVERSIDE AVE
Trucking/Transportation /Fleet Operation	STAATS EXPRESS INC	550 SOUTH ST

Chemical Bulk Storage Facility

These locations are regulated under the NYS Chemical Bulk Storage (CBS) program which applies to facilities that store a "hazardous substance" listed in 6 NYCRR Part 597 in an aboveground storage tank larger than 185 gallons, any size underground storage tank, with some exceptions, or in a non-stationary tank used to store 1,000 kg or more for a period of 90 consecutive days or more.⁶⁶ Sites with Chemical Bulk Storage permits as of 2020 are below.

Table 18: Facilities with Active Chemical Bulk Storage Permits

Site Type Name	Program Facility Name	Address
Chemical	AMRI-RENSSELAER	33 RIVERSIDE
Manufacturing	AWKI-KENSSELAEK	AVENUE
Manufacturing		
(Other than	RENSSELAER IRON & STEEL, INC.	35 RIVERSIDE
Chemical)/Processi	RENSSELAER IRON & STEEL, INC.	AVENUE
ng		
Other	RENSSELAER COGEN	39 RIVERSIDE
Other	RENSSELAER COGEN	AVENUE
Storage	CENEX RENSSELAER TERMINAL,	54 RIVERSIDE
Terminal/Petroleu	L.L.C.	AVENUE
m Distributor	L.L.C.	AVENUE
Storage	SPRAGUE OPERATING RESOURCES,	58 RIVERSIDE
Terminal/Petroleu	LLC.	AVENUE
m Distributor	LLC.	AVENUE
Utility (Other than	EMPIRE GENERATING CO, LLC	75 RIVERSIDE
Municipal)	EMITINE GENERATING CO, LLC	AVENUE

Major Oil Storage Facility

These locations are regulated under the NYS Oil Spill Prevention, Control and Compensation Act, which requires regulation of all oil terminals and transport vessels operating in the waters of the State that have a storage capacity of 400,000 gallons or more.⁷¹ Sites with Major Oil Storage Facility permits as of 2020 are on the following page.

Table 19: Facilities with Active and In Service Petroleum Bulk Storage Permits

Site Type Name	Program Facility Name	Address
Railroad	RENSSELAER MAINTENANCE FACILITY	675 BROADWAY
Storage Terminal/Petroleum Distributor	GORMAN TERMINALS LLC	290 RIVERSIDE AVENUE
Storage Terminal/Petroleum Distributor	CENEX RENSSELAER TERMINAL, LLC	54 RIVERSIDE AVENUE

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⁷¹ "Regulation of Major Oil Storage Facilities." NYS Department of Environmental Conservation. https://www.dec.ny.gov/chemical/2644.html.

Storage Terminal/Petroleum Distributor	SPRAGUE RENSSELAER TERMINAL	58 RIVERSIDE AVENUE
Utility (Other than Municipal)	EMPIRE GENERATING CO, LLC	75 RIVERSIDE AVENUE

Salt Bulk Storage Facility

These facilities are locations where road salt and other materials used for snow and ice operations by public works and roadway agencies are stockpiled. The City of Rensselaer Salt Shed is the only facility of this nature within the municipal boundary and it is located on South Street between two Amtrak rail lines.

State Superfund Sites

The NYS Superfund Program is an enforcement program whose goal to identify and characterize suspected inactive hazardous waste disposal sites and to ensure that those sites which pose a significant threat to public health or the environment are properly addressed. These are locations where a presence of a consequential amount of hazardous waste has been confirmed and to which various tracking, remediation, environmental management and reporting requirements apply. There are 15 such sites in the Rensselaer. ⁷² They are identified in the chart on the following page.

A description of <u>NYS Superfund Programs</u> and <u>NYSDEC Site Classifications Codes</u> are available through the DEC website.

Table 20: NYS Superfund Sites in the City of Rensselaer

Site Name	Program	Site Class	Address
Ashland Distribution	RCRA	A	South Street
BASF	HW	4	36 Riverside Avenue
BASF - Manufacturing Plant	HW	2	36 Riverside Avenue
BASF - Corporation "South 40"	ВСР	С	36 Riverside Avenue
BASF - Corporation Closed Landfill	VCP	С	36 Riverside Avenue
BASF - Corporation South 40 Parcel	VCP	N	36 Riverside Avenue

⁷² "State Superfund Sites." NYS Department of Environmental Conservation. https://www.dec.ny.gov/chemical/8439.html.

BASF - Wyandotte Corporation	HW	4	36 Riverside Avenue
Former City of Rensselaer Landfill	HW	С	Partition Street
NM - Rensselaer MGP	HW	A	Washington St
NM - Rensselaer MGP	VCP	N	Washington St
Rensselaer Riverfront Site	ERP	N	River Road
Rensselaer Wyck Target Range	HW	С	10th Street
Sterling Drug Site 1	HW	4	33 Riverside Avenue
Tim Bayly Property	ВСР	С	800 Broadway
Tim Bayly Property - Off-Site	ВСР	С	800 Broadway

The sites shown on Map 18 also indicate which sites are active and which are closed out.

Active superfund sites include the Rensselaer Riverfront Site, the BASF Site, and the NM – Rensselaer MPG Site. Sites that are active with through the Conservation and Recovery Program include the Ashland Distribution Site, which is denoted the map in orange.

Ashland Chemical Company

The Ashland site is approximately 4.8 acres in size and is located at 130 South Street in the City of Rensselaer, Rensselaer County, New York. The main site area is bordered by CSX Transportation and rail lines to the west, undeveloped land to the north, South Street to the east, and Columbia Turnpike to the south. The commercial history of the site began in 1892 when a slaughter house occupied the southern portion of the site. Chemical related industry began in 1909 when Empire Size and Chemical Corporation acquired the site and continued through successive owners until Ashland purchased the site in 1969 from Eastern Chemical.

Groundwater at the facility is contaminated with chlorinated volatile organic compounds (CVOCs). Concentrations of these CVOCs exceed New York State standards for a number of contaminants including tetrachloroethylene (PCE), trichloroethylene (TCE), benzene, toluene, ethylbenzene, xylene (BTEX), vinyl chloride and number of breakdown products (cis-1,2-DCE and trans-1,2-DCE).

The remedy for the site was approved by EPA, in consultation with the New York State Department of Conservation (NYSDEC) and New York State Department of Health (NYSDOH), in 2009, was started in 2010, and includes the following components: on-site enhanced bio attenuation (enhancement of natural microbiological processes that degrade chlorinated compounds by introducing organic compound sources (e.g.

molasses, emulsified vegetable oil) to the impacted groundwater); monitored natural attenuation, groundwater monitoring, institutional and engineering controls, and groundwater monitoring and if necessary, evaluation of additional vapor monitoring at the downgradient former Volvo Service Center.

Cleanup measures that were previously implemented include the excavation and onsite treatment by enhanced aeration techniques of 6,000 cubic yards of contaminated soil; and installation of a buried culvert to isolate a small unnamed creek that runs through the site. The site has most recently been used by Ashland for a chemical distribution facility, however these operations were discontinued in 2001. ⁷³

BASF

The BASF Superfund Site is the most prominent environmental remediation project in the City. The former manufacturing site produced dyestuffs beginning in the 1880s. BASF acquired the property in 1978 and manufactured dye related products until the facility was closed in 2000. BASF has invested more than \$20 million in the environmental investigation and cleanup of the property. This work – which included removal and/or capping of contaminated soil, installation of an on-site groundwater treatment system and installation of a groundwater containment system that prevents groundwater from moving off-site – has been completed by BASF through a cooperative relationship with the New York State DEC. ⁷⁴

The goal of the cleanup plans and activities for this site is to achieve cleanup levels that protect public health and the environment. The key components of the remedy are:

- Installation of facilities, including a structure to store and process the sediment and a sediment water treatment system (completed in 2018).
- Installation of a steel bulkhead (completed in 2018).
- Dredging to remove approximately 40,000 cubic yards of river sediment that exceeds the site-specific sediment cleanup objectives (e.g., dichlorobenzene, lead). Dredged sediments will be disposed off-site at a facility permitted to accept the material. (Dredging commenced in 2018 and a total of 8,500 cubic yards of contaminated sediment was excavated. Dredging is scheduled to be completed this construction season).
- Restoring the dredged areas with appropriate riverbed material.

⁷³ Environmental Protection Agency. (2015, October). Hazardous Waste Cleanup: Ashland Chemical Company in Rensselaer, New York. US EPA. https://www.epa.gov/hwcorrectiveactionsites/hazardous-waste-cleanup-ashland-chemical-company-rensselaer-new-york

⁷⁴ BASF. (2011, September 21). BASF opens new environmental education classroom and wildlife habitat in Rensselaer, New York [Press release]. https://www.basf.com/us/en/media/news-releases/2011/09/p-10-0083.html

- Monitoring the remediated/restored areas.
- Implementation of a Community Air Monitoring Plan (CAMP) during all intrusive activities.
- Implementation of a Site Management Plan (SMP) for long-term maintenance of the remedy.
- Recording of an Environmental Easement to ensure implementation of the SMP.⁷⁵

In 2011, BASF celebrated the opening of its environmental education classroom and wildlife habitat at Riverside Ave. site and declared the property ready for redevelopment. The 90-acre site along the Hudson River now has a 10 acre wildlife habitat and 40 acres of developable property available for redevelopment. The remaining 40 acres are leased to Empire Generating Company which operates a natural gas power plant on the property.⁷⁶

In 2020, NYS DEC authorized involve the dredging of approximately 260 cubic yards of material from an approximate 0.11 acre area located behind an existing wooden bulkhead in the intertidal zone of the Hudson River, to facilitate the creation of 0.17 acres of wetland, including 0.05 acres of deep marsh in the intertidal zone, 0.08 acres of shallow marsh in the mid-intertidal zone, and 0.04 acres of scrub shrub wetland along the mean high tide elevation of the river. In addition, fifteen (15) 12-inch diameter timber piles will be installed directly abutting the existing wooden bulkhead to stabilize and provide protection from ice flows and associated shear stress along the river during seasonal times of the year. These timber piles will also be anchor points for six (6) turtle basking platforms that will be 10 feet long by 3 feet wide, and will extend a maximum of 3 feet from the existing wooden bulkhead. All work is being conducted as a result of compensation for Natural Resource Damages in association with an Order of Consent (dated February 23, 2017) between the New York State Department of Environmental Conservation (NYSDEC) and BASF Corporation.⁷⁷

Transfer Station

There are no transfer stations within the City of Rensselaer's municipal boundaries.

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⁷⁵ NYS Department of Environmental Conservation. (2018, June). Cleanup Action to Begin at State Superfund Site. NYS Department of Environmental Conservation Fact Sheet. https://www.dec.ny.gov/data/der/factsheet/442027cubegins.pdf

⁷⁶ BASF. (2011, September 21). BASF opens new environmental education classroom and wildlife habitat in Rensselaer, New York [Press release]. https://www.basf.com/us/en/media/news-releases/2011/09/p-10-0083.html

Dunn Mine and Construction and Debris Landfill

There is one construction and debris (C&D) landfill that is currently operating in the City, the Dunn Mine and C&D Debris Landfill.

The Dunn facility has been the location of sand and gravel mining since the 1890s. After the New York State Legislature enacted the Mined Land Reclamation Law in 1975, DEC issued the first mining permit for the Dunn facility in 1984, following an environmental review and the submission of a Full Environmental Impact Statement (EIS). After another round of environmental review in the early 1990s, including noise and traffic studies and a public hearing, the mine site was expanded from eight acres to 51 acres. As part of the permitted expansion of the site in 1993, the Dunn facility was subject to designated truck routes, truck counts, hours of operation, and other operational requirements. The mining permit was renewed and modified several times between 1993 and 2012, including modifications related to aid the construction of the school and to account for changes in ownership. In 2012, the operator applied to DEC for another modification to the permit to allow for a phased conversion of the sand and gravel mine to a C&D disposal facility. The permit application process included the submission of an additional Full Environmental Impact Statement and noise mitigation and traffic studies. DEC was lead agency for the coordinated environmental review and provided public notice and a public hearing at Rensselaer City Hall. After the environmental review process was completed, and after finding that the application met all applicable regulatory standards and requirements, DEC issued the combined solid waste and mining permit, effective July 20, 2012. This permit has since been further renewed and modified, including the operator's construction of a new water tower for the City of Rensselaer. The current permit is in effect and is scheduled to expire on July 19, 2022. DEC maintains active and continuous monitoring and inspections of the Dunn facility to ensure that its operations remain in compliance with all applicable environmental laws and regulations and to allow DEC to quickly respond to any actual or potential violations or other concerns. In addition to the daily inspections undertaken by the fulltime on-site monitor DEC required in the 2019 order, since July 2, 2019, DEC staff have been diligently responding to community concerns and performing after-hours and weekend odor inspections nearly every day. DEC staff also visit the Dunn facility regularly during normal business hours to ensure compliance with the permit and all outstanding DEC enforcement measures and to identify any potential areas of concern for further action.

DEC is undertaking comprehensive measures to identify, quantify, and reduce odors from the solid waste placement at the Dunn facility. DEC initiated active odor monitoring by installing four hydrogen sulfide (H2S) Acrulog pole-mounted samplers at strategic locations around the perimeter of the Dunn facility. These samplers are an effective screening tool to detect H2S odors. After receiving public input, on August 14, 2019, DEC relocated one of the monitors from its previous location on Ninth Street, where detections were minimal, to its current location at Garden Place near Quackenderry Creek. These devices sample and record H2S data every 10 minutes, and the resulting data are then compiled and analyzed by DEC. To date, monitors have recorded low levels of H2S, although data acquired from the Acrulogs have indicated elevated 10-minute results, which coincided with operational issues at the Dunn facility that required DEC to respond. Additional DEC review and interpretation of this sampling data indicate times when short-term odor events may have been noticed by residents. DEC will continue to actively monitor the results and if values become elevated, require an appropriate responsive and corrective action. Gas collection and cover measures have been implemented on-site to address odors and DEC is requiring these measures be expanded and enhanced to address community concerns. Additional information regarding the upcoming enhancements will be included in future Community Updates.⁷⁸

4-C's Development Corporation/Cristo's Construction and Demolition Debris Landfill

Also along Partition Street is the site of the former 4-C's Development Corporation (4-C's) demolition debris site.

In 1988, the 4-C's Corporation sought a permit from NYSDEC to construct and operate the 12.4 acre demolition and debris site for the former Cristo Mine. Of the 12.4 acres, about 5.5 are in the City of Rensselaer. The remaining acres cross the municipal boundary into the neighboring town of North Greenbush. This permit would allow the site to accept C&D from Cristo's Construction and Demolition (Cristo's). In 1993, Cristo's organized with the town supervisor of North Greenbush to file an application with NYSDEC to renew the permit for the site and modify the permit to allow the landfill to accept waste from sites not demolished by Cristo's. The permit renewal application received a Positive Declaration after going through the SEQR process in 1994. The impacts associated with the increases in facility operation involved increased

⁷⁸ NYS DEC Region 4. (2019, September). Dunn Mine and C&D Debris Landfill Monitoring and Enforcement. NYS DEC Region 4 Community Update, 1-4.

traffic and noise and less effective control over the waste stream. Construction and operation was suspended until 4-C's complied with all local laws. In 1998, following the GEIS process and numerous public hearings, DEC issued a conditional permit to comply with solid waste regulations. This permit expired in 2003 and another operating permit was issued in 2008, which expired in 2013. The permit was renewed until 2018 and in 2018, the permit was re-issued and is set to expire in 2023.

NM - Rensselaer MGP

The "NM - Rensselaer MGP" Washington Street site is the Rensselaer a former Manufactured Gas Plant (MGP) Site is a 0.3 acre site located at 89 Washington Street in the City of Rensselaer, Rensselaer County, NY. Site Features: The entire site is covered by asphalt, used as a parking lot, and is generally flat with a slight decline to the southeast. The site is abutted to the northwest by Academy Street, to the southwest by commercial buildings, to the southeast by Washington Street, and to the northeast by Huyck Square and undeveloped land. Huyck Stream is located approximately 200 feet north of the site. Current Zoning and Land Use: The site is currently used as a parking lot and is located in an area zoned for downtown mixed use (e.g., commercial/residential) and planned development district land use. There are no structures on the site. Past Use of the Site: Manufactured Gas Plant operations, which caused the site contamination, occurred at the site from approximately 1870 to 1920. Historically a number of MGP structures were present on the site, including two gas holders, a tar well, a retort house, coal shed, purifier and condenser rooms, and a meter room. Site Geology and Hydrogeology: The overburden, in descending order from the ground surface consists of fill, silt and sand, sand and gravel, and glacial till underlain by bedrock. Bedrock is encountered at a depth ranging from approximately 23 to 28 feet below grade. Groundwater depth across the site ranges from 6 to 8 feet below ground surface. The direction of flow in the vicinity of the site is north-northeast toward Huyck stream.

Soil, groundwater and sediment were analyzed for volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), metals, polychlorinated biphenyls (PCBs), and pesticides. Based upon investigations conducted to date, the primary contaminants of concern at the site include benzene, ethylbenzene, toluene, xylene (BTEX) and polycyclic aromatic hydrocarbons (PAHs) which are impacting the soil and groundwater.

Contaminated groundwater at the site is not used for drinking or other purposes and the site is served by a public water supply that obtains water from a different source not affected by this contamination. People are not expected to come into contact with the contaminated soil unless they dig below the surface. Volatile organic compounds in the groundwater may move into the soil vapor (air between soil particles), which in turn may move into overlying buildings and affect the indoor air quality. This process, which is similar to the movement of radon gas from the subsurface into the indoor air of buildings, is referred to as soil vapor intrusion. The site is currently unoccupied and used as a parking lot. However, the potential exists for people to inhale site contaminants in indoor air due to soil vapor intrusion in any future on-site buildings which are developed and occupied. Environmental sampling indicates soil vapor intrusion is not a current concern for off-site buildings.⁷⁹

Rensselaer Riverfront Site

The "Rensselaer Riverfront Site" River Street Superfund Site is 1.33 acres of vacant land, formerly the site of the City of Rensselaer's waterworks. All structures on the property were demolished and the land left vacant. There has been some illegal dumping, primarily C&D material. Property did not reach a threshold of being a contaminated site and the application for the Brownfield Cleanup Program was denied.⁸⁰

Rensselaer Wyck Target Range

Historically, this site in the Hollow was part of Rensselaerwyck Manor, a large landholding established by Kiliaen Van Rensselaer in 1629. An 11-acre section of the site was used by the New York National Guard as the Rensselaerwyck Target or Rifle Range from approximately 1894 to 1938. The property comprising the Hollow Site was transferred to the City of Rensselaer in 1959 from the State of New York. The Hollow Site remains under City ownership. A concrete bunker, which served as the target-mounting location for the range, remains at the foot of a steep, earthen embankment (bunker hill) on the northern portion of the Hollow Site.

A Phase I Environmental Site Assessment (ESA) was conducted at the site in May 2011 by Malcolm Pirnie. The ESA identified evidence of potential recognized environmental conditions (RECs) associated with the site, as defined by the American Society for Testing and Materials (ASTM) Standard E 1527-05 guideline for Phase I ESAs. Included

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NYS Department of Environmental Conservation. (n.d.). Environmental Remediation Databases NM - Rensselaer MGP. https://www.dec.ny.gov/cfmx/extapps/derexternal/haz/details.cfm
 NYS Department of Environmental Conservation. (n.d.). Environmental Remediation Databases
 Rensselaer Riverfront Site. https://www.dec.ny.gov/cfmx/extapps/derexternal/haz/details.cfm

in the potential RECs identified in the Phase I ESA was the use of a 2 portion of the Hollow property as a rifle range for almost 50 years. The results of a subsequent Phase II ESA conducted by Malcolm Pirnie at the site in August 2012 demonstrated that the former rifle range was a REC, whereas the other potential identified RECs in the Hollow area did not represent environmental concerns. The results of environmental investigations conducted during the Phase II ESA indicated that contaminants associated with ammunition, predominantly lead and copper, were found in soil in the bunker hill (upper berm) behind the target area of the historic rifle range at concentrations exceeding USEPA Residential Regional Screening Levels and 6 New York Code of Rules and Regulations (NYCRR) Part 375 Restricted Residential Soil Cleanup Objectives (SCO). In accordance with the DER10 Technical Guidance for Site Investigation and Remediation (DER-10), the 6 NYCRR Part 375 Restricted Residential Use Standards are appropriate for active recreational uses with a reasonable potential for soil contact, and were established as the objectives of the Hollow Site remediation.

The primary objective of the Hollow Site remedy was established to eliminate potential human health risks related to the presence of the heavy metals present in surface and subsurface soil by eliminating the potential for direct contact between potential receptors and the contaminated soil. This was to be accomplished by removing the soil from the site and transporting it for disposal at an offsite facility permitted to receive materials of the quantity and character identified in the previously-described investigations. Based on the results of the investigations, an estimated 550 tons of soil were identified as potentially affected by the prior use of the site as a rifle range. This material was planned for removal and disposal. On April 28, 2016, PCS seeded and mulched the bunker area of the site. The staging and site entrance areas were restored to pre-construction conditions on March 4, 2016. PCS also restored the existing gravel trail that led to the bunker area. Additional gravel was imported to restore the pathway to pre-construction conditions. Site restoration was completed on April 28, 2016.

Sterling Drug Site 1

This site is a former disposal area located on an 11 acre section of the former Sterling Drug (Sterling) property (now owned by Albany Molecular Research Incorporated (AMRI))nearly adjacent to the Port of Rensselaer. Site Features: Sterling is located approx. 1,000 feet east of the Hudson River. A residential area (the Fort Crailo

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⁸¹ Arcadis Design and Consultancy. (2016, December). REMEDIAL ACTION COMPLETION REPORT (RACR) Hollow Site Remediation (No. 96290514).

https://www.dec.ny.gov/data/DecDocs/442042/Report.HW.442042.2016-12-

^{01.}Remedial_Action_Completion_Report-FER.pdf

neighborhood) is directly north of the site. The BASF Manufacturing Plant (Site No. 442027) borders Sterling to the south. The former disposal area is now entirely covered by pavement and buildings. Current Zoning/Use: The AMRI property is zoned industrial. AMRI provides integrated drug discovery, development and manufacturing services. Past Use of the Site: It is reported that the area was used for disposing hazardous and industrial wastes (that were generated by Sterling Drug) prior to 1947. Site Geology and Hydrogeology: The stratigraphy at Sterling consists of highly permeable sediments (silty sand) with clayey silt found between 7 and 11 feet. These sediments create a very prolific water table acquifer adjacent to the Hudson River. Ground water is measured between 6 and 14 feet below ground level. Groundwater flow patterns across the site exhibits both northwesterly and southeasterly components of flow, with an apparent divide extending northeastward across the site from the area of MW-7A.

Prior to Remediation Contaminants of concern were benzene and chlorobenzene in groundwater and soil. Soil - The highest levels of benzene and chlorobenzene were found in surface/sub-surface soil. All impacted soil is covered by pavement. Groundwater - A groundwater interceptor trench was installed in 1988 to recover groundwater impacted with benzene and chlorobenzene. The interceptor trench was altered and extended in August 2005. The groundwater goes to a sump and is pumped through a filter and granular activated carbon treatment system then discharged to a reinjection trench. Soil Vapor - Legacy Soil Vapor Intrusion Evaluation Determination (signed 11/29/12) stated that Investigation Complete - No Action recommended. The NYSDEC and NYSDOH agree that no additional soil vapor investigation is necessary unless there is a change in on-site use. Remediation at the site is complete. Site Management includes reporting of the groundwater treatment system (both influent and effluent results) and monitoring of existing monitoring wells. Reporting is done semi-annually. Next Periodic Review Report is due in 2022.

The site is fenced and covered by pavement or buildings, so people will not come into contact with site-related soil and groundwater contamination unless they dig below the surface. People are not drinking the contaminated groundwater because the area is served by a public water supply that is not contaminated by the site. Volatile organic compounds in the groundwater may move into the soil vapor (air spaces within the soil), which in turn may move into overlying buildings and affect the indoor air quality. This process, which is similar to the movement of radon gas from the subsurface into the indoor air of buildings, is referred to as soil vapor intrusion. Sampling indicates soil

vapor intrusion is not a health concern for off-site buildings. An evaluation of the potential for soil vapor intrusion to occur in on-site buildings will be completed should the current use of the site change.⁸²

Timmy Bayly Property

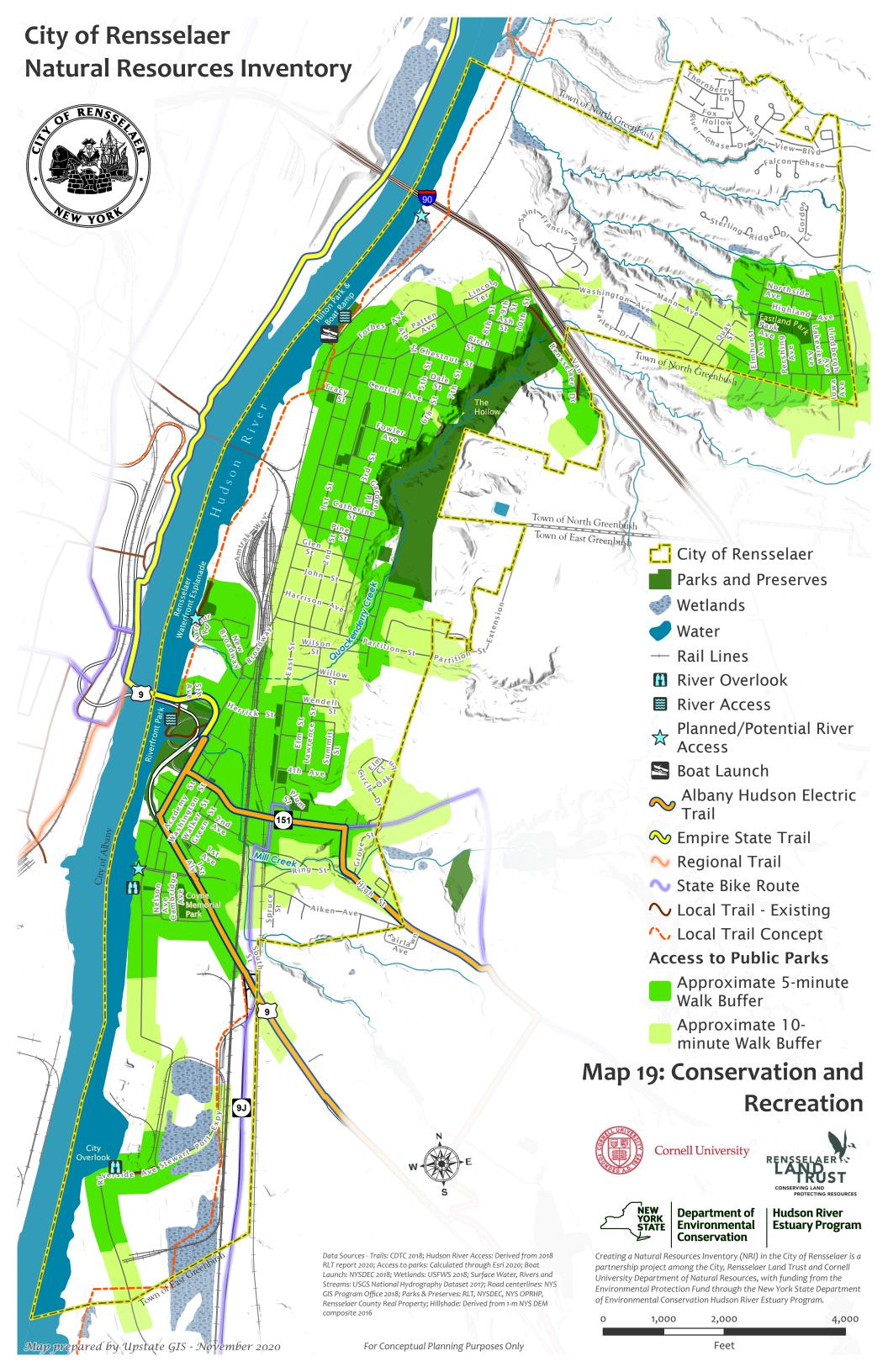
In 2017, the former dry cleaner site has been contaminated with the chlorinated solvent tetrachloroethene and its degradation products, which are typically associated with historical dry cleaning operations. The cleanup activities were performed by Tim Bayly Development, LLC ("applicant") with oversight by NYSDEC. NYSDEC has approved a Final Engineering Report and issued a Certificate of Completion for the site.

The following activities have been completed to achieve the remedial action objectives:

- A sub slab depressurization system (SSDS), vapor barrier and concrete slab were installed beneath the existing on-site building. This system will prevent building occupants from potentially being exposed to volatile contaminants that may affect indoor air. Similar to a radon mitigation system, the SSDS will prevent sub slab vapors from entering the building by applying a low amount of suction below the foundation and venting the vapors to the outdoors. The operation and maintenance of the SSDS will be performed under a Site Management Plan (SMP).
- An asphalt cover was installed in the alleyway to the east of the building to cover previously exposed surface soil that exceeded soil cleanup objectives.
- Periodic groundwater monitoring will be performed under the SMP. Institutional controls, including an environmental easement, will be put in place to limit/control future site use as appropriate.⁸³

82 NYS Department of Environmental Conservation. (n.d.). Environmental Remediation Databases

Sterling Drug Site 1. https://www.dec.ny.gov/cfmx/extapps/derexternal/haz/details.cfm 83 NYS Department of Environmental Conservation. (2017, December). NYSDEC Certifies Cleanup Requirements Achieved at Brownfield Site. Brownfield Cleanup Program Fact Sheet. https://www.dec.ny.gov/data/der/factsheet/c442043coc.pdf



Conservation and Recreation (Map 19)

Access to parks and open space within a community brings substantial social, environmental, economic, and health benefits.⁸⁴ These places help define the City of Rensselaer by giving residents opportunities to enjoy the natural beauty of the region and provide areas to promote relaxation and exercise.

Parks and Preserves

A variety of parks, preserves, and other protected lands in the City of Rensselaer were identified from the county tax parcel data. The parks in the city serve a diverse population and for that reason, provide a diverse range of services. The parks can be broken down into three simple categories – active recreation, passive recreation, and waterfront recreation. Active recreation parks provide amenities that are play-centric and often include provisions for organized sports such as baseball, tennis, and basketball. Passive recreation parks offer a combination of greenery and seating or walking options, but do not include amenities such as playground equipment or sports fields. Both passive and active recreation opportunities are available at locations along Rensselaer's waterfront for water activities such as kayaking, canoeing, boating, and fishing.

The chart below associates each city park with one of these categories and lists their amenities.

A park accessibility analysis is also shown on the map indicating approximate 5-minute and 10-minute walking distances to access park entrances. The buffer areas were generated using ESRI's walk-time buffer analysis tool. The analysis indicates that most residential areas in the City are within at least a 10-minute walking distance from a park. This information can be used to help identify areas that are underserved for park access and inform future park planning to enhance access for City residents.

Table 21: City of Rensselaer Parks and Amenities by Type

Type of Park	Park	Amenities
Active Recreation	Coyne Memorial Park	Playground, tennis courts, baseball field, basketball court

⁸⁴ Sherer, P. M. The Benefits of Parks: Why America Needs More City Parks and Open Space. 2006

	Plum Street Park	Playground, baseball field, basketball court
	Rensselaer City Splash Pad	Splash pad, pavillion, benches, picnic tables
	8th Street Park	Playground, basketball court, large field
	Eastland Park	Playground, tennis courts, baseball field, basketball court, benches
	Tracy Street Park	Playground, basketball court
	1st Street Park	Playground
Passive	Central Park	Benches
Recreation	The Hollow Park and Preserve	Walking trails
Waterfront	Riverfront Park	Playground, tennis courts, baseball field, basketball court, walking trails, benches, pavillion, terraced seating, picnic tables, seasonal docks
Recreation	City of Rensselaer Boat Launch	Boat launch, benches, picnic table, seasonal docks
	City of Rensselaer Esplanade	Multi-use trails, benches

Rensselaer Land Trust's Hudson River Access Plan

The Rensselaer Land Trust's Hudson River Access Plan ("the Plan") assesses the potential to increase accessibility to the Hudson River for communities throughout Rensselaer County. In Rensselaer, nine sites were identified for potential River access points and should be fully incorporated into any future open space planning the City pursues. The sites were initially identified through aerial image reviews with site visits used to identify potential access site locations. Each site was assessed for current conditions and a resulting recommendation was created. Water-based mileage calculations are provided based on distance from Schodack Island State Park boat launch. Finally, each site was assigned a priority score based on set criteria like distance to other sites, likely priority for local governments, recreational appeal, ease of constructability, implementation potential, and stewardship potential The sites and information listed below are shown on Map 19 and more information is available through the Rensselaer Land Trust.

Port of Rensselaer "Overlook"

This is an open space created in a corner of the Port at the end of an off-street bicycle path that runs through the Port. (Milepoint 9.1). The Plan identifies this site as a low priority and recommends select vegetation trimming to open-up views to the riverfront

to could potentially increase desirability of utilizing the site without necessarily degrading the vegetative "buffer" along the river's edge.

Belmore Place Waterfront Parcel

This is a vacant parcel owned by the City of Rensselaer and located adjacent to the County pump station. (Milepoint 9.4) The Plan identifies this site as a low priority and suggests that while it is not a high priority, the site could potentially provide a unique access point to the River that is primarily dedicated to fishing and viewing the River.

Crailo State Historic Site

This is a public historic site located just south of Columbia Street/Route 20 on Riverside Avenue. (Milepoint 9.7) The Plan identifies this site as a high priority and suggests that the development of water-based access through a dock or non-powerboat landing area for small craft would provide additional access opportunities and visitor potential for the site. Additionally, developing an ADA accessible pathway to the waterfront/stone retaining wall, if feasible with the slope, from the road and an associated passive sitting area would increase access opportunities to the River at this site.

Albany Yacht Club

This is a private yacht club. (Milepoint 9.9) As a private yacht club, there are no recommendations for this site.

Riverfront Park (Broadway)

This is a public park with water access and a dock located under and south of the Dunn Memorial Bridge. (Milepoint 10.2) The Plan identifies this as a high priority site. Expansion of the docks is a priority to improve water-based access and the ability to more fully participate in the tall ships event which must end here due to the barrier created by the bridge.

Hudson River Walk & DeLaet's Landing

This is a private 24-acre mixed-use development that is currently being constructed. It is listed online being approved for 250,000 s.f. of office space, 165,000 s.f. of retail space, a 236,000 s.f. hotel, and 630,000 s.f. of residential space. The schematic on the project website also shows docking for up to six boats. (Milepoint 10.5) As a private site currently under development, there are no physical recommendations for this site.

Livingston Avenue Bridge

This is a 100+ year-old swing-type railroad bridge used by approximately 14 Amtrak and 6 CSX trains per day according to the NYSDOT. It is a vital crossing that needs to be replaced due to the deterioration of the bridge. There is a significant push to reopen a pedestrian connection across the bridge as part of any upgrade or replacement. (Milepoint 11.1) The Plan identifies this as a high priority site and recommends supporting efforts to ensure that a pedestrian connection is provided across the bridge. Realignment of the crossing should occur to the south due to the presence of NYS Office of General Services-owned property.

Kiliaen's Landing

This is a proposed mixed-use development along a large section of the northern part of the City of Rensselaer waterfront extending into North Greenbush at/near the Tech Valley Trails. A portion of the area is owned by NYS OGS. When completed it will include a maritime center, passive and active recreation fields, and trail/sidewalk connections. (Milepoint 11.3) The Plan does not prioritize this project.

Forbes Ave. Boat Launch/Hilton Park

This is an existing boat launch and waterfront park. (Milepoint 11.5) The Plan identifies this as a high priority site and recommends installation of permanent bathroom facilities would be highly beneficial given the other on-site amenities and the location of this site in proximity to others. Minor improvements like better signage and upkeep of existing amenities would make

the site more usable. A larger project to expand dock space could also be considered to make the launch more boater-friendly.⁸⁵

Pedestrian and Bicycle Access

Safe access for pedestrians and bicycles allows residents to use alternate forms of transportation, which helps reduce car congestion, increases overall health of the community, and provides economic benefits.⁵ In recent decades, shared-use bicycle and pedestrian paths have become a trademark of "livable" communities, making them more attractive to potential home buyers and businesses.

In recent years, efforts on the state and local level have resulted in the creation and enhancement of numerous bike and pedestrian facilities throughout the city. There are

⁸⁵ Rensselaer Land Trust. (2018). Rensselaer County Hudson River Access Plan. https://www.renstrust.org/images/projects/HudsonRiverAccessPlan_FINAL_3-25-18_forweb_Revised.pdf

currently three main trail projects in the city. They include the Waterfront Multi-Use Trail, the Albany-Hudson Electric Trail/Empire State Trail (AHET) trailhead at Riverfront Park, and The Hollow Multi-Use Trail. These three trails, when completed, will effectively weave bike and pedestrian access throughout the entire southern portion of the City below the I-90 bridge. Map 19 shows the AHET, Waterfront Multi-Use Trail, and the proposed Rensselaer County Mickey Mahar Trail. The image below shows the proposed alignment for the Hollow Trail as well at the on and off-road connections to the Riverfront Park and the Esplanade, which is the trailhead for the Waterfront Multi-Use Trail.

The City's planned and existing trails and parks system is pivotal to ensuring a sustainable future. Connecting the city through trails promotes use of alternate modes of transportation and enhances environmental quality. Providing a routes for residents to traverse the city can help to reduce the number of vehicles on the road thus reducing the amount of greenhouse gasses released into the atmosphere, this impact can be amplified when considering much of the city is only a 5-to-10 minute walk to a park.

Section 6: Land Use Discussions and Implications

The green spaces and trees that parks provide are highly effective ways to moderate air temperatures, improve air quality, and promote absorption of flood waters. In addition, vegetation in parks and conserved areas promote biodiversity by providing habitats for native species. It is imperative that linkages between these alternative transportation resources be examined and explored in future planning efforts, such as an Open Space and/or Recreation Plan. Rensselaer's unique and undeveloped location on the Hudson River, our small scale in terms of population and land area, and our vast number of parks are together some of the strongest assets that the City has. The appeal of economic development in the short term must be weighed against the impacts to the flood plain in the long term.

Additionally, when it comes to environmental remediation and permitted facilities in our industrially zoned portion of the City, it is imperative that the presence of existing facilities is deliberated when considering the overall impact of a proposed project. Section § 179-75C(14) of the City of Rensselaer Zoning Ordinance provides that new uses should be consistent with the Comprehensive Plan; the 2006 Comprehensive Plan states the following: "Strengthen the city's tax and employment base by encouraging appropriate industrial development in the city's traditionally industrial areas while minimizing the negative impacts traditionally associated with industrial land development". Community support for industrial operations should be strongly considered in proposals for new development, as residents of our environmental justice areas and those adjacent to the I-1 and I-2 zones are the most likely to be highly impacted by new operations and are the familiar with the negative impacts that can be associated with new and existing industry.

As the City continues to pursue CSC Certification, the actions in *Table 22*, below, will be prioritized to help preserve, enhance, and improve the resiliency and climate impact of our open spaces, developed areas, and floodplain.

Table 22: Proposed Local Action Framework in Response to Section 6

Action #	Legacy Action	Local Climate Goal	Additional Notes
6.2	Incorporate smart growth principles into land-use policies and regulations	Resilience	
6.3	Adopt a renewable energy ordinance	Resilience Air Quality	Action is related to

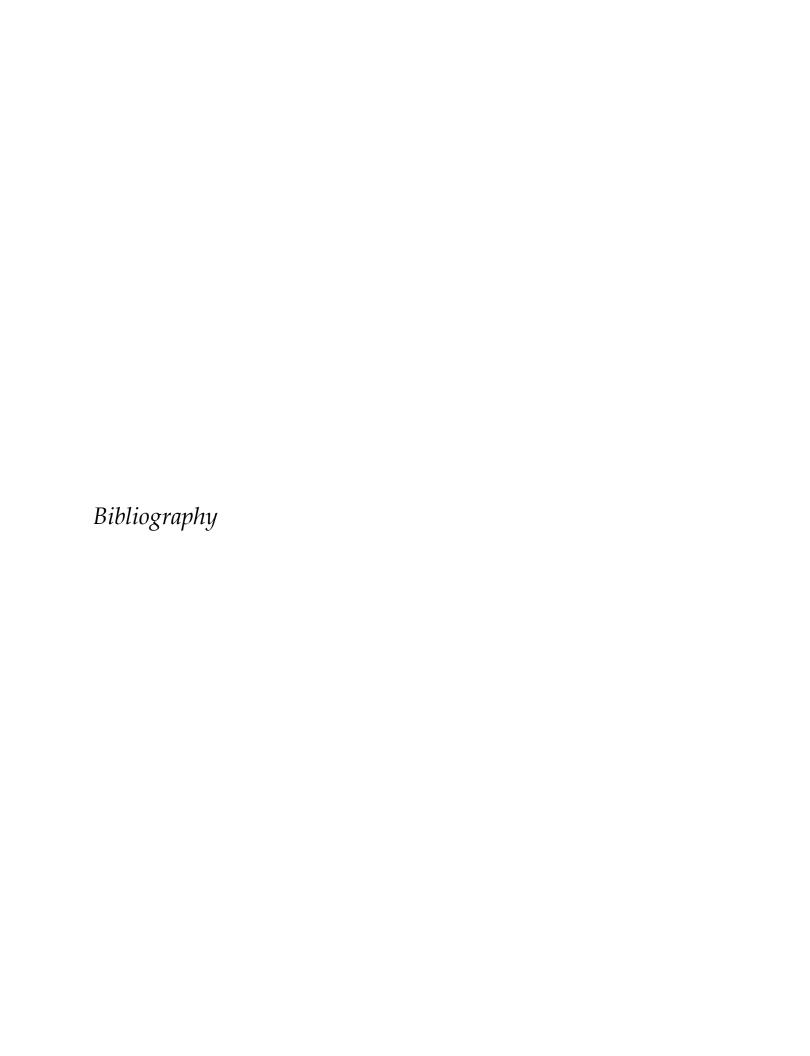
		Temperature Emissions	NYSERDA Clean Energy Communities High Impact Actions
6.7	Adopt land-use policies that support or incentivize farmers' markets, community gardens and urban and rural agriculture	Resilience Biodiversity Absorption	
3.27	Utilize a green or sustainability rating system for infrastructure improvement projects	Resilience Air Quality Temperature Emissions	
6.10	Implement strategies that support bicycling and walking	Air Quality Temperature Emissions	Action may be funded under CSC Grants Program (Bike/ped plan only)
6.12	Implement strategies that increase public transit ridership and alternative transport modes	Air Quality Temperature Emissions	
6.14	Implement traffic calming measures	Air Quality Temperature Emissions	
6.19	Preserve natural areas through zoning or other regulations	Resilience Air Quality Biodiversity Absorption	
7.21	Use green infrastructure to manage stormwater in developed areas	Resilience Biodiversity Absorption Water Quality	
7.14	Facilitate a strategic relocation of uses that are not water dependent from flood prone areas	Resilience Absorption Water Quality	Emergency Preparedness
8.3	Include green industries in economic development plans	Emissions	
8.9	Establish incentives for green industry or businesses to locate in community	Air Quality Temperature Emissions	
8.11	Adopt energy benchmarking requirements for privately owned buildings	Temperature Emissions	Action is related to NYSERDA Clean Energy Communities

			High Impact Actions
2.6	Develop a community climate action plan	Resilience Air Quality Temperature Emissions Biodiversity Absorption Water Quality	Priority Action, May be funded under CSC Grants Program
3.18	Upgrade outdoor lighting (other than streetlights and traffic signals) to more efficient and/or solar technology	Emissions	
6.18	Develop a local forestry or tree planting project or program	Biodiversity Air Quality Temperature Emissions Absorption	
6.8	Adopt green parking lot standards	Emissions Air Quality	
6.1	Develop and adopt a comprehensive plan with sustainability elements	Resilience Air Quality Temperature Water Quality Absorption Biodiversity	Priority Action, May be funded under CSC Grant Program
6.19	Preserve natural areas through zoning or other regulations	Biodiversity Absorption Temperature Air Quality	

Conclusion

The City of Rensselaer's Hudson Riverfront location presents myriad opportunities. There are opportunities to conserve the Shoreline and opportunities to develop the Shoreline. There are opportunities to protect and enhance our existing open and recreation spaces and opportunities connect our local trails to the Empire State Trail system. There are opportunities to attract heavy industry and opportunities to attract green industry. The CSC actions provide an excellent framework to make small changes on a local level that can transform into major changes funded through New York State. These small changes can be highly impactful as they inform and influence more sustainable land use decisions for the City that will benefit the community for generations to come.

Most importantly, the biggest thing each of these opportunities have in common is the community they serve. When engaging with members of the community, it became evident that proactively pursuing a more climate resilient Rensselaer is a major priority in the community. The proposed local actions discussed in each section of this report were brought to the community and an assessment of priority level and discussion is included in Appendix D. Education was one of the top opportunities, as the community felt that the more the community knows, the more they will care and the greater the call to municipal action will be. As the City continues in its pursuit of data to inform sustainable planning, these priorities will be referred to as a baseline for decision making as we allocate local funding and seek NYS funding. Small changes to consider in the immediate future include using drought resistant plants in our public spaces, creating overlay zones for properties abutting bodies of water, and creating a Climate Smart Communities Task Force to promote the success of other CSC Actions. We must continue to explore feasible ways to promote the health of our natural resources and the Hudson River Estuary and also reduce the climate risks associated with being in a floodplain. The next steps for the City's Planning Department are to conduct a Climate Vulnerability Assessment and apply for funding to create an Open Space Plan. This Natural Resources Inventory should be updated regularly as the NYS ClimAID report releases new projections and should be used in all environmental reviews for planning, building, and engineering purposes.



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Appendix A: Hudsonia Habitat Map

Appendix B: Dr. David Hunt Habitat Report

City of Rensselaer, Rensselaer County, New York
Natural Resource Information
David M. Hunt, Ecological Intuition & Medicine
August 7, 2020

1. SURVEY BACKGROUND.

One long-term hope of the Rensselaer County Biodiversity Greenprint Project (RCBGP) of Ecological Intuition & Medicine has been to explore a site referred to in the past as the "Hudson River Forest", a synonym of what is now more precisely termed the "Northern Rensselaer Forest". This site represents a mature forest band north and south of the Interstate Route 90 bridge over the Hudson River in the City of Rensselaer. For decades, it has been thought to be important for biodiversity based on its more casually perceived "scenic qualities" and riverside setting. This undeveloped forested area lining the Hudson River gives one the sense that Rensselaer County has a special rural feel, being abruptly distinct from Albany County across the river, as one travels the Interstate 90 bridge eastward over the river from the urban setting west of the bridge. The current project thus manifested long-awaited surveys of this area. In addition, a survey of "The Hollow", the largest city-owned park in the City of Rensselaer, a natural area with many mature natural forest communities, was also suggested and requested for this project.

Geographic Area.

Two sites were originally designated for field survey by RCBGP to assist the Rensselaer Land Trust (RLT) and the Hudson River Estuary Program with a natural resource inventory for the City of Rensselaer (see Map CR1). These sites were thought to represent the most intact natural areas within the city and the areas most likely to contain both the most abundant and most important examples of regionally-important ecological features. The sites were originally called "The Hollow" and the "Northern Rensselaer Forest". Upon conducting field surveys, it was decided best to further divide the Northern Rensselaer Forest area into two component subsites representing distinct ecological units:

1. Hudson River Floodplain Rensselaer.

the relatively flat floodplain terrace of the Hudson River in the northern part of the city, essentially west of the railroad tracks.

2. Northern Rensselaer Hills.

a forested area of numerous dry ridges dissected by steep stream ravines along the north edge of the city, essentially east of the railroad tracks and mostly north of Interstate Route 90.

With potential survey plans anticipated to be complicated by the number of landowners, parcels with the easiest access and/or largest size within these sites were originally chosen for survey. Lands chosen for survey are owned by about 8 municipal to private landowners (see Map CR2). The Hollow is a 58-acre city parkland representing multiple contiguous tax parcels owned by the City of Rensselaer. The core of the Northern Rensselaer Forest site consists of up to about 14 tax parcels owned by 7 landowners, ranging from 14 to 93 acres per landowner and totaling 335 acres over the site. The 5 major landowners at this site are: Rensselaer Polytechnic Institute, Franciscan Order Seminary, Grandview Estates Construction Corporation, 1011 Clark TP LLC, and Doane Stuart School.

Field surveys to evaluate the 3 survey sites were originally contingent upon access issues and the Rensselaer Land Trust was charged with trying to secure access to these largest parcels associated with these sites. Although permission was secured by only one landowner, the Franciscan Order Seminary, in the end, the entire area was accessed, as no observed posted signs contained ownership information, thus the lands were not legally posted.

Survey Logistics.

Information on survey timing, effort, and geographic coverage is presented as background to the effectiveness of field surveys in understanding the ecology of the sites. Survey observations were dependent on the timing of the project, but were made during the best time of year for plant surveys, in the middle of the growing season. A total of 9 survey days were conducted between May and July (May 22, June 2, June 12, June 16, June 19, June 28, July 9, July 12), averaging about 5 hours per day and divided between the 3 sites as follows:

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The Hollow: 4 days.

Hudson River Floodplain Rensselaer: 3 days.

Northern Rensselaer Hills: 3 days.
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Survey assistance was provided by multiple colleagues of the Capital District Friday Field Group coordinated by Tom Phillips (2 days), Terrason Hunt of Grafton (1 day), and Geo Kuehn of East Greenbush (1 day).

Surveys were both <u>intensive</u> and <u>extensive</u>. For intensity, copious detailed field notes were taken on ecological community types, community maturity, microhabitat diversity, various plant and animal species categories (dominant, indicative, and characteristic species for communities; rare and invasive species), animal evidence type, plus disturbance features. For extensiveness, the 3 survey sites were

generally widely covered from end to end, as well as across all known, observed, and suspected physical and biological gradients throughout the sites. However, not all small-scale features of each site (e.g., small streams, wetlands, and conifer forest patches) were examined, and future surveys of those areas might reveal additional rare species and/or community types. Parallel observation transects were made along the length of multiple parallel linear features/ecological zones (e.g., ridges, midslopes, stream terraces, and shorelines). For the 3 survey sites, details on surveyed areas are mostly as follows:

The Hollow: essentially the entire city park site plus additional private forested lands along the NW edge plus additional city property S and NE of the major parcels including lands associated with Rensselaer High School.

Hudson River Floodplain Rensselaer: essentially the entire RPI site, plus additional city lands S to the Forbes Avenue boat launch. with the least intensive survey being near the NE corner of the site.

Northern Rensselaer Hills: essentially the entire site plus additional private lands along some, but not all, of the ravines and ridges to the E. The forest extends farther E from the surveyed areas along many ridges and ravines, but on smaller private parcels that were beyond the scope of the contract; many of those areas were unposted and could have been surveyed with more time. Although attempts were made to systematically observe parallel transects along as many of the numerous ridgetops, midslopes, and stream corridors as possible, due to the large size of this site, not all small-scale potential wetland pockets along the ridges or conifer patches along the midslopes were field checked.

Site Assessment Methods.

Feature Identification. Due to the unexpected very high diversity of community types and abundance of regionally-rare features found at the 3 survey sites, limited time was available for thorough technical identification of all features, especially suspected rare plant taxa. Much of the plant identities, therefore, relied on field identifications. Technical assistance on the identification of sedges (Carex spp.) and mosses was also volunteered by Tom Phillips, Tables are presented for each site indicating the identification certainty of many rare plants, reflecting the partial state of knowledge of some identities. These identifications could be refined in the future, with more time spent using technical keys on the many collected specimens. Natural community identities were more certain, based on knowledge of indicative community features from focused field observations, such as hydrology, physiognomy, substrate, and dominant species, as recorded via copious field notes. Ecosystem complex identities were inferred from community composition and the general physiotopography of the sites.

City of Rensselaer, Natural Resource Information

Importance analyses. Importance analyses for all features relied upon the cumulative collection and analysis of information for the county by the RCBGP, much of which was comprehensively synthesized in the 2017 county conservation plan for RLT. Community ranking information followed standard assessment methods of the natural heritage network, based especially on field observations of community condition variability and the geographic extent of community occurrences at each site, the latter coupled with air photo interpretation. Preliminary importance analyses of various ecological features usually relied on casual size estimates and followed methods used by RCBGP in the county conservation plan. Features thought to be most regionally important were mapped on GIS (Geographic Information System), allowing more precise determinations of size for comparison to other sites and/or standard criteria.

Feature Mapping.

Only ecological features deemed important at a county or broader level were mapped on GIS. None of the numerous rare plant taxa were mapped as individual populations, given the abundance of such taxa at each survey site. Instead, a combined "rare plant concentration area" was mapped as a surrogate for each site, circumscribing areas that contain concentrations of multiple rare plant taxa. Similarly, neither a polished comprehensive community map nor polished maps of all potentially-significant community occurrences were created for each site, also given the abundance of such features. Instead, only community occurrences with high certainty of regional importance were mapped as GIS-based figures for this report. Additional GIS maps for other features referenced at each site can be provided, upon request, with more time invested, based on field notes and field maps.

Hudsonia Habitat Mapping. A separate review of the comprehensive Hudsonia habitat map throughout the City of Rensselaer was conducted only for areas surveyed in 2020, those originally referred to as "The Hollow" and "Northern Rensselaer Forest". Habitat patch identities assigned by Hudsonia from their preliminary analyses, which cover 6 air photos for the entire municipality, used a general standard habitat classification. Those habitat patches were crosswalked by the author to the typically more finely split New York Natural Heritage Program (NYNHP) state community classification, especially to help resolve any discrepancies with terms such as "upland" versus "wetland" between the two classifications. For example, onsite patches of Floodplain Forest (a NYNHP wetland type) were observed to have drier levee and wetter swale microhabitats, many of which

were respectively labelled as upland versus wetland on the Hudsonia habitat map, perhaps representing, in this instance, a finer split than the NYNHP community classification. Other upland forest polygons of Hudsonia outside of floodplain settings were often more finely split by the author to reflect different forest community composition on ridges versus midslopes versus stream terraces. The number of polygons circumscribed and described by the author upon review of the Hudsonia map totalled 163 (34 from The Hollow, 36 from the Hudson River Floodplain Rensselaer, 93 from the Northern Rensselaer Hills).

2. ECOLOGICAL FEATURES OF FOCUS.

The four ecological features of focus for surveys were natural communities, regionally-rare plants, important animal features (regionally-rare taxa and important habitats), and restricted ecosystem complexes. Other considered larger-scale features, to help put survey sites into a broader perspective, were aquatic networks, forest-interior areas, forest landscapes, roadless blocks, and conservation sites. Each feature is mentioned below in a general sense for the entire study area. Detailed site-specific information is subsequently compiled and presented in a separate report section for the 3 survey sites.

Ecological Communities.

Detailed ecological community information is presented for each of the 3 survey sites. Information includes that for the overall site community composition (list), any rare natural community types (list), any regionally-significant natural community examples (list, importance analysis summary, and detailed descriptions), and any regionally-exemplary natural community examples (list and importance analysis). A tally of various natural community metrics for each site, based on community occurrences of high certainty, follows:

	The	Hudson	River	Northern Rens	selaer
	Hollow	Floodplain	Rensselaer	Hills	
				0.1	
total types	21	16		21	
rare types	8	10		6	
significant examples	3 2	5		3	
exemplary examples	2	3		2	

Only two regionally-important community occurrences within the 3 survey sites were known prior to surveys, both state significant with county exemplary status. Both are associated with the Northern Rensselaer Forest site: a county co-exemplary Appalachian Oak-Hickory Forest site at Rensselaer Tech Park and a county

sole-exemplary Tidal River site at the Hudson River Estuary. Field surveys intended to further evaluate the quality and extent of these occurrences, especially the forest occurrence.

Rare Plants.

No prior rare plant populations were known from the 3 survey sites. Rare plant information from field surveys was newly compiled and is presented for each of these sites. Information includes that for individual regionally-rare plant species (list and demography summary) and any associated rare plant concentration areas (importance analysis, site summary). Species rarity was assessed from global, state, and county perspectives. A tally of rare plant metrics for each site, based on taxa of relatively certain identity, follows:

	The Hollow	Hudson River Floodplain Rensselae	Northern Rensselaer Hills
global rare taxa	0	0	0
state rare taxa	0	1	0
county rare taxa (active)	3	4	3
county rare taxa (watch)	14	9	13
county rare taxa (total)	17	13	16
concentration areas	1	1	1

Rare plant concentration areas were newly designated and delineated for 2 sites, The Hollow and Hudson River Floodplain Rensselaer. third site, the Northern Rensselaer Hills, partially overlaps a county-important rare plant concentration area previously designated in the 2017 county conservation plan, Rensselaer Tech Park. That concentration area was expanded deeper into the Northern Rensselaer Hills site to reflect new findings of the recent field surveys. Rare plant concentration area boundaries were either newly formed or revised from a combination of 1) all spots with the rarest (active list) taxa, 2) other spots with moderately rare (watch list) taxa that were not observed to be widespread throughout the site, and 3) interpolated areas that have similar habitat types between those known locations. Basic information on the regional importance of each concentration area was compiled for each site. More detailed site summary sheets for each rare plant concentration area, such as those produced for the Town of Poestenkill natural resource inventory, were beyond the scope of the project but can be designed later upon request from field notes.

Important Animal Features.

Important animal feature information, including that for regionally-rare animal taxa, was considered for each of the 3 survey

sites. While no rare animal species were knowingly detected and no county-important animal habitats were thought to be found on any of the 3 sites, at best some animal habitats on the site may have local importance (e.g., important within the City of Rensselaer) and others abut, however essentially do not extend into, the 3 sites, as noted below. A general account of important animal features as it relates to these survey areas is provided below to put the 3 sites into a broader regional context.

Rare Animal Species. Although the expertise of the author is greater for flora than fauna and rare fauna are generally harder to detect in the field, being much more mobile, searches were made, as an ecologist, for any potential regionally-rare animal taxa (global, state, and county rare), especially in macrohabitats and microhabitats thought most likely to support such taxa. The more focused rare animal species searches were for rare nesting birds (especially in forest-interior areas), shoreline birds and tiger beetles (in sandy open shoreline communities), plus odonates and turtles (along rivers and in larger wetlands). Rare animal taxa were neither known from these sites prior to surveys nor detected during any of the surveys.

Important Animal Habitat. A total of 112 important animal habitat sites were documented for Rensselaer County in the 2017 county conservation plan. Although some animal concentration areas were observed at the 3 sites, none were deemed important enough at the county level after preliminary analyses that applied importance criteria used for the county conservation plan. Animal habitats on these sites that may have local importance, such as at the municipality level (e.g., within the City of Rensselaer), are noted under the description of each site and summarized here.

Survey Site Animal Habitat Type county-important exclusion rationale

The Hollow abundant cleanwater macroinvertebrates too small
Hudson River Floodplain anadromous fish concentration area adjacent Hudson River

Estuary site

N. Rensselaer Hills aquatic mammal concentration area not diverse enough, too small

Numerous relevant potential animal concentration area types were sought in appropriate habitats, but none were found for: aquatic mammals, forest-interior denning large mammals, shorebirds, waterfowl, wetland birds, riparian birds, forest-interior nesting birds, herptiles, fish, mollusks, and odonates. A cleanwater macroinvertebrate concentration area was observed in Quackenderry Creek at The Hollow site, but was deemed too small to be of county importance (see the account under that site). Similarly, streams in the

Northern Rensselaer Forest site of even smaller discharge and macroinvertebrate were suspected not to constitute a concentration area there. Two important animal habitat sites designated in the county conservation plan, the Hudson River Estuary and Rensselaer Tech Park tidal wetland, are in close proximity to one of the 3 survey sites and are thus addressed here.

Hudson River Estuary.

The Hudson River Estuary important animal site, an entirely aquatic site designated in the 2017 county conservation plan, abuts the Hudson River Floodplain Rensselaer survey site. The former site is important especially for anadromous fish and mollusks and is limited to the Tidal River. Because the project surveys were essentially limited to non-aquatic settings, which extend only as far as the low tide limits, no focused surveys were done of the Tidal River (Hudson River). No evidence of aquatic fauna concentrations in the adjacent Hudson River were noted from the vantage point of the shoreline, part of the Hudson River Floodplain Rensselaer site, other than multiple spots with abundant small minnows in nearshore areas. Mostly turbid water was seen from an above-water perspective. No substantive information is available from the current surveys to add to the database information for this important animal habitat site provided in the county conservation plan. Although the author could prepare a summary description upon request for this large site, the element occurrence record at NY Natural Heritage Program for the Hudson River Tidal River, drafted by the author circa 2000, provides much information on this community, especially for fauna, as important animal habitat. relationship of the Hudson River Estuary site to the Hudson River Floodplain Rensselaer site is also explored under a similar designated county-important site for restricted ecosystem complexes, representing a subset of the Hudson River Estuary (see tidal riparian complex below).

Rensselaer Tech Park.

The Rensselaer Tech Park important animal site, a wetland site designated as county-important in the 2017 county conservation plan, is also in close proximity to the Hudson River Floodplain Rensselaer survey site. The former site is important especially for a suspected wetland bird concentration area, corresponding in extent to a freshwater tidal wetland complex (see below). The site was mapped as close as 0.008 miles from (north of) the Hudson River Floodplain Rensselaer survey site and field observations confirmed that it does not extend to the City of Rensselaer municipal line or that survey site.

Important Restricted Ecosystem Complexes.

A total of 187 important restricted ecosystem complex sites were documented for Rensselaer County in the 2017 county conservation plan. Important restricted ecosystem complex information was considered for each of the 3 survey sites. Multiple types of complexes were observed at each site, but only one type per site (mature forest complex) was deemed with certainty to be of high enough importance for a county-important example, as noted below.

County Importance Assessment for Restricted Ecosystem Complexes.

complex type	The Hollow	Hudson River Floodplain Rensselaer	Northern Rensselaer Hills
mature forest	Y	Y	Y
riparian complex	s	?	s
rocky summit/slope	N	NA	N
tidal wetland	NA	N	NA

N=not county important, NA=not applicable to site, s=too small for county importance, Y=county important, ?= of uncertain importance.

A general account of these 4 important restricted ecosystem complex types, as they relate to the project area, is provided below to put the 3 survey sites into a broader regional context.

Mature Forest Complex.

Previously unknown examples of mature forest complex were noted at each of the 3 survey sites and represent the largest 3 known/mapped occurrences in the county to date. A total of 15 county-important sites of this complex type were designated for Rensselaer County in the 2017 county conservation plan, ranging from 1.07 to 23.6 acres. Of these, all those over 10 acres were treated as Tier-1 (highest priority) sites. Other than the recently-documented 4-acre Poesten Kill Bends Forest complex (added in 2019 after the 2017 county conservation plan), these 3 sites represent the only ones known to date with certainty from the Hudson Valley physiographic region of the county, the most developed part of the county. Although no mature forest complexes were known from this region at that time, other likely examples are suspected there, however, from some of the deep ravines. Potential Hudson Valley sites are most likely in Schaghticoke (Deep Kill, Mill Hollow Brook), Troy (Poesten Kill Gorge, Oakwood Cemetery/Devil's Kitchen), and North Greenbush (Rensselaer Tech Park).

Riparian Complexes.

A diverse set of riparian complex types is classified more generally under aquatic complexes. A total of 31 county-important sites of riparian complex were designated for Rensselaer County in the 2017 county conservation plan. Of these, 10 represent Freshwater Tidal River riparian complexes, all along the Hudson River in the Hudson Valley region. Others represent non-tidal riparian complexes, 7 of which are categorized as floodplain complexes. Because sites for either of these types may resemble areas at the Hudson River Floodplain Rensselaer survey site, the two types are briefly discussed here.

Tidal riparian complexes. The primary feature of this complex type is state-mapped submergent aquatic vegetation (SAV) beds. Boundaries for some sites of this type also include associated tidal wetlands. This complex type is also important for multiple state-rare fish, especially anadromous fish, state-rare mollusks, and fish spawning areas. Designated county-important sites of this type range from 24 to 320 acres, with 4 Tier-1 sites (77-320 acres), 3 Tier-2 sites (91-148 acres), and 3 Tier-3 sites (24-63 acres). All are part of the large Hudson River Estuary site. The designated Hudson River Rensselaer North complex overlaps with part of the Hudson River Floodplain Rensselaer survey site, where a freshwater tidal wetland is included but not Floodplain Forest, as addressed under the description of that site.

Non-tidal floodplain riparian complexes. Examples of this complex type designated for the 2017 county conservation plan include 4 sites along large rivers, all the Hoosic River, with these large floodplain sites ranging from 175 to 372 acres. The Hudson River Floodplain Rensselaer example is much smaller (~23 acres) and needs further evaluation as a potential county-important site for this type.

Other riparian complex types may be present at The Hollow and this site also needs further evaluation for a county-important example of different variants of this general complex type. The closest fit may be "acidic/circumneutral gorges" associated with small confined streams (Rocky Headwater Streams) of the county. This complex subtype typically includes the lower slopes and central part of a stream site. Communities at The Hollow typically associated with this complex subtype, in addition to the central Rocky Headwater Stream, include Riverside/Lakeside Bluff, Riverside Sand/Gravel Bar, Cobble Shore, plus possibly Floodplain Forest and/or Maple-Basswood Rich Mesic Forest. The 3 sites of this complex subtype designated for the county

conservation plan range from 44 to 68 acres. All sites are on the Rensselaer Plateau, in a relatively intact forested landscape setting. The roughly 10-acre example at The Hollow is smaller, and tentatively considered to be not county important unless regional variants (e.g., for the Hudson Valley) are stratified as targets for this set. The Hollow site may be most comparable in composition to Quacken Kill Narrows in Brunswick. Potential treatment as a county-important site for this type is pending further evaluation.

Rocky Summit/Slope Complex.

No examples of rocky summit/slope complex are mapped for the 3 survey sites, although some features at The Hollow may be characteristic of this upland complex type. A total of 40 sites of this types were designated in Rensselaer County for the 2017 county conservation plan. Those of the Hudson Valley region (7 sites) represent circumneutral to calcareous Hudson River Valley bluff/gorge complexes, with 3 subtypes: escarpment bluffs, river gorges, and high river terraces. All of these subtypes are based on communities with consolidated (i.e., rocky) substrate (e.g., cliff community types). Although the Riverside/Lakeside Bluff at The Hollow, an unconsolidated steep, open upland community type, may come closest to this complex type among the 3 survey sites, this feature seems better classified under a riparian complex, where other unconsolidated riverside communities have been included (see above).

Tidal Wetland Complex.

No examples of tidal wetland complex are mapped for the 3 survey sites and no sizeable patches of this type were observed there. A total of 4 sites for this wetland complex type were designated for Rensselaer County in the 2017 county conservation plan, all along the Hudson River. None of these sites extend into the City of Rensselaer. Any CONUS-mapped patches of tidal wetlands within the survey sites, such as the one southwest of the Interstate Route 90 bridge in the Hudson River Floodplain Rensselaer site (see the description of that site), are too small to qualify for an example of this complex. The designated example in closest proximity to a survey site is the 34.5-acre Rensselaer Tech Park Tidal Wetland, which is mapped within 0.008 miles (to the north) of the Hudson River Floodplain Rensselaer site. Field surveys confirmed that this wetland complex does not extend far enough south into the City of Rensselaer or that site. The very small (<0.01-acre) Freshwater Tidal Marsh patch of the Hudson River Floodplain Rensselaer site, deemed too small to be a "complex", is better treated as part of the shoreline of the Hudson River Rensselaer North site (see tidal riparian complex above).

3. OTHER ECOLOGICAL FEATURES.

Although large-scale ecological features such as regionally-important aquatic networks and forest-interior areas were not specifically addressed as a focus in the project scope, they are briefly mentioned here because key parts of a county-important site for both of these features overlaps with two of the survey sites, Hudson River Floodplain Rensselaer and Northern Rensselaer Hills (the Northern Rensselaer Forest combined). These sites are similarly within corresponding county-important examples of forest landscape, roadless block, and conservation site.

Important Aquatic Networks

Among regionally-important aquatic network sites designated for Rensselaer County in the 2017 county conservation plan is one that overlaps with the project area, the Hudson River Freshwater Tidal network. This 5879-acre network represents one of 19 Tier-1 aquatic network sites for the county. It covers parts of 2 survey sites: the Hudson River Floodplain Rensselaer, as a forested buffer to the main channel, and Northern Rensselaer Hills, as a relatively large intact forested subcatchment of the river. The network is categorized as a "main channel freshwater tidal network", the only one of its type in the county. It extends from the Troy dam downstream to Columbia County, lining the entire west edge of the City of Rensselaer. The Hudson River Floodplain Rensselaer survey site is part of the best forested buffer for the network, part of a "natural riparian strip" network component. Another component, wide forested subcatchments, is represented by only two areas along the network length. The Northern Rensselaer Hills, along with adjacent forests in the Rensselaer Tech Park of North Greenbush to the north, form part of one wide forest subcatchment, as does much of the Schodack part of the network. While maps of this network site can be found in the county conservation plan database, the site is approximated by the corresponding county-priority conservation site, the Hudson River Freshwater Tidal Corridor (see below).

Important Forest-Interior Areas.

Among 62 regionally-important forest interior sites designated for Rensselaer County in the 2017 county conservation plan is one that overlaps with the Northern Rensselaer Forest. This 415-acre area, the Rensselaer Tech Park Forest, a Tier-6 forest-interior area for the county, is detailed under the description for the Northern Rensselaer Forest site.

Important Forest Landscapes.

Among 44 regionally-important forest landscape sites designated for Rensselaer County in the 2017 county conservation plan is one that overlaps with the Northern Rensselaer Forest, The Rensselaer Tech Park Forest. This 1082-acre Tier-5 forest landscape for the county surrounds the aforementioned forest-interior area.

Important Roadless Blocks.

Among 40 regionally-important (Level-4) roadless block sites designated for Rensselaer County in the 2017 county conservation plan is also one that overlaps with the Northern Rensselaer Forest. This 2028-acre area, the Rensselaer Tech Park Block, a Tier-4 block for the county (of 2000 to 3000 acres), similarly surrounds the aforementioned forest landscape. The Northern Rensselaer Forest is also within a 8178-acre Tier-1 "aquatic block", the Hudson River Southern Rensselaer County Block, which surrounds the Hudson River. Site maps can be found in the county conservation plan database.

Priority Conservation Sites.

Among 21 regional priority (Level 2) conservation sites designated for Rensselaer County in the 2017 county conservation plan, which combine all other ecological features into one overall synthesized site concept for conserving biodiversity, is also one that overlaps with the Northern Rensselaer Forest (see Map CR-3). The 11475-acre Tier-2 area, Hudson River Freshwater Tidal Corridor, encompasses all of the aforementioned aquatic network area including all of the Hudson River Floodplain Rensselaer survey site. A full map of this conservation site can be found in the county conservation plan database.

City of Rensselaer Natural Resource Information. Site Descriptions.

Site 1. The Hollow

General Description.

The Hollow, as a broadly ecologically-defined site perhaps better referred to in an ecological sense as the "Quackenderry Creek Valley", is an essentially undeveloped natural area of contiguous forest representing a deep valley of Quackenderry Creek in the northeast part of the City of Rensselaer (see Map TH-1). The roughly 70-acre site is dominated by relatively mature forests and a well-developed central Rocky Headwater Stream, Quackenderry Creek, that has carved a relatively wide valley with steep side slopes. Above the valley are developed (suburban and industrial) areas on an older sandy clay low level terrace/lakeplain of the Hudson River. The site contains some successional (succeeding) areas, maintained trails/off-road vehicle routes, historic structures, and trash dumps. It consists of a central parcel (perhaps The Hollow in the strict sense) plus other city-owned parcels to the north (Rensselaer City High school) and south, with private forested backyards along the west edge.

The site contains a diverse set (21) of natural community types, especially upland types, including 8 regionally-rare community types. Two community occurrences are of high certainty as county significant, both warranting county exemplary status. Numerous (17) county-rare plant species, including a few of very rare status, were found from the site, thus warranting a newly-designated rare plant concentration area for the county. No rare animal species were observed. The one animal habitat suggested as most important at the site, a cleanwater macroinvertebrate concentration area, is thought to be at most only locally important, namely for the city/municipality. A newly-discovered sizeable mature forest complex at the site is deemed a county-important restricted ecosystem complex example. A riparian complex at the site is thought to be only of more local importance.

Ecological Communities

General Community Description. The Hollow contains a good diversity of climax forest types typical of the Hudson Valley physiographic region (Maple-Basswood-Rich Mesic Forest, Beech-Maple Mesic Forest, Appalachian Oak-Pine Forest, Appalachian Oak-Hickory Forest) mixed with one successional forest type (Successional Southern Hardwoods). Three Central Appalachian (Oak-codominated) forest types (Appalachian Oak-Hickory Forest, Appalachian Oak-Pine Forest, Chestnut Oak Forest) occupy much of the upper east slopes

of the site, where dry, well-drained soils prevail. Small patches of Shale Talus Slope Woodland also occur on steep slopes in this part of the site. Floodplain Forest patches are relatively small, with more of the stream terraces occupied instead by the upland forest type Maple-Basswood-Rich Mesic Forest. The few Floodplain Forest patches are dominated by hydrophytic (wetland) vegetation. dominant aquatic community is the centralized Rocky Headwater Stream. Other aquatic communities include possible small internal patches resembling Marsh Headwater Stream, multiple tributary Intermittent Stream examples in numerous steep side ravines, and a couple of Vernal Pool patches. Most wetland patches are small, located in stream terrace settings. Wetland community types include Shallow Emergent Marsh and Shrub Swamp. Most open riverside uplands are also small except for a couple relatively large patches of Riverside/Lakeside Bluff on the steep eastern slope of The Hollow. More typical open riverside upland communities, within the streambed, include Riverside Sand/Gravel Bar and Cobble Shore. distinct centralized open successional field is of unknown origin.

Community Composition. A list of the 21 natural communities at The Hollow is arrayed below by community system, then subsystem.

Terrestrial

Forested:

Maple-Basswood-Rich Mesic Forest, Beech-Maple Mesic Forest, Appalachian Oak-Pine Forest, Appalachian Oak-Hickory Forest, Chestnut Oak Forest, Successional Southern Hardwoods.

Barren/Woodlands: Shale Talus Slope Woodland.

Open:

Riverside Sand/Gravel Bar, Cobble Shore, Riverside/Lakeside Bluff, Successional Old Field, Successional Shrubland.

Palustrine

Forested-Mineral: Floodplain Forest.

Open-Mineral:

Shallow Emergent Marsh, Shrub Swamp, Riverside Mudflats (a variant of Inland Non-Calcareous Lakeshore).

Lacustrine: Vernal Pool.

Riverine: Rocky Headwater Stream, Marsh Headwater Stream, Intermittent Stream, Spring.

Rare Community Types. A total of 8 community types from The Hollow are rare at a global to county level, as noted below.

Globally Rare: Floodplain Forest, Shale Talus Slope Woodland.

Other State Rare: Maple-Basswood Rich Mesic Forest, Riverside/Lakeside Bluff, Spring.

Other County Rare: Riverside Sand/Gravel Bar, Cobble Shore, Vernal Pool.

Significant Community Occurrences. From 2 to 6 community occurrences at the site are suggested to be potentially regionally significant, at least at a county level, as analyzed and documented below. A basic list of significant occurrences is provided, followed by a summary table of importance metrics. Descriptions of individual known/potentially significant occurrences are detailed in Appendix TH-1. Only 2 occurrences with the highest certainty of significance, Riverside/Lakeside Bluff and Shale Talus Slope Woodland, are mapped for the site (see Map TH-2).

State Significant: Floodplain Forest, Riverside/Lakeside Bluff. County Significant:

Maple-Basswood Rich Mesic Forest, Riverside Sand/Gravel Bar, Shale Talus Slope Woodland, Spring.

Regionally-Significant Community Summary Table.

	EO	Significance		Estimated	Exemplary	
Community Name	Rank*	Thresholds	Level	Certainty	Size	Status
Riverside/Lakesid	e BC	St:BC/Co:D	St	St:?,Co:Y0	.6 acres	county co-ex (1
Bluff						of 3)
Floodplain Forest	С	St:C/Co:C	St	St:?,Co:~	10 acres	X
Shale Talus Slope	CD	St:BC/Co:D	Со	St:N,Co:Y	1.1 acres	county
Woodland					р	otential near-ex
Maple-Basswood	С	St:BC/Co:C	Со	St:N,Co:?	30 acres	X
Rich Mesic Fo	orest					
Riverside Sand/	С	St:BC/Co:C	Со	St:N,Co:??	0.3 miles	X
Spring	С	St:BC/Co:C	Co	St:N,Co:??	50 feet	Х

^{*}EO rank estimated from rapid analysis of rough size estimate (compared to size rank specifications) plus ranks based on field condition and landscape knowledge.

Regionally-Exemplary Community Occurrences. From 1 to 2 community occurrences at the site are suggested to be among sets of county-exemplary sites for their community type (see Table TH-1). The exemplary status of one occurrence, Riverside/Lakeside Bluff, is of high certainty.

Important Species Features.

Rare Plant Taxa. A diverse set of county-rare plant taxa was observed at the site, 17 of relatively high certainty (see Table TH-2). The rarest taxon is probably yellow grass (Hypoxis hirsuta), only about the second population observed in the county, the other located at Oakwood Cemetery in Troy. It is very vulnerable at this site, represented by only 1 observed individual and near the property boundary with an adjacent landfill.

Rare Plant Concentration Area. A rare plant concentration area was newly designated for The Hollow, discovered through the first documented field surveys for this area. Information in support of this designation is presented below. Tallies of regionally-rare plant taxa at the site are as follows:

```
County Active List: 3 certain, 2 uncertain (5 potential)
County Watch List: 14 certain, 4 uncertain (18 potential)
Total County Rare: 17 certain, 6 uncertain (23 potential)
State Rare: 1 (1 watch list-uncertain identity).
```

Designation Rationale. The number of county-rare plants observed with certainty at The Hollow site clearly warrants designation as a county-important rare plant concentration area. Thus, a corresponding rare plant concentration area site was newly delineated (see Map TH-3). This site is relatively moderately large (46 acres), relatively diverse, and has abundant rare species including multiple county active list species (see Table TH-2), many of which are apparently limited in the county to the Hudson Valley. Such species include yellow grass, early buttercup, heart-leaved golden Alexanders, and moonseed.

Importance Analysis. As of July 2020, The Hollow now represents the second most important known rare plant concentration area in the City of Rensselaer, behind the Rensselaer Tech Park (see the Northern Rensselaer Hills site). Basic importance metrics for the site are summarized here.

```
Town Priority: #2 (newly revised).
County Priority:
   possibly warranting placement in the Top 50 rare plant concentration areas for the county (roughly 15th to 50th range), pending detailed future reanalyses.
Concentration Priority: 3 (= high concentration level).
```

Important Animal Features. No rare animal taxa were observed at the site. Quackenderry Creek, as a cleanwater macroinvertebrate concentration area at this site, comes closest to a county-important site for animal habitats among the 3 survey sites. This observed important animal habitat, described briefly below, is thought to be of only local importance (for the City of Rensselaer), not warranting county importance status.

<u>Quackenderry Creek The Hollow</u>: cleanwater macroinvertebrate concentration area.

A total of 6 abundant cleanwater macroinvertebrate sites were designated as county important for Rensselaer County in the 2017 county conservation plan. Most represent designated trout streams. All are much larger than this site (at least 12 acres/7 to 60 miles long) and all are in more intact landscapes. In comparison, the stream segment of Quackenderry Creek observed to have abundant cleanwater macroinvertebrates, centrally located on The Hollow property and corresponding to a Rocky Headwater Stream, is only about 0.48 miles long. It is classified as a Class C stream without a trout designation. Despite an abundance of cleanwater macroinvertebrate individuals and a high diversity of macroinvertebrate families (especially for caddisflies), the relatively small size of the habitat, lack of trout designation, and reportedly compromised water quality (per River Haggie Outdoors information) suggests that this site should not be deemed county important for this animal habitat type. However, it is thought to be locally important and may be the best example in the city (with only Mill Creek potentially comparable). Because of its lesser importance, this habitat is neither mapped nor characterized in detail here. A summary description of this animal habitat type (especially listing observed faunal taxa and their abundance) could be prepared from field notes, however, upon request.

Important Restricted Ecosystem Complexes.

One area onsite was deemed to be a county-important restricted ecosystem complex: a 25-acre mature forest complex with abundant mature trees growing on steep slopes and secluded stream terraces. This complex is shown in Map TH-4 and described in Appendix TH-2, with maximum tree girths summarized in Table TH-3. Other areas onsite considered for important examples of restricted ecosystem complexes, a rocky summit/slope complex and riparian complex, were deemed not regionally important and are briefly mentioned in the general section of this report.

City of Rensselaer Natural Resource Information. Site Descriptions.

Sites 2 & 3. Northern Rensselaer Forest

General Site Description.

The roughly 337-acre Northern Rensselaer Forest site represents the largest contiquous forest entirely within the City of Rensselaer. It is bisected by railroad tracks, roughly into two ecologically distinct subsites, treated and described separately below: the 64-acre Hudson River Floodplain Rensselaer subsite (to the northwest) and the 273-acre Northern Rensselaer Hills subsite (to the southeast) (see Map NF-1). The railroad appears used infrequently by trains but frequently by all-terrain vehicles (ATVs). Although it has many characteristics of a "disturbance corridor", it probably does not function as a substantial barrier to many native taxa. Thus, the two subsites are expected to be ecologically fairly well connected. Interstate Route 90 further bisects the site, where it divides both subsites into larger northern forest areas and smaller southern forest areas (see the descriptions for each subsite). The large central forested parcels of the Northern Rensselaer Hills subsite are bordered to the east by subdivisions (with looping roads, apartments, and residential homes) that have apparently progressively intruded westward on upland flats and ridges into a former larger natural area (see Map NF-2). The remaining forestland now consists mostly of steep slopes and deep ravines where logging and development would be challenging, suggesting that the build-out scenario may have been reached here. Mature trees are abundant throughout the closed canopy forest areas of the Northern Rensselaer Forest site.

Rensselaer Tech Park Forest.

The Northern Rensselaer Forest essentially represents a subset of the 1082-acre Rensselaer Tech Park Forest, designated as a county-important forest landscape in the 2017 county conservation plan. The latter site is primarily in the Town of North Greenbush but extends into the City of Rensselaer (see Map NF-2). While the City of Rensselaer portion of the larger site corresponds closely to the Northern Rensselaer Forest, it contains only the portion of the latter site north of Interstate Route 90, not parts of the Northern Rensselaer Forest south of the interstate. Embedded within the Rensselaer Tech Park Forest is a 415-acre forest-interior area, also designated as county-important in the 2017 county conservation plan and also spanning the two municipalities. It occupies about 300 acres in North Greenbush and 100 acres in Rensselaer.

The Rensselaer Tech Park Forest represents one of the largest forest landscapes and forest-interior areas in close proximity to downtown Albany (just across the river). It represents the largest forest landscape and only designated county-important forest landscape in the City of Rensselaer. It also represents the largest forest-interior in the City of Rensselaer, by far, and is also the largest such area in the Town of North Greenbush. The next largest forest-interior area in the City of Rensselaer is much smaller, the 4-acre Pattison Street Woods site, mapped for the 2017 county conservation plan. Most of the Rensselaer Tech Park Forest Interior is on Rensselaer Polytechnic Institute property, both in the City of Rensselaer and the Town of North Greenbush. Both the forest landscape and forest-interior area of the Rensselaer Tech Park Forest site cover parts of the Northern Rensselaer Hills and Hudson River Floodplain Rensselaer subsites (Map NF-2).

Field observations confirmed many forest-interior qualities within the forest-interior part of the Northern Rensselaer Hills site that seem "atypical" for a "city". A sense of seclusion can be gained in the center of the site, with no sight of human structures and few signs of human visitation. Even the noise of the nearby interstate and traffic on Washington Avenue were obscured at the base of the deepest ravines, shielded by the multiple tall upland ridges. While invasive species and trash (biological and physical pollution) are common at the edge of the Northern Rensselaer Forest site, both were observed to be sparse in the forest-interior area. Natural communities are also in more mature condition within this core area.

City of Rensselaer Natural Resource Information. Site Descriptions.

Site 2. Hudson River Floodplain Rensselaer

General Site Description.

The 64-acre Hudson River Floodplain Rensselaer site is an essentially undeveloped forested area representing the floodplain of the Hudson River along the northwestern edge of the City of Rensselaer (see Map It borders the largest Tidal River in the Northeast United States, the Hudson River, with closed forest canopy extending all the way to the river shoreline. The site occupies a low level terrace of the existing Hudson River, formed by recent alluvial deposits. The floodplain is essentially bounded on the southeast by an infrequently-used railroad track, beyond which are steep side slopes that represent an escarpment of a higher and older historic low level terrace (lakeplain) of the Hudson River. The site contains some small/narrow successional (succeeding) areas, maintained trails/off-road vehicle routes, historic structures, trash dumps, and undesignated public swimming areas. It is primarily on property of the Rensselaer Polytechnic Institute (RPI), immediately adjacent to and linked via trail networks to the Rensselaer Tech Park natural area to the northeast in North Greenbush. Other parcels to the south include ones owned by the City of Rensselaer (associated with the Forbes Avenue Public Boat Launch) and National Grid (associated with a large powerline).

The site contains a diverse set (16) of natural community types, especially estuarine (freshwater tidal) communities, including 10 regionally-rare types. Five community occurrences are of high certainty as county significant, 3 warranting county exemplary status. Numerous (13) county-rare plant species, including a few of very rare status, were found from the site, thus warranting a newly-designated rare plant concentration area for the county. rare animal species were observed. The one animal habitat most important at the site, an anadromous fish concentration area within the adjacent Hudson River, was considered not a geographic focus of this site. A newly-discovered sizeable mature forest complex at the site is deemed a county-important restricted ecosystem complex example. The boundary of a second, previously-documented, county-important ecosystem complex, a tidal riparian complex mostly associated with the adjacent Hudson River, might be extended into the floodplain on the site upon more careful evaluation.

Ecological Communities

General Community Description. The site contains a fair diversity of floodplain and tidal (estuarine) community types typical of the scattered remaining natural settings along the uppermost freshwater reaches of the Hudson River Estuary. The moderately wide floodplain is dominated by Floodplain Forest, mostly represented by mesic (not hydric) patches, with the highest rises grading to the upland forest types Maple-Basswood-Rich Mesic Forest and its successional equivalent, Successional Southern Hardwoods. The Floodplain Forest is comprised mostly of a dry to mesic levee, suspected to be flooded only briefly in early spring after snowmelt, with small pockets of wet to mesic hollows, some of which were classified as Vernal Pool. The western edge of the site is fringed by a long, essentially natural estuarine shoreline, lining the freshwater section of a very large Tidal River, the Hudson River. The dominant shoreline community, Freshwater Intertidal Shore, consists of various ecological association zones paralleling the river, with dry to wet gravel-sand substrate areas dominant and cobble substrate areas subdominant, the former typically at the highest intertidal zones, the latter at lower intertidal zones. Shorter, narrow patches of Freshwater Intertidal Mudflats, characterized by clay and silt substrate, occur at scattered spots in the lowest intertidal zone. Very small patches of Freshwater Tidal Marsh, with permanently emergent aquatic vegetation, were observed within the Tidal River in very small embayments and at the mouths of intermittent drainages, just below the low tide extent. While most of the estuarine shoreline is natural, very few scattered small patches of cultural communities were observed. These include Estuarine Rip-rap/Artificial Shore, all patches of which are seemingly recovered to a semi-natural state, located at a city boat launch/park at the southern end of the shoreline within the site, under the Interstate Route 90 bridge, and associated with old piers and buoy markers.

Two very small tributaries of the Hudson River cut across the floodplain within this site, the largest a flat, very slow-flowing, meandering Marsh Headwater Stream with mud substrate that drains the central part of the Northern Rensselaer Hills from the southeast, the other a narrow gently-sloping Rocky Headwater Stream with rocky substrate and trickling flow that emanates from the slopes in the southern part of that site. Other very small-patch habitats within the floodplain include Spring, Shallow Emergent Marsh, and Riverside/Lakeside Bluff (the latter two bordering the Marsh Headwater Stream). A heavily used trail network within the floodplain, apparently created and maintained by all-terrain vehicles (ATVs), has resulted

in a mosaic of successional upland communities that developed on exposed soils. The most interesting of these communities is one that occurs on the driest and sandiest soils, Successional Northern Sandplain Grassland. That community harbors several county-rare species at the site characteristic of sandplains, ones much more common across the river in Albany County than in Rensselaer County.

Community Composition. A list of ecological communities observed at the site is arrayed below by community system, then subsystem.

Terrestrial

Forested: Maple-Basswood-Rich Mesic Forest, Successional Southern Hardwoods.

Open: Riverside/Lakeside Bluff, Successional Northern Sandplain Grassland, Successional Old Field, Successional Shrubland.

Palustrine

Forested-Mineral: Floodplain Forest.

Open-Mineral: Shallow Emergent Marsh.

Lacustrine. Vernal Pool.

Riverine. Rocky Headwater Stream, Marsh Headwater Stream, Spring.

Estuarine

Tidal River, Freshwater Intertidal Shore, Freshwater Intertidal Mudflats, Freshwater Tidal Marsh.

Cultural.

Estuarine Rip-Rap/Artificial Shore, Dredge Spoils (dredge spoil forest), Herbicide-Sprayed Roadside/Pathway (powerline), Railroad.

Rare Community Types. A total of 10 community types from the site are rare at a global to county level, as noted below.

Globally Rare:

Floodplain Forest, Freshwater Intertidal Shore, Freshwater Intertidal Mudflats, Freshwater Tidal Marsh.

Other State Rare:

Tidal River, Maple-Basswood Rich Mesic Forest, Riverside/Lakeside Bluff, Successional Northern Sandplain Grassland, Spring.

Other County Rare: Vernal Pool.

Significant Community Occurrences. Five community occurrences at the site are suggested to be potentially regionally significant, at least at a county level, as analyzed and documented below. A basic list of significant occurrences is provided, followed by a summary table of importance metrics. Descriptions of individual known/potentially significant occurrences are detailed in Appendix HF-1. Only 4 occurrences are mapped for the site (see Map HF-2). The other occurrence, a large Tidal River community extending far

beyond the site, was originally mapped for the NY Natural Heritage Program, with the county portion provided in the county conservation plan. Freshwater Intertidal Shore and Freshwater Intertidal Mudflats communities are mapped as a mosaic.

State Significant:

Floodplain Forest, Freshwater Intertidal Shore, Freshwater Intertidal Mudflats, Tidal River.

County Significant: Freshwater Tidal Marsh.

Regionally-Significant Community Summary Table.

	EO	Significance			Estimated	Exemplary
Community Name	Rank*	Thresholds	<u>Level</u>	Certainty	Size	Status
Tidal River	В	St:BC/Co:CD	St	St:Y,Co:Y	74249 acres	state/county
						sole-exemp
Floodplain Forest	E BC	St:C/Co:C	St	St:Y,Co:Y	23 acres	county co-ex
						(1 of 3)
Freshwater	С	St:CD/Co:D	St	St:Y,Co:Y	4.8 ac/	county co-ex
Intertidal Shor	ce				0.9 mi	(1 of 2)
Freshwater	CD	St:CD/Co:D	St	St:N?,Co:Y	0.2 miles	X
Intertidal Mudflats						
Freshwater Tidal	D	St:CD/Co:D	Со	St:N,Co:Y	0.04 acres	X
Marsh						

*EO rank estimated from rapid analysis of rough size estimate (compared to size rank specifications) plus ranks based on field condition and landscape knowledge.

Regionally-Exemplary Community Occurrences. From 1 to 3 community occurrences at the site are suggested to be among sets of county-exemplary sites for their community type (see Table HF-1). The exemplary status of one occurrence, a Tidal River, is of high certainty, and it has long been documented as a state sole-exemplary site.

Important Species Features.

Rare Plant Taxa. A diverse set of county-rare plant taxa was observed at the site, 13 of relatively high certainty (see Table HF-2). The rarest taxon is probably the state-rare graminoid Bush's sedge (Carex bushii), only about the second population observed by the author in the county, the other located on a shale escarpment in Troy. Although this species may be dependent upon ATV-use in an open sandy habitat for its long-term viability at the site, it is in a confined and vulnerable area, situated along an ATV trail network.

Rare Plant Concentration Area. A rare plant concentration area was newly designated for this site, discovered through the first documented field surveys for this area. Information in support of this designation is presented below. Tallies of regionally-rare plant taxa at the site are as follows:

```
County Active List: 4 certain, 2 uncertain (6 potential)
County Watch List: 9 certain, 8 uncertain (17 potential)
Total County Listed: 13 certain, 10 uncertain (23 potential)
```

State Rare: 2 watch list.

Designation Rationale. The number of county-rare plants observed with certainty at the Hudson River Floodplain Rensselaer site clearly warrants designation as a county-important rare plant concentration area. Thus, a corresponding rare plant concentration area site was newly delineated (see Map HF-3). Overall, this site is relatively moderately large (48 acres), relatively diverse, and has abundant rare species including multiple county active list species, many of which are apparently limited in the county to the Hudson River corridor. Such species include Gray's sedge, three-square bulrush, moonseed, germander, smooth alder, and common sneezeweed.

Importance Analysis. As of July 2020, this site now represents the third most important known rare plant concentration area in the City of Rensselaer. Basic importance metrics for the site are summarized here.

```
Town Priority: #3
```

(possibly even more so if lumped with the floodplain part of the large, broadly-defined, previously-designated Rensselaer Tech Park site from North Greenbush)

County Priority: not among the Top 50 sites.

(possibly among the Top 50 sites if lumped with the floodplain part of the large, broadly-defined, previously-designated Rensselaer Tech Park site from North Greenbush)

Concentration Priority: 4 (= concentrated area).

Although the larger site concept (perhaps best designated as "Hudson River Floodplain Rensselaer North", extending from the Forbes Avenue boat launch park in Rensselaer north to the sewerage treatment plant in North Greenbush) overlaps with the Town of North Greenbush, that part of the site has not yet been finely assessed as part of this site concept. Any "Hudson River Floodplain North Greenbush" subsite is currently lumped under the Rensselaer Tech Park rare plant concentration area site. It would need to be split apart from the remaining "Rensselaer Tech Park Hills" portion of that site (see Northern Rensselaer Hills site) to determine which

rare species are in the floodplain part of that site and which rare species may be new to those known from the City of Rensselaer portion of the broader site. Although the Hudson River Floodplain Rensselaer site, by itself, probably does not warrant one of the Top 50 rare plant concentration areas in the county (i.e., a "county priority site"), the larger site might, pending detailed future re-analyses that consider any additional rare species found in the North Greenbush extension of the site. In comparison, the previously-designated Rensselaer Tech Park site in North Greenbush was characterized as the first town priority for North Greenbush and the 16th county priority site, consisting of 29 total county-rare plants (1 state rare, 10 county active list taxa, 19 county watch list taxa). Pending detailed future re-analyses of a combined Hudson River Floodplain Rensselaer North site, higher county priority and concentration area levels are possible, ranging from 30 to 52 total combined rare taxa.

Important Animal Features. No rare animal taxa were observed at the Hudson River Floodplain Rensselaer site. Similarly, no important animal habitat was observed on the site, although a previously-designated anadromous fish area, the Hudson River Estuary, which spans the southern half of the west edge of the county, representing the Hudson River Tidal River, is directly adjacent to the entire length of this site (see the general report section). Potential riparian animal habitat was casually evaluated during field surveys. While regionally-important riparian habitat for animals (e.g., riparian bird concentration areas) is common in large examples of Floodplain Forest throughout the county, the moderately large Floodplain Forest community at this site revealed no evidence of faunal concentration areas. The lack of characteristic fauna is attributed to the lack of more typical inundated associated features such as Oxbow Lake (including levee lakes) and Backwater Slough communities, as well as overflow channel microhabitats. Only one characteristic potential "riparian" bird species was noted during a casual bird survey of the Capital District Friday Field Group, warbling vireo, as identified by Ruth Brooks.

Important Restricted Ecosystem Complexes.

One area onsite was deemed to be a county-important restricted ecosystem complex: a 25-acre mature forest area with abundant mature trees growing on floodplain levees and the adjacent river shoreline. This complex is shown in Map HF-4 and described in Appendix HF-2, with maximum tree girths summarized in Table HF-3. A small area onsite is considered to slightly overlap a second county-important example of a restricted ecosystem complex, one previously designated

in the 2017 county conservation plan, the Hudson River Rensselaer North tidal riparian complex site, an aquatic basic type. A comparison of these two sites is presented in Appendix HF-3, especially focusing on the role of the Floodplain Forest to the greater riparian ecosystem and its connection to the adjacent Tidal River.

City of Rensselaer Natural Resource Information.
Site Descriptions.

Site 3. Northern Rensselaer Hills

General Site Description.

The 273-acre Northern Rensselaer Hills site represents the largest essentially unbisected forest in the City of Rensselaer (see Map NH-1), extending into the adjacent part of the Rensselaer Tech Park Forest in the Town of North Greenbush (see Map NF-2). Physiographically, the site can be described as a highly dissected, old regional low level terrace or lakeplain of the Hudson River with sand and clay sediment deposits. That terrace has been heavily eroded by numerous fingered headwater streams, leaving many narrow ridges alternating with deep stream valleys. The wider parts of the lakeplain to the east have been converted into dense residential subdivisions with looping road networks, leaving mostly only a minimally sufficient forested buffer to the steep slopes and streams immediately below through which scattered trash and eroded silt runoff are evident. These fingered streams have formed steeply sloping ravines and are bordered by narrow mesic stream terraces. The steep slopes have apparently been unsuitable for human development and logging in the past, thus most support relatively mature forest. The west edge of the site represents a long, sharp, linear escarpment of the old lakeplain, the bottom of which abuts the current Hudson River floodplain/alluvial terrace. only few wetlands within the site, mostly along the stream courses, both at the upper extents (e.g., small springs and seeps) and lowest extents (e.g., larger marshes). Land ownership patterns at the central part (core) of the site reveal locally large parcels of only a few landowners: Rensselaer Polytechnic Institute (93 acres of "vacant" land), the Franciscan Order Seminary (87 acres with a large natural buffer around associated buildings and roads), and two subdivision corporations (82 acres with some natural forests left possibly as "set-aside" areas). Numerous small tracts in the east part of the site make up the remainder of the contiguous forest within the city. Survey of the latter tracts were beyond the scope of this ecological assessment due to the anticipated challenge of securing access permission from numerous landowners.

The site is bisected by Interstate Route 90, a large highway separating a portion of the site to the south, representing the Doane Stuart School property (26 acres with a substantial forest buffer), from the much larger part of the site north of the interstate. Under the tall Interstate 90 bridge that crosses the Hudson River is a semi-natural corridor that functionally connects the north and south parts of the site, undoubtedly representing a N-S bottleneck for wildlife

movement across the interstate highway in western Rensselaer County. A National Grid powerline also bisects the site and disrupts the forest canopy in the northern part of the site. However, it is in a semi-natural condition, resembling open successional community types.

The site contains a diverse set (21) of natural community types, especially upland communities, with 6 regionally-rare community types. Single occurrences of 3 communities are of high certainty as county significant and at least one warrants county exemplary status. Numerous (18) county-rare plant species, including a few of very rare status, were found from the site, supporting the previous designation of the Rensselaer Tech Park rare plant concentration area, which includes much of this survey site, as a county priority site. No rare animal species were observed and no regionally-important animal habitat was identified at this site. A newly discovered large mature forest complex within this site is deemed a county-important restricted ecosystem complex example.

Ecological Communities.

General Community Description. The site contains a good diversity of mostly deciduous climax forest types typical of the Hudson Valley physiographic region (Maple-Basswood-Rich Mesic Forest, Beech-Maple Mesic Forest, Appalachian Oak-Pine Forest, Appalachian Oak-Hickory Forest) mixed with two successional forest types (Successional Southern Hardwoods, Successional Northern Hardwoods). Three Central Appalachian (oak-codominated) forest types (Appalachian Oak-Hickory Forest, Appalachian Oak-Pine Forest, Chestnut Oak Forest) occupy much of the upper slopes and ridges of the site. Additionally, narrow bands of Hemlock-Northern Hardwood Forest cover many of the steep N-facing ravine slopes. Maple-Basswood-Rich Mesic Forest patches are relatively abundant, especially on wider mesic stream terraces in valleys between ridges. The dominant aquatic community is Rocky Headwater Stream, with a centralized network of stream segments in the valleys. segments of Marsh Headwater Stream are present at the lowest extents of the site where slopes are relatively flat. Other aquatic features include multiple tributary Intermittent Stream examples situated in numerous steep side ravines, a couple of very small Vernal Pool patches, and a moderate-sized beaver pond (Oligotrophic Pond/flow-through variant). Most of the few wetland patches are small, located in stream terrace settings. Wetland community types, dominated by hydrophytic vegetation, include Shallow Emergent Marsh, Shrub Swamp, and Red Maple-Hardwood Swamp. Most riverside open upland patches are also small. They include areas of Site 3. Northern

Rensselaer Hills (continued)

Riverside/Lakeside Bluff, on steep slopes in limited parts of the site, and Riverside Sand/Gravel Bar, scattered within the fingered streambeds on gentle slopes.

Community Composition. A list of ecological communities observed at the site is arrayed below by community system, then subsystem.

Terrestrial

Forested:

Appalachian Oak-Hickory Forest, Appalachian Oak-Pine Forest, Chestnut Oak Forest, Beech-Maple Mesic Forest, Maple-Basswood Rich Mesic Forest, Hemlock-Northern Hardwood Forest, Successional Southern Hardwoods, Successional Northern Hardwoods.

Open:

Riverside/Lakeside Bluff, Riverside Sand/Gravel Bar, Shale Cliff and Talus Community, Successional Old Field, Successional Shrubland.

Palustrine

Forested-Mineral: Red Maple-Hardwood Swamp.

Open-Mineral: Shallow Emergent Marsh, Shrub Swamp.

Lacustrine: Vernal Pool.

Riverine

Rocky Headwater Stream, Intermittent Stream, Marsh Headwater Stream, Spring. Cultural: Reedgrass Marsh, Herbicide Sprayed Roadside/Pathway.

Rare Community Types. A total of 6 community types from the site are rare at a global to county level, as noted below.

Globally Rare: none.

Other State Rare:

Maple-Basswood Rich Mesic Forest, Riverside/Lakeside Bluff, Shale Cliff and Talus Community, Spring.

Other County Rare: Riverside Sand/Gravel Bar, Vernal Pool.

Significant Community Occurrences. From 3 to 8 community occurrences at the site are suggested to be potentially regionally significant, at least at a county level, as analyzed and documented below. A basic list of significant occurrences is provided, followed by a summary table of importance metrics. Descriptions of individual known/potentially significant occurrences are detailed in Appendix NH-1. Only 3 occurrences with the highest certainty of significance, Appalachian Oak-Hickory Forest, Maple-Basswood Rich Mesic Forest, and Riverside/Lakeside Bluff, are mapped for the site (see Map NH-2).

State Significant:

Appalachian Oak-Hickory Forest, Appalachian Oak-Pine Forest, Beech-Maple Mesic Forest, Maple-Basswood Rich Mesic Forest, Rocky Headwater Stream, Intermittent Stream.

County Significant:

Riverside/Lakeside Bluff, Riverside Sand/Gravel Bar.

Regionally-Significant Community Summary Table.

	EO	Significance		Estimated	Exemplary	
Community Name	Rank*	Thresholds	Level	Certainty	Size	Status
Appalachian Oak-	В	St:B/Co:BC	St	St:?,Co:Y	84 (396) ac	county co-ex
Hickory Forest						(1 of 4)
Maple-Basswood	BC	St:BC/Co:C	St	St:?,Co:Y	48 acres	county
Rich Mesic Fore	est				pot	ential-near?
Intermittent	В	St:B/Co:B	St	St:??,Co:?	1-5 miles	county
Stream					pote	ential-near??
Beech-Maple	В	St:B/Co:B	St	St:?,Co:?	150-200 acre	s -
Mesic Forest						
Appalachian Oak-	В	St:B/Co:B	St	St:??,Co:??	50-100 acres	-
Pine Forest						
Rocky Headwater	B (BC)	St:B/Co:B	St	St:??,Co:??	1-3 miles	-
Stream						
Riverside/	CD	St:BC/Co:D	Со	St:N,Co:Y	0.06 acres	-
Lakeside Bluff						
Riverside Sand/	С	St:BC/Co:C	Со	St:N,Co:??	~ 0.1 miles	-
Gravel Bar						
Successional	CD	St:B/Co:B		St:N,Co:N	20-50 acres	-
Southern Hardwo	ods					

^{*}EO rank estimated from rapid analysis of rough size estimate (compared to size rank specifications) plus ranks based on field condition and landscape knowledge.

Regionally-Exemplary Community Occurrences. From 1 to 3 community occurrences at the site are suggested to be among sets of county-exemplary sites for their community type (see Table NH-1). The exemplary status of one occurrence, Appalachian Oak-Hickory Forest, is of high certainty. It is essentially the only community within the project area that was mapped for the 2017 county conservation plan as a county-exemplary site.

Important Species Features.

Rare Plant Taxa. A diverse set of county-rare plant taxa was observed at the site, 16 of relatively high certainty (see Table NH-2). The rarest taxon is probably lopseed (Phyrma leptostachya), only about the third population observed in the county, the others located in the Lower Hoosic Valley of Schaghticoke. Although in a secluded mature

forest setting, it is vulnerable at this site, represented by only 1 population in a small confined area near the property boundary with the National Grid powerline.

Rare Plant Concentration Area. A rare plant concentration area previously documented for the county conservation plan in 2017, the Rensselaer Tech Park site, extends well into this survey site (see Map NH-3), although no field surveys had been previously conducted for the City of Rensselaer part of that site, which includes both a large part of the Northern Rensselaer Hills site plus part of the Hudson River Floodplain Rensselaer site (see also the latter site). Information in support of this designation from the recent surveys, focused on the Northern Rensselaer Hills part of the broader site in the City of Rensselaer, is presented below. Tallies of regionally-rare plant taxa observed within the entire 273-acre Northern Rensselaer Hills survey site are as follows:

County Active List: 3 certain, 1 uncertain (4 potential)
County Watch List: 13 certain, 1 uncertain (14 potential)
Total County Listed: 16 certain, 2 uncertain (18 potential)

State Rare: 0

Site Concepts and Boundaries. The larger 825-acre Rensselaer Tech Park rare plant concentration area concept was originally based on surveys only within the Town of North Greenbush, an area finely assessed as part of this site concept for the 2017 county conservation plan, and more of the site is located in that municipality. of Rensselaer portion of the site was based on extrapolations from similar habitats to the North Greenbush part of the site. of the wide physiotopographic diversity of the original Rensselaer Tech Park site, it is recommended to split that site into two subsites, forming a new "Rensselaer Tech Park Hills" site for dissected hills (which includes this survey site) and a "Rensselaer Tech Park Floodplain" site for floodplain areas (which would include the Hudson River Floodplain Rensselaer survey site). Both new sites would span the Town of North Greenbush and City of Rensselaer. Further analyses would be needed to determine which rare species from the broader Rensselaer Tech Park site are in the hills part of that site and which of those species may be new to those known from the City of Rensselaer portion of the broader site (the Northern Rensselaer Hills site) tallied above.

The known area of rare plants within the Northern Rensselaer Hills survey site exceeded the geographic extent of the equivalent City

of Rensselaer hills portion of the originally mapped Rensselaer Tech Park site by nearly twice as much area (see Map NH-3). The revised delineation within the Northern Rensselaer Hills survey site follows both known rare plant spots plus extrapolations based on Appalachian Oak-Hickory Forest habitat, where rare plants were concentrated. Similarly, the Rensselaer Tech Park site or its Rensselaer Tech Park Hills subsite, as a rare plant concentration area, should be newly expanded to cover that additional acreage.

The Doane Stuart portion of the Northern Rensselaer Hills survey site, south of the interstate, has only very few rare plants, most of watch list species. Thus, that area is neither considered a rare plant concentration area nor included in the area north of the interstate.

Designation Rationale. The number and nature of county-rare plants observed with certainty within the 144-acre Northern Rensselaer Hills rare plant concentration area, by itself, clearly warrants designation as a county-important site. Overall, the revised Northern Rensselaer Hills portion of the larger site is relatively moderately large, relatively diverse, and has abundant rare species including multiple county active list species, many of which are apparently limited in the county to the Hudson Valley region. Such species include early buttercup, lopseed, heart-leaved golden Alexanders, and moonseed.

Importance Analysis. The previously-designated Rensselaer Tech Park site was characterized as the first town priority for North Greenbush and the 16th county priority site, consisting of 29 total county-rare plants (1 state rare, 10 county active list taxa, 19 county watch list taxa), all known from the North Greenbush part of the site. has represented the most important known rare plant concentration area in the City of Rensselaer since the 2017 county conservation plan, despite the lack of field information for the City of Rensselaer part of the site. Estimated basic importance metrics for the restructured Rensselaer Tech Park Hills rare plant concentration area, based now on field surveys in the Northern Rensselaer Hills portion of that site, are summarized here. Complications of splitting the original Rensselaer Tech Park site boundaries and population information for that larger area would require more time and analyses for more precise metrics, pending detailed future reanalyses of a combined "Rensselaer Tech Park Hills site".

Town Priority: #1 (most important in municipality)

(even more important when lumped with the hilly part of the previously-designated Rensselaer Tech Park site from North Greenbush)

County Priority: probably among the Top 50 sites.

(probably #16 or higher priority when lumped with the larger hilly part of the previously-designated Rensselaer Tech Park site from North Greenbush)

Concentration Priority: 3 (= high concentration level).

The recent City of Rensselaer field surveys, especially those in the Northern Rensselaer Hills part of the Rensselaer Tech Park site, probably only strengthen the priority status based on observations limited to the city portion of that site. Removal of species in North Greenbush limited to the floodplain part of original Rensselaer Tech Park site may, however, counterbalance any priority increases. However, higher county priority and concentration area levels are still expected for the Rensselaer Tech Park Hills site, with a potential total combined tally of rare taxa ranging from 18 to 47. Although, by itself, the Northern Rensselaer Hills site may warrant one of the Top 50 rare plant concentration areas in the county (a "county priority site"), it would likely be at least 16th county priority if lumped into the Rensselaer Tech Park Hills site after further detailed reanalysis considering any additional rare species found in the North Greenbush extension of the site.

Important Animal Features. No rare animal species were observed at the site. Additionally, no animal habitats observed at the site are thought to be of county importance, although the two mentioned below, a beaver pond and forest-interior area, may be of local importance (for the City of Rensselaer). Although careful surveys were not conducted of macroinvertebrate fauna in the headwater streams of this site, as they were for Quackenderry Creek at The Hollow, the site probably does not warrant a cleanwater macroinvertebrate concentration area, the streams being of rather small discharge. However, they are probably important for stream fauna from a local perspective, representing the most intact headwater subcatchment in the city. More focused surveys are recommended to better assess these streams.

Aquatic mammal concentration area.

An active beaver pond at this site was deemed not to meet criteria for an aquatic mammal <u>concentration</u> area. There were signs of only one aquatic mammal species, beaver, not others such as muskrat or otter. However, this habitat was not carefully explored during surveys. Additionally, the site is rather small for an aquatic mammal concentration area. Although not deemed a county-important animal habitat site, it may be locally important in the City of Rensselaer as one of only few areas there with active beaver habitat.

Forest-interior habitats.

Despite the designation of a county-important forest-interior area (the Rensselaer Tech Park Forest) that extends far into this site, no evidence of concentrated forest-interior bird breeding or nesting was noted here. At best, calls of some common forest-interior birds such as red-eyed vireo were noted. Similarly, no evidence of concentrated forest-interior large mammal denning was noted, although many dens of smaller mammals were observed, possibly associated with chipmunks, squirrels, woodchucks, and foxes.

Important Restricted Ecosystem Complexes.

One area onsite was deemed to be a county-important restricted ecosystem complex: a 157-acre mature forest area with abundant mature trees growing on steep slopes and secluded stream terraces. This complex is shown in Map NH-4 and described in Appendix NH-2, with maximum tree girths summarized in Table NH-3. Other areas onsite considered for important examples of restricted ecosystem complexes (riparian complex) were deemed not regionally important and are briefly mentioned in the general section of this report.

Table TH-1. The Hollow: Regionally-Exemplary Community Occurrences. Summary Table.

- A. Already Tracked as County-Exemplary Community.
- B. Recommendations for County-Exemplary Community Addition.

Riverside/Lakeside Bluff

BC-ranked example. comparable to two current county co-exemplary examples (C ranked); size (~2 perpendicular acres) also comparable to largest known example (River Road Schaghticoke; 4 acres); diverse example; newly recommended as 1 of 3 county co-exemplary sites.

C. In Need of Further Evaluation for County Exemplary Status.

Shale Talus Slope Woodland

Not comparable to two current county co-exemplary examples, but size (~1 acre) and CD rank possibly comparable to potential-near-exemplary Poesten Kill Gorge site (0.9 acres); not as typical as the latter site (with more open canopy talus) but probably in better condition (with few invasive species).

D. Communities Not Approaching County Exemplary Status.

Floodplain Forest

too small (\sim 10 acres); also degraded with invasives, with relatively low understory diversity, and not well developed (not typically flooded).

Maple-Basswood Rich Mesic Forest

rank (C rank) too low for exemplary status candidate.

Riverside Sand/Gravel Bar

close to "potential near county-exemplary" sites in size, but degraded from invasives and with only fair species diversity.

Spring

small and degraded for county, but possibly among several best in the Hudson Valley physiographic region of county. better examples of that regional variant are expected in Schaghticoke and Schodack.

Table TH-2. The Hollow: Rare Plant Species.

Rarity Group	Rarit	y Ident	itv	Demographics	
Species Common Name/Scientific Name	Rank	Certa	_	Populations	Genets
Active list species (C1 to C1C2)					
yellow grass/Hypoxis hirsuta	C1C2	100		1	1
early buttercup/Ranunculus fascicularis	C1C2	98		3	13
heart-leaved golden Alexanders/Zizia aptera	C1C2	85		4	17
ambiguous sedge/Carex cf. amphibola	C1/S4	W* 30		1	20
cursed buttercup/Ranunculus cf. scleratus	C1C2	40		1	1
Watch list species (C1 to C1C2)					
moonseed/Menispermum canadense	C2	100		14	
black walnut/Juglans nigra	C2N	100		16	
spikenard/Aralia racemosa	C2N	100		1	
flowering dogwood/Cornus florida	C2C3	100		1	
roundleaf ragwort/Packera obtusata	C2C3	100		1	
spreading sedge/Carex laxiculmis	C2C3	80		1	
wild licorice/Galium circaezans	C2C3	100		2	
wood betony/Pedicularis canadensis	C2C3	100		2	
scarlet oak/Quercus coccinea	C2C3	100		2	
aniseroot/Osmorhiza longistylis	C2C3	95		2	
pubescent sedge/Carex hirtifolia	C2C3	60		3	
	C2C3	100		4	
stickseed/Hackelia virginiana rue anemone/Thalictrum thalictroides	C2C3	100		5	
sticky tick-trefoil/Hylodesmum glutinosum	C2C3 C2	100 50		13	
ribbed sedge/Carex cf. virescens	C2C3	80		1	
plantain-leaved sedge/Carex cf. plantaginea				6	
gray sedge/Carex cf. grisea	C2C3	60		•	
white trillium/cf. Trillium grandiflorum	C2C3	20		1	
other uncommon species (C3)					
elegant drooping sedge/Carex prasina	C2C4				
wild ginger/Asarum canadense	С3				
false shagbark hickory/Carya ovalis	С3				
horsebalm/Collinsonia canadense	С3				
toadflax/Comandra umbellata ssp. umbellata	С3				
honewort/Cryptotaenia canadense	С3				
silvery spleenwort/Deparia acrostichoides	С3				
cowwheat/Melampyrum lineare	C3				
early saxifrage/Micranthes virginiensis	C3				
miterwort/Mitella diphylla	C3				
deerberry/Vaccinium stamineum	C3				
Canada violet/Viola canadensis var. canadensis					
bur-reed sedge/Carex cf. sparganioides	C3				
more common (C3C4 to C4)					
pussytoes/Antennaria plantaginifolia	C3C4				
showy tick-trefoil/Desmodium canadense	C3C4				
common scouring rush/Equisetum hyemale	C3C4				
mayapple/Podophyllum peltatum	C3C4				
smooth sumac/Rhus glabra	C3C4				
Dewey's sedge/Carex cf. deweyana	C3C4	(considering	C3 or	C2C3)	
early azalea/Rhododendron cf. prinophyllum	C3C4				
rough hawkweed/cf. Hieracium scabrum	C3C4				
ostrich fern/Matteucia struthiopteris	C4				
sassafras/Sassafras albidum	C4				
Maryland snakeroot/Sanicula cf. marilandica	C4				

legend: C=county, S=State; A=active list, W=watch list. county rank explanations elsewhere (C1 rarest).

Table TH-3. The Hollow: Maximum Tree Girths.

Diameter-at-Breast Height (cm)				
Species*	<u>Site</u>	Old-Growth Forests**	% Rangewide Maximum	
I. Native Trees				
Cottonwood	130	170	76	
Red Oak	110	150	73	
Black Walnut	100	100	100	
Sugar Maple	100	150	67	
Chestnut Oak	100	150	67	
White Oak	100	160	63	
Black Birch	80	120	75	
American Elm	70	80	88	
Basswood	70	100	70	
White Ash	70	130	54	
Sycamore	70	130	54	
False Shagbark Hickory	60	100	60	
Black Oak	60	160	38	
American Beech	40	120	33	

II. Native Shrubs and Woody Vines

III. Non-Native Trees, Shrubs and Woody Vines

Norway Maple 80 Indian Cigar Tree 60

⁻⁻⁻⁻⁻

^{*} species are arrayed by nativeness, physiognomy, site maximum size, then percent of rangewide maximum size.

^{**} estimated based on extensive field experience; may be more precise information elsewhere. slightly revised from Featherweald Preserve and Poesten Kill Bends management plan estimates plus recent observations from these field surveys.

Table HF-1. Hudson River Floodplain Rensselaer:

Regionally-Exemplary Community Occurrences. Summary Table.

A. Already Tracked as County-Exemplary Community.

Tidal River

B ranked. sole county-exemplary site (and only county site); also state exemplary (per D.Hunt NY Natural Heritage Program ca. 2000).

B. Recommendations for County-Exemplary Community Addition.

Floodplain Forest

BC ranked. probably comparable to 2 current co-exemplary sites (which include Schodack Island, another site along the Hudson River), roughly estimated at B to BC rank. Smaller size than 2 current co-exemplary sites (122-228 acres) and probably with more invasive species (at least compared to the Hoosic River example), but probably more mature and possibly with a higher diversity of native species. Strongly recommended now as 1 of 3 county co-exemplary sites.

Freshwater Intertidal Shore

C ranked. at least as comparable to the current sole exemplary site (Campbell Island Schodack South); larger (estimated at 5 acres/0.9 miles) than the latter site (1.2 acres/0.2 miles) and definitely much longer and with some comparably wide patches. also extends north into North Greenbush (not surveyed, not included in size estimate), thus probably even larger than currently estimated size. Possibly best as a new "sole exemplary site", but tentatively treated, with high certainty, as 1 of 2 county co-exemplary sites, partly due to its low apparent diversity.

- C. In Need of Further Evaluation for County Exemplary Status.
- D. Communities Not Approaching County Exemplary Status.

Freshwater Intertidal Mudflats

CD ranked. much smaller than sole exemplary site (Schodack Creek, 22 acres).

Freshwater Tidal Marsh

D ranked. much smaller than sole exemplary site (Upper Schodack Creek, 78 acres).

Table HF-2. Hudson River Floodplain Rensselaer: Rare Plant Species.

Rarity Group	Rarity	Identity	Demographics	
Species Common Name/Scientific Name	Rank	Certainty	Populations	Genets
Active list species (C1 to C1C2)				
Bush's sedge/Carex bushii	C1/S3W*	80	2	400
long-beaked sedge/Carex sprengelii	C1	100	4	200
Gray's sedge/Carex grayi	C1C2	100	5	150
wild bergamot/Monarda fistulosa	C1C2	100	5	300
ambiguous sedge/Carex cf. amphibola	C1/S4W*	40	10	100s
wedge grass/Sphenopholis cf. intermedia	C1C2	70	1	50
Watch list species (C1 to C1C2)				
moonseed/Menispermum canadense	C2	98	1	
three-square bulrush/Schoenoplectus pungens	C2	90	1	
black walnut/Juglans nigra	C2N	100	16	
aniseroot/Osmorhiza longistylis	C2C3	90	1	
sleepy catchfly/Silene antirrhina	C2C3	100	2	
switchgrass/Panicum virgatum	C2C3	100	8	
meadow sedge/Carex granularis	C2C3	90	8	
germander/Teuchrium canadense				
-	C2C3	100	11	
stickseed/Hackelia virginiana	C2C3	100	8	
intermediate spikerush/Eleocharis cf. intermed		30	1	
white dock/Rumex cf. triangulivalvis	C2	20	2	
or R.verticellatus (C1C2)				
gray sedge/Carex cf. grisea	C2C3	60	1	
linear-leaved rosette grass				
/Dichanthelium cf. linearifolium	C2C3	40	1	
wild black currant/Ribes cf. americanum	C2C3	30	1	
dotted hawthorn/Crataegus cf. punctata	C2C3	30	1	
stalked woolgrass/Scirpus cf. pedicellatus	C2C3	40	3	
common toad rush/Juncus cf. bufonius	C2C3	30	5	
other uncommon species (C3)				
smooth alder/Alnus serrulata	C3			
bitternut hickory/Carya cordiformis	C3			
honewort/Cryptotaenia canadense	C3			
common sneezeweed/Helenium autumnale	C3			
more common (C3C4)				
thimbleweed/Anemone canadensis	C3C4			
showy tick-trefoil/Desmodium canadense	C3C4			
common scouring rush/Equisetum hyemale	C3C4			
Robin's plantain/Erigeron pulchellus	C3C4			
mayapple/Podophyllum peltatum	C3C4			
needle spikerush/Eleocharis cf. acicularis	C3C4			
mountain blue-eyed grass				
/Sisyrinchium cf. montanum	C3C4			
potentially rare (identity poor)				
Bicknell's sedge/Carex cf. bicknellii	C1/S3W*		1	
hairy pinweed/cf. Lechea mucronata	C1/53W^		1	
narry princed/Cr. Lechea mucronata northern shore quillwort	CI		Τ.	
/cf. Isoetes septentrionalis	CH/S1A*		1	
hedge-nettle/cf. Stachys sp. (probably rare or	•		2	

Table HF-3. Hudson River Floodplain Rensselaer: Maximum Tree Girths.

	Diameter-at-B	reast Height (cm)	• • • • • • • • • • • • •
Species*	<u>Site</u>	Old-Growth Forests**	% Rangewide Maximum
I. Native Trees			
Cottonwood	220	220	100
Basswood	90	100	90
Sugar Maple	90	150	60
Silver Maple	80	100	80
Sycamore	80	130	62
American Elm	70	80	88
Green Ash	70	100	70
Bigtooth Aspen	50	100	50
Red Oak	50	150	33
White Oak	40	160	25
Black Walnut	30	100	30
Box Elder	20	40	50

II. Native Shrubs and Woody Vines

III. Non-Native Trees, Shrubs and Woody Vines

Crack Willow	140
Norway Maple	60
Black Alder	50
Tree-of-Heaven	30
Asiatic Bittersweet	10

^{*} species are arrayed by nativeness, physiognomy, site maximum size, then percent of rangewide maximum size.

^{**} estimated based on extensive field experience; may be more precise information elsewhere. slightly revised from Featherweald Preserve and Poesten Kill Bends management plan estimate plus recent observations from these field surveys.

Table NH-1. Northern Rensselaer Hills:

Regionally-Exemplary Community Occurrences. Summary Table.

A. Already Tracked as County-Exemplary Community.

Appalachian Oak-Hickory Forest

B ranked (City of Rensselaer portion, N of Interstate 90). An AB-ranked, 393-acre Rensselaer Tech Park example was designated in the 2017 county conservation plan as 1 of 4 co-exemplary sites for this community type. among the few relatively large intact sites outside the intact Rensselaer Plateau landscape. original area mapped in City of Rensselaer: 81 acres. revised area: added 3 acres, on slopes S of Fox Hollow and River Chase, expanded to 84 acres. A 5 to 10 acre area of this community type S of Interstate 90 on the Doane Stuart School property is assessed as a separate, non-significant, non-exemplary site for this community.

B. Recommendations for County-Exemplary Community Addition.

none

C. In Need of Further Evaluation for County Exemplary Status.

Maple-Basswood Rich Mesic Forest

BC ranked (City of Rensselaer portion, N of Interstate 90). Although not comparable to AB-ranked sole-exemplary site on the Rensselaer Plateau, possibly comparable in size (47 acres) and condition to other potential-near-exemplary sites as low as 65 acres. Likely extends into the Town of North Greenbush along stream terraces and may warrant B rank (larger size) for full extent; needs a more careful assessment in that area. A much smaller area of this community type S of Interstate 90 on the Doane Stuart School property is assessed as a separate, non-significant, non-exemplary site for this community.

Intermittent Stream

B ranked. although possibly comparable in size to 7 AB-ranked co-exemplary sites in large forest landscapes (Rensselaer Plateau and Taconic Mountains), not in as good condition. possibly very good for a Hudson Valley region variant/example, thus should be considered more carefully as a potential-near-exemplary site that might be the best example of that regional variant. However, comparable or better regional examples are likely in the Moordener Kill System (East Greenbush-Schodack-Sand Lake) and Mill Hollow Brook System (Schaghticoke), associated with county-exemplary Rocky Headwater Stream sites (see below).

D. Communities Not Approaching County Exemplary Status.

Successional Southern Hardwoods

CD ranked. carefully compared to near-exemplary 83-acre Rensselaer Tech Park site designated in the 2017 county conservation plan mostly in North Greenbush but also with a very small patch at the edge of the City of Rensselaer north of Thornberry Lane. Patches observed within the Northern Rensselaer Hills site, amounting to about 20 to 50 acres, are deemed a separate example, being too far away from the Rensselaer Tech Park site: at the edge of the National Grid powerlines and Interstate Route 90 plus west of Scott Place.

Appalachian Oak-Pine Forest

B ranked. not comparable to 3 AB-ranked co-exemplary sites. too small (<100 acres) compared to other designated county near/potential-near-exemplary sites (at least 120 acres).

Beech-Maple Mesic Forest

B ranked. not comparable to 6 AB-ranked co-exemplary sites. too small (~ 200 acres) compared to other designated county near/potential-near-exemplary sites (over ~ 1000 acres).

Riverside Sand/Gravel Bar

C ranked. although equal in rank to potential-near-exemplary sites, smaller (<0.1 mile long) than those examples and not as well developed.

Riverside/Lakeside Bluff

CD ranked. smaller than county near-exemplary sites in the nearby Rensselaer Tech Park of North Greenbush and The Hollow of Rensselaer.

Rocky Headwater Stream

B (BC) ranked. not comparable to 3 AB-ranked co-exemplary sites in more intact forest landscapes (Rensselaer Plateau and Taconic Mountains). although comparable in size (~1-3 miles) to shortest near-exemplary site (3 miles, East Hollow Brook in Taconic Mountains), not in as good condition. thought to be in moderately good condition for the Hudson Valley region but the best regional examples are likely the Moordener Kill System (East Greenbush-Schodack-Sand Lake, 41 miles/84 acres) and Mill Hollow Brook System (Schaghticoke, 10 miles/20 acres), both previously

designated as county near-exemplary in the county conservation plan.

Table NH-2. Northern Rensselaer Hills: Rare Plant Taxa List.

Rarity Group Species Common Name/Scientific Name	Rarity Rank	Identity	Demographics Populations	
species common Name/Sciencific Name	<u>Kalik</u>	Certainty	POPULACIONS	Genets
Active list species (C1 to C1C2)				
early buttercup/Ranunculus fascicularis	C1C2	95	1	10
lopseed/Phyrma leptostachya	C1C2	100	1	50
woodland milkweed/Asclepias exaltata	C1C2	90	7	50
wedge grass/Sphenopholis cf. intermedia	C1C2	50	6	400
heart-leaved golden Alexanders/Zizia aptera	C1C2	90	1 NGr	100
spreading-beaked sedge/Carex squarrosa	C1C2	90	1 NGr	
wild bergamot/Monarda fistulosa	C1C2	98	1 NGr	
Watch list species (C2 to C2C3)				
bulblet fern/Cystopteris bulbifera	C2	90	1	
moonseed/Menispermum canadense	C2	90	2	
black walnut/Juglans nigra	C2N	100	4	
forked chickweed/Paronychia cf. canadense	C2	70	6	
scarlet oak/Quercus coccinea	C2C3	100	2	
plantain-leaved sedge/Carex plantaginea	C2C3	90	2	
bottlebrush grass/Elymus hystrix	C2C3	100	3	
wild licorice/Galium circaezans	C2C3	100	3	
flowering dogwood/Cornus florida	C2C3	100	5	
rue anemone/Thalictrum thalictroides	C2C3	100	12	
sticky tick-trefoil/Hylodesmum glutinosum	C2C3	100	14	
stickseed/Hackelia virginiana	C2C3	100	29	
bristly black currant/Ribes cf. lacustre	C2C3	30	1	
switchgrass/Panicum virgatum	C2C3	100	1 NGr	
other uncommon species (C3)				
pale St.John's-wort/Hypericum ellipticum	C2C4			
bitternut hickory/Carya cordiformis	C3			
false shagbark hickory/Carya ovalis	C3			
horsebalm/Collinsonia canadensis	C3			
honewort/Cryptotaenia canadensis	C3			
silvery spleenwort/Deparia acrostichoides	C3			
miterwort/Mitella diphylla	C3			
Canada violet/Viola canadensis	C3			
bur-reed sedge/Carex cf. sparganioides	C3			
more common (C3C4)				
common scouring rush/Equisetum hyemale	C3C4			
Robin's plantain/Erigeron pulchellus	C3C4			
mayapple/Podophyllum peltatum	C3C4			

legend: C=county, S=State; A=active list, W=watch list; county rank explanations elsewhere (C1 rarest). NGr = observed only from nearby North Greenbush in the Rensselaer Tech Park site.

Table NH-3. Northern Rensselaer Hills: Maximum Tree Girths.

	Diameter-at-B	reast Height (cm)	
Species*	Site	Old-Growth Forests**	% Rangewide Maximum
I. Native Trees			
White Oak	160	160	100
Cottonwood	150	220	68
Red Oak	120	150	80
False Shagbark Hickory	100	100	100
Pignut Hickory	80	100	80
Bitternut Hickory	80	110	73
American Beech	80	120	67
White Ash	80	130	62
Sugar Maple	80	150	53
Scarlet Oak	80	150	53
Black Oak	80	160	50
American Elm	70	80	88
Basswood	70	100	70
Hemlock	70	120	58
Chestnut Oak	70	150	47
White Pine	70	150	47
Black Birch	60	120	50
Sycamore	60	130	46
Hop Hornbeam	50	60	83
Red Maple	50	100	50
Shagbark Hickory	30	100	30
Ironwood	15	30	50
Flowering Dogwood	5	10	50

II. Native Shrubs and Woody Vines

Grape

III. Non-Native Trees, Shrubs and Woody Vines

Norway Maple 60

^{*} species are arrayed by nativeness, physiognomy, site maximum size, then percent of rangewide maximum size.

^{**} estimated based on extensive field experience; may be more precise information elsewhere. slightly revised from Featherweald Preserve and Poesten Kill Bends management plan estimates plus recent observations from these field surveys.

Appendix TH-1. The Hollow. Significant Community Descriptions.

State Significant:

Riverside/Lakeside Bluff.

Description.

steep unconsolidated sand/gravel slope, averaging about 45-50 degrees, representing an eroded escarpment of a former lakeplain (suspected to have been derived from a former landslide event during heavy rains). with unvegetated and sparsely-revegetating areas.

Dominant Species:

witch hazel (Hamamelis virginiana), northern bush honeysuckle (Diervilla lonicera), white wood aster (Eurybia divaricata), red raspberry (Rubus occidentalis), horsebalm (Collinsonia canadensis).

Characteristic/Indicative Species:

native: pin cherry (Prunus pensylvanica), northern bush honeysuckle (Diervilla lonicera),
 maple-leaved viburnum (Viburnum acerifolium), whorled loosestrife (Lysimachia quadrifolia),
 spikenard (Aralia racemosa), sticky tick-trefoil (Hylodesmum glutinosum), marginal woodfern
 (Dryopteris marginalis).

non-native: colt's-foot (Tussilago farfara).

Significance.

state-rare community type with A to BC-ranked occurrences state significant. possibly meeting minimum criteria (BC ranked) for state significance. Not higher ranked due to relatively small size (2 perpendicular acres, associated with a relatively small stream). in good condition and in fair landscape context.

Floodplain Forest.

Description.

deciduous forest dominated by a good diversity of hydrophytic to facultative floodplain tree and understory species on mesic, moderately high stream terraces along a Rocky Headwater Stream. with wet leaf packs, suggesting spring flooding.

Dominant Species:

native: black walnut (Juglans nigra), American elm (Ulmus americana), Virginia creeper
 (Parthenocissus quinquefolia), jumpseed (Persicaria virginiana), wood nettle (Laportea
 canadensis), clearweed (Pilea pumila).

non-native: garlic mustard (Alliaria petiolata), dame's rocket (Hesperis matronalis). Indicative Species:

native: sycamore (Platanus occidentalis), eastern cottonwood (Populus deltoides), box elder
 (Acer negundo), black walnut (Juglans nigra), moonseed (Menispermum canadense), ostrich fern
 (Matteucia struthiopteris).

non-native: Japanese stiltgrass (Microstegium vimineum), Japanese knotweed (Reynoutria japonica), privet (Ligustrum sp.), crack willow (Salix alba/fragilis).

Other Characteristic Species:

American elm (Ulmus americana), honewort (Cryptotaenia canadensis), jumpseed (Persicaria virginiana), wood nettle (Laportea canadensis), northern lady fern (Athyrium angustum), gray sedge (Carex grisea), Jack-in-the-pulpit (Arisaema triphyllum), grove bluegrass (Poa alsodes), white snakeroot (Ageratina altissima).

Significance.

globally-rare community type with A to C-ranked occurrences state significant. possibly meeting minimum criteria (C rank) for state significance. Not higher ranked due to a relatively small size (floodplain of a relatively small stream: Quackenderry Creek). in moderately good condition and in fair landscape context.

County Significant:

Shale Talus Slope Woodland.

Description.

deciduous forest on steep (45 degree) slope with exposed unconsolidated shale gravel/pebble talus (which forms about 98% of the surface layer), situated along the eroded escarpment of a former lakeplain.

Dominant Species:

hop hornbeam (Ostrya virginiana), basswood (Tilia americana), witch hazel (Hamamelis virginiana), common scouring rush (Equisetum hyemale).

Characteristic/Indicative Species:

black birch (Betula lenta), red oak (Quercus rubra), hop hornbeam (Ostrya virginiana), sugar maple (Acer saccharum), yellow birch (Betula alleghaniensis), witch hazel (Hamamelis virginiana), common scouring rush (Equisetum hyemale), sarsaparilla (Aralia nudicaulis), marginal woodfern (Dryopteris marginalis), white wood aster (Eurybia divaricata), largeleaf aster (Eurybia macrophylla), white snakeroot (Ageratina altissima), poodle moss (Anomodon attenuatus).

Significance.

global-rare community type with very few examples known/suspected in the county. all county examples are deemed county significant. Not highly ranked due mostly to relatively small size (1 acre), but in moderately good condition, with good maturity and few invasives.

Maple-Basswood Rich Mesic Forest.

Description.

upland deciduous forest dominated by a high diversity of upland to facultative tree and understory species on rich mesic clay soils, occupying a variety of physical settings within the site, most extensively on relatively wide flat stream terraces. Other settings include coves and lowslope to highslope of valley sides. Microhabitat features include seeps, overflow channels, and steep clay streambanks. abundant large trees reflect its mature condition.

Dominant Species:

native: sugar maple (Acer saccharum), basswood (Tilia americana/local), eastern cottonwood
 (Populus deltoides), white ash (Fraxinus americana), jumpseed (Persicaria virginiana), wood
 nettle (Laportea canadensis), enchanter's nightshade (Circaea canadensis),
 Jack-in-the-pulpit (Arisaema triphyllum).

non-native: Asiatic bittersweet (Celastrus orbiculatus), garlic mustard (Alliaria petiolata).

Indicative Species:

basswood (Tilia americana), bitternut hickory (Carya cordiformis), ironwood (Carpinus caroliniana), alternate-leaved dogwood (Cornus alternifolia), horsebalm (Collinsonia canadensis), bloodroot (Sanguinaria canadensis), wild ginger (Asarum canadense), maidenhair fern (Adiantum pedatum), Canada violet (Viola canadensis), Dewey's sedge (Carex deweyana), miterwort (Mitella diphylla), zig-zag goldenrod (Solidago flexicaulis), baneberry (Actaea sp.), stickseed (Hackelia virginiana), common toothwort (Cardamine diphylla), sweet cicely (Osmorhiza claytonii), mayapple (Podophyllum peltatum), large-leaf aster (Eurybia macrophylla), white trillium (Trillium grandiflorum).

Other Characteristic Species:

sugar maple (Acer saccharum), white ash (Fraxinus americana), black walnut (Juglans nigra), red oak (Quercus rubra), spicebush (Lindera benzoin), jumpseed (Persicaria virginiana), wood nettle (Laportea canadensis), hooked buttercup (Ranunculus recurvatus), early meadow rue (Thalictrum dioicum), white snakeroot (Ageratina altissima), Solomon's seal (Polygonatum sp.), red trillium (Trillium erectum), northern lady fern (Athyrium angustum), Jack-in-the-pulpit (Arisaema triphyllum), wild geranium (Geranium maculatum).

County Significant (continued):

Maple-Basswood Rich Mesic Forest (cont.) Significance.

state-rare community type with A to C-ranked occurrences county significant. possibly meeting minimum criteria (C ranked) for county significance, especially because in moderately good condition. not higher ranked due to relatively small known size (30 acres, although likely larger and extending to N & S along Quackenderry Creek corridor) and in a disturbed landscape context.

Riverside Sand/Gravel Bar

Description.

relatively narrow areas of exposed sand and gravel on midstream and side bars of a Rocky Headwater Stream, forming low terraces within the stream channel. grades to Riverside Mudflats in wetter areas with more clay and silt in the substrate.

Dominant Species:

native: honewort (Cryptotaenia canadensis).

non-native: Japanese stiltgrass (Microstegium vimineum).

Characteristic/Indicative Species:

native flora: cursed buttercup (Ranunculus sceleratus), smaller forget-me-not (Myosotis laxa), pale jewelweed (Impatiens pallida), hog peanut (Amphicarpaea bracteata), Robin's plantain (Erigeron pulchellus), reed canary grass (Phalaris arundinacea). native fauna: raccoon (tracks).

non-native flora: colt's-foot (Tussilago farfara), moneywort (Lysimachia nummularia). Significance.

county-rare community type with A to C-ranked occurrences county significant. possibly meeting minimum criteria (C ranked) for county significance, especially because in moderately good condition. not higher ranked due to relatively small known size onsite (although likely extends downstream to S along the Quackenderry Creek corridor) and in a disturbed landscape context.

Spring.

Description.

trickling stream source and surrounding associated mucky seep on a moderate slope, flowing a short distance into a small basin wetland.

Dominant Species:

skunk cabbage (Symplocarpus foetidus), fowl bluegrass (Poa palustris).

Characteristic/Indicative Species:

skunk cabbage (Symplocarpus foetidus), field horsetail (Equisetum arvense), spotted jewelweed (Impatiens capensis), enchanter's nightshade (Circaea canadensis).

Significance.

state-rare community type with A to C-ranked occurrences county significant. possibly meeting minimum criteria (C ranked) for county significance, especially because in moderately good condition. not higher ranked due mostly to relatively small size.

Appendix TH-2. The Hollow: Mature Forest Complex.

Description:

mature forest occupying steep slopes and stream terraces, especially southeast of Quackenderry Creek. representing a diverse set of upland deciduous forest types characteristic of the Hudson Valley and Central Appalachians. with large examples of 14 native tree species and 2 non-native tree species; with 6 native tree species represented by individuals over 100 cm dbh and 6 native tree species represented by individuals thought to be over 70% of their maximum girth. The relatively largest individuals are primarily of eastern cottonwood, red oak, and black walnut. mature areas occur on both the east and west slopes of the hollow, being more extensive on the east side of Quackenderry Creek, with less mature patches on private land.

Ecological Community Composition:

mostly Maple-Basswood Rich Mesic Forest, Appalachian Oak-Hickory Forest, and Appalachian Oak-Pine Forest, with lesser amounts of Chestnut Oak Forest and Beech-Maple Mesic Forest.

Tree Species with Most Abundant Mature Individuals:

eastern cottonwood, red oak, American beech; with slightly lesser amounts of white oak, sugar maple, black birch, and basswood.

Size: 25.2 acres.

Number of Relevant Observation Points: 42.

Core Mature Areas:

relatively uniform throughout the site, although seemingly with mature trees more abundant on the eastern slopes, below the nearby landfill.

Maturity Status:

with abundant mature trees, but with only limited to moderate signs of large standing dead and downed dead trees; estimate about 3 to 4 decades away from incipient old-growth status.

County Priority Tier: Tier 1 (among most important sites in county)

Rationale:

importance primarily for abundance of very mature trees; also among the largest few mapped examples in the county to date and in a region (Hudson Valley) with very limited known and suspected examples.

State Significant:

Floodplain Forest.

Description.

dense to open deciduous forest mostly on dry to mesic alluvial soil "levees" but with small scattered wet pockets/"hollows". starting just above the high tide line at the edge of an intertidal shore, where it grades into Freshwater Intertidal Shore, under estuarine influence with exposed substrate plus scattered rooted and overhanging trees. grading in the driest areas, along the long high levee paralleling the Hudson River, to Maple-Basswood-Rich Mesic Forest (with native climax forest species) and Successional Southern Hardwoods (mostly with non-native successional trees). too high (above the average high tide level) for Freshwater Tidal Swamp. with local wet pockets dominated by hydrophytic herbs such as fowl mannagrass and characterized by tussocks. of good maturity, with abundant multi-trunked trees (derived by a flood-disclimax setting) and trees of large girth (dbh), suggesting existing or incipient old-growth. microhabitats include broad flat terraces (wide levees), narrow ridges, hollows, and overwash channels. local features include wrack lines (often with deposited trash). also with narrow suspected embedded dredge spoil berms (potentially "Dredge Spoil Forest" described in the state community classification).

Dominant Species:

native: eastern cottonwood (Populus deltoides), American elm (Ulmus americana), green ash
 (Fraxinus pennsylvanica), box elder (Acer negundo), Virginia creeper (Parthenocissus
 quinquefolia).

non-native (exotic): Norway maple (Acer platanoides), Asiatic bittersweet (Celastrus orbiculatus), garlic mustard (Alliaria petiolata), dame's rocket (Hesperis matronalis).

Indicative Species (moist to dry):

native: eastern cottonwood (Populus deltoides), silver maple (Acer saccharinum), black walnut
 (Juglans nigra), sycamore (Platanus occidentalis), smooth alder (Alnus serrulata), river
 grape (Vitis riparia), moonseed (Menispermum canadense), germander (Teuchrium canadense),
 long-beaked sedge (Carex sprengelii), rough avens (Geum laciniatum), ostrich fern (Matteucia
 struthiopteris), clearweed (Pilea pumila).

non-native (exotic): crack willow (Salix alba/fragilis), privet (Ligustrum sp.), Japanese stiltgrass (Microstegium vimineum).

Indicative Species (wet):

native: Gray's sedge (Carex grayi). non-native (exotic): moneywort (Lysimachia
nummularia).

Other Characteristic Species (mesic to dry):

American elm (Ulmus americana), basswood (Tilia americana), bitternut hickory (Carya cordiformis), white ash (Fraxinus americana), honewort (Cryptotaenia canadensis), gray sedge (Carex grisea), jumpseed (Persicaria virginiana), wood nettle (Laportea canadensis), aniseroot (Osmorhiza longistylis), enchanter's nightshade (Circaea canadensis), grove bluegrass (Poa alsodes), fringed loosestrife (Lysimachia ciliata), reed canary grass (Phalaris arundinacea), white snakeroot (Ageratina altissima), stickseed (Hackelia virginiana), white cutgrass (Leersia virginica), field horsetail (Equisetum arvense), Joe-Pye-weed (Eutrochium maculatum), Robin's plantain (Erigeron pulchellus).

Other Characteristic Species (wet):

native: buttonbush (Cephalanthus occidentalis), hop sedge (Carex lupulina), brome-like sedge
 (Carex bromoides), wood horsetail (Equisetum sylvaticum), slender mannagrass (Glyceria
 melicaria), fowl mannagrass (Glyceria striata).

non-native: yellow iris (Iris pseudacorus).

Significance.

globally-rare community type with A to C-ranked occurrences state

Floodplain Forest (cont.)

significant. clearly meeting minimum criteria (C rank) for state and county significance due to moderate size (floodplain of very large river: Hudson River) and moderate diversity. also in moderately good condition (with abundant very mature trees) and in moderately good landscape context (mostly bordered by natural river and upland forest communities).

Tidal River (freshwater section).

Description.

very large freshwater section of a tidal river with local reaches onsite having mostly gravel substrate in shallow nearshore areas. with slightly turbid water and with shoreline influenced by frequent boat wakes. with diurnal tidal flow and mostly unvegetated substrate in subtidal zones. with large discharge but slow base flow from large upper watershed.

Indicative Species:

common elliptio (Elliptio complanata/spent shells).

Significance.

state-rare community type with A to BC-ranked occurrences state significant. clearly meeting minimum criteria (C rank) for state significance due to very large size. also in moderately good condition and in moderately good landscape context, as analyzed throughout its long extent by D.Hunt for NY Natural Heritage Program circa 2000.

Freshwater Intertidal Shore.

Description.

intertidal shore of the large freshwater section of a tidal river with hydrophytic vegetation and substrate varying from gravel (in higher zones) to cobbles (in lower zones). variably exposed at low tide and mostly submersed at high tide, with the highest zones possibly infrequently flooded and resembling the non-estuarine open upland community Riverside Sand/Gravel Bar. sparsely vegetated throughout, with overhanging trees at the upper edge. microhabitat features include large downed driftwood logs. Significance.

globally-rare community type with A to CD-rank occurrences state significant and all occurrences deemed county significant. definitely meeting minimum criteria for county significance, probably also for state significance due to sufficient size (both length and width), as well as moderately good condition and moderately good landscape context.

---gravel variant (dry & wet zones, some with shale substrate):
Dominant Species (all non-native):

lady's-thumb (Persicaria maculosa).

Indicative Species:

white dock (Rumex triangulivalvis), common sneezeweed (Helenium autumnale).

Other Characteristic Species:

native flora: water purslane (Ludwigia palustris), spikerush (Eleocharis sp.), beggar-ticks
 (Bidens sp.), Robin's plantain (Erigeron pulchellus), common toad rush (Juncus cf. bufonius),
 reed canary grass (Phalaris arundinacea), Canada wild mint (Mentha canadensis), southern
 bugleweed (Lycopus virginicus); native fauna: common elliptio (Elliptio complanata/spent
 shells).

non-native: yellow iris (Iris pseudacorus).

Freshwater Intertidal Shore (cont.)

---cobble variant (mostly wet):

Dominant Species (all non-native):

purple loosestrife (Lythrum salicaria), lady's-thumb (Persicaria maculosa).

Indicative Species:

broad-leaved arrowhead (Sagittaria latifolia).

Other Characteristic Species:

native: three-square bulrush (Schoenoplectus pungens), marsh yellow cress (Rorippa
palustris), swamp candles (Lysimachia terrestris), American bugleweed (Lycopus americanus).
non-native: garden loosestrife (Lysimachia vulgaris).

Freshwater Intertidal Mudflats.

Description.

Sparsely vegetated intertidal shore of the large freshwater section of a tidal river with mud substrate and hydrophytic vegetation. variably exposed at low tide and submersed at high tide.

Dominant Species:

native: common sneezeweed (Helenium autumnale).

non-native: lady's thumb (Persicaria maculosa), purple loosestrife (Lythrum salicaria). Indicative Species:

broad-leaved arrowhead (Sagittaria latifolia), marsh yellow cress (Rorippa palustris). Other Characteristic Species:

non-native: garden loosestrife (Lysimachia vulgaris).

Significance.

globally-rare community type with A to CD-rank occurrences state significant and all occurrences deemed county significant. probably meeting minimum criteria only for county significance. Not higher ranked due to relatively small size (length and especially width) and low diversity, despite moderately good condition and moderately good landscape context.

County Significant:

Freshwater Tidal Marsh

Description.

relatively densely vegetated graminoid areas, emergent at high tide. with low diversity, in mud substrate, and just below the low tide level.

Dominant Species:

three-square bulrush (Schoenoplectus pungens).

Significance.

globally-rare community type with A to CD-ranked occurrences state significant, and all occurrences deemed county significant. meeting minimum criteria only for county level. Not higher ranked due primarily to extremely small size.

Appendix HF-2. Hudson River Floodplain Rensselaer: Mature Forest Complex.

Description:

mature forest on levee and shoreline buffer of the Hudson River, a large tidal river, situated on a wide floodplain terrace. representing only one forest type, Floodplain Forest, characteristic of the Great Lakes region. although a wetland community type, the example at this site has mostly mesic microhabitat, but is probably exposed to infrequent spring floods. with large examples of 12 native tree species and 5 non-native tree species; with 5 native tree species represented by individuals over 80 cm dbh and eastern cottonwood with individuals up to 220 cm dbh (thought to be at or near its maximum girth); with 5 native tree species represented by individuals thought to be over 70% of their maximum girth. the relatively largest individuals are primarily eastern cottonwood, silver maple, and basswood. The site extends 0.5 miles northeast of the Interstate Route 90 bridge (possibly farther into North Greenbush) and 0.4 miles southeast of the bridge to the Forbes Avenue boat launch park.

Ecological Community Composition:

only Floodplain Forest.

Tree Species with Most Abundant Mature Individuals:

eastern cottonwood, sycamore, silver maple, American elm, crack willow.

Size: 25.4 acres.

Number of Relevant Observation Points: 27.

Core Mature Areas:

0.3 mile stretch northeast of Interstate Route 90 bridge, especially nearest the Hudson River shoreline.

Maturity Status:

with abundant mature trees; also with moderate signs of large standing dead and downed dead trees; estimate about 2 to 3 decades away from incipient old-growth status.

County Priority Tier: Tier 1 (among most important sites in county)

Rationale:

importance primarily for abundance of very mature trees and old forest indicators; also among the largest few mapped examples in the county to date and in a region (Hudson Valley) with very limited known and suspected mature forest examples.

Appendix HF-3. Hudson River Floodplain Rensselaer:

Hudson River Rensselaer North: Tidal Riparian Complex.

Only one restricted ecosystem complex site designated for Rensselaer County in the 2017 county conservation plan is adjacent to any of the 3 surveyed sites in the City of Rensselaer, the Hudson River Rensselaer North riparian complex, a 91.0-acre Tier-2 site that abuts this survey site. It represents a tidal riparian complex with two main ecosystem components: SAV beds and an associated CONUS-mapped forested/shrub tidal wetland (interpreted remotely as Freshwater Tidal Swamp in the state community classification). At best, the former feature abuts the Hudson River Floodplain Rensselaer site, while the latter feature is entirely embedded within this survey site. Synonyms by which the complex site has been referred include Hudson River Shore Rensselaer and Hudson River Interstate 90. An assessment and survey of the river portion of the site, the core of this complex, was beyond the scope of this project, which included areas only above the low tide shoreline extent. The mapped long SAV bed would need to be field examined, probably with a mask and snorkel, to confirm the suspected importance of this site. That assessment has not yet been done by the Rensselaer County Biodiversity Greenprint Project. The CONUS-mapped tidal wetland, however, was field evaluated as "not tidally influenced". Thus, instead it was classified as a Floodplain Forest, at best "grading" to a tidally influenced Freshwater Tidal Swamp. That area was interpreted as being permanently wet (saturated but not inundated), however not influenced by tidal waters. Rather, the wetland is influenced both by emerging groundwater from an upslope spring and seeps and by being situated in a local depression (hollow). Additionally, the floodplain levee between the river and this wetland apparently effectively blocks any tidal influence. Characteristic Freshwater Tidal Swamp species, such as the tree swamp white oak (Quercus bicolor), were not observed in this wetland and the flora is more typical of a non-tidal Floodplain Forest (e.g., Gray's sedge, long-beaked sedge).

Non-tidal floodplain areas were not lumped into this site or generally into most other similar tidal riparian complex sites along the Hudson River designated for the county conservation plan such as Hudson River Schodack Island. Only one designated Hudson River tidal riparian complex has an attached Floodplain Forest patch, the 320-acre Tier-1 Hudson River Papscanee Island site. If the Hudson River Rensselaer North site followed that model, the 23-acre Floodplain Forest would be added to expand the site boundary, totaling about 114 acres for the complex. In that case, a reconsideration as a Tier-1 site may be in order, but any revision to the site concept and boundaries is pending a more careful evaluation. The other option is to remove the CONUS wetland at the Hudson River Rensselaer North site from the site boundaries, leaving only the estuarine shoreline communities of the Hudson River Floodplain Rensselaer site within that complex site.

Because <u>only</u> the shoreline, as the edge of the Hudson River Rensselaer North site, and not its aquatic core, was observed during field surveys and a focus of those surveys, a detailed summary of this complex is not presented here. Instead, a map and database record for this ecosystem complex was previously provided in the county conservation plan. A summary description sheet, like those prepared for the Town of Poestenkill, has not yet been prepared for this site, but could be compiled, upon request, from information in the RCBGP files.

State Significant:

Appalachian Oak-Hickory Forest

Description.

Circumneutral oak and hickory co-dominated deciduous forest with diverse herb layer on dry gravelly mid- to upper slopes plus ridgetops and knolls. Dominant Species:

shagbark hickory (Carya ovata), sugar maple (Acer saccharum), white oak (Quercus alba), red
 oak (Quercus rubra), hop hornbeam (Ostrya virginiana), white snakeroot (Ageratina altissima).
Indicative Species:

shagbark hickory (Carya ovata), false shagbark hickory (Carya ovalis), pignut hickory (Carya glabra), white oak (Quercus alba), scarlet oak (Quercus coccinea), maple-leaf viburnum (Viburnum acerifolium), flowering dogwood (Cornus florida), Pennsylvania sedge (Carex pensylvanica), bottlebrush grass (Elymus hystrix), early buttercup (Ranunculus fascicularis), forked chickweed (Paronychia sp.), rue anemone (Thalictrum thalictroides), wild licorice (Galium circaezans), sticky tick-trefoil (Hylodesmum glutinosum), Swan's sedge (Carex swanii), wedge grass (Sphenopholis cf. intermedia).

Other Characteristic Species:

sugar maple (Acer saccharum), red oak (Quercus rubra), hop hornbeam (Ostrya virginiana), American elm (Ulmus americana), white ash (Fraxinus americana), bitternut hickory (Carya cordiformis), witch hazel (Hamamelis virginiana), woodland goldenrod (Solidago caesia), white snakeroot (Ageratina altissima).

Significance.

with A to B-ranked occurrences state significant. clearly meeting minimum criteria (B rank) for state and county significance due to moderate size and diversity, good condition and moderate landscape context. Previously delineated for county conservation plan as AB-ranked Rensselaer Tech Park example, extending well into the City of Rensselaer throughout this site. Field observations in Rensselaer (B ranked by itself due to size limitations) only strengthen support for state significance (e.g., with abundant very mature trees and few invasives).

Maple-Basswood Rich Mesic Forest.

Description.

Rich sugar maple-dominated deciduous forest with basswood subdominant and very diverse herb layer on mesic clay soils, situated mostly on low to high stream terraces but also found in steep ravines, coves, and some steep midslopes to upper slopes of valley side. contains some wet sloping microhabitats (seeps).

Dominant Species:

sugar maple (Acer saccharum), basswood (Tilia americana), bitternut hickory (Carya
cordiformis), red oak (Quercus rubra), white ash (Fraxinus americana), maidenhair fern
(Adiantum pedatum).

Indicative Species:

basswood (Tilia americana), bitternut hickory (Carya cordiformis), American elm (Ulmus americana), eastern cottonwood (Populus deltoides), ironwood (Carpinus caroliniana), lopseed (Phryma leptostachya), maidenhair fern (Adiantum pedatum), blue cohosh (Caulophyllum thalictroides), wild ginger (Asarum canadense), bloodroot (Sanguinaria canadensis), plantain-leaved sedge (Carex plantaginea), silvery spleenwort (Deparia acrostichoides), bulblet fern (Cystopteris bulbifera), miterwort (Mitella diphylla), hooked buttercup (Ranunculus recurvatus), mayapple (Podophyllum peltatum), horsebalm (Collinsonia canadensis), ostrich fern (Matteucia struthiopteris), wood nettle (Laportea canadensis), baneberry (Actaea sp.), zig-zag goldenrod (Solidago flexicaulis), honewort (Cryptotaenia canadensis), red trillium (Trillium erectum), rough sedge (Carex scabrata), northern lady fern (Athyrium angustum), Jack-in-the-pulpit (Arisaema triphyllum).

Maple-Basswood Rich Mesic Forest (cont.)

Other Characteristic Species (dry to mesic):

sugar maple (Acer saccharum), white ash (Fraxinus americana), hop hornbeam (Ostrya virginiana), American elm (Ulmus americana), white snakeroot (Ageratina altissima), jumpseed (Persicaria virginiana), enchanter's nightshade (Circaea canadensis), woodland goldenrod (Solidago caesia), clearweed (Pilea pumila), wild geranium (Geranium maculatum).

Other Characteristic Species (seeps):

spicebush (Lindera benzoin), skunk cabbage (Symplocarpus foetidus).

Significance.

state-rare community with A to BC-ranked occurrences state significant and A to C-ranked occurrences county significant. possibly meeting minimum criteria (BC rank) for state significance and probably meeting minimum criteria (C rank) for county significance. not higher ranked due to moderate size (unless larger, extending into the Rensselaer Tech Park). in moderately good condition and moderate landscape context.

Appalachian Oak-Pine Forest

Description.

Acidic oak-dominated deciduous forest with scattered white pine and low diversity of herbs, situated on dry to mesic steep S-facing upper to mid slopes of valley sides and knolls. grades to Beech-Maple Mesic Forest (because of relatively low abundance of pine, but with some Central Appalachian indicator species suggesting this community type).

Dominant Species:

red oak (Quercus rubra), white oak (Quercus alba), red maple (Acer rubrum), sugar maple (Acer saccharum), American beech (Fagus grandifolia), witch hazel (Hamamelis virginiana).

Indicative Species:

white pine (Pinus strobus), white oak (Quercus alba), maple-leaf viburnum (Viburnum acerifolium), witch hazel (Hamamelis virginiana), sticky tick-trefoil (Hylodesmum glutinosum), woodland milkweed (Asclepias exaltata), early buttercup (Ranunculus fascicularis), rough hawkweed (Hieracium scabrum).

Other Characteristic Species:

chestnut oak (Quercus montana), red oak (Quercus rubra), black birch (Betula lenta), hop hornbeam (Ostrya virginiana), Concord grape (Vitis labrusca), indian pipe (Monotropa uniflora), Christmas fern (Polystichum acrostichoides), white wood aster (Eurybia divaricata), rue anemone (Thalictrum thalictroides), interrupted fern (Osmunda claytoniana), wild licorice (Galium circaezans), broad-leaved sedge (Carex platyphylla), wild geranium (Geranium maculatum).

Significance.

with A to B-ranked occurrences state and county significant. possibly, but probably not, meeting minimum criteria (B rank) for state significance and county significance unless larger, extending into the Rensselaer Tech Park. not higher ranked due to moderate size and diversity, although in good condition and moderate landscape context.

Beech-Maple Mesic Forest

Description.

Acidic beech and sugar maple co-dominated deciduous forest on mesic soil with relatively low diversity of herbs, situated on steep upper to low slopes, as well as coves and ridges. most common on S-facing slopes. grading to Appalachian Oak-Pine Forest in patches with oaks co-dominant. condition: local patches with some cut stumps.

Beech-Maple Mesic Forest (cont.)

Dominant Species:

American beech (Fagus grandifolia), sugar maple (Acer saccharum), red oak (Quercus rubra), hop hornbeam (Ostrya virginiana), black birch (Betula lenta), witch hazel (Hamamelis virginiana), Christmas fern (Polystichum acrostichoides), broad-leaved sedge (Carex platyphylla).

Indicative Species:

yellow birch (Betula alleghaniensis), Christmas fern (Polystichum acrostichoides). Other Characteristic Species:

American beech (Fagus grandifolia), sugar maple (Acer saccharum), white ash (Fraxinus americana), white wood aster (Eurybia divaricata), common sedge (Carex communis), broad-leaved sedge (Carex platyphylla).

Significance.

with A to B-ranked occurrences state and county significant. possibly, but probably not, meeting minimum criteria (B rank) for state and county significance unless larger, extending into the Rensselaer Tech Park. not higher ranked due to moderate size and diversity, although in good condition and fair landscape context for community type.

Rocky Headwater Stream

Description.

network of riffle-pool dominated perennial headwater stream segments with gentle but distinct slope and rocky substrate. with perennial flow at moderate rates, with riffles very abundant and more local rapids over shale bedrock including 5-10 cm whitewater drops. with cobble substrate dominant, gravel subdominant, scattered clay banks, and shale bedrock infrequent, the latter in areas of steeper slopes. With turbid water in clay reaches. consisting of a mix of narrow reaches with rapids and wider reaches with meanders. in very good to good condition, with areas of abundant large treefall.

Dominant Species: green frog (Rana clamitans), ebony jewelwing (Calopteryx maculata). Significance.

with A to B-ranked occurrences state and county significant. possibly, but probably not, meeting minimum criteria (B rank) for state and county significance. not higher ranked due to only moderate size and diversity, coupled with moderate condition and fair landscape context.

Intermittent Stream

Description.

network of intermittently-flowing headwater stream segments that are mostly dry during the summer season. With mostly no flow under low-flow conditions. Some areas of trickling water (over waterfalls), with a slow flow rate, and some isolated pools of water. Situated in isolated to fingered ravines. primarily with sandy clay substrate, but with limited areas of shale bedrock. Generally in good condition, with areas of abundant large treefall but also with local areas of trash nearest cultural landscape edge.

Characteristic Species: none observed.

Intermittent Stream (cont.)

Significance.

with A to B-ranked occurrences state and county significant. possibly, but probably not, meeting minimum criteria (B rank) for state significance; probably meeting county significance as a good regional variant. although of moderate size, not higher ranked due to only moderate condition and fair landscape context.

County Significant:

Riverside/Lakeside Bluff

Description.

small, steep eroding patches of unconsolidated sandy soil surrounding the uppermost fingered extents of an Intermittent Stream network, situated in gullies resembling "steepheads" of the SE United States.

Dominant Species:

white snakeroot (Ageratina altissima), jumpseed (Persicaria virginiana), Jack-in-the-pulpit (Arisaema triphyllum).

Significance.

state-rare community type with all occurrences deemed county significant. although of small size, large enough for an "occurrence".

Riverside Sand/Gravel Bar

Description.

narrow streamside bars of gravel, many compromised by invasive Japanese stiltgrass (Microstegium vimineum).

Characteristic Species: none observed.

Significance.

county-rare community type with A to C-ranked occurrences county significant. possibly meeting minimum criteria (C rank) for county significance. not higher ranked due to small size, fair condition, and moderate landscape context.

Appendix NH-2. Northern Rensselaer Hills: Mature Forest Complex.

Description:

mature forest on steep slopes, stream terraces, and some narrow high ridges at the edge of an eroding lakeplain. representing a diverse set of upland, mostly deciduous, forest types, with narrow bands of mixed and conifer forests, all characteristic of the Hudson Valley and Central Appalachians. with large examples of a diverse set (23) native tree species, 1 native vine species, and 1 non-native tree species; with 4 native tree species represented by individuals over 100 cm dbh (and 7 more over 80 cm dbh); with 8 native tree species represented by individuals thought to be over 70% of their maximum girth. The relatively largest individuals are primarily white oak, red oak, false shagbark hickory, pignut hickory, and bitternut hickory.

Ecological Community Composition:

mostly Maple-Basswood Rich Mesic Forest, Appalachian Oak-Hickory Forest, Appalachian Oak-Pine Forest, Beech-Maple Mesic Forest, and Hemlock-Northern Hardwood Forest.

Tree Species with Most Abundant Mature Individuals:

red oak, white oak, sugar maple, American beech, false shagbark hickory, pignut hickory, hop hornbeam, and eastern cottonwood.

Size: 156.5 acres.

Number of Relevant Observation Points: 55.

Core Mature Areas:

with the most abundant and mature trees seemingly in the center of the site, farthest from roads and development, especially on the Rensselaer Polytechnic Institute and Grandview Estates Construction Corporation tracts. also seemingly with mature trees more abundant on the steepest slopes and on stream terraces in more secluded valleys.

Maturity Status:

with abundant relatively mature trees, but with only limited to moderate signs of large standing dead and downed dead trees; estimate about 2 to 3 decades away from incipient old-growth status.

County Priority Tier: Tier 1 (among most important sites in county)

Rationale:

importance primarily for its large size, the largest example in the county known and mapped to date, by far; also important for its abundance of relatively mature trees and representation of a region (Hudson Valley) with very limited known and suspected mature forest examples.

The Hollow.

Status

currently a city-owned area with uncertain protection level; part of a parcel has landfill use from air photo interpretation. Recommendations:

avoid further conversion to landfill use; try to maintain all existing forested areas; avoid logging of mature forests; allow recovery of successional areas bordering Quackenderry Creek; avoid conversion to other cultural uses (e.g., pavilions, paved areas, vehicle access routes) in the most ecologically important areas; ideally secure a conservation easement for the entire site. establish more obvious trailheads with signage and/or kiosks.

Hudson River Floodplain Rensselaer.

Status: RPI land. Recommendations:

avoid logging of mature forests; secure conservation easement with RPI or purchase for conservation fee ownership. continued ATV use may help maintain some rare plant populations. establish more formal trail network linking RPI Tech Park to Forbes Avenue boat launch; include limited access to scattered viewing points along Hudson River.

Northern Rensselaer Hills.

Status: mixed ownership, with some moderately large parcels. Recommendations (RPI land):

avoid logging of mature forests; secure conservation easement or purchase for conservation fee ownership.

Recommendations (Franciscan Order):

conservation easement strongly recommended.

Recommendations (2 subdivisions):

determine if surveyed land contains any set-aside areas for previous development projects and if they already have some degree of protection; if not, secure conservation easement.

Recommendations (Doane Stuart School):

not highly recommended for easement relative to other parcels. Recommendations (Trail Networks):

explore establishing a trail network parcel by parcel; consider links to RPI Tech Park trails on RPI land; recommended areas include both flat secluded stream terraces and high ridgelines.

Appendix C: Kiliaen's Landing GEIS Study Area





Appendix D: Community Priorities

City of Rensselaer Natural Resources Inventory

Public Information and Feedback Session, Climate Smart Communities

Wednesday, May 12th 2020 at 6:00 PM, City Hall and ZOOM

Attended by: Ketura Vics, Ingrid Haeckel, Daniel Madigan, Salena Dabbs, Ray Stevens, Anne Burton, Andrea Chaloux, David Ellis, John Ferro

Meeting overview: Attendees were given a presentation, similar versions of which had been given on October 5th and April 12th, about the nature of the NRI and the primary takeaways for the City, noting that the content of the plan will guide all future plan reviews. After discussing the NRI and the Climate Smart Communities (CSC) framework, residents were asked to prioritize the CSC actions that were identified by the Planning Department in the report. A ranking system of high, medium, low, or no priority was used and discussions about the CSC actions and their relationship with the NRI materials helped to guide priority designation.

CSC Action	Community Priority H/M/L	Notes from Community
Develop a government operations climate action plan	Н	
Develop a community climate action plan	M	
Conduct energy audits of local government buildings	М	
Adopt an energy benchmarking requirement for government-owned buildings	Н	
Adopt a green building standard for local government buildings and facilities	Н	Want to see government buildings lead by example
Develop and adopt a comprehensive plan with sustainability elements	Н	Necessary to implement future community priorities
Incorporate smart growth principles into land-use policies and regulations	Н	Want to encourage more reuse to complement new construction and provide balance to offset impact of more impervious surfaces
Adopt a renewable energy ordinance	L	
Establish green building codes	L	Cost prohibitive, don't want to discourage investment

Adopt land-use policies that support or incentivize farmers' markets, community gardens and urban and rural agriculture	Н	Community expressed strong desire for a farmers market
Utilize a green or sustainability rating system for infrastructure improvement projects	Н	The City should not upgrade to unsustainable infrastructure
Adopt green parking lot standards	Н	With the amount of pavement that is already downtown that goes unused, new development in a floodplain should not make the problem worse
Implement strategies that increase public transit ridership and alternative transport modes	Н	By increasing public transit and alternate modes, get less cars on the road and make the City safer as well
Implement traffic calming measures	Н	Volume and speed of traffic on the City's small streets has proven to be problematic, specifically in the Washington Avenue/Broadway/Forbes Avenue corridor. Resident also mentioned speeding cars is a major problem on Green Street as well.
Develop a local forestry or tree planting project or program	Н	Residents felt this was not only a high priority, but that action should be taken to discourage the removal of trees as well.
Preserve natural areas through zoning or other regulations	Н	Residents felt that a sustainable Comprehensive Plan should highly prioritize the protection of natural areas
Conduct a vulnerability assessment	Н	Action should be taken based on biggest climate risks in City
Review existing community plans and projects to identify climate adaptation strategies and policies or projects that may decrease vulnerability (v3: Climate Smart Resiliency Planning)	Н	
7.2 Develop a climate resilience vision and goals (v3: Climate Resilience Vision) and 7.4 Develop climate adaptation strategies (v3: Climate Adaptation Strategies)	Н	

Require shade structures and features in public spaces	Н	Especially important in parks; more shade in parks can encourage use even on hot days instead of staying inside and running an air conditioner
Conserve natural areas for species migration and ecosystem resilience (v3: Conservation of Natural Habitats)	Н	
Create or update a watershed assessment to identify flooding and water quality priorities (v3: Watershed Assessment)	Н	
Require consideration of sea-level rise in planning coastal development	Н	If new development is going to highly compromise or worsen the existing flood plain, does the city want that for future generations?
Extend areas in which the two-foot freeboard requirement applies	N/A	Generally comfortable with the idea, but need to know more before suggesting a community priority level
Use green infrastructure to manage stormwater in developed areas	Н	City should begin using green infrastructure in their own projects in order to hold private developers to the same standard
Conserve, revegetate and reconnect floodplains and buffers in riparian areas (v3: Restoration of Floodplain & Riparian Buffers)	Н	Lots of existing funding, would like to see City pursue when possible
Facilitate a strategic relocation of uses that are not water dependent from flood prone areas	L	Expensive and not feasible; many buildings have already been relocated and are in a flood plain.
Use natural, nature-based or ecologically enhanced shoreline protection	Н	Regionally distinct waterfront; should preserve and enhance where possible
Implement a water conservation and reuse program	Н	Very receptive; i.e. rain barrels for using water in gardens and to water lawns
Encourage xeriscaping	Н	City should consider where we can xeriscape in public areas to conserve water as a city and encourage residents to do the same; known to occur in nearby communities in Massachusetts so it is possible

Include green industries in economic development plans	Н	Particularly important when considering our current selection of industries and the Dunn Dump
Establish incentives for green industry or businesses to locate in community	Н	We should not only plan for green industries but incentivize them
Adopt energy benchmarking requirements for privately owned buildings	Н	If the City is going to do it, privately owned businesses, particularly those on the industrial scale, should have to as well.
Create a climate change education, outreach, and engagement program, focusing on mitigation and adaptation	Н	The more people know, the more the City can support initiatives and support the City's pursuit of additional funding.