PRELIMINARY
NATURAL RESOURCE INVENTORY
for the
NEW PALTZ ROUTE 299 GATEWAY

Prepared for the

Town of New Paltz Town Board

By

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Hudsonia Ltd.

February 2019

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INTRODUCTION

The Town of New Paltz is developing amendments to the town comprehensive plan, and rezoning approximately 230 acres in the vicinity of the Interstate 87 Exit 18—an area referred to as the New Paltz Gateway. To assist with those efforts and to inform the SEQR process prior to adoption of the revisions, the town asked Hudsonia to prepare a preliminary natural resource inventory (NRI). This preliminary NRI is a brief introduction to some of the important resources on the site, based almost entirely on pre-existing information from public sources, not on Hudsonia field surveys of the Gateway.

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The NRI describes natural features and environmental constraints of the Gateway, discusses some of the implications for potential land use, and explains where more detailed information is needed to inform the design and review of new development projects.

METHODS

We gathered existing spatial data for topography, wetlands, soils, rare species and communities, and water quality from the NYS GIS Clearinghouse, and other state and federal sources. Data sources included:

- *High-resolution (1 pixel = 6 in) 4-band digital orthophotos* taken in spring 2013 and 2016, obtained from the New York State GIS Clearinghouse website (http://gis.ny.gov; accessed January 2019).
- *Digital Elevation Model (DEM)* data, 10-meter resolution, from Cornell University Geospatial Information Repository (https://cugir.library.cornell.edu)
- *Soil Survey of Ulster County, New York* (Tornes1974) and updated soil names from the Web Soil Survey of the Natural Resources Conservation Service.
- *Watershed* data from the US Geological Survey
- *Active River Area* data from the Conservation Gateway (The Nature Conservancy)
- *Flood zone* data from the Federal Emergency Management Agency
- *Habitat cores* data from the Ulster County website

- *Municipal boundaries, roads, stream classification, 2-ft contour data, NYS Freshwater Wetlands data*, and *Significant Biodiversity Areas* from the NYSGIS Clearinghouse.
- *National Wetlands Inventory* data from the US Fish and Wildlife Service website.

We examined spatial data, and used combinations of map features (e.g., topography, soils) and features visible on aerial photographs (e.g., vegetation cover types, streams) to predict the locations and extents of ecologically significant habitats, and digitized habitat boundaries onscreen over the orthophoto images. Heffernan spent six hours in the field on 5 February 2019 to verify some aspects of the map, but most of the habitats and their boundaries have not been field-verified. Snow up to four inches deep was present in patches on 5 February, obscuring the details of the ground conditions. We consulted the maps showing onsite wetland delineations conducted for the proposed Wildberry and Ferris Woods development projects, and incorporated those boundaries (approximately) into the habitat map for this NRI. All habitat boundaries on that map, including those of wetlands, should be treated as sketches only and should not be relied on for jurisdictional determinations.

We used ArcMap 10.6 software (Environmental Systems Research Institute 2018) to examine spatial data, digitize habitat boundaries, and create a series of natural resource maps.

PHYSICAL SETTING

The New Paltz Gateway is in the Town of New Paltz, Ulster County, New York, at the junction of Interstate 87 exit 18 and NYS Route 299, just west of the Village of New Paltz (Figure 1). NYS Route 299, which runs east-and-west through the Gateway, is lined with commercial development, and Ohioville Road is lined with residences. The Gateway is a relatively flat area at elevations approximately 368-410 ft above sea level. The entire Gateway area is in the Wallkill River watershed; the eastern half drains to the nearby Swarte Kill, a tributary to the Wallkill. All of the western half formerly drained via Mill Brook (Tributary 13) to the Wallkill River (Figure 2), but it appears to us that several artificial ditches now redirect the flow from the stippled area in Figure 2 to the Swarte Kill. A large wetlands complex along the Swarte Kill, including Plutarch Swamp, lies mostly north and east of the Gateway, but extends into the Gateway area at several locations.

GEOLOGY AND SOILS

General

The Gateway is underlain by greywacke (an impure sandstone) and shale bedrock (Fisher et al. 1970). The surficial material is primarily glacial till, but significant areas of glacial outwash are in the eastern arm of the Gateway (Cadwell et al. 1989).

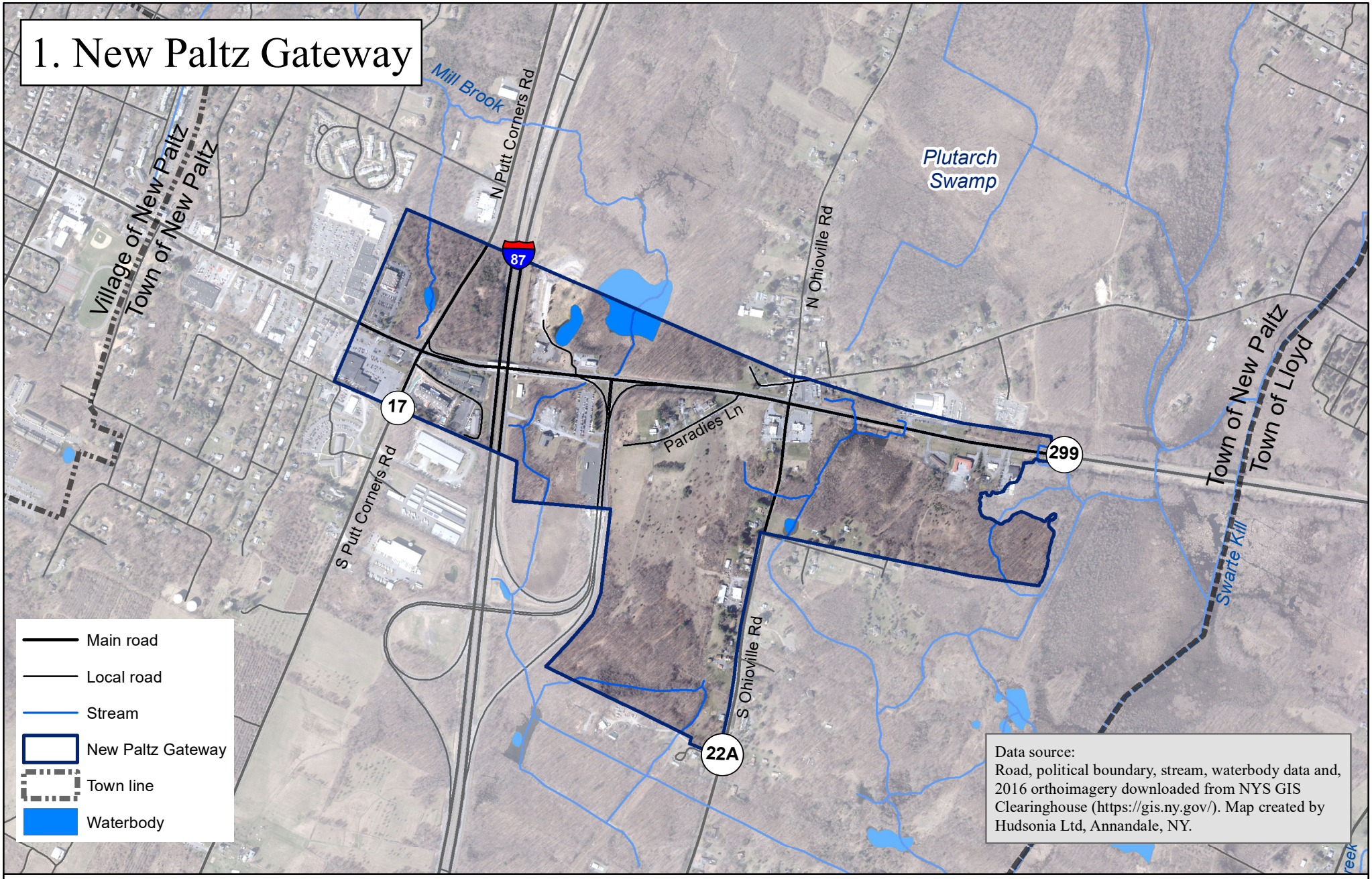

Figure 1. New Paltz Gateway, Ulster County, New York. New Paltz Gateway Natural Resource Inventory, 2019.

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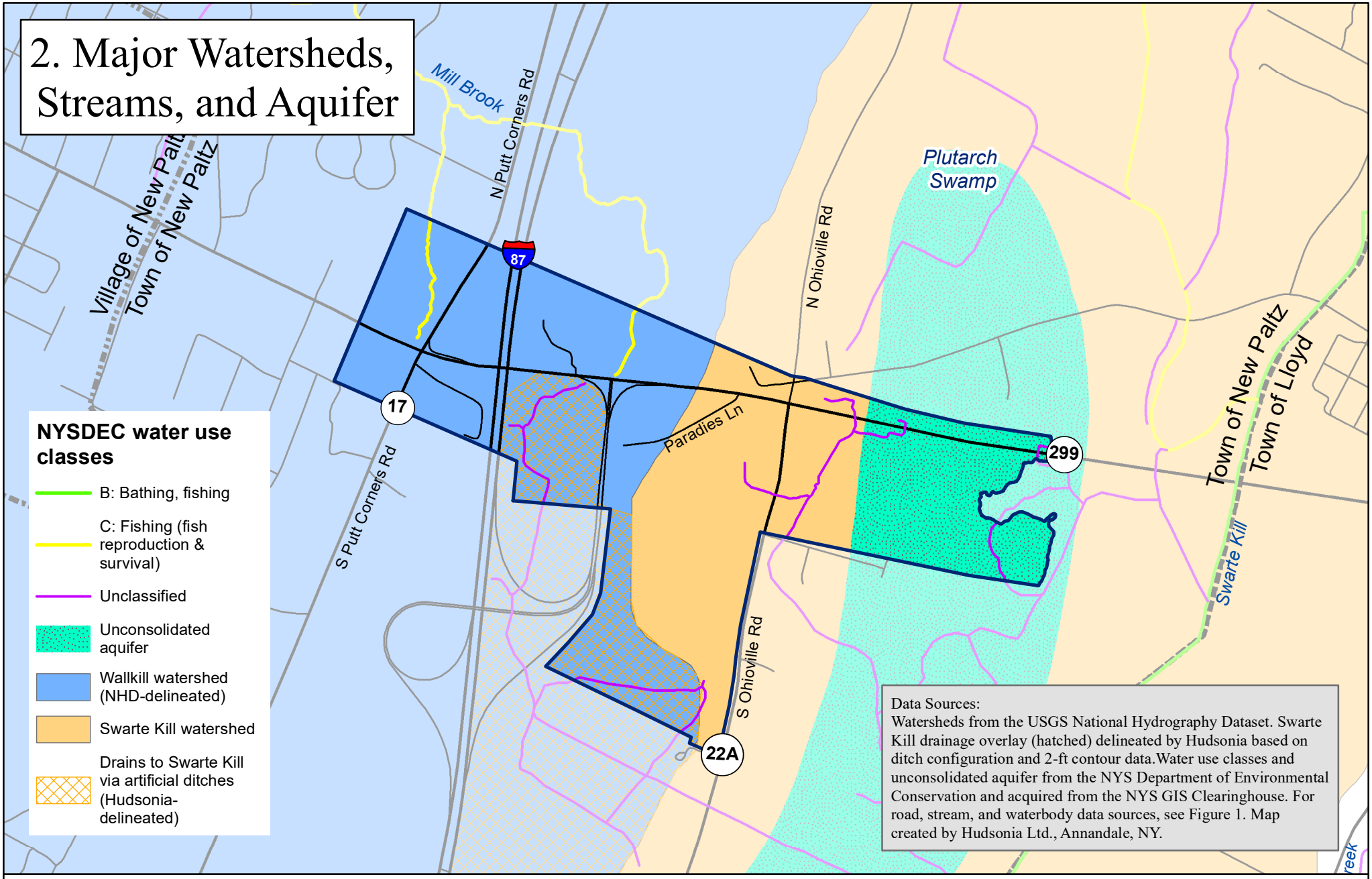

Figure 2. Watersheds, streams, water use classes, and unconsolidated aquifer in and near the New Paltz Gateway, Ulster County, New York. Both sub-basins are part of the Wallkill River watershed. New Paltz Gateway Natural Resource Inventory, 2019.

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According to Tornes (1974) the main soils formed in glacial till are Mardin gravelly silt loam, Nassau shaly silt loam, and Bath gravelly silt loam (Figure 3). These are somewhat excessively to moderately well drained upland soils, ranging from very strongly to slightly acidic. Mardin soils have a fragipan (a somewhat cemented restrictive layer) at 14-26 inches below the surface, and Bath soils have a fragipan at 29-55 inches. This layer restricts the rooting zone of plants and sometime acts to perch water near the soil surface.

The soils formed in glacial outwash are Chenango gravelly silt loam, Hoosic gravelly loam, and Volusia channery silt loam. Chenango and Hoosic are deep, well drained and somewhat excessively drained soils, very strongly or strongly acidic. The area mapped as "borrow pit" (BP) on Figure 3 was also presumably one of these soils. Volusia is a deep, somewhat poorly drained soil, very strongly to moderately acidic, with a fragipan at about 19-58 inches below the surface.

Wetland Soils

The main wetland soils are Canandaigua silt loam, Catden muck, and Palms muck. Canandaigua is a deep, poorly and very poorly drained soil, moderately acidic to mildly alkaline, formed in lacustrine silt, sand, and clay. Catden muck underlies the largest areas of Plutarch Swamp, including a small area in the northeast corner of the Gateway. It is a deep, very poorly drained organic soil, moderately acidic to neutral. Palms muck is a deep, very poorly drained organic soil, very strongly acidic to neutral. A complex of Lyons and Atherton soils are at the edges of large wetland areas in the eastern arm of the Gateway. These are poorly to very poorly drained, calcareous soils (calcium-rich) derived from limestone, calcareous shale, and calcareous sandstone. Volusia channery silt loam supports small areas of wetland, perhaps because the fragipan perches water near the soil surface.

Farmland Soils

Chenango loam is classified as a Prime Farmland Soil, and Bath, Canadaigua, Mardin, Hoosic and Volusia as Farmland Soils of Statewide Importance. Together these soil types constitute approximately 80% of the site (Figure 3). Prime Farmland Soils are those that have the best combination of physical and chemical characteristics for producing crops. Farmland Soils of Statewide Importance are nearly as productive as Prime Farmland Soils and also produce high yields of crops when properly managed.

WATER RESOURCES

The drinking water sources for the Village of New Paltz and adjacent areas of the Town of New Paltz are the New York City Catskill Aqueduct and four New Paltz reservoirs on Mountain Rest Road (Annual Drinking Water Quality Report for 2017). Water districts in the Town and Village of

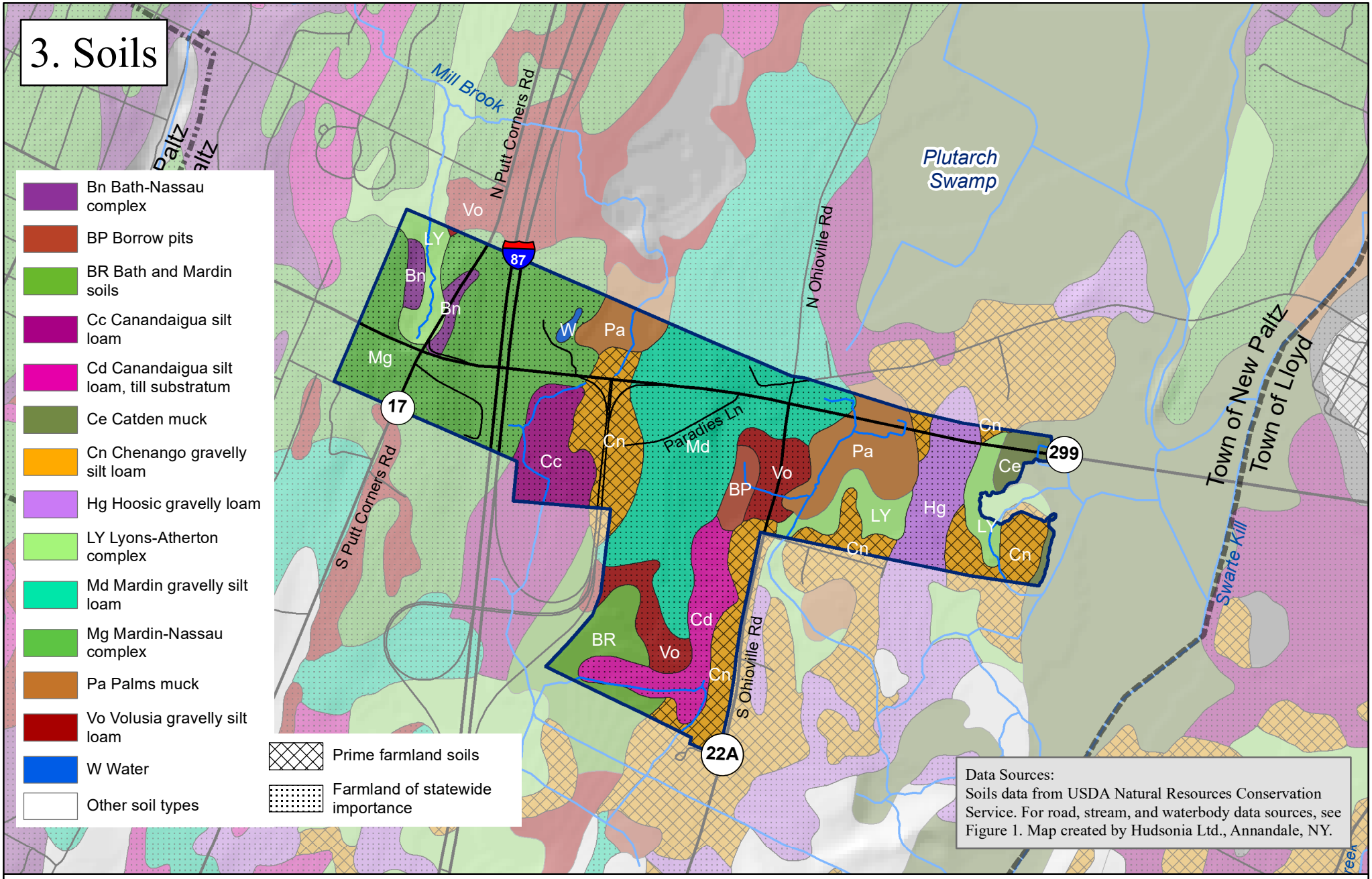

Figure 3. Soils in and around the New Paltz Gateway, Ulster County, New York. Soils not found in the Gateway are displayed in white. New Paltz Gateway Natural Resource Inventory, 2019.

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New Paltz are currently under review in preparation for a 10-week shutdown of the Catskill Aqueduct in October 2019. Parts of the New Paltz Gateway are in Water Districts 1, 2, and 3. A property just east of the Thruway exit (the Plesser site) was considered as a potential wellfield site that could be used during the shutdown, but 2016 tests found the well yield and water quality to be inadequate. Salt contamination, possibly from the Thruway, was the main water quality problem (Urban-Meade 2016).

Groundwater

Groundwater wells supply most of the drinking water for residents, farms, and businesses outside the water districts in and near the village. Groundwater also feeds some upland habitats, as well as springs, ponds, and wetlands, and is the source of base flow for perennial streams. Drinking water wells throughout the town tap into groundwater from a variety of shallow and deep sources. Most of the shallow wells, tens of feet deep, are in coarse glacial outwash deposits (sand and gravel), and the deep wells, tens to hundreds of feet deep, are in the finer and mixed glacial till material or in bedrock fractures, seams, and solution cavities. Groundwater is fed and replenished by rainwater and snowmelt that seeps through surficial material, and rock pores and fissures. It can be depleted or degraded by inadequate or contaminated seepage.

An unconsolidated aquifer is a place where groundwater is stored in saturated sand and gravel deposits. Most such aquifers are in glacial outwash and kame deposits, and some are in lacustrine sands. Unconsolidated aquifers represent the largest and most accessible potential water sources for shallow wells. Aquifer areas are important for recharging groundwater through the coarse, permeable sand and gravel material, but that material is also an efficient conduit for contaminants introduced by above-ground human activities. For those reasons, protection of the aquifer areas from inappropriate uses is especially important. Figure 2 shows the area of an unconsolidated aquifer identified by NYSDEC in the Gateway vicinity.

Surface Water

Surface water resources include streams, ponds, and wetlands. The Gateway has several small streams that drain variously eastward to the Swarte Kill or westward to the Wallkill (Figure 2). The Mill Brook (also called Tributary 13) rises in the Gateway area, flows generally north to the Mill Brook Preserve in the Village of New Paltz, then turns west and eventually joins the Wallkill northwest of the village. Other small, unnamed streams rise in Gateway wetlands and drain to the Swarte Kill. Small streams provide valuable in-stream habitat, and are used by many kinds of terrestrial and aquatic wildlife. They also supply essential water, organisms, and organic materials to larger streams, lakes, and ponds, and strongly influence the water quality and habitat quality of those waterbodies.

Of the four ponds in the Gateway, we mapped two as "constructed" and two as "open water" (Figure 6). Although all four were constructed by excavation and/or by damming a stream, the distinction is based on the character of the surrounding land. We classified a constructed waterbody as "constructed pond" if it was surrounded by developed land or a manicured landscape, and as "open water" if it was surrounded by intact habitat.

Water Use Classes

NYSDEC has classified many of the perennial streams and other waterbodies in the state according to the "existing or expected best usage of each water or waterway segment." The classes range from AA to D, and each may be modified by a T or TS to indicate suitability for supporting trout or trout spawning (see sidebar). These classifications are based on limited information, and do not necessarily reflect up-to-date or site-specific habitat conditions. NYSDEC has also established water quality standards for pollutants and other factors such as dissolved oxygen and turbidity to protect the uses associated with the waterbody classifications.

NYSDEC Waterbody Classes

Class	Best Use
AA	drinking (with disinfection), bathing, fishing
A	drinking (with disinfection and treatment), bathing, fishing
B	bathing, fishing
C	fishing (reproduction and survival)
D	fishing (survival)
Modifiers	
T	sufficient dissolved oxygen to support trout
TS	suitable for trout spawning

Streams classified as AA, A, B, C(TS) or C(T) are "protected streams" subject to additional regulations to protect the associated uses. State permits are also required for disturbance of the bed or banks of those streams. Any perennial streams that have not been classified by NYSDEC share the classification of the larger stream that they flow into. Intermittent streams are considered to be Class D *(*Article 15 of the ECL, 6NYCRR Part 608).

Figure 2 shows the larger streams in and near the Gateway coded by water use classifications. None of the streams in the Gateway vicinity are classified as trout streams. Two branches of the Mill Brook, or Tributary 13, which drain some of the western part of the Gateway, are class C streams, but without a "T" or "T" modifier, so are not subject to the state permit requirements. The smaller, intermittent streams in and near the Gateway are unclassified (or Class D) and unregulated by New York State. The Town of New Paltz, however, regulates activities in any intermittent or perennial (with identifiable bed and banks, as defined in the local ordinance), and within a 50-ft or 100-ft buffer zone of the stream; see further explanation below.

Stream size, gradient, substrate conditions, water temperature, water chemistry, and clarity all influence the occurrence and survival of fish species and aquatic communities.

Streams are subject to impairment from sources such as runoff from construction sites, industrial sites, pavement, and farmland; leachate from failing septic systems, discharges from sewage treatment plants; streambank erosion; atmospheric deposition, and contaminated sediments from past industrial activities. Commercial, industrial, and residential land development typically leads to more stormwater runoff carrying silt, nutrients, chorides, and other contaminants into streams; stream flows that swiftly increase and decrease in response to runoff events; and unstable stream channels, bank erosion, and degraded habitat.

Other sources of stream impairment are barriers such as dams and improperly-sized or poorly-installed culverts. These are widespread and have led to the loss of whole populations of fish unable to navigate those barriers. Dams are an obvious impediment to the movements of fish and other aquatic organisms, but bridges and culverts, if improperly sized, designed, and installed, can also act as partial or total barriers, severely altering stream flows and disrupting the stream ecology.

Floodplains.Flood Zones, and Active River Areas

A "floodplain" is the area bordering a stream, lake, or pond that is subject to flooding. Some streamside areas flood annually or more frequently, and some flood only in the largest storms or snowmelt events. Floodplains at some locations are just a few feet wide, and elsewhere are a half-mile wide or wider, depending on the local topography.

The Federal Emergency Management Agency (FEMA) maps the areas expected to flood at statistical intervals based on historical flood records. The FEMA-designated "100-year flood zone" is the area believed to have a 1% chance of flooding in any given year. The "500-year flood zone" is the area believed to have a 0.2% chance of flooding in any given year. What does that mean for property owners? During the span of a 30-year mortgage, a house in the 100-year flood zone has a 26 percent chance of being flooded at least once in those 30 years (Holmes and Dinicola 2010).

These flood zones are identified by FEMA only on the larger streams, even though small streams can also have significant floodplains. Furthermore, the data for Ulster County were published in 2008, so do not consider the extent of flooding from recent large storms (Irene, Lee, Sandy), or from future storms that may be even larger.

Figure 4 shows the extent of the 100-year flood zone identified by FEMA. The Swarte Kill's flood zone reaches to the eastern edge of the Gateway. The 500-year flood zone mapped by FEMA does not extend beyond (upgradient of) the 100-year zone in the Gateway vicinity, so is not shown on the map.

4. Flood Zones and "Active River Areas"

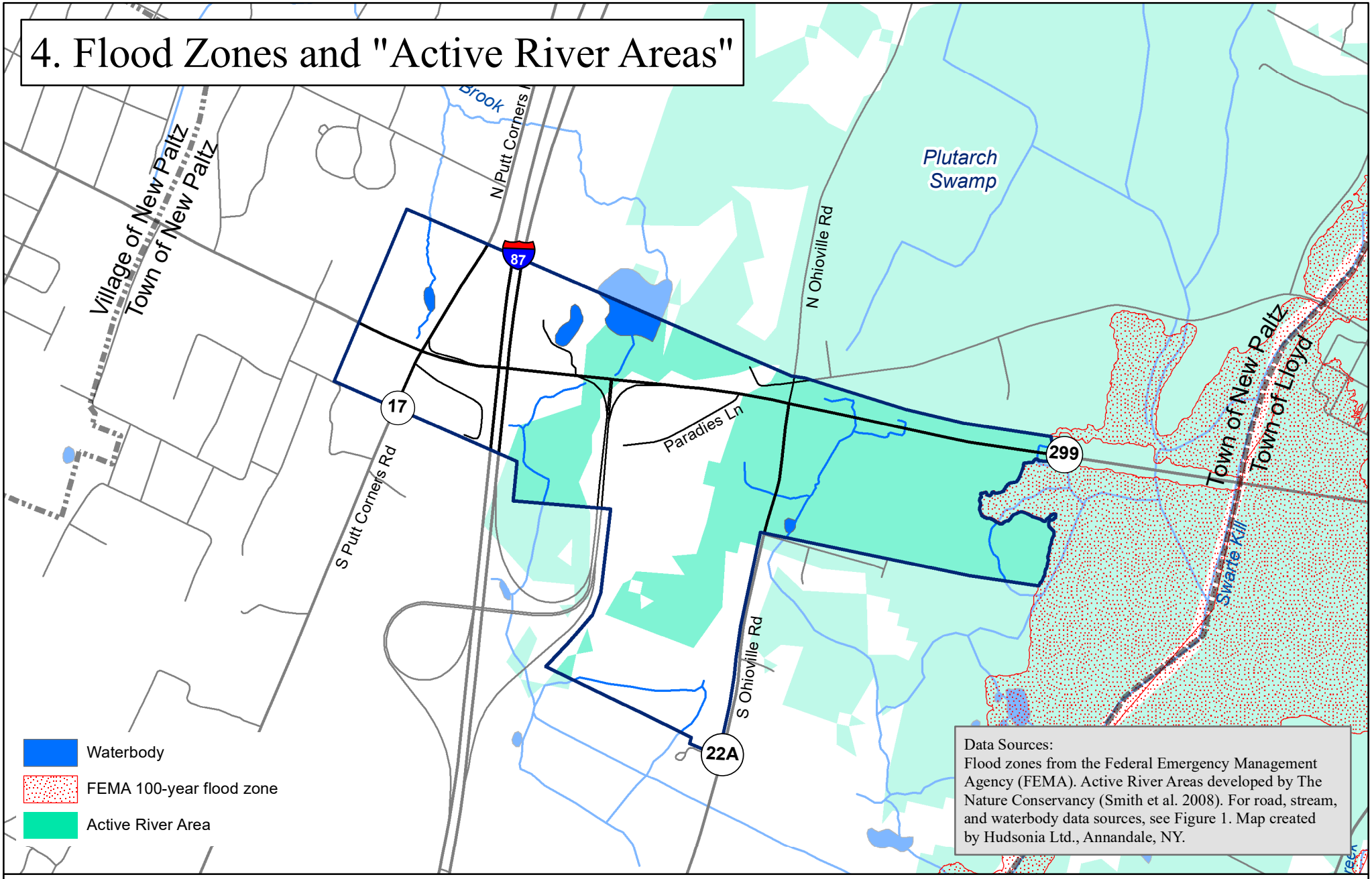

Figure 4. FEMA-designated flood zones and Active River Areas (ARAs) in and near the New Paltz Gateway, Ulster County, New York. See text for explanation of ARAs. New Paltz Gateway Natural Resource Inventory, 2019.

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The floodplain serves critical roles in stream ecology and flow dynamics. A well-vegetated floodplain stores water, absorbs excess runoff, and serves as a groundwater recharge area. It helps to stabilize the streambank and reduce stream channel erosion, moderate stream water temperatures, and trap and remove sediments and other pollutants from runoff and floodwaters. Well-vegetated floodplains also provide important habitat for terrestrial plants and animals, and contribute woody debris and other organic detritus to the habitat structure and food base for stream organisms (Wenger 1999). Characteristics of the topography, soils, and vegetation at any particular location govern the effectiveness of the streamside and floodplain habitats for providing these services. Many rare plants occur on streambanks and floodplains in Ulster County, such as cattail sedge, Davis' sedge, diarrhena, and goldenseal. The Gateway area has not been surveyed for rare species.

Streams are an unusually dynamic kind of ecological system, with water, substrates, and organic materials moving and changing continuously, and footprints that narrow, widen, and shift on a seasonal or episodic basis in response to storm events or land uses in the stream's watershed. These ongoing changes account in part for the unusual biological diversity of stream corridors (Smith et al. 2008).

Recognizing that the ecological and biodiversity values of streams are closely tied to the interactions between water and land, The Nature Conservancy has developed the concept of the Active River Area (ARA) to encompass some of the physical and ecological processes that drive and sustain a stream, and to provide a conceptual basis for restoring and conserving the landscapes most essential to the functions of stream ecosystems. Active River Areas include the stream itself and the present and past floodplains and adjacent areas that protect, nourish, and accommodate the stream during normal flow conditions as well as during extreme droughts and floods (Smith et al. 2008).

The "Active River Area" of a stream includes five major components, some of which overlap with each other:

- *material contribution zones*, which regularly contribute organic and inorganic (e.g., sediments, water) material to streams;
- *floodplain*;
- *meander belts*, the lateral areas within which the channel migrates over time;
- *riparian wetlands*; and
- *terraces*, the former floodplains that may still flood in the largest flood events.

The contributions of these components encompass the major processes influencing the stream—system hydrology, sediment transport, processing and transport of organic materials, and key biotic interactions (Smith et al. 2008). All are useful concepts when considering the landscape areas most important for stream conservation. Figure 4 shows the Active River Areas identified by The Nature Conservancy along the larger streams in and near the Gateway; the smaller streams were not part of the analysis, but would also interact with adjacent land in similar ways. The mapped ARA zones are based only on coarse elevation data, and have not been field-verified.

Wetlands

The term "wetland" refers to vegetated areas that have saturated soils in the rooting zone of plants for a prolonged period during the growing season. Some wetlands (e.g., marshes) have permanent standing water, and some (e.g., wet meadows) have little or no standing water, and may appear to be quite dry for a significant part of the year. Wetlands occur in any vegetated place where:

- the water table is at or near the ground surface for prolonged periods during the growing season, or
- groundwater seepage emerges under gravitational pressure for prolonged periods, or
- a confining layer (e.g., bedrock or a compacted soil layer) holds water perched near the ground surface for prolonged periods.

Wetlands are one of the few parts of the landscape that receive some regular protections from state and federal governments but many wetlands are excluded from those protections due to small size or isolation from streams or waterbodies. Wetlands have been mapped by New York State and the US Fish and Wildlife Service, but those maps (Figure 5a) are based mainly on remote sensing and therefore show inaccurate wetland boundaries, and omit many small wetlands and even some large ones. Figure 5a also shows areas where the soils are mapped as "somewhat poorly drained," "poorly drained," or "very poorly drained." These are areas of "possible" and "probable" wetlands based on the county soils data, and should be examined by wetland specialists prior to any site-specific land use planning.

Federal Wetland Regulatory Program

Under Section 404 of the Clean Water Act the federal government regulates activities in wetlands of any size as long as the wetland is functionally connected to "navigable waters." The law prohibits certain kinds of activities (especially filling) in jurisdictional wetlands without a permit. It imposes no standard regulated buffer zone around a wetland, but federal agencies may specify such a zone in permit conditions if they so choose.

The criteria for federal jurisdiction have been in flux in recent years, and decisions about which wetlands come under the federal purview are now made by the Army Corps of Engineers (ACOE) on a case-by-case basis. In most situations, a wetland adjacent to a perennial stream is considered jurisdictional, because the stream has a "significant nexus" with downstream navigable waters. An isolated wetland or a wetland adjacent to an intermittent stream that runs only a few days or a few weeks of the year is often non-jurisdictional.

The National Wetland Inventory (NWI) maps created by the US Fish and Wildlife Service show many wetlands, but show inaccurate wetland boundaries, omit many small wetlands and even some

5a. Wetlands and Potential Wetland Areas

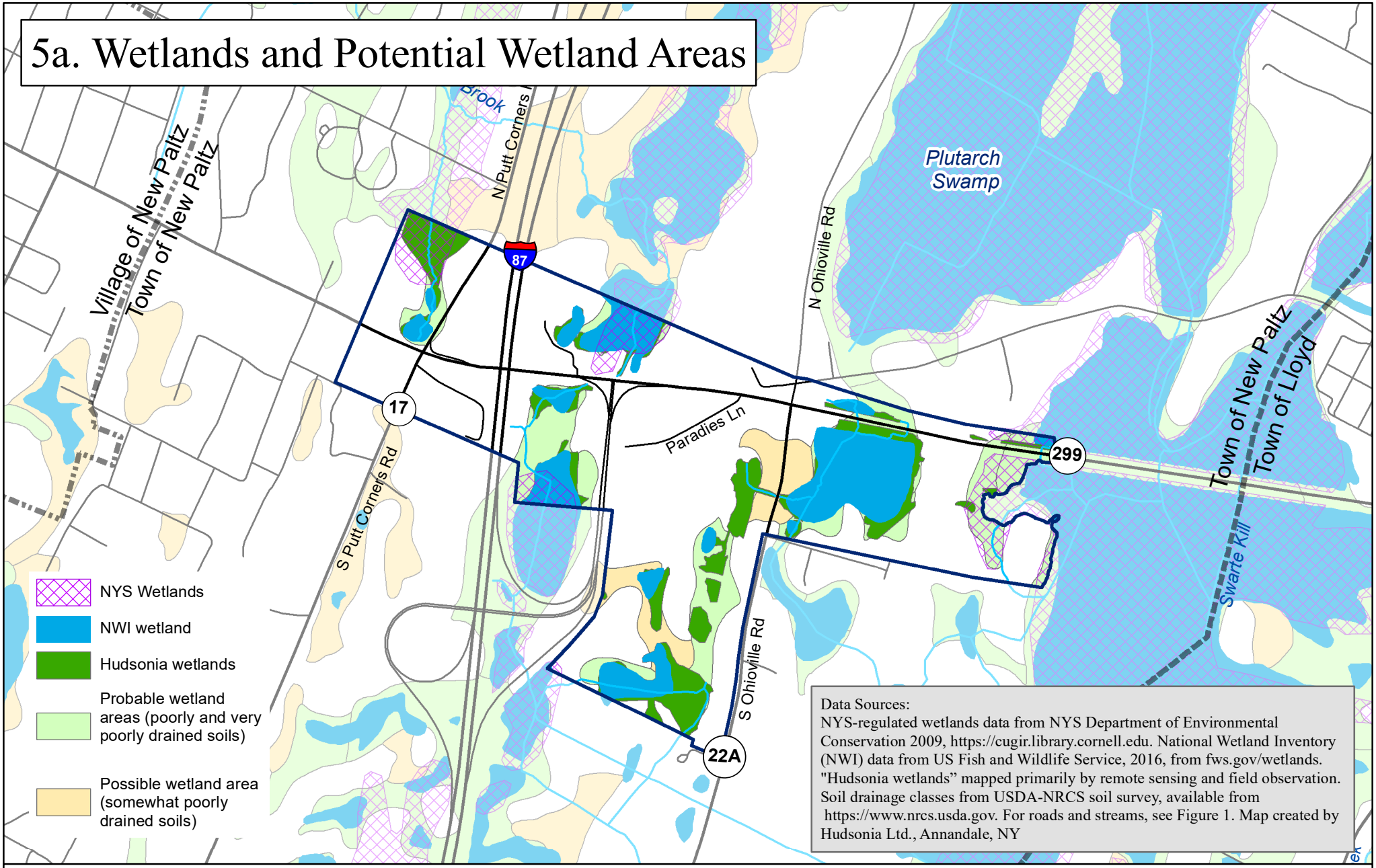

Figure 5a. Wetlands and potential wetland areas in and near the New Paltz Gateway, Ulster County, New York. Wetlands mapped independently by Hudsonia are shown only where they extend outside NWI wetlands. All wetland jurisdictional determinations must be made on the basis of field observations. New Paltz Gateway Natural Resource Inventory, 2019.

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large ones, and include some wetlands that do not fall under federal jurisdiction. The ACOE recognizes these shortcomings, and does not use the NWI maps to determine federal jurisdiction, but instead requires onsite field delineations of wetlands based on characteristics of soils, vegetation, and other field indicators. Although the NWI maps are still the best wetland maps available that cover most areas of the country, they are not suitable for detailed, site-specific planning and project design. The NWI wetlands in the Gateway are depicted in Figure 5a.

New York State Wetland Regulatory Program

The New York State Freshwater Wetlands Act (Article 24 of the New York Conservation Law) specifies the kinds of activities that can and cannot legally occur in and near large wetlands (12.4 acres and larger), and in a few smaller wetlands "of unusual local importance." The most typical instances of the latter are wetlands connected to a public drinking water supply, or wetlands known to support a state-listed Threatened or Endangered animal. The law also regulates activities in a 100-foot-wide "adjacent zone" around the perimeter of any state-jurisdictional wetland. Most wetlands in New York do not fall under state jurisdiction, however, because they meet neither the size nor the "unusual local importance" criteria.

Thus, due to their small size or hydrologic isolation, most of our intermittent woodland pools, isolated swamps and isolated wet meadows receive no protection in federal or state law. Small, isolated wetlands can have great value for biodiversity and for water management, however. Indeed it is often the very isolation that imparts their special value to certain plants or animals.

The New York State Freshwater Wetland Maps show the wetlands that are protected under the NYS Environmental Conservation Law. Like the federal NWI maps, the state wetland maps show inaccurate wetland boundaries and exclude some wetlands that otherwise meet the jurisdictional criteria. The wetlands on the NYS Freshwater Water Wetlands map in the Gateway vicinity are shown in Figure 5a.

Town of New Paltz Wetlands and Watercourse Regulations

Recognizing the great ecological values of the many streams and wetlands that are left unprotected by state and federal laws, the local code of the Town of New Paltz extends protections to small streams, wetlands, and waterbodies and associated buffer zones (Figure 5b). Protected areas include:

- "quality vernal pool" $\geq$ 100 ft^2, plus a 100-ft buffer zone
- other wetland 0.1-1 acre, plus a 50-ft buffer zone
- wetland >1 acre, plus a 100-ft buffer zone
- intermittent stream, plus a 50-ft buffer zone
- perennial stream, plus a 100-ft buffer zone (§139-5 Regulated Areas)

Figure 5b shows the approximate extent of wetland and stream regulated areas under the New Paltz wetlands law. The map uses the combined footprints of the NWI wetlands and additional wetlands

5b. Wetland and Stream Jurisdictional Areas

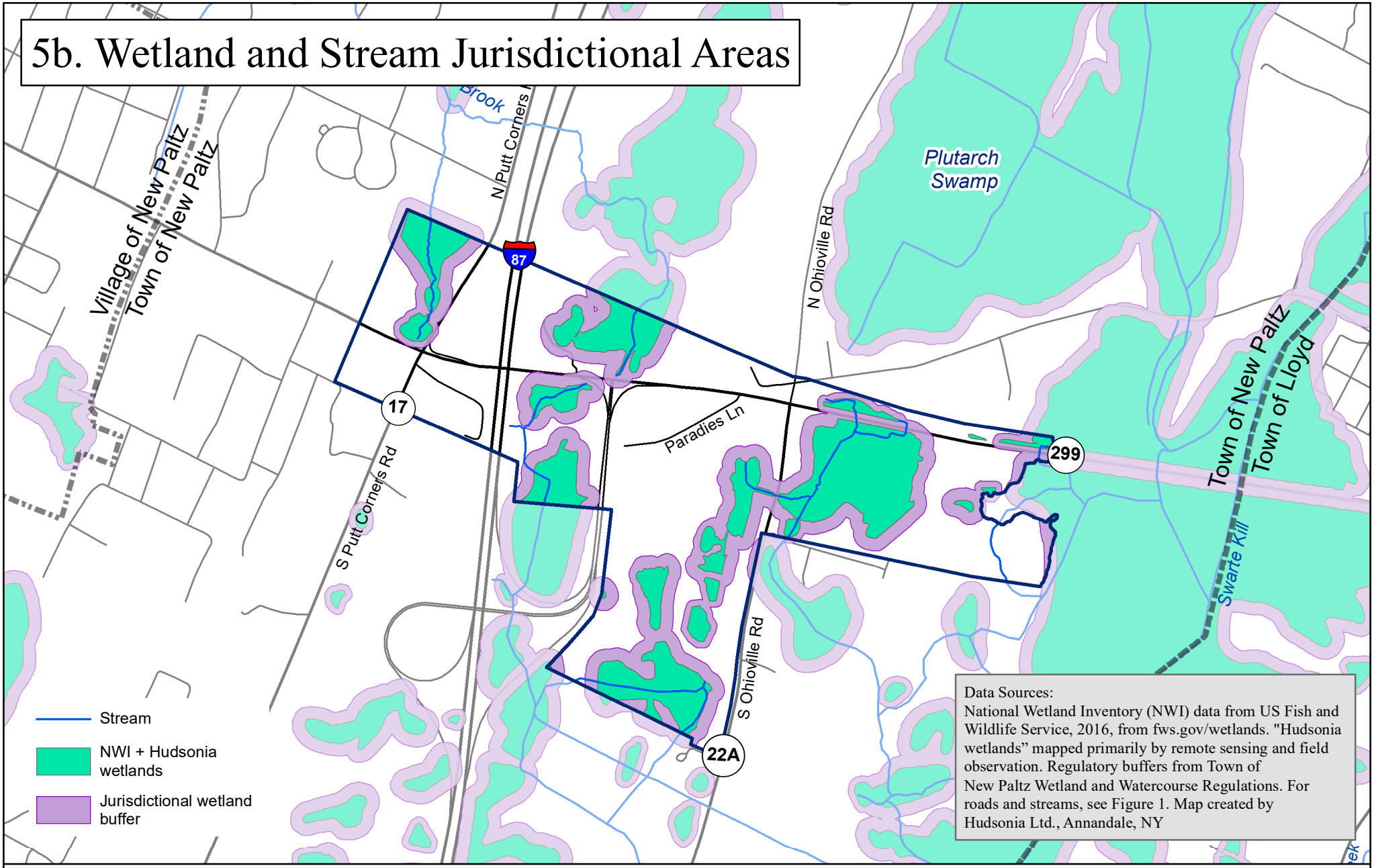

Figure 5b. Wetlands, streams, and their regulated buffer zones. Wetlands polygons are the combined areas of NWI and Hudsonia wetlands. Buffer zones are those designated in Town of New Paltz Wetlands and Watercourse Protection law. Actual jurisdictional boundaries of wetlands and buffer zones must be delineated onsite. New Paltz Gateway Natural Resource Inventory, 2019.

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drawn by Hudsonia mostly on the basis of remote sensing (analysis of soils, topography, and aerial photo images). The wetlands on the NYS Freshwater Wetland Maps were not used for this figure because they show the least-accurate wetland boundaries, and appeared to exaggerate the extent of wetlands at this site.

BIOLOGICAL RESOURCES

Habitats

About 30% of the Gateway land is developed with buildings, driveways, lawns, and pavement, and the remaining land has a mix of upland forests and meadows, swamps, marshes, and streams (Figure 6). We identified 18 types of ecologically significant habitats in the Gateway. Upland hardwood forest covered 25% of the site, upland meadows 14%, and wetlands 17%. Habitat distributions and brief definitions are in Table 1. These general habitat types and some of their ecological values and sensitivities are described in the *Biodiversity Assessment Manual for the Hudson River Estuary Corridor* (Kiviat and Stevens 2001). For larger scale habitat context, land cover outside the Gateway is shown in Figure 7.

Significant Biodiversity Area

In recognition of the high concentrations of important, unusual, and vulnerable biological features in certain areas, NYSDEC has identified twenty-three "Significant Biodiversity Areas" (SBAs) throughout the ten counties of the Hudson River estuary corridor. Much of the Gateway lies within the Esopus/Lloyd Wetlands and Ridges Significant Biodiversity Area, which covers approximately 51 mi^2 in parts of the towns of New Paltz, Lloyd, Esopus, Marlborough, and Plattekill (Penhollow et al 2006).

This SBA was designated because of significant wetland communities that serve as critical habitat for threatened amphibian species, breeding populations of waterfowl, rare and uncommon plants with highly specialized habitat requirements, and several rare and exemplary ecological communities (Penhollow et al. 2006). Rarities include small-flowered crowfoot (NYS Rare), lily-leaved twayblade (NYS Endangered), and the northern cricket frog (NYS Endangered). Jakim et al. (2008) described a great blue heron rookery in Plutarch Swamp.

Rare Species

No rare species are known to occur within the Gateway but, to our knowledge, no rare species surveys or habitat assessments have been conducted there. There is potential for rare species of plants and animals in any of the habitat areas in the Gateway, and especially in the less-disturbed areas.

Table 1. Habitats of the New Paltz Gateway

Habitat	Area (ac)	Definition
Cultural	20.7	Habitats that are intensively managed (e.g., mowed), but have no structures or pavement.
Upland hardwood forest	55.9	A forested upland with deciduous hardwoods representing 75% or more of the canopy trees.
Upland mixed forest	1.4	A forested upland with both hardwood and conifer trees in the canopy, each representing 25-75% cover.
Upland conifer forest	0.4	A forested upland with conifers representing 75% or more of the canopy trees.
Red cedar woodland	0.4	A habitat with widely-spaced eastern red cedar trees and grassy meadow-like areas between.
Upland shrubland	4.6	An unforested upland habitat with 20% or more shrub cover.
Upland meadow	32.1	An unforested upland habitat dominated by forbs and grasses and having less than 20% shrub cover.
Row cropland	0.1	Land in cultivated row crops
Waste ground	2.9	Land severely altered by human activity, but lacking pavement or structures.
Hardwood swamp	17.2	A forested wetland with deciduous hardwood trees representing 75% or more of the canopy trees.
Conifer swamp	0.1	A forested wetland with conifers representing 75% or more of the canopy trees.
Intermittent woodland pool	0.2	A vernal pool in a forested setting.
Shrub swamp	3.6	A wetland dominated by shrubs.
Wet meadow	1.7	A wetland with predominantly herbaceous vegetation, less than 20% shrub cover, and with little or no standing water for much of the growing season.
Marsh	17.0	A wetland with predominantly herbaceous vegetation and with standing water for most or all of the growing season.
Constructed pond	1.1	A waterbody created by humans by excavating in upland or wetland, or by damming a stream.
Open water	2.6	A naturally-formed water body without emergent vegetation; or a constructed pond without emergent vegetation and surrounded by unmanaged habitats.

6. Ecologically Significant Habitats

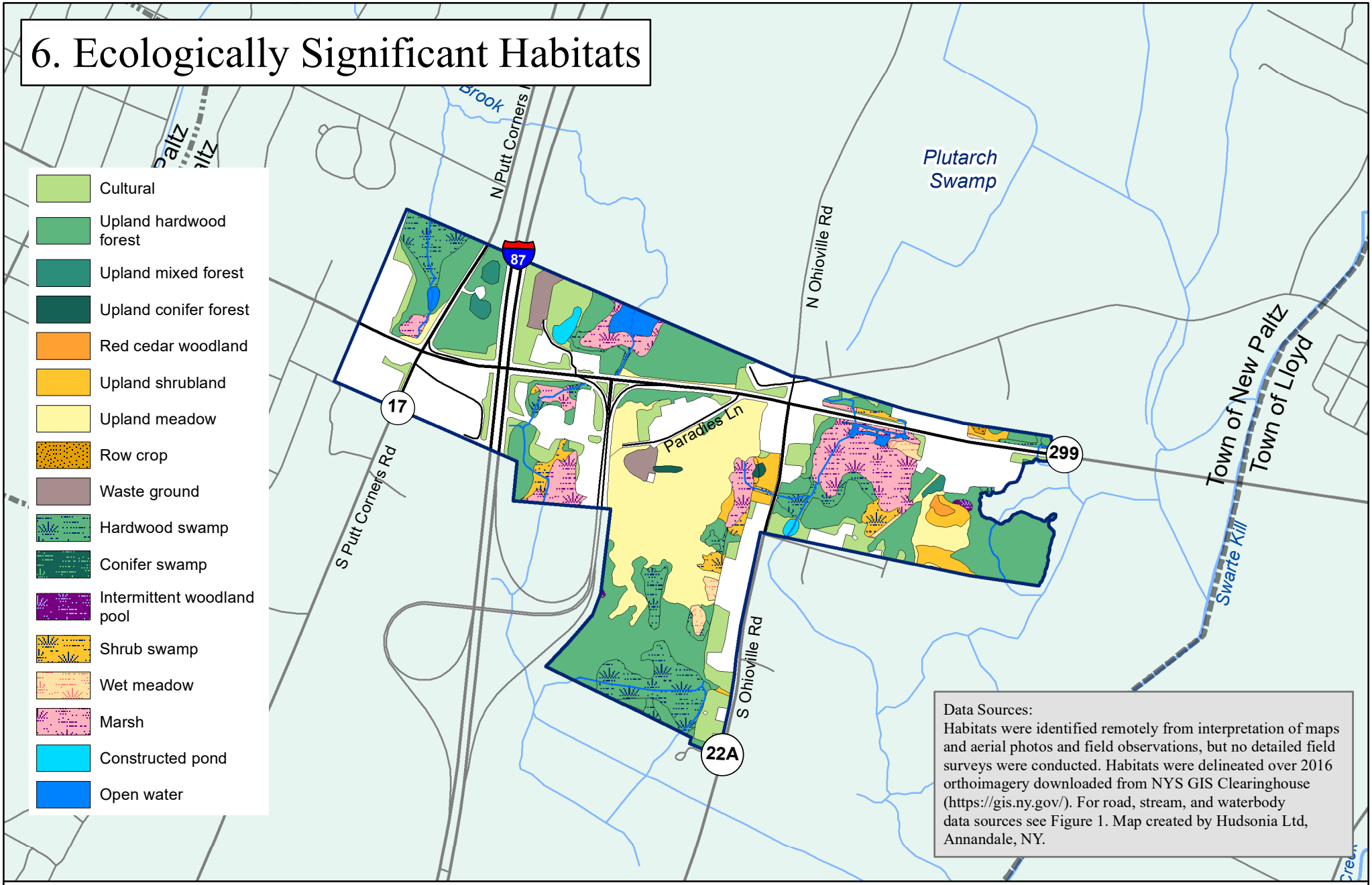

Figure 6. Ecologically significant habitat areas in the New Paltz Gateway, Ulster County, New York. Developed areas and other non-significant habitats are shown in white. New Paltz Gateway Natural Resource Inventory, 2019.

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While the SBA covers a broad area containing multiple features that are significant for biodiversity, the New York Natural Heritage Program (NYNHP) has identified more localized Areas of Known Importance that are deemed to be important for the continued persistence of rare plants, rare animals, and significant ecosystems. These areas were identified through analysis of known occurrences of exemplary ecological communities, rare plants, and rare animals, their life histories and habitats, and the physical and hydrological features of the landscape.

The actual species of concern in each Area of Known Importance are not divulged here because of the sensitivity of the information. Rare species are vulnerable to illegal collecting, harassment, or removal, so the NYNHP and NYSDEC are careful to keep exact locations confidential unless there is an important reason to make them known to a landowner or the public. If there is a potential or imminent threat to an Area of Known Importance, further information can be obtained from the NYNHP.

Rare species known to occur in nearby areas of New Paltz and Lloyd include northern cricket frog (NYS Endangered), sedge wren, (NYS Threatened), red-headed woodpecker (New York State Special Concern), and beakgrass (NYS Threatened). The New York Natural Heritage Program has also identified this general area as having potential for prairie wedge grass (NYS Endangered).

The northern cricket frog spends most of its time in well-vegetated shallow ponds with permanent standing water, but may move several hundred feet or more to overwintering sites in upland forests (Gibbs et al. 2007). The frogs occupy a wetland in Lloyd and have been found along a stream corridor not far from the Gateway, perhaps using it for dispersal. Sedge wren nests in wet meadows, hayfields, and marshes with tall sedges and grasses, typically avoiding areas with cattails and standing water (McGowan and Corwin 2008). Red-headed woodpecker nests in cavities of live or dead trees in a variety of habitats, including open hardwood forests, recent clearings, swamps, forest edges, meadows with scattered trees, and orchards. Beakgrass occurs in forested floodplains, and prairie wedge grass in grasslands or open woodlands, marshes, and shores of rivers and lakes. The habitats in and near the Gateway have not been assessed for these species.

Other animal species of interest that could occur in habitats in the Gateway include, for example, river otter, beaver, wood duck, and American black duck (NYS Species of Greatest Conservation Need) in wetlands and ponds; pied-billed grebe (NYS Threatened) in marshy areas next to open water; wood turtle and spotted turtle (both NYS Special Concern)—nesting in unforested upland areas, resting and foraging in a variety of upland, wetland, and stream habitats; eastern ribbon snake (regionally scarce) in and near marshes, swamps, and ponds; and Indiana bat (NYS Endangered) and other bats—roosting in trees or on structures, and foraging over open wetlands, ponds, streams, and meadows. Other uncommon or rare plant species that could occur in the area include goldenseal (NYS Threatened), winged monkeyflower, small-flowered agrimony (both NYS Rare), and green dragon (regionally rare) (Kiviat and Stevens 2001).

When new land uses are contemplated within an SBA or an Area of Known Importance, people are encouraged to contact the NYNHP to learn more about the particular elements of concern in the vicinity.

Connectivity

Maintaining broad connections between natural (i.e., undeveloped) areas helps to support ecosystem functions, and the habitat, migration, and behavior requirements of many native plant and animal species. Broad connections between intact habitat areas allow wildlife to move safely across the landscape to fulfill their seasonal, annual, or longer-term life needs, maintain genetic exchange among distant populations, and migrate to new habitats under deteriorating environmental conditions or climate change. Figure 7 shows the spatial relationships of Gateway habitats with habitat areas outside the Gateway.

In a project conducted with the Ulster County Department of the Environment, the Green Infrastructure Center (GIC) (Firehock 2013) identified and ranked "habitat cores" throughout the county. These are areas of large unfragmented habitat patches that were weighted and ranked according to size, landscape complexity, biological diversity, and water quality. The purpose was to identify the parts of the landscape that may be most important to maintaining ecosystem function and native biological diversity. This was a coarse-scale analysis that did not consider the habitat details at the local level, but nonetheless provides a regional perspective that may be valuable for general planning. Figure 8 shows the results of the GIC analysis in the vicinity of the Gateway. Large areas of the Swarte Kill wetland complex, including Plutarch Swamp, were identified among the important habitat cores in the county. One of these areas, ranked as "medium value," includes a part of the eastern arm of the Gateway.

7. Regional Land Cover

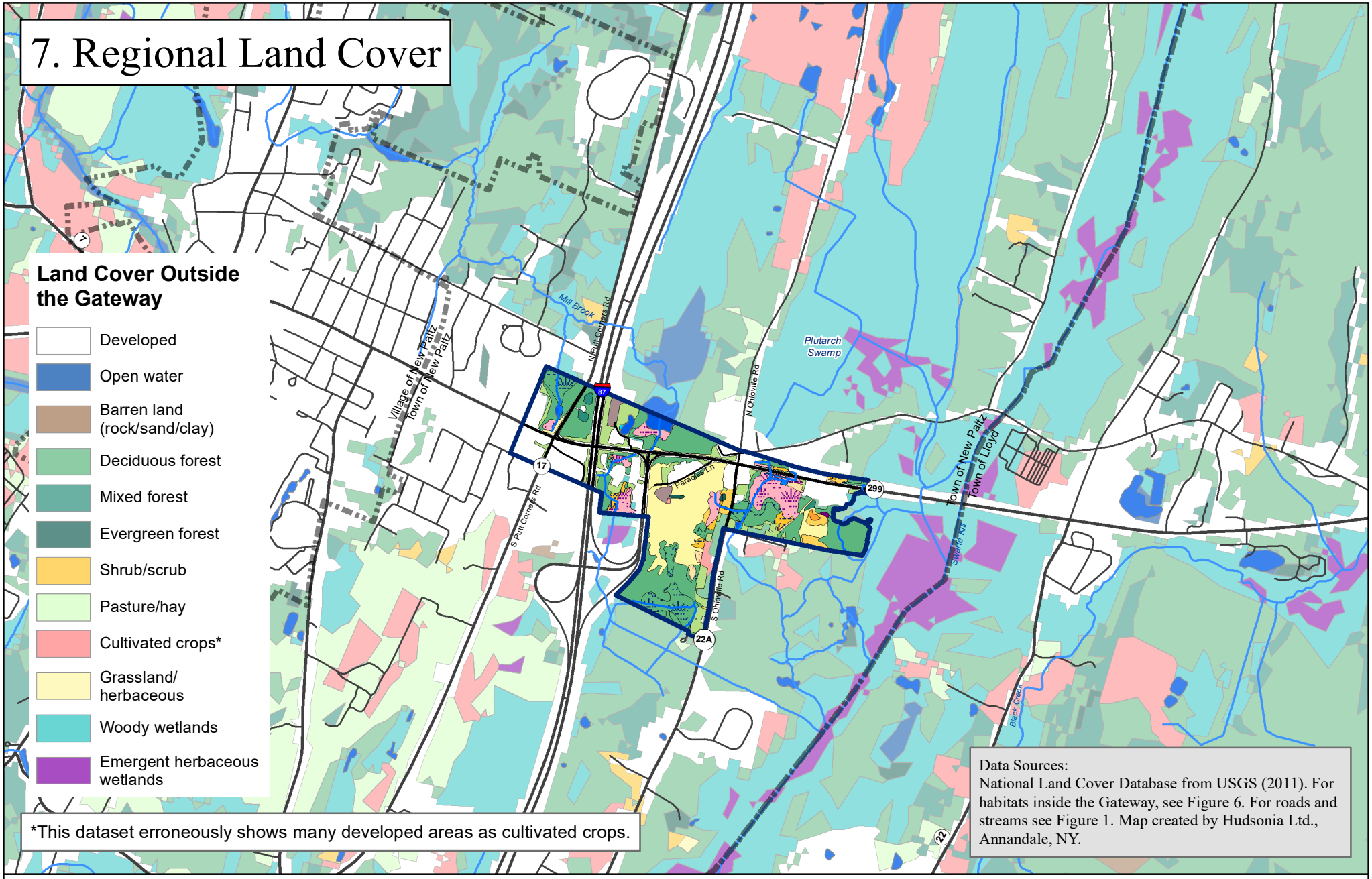

Figure 7. Land cover outside the New Paltz Gateway, from the USGS National Land Cover Database, See Figure 6 for the key to habitats within the Gateway.
New Paltz Gateway Natural Resource Inventory, 2019.

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8. Ulster County Habitat Cores

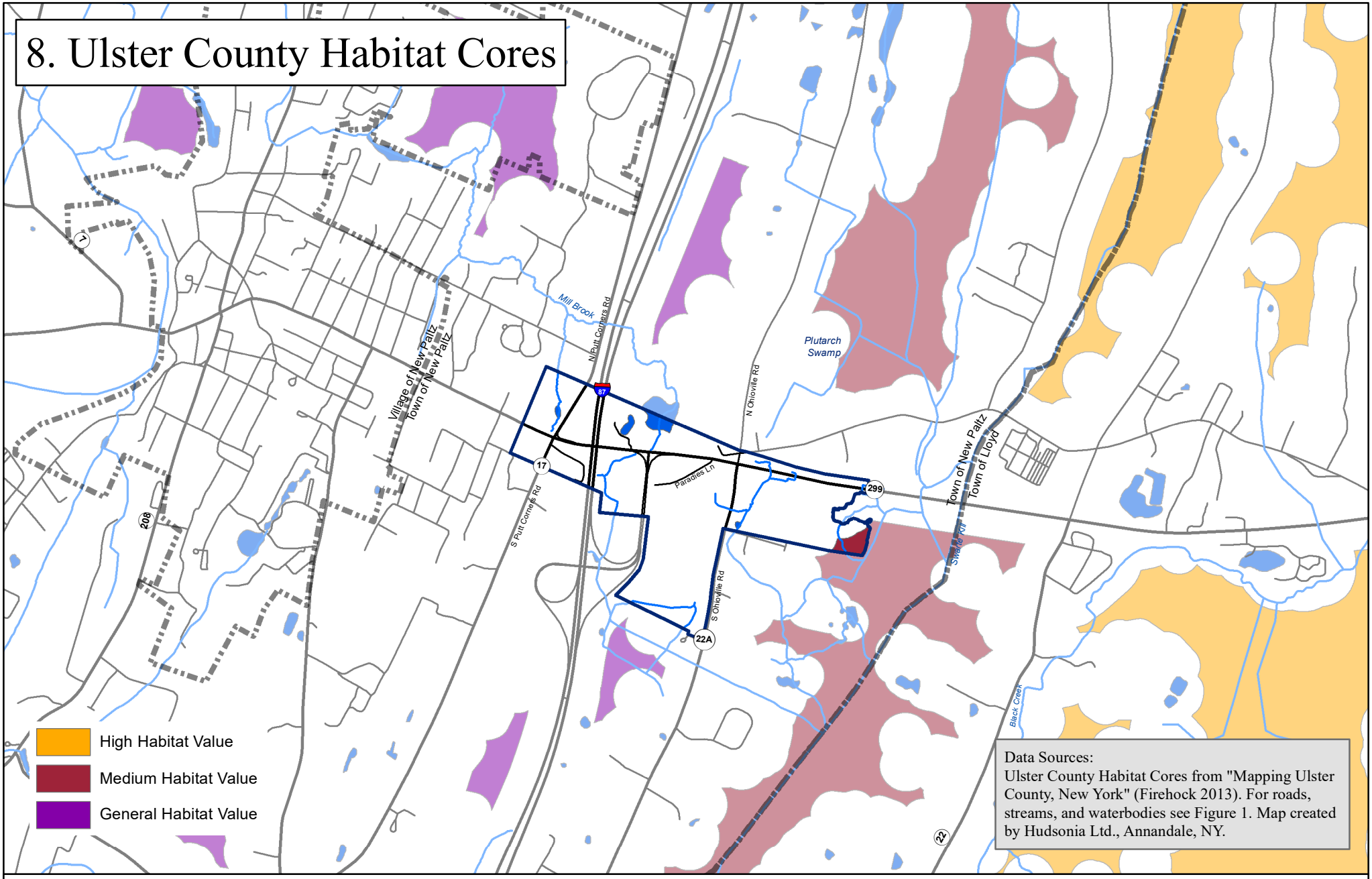

Figure 8. Core habitat areas identified by Firehock (2013) in and near the New Paltz Gateway, Ulster County, New York. See text for explanation. New Paltz Gateway Natural Resource Inventory, 2019.

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DISCUSSION AND CONCLUSIONS

The Gateway lies at the edge of intensively-developed parts of the Village and Town of New Paltz. Concentrating new development in such an area instead of the more rural parts of the town could take advantage of existing infrastructure, enhance cultural aspects of the community, and help to avoid the ecological and cultural problems associated with rural sprawl. The town understands, however, the importance of protecting sensitive natural areas so that they can continue to support local ecosystems, habitats for native plants and wildlife, and the uncountable ecosystem services provided to the human community. The town is seeking ways to promote the kinds of land development compatible with a visually appealing entrance to the town and village, while preserving valuable natural attributes of the Gateway area.

This preliminary NRI has gathered and analyzed existing information to help identify the most important environmental constraints in the Gateway, and the areas that may be best suited for new development. Below are brief summaries of our general findings. Onsite assessments, however, would be necessary to understand the physical and biological features relevant to site-specific planning.

Figure 9 labels sections of the Gateway with letter codes—A, B, C etc.—for easy reference in the discussion below.

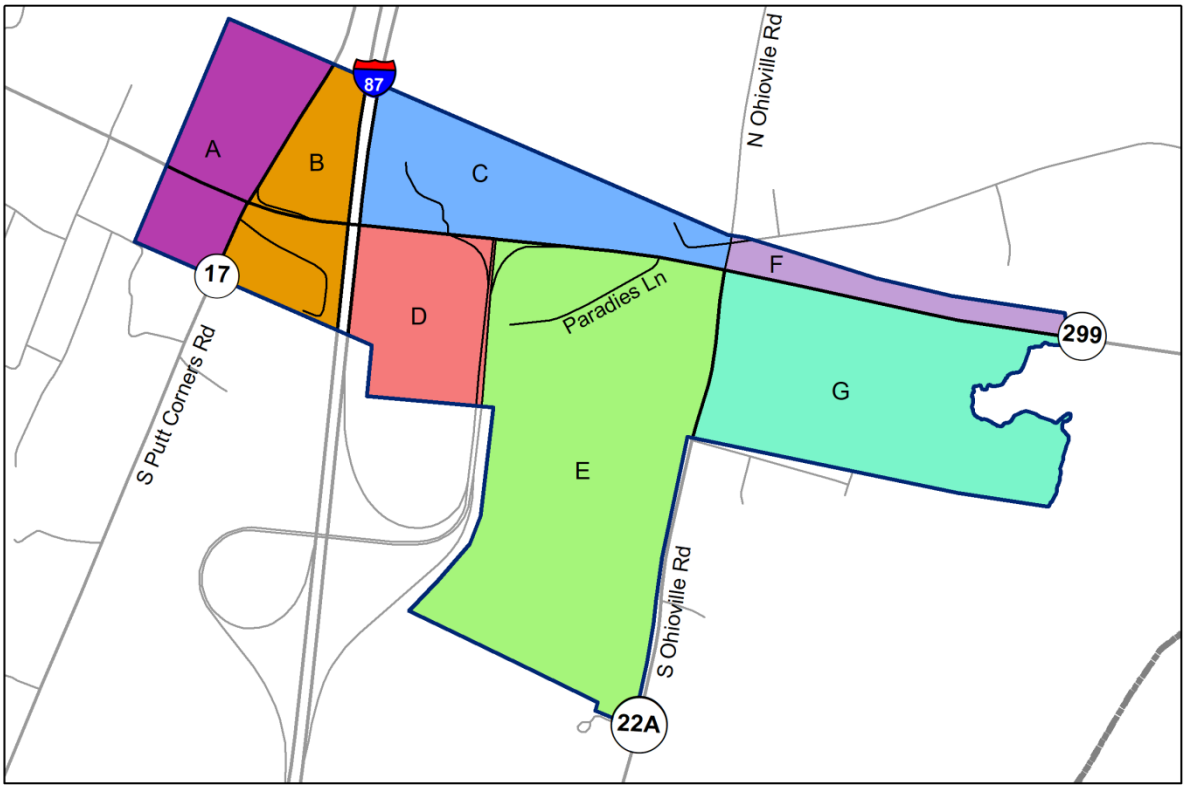

Figure 9. Letter-coded sections of the Gateway.

Aquifer. Much of sections F and G—the eastern arm of the Gateway—overlies an unconsolidated aquifer identified by the NYSDEC (figures 2 and 10). This area is likely to hold large volumes of accessible groundwater, but is also where the groundwater may be most susceptible to contamination from the ground surface, due to the coarse-textured and highly–permeable surficial material. To protect the quality and quantity of groundwater supplies, land uses in the aquifer area should be designed to maximize the groundwater recharge potential, and minimize the potential for contamination from, for example, petroleum hydrocarbons and heavy metals in road runoff, and fertilizers and pesticides from lawn, garden, or field crop applications. The mapped aquifer identified by NYSDEC is a rough representation that could be refined with the aid of local data.

Wetlands and streams. Wetlands, streams, and their regulated buffer zones cover approximately 49% of the Gateway land area (figures 5b and 10). The New Paltz Wetland and Watercourse law requires approvals or permits from the town for land uses that would significantly disturb those areas. Some land uses are exempted from those requirements, but regulated activities include, for example, excavation, grading, channelizing, dumping, building or installation of structures or berms (as defined in the ordinance), storage or disposal of toxic materials, and clearing of vegetation (§139-8).

Flood zones and Active River Areas. The 100-year flood zone of the Swarte Kill, as mapped by FEMA (Figure 4), extends to the edge of the Gateway, but not beyond the boundary of the Swarte Kill wetland complex (sections F and G). Thus it does not add an additional area of constraint, but does add another reason for avoiding new disturbance to that wetland or its buffer zone. Some of the smaller streams in the Gateway could also have significant floodplains which may or may not be covered by the 50-ft or 100-ft regulated buffer zones of those streams.

The coarsely-drawn Active River Area of the Swarte Kill and some associated streams covers significant parts of sections C, D, and E, and all of sections F and G. (The ARA was identified remotely by The Nature Conservancy without the benefit of onsite observations. A site-specific assessment could refine the apparent footprint of this zone.) The mapped area represents the parts of the landscape that are associated with the long-term dynamic interactions of the streams and riparian areas.

In addition to supporting habitats that are used by terrestrial and stream animals, floodplains and Active River Areas process and filter pollutants in overland runoff, absorb flood waters and dampen flood flows, recharge the groundwater that feeds the stream during low-flow periods, and supply organic matter that is at the base of the stream's food web. To preserve the important functions and services of floodplains and Active River Areas, design of any land uses in those areas should include measures to promote infiltration of precipitation to the soils, minimize pavement or structures that would hasten or obstruct overland water flows, promote dense vegetation cover, and maintain habitat connectivity with the stream, associated wetlands, and terrestrial areas as much as possible.

Habitats and connectivity. Ecologically significant habitats occupy much of the Gateway, and many are broadly connected to large habitat areas in the surrounding landscape. A general measure for biodiversity conservation is to maintain broad landscape connections between habitat areas to facilitate the safe movements (day-to-day, seasonal, and longer-term) of plants and animals. Although some of the forests and meadows of the Gateway are likely to be developed in the future, Figure 10 shows the key places for maintaining connections between habitat areas in and adjacent to the Gateway. New land uses can be designed in ways that maintain those connections.

Rare species. No rare species of plants or animals are known to occur in the Gateway but, to our knowledge, no habitat assessments or surveys for rare species have been conducted here. Several rare species occur in nearby areas of New Paltz and Lloyd—northern cricket frog, sedge wren, red-headed woodpecker, and beakgrass. Onsite habitat assessments would be necessary to determine the likelihood of these or other rarities occurring in the Gateway.

Farmland soils. Most of the mineral soils of the Gateway are classified as Prime or Statewide Important farmland soils. While protection of good farmland soils may be a high priority in other parts of New Paltz, it may not be among the town's highest concerns in the Gateway. We would nonetheless be remiss in not mentioning their prominence here, among the other significant natural resources.

* * * * * *

Figure 10 shows the land areas with the most obvious environmental constraints in the Gateway—1) wetlands, streams, and their regulated buffer zones, 2) the unconsolidated aquifer area, and 3) the areas representing important connections to offsite habitat areas.

Approximately 47% of the Gateway falls outside of these major constraint areas. The remaining areas still have important natural resource values and ecological functions that could be accommodated in various ways in the design of new development projects and other land uses. Significant habitats, including forests, woodlands, shrublands, and meadows, would need onsite assessments to understand their condition, their interactions with adjacent habitats, and the likelihood of supporting plants or animals of conservation concern. Some areas will have additional importance for the human community, such as scenic values, moderation of local air temperatures, screening of noise or lights from intensive-use areas, and groundwater recharge capabilities.

Beyond the regulated buffer zones, additional undeveloped land around a wetland or along a stream can provide additional protection to the wetland and stream habitats. For example, a forest at the edge of a wetland provides habitat for wildlife moving in and out of the wetland and also buffers the wetland from lights, noise, contaminated runoff, and other disturbances. While a 50-ft or 100-ft buffer is a good starting point, a larger buffer would be even more protective.

10. Major Environmental Constraints

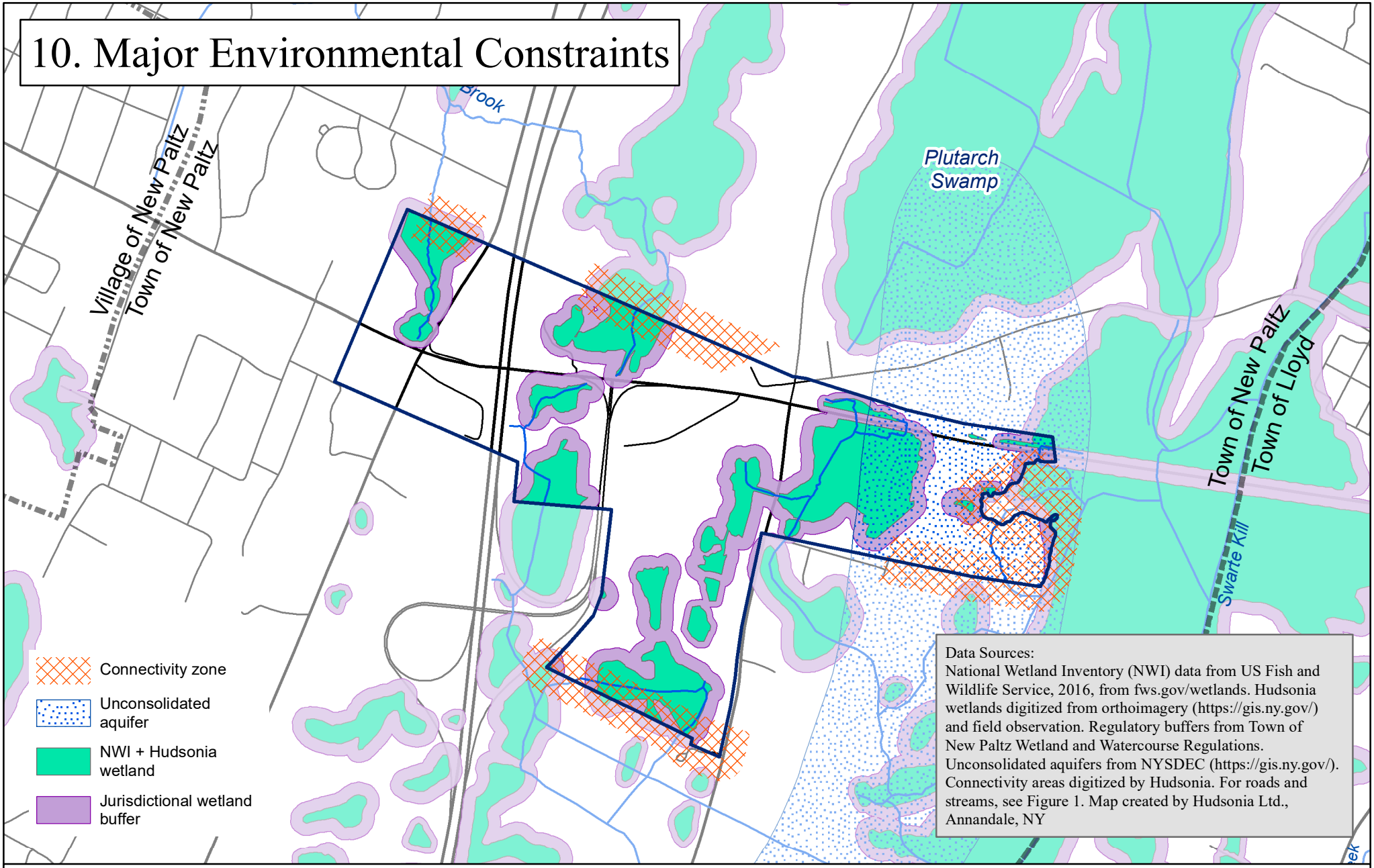

Figure 10. Major environmental constraints (wetlands, unconsolidated aquifers, and habitat connectivity areas) in and around the New Paltz Gateway. New Paltz Gateway Natural Resource Inventory, 2019.

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On lands where new development is planned, some measures can help to protect nearby sensitive biological and water resources. Planting "living fences" between development and habitat areas can help to screen the habitats from noise and artificial light. Careful design of stormwater management features can ensure that runoff from paved areas does not flow directly into streams, wetlands, or ponds, but instead into detention basins, rain gardens, and other infrastructure that facilitates infiltration to the soils. Where driveways or roads cross streams, installation of properly sized bridges, and properly sized and installed culverts can help to protect infrastructure and maintain stream habitat continuity. Limiting light pollution by reducing night-time lighting, directing outdoor lights downward, and minimizing glass expanse on buildings can reduce adverse effects on the many kinds of wildlife that depend on dark environments.

Finally, in the planning, design, and review of future development projects or other land uses in the Gateway, more detailed natural resource information can be gathered as needed. For example:

- Refinement of the aquifer map based on local geological data and well data
- Delineations of floodplains of smaller streams based on onsite observations of indicators
- Formal delineations, surveying, and mapping of wetland boundaries and buffer zones
- Habitat assessments for plants and animals of conservation concern

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