4.0 NATURAL RESOURCES

4.1 Introduction

Natural resources are the city's environmental and ecological assets; the land, water, plants, and animals that sustain and enhance the community. Planning for natural resources includes planning for protection, preservation, restoration, and improvement of different types of resources. It also requires balancing natural resource preservation with development practices and human activities. Natural resources and a beautiful environment help to support a healthy and prosperous community. When natural resources are degraded, it threatens the safety and well-being of the City, as well as the economy, its visitors, and its neighbors.

Cranston's lands and waters support a variety of public benefits, recreational and economic activities, and many important species and habitats. This chapter describes the extent and condition of the City's natural resources, as well as the issues and opportunities associated with them. It ultimately articulates goals and actions for their protection and improvement that align with the city's broader vision for its future.

4.2 Existing Conditions

4.2.1 Surface Water

Surface waters, or bodies of water above ground, cover approximately 356 acres (1.9% of the City) within the City. Surface water includes streams, rivers, lakes, wetlands, reservoirs, and creeks. Surface water is critical to both human health and ecosystem health, as most organisms rely on surface waters for drinking water and habitat.

Cranston's drinking water comes from three suppliers: the Providence Water Supply Board, the Warwick Water Department, and the Kent County Water Authority. Most drinking water comes from the Providence Water Supply Board, which comes from the Scituate Reservoir, which is fed by five smaller tributary reservoirs: Barden, Moswansicut, Ponaganset, Regulating, and Westconnaug (Providence Water). Chapter 8, *Services and Facilities*, provides further details on the City's water systems and supply.

The City is located within five watersheds: The Woonasquatucket River Watershed, The Pawtuxet River Watershed, the North Branch Pawtuxet River Watershed, the Scituate Reservoir Watershed, and the Pocassett River Watershed. See Figure 4-1, Surface Water and Watershed Map, for the watershed boundaries and location of surface water bodies. The Woonasquatucket River Watershed and the Scituate Reservoir Watershed cover only small portions of the City.

Surface waters found within Cranston include:

- Dyer Pond
- Randall Pond
- Cranston Print Works Pond
- Tongue Pond
- Spectacle Pond
- Fenner Pond
- Bellfont Pond
- Ralph's Pond

- J.L. Curran Reservoir
- Blackamore Pond
- Meshanticut State Park
- Clarke Brook
- Lippitt Brook
- Furnace Hill Brook
- Meshanticut Brook
- Pawtuxet River
- Pocasset River

The quality of the state's freshwater supplies has been classified by RIDEM. See Figure 4-2 Water Quality Map for the locations of each water body classified by RIDEM. Table 4-2 lists the classifications and impairments for each major waterbody in the City.

When classifying a water body, RIDEM evaluates the potential of that water body to serve seven designated uses (RIDEM 2021) :

- Fish and Wildlife Habitat
- Drinking Water Supply
- Shellfish Consumption
- Shellfish Controlled Relay and Depuration
- Fish Consumption
- Primary Contact Recreation
- Secondary Contact Recreation

The highest quality surface waters in the City (of those that have been evaluated by RIDEM) are:

- Furnace Hill Brook
- Randall Pond
- Several unnamed brooks

The waters listed above are designated category 2, meaning that some, but not all of the designated uses are supported.

The category representing highest impairment is category 5, which indicates that at least one designated use is not being supported or is threatened, and a TMDL is needed. A TMDL assessment describes impairments and identifies measures needed to restore water quality. It is required by the Clean Water Act for all waters in this category. The category 5 water bodies and their impairments are listed in Table 4-1.

Table 4-1. Water Quality Classification

Water Body	Impairment
Blackamore Pont	Total phosphorus
Fenner Pond	Total phosphorus
Pawtuxet River	Lead

Table 4-1. Water Quality Classification	
Water Body	Impairment
	Mercury in fish tissue
Pocasset River	Benthic macroinvertebrates Chloride Copper Non-native aquatic plants Enterococcus
Print Works Pond	Chloride Lead Total suspended solids Fecal coliform

Impairments can occur for a variety of reasons. Impairments commonly come from stormwater runoff that contains pollutants. The most common pollutants coming from stormwater sources include sediment, pathogens, nutrients, and metals such as copper or lead (EPA). Stormwater runoff increases as impervious cover increases. Other impairments can include biodiversity impairments such as invasive species, nutrient impairments most commonly from phosphorus and nitrogen, pathogen impairments such as *Enterococcus* or *fecal coliform*, mercury impairments, or total toxics and unknown toxicity impairments (RIDEM 2021).

These waters are designated as a source of public drinking water supply or as tributary waters within a public drinking water supply, for primary and secondary contact recreational activities and for fish and wildlife habitat. These waters shall have excellent aesthetic value.

These waters are designated for primary and secondary contact recreational activities and for fish and wildlife habitat. They shall be suitable for compatible industrial processes and cooling, hydropower, aquaculture uses, navigation, and irrigation and other agricultural uses. These waters shall have excellent aesthetic value.

These waters are designated for fish and wildlife habitat and primary and secondary contact recreational activities. They shall be suitable for compatible industrial processes and cooling, hydropower, aquaculture uses, navigation, and irrigation and other agricultural uses. These waters shall have good aesthetic value.

These waters are designated for primary and secondary contact recreational activities and fish and wildlife habitat. They shall be suitable for compatible industrial processes and cooling, hydropower, aquaculture uses, navigation, and irrigation and other agricultural uses. These waters shall have good aesthetic value. Primary contact recreational activities may be impacted due to pathogens from approved wastewater discharges. However, all Class B criteria must be met.

These waters are designated for secondary contact recreational activities and fish and wildlife habitat. They shall be suitable for compatible industrial processes and cooling, hydropower, aquaculture uses, navigation, and irrigation and other agricultural uses. These waters shall have good aesthetic value.

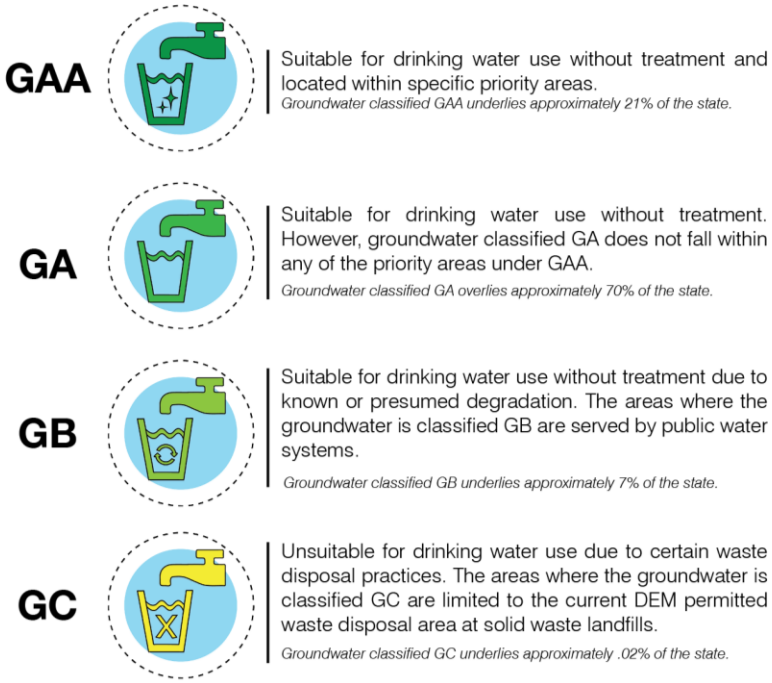
Source: RIDEM, Water Quality Regulations, 2009.

Table 4-2. Water Quality Classification		
Waterbody	Classification	Impairment
Blackamore Pond	B	5
Clarke Brooke	B	3
Cranston Print Works Pond	B	5
Dyer Pond	B	3
Fenner Pond	B	5
Furnace Hill Brook	B	2
J.L. Curran Reservoir	B	4A
Lippitt Brook	B	3
Meshanticut Brook	B	4A

Table 4-2. Water Quality Classification		
Waterbody	Classification	Impairment
Meshanticut State Park	B	3
Pawtuxet River	B1	5
Pocasset River	B	5
Randall Pond	B	2
Spectacle Pond	B	4A
Tongue Pond	B	3

4.2.2 Groundwater

The Rhode Island Department of Environmental Management identifies and maps the state's groundwater reservoirs and groundwater reservoir recharge areas. See Figure 4-3 for the location of groundwater reservoirs and recharge areas. RIDEM classifies the state's groundwater as GAA, GA, GB, or GC, as defined below. The City of Cranston does not contain any groundwater recharge areas. It does contain two groundwater reservoirs, both classified as GB, not suitable for drinking water use without treatment. The City of Cranston has no sole source aquifers and does not rely on groundwater for its water supply.



Fortunately, the City of Cranston does not have any Superfund Sites within its boundaries. Superfund Sites are areas that have been contaminated by hazardous waste or pollutants that were improperly managed or disposed of (US EPA). These sites include manufacturing facilities, processing plants, landfills, or mining sites. Pollutants or hazardous waste that was disposed of improperly often ends up in waterways or seeping into the groundwater table. The Environmental Protection Agency aims

to clean up these sites, hold the responsible parties accountable, and return the Superfund Sites to productive uses (US EPA). There are 13 Superfund Sites in Rhode Island (US EPA).

4.2.3 Soils

Cranston has a variety of soils that vary in their physical and chemical properties. Soils are classified in the NRCS National Engineering Handbook based on their infiltration rates and runoff potentials, as seen in Figure 4-4 (University of Rhode Island, 2016). *Figure 4-4: N*

Group	Description
A	• Contains soils having a high infiltration rate when thoroughly wet and therefore have a low runoff potential.
B	• Has moderate infiltration a low runoff potential.
C	• Has slow infiltration and higher runoff potential.
D	• Lists soils having a very slow infiltration rate and thus the highest runoff

RCS Soil Classifications
Source: University of Rhode Island, 2016

Soils with slower infiltration rates (Groups C and D) attenuate pollutants better than those with rapid infiltration rates. These groups comprise about 44% of the City's soils. However, soils in Groups C and D also have the highest runoff potential and may contribute more to stormwater runoff in areas where impervious surfaces are prevalent. Soils in Groups A and B have high infiltration rates and therefore contribute less to stormwater runoff because they are superior at percolation and absorption. These soils comprise about 49% of the soils in the City. The remaining 7% of soils were not classified. Table 4-3 and Figure 4-5 Soil Hydrologic Group Table and Map provide additional information on the extent of the soil hydrological groups found in Cranston.

Table 4-3. Hydrologic Group

Group	Acres	Percentage of Town
D	6,322	34%
A	5,750	31%
B	3,257	18%
C	1,768	10%

4.2.4 Soil Constraints

Soil constraints, shown in Table 4-4, are grouped by category. The Soil Constraints Map, Figure 4-6, depicts areas throughout the City where existing soil on specific sites would present a constraint to development. Approximately 50% of the City has moderate constraints to development due to soils, and over 1,127 acres (6%) within the City has constraints to development due to slopes of over 15% or bedrock. The seasonal high-water table covers a significant portion of the town. It occurs within a variety of developed areas, agricultural areas, and forested areas of the City. This seasonal high-water table could have a significant impact on development and agriculture.

Table 4-4. Soil Constraints

Category	Acres	Percentage of Town
Moderate constraints to development	9,253	50%
Constraints due to seasonal high water table (19" to 42" depth)	4,723	26%

Table 4-4. Soil Constraints		
Hydric soils- severe constraints (0" to 18" water table)	2,789	15%
Bedrock and/or slope constraints (>15% slope)	1,127	6%
All other severe constraints (rock, sand, etc.)	261	1%

Agricultural Soils

Approximately 4,241 acres, or 23%, of Cranston are in the prime farmland soil unit. In addition to the soils identified as prime farmland, the National Cooperative Soil Survey (NCSS) has designated 1,298 acres or 7% of Cranston's farmland as farmland of statewide importance. See Figure 4-7 for a map of active farms and important farmland soils in Cranston.

4.2.5 Geology

According to RIDEM and Rhode Island Geographic Information System (RIGIS), most of the surficial geology of Cranston is characterized as till and outwash plain soil. Figure 4-8 Surficial Geology Map depicts the parts of the City characterized as till and outwash.

Floodplains

A floodplain is defined as any land area that is susceptible to being inundated by floodwaters from any source. The Federal Emergency Management Agency (FEMA) designates the floodplain into three main zones: AE, VE, and X. Zones AE and VE are within the Special Flood Hazard Area (SFHA). The SFHA is defined as the area that will be inundated by the flood having a 1% chance of being equaled or exceeded in any given year (FEMA). These areas have a higher risk of flooding. VE zones have a higher risk than AE zones. X zones have a more moderate risk and are outside the SFHA. Most of the City is located outside the SFHA in an X zone, as shown in Table 4-5. Less than 7% of the City is located in an AE or VE zone. Figure 4-9 shows the FEMA designated flood hazard areas in Cranston.

Table 4-5. Flood Zones		
Zone	Acres	Percentage of Town
AE	1,198	6.5%
VE	48	0.2%
X	17,267	93.3%

Most of Cranston is prone to riverine flooding, especially the far east portion of Cranston which is located directly on the banks of the Providence River. Riverine flooding poses a risk to major highways such as Interstate 295 and Route 37, as well as to residences and businesses. Eastern Cranston is more densely developed than Western Cranston and contains a majority of the city's economic development. Riverine flooding could have major impacts both to the City's built environment and the City's economy. Major flooding events can disrupt daily life, paralyze transportation systems, and close or damage businesses.

4.2.6 Habitat

The City consists of deciduous woodlands, ruderal forests, fresh water, and forested wetlands, all of which provide habitat for a variety of terrestrial and aquatic plants and animals.

The Rhode Island Natural Heritage Program indicates that Cranston contains 1,026 acres of natural heritage areas (5.5% of the City), or important habitat areas for rare species and natural communities (RIGIS). Figure 4-10 Ecological Communities and Habitat Areas shows the locations of these natural heritage areas. The program collects data to help identify and protect plan and animal species but does not provide details about protected species locations in public data sets.

The Rhode Island Ecological Community Classification (RIECC) was created in 2011 to support the development of a detailed ecological community map and database for the state (Enser 2011). The most common ecological community, other than developed land, in Cranston is Plantation and Ruderal Forest. Table 4-6 and Figure 4-10 provide information on ecological communities in Cranston.

Table 4-6. Ecological Communities

Description	Acres	Percentage of Town
Plantation and Ruderal Forest	2,427	13.1%
Open Uplands (Grassland and Shrubland)	666	3.6%
Open Mineral Soil Wetlands	138	0.75%
Mixed Deciduous/Coniferous Forests	35	0.19%
Fresh Water	351	1.9%
Forested Wetlands (Mineral and Peat Soils)	947	5.1%
Estuarine Intertidal	4	<0.1%
Deciduous Woodlands and Forests	1879	10.1%
Agricultural	728	3.9%
Developed Land	11,338	61.2%

Rhode Island has almost 112,000 acres of freshwater wetlands, covering approximately 16% of state surface area (RIEMC). Wetlands account for a small percentage of Cranston's land area (about 5.95%), but they provide a variety of community benefits. Cranston contains three types of wetlands: open mineral soil wetlands, forested wetlands, and estuarine intertidal wetlands. First and foremost, they provide essential fish and wildlife habitat and promote biodiversity. Wetlands are notoriously productive ecosystems. Their high capacity to hold water is beneficial in that they can soak up rainwater that might otherwise cause flooding (RIEMC). Water held in wetlands can seep into the ground and recharge streams and groundwater aquifers (RIEMC). Wetland vegetation filters out pollutants from the water as it flows through the wetland, resulting in improved water quality. Wetlands also support activities such as fishing, nature walks, photography, and bird watching. Wetlands are disappearing across the coastal United States due to development, coastal erosion, major storms, and sea level rise, making wetland conservation a task of the utmost importance. The remaining wetlands in the City should be conserved for their habitat, stormwater recharge and filtration, and recreational benefits.

Existing conservation lands in the City of Cranston cover 1,735 acres and are represented in green in Figure 4-11. There are approximately 1,088 acres (5.9% of City) preserved by the State of Rhode Island within the City. There are two state parks located within Cranston: Meshanticut State Park and John L. Curran State Park. Meshanticut Lake is a 12-acre lake that allows for activities such as paddling or canoeing. The John L. Curran Management Area is 332 acres and largely forested with

deciduous hardwood trees, oaks, maples, and beeches. It has two ponds as well as agricultural land for public gardening.

There are an additional 647 acres that have been preserved either by the City or by a non-governmental organization, such as the Audubon Society of Rhode Island. Most of the conserved areas are concentrated in the western portion of the City of Cranston. In the more developed eastern portion of the City, conservation areas are concentrated around rivers and smaller bodies of water. These undeveloped lands are valued and part of economic, recreational, and cultural activities.

Cranston has a robust parks and recreation department that maintains outdoor facilities for citizens to enjoy. Facilities include trails, a botanical center, parks, playgrounds, and sports fields. These facilities allow for hiking, biking, walking, and many other outdoor activities. Such activities are socially and culturally important in Cranston. More information about these areas can be found in the Open Space and Recreation chapter.

4.3 Challenges and Opportunities

4.3.1 Challenges

Wetland Protection and Conservation:

Wetlands in Cranston are at risk due to development pressures, coastal erosion, and impacts from climate change such as sea level rise. The diminishment of these resources adversely affects critical natural systems and quality of life for residents. Conservation of the remaining wetlands in the City is necessary to support biodiversity, stormwater recharge and filtration abilities, and recreational benefits.

Open Space Preservation and Development Pressure:

There is ongoing pressure to develop Western Cranston, which threatens to reduce natural habitats, consume open land, and impact natural resources. The City currently struggles to balance the desire for new development with the conservation of open land. New growth should be guided to sensitively preserve open space, which is vital for maintaining the area's natural character.

Flooding and Floodplain Development :

Riverine flooding is a challenge for the City, particularly in Eastern Cranston where development is denser and more vulnerable to stormwater flooding, which is being exacerbated by climate change. The increasing frequency of flooding events challenges the city's existing stormwater infrastructure and threatens the city's economic and social welfare. Development in low-lying, flood prone areas should be limited, and water management capacity should be increased by conserving and enhancing natural water storage, filtration, and drainage features.

Stormwater and Groundwater:

The City faces challenges in managing stormwater runoff, which contributes to water pollution and flooding, particularly during heavy rainfall events. The seasonal high groundwater table, which is near grade throughout a large portion of Cranston, adds to the challenge by restricting groundwater recharge. These factors present a major constraint to development and requires careful consideration in land-use planning.

Water Quality and Contamination:

Protecting rivers from contamination is an ongoing issue. Other factors such as invasive species and algae blooms also threaten rivers and riparian areas. Finally, the legacy of historical industrial contamination is also a major challenge to environmental remediation and redevelopment activities. Expansion of impervious surfaces should be limited to prevent increased runoff. Open space—especially along rivers—should be conserved to the greatest extent possible.

4.3.2 Opportunities

Collaboration with Local Land Trusts:

Partnering with local land trusts can help the City identify and prioritize open and green spaces—especially in Western Cranston—for conservation. By working together, the City and land trusts can develop cooperative conservation strategies, engage community members through education and volunteer opportunities, and explore creative funding mechanisms to acquire and protect valuable natural areas.

FEMA Community Rating System (CRS) Participation:

Cranston should subscribe to FEMA's Community Rating System (CRS) to enhance floodplain management efforts, implement CRS-recommended practices to improve flood resilience and reduce flood insurance premiums for residents, and utilize CRS resources and technical assistance to develop more effective flood mitigation strategies.

Strengthening Partnership with Pawtuxet River Authority:

Collaboration with the Pawtuxet River Authority can support implementation of river restoration projects. Leveraging the Authority's expertise in watershed management can inform citywide water resource policies and lead to new joint policies for water quality improvement, habitat restoration, and recreational opportunities along the Pawtuxet River.

Enhancing Greenspace Conservation with Parks and Recreation Advisory:

Cranston can also work closely with the Parks and Recreation Advisory to identify and prioritize greenspaces for conservation and recreational use, develop a comprehensive greenspace network plan that connects existing parks and natural areas, and create innovative programs to promote community engagement in greenspace stewardship and recreational activities.

Aligning Natural Resource Protection with Hazard Mitigation:

Cranston can integrate natural resource protection strategies with the City's Hazard Mitigation Plan to create multi-benefit solutions, including nature-based strategies for flood mitigation that also enhance ecosystem services and biodiversity, and green infrastructure projects that address both natural resource conservation and hazard mitigation goals.

Sustainable Development Practices:

Low-impact development techniques could be implemented to preserve natural features and minimize environmental impacts. Cranston can encourage these green building practices to create better energy efficiency, water conservation, and sustainable materials.

Environmental Education and Outreach:

To thrive, environmental management and conservation require significant community support. Local residents will be most supportive of environmental management when they see its benefit directly and when they participate directly conservation and environmentally related activities. The City should seek to expand environmental education and outreach with schools and community groups. The City should consider highly visible opportunities such as creating interpretive trails and signage in natural areas to promote awareness and appreciation of local ecosystems. In particular, the City may wish to focus on collaborative opportunities and leverage partnerships.

Ecosystem Restoration Initiatives:

Healthy ecosystems provide essential benefits like clean water and climate regulation. By restoring degraded ecosystems, we enhance these services, benefiting both people and the planet. Like most urbanized areas, the City has more restoration opportunities than resources and will want to prioritize efforts. The City may wish to consider implementing targeted restoration projects for degraded habitats, focusing on native species and biodiversity enhancement. The City may also wish to develop a citywide invasive species management plan to protect and restore native ecosystems.

Water Resource Management:

Watersheds contribute to the overall health of ecosystems. Careful watershed planning helps protect the physical, chemical, and biological components of your watershed, or restore those that have already been degraded. Unmanaged stormwater is a leading source of water resources degradation. Opportunities for improving watershed management in Cranston include implementing innovative stormwater management techniques, such as rain gardens and bioswales, to improve water quality and reduce flooding.

Climate Resilience Planning:

Climate impacts, including extreme weather events, have shown that resilience is an essential component of our planning whether that planning is occurring at the global, regional, or local level. Opportunities for the City include incorporating climate change projections into natural resource management strategies and developing green corridors and urban forests to mitigate urban heat island effects and enhance carbon sequestration.

Community Gardens and Urban Agriculture:

From an environmental standpoint, urban agriculture can improve watershed health by reducing stormwater runoff, enhance biodiversity and pollinator habitat, and foster connection to the outdoors. Community gardens and urban farms also offer training and job- skills programs for youth and other community members and promote local food production and green space utilization. Opportunities in the City include opening underutilized public spaces to community gardening and farming for food production and providing space for selling local agricultural products (e.g., farmers markets).

Figure 2-1. Surface Water and Watersheds

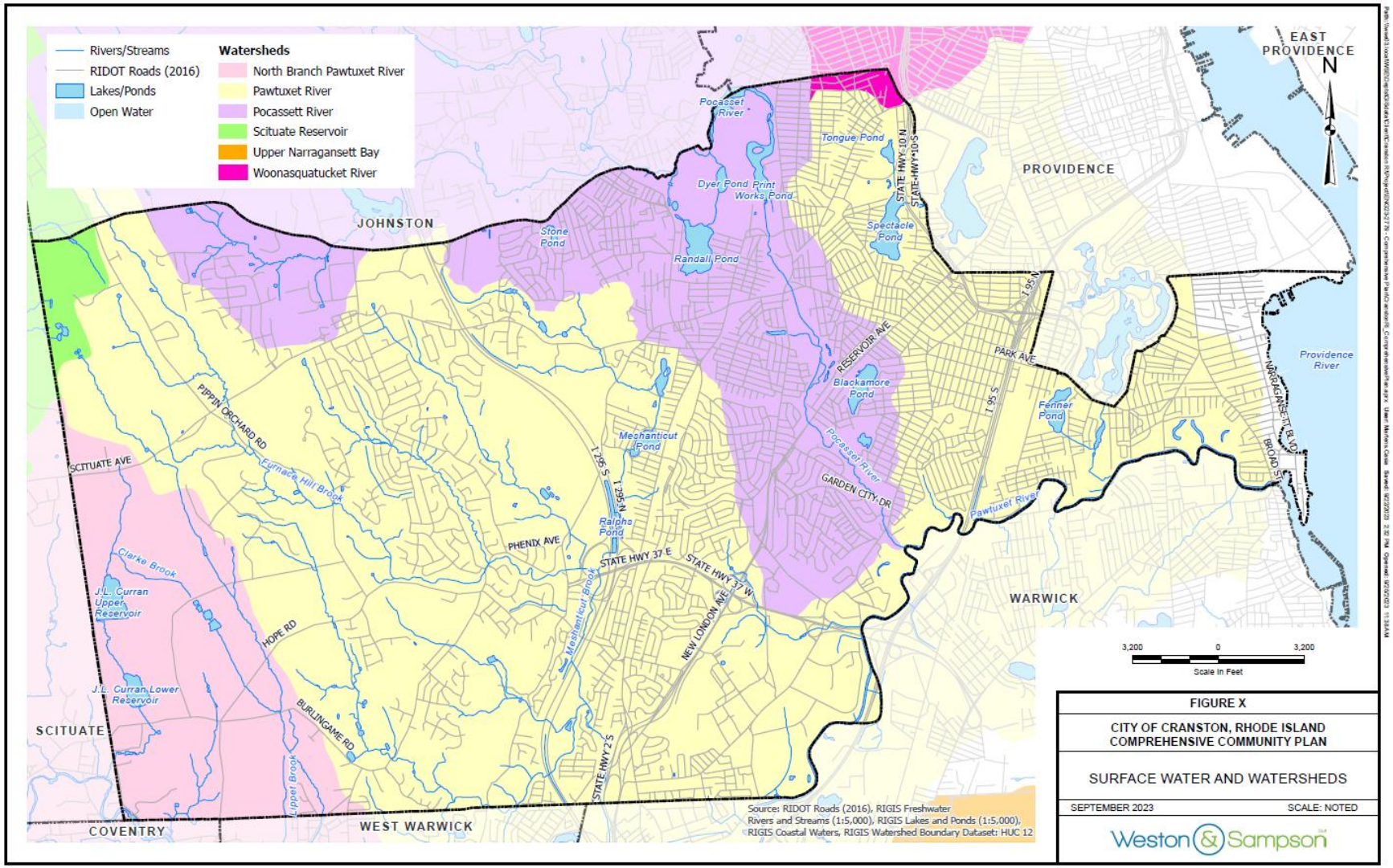


Figure 2-2. Water Quality

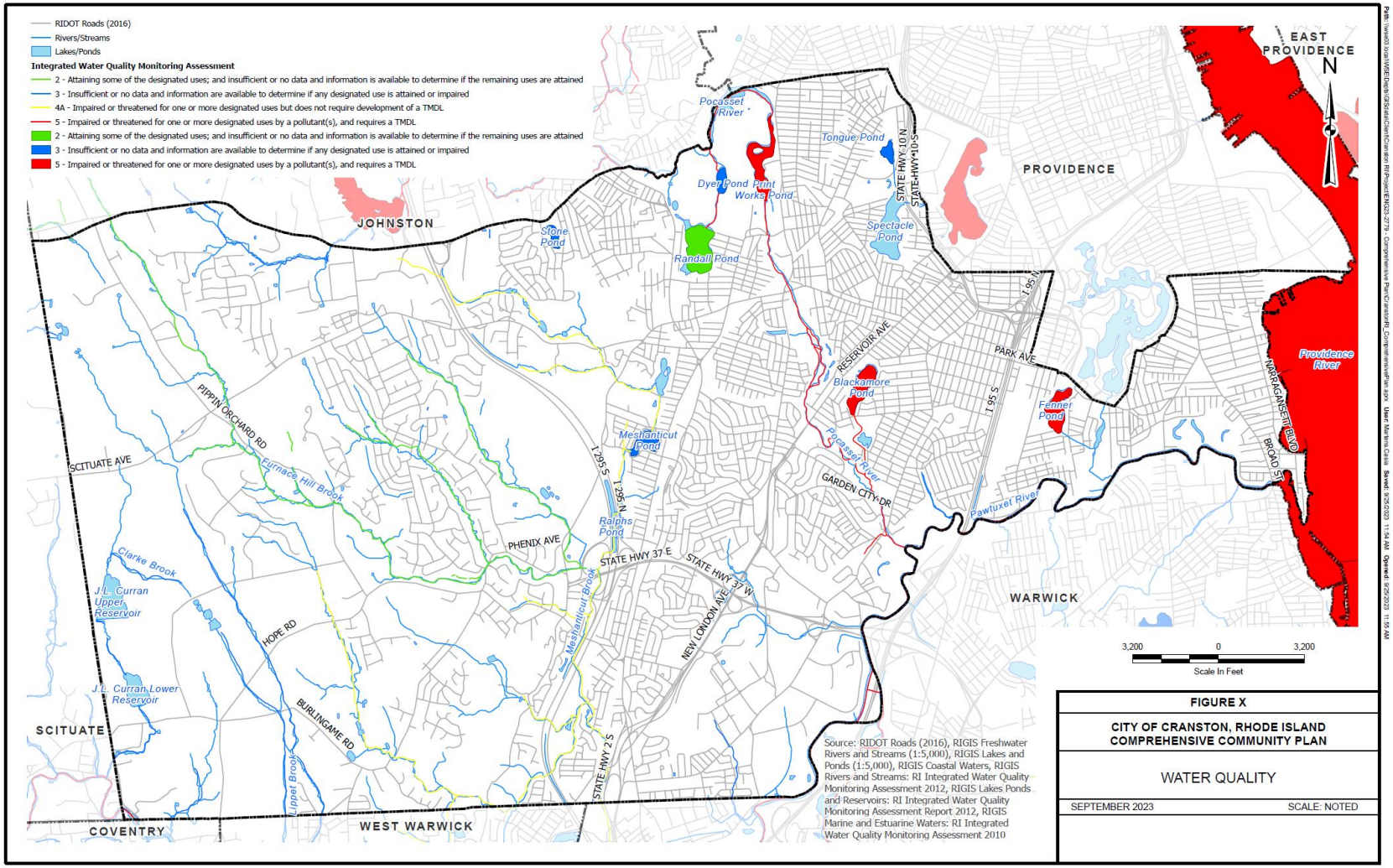


Figure 2-3. Groundwater Supply and Protection

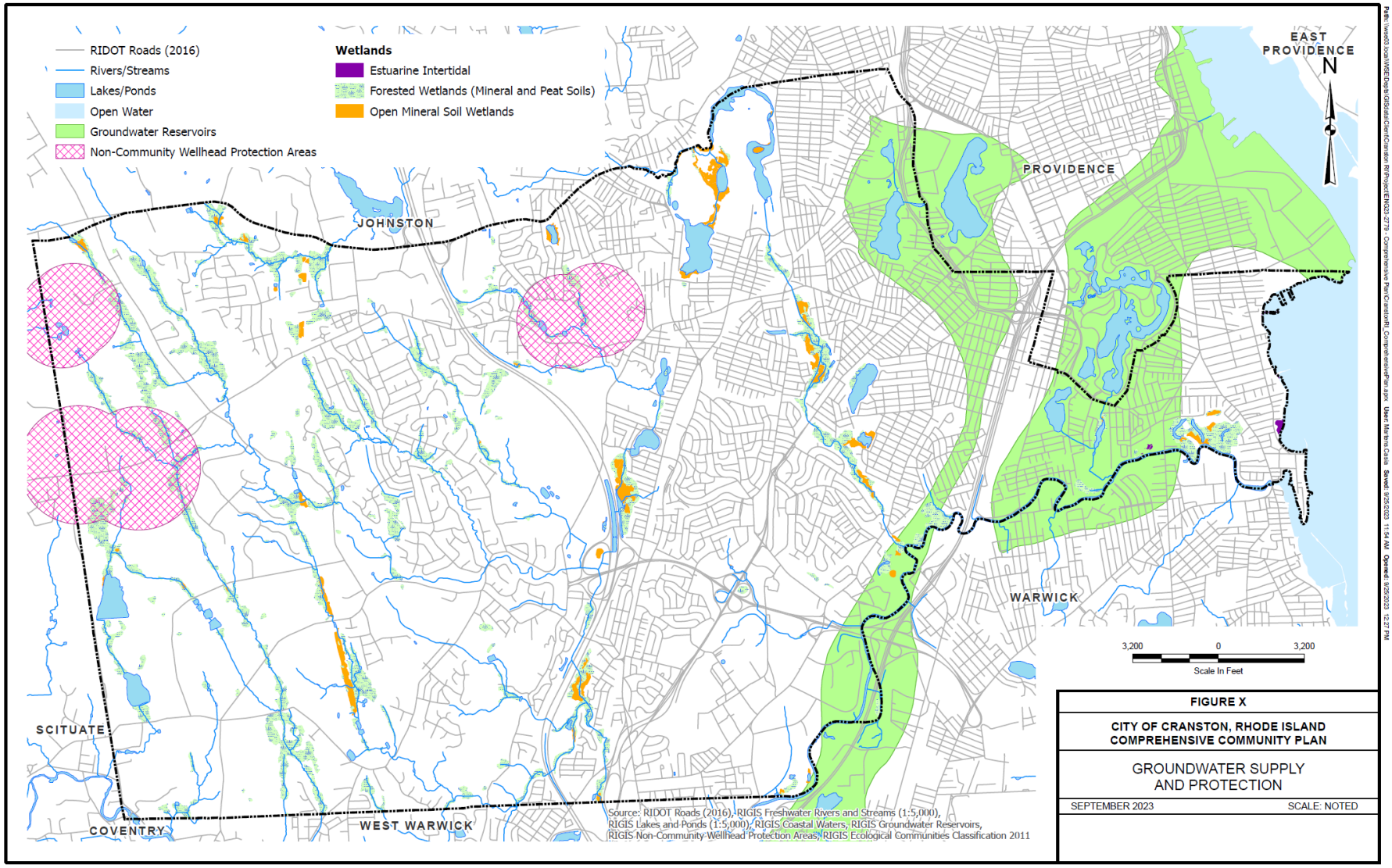

RIDOT Roads (2016)
Rivers/Streams
Lakes/Ponds
Open Water
Groundwater Reservoirs
Non-Community Wellhead Protection Areas
Wetlands
Estuarine Intertidal
Forested Wetlands (Mineral and Peat Soils)
Open Mineral Soil Wetlands
EAST PROVIDENCE
N
PROVIDENCE
JOHNSTON
WARWICK
SCITUATE
COVENTRY
WEST WARWICK
3,200
0
3,200
Scale In Feet
Source: RIDOT Roads (2016), RIGIS Freshwater Rivers and Streams (1:5,000), RIGIS Lakes and Ponds (1:5,000), RIGIS Coastal Waters, RIGIS Groundwater Reservoirs, RIGIS Non-Community Wellhead Protection Areas, RIGIS Ecological Communities Classification 2011
FIGURE X
CITY OF CRANSTON, RHODE ISLAND
COMPREHENSIVE COMMUNITY PLAN
GROUNDWATER SUPPLY AND PROTECTION
SEPTEMBER 2023
SCALE: NOTED

Figure 2-5. Soil Hydrologic Groups

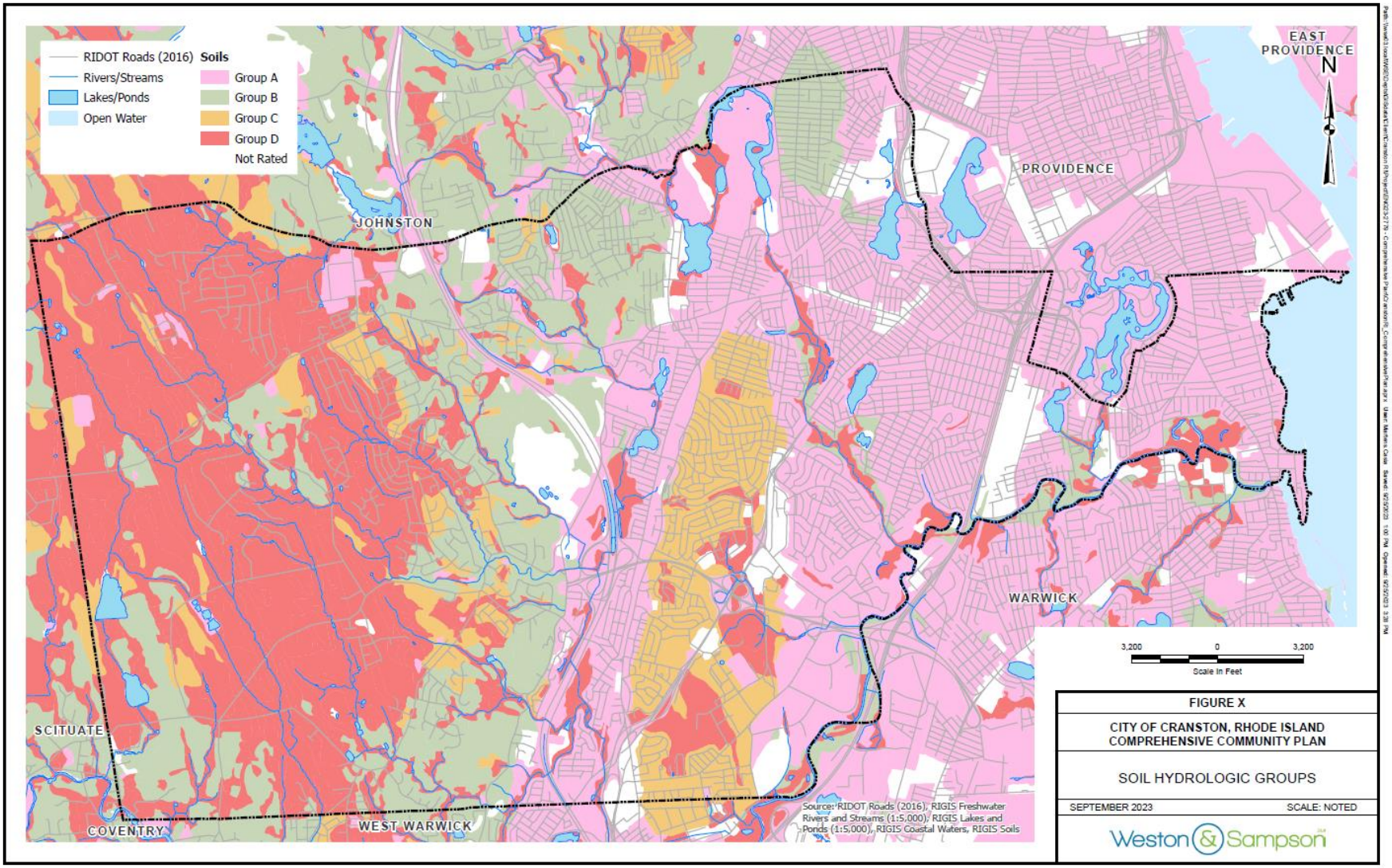


Figure 2-6. Soil Constraint

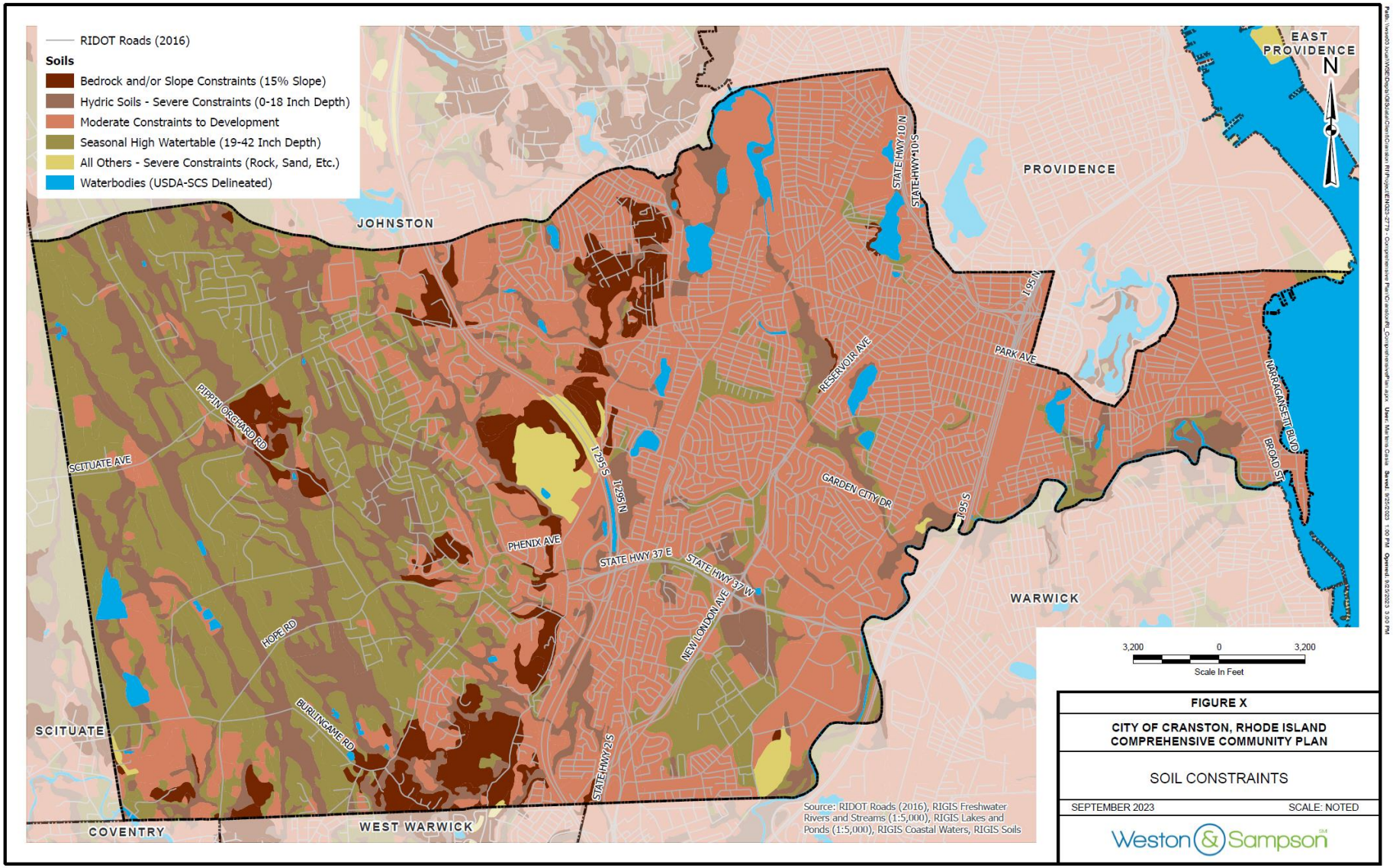


Figure 2-7. Surficial Geology

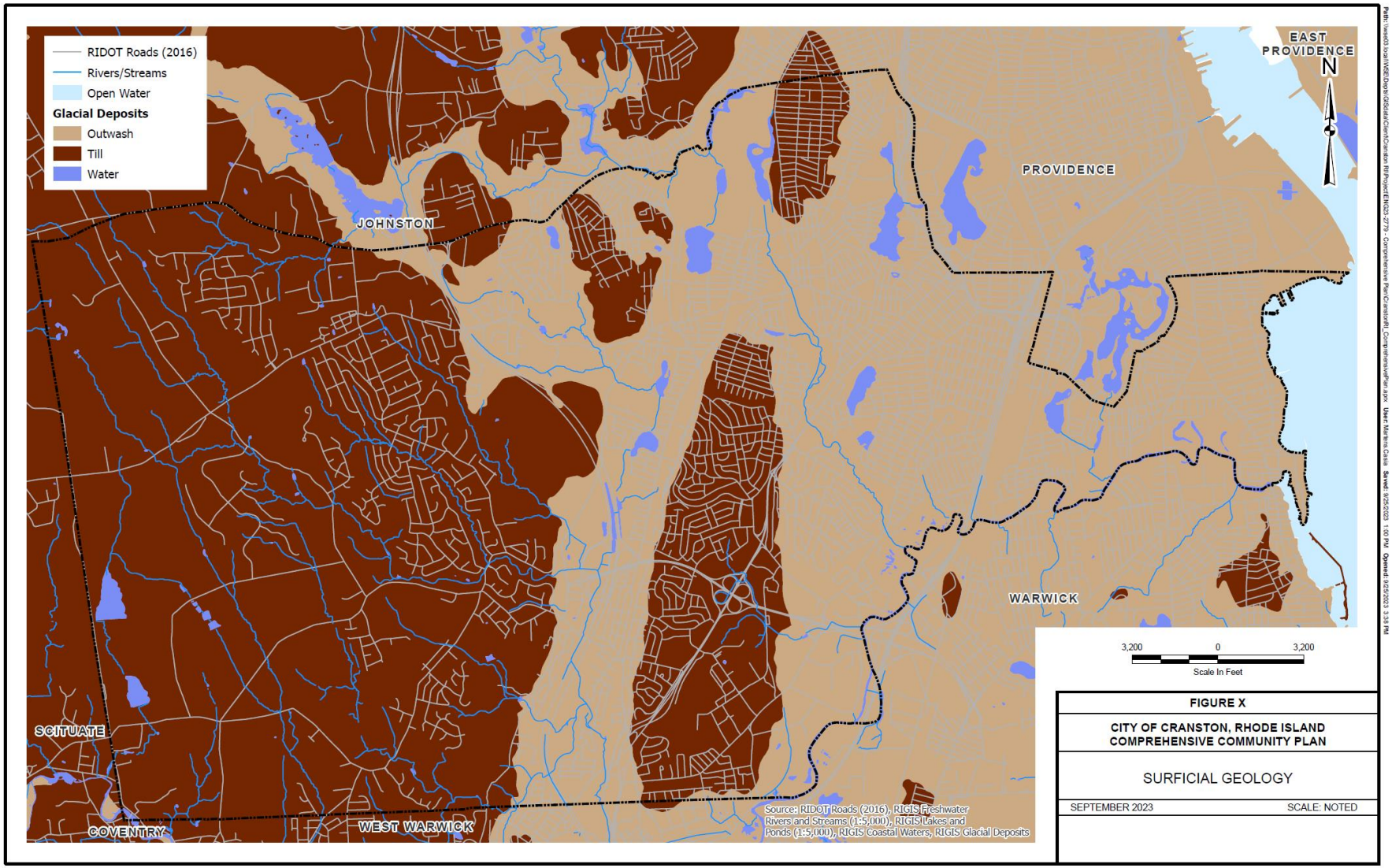


Figure 2-8. Flood Hazard Areas

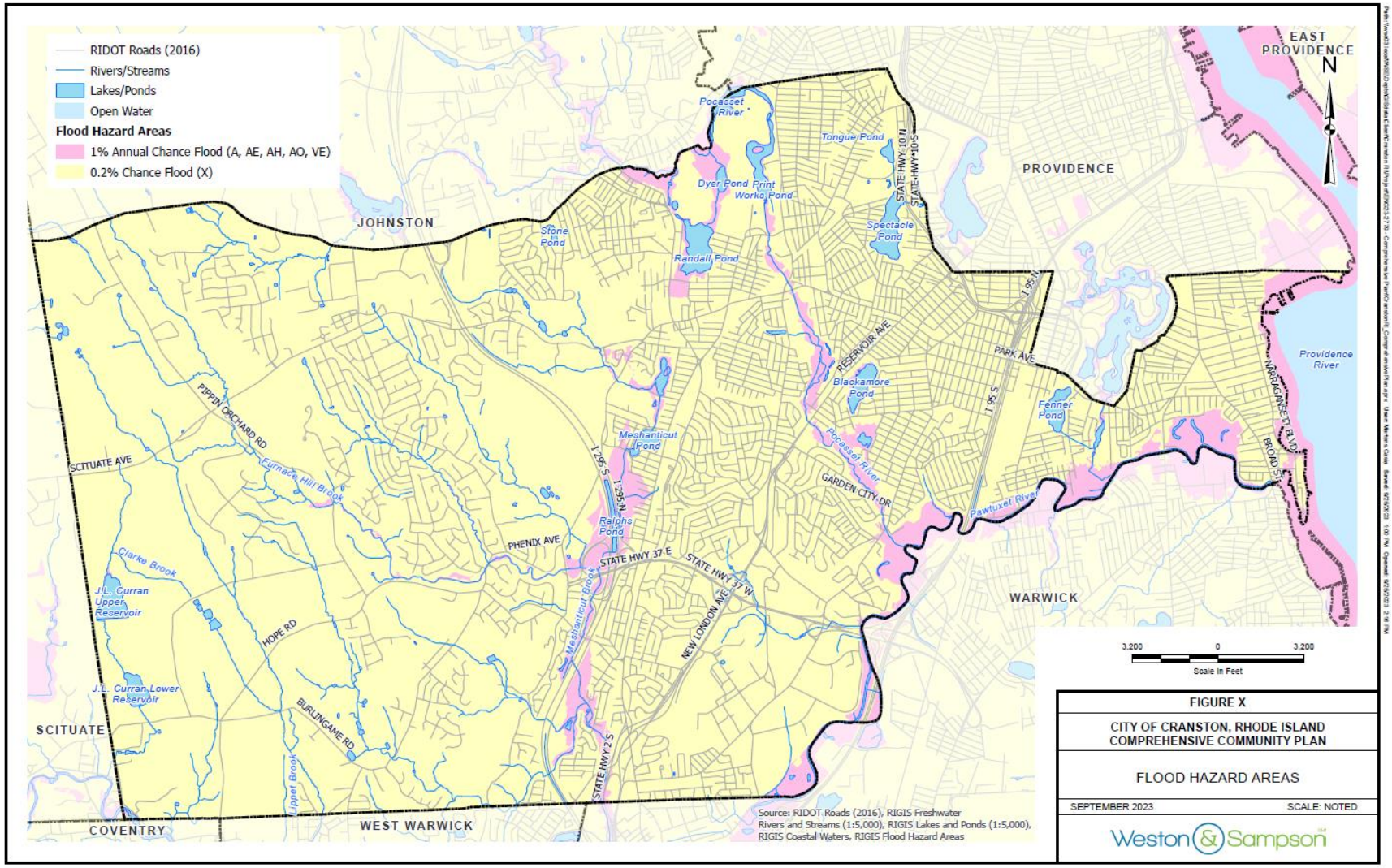


Figure 2-9. Ecological Communities and Habitat Area

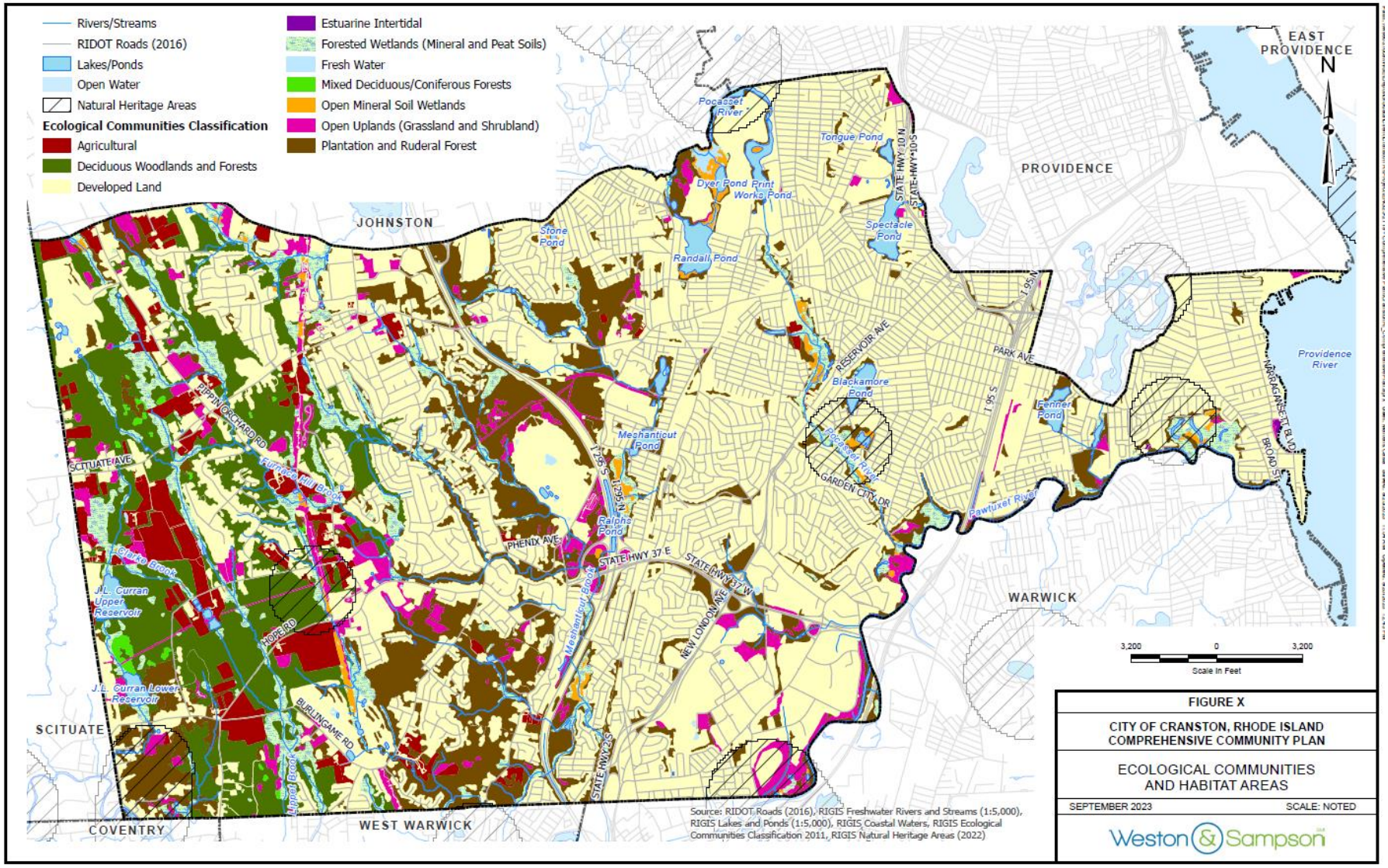
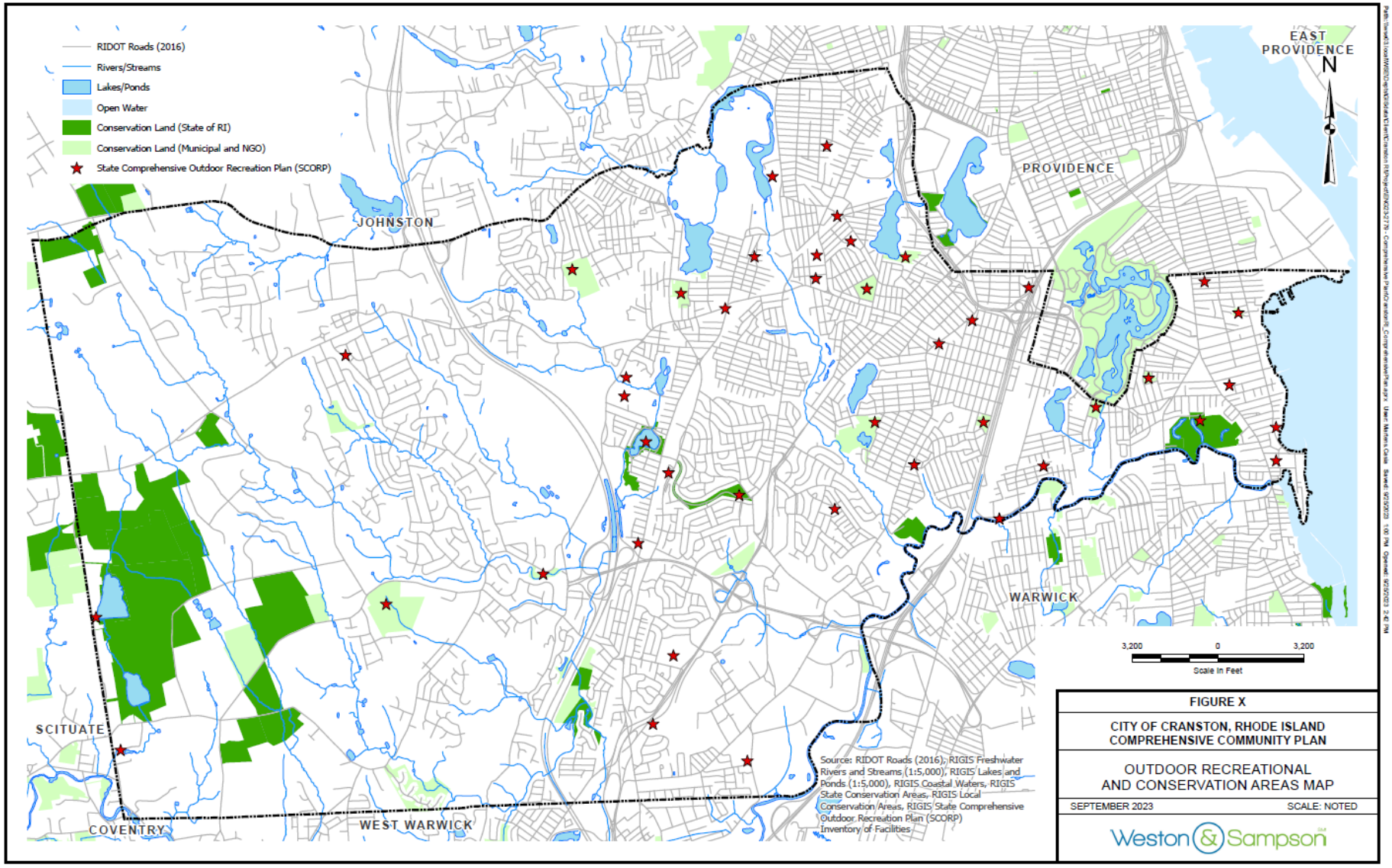


Figure 2-10. Outdoor Recreational and Conservation Areas Map


RIDOT Roads (2016)
Rivers/Streams
Lakes/Ponds
Open Water
Conservation Land (State of RI)
Conservation Land (Municipal and NGO)
State Comprehensive Outdoor Recreation Plan (SCORP)
EAST PROVIDENCE
N
PROVIDENCE
JOHNSTON
WARWICK
SCITUATE
COVENTRY
WEST WARWICK
3,200 0 3,200
Scale in Feet
Source: RIDOT Roads (2016), RIGIS Freshwater Rivers and Streams (1:5,000), RIGIS Lakes and Ponds (1:5,000), RIGIS Coastal Waters, RIGIS State Conservation Areas, RIGIS Local Conservation Areas, RIGIS State Comprehensive Outdoor Recreation Plan (SCORP) Inventory of Facilities
FIGURE X
CITY OF CRANSTON, RHODE ISLAND
COMPREHENSIVE COMMUNITY PLAN
OUTDOOR RECREATIONAL
AND CONSERVATION AREAS MAP
SEPTEMBER 2023
SCALE: NOTED
Weston & Sampson