

Appendix J-2
Ecological Communities and Vegetation

Appendix J-2

Ecological Communities and Vegetation

This appendix describes the ecological communities of the I-81 Viaduct Project Area. The ecological communities are described within each of the four Study Areas (i.e., Central Study Area, I-481 South Study Area, I-481 East Study Area, and I-481 North Study Area) (Project Area) and characterized within the context of “Ecological Communities of New York State (Edinger et al. 2014).” Per Executive Order 13122 (amended on December 5, 2016) and NYSDOT’s TEMs Chapter 4.8 invasive plant species are discussed within each study area.

NYSDOT most recently reviewed the United States Fish and Wildlife (USFWS) Information for Planning and Consultation System (IPaC) database on March 25, 2021 and May 17, 2021¹ and the New York Natural Heritage Program (NYNHP) database for Federally- and New York State-listed species and significant ecological communities for each study area on March 26, 2021 and May 11, 2021.² The plant species and significant ecological communities are described for each study area.

Ecological communities mapping is presented in **Figures J-2-1 through J-2-10**. Photographs of representative ecological communities within each of the four study areas are presented in **Figures J-2-11 through J-2-41**. A list of plant species observed in the Project Area (including all four study areas) is documented at the end of this appendix in **Table J-2-5**.

A. CENTRAL STUDY AREA

As indicated in **Table J-2-1** below and shown in **Figures J-2-1 through J-2-3**, the majority of the ecological communities present in the Central Study Area are terrestrial cultural communities with a total of 693.3 acres of coverage. Terrestrial cultural communities in this study area consist of impervious surfaces (515.5 acres) and vegetated areas, including “paved road/path,”³ “railroad,”⁴ “urban vacant lot”⁵ and “junkyard.”⁶ Vegetated terrestrial cultural communities include “mowed lawn,”⁷ “mowed lawn with trees,”⁸ “mowed

¹ The May 2021 IPaC System review was conducted for the area associated with Noise Barrier 16A&B, only.

² The May 2021 NYNHP database review was conducted for the area associated with Noise Barrier 16A&B, only.

³ Paved road/path: This community is paved (e.g., asphalt, concrete, etc.) and there may be sparse vegetation rooted in cracks in the paved surface.

⁴ Railroad: a permanent road having a line of steel rails fixed to wood ties and laid on gravel roadbed that provides a track for cars or equipment drawn by locomotives or propelled by self-contained motors. There may be sparse vegetation rooted in the gravel substrate.

⁵ Urban vacant lot: an open site in developed, urban areas that has been cleared either for construction or following the demolition of a building. Characteristic trees are often naturalized non-native species such as Norway maple (*Acer platanoides*), white mulberry (*Morus alba*), and tree-of-heaven (*Ailanthus altissima*).

⁶ Junkyard: a site that has been cleared for disposal or storage of primarily inorganic refuse, including discarded automobiles, large appliances, etc.

⁷ Mowed lawn: residential, recreational, or commercial land or unpaved airport runways in which the groundcover is dominated by clipped grasses and there is less than 30% cover of trees. Ornamental and/or native shrubs may be present, usually with less than 50% cover. The groundcover is maintained by mowing and broadleaf herbicide application.

⁸ Mowed lawn with trees: residential, recreational, or commercial land in which the groundcover is dominated by clipped grasses and forbs, and it is shaded by at least 30% cover of trees. Ornamental and/or native shrubs may be present, usually with less than 50% cover. The groundcover is maintained by mowing and broadleaf herbicide application.

Ecological Communities and Vegetation

roadside/pathway,⁹ and “flower herb garden.”¹⁰ Ecological communities in the study area also include successional southern hardwoods (38.1 acres), successional old field (19.0 acres), successional shrubland (7.0 acres), floodplain forest (1.7 acres), emergent and forested wetlands (2.2 acres) and freshwater creeks (3.0 acres) (e.g., Ley Creek and Onondaga Creek), described below.

Within the Central Study Area, plant species associated with the paved road/path, mowed roadside pathway, urban vacant lot, and junkyard ecological communities are all of similar composition. They are generally non-native and invasive herbaceous species, including grasses that are able to persist in disturbed conditions. Common species observed in these communities include common reed (*Phragmites australis*), fescue grass (*Festuca rubra*), birds-foot trefoil (*Lotus corniculatus*), yellow mustard (*Guillenia flavescens*), mugwort (*Artemisia vulgaris*), chicory (*Cichorium intybus*), hawkweed (*Hieracium* sp.), Queen Anne’s lace (*Daucus carota*), knapweeds (*Centaurea* sp.), amaranth (*Amaranthus* sp.), millet (*Panicum miliaceum*), dandelion (*Taraxacum officinale*), barnyard grass (*Echinochloa crus-galli*), orchard grass (*Dactylis* sp.), clovers (*Trifolium* sp.), and sweet clovers (*Melilotus* sp.). These plants were observed growing in cracks of paved and gravel areas and along the edges of roadsides and mowed areas.

Urban vacant lot communities throughout the Central Study Area typically have a higher percent cover of vegetation, including trees and shrubs, in comparison to the paved and mowed communities previously described. Trees within the urban vacant lot communities consist of non-native invasive Norway maple (*Acer platanoides*), black locust (*Robinia pseudoacacia*), tree-of-heaven (*Ailanthus altissima*), and white mulberry (*Morus alba*), and native pioneer species including eastern cottonwood (*Populus deltoides*) and black walnut (*Juglans nigra*). Within the Central Study Area, where present, these trees are generally present in low numbers and are scattered throughout this community. Non-native common buckthorn (*Rhamnus cathartica*), saplings of the abovementioned trees, and staghorn sumac (*Rhus typhina*) are also scattered throughout the shrub layer. The dominant species in this community are generally herbs, which exist in a higher coverage/density than in other communities previously described. In addition, stands of common reed, Canada goldenrod (*Solidago canadensis*), Canada thistle (*Cirsium arvense*), and teasel (*Dipsacus sylvestris*) are present along with some coverage of vines, including Virginia creeper (*Parthenocissus quinquefolia*) and grape (*Vitis* sp.). Portions of this community consist of gravel and rubble (i.e., construction and demolition debris and household garbage).

⁹ Mowed roadside/pathway: a narrow strip of mowed vegetation along the side of a road, or a mowed pathway through taller vegetation (e.g., meadows, old fields, woodlands, forests), or along utility right-of-way corridors (e.g., power lines, telephone lines, gas pipelines). The vegetation in these mowed strips and paths may be dominated by grasses, sedges, and rushes; or it may be dominated by forbs, vines, and low shrubs that can tolerate infrequent mowing.

¹⁰ Flower/herb garden: residential, commercial, or horticultural land cultivated for the production of ornamental herbs and shrubs.

Ecological Communities and Vegetation

Table J-2-1

Summary of Terrestrial Ecological Communities within the Central Study Area

Ecological Community	Acreage
Terrestrial Cultural	622.3
Successional Southern Hardwoods	38.1
Successional Old Field	19.0
Successional Shrubland	7.0
Floodplain Forest	1.7
Freshwater Wetland	2.2
Surface Water	3.0
Total Estimated Acreage	693.3
Notes: Ecological community names and descriptions are derived from “Ecological Communities of New York State” (Edinger et al. 2014). Terrestrial Cultural includes paved road/path, mowed lawn, mowed lawn with trees, mowed roadside/pathway, flower herb garden, railroad, urban vacant lot, and junkyard communities. Sources: Ecological community observations were made during field investigations in the Central Study Area by AKRF in 2016, 2017, and 2019.	

A forest community, best described as “successional southern hardwoods¹¹” (Edinger et al. [2014]), is also present within the Central Study Area. The successional southern hardwoods community covers 38.1 acres of the Central Study Area. This community is characterized by disturbance, and it is mainly located along the fence lines of highway right-of-ways between residential neighborhoods and the highway and within narrow medians along highway ramps. Tree assemblages vary within segments of this community, ranging from monotypic stands of nearly one non-native or native pioneer species to a mixture of the following tree species: Norway maple, tree-of-heaven, black walnut, honey locust (*Gleditsia triacanthos*), white mulberry, hackberry (*Celtis occidentalis*), eastern cottonwood, and box elder (*Acer negundo*). Species occurring in lower densities consist of red maple (*Acer rubrum*), silver maple (*Acer saccharinum*), black cherry (*Prunus serotina*), and eastern white pine (*Pinus strobus*). Common buckthorn, staghorn sumac, and saplings of the abovementioned species are dominant in the sub-canopy and shrub layer. Within the Central Study Area, the herbaceous layer of this community is often sparse, particularly where there is a dense canopy and shrub layer. Species present in the herbaceous layer include Virginia creeper, avens (*Geum* sp.), poison ivy (*Toxicodendron radicans*), and garlic mustard (*Alliaria petiolata*). Virginia creeper and grape are also present in all strata.

This study area, particularly the northern segment near Ley Creek, also contains a forested edge community located outside of the limits of disturbance, but within the 100-ft study area.

¹¹ Successional southern hardwoods: a hardwood or mixed forest that occurs on sites that have been cleared or otherwise disturbed. Characteristic trees and shrubs include any of the following: American elms (*Ulmus americana*), slippery elm (*Ulmus rubra*), white ashes (*Fraxinus americana*), red maples (*Acer rubrum*), box elders (*Acer negundo*), silver maple (*Acer saccharinum*), sassafras (*Sassafras albidum*), gray birch (*Betula populifolia*), hawthorns (*Crataegus* spp.), eastern red cedar (*Juniperus virginiana*), and choke-cherries (*Prunus virginiana*). Certain introduced species are commonly found in successional southern hardwoods forests, including black locust (*Robinia pseudo-acacia*), tree-of-heaven (*Ailanthus altissima*), and buckthorn (*Rhamnus cathartica*).

Ecological Communities and Vegetation

This forest, occupying 1.7 acres, is best characterized as “floodplain forest.”¹² Dominant species in the canopy include green ash (*Fraxinus pennsylvanica*), eastern cottonwood, red maple, and box elder. Less common species include black locust and silver maple. In several locations, the shrub layer is dense, with dominant species consisting of common buckthorn and bush honeysuckle (*Lonicera* sp.) with multi-flora (*Rosa multiflora*) rose also commonly occurring. The herbaceous layer varies in species composition and assemblages, ranging from a monoculture of dense poison ivy to a mixture of small saplings, shrubs, and forbs. Herbaceous species present in this layer include jumpseed (*Polygonum virginianum*), avens, goldenrods (*Solidago* spp.), New York aster (*Aster novi-belgii*), small white aster (*Symphotrichum racemosum*), sensitive fern (*Onoclea sensibilis*), Dame’s rocket (*Hesperis matronalis*), poison ivy, and Virginia creeper. Shrubs of common buckthorn and honeysuckle are also present in the herbaceous layer. This community is common along stream banks and in the vicinity of wetlands within this study area.

Portions of the Central Study Area also consist of a successional old field ecological community. The successional old field community, estimated at 19.0 acres, primarily occurs in the northern portion of the Central Study Area, in areas that are not frequently mowed. Dominant species of this community include everlasting pea (*Lathyrus latifolius*), Canada goldenrod, Canada thistle, knapweeds, mugwort, and fescue. Other commonly occurring species observed within this community include common reed, white teasel (*Dipsacus laciniatus*), purple teasel, millet, Queen Anne’s lace, poison ivy, (*Leucanthemum vulgare*), black-eyed Susan (*Rudbeckia hirta*), chicory, butter and eggs (*Linaria vulgaris*), birds-foot trefoil (*Lotus corniculatus*), daisy fleabane (*Erigeron annuus*), and vetch (*Vicia* sp.). Butterfly weed (*Asclepias tuberosa*), a State-listed “exploitably vulnerable” species, is also present throughout this community. Dominant species in the shrub layer include common buckthorn and staghorn sumac, with gray dogwood (*Cornus racemosa*), multi-flora rose, and bush honeysuckle also frequently occurring. Portions of this community appear to be maintained by mowing, but not on an annual basis.

In a small portion of the Central Study Area, the successional old field community described above has transitioned into a successional shrubland (7.0 acres). This community is present in a median area. The same species described for the successional old field community are present, but with greater coverage of shrubs. The dominant shrub of this community is common buckthorn with gray dogwood also commonly occurring.

Flower herb garden communities are limited to landscaping and gardens of residential and commercial buildings. Species are typically horticultural varieties. Examples include yew

¹² Floodplain forest: typically a hardwood forest that occurs on mineral soils on low terraces of river floodplains and river deltas. Characteristic trees include silver maple (*Acer saccharinum*), ashes (*Fraxinus pennsylvanica*, *F. nigra*, *F. americana*), cottonwood (*Populus deltoides*), red maple (*Acer rubrum*), box elder (*Acer negundo*), elms (*Ulmus americana*, *U. rubra*), hickories (*Carya cordiformis*, *C. ovata*, *C. laciniata*), butternut and black walnut (*Juglans cinerea*, *J. nigra*), sycamore (*Platanus occidentalis*), oaks (*Quercus bicolor*, *Q. palustris*), and river birch (*Betula nigra*). Characteristic shrubs include spicebush (*Lindera benzoin*), American hornbeam (*Carpinus caroliniana*), bladdernut (*Staphylea trifoliata*), speckled alder (*Alnus incana* ssp. *rugosa*), shrubby dogwoods (*Cornus sericea*, *C. racemosa*, *C. amomum*), viburnums (*Viburnum nudum* var. *cassinoides*, *V. prunifolium*, *V. dentatum*, *V. lentago*), and sapling canopy trees. Invasive non-native shrubs that may be locally abundant include shrub honeysuckles (*Lonicera tatarica*, *L. morrowii*), and multiflora rose.

Ecological Communities and Vegetation

(*Taxus* sp.), Rose-of-Sharon (*Hibiscus syriacus*), morning glory (*Ipomoea* sp.), day lily (*Heemerocallis fulva*), Japanese barberry (*Berberis thunbergii*), lilac (*Syringa vulgaris*), and privet (*Ligustrum vulgare*).

In addition to the ecological communities described above, the ecological communities in the downtown area consist of sidewalks and walkways with planted street trees in tree pits. Street trees common to these areas include honey locust, lindens (*Tilia* spp.), sugar maple (*Acer saccharum*), red maple, silver maple, Norway maple ‘Crimson King’ (*Acer plantanoides* ‘Crimson King’), ashes (*Fraxinus* sp.), ginkgo (*Ginkgo biloba*), oaks (*Quercus* spp.), crabapple (*Malus* sp.), and Callery pear (*Pyrus calleryana*). Trees ranging from newly planted (i.e., approximately 3 inches diameter at breast height [dbh]) to mature trees (approximately 12+ inches dbh) are present throughout this study area.

The dominant tree species in the mowed lawn and mowed lawn with trees communities is honey locust, although pines (*Pinus* spp.), Norway maple, and ash trees are also present.

THREATENED AND ENDANGERED PLANTS

Six State-listed plants have been documented by NYNHP (March 26, 2021) as occurring in the vicinity of the Central Study Area. These include the following species:

- **Seaside Bulrush (*Bolboschoenus maritimus* ssp. *paludosus*):** Seaside bulrush is a State-listed threatened perennial plant. In New York, it is found in Long Island salt marshes and inland salt ponds and marshes (NYNHP). It is listed as an OBL (i.e., almost always occurs in wetlands) plant by the 2018 National Wetland Plant List: Northcentral and Northeast Region (USACE 2018). Its habitat includes a variety of open, saltwater, or brackish wetlands. Seaside bulrush may also be found in disturbed areas like roadsides and ditches. In New York, confirmed ecological communities associated with seaside bulrush include artificial pools, brackish interdunal swales, brackish intertidal mudflats, coastal salt ponds, and high salt marshes (NYNHP). These communities are not present within the Project Area. A known population of seaside bulrush exists in the vicinity of the Central Study Area (NYNHP). However, seaside bulrush was not found during targeted searches (conducted on August 30, 2017) for this species in the Central Study Area. For these reasons, seaside bulrush has a low potential to occur in the Central Study Area.
- **Midland Sedge (*Carex mesochorea*):** Midland sedge is a State-listed threatened plant found in dry, sandy soils in maritime grasslands, oak woods, mowed cemeteries, railroads, paths, and fields. It is listed as an UPL (i.e., almost always occurs in non-wetlands) plant by the 2018 National Wetland Plant List: Northcentral and Northeast Region (USACE 2018). Its range in New York is from Long Island to the Hudson Highlands and central New York. In New York, confirmed ecological communities associated with midland sedge include Hempstead Plains grasslands, maritime grasslands, mowed lawn, rocky summit grasslands, and successional old fields (NYNHP). A known population exists in the vicinity of the Central Study Area (NYNHP). However, Midland sedge was not found during targeted searches (conducted on June 27 and 28, 2017 and July 10, 11, 12, and 16, 2019) for this species in the Central Study Area.

Ecological Communities and Vegetation

- **Saltmarsh Aster (*Symphyotrichum subulatum* var. *subulatum*):** Saltmarsh aster is a State-listed threatened species that is found in coastal areas in salt or brackish marshes, along tidal channels and creeks, in the swales of coastal dunes, and occasionally in disturbed habitats that are salt influenced. It is listed as an FACW (i.e., usually occurs in wetlands) plant by the 2018 National Wetland Plant List: Northcentral and Northeast Region (USACE 2018). In New York, saltmarsh aster primarily occurs along the shores of Long Island, Brooklyn, and Staten Island and along the shore of the Hudson River north to Putnam and Rockland Counties. However, a known population exists in the vicinity of the Central Study Area (NYNHP). In New York, confirmed ecological communities associated with saltmarsh aster include brackish interdunal swales, brackish meadows, brackish tidal marshes, coastal salt ponds, estuarine riprap/artificial shores, high salt marshes, inland salt marshes, salt shrubs, and sea level fens (NYNHP). These communities are not present within the Project Area. Additionally, saltmarsh aster was not found during targeted searches (conducted on August 30, 2017) for this species in the Central Study Area. Due to habitat requirements, saltmarsh aster has a low potential to occur within the Central Study Area.
- **Reflexed Sedge (*Carex retroflexa*):** Reflexed sedge is a State-listed threatened plant that prefers successional areas with open tree canopies. Its habitat includes dry-mesic to mesic deciduous forests, forest openings and edges, and rocky summits and ledges. Reflexed sedge is known to grow along and in paths, forest roads, and abandoned railroad lines. It can grow in poor land or waste places as well. It is listed as an FACU (i.e., usually occurs in non-wetlands) plant by the 2018 National Wetland Plant List: Northcentral and Northeast Region (USACE 2018). In New York, it has been documented throughout the Hudson Valley and in scattered locations within central New York. Confirmed ecological communities associated with reflexed sedge include acidic talus slope woodlands, Appalachian-oak hickory forests, Appalachian oak-pine forests, red cedar rocky summits, rocky summit grasslands, and successional southern hardwoods (NYNHP). As described above, successional southern hardwoods communities occur within the Project Area. Furthermore, a known population of reflexed sedge exists in the vicinity of the Central Study Area (NYNHP 2016), but reflexed sedge was not found during targeted searches (conducted on June 27 and 28, 2017 and July 10, 11, 12, and 16, 2019).
- **Straight-leaf Pondweed (*Potamogeton strictifolius*):** Straight-leaf pondweed is a State-listed endangered species which occurs in shallow water habitats of natural and artificial lakes and slow-moving streams. It prefers alkaline water. It is listed as an OBL (i.e., almost always occurs in wetlands) plant by the 2018 National Wetland Plant List: Northcentral and Northeast Region (USACE 2018). New York is the eastern edge of this species' range; it is found in central and eastern New York (NYNHP). In New York, straight-leaf pondweed does not have confirmed associated ecological communities (NYNHP). A known population exists in the vicinity of the Central Study Area (NYNHP). However, straight-leaf pondweed was not found during targeted searches (conducted on August 30, 2017) for this species in the Central Study Area. Therefore, given its habitat requirements, straight-leaf pondweed has the low potential to occur within wetlands and surface waters of the Central Study Area.

Ecological Communities and Vegetation

- **Glomerate Sedge (*Carex aggregata*):** Glomerate sedge is a State-listed endangered plant that occurs in calcareous soils in meadows, thickets, open forests, moist woods, cemeteries, and ditches. It is not listed as a wetland plant by the 2018 National Wetland Plant List: Northcentral and Northeast Region (USACE 2018). In New York, confirmed associated ecological communities associated with glomerate sedge are not documented by NYNHP. Within the Central Study area, thicket, cemetery, and ditch habitats are present. Therefore, this plant has the potential to occur within the Central Study Area.¹³

SIGNIFICANT ECOLOGICAL COMMUNITIES

One significant ecological community, inland salt pond, has been documented by NYNHP (March 26, 2021) as occurring within the vicinity of the Central Study Area. Inland salt pond is a globally rare community identified by NYNHP as having the potential to occur as an artificial salt pond in a roadside park in the vicinity of the Central Study Area. Edinger et al. (2014) define this community as an “aquatic community of a small spring-fed pond in which the water is salty from flowing through salt beds in the aquifer. These salt springs occur in central New York and were once common around Onondaga Lake in Syracuse” (2014). Most of these springs were used for salt production, and thus can be severely degraded. Inland salt ponds are permanently flooded, but water levels in the pond seasonally fluctuate. No inland salt ponds were observed in the Central Study Area. Therefore, this habitat does not occur within the Central Study Area.

INVASIVE SPECIES SUMMARY

As described above, within the Central Study Area invasive species are interspersed with native and naturalized species. However, the majority of species present in the ecological communities of the Central Study Area are non-native and invasive or native pioneer species of low ecological value. Furthermore, the majority of these communities are maintained (e.g., mowing) or altered to such a degree that the physical conformation and biological composition is of little ecological value. Areas that contain concentrations of invasive populations that are less maintained include common reed-dominated wetlands and the banks of Onondaga Creek which contain stands of Japanese knotweed (*Fallopia japonica*). For these reasons, the ecological communities present in the Central Study Area are characterized by disturbance and are considered to be of low ecological value.

Common reed and Japanese knotweed are on the Finger Lakes Partnership for Regional Invasive Species Management (FL-PRISM) Priority Invasive Species list. These species have a NYS score of Very High (FL-PRISM 2020), meaning that these species are considered invasive and are recommended species for regulatory action (Jordan et al. 2008). In addition, Japanese knotweed is a priority invasive species of concern for both the FL-PRISM’s terrestrial and agricultural working groups (FL-PRISM 2014).

¹³ Surveys for this species were conducted during its fruiting period (middle of May through the middle of July [NYNHP]) in 2017 and 2019.

B. I-481 SOUTH STUDY AREA

As shown in **Table J-2-2** and **Figures J-2-4** and **J-2-5**, the ecological communities of the I-481 South Study Area (233.4 acres) consist of some of the terrestrial cultural communities (122.9 acres) described above, including mowed lawn/mowed lawn with trees (45.8 acres) and impervious surfaces (77.1 acres). Impervious surfaces in the I-481 South Study Area include paved road/path, urban structure exterior, and railroad. These terrestrial ecological communities consist of the same plant species and assemblages, as described above under the Central Study Area. This study area also contains successional communities, including successional southern hardwoods, successional old field,¹⁴ and successional shrubland.¹⁵

Similar to the Central Study Area, the successional southern hardwoods community is present in unmaintained portions of the highway right-of-ways occurring between ramps, side roads, and within the interchange areas. In these locations, the species composition and assemblages are similar to those ecological communities described for the Central Study Area. As shown in **Table J-2-2**, the successional southern hardwoods community occupies 57.3 acres (including 6.0 acres of roadcut cliff/slope¹⁶) of the I-481 South Study Area.

¹⁴ Successional old field: a meadow dominated by forbs and grasses that occurs on sites that have been cleared and plowed (for farming or development), and then abandoned. Fields that are mowed at an interval (e.g., less than once per year) that favors the reproduction of characteristic successional old field species are included here. Characteristic herbs include goldenrods (*Solidago altissima*, *S. nemoralis*, *S. rugosa*, *S. juncea*, *S. canadensis*, and *Euthamia graminifolia*), bluegrasses (*Poa pratensis*, *P. compressa*), Timothy-grass (*Phleum pratense*), quackgrass (*Elymus repens*), smooth brome (*Bromus inermis*), sweet vernal grass (*Anthoxanthum odoratum*), orchard grass (*Dactylis glomerata*), common chickweed (*Cerastium arvense*), common evening primrose (*Oenothera biennis*), old-field cinquefoil (*Potentilla simplex*), calico aster (*Symphyotrichum lateriflorum* var. *lateriflorum*), New England aster (*Symphyotrichum novae-angliae*), wild strawberry (*Fragaria virginiana*), Queen-Anne's-lace (*Daucus carota*), ragweed (*Ambrosia artemisiifolia*), hawkweeds (*Hieracium* spp.), dandelion (*Taraxacum officinale*), and ox-tongue (*Picris hieracioides*). Shrubs may be present, but collectively they have less than 50% cover in the community. Characteristic shrubs include gray dogwood (*Cornus racemosa*), silky dogwood (*C. amomum*), arrowwood (*Viburnum dentatum* var. *lucidum*), raspberries (*Rubus* spp.), sumac (*Rhus typhina*, *R. glabra*), and eastern red cedar (*Juniperus virginiana*).

¹⁵ Successional shrubland: a shrubland that occurs on sites that have been cleared (for farming, logging, development, etc.) or otherwise disturbed. This community has at least 50% cover of shrubs. Characteristic shrubs include gray dogwood, eastern red cedar, raspberries (*Rubus* spp.), serviceberries (*Amelanchier* spp.), choke-cherry (*Prunus virginiana*), wild plum (*Prunus americana*), sumac, nanny-berry (*Viburnum lentago*), and arrowwood (*Viburnum dentatum* var. *lucidum*). Non-native invasive shrubs include hawthornes (*Crataegus* spp.), multiflora rose (*Rosa multiflora*), Russian and autumn olive (*Elaeagnus angustifolia*, *E. umbellata*), buckthorns (*Rhamnus cathartica*, *Frangula alnus*), and shrubby honeysuckles (*Lonicera tatarica*, *L. morrowii*, *L. maackii*).

¹⁶ The vegetation of the roadcut cliff/slope ecological community within the I-481 South Study Area consists of successional southern hardwoods. Therefore, roadcut cliff/slope ecological community acreages are counted with the successional southern hardwoods acreages.

Ecological Communities and Vegetation

Table J-2-2

Summary of Terrestrial Ecological Communities within the I-481 South Study Area

Ecological Community	Acreage
Terrestrial Cultural	122.9
Successional Southern Hardwoods*	57.3
Successional Old Field	32.0
Successional Shrubland	20.2
Surface Water	1.0
Total Estimated Acreage	233.4
<p>Note: Ecological community names and descriptions are derived from “Ecological Communities of New York State” (Edinger et al. 2014). Terrestrial Cultural includes paved road/path, mowed lawn, mowed lawn with trees, mowed roadside/pathway, flower herb garden, and railroad communities. * 6.0 acres of roadcut cliff/slope is located within the successional southern hardwoods community.</p> <p>Source: Ecological community observations were made during field investigations in the I-481 South Study Area by AKRF in 2016, 2017, and 2019.</p>	

In the southern portion of this study area, the terrain becomes more variable, with steep rocky slopes within and outside (at the edge) of the I-81 right-of-way. The successional southern hardwoods community is present within the 100-ft study area on both sides of I-81 and within the median. Within this community, there are also roadcut cliff/slope (6.0 acres)¹⁷ features occurring on the side of the highway and within the median. This cliff/slope ranges between approximately 5 and 25 feet in height. In many locations, the dominant tree species in this community are black locust and Norway maple in the canopy with common buckthorn in the shrub layer. While the roadcut cliff/slopes are barren in many locations, small trees (less than 6 inches dbh) and saplings of honey locust, staghorn sumac, and common buckthorn are present at the bases and along the rock ledges.

Along the steep rocky slopes, mainly located outside of the right-of-way, species of the successional southern hardwoods community described above are present. However, this community type also appears to be mixed with remnant native forest consisting of pockets of sugar maple, American basswood (*Tilia americana*), black oak (*Quercus velutina*), white ash (*Fraxinus americana*), pignut hickory (*Carya glabra*), and hophornbeam (*Ostrya virginiana*). These species occur on the rocky slopes and at the top of the roadcut cliff/slope mixed with black locust and Norway maple. The understory in these areas is dominated by common buckthorn in the shrub and subcanopy. While some regeneration of the native forest species is present in the herbaceous and shrub strata, common buckthorn, black locust, and Norway maple are dominant in the understory strata and, in some cases, are the only species regenerating in the lower strata of this ecological community. In summary, within the 100-ft study area, the successional southern hardwoods community is an edge community dominated by non-native species.

Portions of the I-481 South Study Area also consist of a successional old field ecological community. The successional old field community, 32.0 acres, primarily occurs in the median to the north of East Seneca Turnpike (with a small section also located in the median South of East Seneca Turnpike) and the I-81 and I-481 interchange areas. The same species

¹⁷ Roadcut cliff/slope: a sparsely vegetated cliff or steep slope, along a road, that was created by blasting or digging during road construction.

Ecological Communities and Vegetation

composition and assemblages as described above under the Central Study Area are present in this community within the I-481 South Study Area. Portions of this community appear to be maintained by mowing, but not on an annual basis.

In other portions of the I-481 South Study Area, the successional old field community described above has transitioned into a successional shrubland. This community, 20.2 acres, is present along steep slopes and in interchange areas. The same species composition and assemblages as described above under the Central Study Area are present in this community within the I-481 South Study Area.

In the eastern portion of the I-481 South Study Area, 1.0 acres of surface waters are present in a channel that runs parallel to I-481.

THREATENED AND ENDANGERED SPECIES

One Federally- and State-listed threatened plant has been documented by the USFWS IPaC system (March 25, 2021) and four State-listed threatened plants have been documented by the NYNHP (March 26, 2021) as occurring within the vicinity of the I-481 South Study Area. These include the following species:

- **American Hart's-Tongue Fern (*Asplenium scolopendrium* var. *americanum*):** American hart's-tongue fern is a Federally- and State-listed threatened perennial and evergreen fern. This species requires deep shade and grows in cool, moist, rocky, calcareous substrates, usually within small cracks in large rocks. American hart's-tongue fern is found in close association with outcrops of dolomitic limestone and other calcareous rocks. American hart's-tongue fern has been found in cave entrances, coulees, gorges, and sinkholes in mature hardwood forests. Populations of American hart's-tongue fern tend to be scattered due to its habitat requirements. In New York, native populations of this fern are restricted to glacial plunge basins near Syracuse. The upland ecological communities of the study areas are associated with maintained right-of-ways, successional old fields and shrublands, and successional and floodplain forests located along the edges of the right-of-way. All of these ecological communities are associated with disturbance. Although roadside cliff/slope communities are present within the I-481 South Study Area, they are located directly along the highway and are associated with disturbance and are not characterized by cool, moist conditions. American's hart's-tongue was not found during targeted surveys for this species (conducted on April 18, 19, and 20, 2017).¹⁸ Based on the lack of preferred habitat and the results of targeted surveys, the American hart's-tongue fern has the low potential to occur within the I-481 South Study Area.
- **Midland Sedge (*Carex mesochorea*):** As described above, Midland sedge is a State-listed threatened plant found in dry, sandy soils in maritime grasslands, oak woods, mowed cemeteries, railroads, paths, and fields. It is listed as an UPL (i.e., almost always occurs in non-wetlands) plant by the 2018 National Wetland Plant List: Northcentral and

¹⁸ A habitat investigation was conducted in the vicinity of Noise Barrier 9 in the I-481 South Study Area on July 13, 2017. Habitat is not present for American hart's tongue-fern at this location.

Ecological Communities and Vegetation

Northeast Region (USACE 2018). Its range in New York is from Long Island to the Hudson Highlands and central New York. In New York, confirmed ecological communities associated with midland sedge include Hempstead Plains grasslands, maritime grasslands, mowed lawn, rocky summit grasslands, and successional old fields (NYNHP). A known population exists in the vicinity of the I-481 South Study Area (NYNHP). Given its habitat preferences, this species has the potential to occur within the I-481 South Study Area.¹⁹ However, Midland sedge was not found during targeted searches (conducted on June 27 and 28, 2017 and July 10, 11, 12, and 16, 2019) for this species in the I-481 South Study Area.

- **Reflexed Sedge (*Carex retroflexa*):** Reflexed sedge is a State-listed threatened plant that prefers successional areas with open tree canopies. Its habitat includes dry-mesic to mesic deciduous forests, forest openings and edges, and rocky summits and ledges. Reflexed sedge is known to grow along and in paths, forest roads, and abandoned railroad lines. It can grow in poor land or waste places as well. It is listed as an FACU (i.e., usually occurs in non-wetlands) plant by the 2018 National Wetland Plant List: Northcentral and Northeast Region (USACE 2018). In New York, it has been documented throughout the Hudson Valley and in scattered locations within central New York. Confirmed ecological communities associated with reflexed sedge include acidic talus slope woodlands, Appalachian-oak hickory forests, Appalachian oak-pine forests, red cedar rocky summits, rocky summit grasslands, and successional southern hardwoods (NYNHP). As described above, successional southern hardwoods communities occur within the Project Area. Furthermore, a known population of reflexed sedge exists in the vicinity of the I-481 South Study Area (NYNHP 2016). Given its habitat preferences, this species has the potential to occur within the I-481 South Study Area. However, reflexed sedge was not found during targeted searches (conducted on June 27 and 28, 2017 and July 10, 11, 12, and 16, 2019) for this species in the I-481 South Study Area.
- **Marsh Arrowgrass (*Triglochin palustris*):** Marsh arrowgrass is a State-listed threatened plant that occurs in open calcareous mires, soligenous mires, limestone areas, peat bogs, open meadows, narrow coastal strips, and salt marshes (Metcalf et al. 1917, Norton 1933, Thomas et al. 1980, Van Straaten et al. 1982, Wheeler 1980) brackish and salt marshes and flats, river or stream floodplains, marshes, intertidal, subtidal, shores of rivers or lakes (GoBotany 2018). It is listed as an OBL (i.e., almost always occurs in wetlands) plant by the 2018 National Wetland Plant List: Northcentral and Northeast Region (USACE 2018). New York is located at the southern range-limit for this species. A known population exists in the vicinity of the South Study Area (NYNHP). Given its habitat requirements, the potential for marsh arrowgrass to occur within the I-481 South Study Area would be limited to ditches and the narrow channel located in the vicinity of the proposed noise barrier (Noise Barrier 9). However, marsh arrowgrass was not found during targeted searches (conducted on July 10, 11, 12, and 16, 2019) for this species in the I-481 South Study Area.

SIGNIFICANT ECOLOGICAL COMMUNITIES

Four significant ecological communities have been documented by NYNHP (March 26, 2021) as occurring within the vicinity of the I-481 South Study Area. These include the following:

- **Maple-basswood Rich Mesic Forest:** Maple-basswood rich mesic forest is an uncommon community type documented by NYNHP in the vicinity of the I-481 South Study Area. NYNHP identified the potential for a high-quality occurrence of maple-basswood rich mesic forest to occur in a protected natural area outside of the I-481 South Study Area. Edinger et al. (2014) defines the maple-basswood rich mesic forest community as a “species-rich northern hardwood forest that typically occurs on well-drained, moist soils of circumneutral pH.” Herbs common on calcareous bedrock are associated with this community. When bedrock is not exposed, surficial features such as seeps are often present (Edinger et al. 2014, NYNHP). No maple-basswood rich mesic forests were observed in the I-481 South Study Area. Therefore, this habitat does not occur within the I-481 South Study Area.
- **Calcareous Cliff Community:** Calcareous cliff community is an uncommon community type documented by NYNHP near the I-481 South Study Area. NYNHP identified the potential for a high-quality occurrence of a calcareous cliff community to occur in a protected natural area outside of the study area. Edinger et al. (2014) define this community as a “community that occurs on vertical exposures of resistant, calcareous bedrock (such as limestone or dolomite) or consolidated material; these cliffs often include ledges and small areas of talus.” There is minimal soil development in calcareous cliff communities, and they are often sparsely vegetated. Plant species vary depending on exposure and moisture conditions, which can range from shady and moist to sun-exposed and dry. Vegetation is generally found in cracks or crevices within the cliff wall or in shallow pockets of soil accumulated on ledges (Edinger et al. 2014, NYNHP).

Within the I-481 South Study Area, there are small cliffs within the right-of-way. However, the I-81 northbound and southbound lanes have been cut through portions of these cliffs, thereby disturbing their form. For this reason, within the I-481 South Study Area, these cliffs are best characterized as a disturbed roadcut cliff/slope community (as defined by Edinger et al. 2014) with successional southern hardwoods as the predominant vegetation.

- **Calcareous Talus Slope Woodland:** Calcareous talus slope woodlands are an uncommon community documented by NYNHP near the I-481 South Study Area. NYNHP identified the potential for a high-quality occurrence of a calcareous talus slope woodland to occur in a protected natural area outside of the Study Area. Edinger et al. (2014) define this community as an “open or closed canopy community dominated by calciphilic plants that occurs on talus slopes composed of calcareous to circumneutral bedrock such as limestone, dolomite, or amphibolite.” Rocky outcrops are common. The soil in calcareous talus slope woodlands is generally moist and loamy, and the soil usually has a pH greater than 5.5 (Edinger et al. 2014, NYNHP).

As described above, within the I-481 South Study Area, there are a number of small talus slopes within the right-of-way. However, the I-81 northbound and southbound lanes

Ecological Communities and Vegetation

have been cut through portions of these slopes, thereby disturbing their form. For this reason, within the I-481 South Study Area, these cliffs are best described as a disturbed roadcut cliff/slope community (as defined by Edinger et al. 2014) with successional southern hardwoods as the predominant vegetation. Thus, calcareous talus slope woodland communities are not present within the I-481 South Study Area.

- **Limestone Woodland:** Limestone woodlands are an uncommon community documented by NYNHP as occurring near the I-481 South Study Area. NYNHP identified the potential for a high-quality occurrence of a limestone woodland in a protected natural area outside of the study area. Edinger et al. (2014) defines a limestone woodland community as a “conifer or hardwood community that occurs on shallow soils over limestone bedrock, and usually includes numerous small rock outcrops.” Examples of typical bedrock include limestone, dolomite, calcite, marble, amphibolite, and Potsdam sandstone. The tree canopy can either be open or closed, and the canopy is often composed of either one dominant tree species or a few codominant tree species (Edinger et al. 2014, NYNHP). Limestone woodlands were not observed within the I-481 South Study Area. Therefore, this habitat does not occur within the I-481 South Study Area.

INVASIVE SPECIES SUMMARY

As described above, within the I-481 South Study Area invasive species are interspersed with native and naturalized species. However, the majority of species present in the ecological communities of the I-481 South Study Area are non-native and invasive or native pioneer species of low ecological value. Furthermore, the majority of these communities are maintained (e.g., mowing) or altered to such a degree that the physical conformation and biological composition is of little ecological value. Within the I-481 South Study Area invasive species are interspersed with native and naturalized species. Areas that contain concentrations of invasive populations include the common reed and Japanese knotweed dominated terrestrial habitats. Common buckthorn also commonly occurs throughout unmaintained terrestrial habitats but does not form a monoculture in these areas. For these reasons, the ecological communities present in the I-481 South Study Area are characterized by disturbance and are considered to be of low ecological value.

Common reed, Japanese knotweed, and common buckthorn are on the FL-PRISM Priority Invasive Species list (FL-PRISM 2020). These species have a NYS score of Very High (FL-PRISM 2020), meaning that these species are considered invasive and are recommended species for regulatory action (Jordan et al. 2008). In addition, Japanese knotweed is a priority invasive of concern for both the FL-PRISM’s terrestrial and agricultural working groups (FL-PRISM 2014).

C. I-481 EAST STUDY AREA

As shown in **Table J-2-3** and **Figures J-2-6** through **J-2-8**, the majority of the terrestrial ecological community within the I-481 East Study Area (557.8 acres) is characterized as a terrestrial cultural community (296.8 acres), including mowed lawn/mowed lawn with trees (148.6 acres), drainage ditches (3.0 acres) and impervious surfaces (144.6 acres). Impervious surfaces in the I-481 East Study Area include paved road/path, urban and rural structure

Ecological Communities and Vegetation

exteriors, and railroad. Unmowed highway infrastructure drainage ditches are also common within the right-of-way, particularly in the northern section of the I-481 East Study Area. Railroad is also present within the southern portion of this study area. The species composition of the terrestrial cultural community of this study area is similar to the terrestrial cultural community found in the Central Study Area and I-481 South Study Area. In locations where mowing may not be accessible (e.g., steep slopes and drainage ditches) stands of common reed with purple loosestrife (*Lythrum salicaria*) and reed canary grass (*Phalaris arundinacea*) persist.

Table J-2-3
Summary of Terrestrial Ecological Communities within the I-481 East Study Area

Ecological Community	Acreage
Terrestrial Cultural	296.8
Successional Southern Hardwoods	6.6
Successional Old Field	45.4
Successional Shrubland	13.0
Floodplain Forest	86.0
Freshwater Wetland	99.0
Surface Water	11.0
Total Estimated Acreage	557.8
Notes: Ecological community names and descriptions are derived from "Ecological Communities of New York State" (Edinger et al. 2014). Terrestrial Cultural includes paved road/path, mowed lawn, mowed lawn with trees, mowed roadside/pathway, flower herb garden, railroad, and drainage ditch communities.	
Source: Ecological community observations were made during field investigations in the I-481 East Study Area by AKRF in 2016, 2017, 2019, and 2020.	

The floodplain forest community occupies 86.0 acres of the I-481 East Study Area. This community is common along stream banks (11.0 acres, surface waters) and in the vicinity of wetlands (99.0 acres) within this study area. The same species composition and assemblages as described above under the Central Study Area are present in this community within the I-481 East Study Area.

Successional old field habitat and successional shrubland habitat occupies 45.4 acres and 13.0 acres of the I-481 East Study Area, respectively. The same species composition and assemblages as described above under the Central Study Area and I-481 South Study Area are present in these communities within the I-481 East Study Area.

THREATENED AND ENDANGERED SPECIES

One State-listed endangered and three State-listed threatened plants have been documented by the NYNHP (March 26, 2021) as occurring in the vicinity of the I-481 East Study Area. These include the following species:

- Marsh Arrowgrass (*Triglochin palustris*):** Marsh arrowgrass is a State-listed threatened plant that occurs in open calcareous mires, soligenous mires, limestone areas, peat bogs, open meadows, narrow coastal strips, and salt marshes (Metcalf et al. 1917, Norton 1933, Thomas et al. 1980, Van Straaten et al. 1982, Wheeler 1980) brackish and salt marshes and flats, river or stream floodplains, marshes, intertidal, subtidal, shores of rivers or lakes (GoBotany 2018). It is listed as an OBL (i.e., almost always occurs in wetlands) plant by the 2018 National Wetland Plant List: Northcentral and Northeast

Ecological Communities and Vegetation

Region (USACE 2018). New York is located at the southern range-limit for this species. A known population exists in the vicinity of the I-481 East Study Area (NYNHP). Given its habitat requirements, the potential for marsh arrowgrass to occur would be limited to wetlands, ditches, and a narrow channel located in the vicinity of the proposed noise barrier (Noise Barrier 8) within the I-481 East Study Area. Survey work for this species would be conducted in suitable habitats within the limits of disturbance in the I-481 East Study Area during final design of the Project.

- **Thread-leaved Pondweed (*Stuckenia filiformis*):** Thread-leaved pondweed is a State-listed endangered species which occurs in shallow, still or slow-moving water of lakes and rivers. It prefers neutral to alkaline water (NYNHP). It is listed as an OBL (i.e., almost always occurs in wetlands) plant by the 2018 National Wetland Plant List: Northcentral and Northeast Region (USACE 2018). In New York, thread-leaved pondweed has been found in only two alkaline settings, including a small stream and a lake. Confirmed ecological communities associated with thread-leaved pondweed include deepwater river, marsh headwater stream, sand beach, and summer-stratified monomictic lake. These communities are not present within the Project Area. A known population of thread-leaved pondweed exists in the vicinity of the I-481 East Study Area (NYNHP). Given its habitat requirements, thread-leaved pondweed has low potential to occur within wetlands and surface waters of the I-481 East Study Area. Survey work for this species would be conducted in suitable habitats within the limits of disturbance in the I-481 East Study Area during final design of the Project.
- **Blunt-lobed Grape Fern (*Botrychium oneidense*):** Blunt-lobed grape fern is a State-listed threatened species which occurs in highly organic moist soils and sandy soils of mixed deciduous hardwood forests (NYNHP). It is listed as a FAC (i.e., occurs in wetlands and non-wetlands) plant by the 2018 National Wetland Plant List: Northcentral and Northeast Region (USACE 2018). In New York, blunt-lobed grape fern is scattered across the state south of the Adirondacks. Confirmed ecological communities associated with blunt-lobed grape fern include beech-maple mesic forest, floodplain forest, maple-basswood rich mesic forest, red maple-blackgum swamp, red maple-hardwood swamp, rich mesophytic forest, and successional northern hardwoods (NYNHP). Floodplain forest occurs within all four study areas. Furthermore, a known population exists in the vicinity of the I-481 East Study Area. Given its habitat requirements, blunt-lobed grape fern has the potential to occur within the I-481 East Study Area. Survey work for this species would be conducted in suitable habitats within the limits of disturbance in the I-481 East Study Area during final design of the Project.
- **Ohio Goldenrod (*Oligoneuron ohioense*):** Ohio goldenrod is a State-listed threatened plant that grows in rich fens including sloping and marl fens. It occasionally occurs in rich peat swamps, calcareous dripping cliffs, and banks of large rivers in the state. In New York, confirmed ecological communities associated with Ohio goldenrod include marl fen, red maple-tamarack peat swamp, rich graminoid fen, and rich sloping fen (NYNHP). Other habitats non-specific to New York include marshes, wet sand dunes, along rivers, swamps, beaches, and other moist places, calcareous bogs, wet prairies, and sandy shores (NYNHP). It is listed as an OBL (i.e., almost always occur in wetlands) plant by the 2018 National Wetland Plant List: Northcentral and Northeast Region (USACE 2018). A

Ecological Communities and Vegetation

known population exists in the vicinity of the I-481 East Study Area (NYNHP). However, none of the confirmed ecological communities listed above is present within the Project Area. Given its habitat requirements, Ohio goldenrod has a low potential to occur within the wetlands and surface waters of the I-481 East Study Area, and it was not found during targeted surveys (conducted on August 28, 29, and 30, 2017).

SIGNIFICANT ECOLOGICAL COMMUNITIES

Significant ecological communities have not been documented by NYNHP (March 26, 2021) as occurring within the vicinity of the I-481 East Study Area.

INVASIVE SPECIES SUMMARY

As described above, within the I-481 East Study Area invasive species are interspersed with native and naturalized species. However, the majority of species present in the ecological communities of the I-481 East Study Area are non-native and invasive or native pioneer species of low ecological value. Furthermore, the majority of these communities are maintained (e.g., mowing) or altered to such a degree that the physical conformation and biological composition is of little ecological value. Within the I-481 East Study Area invasive species are interspersed with native and naturalized species. Areas that contain concentrations of invasive populations include areas with common reed dominated wetlands. Common buckthorn also commonly occurs throughout unmaintained terrestrial habitats but does not form a monoculture in these areas. For these reasons, the ecological communities present in the I-481 East Study Area are characterized by disturbance and are considered to be of low ecological value.

Common reed and common buckthorn are on the FL-PRISM Priority Invasive Species list (FL-PRISM 2020). Common reed and common buckthorn are on the FL-PRISM Priority Invasive Species list (FL-PRISM 2020). These species have a NYS score of Very High (FL-PRISM 2020), meaning that these species are considered invasive and are recommended species for regulatory action (Jordan et al. 2008). In addition, Japanese knotweed is a priority invasive of concern for both the FL-PRISM's terrestrial and agricultural working groups (FL-PRISM 2014).

D. I-481 NORTH STUDY AREA

The ecological communities of the I-481 North Study Area (343.8 acres) are similar to those described above under the I-481 East Study Area. As indicated in **Table J-2-4** and shown in **Figures J-2-9** and **J-2-5**, terrestrial cultural communities are dominant, occupying 207.4 acres. The study area primarily consists of the mowed lawn/mowed lawn with trees (98.3 acres) ecological community described above. Areas that are mowed less frequently have a number of herbaceous herbs and grasses that are similar to those found in the successional old field community (24.9 acres) described above for the I-481 South Study Area. In areas where mower access is limited, common reed patches persist, particularly along drainage ditches (2.8 acres) and steep slopes.

Ecological Communities and Vegetation

Table J-2-4

Summary of Terrestrial Ecological Communities within the I-481 North Study Area

Ecological Community	Acreage
Terrestrial Cultural	207.4
Successional Southern Hardwoods	15.8
Successional Old Field	24.9
Successional Shrubland	13.9
Floodplain Forest	45.7
Freshwater Wetland	31.8
Surface Water	4.3
Total Estimated Acreage	343.8
Notes: Ecological community names and descriptions are derived from "Ecological Communities of New York State" (Edinger et al. 2014). Terrestrial Cultural includes paved road/path, mowed lawn, mowed lawn with trees, mowed roadside/pathway, flower herb garden, and drainage ditch communities.	
Sources: Ecological community observations were made during field investigations in the I-481 North Study Area by AKRF in 2016, 2017, 2019, 2020, and 2021.	

Within the right-of-way, particularly along steep slopes located behind noise barrier walls along I-481, successional shrubland is present (estimated at 13.9 acres). The species composition of this community type is similar to that found in the successional shrubland communities of the Central Study Area and I-481 South Study Area, in that common buckthorn is dominant and with gray dogwood also commonly occurring.

Within the 100-ft study area beyond the right-of-way (private property), successional southern hardwoods forest (15.8 acres), floodplain forest (45.7 acres), successional old field (24.9 acres), freshwater wetland (31.8 acres), and surface water (4.3 acres) ecological communities are also present. The species composition in these communities is similar to those described in the previous study areas.

THREATENED AND ENDANGERED SPECIES

Four State-listed endangered and one State-listed threatened plants have been documented by the NYNHP (March 26, 2021 and May 21, 2021²⁰) as occurring in the vicinity of the I-481 North Study Area. These include the following species:

- Troublesome Sedge (*Carex molesta*):** Troublesome sedge is a State-listed threatened plant that prefers open habitats associated with dry fields, wet fields, and native grasslands. This species can often have a somewhat weedy habit where it occurs in fields, roadsides, bottomlands, open woods, on dry to wet, often heavy, calcareous soils. Less frequently it occurs on open edges of rivers, woodlands, talus slopes, and in waste areas. It is listed as a FAC (i.e., occurs in wetlands and non-wetlands) plant by the 2018 National Wetland Plant List: Northcentral and Northeast Region (USACE 2018). In New York, confirmed ecological communities include alvar grassland, alvar pavement grassland, inland calcareous lake shore, oak openings, and successional old field (NYNHP). A known population of troublesome sedge exists in the vicinity of the I-481 North Study Area (NYNHP). Given its habitat requirements, troublesome sedge has the potential to

²⁰ The May 2021 NYNHP database review was conducted for the area associated with Noise Barrier 16A&B, only.

Ecological Communities and Vegetation

occur within the I-481 North Study Area. However, it was not found during targeted surveys (conducted on August 30, 31, and September 1, 2017).

- **Southern Twayblade (*Neottia bifolia*):** The southern twayblade is a State-listed endangered orchid. In New York, it is found along the Coastal Plain of Long Island and over a widely scattered area, ranging from the Adirondacks into central and western New York (NYNHP). It is listed as a FACW (i.e., usually occurs in wetlands) plant by the 2018 National Wetland Plant List: Northcentral and Northeast Region (USACE 2018). Its habitat includes peat moss areas such as bogs, poor fens, and wet woods (NYNHP). It is usually associated with cinnamon fern (*Osmunda cinnamomea*) and royal fern (*O. regalis*). Confirmed ecological communities associated with southern twayblade include black spruce-tamarack bog, coastal plain poor fen, dwarf shrub bog, highbush blueberry bog thicket, inland poor fen, red maple-blackgum swamp, red maple-hardwood swamp, red maple-tamarack peat swamp (NYNHP). These communities are not present within the Project Area. A known population exists in the vicinity of the I-481 North Study Area (NYNHP). Given its habitat requirements, southern twayblade has a low potential to occur in the I-481 North Study Area. However, survey work for this species would be conducted in the I-481 North Study Area during final design of the Project. Southern twayblade is not expected to occur in the Central, I-481 South, and I-481 East Study Areas.
- **Large Twayblade (*Liparis lilifolia*):** The large twayblade is a State-listed endangered perennial orchid. In New York, it is found in both upland and wetland habitats scattered throughout the state, including red maple-dominated swamps, dry woods, wooded talus slopes, and along railroad grades at the edge of swamps (NYNHP). It is listed as an FACU (i.e., usually occurs in non-wetlands) plant by the 2018 National Wetland Plant List: Northcentral and Northeast Region (USACE 2018). It is thought to prefer areas that are recovering from disturbance. Confirmed ecological communities associated with large twayblade include limestone woodland, red cedar rocky summit, red maple-hardwood swamp, and shrub swamp (NYNHP). These communities are not present within the Project Area. A known population exists in the vicinity of the I-481 North Study Area (NYNHP). Given its habitat requirements, large twayblade has the potential to occur in the I-481 North Study Area. Survey work for this species would be conducted in suitable habitats within the limits of disturbance in the I-481 North Study Area during final design of the Project. Large twayblade is not expected to occur in the Central, I-481 South, and I-481 East Study Areas.
- **Red Pigweed (*Oxybasis rubra var. rubra*):** Red pigweed is a State-listed threatened plant that occurs in intertidal swales, stony beaches, saltmarshes, waste places, brackish soils, riverbanks, and ship ballasts. In New York, red pigweed is primarily limited to the saline areas of Long Island and lowest part of the Hudson Valley, although there are historic records of it occurring in salt ponds of Onondaga County. It is listed as an OBL (i.e., almost always occur in wetlands) plant by the 2018 National Wetland Plant List: Northcentral and Northeast Region (USACE 2018). Confirmed ecological communities include brackish interdunal swales, coastal plain pond shore and salt ponds, dredge spoil wetlands, marine dredge spoil shore and intertidal gravel/sand beaches, and maritime freshwater interdunal swales. These communities are not present within the Project Area.

Ecological Communities and Vegetation

Furthermore, the last NYNHP record of this species is from 1940 in the vicinity of the I-481 North Study Area. Given its habitat requirements, red pigweed has a low potential to occur in the I-481 North Study Area. However, survey work for this species would be conducted in the I-481 North Study Area during final design to confirm its presence or absence. Red pigweed is not expected to occur in the Central, I-481 South, and I-481 East Study Areas.

SIGNIFICANT ECOLOGICAL COMMUNITIES

One significant ecological community, black spruce-tamarack bog, has been documented by the NYNHP (March 26, 2021) as having the potential to occur within the I-481 North Study Area. Black spruce-tamarack bog is a globally rare community identified by NYNHP as having the potential to occur within the I-481 North Study Area. Edinger et al. (2014) define this community as a “conifer forest or woodland that occurs on acidic peatlands in cool, poorly drained depressions.” The characteristic trees are black spruce (*Picea mariana*) and tamarack (*Larix laricina*); in any one stand, either tree may be dominant or codominant. Canopy cover is quite variable, ranging from open canopy woodlands with as little as 20 percent cover of evenly spaced canopy trees to closed canopy forests with 80 to 90 percent cover. No black spruce-tamarack bogs were observed in the vicinity of the I-481 North Study Area during field inspections.

INVASIVE SPECIES SUMMARY

As described above, within the I-481 North Study Area invasive species are interspersed with native and naturalized species. However, the majority of species present in the ecological communities of the I-481 North Study Area are non-native and invasive or native pioneer species of low ecological value. Furthermore, the majority of these communities are maintained (e.g., mowing) or altered to such a degree that the physical conformation and biological composition is of little ecological value. Floodplain forest, successional southern hardwoods, successional old field, and successional shrubland communities within this study area represents edge habitat and in some cases is characterized by invasive species (e.g., common buckthorn and bush honeysuckle). While these communities may provide limited habitat, better representations of these communities are present within the region and state.

Areas that contain concentrations of invasive populations include areas with common reed dominated wetlands. Common buckthorn also commonly occurs throughout unmaintained terrestrial habitats but does not form a monoculture in these areas. For these reasons, the ecological communities present in the I-481 North Study Area are characterized by disturbance and are considered to be of low ecological value.

Common reed and common buckthorn are on the FL-PRISM Priority Invasive Species list (FL-PRISM 2020). These species have a NYS score of Very High (FL-PRISM 2020), meaning that these species are considered invasive and are recommended species for regulatory action (Jordan et al. 2008). In addition, Japanese knotweed is a priority invasive of concern for both the FL-PRISM’s terrestrial and agricultural working groups (FL-PRISM 2014).

Ecological Communities and Vegetation

Table J-2-5
Plant Species of the I-81 Viaduct Project

Scientific Name	Common Name
Ferns	
<i>Dennstaedtia punctilobula</i>	Hay-scented fern
<i>Onoclea sensibilis</i>	Sensitive fern
<i>Osmundastrum cinnamomeum</i>	Cinnamon fern
Grasses, Sedges, and Rushes	
<i>Anthoxanthum odoratum</i>	Sweet vernal grass
<i>Bromus tectorum</i>	Cheatgrass
<i>Carex blanda</i>	Common Wood sedge
<i>Carex crinita</i>	Fringed sedge
<i>Carex hystericina</i>	Bottlebrush sedge
<i>Carex pensylvanica</i>	Pennsylvania sedge
<i>Carex stricta</i>	Tussock sedge
<i>Carex vulpinoidea</i>	Fox sedge
<i>Dactylis</i> sp.	Orchard grass
<i>Danthonia spicata</i>	Poverty oatgrass
<i>Eleocharis palustris</i>	Common Spikerush
<i>Elymus elymoides</i>	Squirreltail
<i>Elymus repens</i>	Quackgrass
<i>Festuca rubra</i>	Red fescue
<i>Juncus canadensis</i>	Canada rush
<i>Juncus effuses</i>	Soft rush
<i>Juncus militaris</i>	Bayonet rush
<i>Juncus tenuis</i>	Path rush
<i>Lolium</i> sp.	Rye grass
<i>Panicum dichotomiflorum</i>	Fall panicum
<i>Panicum virgatum</i>	Switchgrass
<i>Phalaris arundinacea</i>	Reed canary grass
<i>Phleum pretense</i>	Timothy-grass
<i>Phragmites australis</i>	Common reed
<i>Poa pratensis</i>	Kentucky bluegrass
<i>Scirpus cyperinus</i>	Woolgrass
<i>Schoenoplectus pungens</i>	Common three square
<i>Scirpus americanus</i>	Three square sedge
<i>Scirpus microcarpus</i>	Large-fruited bulrush
<i>Sisyrinchium</i> sp.	Blue-eyed grass
<i>Typha angustifolia</i>	Narrowleaf cattail
<i>Typha latifolia</i>	Common cattail
Forbs	
<i>Achillea millefolium</i>	Yarrow
<i>Ageratina altissima</i>	White Snakeroot
<i>Alisma subcordatum</i>	Small Water Plantain
<i>Alliaria petiolate</i>	Garlic mustard
<i>Amaranthus</i> sp.	Pigweed
<i>Anagallis arvensis</i>	Pimpernel
<i>Apocynum cannabinum</i>	Indian hemp
<i>Arctium minus</i>	Common burdock
<i>Artemisia biennis</i>	Biennial wormwood
<i>Artemisia vulgaris</i>	Common mugwort
<i>Asclepias syriaca</i>	Common milkweed

Ecological Communities and Vegetation

Table J-2-5 (cont'd)
Plant Species of the I-81 Viaduct Project

Scientific Name	Common Name
Forbs, cont'd	
<i>Asclepias tuberosa</i>	Butterfly milkweed
<i>Asparagus officinalis</i>	Asparagus
<i>Aster novae-angliae</i>	New England aster
<i>Aster novi-belgii</i>	New York aster
<i>Bellis perennis</i>	Common daisy
<i>Bidens frondosa</i>	Common Beggar-ticks
<i>Brassica rapa</i>	Field mustard
<i>Calystegia sepium</i>	Hedge bindweed
<i>Carum carvi</i>	Caraway
<i>Centaurea jacea</i>	Brown knapweed
<i>Centaurea maculosa</i>	Spotted knapweed
<i>Centaureum umbellatum</i>	Centaury
<i>Chenopodium album</i>	Lamb's quarters
<i>Cichorium intybus</i>	Chicory
<i>Circaea lutetiana</i>	Enchanter's-nightshade
<i>Cirsium arvense</i>	Canada thistle
<i>Cirsium vulgare</i>	Bull thistle
<i>Dianthus armeria</i>	Deptford pink
<i>Dipsacus sylvestris</i>	Teasel
<i>Dipsacus laciniatus</i>	Cutleaf teasel
<i>Echium vulgare</i>	Viper's bugloss
<i>Equisetum arvense</i>	Field horsetail
<i>Erigeron annuus</i>	Annual fleabane
<i>Erigeron canadensis</i>	Horseweed
<i>Eupatorium perfoliatum</i>	Boneset
<i>Eutrochium maculatum</i>	Spotted Joe-pye weed
<i>Euphorbia cyparissias</i>	Cypress spurge
<i>Euthamia graminifolia</i>	Slender goldenrod
<i>Fallopia japonica</i>	Japanese knotweed
<i>Galinsoga ciliate</i>	Galinsoga
<i>Galium aparine</i>	Cleavers
<i>Galium asprellum</i>	Rough bedstraw
<i>Galium sp.</i>	Bedstraw
<i>Geum canadensis</i>	White avens
<i>Geum laciniatum</i>	Rough avens
<i>Geranium sp.</i>	Geranium
<i>Glechoma hederacea</i>	Ground ivy
<i>Heimerocallis fulva</i>	Day lily
<i>Heracleum maximum</i>	Cow parsnip
<i>Hesperis matronalis</i>	Dames rocket
<i>Hieracium spp.</i>	Hawkweed
<i>Hypericum perforatum</i>	St John's wort
<i>Hypochaeris radicata</i>	Cat's ear
<i>Impatiens capensis</i>	Jewelweed
<i>Ipomoea sp.</i>	Morning glory
<i>Iris sp.</i>	Iris sp.
<i>Lactuca serriola</i>	Prickly lettuce
<i>Lamium amplexicaule</i>	Henbit
<i>Lathyrus latifolius</i>	Everlasting pea
<i>Lemna minor</i>	Duckweed
<i>Lepidium campestre</i>	Field peppergrass

Ecological Communities and Vegetation

Table J-2-5 (cont'd)
Plant Species of the I-81 Viaduct Project

Scientific Name	Common Name
Forbs, cont'd	
<i>Leucanthemum vulgare</i>	Oxeye daisy
<i>Linaria vulgaris</i>	Butter-and-eggs
<i>Lotus corniculatus</i>	Birds-foot trefoil
<i>Ludwigia alternifolia</i>	Seedbox
<i>Lychnis alba</i>	White campion
<i>Lythrum salicaria</i>	Purple loosestrife
<i>Matricaria discoidea</i>	Wild chamomile
<i>Medicago lupulina</i>	Black medic
<i>Melilotus alba</i>	Sweet white clover
<i>Melilotus officinalis</i>	Yellow sweet clover
<i>Myosotis scorpioides</i>	Forget-me-not
<i>Nasturtium officinale</i>	Watercress
<i>Nepeta cataria</i>	Catnip
<i>Oenothera biennis</i>	Common evening primrose
<i>Oenothera laciniosa</i>	Cutleaf evening primrose
<i>Pastinaca sativa</i>	Wild parsnip
<i>Penstemon digitalis</i>	Foxglove beardtongue
<i>Persicaria maculosa</i>	Lady's thumb
<i>Phytolacca americana</i>	Pokeweed
<i>Plantago lanceolata</i>	English plantain
<i>Plantago major</i>	European plantain
<i>Portulaca oleracea</i>	Purslane
<i>Potentilla recta</i>	Rough-fruited cinquefoil
<i>Potentilla simplex</i>	Common cinquefoil
<i>Ranunculus</i> sp.	Buttercup
<i>Rubus</i> sp.	Raspberry
<i>Rudbeckia hirta</i>	Black-eyed Susan
<i>Rumex crispus</i>	Curly dock
<i>Sagittaria latifolia</i>	Common arrowhead
<i>Securigera varia</i>	Crown vetch
<i>Silene vulgaris</i>	Bladder campion
<i>Solanum dulcamara</i>	Bittersweet nightshade
<i>Solanum nigrum</i>	Black nightshade
<i>Solidago canadensis</i>	Canada goldenrod
<i>Solidago rugosa</i>	Rough-stemmed goldenrod
<i>Solidago sempervirens</i>	Seaside goldenrod
<i>Sonchus arvensis</i>	Field sow thistle
<i>Sparganium</i> sp.	Bur-reed
<i>Symphyotrichum novae-angliae</i>	New England aster
<i>Symphyotrichum pilosum</i>	Frost aster
<i>Symphyotrichum racemosum</i>	White aster
<i>Symphytum officinale</i>	Common comfrey
<i>Taraxacum officinale</i>	Common dandelion
<i>Teucrium canadense</i>	American germander
<i>Thlaspi arvense</i>	Field pennycress
<i>Tovara virginiana</i>	Jumpseed
<i>Trifolium hybridum</i>	Alsike clover
<i>Trifolium pretense</i>	Red clover
<i>Trillium</i> sp.	Trillium
<i>Verbascum Thapsus</i>	Common mullein
<i>Verbena stricta</i>	Hoary vervain

Ecological Communities and Vegetation

Table J-2-5 (cont'd)
Plant Species of the I-81 Viaduct Project

Scientific Name	Common Name
Forbs, cont'd	
<i>Vernonia noveboracensis</i>	New York ironweed
<i>Viola</i> sp.	Violet sp.
<i>Xanthium chinense</i>	Common cocklebur
Shrubs	
<i>Cephalanthus occidentalis</i>	Buttonbush
<i>Cornus amomum</i>	Silky dogwood
<i>Cornus racemose</i>	Gray dogwood
<i>Cornus sericea</i>	Red oiser dogwood
<i>Elaeagnus umbellate</i>	Autumn olive
<i>Hamamelis virginiana</i>	Witchhazel
<i>Hibiscus syriacus</i>	Rose-of-Sharon
<i>Juniperus horizontalis</i>	Creeping juniper
<i>Ligustrum vulgare</i>	Privet
<i>Lonicera tatarica</i>	Tartarian honeysuckle
<i>Physocarpus opulifolius</i>	Ninebark
<i>Rhamnus cathartica</i>	Common buckthorn
<i>Rhus typhina</i>	Staghorn sumac
<i>Rosa multiflora</i>	Multiflora rose
<i>Rubus canadensis</i>	Smooth blackberry
<i>Samucus canadensis</i>	Elderberry
<i>Viburnum recognitum</i>	Arrowwood
Trees	
<i>Acer ginnala</i>	Amur maple
<i>Acer negundo</i>	Boxelder
<i>Acer platanoides</i>	Norway maple
<i>Acer pseudoplatanus</i>	Sycamore maple
<i>Acer saccharinum</i>	Silver maple
<i>Acer saccharum</i>	Sugar maple
<i>Acer platanoides</i> 'Crimson King'	Norway maple 'Crimson King'
<i>Ailanthus altissima</i>	Tree of heaven
<i>Betula nigra</i>	River birch
<i>Betula</i> sp.	Birch
<i>Betula papyrifera</i>	Paper birch
<i>Carya cordiformis</i>	Bitternut hickory
<i>Carya glabra</i>	Pignut hickory
<i>Carya</i> sp.	Hickory
<i>Catalpa</i> sp.	Catalpa
<i>Catalpa speciose</i>	Northern catalpa
<i>Celtis occidentalis</i>	Hackberry
<i>Crataegus phaenopyrum</i>	Washington hawthorn
<i>Fraxinus americana</i>	White ash
<i>Fraxinus pennsylvanica</i>	Green ash
<i>Ginkgo biloba</i>	Ginkgo
<i>Gleditsia triacanthos</i>	Honey locust
<i>Juglans nigra</i>	Black walnut
<i>Juniperus virginiana</i>	Eastern red cedar
<i>Malus</i> sp.	Crabapple
<i>Picea abies</i>	Norway spruce
<i>Picea pungens</i>	Blue spruce
<i>Pinus strobus</i>	Eastern white pine
<i>Pinus sylvestris</i>	Scots pine

Ecological Communities and Vegetation

Table J-2-5 (cont'd)
Plant Species of the I-81 Viaduct Project

Scientific Name	Common Name
Trees, cont'd	
<i>Pinus echinata</i>	Short-leaf pine
<i>Platanus × acerifolia</i>	London planetree
<i>Populus</i> sp.	Poplar
<i>Populus deltoides</i>	Eastern cottonwood
<i>Populus tremuloides</i>	Quaking aspen
<i>Prunus serotina</i>	Black cherry
<i>Prunus</i> sp.	Plum
<i>Pyrus calleryana</i>	Callery pear
<i>Quercus rubra</i>	Red oak
<i>Quercus montana</i>	Chestnut oak
<i>Quercus velutina</i>	Black oak
<i>Rhus typhina</i>	Staghorn sumac
<i>Robinia pseudoacacia</i>	Black locust
<i>Salix babylonica</i>	Weeping willow
<i>Salix</i> sp.	Willow
<i>Tilia americana</i>	American basswood
<i>Tilia</i> sp.	Linden
<i>Tilia tomentosa</i>	Silver linden
<i>Ulmus rubra</i>	Slippery elm
Woody Vines	
<i>Parthenocissus quinquefolia</i>	Virginia creeper
<i>Parthenocissus tricuspidata</i>	Boston ivy
<i>Toxicodendron radicans</i>	Poison ivy
<i>Vitis</i> sp.	Grape
<i>Vitis labrusca</i>	Fox grape
Notes: The Project Area includes four study areas: Central, I-481 South, I-481 East, and I-481 North Study Areas. Sources: Ecological communities field inspections conducted in 2016, 2017, 2019, 2020, and 2021 by AKRF.	

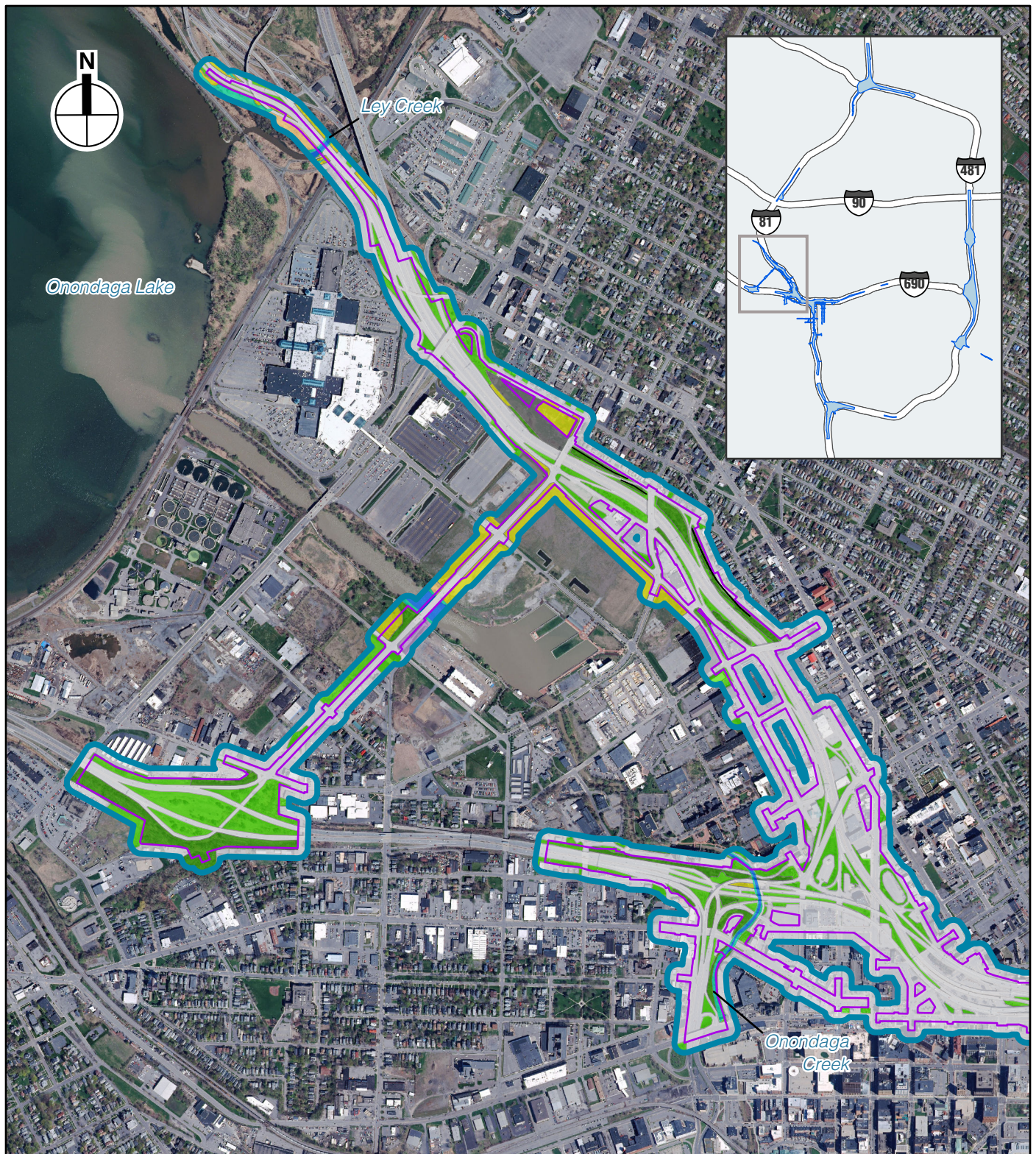
E. REFERENCES

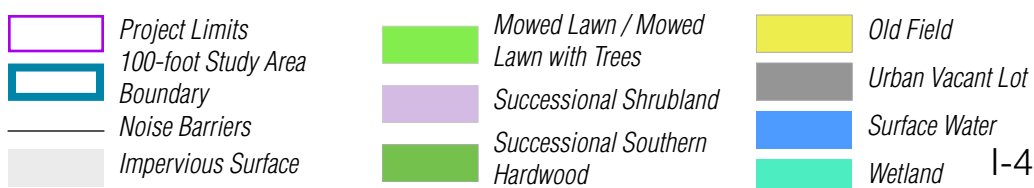
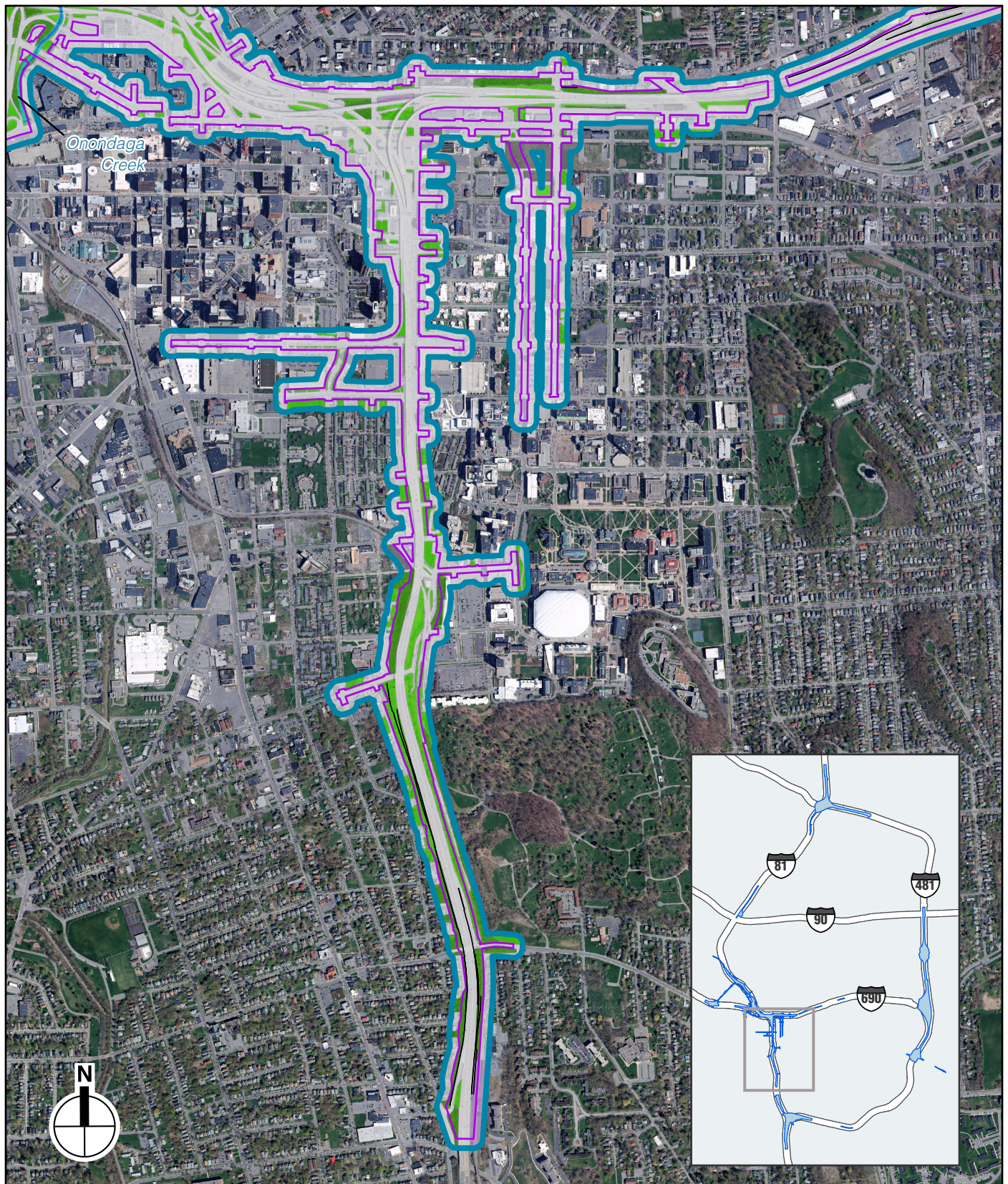
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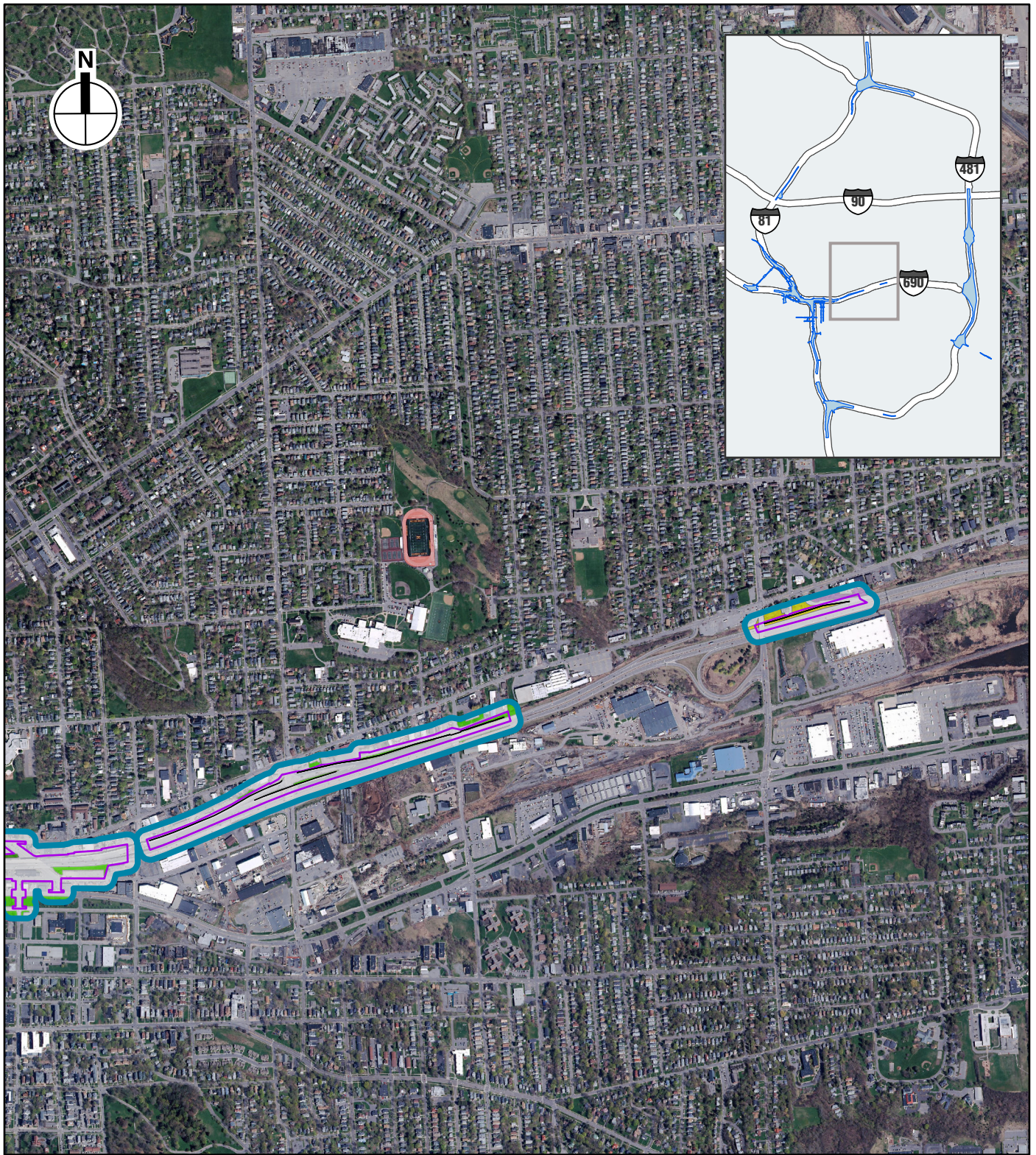
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







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I-481 Central Study Area
Ecological Communities

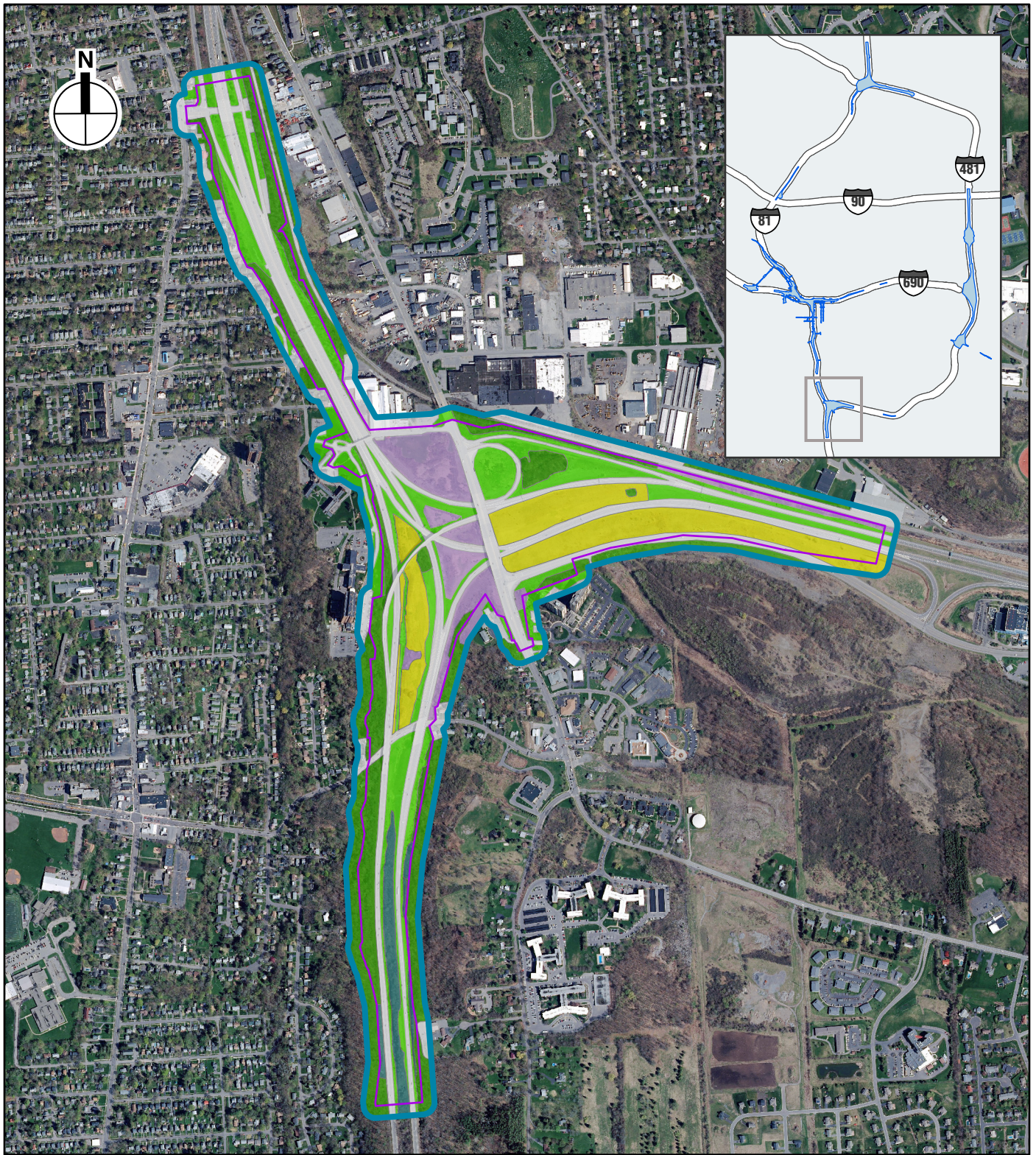


 *Project Limits*
 *100-foot Study Area Boundary*
 *Noise Barriers*

 *Impervious Surface*
 *Mowed Lawn / Mowed Lawn with Trees*
 *Successional Shrubland*

 *Successional Southern Hardwood*
 *Old Field*

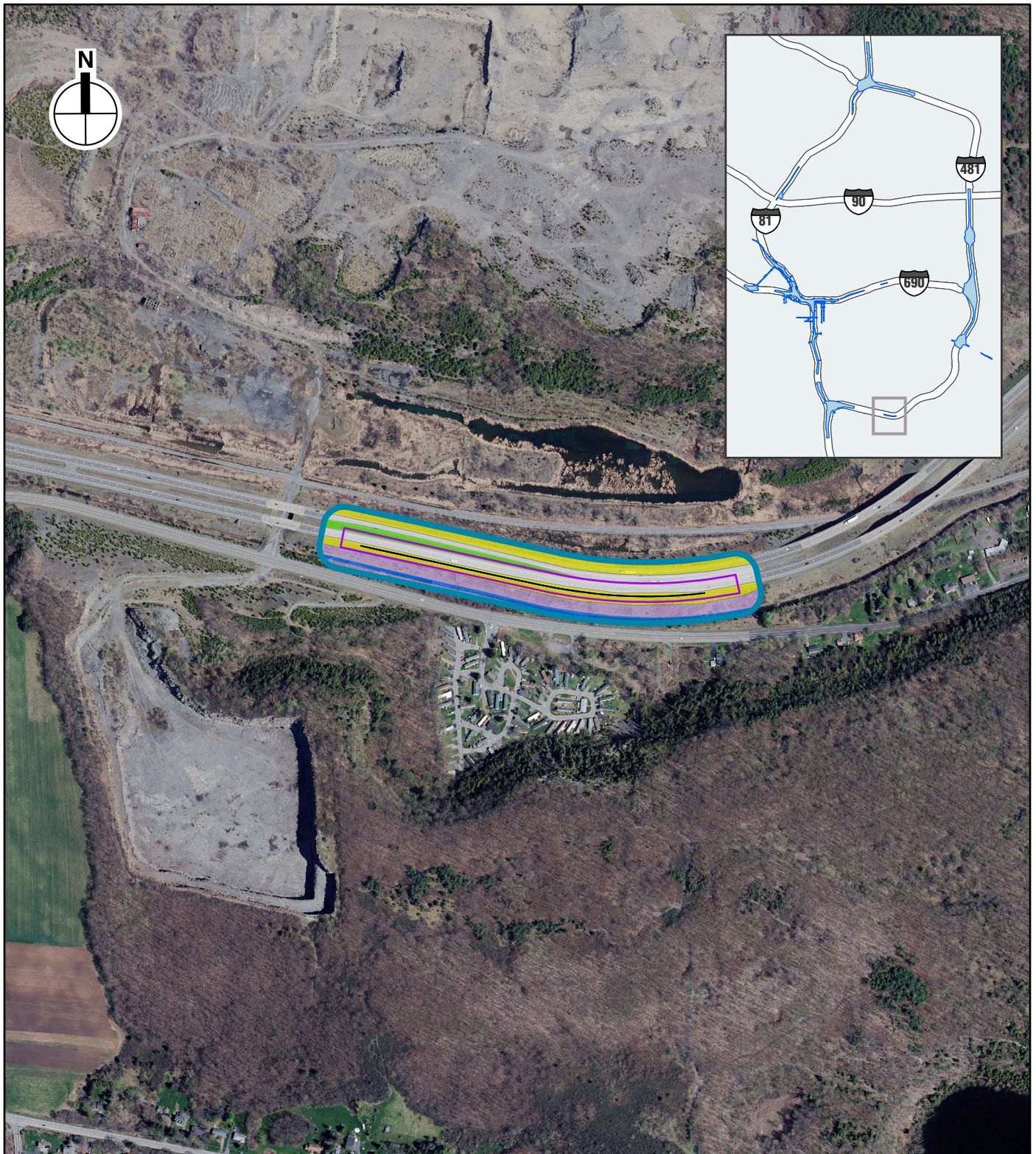
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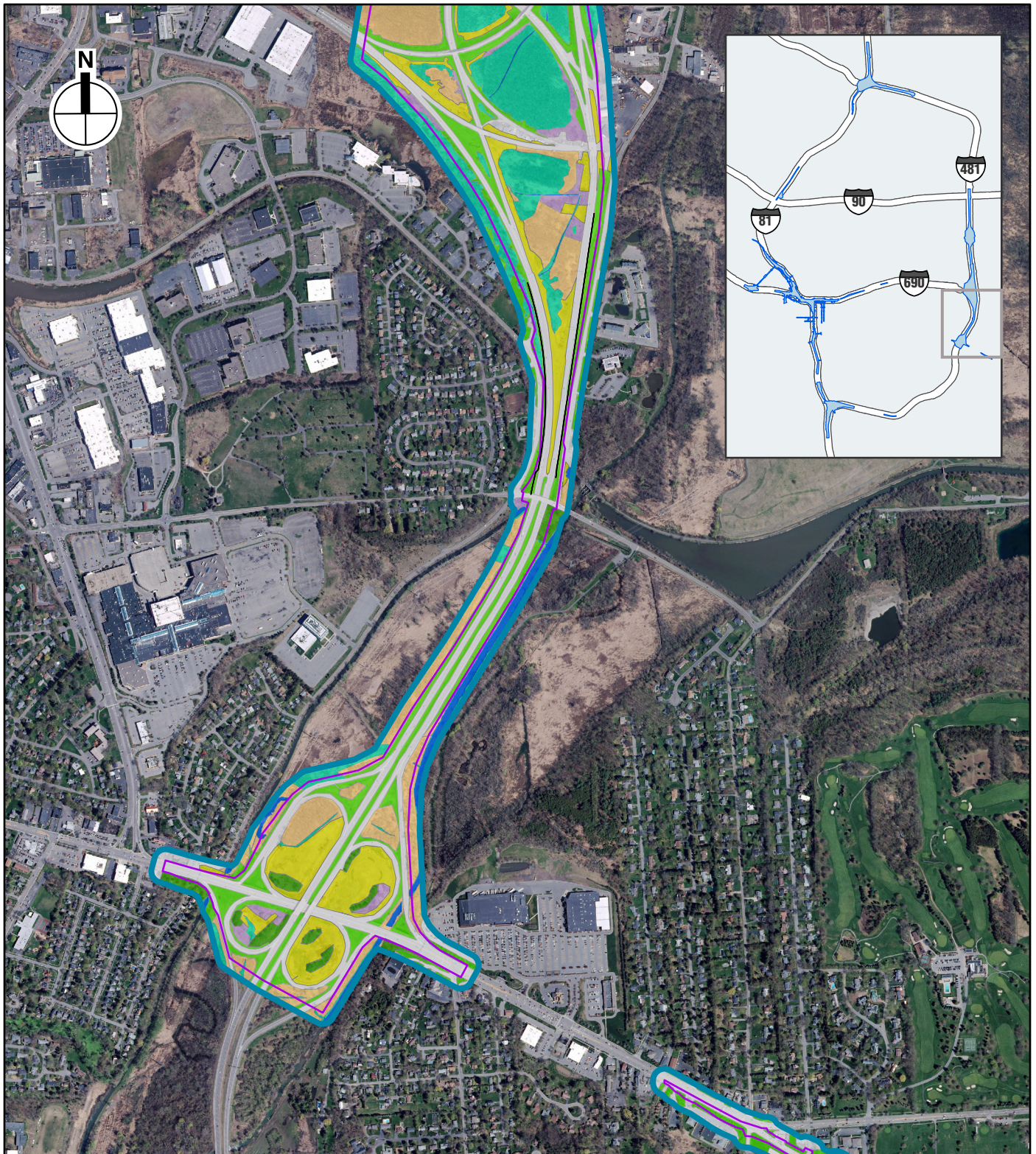


- Project Limits
- 100-foot Study Area Boundary
- Noise Barriers

- Impervious Surface
- Mowed Lawn / Mowed Lawn with Trees
- Successional Shrubland

- Successional Southern Hardwood
- Old Field
- Roadcut Cliff/Slope





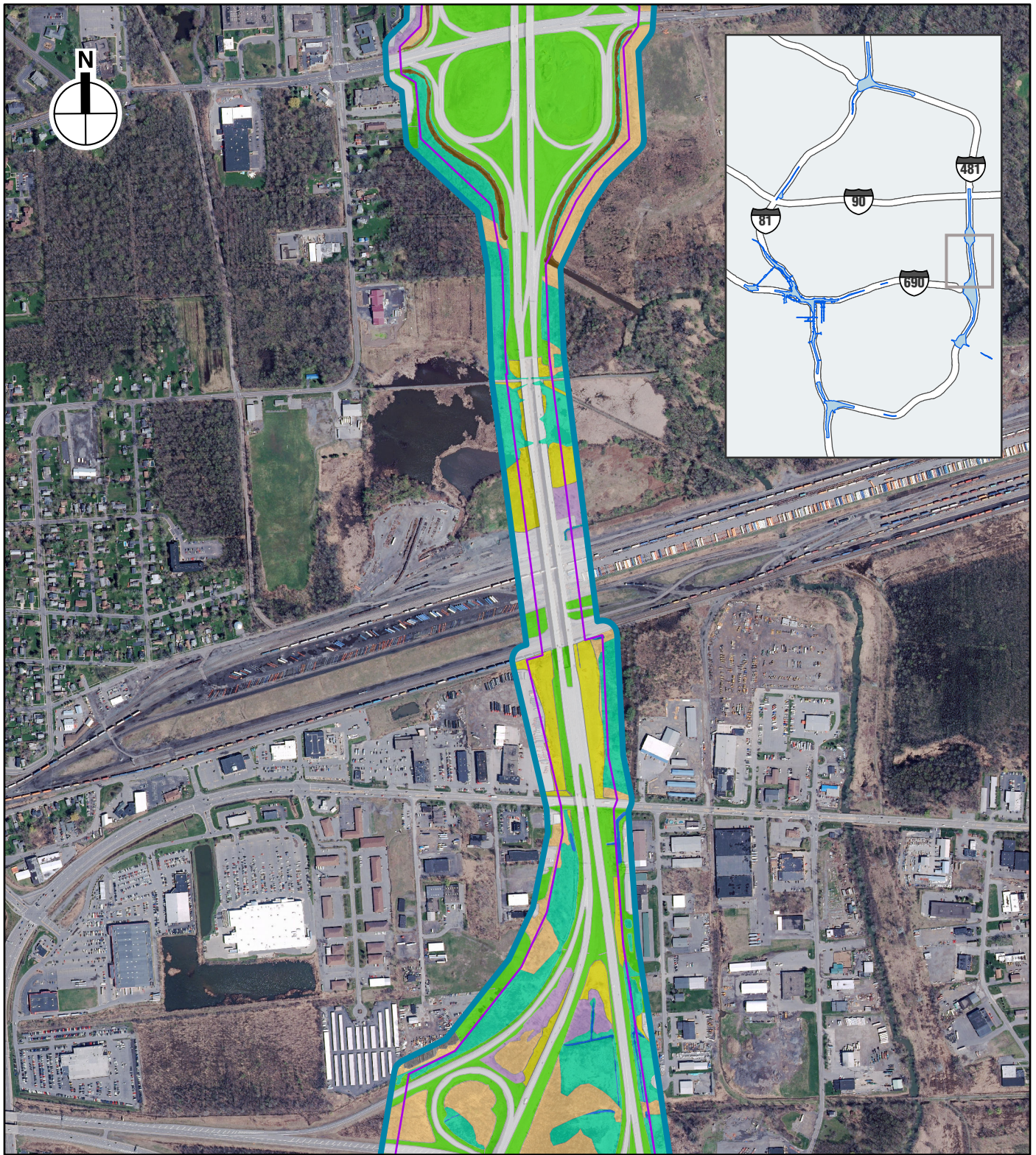
- Project Limits
- 100-foot Study Area Boundary
- Noise Barriers
- Floodplain Forest

- Impervious Surface
- Mowed Lawn / Mowed Lawn with Trees
- Successional Shrubland

- Successional Southern Hardwood
- Old Field
- Surface Water
- Wetland

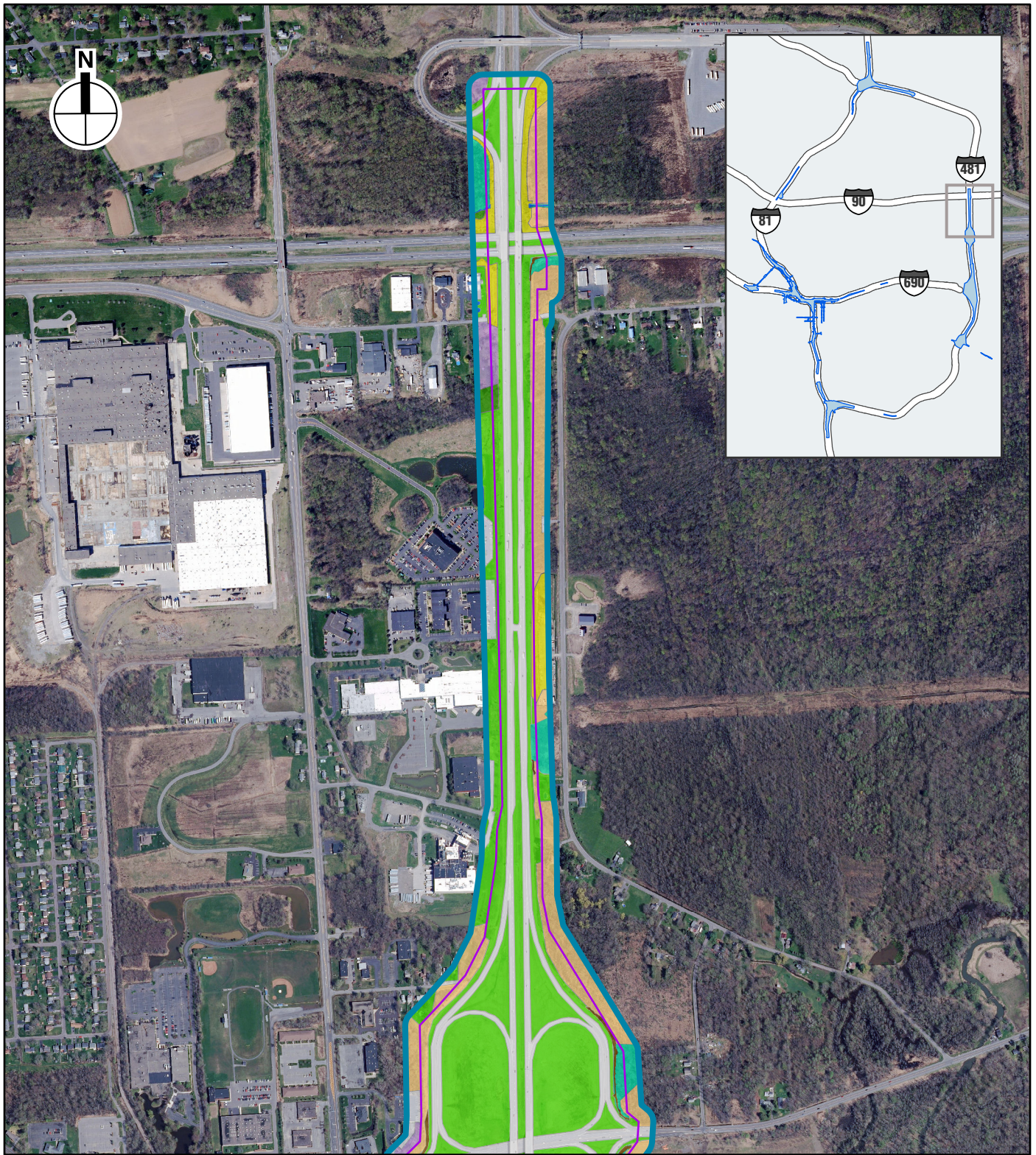
I-81 Viaduct Project

I-481 East Study Area
Ecological Communities
Figure J-2-6



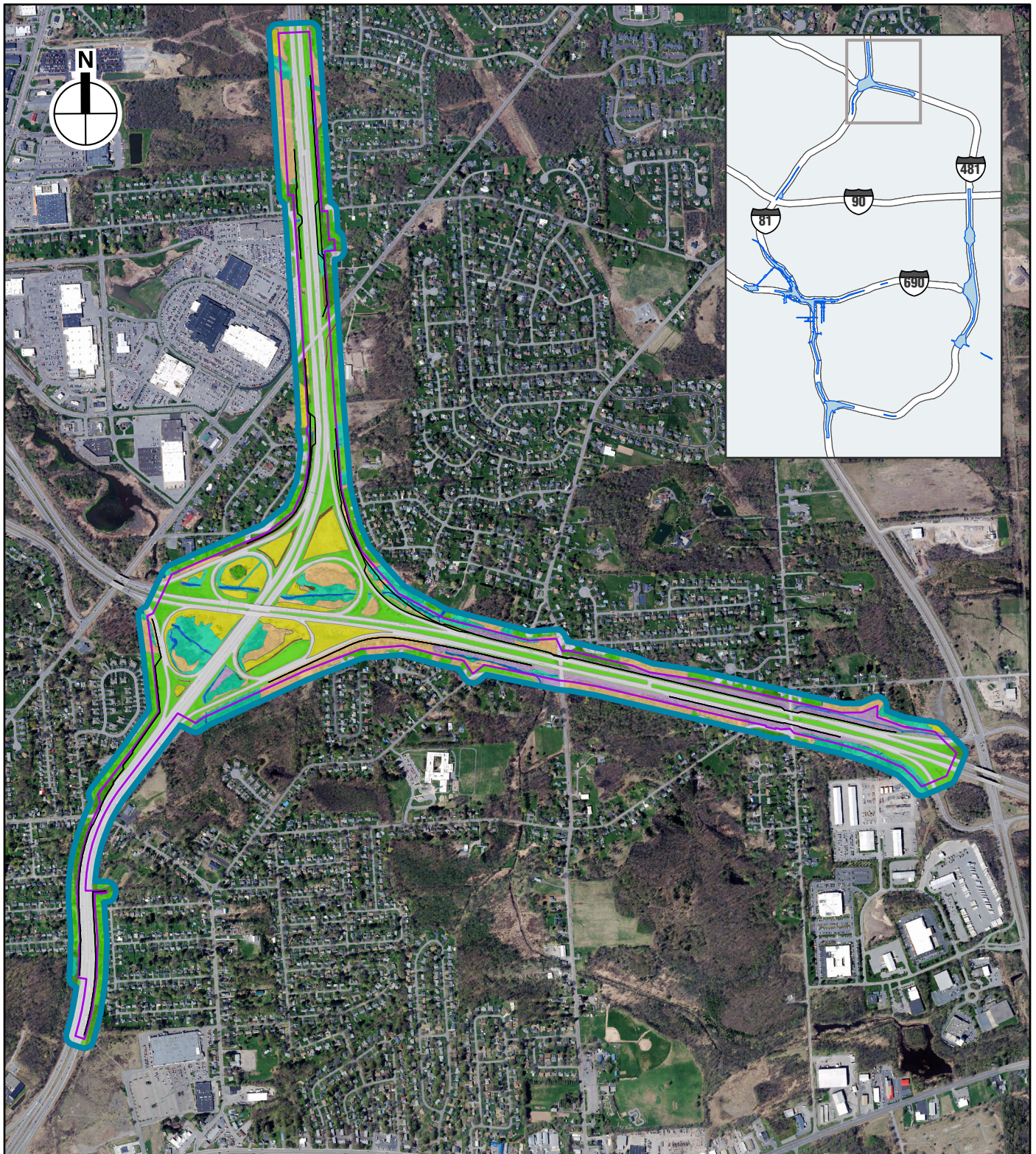
I-81 Viaduct Project

**I-481 East Study Area
Ecological Communities
Figure J-2-7**



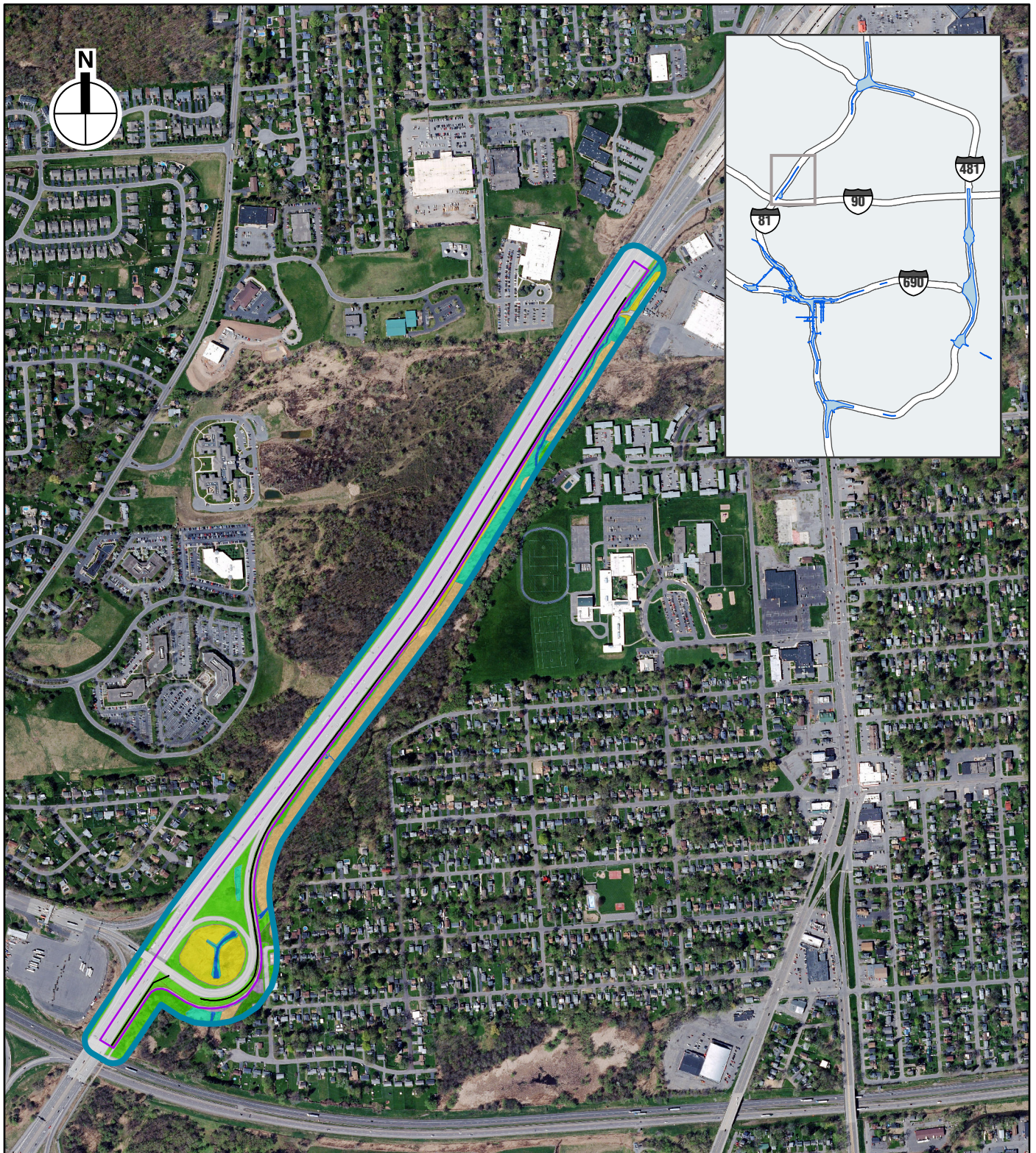
I-81 Viaduct Project

I-481 East Study Area
Ecological Communities
Figure J-2-8



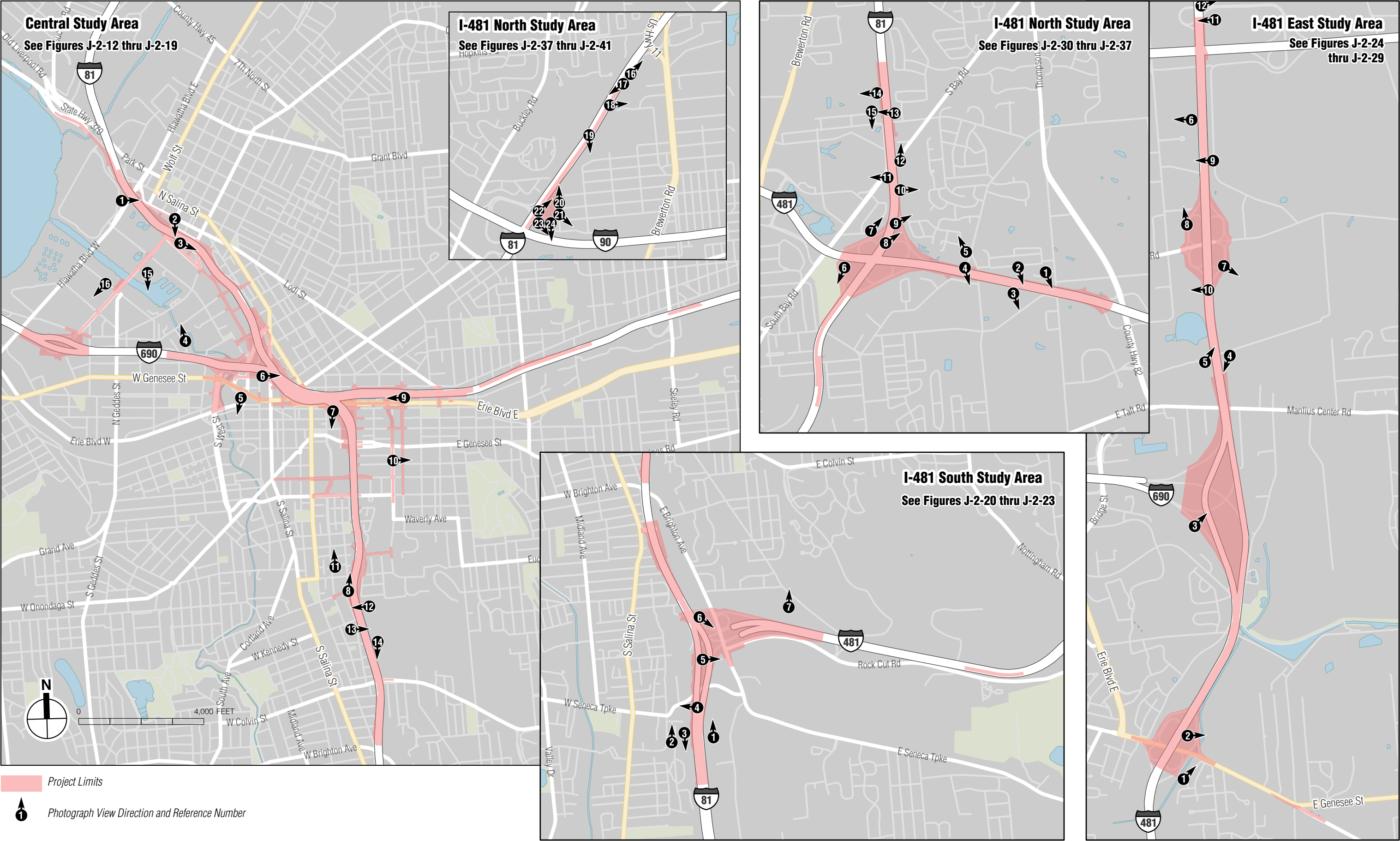
I-81 Viaduct Project

I-481 North Study Area
Ecological Communities
Figure J-2-9



I-81 Viaduct Project

I-481 North Study Area
Ecological Communities
Figure J-2-10





Mowed Lawn with Trees; July 8, 2016; facing north. 1



Urban vacant lot; July 8, 2016; facing north. 2



Mowed Lawn with Trees; July 8, 2016; facing north. 3



Successional Southern Hardwoods and Paved Road/Path; July 28, 2016; facing north. 4



Street Trees; July 8, 2016; facing west. 5



Paved Road/Path/Street Trees; July 8, 2016; facing north. 6



Paved Road/Path/Mowed Lawn with Trees; July 8, 2016; facing west.

7



Successional Southern Hardwoods; August 1, 2016; facing east.

8



Successional Old Field; August 1, 2016; facing south.

9



Paved Road/Path; July 8, 2016; facing north.

10



Successional Southern Hardwoods and Mowed Lawn; August 1, 2016; facing east. 11



Railroad; August 1, 2016; facing south. 12



Successional Southern Hardwoods; August 1, 2016; facing north. 13



Successional Old Field; August 1, 2016; facing west. 14



Urban structure exterior; September 25, 2019; facing west. 15



Mowed lawn; September 19, 2019; facing southwest. 16



Successional Southern Hardwoods/Road Cut Cliff/Slope; September 16, 2016; facing east.

1



Successional Southern Hardwoods/Road Cut Cliff/Slope; September 16, 2016; facing east.

2



Successional Southern Hardwoods; September 16, 2016; facing west. 3



Successional Southern Hardwoods; July 28, 2016; facing south. 4



Successional Old Field; July 21, 2016; facing north. 5



Mowed Lawn; July 21, 2016; facing north. 6



Railroad; July 21, 2016; facing east.

7



Wetland; October 4, 2019; facing northeast.

1



Successional old field; October 3, 2019; facing north.

2



Floodplain forest; October 11, 2019; facing northeast. 3



Mowed Lawn; July 20, 2016; facing west. 4



Railroad; July 20, 2016; facing northeast.

5



Paved Road/Path; July 20, 2016; facing south.

6



Kirkville Interchange; August 28, 2017; facing northwest.

7



Kirkville Interchange; September 28, 2017; facing east.

8



Kirkville Interchange; September 28, 2017; facing east.

9



Successional Old Field; July 20, 2016; facing south.

10



Floodplain Forest; July 20, 2016; facing south. 11



Roadside Drainage Ditch; July 20, 2016; facing north. 12



Recently Cleared Land; September 16, 2016; facing east.

1



Paved Road/Path and Mowed Lawn; August 1, 2016; facing west.

2



Successional Old Field; July 19, 2016; facing west. 3



Mowed Lawn; September 16, 2016; facing west. 4



Recently Cleared Land; September 16, 2016; facing east.

5



Successional Old Field; September 16, 2016; facing southwest.

6



Roadside Drainage Ditch; July 8, 2016; facing north. 7



Mowed Lawn and Drainage Ditch; July 8, 2016; facing north. 8



Mowed Lawn and Drainage Ditch; July 8, 2016; facing north. 9



Mowed Lawn and Drainage Ditch; July 8, 2016; facing north. 10



Mowed Roadside/Pathway; July 8, 2016; facing south. 11



Mowed Lawn with Trees; September 16, 2016; facing east. 12



Drainage Ditch; July 9, 2016; facing south. **13**



Mowed Lawn; July 8, 2016; facing south. **14**



Floodplain forest; October 23, 2019; facing west. 15



Mowed lawn and wetland; May 11, 2021; facing northeast. 16



Beartrap Creek and floodplain forest; May 11, 2021; facing southeast. 17



Wetland and mowed lawn; May 11, 2021; facing east. 18



Mowed lawn and floodplain forest; May 11, 2021; facing south **19**



Floodplain forest; May 11, 2021; facing north. **20**



Successional southern hardwoods; May 11, 2021; facing southwest. 21



Mowed lawn and successional old field; May 11, 2021; facing northeast. 22



Mowed lawn with trees; May 11, 2021; facing southwest. **23**



Beartrap Creek and wetland; May 11, 2021; facing south. **24**