This section documents the evaluation of potential effects of the Project to water resources, which include wetlands, surface waters (including NYSDEC-mapped streams and waterbodies), groundwater, floodplains, drainage areas, and surface flow. Appendix I-1 presents the legislation and regulatory programs that pertain to water resources.

Four main study areas were identified for the Project: Central Study Area, I-481 South Study Area, I-481 East Study Area, and I-481 North Study Area (see Figure 6-4-7-1). The Central and I-481 South study areas both include small isolated areas to their east where noise barriers are proposed as the only project activity; these areas have been evaluated for potential effects to water resources. Onondaga Lake, Onondaga Creek, Ley Creek, Mud Creek, Butternut Creek, and several unnamed streams are located within these study areas.

Existing conditions for water resources within the study areas were characterized using the following data sources:

- NYSDEC's Environmental Resource Mapper for data on streams, waterbodies, and freshwater wetlands;
- United States Fish and Wildlife Service (USFWS) National Wetland Inventory (NWI) wetlands maps;
- United States Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) soils maps;
- Federal Emergency Management Agency (FEMA) Flood Insurance Rate Maps (FIRM) for areas that may be located within flood hazard areas;
- The Final New York State 2016 Section 303(d) List of Impaired Waters Requiring a Total Maximum Daily Load (TMDL)/Other Strategy (November 2016);¹
- Site reconnaissance of the study areas in July and September 2016, June through October 2017, and June and August 2018;

¹ The Clean Water Act Section 303(d) requires states to identify waterbodies that are not fully supporting their best uses. These waterbodies are then listed on the Clean Water Act 303(d) "impaired waters" list. Waterbodies may have been identified as impaired due to fish consumption advisories, public bathing beach closures, or sampling results (high nutrient levels, turbidity, and toxic sediments).
Wetlands and Surface Waters Overview

I-81 Viaduct Project

Central Study Area
See Figures 6-4-7-2 and 6-4-7-3

I-481 North Study Area
See Figures 6-4-7-10 thru 6-4-7-12

I-481 South Study Area
See Figure 6-4-7-4

I-481 East Study Area
See Figures 6-4-7-5 thru 6-4-7-9

Project Limits
Delineated Freshwater Wetland Boundary
NYSDEC 100' Freshwater Wetland Adjacent Area Line
Drainage Ditch
Edge of Bank
Culvert, Pipe

Figure 6-4-7-1
Wetland delineations\(^2\) conducted within the study areas in July, August, and September 2017 (see I-81 Viaduct Project: Wetland Delineation and Surface Waters Assessment Summary, Appendix I-2);

Stream and culvert surveys\(^3\) conducted within the study areas in October 2017 and June and August 2018 (Appendix I-2 and Appendix I-3);

U.S. Geological Survey’s (USGS’s) National Streamflow Information Program for watershed size data for streams; and

USEPA’s STOrage and RETrieval and Water Quality eXchange (STORET) for water quality data for streams.

The assessment of potential impacts to the surface waters listed above included analyses conducted in accordance with the Toler Method\(^4\) and FHWA’s Pollutant Loadings and Impacts from Highway Stormwater Runoff, 1990 method.\(^5\) Appendix I-3 presents the results of the analyses. To conservatively estimate the potential change in water quality characteristics, the analyses were conducted without the inclusion of stormwater best management practices (BMPs).

### 6-4-7.1 AFFECTED ENVIRONMENT

#### 6-4-7.1.1 FRESHWATER WETLANDS

For the purposes of identifying wetland resources, the assessment was conducted for each of the four study areas described above as well as up to an additional 164 feet around the outside of these study areas (see Appendix I-2). The wetland delineation for the Project documented 85.72 acres of wetlands, which includes those mapped by NYSDEC and NWI (see Appendix I-2) within the Project Area. Most of the wetlands within the Project Area are in close proximity to highway and railroad infrastructure and are characterized as disturbed. Several of these wetlands have associated creeks that have been diverted under roads, ramps, and railroads via culverts (described below in Section 5-4-7.1.2 and Appendix I-3). Appendix I-2 provides a summary of the wetland delineation (I-81 Viaduct Project: Wetland Delineation and Surface Waters Assessment Summary) conducted for the proposed project during the 2017 growing season. Wetland acreage calculations were made on the basis of the

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\(1\) The wetland delineation was conducted following the United States Army Corps of Engineers (USACE) 1987 Wetland Delineation Manual and USACE 2012 Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Northcentral and Northeast Region (Version 2.0).

\(2\) The stream and culvert survey was conducted as a rapid assessment of channel and culvert conditions. Methodology was adapted from the United States Department of Agriculture (USDA) Forest Service 1994 Stream Channel Reference Sites: An Illustrated Guide to Field Technique. Stream surveys are described in Appendix I-2 and culvert assessments are detailed in Appendix I-3.


wetland delineation as summarized in Appendix I-2. Table 6-4-7-1 summarizes the Federal and State jurisdictional freshwater wetland acreages and the NYSDEC regulated freshwater wetland adjacent areas. All reference to jurisdictional wetlands below are preliminary based on consultation with the agencies to date. A final jurisdictional determination from USACE for Federal wetlands and from NYSDEC for State wetlands will be obtained during final design.

### Table 6-4-7-1

Summary of Freshwater Wetland and Adjacent Area Coverage within the Project Study Areas

<table>
<thead>
<tr>
<th>Project Study Area</th>
<th>Delineated Freshwater Wetlands (acres)</th>
<th>Federal Jurisdictional Wetlands (acres)</th>
<th>State Regulated Wetlands (acres)</th>
<th>NYSDEC-Regulated Freshwater Wetland Adjacent Area (acres)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Central Study Area</td>
<td>4.2</td>
<td>4.2</td>
<td>4.2</td>
<td>14.67</td>
</tr>
<tr>
<td>I-481 South Study Area</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>I-481 East Study Area</td>
<td>51.40</td>
<td>51.40</td>
<td>51.39</td>
<td>81.33</td>
</tr>
<tr>
<td>I-481 North Study Area</td>
<td>30.12</td>
<td>30.12</td>
<td>30.12</td>
<td>62.58</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>85.72</strong></td>
<td><strong>85.72</strong></td>
<td><strong>85.71</strong></td>
<td><strong>158.58</strong></td>
</tr>
</tbody>
</table>

**Notes:**

The acreages presented herein are calculated on the basis of the boundaries of wetlands that were delineated within an area up to 164-ft of the boundaries of each study area as part of this Project (see Appendix I-2 “I-81 Viaduct Project: Wetland Delineation and Surface Waters Assessment Summary”). The NYSDEC-regulated adjacent area is a 100-foot area extending from the NYSDEC freshwater wetland boundary. This adjacent area includes pervious and impervious areas.

**Source:** I-81 Viaduct Project: Wetland Delineation and Surface Waters Assessment Summary (Appendix I-2).

The acreages for the Federal and State wetland and State regulated freshwater wetland adjacent areas are identified in Table 6-4-7-1 for each study area and are characterized as follows:

- **Central Study Area.** The study area at Ley Creek contains a total of 4.2 acres of Federal and State jurisdictional wetlands dominated by common reed (*Phragmites australis*) (see Wetland 1 in Figure 6-4-7-2). Area contains a total of 14.67 acres of State-regulated freshwater wetland adjacent area, consisting of paved highway and mowed lawn. The study area at Onondaga Creek does not contain Federal and State jurisdictional wetlands (see Figure 6-4-7-3).

- **I-481 South Study Area.** There are no Federal or State mapped freshwater wetlands within the I-481 South Study Area, including in the vicinity of Noise Barrier 9 where surface waters occur within the study area (see Figure 6-4-7-4), and no wetlands were observed during the field inspection.

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Under Article 24 (included in the appendix), NYSDEC is responsible for implementing New York State’s Freshwater Wetland Regulatory program. It is stipulated that adjacent areas within 100 feet of mapped NYSDEC freshwater wetlands are also regulated.

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PIN 3501.60

6
Onondaga Lake
[Class C]

Onondaga Lake
[Class C]

Figure 6-4-7-2

Central Study Area
Wetlands and Surface Waters

I-81 Viaduct Project

Note: A formal wetland delineation was conducted during the 2017 growing season using USACE 1987 Wetland Delineation Methodology.

Project Limits

0.05 Acres - Permanent areas of new pavement within NYSDEC Freshwater Wetland Adjacent Area

0.15 Acres - Permanent areas of pavement removal within NYSDEC Freshwater Wetland Adjacent Area

Delineated Freshwater Wetland Boundary

NYSDEC 100' Freshwater Wetland Adjacent Area Line

Ordinary High Water

0.05
0.15
Figure 6-4-7-4
I-481 South Study Area
Wetland and Surface Waters

I-81 Viaduct Project

Project Limits
Ordinary High Water
Noise Wall

Noise Barrier 9
(Community Grid and Viaduct Alternatives)
Ont. 66-11-P 26-37-6-13 [Class AA]
Rock Cut Rd
• **I-481 East Study Area.** The study area contains a total of 51.40 acres of wetlands, all of which are Federal jurisdictional wetlands, and 51.39 of these acres are State jurisdictional wetlands (see Figure 6-4-7-5 through Figure 6-4-7-9). Most of the wetlands in the I-481 East Study Area are associated with a State Class I Wetland (see Appendix I-1 for NYSDEC Wetland Class definitions) and Federal jurisdictional emergent (with some forest) wetland located just north of the CSX railroad tracks (see Wetland 6 in Figure 6-4-7-6 and Figure 6-4-7-7). This wetland extends to the east and west beyond the I-481 East Study Area boundary. The emergent portion of this wetland contains a variety of micro-habitats including areas dominated by narrowleaf cattail (*Typha angustifolia*), purple loosestrife (*Lythrum salicaria*), reed canary grass (*Phalaris arundinacea*), and common reed, and includes open water sections. Due to its size and diversity of habitats, this wetland has the potential to support a variety of wildlife species. The forested portion of this wetland occurs along the eastern edges of the right-of-way and includes species assemblages that are typical of a floodplain forest (see Appendix J-2, “Ecological Communities and Vegetation”). Other wetlands include Wetland 4 associated with State jurisdictional SYE-21 (Class II) (see Figure 6-4-7-6), Wetland 5 associated with State jurisdictional SYE-17, an unnamed channel (see Figure 6-4-7-6), Wetland 7 associated with State jurisdictional SYE-11 (Class I) (see Figure 6-4-7-7), and Wetland 9 (tributary to North Branch of Ley Creek associated with State jurisdictional SYE-8 [Class III]) (see Figure 6-4-7-9). In general, these wetlands are characterized by disturbance (i.e., channelization, fill, prevalence of common reed).

- The wetland acreage presented in Table 6-4-7-1 includes one unmapped wetland (Wetland 8, see Figure 6-4-7-9). This unmapped wetland is emergent and is largely dominated by common reed. It is anticipated that Wetland 8 will be Federally regulated as it is connected to Waters of the United States (WOTUS). Wetland 8 is not anticipated to be State-regulated as it is not mapped by NYSDEC nor is adjacent or connected to other State-regulated wetlands.

- The I-481 East Study Area contains 81.33 acres of NYSDEC-regulated freshwater wetland adjacent area. The NYSDEC-regulated freshwater wetland adjacent area consists primarily of paved highway, unpaved (gravel) roads and parking lots, mowed lawn, and successional old fields.

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7 A semi-permanently flooded palustrine emergent wetland dominated by common reed (PEM5) with an unconsolidated bottom (UBF).

8 Wetland 4 is not mapped by NWI.

9 Temporarily flooded palustrine forested wetland that is dominated by deciduous broad-leaf vegetation (PFO1A).

10 The unnamed channel is not mapped by NWI.

11 Wetland 7 is not mapped by NWI.

12 Unknown perennial riverine system with an unconsolidated bottom that is permanently flooded (R5UBH).
Wetland 2
Mapped as
NYSDEC SYE-23
(Class III)

Meadow Brook
Mapped as
NYSDEC SYE-22
(Class II)

Culvert E-12

Wetland 3
Mapped as
NYSDEC SYE-21
(Class II)

Wetland 3
Connected to
NYSDEC-mapped
SYE-21 (Class II)

Unnamed Butternut
Creek Tributary
Mapped as
NYSDEC SYE-24
(Class II)

Culvert E-13

Note:
A formal wetland delineation was conducted during the 2017 growing season using USACE 1987 Wetland Delineation Methodology.
A formal wetland delineation was conducted during the 2017 growing season using USACE 1987 Wetland Delineation Methodology.

**Project Limits**
- 0.09 Acres - Permanent areas of new pavement within NYSDEC Freshwater Wetland Adjacent Area
- 1.38 Acres - Permanent areas of pervious cut/fill within NYSDEC Freshwater Wetland Adjacent Area
- 0.11 Acres - Temporary Open Water Wetland Effects
- 0.08 Acres - Permanent Vegetated Freshwater Wetland Effects
- 0.33 Acres - Temporary Vegetated Freshwater Wetland Effects

**Stormwater Detention Basin**

**NYSDEC 100’ Freshwater Wetland Adjacent Area Line**

**Ordinary High Water**

**Culvert, Pipe**

Note: A formal wetland delineation was conducted during the 2017 growing season using USACE 1987 Wetland Delineation Methodology.
A formal wetland delineation was conducted during the 2017 growing season using USACE 1987 Wetland Delineation Methodology.
I-481 East Study Area
Wetlands and Surface Waters

Figure 6-4-7-8

Project Limits:
- 0.10 Acres - Permanent areas of new pavement within NYSDEC Freshwater Wetland Adjacent Area
- 0.18 Acres - Permanent areas of pervious cut/fill within NYSDEC Freshwater Wetland Adjacent Area
- 0.04 Acres - Temporary Vegetated Freshwater Wetland Effects

Delineated Freshwater Wetland Boundary
NYSDEC 100’ Freshwater Wetland Adjacent Area Line
Drainage Ditch
Culvert, Pipe

Note: A formal wetland delineation was conducted during the 2017 growing season using USACE 1987 Wetland Delineation Methodology.

Wetland 7
Mapped as
NYSDEC SYE-11
[Class I]

Culvert E-10
Figure 6-4-7-9

I-81 Viaduct Project

I-481 East Study Area

Note: A formal wetland delineation was conducted during the 2017 growing season using USACE 1987 Wetland Delineation Methodology.
I-481 North Study Area. Study area includes State- and Federally-mapped wetlands, as well as wetland habitats not previously mapped (see Figure 6-4-7-10 through Figure 6-4-7-12). As indicated in Table 6-4-7-1, 30.12 acres of wetlands were identified during the wetland delineations, all of which are Federal and State\(^\text{13}\) jurisdictional. These wetlands include common reed and floodplain forest wetlands associated with the Mud Creek wetland complex (described below). In addition, the study area includes 62.58 acres of NYSDEC-regulated freshwater wetland adjacent area, consisting primarily of paved highway, unpaved (gravel) roads and parking lots, mowed lawn, and successional old fields.

6-4-7.1.2 SURFACE WATERS

For the purposes of identifying surface waters, an assessment was conducted for each of the four study areas described above as well as for an additional 100 feet around the outside of these study areas (see Appendix I-2). The study areas are within the Oswego River/Finger Lakes watershed, which drains to Lake Ontario. Surface waters within the study areas drain to local rivers and drainage ways and ultimately discharge to the Oswego River north of Syracuse. The Oswego River drains an area of 5,122 square miles comprising most of the Finger Lakes region. From its discharge point on Lake Ontario, the Oswego River contains a series of locks and dams forming the 24-mile Oswego Canal system and serves as a route for boat traffic linking the Atlantic/Hudson River system to Lake Ontario via the Erie Canal.\(^\text{14}\) Figure 6-4-7-13 shows the relationship between the study areas and the primary sub-watersheds and waterbodies in the region. The waterbodies were identified based on the New York Codes, Rules and Regulations (NYCRR) Oswego River Drainage Basin Series maps and tables.\(^\text{15}\)

The Central Study Area, I-481 South Study Area, and a portion of the I-481 East Study Area are located within the Onondaga Lake watershed. The I-481 North Study Area and part of the I-481 East Study Area are within the Oneida River watershed. Both the Oneida River and Onondaga Lake sub-watersheds drain to Lake Ontario.

All surface waters in the study areas are presumed to be WOTUS under Federal jurisdiction. Surface waters within the study areas are classified as either NYSDEC Water Classification B or C (see Table 6-4-7-2). Figures 6-4-7-2 through 6-4-7-12 show the surface waters within the study areas, their NYSDEC classifications, the locations of wetland and Ordinary High Water (OHW) extent,\(^\text{16}\) and the locations of outfalls and culverts. Figure 6-4-7-13 shows an overview of the streams and water bodies within the study areas, including their NYSDEC Water Quality Classification, and

\(^{13}\) State-mapped CIC-13, CIC-15, CIC-16, and CIC-17.


\(^{16}\) OHW was based conservatively on the edge of bank.
Note: A formal wetland delineation was conducted during the 2017 growing season using USACE 1987 Wetland Delineation Methodology.
Note: A formal wetland delineation was conducted during the 2017 growing season using USACE 1987 Wetland Delineation Methodology.
Note: A formal wetland delineation was conducted during the 2017 growing season using USACE 1987 Wetland Delineation Methodology.
Watersheds

I-81 Viaduct Project

Figure 6-4-7-13

- Project Limits
- City/Town Boundary
- Chittenango Creek Watershed
- Limestone Creek Watershed
- Lower Seneca River Watershed
- Oneida Lake-Oneida River Watershed
- Oneida River Watershed
- Onondaga Watershed

National Hydrology Dataset: Flow Lines
- Artificial Path - Modified Stream/River
- Canal/Ditch
- Connector - Modified Stream/River
- Pipeline
- Stream/River

Source: USGS/USDA, HuPoly, 2008
identifies segments that have been piped underground. Table 6-4-7-3 summarizes the impairment status and NYSDEC Water classification of the surface waters within the study areas, as well as observations on the condition of those streams made during field reconnaissance. Each waterbody has a Waters Index Number, assigned by NYSDEC for identification. The primary waters are typically referred to by name or an abbreviation, while tributaries of primary waters are consecutively numbered progressing upstream from the mouth. Ponds and lakes are denoted by the letter “P” and numbered consecutively as they are encountered, with their tributaries numbered consecutively as they enter and progressing clockwise around the lake or pond from its outlet or mouth.

Table 6-4-7-2
NYSDEC Surface Water Quality Standards

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Class B and Class C Waters[^2]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Taste, color, and odor-producing, toxic</td>
<td>None in amounts that will adversely affect the taste, color or odor thereof, or impair the waters for their best usages</td>
</tr>
<tr>
<td>and other deleterious substances</td>
<td></td>
</tr>
<tr>
<td>Turbidity</td>
<td>No increase that will cause a substantial visible contrast to natural conditions</td>
</tr>
<tr>
<td>Suspended, colloidal and settleable solids</td>
<td>None from sewage, industrial wastes or other wastes that will cause deposition or impair the waters for their best usages</td>
</tr>
<tr>
<td>Oil and floating substances</td>
<td>No residue attributable to sewage, industrial wastes or other wastes, nor visible oil film nor globules of grease</td>
</tr>
<tr>
<td>Phosphorus and nitrogen</td>
<td>None in amounts that will result in growths of algae, weeds and slimes that will impair the waters for their best usages</td>
</tr>
<tr>
<td>Flow</td>
<td>No alteration that will impair the waters for their best usages</td>
</tr>
<tr>
<td>pH</td>
<td>Normal range shall not be less than 6.5 nor more than 8.5</td>
</tr>
<tr>
<td>Dissolved oxygen (mg/L)</td>
<td>For non-trout waters, the minimum daily average shall not be less than 5.0 mg/L, and at no time shall the DO concentration be less than 4.0 mg/L</td>
</tr>
<tr>
<td>Dissolved solids</td>
<td>Shall be kept as low as practicable to maintain the best usage of waters but in no case shall it exceed 500 mg/L.</td>
</tr>
<tr>
<td>Fecal coliform (cfu/100 mL)</td>
<td>The monthly geometric mean, from a minimum of five examinations, shall not exceed 200.</td>
</tr>
<tr>
<td>Ammonia (µg/L)^(3)</td>
<td>For non-trout waters, with pH ranging from 6.5 to 9.0, and temperature ranging from 0°C to 30°C, standard shall not exceed 0.7 at 0°C, and 50 at 35°C</td>
</tr>
<tr>
<td>Cyanide (µg/L)</td>
<td>9000 for Fish Consumption 5.2 for Aquatic Chronic, 22 for Aquatic Acute</td>
</tr>
</tbody>
</table>

Notes:
1. In accordance with the Federal Clean Water Act, surface waters in New York State are classified for their best uses (fishing, source of drinking water, etc.) and standards (allowable levels of pollutants) are set to protect those uses. Letter classes and standards range from A to D in descending order of quality. Standards set forth the maximum allowable levels of chemical pollutants, which are used as the regulatory targets for permitting, compliance enforcement, and assessing the quality of the State's waters. These standards can be either narrative (e.g., "none in amounts that will impair ...") or numeric (e.g., "0.001 µg/L") and are found in NYS regulation 6 NYCRR Part 703. The letter classifications and their best uses are described in regulation 6 NYCRR Part 701.
2. On all parameters listed, Class B and C Waters have the same standards.
3. The NYSDEC standard for ammonia applies to un-ionized ammonia as NH3.

Sources:
## Table 6-4-7-3
### Surface Waters Within the Study Areas

<table>
<thead>
<tr>
<th>Stream Name¹</th>
<th>6 NYCRR Waters Index Number¹</th>
<th>NYSDEC Stream Classification¹</th>
<th>6 NYCRR¹ Standards</th>
<th>TMDL List²</th>
<th>Cause /Pollutant</th>
<th>Suspected Source²</th>
<th>Stream Condition³</th>
<th>Receiving Waterbody¹</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Central Study Area</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Onondaga Creek (lower)</td>
<td>P 154-4 portion</td>
<td>Class C</td>
<td>C</td>
<td>303(d) - Part 3a</td>
<td>Turbidity</td>
<td>Streambank erosion</td>
<td>Channelized. Lower perennial riverine system with an unconsolidated bottom that is permanently flooded.</td>
<td>Onondaga Lake</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Pathogens, Nutrients (P), Ammonia</td>
<td>CSOs, Municipal, Urban Runoff</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>303(d) - Part 3c</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ley Creek</td>
<td>P 154-3 portion</td>
<td>Class C</td>
<td>C</td>
<td>303(d) - Part 3c4</td>
<td>Pathogens, Nutrients (P), Ammonia, Cyanide</td>
<td>CSOs, Municipal, Urban Runoff</td>
<td>Channelized. Lower perennial riverine system with an unconsolidated bottom that has been excavated and is permanently flooded.</td>
<td>Onondaga Lake</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Dioxon, Mercury, PCBs, other toxins</td>
<td>Contaminated Sediment</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>303(d) - Part 2b</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Onondaga Lake</td>
<td>P 154</td>
<td>Class C</td>
<td>C</td>
<td>303(d) - Part 2b</td>
<td>Dioxon, Mercury, PCBs, other toxins</td>
<td>Contaminated Sediment</td>
<td>Onondaga Lake is a limnetic lacustrine system with an unconsolidated bottom that is permanently flooded.</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>303(d) - Part 3c</td>
<td>Pathogens</td>
<td>CSOs, Municipal, Urban Runoff</td>
<td></td>
</tr>
<tr>
<td><strong>I-481 South Study Area</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>City Line Brook</td>
<td>P 154-4-4 and all tribs.</td>
<td>Class B</td>
<td>B</td>
<td>303(d) - Part 3a</td>
<td>Turbidity</td>
<td>Streambank erosion</td>
<td>Diverted underground.</td>
<td>Onondaga Creek (Middle)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Pathogens, Nutrients (P), Ammonia</td>
<td>CSOs, Municipal, Urban Runoff</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>303(d) - Part 3c</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

¹ Stream Name is an abbreviation of the full name of each stream.
² TMDL List: Total Maximum Daily Load List.
³ Stream Condition describes the condition of the stream as per the 6 NYCRR Standards.
⁴ CSOs: Combined Sewer Overflows.
⁵ NYSDEC Stream Classification: The classification of the stream according to the NYSDEC standards.
⁶ 6 NYCRR Standards: The 6 NYCRR Standards are part of the New York State Clean Water Act.
## Table 6-4-7-3 (cont’d)
### Surface Waters Within the Study Areas

<table>
<thead>
<tr>
<th>Stream Name¹</th>
<th>6 NYCRR Waters Index Number¹</th>
<th>NYSDEC Stream Classification¹</th>
<th>6 NYCRR¹ Standards</th>
<th>TMDL List²</th>
<th>Cause /Pollutant</th>
<th>Suspected Source³</th>
<th>Stream Condition³</th>
<th>Receiving Waterbody¹</th>
</tr>
</thead>
<tbody>
<tr>
<td>City Line Brook</td>
<td>P 154-4-4 and all tribs.</td>
<td>Class B</td>
<td>B</td>
<td>303(d) - Part 3a</td>
<td>Turbidity</td>
<td>Streambank erosion</td>
<td>Diverted underground.</td>
<td>Onondaga Creek (Middle)</td>
</tr>
<tr>
<td>Tributary of Butternut Creek</td>
<td>Ont. 66-11-P 26-37-6-13</td>
<td>Class AA</td>
<td>AA(T)</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>Perennial riverine system with an unconsolidated bottom that is permanently flooded.</td>
<td>Butternut Creek</td>
</tr>
<tr>
<td><strong>I-481 East Study Area</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Butternut Creek</td>
<td>Ont. 66-11-P 26-37-6</td>
<td>Class C</td>
<td>C</td>
<td>303(d) - Part 3a</td>
<td>Pathogens, Oxygen demand</td>
<td>Municipal</td>
<td>Lower perennial riverine system with unconsolidated bottoms that are permanently flooded.</td>
<td>Chittenango Creek</td>
</tr>
<tr>
<td>Tribs. of Butternut Creek</td>
<td>Ont. 66-11-P 26-37-6-2-c, Ont. 66-11-P 26-37-6-8</td>
<td>Class C</td>
<td>C</td>
<td>303(d) - Part 3a</td>
<td>Pathogens, Oxygen demand</td>
<td>Municipal</td>
<td>Lower perennial riverine systems with an unconsolidated bottom that is permanently flooded.</td>
<td>Butternut Creek</td>
</tr>
<tr>
<td>Tribs. of North Branch Ley Creek</td>
<td>P 154-3-10, P 154-3-10-1, P 154-3-11</td>
<td>Class C</td>
<td>C</td>
<td>303(d) - Part 3c</td>
<td>Pathogens, Nutrients (P), Ammonia, Cyanide</td>
<td>CSOs, Municipal, Urban Runoff</td>
<td>Perennial riverine systems with unconsolidated bottoms that are permanently flooded. Pass under I-480 and I-90 via culverts.</td>
<td>North Branch Ley Creek</td>
</tr>
<tr>
<td>Sanders Creek</td>
<td>P 154-3-3 and all tribs.</td>
<td>Class C</td>
<td>C</td>
<td>303(d) - Part 3c</td>
<td>Pathogens, Nutrients (P), Ammonia, Cyanide</td>
<td>CSOs, Municipal, Urban Runoff</td>
<td>Perennial riverine system with an unconsolidated bottom that is permanently flooded.</td>
<td>Ley Creek</td>
</tr>
</tbody>
</table>

¹ Stream Name: The name of the stream is indicated.
² 6 NYCRR Standards: The standards under the 6 NYCRR are listed.
³ TMDL List: The TMDL list is provided for reference.
⁴ Cause /Pollutant: The cause and pollutants are specified.
⁵ Suspected Source: The suspected sources are identified.
⁶ Stream Condition: The condition of the stream is described.
⁷ Receiving Waterbody: The receiving waterbody is mentioned.
## Table 6-4-7-3 (cont’d)
Surface Waters Within the Study Areas

<table>
<thead>
<tr>
<th>Stream Name1</th>
<th>6 NYCRR Waters Index Number1</th>
<th>NYSDEC Stream Classification1</th>
<th>6 NYCRR1 Standards</th>
<th>TMDL List2</th>
<th>Cause /Pollutant</th>
<th>Suspected Source2</th>
<th>Stream Condition3</th>
<th>Receiving Waterbody1</th>
</tr>
</thead>
<tbody>
<tr>
<td>I-481 North Study Area</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mud Creek and tributaries</td>
<td>Ont. 66-11-10 west and tribs</td>
<td>Class C</td>
<td>C</td>
<td>-</td>
<td>Flows underground via culvert inlet/outlets under the highway. Intermittent riverine system with a seasonally flooded streambed.</td>
<td>Oneida River</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mud Creek</td>
<td>Ont. 66-11-10 east</td>
<td>Class C</td>
<td>C</td>
<td>-</td>
<td>Connects emergent and forested wetlands via culverts located underneath highway. Lower perennial riverine system with an unconsolidated bottom that has been excavated and is permanently flooded.</td>
<td>Oneida River</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tribs of Oneida River</td>
<td>Ont. 66-11-11 and tribs.</td>
<td>Class C</td>
<td>C</td>
<td>-</td>
<td>Intermittent riverine system with a seasonally flooded streambed.</td>
<td>Oneida River</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Notes:
303(d) - Part 2b - fish consumption advisories
303(d) - Part 3a - TMDL development may be deferred
303(d) - Part 3c - TMDLs are deferred
4. Combined Sewer Overflows (CSOs).
Most surface waters within the study areas are characterized by disturbance. They are in close proximity to highway and railroad infrastructure and in many cases have been channelized or diverted underneath roads, ramps, and railroads via culvert inlets/outlets. Surface waters within the study areas were surveyed in October 2017 as described in **Appendix I-2**. The survey describes the stream channel characteristics upstream and downstream of existing culverts (which are described in **Tables 6-4-7-4a** and **6-4-7-4b**), identifies OHW and channel features within these limits, and identifies potential opportunities for stream restoration or enhancement. The locations and conditions of stormwater drainage outfalls were noted when observed in the field and are briefly described in **Table 6-4-7-4c**. Refer to **Chapter 5 Transportation and Engineering Considerations** for additional information on stormwater drainage within the study areas.

Following the field work, culverts were assessed using the North Atlantic Aquatic Connectivity Collaborative (NAACC) 2015 rapid assessment protocol for evaluating Aquatic Organism Passage (AOP) at road-stream crossings.\(^{17}\) In June and August 2018, additional culvert assessment field surveys were completed using the NAACC rapid assessment field forms in order to characterize all of the culverts within the Study Areas. Detailed culvert assessment information is provided in **Appendix I-4**.

The protocol includes two scoring methods – a numeric fine rating system for computing an AOP score ranging from 0 (severe barrier to AOP) to 1 (no barrier to AOP), and a coarse screening system with three categories: 1) Full AOP, 2) Reduced AOP, and 3) No AOP.

**Central Study Area**

The Central Study Area is located within the Onondaga Lake watershed and includes two NYSDEC Class C streams – Onondaga Creek and Ley Creek (see **Figure 6-4-7-4**, **Figure 6-4-7-3**, and **Figure 6-4-7-14**). In general, the watersheds of these two streams are characterized by disturbance associated with roadway, commercial, industrial, and residential development.

- **Onondaga Creek**: Onondaga Creek is one of the largest tributaries to Onondaga Lake; its drainage area is approximately 110 square miles. The creek is a NYSDEC Class C stream that meanders in a northerly direction through the western part of the Central Study Area. It is mapped by NWI as a lower perennial riverine system with an unconsolidated bottom that is permanently flooded. The creek is channelized within the Central Study Area with a trapezoidal cross section and heavily armored banks. Within the Central Study Area, it is not considered a navigable waterway under Section 10 of the Rivers and Harbors Act\(^{18}\) or under Section 404 of the Clean Water Act,\(^{19}\) but Onondaga Creek meets the definition of navigable under Title 5 of Article 15 of

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\(^{17}\) NAACC 2015. Scoring Road Stream Crossings as Part of the NAACC.

\(^{18}\) [http://scholarship.law.duke.edu/cgi/viewcontent.cgi?article=2734&context=dlj](http://scholarship.law.duke.edu/cgi/viewcontent.cgi?article=2734&context=dlj)

\(^{19}\) A water body qualifies as “navigable waters of the United States” if “the water body is (a) subject to the ebb and flow of the tide, and/or (b) the water body is presently used, or has been used in the past, or may be susceptible for use (with or without reasonable improvements) to transport interstate or foreign commerce.” [http://www.usace.army.mil/Portals/2/docs/civilworks/regulatory/cwa_guide/app_d_traditional_navigable_waters.pdf](http://www.usace.army.mil/Portals/2/docs/civilworks/regulatory/cwa_guide/app_d_traditional_navigable_waters.pdf)

The Buffalo District of the USACE has a list of navigable waters of the United States within New York State: [http://www.lrb.usace.army.mil/Portals/45/docs/regulatory/Section10NavigableWaterways/waterwayNY.pdf](http://www.lrb.usace.army.mil/Portals/45/docs/regulatory/Section10NavigableWaterways/waterwayNY.pdf)
the NYSDEC Environmental Conservation Law (ECL). The Final NYSDEC 2016 Section 303(d) List of Impaired Waters Requiring a TMDL or other restoration strategy indicates this portion of 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. Four stormwater outfalls ranging in size from 8 to 30 inches and one 68-inch diameter CSO outfall are located along the portion of Onondaga Creek within the Central Study Area (see Figure 6-4-7-3 and Table 6-4-7-4c). The CSO outfall discharges under high flow conditions onto a concrete spillway positioned at the level of the floodplain, above bankfull elevation. These outfalls have the potential to discharge pollutants to the creek during high flow precipitation events. Within the study area, nine bridges cross the creek: the Evans Street bridge, a ramp from Franklin Street to North Water Street and a ramp from I-690 West to North West Street South, the I-690 West and East bridges, a ramp from West Street to I-690 East, a ramp from West Street to Herald Place, the West Genesee Street bridge, and the Erie Boulevard bridge. There are no culverts conveying the creek within the study area.

- **Ley Creek:** Located north of Onondaga Creek, Ley Creek is another large tributary to Onondaga Lake, draining an area of about 30 square miles. Ley Creek is a NYSDEC Class C stream that flows from east to west through the Central Study Area. It is mapped by NWI as a lower perennial riverine system with an unconsolidated bottom that has been excavated and is permanently flooded. Within the Central Study Area, the creek has been channelized and has rip-rap along the upper edges of the banks and gravel along the lower edges with common reed dominant lower on the banks of the creek and along mudflats. In the Central Study Area, the creek is classified as a navigable waterway under Section 10 of the Rivers and Harbors Act and the NYSDEC ECL Article 15, although it is not included on the list of navigable waters provided by the USACE associated with Section 404 of the Clean Water Act. Ley Creek passes under the I-81 and Park Street bridges, which are subject to Section 9 of the Rivers and Harbors Act and the General Bridge Act of 1946. The channel has no aids to navigation as defined by 14 U.S.C. § 85 or 33

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20 “Navigable waters” of the State under Article 15 means all lakes, rivers, streams and other bodies of water in the State that are navigable in fact or upon which vessels with a capacity of one or more persons can be operated notwithstanding interruptions to navigation by artificial structures, shallows, rapids or other obstructions, or by seasonal variations in capacity to support navigation. It does not include waters that are surrounded by land held in single private ownership at every point in their total area.


23 http://scholarship.law.duke.edu/cgi/viewcontent.cgi?article=2734&context=dlj


CFR Part 118. The 303(d) List indicates Ley Creek is impaired due to contamination, which includes pathogens, nutrients (phosphorus), ammonia, and cyanide due to CSOs, municipal sources, and urban runoff. Within the Study Area, a 42-inch metal outfall protrudes from the stream bank at bankfull elevation and has the potential to be a pollutant discharge point (see Figure 6-4-7-2 and Table 6-4-7-4c). The 303(d) List also indicates that Ley Creek has a fish advisory due to contaminated sediment, which contains toxins including dioxin, mercury, and PCBs. Within the Central Study Area, an additional bridge carrying the ramp from Old Liverpool Road and Onondaga Lake Parkway to southbound I-81 crosses over the creek. There are no culverts conveying the creek within the study area.

- **Onondaga Lake**: Although only a portion is within the study area, Onondaga Lake is characterized for this discussion, since it receives discharge from Onondaga Creek and Ley Creek. Onondaga Lake (WOTUS under Federal jurisdiction and NYSDEC Class B and C) is located immediately northwest of the Central Study Area (see Figure 6-4-7-2 and Figure 6-4-7-14). The Lake is approximately one mile wide and 4.6 miles long and receives water from a drainage basin of approximately 285 square miles, almost entirely within Onondaga County. The Lake is classified as a navigable waterway under Section 10 of the Rivers and Harbors Act, under Section 404 of the Clean Water Act, and under NYSDEC ECL Article 15. It has 13 lights and beacons as aids to navigation (covered by 14 U.S.C. § 85 or 33 CFR Part 118), two of which are located along the southeast shore near the Central Study Area. For over 125 years, industrial and chemical operations disposed of a variety of pollutants into the Lake. Under the National Water Resources Development Act of 1990, the Lake was given priority cleanup status. In 1994, Onondaga Lake and related upland sites were added to the Federal Superfund National Priorities List and the New York State Registry of Inactive Hazardous Waste Disposal Sites (State Superfund Program). The Final NYSDEC 2016 Section 303(d) List of Impaired Waters requiring a TMDL lists Onondaga Lake and waters which, “extend into and include tributary waters to the first impassable barrier,” as impaired by fish consumption advisories. The impairment is attributed to sediment contamination, which includes dioxins, mercury, PCBs, and other toxins resulting from industrial

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26 https://www.law.cornell.edu/cfr/text/33/part-118
32 https://www.law.cornell.edu/cfr/text/33/part-118
34 http://www.dec.ny.gov/chemical/8668.html
discharges, wastewater pollution, and polluted stormwater runoff in the Syracuse/Onondaga Lake area. Remediation has included the dredging of contaminated lake bottom (in 2014), wastewater treatment improvements, and projects aimed at reducing sediment, nutrients, and other polluted runoff.  

**I-481 South Study Area**

The I-481 South Study Area is also within the Onondaga Lake watershed. City Line Brook is the only surface water identified within the Onondaga Lake watershed I-481 South Study Area and is piped underground (see Figure 6-4-7-14). The eastern part of the I-481 South Study Area is within the Limestone Creek Watershed, which drains to Oneida River. Within this portion of the Study Area, an unnamed tributary to Butternut Creek (which drains to Limestone Creek) is present near Noise Barrier 9 (see Figure 6-4-7-4).

- **City Line Brook**: City Line Brook and its tributaries flow north and west, until they reach Onondaga Creek. The main stem of City Line Brook flows northwest under I-81, where it has a drainage area of less than one square mile; the tributaries to City Line Brook do not enter the study area. These creeks do not appear on NWI maps, and based on field inspection, it was determined that much of the length of these NYSDEC Class B creeks have been piped underground within the study areas. The culvert conveying City Line Brook does not inlet or outlet within the study areas. The creeks are not classified as navigable under Section 10 of the Rivers and Harbors Act or Section 404 of the Clean Water Act but meet the definition of navigable under NYSDEC ECL Article 15. City Line Brook and its tributaries are also on the 303(d) List due to turbidity and pathogen, nutrient (phosphorus), and ammonia contamination from streambank erosion, CSOs, municipal sources, and urban runoff.

- **Unnamed tributary to Butternut Creek**: An unnamed tributary to Butternut Creek, Ont. 66-11-P 26-37-6-13, is located along the southern edge of the eastern part of the I-481 South Study Area. The creek flows eastward parallel to I-481. Outside of the study area, the creek is conveyed under Ram’s Gulch Road and railroad tracks, into Ram’s Gulch, a portion of which is used as a settlement basin for wash water from a large stone quarry operation. The portion of the tributary that is within the study area, to the west of Rams Gulch Road, is not mapped by NYSDEC or NWI, but the downstream portion is mapped by NWI as a perennial riverine system with an

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36 http://www.dec.ny.gov/chemical/8668.html
unconsolidated bottom that is permanently flooded. It is also classified as a NYSDEC Class AA stream, with AA(T) standards. The tributary is not on the 2016 303(d) List. There are no culverts conveying the creek within the study area.

I-481 East Study Area

The I-481 East Study Area includes Butternut Creek, three unnamed tributaries of Butternut Creek, two unnamed tributaries of North Branch Ley Creek, and Sanders Creek (see Figure 6-4-7-14). Within the study area, none of these surface waters are classified as navigable under Section 10 of the Rivers and Harbors Act or Section 404 of the Clean Water Act. These streams meet the definition of navigable under NYSDEC ECL Article 15.

- **Butternut Creek:** To the east of the Study Area, Butternut Creek flows northeastward and discharges to Chittenango Creek, eventually discharging to Oneida Lake in Bridgeport, New York. It has a drainage area of 63 square miles. NWI maps the creek as a lower perennial riverine system with an unconsolidated bottom that is permanently flooded. Butternut Creek is a NYSDEC Class C stream and is listed as impaired on the 2016 303(d) List due to municipal sources contributing to pathogen contamination and the exceedance of the NYSDEC standard for dissolved oxygen.

- **Unnamed tributaries to Butternut Creek:** An unnamed tributary to Butternut Creek, Ont. 66-11-P 26-37-6-2-c, is located immediately to the east of the I-481 East Study Area and flows south outside of the study area, until its confluence with Butternut Creek. A second tributary, referred to as Ont. 66-11-P 26-37-6-8, but locally known as Meadow Brook, is located immediately to the west of the I-481 East Study Area and flows northward until it turns east and crosses underneath I-481 (at the edge of the study area) and then flows into Butternut Creek. This confluence (located outside of the I-481 East Study Area) is a part of the old Erie Canal known as Cedar Bay. NWI maps these two tributaries as lower perennial riverine systems with unconsolidated bottoms that are permanently flooded. Both tributaries are NYSDEC Class C streams and are listed as impaired on the 2016 303(d) List due to municipal sources contributing to pathogen contamination and the exceedance of the standard for dissolved oxygen. A third tributary, unmapped by NWI or NYSDEC, flows from the west side of I-481 to the east side of the highway and southeast into Butternut Creek, to the north of Cedar Bay. This creek is located in the headwaters at the edge of the Oneida Creek watershed and travels east of the I-481 East Study Area prior to the confluence with Butternut Creek.

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41 I-81 Viaduct Project: Water Resources Regulatory Framework, Appendix I-1.


Within the I-481 East Study Area, 12 culverts convey wetlands, highway drainage, the unnamed headwater tributary, and tributary Ont. 66-11-P 26-37-6-2-c to Butternut Creek through multiple flow paths; refer to Figures 6-4-7-5 through Figure 6-4-7-9, and Table 6-4-7-4a for culvert locations and descriptions. All 12 culverts were determined to have “reduced aquatic organism passage (AOP)” using the coarse NAACC screening system, with fine screening ratings of “insignificant barrier” (scores of 0.81 to 0.90) for all culverts except E-5 and E-12, which were rated as “minor barriers” (scores of 0.70 and 0.77, respectively). The culverts were in good to moderate condition and were primarily rated as barriers to AOP due to low openness scores (which is the cross sectional area divided by the structure length) and moderate constriction of the stream channel. Culvert E-5 received a lower rating than the others in this area because the water depth and velocity within the culvert were lower than those in the channel, and there was only about 25 percent substrate coverage within the culvert, all of which make aquatic organism passage more difficult. Culvert E-12 was determined to be a minor barrier to AOP due to one of the pipes in the double-barrel structure being 50 to 75 percent full of sediment and debris. Refer to Appendix I-4 for information.

- **Unnamed tributaries to North Branch Ley Creek:** There are two unnamed tributaries of North Branch Ley Creek located east of the northern roadway segment that flow north and east to the North Branch of Ley Creek and eventually discharge into Onondaga Lake. Both are NYSDEC Class C streams that pass under I-481 and I-90 through culverts. They are NWI mapped perennial riverine systems with unconsolidated bottoms that are permanently flooded. These two tributaries are listed as impaired on the 303(d) List due to contamination, which includes pathogens, nutrients (phosphorus), ammonia, and cyanide from CSOs, municipal sources, and urban runoff. A fish advisory is also in place for these tributaries due to contaminated sediment containing toxins including dioxin, mercury, and PCBs.46

Within the study area, the northern tributary crosses under I-481 via a triple barrel culvert (E-11) and continues east outside of the study area (see Figure 6-4-7-9). During the surface waters survey, up to approximately one foot of water was observed in the creek channel to the east of the culvert, while to the west of the culvert the channel was poorly defined, heavily armored with gravel at the culvert inlet and surrounded by common reed. The triple-barrel culvert structure contains one 65-inch corrugated metal pipe (CMP) that is deteriorating at the outlet and two 54-inch high-density polyethylene (HDPE) pipes that are in good condition; the pipes are encased in a concrete headwall that holds back the highway embankment. The NAACC fine rating for this culvert indicates that it presents a moderate barrier to aquatic organism passage (Table 6-4-7-4a). The structure’s score of 0.52 was higher than expected given the observed conditions and the course rating of “No AOP,” which was assigned because the structure was observed to convey no flow or sediment during typical flow. Table 6-4-7-4a presents the scorings for each culvert. Appendix I-4 provides a detailed discussion of the culvert survey study and NAACC scoring.

- **Sanders Creek:** Sanders Creek is a NYSDEC Class C tributary to Ley Creek. Its headwaters are located just west of the I-481 East Study Area. The creek is a NWI mapped perennial riverine system with an unconsolidated bottom that is permanently flooded. The 303(d) List indicates

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Sanders Creek is impaired due to contamination, which includes pathogens, nutrients (phosphorus), ammonia, and cyanide due to CSOs, municipal sources, and urban runoff. The 303(d) List also indicates that Sanders Creek has a fish advisory due to contaminated sediment, which contains toxins including dioxin, mercury, and PCBs.\textsuperscript{47}

\begin{table}[h]
\centering
\begin{tabular}{|c|c|c|c|c|}
\hline
Study Area & Culvert ID & Description & NAACC Coarse AOP Rating & NAACC Fine AOP Score/ Rating \\
\hline
East & E-1 & 24" CMP culvert. Connects Wetland 4 to an unnamed channel (tributary to Butternut Creek). & Reduced AOP & 0.84 / Insignificant Barrier \\
East & E-2 & 48" RCP. Connects Wetland 4 under Manlius Center Road to unnamed Butternut Creek tributary. & Reduced AOP & 0.90 / Insignificant Barrier \\
East & E-3 & 48" CMP and HDPE culvert - appeared to have been extended with HDPE pipe at outlet. Connects Wetland 5 to an unnamed channel under CSX railroad tracks. & Reduced AOP & 0.89 / Insignificant Barrier \\
East & E-4 & 30" HDPE culvert with 60" metal apron on downstream side. Connects Wetland 6 under highway maintenance road under highway bridge. & Reduced AOP & 0.83 / Insignificant Barrier \\
East & E-5 & 32" HDPE culvert. Connects Wetland 6-504 to Wetland 6-115 under highway maintenance road under highway bridge. & Reduced AOP & 0.70 / Minor Barrier \\
East & E-6 & 24" HDPE culvert with 60" metal apron. Connects to Wetland 6 under highway maintenance road under highway bridge. & Reduced AOP & 0.86 / Insignificant Barrier \\
East & E-7 & 42" HDPE double-barrel culvert. Connects Wetland 6-303 to A-215 (unnamed channel) under I-481. & Reduced AOP & 0.84 / Insignificant Barrier \\
East & E-8 & Triple-barrel culvert under Kirkville Road, east of I-481. Elliptical CMPs, 60" wide by 36" tall. Conveyance from drainage ditches to A-215. & Reduced AOP & 0.90 / Insignificant Barrier \\
East & E-9 & Quadruple-barrel culvert under Kirkville Road, west of I-481. Elliptical CMPs, 60" wide by 36" tall. Conveyance from drainage ditches to A-215. & Reduced AOP & 0.90 / Insignificant Barrier \\
East & E-10 & 54" CMP. Connects highway drainage to Wetland 7. & Reduced AOP & 0.91 / Insignificant Barrier \\
East & E-11 & One 65" CMP culvert, two 54" HDPE culverts, one concrete headwall. Outlets into Wetland 9-105 – tributary of North Branch Ley Creek. & No AOP & 0.52 / Moderate Barrier \\
East & E-12 & Elliptical RCP, 84" wide by 66" tall. Connects Meadow Brook to Cedar Bay. & Reduced AOP & 0.77 / Minor Barrier \\
East & E-13 & Double-barrel culvert under I-481. Elliptical CMPs, 60" wide by 36" tall. Conveys Butternut Creek tributary under I-481. & Reduced AOP & 0.81 / Insignificant Barrier \\
\hline
\end{tabular}
\caption{Existing Culverts Within the Study Areas – East Study Area}
\end{table}

\textsuperscript{47} Ibid, 2016.
### Table 6-4-7-4b
Existing Culverts Within the Study Areas – North Study Area

<table>
<thead>
<tr>
<th>Study Area</th>
<th>Culvert ID</th>
<th>Description</th>
<th>NAACC Coarse AOP Rating</th>
<th>NAACC Fine AOP Score/ Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>North</td>
<td>N-1</td>
<td>30&quot; RCP. Outlets into wide channel surrounded by common reed; density reduces outside of highway right of way (ROW) - Pine Grove Brook.</td>
<td>Reduced AOP</td>
<td>0.65 / Minor Barrier</td>
</tr>
<tr>
<td>North</td>
<td>N-2</td>
<td>36&quot; RCP. Outlets into dense common reed low area on edge of highway that becomes South Branch of Pine Grove Brook.</td>
<td>Reduced AOP</td>
<td>0.72 / Minor Barrier</td>
</tr>
<tr>
<td>North</td>
<td>N-3</td>
<td>24&quot; RCP. Inlet and outlet are Mud Creek tributary wetland areas.</td>
<td>Reduced AOP</td>
<td>0.86 / Insignificant Barrier</td>
</tr>
<tr>
<td>North</td>
<td>N-4</td>
<td>24&quot; RCP. Inlet and outlet are highway drainage swale tributary to Wetland 10 and Mud Creek. No dry weather flow.</td>
<td>Reduced AOP</td>
<td>0.66 / Minor Barrier</td>
</tr>
<tr>
<td>North</td>
<td>N-5</td>
<td>24&quot; CMP. Inlet and outlet are highway drainage swale tributary to Wetland 10 and Mud Creek. No dry weather flow.</td>
<td>Reduced AOP</td>
<td>0.88 / Insignificant Barrier</td>
</tr>
<tr>
<td>North</td>
<td>N-6</td>
<td>84&quot; CMP. Inlet and outlet are Mud Creek.</td>
<td>Reduced AOP</td>
<td>0.90 / Insignificant Barrier</td>
</tr>
<tr>
<td>North</td>
<td>N-7</td>
<td>60&quot; HDPE double-barrel culvert. Inlet and outlet are Mud Creek.</td>
<td>Reduced AOP</td>
<td>0.86 / Insignificant Barrier</td>
</tr>
<tr>
<td>North</td>
<td>N-8</td>
<td>60&quot; CMP. Inlet and outlet are Mud Creek tributary Ont. 66-11-10-2.</td>
<td>Reduced AOP</td>
<td>0.90 / Insignificant Barrier</td>
</tr>
<tr>
<td>North</td>
<td>N-9</td>
<td>24&quot; CMP. Inlet is a drainage ditch area; outlet is Wetland 10.</td>
<td>Reduced AOP</td>
<td>0.78 / Minor Barrier</td>
</tr>
<tr>
<td>North</td>
<td>N-10</td>
<td>24&quot; RCP. Outlets to drainage ditch connected to Wetland 10 by culvert N-9.</td>
<td>Reduced AOP</td>
<td>0.82 / Insignificant Barrier</td>
</tr>
<tr>
<td>North</td>
<td>N-11</td>
<td>60&quot; CMP. Inlet and outlet are Mud Creek tributary Ont. 66-11-10-2.</td>
<td>Reduced AOP</td>
<td>0.78 / Minor Barrier</td>
</tr>
<tr>
<td>North</td>
<td>N-12</td>
<td>36&quot; CMP. Connects drainage ditches in two sections of Wetland 10 under clover leaf ramp.</td>
<td>Reduced AOP</td>
<td>0.88 / Insignificant Barrier</td>
</tr>
<tr>
<td>North</td>
<td>N-13</td>
<td>Elliptical CMP - 60&quot; wide by 40&quot; high. Inlet and outlet are Mud Creek tributary Ont. 66-11-10-2.</td>
<td>Reduced AOP</td>
<td>0.93 / Insignificant Barrier</td>
</tr>
<tr>
<td>North</td>
<td>N-14</td>
<td>Double-barrel culvert. 60&quot; CMP and 48&quot; RCP set at a higher elevation. Inlet and outlet are Mud Creek.</td>
<td>Reduced AOP</td>
<td>0.68 / Minor Barrier</td>
</tr>
<tr>
<td>North</td>
<td>N-15</td>
<td>84&quot; CMP. Inlet and outlet are Mud Creek.</td>
<td>Reduced AOP</td>
<td>0.70 / Minor Barrier</td>
</tr>
<tr>
<td>North</td>
<td>N-16</td>
<td>84&quot; CMP. Inlet and outlet are Mud Creek.</td>
<td>Reduced AOP</td>
<td>0.76 / Minor Barrier</td>
</tr>
<tr>
<td>North</td>
<td>N-17</td>
<td>84&quot; CMP. Inlet and outlet are Mud Creek.</td>
<td>Reduced AOP</td>
<td>0.68 / Minor Barrier</td>
</tr>
<tr>
<td>North</td>
<td>N-18</td>
<td>Double-barrel 24&quot; RCP. Inlets and outlets are Mud Creek under Thompson Road.</td>
<td>Reduced AOP</td>
<td>0.86 / Insignificant Barrier</td>
</tr>
<tr>
<td>North</td>
<td>N-19</td>
<td>56&quot; CMP, 20' long concrete headwall. Inlet is Wetland 10, outlet is Mud Creek. No dry-weather flow through the culvert.</td>
<td>No AOP</td>
<td>0.92 / Insignificant Barrier</td>
</tr>
</tbody>
</table>
### Table 6-4-7-4c
Existing Outfalls Observed During Field Work Within the Study Areas

<table>
<thead>
<tr>
<th>Study Area</th>
<th>Outfall ID</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Central</td>
<td>C-1</td>
<td>68&quot; concrete double-barrel culvert, one closed with 90° cast iron cap, 20.3’ concrete apron. Combined Sewer Overflow (CSO) outfall. Outlets to Onondaga Creek, 1.5 feet above the creek bed.</td>
</tr>
<tr>
<td>Central</td>
<td>C-2</td>
<td>8” metal outfall. Stormwater runoff conveyance. Outlets to Onondaga Creek, 2.5 feet above the creek bed.</td>
</tr>
<tr>
<td>Central</td>
<td>C-3</td>
<td>30” high density polyethylene (HDPE) outfall. Set flush with bridge pier, in the constructed “floodplain”. Stormwater runoff conveyance. Outlets to Onondaga Creek, 5.5 feet above the creek bed.</td>
</tr>
<tr>
<td>Central</td>
<td>C-4</td>
<td>24” HDPE pipe, 59” metal apron. Set in the constructed “floodplain”. Stormwater runoff conveyance. Outlets to Onondaga Creek, 4.5 feet above the creek bed.</td>
</tr>
<tr>
<td>Central</td>
<td>C-5</td>
<td>Three 14” clay pipes with stone surround, half buried in water and sediment in the stream bank/bed. Stormwater runoff conveyance. Outlets to Onondaga Creek.</td>
</tr>
<tr>
<td>Central</td>
<td>C-6</td>
<td>42” corrugated metal pipe (CMP) outfall, 90” metal apron. Stormwater runoff drainage. Outlets into Ley Creek, 2.6 feet above the creek bed.</td>
</tr>
<tr>
<td>North</td>
<td>N-2</td>
<td>36” CMP. Highway drainage. Outlets into a steep wet-weather flow drainage ditch to Mud Creek that appears to be eroding the culvert outlet.</td>
</tr>
</tbody>
</table>

**Note:** Additional outfalls are likely present within all study areas, but were not observed or evaluated during field work.

---

## I-481 North Study Area

The I-481 North Study Area includes Mud Creek and a number of its tributaries, all of which flow westwards through natural and channelized drainageways and wetlands into the Oneida River, which discharges to Oneida Lake. There are several unnamed tributaries to the north of the I-481 North Study Area that drain east and northwards through the Cicero Swamp State Wildlife Management Area. All of the surface waters in this area are designated as WOTUS and NYSDEC Class C (see Figure 6-4-7-10 through Figure 6-4-7-12) and none are listed on the 303(d) List of impaired waters. Surface waters within the Study Area are not classified as navigable under Section 10 of the Rivers and Harbors Act or Section 404 of the Clean Water Act, but these streams meet the definition of navigable under NYSDEC ECL Article 15.

- **Mud Creek:** The main stem of Mud Creek, Waters Index Number Ont. 66-11-10, originates to the east of the I-481 North Study Area and flows west underneath I-481 through a series of culverts (see Figure 6-4-7-11 and Figure 6-4-7-12). It connects emergent and forested wetlands via culverts located underneath the highway and eventually drains to the Oneida River. The eastern

---


part of Mud Creek is mapped by NWI as an intermittent riverine system with a seasonally flooded streambed. As the stream moves west, it becomes a lower perennial riverine system with an unconsolidated bottom that has been excavated and is permanently flooded. During the stream and culvert assessment survey, the 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.

The culverts connecting the main stem of Mud Creek (N-7, N-6, and N-14 through N-19 – see Figure 6-4-7-11 and Figure 6-4-7-12) were observed to be in moderate or good condition with little erosion or deposition and were assessed under the NAACC coarse screening system as having “Reduced AOP,” with the exception of the culvert located furthest upstream (culvert N-19 – see Figure 6-4-7-12), which was determined to have “No AOP,” as it does not convey water or sediment during dry-weather conditions. The NAACC fine rating system resulted in an assessment of the culverts N-14 through N-17 as minor barriers to aquatic organism passage, with scores ranging from 0.68 to 0.76, while culverts N-6, N-7, N-18, and N-19 were assessed as insignificant barriers to AOP with scores of 0.86-0.92 (Table 6-4-7-4b). The fine rating system does not penalize culverts for having no flow when the stream channel is also not flowing, which is partially why N-19 was found to have a higher score than expected. The culverts that convey the main stem of Mud Creek moderately or severely constrict the stream channel. Those rated as “minor” barriers had shallower and faster water flowing in them than in the stream channel, making them less suitable for AOP (refer to Appendix I-4).

- Tributaries to Mud Creek: Six tributaries to Mud Creek are in the vicinity of the I-481 North Study Area and converge into the main stem of Mud Creek within the study area (see Figure 6-4-7-14). Many of the tributaries are unnamed and are thus differentiated using their NYSDEC index stream segment numbers. These tributaries have all been classified by NWI as intermittent riverine systems with seasonally flooded streambeds and have drainage areas of less than one square mile upstream of their respective confluences with the main stem of Mud Creek. Stream segment Ont. 66-11-10-0 is a tributary to Pine Grove Brook that flows from north to south outside of the western portion of the North Study Area. Stream segment Ont. 66-11-10-1, the South Branch of Pine Grove Brook, is located north of Exit 29N and flows from east to west underneath I-81 via culvert N-2 inlet/outlets. To the north of segment Ont. 66-11-10-1, Pine Grove Brook flows from east to west underneath of I-81 via culvert N-1 inlet/outlets and joins first the South Branch of Pine Grove Brook, then the main stem of Mud Creek. Stream segment Ont. 66-11-10-2 is located along the east side of I-81 and flows north and west underneath I-81

and the ramps connecting to I-481 via culverts N-11, N-13, and N-8 inlet/outlets before exiting the study area, flowing under I-481, and connecting with the main branch of Mud Creek downstream of culvert N-7. Stream segments Ont. 66-11-10-3 and Ont. 66-11-10-3-1 both flow primarily northerly into the main stem of Mud Creek and do not pass through culverts within the study area. Stream segment Ont. 66-11-10-4 flows southeast, then west, and connects with the main stem of Mud Creek, which then crosses underneath of I-481 via culvert N-19.

Using the coarse screening system, the culverts conveying the Mud Creek tributaries were all assessed as having reduced AOP under typical flow conditions. Table 6-4-7-4b and Appendix I-4 describe the culverts in greater detail; refer to Figure 6-4-7-10 through Figure 6-4-7-12 for culvert locations.

Both culverts N-1 and N-2, which convey the two branches of Pine Grove Brook, were designated as minor barriers to AOP using the fine rating system, and had scores of 0.65 and 0.72, respectively. Both had little substrate cover within the structures and less water in the structures than in the channels.

As described above, culverts N-11, N-13, and N-8 convey tributary Ont. 66-11-10-2 through the highway interchange. These culverts are rated as insignificant and minor barriers to AOP, with the furthest upstream culvert, N-11, having the lowest rating of 0.78 (a minor barrier) due to the presence of the metal debris rack at the outlet.

In addition to the culverts described above, there are culverts that connect wetlands (described in Section 6-4-7.1.1) to the main stem and tributaries of Mud Creek: culverts N-3, N-4, N-5, N-9, N-10 and N-12 (see Figure 6-4-7-11). Culverts N-3, N-5, N-10, and N-12 were rated to be insignificant barrier to AOP, with scores ranging from 0.82 to 0.88, while culverts N-4 and N-9 were described as minor barriers to AOP with a scores of 0.66 and 0.78, respectively. All six culverts convey flow through the I-481 and I-81 interchange system and connect highway drainage to wetland areas, but N-4 scored lowest because of the vertical inlet, and the “minor barrier” rating for N-9 score was due to an inlet heavily clogged by debris that act as a physical barrier to aquatic organism passage.

Two highway drainage pipes, Outfalls N-1 and N-2, are also located in the I-481 North Study Area. Neither pipe was assessed for AOP, as there is no dry-weather flow through the pipes and neither the inlets nor outlets are wetlands or stream habitat.

6-4-7.1.3 FLOODPLAINS

Portions of the I-81 Central, I-481 East, and I-481 North Study Areas are located within the 100-year floodplain, the area with a one percent chance of flooding each year (shown on FEMA Q3 Flood Data Map for Onondaga County, New York, November 2016). This is the floodplain as defined under

the current 23 CFR §650 and is the Flood Hazard Area as defined under 6 NYCRR §502 (see Figure 6-4-7-15).

Central Study Area

Within the Central Study Area, mapped 100-year (base) floodplains occur along Onondaga Lake, Onondaga Creek, and Ley Creek (as shown on Figure 6-4-7-15). The floodplains of the creeks within the Central Study Area have been altered due to urban development. Onondaga Creek and Ley Creek have been channelized and lined with stone, which reduces the stream channels connection to their original floodplains, especially during normal flow conditions. Existing transportation infrastructure that intersects the 100-year floodplains of these waterbodies include: the I-81 bridge that passes over Carousel Center Drive, Ley Creek, and the CSX railroad tracks; the Park Street bridge over Ley Creek; the Evans Street bridge over Onondaga Creek; the I-690 westbound ramp over Onondaga Creek, the westbound and eastbound I-690 bridges over Onondaga Creek; the I-690 to northbound I-81 ramp that passes over West Street and Onondaga Creek; and the eastbound I-690 ramp over Onondaga Creek. Portions of transportation infrastructure within the Central Study Area that are shown to be within the 100-year floodplains of Onondaga Lake, Onondaga Creek, and Ley Creek include Onondaga Lake Parkway, Old Liverpool Road, Buckley Road, Park Street, Evans Street, West Genesee Street, Erie Boulevard West, and South West Street.

I-481 South Study Area

City Line Brook is piped underground within the I-481 South Study Area. There is no mapped floodplain for the unnamed tributary to Butternut Creek located in the vicinity of Noise Barrier 9. There is a mapped 100-year floodplain southeast of the I-81 and I-481 interchange. The floodplain is isolated within a forested area. There are no mapped Flood Hazard Areas in the I-481 South Study Area.

I-481 East Study Area

The southern portion of the I-481 East Study Area is within the Butternut Creek 100-year (base) floodplain (as shown on Figure 6-4-7-15). Portions of Manlius Center Road and Conrail Road within the I-481 East Study Area intersect the 100-year floodplain.

I-481 North Study Area

The 100-year (base) floodplains of Mud Creek and its tributaries are within the I-481 North Study Area (as shown on Figure 6-4-7-15). Within the study area, portions of I-81, I-481, South Bay Road, the on and off ramps connecting I-481 and Northern Boulevard, and the northeastern portion of the I-81 and I-481 Interchange intersect the 100-year floodplain.

6-4-7.1.4 STORMWATER

Stormwater runoff generated by rain can bring sediment, nutrients, and contaminants to surface waters. Pollutants contained in stormwater runoff are termed “non-point source pollution” to distinguish them from “point sources” of water pollution, such as those from sewage treatment plants or industrial processing wastes that discharge to a surface water through a pipe outlet or outfall. Land development that involves the replacement of pervious surfaces that allow runoff from precipitation events to infiltrate into the soil with impervious surfaces that do not allow runoff to infiltrate results
in an increase in the rate and volume of runoff discharged to receiving waters. Stormwater runoff can adversely affect water quality of the receiving surface water body due to erosion of banks resulting from the increased flow and to the discharge of pollutants contained in the stormwater runoff (e.g., pesticides, nutrients, metals, hydrocarbons, and bacteria).  

Chapter 5, Transportation and Engineering Considerations, Section 5-3-3 describes existing stormwater infrastructure within the study areas.

The I-481 South, East, and North Study Areas are generally open drainage systems, which facilitate ground infiltration. These open drainage systems utilize open swales, dry ditches, and the culverts described in Section 6-4-7.1.2 and Table 6-4-7-4.

Central Study Area

Within the I-81 Central Study Area, the drainage system primarily consists of a closed sewer network owned by the City of Syracuse and Onondaga County. This system contains drainage inlets, bridge deck drains, manholes, and storm pipes that convey runoff to Onondaga Creek through a network of small diameter pipes that drain to larger diameter county interceptor sewers. Most of the City of Syracuse is serviced by a combined sewer system, in which sanitary waste, industrial waste, and stormwater runoff are discharged to the same sewer system and conveyed to the Metropolitan Syracuse Wastewater Treatment Plant (Metro) for treatment. During periods of heavy rain or snowmelt, the wastewater volume in the combined sewer system may exceed the capacity of the combined sewer system or Metro. During these periods, the combined sewer system is designed to overflow (i.e., combined sewer overflows [CSOs]) and discharges excess combined flow into nearby surface waters, including Ley Creek and Onondaga Creek. The Ley Creek CSO outfall is located upstream of the Study Area, and several outfalls discharge into Onondaga Creek upstream of the Study Area. Within the Study Area, a 60-inch CSO outfall discharges into Onondaga Creek, near Butternut Street (see Figure 6-4-7-16 for CSO outfall locations and Chapter 5, Transportation and Engineering Considerations for additional descriptions of outfalls). The existing combined sewer connected to this outfall has been identified as having insufficient capacity, resulting in a history of flooding at the existing I-81 underpass at Butternut Street, to the east of the outfall itself.

In 1989, litigation between New York State, the Atlantic States Legal Foundation, and Onondaga County regarding alleged violations of State and Federal water pollution control laws was settled through the development of a Consent Judgement requiring investigation into the pollution of Onondaga Lake and its tributaries. The Amended Consent Judgement was signed in 1998, after a series of engineering and scientific studies revealed the need for upgrades to Metro and to provide treatment of CSOs that occur in the Metro service area. Under the Amended Consent Judgement, Metro was obligated to achieve a phosphorous effluent limit of 0.02 mg/L. In addition, Onondaga

Sources of stormwater runoff pollutants include fertilizers and pesticides applied to lawns and crops, atmospheric deposition of airborne pollutants onto impervious surfaces (roads/buildings), improperly contained garbage or organic wastes, and petroleum/metals deposited by automobiles on roadways. Nutrient pollutants (nitrogen/phosphorus) can result in algal blooms in receiving waters causing hypoxia and damage to the aquatic ecosystem. Toxic pollutants (metals, petroleum) can damage aquatic life and spread to terrestrial components of the ecosystem. Sediment in runoff can cause turbidity and deposition, which can damage aquatic plant and animal life.
County developed the Save the Rain initiative, a comprehensive stormwater management plan focused on the design and implementation of gray and green infrastructure solutions to address the CSOs and surface water pollution issues. The Central, I-481 South, I-481 East, and I-481 North Study Areas are subject to the Save the Rain initiative; NYSDEC and USACE have stated that the Project should maximize the use of green infrastructure practices to the extent possible to improve water quality in Onondaga Lake.

Since the 2010 implementation of Save the Rain, over 180 separate green infrastructure projects, capturing an average of over 122 million gallons of stormwater every year, have been created on public and private property throughout Onondaga County. Save the Rain green infrastructure technologies include rain gardens, bioswales, porous pavement, green roofs, cisterns, and underground infiltration trenches, all of which intercept stormwater before it enters the combined sewers, addressing both water quality and quantity issues. The Amended Consent Judgement required elimination or capture and treatment of 95 percent of the combined sewage generated in the City of Syracuse by 2018; this goal was achieved in 2014. Water quality monitoring conducted in compliance with the Amended Consent Judgement indicates improvements in Onondaga Lake since the implementation of Save the Rain and upgrades to Metro and green infrastructure projects.58

In 2014, the northern two thirds of Onondaga Lake were determined to be suitable for swimming use. The improved water quality has led to improvements in the fish community in Onondaga Lake; 26 adult species of fish were captured in 2014, as compared to 20 species in 2000, and largemouth bass capture rates were 50 per hour during the same year, as compared to just over 10 per hour in 2000.59 Improvements to water quality from the Save the Rain program are expected to continue to be seen in the Central Study Area surface waters, as additional green infrastructure practices are built, improving the stormwater runoff water quality and decreasing the occurrence of CSOs.

I-481 South Study Area

Portions of the I-481 South Study Area contain ditches and swales that drain to an existing storm sewer network, the outlet of which is an existing 84” reinforced concrete pipe that drains northwest along West Ostrander Avenue towards Onondaga Creek. Additionally, portions of the I-481 South Study Area drain east along I-481 towards Butternut Creek. There are no known drainage issues or reports of pavement flooding in the South Study Area.

I-481 East Study Area

The I-481 East Study Area consists of an open drainage system tributary to Butternut Creek and the North Branch of Ley Creek, as described in Section 6-4-7.1.2. There are no known drainage issues or reports of pavement flooding in the I-481 East Study Area.

I-481 North Study Area

As described in Section 6-4-7.1.2, the existing drainage pattern of the I-481 North Study Area is to the west. Ditches and swales along I-481 convey roadway runoff to Mud Creek, the primary drainage

59 http://static.ongov.net/WEP/AMP/LAKE_PROGRESS_RPTS/OnondagaLakeProgressReport_August2015_UPDATE.pdf
outlet for the I-481 North Study Area. There are no known drainage issues or reports of pavement flooding associated with the I-481 North Study Area.

6-4-7.1.5 GROUNDWATER

Groundwater is not used as a potable water supply within the Project Area. The primary water supply for the City of Syracuse is Skaneateles Lake, a Finger Lake approximately 20 miles southwest of the city. The closest USEPA-designated sole source aquifer (SSA) to the Project Area is the Cortland-Homer-Preble SSA, located approximately 13 miles to the south of the I-481 South Study Area.

The Project Area contains shale and limestone bedrock, located at a depth of approximately 20 – 70 feet below the ground surface, and overlain by an unconsolidated basal aquifer. The layers contain slowly moving water that ranges from saline to briny and is enriched with minerals through the dissolution of halite, calcite, and gypsum. Overlying middle and upper glacial valley-fill deposits contain several aquifers with more rapidly moving and less mineral-rich freshwater. Groundwater flow-paths are present along the southeastern shore of Onondaga Lake, in the Central Study Area, and allow salty water to move upwards from the deep flow system to brine springs in and around the lake. From 1797 to 1917, commercial salt production utilized brine from the springs on the southeastern shore of Onondaga Lake, from former brine wells dug or drilled at the lake’s edge, and from wells that tapped halite beds near Tully, 15 miles south of Syracuse. The extensive mining of the halite layers in the Tully Valley resulted in subsidence and fracturing of the bedrock layers and created hydraulic connections between the bedrock, unconsolidated aquifer, and the aquifers within the valley-fill deposits. USGS (2000) noted that the hydraulic connection may be increasing the quantity and decreasing the quality of the water that flows through the rest of the Onondaga Creek valley aquifer system. This connection may have an impact on the existing groundwater quality in the I-481 South and Central Study Areas, as well as in Onondaga Lake.

The northern portion of the Central Study Area is within a principal aquifer (Baldwinsville, see Figure 6-4-7-16), defined by NYSDEC (Technical and Operational Guidance Series (TOGS) 2.1.3) as “aquifers known to be highly productive or whose geology suggests abundant potential water supply, but which are not intensively used as sources of water supply by major municipal systems at the present time.” As described in Section 5.3.3, the subsurface ground conditions were evaluated using extensive historical soil borings performed in the 1960s by the New York State Department of Public Works. The boring log records primarily concentrated along the existing bridge footprints within the I-81 Viaduct Study Area. In addition, ten new soil borings were performed in 2015 by NYSDOT at selected locations north and south of the I-690 & I-81 interchange. The subsurface conditions consist of manmade fill of variable thickness underlain by natural soils and bedrock and are described further in Section 5.3.3.

Within the principal aquifer, in the vicinity of Ley Creek geotechnical borings recorded groundwater within the surficial aquifer between 3 feet to 3.75 feet below ground surface. The reported elevation of the groundwater at the time of borings (1960s) ranged from 375 to 410 feet within the rest of the Central Study Area. Artesian water head up to seven feet above existing grade was reported at

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60 An aquifer that supplies at least 50 percent of the drinking water for its service area and where there are no reasonably available alternative drinking water sources should the aquifer become contaminated.
underlying bedrock about 0.75 to 1.0 miles east of the I-81 viaduct during subsurface explorations in 2015 (NYS DOT, 2016).

Within the I-481 South Study Area, sinkholes caused by karstic bedrock conditions occur at the southerly region of the I-81/I-481 South Interchange. Currently, NYSDOT is monitoring two sinkholes located to the north of the East Seneca Turnpike (see Section 5.3.3 for additional information on the sinkholes).

There are no known groundwater considerations in the I-481 North or I-481 East Study Areas.

### 6-4-7.2 NO BUILD ALTERNATIVE

The No Build Alternative would maintain the highway in its existing configuration with routine maintenance and minor repairs to ensure safety of the traveling public. The No Build Alternative assumes no improvements within the Project limits besides those planned by others or implemented as part of routine maintenance. As such, there would be no impacts to wetlands, surface waters, and floodplains associated with the No Build Alternative.

### 6-4-7.3 ENVIRONMENTAL CONSEQUENCES OF THE VIADUCT ALTERNATIVE

#### 6-4-7.3.1 PERMANENT/OPERATIONAL EFFECTS

**Freshwater Wetlands and Surface Waters**

As shown in Tables 6-4-7-5 and 6-4-7-6, approximately 4.2 acres (3.9 acres vegetated and 0.3 acres open water) of Federal and State-jurisdictional wetlands are present within the Central Study Area associated with Ley Creek. However, none are located within the limits of disturbance for the Viaduct Alternative within the Central Study Area (see Wetland 1 in Figure 6-4-7-2). As design progresses, all practicable measures (i.e., avoidance, implementation of erosion and sediment control measures) would be implemented to continue to minimize effects to freshwater wetlands of the Central Study Area.

**Table 6-4-7-5**

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
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<td><strong>75.96</strong></td>
<td><strong>0.01</strong></td>
<td><strong>75.95</strong></td>
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</tbody>
</table>

*Source: I-81 Viaduct Project: Wetland Delineation and Surface Waters Assessment Summary.*
Permanent Effects to State Freshwater Wetlands from the Viaduct Alternative

<table>
<thead>
<tr>
<th>Study Area</th>
<th>Delineated Freshwater Wetlands (acres)</th>
<th>State Jurisdictional Freshwater Wetlands (acres)</th>
<th>State Jurisdictional Freshwater Wetlands Effects (acres)</th>
<th>Remaining Freshwater Wetlands (acres)</th>
</tr>
</thead>
<tbody>
<tr>
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<td>4.2</td>
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<td>I-481 South Study Area</td>
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<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>I-481 East Study Area</td>
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<td>44.04</td>
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<td>27.71</td>
<td>27.71</td>
<td>0.01</td>
<td>27.70</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>75.96</strong></td>
<td><strong>75.96</strong></td>
<td><strong>0.01</strong></td>
<td><strong>75.95</strong></td>
</tr>
</tbody>
</table>

Note: Freshwater Wetland 8 (0.01 acres) is Federally regulated, but not State regulated.

Source: I-81 Viaduct Project: Wetland Delineation and Surface Waters Assessment Summary

As part of the noise mitigation (see Section 6-4-6) for the Viaduct Alternative, noise barriers would be constructed in the eastern part of the I-481 South Study Area, the I-481 East and I-481 North Study Areas, and the eastern part of the Central Study Area. There are 27.71 acres of Federal and State-jurisdictional wetlands within the I-481 North Study Area. The Viaduct Alternative would permanently impact 0.01 acres of freshwater wetlands in the I-481 North Study Area. The effect would occur in the vicinity of Wetland 10, which is part of a wetland complex associated with State jurisdictional Class II wetlands (CIC-13, CIC-15, CIC-16, and CIC-17) and Federal jurisdictional wetlands located in the I-481 North Study Area.

No Federal or State jurisdictional freshwater wetlands would be permanently affected in the I-481 East or South Study Areas under the Viaduct Alternative.

With respect to State-regulated freshwater wetland adjacent area, approximately 14.67 acres\(^61\) of State-regulated freshwater wetland adjacent area is present within the Central Study Area. Approximately 0.05 acres of State-regulated freshwater wetland adjacent area that is currently pervious (maintained median area) would be permanently affected in the vicinity of Wetland 1 in the Central Study Area by the addition of pavement. However, approximately 0.15 acres of existing pavement within the State-regulated freshwater wetland adjacent area of Wetland 1 would be permanently removed. As a result, there would be a net gain of 0.10 acres of pervious vegetated areas within the State-regulated freshwater Wetland 1 adjacent area, benefiting freshwater wetlands within the Central Study Area. Following construction, the 0.15 acres of previous pavement area would be restored using soil restoration techniques and planting native plants where possible as per the landscape restoration plan that would be developed for this alternative. Therefore, no adverse effects to State-regulated freshwater wetland adjacent area would occur as a result of the Viaduct Alternative in the Central Study Area.

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\(^{61}\) This adjacent area acreage also overlaps with the terrestrial ecological community calculations outlined in Section 6-4-8 “General Ecology and Wildlife Resources.”

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PIN 3501.60
6-301
As described above, noise barriers would be constructed in the vicinity of freshwater wetlands located in the I-481 East and I-481 North Study Areas. These noise barriers would permanently affect 1.86 acres of the 81.33 acres of existing State-regulated freshwater wetland adjacent area within the I-481 East Study area and 0.43 acres of the existing 62.58 acres of State-regulated freshwater wetland adjacent area within the I-481 North Study area, for a total of 2.29 acres.

A Section 404 permit, and a Section 401 Water Quality Certification and an Article 24 “Freshwater Wetlands” permit would be obtained from the USACE and NYSDEC, respectively. As discussed in Appendix I-1, NYSDEC and NYSDOT have a Memorandum of Understanding (MOU) pursuant to Article 24 of the Environmental Conservation Law (ECL), and accordingly, the small amount of NYSDEC freshwater wetland effects (0.01 acres) may qualify for a NYSDEC General Permit GP-0-11-002 under Activity #2 “Permanent and temporary placement of earth fills.” Under the conditions of this General Permit, NYSDOT would submit a request for authorization to NYSDEC as design advances.

According to the current (2017) NWP conditions and based on the anticipated wetland effects of less than 0.10 acres, no compensatory mitigation is expected for this alternative. As result, the minor impact of 0.01 acres of permanent wetlands affects would not result in significant adverse effects on wetlands. State-regulated freshwater wetland adjacent area would be affected during the operation of the Viaduct Alternative.

**Executive Order 11990**

The Viaduct Alternative was reviewed for compliance with Executive Order (EO) 11990, Protection of Wetlands (23 CFR 771.125(a)(1)). Under EO 11990, Federal actions (in which impacts to wetlands are unavoidable) require a “finding” that there are no practicable alternatives to the proposed construction in wetlands and that the proposed action includes all practical means to reduce harm to wetlands.

The Viaduct Alternative has been carefully studied with respect to its effects on wetlands. Design refinements (i.e., alterations to ramp and noise barrier alignments to avoid wetlands where possible) have been made to avoid and minimize effects to wetlands. As described above, the Viaduct Alternative involves unavoidable permanent impacts to 0.01 acres of freshwater wetlands due to the placement of noise walls. This work is necessary to fulfill the purpose and need of the proposed project.

The Viaduct Alternative was designed to minimize and avoid impacts to wetlands resulting in a minimal permanent impact of 0.01 acres. Coordination regarding wetland effects as a result of the Viaduct Alternative is ongoing with USACE and NYSDEC. Based upon the above considerations, it is determined that this alternative includes all practicable measures to minimize harm to wetlands that may result from such use.

**Surface Waters**

*Effects from Stormwater*

As described in Chapter 5, an analysis of the existing and proposed drainage conditions was undertaken, with a focus on water quality and quantity. Additionally, the potential effects of the Viaduct Alternative on surface waters were analyzed using the FHWA’s “Pollutant Loadings Analysis”
(FHWA-RD-88-006) and “Toler Analysis” (USGS-MDPW-003) methodologies. Appendix I-3 summarizes the results of these analyses. The analyses are conservative, in that they assume that the runoff enters the receiving waterbody directly, without any treatment or passing through water quality infrastructure. Under the Viaduct Alternative, two new stormwater trunk lines would collect stormwater runoff and discharge it to outfalls (one 96-inches, the other 42-inches in diameter) on opposite banks of Onondaga Creek near Wallace Street, between the Herald Place Bridge and the West Street to I-690 eastbound ramp (see Figure 6-4-7-3). This would reduce the volume of runoff flowing to the combined sewer system, decrease the frequency and magnitude of overflow events, and help Onondaga County meet the mandate in the USEPA Consent Order. The new stormwater system would also include BMPs such as hydrodynamic stormwater treatment units and infiltration/detention basins, which would improve stormwater quality prior to it entering the stormwater trunk lines. As described in Section 5.5.3, the total storage volume of each infiltration/detention basin BMP would reflect the volume required for 24-hour extended detention of the post-developed 1-year, 24-hour storm event. The hydrodynamic units would be sized as needed to meet the water quality target volume, which was calculated using the post-developed 1-year, 24-hour storm event. The NYSDEC storage volume requirements for the 10-year storm and 100-year storm were used as the design volume for the infiltration/detention basin BMPs, indicating that they would be able to treat a large volume of the stormwater from the Project Area. Under the current drainage system, the stormwater enters the combined sewer system and is treated by Metro during low-flow conditions, but untreated stormwater and sanitary sewage overflows into Onondaga Creek during high flow conditions. The level of treatment provided to stormwater by Metro under low-flow conditions does not mitigate for the increased pollutant loading that occurs during CSO events. While stormwater would no longer be treated at Metro and only a portion of the stormwater runoff volume would be treated by stormwater management BMP’s, the overall benefit of the separate storm drainage system would improve water quality by reducing CSO’s.

The pollutant loading analyses were conservative in assuming the No Build Alternative would not provide any treatment of water quality. Thus, any improvements to water quality indicated by the FHWA Pollutant Loading Analysis or the Toler Analysis would represent improvements over the No Build Condition due to the Viaduct Alternative, through changes in land use, the separation of the stormwater and sanitary sewer systems, or the addition of BMPs.

Table 6-4-7-7 presents the results of the stream impact analysis portion of the FHWA’s Pollutant Loading Analysis. FHWA’s Pollutant Loading Analysis is a quantitative procedure for estimating the magnitude and frequency of occurrence, on a watershed scale, of in-stream concentrations of pollutants caused by stormwater runoff, namely copper, lead, zinc, total organic carbon, chemical oxygen demand, nitrate + nitrite nitrogen, total kjeldahl nitrogen, phosphorous, total suspended solids, and volatile suspended solids. Similarly, the Toler Analysis estimates the effects of chloride on surface waters, resulting from applications of highway deicing salts within the watershed. Highway right-of-way (area of pavement area [in acres]) is the primary variable in these methodologies that demonstrate differences in pollutant concentrations between the Project alternatives. These methodologies are applied on a watershed scale and focus on the entire right-of-way, rather than on the area of disturbance that was evaluated for the runoff discussion presented in Chapter 5, Transportation and Engineering Considerations.
### Table 6-4-7-7

**Summary Estimate Results of Stream Impact Assessment without Best Management Practices (BMPs)**

<table>
<thead>
<tr>
<th>Pollutant</th>
<th>Soluble Fraction</th>
<th>Acute Criteria</th>
<th>Threshold Effect Level</th>
<th>No Build</th>
<th>Build</th>
</tr>
</thead>
<tbody>
<tr>
<td>Copper (Cu)</td>
<td>0.4</td>
<td>0.021</td>
<td>0.045</td>
<td>0.025</td>
<td>0.025</td>
</tr>
<tr>
<td>Lead (Pb)</td>
<td>0.1</td>
<td>0.103</td>
<td>0.450</td>
<td>0.046</td>
<td>0.045</td>
</tr>
<tr>
<td>Zinc (Zn)</td>
<td>0.4</td>
<td>0.374</td>
<td>0.785</td>
<td>0.151</td>
<td>0.149</td>
</tr>
</tbody>
</table>

**Notes:**
1. Concentration in runoff entering the stream that has the probability of occurring once in three years. FHWA methodology: https://www.dot.ny.gov/divisions/engineering/environmental-analysis/manuals-and-guidance/epm/repository/4-5-b.pdf
3. United States Environmental Protection Agency. The acute criteria indicate the highest concentration of specific pollutants or parameters in water that are not expected to pose a significant risk to the majority of species. https://www.epa.gov/wqc/national-recommended-water-quality-criteria-aquatic-life-criteria-table
4. United States Environmental Protection Agency Nationwide Urban Runoff Program. The threshold effect level indicates the concentration from a short storm surge that would result in the mortality of the most sensitive individual of the most sensitive species. https://www3.epa.gov/npdes/pubs/sw_nurp_vol_1_finalreport.pdf

The Central Study Area would consist of 146.2 acres of impervious surface under the No Build Alternative. Under the Viaduct Alternative, the amount of impervious area in the Central Study Area (136.8 acres) would decrease by 9.4 acres, or 6.4 percent. The FHWA Pollutant Loading analyses, which were conducted without any reduction in loadings due to BMPs (which would occur under the Viaduct Alternative) or treatment by Metro (which would occur under the No Build Alternative), indicate that loadings of pollutants on an annual and mean event basis would be approximately 5 percent lower under the Viaduct Alternative than under the No Build Alternative. The reduced impervious surface would result in a smaller volume of storm runoff, leading to smaller pollutant loading. The Toler Analysis showed that chloride loadings to Lower Onondaga Creek would be higher by approximately 18 percent on an annual basis for the Viaduct Alternative, when compared with the No Build Alternative, due to the 18 percent increase in lane miles that would have to be deiced during the winter. Even though the total lane miles would increase under the Viaduct Alternative, the total acreage of impervious area in the study area would be reduced through changes in land use outside of the highway lanes but within the NYSDOT right of way (ROW). Restoration of open areas would be controlled so that no more than 35 percent of these areas would be constructed as impervious surfaces (see Chapter 5, Transportation and Engineering Considerations). The reduction in impervious area outside of the highway lanes but within the NYSDOT right-of-way could lead to a reduction in chloride applications, and a benefit to water quality not indicated by the Toler Analysis. Additionally, while stormwater would no longer be treated at Metro and only a portion of the stormwater runoff volume would be treated by stormwater management BMP’s, the overall benefit of the separate storm
drainage system would further improve water quality in a way not indicated by the FHWA analysis, by reducing CSO events.

The FHWA Pollutant Loading analyses indicated that without BMPs, projected lead and zinc loadings would not result in concentrations of these pollutants discharging to Onondaga Creek that would pose a risk to aquatic organisms (see Table 6-4-7-7). Projected copper concentrations discharging to Lower Onondaga Creek would slightly exceed the USEPA acute criteria of 0.021 mg/L, but at 0.025 mg/L, would be well below the USEPA National Urban Runoff Program (NURP) suggested threshold level of 0.045 mg/L and would not pose a risk to aquatic biota. With implementation of stormwater BMPs expected to have a target removal rate of 80 percent of total suspended solids (TSS), and thus the metals that attach to these particles, pollutant loadings of lead, zinc, and copper to Lower Onondaga Creek would be lower than projected by the FHWA Pollutant Loading analysis, resulting in concentrations in Lower Onondaga Creek that would be below the USEPA acute criteria concentrations.

Currently, Onondaga Creek is listed as impaired on the 303(d) List due to nutrients, specifically phosphorus. The Viaduct Alternative would result in a five percent lower loading of nutrients such as phosphorus, and nitrite and nitrate nitrogen (as compared to the No Build Alternative), and proposed stormwater BMPs would have target removal rates for phosphorus of at least 40 percent, which would further reduce phosphorus loads to Onondaga Creek. Similarly, stormwater BMPs would have target TSS removals of at least 80 percent, which would also further reduce the TSS loadings to Onondaga Creek. BMPs designed in accordance with the New York State Stormwater Management Design Manual (Design Manual) do remove nitrogen from stormwater, but target removal rates vary depending on the practice and are typically not quantified in the Design Manual. Therefore, the operation of the Viaduct Alternative with the proposed stormwater trunk lines and stormwater BMPs (i.e. hydrodynamic units and detention basins – discussed below) would provide sufficient treatment

62 Concentration in runoff entering the stream that has the probability of occurring once in three years. FHWA methodology: https://www.dot.ny.gov/divisions/engineering/environmental-analysis/manuals-and-guidance/epm/repository/4-5-b.pdf

63 United States Environmental Protection Agency. The acute criteria indicate the highest concentration of specific pollutants or parameters in water that are not expected to pose a significant risk to the majority of species. https://www.epa.gov/wqc/national-recommended-water-quality-criteria-aquatic-life-criteria-table

64 United States Environmental Protection Agency Nationwide Urban Runoff Program. The threshold effect level indicates the concentration from a short storm surge that would result in the mortality of the most sensitive individual of the most sensitive species. https://www3.epa.gov/npdes/pubs/sw_nurp_vol_1_finalreport.pdf


for the stormwater and would not result in the failure of the surface waters within the Central Study Area to meet the water quality criteria for its designated Class C Water Classification.

The higher chloride loadings would not result in significant adverse effects to water quality of Lower Onondaga Creek, the receiving water body in the Toler Analysis, when compared with the No Build Alternative. The average annual concentration entering Lower Onondaga Creek from the Central Study Area under the Viaduct Alternative projected through the Toler analysis is 3.46 ppm (equivalent to mg/L). The chloride concentration in Lower Onondaga Creek in 2012, as measured by NYSDEC, ranged from 259 to 833 mg/L. Thus, according to the Toler Analysis, the Central Study Area under the Viaduct Alternative would contribute a 0.4 to 1.3 percent increase in the total concentration of chloride in Lower Onondaga Creek. The USEPA chronic toxicity water quality criteria concentration of chloride, for the majority of aquatic species, is 230 mg/L, while the acute toxicity concentration is 860 mg/L. Both high and low concentrations of chloride have effects on diversity and community structure of aquatic invertebrates and may influence reproduction of aquatic organisms. Since stormwater BMPs do not remove chloride from stormwater, the Viaduct Alternative would result in higher chloride concentration within Lower Onondaga Creek when compared with the No Build Alternative, in which chloride is already elevated above the chronic toxicity water quality criteria; under both alternatives, chloride concentration would be below the acute toxicity concentration.

As discussed in Chapter 5, Transportation and Engineering Considerations, a combination of hydrodynamic stormwater treatment units and infiltration/detention basins would be installed within the Central Study Area and would treat the 1-year, 24-hour rainfall event for watersheds where phosphorous pollution is a concern. The target water quality volume would be 7.6 acre-feet of stormwater runoff, and the runoff reduction minimum volume would be 0.4 acre-feet. The combination of stormwater treatment practices would meet the peak flow attenuation requirements as described in the Design Manual. The water quality treatment provided by the implementation of these BMPs would further reduce the pollutant loadings previously described. The final locations for the BMPs would be determined during final design and would be positioned within the landscape in accordance with the Design Manual, in such a way that would provide the required water quality treatment, runoff reduction, and peak flow attenuation. In addition to the water quality BMPs, green infrastructure practices are proposed for the study area, which would be further refined during the final design stage. Practices under consideration include vegetated swales, stormwater tree planting, tree pits, stormwater planters, rain gardens, and conservation of existing trees. In addition to providing the water quality improvements described above, some of the proposed BMPs and green infrastructure practices under consideration would increase infiltration, decrease stormwater runoff volume within the study area, and provide storage and delayed release of stormwater, which would reduce peak flows. Therefore, the Viaduct Alternative would result in an overall benefit to receiving wetlands, surface waters, floodplains, and groundwater within the study area.

Most of the Central Study Area is within or on the border of the Clinton/Lower Main Interceptor Sewer combined sewershed (see Figure 6-4-7-17). The exception is the northern portion of study

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68 http://nwis.waterdata.usgs.gov/usa/nwis/qwdata/?site_no=04240010
69 https://www.epa.gov/wqc/national-recommended-water-quality-criteria-aquatic-life-criteria-table
70 http://dx.doi.org/10.1016/j.scitotenv.2014.12.012
Combined Sewershed Basins
Figure 6-4-7-17
area, which is on the border of the Hiawatha Regional Treatment Facility combined sewershed, and a portion of the study area immediately adjacent to Onondaga Creek where the storm and sanitary sewers have been separated. Within the Central Study Area, there are four active combined sewer outfalls and two additional outfalls along Onondaga Creek. The outfalls are expected to remain active under the Viaduct Alternative but would deliver reduced loads of stormwater and pollutants to Onondaga Creek.

Stormwater runoff from the Central Study Area would not discharge to the City’s combined sewer system; design of the new roadways’ drainage system would prevent any contribution to the current combined sewer, in accordance with the USEPA Consent Order and the Save the Rain initiative. A new stormwater runoff conveyance system would discharge runoff directly to the receiving surface water of Onondaga Creek (see Chapter 5, Transportation and Engineering Considerations). This direct discharge of stormwater flows into Onondaga Creek and would represent a change from the existing condition; currently, a CSO outfall discharges into the creek during high flow events. With the installation of the stormwater trunk lines, stormwater discharges into Onondaga Creek would occur during all stormflow events. However, these discharges would have improved water quality as compared to the CSO events due to the separation of the stormwater and sanitary sewers and the implementation of BMPs in the watershed. CSO events would be unlikely to occur under the operation of the stormwater trunk lines, providing a substantial improvement to water quality downstream of the outfalls. Therefore, the operation of the stormwater trunk lines would have a beneficial effect on the water quality in Onondaga Creek and Onondaga Lake when compared to the No Build Alternative.

With the implementation of BMPs designed to treat stormwater quantity and quality in accordance with the Design Manual and the Stormwater Pollution Prevention Plan (SWPPP) prepared in accordance with SPDES General Permit for Stormwater Discharges from Construction Activity (GP-0-15-002), stormwater runoff from the Viaduct Alternative would have beneficial effects to Onondaga Creek or Onondaga Lake when compared to the No Build Alternative, and would not result in the failure of these surface waters to meet the water quality criteria for their designated water quality classification. The following describes the potential impact of the stormwater trunk lines on the bed and banks of Onondaga Creek.

Effects on Beds and Banks of the Surface Waters

Table 6-4-7-8 summarizes the temporary and permanent effects of the Viaduct Alternative on surface waters in the Central Study Area. While no permanent loss (fill) of waters is proposed under the Viaduct Alternative, the work to construct structures below the ordinary high water of the Onondaga Creek (a WOTUS), in addition to the wetland impacts associated with the noise walls, is anticipated to meet the requirements for Section 404 of the Clean Water Act authorization under a Nationwide Permit and, based on final design details, may either meet the requirements for coverage under the NYSDEC Section 401 Water Quality Certification issued for the chosen Nationwide Permit or require

Table 6-4-7-8


Specifically, NWP #7 (Outfall Structures and Associated Intake Structures), NWP#18 (Minor discharges) & NWP #14 (Linear Transportation) may be appropriate.
an individual certification. Based on the field survey of Ley Creek and a review of the Project plans for the Central Study Area, the proposed project is not expected to result in direct effects to Ley Creek.

### Table 6-4-7-8

**Effects to Surface Waters from the Viaduct Alternative**

<table>
<thead>
<tr>
<th>Central Study Area – Onondaga Creek</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Existing</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Culvert (linear feet (lf))</td>
<td>Stream Channel (lf)</td>
</tr>
<tr>
<td>226</td>
<td>1,563</td>
</tr>
<tr>
<td><strong>Design</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Culvert (lf)</td>
<td>Stream Channel (lf)</td>
</tr>
<tr>
<td>226</td>
<td>1,563</td>
</tr>
</tbody>
</table>

**Summary of Effects**

<table>
<thead>
<tr>
<th>Quantity</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Length of Permanent Stream Impact (lf)</td>
<td>0</td>
</tr>
<tr>
<td>Area of Permanent Stream Impact (sf)</td>
<td>0</td>
</tr>
<tr>
<td>Area of Permanent Stream Impact (acres)</td>
<td>0</td>
</tr>
<tr>
<td>Length of Temporary Stream Impact (lf)</td>
<td>65</td>
</tr>
<tr>
<td>Area of Temporary Stream Impact (sf)</td>
<td>2,387</td>
</tr>
<tr>
<td>Area of Temporary Stream Impact (acres)</td>
<td>0.05</td>
</tr>
</tbody>
</table>

**Note:** ***Used culvert section for Erie Blvd and W. Genesee St only, treated other bridge structures as open channel.***

<table>
<thead>
<tr>
<th>Central Study Area – Ley Creek</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Existing</strong></td>
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</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Culvert (lf)</td>
<td>Stream Channel (lf)</td>
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<td>0</td>
<td>-</td>
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<tr>
<td><strong>Design</strong></td>
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<tr>
<td>Culvert (lf)</td>
<td>Stream Channel (lf)</td>
</tr>
<tr>
<td>0</td>
<td>-</td>
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</tbody>
</table>

**Summary of Effects**

<table>
<thead>
<tr>
<th>Quantity</th>
<th>Description</th>
</tr>
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<tbody>
<tr>
<td>Length of Permanent Stream Impact (lf)</td>
<td>0</td>
</tr>
<tr>
<td>Area of Permanent Stream Impact (sf)</td>
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<tr>
<td>Area of Permanent Stream Impact (acres)</td>
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<tr>
<td>Length of Temporary Stream Impact (lf)</td>
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</tr>
<tr>
<td>Area of Temporary Stream Impact (sf)</td>
<td>0</td>
</tr>
<tr>
<td>Area of Temporary Stream Impact (acres)</td>
<td>0</td>
</tr>
</tbody>
</table>
The new 96-inch (8-foot) outfall for the proposed stormwater trunk line servicing the area east of Onondaga Creek would be located in the existing bank of Onondaga Creek, and would not have a permanent effect on the surface water area or stream length, as described in Table 6-4-7-8. The invert of the outfall would be approximately 1.6 feet above the Onondaga Creek stream bed at that the outfall location. During low flow conditions, the top of the water surface is at 1.9 feet above the creek bed and therefore the pipe would contain some water for a short distance. The top of the outfall would be below the mean high water line. Therefore, discharge from the outfall would not result in a head drop and would have minimal erosive impact on the stream bed and stone wall banks. The proposed sewer trunk would be located on an outside meander bend of Onondaga Creek, at an angle that would direct the flow from the outfall towards the far bank, which would reduce the potential for erosion of the bed and banks around the outfall structure. Additional protection from erosion would be provided by the construction of an energy-dissipating structure. The energy dissipating structure would be designed during final design and would meet the requirements of the New York State Department of Transportation’s Geotechnical Design Procedure: Bank and Channel Protective Lining Design Procedures.

Similarly, the new 42-inch (3.5-foot) outfall for the proposed stormwater trunk line servicing the area west of Onondaga Creek would be located in the existing embankment of the Onondaga Creek floodplain, on the opposite shore from the 96-inch outfall. There would be no permanent effect on the surface water area or stream length as a result of the new outfall, as described in Table 6-4-7-8. The invert of the outfall would be between 15 and 20 feet above the Onondaga Creek stream bed at the outfall location (exact location to be determined during final design). Protection from erosion would be provided by the construction of an energy-dissipating structure and bank stabilization measures. The energy dissipating structure would be designed during final design and would meet the requirements of the New York State Department of Transportation’s Geotechnical Design Procedure: Bank and Channel Protective Lining Design Procedures.

The velocities and hydraulics of discharges from the stormwater trunk lines would be determined during final design, along with the details of protection measures needed to stabilize the creek bed, banks, and floodplain. The stormwater trunk lines would discharge stormwater runoff directly to Onondaga Creek, but the proposed stormwater BMPs located upstream of the creek would improve the quality of the stormwater and reduce peak flows as compared to the quality and quantity of stormwater that is discharged to Onondaga Creek during a CSO event from the existing outfall. The proposed stormwater BMPs would also meet the USEPA Consent Order’s water quality objectives. Therefore, the operation of the stormwater trunk lines would have an overall beneficial effect on the bed and banks of Onondaga Creek when compared to the No Build Alternative.

As discussed in Chapter 5, Transportation and Engineering Considerations, five bridges over Onondaga Creek are within the Central Study Area. There are no known hydraulic issues associated with the existing retaining walls and existing bridge piers and changes to these bridges would require a hydraulic analysis. As part of this alternative, the existing retaining walls and piers would be retained or reconstructed as necessary, and any replacement piers and retaining walls would be placed farther back from the creek than the existing piers and retaining walls. As a result, no adverse effects on hydraulics are anticipated, as the existing conditions would be either maintained or improved.
Effects on Navigation

Onondaga Creek is not a navigable water under Federal law (within the Central Study Area). The Viaduct Alternative would not adversely affect navigability of the creek under Article 15 of the ECL. Ley Creek is the only navigable stream under Federal law within the Central Study Area and the I-81 and Park Street Bridges would not be modified under the Viaduct Alternative. Therefore, this alternative has no impact to navigability under State and Federal laws.

Floodplains

The floodplains of the creeks within the Central Study Area have been altered due to urban development. Preliminary design of the Viaduct Alternative conforms to FHWA policies for the location and hydraulic design of highway encroachments on floodplains (23 CFR § 650) and the floodplain management criteria for State projects in flood hazard areas (6 NYCRR 502) (see Chapter 5, Transportation and Engineering Considerations for a detailed discussion). By complying with these regulations, the Viaduct Alternative would not adversely affect floodplains and would be consistent with the intent of the Standards and Criteria of the National Flood Insurance Program.

Within the Viaduct Study Area, as shown on Figure 6-4-7-15, the 100-year floodplain occurs along Onondaga Lake, Onondaga Creek, and Ley Creek. As discussed in Chapter 5, Transportation and Engineering Considerations, the Viaduct Alternative would not cause a substantial encroachment within any floodplains, although the bridge piers associated with the I-690 bridges and West Street interchange ramps may occur within the boundary of the 100-year floodplain.

The Viaduct Alternative is defined as a rehabilitation project because it does not include any reconstruction within the floodplains that raises existing embankment elevations, does not widen an existing roadway along a stream in the flood hazard area, and does not include any new construction (or new bridges) within the flood hazard area. Within this well-developed area, there is no practicable alternative that includes moving the highway outside of 100-year floodplain areas entirely. However, any replacement piers and retaining walls needed by the five sections of road surface that span Onondaga Creek in the Central Study Area would be placed farther back from the creek than the existing piers and retaining walls. In addition, due to the topography of the area and the elevation of the bridges over the creek, it is anticipated that the freeboard provided below all structures at the 100-year flood would be greater than the two-foot minimum required; therefore, a hydraulic study would not be required until final design, and a Coast Guard Checklist would not be required. The stormwater trunk lines would be constructed beneath the existing ground surface and therefore would not impact the elevation of the floodplain. The Viaduct Alternative would result in the removal of 9.4-acres of impervious area, as well as the removal of infrastructure in the vicinity of the Lower Onondaga Creek floodplain through the restoration of the open areas within the highway right of way, resulting in lower amounts of impervious surface and the associated surface runoff compared with the No Build Alternative. Since the Viaduct Alternative would not result in the construction of substantial structures within the base floodplain, it would not result in a change in the existing flood hazard area.
Executive Order 11988

The Viaduct Alternative was reviewed for compliance with EO 11988, Floodplain Management. Under EO 11988, Federal actions (in which impacts to floodplains are unavoidable) require a “finding” that there are no practicable alternatives to the proposed construction in floodplains and that the proposed action includes all practical means to reduce harm to floodplains.

The Viaduct Alternative has been carefully studied with respect to its effects on floodplains. Design refinements (i.e., reducing impervious cover and locating bridge piers further from the creek than the existing structures where possible) have been made to avoid and minimize effects to floodplains.

Additional design refinements and quantification of the total impacts to floodplains shall be completed during final design, and shall be in compliance with EO 11988. Based upon the above considerations, it is determined that this alternative includes all practicable measures to minimize harm to floodplains that may result from such use.

Groundwater

Under the Viaduct Alternative, the decrease in impervious area would have an overall beneficial effect on groundwater resources. Stormwater BMPs would be implemented to receive stormwater runoff from the new impervious surfaces constructed under the Viaduct Alternative. The BMPs would increase groundwater infiltration of stormwater and would result in a beneficial effect on groundwater quality as well, as the stormwater runoff would have reduced sediment, nutrient, and heavy metal concentrations. As indicated in the Toler analysis, the increased road mileage as compared to the No Build Alternative would result in an increased amount of winter road salting, and increased loadings of chloride in stormwater runoff from the highway. The increased chloride in stormwater runoff from the highway would result in increased concentration of chloride in the water that would infiltrate into the surficial aquifer. However, this increase would be offset to some extent by the reduction in impervious area outside of the highway lanes but within the NYSDOT ROW; the change in land use could lead to a reduction in chloride applications in these area, and thus a benefit to groundwater quality not indicated by the Toler Analysis. Therefore, the increased chloride concentration from the highway lanes would not result in a substantial adverse effect to groundwater quality.

Through the provision of stormwater management practices, the preservation of water quality and contribution to surface water base flows would be preserved. BMPs that increase groundwater infiltration would be used where possible that would contribute to groundwater recharge and improve water quality.

As discussed in Chapter 4, Construction Means and Methods, the new bridge construction along the portions of I-81, I-690, and ramps would require pile foundations, which could have the potential to intercept the groundwater table. Within the Baldwinsville Principal Aquifer, in the vicinity of the Ley Creek bridge construction area, groundwater was recorded in borings between 3 and 3.75 feet below ground surface. Construction of bridge foundations would involve driving approximately 470 piles approximately 12 inches in diameter and between 20 to 40 feet long. While intercepted by the piles, groundwater would be expected to flow around them. Therefore, the driving of the piles would not result in a significant adverse effect to groundwater resources within the surficial aquifer.

The Viaduct Alternative would not result in any below ground structures that would significantly affect groundwater flow.
6-4-7.3.2 CONSTRUCTION EFFECTS

During construction, the implementation of erosion and sediment controls will be in accordance with the 2016 New York State Standards and Specifications for Erosion and Sediment Control ("Blue Book"). The SWPPP will be prepared for the Project to meet the requirements of SPDES General Permit GP-0-15-002, and NYSDOT Highway Design Manual, Chapter 8 Highway Drainage. The SWPPP would implement erosion and sediment control measures and minimize the potential for construction activities to result in adverse effects to wetlands and surface water quality within the Project Area. Erosion and sediment controls to be implemented during construction would be developed during final design and would include measures such as inlet protection at existing stormwater inlets, sediment controls to minimize erosion and transport of sediment from the site, dust control measures, spill prevention and containment measures, stabilized construction entrance/exits, and vegetative measures to stabilize any exposed soils. Any construction activities conducted in surface waters, including the installation of the stormwater trunk outfall, would be minimized to protect water quality. As much of the work would be completed from dry land as possible. Erosion and sediment control measures such as turbidity curtains, cofferdams, and temporary piping or diversion of Onondaga Creek would be implemented for any in-water construction activities, including the installation of the stormwater trunk line outfalls, to maintain stream flow and minimize suspended sediment. The construction of the stormwater trunk line outfalls would result in a temporary impact to Onondaga Creek of approximately 0.05 acres. There would not be any temporary effects to Ley Creek during construction, as all work would occur outside of the creek. Likewise, there would not be any temporary effects to the Butternut Creek tributaries in the I-481 South or I-481 East study areas due to the construction of the noise barriers, as all work would occur outside of the creek, and extra precautions for erosion and sediment controls would be set in place to protect the AA(T) water quality standard of Ont. 66-11-P 26-37-6-13.

Construction of this alternative would not result in any temporary effects to wetlands in the Central Study Area or I-481 East Study Area. Approximately 0.06 acres of temporary effects to wetlands would occur during the construction of the proposed noise barriers in the I-481 North Study Area. Construction that would permanently change portions of State-regulated freshwater wetland adjacent area (from pavement to restored naturalized area or from mowed median to pavement/noise barrier) is discussed in permanent effects above. Work would also occur in paved areas within the State-regulated freshwater wetlands adjacent area (as shown on Figure 6-4-7-2). Work in freshwater wetlands and in vegetated areas within the State-regulated freshwater wetland adjacent areas for construction access would be temporary in nature; erosion and sediment control BMPs would be employed, and the disturbed areas would be restored using soil restoration techniques and planting native plants, where possible as per the landscape restoration plan that would be developed for this alternative. As described above, pavement removal would occur within the State-regulated freshwater wetland adjacent area in the Central Study Area. With these measures in place, no more than minimal adverse effects to wetlands and State-regulated freshwater wetland adjacent area would occur during construction of the Viaduct Alternative.

For construction of the new bridge piles, pre-auguring equipment would be used to reduce the duration of impact or vibratory pile driving, which would reduce any potential effects of pile driving on groundwater resources.
Along with measures previously identified, and in Section 6-4-7.3.5, the Contractor would implement environmental protection practices for water quality. As described in Chapter 4, Construction Means and Methods, NYSDOT would incorporate the standard practices into the construction contracts for the Viaduct Alternative including:

- The Contractor shall schedule and conduct its work to minimize soil erosion, not cause or contribute to a violation of water quality standards and prevent sedimentation on lands adjacent to or affected by the work.

- Construction of temporary soil erosion and sedimentation control measures, temporary and permanent soil stabilization, construction of drainage facilities, and performance of other contract work, which will contribute to the control of erosion and sedimentation.

6-4-7.3.3 INDIRECT EFFECTS

The Viaduct Alternative would be constructed within the footprint of existing roadways and other developed areas with existing infrastructure and would therefore have limited potential for resulting in indirect impacts to surface waters, groundwater, or floodplains outside the Central Study Area. Reductions in peak flow resulting from stormwater BMPs could contribute to decreased CSO events and reduce the volume of stormwater that reaches Metro as compared to the No Build Alternative.

The Viaduct Alternative would result in a decrease in impervious surface within the watershed of Onondaga Lake and, therefore, would not have the potential to result in indirect adverse effects to the base floodplain of the Class C creeks and lake within the Central Study Area. Additionally, with the implementation of BMPs, in accordance with the SWPPP prepared for the Project, such as infiltration and detention basins, dry swales, and hydrodynamic stormwater treatment units, the volume and rate of stormwater discharge would be lower than the No Build Alternative. Infiltration would be higher and peak flow would be lower compared with the No Build Alternative. Green infrastructure practices proposed for the Project Area such as vegetated swales, tree planting, tree pits, stormwater planters, rain gardens, and conservation of existing trees would result in additional infiltration and/or reduction in stormwater runoff volume within the Project Area, in addition to providing the water quality improvements.

Because the stormwater trunk lines would be constructed, any runoff not captured by the BMPs would be discharged into Onondaga Creek about 1,000 feet upstream of where it would be discharged during a CSO event under the No Build Alternative. The operation of the stormwater trunk lines would not have a substantial impact on the creek because of the channelized nature of the creek, the reduction in runoff volume provided by the BMPs, and the capacity of the creek to handle this volume of runoff, as the drainage area would not increase from the existing condition. As described in Chapter 5, Transportation and Engineering Considerations, the 96-inch stormwater trunk line outfall and energy dissipater would include work below the ordinary high water of the stream and, as such, be subject to permit requirements by NYSDEC and USACE associated with Sections 401 and 404 of the Clean Water Act. The 42-inch stormwater trunk line outfall would be located above ordinary high water elevations and thus would not be subject to those specific permit requirements by NYSDEC or USACE. For both outfalls, a detailed hydraulic analysis would be conducted during final design to demonstrate that the systems would not result in adverse effects to the downstream watercourses and discharge through both outfalls would be subject to NYSDEC requirements under SPDES.
The Viaduct Alternative would not result in indirect adverse effects to wetlands, surface waters, groundwater, or floodplains.

### 6-4-7.3.4 CUMULATIVE EFFECTS

No adverse cumulative effects to wetlands, surface waters, groundwater, and floodplains are anticipated as a result of the Viaduct Alternative. Improvements attributable to the watershed modifications made by the Save the Rain program would be expected regardless of any alternative chosen. Water quality monitoring completed in conjunction with the Save the Rain program has shown improvements to Onondaga Lake since the implementation of the program and this improvement is expected to continue as additional green infrastructure practices are built and the lake adjusts to the decreased pollution load from CSOs.

As described above, stormwater BMPs, such as infiltration and detention basins and hydrodynamic stormwater treatment units, would be incorporated into the Viaduct Alternative, and additional green infrastructure practices would be considered during final design. The BMPs and green infrastructure practices would result in water quality improvements and peak flow reductions, and thus, would offset discharges from the new impervious surfaces. Similarly, the stormwater trunk lines would reduce the demand on the existing combined sewer system, which would result in a reduction in the number and magnitude of CSO events within the existing watershed. Chloride loadings could be reduced through changes in land use outside of the highway right of way (but within the NYSDOT ROW) and through the implementation of operational BMPs such as street sweeping to remove excess roads salts and/or reduced application rates.

In combination with efforts associated with Save the Rain and stormwater management requirements for new development, it is anticipated that the overall cumulative effect of the Viaduct Alternative would be beneficial to wetlands, surface waters, groundwater, and floodplains.

### 6-4-7.3.5 MITIGATION

#### Wetlands and Surface Waters

Approximately 0.01 acres of effects would occur in freshwater wetlands (e.g., due to fill placement as a result of noise barrier construction in Wetland 10) as a result of the Viaduct Alternative. During construction, measures (i.e., design refinements, silt fencing, exclusion fencing) would be implemented to avoid effects to wetlands and waters. It is anticipated that any permanent and temporary work in State freshwater wetlands and regulated freshwater wetland adjacent areas would be conducted as per the MOU pursuant to Article 24 “Freshwater Wetlands”. Accordingly, the small amount of State freshwater wetland effects may qualify for a NYSDEC General Permit GP-0-11-002 under Activity #2 “Permanent and temporary placement of earth fills.” State-regulated freshwater wetland work within WOTUS (Onondaga Creek and Wetland 10) would need to be permitted under Section 404. As currently proposed the work would not cause significant adverse effects. Therefore, no State wetland or stream mitigation is proposed.

As design advances, all practicable measures would be employed to avoid and minimize harm to wetlands and waters including consideration of Section 404 Nationwide Permit and Section 401 Water Quality Certification conditions regarding stream crossings. As currently proposed, permanent loss of
wetlands is minimal (0.01 acres), and no loss of open waters would occur as a result of the Viaduct Alternative. Therefore, no USACE wetland or stream mitigation is required.

Within Onondaga Creek, the effect of the 8-foot diameter stormwater trunk line and 3.5-foot diameter stormwater trunk line outfalls would be minimized to the maximum extent practicable by the creation of energy dissipaters at the outfalls to reduce the potential for erosion. As currently proposed, no Section 404 stream mitigation is required. Additional restoration and enhancement activities could be achieved by stabilization of streambanks and habitat enhancements through strategic use of native plantings, erosion control matting, and rip-rap to reduce erosion and subsequent sedimentation and to improve water quality.

As currently proposed, no work would occur within Ley Creek for the Viaduct Alternative. As currently proposed, no Section 404 stream mitigation would be required; however, additional restoration and enhancement activities could be achieved by streambank stabilization at bridge piers and an existing stormwater outfall, which would improve Ley Creek water quality.

**Stormwater**

Based on the total amount of impervious area, both water quality and water quantity treatment would be required for the Viaduct Alternative. Chapter 5, Transportation and Engineering Considerations provides calculations and a detailed discussion on stormwater BMPs, including proposed locations for treatment methods. Water quality treatment for the new bridges and roadway pavements would be accommodated through infiltration and detention basins, as space, soil conditions and geology permit, and in hydrodynamic units where space is limited, as discussed above. The locations and design of the BMPs will be finalized during final design and will meet all requirements of the NYSDEC Stormwater Management Design Manual. As a result of installing a new stormwater trunk lines as part of the Viaduct Alternative, the demand on the existing combined sewer system would be reduced, which would result in a reduction in the number and magnitude of CSO events within the existing watershed. The new stormwater trunk lines, in combination with peak flow mitigation for any increases in impervious area and water quality treatment for paved surfaces, would result in improvements to downstream receiving waters. Stormwater BMPs and green infrastructure that are not required under this alternative would be considered as design advances to provide added benefits to the watershed.

### 6-4-7.4 ENVIRONMENTAL CONSEQUENCES OF THE COMMUNITY GRID ALTERNATIVE

#### 6-4-7.4.1 PERMANENT/OPERATIONAL EFFECTS

**Freshwater Wetlands and Surface Waters**

A total of 75.66 acres of wetlands are present within the Central, I-481 East, and I-481 North Study Areas, all of which are Federal jurisdictional wetlands and 75.65 acres of which are State jurisdictional wetlands. As described above, the I-481 South Study Area contains an unmapped tributary to Butternut Creek, but freshwater wetlands are not present. As shown in Table 6-4-7-9, 0.61 acres of Federal jurisdictional freshwater wetlands would be permanently incorporated into the proposed footprint of the Community Grid Alternative. A total of 0.60 acres of State jurisdictional freshwater wetlands would be incorporated into the proposed footprint of the Community Grid Alternative as
shown in Table 6-4-7-10. These effects would occur in the I-481 East and I-481 North Study Areas. As described above, there would be no work within wetlands of the Central Study Area.

Table 6-4-7-9

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Central Study Area</td>
<td>3.9</td>
<td>3.9</td>
<td>0.00</td>
<td>3.9</td>
</tr>
<tr>
<td>I-481 South Study Area</td>
<td>0</td>
<td>0</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>I-481 East Study Area</td>
<td>44.05*</td>
<td>44.05</td>
<td>0.08</td>
<td>43.96</td>
</tr>
<tr>
<td>I-481 North Study Area</td>
<td>27.71</td>
<td>27.71</td>
<td>0.52</td>
<td>27.19</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>75.66</strong></td>
<td><strong>75.66</strong></td>
<td><strong>0.61</strong></td>
<td><strong>75.05</strong></td>
</tr>
</tbody>
</table>

Notes: Acreages represents the vegetated portion of the delineated wetland. Open water portions of delineated wetlands (surface waters) are presented in Table 6-4-7-11.

Source: I-81 Viaduct Project: Wetland Delineation and Surface Waters Assessment Summary.

Table 6-4-7-10

<table>
<thead>
<tr>
<th>Study Area</th>
<th>Delineated Freshwater Wetlands (acres)</th>
<th>State Jurisdictional Freshwater Wetlands (acres)</th>
<th>State Jurisdictional Freshwater Wetlands Effects (acres)</th>
<th>Remaining Freshwater Wetlands (acres)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Central Study Area</td>
<td>3.9</td>
<td>3.9</td>
<td>0.00</td>
<td>3.9</td>
</tr>
<tr>
<td>I-481 South Study Area</td>
<td>0</td>
<td>0</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>I-481 East Study Area</td>
<td>44.05*</td>
<td>44.04</td>
<td>0.08</td>
<td>43.96</td>
</tr>
<tr>
<td>I-481 North Study Area</td>
<td>27.71</td>
<td>27.71</td>
<td>0.52</td>
<td>27.19</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>75.66</strong></td>
<td><strong>75.65</strong></td>
<td><strong>0.60</strong></td>
<td><strong>75.05</strong></td>
</tr>
</tbody>
</table>

Notes:
* Freshwater wetland 8 (0.01 acres) is Federally regulated, but not State regulated.
Acreages represent the vegetated portion of delineated wetland. Open water portions of delineated wetlands (surface waters) are presented in Table 6-4-7-11.

Source: I-81 Viaduct Project: Wetland Delineation and Surface Waters Assessment Summary.

A total of 10.06 acres of Federal and State-jurisdictional open surface waters are present within the Central, I-481 East, and I-481 North Study Areas. As described above, the I-481 South Study Area does not contain surface waters. As shown in Table 6-4-7-11, approximately 0.07 acres of surface waters would be permanently incorporated into the proposed footprint of the Community Grid Alternative. These effects would occur in the I-481 East and I-481 North Study Areas. As described above, there would be no work within portions of the delineated surface waters in the Central Study Area.
## Permanent Effects to Surface Waters from the Community Grid Alternative

<table>
<thead>
<tr>
<th>Study Area</th>
<th>Surface Waters Coverage (acres)</th>
<th>Federal Jurisdictional Surface Waters (acres)</th>
<th>NYSDEC Jurisdictional Surface Waters (acres)</th>
<th>Approximate Surface Waters Effects (acres)</th>
<th>Remaining Surface Waters (acres)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Central Study Area</td>
<td>0.3</td>
<td>0.3</td>
<td>0.3</td>
<td>0.00</td>
<td>0.3</td>
</tr>
<tr>
<td>I-481 South Study Area</td>
<td>0.000</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>I-481 East Study Area</td>
<td>7.35</td>
<td>7.35</td>
<td>7.35</td>
<td>0.03</td>
<td>7.325</td>
</tr>
<tr>
<td>I-481 North Study Area</td>
<td>2.41</td>
<td>2.41</td>
<td>2.41</td>
<td>0.04</td>
<td>2.37</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>10.06</strong></td>
<td><strong>10.06</strong></td>
<td><strong>10.06</strong></td>
<td><strong>0.07</strong></td>
<td><strong>9.99</strong></td>
</tr>
</tbody>
</table>

**Notes:** Surface waters, Ley Creek and Onondaga Creek, are NYSDEC Class C streams and are not mapped by NYSDEC as freshwater wetlands. City Line Brook, while occurring within the South Study Area, is entirely contained within pipes and diverted underground within the study area and therefore no acreage is included in Surface Waters.

Within the I-481 East Study Area, permanent effects to wetlands would result from the Community Grid Alternative. These effects result from alterations to the road alignment and the addition of an auxiliary lane along southbound I-481, which would be re-designated as I-81 under this alternative. As shown in Table 6-4-7-12, the construction of this lane would involve the placement of fill in 0.10 acres of a common reed dominated wetland (see Wetland 4 [State Class II] in Figure 6-4-7-6 and Appendix I-2) of low ecological value located near the I-481 and I-690 interchange. In addition, this lane would extend northbound across the CSX railroad bridge and a Federal-and State jurisdictional freshwater emergent wetland of high ecological value (see Wetland 6 [NYSDEC Class III] in Figure 6-4-7-7 and Appendix I-2). No effects are expected in Wetland 6. The Project would avoid permanent fill in Wetland 6 by elevating the lane.

As a result of bridge widening over Wetland 6, an additional 0.032 acres of new deck would suspend over the wetland. However, the widened bridge deck would have a minimal effect on the amount of sunlight and hydrophytic plants composition within Wetland 6, as wetlands and associated hydrophytic plants are present underneath the existing bridge. Therefore, the wetland directly under the widened bridge deck would continue to function (i.e., plant composition and hydrology) as it does under the existing condition.
Table 6-4-7-12
Community Grid Alternative
I-481 East Study Area
Permanent Wetland Effects

<table>
<thead>
<tr>
<th>Wetland Identification</th>
<th>NYSDEC Wetland Identification</th>
<th>NYSDEC Wetland Class</th>
<th>Vegetated (acres)</th>
<th>Open Water (acres)</th>
<th>Total (acres)</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>SYE-21</td>
<td>II</td>
<td>0.08</td>
<td>0.02</td>
<td>0.10</td>
</tr>
<tr>
<td>6</td>
<td>SYE-11</td>
<td>I</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>8</td>
<td>--</td>
<td>--</td>
<td>0.01</td>
<td>0</td>
<td>0.01</td>
</tr>
<tr>
<td>9 (tributary to North Branch Ley Creek)</td>
<td>SYE-8</td>
<td>III</td>
<td>0.00</td>
<td>0.01</td>
<td>0.01</td>
</tr>
<tr>
<td>Total</td>
<td>--</td>
<td>--</td>
<td>0.09</td>
<td>0.03</td>
<td>0.12</td>
</tr>
</tbody>
</table>

Notes:
Wetland 8 is not expected to be under the jurisdiction of the state. Thus, the total potential effects to all State-jurisdictional freshwater wetlands would equate to 0.11 acres. All of the wetlands listed in this table are expected to be Federally regulated. Thus, the potential effect to Federal jurisdictional wetlands is 0.12 acres.
State Class I wetlands are considered to be of the highest quality/value and state Class IV wetlands are considered to be of the lowest quality/value.
Source: Parsons (October 2017).

As shown in Figure 6-4-7-9, to the north of Wetland 6, 0.01 acres of permanent effects would occur to Wetland 8 as a result of widening a highway embankment in its vicinity. Wetland 8 is associated with common reed dominated channel and a ditch. It is not mapped by NYSDEC or NWI, but it is expected to be under Federal jurisdiction. As shown in Figure 6-4-7-9, north of Wetland 8, an existing culvert would be extended within Wetland 9 (tributary to North Branch of Ley Creek [associated with State SYE-8 [Class III]], a State Class C stream and a Federally-mapped stream, resulting in a permanent wetland effect of 0.01 acres. In summary, permanent effects are estimated at 0.12 acres within wetlands of the I-481 East Study Area.

As shown in Table 6-4-7-13 and Figure 6-4-7-10 through Figure 6-4-7-12, within the I-481 North Study Area, a total of 0.56 acres of wetlands would be permanently affected by the Community Grid Alternative. Effects would occur in the freshwater wetland complex associated with Mud Creek and Wetland 10. Of the 0.56 acres of permanent effects, 0.52 acres would be within disturbed common reed dominated wetlands (Wetland 10) and 0.04 acres would be within open water associated with Mud Creek. These effects to wetlands would be associated with the conversion of the northeastern quadrant interchange to the new travel lanes of I-81, construction of noise barriers in the vicinity of the interchange, and culvert extension work located in the northern portion of this study area.
### Table 6-4-7-13

**Community Grid Alternative**  
**I-481 North Study Area**  
**Permanent Wetland Effects**

<table>
<thead>
<tr>
<th>Wetland Identification</th>
<th>NYSDEC Wetland Identification</th>
<th>NYSDEC Wetland Class</th>
<th>Vegetated (acres)</th>
<th>Open Water (acres)</th>
<th>Total (acres)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mud Creek</td>
<td>CIC-16, CIC-17</td>
<td>II</td>
<td>0.00</td>
<td>0.04</td>
<td>0.04</td>
</tr>
<tr>
<td>10</td>
<td>CIC-13, CIC-15, CIC-16, CIC-17</td>
<td>II</td>
<td>0.52</td>
<td>0.00</td>
<td>0.52</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td></td>
<td><strong>0.52</strong></td>
<td><strong>0.04</strong></td>
<td><strong>0.56</strong></td>
</tr>
</tbody>
</table>

**Notes:**  
Mud Creek and Wetland 10 are part of the same wetland complex. They are presented separately to differentiate between vegetated wetlands versus open water of Mud Creek. Of the 0.52 acres of permanent wetland effects, 0.01 acres is due to the placement of a noise barrier wall within Wetland 12. All wetlands in the I-481 North Study Area are State and Federal wetlands.  

**Source:** Parsons (October 2017).

As shown in **Table 6-4-7-14** approximately 158.58 acres of NYSDEC-regulated freshwater wetland adjacent area is present within the Project Area. Following construction, previous pavement area would be restored using soil restoration techniques and planting native plants, where possible, as per the landscape restoration plan that would be developed for this alternative.

### Table 6-4-7-14

**Approximate Effects to State-Regulated Freshwater Wetland Adjacent Area**

<table>
<thead>
<tr>
<th>Study Area</th>
<th>Existing Approximate Adjacent Area (acres)</th>
<th>New Impervious Pavement Effects (acres)</th>
<th>Impervious Pavement Removal (acres)</th>
<th>Side Slope (acres)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Central</td>
<td>14.67</td>
<td>0.05</td>
<td>0.10</td>
<td>0.0</td>
</tr>
<tr>
<td>I-481 South</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td>I-481 East</td>
<td>81.33</td>
<td>2.23</td>
<td>0.0</td>
<td>2.68</td>
</tr>
<tr>
<td>I-481 North</td>
<td>62.58</td>
<td>1.52</td>
<td>1.36</td>
<td>3.08</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>158.58</strong></td>
<td><strong>3.80</strong></td>
<td><strong>1.46</strong></td>
<td><strong>5.76</strong></td>
</tr>
</tbody>
</table>

**Notes:** The State-regulated freshwater wetlands adjacent area is a 100-foot area extending from the freshwater wetland boundary (including impervious and pervious surfaces). The acreages presented herein are calculated on the basis of the wetland boundaries that were delineated as part of this Project (see **Appendix I-2, "I-81 Viaduct Project: Wetland Delineation and Surface Waters Assessment Summary") that are also State-mapped wetlands. Note that the freshwater wetland adjacent area described above also includes the acreage calculations of the terrestrial ecological communities from **Section 6-4-8**.

In the Central Study Area, as shown in **Figure 6-4-7-2** and described above, approximately 0.05 acres of State-regulated freshwater wetland adjacent area that is currently pervious (maintained median area) would be permanently affected in the vicinity of Wetland 1 by the addition of pavement. Approximately 0.15 acres of existing pavement within the State-regulated freshwater wetland adjacent area of Wetland 1 would be permanently removed. As a result, there would be a net gain of 0.10 acres of pervious vegetated areas within the State freshwater Wetland 1 adjacent area, thereby benefiting freshwater wetlands within the Central Study Area.

In the I-481 East Study Area, as shown in **Figure 6-4-7-5** through **Figure 6-4-7-9**, State-regulated freshwater wetland adjacent area that is currently pervious (primarily maintained lawn area) would be
permanently affected by the addition of 2.23 acres of pavement. In addition, 2.68 acres of impervious side slope would be constructed for lane expansion, construction of the proposed detention basins, (e.g., the construction of a proposed detention basin near State-regulated Wetland 5), and the construction of noise barrier walls.

With respect to the I-481 North Study Area, 1.52 acres of pavement would be removed from the study area (see Figure 6-4-7-11), 1.36 acres of currently pervious (primarily maintained lawn area) would be permanently affected by the addition of pavement and noise barrier walls, and 3.08 acres would be permanently affected by the construction of impervious side slopes (for lane expansion and proposed detention basins). In most instances, the State-regulated freshwater wetland adjacent areas are associated with low value habitat in terrestrial cultural ecological communities (e.g., mowed areas), particularly maintained right-of-way, and pavement associated with transportation infrastructure. These areas provide limited buffer attributes (e.g., quality vegetation and soils for water absorption) to the State-regulated wetlands.

As part of the preliminary design, efforts have been made to avoid wetlands where possible. These efforts have included adding a three-span, 385-foot long bridge and several hundred feet of retaining wall along both southbound and northbound I-81 in the I-481 North Study Area. This design change minimizes the impacts to 0.46 acres of wetland, 0.02 of surface water, and 0.16 acres of NYSDEC-regulated freshwater wetland adjacent area associated with Mud Creek and Wetland 10. As part of efforts to avoid and minimize effects to wetlands, ramp alignments and proposed detention basins were moved to areas outside of wetlands where feasible.

The wetland effects shown in Table 6-4-7-12 and 6-4-7-13 include considerable efforts to minimize impacts through an iterative process of design refinements. As design advances, refinements would continue to be implemented, as practicable, to avoid and reduce permanent impacts on wetlands where reasonable. During construction, BMPs would be employed to reduce permanent impacts to wetlands located in close proximity to the construction areas, as discussed below.

The total of 0.68 acres of permanent construction effects to wetlands and surface waters under Federal jurisdiction for the Community Grid Alternative would require an individual Section 404 permit and Section 401 Certification for the placement of dredged or fill materials into waters of the United States, including wetlands. With respect to NYSDEC wetlands and regulated freshwater wetland adjacent areas, the Community Grid Alternative would require an Article 24 “Freshwater Wetlands” permit from NYSDEC to conduct temporary or permanent activities on wetlands or adjacent areas that have not been specifically exempted from regulation (6 CRR-NY 663.3(e)).

As described below under Mitigation, NYSDOT has coordinated with NYSDEC and USACE in developing a preliminary mitigation plan.

Executive Order 11990

The Community Grid Alternative was reviewed for compliance with Executive Order (EO) 11990, Protection of Wetlands (23 CFR 771.125(a)(1)). Under EO 11990, Federal actions (in which impacts to wetlands are unavoidable) require a “finding” that there are no practicable alternatives to the proposed construction in wetlands and that the proposed action includes all practical means to reduce harm to wetlands.
The Community Grid Alternative has been carefully studied with respect to its effects on wetlands. As described above, design refinements (i.e., addition of a bridge and changes in the locations of ramps and stormwater basins) have been made to avoid and minimize impacts to wetlands. However, the Community Grid Alternative involves unavoidable permanent impacts to 0.68 acres (0.61 acres vegetated and 0.07 acres of surface water) of freshwater wetlands due to lane extensions, interchange reconfigurations, and placement of noise walls. Unavoidable temporary impacts to wetlands would occur to approximately 0.62 acres of vegetated wetlands and 0.043 acres of open water as described below in Construction Effects. This work is necessary to fulfill the purpose and need of the proposed Project, which is to address major structural and operational deficiencies, and other non-standard features within the Project Area along I-81 and I-690.

As described above, the Community Grid Alternative was designed to minimize and avoid impacts to wetlands. The measures to minimize harm to the wetlands include compensatory mitigation for the temporary and permanent disturbances during construction in accordance with the joint mitigation rule (Federal Register dated April 10, 2008, 73 FR 19594 through 19705). Coordination with the USACE and NYSDEC has been ongoing (as identified in Mitigation, below). Based upon the above considerations, it is determined that the Community Grid Alternative includes all practicable measures to minimize harm to wetlands that may result from such use.

Surface Waters

Effects from Stormwater

As described in Chapter 5, an analysis of the existing and proposed drainage conditions was undertaken, with a focus on water quality and quantity. Additionally, the potential effects of the Community Grid Alternative on surface waters were analyzed using the FHWA’s “Pollutant Loadings Analysis” (FHWA-RD-88-006) and “Toler Analysis” (USGS-MDPW-003) methodologies. Appendix I-3 presents the results of the Pollutant Loading Analysis. Table 6-4-7-15 summarizes the results of the stream impact analysis portion of the FHWA’s Pollutant Loading Analysis. The analyses are conservative, as they assume that the runoff enters the receiving waterbody directly, without any treatment or passing through infrastructure.

Under the Community Grid Alternative, two new stormwater trunk lines would collect stormwater runoff and discharge it to outfalls (one 96-inches, the other 42-inches in diameter) on opposite banks of Onondaga Creek near Wallace Street, between the Herald Place Bridge and the West Street to I-690 eastbound ramp (see Figure 6-4-7-3). This would reduce the volume of runoff flowing to the combined sewer system, decrease the frequency and magnitude of overflow events, and help Onondaga County meet the mandate in the USEPA Consent Order. The new stormwater system would also include BMPs such as hydrodynamic stormwater treatment units and infiltration/detention basins, which would improve stormwater quality prior to it entering the stormwater trunk lines. As described in Section 5.5.3, the total storage volume of each infiltration/detention basin BMP would reflect the volume required for 24-hour extended detention of the post-developed 1-year, 24-hour storm event. The hydrodynamic units would be sized as needed to meet the water quality target volume, which was calculated using the post-developed 1-year, 24-hour storm event. The NYSDEC storage volume requirements for the 10-year storm and 100-year storm were used as the design volume for the infiltration/detention basin BMPs, indicating that they would be able to treat a large volume of the stormwater from the Project Area. Under the current drainage system, the stormwater enters
the combined sewer system and is treated by Metro during low-flow conditions, but untreated stormwater and sanitary sewage is discharged into Onondaga Creek during high flow conditions. The level of treatment provided to stormwater by Metro under low-flow conditions does not mitigate for the increased pollutant loading that occurs during CSO events. While stormwater would no longer be treated at Metro and only a portion of the stormwater runoff volume would be treated by stormwater management BMP's, the overall benefit of the separate storm drainage system would improve water quality by reducing CSO events.

These pollutant loading analyses were conservative in assuming that neither the No Build Alternative nor the Community Grid Alternative would provide any treatment of runoff for water quality. Thus, any improvements to water quality indicated by the FHWA Pollutant Loading Analysis or the Toler Analysis would represent improvements over the No Build Condition due to the Community Grid Alternative through changes in land use.

Table 6-4-7-15 shows the results of the stream impact analysis portion of the FHWA’s Pollutant Loading Analysis. FHWA’s Pollutant Loading Analysis is a quantitative procedure for estimating the magnitude and frequency of occurrence of in-stream concentrations, on a watershed scale, of pollutants caused by stormwater runoff, namely copper, lead, zinc, total organic carbon, chemical oxygen demand, nitrate + nitrite nitrogen, total kjeldahl nitrogen, phosphorus, total suspended solids, and volatile suspended solids. Similarly, the Toler Analysis estimates the effects of chloride on surface waters, resulting from applications of highway deicing salts within the watershed. Paved right-of-way (acres) is the primary variable in these methodologies that demonstrate differences in pollutant concentrations between alternatives. These methodologies are applied on a watershed scale and focus on the entire right-of-way, rather than on the area of disturbance that was evaluated for the runoff discussion presented in Chapter 5, Transportation and Engineering Considerations.

Central Study Area:

The Central Study Area would consist of 147.6 acres of impervious surface under the No Build Alternative. Under the Community Grid Alternative, the amount of impervious highway right-of-way in the Central Study Area (136.9 acres) would decrease by 10.7 acres or 7.2 percent when compared with the No-Build Alternative. Potential beneficial effects from this decrease are assessed below. The majority of the Central Study Area is within or on the border of the Clinton/Lower Main Interceptor Sewer combined sewershed (see Figure 6-4-7-17). The exception is the northern portion of the study area, which is on the border of the Hiawatha Regional Treatment Facility combined sewershed, and the portion of the study area immediately adjacent to Onondaga Creek where the storm and sanitary sewers have been separated. Within the Central Study Area, there are four active and two additional outfalls along Onondaga Creek, and one active outfall along Ley Creek. These outfalls are expected to remain active under the Community Grid Alternative and would continue to contribute their current loads of stormwater and pollutants to Onondaga and Ley Creeks during CSO events.
### Summary Estimate Results of Stream Impact Assessment without Best Management Practices (BMPs)

#### Table 6-4-7-15

Community Grid Alternative

**SUMMARY ESTIMATE RESULTS OF STREAM IMPACT ANALYSIS WITHOUT BMPs, Once in 3 Year Stream Pollutant Concentration mg/L**

<table>
<thead>
<tr>
<th>Alternative</th>
<th>Central Study Area</th>
<th>South Study Area</th>
<th>East Study Area: Northern Region</th>
<th>East Study Area: Southern Region</th>
<th>North Study Area</th>
</tr>
</thead>
<tbody>
<tr>
<td>Study Area</td>
<td>South Study Area</td>
<td>North Study Area</td>
<td>Butternut Creek</td>
<td>Mud Creek</td>
<td></td>
</tr>
<tr>
<td>Receiving Waterbody</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lower Onondaga Creek</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Middle Onondaga Creek</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>North-Branch Ley Creek</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Butternut Creek</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mud Creek</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Pollutant</th>
<th>Soluble Fraction</th>
<th>Acute Criteria</th>
<th>Threshold Effect Level</th>
<th>No Build</th>
<th>Build</th>
<th>No Build</th>
<th>Build</th>
<th>No Build</th>
<th>Build</th>
<th>No Build</th>
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<th>No Build</th>
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<th>Build</th>
</tr>
</thead>
<tbody>
<tr>
<td>Copper (Cu)</td>
<td>0.4</td>
<td>0.021</td>
<td>0.045</td>
<td>0.025</td>
<td>0.023</td>
<td>0.063</td>
<td>0.063</td>
<td>0.117</td>
<td>0.119</td>
<td>0.054</td>
<td>0.054</td>
<td>0.063</td>
<td>0.063</td>
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<td></td>
</tr>
<tr>
<td>Lead (Pb)</td>
<td>0.1</td>
<td>0.103</td>
<td>0.450</td>
<td>0.046</td>
<td>0.043</td>
<td>0.117</td>
<td>0.117</td>
<td>0.217</td>
<td>0.221</td>
<td>0.099</td>
<td>0.101</td>
<td>0.117</td>
<td>0.117</td>
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<td></td>
</tr>
<tr>
<td>Zinc (Zn)</td>
<td>0.4</td>
<td>0.374</td>
<td>0.785</td>
<td>0.151</td>
<td>0.143</td>
<td>0.386</td>
<td>0.385</td>
<td>0.713</td>
<td>0.728</td>
<td>0.327</td>
<td>0.332</td>
<td>0.385</td>
<td>0.384</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Notes:**

3. United States Environmental Protection Agency. The acute criteria indicate the highest concentration of specific pollutants or parameters in water that are not expected to pose a significant risk to the majority of species. [https://www.epa.gov/wqc/national-recommended-water-quality-criteria-aquatic-life-criteria-table](https://www.epa.gov/wqc/national-recommended-water-quality-criteria-aquatic-life-criteria-table)
4. United States Environmental Protection Agency Nationwide Urban Runoff Program. The threshold effect level indicates the concentration from a short storm surge that would result in the mortality of the most sensitive individual of the most sensitive species. [https://www3.epa.gov/npdes/pubs/sw_nurp_vol_1_finalreport.pdf](https://www3.epa.gov/npdes/pubs/sw_nurp_vol_1_finalreport.pdf)
5. Concentration in runoff entering the stream that has the probability of occurring once in three years, in accordance with FHWA methodology.
The Project would be designed with entirely separate runoff conveyance and treatment systems and would not contribute to the combined sewer flows. Instead, a new stormwater runoff conveyance system would discharge runoff from the study areas directly to receiving surface waters. The BMPs would provide both runoff reduction and water quality improvement for the stormwater entering the stormwater trunk. As a result, the Community Grid Alternative would be consistent with the Save the Rain initiative and the USEPA Consent Order’s mandate to reduce stormwater entering the combined sewer system, and would have an overall beneficial effect on water quality in Onondaga Creek when compared to the No Build Alternative.

The results of the Toler and FHWA Pollutant Loading analyses (see Table 6-4-7-15), conducted without treatment by BMPs (which would occur in the case of the Community Grid Alternative) or treatment by Metro (which would occur in the case of the No Build Alternative), indicate that the reduction in impervious road surface within the Central Study Area would result in pollutant loading approximately 6.0 percent lower than the No Build Alternative. The reduction in road surface under this alternative would result in lower stormwater runoff volumes, and thus lower mass loading of pollutants. The Toler Analysis showed that chloride loading to Lower Onondaga Creek on an annual basis would be approximately 9.8 percent higher because the Community Grid Alternative would introduce 3.7 more highway miles that would require deicing.

As discussed under the Viaduct Alternative, the chloride concentration in Lower Onondaga Creek in 2012, as measured by NYSDEC, ranged from 259 to 833 mg/L. 72 Thus, according to the Toler Analysis, the Central Study Area under the Community Grid Alternative would contribute a 0.4 to 1.2 percent increase in the total concentration of chloride in Lower Onondaga Creek. The USEPA chronic toxicity water quality criteria concentration of chloride, for the majority of aquatic species, is 230 mg/L, while the acute toxicity concentration is 860 mg/L. 73 Both high and low concentrations of chloride have effects on diversity and community structure of aquatic invertebrates and may influence reproduction of aquatic organisms. 74 Since stormwater BMPs do not remove chloride from stormwater, the Community Grid Alternative would result in higher chloride concentration within Lower Onondaga Creek when compared with the No Build Alternative, in which chloride is already elevated above the chronic toxicity water quality criteria; under both alternatives, chloride concentration would be below the acute toxicity concentration. Therefore, the increase in chloride concentration in Lower Onondaga Creek as a result of the Community Grid Alternative is not expected to result in significant adverse effects to the creek.

Although the total lane miles would increase under the Community Grid Alternative, the total impervious area in the Central Study Area would be reduced; restoration of open areas within the NYSDOT ROW would be designed so that no more than 35 percent of these areas would be constructed as impervious surfaces. The reduction in impervious area outside of the highway lanes but within the NYSDOT ROW could lead to a reduction in chloride applications, and a benefit to water quality not indicated by the Toler Analysis. Additionally, while stormwater would no longer be treated at Metro and only a portion of the stormwater runoff volume would be treated by stormwater 

72 http://nwis.waterdata.usgs.gov/usa/nwis/qwdata/?site_no=04240010
73 https://www.epa.gov/wqc/national-recommended-water-quality-criteria-aquatic-life-criteria-table
74 http://dx.doi.org/10.1016/j.scitotenv.2014.12.012
management BMP’s, the overall benefit of the separate storm drainage system would further improve water quality in a way not indicated by the FHWA analysis, by reducing CSO events.

The FHWA Pollutant Loading analyses indicated that even without BMPs, projected in-stream concentrations of lead or zinc would be lower under the Community Grid alternative than the No Build Alternative: — 0.043 mg/L for lead and 0.143 mg/L for zinc under the Community Grid, compared to 0.046 mg/L for lead and 0.151 mg/L for zinc under the No Build Alternative. These concentrations would not exceed the USEPA acute criteria of 0.103 mg/L and 0.374 mg/L, respectively and would be below the USEPA (NURP) suggested threshold level of 0.450 mg/L and 0.785 mg/L, respectively, suggesting a low potential to pose a risk to aquatic organisms (see Table 6-4-7-15). The projected copper concentration under the Community Grid Alternative would be slightly lower than under the modeled No Build Alternative, 0.023 mg/L compared to 0.025 mg/L. These concentrations would exceed the USEPA acute criteria of 0.021 mg/L, but would be below the USEPA (NURP) suggested threshold level of 0.045 mg/L, suggesting a low potential to pose a risk to aquatic organisms.

Stormwater BMPs that would be utilized in the study area (which would be designed during final design) would have a target removal rate of 80 percent of TSS, and thus the metals that attach to these particles would be removed from the stormwater as well. Therefore, pollutant loadings of lead, zinc, and copper to Lower Onondaga Creek would be lower than projected by the FHWA Pollutant Loading analysis, resulting in concentrations in Lower Onondaga Creek that would be below the USEPA acute criteria concentrations. Therefore, the Community Grid Alternative would result in beneficial effects to Lower Onondaga Creek through the reduction in pollutant loading due to stormwater runoff, and would not have significant adverse effects on the creek as a result of increased chloride concentration.

I-481 South Study Area:

In the No Build Alternative, the I-481 South Study Area would consist of 48.2 acres of impervious surface. The Community Grid Alternative would result in an impervious area of 46.7 acres, a decrease of 1.5 acres, or 3.1 percent. The I-481 South Study Area is not within a CSO sewershed. All of the project elements that would occur within the I-481 South Study Area would be within the NYSDOT right-of-way, and the difference in impervious area is a result of a reconstructed interchange with a smaller impervious footprint.

The results of the Toler and FHWA Pollutant Loading analyses, conducted without BMPs, indicate that the reduction of impervious area would result in 2 percent lower pollutant loadings from the I-481 South Study Area on an annual and mean event basis. Chloride loading to Middle Onondaga Creek on an annual basis would be approximately 7.6 percent lower compared with that under the No Build Alternative, due to 1.1 fewer miles of highway that would need deicing. The projected in-stream copper, lead, and zinc concentrations are similar between the Community Grid Alternative and the

75 https://www3.epa.gov/npdes/pubs/sw_nurp_vol_1_finalreport.pdf
76 Ibid.
No Build Alternative, despite the differences in impervious areas (see Table 6-4-7-15). This is because the calculated concentration is based largely on the ratio of average annual streamflow to the runoff flow rate from the mean storm, a ratio which changed by less than one from the No Build Alternative to the Community Grid Alternative. Pollutant concentrations of lead and zinc for the Community Grid Alternative, without BMPs, would be approximately 0.117 mg/L and 0.385 mg/L, respectively, compared to lead and zinc concentrations of 0.117 mg/L and 0.386 mg/L, respectively, for the No Build Alternative. These concentrations would exceed the USEPA acute criteria of 0.103 mg/L and 0.374 mg/L, respectively, but would be below the USEPA NURP suggested threshold level of 0.450 mg/L and 0.785 mg/L, respectively, suggesting a low potential to pose a risk to aquatic organisms. Projected copper concentrations are approximately 0.063 mg/L under both Alternatives, which would exceed the USEPA NURP suggested threshold level of 0.045 mg/L. The concentrations of copper would exceed the USEPA acute criteria, and would exceed the USEPA NURP suggested threshold levels.

Stormwater BMPs that would be utilized in the Study Area (which would be designed during final design) would have a target removal rate of 80 percent of TSS, and thus the metals that attach to these particles would be removed from the stormwater as well. Therefore, pollutant loadings of lead, zinc, and copper to Middle Onondaga Creek would be lower than projected by the FHWA Pollutant Loading analysis, resulting in concentrations in Middle Onondaga Creek that would likely be below the USEPA acute criteria concentrations. Therefore, the Community Grid Alternative would result in beneficial effects to Middle Onondaga Creek through the reduction in pollutant loading due to stormwater runoff.

I-481 East Study Area:

Currently, the I-481 East Study Area consists of 35.5 acres of impervious surface in the northern section and 5.5 acres of impervious surface in the southern section. The Community Grid Alternative for the northern section would result in approximately 37.5 acres of impervious area, an increase of 2 acres, or 5.6 percent. For the southern section, the Community Grid Alternative would result in approximately 6 acres of impervious area, an increase of 0.5 acres, or 9.0 percent (see Table 6-4-7-15). The I-481 East Study Area is not within a CSO sewershed. With the exception of the bridge over the CSX tracks, all of the Project elements in this study area would be within the NYSDOT right-of-way.

The results of the Toler and FHWA Pollutant Loading analyses, conducted without BMPs, indicate that the greater amount of impervious surface from the additional auxiliary lanes would result in an approximately 4 percent higher pollutant loading and an approximately 40 percent higher chloride loading on an annual basis to the unnamed tributary of North Branch Ley Creek within the northern section of the East Study Area. Similarly, for the southern section, the increase of impervious surface

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78 Ibid
79 Ibid
from the additional auxiliary lanes would result in an approximately 6 percent higher pollutant loading and an approximately 37 percent higher chloride loading on an annual basis to Butternut Creek. For the northern section, pollutant loadings of lead and zinc, without BMPs, would result in-in stream concentrations of 0.221 mg/L and 0.728 mg/L, respectively for the Community Grid Alternative, a slight increase from the concentrations under the No Build Alternative of 0.217 mg/L and 0.713 mg/L respectively. These concentrations would exceed the USEPA acute criteria of 0.103 mg/L and 0.374 mg/L respectively but would be below the USEPA NURP suggested threshold level of 0.450 mg/L and 0.785 mg/L, respectively, suggesting a low potential to pose a risk to aquatic organisms.\textsuperscript{81} For the southern section, lead and zinc concentrations both fall below the USEPA acute criteria, suggesting they would not pose a risk to aquatic biota in the unnamed tributary of North Branch Ley Creek. Projected copper concentrations for the northern and southern sections under the Community Grid Alternative, 0.119 mg/L and 0.054 mg/L respectively, would exceed the USEPA acute criteria of 0.021 mg/L and exceed the USEPA NURP suggested threshold level of 0.045 mg/L. The projected copper concentration under the No Build Alternative would be approximately 0.117 mg/L for the northern section and 0.054 mg/L for the southern section. Projected in-stream copper concentrations in the northern and southern sections would be higher than those under the No Build Alternative for the northern section and remain the same under the southern section. These concentrations would exceed the USEPA acute criteria, and would exceed the USEPA NURP suggested threshold levels.

Stormwater BMPs that would be utilized in the study area (which would be designed during final design) would have a target removal rate of 80 percent of TSS,\textsuperscript{82} and thus the metals that attach to these particles would be removed from the stormwater as well. Therefore, pollutant loadings of lead, zinc, and copper to Butternut Creek and the unnamed North Branch Ley Creek tributary would be lower than projected by the FHWA Pollutant Loading analysis. The Community Grid Alternative would result in beneficial effects to Butternut Creek and the North Branch Ley Creek tributary through the reduction in pollutant loading due to stormwater runoff.

\textit{I-481 North Study Area:}

Under the No Build Alternative, the I-481 North Study Area consists of 48.2 acres of impervious surface. The Community Grid Alternative would result in 46.7 acres of impervious surfaces, a decrease of 1.5 acres, or 6.4 percent. The I-481 North Study Area is not within a CSO sewershed. All of the project elements that would occur are within the NYSDOT right-of-way. The results of the Toler and FHWA Pollutant Loading analyses, conducted without BMPs, indicate that the decrease in the amount of impervious surface from the reconstructed ramps would result in an approximately 2 percent lower pollutant loading and an approximately 27 percent higher chloride loading on an annual basis to Mud Creek, compared with the loadings under the No Build Alternative. Projected concentrations of lead under the Community Grid Alternative, without BMPs, would be the same as the No Build Alternative—approximately 0.117 mg/L. Projected concentrations of zinc under the Community Grid Alternative, without BMPs, would be similar to the No Build Alternative — approximately 0.384 mg/L.

\textsuperscript{81} Ibid

for zinc under the Community Grid, compared to 0.385 mg/L for zinc under the No Build. These concentrations would exceed the USEPA acute criteria of 0.103 mg/L and 0.374 mg/L, respectively, but would be below the USEPA NURP suggested threshold levels of 0.450 mg/L and 0.785 mg/L, respectively. Projected copper concentrations are also the same between the No Build and Community Grid Alternatives—0.063 mg/L. These concentrations would exceed the USEPA acute criteria of 0.021 mg/L, and would exceed the USEPA NURP suggested threshold level of 0.045 mg/L. The projected in-stream copper, lead, and zinc concentrations are similar under the Community Grid Alternative and the No Build Alternative, despite the differences in impervious areas (see Table 6-4-7-15). This is because the calculated concentration is based largely on the ratio of average annual streamflow to the runoff flow rate from the mean storm, a ratio that changes by less than one from the No Build Alternative to the Community Grid Alternative. The concentrations of copper, lead, and zinc would exceed the USEPA acute criteria, and the copper concentration would exceed the USEPA NURP suggested threshold levels. Stormwater BMPs that would be utilized in the Study Area (which would be designed during final design) would have a target removal rate of 80 percent of TSS, and thus the metals that attach to these particles would be removed from the stormwater as well. Therefore, pollutant loadings of lead, zinc, and copper to Mud Creek would be lower than projected by the FHWA Pollutant Loading analysis. The Community Grid Alternative would result in beneficial effects to Mud Creek through the reduction in pollutant loading due to stormwater runoff.

With the implementation of BMPs, the Community Grid Alternative would not adversely affect aquatic organisms in any of the study areas when compared with the No Build Alternative. The increases in impervious area in the I-481 East and I-481 North Study Areas would be similarly mitigated with the implementation of BMPs, and stormwater runoff volumes entering the receiving waters would not increase, as the BMPs would, at a minimum, treat the runoff reduction volumes of each Study Area (volumes and calculations provided in Chapter 5, Transportation and Engineering Considerations). In accordance with the NYS Stormwater Management Design Manual, BMPs would have target phosphorus removals of at least 40 percent, and TSS removals of at least 80 percent, which would result in improved quality of stormwater runoff. In the Central Study Area, stormwater would no longer be treated at Metro and only a portion of the stormwater runoff volume would be treated by stormwater management BMP’s, but the overall benefit of the separate storm drainage system would improve water quality by reducing CSO events. Pollutant loadings of lead, zinc, and copper to all streams in the study areas would also be lower than projected by the FHWA Pollutant Loading analysis as a result of BMP’s. Because these pollutants are typically filtered out with the sediment (TSS), BMPs designed in accordance with the 2015 New York State Stormwater Management Design Manual may remove nitrogen from stormwater, although target removal rates vary depending on the practice and are typically not quantified in the Design Manual. The water quality treatment provided by the implementation of these BMPs would result in reductions to the pollutant loadings described above. BMPs would be designed during the final design phase, and the actual reductions in pollutant concentrations would be calculated at that time. Chlorides, unlike other pollutants, are not treated by BMPs. Annual chloride loading from the Central and I-481 South Study

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83 Ibid.

Areas would be lower than that under the No Build Alternative. Annual chloride loading to the unnamed tributary of North Branch Ley Creek from the I-481 East Study Area, Northern Section would be approximately 40 percent higher compared with that under the No Build Alternative, due to the additional lanes that would be constructed. Annual chloride loading from the I-481 North Study Area to Mud Creek is expected to be approximately 27 percent higher compared with the No Build Alternative. The average annual concentration of chloride discharging from the southern portion of the I-481 East Study Area to Butternut Creek is projected at 49.71 mg/L. Chloride concentration in Butternut Creek in 1997, the most recent measurement by NYSDEC, was 8.1 mg/L. Thus, according to the Toler Analysis, the runoff from the southern portion of the I-481 East Study Area would add nearly 37 times as much chloride to Butternut Creek compared with the No Build Alternative.

It is important to note, however, that chloride concentrations in Butternut Creek are likely higher than they were 20 years ago, due to increased rates of deicing application, changes in snowfall, and increased baseline conditions from chloride storage in the shallow groundwater system. In Lower Onondaga Creek, for example, the chloride concentration in 2012, as measured by NYSDEC, ranged from 259 to 833 mg/L, while the range measured in 1990 was 62.2 to 210 mg/L, a four-fold increase in 12 years. If Butternut Creek were to follow the same trend of increasing chloride concentrations, the current levels would be higher than the 8.1 mg/L reported in 1997, possibly as high as 50 mg/L, and the runoff from the southern portion of the I-481 East Study Area would result in a smaller net increase in chloride in Butternut Creek.

Studies of changes in chloride concentrations in streams over time indicate that concentrations typically double over twenty years, which would result in a projected chloride concentration in Butternut Creek of 16 mg/L in 2016. The lower estimated No Build Alternative chloride concentration in the stream would result in a greater net increase as a result of the Community Grid Alternative. The projected concentration of chloride in Butternut Creek under the Community Grid Alternative is expected to be from approximately 55 to 90 mg/L, which still is well below the USEPA chronic toxicity concentration of 230 mg/L. Thus, the operation of the Community Grid Alternative would not have the potential to result in the failure of the Butternut Creek to meet the water quality criteria for its designated Class C Water Classification. Likewise, the similar or lower change in chloride loads to the North Branch Ley Creek tributary and Mud Creek from the operation of the Community Grid Alternative would likely not result in the failure of these streams to meet the water quality criteria for their designated Class C Water Classifications.

As discussed in Chapter 5, Transportation and Engineering Considerations, a combination of hydrodynamic stormwater treatment units and infiltration/detention basins would be installed within the Central Study Area and would treat the 1-year rainfall event or 6.7 acre-feet of stormwater runoff (refer to Chapter 5, Transportation and Engineering Considerations for calculations and proposed locations). The final locations for the BMPs would be determined during final design and

85  http://nwis.waterdata.usgs.gov/usa/nwis/qwdata/?site_no=04245200
86  http://dx.doi.org/10.1016/j.scitotenv.2014.12.012
87  http://nwis.waterdata.usgs.gov/usa/nwis/qwdata/?site_no=04240010
88  http://dx.doi.org/10.1016/j.scitotenv.2014.12.012
would be positioned within the landscape in accordance with the Design Manual, in such a way that would provide the required water quality treatment, runoff reduction, and peak flow attenuation. In addition to the water quality BMPs, green infrastructure practices are proposed for the Central Study Area and would be further refined during the final design stage. Practices under consideration include vegetated swales, tree planting, tree pits, stormwater planters, rain gardens, and conservation of existing trees. BMPs in the South Study Area would treat 3.1 acre-feet of runoff and would primarily include dry swales with check dams (refer to Chapter 5, Transportation and Engineering Considerations for calculations and proposed locations). Green infrastructure practices under consideration for the I-481 South Study Area include vegetated swales and infiltration practices such as bioretention basins. Stormwater treatment in the East Study Area would be achieved through the construction of detention and infiltration basins designed to treat 0.5 acre-feet of stormwater runoff (refer to Chapter 5, Transportation and Engineering Considerations for calculations and proposed locations). Green infrastructure practices constructed in the I-481 South Study Area could include vegetated swales and additional infiltration practices.

In the I-481 North Study Area, the Community Grid Alternative would include the treatment of 1.4 acre-feet of stormwater runoff using detention and infiltration basins, dry swales with check dams, and infiltration trenches (refer to Chapter 5, Transportation and Engineering Considerations for calculations and proposed locations). The final locations for the BMPs would be determined during final design and would be positioned within the landscape in accordance with the Design Manual, in such a way that would avoid existing stream channels (to prevent habitat degradation) and provide the required water quality treatment, runoff reduction, and peak flow attenuation. Additional treatment could be provided through additional infiltration practices and vegetated swales. All of these BMPs provide additional infiltration and water quality improvements not achieved under the No Build Alternative and not considered in the FHWA Pollutant Loading Analysis of the Community Grid Alternative described above. Most of the Central Study Area is within or on the border of the Clinton/Lower Main Interceptor Sewer combined sewershed (see Figure 6-4-7-17). The exception is the northern portion of the study area, which is on the border of the Hiawatha Regional Treatment Facility combined sewershed, and the portion of the study area immediately adjacent to Onondaga Creek where the storm and sanitary sewers have been separated. Within the Central Study Area, there are four active CSO outfalls and two additional outfalls along Onondaga Creek, and one active outfall along Ley Creek. These outfalls are expected to remain active under the Community Grid Alternative and would continue to contribute their current loads of stormwater and pollutants to Onondaga and Ley Creeks.

Stormwater runoff from the Central Study Area would not discharge to the City’s combined sewer system; design of the new roadways’ drainage system would prevent any contribution to the current combined sewer, in accordance with the USEPA consent order and the Save the Rain initiative. A new stormwater runoff conveyance system would discharge runoff directly to the receiving surface water of Onondaga Creek (see Chapter 5, Transportation and Engineering Considerations). This direct discharge of stormwater flows into Onondaga Creek and would represent a change from the existing condition; currently, a CSO outfall discharges into the creek during high flow events. With the installation of the stormwater trunk lines, stormwater discharges into Onondaga Creek would occur during all stormflow events. However, these discharges would have improved water quality as compared to the CSO events due to the separation of the stormwater and sanitary sewers and the
implementation of BMPs in the watershed. CSO events would be unlikely to occur under the operation of the stormwater trunk lines, providing a substantial improvement to water quality downstream of the outfall. Therefore, the stormwater trunk lines would have an overall beneficial effect on the water quality in Onondaga Creek and Onondaga Lake compared to the No Build Alternative. The potential impact of the stormwater trunk lines on the bed and banks of Onondaga Creek is discussed below.

With the implementation of BMPs designed to treat stormwater quantity and quality in accordance with the Design Manual and the SWPPP prepared in accordance with SPDES General Permit for Stormwater Discharges from Construction Activity (GP-0-15-002), stormwater runoff from the Community Grid Alternative would be improved as compared to the No Build Alternative, would not result in adverse effects to Onondaga Creek or Onondaga Lake, and would not result in the failure of these surface waters to meet the water quality criteria for their designated water quality classification.

**Effects on Beds and Banks of Surface Waters**

Table 6-4-7-16 summarizes the temporary and permanent effects of the Community Grid Alternative on surface waters in the Study Areas.

<table>
<thead>
<tr>
<th>Central Study Area – Onondaga Creek</th>
<th>Effects to Surface Waters from the Community Grid Alternative</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Existing</strong></td>
<td></td>
</tr>
<tr>
<td>Culvert (lf)</td>
<td>Stream Channel (lf)</td>
</tr>
<tr>
<td>226</td>
<td>1,563</td>
</tr>
<tr>
<td><strong>Design</strong></td>
<td></td>
</tr>
<tr>
<td>Culvert (lf)</td>
<td>Stream Channel (lf)</td>
</tr>
<tr>
<td>226</td>
<td>1,563</td>
</tr>
<tr>
<td><strong>Summary of Effects</strong></td>
<td>Quantity</td>
</tr>
<tr>
<td>Length of Permanent Stream Impact (lf)</td>
<td>0</td>
</tr>
<tr>
<td>Area of Permanent Stream Impact (sf)</td>
<td>0</td>
</tr>
<tr>
<td>Area of Permanent Stream Impact (acres)</td>
<td>0</td>
</tr>
<tr>
<td>Length of Temporary Stream Impact (lf)</td>
<td>65</td>
</tr>
<tr>
<td>Area of Temporary Stream Impact (sf)</td>
<td>2,387</td>
</tr>
<tr>
<td>Area of Temporary Stream Impact (acres)</td>
<td>0.05</td>
</tr>
<tr>
<td>Note:</td>
<td><strong>Used culvert section for Erie Blvd and W. Genesee St only, treated other bridge structures as open channel.</strong>*</td>
</tr>
</tbody>
</table>

Draft April 2019
PIN 3501.60
Table 6-4-7-16 (cont'd)
Effects to Surface Waters from the Community Grid Alternative

<table>
<thead>
<tr>
<th>Central Study Area – Ley Creek</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Existing</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Culvert (lf)</td>
<td>Stream Channel (lf)</td>
<td>Stream Area (sf)</td>
<td>Stream Area (acres)</td>
</tr>
<tr>
<td>0</td>
<td>-</td>
<td>3,296</td>
<td>0.08</td>
</tr>
<tr>
<td><strong>Design</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Culvert (lf)</td>
<td>Stream Channel (lf)</td>
<td>Stream Area (sf)</td>
<td>Stream Area (acres)</td>
</tr>
<tr>
<td>0</td>
<td>-</td>
<td>3,296</td>
<td>0.08</td>
</tr>
</tbody>
</table>

**Summary of Effects**

<table>
<thead>
<tr>
<th>Quantity</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Length of Permanent Stream Impact (lf)</td>
<td>0</td>
</tr>
<tr>
<td>Area of Permanent Stream Impact (sf)</td>
<td>0</td>
</tr>
<tr>
<td>Area of Permanent Stream Impact (acres)</td>
<td>0</td>
</tr>
<tr>
<td>Length of Temporary Stream Impact (lf)</td>
<td>0</td>
</tr>
<tr>
<td>Area of Temporary Stream Impact (sf)</td>
<td>0</td>
</tr>
<tr>
<td>Area of Temporary Stream Impact (acres)</td>
<td>0</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>East Study Area – Unnamed North Branch Ley Creek Tributary</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Existing</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Culvert (lf)</td>
<td>Stream Channel (lf)</td>
<td>Stream Area (sf)</td>
<td>Stream Area (acres)</td>
</tr>
<tr>
<td>124</td>
<td>50</td>
<td>496</td>
<td>0.01</td>
</tr>
<tr>
<td><strong>Design</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Culvert (lf)</td>
<td>Stream Channel (lf)</td>
<td>Stream Area (sf)</td>
<td>Stream Area (acres)</td>
</tr>
<tr>
<td>134</td>
<td>40</td>
<td>400</td>
<td>0.01</td>
</tr>
</tbody>
</table>

**Summary of Effects**

<table>
<thead>
<tr>
<th>Quantity</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Length of Permanent Stream Impact (lf)</td>
<td>10</td>
</tr>
<tr>
<td>Area of Permanent Stream Impact (sf)</td>
<td>96</td>
</tr>
<tr>
<td>Area of Permanent Stream Impact (acres)</td>
<td>0.01</td>
</tr>
<tr>
<td>Length of Temporary Stream Impact (lf)</td>
<td>15</td>
</tr>
<tr>
<td>Area of Temporary Stream Impact (sf)</td>
<td>150</td>
</tr>
<tr>
<td>Area of Temporary Stream Impact (acres)</td>
<td>0.003</td>
</tr>
</tbody>
</table>
### Table 6-4-7-16 (cont’d)
Effects to Surface Waters from the Community Grid Alternative

<table>
<thead>
<tr>
<th>North Study Area – Mud Creek</th>
<th>Existing</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Culvert (lf)</td>
<td>Stream Channel (lf)</td>
<td>Stream Area (sf)</td>
<td>Stream Area (acres)</td>
</tr>
<tr>
<td>Ont 66-11-10</td>
<td>1,108</td>
<td>3,327</td>
<td>62,731</td>
<td>1.44</td>
</tr>
<tr>
<td>Ont 66-11-10-2</td>
<td>493</td>
<td>1,740</td>
<td>43,665</td>
<td>1.00</td>
</tr>
<tr>
<td>Ont 66-11-10-4</td>
<td>423</td>
<td>1,969</td>
<td>9,046</td>
<td>0.21</td>
</tr>
<tr>
<td>Ont 66-11-10-1A (SB-PGB-1)</td>
<td>257</td>
<td>126</td>
<td>885</td>
<td>0.02</td>
</tr>
<tr>
<td>Ont 66-11-10-1B (PGB-1)</td>
<td>316</td>
<td>57</td>
<td>572</td>
<td>0.01</td>
</tr>
<tr>
<td>Totals</td>
<td>2,597</td>
<td>7,219</td>
<td>116,900</td>
<td>2.68</td>
</tr>
<tr>
<td></td>
<td>Design</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Culvert (lf)</td>
<td>Stream Channel (lf)</td>
<td>Stream Area (sf)</td>
<td>Stream Area (acres)</td>
</tr>
<tr>
<td>Ont 66-11-11</td>
<td>1,039</td>
<td>3,396</td>
<td>63,723</td>
<td>1.46</td>
</tr>
<tr>
<td>Ont 66-11-10-2</td>
<td>395</td>
<td>1,838</td>
<td>46,605</td>
<td>1.07</td>
</tr>
<tr>
<td>Ont 66-11-10-4</td>
<td>423</td>
<td>1,969</td>
<td>9,046</td>
<td>0.21</td>
</tr>
<tr>
<td>Ont 66-11-10-1A (SB-PGB-1)</td>
<td>321</td>
<td>95</td>
<td>662</td>
<td>0.02</td>
</tr>
<tr>
<td>Ont 66-11-10-1B (PGB-1)</td>
<td>337</td>
<td>35</td>
<td>354</td>
<td>0.01</td>
</tr>
<tr>
<td>Totals</td>
<td>2,516</td>
<td>7,333</td>
<td>120,390</td>
<td>2.76</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Summary of Effects</th>
<th>Quantity</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Length of Permanent Stream Impact (lf)</td>
<td>81</td>
<td>Increase in Channel Section</td>
</tr>
<tr>
<td>Area of Permanent Stream Impact (sf)</td>
<td>3,490</td>
<td>Increase in Channel Area</td>
</tr>
<tr>
<td>Area of Permanent Stream Impact (acres)</td>
<td>0.08</td>
<td>Increase in Channel Area</td>
</tr>
</tbody>
</table>

| Length of Temporary Stream Impact (lf) | 178 | Erosion Protection on West Side of Culvert N-9 following lengthening, erosion protection on the North Side of N-11 following lengthening, widening of MC-4 to minimum 15'. Erosion protection on either end of culvert N-3. Erosion protection at western end of culvert in PGB-1. |
| Area of Temporary Stream Impact (sf) | 2,083 | |
| Area of Temporary Stream Impact (acres) | 0.05 | |

Central Study Area:
While no permanent loss (fill) of waters is proposed within the Central Study Area (see Table 6-4-7-16), the work to construct these replacement structures (including the removal of existing structures) below the ordinary high water of the Onondaga Creek (a WOTUS) would require a Section 404 Permit. The Community Grid Alternative would require an Individual Section 404 Permit and
Section 401 Certification for its combined impacts to WOTUS, including wetlands. Based on the field survey of Ley Creek and a review of the Project plans for the Central Study Area, the proposed project is not expected to result in direct effects to Ley Creek.

The new 96-inch (8-foot) outfall for the proposed stormwater trunk line servicing the area east of Onondaga Creek would be located in the existing bank of Onondaga Creek, and would not have a permanent effect on the surface water area or stream length, as described in Table 6-4-7-16. The invert of the outfall would be approximately 1.6 feet above the Onondaga Creek stream bed at the outfall location. During low flow conditions, the top of the water surface is at 1.9 feet above the creek bed and therefore the pipe would always contain some water for a short distance. The top of the outfall would be below the mean high water line. Therefore, discharge from the outfall would not result in a head drop and thus would have minimal erosive impact on the stream bed and the stone wall banks. The proposed outfall would be located on an outside meander bend of Onondaga Creek, at an angle that directs the flow from the outfall towards the far bank, which would reduce the potential for erosion of the bed and banks around the outfall structure. Additional protection from erosion would be provided by the construction of an energy-dissipating structure at the outfall. The energy dissipating structure would be designed during Final Design and would meet the requirements of the New York State Department of Transportation’s Geotechnical Design Procedure: Bank and Channel Protective Lining Design Procedures.

Similarly, the new 42-inch (3.5-foot) outfall for the proposed stormwater trunk line servicing the area west of Onondaga Creek would be located in the existing embankment of the Onondaga Creek floodplain, on the opposite shore from the 96-inch outfall. There would be no permanent effect on the surface water area or stream length because of the new outfall, as described in Table 6-4-7-8. The invert of the outfall would be between 15 and 20 feet above the Onondaga Creek stream bed at the outfall location (exact location to be determined during final design). Protection from erosion would be provided by the construction of an energy-dissipating structure and bank stabilization measures. The energy dissipating structure would be designed during final design and would meet the requirements of the New York State Department of Transportation’s Geotechnical Design Procedure: Bank and Channel Protective Lining Design Procedures.

The velocities and hydraulics of discharges from the stormwater trunk lines would be determined during final design, along with the details of protection measures needed to stabilize the creek bed, banks, and floodplain. The stormwater trunk lines would discharge stormwater runoff directly to Onondaga Creek, but the proposed stormwater BMPs located upstream of the creek would improve the quality of the stormwater and reduce peak flows as compared to the quality and quantity of stormwater that is discharged to Onondaga Creek during a CSO event under the No Build Alternative. The proposed stormwater BMPs would also meet the USEPA Consent Order’s water quality objectives. Therefore, the stormwater trunk lines would have beneficial effects to Onondaga Creek water quality and peak flows, as compared to the No Build Alternative.

As discussed in Chapter 5, Transportation and Engineering Considerations, five bridges over Onondaga Creek are within the Central Study Area. There are no known hydraulic issues associated with the existing retaining walls or existing bridge piers, and changes to these bridges would require a hydraulic analysis. As part of this alternative, the existing retaining walls and piers would be retained or reconstructed as necessary, and any replacement piers and retaining walls would be placed farther
back from the creek than the existing piers and retaining walls. As a result, no adverse effects on hydraulics are anticipated, as the existing conditions would be either maintained or improved.

I-481 South Study Area:
A NYSDEC jurisdictional creek, City Line Brook, is present in the vicinity of the I-81/I-481 interchange. However, it is culverted underground throughout the entire length of the I-481 South Study Area and no modifications are proposed to this culvert. A NYSDEC jurisdictional unnamed tributary to Butternut Creek is located adjacent to I-481 near proposed noise barrier 9. No work is proposed in the creek and impacts would be limited to construction of the noise barrier up-gradient of the stream, on the existing highway embankment, and would be temporary in nature (see Construction Effects). Therefore, no further review of effects on stream bed and banks in this study area is required.

I-481 East Study Area:
Currently, the existing triple barrel culvert in the I-481 East Study Area (E-11) is 124 linear feet, and the unnamed tributary to North Branch of Ley Creek within the East Study Area is 50 linear feet, or approximately 496 square feet of surface water area. During the site reconnaissance and stream surveys, up to one foot of water was observed in the North Branch of Ley Creek tributary to the east of the culvert, while to the west of the culvert the channel was poorly defined, heavily armored with gravel at the culvert inlet, and dominated by common reed. The existing culvert was rated as having “No AOP” according to the NAACC coarse screening protocol, and the NAACC fine rating system determined that the structure presents a moderate barrier to aquatic organism passage. For the Community Grid Alternative, each pipe of the existing triple barrel culvert structure would be extended 10 feet downstream into the unnamed tributary to North Branch Ley Creek, creating 134 linear feet of additional culvert and reducing the creek length (within the Study Area) to 40 linear feet, which would reduce the surface water area to 400 square feet (see Figure 6-4-7-9 and Table 6-4-7-16). The extension of the culvert would be a permanent impact to the North Branch Ley Creek tributary. The proposed culvert would have the same NAACC ratings as the existing culvert. Following the extension of the culvert, the new embankment would be stabilized with erosion control matting, to prevent sediment from entering the creek, and planted with native riparian and upland vegetation to prevent invasive species from colonizing and further stabilize the embankment. The work to construct the replacement structures (including the removal of existing structures) below the ordinary high water of the North Branch Ley Creek tributary (a WOTUS) would require a Section 404 Permit. The Community Grid Alternative would require an Individual Section 404 Permit and Section 401 Certification for the combined impacts to Waters of the United States (including wetlands).

I-481 North Study Area:
Within the I-481 North Study Area, the Community Grid Alternative would require construction of infrastructure in the vicinity of NYSDEC-regulated Mud Creek. To avoid and minimize impacts to Mud Creek within the northeast portion of the I-481/I-81 interchange, the proposed project would include retaining walls and a bridge over a portion of the creek that is located in the design footprint. In addition, the proposed project requires numerous culvert replacements, extensions, and removals, as described in Table 6-4-7-16, Table 6-4-7-17b, Figure 6-4-7-18, and below.

The Community Grid Alternative includes the removal of an existing 100-foot culvert, N-16, and restoration of part of Mud Creek between highway ramps. Currently, N-16 connects a 743 linear foot (0.26 acres) reach of Mud Creek (upstream) to a 53 linear foot (0.01 acres) reach (downstream). The
Community Grid Alternative:
Culvert Restoration
I-481 North Study Area

Stormwater Analysis Summary
Total area = 233.6 acres
Existing impervious area = 54.6 acres
Proposed impervious area = 59.2 acres
Detention storage volume required = minimum storage volume provided = 7.1 acre-feet
Water quality treatment volume (WQV) required = minimum WQV provided = 1.4 acre-feet
Runoff Reduction Volume (RRv) required = minimum RRv provided = 0.08 acre-feet

Culvert Restoration in the North Study Area

<table>
<thead>
<tr>
<th>Culvert ID</th>
<th>Description</th>
<th>Project Effect</th>
<th>Mitigation Opportunities</th>
</tr>
</thead>
<tbody>
<tr>
<td>N-1</td>
<td>30&quot; CMP. Outlets into wide channel surrounded by common reed that narrows after leaving highway ROW - Pine Grove Brook. Reduced AOP.</td>
<td>Extend culvert by 20 feet into wetland area</td>
<td>Replace culvert with open bottom culvert for full AOP</td>
</tr>
<tr>
<td>N-2</td>
<td>36&quot; RCP. Inlet and outlet are in brush/wooded areas - South Branch of Pine Grove Brook. Reduced AOP.</td>
<td>Extend both ends of culvert by a total of 80 feet into the brush/wooded brook areas</td>
<td>Replace culvert with open bottom culvert for full AOP</td>
</tr>
<tr>
<td>N-3</td>
<td>24&quot; RCP. Inlet and outlet are Mud Creek tributary wetland areas. Reduced AOP.</td>
<td>Extend culverted area by 75 feet into wetland area</td>
<td>Replace culvert with open bottom culvert for full AOP</td>
</tr>
<tr>
<td>N-8</td>
<td>60&quot; CMP. Inlet and outlet are wetland N7. Reduced AOP.</td>
<td>Ramp and 175 foot culvert demolished</td>
<td>Grade land to reconnect wetland N5 to unnamed wetland</td>
</tr>
<tr>
<td>N-9</td>
<td>24&quot; CMP. Inlet and outlet are wetlands. Reduced AOP.</td>
<td>Ramp and 80 foot long culvert demolished</td>
<td>Replace culvert with open bottom culvert for full AOP</td>
</tr>
<tr>
<td>N-15</td>
<td>84&quot; CMP. Inlet and outlet are Mud Creek. Reduced AOP.</td>
<td>Shift culvert downstream</td>
<td>Replace culvert with open bottom culvert for full AOP</td>
</tr>
<tr>
<td>N-16</td>
<td>84&quot; CMP. Inlet and outlet are Mud Creek. Reduced AOP.</td>
<td>Remove and restore 100 feet of Mud Creek and associated wetland.</td>
<td>Mimic upstream Mud Creek form and native aquatic plants</td>
</tr>
</tbody>
</table>

Legend
- Stormwater Analysis Boundary
- Creek or Brook
- Detention Pond
- Culvert to be Removed or Modified
proposed work also includes moving culvert N-15 (currently 119 linear feet, proposed to be 125 linear feet) downstream and the subsequent restoration of the previously culverted area. This work would result in the restoration of 113 linear feet of Mud Creek, connected to the upstream portion, and would form a contiguous 909 linear feet, or 0.31-acre, reach of Mud Creek. The shifting of culvert N-15 downstream and 6 linear foot increase in length would result in a decrease in length to the section of Mud Creek between N-15 and N-14, which is currently 839 linear feet (0.40 acres) and would be reduced to 795 linear feet (0.38 acres); a total of a 44 linear foot decrease in length, or 0.02 acres of surface water.

A new bridge and retaining wall would be constructed between the existing N-17 and N-15 culverts and would avoid construction in any portions of Mud Creek; although, the embankments for the new structures would be close to the existing channel. To provide an adequate vegetated buffer between the embankment and Mud Creek, the stream channel would likely have to be redesigned with a gentle meander; geometry would be determined during final design. The current channel appears to be stable with little evidence of excess erosion or deposition. Thus, the geometry and sediment composition of the restored channel would mimic that of the upstream stream channel, where possible. The floodplain would be enhanced through the establishment of native plantings. This vegetated buffer would be created along the creek edges to protect it from highway runoff and to stabilize the toe of the retaining wall and the bridge footings. A minimum buffer width of 50 feet is recommended. The new alignment and final planting details will occur during final design. Additional mitigation opportunities could include channel enhancements within the restored channel reach such as placement of small woody debris and emergent vegetation to provide microhabitats.

The replacement of existing culvert N-17 along Mud Creek with open bottom culvert (of equal length) would allow for passage of aquatic organisms and small terrestrial species as an additional mitigation measure to unavoidable impacts to surface waters and NYSDEC regulated wetlands. The culvert is currently in a stable condition, and has a “Reduced AOP” score on the NAACC coarse rating protocol, and is classified as a minor barrier to aquatic organism passage through the NAACC fine rating system. The culvert is not required to be replaced under the Community Grid Alternative. Thus, the proposed action would have a beneficial effect on the habitat connectivity of Mud Creek as compared to the No Build Alternative.

A highway drainage pipe, Outfall-N-2, that currently outlets to a steep wet-weather-flow tributary to Mud Creek is proposed to be relocated, requiring the construction of a new drainage pipe. The outlet from this new pipe would be stabilized to prevent erosion. Depending on the final location of the drain pipe, a regenerative stormwater conveyance or step-pool design form could be appropriate for the new drainage channel to Mud Creek, to provide energy dissipation, prevent erosion, and settle sediments before they reach the creek. The final location and design details would be determined during final design.
# Table 6-4-7-17a

## Culvert Restoration Proposed under the Community Grid Alternative – East Study Area

<table>
<thead>
<tr>
<th>Study Area</th>
<th>Culvert ID</th>
<th>Description</th>
<th>Project Effect</th>
<th>Mitigation Opportunities</th>
</tr>
</thead>
<tbody>
<tr>
<td>East</td>
<td>E-1</td>
<td>24&quot; CMP culvert. Connects Wetland 4 to an unnamed channel (tributary to Butternut Creek). Reduced AOP.</td>
<td>No change</td>
<td>NA</td>
</tr>
<tr>
<td>East</td>
<td>E-2</td>
<td>48&quot; RCP. Connects Wetland 4 under Manlius Center Road to unnamed Butternut Creek tributary. Reduced AOP.</td>
<td>No change</td>
<td>NA</td>
</tr>
<tr>
<td>East</td>
<td>E-3</td>
<td>48&quot; CMP and HDPE culvert - appeared to have been extended with HDPE pipe at outlet. Connects Wetland 5 to an unnamed channel under CSX railroad tracks.</td>
<td>No change</td>
<td>NA</td>
</tr>
<tr>
<td>East</td>
<td>E-4</td>
<td>30&quot; HDPE culvert with 60&quot; metal apron on downstream side. Connects Wetland 6 under highway maintenance road under highway bridge. Reduced AOP.</td>
<td>No change</td>
<td>NA</td>
</tr>
<tr>
<td>East</td>
<td>E-5</td>
<td>32&quot; HDPE culvert. Connects Wetland 6-504 to Wetland 6-115 under highway maintenance road under highway bridge. Reduced AOP.</td>
<td>No change</td>
<td>NA</td>
</tr>
<tr>
<td>East</td>
<td>E-6</td>
<td>24&quot; HDPE culvert with 60&quot; metal apron. Connects to Wetland 6 under highway maintenance road under highway bridge. Standing, stagnant water in pipe during dry weather. Reduced AOP.</td>
<td>No change</td>
<td>NA</td>
</tr>
<tr>
<td>East</td>
<td>E-7</td>
<td>42&quot; HDPE double-barrel culvert. Connects Wetland 6-303 to A-215 (unnamed channel) under I-481. Reduced AOP.</td>
<td>No change</td>
<td>NA</td>
</tr>
<tr>
<td>East</td>
<td>E-8</td>
<td>Triple-barrel culvert under Kirkville Road, east of I-481. Elliptical CMPs - 60&quot; wide by 36&quot; tall. Connects drainage ditches that feed into A-215. Reduced AOP.</td>
<td>No change</td>
<td>NA</td>
</tr>
<tr>
<td>East</td>
<td>E-9</td>
<td>Quadruple-barrel culvert under Kirkville Road, west of I-481. Elliptical CMPs - 60&quot; wide by 36&quot; tall. Connects drainage ditches that feed into A-215. Reduced AOP.</td>
<td>No change</td>
<td>NA</td>
</tr>
<tr>
<td>East</td>
<td>E-10</td>
<td>54&quot; CMP. Connects highway drainage to Wetland 7. Reduced AOP.</td>
<td>No change</td>
<td>NA</td>
</tr>
</tbody>
</table>
| East       | E-11       | One 65" CMP culvert, two 54" HDPE culverts, one concrete headwall. Outlets into wetland area (9-105) – unnamed North Branch Ley Creek tributary. No AOP. | Extend culvert by 10 feet into wetland area. | • Repair damaged metal culvert during culvert extension work.  
   • Plant disturbed areas with native species.  
   • Replace culverts with open bottom culverts. |
| East       | E-12       | Elliptical RCP, 84" wide by 66" tall. Connects Meadow Brook to Cedar Bay.    | No change      | NA                       |
| East       | E-13       | Double-barrel culvert under I-481. Elliptical CMPs, 60" wide by 36" tall. Conveys Butternut Creek tributary under I-481. Reduced AOP. | No change      | NA                       |

## Culvert Restoration Proposed under the Community Grid Alternative – North Study Area

<table>
<thead>
<tr>
<th>Study Area</th>
<th>Culvert ID</th>
<th>Description</th>
<th>Project Effect</th>
<th>Mitigation Opportunities</th>
</tr>
</thead>
</table>
| North      | N-1        | 30" RCP. Outlets into wide channel filled with common reed. Common reed density reduces outside of highway right of way (ROW) - Pine Grove Brook. Reduced AOP. | Extend culvert by 20 feet into wetland area. | • Plant disturbed areas with native species.  
   • Replace culvert with open bottom culvert. |
| North      | N-2        | 36" RCP. Inlet and outlet are in brush/wooded areas - South Branch of Pine Grove Brook. Reduced AOP. | Extend both ends of culvert by a total of 80 feet. | • Plant disturbed areas with native species. |
| North      | N-3        | 24" RCP. Inlet and outlet are Mud Creek tributary wetland areas. Reduced AOP. | Extend culverted area by 75 feet into wetland area. | • Plant disturbed areas with native species.  
   • Replace culvert with open bottom culvert for full AOP. |
### Table 6-4-7-17b (cont’d)

**Culvert Restoration Proposed under the Community Grid Alternative – North Study Area**

<table>
<thead>
<tr>
<th>Study Area</th>
<th>Culvert ID</th>
<th>Description</th>
<th>Project Effect</th>
<th>Mitigation Opportunities</th>
</tr>
</thead>
<tbody>
<tr>
<td>North</td>
<td>N-4</td>
<td>24&quot; RCP. Inlet and outlet are highway drainage swale tributary to Wetland 10 and Mud Creek. No dry weather flow. Reduced AOP.</td>
<td>No change</td>
<td>NA</td>
</tr>
<tr>
<td>North</td>
<td>N-5</td>
<td>24&quot; CMP. Inlet and outlet are highway drainage swale tributary to Wetland 10 and Mud Creek. No dry weather flow. Reduced AOP.</td>
<td>No change</td>
<td>NA</td>
</tr>
<tr>
<td>North</td>
<td>N-6</td>
<td>60&quot; CMP. Inlet and outlet are Mud Creek. Reduced AOP.</td>
<td>No change</td>
<td>NA</td>
</tr>
<tr>
<td>North</td>
<td>N-7</td>
<td>60&quot; HDPE double-barrel culvert. Inlet and outlet are Mud Creek. Reduced AOP.</td>
<td>No change</td>
<td>NA</td>
</tr>
<tr>
<td>North</td>
<td>N-8</td>
<td>60&quot; CMP. Inlet and outlet are Mud Creek tributary Ont. 66-11-10-2. Reduced AOP.</td>
<td>Ramp and 175 foot culvert demolished.</td>
<td>• Grade land to fully reconnect Wetland 10 and improve AOP. • Plant disturbed areas with native species.</td>
</tr>
<tr>
<td>North</td>
<td>N-9</td>
<td>24&quot; CMP. Inlet is a drainage ditch area; outlet is Wetland 10. Reduced AOP.</td>
<td>Ramp and 80 foot long culvert demolished.</td>
<td>• Grade land to reconnect Wetland 10 to unnamed wetland. • Plant disturbed areas with native species.</td>
</tr>
<tr>
<td>North</td>
<td>N-10</td>
<td>24&quot; RCP. Outlets to drainage ditch connected to Wetland 10 by culvert N-9. Reduced AOP.</td>
<td>Remove and restore 100 feet of Mud Creek.</td>
<td>• Mimic upstream Mud Creek form and native riparian and aquatic plants</td>
</tr>
<tr>
<td>North</td>
<td>N-11</td>
<td>60&quot; CMP. Inlet and outlet are Mud Creek tributary Ont. 66-11-10-2. Reduced AOP.</td>
<td>No change</td>
<td>NA</td>
</tr>
<tr>
<td>North</td>
<td>N-12</td>
<td>36&quot; CMP. Connects drainage ditches in two sections of Wetland 10 under clover leaf ramp. Reduced AOP.</td>
<td>No change</td>
<td>NA</td>
</tr>
<tr>
<td>North</td>
<td>N-13</td>
<td>Elliptical CMP - 60&quot; wide by 40&quot; high. Inlet and outlet are Mud Creek tributary Ont. 66-11-10-2. Reduced AOP.</td>
<td>No change</td>
<td>NA</td>
</tr>
<tr>
<td>North</td>
<td>N-14</td>
<td>Double-barrel culvert. 60&quot; CMP and 48&quot; RCP set at a higher elevation. Inlet and outlet are Mud Creek. Reduced AOP.</td>
<td>No change</td>
<td>NA</td>
</tr>
<tr>
<td>North</td>
<td>N-15</td>
<td>84&quot; CMP. Inlet and outlet are Mud Creek. Reduced AOP.</td>
<td>Shift culvert downstream</td>
<td>• Plant disturbed areas with native species. • Replace culvert with open bottom culvert. • Restored creek (about 26 feet) would mimic upstream Mud Creek form and native riparian and aquatic plants</td>
</tr>
<tr>
<td>North</td>
<td>N-16</td>
<td>84&quot; CMP. Inlet and outlet are Mud Creek. Reduced AOP.</td>
<td>Remove and restore 100 feet of Mud Creek and associated wetland.</td>
<td>• Restore creek to mimic upstream Mud Creek form and native riparian and aquatic plants</td>
</tr>
<tr>
<td>North</td>
<td>N-17</td>
<td>84&quot; CMP. Inlet and outlet are Mud Creek. Reduced AOP.</td>
<td>No change</td>
<td>NA</td>
</tr>
<tr>
<td>North</td>
<td>N-18</td>
<td>Double-barrel 24&quot; RCP. Inlets and outlets are Mud Creek under Thompson Road. Reduced AOP.</td>
<td>No change</td>
<td>NA</td>
</tr>
<tr>
<td>North</td>
<td>N-19</td>
<td>56&quot; CMP. 20’ long concrete headwall. Inlet is Wetland 10, outlet is Mud Creek. No dry-weather flow through the culvert. Reduced AOP.</td>
<td>No change</td>
<td>NA</td>
</tr>
</tbody>
</table>

Pine Grove Brook, a tributary to Mud Creek, would be affected under the proposed project by the extension of two culverts at two of its branches - N-1 and N-2 (see Table 6-4-7-16 and Table 6-4-7-17b). N-1 is currently 293 linear feet and connects two segments of Pine Grove Brook that are 36
linear feet (upstream) and 22 linear feet (downstream) within the Study Area (total 0.01 acres of surface water). Under the proposed condition, the culvert would be increased by 21 linear feet to 319 linear feet, with a corresponding reduction of the upstream segment of Pine Grove brook to 14 linear feet within the Study Area and the downstream segment to 22 linear feet within the study Area (total surface water area would decrease to 0.008 acres). N-2 is currently 257 linear feet and connects two segments of the South Branch of Pine Grove Brook that are 89 linear feet (upstream) and 37 linear feet (downstream) within the Study Area (total 0.02 acres of surface water). Under the proposed condition, the culvert would be increased by 64 linear feet to 321 linear feet, with a corresponding reduction of the upstream segment of Pine Grove brook to 69 linear feet within the Study Area and the downstream segment to 25 linear feet within the study Area (total surface water area would decrease to 0.015 acres). A hydraulic analysis would be performed during final design to ensure that the design would have no adverse effects on the stream bed and banks and to establish additional protections for these areas if needed. All disturbed areas would be stabilized following construction and planted with appropriate native plantings.

The Community Grid Alternative would also require the extension of a drain pipe, Outfall-N-1, that connects a highway drainage feature to a dry swale. Additionally, existing culvert N-3, which connects two low-lying areas that drain to Mud Creek, would be extended by 75 feet, and would drain into one of the infiltration/detention basin that is proposed for the I-81/I-481 interchange. These disturbances would create an opportunity to strategically plant native species in and around the dry swale, infiltration/detention basin, and highway embankment. In all areas that would be disturbed by the proposed project, the landscape restoration plan would include planting of native species that would provide riparian habitat and bank stabilization.

The proposed demolition of one of the exit ramps in the I-81 North Study Area would also allow for the removal of two existing culverts that connect Wetland 10 to adjacent wetland areas. Culvert N-8 is currently 234 linear feet, 98 linear feet of which would be removed, while the entirety of the 80 linear foot culvert N-9 would be removed. This would also result in an opportunity to lower the existing grade and expand the floodplain area by about 1.2 acres (87,120.00 square feet). Where possible, the disturbed area would be replanted with native plants suitable for the new elevation that could compete with invasive species currently dominant in the area. Soil restoration would be provided for locations where impervious surfaces would be removed, and it would include physical restoration methods such as tilling to loosen the compacted soil.

All new culverts in Mud Creek would meet NYSDEC standards (e.g., embedded or open bottom). The culverts would be constructed to be passable by aquatic organisms. At minimum, they would have a width at bankfull (1.25 x Bankfull width) and would be embedded at least 20 percent at the inlet. Additional wetland and surface water mitigation would include replacing existing culverts (see Figure 6-4-7-18) that may be impeding fish passage with those that meet the NYSDEC standard. Where possible, these culverts would have open bottoms in an effort to maintain bottom habitat within the creek. The larger width would also provide opportunity for incorporating wildlife passage (small to medium) in the culvert design.

In total, there would be net increase in surface waters totaling 81 linear feet and 0.08 acres, with temporary impacts to the surface waters totaling 178 linear feet and 0.05 acres. The affected areas do not all have equal habitat value, and there are many mitigation opportunities to offset the proposed temporary and permanent impacts described above. The net change in the culverted length of North
Study Area streams would be a decrease of 81 linear feet, and the restoration of the Mud Creek area would have a greater habitat and water quality benefit than the loss of the short sections of Pine Grove Brook described above. The work to construct the new and replacement structures (including the removal of existing structures) below the ordinary high water on the tributaries to Mud Creek (all WOTUS) would require a Section 404 Permit. The Community Grid Alternative would require an Individual Section 404 Permit and Section 401 Certification for the combined impacts to WOTUS, including wetlands.

Effects on Navigation

Onondaga Creek is not a navigable waterway under Federal law (within the Central Study Area). Placement of fill or structures within Onondaga Creek as a result of the Community Grid Alternative are anticipated to meet the requirements for authorization for Section 404 of the Clean Water Act, and the outfalls for the stormwater trunk lines would not adversely affect navigability of the creek under Article 15 of the ECL.

Despite the changes to the culverts conveying Mud Creek and its tributaries through the North Study Area (described above), the Community Grid Alternative would not adversely affect navigability of the creeks under Article 15 of the ECL. Likewise, the modification of culvert E-11 would not adversely affect navigability of the unnamed tributary to the North Branch of Ley Creek under Article 15 of the ECL. The Community Grid Alternative would not modify the remainder of the culverts in the I-481 East Study Area.

Ley Creek is the only Federally navigable stream within the study areas, and the I-81 bridge is the only bridge over this Federally regulated navigable water that would be modified under the Community Grid Alternative. No work in Ley Creek is proposed, and as indicated in Chapter 5, a Coast Guard Checklist is not required for the bridge work. Therefore, this alternative would have no effect on navigability under State or Federal laws.

Floodplains

The floodplains of the creeks within the study areas have been altered due to urban development. The Community Grid Alternative has been designed to conform to FHWA policies for the location and hydraulic design of highway encroachments on floodplains (23 CFR § 650) and the floodplain management criteria for New York State projects in flood hazard areas (6 NYCRR 502). By complying with these regulations, the Project would be consistent with the intent of the Standards and Criteria of the National Flood Insurance Program (see Chapter 5, Transportation and Engineering Considerations).

The Community Grid Alternative would not cause a substantial encroachment within any floodplains. This alternative is defined as a rehabilitation project, because it does not include any reconstruction within the floodplains that raises existing embankment elevations, does not widen an existing roadway along a stream in the flood hazard area, and does not include any new construction (or new bridges) within the flood hazard area. There is no practicable alternative that includes moving the highway outside of 100-year floodplain areas, entirely. However, any replacement piers and retaining walls needed in the Community Grid Alternative would be placed farther back from the creeks than the existing piers and retaining walls. In addition, due to the topography of the area and the elevation of the bridges over the creeks, it is anticipated that the freeboard provided below all structures at the...
100-year flood would be greater than the two-foot minimum required; therefore, a hydraulic study
would not be required until final design, and a Coast Guard Checklist would not be required. Since
the Community Grid Alternative would not result in the construction of substantial structures within
the base floodplain, it would not result in a change in the existing flood hazard areas and, therefore,
the alternative would have no adverse effects on floodplains.

**Central Study Area**

As shown on Figure 6-4-7-15, the 100-year (base) floodplain occurs along Onondaga Lake, Onondaga
Creek, and Ley Creek. The Community Grid Alternative would not result in the construction of
substantial structures within the base floodplain and would not result in a change in the existing flood
hazard area.

The Community Grid Alternative would result in a 10.66-acre reduction in impervious area, as well as
the removal of infrastructure in the vicinity of the Lower Onondaga Creek floodplain through the
restoration of the open areas within the highway right-of-way, resulting in lower amounts of
impervious surface and the associated surface runoff compared with the No Build Alternative. The
stormwater trunk would be constructed beneath the existing ground surface and would not impact
the elevation of the floodplain. Therefore, the Community Grid Alternative would not result in
adverse effects to the floodplain of the Class C creeks and lake within the Central Study Area.

**I-481 South Study Area**

The I-481 South Study Area is not near the base floodplain for Middle Onondaga Creek; the
Community Grid Alternative would not encroach upon the floodplain in the I-481 South Study Area.
Additionally, the proposed project would decrease impervious area within the Study Area by 1.5 acres
and four new dry swales would be constructed to manage stormwater runoff from the highway.
Therefore, the Project would not adversely affect floodplains within the I-481 South Study Area.

**I-481 East Study Area**

The southern portion of the I-481 East Study Area is within the Butternut Creek base floodplain.
Within this I-481 East Study Area, the Community Grid Alternative would have a greater total
impervious surface area than the No Build Alternative by 2.5 acres, with two acres in the Butternut
Creek base floodplain associated with new auxiliary lanes along I-481. However, with the installation
of BMPs described previously, the stormwater runoff from the increased impervious area would be
adequately treated in accordance with the NYS Stormwater Management Design Manual, and the
Project would not adversely affect the floodplain within the I-481 East Study Area.

**I-481 North Study Area**

The base floodplains of Mud Creek and its tributaries are within the I-481 North Study Area. New
pavement associated with modification of the I-81/I-481 interchange would increase impervious
coverage by 4.6 acres in the I-481 North Study Area. The proposed project would result in removal
of fill from the floodplain in conjunction with the removal of an existing culvert and its roadway
embankment, the restoration of approximately 250 feet of Mud Creek and associated floodplain
reconnection and restoration efforts, and the removal of a ramp and the associated embankment in
the southeast of the study area. Some fill in the floodplain would be needed to create the new highway
embankments and the new bridge over Mud Creek and would result in modification of the floodplain.
All disturbed areas would be replanted with plants suitable for the area. A floodplain analysis would be performed to ensure that the project would not result in adverse impacts to the floodplain. Additionally, the implementation of BMPs, such as those described above, would adequately treat runoff from the increased impervious area in accordance with the NYS Stormwater Management Design Manual. Thus, the Community Grid Alternative would not adversely affect the floodplain within the I-481 North Study Area.

Executive Order 11988

The Viaduct Alternative was reviewed for compliance with EO 11988, Floodplain Management, as amended by Executive Order 13690. Under EO 11988, Federal actions (in which impacts to floodplains are unavoidable) require a “finding” that there are no practicable alternatives to the proposed construction in floodplains and that the proposed action includes all practical means to reduce harm to floodplains.

The Viaduct Alternative has been carefully studied with respect to its effects on floodplains. Design refinements (i.e., locating bridge piers further from the creek than the existing structures and reducing impervious cover where possible) have been made to avoid and minimize effects to floodplains.

Additional design refinements and quantification of the total impacts to floodplains shall be completed during final design, and shall be in compliance with EO 11988. Based upon the above considerations, it is determined that this alternative includes all practicable measures to minimize harm to floodplains that may result from such use.

Groundwater

The Community Grid Alternative would result in a 10.66-acre reduction in impervious area within the Central Study Area as compared to the No Build Alternative, which is within the Baldwinsville Aquifer, and 1.5 fewer acres of impervious area within the I-481 South Study Area, which is not within the drainage area of an aquifer. The proposed addition of the stormwater trunk lines in the Central Study Area would not result in adverse effects to groundwater or the Baldwinsville Aquifer. The proposed action would increase impervious area in the I-481 East and North Study Areas by 2.5 and 4.6 acres, respectively. However, neither the East nor North Study Area is within the drainage area of an aquifer, so the increased impervious surfaces would not adversely affect drinking water resources in these areas.

BMPs that would be incorporated into the Community Grid Alternative would have the potential to benefit groundwater resources through increased infiltration. BMPs that would be considered include detention basins, dry swales, and hydrodynamic flow units. With these BMPs, surface runoff would be treated and allowed to infiltrate into the groundwater system where possible, which would be beneficial to the resource.

As discussed in Chapter 4, Construction Means and Methods, within the Central Study Area, the new bridge construction along the portions of I-81, I-690, and ramps would require pile foundations, which could have the potential to intercept the groundwater table. Within the Baldwinsville Principal Aquifer, in the vicinity of the Ley Creek bridge construction area, groundwater was reported in borings between 3.00 and 3.75 feet below ground surface. Construction of bridge foundations would involve driving approximately 470 piles approximately 12 inches in diameter and 20 to 40 feet long. These
structures would intercept the groundwater table, but groundwater is expected to be able to move around these 12-inch diameter piles without a major change to the existing flow paths. Therefore, the Community Grid Alternative would not result in any below ground structures that would significantly affect groundwater flow.

### 6-4-7.4.2 CONSTRUCTION EFFECTS

During construction, adverse effects to wetlands and surface water quality within the study areas would be minimized by the implementation of erosion and sediment controls in accordance with the 2016 New York State Standards and Specifications for Erosion and Sediment Control (“Blue Book”), the project-specific SWPPP prepared to meet the requirements of SPDES General Permit for Stormwater Discharges from Construction Activity (GP-0-15-002), and the requirements of the NYSDOT Highway Design Manual, Chapter 8 Highway Drainage. Erosion and sediment controls to be implemented during construction would include inlet protection measures at existing stormwater inlets, sediment controls to prevent erosion and sediment from leaving the construction sites, dust control measures, spill prevention and containment measures, stabilized construction entrance/exit, and vegetative measures to stabilize exposed soils. Construction activities conducted in surface waters, including the culvert replacements and the installation of the stormwater trunk outfall, would be completed from dry land, to the maximum extent practicable. Best management measures such as turbidity curtains, cofferdams, and temporary piping or diversion of Onondaga Creek, Mud Creek, and the North Branch Ley Creek tributary would be implemented for any in-water construction activities, as necessary, to maintain stream flow and minimize increases in suspended sediment. As described in Table 6-4-7-16, the construction of the stormwater trunk line outfalls would result in a temporary impact to Onondaga Creek of approximately 0.05 acres. There would not be any temporary effects to Ley Creek during construction, as all work would occur outside of the creek. Likewise, there would not be any temporary effects to the Butternut Creek tributaries in the I-481 South or I-481 East study areas due to the construction of the noise barriers, as all work would occur outside of the creek, and extra precautions for erosion and sediment controls would be set in place to protect the AA(T) water quality standard of Ont. 66-11-P 26-37-6-13. Temporary impacts to the North Branch of Ley Creek would be associated with the construction of the outfall apron, and would total 0.003 acres. Temporary impacts to streams in the North Study Area due to construction impacts total 178 linear feet and 0.05 acres. Post-construction stabilization of the stream banks would occur in the vicinity of the culvert replacement and removal activities. All disturbed areas would be stabilized with erosion control matting, to prevent sediment from entering the creek, and planted with native riparian and upland vegetation to prevent invasive species from colonizing and further stabilize the embankment.

As described in Table 6-4-7-18, temporary wetlands impacts resulting from the Community Grid Alternative in Federal and State-jurisdictional wetlands would be 0.73 and 0.68 acres, respectively. Within the I-481 East Study Area, these temporary construction impacts would occur in Federal and State-regulated Wetland 4 (0.14 acres), Wetland 6 (0.003 acres), and Wetland 7 (0.04 acres) for a total of approximately 0.18 acres. An additional 0.05 acres would occur in Wetland 8, a wetland presumed to be Federally regulated. For this reason, temporary impacts to State-regulated wetlands are expected to be 0.5 acres less than effects to Federally-regulated wetlands. Within the I-481 North Study Area, temporary construction impacts would occur in State- and Federally regulated Wetland 10 (0.43 acres) only. These temporary effects would be a result of temporary disturbances that would be required to
access work areas including noise barrier locations. As design advances, measures would be implemented to reduce and avoid temporary fill placement in wetlands. However, should temporary fill placement be unavoidable, these impacts would be included within the Section 401 and 404 permits and an Article 24 “Freshwater Wetlands” permit would be obtained from the USACE and NYSDEC, respectively, for the Project as a whole (see Permanent/Operational Effects discussion above). During construction, BMPs, including the erosion and sediment control practices described above, would be implemented to protect wetlands within the Project Area.

### Table 6-4-7-18
Community Grid Alternative
Temporary Wetland Effects

<table>
<thead>
<tr>
<th>Study Area</th>
<th>Vegetated (acres)</th>
<th>Open Water (acres)</th>
<th>Total (acres)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Central</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>I-481 South</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>I-481 East</td>
<td>0.26</td>
<td>0.04</td>
<td>0.30</td>
</tr>
<tr>
<td>I-481 North</td>
<td>0.43</td>
<td>0</td>
<td>0.43</td>
</tr>
<tr>
<td>Total Federal</td>
<td>0.69</td>
<td>0.04</td>
<td>0.73</td>
</tr>
<tr>
<td>Total State</td>
<td>0.64</td>
<td>0.04</td>
<td>0.68</td>
</tr>
</tbody>
</table>

**Notes:**
- There is one wetland in the I-481 East Study Area that is not expected to be under the jurisdiction of the State. Therefore, potential effects to State jurisdictional wetlands is 0.01 acres less for permanent effects and 0.05 acres less for temporary effects than the potential effects to Federal wetlands.

**Source:** Parsons (October 2017).

Any wetlands that would be temporarily affected would be restored subsequent to construction following a soil and landscape restoration. Restoration measures would include restoration of the grade to pre-construction conditions (or better) and the seeding and/or planting of native species, where applicable. With these measures in place, the construction of the Community Grid Alternative would not result in an adverse effect on wetlands of the Project Area.

For the construction of the new bridge piles, pre-auguring equipment would be used to reduce the duration of impact or vibratory pile driving, which would reduce any potential effects of pile driving on groundwater resources. Additionally, the Community Grid Alternative would require limited excavation; its construction would not have a significant adverse impact on groundwater resources.

Along with measures identified above and in **Section 6-4-7.4.5**, below, the Contractor would implement standard environmental protection practices for water quality. As described in **Chapter 4, Construction Means and Methods**, NYSDOT would incorporate the practices into the construction contracts for the Community Grid Alternative that include:

- **The Contractor shall schedule and conduct its work to minimize soil erosion, not cause or contribute to a violation of water quality standards and prevent sedimentation on lands adjacent to or affected by the work.**

- **Construction of temporary soil erosion and sedimentation control measures, temporary and permanent soil stabilization, construction of drainage facilities and performance of other contract work, which will contribute to the control of erosion and sedimentation control measures.**
6-4-7.4.3 INDIRECT EFFECTS

The Community Grid Alternative would have lower impervious surface area in the Central and I-481 South Study Areas, as compared with the No Build Alternative, and would result in reduced amounts of runoff from road surfaces and reduced amounts of surface runoff conveyed to storm and combined sewers. In the Central Study Area, the stormwater trunk lines would reduce demand on the combined sewer system. The integration of green infrastructure and other storm water BMP's into the alternative would further reduce peak flows to the existing stormwater drainage system and combined sewers and result in additional water quality improvement within the Central Study Area. Similarly, the use of BMPs and the potential integration of green infrastructure in the I-481 South Study Area would further improve stormwater runoff quality through treatment, and would benefit surface waters in the area by providing peak flow reduction.

The runoff in the Central Study Area that does not infiltrate into the soils through the stormwater BMPs would be discharged into Onondaga Creek about 1,000 linear feet upstream of where it would be discharged during CSO events under the No Build Alternative. The stormwater outfall would not have a substantial impact on the creek because of the channelized nature of the creek, the reduction in stormwater runoff provided by the BMPs, and the capacity of the stream to handle this volume of runoff, as the drainage area would not change from one alternative to another. As described in Chapter 5, Transportation and Engineering Considerations, the 96-inch stormwater trunk line outfall and energy dissipater would be subject to permit requirements by NYSDEC and USACE. The 42-inch stormwater trunk line outfall would be located above ordinary high water elevations and thus would not be subject to permit requirements by NYSDEC or USACE. For both outfalls, a detailed hydraulic analysis would be conducted during final design to demonstrate that the systems would not result in adverse effects to the downstream watercourses.

The Community Grid Alternative would not result in indirect adverse effects to wetlands within the Project Area.

Under the Community Grid Alternative, there would be no indirect effects to surface waters and floodplains in the I-481 North and East Study Areas due to the construction, as the implementation of stormwater BMPs for water quality and quantity treatment would result in no net increase to stormwater runoff volume entering the surface waters.

The Community Grid Alternative would largely be constructed within the footprint of existing roadways and other developed areas with existing infrastructure, and it would therefore have limited potential for indirect impacts to surface waters, groundwater, or floodplains. In the I-481 North and I-481 East Study Areas, where more surface water and wetland resources are present, indirect effects of the construction would be offset by the use of stormwater BMPs and green infrastructure practices, as described above, or through mitigation actions, described below.

6-4-7.4.4 CUMULATIVE EFFECTS

Based on the effects of the Community Grid Alternative described above, no significant adverse cumulative effects to wetlands, surface waters, groundwater, and floodplains are anticipated as a result of this proposed action. Improvements attributable to the watershed modifications made by the Save the Rain program would be expected regardless of any alternative chosen. Water quality monitoring completed in conjunction with the Save the Rain program has shown improvements to Onondaga
Lake since the implementation of the program and this improvement is expected to continue as additional green infrastructure practices are built and the lake adjusts to the decreased pollution load from CSOs.

As described above, stormwater BMPs such as infiltration and detention basins, dry swales, and hydrodynamic stormwater treatment units would be incorporated into the Community Grid Alternative. These BMPs, along with additional green infrastructure practices that would be chosen during the final stage of design, would result in water quality and peak flow reductions, and thus, would offset discharges from the additional impervious surfaces that would be created in the East and North Study Areas. The stormwater trunk lines described above that would be constructed in the Central Study Area would reduce the demand on the existing combined sewer system, which would result in a reduction in the number and magnitude of CSO events within the existing watershed. In combination with efforts associated with Save the Rain and stormwater management requirements for new development, the overall cumulative effects are expected to be beneficial to surface waters.

Chloride, however, is not treated by any known BMPs, so even though the modeled chloride loadings to Butternut Creek, the North Branch Ley Creek tributary, and Mud Creek are not expected to result in exceedance of the chronic toxicity level, the increased loadings over the No Build Alternative, when combined with future loadings not due to the Project, may result in an adverse effect on aquatic community structure, function, and productivity over time. The chronic toxicity criteria for chloride were developed based on a four-day exposure period. Studies have demonstrated that exposure of aquatic organisms to chloride is not limited to the winter and spring months but continues over multiple seasons as groundwater with elevated chloride concentration is discharged to streams.\textsuperscript{89} Chloride loadings could be reduced through changes in land use outside of the highway right of way (but within the NYSDOT ROW) and through the implementation of operational BMPs such as street sweeping to remove excess road salts and/or reduced salt application rates.

Despite the increased chloride loadings, it is anticipated that the overall cumulative effect of the Community Grid Alternative would be largely beneficial to wetlands, surface waters, groundwater, and floodplains.

\textbf{6-4-7.4.5 MITIGATION}

\textbf{Wetlands and Surface Waters}

As described in Table 6-4-7-19, a total of approximately 0.68 acres of WOTUS (including loss of 0.61 acres of vegetated wetlands and 0.07 acres (206 linear feet) loss of open water stream, of which 0.67 acres are also regulated by the State, would be affected by the Community Grid Alternative.

33 CFR Part 332 (Compensatory Mitigation for Losses of Aquatic Resources) describes the compensatory mitigation requirements to offset environmental losses resulting from unavoidable impacts to waters of the United States (including wetlands). Mitigation at a minimum one-for-one is typically required for all wetland losses that exceed 1/10 acre. For losses of streams or other open waters, compensatory mitigation should be provided, if practicable, through stream rehabilitation, through the implementation of operational BMPs such as street sweeping to remove excess road salts and/or reduced salt application rates.

\textsuperscript{89} http://dx.doi.org/10.1016/j.scitotenv.2014.12.012
enhancement, or preservation, since streams are difficult-to-replace resources (also see 33 CFR 332.3(e)(3)).

Assuming a 1.5-acre (compensation) to 1.0-acre wetland mitigation ratio (effects ratio), the preliminary compensatory mitigation acreage would be a maximum of 1.02 acres. Mitigation for these 1.02 acres would be in the form of an in-lieu fee arrangement with USACE. Mitigation for the 0.67 acres of potential State wetlands effects would be in the form of improvements to Mud Creek (including streambed restoration, habitat connectivity, floodplain enhancements, and riparian corridor enhancements).

As described above, NYSDOT has been coordinating with the USACE and NYSDEC on possible wetland and stream mitigation options. As a result of this coordination, a conceptual mitigation plan as described below has been accepted by USACE and NYSDEC. The conceptual mitigation for wetlands and stream mitigation for the Project would occur in the I-481 North Study Area ROW where there are a number of opportunities to enhance Mud Creek and its floodplain. The primary focus of the conceptual mitigation plan involves a combination of Mud Creek channel enhancements including:

- Replacement of closed bottom culverts with open bottom culverts for improved benthic habitat enhancement and aquatic organism connectivity, and reduced stream channel constriction,

- Removal of fill associated with the existing ramp in the southwest quadrant of the I-81 Interchange, along with two existing culverts, for improved floodplain habitat,

- Addition of woody debris for in-stream habitat enhancement; and

- Channel restoration/floodplain enhancement where culverts would be removed.

In areas of channel restoration, a riparian corridor would be created. This would include a number of natural features such as shelves to allow for a wide range of hydrologic and soil saturation characteristics, thus allowing for a diversity of aquatic benthic habitats. The riparian corridor would be planted with native plant species, particularly with native shrubs that could quickly become established (to provide some resistance to the existing common reed infestation in the Project vicinity). A native planting could provide a possible food source to wildlife and shade over the newly established channel.

As the part of design refinement and the wetland permitting process, the final details of the mitigation would be determined and a detailed mitigation plan would be developed in close collaboration with the agencies. This detailed mitigation plan would be implemented as part of the construction of the...
Project. In addition, BMPs (e.g., silt fence, exclusion fencing) would be employed to reduce impacts to wetlands and streams located in close proximity to the construction zones. With these measures in place, Project Area wetlands would retain their functions and values in keeping with the objectives of 33 CFR Part 332 (Compensatory Mitigation for Losses of Aquatic Resources). Furthermore, as described above, under “Executive Order 11990,” the Community Grid would minimize the destruction, loss, or degradation of wetlands and would preserve and enhance the natural and beneficial values of wetlands as per the goals of EO 11990. Therefore, the intent of EO 11990 would be met.

Additional mitigation/enhancement proposal for State- and Federally-regulated surface waters (i.e., Mud Creek, Ley Creek, and Onondaga Creek), would be, to the extent practicable, to establish (or enhance) a buffer of native species between the creek channel and the right-of-way/edge of pavement as it would slow and absorb stormwater runoff, support bank stability, and create/enhance habitat. As discussed above, where new culverts are proposed or where existing culverts would be modified or replaced, open bottom culverts would be installed to improve habitat connectivity in these locations. The restored Mud Creek reach would mimic existing, stable, upstream stream reaches. Overall, there would be permanent beneficial impacts in the North Study Area in the form of an 81 linear foot increase in stream channel length and 0.08-acre increase in channel area, approximately 300 linear feet of floodplain enhancement directly adjacent to the stream, and about 1.6 acres of floodplain enhancement along the main stem of Mud Creek. An additional 2 acres of floodplain restoration along the tributary to Mud Creek are proposed for habitat improvements to benefit the Project Area.

Within Onondaga Creek, in the Central Study Area, the effect of the two new stormwater trunk line outfalls would be minimized to the maximum extent practicable by the creation of energy dissipaters at the outfalls to reduce the potential for erosion. While, as currently proposed, no Section 404 stream mitigation is required for this work, additional restoration and enhancement activities could include stabilization of streambanks and habitat enhancements through strategic use of native plantings, erosion control matting, and rip-rap to reduce erosion and subsequent sedimentation and to improve water quality.

**Stormwater**

Based on the total amount of impervious area, both water quality and water quantity treatment would be required for this alternative. Calculation details for stormwater BMPs are discussed in **Chapter 5, Transportation and Engineering Considerations**. Water quality treatment for the new bridges and roadway pavements would be accommodated in infiltration or detention basins, dry swales with check dams, or infiltration trenches as space, soil conditions and geology permit, and hydrodynamic units where space is limited, as discussed above. The locations and design of the BMPs will be finalized during Final Design and will meet all requirements of the NYSDEC Stormwater Management Design Manual. As a result of installing stormwater trunk lines as part of this alternative, the demand on the existing combined sewer system would be reduced, which would result in a reduction in the number and magnitude of combined sewer overflows within the existing watershed. The new stormwater line, in combination with peak flow mitigation for the increases in impervious area and water quality treatment for new paved surfaces, would result in improvements to downstream receiving waters. Stormwater BMPs and green infrastructure that are not required under this alternative would be considered as design advances and provide added benefits to the watershed not required by the Project.