

Appendix I-2
Wetland Delineation and Surface
Water Assessment Memorandum



Environmental, Planning, and Engineering Consultants

440 Park Avenue South
7th Floor
New York, NY 10016
tel: 212 696-0670
fax: 212 213-3191
www.akrf.com

Memorandum

To: Jon Adams, NYSDOT
From: Aubrey McMahon and Andrea Fortman, AKRF Inc.
Date: October 19, 2021
Re: I-81 Viaduct Project: Wetland Delineation/Mapping and Surface Waters Assessment Summary
cc: R. Campon; H. Ungar (Parsons); C. Calvert; (AKRF, Inc.)

INTRODUCTION

AKRF, Inc. ecologists conducted a formal wetland delineation in 2017, 2019, and 2021, and additional wetland mapping in 2020 and 2021 to support the natural resources assessment of the Draft and Final Design Report/Draft and Final Environmental Impact Statement (DDR/DEIS and FDR/FEIS) for New York State Department of Transportation's (NYSDOT) I-81 Viaduct Project (Project) in Syracuse, NY (Onondaga County). An AKRF water resources engineer and ecologists also conducted surface waters surveys in 2017, 2019, 2020, and 2021 to support the surface waters assessment of the aforementioned DDR/DEIS. This memorandum provides a summary of the 2017, 2019, and 2021 wetland delineation, 2021 wetland mapping, and 2017, 2019, 2020, and 2021 surface waters surveys conducted in the Project Area (i.e., Central, I-481 South, I-481 East, and I-481 North Study Areas). A formal Wetland Delineation and Surface Waters Survey Report is currently being prepared for the Project.

METHODOLOGY

Wetland Delineation Methodology

The wetland delineation was conducted using the three-parameter approach (i.e., hydrophytic vegetation, hydric soils, and hydrology) as per the 1987 United States Army Corps of Engineers (USACE) wetland delineation methodology.¹ The wetland delineation included the following:

¹ Environmental Laboratory. 1987. "Corps of Engineers Wetlands Delineation Manual," Technical Report Y-87-1, US Army Engineer Waterways Experiment Station, Vicksburg, Miss; U.S. Army Corps of Engineers. 2011. Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Northcentral and Northeast Region (version 2.0), ed. J.S. Wakeley, R.W. Lichvar, C.V. Noble, and J.F. Berkowitz. ERDC/EL TR-12-1. Vicksburg, MS: U.S. Army Engineer Research and Development Center.

- (1) All wetlands/surface waters within the limits of disturbance;
- (2) All wetlands/surface waters immediately adjacent to the limits of disturbance;
- (3) All unmapped wetlands/surface waters in the project vicinity that are located within 50 meters (m) (164 feet[ft]) of a New York State Department of Environmental Conservation (NYSDEC)-mapped wetland where there is a NYSDEC-mapped wetland located 50 meters (m) (164 ft) from the limits of disturbance;² and
- (4) All NYSDEC-mapped freshwater wetlands within 100 ft (anticipated regulated freshwater wetland adjacent area) of the limits of disturbance where not covered in item (3) above.

The wetland delineation was conducted on the following dates by a team of two wetland ecologists: July 5, 6, 7, 8, 10, 11, 12, 13, 18, 19, and 27, 2017 and August 2, 3, 8, and 29, 2017. Revisions to the Study Area and limits of disturbance were made in 2019 and additional wetland delineation work was conducted on September 24 and 25 and October 3, 4, 10, 11, 23, and 30, 2019. Additional study area revisions were made in 2020. Wetlands in the revised study areas were delineated on April 20 and 21, 2021. Data were collected at representative sampling points within each wetland and associated adjacent upland. Multiple sampling points were assigned in instances where more than one vegetative community (i.e., emergent wetland, forested wetland) was observed within a wetland. Following data collection, the boundaries of each delineated wetland were marked with numbered flagging. A licensed land surveyor field-located the numbered flags following the delineation of each wetland.

Wetland Mapping and Assessment

As part of the preparation of a preliminary DEIS (pDEIS) in 2016, a Wetland and Surface Water Assessment was conducted to determine the approximate locations, types, and extent of wetlands within the Project Area. This 2016 Wetland and Surface Water Assessment was conducted using the Preliminary Wetland Mapping and Assessment Methodology (December 2015) that was developed as part of the preliminary DEIS (pDEIS) in 2016. This assessment included the review of available maps and aerial imagery and field verification, but no delineation of wetland boundaries. The wetlands and surface waters identified during the 2016 Wetland and Surface Water Assessment were delineated in 2017 and 2019 following the methodology described above.

In 2020 and 2021, the limits of disturbance were expanded as part of Project design refinements. Due to timing and the DDR/DEIS schedule, wetlands were not delineated following the methodology described above. Instead, wetlands were identified using the Preliminary Wetland Mapping and Assessment Methodology (December 2015) used during the 2016 Wetland and Surface Water Assessment. This methodology was employed in 2020 and 2021 to provide an estimate of wetlands coverage in areas of the expanded limits of disturbance (referred to herein as “2020-2021 wetland mapping”) in order to quantify the approximate wetlands effects for the DDR/DEIS. This 2020-2021 wetland mapping included the review of available maps and aerial imagery and field verification, but no delineation of wetland boundaries.

Following the review of available wetland and soils maps and aerial imagery, a water resources engineer and wetland ecologist field verified wetlands on June 24 and 25, 2020 and May 11, 2021. Following the field verification, the 2017 and 2019 wetland maps were updated to indicate the approximate limits of the wetlands identified in 2020 and 2021.

² These comments, documented in a May 3, 2017 letter, directed NYSDOT to include any un-mapped wetlands that abut a NYSDEC-mapped wetland as regulatory wetlands.

WETLAND NOMENCLATURE

Wetland Delineation

As part of the 2016 Wetland and Surface Waters Assessment, wetlands and surface waters that were mapped and field verified were assigned an identifier using the first letter of the Study Area³ followed by a number. These wetland identifiers were included in the 2016 Wetland and Surface Waters Assessment Report that was prepared following the 2016 wetland field investigations. This same naming convention was carried forward into the 2017 wetland delineation. However, as design refinements were made and further desktop review of agency maps and wetland delineation field work was conducted in 2017 and 2019, and the 2020-2021 wetlands mapping, a number of wetlands were combined where a hydrological connection was determined. For these reasons, the wetlands have been renamed Wetland 1 through Wetland 15 as a means to establish a simple and consistent naming convention. In instances where the wetlands were combined because of hydrologic connection but separated by highway and roads, these individual wetland areas were assigned sublabels (e.g., Wetland 1a through Wetland 1e) to aid in the review process. The first number in the naming convention identifies the overall wetland number/name.

NYSDEC and NWI Mapping and Agency Jurisdiction

As part of the 2016 Wetland and Surface Water Assessment, the 2017 and 2019 wetland delineation, and 2020-2021 wetland mapping, AKRF conducted a desktop review of NYSDEC-mapped freshwater wetlands and National Wetland Inventory (NWI)-mapped wetlands prior to field work. NYSDEC classifications assign value to wetlands in terms of ecological value and function. These classifications are: Class I (most valuable); Class II (moderately valuable); Class III (less valuable), and Class IV (least valuable).⁴ The USFWS NWI assigns codes to mapped wetlands (i.e., Cowardin Classification System) associated with the dominant vegetation, hydrologic regime, and substrate type.

AKRF documented overlaps between AKRF-delineated or -mapped wetlands and NYSDEC- and/or NWI-mapped wetlands. Using the mapping and guidance provided by the USACE and NYSDEC, AKRF assessed the potential for agency jurisdiction, under Section 10 of the River and Harbors Act and Sections 401 and 404 of the Clean Water Act (USACE) and Article 15 (Protection of Waters) and Article 24 Freshwater Wetlands) (NYSDEC) of the Environmental Conservation Law (ECL), for each wetland area. The delineated wetland identifier, NYSDEC identifier, NWI identifier, and anticipated jurisdiction of each wetland are provided in **Tables 1** through **3**, below.

Surface Waters Survey Methodology

The surface waters surveys were conducted to determine the general characteristics of all bodies of surface water within and adjacent to the Project Area, including named and unnamed tributaries, streams, creeks, rivers, ponds, lakes, wetlands, and special aquatic sites (as defined in Section 404 of the Clean Water Act). For surface waters other than wetlands (streams, lakes, ponds etc.) field investigations included the delineation of the Ordinary High Water (OHW) mark within the Project Area. The delineated OHW is shown on the Project plans and DDR/DEIS figures. For linear waters in the Project Area, cross sections were taken at a minimum of two cross sections on either side of each stream / road crossing in the Project Area, as well as one cross section within each stream reach. At these cross sections the following characteristics were recorded:

- Water depth,
- Low flow channel depth and width,
- Bankfull width of stream,
- Description of the general type of stream (relatively permanent waters, intermittent, etc.),

³ The Central Study Area was previously referred to as the “I-81 Viaduct Study Area.”

⁴ 6 CRR-NY 664.5 NY-CRR

- Classification of the reach (riffle, run, pool, etc.),
- Description of the aquatic and riparian vegetation if any, and
- Characterizations of the stream bed material, slope, velocity, etc.

To assess these general characteristics, AKRF employed methodology adapted from the United States Department of Agriculture (USDA) Forest Service 1994 Stream Channel Reference Sites: An Illustrated Guide to Field Technique. Where possible, Wolman Pebble Counts were conducted. Cross section locations, in addition to the two upstream and downstream of each stream/road crossing, were chosen to characterize both unique and representative sections of the stream channels, and were tied to wetland delineation flag locations where logical. The cross sections were typically spaced a minimum of 50 to 100 feet apart, and two cross sections were taken upstream and downstream of every culvert crossing within the study areas. The surface waters surveys were primarily conducted from October 2 through 6, 2017, with some additional data and observations collected during the culvert assessment surveys in June and August 2018, September and October 2019, June 2020, May 2021, and July 2021. Data from the surface water surveys are presented in the Wetland Delineation and Surface Waters Survey Report currently being prepared for the Project; the Culvert Assessment Report is **Appendix I-3** of the DEIS.

WETLAND DELINEATION AND SURFACE WATERS SURVEY SUMMARY

As shown in **Tables 1** through **3**, freshwater wetlands and surface waters were delineated or mapped/estimated in the Central, I-481 South, I-481 East, and I-481 North Study Areas. The delineated and estimated wetland boundaries will be shown on Project plans.

CENTRAL STUDY AREA

Within the Central Study Area, one emergent wetland (Wetland 1, consisting of areas 1a through 1e) was delineated in 2017. Wetland 1 is a NYSDEC Class II wetland (SYW-12) and a NWI seasonally flooded palustrine emergent wetland containing spoil material that supports persistent emergent vegetation (PEMICs). Two culverts convey Wetlands 1a and 1b under highway ROW (refer to **Figure I-3-2**). The culverts were both assessed to have “Reduced AOP” and were rated as “insignificant” and “minor” barriers to AOP, largely due to constriction of the stream, outlet armoring, and sedimentation in the outlets (refer to **Appendix I-3** for additional details). The anticipated USACE and NYSDEC jurisdiction for each area of Wetland 1 is provided in **Table 1**, below.

Ley Creek is a NYSDEC Class C water that is mapped by NWI as a lower perennial riverine system with an unconsolidated bottom that has been excavated and is permanently flooded (R2UBHx). The Final NYSDEC 2018 Section 303(d) List of Impaired Waters Requiring a TMDL or other restoration strategy⁵ indicates Ley Creek is impaired due to contamination, which includes pathogens, nutrients (phosphorus), and ammonia due to CSOs, municipal sources, and urban runoff. Within the Study Area Ley Creek flows from east to west for 282 lf, with a surface area of 0.31 acres, and passes under a three-lane bridge that connects northbound and southbound I-81 to local Syracuse streets. During the 2017 surface waters survey it was observed that the Creek has been channelized and confined by bank slopes ranging from about 35 to 55 percent, and rip-rap along the upper edges of the banks, gravels along the lower edges, and silty sediment within the wetted channel. The floodplain in the Central Study Area is dominated by invasive plant species and highway maintenance access roads. Common reed (*Phragmites australis*) was observed to be dominant lower on the banks of the Creek and along mudflats. Maximum water depth at the time of the stream survey exceeded 50-inches during dry-weather flow conditions, and prohibited safe crossing of the stream; stream width was determined from the plan sets and aerial imagery to be 40 feet. Within the Central Study Area, a 42-inch metal stormwater outfall protrudes from the stream bank at bankfull elevation and has the

⁵ https://www.dec.ny.gov/docs/water_pdf/section303d2018.pdf

potential to be a pollutant discharge point. The anticipated USACE and NYSDEC jurisdiction of Ley Creek/Wetland 1c is provided in **Table 1**, below.

Table 1
Central Study Area Anticipated Jurisdiction

Wetland/Surface Water Identifier	NYSDEC Identifier and Classification	NWI Identifier	USACE Anticipated Jurisdiction	NYSDEC Anticipated Jurisdiction
Wetland 1a	Mapped as SYW-12, Class II	PEM1Cs	Sections 401 & 404	Article 24
Wetland 1b	Mapped as SYW-12, Class II	PEM1Cs	Sections 401 & 404	Article 24
Wetland 1c / Ley Creek	Class C Creek	R2UBHx	Section 10, Sections 401 & 404	Article 15
Wetland 1d	Mapped as SYW-12, Class II	-	Sections 401 & 404	Article 24
Wetland 1e	Mapped as SYW-12, Class II	--	Sections 401 & 404	Article 24
Onondaga Creek (Ont. 66-12-12-P 154-4 portion)	Class C Creek	R2UBH	Sections 401 & 404	Article 15
Wetland 16a/Onondaga Creek	Class C Creek	R2UBH	Section 10, Sections 401 & 404	Article 15
Wetland 16b/Onondaga Creek	Class C Creek	R2UBH	Section 10, Sections 401 & 404	Article 15
Notes: Anticipated jurisdictions will be confirmed with USACE and NYSDEC following publication of the FDR/FEIS.				
Sources: NYSDEC Freshwater Wetlands Maps (2010), NWI Mapping (2016), AKRF, Inc. Wetland Delineation (2017 and 2019), AKRF, Inc. Wetland Mapping (2020 and 2021).				

Onondaga Creek meanders in a northerly direction through the western part of the Central Study Area for 2,243 linear feet (lf), has a surface area of 2.67 acres and is classified as a NYSDEC Class C stream, although the southern portion of the Study Area, from East Brighton Ave north to Garfield Place, is within the watershed of the middle section of Onondaga Creek, which is designated as NYSDEC Class B. Within the Study Area, Onondaga Creek is mapped by NWI as a lower perennial riverine system with an unconsolidated bottom that is permanently flooded (R2UBH). The 303(d) List⁶ indicate that within the Central Study Area, Onondaga Creek is impaired due to turbidity, deriving from streambank erosion; and contamination, which includes pathogens, nutrients (phosphorus), and ammonia due to Combined Sewer Overflows (CSOs), municipal sources, and urban runoff. The floodplain in the Central Study Area is dominated by invasive plant species and impervious surfaces, including the downtown Syracuse Creekwalk and bridge piers and foundations. The creek is channelized within most of the Central Study Area, with a trapezoidal cross section and heavily armored banks and a sandy bottom with large stones found in most of the cross sections surveyed between Erie Boulevard and Evans Street. Channel slopes below OHW are typically 80 to 90 degrees, due to the channelization and bank armoring and the channel width OHW was an average of 30 feet. Maximum water depth at the time of the survey typically varied from 2.5 to 3.5 feet; OHW in the channel averages 10.5 feet deep. Along this portion of Onondaga Creek, between Erie Boulevard and Evans Street, there are three stormwater outfalls ranging in size from 8 to 24 inches, and two CSO outfalls, CSO-020, a 68-inch diameter double-barrel RCP, and CSO-021, a 30" HDPE pipe. Nine bridges cross the Creek within this portion of the Central Study Area; Evans Street bridge, a ramp from Franklin Street to North Water Street and a ramp from westbound I-690 to West Street, the westbound and

⁶ Ibid, 2018.

eastbound I-690 and bridges, a ramp from West Street to eastbound I-690, a ramp from West Street to Herald Place, the West Genesee Street bridge, and the Erie Boulevard bridge. These bridges span the full width of the channel during all flow conditions, and their retaining walls and piers are located in the floodplain, elevated above the channelized creek.

Further downstream within the Central Study Area, where Bear Street crosses over Onondaga Creek, there are four stormwater outfalls, ranging in size from 12 to 30 inches in diameter. In this location, the creek has a more irregular cross section, ranging in width from about 225 to 275 feet. Silty sediments form the bed and banks, which have slopes of about 10 degrees or less on the right bank and 20 to 30 degrees on the left bank. At the time of the 2019 Bear Street survey, the water was near OHW due to a recent rain event, and was too deep to safely measure within most of the channel, as the stream bed slope increased about 10 feet away from the banks. The Bear Street bridge piers were observed to be points of sedimentation, with silty sands accumulated along the banks and piers and shallower water depth further from the stream bank than observed upstream or downstream of the bridge.

The majority of the study area at Onondaga Creek does not contain wetlands with the exception of a 0.03-acre common reed-dominated wetland (Wetland 16) located along the banks in the vicinity of the Bear Street bridge. **Table 1** shows the anticipated jurisdiction of the various areas of Onondaga Creek/Wetland 16 within the Central Study Area, which are expected to be under the jurisdiction of USACE and NYSDEC.

I-481 SOUTH STUDY AREA

The majority of I-481 South Study Area is within the Onondaga Lake watershed, upstream of the Central Study Area. City Line Brook, a tributary of Onondaga Creek, is the only stream identified within the Onondaga Lake watershed that surfaces near the I-481 South Study Area; City Line Brook is spring-fed, originating in part from surface flows from the local high points within the Study Area, which then move west outside of the Study Area through fissures in the limestone Karst topography. City Line Brook is not mapped by NWI, but NYSDEC maps the creek as Class B.

The eastern-most portions of the I-481 South Study Area are within the Butternut Creek watershed. There is one surface waterbody in this portion of the I-481 South Study Area, an unnamed tributary to Butternut Creek, Ont. 66-11-P 26-37-6-13. The portion of the tributary that is within the I-481 South Study Area, to the west of Rams Gulch Road, is not mapped by NYSDEC, NWI, or the 6 NYCRR maps, but the downstream portion (outside of the I-481 South Study Area) is mapped by NWI as a perennial riverine system with an unconsolidated bottom that is permanently flooded (R5UBH). This portion outside of the I-481 South Study Area is a NYSDEC Class AA stream, with AA(T) water quality standards⁷. The tributary is not on the Final 2018 303(d) List⁸. Existing conditions mapping shows that the stream within the I-481 South Study Area is 2,068 lf, with a surface area of 1.02 acres, and stream width increasing from about 10 feet to 15 feet, moving downstream. There are no bridges over the creek and no culverts conveying the channel within the I-481 South Study Area. This creek is expected to be regulated by USACE, but not by NYSDEC.

⁷ Thompson Reuters. 2020. New York Codes, Rules and Regulations. Title 6, Chapter X., Subchapter A, Article 2, Part 703.5 Water quality standards for taste-, color- and odor-producing, toxic and other deleterious substances. Accessed on September 30, 2020 at

<https://govt.westlaw.com/nycrr/Document/I4ed90418cd1711dda432a117e6e0f345?transitionType=Default&contextData=%28sc.Default%29>

⁸ https://www.dec.ny.gov/docs/water_pdf/section303d2018.pdf

I-481 EAST STUDY AREA

Eight wetlands and ten surface waters⁹ are present in the I-481 East Study Area. These wetlands and surface waters are summarized below.

Wetland 2 is associated with NYSDEC-mapped freshwater wetlands SYE-23 (Class II), SYE-24 (Class III), and SYE-25 (Class II). Wetland 2j to the west of I-481 is associated with NWI-mapped palustrine emergent wetland that is dominated by common reed and is seasonally flooded (PEM5E). Two unnamed tributaries (Tributaries 6 and 7) adjacent to Wetlands 2f and 2h, separately, connect Wetland 2 through the I-481 and NYS Route 5 interchange to Butternut Creek, to the east of the project limits. Butternut Creek is a NYSDEC Class C stream, with Class C(T) water quality standards for the upstream portion of the creek, south of the East Genesee Street Bridge. NWI maps Butternut Creek as a permanently flooded lower perennial riverine system with an unconsolidated bottom that has been excavated in places, including along the length of the creek that passes through the study area. Within the I-481 East Study Area, the Class C(T) portion of Butternut Creek is 899 lf with a surface area of 0.79 acres, while the downstream, Class C portion of the stream, is 3,861 lf with a surface area of 4.31 acres. Within the I-481 East Study Area, Butternut Creek Tributary 7 is 933 lf with a surface area of 0.27 acres and flows through the south side of Route 5 via five culverts (culvert E-2 through culvert E-6; refer to **Figure I-3-6**). Butternut Creek Tributary 6 is 1,369 lf with a surface area of 0.21 acres within the I-481 East Study Area and flows through the north side of Route 5 via three culverts (culvert E-10 through culvert E-12; refer to **Figure I-3-6**). A third unnamed tributary adjacent to Wetland 2j, Tributary 5, locally known as Meadow Brook, also flows through Wetland 2 on the western side of the I-481 East Study Area and is mapped by NWI as a lower perennial riverine system with an unconsolidated bottom that has been excavated and is permanently flooded (R2UBHx). Within the I-481 East Study Area, Meadow Brook, including the Cedar Bay portion, is 1,431 lf with a surface area of 0.33 acres. Meadow Brook enters the I-481 East Study Area just south of Route-5, to the west of the I-481/Route-5 interchange, is culverted under Route-5 before continuing north until just south of Kinne Road, where it is culverted northeast underneath I-481 and outlets at the confluence of Cedar Bay and Butternut Creek (located just to the east of the I-481 East Study Area), part of the old Erie Canal (see **Figure I-3-7**). A fourth unnamed tributary (Tributary 4) to Butternut Creek adjacent to Wetland 2h flows south and east through the I-481 East Study Area. Within the Study Area, Tributary 4 is 247 lf with a surface area of 0.04 acres and flows along Towpath Road on the west side of the I-481/I-690 interchange, culverted under the ROW to the east side of the highway, then flows south and east into Butternut Creek, north of Cedar Bay (see **Figure I-3-7**). Tributaries 4, 6, and 7 are not NYSDEC-mapped creeks nor are they mapped by NWI. These channels are wetland-stream complexes that were not flowing or flowing with less than 6" of water at the time of the survey, even though there was a rain event of about 0.65" a day before the survey was completed. The locations of these channels as they drain through the I-481 East Study Area interchanges are further discussed in DDR/DEIS **Appendix I-3**, as they are connected to one another and to Butternut Creek through a network of culverts. As shown in **Table 2**, areas of Wetland 2 and the associated tributaries are expected to be under the jurisdiction of USACE and NYSDEC.

Wetland 3 is associated with NYSDEC-mapped freshwater wetland SYE-21 (Class II). The majority of Wetland 3 is associated with a NWI-mapped palustrine forested broad-leaved deciduous wetland that is temporarily flooded (PFO1A; Wetlands 3a, 3b, 3h, 3i, 3j, 3m, 3n, and 3p). Other NWI-mapped palustrine wetlands associated with Wetland 3 include emergent wetlands that support persistent emergent vegetation that are seasonally flooded (PEM1C; Wetland 3p) and emergent wetlands dominated by common reed that are temporarily flooded (PEM5A; Wetland 3n)/partially drained/ditched (PEM5Ad; Wetland 3b). A fifth unnamed tributary to Butternut Creek (Tributary 3) adjacent to Wetland 3d, unmapped by NWI or NYSDEC, flows north and northeast through Wetland 3 and the I-481/I-690 interchange. Within the I-481 East Study Area, the tributary is 2,606 lf with a surface area of 0.39 acres and is a low-gradient stream-wetland complex with a silty bed and banks, varying in width and depth within the interchange. As shown

⁹ Meadow Brook and Butternut Creek and a number of unnamed channels are present in the I-481 East Study Area.

in **Table 2**, areas of Wetland 3 and the associated tributary are expected to be under the jurisdiction of USACE and NYSDEC.

Wetland 4 is associated with NYSDEC-mapped freshwater wetland SYE-21 (Class II).¹⁰ It is not mapped by NWI. As shown in **Table 2**, areas of Wetland 4 are expected to be under the jurisdiction of USACE and NYSDEC.

Wetland 5 is associated with NYSDEC-mapped freshwater wetland SYE-17 (Class III) and a NWI-mapped PFO1A wetland. A sixth unnamed tributary to Butternut Creek flows through Wetland 5, on the eastern side of the highway ROW, and has three tributaries that flow in a generally northeastern direction through the I-481/I-690 interchange (Tributaries 2, 2.1, 2.2, and 2.3). Tributary 2 and the associated tributaries are a low-gradient stream-wetland complex with silty bed and banks, varying in width and depth within the I-481 East Study Area. Within the I-481 East Study Area, Tributary 2 is 2,763 lf with a surface area of 0.81 acres, Tributary 2.1 is 984 lf with a surface area of 0.18 acres, Tributary 2.2, on the southern bank of Tributary 2, is a 1,089 lf L-shaped channel, with a surface area of 0.25 acres, and Tributary 2.3 is on the right bank of the stream, approximately perpendicular to Tributary 2 and 254 lf with a surface area of 0.08 acres. As shown in **Table 2**, areas of Wetland 5 and the associated tributaries are expected to be under the jurisdiction of USACE and NYSDEC.

¹⁰ The mapped portion of the wetland is located to the south of Wetland 6 but is hydrologically connected via a channel.

Table 2
I-481 East Study Area
Delienated Wetlands and Anticipated Jurisdiction

Wetland / Surface Water Label	NYSDEC Identifier and Classification	NWI Identifiers	USACE Jurisdiction	NYSDEC Jurisdiction
Wetland 2a, 2j	Mapped as SYE-23 (Class II)	R2UBHx, PSS1/EM5E, PEM5E	Sections 401 & 404	Article 24
Wetland 2b, 2c, 2e, 2i, 2k, 2m	--	--	Sections 401 & 404	--
Wetland 2d (Meadow Brook), 2f, 2g, 2h (Butternut Creek), 2l (Meadow Brook)	Directly connected to SYE-24 and SYE-25 (Class II), Class C Creek	R2UBHx	Sections 401 & 404	Article 15 and 24
Wetland 3a, 3b, 3g, 3h, 3i, 3k, 3m, 3n, 3p	Mapped as SYE-21 (Class II)	PFO1A, PEM5Ad, PEM1C	Sections 401 & 404	Article 24
Wetland 3e, 3l, 3o	--	PEM5A, PFO1A, PFO1C, R5UBH	Sections 401 & 404	--
Wetland 4a	Directly connected to SYE-21 (Class II)	-	Sections 401 & 404	Article 24
Wetland 4b	-	-	Sections 401 & 404	--
Wetland 5	Mapped as SYE-17 (Class III)	PFO1A	Sections 401 & 404	Article 24
Wetland 6a, 6b, 6c, 6d, 6e	Mapped as SYE-11 (Class I)	PEM15/UBF, PFO1A	Sections 401 & 404	Article 24
Wetland 6f	-	-	Sections 401 & 404	-
Wetland 7	Mapped as SYE-11 (Class I)	-	Sections 401 & 404	Article 24
Wetland 8	--	--	Sections 401 & 404	--
Wetland 9a	Mapped as SYE-8 (Class III)	R5UBH	Sections 401 & 404	Article 24
Wetland 9b/Tributary to North Branch Ley Creek	Class C Creek	R5UBH	Sections 401 & 404	--
Notes: * "Directly connected" refers to an immediate physical connection. Culvert connections are not considered direct connections. Anticipated jurisdictions will be confirmed with USACE and NYSDEC following publication of the FDR/FEIS. Sources: NYSDEC Freshwater Wetlands Maps (2010), NWI Mapping (2016), AKRF, Inc. Wetland Delineation (2017 and 2019), AKRF, Inc. Wetland Mapping (2020 and 2021).				

Wetland 6 is associated with NYSDEC-mapped freshwater wetland SYE-11 (Class I). It is also mapped by NWI as a semi-permanently flooded palustrine emergent wetland dominated by common reed (PEM5) with an unconsolidated bottom (UBF) within Wetlands 6a and 6b. A seventh tributary to Butternut Creek (Tributary 1) adjacent to Wetlands 6c, 6e, and 6f, flows through Wetland 6 and is unnamed and unmapped by NWI or NYSDEC. The tributary flows southwards along the outside edges of the eastern I-481-Kirkville interchange ramps and has a tributary of its own (Tributary 1.1) that flows along the western outside edges of the I-481-Kirkville interchange ramps. These channels are wide, shallow, poorly defined, low-gradient stream-wetland complexes. Within the I-481 East Study Area, Tributary 1 is 2,747 lf with a surface area of 1.63 acres and Tributary 1.1 is 2,009 lf with a surface area of 1.31 acres. As shown in **Table 2**, areas of Wetland 6 and the associated tributaries are expected to be under the jurisdiction of USACE and NYSDEC.

Wetland 7 is associated with a small segment of NYSDEC-mapped freshwater wetland SYE-11 (Class I). However, Wetland 7 is not mapped by NWI. A small channel, an unnamed tributary to North Branch Ley Creek, flows through Wetland 7; within the I-481 East Study Area, the tributary is 116 lf with a surface

area of 0.02 acres. As shown in **Table 2**, Wetland 7 is expected to be under the jurisdiction of USACE and NYSDEC.

Wetland 8 is not mapped by NYSDEC or NWI. It is an emergent wetland dominated by common reed. As shown in **Table 2**, Wetland 8 is expected to be under the jurisdiction of the USACE, but not NYSDEC (it is not mapped by NYSDEC, nor is it directly connected to a NYSDEC-mapped wetland).

Wetland 9 includes a NYSDEC-mapped Class C creek (tributary to North Branch of Ley Creek) that coincides with a NWI-mapped unknown perennial riverine system with an unconsolidated bottom that is permanently flooded (R5UBH) within Wetlands 9a and 9b. It is also associated with NYSDEC-mapped Wetland SYE-8 (Class III; Wetland 9a). This tributary to North Branch of Ley Creek flows south through the I-481/I-90 interchange, crosses east under I-481 via a triple-barrel culvert, then continues east outside of the I-481 East Study Area. During the surface waters survey, up to approximately one foot of water was observed in the Creek channel downstream of the culvert under I-481, while upstream of the culvert the channel was poorly defined, heavily armored with gravel at the culvert inlet, and surrounded by common reed. To the east of the culvert structure, the channel width at OHW narrows from approximately 15 feet at the culvert outlet to 10 feet wide as it leaves the I-481 East Study Area 50 feet downstream from the culvert. The stream bank slopes are between 25 and 30 degrees. The water depth decreased to about 6 inches downstream of the culverts, with OHW at about 2.5 feet, and the stream banks and bed were observed to be comprised of silt and organic matter. Within the I-481 East Study Area, the tributary is 280 lf with a surface area of 0.06 acres. This tributary has a small tributary of its own, which flows southeast from the I-90 and I-481 interchange via two culverts, then south along the edge of the highway ROW. Within the I-481 East Study Area, this tributary is 793 lf with a surface area of 0.10 acres. As shown in **Table 2**, areas of Wetland 9 and the associated tributaries are expected to be under the jurisdiction of USACE and NYSDEC.

I-481 NORTH STUDY AREA

The I-481 North Study Area contains a network of wetlands (Wetland 10) connected by Mud Creek, two unnamed tributaries to Mud Creek adjacent to Wetlands 10v and 10w (Tributaries 5 and 6), Pine Grove Brook (Tributary 1, and two small unnamed tributaries to Pine Grove Brook adjacent to Wetlands 10c and 10d, Tributaries 2 and 3), and South Branch Pine Grove Brook (Tributary 4), which are also tributaries to Mud Creek, an unnamed tributary to the Oneida River flows through Wetlands 10h and 10i, and Beartrap Creek, a tributary to Ley Creek. These surface waters are mapped by NYSDEC as Class C surface waters. This network of wetlands is associated with a number of NYSDEC-mapped freshwater wetlands, including BRE-18, CIC-13, CIC-15, CIC-16, and CIC-17, all of which are NYSDEC Class II wetlands. Wetlands in this complex are also mapped by NWI as palustrine wetlands that have unconsolidated bottoms that are permanently flooded (PUBHx; Wetland 10o), palustrine forested scrub-shrub wetlands with broad-leaved vegetation that are permanently flooded (PFO/SS1A; Wetlands 10v and 10w), and palustrine scrub-shrub wetlands with broad-leaved vegetation containing pockets of emergent persistent vegetation that are seasonally flooded/saturated (PSS1/EME1; Wetlands 10p and 10q).

Mud Creek is mapped by NWI as a lower perennial riverine system with an unconsolidated bottom that has been excavated and is permanently flooded (R2UBHx). Within the I-481 North Study Area, Mud Creek is 1,780 lf with a surface area of 0.59 acres. The unnamed Mud Creek tributaries are mapped by NWI as riverine intermittent streambed that is seasonally flooded (R4SBC) and were observed to have a silty streambed, that is narrow and shallow upstream of I-481 but doubles in width and depth downstream of the I-481. Within the I-481 North Study Area, Tributary 5 is 1,484 lf with a surface area of 0.82 acres, and Tributary 6 is 1,429 lf with a surface area of 1.95 acres. Pine Grove Brook and South Branch Pine Grove Brook are also mapped as R4SBC by NWI, and were observed to be narrow, shallow channels heavily impacted by the highway infrastructure with dense woody and herbaceous vegetation along the banks where the streams are culverted under I-481. Within the I-481 North Study Area, Pine Grove Brook is 102 lf with a surface area of 0.02 acres, Tributary 2 is 218 lf with a surface area of 0.05 acres, Tributary 3 is 923 lf with a surface area of 0.15 acres, and the South Branch of Pine Grove Brook is 562 lf with a surface area of 0.06 acres. During the stream and culvert assessment survey, Mud Creek was observed to be a low gradient, low

energy stream system with sections of stream/wetland complex and sections with a more defined stream channel lined with woody and herbaceous vegetation. Sediment in the channel was primarily silty sand, with some larger cobbles observed in many cross sections taken near the culverts. Depth at OHW ranged from approximately 1.5 to 3 feet, while observed water depth at the time of the survey ranged from 0.5 to 2.5 feet. Stream width along Mud Creek also generally increased moving from upstream to downstream, with average widths at OHW of the reaches between the culverts in the interchange ranging from 14 to 30 feet. The unnamed tributary to Oneida River that flows through Wetlands 10h and 10i is mapped by NWI as an intermittent, seasonally flooded streambed (R4SBC) upstream (to the east) of culvert N-1 and the I-81 ROW, while downstream of the I-81 ROW, the surface water is mapped by NWI as an emergent, palustrine, seasonally flooded *Phragmites australis* wetland (PEM5c). Mud Creek, South Branch Pine Grove Brook, Pine Grove Brook, associated unnamed tributaries, the unnamed Oneida River tributary, and areas of Wetland 10, as shown in **Table 3**, are expected to be under the jurisdiction of USACE and NYSDEC.

Wetland 11 is not associated with any NYSDEC-mapped freshwater wetlands. Segments of Wetland 11 are mapped by NWI as an intermittent riverine streambed that is seasonally flooded (R4SBC). As shown in **Table 3**, Wetland 11 is not expected to be under the jurisdiction of NYSDEC or USACE.

Table 3
I-481 North Study Area
Delineated Wetlands and Anticipated Jurisdiction

Wetland / Surface Water Label	NYSDEC Identifier and Classification	NWI Identifiers	USACE Jurisdiction	NYSDEC Jurisdiction
Wetland 10a, 10b (South Branch Pine Grove Brook), 10c, 10d (Pine Grove Brook), 10e, 10f, 10g, 10h, 10i, 10v, 10w	Class C Creek	R4SBC, PUBHx, PFO1/SS1A	Sections 401 & 404	--
Wetland 10k, 10l, 10m, 10n, 10o (Mud Creek) 10p, 10q	Class C Creek	PUBHx, R2UBHx, PSS1/EM1E	Sections 401 & 404	--
Wetland 10j, 10u	CIC-13 (Class II), CIC-16 (Class II), Class C Creek	R2UBHx	Sections 401 & 404	Article 15 & Article 24
10r, 10s, 10t	CIC-15 (Class II), Class C Creek	R4SBC	Sections 401 & 404	Article 24
Wetland 10x	--	R4SBC	--	--
Wetland 11	--	R4SBC	--	--
Wetland 12	--	--	--	--
Wetland 13	--	--	Sections 401 & 404	--
Wetland 14	Mapped as BRE-27 (Class II)	--	Sections 401 & 404	--
Wetland 15a, 15d	--	--	Sections 401 & 404	--
Wetland 15b, 15c/Beartrap Creek	Mapped as SYW-8 (Class II)	PFO1E, R4SBC	Sections 401 & 404	Article 15
Wetland 15e/Beartrap Creek	Mapped as SYW-8 (Class II), Class C(T) Creek	PFO1E, R4SBC, PFO5/1E, PFO1/SS1E, PSS1E	Sections 401 & 404	Article 15 & Article 24
Wetland 15f/Beartrap Creek	Class C(T) Creek	R4SBC	Sections 401 & 404	Article 15
Notes: Anticipated jurisdictions will be confirmed with USACE and NYSDEC following publication of the FDR/FEIS.				
Sources: NYSDEC Freshwater Wetlands Maps (2010), NWI Mapping (2016), AKRF, Inc. Wetland Delineation (2017 and 2019), AKRF, Inc. Wetland Mapping (2020 and 2021).				

Wetland 12 is an isolated depression located along the southbound lanes in the northern portion of the I-481 North Study Area. It is not mapped by NWI or NYSDEC. As shown in **Table 3**, Wetland 12 is not expected to be under the jurisdiction of NYSDEC or USACE.

Wetland 13 is located in the northern portion of the I-481 North Study Area. It appears to be connected to wetlands located both to the north and east of the highway. As shown in **Table 3**, areas of Wetland 13 are expected to be under the jurisdiction of NYSDEC and USACE.

Wetland 14 is located outside of the project limits and is associated with NYSDEC-mapped freshwater wetland BRE-27, a Class II wetland. As shown in **Table 3**, Wetland 14 is expected to be under the jurisdiction of NYSDEC and USACE.

Wetland 15 is located in the vicinity of the I-481 North Study Area and is associated with SYW-8, a Class II wetland. Segments of Wetland 15 are mapped by NWI as a seasonally flooded/saturated palustrine forested and scrub-shrub wetland that is vegetated with broad-leaved deciduous (PFO1/SS1E). Beartrap Creek flows through the wetland and is mapped by NWI as a R4SBC. As shown in **Table 3**, areas of Wetland 15 are expected to be under the jurisdiction of NYSDEC and USACE.

Beartrap Creek is located in the vicinity of the I-481 North Study Area and flows from north to south until its confluence with Ley Creek, outside of the study area. Beartrap Creek is a Class C(T) creek, mapped by NWI as riverine intermittent streambed that is seasonally flooded (R4SBC), and is expected to be under the jurisdiction of NYSDEC and USACE. Within the study area, the creek is 2,113 lf with a surface area of 0.74 acres, and is a low gradient, low sinuosity, meandering stream with woody and herbaceous vegetation on the floodplain. Sediment in the channel was primarily silty sand, with some larger cobbles observed in many of the cross sections near the culverts. Beartrap Creek and its floodplain are moderately confined by the highway ROW, a culvert, and a shared use path near the northern extent of the study area, as well as where it passes through two culvert structures within the southern extent of the I-481 North Study Area. Depth at OHW ranged from approximately 1 to 2 feet, while observed water depth at the time of the survey ranged from 0.5 to 2.2 feet. Stream width along Beartrap Creek also generally increased moving from upstream to downstream, with average widths at OHW ranging from about 10 to 30 feet, and with the widest portions of the creek occurring upstream and downstream of the culverts conveying the stream under the highway ROW.

CONCLUSIONS

A formal wetland delineation and surface waters survey were conducted during the 2017 and 2019 growing season and wetland mapping was conducted in June 2020 and May 2021 in the expanded limits of disturbance. As summarized in this memorandum, the majority of the delineated/mapped wetlands and surveyed streams are expected to be under the jurisdiction of the USACE and NYSDEC. A formal Wetland Delineation and Surface Waters Survey Report is currently being prepared for the Project.