# 3.10 Water Resources and Aquatic Habitats

## 3.10.1 Affected Environment

This subsection describes the physical, biological, and chemical characteristics of surface waters in the project corridor, including their associated aquatic habitats. An evaluation of these characteristics can provide an indication of water quality and a baseline from which potential water quality impacts can be assessed. Wetlands are discussed in subsection 3.13.

The project corridor is within the Des Plaines River drainage basin, Hydrologic Unit Code (HUC) 07120004, as catalogued by the U.S. Geological Survey (USGS). The Des Plaines River drainage basin has been divided into several smaller sub-watersheds near the project corridor, including Addison Creek, Des Plaines River (main stem), Salt Creek, West Branch DuPage River, and Willow Creek. The watershed limits are based on those obtained from the IEPA.[13]

Residential land use makes up roughly half of the area within the previously mentioned watersheds (see Table 3-28), except for the Willow Creek Watershed, which consists largely of O'Hare Airport and the adjacent industrial and transportation corridor. Additional information regarding land use is provided in subsection 3.3. Studies have shown that the biological quality of streams may be impacted if the percentage of urban land use within a watershed exceeds between 10 and 30 percent (Midwest Biodiversity Institute, 2008). All of the project corridor watersheds have urban land use that exceeds 30 percent. In an effort to restore or protect watersheds and to maintain or improve water quality, watershed plans have been prepared for many of the project corridor watersheds (CBBEL, 2011a; MWH, 2009; DuPage River Coalition, 2007; CBBEL-West, 2006; CBBEL, 2004; Lower Des Plaines River Ecosystem Partnership, 2004). The DuPage River Salt Creek Workgroup (DRSCW) has also conducted studies and developed initiatives for improvement of water quality in these watersheds. The intent of the EO-WB project would be to maintain/improve the quality and quantity of aquatic resources identified in these plans, as applicable.

TABLE 3-28
Watershed Land Use Summary

| Land Use | Watershed [a] | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Addison Creek | | Des Plaines River (main stem) | | Salt Creek | | West Branch DuPage River | | Willow Creek | |
| | acres | % | acres | % | acres | % | acres | % | acres | % |
| Agricultural | 0.6 | 0.0 | 46.4 | 0.1 | 295.9 | 0.6 | 940.6 | 4.4 | 69.6 | 0.5 |
| Commercial | 1,128.8 | 7.3 | 4,619.4 | 8.2 | 5,814.5 | 11.5 | 1,135.0 | 5.3 | 922.9 | 7.0 |
| Industrial | 2,466.4 | 16.0 | 4,371.1 | 7.8 | 2,448.6 | 4.9 | 296.6 | 1.4 | 5,071.1 | 38.3 |
| Institutional | 1,628.1 | 10.5 | 5,087.6 | 9.1 | 2,342.9 | 4.6 | 676.7 | 3.2 | 88.1 | 0.7 |

[13] Derived from 12-digit HUC (sub-watersheds). The Des Plaines River (main stem) represents one of the watersheds in the project corridor (see Exhibit 3-13). It includes areas that are tributary to the Des Plaines River, but are not included in the other watersheds. For the purposes of this document, the upper and middle Salt Creek sub-watersheds are discussed collectively as the Salt Creek Watershed. The project corridor is not located within the lower Salt Creek sub-watershed, and it is not discussed further.

TABLE 3-28
Watershed Land Use Summary

| Land Use | Watershed [a] | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Addison Creek | | Des Plaines River (main stem) | | Salt Creek | | West Branch DuPage River | | Willow Creek | |
| | acres | % | acres | % | acres | % | acres | % | acres | % |
| Open Space | 1,021.7 | 6.6 | 7,170.4 | 12.8 | 9,237.2 | 18.3 | 4,670.3 | 22.0 | 652.7 | 4.9 |
| Residential | 7,233.4 | 46.8 | 28,879.8 | 51.4 | 24,464.7 | 48.5 | 11,047.9 | 51.9 | 1,525.8 | 11.5 |
| Transportation | 1,686.1 | 10.9 | 4,331.3 | 7.7 | 1,987.5 | 3.9 | 501.6 | 2.4 | 4,302.2 | 32.5 |
| Vacant/ Wetlands/ Construction | 237.3 | 1.5 | 1,050.7 | 1.9 | 2,636.9 | 5.2 | 1,521.5 | 7.2 | 559.4 | 4.2 |
| Water | 70.3 | 0.5 | 653.9 | 1.2 | 1,257.3 | 2.5 | 497.9 | 2.3 | 48.1 | 0.4 |
| Total | 15,472.7 | 100.1 | 56,210.6 | 100.2 | 50,485.5 | 100.0 | 21,288.1 | 100.1 | 13,239.9 | 100.0 |

*Source*: CMAP, 2005.

Note: Land use acreages are from CMAP and may vary from data provided by other sources found in other tables within this document. Numbers in table have been rounded. Percentages may exceed 100.

[a] Includes the 12-digit HUC sub-watersheds where the project corridor is located. For the purposes of this document, the upper and middle Salt Creek sub-watersheds are discussed collectively as the Salt Creek Watershed. The project corridor is not located within the lower Salt Creek sub-watershed and it is not discussed further.

The DRSCW is an active watershed group consisting of local communities, publicly owned treatment works (POTW), and environmental organizations that work together to identify stressors to the aquatic environment (through stream monitoring) and develop/implement recommendations and actions to improve water quality and stream health. The DRSCW has also identified projects with a high potential to restore beneficial uses to stream segments in the DuPage River-Salt Creek Watersheds. Projects include dam removal, habitat restoration, stormwater management, chloride reduction, and a study of the impact of deicers (Midwest Biodiversity Institute, 2010). For additional information refer to: http://drscw.org/.

In addition to the DRSCW, several other watershed groups have formed, including the Upper Des Plaines River Ecosystem Partnership (UDPREP), Lower Des Plaines Ecosystem Partnership (LDPEP), the DuPage River Coalition (DRC), and the Salt Creek Watershed Network (SCWN). The UDPREP, LDPEP, and DRC are Ecosystem Partnerships associated with the IDNR Conservation 2000 (C2000) Program.[14] The UDPREP and LDPEP are dedicated to watershed protection, preservation, and enhancement. Both of these partnerships provide watershed resources, assist stakeholders with developing strong grant proposals for watershed improvements, and provide input on the C2000 grant selection process. Additional information can be found on the Internet at:

[14] The C2000 Program (renamed Partners for Conservation in 2008) is a comprehensive, long-term approach to natural resource protection and management in Illinois. The Partners for Conservation program provides funding and technical assistance for habitat restoration, land acquisition, planning, research, and outreach. Partners for Conservation is joint funded by the IDNR, IDOA, and IEPA.

http://lowerdesplaines.org/index.html and http://www.upperdesplainesriver.org/index.htm.

The DRC is a sister organization to the DRSCW. The main role of the DRC is to work with individuals in the watershed at the local level through outreach and education with the goal of improving the water quality of the DuPage River. The DRC also coordinates the DuPage River Watershed Plan. Similar to UDPREP and LDPEP, the DRC provides input on the C2000 grant selection process. Additional information can be found on the Internet at: http://www.dupagerivers.org/.

The SCWN is an organization that promotes awareness of issues affecting Salt Creek and investigates opportunities to restore the creek to be an enjoyable public resource. The SCWN conducts public education and outreach throughout the watershed and promotes the use of best management practices to improve water quality and recreation. Additional information can be found on the Internet at: http://www.saltcreekwatershed.org/.

#### 3.10.1.1 Water Resources

Water resources in the project corridor include riverine and lacustrine cover types. During the summer and fall of 2009, 2010, and 2011, the Illinois Natural History Survey (INHS) conducted field surveys and assessments of streams, lakes, and non-wetland ponds near the project corridor (Matthews et al., 2009; Matthews et al., 2010; Matthews and Zercher, 2010; Wetzel et al., 2010a; Wetzel et al., 2010b; Matthews et al., 2011).

Ten creeks and their tributaries, two lakes, and 40 non-wetland ponds were identified in the vicinity of the project corridor (see Table 3-29 and Exhibit 3-13). The non-wetland ponds are predominantly stormwater management facilities that INHS did not consider to be jurisdictional waters of the U.S.[15] These non-jurisdictional stormwater management ponds are not discussed further in this subsection.

TABLE 3-29
Project Corridor Water Body Summary

| Watershed | Surface Water [a] | Acreage in Project Corridor [b] |
|---|---|---|
| Addison Creek | Addison Creek | 0.07 |
| Des Plaines River – main stem | Bensenville Drainage Ditch [c] | 0.05 |
| | Silver Creek | 0 |
| Salt Creek | Devon Avenue Tributary (including on-line ponds) | 0.002 |
| | Meacham Creek | 0.04 |
| | Salt Creek | 0.44 |
| | Spring Brook | 0 |
| | Wood Dale – Itasca Reservoir | 0 |
| West Branch DuPage River | West Branch DuPage River | 0 |

15 Section 404 (Clean Water Act) waters are defined at and determined in accordance with 33 CFR §§328-329 and 40 CFR §230.3. Final jurisdictional determination is completed by the USACE.

TABLE 3-29
Project Corridor Water Body Summary

| Watershed | Surface Water [a] | Acreage in Project Corridor [b] |
|---|---|---|
| Willow Creek | Briarwood Lake | 0 |
| | Higgins Creek | 1.50 |
| | Willow Creek | 1.25 |
| **Total** | | **3.35** |

*Source:* Matthews and Zercher, 2010; Matthews et al., 2011.

[a] Two lakes and three streams were identified by INHS near, but outside, the project corridor. These water bodies have an acreage of "0" in this table.
[b] Acreage for streams includes main stem and tributaries (where applicable). Totals may vary from other data in this document due to rounding.
[c] Downstream of O'Hare Airport, Bensenville Drainage Ditch is known as Silver Creek.

The two lakes identified by INHS are located outside the project corridor, but are adjacent to it. One of these lakes is actually a compensatory wetland mitigation site for a project previously authorized under Section 404 of the Clean Water Act (CWA). This mitigation site is located adjacent to Salt Creek, south of Thorndale Avenue at the Wood Dale – Itasca Reservoir, and includes primarily open water. The other lake is known as Briarwood Lake. This lake is located within a residential subdivision north of I-90 and west of Busse Road. Briarwood Lake outlets to Higgins Creek.

FIGURE 3-8
REALIGNED WILLOW CREEK WEST BYPASS CORRIDOR AT O'HARE AIRPORT

*Source: CBBEL, 2010.*

The West Bypass corridor is located along the west side of O'Hare Airport. Two of the project corridor creeks, Willow Creek and Bensenville Drainage Ditch, pass through this corridor. Portions of these creeks have been or will be realigned as part of the OMP improvements to meet airport needs, FAA requirements (AC 150-5300-13), and in compliance with IDNR – OWR regulations (see Exhibit 3-13 and Figure 3-8). Construction of remaining OMP creek realignment(s) is anticipated to continue through 2014.

None of the project corridor streams have special designations with respect to function, value, or high quality.[16] The streams are not listed as navigable waters of the U.S. under Section 10 of the River and Harbors Act of 1899 (USACE, 2010) or as Wild and Scenic Rivers. The waters are also not included on the Nationwide Rivers Inventory for "outstandingly remarkable" natural or cultural values of more than local or regional significance. No Biologically Significant

[16] Based on the DuPage County Wetland Inventory, two of the identified creeks (i.e., Meacham Creek and West Branch DuPage River) pass through/are adjacent to mapped higher quality wetland near the project corridor. As described in this section, these streams are degraded/low quality.

Streams (BSS) are within the project corridor. Based on information provided by the IDNR and Illinois Natural Heritage Database (March 21, 2011), none of the identified streams include mapped Illinois Natural Areas or state-listed threatened or endangered species within the project corridor.

The location of the surface bodies of water and watersheds are depicted in Exhibit 3-13. The physical, biological, and chemical characteristics of the project corridor surface bodies of water are described in the following subsections.

#### 3.10.1.2 Physical and Biological Description of Surface Water Bodies

A stream's physical characteristics (such as substrate and flow rate) may interact to affect the aquatic biota. In rivers, habitat is usually closely linked to biological diversity. This subsection describes the physical and biological characteristics of streams in the project corridor (see Table 3-30 and Table 3-31). The information summarized is primarily based on fieldwork completed during 2009 and 2010 (Matthews and Zercher, 2010; Wetzel et al., 2010a; Wetzel et al., 2010b). Stream sampling locations are depicted in Exhibit 3-13. Key physical characteristics of the streams listed in Table 3-30 are defined in the following subsections.

##### Flow Characteristics

All of the water bodies in Table 3-30 are lotic systems, or streams with flow. Streams may have an ephemeral, intermittent, or perennial flow regime. In general, a perennial stream usually maintains constant flow throughout the year and is capable of supporting fish and mussels. An intermittent stream flows when the water table is seasonally high or during periods of precipitation that generate surface flow. Intermittent streams may support a limited assemblage of fish species. Ephemeral streams flow only during or after storms or snow melt or during short periods of elevated water tables. Stream flow within the evaluated creeks was determined by field observation, unless otherwise noted in Table 3-30. Seven of the nine streams listed in Table 3-30 (i.e., Addison Creek, Higgins Creek, Meacham Creek, Salt Creek, Spring Brook, West Branch DuPage River, and Willow Creek) appear to have perennial flow, and two (i.e., Bensenville Drainage Ditch and Silver Creek) appear to have intermittent flow (near the project corridor).

TABLE 3-30
Summary of the Physical Parameters of Project Corridor Creeks

| Stream [a] | Upstream Drainage Area (sq mi) [b] | Flow Characteristics | Substrate Type | Stream Width (ft) [c] | Water Depth (ft) [c] | Riparian Vegetation | Mean Habitat Score [d] | Watershed Characteristics [e] |
|---|---|---|---|---|---|---|---|---|
| Addison Creek | 6.0 | lotic, perennial | silt, clay | 15-24.5 | 0.5-4 | trees, herbaceous vegetation | 50.5 (poor) | industrial, residential, forest, STP |
| Bensenville Drainage Ditch | 1.9 | lotic, intermittent [f] | silt | 7 | 2 | herbaceous vegetation, mowed grass, concrete [g] | not scored | O'Hare Airport, residential, mowed grass [g] |
| Higgins Creek | 7.0 | lotic, perennial | concrete | 16.5-33 | 1-5 | concrete, mowed grass | not scored | mowed grass, interstate, STP |
| Meacham Creek | 2.9 | lotic, perennial | silt, clay, sand | 19.5-36 | 1-5 | emergents, herbaceous vegetation, shrubs | 44.0 (poor) | mowed grass, parking lot, industrial |
| Salt Creek | 71.0 | lotic, perennial | silt, clay, sand | 46-59 | 1-7 | grasses, trees | 67.0 (poor) | field/pasture, forest, parking lot, industrial, STP |
| Silver Creek | 6.4 [h] | lotic, intermittent [f] | sand, gravel, silt [g] | 15 | ≤1 [g] | herbaceous vegetation, trees [g] | not scored | transportation, industrial, residential [g] |
| Spring Brook | 12.0 [h] | lotic, perennial | silt, sand, clay | 23 | 1.5 | trees, herbaceous vegetation | 52.0 (poor) | industrial, forest, STP |
| West Branch DuPage River | 10.1 [h] | lotic, perennial | clay, silt, gravel, cobble | 26-39.5 | 2.5-5 | trees, grass, herbaceous vegetation | 54.0 (poor) | industrial, field |
| Willow Creek | 6.0 | lotic, perennial | silt, gravel, cobble | 15-18.5 | 1-4 | trees, herbaceous vegetation | 40.5 (poor) | industrial, field/pasture |

*Source:* Matthews and Zercher, 2010; Wetzel et al., 2010a; Wetzel et al., 2010b; USGS Elmhurst Quadrangle Map, 1997; CBBEL field reconnaissance, 2008; CMAP, 2005.

[a] Devon Avenue Tributary was not sampled. Near the project corridor, it consists of a series of interconnected online ponds, which eventually drain to Salt Creek.
[b] Drainage area provided near downstream crossing of project corridor, unless otherwise noted.
[c] Estimated during INHS field visits
[d] A score less than 80 = poor; 80-109.9 = fair; 110-129.9 = good; greater than 130 = excellent
[e] Watershed characteristics are based on surrounding land use as described in INHS Technical Reports, unless otherwise noted. STP = immediately downstream of sewage treatment plant/water with strong odor of treated sewage.
[f] Periodicity of flow based on USGS Quadrangle Map.
[g] Information based on CBBEL field reconnaissance (August 2008) and/or review of mapped land use (CMAP, 2005).
[h] The project corridor drains to Silver Creek, Spring Brook, and the West Branch DuPage River, but it does not cross these streams. Drainage areas are from the Flood Insurance Study for Cook and DuPage County (FEMA and DuPage County, 2007; FEMA, 2008) near Silver Creek/Franklin Avenue, Spring Brook/IL 53, and West Branch DuPage River/Lake Street.

TABLE 3-31
Summary of the Biological Characteristics of Project Corridor Creeks

| Stream [a] | No. Fish Species Present [b] | Dominant Fish Species (%) | Index of Biotic Integrity [c] | Aquatic Habitat Quality [d] | Cumulative EPT Richness [e] | Mean Taxa Richness [f] | Oligochaete Specimens (%) | Chironomid Specimens (%) | Diversity [g] (Score) | Integrity [g] (Score) |
|---|---|---|---|---|---|---|---|---|---|---|
| Addison Creek | 5 | fathead minnow (87%) | 8 | 7.14 (poor) | 0 | 10.00 | 52% | 19% | not scored [h] | not scored [h] |
| Bensenville Drainage Ditch [i] | 1 | mosquitofish (100%) | not scored | not scored | 1 | 10.00 [j] | 0% | 0% | not scored | not scored |
| Higgins Creek [k] | NA | NA | NA | NA | NA | NA | NA | NA | not scored | not scored |
| Meacham Creek | 5 | fathead minnow (70%) | 13 | 6.86 (poor) | 0 | 17.17 | 33% | 15% | not scored | not scored |
| Salt Creek | 10 (plus 1 hybrid) | green sunfish (29%) | 17 | 5.97 (fairly poor) | 0 | 10.83 | 34% | 20% | C (0.714) | C (0.500) |
| Silver Creek [k] | NA | NA | NA | NA | NA | NA | NA | NA | not scored | not scored |
| Spring Brook | 14 | largemouth bass (29%) | 22 | 7.00 (poor) | 1 | 8.00 | 77% | 5% | not scored | not scored |
| West Branch DuPage River | 7 | sand shiner (32%) | 17 | 7.00 (poor) | 0 | 7.67 | 58% | 13% | not scored | not scored |
| Willow Creek | 2 | green sunfish (72%) | 4 | 6.76 (poor) | 1 | 12.33 | 32% | 9% | not scored [h] | not scored |

*Source:* All data from Wetzel et al. (2010a) and Wetzel et al. (2010b), unless otherwise noted. Diversity and Integrity Scores from IDNR-Office of Resource Conservation (ORC) (2008); Data for Bensenville Drainage Ditch from Headrick (2002).

Note: A mussel survey was not completed for this project.

[a] Devon Avenue Tributary was not sampled. Near the project corridor, it consists of a series of interconnected online ponds, which eventually drain to Salt Creek.
[b] No intolerant fish species were collected by INHS or Headrick during field sampling.
[c] Calculated using INHS fish sampling data. Scores range from 0-60. Scores ≤ 30 represent streams where the biotic integrity is much lower than that expected in Illinois streams that are least impacted by human activities.
[d] Based on Hilsenhoff's (1988) *Family-Level Biotic Index*. Mean scores are provided. Scores range from 0-10 (cutoff points associated with this table include: 5.76-6.50 = fairly poor/substantial pollution likely; 6.51-7.25 = poor/very substantial pollution likely)
[e] The total number of different kinds of aquatic organisms in a collection belonging to the insect orders: Ephemeroptera (E), Plecoptera (P), and Trichoptera (T)
[f] An indicator of macroinvertebrate diversity; a greater number represents a more diverse community
[g] From IDNR-ORC (2008). Streams without available data or that did not fit the assessment tools (e.g., Index of Biotic Integrity [IBI]) were “not scored.”
[h] Within the project corridor, Addison Creek and Willow Creek were not scored. Approximately 8,500 feet downstream of the project corridor, Addison Creek has an E rating for diversity and integrity. Approximately 1,750 feet downstream of the project corridor, Willow Creek has a D rating for diversity.
[i] Data for Bensenville Drainage Ditch is from Headrick (2002). Macroinvertebrate communities typical of low quality aquatic habitats were collected during sampling. Only one species of fish was collected during sampling. Therefore, an IBI was not scored.
[j] Represents Total Taxa Richness based on data collected by Headrick (2002).
[k] Higgins Creek was not sampled by INHS due to absence of natural habitat (i.e., concrete-lined channel). Silver Creek was not sampled. NA = data not available.

### Stream Substrate

Substrate may provide habitat, shelter, or refuge from the current or predators, a surface for organisms to cling to or burrow under, or material to build cases or tubes (e.g., caddisflies). The streambed may be composed of sand, gravel, cobble, detritus, silt, clay, or bedrock. Substrate type(s) may vary at different locations within a stream and may change over time. Excessive sand and silt in the substrate can diminish habitat quality for fish and aquatic macroinvertebrates by filling interstitial spaces and by contributing to turbidity (when in suspension). Other substrate types, such as gravel, cobble, and detritus can contribute to a diverse fish and aquatic macroinvertebrate assemblage. The majority of the project corridor streams have substrates of silt, clay, or sand.

### Stream Width and Depth

Stream width and depth, in combination with other factors (e.g., flow velocity, discharge, etc.), can influence channel stability and habitat diversity. A wide stream generally will have more variation in substrate type than a narrow stream, and may support more diverse assemblages of aquatic biota. However, flow regime is a more important determinant of aquatic species richness.

The volume of water in the stream channel also plays an important role in determining the number and variety of aquatic organisms. Slow current velocities and shallow water limit large fish with respect to feeding, reproduction, and predator avoidance.

The project corridor streams range in width from approximately seven to 59 feet and water depth ranges from less than one foot deep to approximately seven feet. In general, Bensenville Drainage Ditch and Silver Creek are the smallest of the assessed project corridor streams and Salt Creek is the largest.

### Riparian Vegetation

Riparian environments include the vegetated portion of the floodplain adjacent to rivers, streams, and creeks (see Figure 3-9). Riparian environment functions may include erosion control, streambank stabilization, water quality benefits, treatment of contaminated stormwater runoff, habitat for plants and animals, a source of organic and nutrient input, moderation of stream temperatures (keep streams cool), and recreational or aesthetic value.

FIGURE 3-9
SALT CREEK SOUTH OF THORNDALE AVENUE LOOKING DOWNSTREAM (SOUTH)

*Source: INHS, 2009.*

The majority of the project corridor streams have trees or shrubs located within a relatively narrow riparian corridor. The wooded areas are generally not extensive and are fragmented by existing roads or other development. For the most part, beneficial buffer functions of the riparian environment in the project corridor are limited. See subsection 3.14 for additional discussion regarding wooded riparian habitat.

### Mean Habitat Score

Mean habitat assessment scores are based on a modified standard USEPA method that looks at several physical stream characteristics to rate the habitat structure of a stream segment. Assessment scores represent an average of scores determined by two researchers. A score greater than 130 indicates excellent habitat characteristics. A score below 80 indicates poor habitat characteristics. The project corridor streams ranked "poor," ranging from 40.5 (Willow Creek) to 67 (Salt Creek). These scores indicate the presence of degraded habitat or the presence of pollutants.

A habitat assessment was not completed for Higgins Creek. This stream is contained within a concrete-lined channel and had limited natural habitat at the INHS sampling point (see Figure 3-10). Higgins Creek was eliminated from further study regarding biota (i.e., fish and macroinvertebrates); however, water quality sampling was completed for Higgins Creek.

FIGURE 3-10
HIGGINS CREEK NORTH OF I-90 LOOKING UPSTREAM (WEST)

*Source: INHS, 2009.*

### Upstream Drainage Area and Watershed Characteristics

Assessing the upstream drainage area and characteristics of a watershed can provide information relative to stream health and potential causes of impairment. The upstream drainage areas range from 1.9 square miles (Bensenville Drainage Ditch) to 71.0 square miles (Salt Creek). The majority of the land use in the project corridor watersheds includes developed land that appears to have contributed to stream degradation (see subsection 3.10.1.3).

### Highly Erodible Soils

Highly erodible soils have been identified to have slopes of four percent or greater. These soils are usually associated with changes in topography and can occur along streams. When cleared of vegetation, these soils can become a source of sediment for adjacent waters. Based on Cook County and DuPage County soils maps, approximately 88.1 acres of highly erodible soils were identified in the project corridor (see Exhibit 3-14), primarily near the creeks, open space, and/or residential areas. Even though soil types have been mapped by the NRCS, most of the project corridor soils have been extensively altered by past grading activity associated with the existing roadway network and adjoining development; therefore, the mapped characteristics actually may not be present.

### Biological Stream Ratings

In 2008, the IDNR released biological stream ratings for Illinois streams (IDNR-Office of Resource Conservation [ORC], 2008).[17] These ratings can be used to identify aquatic

[17] Based on information from IDNR, the new stream ratings replace the Biological Stream Characterization (BSC) and BSS developed in 1984 and 1992, respectively.

resource quality, including biologically diverse streams and those with a high degree of biological integrity. The diversity and integrity scores fall within one of five ratings ranging from A to E, with A representing the highest biological integrity or diversity of evaluated stream segments. Within the project corridor, only one creek was rated by IDNR. Salt Creek received a C rating for both biological diversity and integrity (see Table 3-31).[18]

### Fish

Seventeen species of fish and one hybrid sunfish, representing seven families, were identified within the project corridor streams during sampling (Wetzel et al., 2010a; Wetzel et al., 2010b; Headrick, 2002). No pollution intolerant fish species, threatened or endangered species, or "Species in Greatest Need of Conservation for Illinois"[19] were collected or observed. All fish species collected were common inhabitants of northern Illinois. The low level of fish diversity and absence of intolerant species is likely a result of poor habitat and/or water quality. High levels of siltation and urban debris were observed at most sites during the sampling, and riparian vegetation was minimal.

Dominant fish species are those species that make up 20 percent or more of the total catch at a sampling site. Five fish species dominated these streams, including fathead minnow (*Pimephales promelas*), green sunfish (*Lepomis cyanellus*), largemouth bass (*Micropterus salmoides*), mosquitofish (*Gambusia affinis*), and sand shiner (*Notropis stramineus*) (see Table 3-31). Fathead minnow and green sunfish are among the most tolerant fish species in Illinois, and are frequently found in disturbed habitats. Largemouth bass and sand shiners are widespread in Illinois and found in habitats of all types and quality. Mosquitofish are very adaptable and relatively tolerant of pollution. Mosquitofish have been widely introduced to control mosquitoes, although its expansion is limited locally by cold winters.

Of the streams in which fish assemblages were assessed, Spring Brook had the highest species diversity (14 species; Index of Biotic Integrity [IBI] = 22).[20] However, habitat diversity in Spring Brook was low because the stream was predominantly a run with moderate flow and substrate of mostly firm mud and gravel. Salt Creek had 10 species of fish (plus one hybrid sunfish) (IBI = 17). Both pools and runs were observed at the Salt Creek sampling location. The larger size of Salt Creek appears to be responsible for the greater diversity of fish. The West Branch DuPage River had seven fish species (IBI = 17). Fish diversity was low for a stream of this size. Addison Creek (IBI = 8) and Meacham Creek (IBI = 13) each had five fish species. Low habitat quality likely explains the low diversity of fish. Low-quality habitat likely explains the extremely low diversity at Willow Creek, too, where only two tolerant fish species were collected (IBI = 4). Industrial development surrounds this sampling site, and a large amount of concrete and industrial debris was in the stream at the time of the INHS assessment. One species, the mosquitofish, was collected from Bensenville Drainage Ditch during sampling. Fish sampling was limited by dense stands of common waterweed (*Elodea canadensis*) and thick bank vegetation. The potential of

[18] All integrity and diversity ratings for the project corridor were rated with macroinvertebrates; no fish, mussel, or crayfish data were available for the streams.

[19] Based on Appendix I of Illinois Wildlife Action Plan (IDNR, 2005).

[20] IBI was calculated using INHS fish sampling data. IBI scores range from 0 to 60. Scores equal to or less than 30 represent streams where the biotic integrity is much lower than that expected in Illinois streams least impacted by human activities (i.e., degraded conditions).

this stream to maintain a viable fish population is limited by the water quality conditions and other habitat factors (Headrick, 2002).

The project corridor creeks may be used for recreational fishing, but the creeks do not support commercial fisheries. Game fish, such as largemouth bass, bluegill (*Lepomis macrochirus*), sunfish (*Lepomis* spp.), bullhead (*Ameiurus* spp.), and black crappie (*Pomoxis nigromaculatus*) were identified during the sampling. Besides Bensenville Drainage Ditch, all of the sampled creeks contained at least one species of game fish, with the greatest representation being found in Salt Creek and Spring Brook, which is tributary to Salt Creek. Many of these game fish species are stocked for recreational purposes in water bodies (e.g., Busse Lake) at parks and/or forest preserves located near the project corridor. Busse Lake drains to Salt Creek upstream of the project corridor. The larger project corridor creeks (e.g., Salt Creek and the West Branch DuPage River) may be used for other water-related activities, such as canoeing. However, the recreational use of the project corridor creeks is limited by their degraded nature and water quality impairments (see Table 3-32).

TABLE 3-32
Use Support and Impairment Summary for Project Corridor Water Bodies

| Water Body [a] | Designated Use [b] | Causes of Impairment | Sources of Impairment | Impaired Waters [c] |
|---|---|---|---|---|
| Addison Creek Watershed | | | | |
| Addison Creek (AUID: GLA 04) | Not supporting: AL<br>Not assessed: AQ, FC, PC, SC | alpha.-BHC, alteration in stream-side or littoral vegetative covers, copper, hexachlorobenzene, oil and grease, other flow regime alterations, DO, polychlorinated biphenyls (PCBs), sedimentation/siltation, total suspended solids (TSS), phosphorous (total), bottom deposits, aquatic algae, visible oil | Contaminated sediments, channelization, loss of riparian habitat, streambank modifications/ destabilization, upstream impoundments, municipal point source discharges (MPSD), impacts from hydrostructure flow regulation/modification, urban runoff/storm sewers, dam or impoundment | Yes |
| Des Plaines River (main stem) Watershed | | | | |
| Bensenville Drainage Ditch | Not identified [d] | Not identified [d] | Not identified [d] | Not assessed |
| Silver Creek [e]<br>(AUID: GM 01) | Not assessed: AL, AQ, FC, PC, SC | Not assessed | Not assessed | Not assessed |
| Salt Creek Watershed | | | | |
| Devon Avenue Tributary | Not identified [d] | Not identified [d] | Not identified [d] | Not assessed |
| Meacham Creek<br>(AUID: GLBA) | Not supporting: AL<br>Not assessed: AQ, FC, PC, SC | Other flow regime alterations, DO | Impacts from hydrostructure flow regulation/modification, urban runoff/storm sewers | Yes [f] |

TABLE 3-32
Use Support and Impairment Summary for Project Corridor Water Bodies

| Water Body [a] | Designated Use [b] | Causes of Impairment | Sources of Impairment | Impaired Waters [c] |
|---|---|---|---|---|
| Salt Creek<br>(AUID: GL 10) | Not supporting: AL, FC, PC<br>Not assessed: AQ, SC | Alteration in stream-side or littoral vegetative covers, arsenic, chloride, hexachlorobenzene, methoxychlor, nickel, other flow regime alterations, pH, DO, aquatic plants, aquatic algae, mercury, PCBs, fecal coliform | Channelization, streambank modifications/destabilization, contaminated sediments, MPSD, urban runoff/storm sewers, impacts from hydrostructure flow regulation/modification, upstream impoundments, dam or impoundment, source unknown, atmospheric deposition - toxics | Yes |
| Spring Brook [e]<br>(AUID: GLB 01) | Not supporting: AL<br>Not assessed: AQ, FC, PC, SC | Alteration in stream-side or littoral vegetative covers, dichloro-diphenyl-trichloroethane (DDT), endrin, hexachlorobenzene, other flow regime alterations, DO, sedimentation/siltation, TSS, phosphorus (total), aquatic algae | Channelization, contaminated sediments, impacts from hydrostructure flow regulation/modification, MPSD, upstream impoundments, urban runoff/storm sewers | Yes |
| West Branch DuPage River Watershed | | | | |
| West Branch DuPage River [e]<br>(AUID: GBK 14,09) | Not supporting: AL, PC<br>Not assessed: AQ, FC, SC | Chloride, sedimentation/siltation, pH, phosphorus (total), fecal coliform, alteration in stream-side or littoral vegetative covers, DO, changes in stream depth and velocity patterns | MPSD, urban runoff/storm sewers, site clearance, channelization, municipal (urbanized high density area) | Yes |
| Willow Creek Watershed | | | | |
| Briarwood Lake<br>(AUID: SGI) | Insufficient information: AL, AQ<br>Not assessed: FC, PC, SC | TSS, phosphorus (total) | Unknown | Insufficient information/ Not assessed |
| Higgins Creek<br>(AUID: GOA 02,01) | Not supporting: AL, PC<br>Not assessed: AQ, FC, SC | Chloride, phosphorus (total), fecal coliform, cause unknown | MPSD, urban runoff/storm sewers | Yes |
| Willow Creek<br>(AUID: GO 01) | Not supporting: AL<br>Not assessed: AQ, FC, PC, SC | Alteration in stream-side or littoral vegetative covers, phosphorus (total), loss of in-stream cover | Channelization, loss of riparian habitat, municipal (urbanized high density area), MPSD | Yes |

*Source:* IEPA/BOW, 2012.

[a] Information is provided for water body segment Assessment Unit Identifications (AUID) associated with the project corridor. Designated uses and impairments may vary per AUID. The Wood Dale – Itasca Reservoir was not assessed by IEPA and is not included in this table.
[b] Abbreviations: AL: Aquatic Life; AQ: Aesthetic Quality; FC: Fish Consumption; PC: Primary Contact; SC: Secondary Contact. No specific assessment guidelines have been developed to assess SC use for Illinois streams and inland lakes.
[c] Impairment status is based on the IEPA *Illinois Integrated Water Quality Report and Section 303(d) List* (IEPA/BOW, 2012)
[d] "Not identified" means that the water body was not listed in the IEPA *Illinois Integrated Water Quality Report and Section 303(d) List* (IEPA/BOW, 2012)
[e] AUID is not crossed by the project corridor.
[f] Meacham Creek is impaired for AL, but it is not on the IEPA 303(d) list. A TMDL for the pollutant causing the impairment has been approved by USEPA.

### Aquatic Macroinvertebrates

Aquatic macroinvertebrates can be used as indicators of water quality conditions. Aquatic macroinvertebrates were sampled in seven of the project corridor streams (Wetzel et al., 2010a; Wetzel et al., 2010b; Headrick, 2002).[21] No unique or rare aquatic macroinvertebrates were observed during the sampling. The project corridor streams support aquatic macroinvertebrate communities that are typical of polluted, urban streams. Based on the sampling, none of the aquatic macroinvertebrates collected from the streams are listed as threatened or endangered species, nor are any of the listed species known or thought likely to occur within the project corridor (Wetzel et al., 2010a; Wetzel et al., 2010b).

Relationships between four metrics were assessed during analysis of the project corridor streams, including Cumulative EPT[22] Richness, Mean Taxa Richness, Mean Habitat Score, and Mean Family-Level Biotic Index. The EPT taxa are generally considered good indicators of water quality. Only a small number of mayflies (Ephemeroptera)[23] were collected during the sampling at Willow Creek, Spring Brook, and Bensenville Drainage Ditch (a mayfly was also collected at Meacham Creek during supplemental sampling). No stoneflies (Plecoptera) or caddisflies (Trichoptera) were collected (see Table 3-31).

Mean Taxa Richness can be used as an indicator of macroinvertebrate diversity; a greater number represents a more diverse community. Mean Taxa Richness ranged from 7.67 (West Branch DuPage River) to 17.17 (Meacham Creek) (see Table 3-31). Based on the macroinvertebrate samples collected by INHS, Meacham Creek had the greatest number of different taxa collected and the most diversity. Generally, the number of taxa decreases with increased degradation. Mean Habitat Score was previously discussed with physical characteristics of the project corridor streams. Salt Creek had the highest Mean Habitat Score, with the other sites having somewhat similar lower scores; all were indicative of poor habitat conditions (see Table 3-30).

In contrast to the EPT taxa, other macroinvertebrate taxa may be indicative of degraded or polluted streams. Degraded streams (e.g., streams with low amounts of dissolved oxygen [DO]) may include a higher percentage of oligochaete worms and midges (Chironomids). In general, the percentage of oligochaete worms in the macroinvertebrate samples ranged from 32 to 77 percent and the percentage of midges ranged from five to 20 percent (see Table 3-31). No oligochaete worms or midges were collected from Bensenville Drainage Ditch; flatworms (Turbellaria) were the dominant taxa at this site (Headrick, 2002). Flatworms may dominate in moderately polluted waters and prefer moderate nutrient levels.

Aquatic Habitat Quality was based on Hilsenhoff's (1988) *Family-Level Biotic Index*, which summarizes the macroinvertebrate community into a single pollution tolerance value. The biotic index is reported on a scale of 0 to 10. Low scores indicate good water quality with negligible organic pollution. High scores indicate poor water quality with serious organic pollution. Mean scores for the project corridor streams ranged from 5.97 (Salt Creek) to 7.14 (Addison Creek). Salt Creek was the only stream that received a mean score indicative of fairly poor aquatic habitat (likely substantial pollution). The other streams received mean

[21] INHS did not assess Bensenville Drainage Ditch. Data from Headrick (2002) was used in this document.

[22] EPT refers to Ephemeroptera (mayflies), Plecoptera (stoneflies), and Trichoptera (caddisflies). EPT taxa richness will decrease with degrading water quality.

[23] Mayflies exhibit variation in pollution tolerance between species, but in general, are indicators of good water quality.

scores that indicate poor aquatic habitats that likely have very substantial pollution (see Table 3-31).

Based on the results of an unrelated study for the DRSCW, the Salt Creek main stem scored in the poor to fair quality range with respect to macroinvertebrate sampling. The West Branch DuPage River sites located in the vicinity of the project corridor had scores indicating relatively poor quality. Addison Creek, Spring Brook, and Meacham Creek had relatively tolerant macroinvertebrate communities, with scores suggesting toxic conditions (Midwest Biodiversity Institute, 2008). The Willow Creek and Des Plaines River (main stem) Watersheds were not sampled during the DRSCW study.

#### Mussels and Clams

Due to the degraded condition of the streams in the project corridor, a mussel survey was not completed for this project. Instead, available databases were searched for mussel and clam information. According to a review of the available data, seven species of mussels and four species of clams were collected from aquatic resources located in (or near) the project corridor.[24] Most of these mussel species are widespread or common and locally abundant species (INHS, 2005). The Forest Preserve District of DuPage County (FPDDC) information included one state-listed threatened slippershell mussel (*Alasmidonta viridis*); however, the specimen was a relic or weathered dead shell (Meister, 2010).

### 3.10.1.3 Water Quality

In addition to the information previously discussed in this subsection (e.g., Hilsenhoff's 1988 *Family-Level Biotic Index*), water quality was assessed based on the Illinois Integrated Water Quality Report and Section 303(d) List (IEPA/Bureau of Water [BOW], 2012) and based on chemical constituents of area streams from data collected by INHS during 2009 and 2010 (Wetzel et al., 2010a; Wetzel et al., 2010b) and DRSCW (various years, see discussion below).

Within Illinois, waters are protected and evaluated under the General Use Water Quality Standards (Title 35 Illinois Administrative Code, Subtitle C, Chapter I, Part 302, Subparts A and B). Designated uses under the General Use Water Quality Standards include aquatic life, fish consumption, primary contact, secondary contact, and aesthetic quality. States are required to classify waters with respect to impairments. Waters that do not fully support their designated uses are considered impaired and are cataloged in the 303(d) list, requiring total maximum daily loads (TMDLs). TMDLs establish pollution reduction goals to improve the quality of impaired waters.

TMDLs have been prepared for waters in the Salt Creek Watershed[25] and the West Branch DuPage River (CH2M HILL, 2004b). In addition, segments of three creeks that cross (or are proximate to) the project corridor (i.e., Salt Creek, West Branch DuPage River, and Higgins Creek) have TMDLs in progress to address additional impairments (IEPA/BOW, 2012; AECOM, 2009; AECOM, 2010; CDM, 2009).

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[24] Includes mussel and clam data from the county forest preserves, from the macroinvertebrate sampling completed for this project (Wetzel et al., 2010a; Wetzel et al., 2010b), and from a separate study for O'Hare Airport (Headrick, 2002).

[25] The Salt Creek TMDLs address segments of the following project corridor creeks: Salt Creek, Addison Creek, Spring Brook, and Meacham Creek (CH2M HILL, 2004a).

Table 3-32 provides IEPA water quality assessment designations for surface waters within the project corridor.

Most of these surface waters are impaired creeks that do not support aquatic life (i.e., have an aquatic life use impairment), have been channelized or modified, and are surrounded by development (with forest preserve areas generally being an exception). All of the assessed streams with impairments have municipal point source discharges (MPSD), urban runoff, and/or storm sewers listed as a source of their degradation. Other common sources of impairment for these streams include channelization, impacts from hydrostructure flow regulation/modification,[26] upstream impoundments, and contaminated sediments (IEPA/BOW, 2012).

Effluent from wastewater treatment plants (e.g., MPSD) can dominate the flow of creeks downstream, especially during the summer base flow period between July and October (Midwest Biodiversity Institute, 2008). Wastewater effluents entering streams may increase pollutant loads, particularly during low-flow conditions. These loads may affect water quality downstream of their outflows. Eight wastewater treatment plant outfalls are located near the project corridor; in general, six are located within two miles upstream of the project corridor and two are located within one mile downstream of the project corridor (see Exhibit 3-13).

Five of the seven INHS sampling sites (Addison Creek, Higgins Creek, Salt Creek, Spring Brook, and West Branch DuPage River) are located downstream of municipal wastewater treatment facilities. Several of these streams smelled strongly of treated wastewater effluent or had a heavy chlorinated water odor (most likely attributed to the upstream wastewater treatment facility) during the INHS field visits (Wetzel et al., 2010a; Wetzel et al., 2010b).

Similar to IEPA, other studies concur that the urban surroundings (and consequent stormwater runoff and other discharges) and channel/riparian modifications have contributed to the degradation of the project corridor streams. Based on the field assessments completed by INHS, the degraded condition of the project corridor streams is associated with urbanization, sedimentation, and chemical pollution resulting from urban/industrial development, channelization of streams, garbage and appliance dumping, and indiscriminate/haphazard bank “stabilization” with old concrete and asphalt pieces (Wetzel et al., 2010a; Wetzel et al., 2010b). In an unrelated study of the DuPage River and Salt Creek Watersheds, stormwater impacts and habitat degradation appeared to be the predominant stressors on the aquatic biological community. Sewer overflows and wastewater loadings were mentioned as secondary and indirect stressors, respectively (Midwest Biodiversity Institute, 2008).[27]

Urban streams, such as those crossed by the project corridor, often show signs of degradation. The water quality of streams in developed watersheds typically reflects the point and nonpoint source pollutant discharges from surrounding urban areas. Stormwater runoff from urban areas often includes pollutants (such as total suspended solids [TSS] and heavy metals) as summarized in Table 3-33.

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[26] Alteration of normal flow regimes (e.g., dams, channelization, impervious surfaces, water withdrawal) based upon actual observation and/or other existing data.

[27] With respect to the EO-WB project corridor, this study included Addison Creek, Meacham Creek, Salt Creek, Spring Brook, and West Branch DuPage River.

TABLE 3-33
Urban Stormwater Runoff Quality for TSS and Metals

| Data Description | TSS (mg/L) | Copper, Total (mg/L) | Lead, Total (mg/L) | Zinc, Total (mg/L) |
|---|---|---|---|---|
| Average concentration | 79 | 0.016 | 0.017 | 0.116 |
| Maximum concentration | 4,800 | 1.36 | 1.20 | 22.50 |
| Average range based on comparison of several prior national studies | 78 - 174 | 0.014 - 0.067 | 0.068 - 0.175 | 0.162 - 0.176 |

Note: mg/L = milligrams per liter. This summary table is based on *A Compilation and Analysis of NPDES Stormwater Monitoring Information from The National Stormwater Quality Database, Version 1.1* (Maestre, Pitt, and Center for Watershed Protection, 2005).

Table 3-34 compares water quality constituents for project corridor streams against Illinois General Use Water Quality Standards. The measured values in the table are generally the average of two or three sampling events conducted by INHS in the months of May through October during 2009 and 2010. The sampling data collected by INHS were within acceptable levels, except for the June 2009 DO concentration in Addison Creek and dissolved zinc in Higgins Creek and Salt Creek.[28] Dissolved metal concentrations did not exceed the acute toxicity concentration in any single sample measured.

TABLE 3-34
Measured Levels of Water Quality Constituents versus the Numeric Water Quality Standards within the Project Area

| Parameter | Stream | | | | | | | General Use Water Quality Standard [b] |
|---|---|---|---|---|---|---|---|---|
| | Addison Creek | Higgins Creek | Meacham Creek | Salt Creek | Spring Brook [a] | West Branch DuPage River [a] | Willow Creek | |
| pH (s.u.) | 7.87 - 8.19 | 7.21 - 7.92 | 7.53 - 8.04 | 7.50 - 7.86 | 6.52 - 7.16 | 6.98 - 7.59 | 7.68 - 8.12 | 6.5 - 9.0 |
| Dissolved Oxygen (mg/L) [c] | 4.90/ June [d] | 8.90/ October | 4.69/ August | 7.63/ June | 6.92/ June | 7.43/ June | 5.55/ June | 5.0 mg/L minimum (March-July)<br>3.5 mg/L minimum (August-February) |
| Total Phosphorous (mg/L) | 1.15 | 1.32 | 0.04 | 1.25 | 0.21 | 1.31 | 0.07 | Not applicable [e] |
| Chloride (mg/L) | 135 [f] | 194 [f] | 224 [f] | 212 [f] | 183 [f] | 179 [f] | 203 [f] | 500 mg/L |
| Dissolved Copper (mg/L) | 0.011 | 0.019 | 0.008 | 0.009 | 0.005 | 0.006 | 0.018 | 0.023 – 0.030 mg/L chronic<br>0.037 – 0.050 mg/L acute |
| Dissolved Lead (mg/L) | <0.041 [g] | <0.041 [g] | <0.041 [g] | <0.041 [g] | <0.041 [g] | <0.041 [g] | <0.041 [g] | 0.039 – 0.054 mg/L chronic<br>0.184 – 0.258 mg/L acute |
| Dissolved Zinc (mg/L) [h] | 0.062 | 0.140 [d] | 0.043 | 0.073 [d] | 0.013 | 0.030 | 0.063 | 0.063 – 0.083 mg/L chronic<br>0.241 – 0.317 mg/L acute |

28 Water quality exceedances are listed for the zinc chronic criteria as reflected under the proposed Illinois Pollution Control Board change R2011-018.

**TABLE 3-34**
**Measured Levels of Water Quality Constituents versus the Numeric Water Quality Standards within the Project Area**

| Parameter | Stream | | | | | | | General Use Water Quality Standard [b] |
|---|---|---|---|---|---|---|---|---|
| | Addison Creek | Higgins Creek | Meacham Creek | Salt Creek | Spring Brook [a] | West Branch DuPage River [a] | Willow Creek | |
| Dissolved Sulfate (mg/L) | 77.1 | 78.4 | 90.7 | 70.6 | 102.7 | 51.0 | 35.8 | 1,462 – 1,788 mg/L |
| Total Dissolved Solids (mg/L) | 568 | 621 | 673 | 623 | 656 | 574 | 501 | No standard |
| Water Temperature (ºC) [i] | 29.8 | 23.5 | 31.7 | 27.2 | 26.6 | 28.0 | 26.9 | 16ºC maximum (December – March)<br>32ºC maximum (April – November) |
| Hardness (mg/L) | 290 | 278 | 308 | 248 | 316 | 229 | 230 | No standard |

*Source*: Wetzel et al., 2010a; Wetzel et al., 2010b.

Notes: mg/L = milligrams per liter, ºC = degrees Celsius, s.u. = standard unit.

Measured levels of parameters in this table are the average of three sampling events in June, August, and October of 2009, unless otherwise noted. pH value ranges are provided.

Silver Creek, Bensenville Drainage Ditch, tributaries to the streams listed in this table, lakes near the project corridor, and non-wetland ponds were not sampled by INHS and are not included in this table. USEPA STORET website (2010a) did not include monitoring data for the water bodies that were not sampled by INHS.

[a] Measured levels of parameters are the average of two sampling events in May and June of 2010, unless otherwise noted.
[b] General Use Water Quality Standards are provided (from Illinois Administrative Code, Title 35, Part 302), unless otherwise noted. The dissolved metal standard is calculated based on equations in Section 302, Water Quality Standards. Refer to the Illinois Administrative Code for additional information. A range is provided for the General Use Water Quality Standard. Specific standards (within each range) may vary per creek based on input values used in the calculations.
[c] Measurement represents the minimum DO concentration from all sampling events. The month the lowest measurement was taken is provided.
[d] **Bold** text indicates that the measurement does not meet water quality standards.
[e] Not applicable for the project corridor sampling sites. The water quality standard particularly applies to inland lakes and reservoirs, or in streams at the point of entry into these inland lakes and reservoirs.
[f] Chloride concentrations did not exceed the chloride water quality standard in any single sample.
[g] Sample is below mean detection limit of 0.041 mg/L.
[h] Water quality exceedances are listed for the chronic criteria as reflected under the proposed Illinois Pollution Control Board change R2011-018.
[i] Maximum water temperature from sampling events is provided. Sampling took place between June and October.

Streams in developed watersheds often have low DO concentrations. Combined sewer overflows, leaky or broken combined sewers and sanitary sewers, MPSD, nutrient enrichment, and high algal concentrations are potential causes of low DO in streams (CH2M HILL, 2004a). Low DO can also be caused by sediment oxygen demand and high biochemical oxygen demand (BOD). Elevated BOD can be influenced by stormwater runoff from developed areas and by organic decomposition. It can also result from the oxidation of ammonia in surface waters. One source of ammonia in surface waters is effluent from wastewater treatment plants. IEPA lists DO as an impairment cause for segments of Addison Creek, Meacham Creek, Salt Creek, Spring Brook, and West Branch DuPage River near the project corridor (IEPA/BOW, 2012).

Heavy metals, such as zinc, are common pollutants in highway stormwater runoff. Zinc may be deposited on roadway surfaces through normal vehicle operations and friction of moving parts. Some sources of zinc associated with the use of motor vehicles include tire wear, motor oil, and grease. Industrial facilities can also contribute zinc to receiving waters, as a result of their activities (e.g., plating or galvanizing operations) and runoff from impervious surfaces (e.g., parking areas). Sources of zinc from industrial areas could include waste, galvanized surfaces (e.g., roofs), batteries, paints, and pharmaceuticals. Other sources of zinc include municipal wastewater and combustion of fossil fuels. Zinc can negatively impact aquatic organisms even at low concentrations. In 2010, IEPA listed zinc as an impairment cause for segments of Higgins Creek and the West Branch DuPage River near the project corridor, but not for Salt Creek (IEPA/BOW, 2010). Based on the TMDL reports for Higgins Creek and the West Branch DuPage River, a point source is most likely causing the impairment. The point source would be required to comply with the water quality standard at the point of discharge. IEPA believes that compliance with the zinc water quality standard would be achieved after point source dischargers have installed appropriate best management practices (AECOM, 2009; AECOM, 2010). IEPA did not list zinc as an impairment cause for these creek segments in 2012 (IEPA/BOW, 2012).

In addition to the water quality sampling conducted by INHS, the DRSCW has chloride data for the Salt Creek and the West Branch DuPage River watersheds (see Table 3-35).[29] Based on chloride and conductivity data collected in 2007 and 2008, chloride concentrations in sampled segments of Salt Creek and West Branch DuPage River exceeded the 500 milligram per liter (mg/L) water quality standard for considerable periods of the winter (CDM, 2008). Subsequent to the winter 2007/2008 monitoring, DRSCW conducted additional sampling in the watersheds crossed by the project corridor. For sampling locations near or downstream of the project corridor, chloride concentrations for the winter season were found to exceed (on average) the 500 mg/L water quality standard, while annual and non-winter season averages were below the standard (McCracken, 2011b). This is consistent with the data collected by INHS for the non-winter season (see Table 3-34). IEPA lists chloride as an impairment cause for segments of Higgins Creek, Salt Creek, and the West Branch DuPage River near the project corridor (IEPA/BOW, 2012).

TABLE 3-35
Chloride Monitoring for Salt Creek and West Branch DuPage River

| | Salt Creek at Busse Woods | Salt Creek at JFK Boulevard | Salt Creek at Wolf Road | West Branch DuPage River at Arlington Drive |
|---|---|---|---|---|
| 2010 Annual Average | 428.1 mg/L | 345.5 mg/L | 358.4 mg/L | NA |
| 2010 Winter Average (January-March and November-December) | 605.6 mg/L | 503.4 mg/L | 576.1 mg/L | 428.3 mg/L [a] |
| 2010 Non-Winter Season Average (April-October) | 297.5 mg/L | 269.9 mg/L | 256.8 mg/L | NA |

Note: mg/L = milligrams per liter, NA = Not available

[a] Data for the West Branch DuPage River is from January-February 2010.

[29] DRSCW uses conductivity as a surrogate for measuring chlorides. Equations can be used to estimate chloride concentrations from conductivity measurements.

Another pollutant that can have negative effects on the aquatic environment includes polycyclic aromatic hydrocarbons (PAHs). PAHs are a group of organic compounds that may form as a result of natural or man-made sources. Materials with PAHs include fossil fuels, coal-tar-based pavement sealants, incomplete combustion of organic matter, and others (Mahler and Van Metre, 2011). Although Illinois does not have any water quality standards for PAHs, there are guidelines for threshold effects levels and probable effects levels (PELs) for various PAHs (MacDonald et al., 2000). Threshold effects levels represent the concentration below which adverse affects on aquatic organisms are rarely expected to occur. PELs represent the concentration above which adverse effects are frequently expected to occur. Although these are not regulated criteria recognized by USEPA or IEPA, they are recognized among the scientific community as consensus-based guidelines.

PAHs attach to small particles, particularly organic matter, and can be transported to surface waters via stormwater runoff after being deposited on the landscape. Runoff from pavements coated with coal-tar-based sealants was identified as a source of PAHs in stormwater runoff in studies conducted by USGS and the Minnesota Pollution Control Agency (Van Metre and Mahler, 2010; Crane et al., 2010). These studies found that coal-tar based sealants contributed approximately 50 percent of the PAHs found in nearby bodies of water.

DRSCW also commissioned a literature study to review potential sources of PAHs (Prabhukumar and Pagilla, 2010). Sediments in several of the watersheds that are crossed by the project corridor have been tested for PAHs. Studies in the Salt Creek and West Branch DuPage River watersheds found PAH concentrations in sediment that exceed PELs where toxicity is likely to be observed over a range of aquatic organisms, including amphipods (*Hyalella azteca*), mayflies (*Hexagenia limbata*), midges (*Chironomus tentans* or *C. riparius*), oligochaetes (*Lumbriculus variegates*), daphnids (*Ceriodaphnia dubia*), and bacteria (*Photobacterium phosphoreum*) (Midwest Biodiversity Institute, 2008).

## 3.10.2 Environmental Consequences

This subsection discusses potential impacts to surface water resources that would be associated with the construction, operation, and maintenance of the Build Alternative, including the pollutants that could be deposited into receiving waters, potential impacts to water quality, and direct impacts through construction and the placement of fill material. Pollutants, such as sediments, solids, heavy metals (e.g., copper, lead, and zinc), oil and grease, deicing material, fertilizers, and nutrients, may be released into the environment during construction or may accumulate on roadway surfaces and adjoining rights-of-way as a result of motor vehicle operations and maintenance. These pollutants can be transported to receiving waters via stormwater runoff.

Several of the project corridor streams have named tributaries (e.g., Willow Creek South Tributary, Willow Creek North Tributary, and Higgins Creek Tributary A) that were evaluated separately for the project drainage study and are discussed separately in this subsection.

### 3.10.2.1 Construction Impacts to Surface Waters

The Build Alternative crosses six streams and their tributaries at 13 general locations (see Appendix J [Exhibits J-1 through J-16] and Table 3-36). Nine of the proposed crossings are located in the Willow Creek Watershed. Direct impacts to surface waters would result from construction and the placement of fill to construct the proposed improvements. Construction associated with transportation projects include earthmoving practices (e.g., demolition, clearing and grubbing, grading, filling, excavation) that remove vegetative cover and expose soils. Such activities increase the potential for erosion and sedimentation by exposing disturbed soils to precipitation.

Increased impervious surface area due to construction and compaction of soils by heavy equipment may result in less stormwater infiltration and additional stormwater runoff. In-stream construction, placement of structures (e.g., abutments and piers), streambank disturbance, channel realignment, and temporary crossings could cause increases in turbidity and sedimentation and temporarily alter downstream hydraulics and substrate conditions. Downstream aquatic systems could be temporarily affected by the increases in turbidity and sedimentation. Increased sedimentation during construction has the potential to cover stream substrate, thereby affecting habitat for some species of fish and macroinvertebrates. The magnitude of impact varies based on several factors, such as proposed type of crossing, number of crossings, stream characteristics (substrate, depth, current velocity), soil type, construction method, and implementation of best management practices.[30]

Highly erodible soils are mapped as being present within the Build Alternative corridor with minimal surface area near the proposed stream crossings (see Exhibit 3-14). To reduce potential stream impacts, soil erosion and sediment control measures near streams would involve special consideration, such as minimization of soil disturbance, installation of applicable soil erosion and sediment controls prior to, during, and following construction. This may include installation of silt fence prior to construction activities, installation of temporary erosion control products if disturbed areas are to sit idle, and protection of side slopes with seed and rolled erosion control products (i.e., erosion control blanket) to assist with vegetation establishment (see subsection 3.10.3.1).

The placement of fill for stream crossings and additional lanes may also have an impact on surface waters. Improvements associated with the Build Alternative primarily take place adjacent to and within existing transportation corridors. As such, surface water impacts may be associated with the widening or lengthening of existing stream crossing structures or construction of new stream crossings. Temporary construction-related impacts could result even if a waterway is not directly impacted, depending on the proximity of the activity to the waterway and drainage patterns. Potential impacts would be minimized through best management practices implementation.

In-stream construction may be required to install bridge piers, extend culverts, or install new culverts (see Table 3-36). In-stream construction would follow standard practice (see IDOT *Standard Specification for Road and Bridge Construction* [IDOT, 2012] and the *Tollway Supplemental Specifications* [Illinois Tollway, 2011]), including isolating the work area, as necessary. All required permits and approvals (e.g., Section 404 CWA, Section 401 CWA water quality certification, and IDNR-OWR floodway construction permits) would be obtained prior to any in-stream construction. Additional details regarding construction

30 Best management practices are schedules of activities, prohibition of practices, maintenance procedures, and other management practices used to prevent or reduce negative impacts to water quality.

methodology would be provided during CWA and floodway construction permitting. Flow would be maintained during construction in perennial streams by using dam and pumping, fluming, culverts, or other techniques. Cofferdams, if necessary, would be constructed of nonerodible materials; earthen embankments or dikes would not be used as cofferdams. If dewatering is required to perform "work in the dry" in perennial streams, the dewatering would be temporary in nature. All materials used for temporary construction activities would be moved to upland areas following completion of the construction activity. Temporarily disturbed areas would be restored to preconstruction conditions, including grading to original contours and installation of erosion control as soon as practicable in accordance with National Pollutant Discharge Elimination System (NPDES) permit requirements. Erosion and sediment controls would be used to minimize downstream impacts.

TABLE 3-36
Streams Crossed by the Proposed Project in the Existing and Proposed Condition

| Stream | Description of Existing Crossing | Description of Proposed Crossing [a] | Impact (acre) [a] | Linear Feet of Stream Enclosed in Culvert (Proposed Condition) |
|---|---|---|---|---|
| Addison Creek Watershed | | | | |
| Addison Creek | Two-cell, 10-foot (span) x 9.5-foot (rise) concrete box culvert at I-294 | Extend culvert in-kind approximately 20 feet to the east and 10 feet to the west | 0.039 | 30 |
| Des Plaines River (main stem) Watershed | | | | |
| Bensenville Drainage Ditch | No crossing in project corridor | Extend railroad culvert (constructed as part of OMP) approximately 400 feet to the east | 0.280 [b] | 367 [b] |
| Salt Creek Watershed | | | | |
| Meacham Creek | 10-foot (span) x 8-foot (rise) concrete box culvert at Elgin-O'Hare Expressway | Extend existing drainage structure approximately 15 feet to the south | 0.008 | 15 |
| Salt Creek | Two-span, prestressed concrete beam bridge carrying Thorndale Avenue over creek. Center pier is pile supported with solid cast-in-place concrete wall around piles | Construct two new bridges to carry eastbound/westbound Elgin O'Hare corridor over creek. New bridges will span the creek and will not require piers to be placed in the creek | 0 | Not applicable |
| Willow Creek Watershed | | | | |
| Higgins Creek (I-90 east of Elmhurst Road) | Two 2-span, prestressed concrete beam bridges with center pier in creek for eastbound/westbound I-90 | Widen both existing I-90 bridges in-kind (with center pier in creek). Construct two new bridges over the creek, one to the north and one to the south of I-90 for ramps (these new bridges will span the creek and will not require piers to be placed in the creek) | 0.006 | Not applicable |

TABLE 3-36
Streams Crossed by the Proposed Project in the Existing and Proposed Condition

| Stream | Description of Existing Crossing | Description of Proposed Crossing [a] | Impact (acre) [a] | Linear Feet of Stream Enclosed in Culvert (Proposed Condition) |
|---|---|---|---|---|
| Higgins Creek (at Touhy Avenue) | Two-cell, 13.5-foot (span) x 8-foot (rise) concrete box culvert at railroad and Touhy Avenue | New bridge to span over the creek/existing culvert (culvert to remain for railroad) | 0 | Not applicable |
| Higgins Creek (Elmhurst Road) | Single 25-foot concrete slab bridge at Elmhurst Road | Widen existing structure in-kind | 0.024 | Not applicable |
| Higgins Creek (I-90 north embankment west of Elmhurst Road) | No crossing in project corridor | Longitudinal impact at the south bank of Higgins Creek for the proposed westbound I-90 ramp from southbound Elmhurst Road. Construct an outfall for a proposed compensatory storage site at the northwest quadrant of the I-90/Elmhurst Road interchange | 0.101 | Not applicable |
| Higgins Creek headwaters (I-90 approximately two miles west of Elmhurst Road) | Two-cell, 9-foot (span) x 4-foot (rise) concrete box culvert at I-90 | Extend existing drainage structure approximately 15 feet to the southwest | 0.012 | 15 |
| Higgins Creek Tributary A | Two-cell, 9-foot (span) x 5.75-foot (rise) concrete box culvert at I-90 | Extend existing drainage structure approximately 60 feet to the north and south | 0.089 | 60 |
| Willow Creek (downstream of York Road) | No crossing in project corridor | Install new culverts and/or extend three existing drainage structures from the railroad beneath the proposed West Bypass embankment | 1.170 [b] | 1,677 [b] |
| Willow Creek South Tributary | Three-cell, 10-foot (span) x 4-foot (rise) concrete box culvert at Thorndale Avenue | Existing Thorndale Avenue culvert would be removed, replaced, and realigned. Existing channel between Thorndale Avenue and York Road would be filled and slightly shifted | 0.721 | 1,185 [c] |
| Willow Creek South/North Tributaries (upstream of York Road) | Three trapezoidal channels under a dry land bridge at York Road. The three different channels have varying dimensions in regard to top width, bottom width, and depth | Maintain condition at York Road | 0 | Not applicable |
| Build Alternative Total [b] | | | 2.45 | 3,349 |

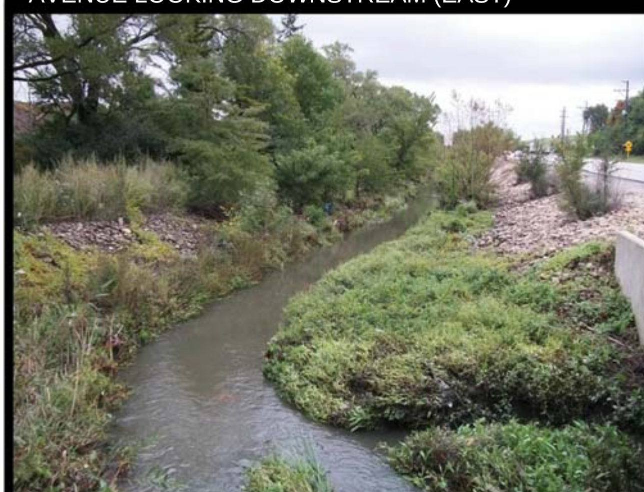
[a] Impact area includes the placement of fill material (e.g., culvert, pier footprint, retaining wall) in waters of the U.S. Total does not include potential temporary impacts.
[b] Bensenville Drainage Ditch and Willow Creek are being realigned as part of a separate project at O'Hare Airport. Impacts are based on the proposed realignment (as part of the O'Hare Modernization Program).
[c] In existing condition, Willow Creek South Tributary consists of approximately 3,905 linear feet open channel and 296 linear feet enclosed in culvert within the project corridor. In proposed condition, Willow Creek South Tributary will consist of approximately 1,743 linear feet of open channel and 1,185 linear feet enclosed in culvert.

To allow for wildlife connectivity and fish habitat, new culverts greater than 48 inches in diameter or height associated with waters of the U.S. are proposed to be enlarged and buried with stream bedding material approximately six to 12 inches. New culverts to be buried include I-90 over Higgins Creek Tributary A, Elmhurst Road over Higgins Creek (if a second culvert alternative is selected during a future design phase), culverts associated with the proposed Elgin-O'Hare Expressway and West Bypass interchange ramps over Willow Creek South Tributary, and culverts associated with the headwaters of Devon Avenue Tributary. The buried depth was determined based on standard culvert sizes. For example, the two-cell, 12-foot (span) x 9-foot (rise) concrete box culverts at I-90 over Higgins Creek Tributary A would be 12-foot (span) x 10-foot (rise) culverts, and buried one foot.

The proposed West Bypass crossings at Bensenville Drainage Ditch and Willow Creek are within the limits of OMP and would be on new roadway alignment (i.e., in a reserved transportation corridor). The Build Alternative would cross stream segments that will be (or recently have been) relocated as part of OMP.[31] The OMP has specific design criteria that apply to all OMP construction projects. These criteria would be provided to the designer for the West Bypass. The OMP would participate in review of 30 percent, 60 percent, 90 percent, and 100 percent plans to assure compliance with CDA and OMP design project requirements.

The segment of Willow Creek South Tributary between Thorndale Avenue and York Road would be slightly shifted as part of the Build Alternative. Within the project corridor, this tributary is channelized and located immediately adjacent and parallel to the north side of Thorndale Avenue and the west side of York Road (see Exhibit 3-13). It ranges from approximately seven to 20 feet wide and is relatively shallow in depth (up to approximately three feet deep). The substrate is variable, consisting of silt, riprap, and silt with gravel. The creek banks are stabilized with riprap and vegetation, dominated by sandbar willow (*Salix interior*), common reed (*Phragmites australis*), pinkweed (*Polygonum pensylvanicum*), and tall goldenrod (*Solidago altissima*) (see Figure 3-11).

FIGURE 3-11
WILLOW CREEK SOUTH TRIBUTARY AT THORNDALE AVENUE LOOKING DOWNSTREAM (EAST)



*Source: CBBEL, 2011b.*

Under proposed conditions, Willow Creek South Tributary would be shifted west, farther from York Road; this would improve drainage conditions near York Road and present-day Thorndale Avenue and would better accommodate proposed compensatory storage locations northwest of the proposed Elgin O'Hare and West Bypass interchange. The proposed channel would be constructed and stabilized prior to use by

[31] The OMP obtained a Section 404 CWA permit from the USACE in December 2005 for airport improvements. That permit authorized the relocation of several waterways to accommodate airport improvements.

installing appropriate erosion control measures, which may include gabions, mechanically stabilized earth walls, vertical walls, cellular concrete mat, riprap, seed, or rolled erosion control products (e.g., turf reinforcement mats, blankets). Due to the proximity of the proposed interchange ramps to the adjacent runways at O'Hare Airport, the elevation of the ramp would be kept to a minimum. To accommodate the ramp design and FAA safety requirements, it is anticipated that approximately 1,000 feet of the south portion of Willow Creek South Tributary may be enclosed in a box culvert under the interchange ramps.[32] Any necessary construction in the existing waterway would be conducted in low- or zero-flow conditions. As necessary, flow would be maintained during construction, and erosion and sediment controls would be used to minimize downstream impacts.

All seven of the assessed streams that could be affected by the Build Alternative are impaired (see Table 3-32), based on the IEPA 303(d) list,[33] and parts have been channelized or modified. All of the assessed streams had relatively poor habitat quality and were dominated by pollution-tolerant to intermediate-tolerant fish and macroinvertebrates. None of the streams are listed as a natural area (Illinois Natural Areas Inventory [INAI] site) or rated as a higher-quality Class A or B stream (based on biological diversity or integrity; see subsection 3.10.1).[34] With the implementation of best management practices during construction, the in-stream work and construction activities adjacent to the streams would not be expected to adversely impact the overall habitat quality of the stream. Impacts to the aquatic community are anticipated to be minor and temporary in nature.

#### 3.10.2.2 Operational Impacts to Surface Waters

Operation includes the use and maintenance of the transportation system. Potential impacts associated with the operation of the Build Alternative would result from pollutant accumulation on roadway surfaces, median areas, and adjacent rights-of-way. Pollutants accumulate through use and maintenance of the transportation system, natural processes, and as a result of airborne deposition. Pollutant concentrations are highly variable and are affected by numerous factors, such as traffic characteristics (volume and speed), weather (precipitation and wind), maintenance practices, and adjacent land uses. Roadway runoff can transport pollutants that have accumulated on impervious surfaces. Primary constituents of highway runoff associated with typical operations include TSS (from pavement wear, atmospheric deposition, dirt), lead (from tire wear), zinc (from tire wear, motor oil, grease), copper (from metal plating, moving engine parts, brake lining wear), and petroleum (from spills, leaks, gasoline, antifreeze, hydraulic fluids).

Additional travel lanes and other impervious surfaces would be constructed under the Build Alternative (see Table 3-37). When undeveloped land is converted to impervious surface, the volume of stormwater runoff increases and stormwater infiltration decreases. Use and maintenance of the additional impervious surfaces would generate more pollutants. The increased volume of stormwater runoff could increase in-stream erosion. However, this risk is minimized through the incorporation of stormwater best management practices and stormwater detention facilities. Stormwater detention facilities would be

[32] The length of the creek to be enclosed and the type of structure will be determined during final design and permitting. Final design may vary based on additional coordination with FAA and/or other agencies.

[33] Meacham Creek is impaired for aquatic life use, but it is not listed on IEPA's 2012 303(d) list.

[34] Mapped critical wetlands are located adjacent to two of the streams near the project corridor—Meacham Creek and the West Branch DuPage River (see Exhibit 3-17).

constructed to compensate for the increased impervious surface. The detention facilities will follow Illinois Tollway and IDOT drainage requirements for highway systems (including consideration of local stormwater management ordinances). For a more detailed description of stormwater detention and other proposed stormwater best management practices refer to subsection 3.10.3 and the Location Drainage Study.

TABLE 3-37
Impervious Area and Detention Summary

| Watershed | County | Detention Required due to Increase in Impervious Area | | | Detention Required due to Proposed Hydrologic Disturbed Area (acre-feet) | Total Required Detention [a] (acre-feet) |
|---|---|---|---|---|---|---|
| | | Existing Impervious Area (acres) | Proposed Impervious Area (acres) | Required Detention Storage (acre-feet) | | |
| Addison Creek | Cook | 44.06 | 56.84 | 6.65 | -- | 13.36 |
| | DuPage | 3.37 | 4.70 | 0.76 | 5.58 | |
| Bensenville Ditch | DuPage | -- | -- | -- | 25.60 | 25.60 |
| Higgins Creek | Cook | 112.66 | 160.87 | 25.07 | 18.18 | 44.76 [b] |
| Meacham Creek | Cook | 34.55 | 50.67 | 8.38 | -- | 15.48 |
| | DuPage | 15.61 | 28.06 | 7.10 | -- | |
| Spring Brook | Cook | 19.16 | 23.73 | 2.38 | -- | 2.38 |
| Salt Creek | Cook | 5.20 | 5.43 | 0.12 | -- | 80.71 [c] |
| | DuPage | 82.13 | 138.88 | 32.47 | -- | |
| Silver Creek | Cook | 12.95 | 20.20 | 3.77 | 14.68 | 21.08 |
| | DuPage | 0.83 | 1.19 | 0.21 | 2.43 | |
| West Branch DuPage River | Cook | 31.56 | 37.58 | 3.13 | -- | 3.15 |
| | DuPage | 0.26 | 0.29 | 0.02 | -- | |
| Willow Creek | Cook | -- | -- | -- | 11.98 | 86.76 [d] |
| | DuPage | 55.73 | 101.42 | 26.04 | 37.80 | |
| Total | | 418.7 | 629.86 | 116.10 | 116.25 | 293.28 |

Note: Hydrologic disturbed area was used to calculate detention required for new roadways, including the West Bypass based on IDOT and Illinois Tollway requirements. Increased impervious area was used to calculate detention for existing roadway expansion, including the Elgin-O'Hare Expressway, I-90, I-290, and I-294.

[a] See Appendix E for potential locations of detention facilities.
[b] Includes compensation for 1.51 ac-ft of existing detention fill.
[c] Includes compensation for 25.08 ac-ft of existing detention fill, 20.89 ac-ft of lost depressional storage area, and 2.27 ac-ft diverted from Willow Creek to Salt Creek.
[d] Includes compensation for 9.80 ac-ft of existing detention fill, 3.41 ac-ft of lost depressional storage area, and loss of 2.27 ac-ft diverted from Willow Creek to Salt Creek.

Highway runoff pollution may affect the quality of receiving waters not only through shock or acute loadings during storms but also through chronic effects from long-term accumulation in the receiving water. Water impacts are site-specific and depend heavily on the characteristics of the highway and the receiving waters. The degree of pollutant loading is linked directly to the amount of roadway traffic. Research indicates few substantial impacts for highways with less than 30,000 ADT (Young et al., 1996; Dupuis et al., 1985). Under these conditions, potential impacts are generally short-term, localized, acute loadings from temporary water quality degradation, with few (if any) long-term or chronic effects.

All projected year 2040 ADTs (bidirectional) along the proposed Elgin O'Hare and West Bypass corridors exceed 30,000. The projected bidirectional ADT for the Build Alternative in the year 2040 ranges from 57,700 to 132,300 vehicles per day along the Elgin O'Hare corridor from Lake Street to the proposed West Bypass corridor.

The low end of that range is between Lake Street and Gary Avenue, and the high end is projected between Gary Avenue and I-290. The greatest increase in bidirectional ADT from existing conditions (year 2010) to year 2040 traffic is anticipated east of I-290 to the proposed West Bypass corridor (i.e., an increase of approximately 202 to 211 percent). Salt Creek and Willow Creek South Tributary would be crossed by the Build Alternative along this stretch of the Elgin O'Hare corridor. West of I-290 the projected percent increase in bidirectional ADTs is much less (i.e., an increase of approximately 2.5 to 26 percent). Meacham Creek and West Branch DuPage River are located along this stretch of the Elgin O'Hare corridor.

The projected ADT (bidirectional) for the West Bypass corridor in the year 2040 ranges from 55,100 to 100,800 vehicles per day. The low end of that range is between IL 19 and I-294, and the high end is projected between I-90 and Devon Avenue. The West Bypass corridor would cross Bensenville Drainage Ditch, Willow Creek, and Higgins Creek. The West Bypass corridor would be constructed on new alignment, so there is no existing condition for comparison.

For streams receiving runoff along these corridors, the pollutant loading from traffic could be higher and the potential impact could be greater, depending upon the stream characteristics and the post-construction stormwater best management practices used. Potential water quality impacts to the project corridor streams as a result of the Build Alternative were evaluated using the FHWA methodology developed by Driscoll, Shelley, and Strecker (1990) for both existing and proposed conditions (including proposed structural best management practices). The analysis is specific to highway projects and predicts stormwater runoff concentrations of copper, lead, zinc, and TSS from highway right-of-way areas. The analysis also predicts the resultant stream concentrations (see Table 3-38). More information can be found in Appendix K.

TABLE 3-38
Pollutant Loading Analysis Summary

| Condition | Pollutant (mg/L) | Addison Creek | Bensenville Drainage Ditch | Higgins Creek | Meacham Creek | Salt Creek | Silver Creek | Spring Brook | West Branch DuPage River | Willow Creek |
|---|---|---|---|---|---|---|---|---|---|---|
| Summary of Analysis Without Best Management Practices | | | | | | | | | | |
| Existing Condition | TSS | 257 | 274 | 361 | 360 | 171 | 307 | 352 | 284 | 355 |
| | Copper | 0.033 | 0.035 | 0.046 | 0.046 | 0.022 | 0.039 | 0.045 | 0.036 | 0.046 |
| | Lead | 0.005 | 0.005 | 0.007 | 0.007 | 0.003 | 0.006 | 0.007 | 0.006 | 0.007 |
| | Zinc | 0.151 | 0.161 | 0.211 | 0.211 | 0.100 | 0.180 | 0.206 | 0.166 | 0.208 |
| 2040 Build Condition | TSS | 337 | 344 | 407 | 412 | 204 | 313 | 372 | 296 | 412 |
| | Copper | 0.043 | 0.044 | 0.052 | 0.053 | 0.026 | 0.040 | 0.048 | 0.038 | 0.053 |
| | Lead | 0.007 | 0.007 | 0.008 | 0.008 | 0.004 | 0.006 | 0.007 | 0.006 | 0.008 |
| | Zinc | 0.197 | 0.201 | 0.238 | 0.241 | 0.119 | 0.183 | 0.218 | 0.173 | 0.241 |
| Percent Increase [a] | TSS | 31% | 25% | 13% | 14% | 19% | 2% | 6% | 4% | 16% |
| | Copper | 31% | 25% | 13% | 14% | 19% | 2% | 6% | 4% | 16% |
| | Lead | 31% | 25% | 13% | 14% | 19% | 2% | 6% | 4% | 16% |
| | Zinc | 31% | 25% | 13% | 14% | 19% | 2% | 6% | 4% | 16% |
| Summary of Analysis With Best Management Practices [b] | | | | | | | | | | |
| Existing Condition | TSS | 227 | 261 | 302 | 68 | 74 | 292 | 88 | 70 | 326 |
| | Copper | 0.030 | 0.034 | 0.041 | 0.017 | 0.013 | 0.038 | 0.019 | 0.015 | 0.043 |
| | Lead | 0.005 | 0.005 | 0.006 | 0.003 | 0.002 | 0.006 | 0.003 | 0.002 | 0.007 |
| | Zinc | 0.138 | 0.155 | 0.187 | 0.076 | 0.058 | 0.174 | 0.087 | 0.066 | 0.196 |
| 2040 Build Condition | TSS | 144 | 152 | 246 | 54 | 63 | 171 | 60 | 47 | 155 |
| | Copper | 0.026 | 0.019 | 0.036 | 0.015 | 0.011 | 0.026 | 0.016 | 0.013 | 0.028 |
| | Lead | 0.004 | 0.003 | 0.006 | 0.002 | 0.002 | 0.004 | 0.002 | 0.002 | 0.004 |
| | Zinc | 0.116 | 0.089 | 0.166 | 0.070 | 0.052 | 0.116 | 0.071 | 0.059 | 0.125 |
| Percent Increase [a] | TSS | -37% | -42% | -18% | -21% | -16% | -42% | -32% | -33% | -52% |
| | Copper | -16% | -43% | -11% | -8% | -10% | -33% | -19% | -12% | -36% |
| | Lead | -16% | -43% | -11% | -8% | -10% | -33% | -19% | -12% | -36% |
| | Zinc | -16% | -43% | -11% | -8% | -10% | -33% | -19% | -12% | -36% |

[a] Percent increase values were rounded. Percentages were calculated prior to rounding and represent the increase or decrease between existing and build conditions.
[b] Best management practices were factored into the analysis for the existing and 2040 build conditions.

Based on the results of the pollutant loading analysis, the resultant concentrations for representative roadway pollutants (i.e., copper, lead, and zinc) were compared to Illinois General Use Water Quality Standards. The results from the analysis indicate that the project does not exceed General Use Water Quality Standards in the proposed condition with the implementation of best management practices. In fact, the heavy metal concentrations associated with the roadway are predicted to decrease in the 2040 build condition in all the streams (by eight to 43 percent) due to the incorporation of stormwater best management practices that would be implemented with the project. With proper best management practices implementation, the project is not expected to exceed water quality standards for heavy metals.

There is no numeric water quality standard in Illinois for TSS. Based on the results of the pollutant loading analysis, the estimated TSS concentration decreases in the creeks by 16 to 52 percent with the implementation of best management practices in the proposed condition (when compared to the existing condition). Under existing conditions, the best management practices that treat stormwater runoff from the roadways within the project corridor are limited east of IL 53. There are limited numbers of existing detention ponds along this portion of the corridor and the grassed swales that are present do not appear to have been designed specifically for water quality treatment. Under existing conditions, several best management practices are already in place along the project corridor west of IL 53, where Spring Brook, Meacham Creek, and West Branch DuPage River are located, so the anticipated change in stormwater quality is smaller for these streams.[35] With proper best management practice implementation, no adverse changes or effects to the project corridor streams are anticipated as a result of TSS concentrations and operation of the proposed EO-WB project.

As engineering details progress, additional stormwater best management practices (such as bioswales and infiltration basins/trenches) will be evaluated and installed where practicable and feasible (see subsection 3.10.3.2). The effectiveness of pollutant removal is anticipated to increase with the implementation of these additional best management practices. Areas along the project corridor to be evaluated for additional best management practices opportunities are shown in Appendix E.

In general, existing pollutant concentrations and habitat modifications have affected the water quality of the project corridor streams. Seven of the streams (Addison Creek, Higgins Creek, Meacham Creek, Salt Creek, Spring Brook, West Branch DuPage River, and Willow Creek) are impaired streams, as defined by the federal CWA and as identified by IEPA (IEPA/BOW, 2012).[36] Refer to Table 3-32 for causes and sources of impairments. Potential causes of impairment for these streams include chloride from maintenance practices, phosphorus, DO, and other signature highway runoff pollutants, such as heavy metals and TSS. The USEPA has approved TMDLs for the Salt Creek Watershed[37,38] to address chloride

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35 The existing best management practices located adjacent to the Elgin-O'Hare Expressway have been included in the pollutant loading analysis.

36 Meacham Creek is impaired for aquatic life use, but it is not listed on IEPA's 2012 303(d) list.

37 The Salt Creek TMDLs address segments of the following project corridor creeks: Salt Creek, Addison Creek, Spring Brook, and Meacham Creek (CH2M HILL, 2004a). Meacham Creek is impaired, but is not on IEPA's 2012 303(d) list.

38 The Build Alternative crosses surface waters that are in TMDL development to address additional impairments (IEPA/BOW, 2012). Additional TMDLs and other NPDES requirements would be followed, as necessary. The Chicago District USACE has also added a General Condition for TMDLs to their re-issued Regional Permit Program that requires applicants to develop plans and best management practices that are consistent with the assumptions and requirements in approved TMDLs (USACE, 2012).

and DO[39] and for the West Branch DuPage River to address chloride (CH2M HILL, 2004b). Chloride used for road deicing is a primary pollutant associated with highway maintenance and is discussed in subsection 3.10.2.3.

If untreated, stormwater runoff and highway pollutants could cause further degradation of receiving waters, erosion, harm or stress to aquatic life, and decreased recreational use and aesthetics. However, best management practices would be incorporated into the Build Alternative to minimize adverse impacts to the downstream aquatic environment. Water quality would be managed through a combination of stormwater runoff and drainage collection facilities, and the implementation of other post-construction best management practices in accordance with state and federal water quality goals for managing the water quality of impaired or degraded streams. To the extent practicable, improvements would be designed so that stormwater runoff quality would be improved with capture infiltration, detention, or other stormwater treatment before discharge to surface waters. Stormwater controls that treat stressors of concern based on TMDLs or typical highway pollutants (e.g., suspended solids, sediment, heavy metals, inorganic salts, PAHs) and that control the volume of stormwater runoff are discussed in subsection 3.10.3.

Based on available data, most of the aquatic species found in the surface waters that cross the Build Alternative generally are locally common, widespread, and tolerant of urban conditions. Several waters are impaired for support of aquatic life (see Table 3-32). As a result, the dominant fish species are pollution tolerant, and potential impacts to fishing and other recreational surface water uses near the proposed improvements are anticipated to be minimal with implementation of best management practices.

#### 3.10.2.3 Maintenance Impacts to Surface Waters

Maintenance impacts associated with the proposed project include implementation of deicing practices during winter months and herbicide spraying for invasive/noxious vegetative species within the right-of-way. Herbicide applications would follow the manufacturer's guidelines to minimize drift and runoff into surface waters. An NPDES permit for pesticide application point source discharges (including herbicide application) will be obtained, as necessary.

Seasonal deicing with salt (commonly sodium chloride), along with plowing and other alternative measures, are used to reduce snow and ice build-up on roads. Deicing assists with safe traffic movement by improving road conditions in winter, but application of road salt contributes chloride loads to surface waters. Road salt is highly soluble and moves through the environment in solution as runoff, splash, spray, and dust. The General Use Water Quality Standard for chloride in Illinois is 500 mg/L.[40] Sodium does not have a numeric water quality standard.

The primary methods of snow and ice removal in IDOT, District One, and on the Illinois Tollway are plowing and the application of road salt. During the last ten winter seasons (2000/2001 through 2010/2011), IDOT and the Illinois Tollway averaged 39.7 tons of salt per

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[39] The DO TMDL includes load allocations for carbonaceous biochemical oxygen demand (CBOD), volatile suspended solids (VSS), and ammonia-nitrogen. In general, the DO TMDL recommendations pertain to wastewater treatment plants and dam removal on Salt Creek. Stormwater control for municipal separate storm sewer systems would be accomplished through the NPDES Phase II General Permit No. ILR40.

[40] Title 35 Illinois Administrative Code, Subtitle C, Chapter 1, Part 302.

lane-mile (systemwide).[41] An abrasive sand-type material (e.g., crushed pea gravel or equivalent) is often used by the Illinois Tollway on the ramps. Whatever material is used, efforts are made to apply only the amount of material necessary to maintain motorist safety. The total quantity of road salt entering the environment varies based on the number of snow events per season and the number of times road salt is applied per storm.

Under proposed conditions, the majority of the Elgin O'Hare and West Bypass corridors will be a tolled facility maintained by the Illinois Tollway. The Build Alternative would increase the number of lane-miles and pavement in the project corridor, thereby increasing the total salt loading over existing levels. Potential water quality impacts to the project corridor streams due to chlorides were evaluated for the Build Alternative by using the USGS methodology developed by Frost, Pollock, and Wakelee (1981) for both existing and proposed conditions. The results of the pollutant loading analysis were compared to Illinois General Use Water Quality Standards (see Table 3-39).

TABLE 3-39
Chloride Loading Analysis Summary

| Stream | Highway Lane-Miles | | | Annual Daily Average Chloride (mg/L) | | | Annual Daily Maximum Chloride (mg/L) | | |
|---|---|---|---|---|---|---|---|---|---|
| | Existing | Build | Percent Increase | Existing | Build | Percent Increase | Existing | Build | Percent Increase |
| Addison Creek | 47.52 | 74.39 | 57% | 255 | 400 | 57% | 467 | 716 | 53% |
| Bensenville Drainage Ditch | 0.92 | 13.89 | 1410% | 15 | 255 | >100% | 52 | 415 | >100% |
| Higgins Creek | 44.87 | 79 | 76% | 208 | 367 | 76% | 385 | 658 | 71% |
| Meacham Creek | 27.14 | 43.77 | 61% | 294 | 474 | 61% | 532 | 842 | 58% |
| Salt Creek | 23.46 | 67.04 | 186% | 11 | 33 | >100% | 46 | 84 | 83% |
| Silver Creek | 12.84 | 47.19 | 268% | 64 | 235 | >100% | 136 | 431 | >100% |
| Spring Brook | 6.21 | 11.34 | 83% | 157 | 286 | 82% | 296 | 520 | 76% |
| West Branch DuPage River | 6.89 | 10.62 | 54% | 48 | 75 | 56% | 110 | 156 | 42% |
| Willow Creek | No existing crossing | 50.29 | No existing crossing | No existing crossing | 270 | No existing crossing | No existing crossing | 492 | No existing crossing |

41 Salt application rates are based on information from IDOT and the Illinois Tollway.

Based on the results of the analysis, the annual daily average chloride concentrations in the existing condition range from 11 mg/L to 294 mg/L, compared to 33 mg/L to 474 mg/L in the build condition. Under the existing and proposed conditions, the estimated annual daily average chloride concentrations are below 500 mg/L for all creeks in the project corridor.

The annual daily maximum chloride concentrations range from 46 mg/L to 532 mg/L in the existing condition, while the build condition ranges from 84 mg/L to 842 mg/L. Addison Creek, Higgins Creek, and Spring Brook meet the General Use Water Quality Standard in the existing condition, but exceed the standard in the proposed condition. Meacham Creek exceeds the General Use Water Quality Standard in both the existing and proposed conditions.

Watersheds exceed the chloride water quality standard (in the analysis) because of the amount of road salt applied and the amount of impervious highway lane-miles under existing and/or proposed conditions. The highway lane-miles in each of the watersheds exceeding chloride water quality standards increases by 50 percent or more. The salt application on the number of highway lane-miles in these watersheds combined with the relatively small watershed area (compared to other project corridor drainage areas, like Salt Creek) creates a chloride concentration that is estimated to exceed the water quality standard.

Even though chloride is dissolved in the stormwater runoff, the daily annual maximum chloride concentration may be able to be reduced by using structural best management practices. Best management practices, such as detention ponds, infiltration basins/trenches, and vegetated swales/bioswales with ditch checks, may be able to attenuate the peak concentration of stormwater flows by mixing chlorides with permanent pool volumes in existing wet ponds and/or by collecting the runoff and allowing it to mix with lower-concentration runoff. In addition, non-structural best management practices (such as pre-wetting and monitoring salt application rates) are already used and will continue to be used to balance public safety and environmental impacts (see subsections 3.10.3.2 and 3.10.3.3).

Reductions in peak chloride loading from best management practices have been documented by the USGS (Sherwood, 2001). A 2001 USGS study looked at the concentration of chloride (and other pollutants) at the inlet and outlet of a stormwater detention basin, which included a mixture of open water and vegetated areas. The study concluded that chloride concentrations can be reduced during large winter storm events (up to 30 percent reduction). However, during smaller storm events in other seasons, chloride concentrations were observed in the stormwater discharge from the basin. The USGS observations suggest mixing of chlorides was occurring in the stormwater basin and that this resulted in lower concentrations in the outflow than what was measured in the inflow during winter deicing. The stormwater best management practices associated with the EO-WB project would also be expected to provide mixing and subsequent lowering of peak chloride concentrations during the winter deicing season.

For the proposed improvements, a 20 percent reduction was used in the chloride analysis to represent a conservative estimate of the reduction in peak chloride loading. A 20 percent attenuation in peak chloride concentration from stormwater best management practices results in annual daily maximum chloride concentrations ranging from 67 mg/L to 674 mg/L under the Build Alternative. Under this analysis, Spring Brook no longer exceeds the chloride water quality standard. However, Addison Creek, Higgins Creek, and Meacham Creek still exceed the chloride water quality standard, although to a lesser extent. Details of the chloride analysis can be found in Appendix K.

In the winter, deicing salt moves primarily through the project corridor environment as surface runoff. Studies show that 60 to 80 percent of the salt is carried by runoff to surface waters, 15 to 35 percent occurs as splash, and up to three percent occurs as spray (Frost et al., 1981; Diment et al., 1973; Lipka and Aulenbach, 1976; Sucoff, 1975). Salt also percolates into the soil profile. The highest salt concentrations generally are found near the roadway shoulders because of plowing and splash. Salt deposition and concentrations adjacent to roadways decrease as the distance from a treated roadway increases (Kelsey and Hootman, 1992; Williams et al., 2000). Sodium chloride can decrease soil permeability and raise soil pH, which could adversely affect soil fertility and plant growth (Transportation Research Board, 1991).

High salinity levels may adversely affect sensitive floral communities, particularly wetland plants and conifer trees. Road salt runoff can stress wetland plant communities and may result in reduction of native plant diversity due to replacement by more salt-tolerant plant species, such as narrow-leaved cattail (*Typha angustifolia*) and common reed (*Phragmites australis*). Both cattail and common reed are wetland plant species that frequently can be observed in roadside ditches, stormwater management facilities, and wetlands within and adjacent to the Build Alternative.

The potential impact that stormwater containing chlorides may have on receiving waters is dependent on many factors, such as the concentration, size of the water body (water volume), precipitation, topography, soil type, and drainage patterns. In smaller bodies of water, fish and aquatic macroinvertebrates can be affected by elevated chloride levels. However, impact thresholds may vary.

Parts of the Build Alternative are within the Salt Creek, Addison Creek, and West Branch DuPage River watersheds, which have a chloride TMDL.[42] Also, a draft Stage 3 TMDL Report for chloride has been prepared for Higgins Creek.[43] The IEPA's General NPDES Permit No. ILR40 requires that small municipal separate storm sewer system (MS4) permittees, such as IDOT and the Illinois Tollway, implement TMDLs, as applicable.[44]

Of the creeks in the project corridor, a chloride TMDL is in effect for Addison Creek, Salt Creek, and West Branch DuPage River. However, the TMDL and best management practices to address chloride loads can be applied to protect other streams located downstream of the proposed project, as well. Elevated levels of chloride in receiving streams are seasonal and occur predominantly during the winter months as a result of salt application (CH2M HILL, 2004a). Although road deicing is necessary, the overall goal of the TMDL is to reduce chloride loading caused by winter road salting applications.

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[42] The Salt Creek TMDL includes Addison Creek. Based on the Salt Creek TMDL report (CH2M HILL, 2004a), Salt Creek and Addison Creek are listed for TDS/conductivity impairments. Chloride constitutes a significant part of TDS/conductivity and chloride management provides a means to control exceedances of the TDS/conductivity standard.

[43] Refer to the Des Plaines River/Higgins Creek Watershed TMDL Stage 3 Report (AECOM, 2010) for Higgins Creek. In addition to chloride, TMDLs for Higgins Creek are being prepared for dissolved oxygen and fecal coliform.

[44] Road deicing is necessary for public safety. Thus, the implementation of the chloride TMDL by MS4s should be based on prudent and practicable road salting best management practices to the extent that the safety of the public is not compromised (CH2M HILL, 2004a).

Organizations, such as the DRSCW, have presented seminars on deicing best practices to educate those involved in the maintenance of public roads. Evaluation of these practices would occur as necessary to meet NPDES permit requirements and TMDL goals.

The initial water quality modeling indicates that annual daily maximum chloride concentrations calculated without stormwater management structures in place are predicted to exceed water quality standards for several of the watersheds crossed by the project. However, the amount of salt entering the environment depends on the number of snow storms per season and salting events per storm. There will be additional effort applied to identify ways for the project to achieve lower chloride concentrations in receiving streams through the implementation of stormwater best management practices, promoting deicing material application best practices in the project corridor watersheds, reviewing the anticipated road-salt application rate for future operating conditions, and evaluating chloride reduction implementation plans for TMDLs developed within the watersheds affected by the project. IDOT and the Illinois Tollway recognize that water quality is an important issue and will strive to meet chloride standards based on prudent and practicable stormwater and road salting best management practices to the extent that public safety is not compromised (see subsection 3.10.3).

### Surface Runoff

Surface runoff is the primary means of road salt transport following application. Runoff would generally be directed into roadside ditches and other stormwater management structures or facilities before discharge into receiving waters. The intent is to drain surface runoff from bridge decks and roadways to ditches or detention ponds via scuppers and storm sewers, prior to discharge to offsite drainageways. Peak chloride concentrations in waterways could be reduced by using detention basins.

As practical and feasible, stormwater runoff from the proposed bridge over Salt Creek will be routed to a stabilized outlet and through additional best management practices, where the runoff can receive treatment prior to discharge into the creek.[45] Although all of the streams crossed by the project corridor are degraded, Salt Creek appears to have the least disturbed aquatic habitat, comparatively speaking (based on Mean Habitat Score and Aquatic Habitat Quality score; see Tables 3-30 and 3-31).

### Splash and Spray

Plants, soils, and to a limited extent aquatic biota, could be affected by salt brine splash and spray from the Build Alternative. The greatest effect from splash generally would be expected within 45 to 60 feet of the edge of the road in the splash deposition zone (Transportation Research Board, 1991; Public Sector Consultants, Inc., 1993; Williams and Stensland, 2006). Splash could increase soil erosion because of soil impact and subsequent flow concentration on embankments and other slopes. Spray consists of smaller-sized droplets than splash and may be deposited farther from the roadside. Roadside vegetation (trees, shrubs, ground cover, grasses) may suffer salt injury with drought-like symptoms, such as inhibited growth, leaf discoloration, and defoliation. Some plant species are more susceptible than others (e.g., grasses are generally more tolerant of salt than conifer trees). Vegetative damage generally increases with greater salt usage, traffic speed and volume,

[45] Based on a request by the USACE at meeting with USEPA, USFWS, IDOT, Illinois Tollway, and project consultants on October 12, 2011.

and steeper side slopes; vegetative damage generally diminishes as the distance from the road increases (Transportation Research Board, 1991; Public Sector Consultants, Inc., 1993; Shi et al., 2009).

## 3.10.3 Measures to Minimize Harm and Mitigation

### 3.10.3.1 Construction

Construction activities can affect surface waters. This project would be subject to the requirements of IEPA's NPDES permit for construction site stormwater discharges. NPDES permit coverage is required when a construction project disturbs one acre or more of land, or is part of a larger common plan of development that ultimately disturbs one or more acres of total land (see subsection 3.20.4).

As required by the NPDES permit, a Storm Water Pollution Prevention Plan (SWPPP) would be prepared during Phase II engineering (final design and permitting). The Illinois Tollway's *Erosion and Sediment Control, Landscape Design Criteria* manual (Illinois Tollway, 2012) would be referenced when preparing the SWPPP for the proposed tolled facility. The IDOT *Bureau of Design and Environment (BDE) Manual*, "Chapter 41, Construction Site Storm Water Pollution Control" (IDOT, 2011), would be referenced when preparing the SWPPP for free roads. IDOT and Illinois Tollway standard specifications (including supplemental specifications) would also be followed, as applicable. The SWPPP would identify soil erosion and sediment control practices to be used throughout the construction process to minimize soil loss and subsequent sedimentation.

Control practices would be implemented as outlined in the SWPPP to protect surface waters and the downstream aquatic environment. For example, perimeter sediment controls (e.g., silt fence) would be installed before land disturbance activities are initiated. Appropriate erosion and sediment controls would be implemented onsite and would be modified as necessary to reflect the current phase of construction. Controls would be inspected, maintained, and repaired/replaced, as necessary, to maintain NPDES compliance. IDOT has prepared the *Erosion and Sediment Control Field Guide for Construction Inspection* (IDOT, 2010), which provides guidance that can be used during construction of roadway projects. The Illinois Tollway's *Erosion and Sediment Control, Landscape Design Criteria* manual (Illinois Tollway, 2012) would also be referenced.

Contractors would be responsible for compliance with the NPDES permit and shall submit a signed certification statement to that effect. Contractors also would be responsible for non-stormwater controls, including material delivery, storage, and use; stockpile management; waste disposal; spill prevention and control; concrete residuals and washout; litter management; and vehicle equipment, fueling, and maintenance.

Soil erosion and sediment control measures would be installed in areas of active construction. Special attention would be given to particular areas such as wetlands, surface waters, highly erodible soils, and drainage ways. Disturbance of streamside vegetation and riparian vegetation would be kept to a minimum. Temporary fencing or alternative measures would be considered to protect existing vegetation to remain in critical erosion-prone areas. In-stream construction (e.g., for the placement of bridge piers) and soil-disturbing activities near streams would be conducted during low or no-flow periods, as required. Discharge points would be protected with rock (or an alternative measure) to minimize scour and erosion. Exposed soils adjacent to surface waters and any work on a streambank that is performed below the ordinary high water mark of a stream would be permanently stabilized in accordance with NPDES and Section 404 CWA permit requirements. Final stabilization would follow the applicable Landscaping and Erosion Control sections of the IDOT and the Illinois Tollway standard specifications (including supplemental specifications), Chapters 41 and 59 ("Landscape Design") of the *BDE Manual* (IDOT, 2011), and/or the Illinois Tollway's *Erosion and Sediment Control, Landscape Design Criteria* manual (Illinois Tollway, 2012). A Section 404 CWA permit and Section 401 CWA water quality certification would be obtained prior to in-stream work.

At a minimum, the following best management practices will be used for the project to reduce soil erosion, minimize sedimentation, and limit the amount of dust created in association with construction activities (specific best management practices, locations, and types would be developed during Phase II engineering):

- Mulch (straw, hydraulic, etc.)
- Seed (temporary or permanent) or sod
- Preservation of existing vegetation or vegetated buffer strip
- Limitation of the amount of area that is disturbed at any one time
- Polymers (for stabilization and/or flocculation)
- Rolled erosion control products (erosion control blankets or turf reinforcement mats)
- Stone aprons at flared end sections
- Concentrated flow controls (diversion dikes, drainage swales, lined ditches)
- Storm drain inlet protection
- Temporary ditch checks
- Stabilized construction entrance/exit
- Silt fence barrier
- Wattles
- Sediment traps and basins

Proper use of soil erosion and sediment control measures are a condition of Section 404 CWA permits, prescribed in design and construction guidance by IDOT and the Illinois Tollway, and would be coordinated with the local SWCD, if required by the USACE. Pursuant to an Interagency Cooperative Agreement (ICA) between SWCD and USACE, the SWCD conducts soil erosion and sediment control plan reviews and performs site inspections to determine compliance with those plans. These site visits would be in addition to those required under the NPDES Construction General Permit. Due to the size, scope, and anticipated duration of this project, a cost-reimbursable agreement with the SWCDs may be prepared. This agreement could include a modified fee schedule appropriate for the EO-WB project (as was completed for OMP).

Surface water impacts (including adverse impacts to fish and aquatic macroinvertebrates) as a result of construction of the proposed EO-WB project are anticipated to be minimal with routine and storm-event site inspections and the implementation of appropriate best management practices. Mitigation for permanent fill placed in jurisdictional waters of the U.S. would be accomplished in conjunction with wetland mitigation either through purchasing credits in a USACE-approved mitigation bank or at an offsite location. Opportunities for stream enhancements (e.g., streambank stabilization, installing rock riffles) within the project corridor watersheds will be investigated with the mitigation (see subsection 3.13.3). Depending on the potential mitigation sites, mitigation for unvegetated waters may include re-meandering channelized streams, removing/replacing existing drain tiles/culverts with stabilized stream channels, stabilizing eroded streambanks, constructing in-stream habitat, creating riparian buffer, etc. (or a combination of these methods).

#### 3.10.3.2 Operation (Including Federal Aviation Administration Guidance)

Operation of the proposed EO-WB project could affect surface waters. Best management practices would be incorporated into project design to minimize that effect and improve the quality of stormwater discharging to receiving waters or nearby wetlands. Right-of-way requirements to accommodate these best management practices have been accounted for in the project corridor. Existing drainage patterns will be maintained as part of the project. However, the existing drainage system would be enhanced where practicable and feasible. Appendix E contains exhibits that show locations for the application of best management practices.

Among these practices would be grassed ditches, infiltration basins/trenches, bioswales, etc., in addition to detention basins and compensatory floodplain storage facilities. At this stage in project development, the implementing agencies are committed to the use of these practices, and the information presented in Appendix E demonstrates that there is sufficient area in the project corridor to accommodate these practices. As the overall details for the project's drainage plan evolve, so will the specificity for best management practices. A concept plan for best management practices was created that defines location, type, and effectiveness of best management practices. The plan demonstrates a general improvement in stormwater runoff quality throughout the project corridor.[46] The best management practice concept plan was reviewed and discussed with resource agencies (including the USACE, USEPA, USFWS, IDNR, FAA, and USDA–APHIS) at a meeting on July 23, 2012. At this meeting, the resource agencies agreed, in principle, that that the concept plan had sufficient detail for this Tier Two Final EIS and that specific details would be coordinated during the Section 404 CWA permitting process.

Based on coordination with the resource agencies, one area in particular that will receive special consideration regarding water quality best management practices is the proposed system interchange at I-290.[47] This interchange drains to the Devon Avenue tributary ponds at Hamilton Lakes' Development (in Itasca) and eventually to Salt Creek. As practicable and feasible, stormwater runoff will be treated by stormwater best management practices prior to leaving the proposed right-of-way outlet to the Devon Avenue tributary ponds. This proposed interchange is located in DuPage County. Therefore, any offsite, future development adjacent to this proposed interchange will be subject to the requirements of the DuPage County Countywide Stormwater and Flood Plain Ordinance. The ordinance requires that the developer incorporate best management practices into its site design to minimize increases in runoff rates, volumes, and pollutant loads. In accordance with this ordinance, impacts to the effectiveness of the proposed best management practices at this system interchange are not anticipated as a result of adjacent future development.

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[46] Based on results of the pollutant loading analysis with respect to TSS and heavy metals for year 2040 Full Build conditions.
[47] Based on meeting with the USACE, USEPA, USFWS, IDOT, Illinois Tollway, and project consultants on October 12, 2011.

Best management practice selection and drainage design for this project incorporate both water quantity and quality control, where practicable. Best management practices would be implemented that minimize the volume of stormwater runoff discharge and change to water quality, resulting in pollutant load reduction, increased infiltration and evapotranspiration, where possible. The previously mentioned best management practices that would be incorporated into project design could also reduce potential thermal impacts to receiving waters.

Selection of best management practices for this project would be influenced by the proximity of the project corridor to two airports (i.e., Schaumburg Regional Airport and O'Hare Airport). Oftentimes, stormwater quality/quantity best management practices include open water and/or vegetative components. Vegetative cover types (e.g., wetlands) and open water areas can attract wildlife. The Federal Aviation Act charges the FAA with providing a safe and efficient National Airspace System. As such, the FAA prepares ACs that include standards, practices, and suggestions for use by project developers, land use planners, the operators and sponsors of public airports, and others. Safe and efficient operations at an airport require that certain areas on and near the airport are clear of objects (e.g., wildlife attractants) or restricted to objects with a certain function, composition, and height.

FAA AC No. 150/5200-33B, *Hazardous Wildlife Attractants on or near Airports* (dated August 28, 2007), discusses certain land uses on and near public-use airports. The use of active airport land, including approach and departure airspace, by wildlife can pose a safety threat. Deer have the potential to pose the greatest relative hazard to aircraft. However, the most common type of aircraft/wildlife collision is caused by birds (specifically, gulls, waterfowl, and raptors, including vultures).[48] Man-made or natural areas (e.g., stormwater management facilities, wetlands, landscaping) attract and provide habitat for wildlife (including birds).

Several species of birds may use the wetlands and open water habitats in the vicinity of the project corridor on a seasonal or transient basis. The project corridor is located within a bird migration route, and various bird species likely use habitats along the project corridor for resting.

Having open water or wetlands on or near airport property can increase the likelihood of aircraft/wildlife collisions. In July 2003, a Memorandum of Agreement (MOA) between federal resource agencies[49] was signed to acknowledge their respective missions in protecting aviation from wildlife hazards. The FAA recommends that the following distances be established between the wildlife attractant and an airport's aircraft movement areas, loading ramps, or aircraft parking areas:

- 5,000 feet for propeller-serviced airports.
- 10,000 feet for jet-serviced airports.

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[48] *Memorandum of Agreement Between the Federal Aviation Administration, the U.S. Air Force, the U.S. Army, the U.S. Environmental Protection Agency, U.S. Fish and Wildlife Service, and the USDA to Address Aircraft-Wildlife Strikes.* July 29, 2003.

[49] The resource agencies included FAA, U.S. Air Force, USACE, USEPA, USFWS, and the USDA – Wildlife Services.

- Five miles for approach and departure airspaces (if the wildlife attractant has the potential to cause hazardous wildlife movement into or across these areas similar to wetlands and stormwater management facilities).

The proposed West Bypass corridor is located on O'Hare Airport property at the east end of the project corridor, and the Schaumburg Regional Airport is located adjacent to Rodenburg Road near the west end of the project. Consequently, the majority of the project corridor is located within the wildlife hazard separation distances listed above (see Exhibit 3-15).

Stormwater runoff best management practices for the EO-WB project would be designed to minimize wildlife hazards near the airports, while at the same time provide stormwater quality and quantity control, to the extent practicable. Based on preliminary engineering, 66 potential stormwater detention sites and 11 potential compensatory storage sites have been identified along the project corridor to accommodate the roadway improvements (some sites may have multiple basins) (see Appendix E). Compensatory storage is discussed in more detail under subsection 3.12.3. The stormwater detention sites are designed to capture stormwater runoff from the project's disturbed surfaces and control the release rate. At least one stormwater detention site would be constructed in each of the sub-watersheds that receive runoff from this project (see Table 3-37).

To minimize attractiveness to wildlife within the separation distances noted above, the proposed stormwater management facilities would be designed following the guidance in FAA AC No. 150/5200-33B, to the extent practicable, which includes narrow, linear-shaped facilities with steep side slopes that are lined with rip-rap. The AC also recommends that stormwater detention ponds have a maximum 48-hour detention period after the design storm and have no open water between storms. Measures would be taken to minimize the number of basins with a drawdown time greater than 48 hours. However, this requirement cannot be met at all locations due to the necessity to meet storage volume and release rate requirements. Vegetation to be established in or around the detention facilities should not be wildlife attractants that provide food or cover for wildlife. Underground stormwater infiltration systems (such as vaults), French drains, or rock fields, would be considered where practicable to minimize surface water ponding.

To increase the pollutant removal effectiveness of "dry" detention facilities, design considerations may include (USEPA, 2006):

- Sediment forebays for pretreatment (to help settle larger sediment particles).
- High length-to-width ratios (at least 1.5:1) to maximize flow path and enhance pollutant removal.
- Micropools at the outlet to minimize resuspension of sediment and outlet clogging.
- Regular maintenance for functionality.

In addition to detention facilities, other practices such as vegetated buffers, infiltration basins/trenches, or bioswales, would be installed where practicable to minimize transport of sediment, heavy metals, and other pollutants to surface waters. Pollutant removal in stormwater basins would be accomplished through gravity settling, assimilation of nutrients, bacterial degradation, and filtration. Vegetated stormwater conveyance channels could be used alone or in conjunction with stormwater basins to remove pollutants by filtering particulates through the vegetation and infiltration into the subsoil, which would remove soluble pollutants. Permanent ditch checks may be added to allow for additional stormwater treatment and to minimize erosion. Low profile grass seed mixes would be evaluated for the bioswales and detention basins to minimize maintenance and attractiveness to wildlife. Plant species listed in the *OMP Master Specifications*, "Section 02905: Sustainable Airport Landscaping," would be considered when designing seed mixes to address FAA AC guidelines (CDA, 2011).[50]

Studies show that best management practices such as infiltration basins/trenches, detention basins, and vegetated swales generally have pollutant removal effectiveness of between 50 and 90 percent for TSS with more variable removal percentages for metals (generally averaging between 35 and 85 percent).[51] Sediment particles are a primary component of TSS. Other pollutants such as nutrients, trace metals, and hydrocarbons have been known to attach to sediments and can be transported in stormwater runoff. As discussed in the FHWA's *Stormwater Best Management Practices in an Ultra-Urban Setting: Selection and Monitoring*, studies suggest that by controlling TSS, other constituents (e.g., metals and nutrients), could also be controlled (Shoemaker et al., 2002). This document summarizes water quality best management practices and their pollutant removal effectiveness.

Best management practices to reduce PAHs from entering surface waters include installing stormwater best management practices that settle or filter out particles to which PAHs attach, and using source control practices to minimize the amount of high PAH-containing materials used in the watershed (Prabhukumar and Pagilla, 2010). The DRSCW intends to advocate for source control and stormwater best management practices that reduce the potential for additional PAHs to enter surface waters, including those crossed by the project corridor (McCracken, 2011a). The stormwater best management practices being considered with the Build Alternative would likely also be beneficial for PAH removal. A study by the USGS (2011) found that the principal source of PAHs was often coal-tar-based pavement sealcoat, followed by vehicle-related sources. Coal-tar-based sealants are not anticipated for the proposed roadway improvements. The EO-WB project would consider stormwater best management practices consistent with highway operational requirements that can reduce PAHs from stormwater runoff.

During final engineering, stormwater controls would be designed to meet local, state, and federal regulatory requirements to treat the "first flush" of a storm, as necessary. The first flush is often referred to as the first 0.5 to 1.25 inch of runoff per impervious area in a drainage basin and typically includes a higher concentration of pollutants compared to later during the storm (Shoemaker et al., 2002; CMAP, 2008; DuPage County, 2012).

In addition, a watershed approach was used where it was possible to evaluate opportunities to improve existing drainage conditions and provide water quality benefits to local municipalities near the project corridor. As such, seven additional detention facilities are proposed near the project corridor to minimize flooding. For example, Franklin Park has experienced chronic flooding problems in an industrial area along I-294. Therefore, as part

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[50] The three main criteria for sustainable landscaping at O'Hare Airport include minimizing wildlife hazards, increasing landscape sustainability, and maximizing safety and security.

[51] Dry detention ponds may be less efficient at pollutant removal compared to wet ponds and stormwater wetland basins.

of this project, a drainage investigation was coordinated with Franklin Park to propose solutions for this problem. Recommendations to improve the chronic flooding include three potential stormwater detention sites on vacant land within Franklin Park. Similarly, several potential stormwater detention sites are proposed near the I-290/I-294/North Avenue interchange to improve chronic flooding in the cities of Elmhurst and Northlake.

Stream crossings and structure sizing would be performed in accordance with state and federal guidelines regarding floodplain and floodway encroachment and hydraulic capacity. All new structures would comply with these guidelines. Waterway crossings would be bridged, enclosed in a culvert, or otherwise designed to accommodate anticipated high-water flows, to allow movement of aquatic biota, and not to impede low-water flows to minimize negative effects to the aquatic ecosystem. Per the Illinois Tollway drainage design criteria, culverts are designed for the 50-year peak flow and checked for the 100-year and 500-year peak flows to avoid overtopping.

Drainage systems, including ditches, would be maintained and restored so as not to impound water (unless designed to do so for a water quality benefit, such as using ditch checks). The final design of stormwater best management practices would be completed during Phase II engineering. Stormwater facilities and discharges would be monitored and managed during and following construction in accordance with the requirements of the General NPDES Permit No. ILR40.

#### 3.10.3.3 Maintenance

Deicing (e.g., salt application) of highways is necessary during the winter months for safety reasons. As a result, chloride water quality standards may be exceeded in some of the project corridor watersheds. The Illinois Tollway will sponsor a chloride water quality initiative with the following objectives:

- The Illinois Tollway will implement chloride stormwater best management practices (in accordance with FAA wildlife hazard guidelines, to the extent practicable) to reduce peak chloride concentrations consistent with the findings of USGS (Sherwood, 2001) and to minimize potential water quality impacts from deicing associated with the proposed improvements.
- The Illinois Tollway will promote weather-related data sharing with local communities to enable more efficient chloride application and to minimize the over-application of road salt based upon available pavement temperature and weather forecasts.
- The Illinois Tollway will approach chloride reduction on a watershed basis by partnering with local municipalities. The outcome of these partnerships will assist in providing a holistic view and approach to chloride application and reduction on a watershed level.
- Additionally, over the next two and half years (by winter 2014/2015 – prior to winter maintenance of the new facility), the Illinois Tollway will review road salting practices, procedures, and materials. This review will include evaluation of chloride reduction implementation plan recommendations for chloride TMDLs within the watersheds affected by the project. Adjustments will be made where practicable and feasible. Additional operator training will be provided, as necessary, based on this review. The potential use of chloride reduction best management practices, including a water quality

monitoring program, will be explored with resource agencies and interested stakeholders.

Implementing these measures may help to mitigate the potential future impact from salt use and could provide guidance for future highway projects.

In addition, best management practices and recommendations for chloride reduction are provided in the chloride TMDLs and other studies including *Chloride Usage Education and Reduction Program Study* published by the DRSCW (CDM, 2007), *Evaluation of Alternative Anti-icing and Deicing Compounds Using Sodium Chloride and Magnesium Chloride as Baseline Deicers – Phase I* (Shi et al., 2009), and *Source Water Protection Practices Bulletin: Managing Highway Deicing to Prevent Contamination of Drinking Water* (USEPA, 2010). Nonstructural best management practices (such as management strategies) can be used in concert with structural best management practices to control dissolved chlorides. Best management practices to reduce chloride loads would also likely include:

- Public education and employee training.
- Proper storage and handling operations (e.g., perform on impervious surfaces, completely cover salt piles, control stormwater runoff).
- Use of digitally calibrated spreaders to minimize over-application.
- Routine calibration (at least twice a year).
- Timing of application.
- Consideration of alternative non-chloride products (e.g., acetate deicers or corn and beet derivatives).
- Implementation of pre-wetting and anti-icing programs throughout the watershed.
- Weather information and forecasting using Road Weather Information Systems (RWIS) and Maintenance Decision Support Systems (MDSS).
- Passive snow control with the use of snow fences.
- Plowing and snow removal.
- Street sweeping during or soon after spring snow melt.

Evaluation of these practices would occur as necessary to meet NPDES permit requirements. IDOT and Illinois Tollway currently implement some of these best management practices (e.g., having a written snow plan, utilizing digital spreaders, and/or reviewing data from an existing RWIS station) and would continue to do so, or would implement alternative practices. As a result of ice formation, IDOT and Illinois Tollway also apply anti-icing strategies (e.g., salt brine) on existing bridges where necessary. The use of alternative deicing agents could be considered in relation to cost, applicability, feasibility, and public safety. Costs for sodium chloride alternatives tend to be substantially higher, and those alternatives cannot be used in all conditions or locations. In addition, these deicing alternatives may present potential adverse water quality impacts, such as reduced DO, that must be taken into consideration.

### 3.10.4 Indirect and Cumulative Water Resource Impacts

The six core communities near the project corridor are predominantly urban and built-out with a high concentration of industrial and commercial uses. Exceptions include preserved open space associated with forest preserves and municipal parks. The built-up nature and use of the area have contributed to the degradation of its streams by various means, such as urban runoff, storm sewers, MPSDs, upstream impoundments, or channelization and streambank modification.

More development through infilling and selective redevelopment is expected to occur in the vicinity of the project corridor over the next 30 years. Additional impervious surfaces may be constructed as part of the anticipated development. Areas that are unprotected open, underdeveloped, or underused space may be developed to take advantage of better transportation and access. These effects would be most noticeable in proximity to the proposed Elgin O'Hare and West Bypass corridors.

In addition, increased traffic on other roads is anticipated as a result of the proposed project and from induced and cumulative development. The increased traffic and impervious surfaces could result in additional pollutants being deposited on the roadways. Pollutant concentrations are highly variable and can be affected by numerous factors, such as construction, operation, maintenance, weather, and adjacent land uses. Through normal operations, such as tire wear, vehicles contribute constituents to roadway surfaces. During storms, these constituents are transported to receiving waters and could cause an indirect impact on the aquatic ecosystem or designated uses of nearby creeks. Potential impacts from pollutants in stormwater runoff from roads and other developed areas include the following:

- Sediment contamination: Bottom substrates in the aquatic environment accumulate contaminated sediment that could interfere with the reproduction and feeding mechanisms of aquatic organisms, such as fish. Contaminated sediments may be toxic to some organisms because of elevated pollutant concentrations. Sediments can have a relatively high organic content that when "broken down," exert an oxygen demand.
- Deicing salts: Induced development could include additional paved surfaces (e.g., parking lots, widened roads), which could result in an increased use of deicing salts. The use of deicing agents may raise salt concentrations in receiving waters. High salinity levels may affect sensitive floral communities, particularly wetland plants and conifer trees. Road salt runoff may stress wetland plant communities and may result in a reduction of native plant diversity and replacement by more salt-tolerant plant species.
- Impaired aesthetics: Turbid water, trash, debris, and an oily sheen may reduce the visual appeal of waterways, affect recreational potential, and harm wildlife.
- Elevated water temperatures: Several factors can increase summertime water temperatures, such as the removal of overhanging vegetation, reduction of base flows, and runoff from impervious surfaces that have been heated by the sun. Higher temperatures can stress aquatic life and raise water quality issues.

- Impairment of water supplies: Pollutants have the potential to adversely affect surface and groundwater sources of water supply. See subsection 3.11 for a discussion on potential impacts to groundwater resources (USDA-NRCS and IEPA, 2002).

With the implementation of best management practices, negative impacts to the aquatic environment are anticipated to be minimal as a result of the EO-WB; however, if a development is not designed with appropriate best management practices, impacts may occur. Development has the potential to increase the rate and volume of stormwater runoff and reduce groundwater recharge. If not managed appropriately, cumulative urban development could result in increased flooding, higher and more frequent storm-related flows, and low flows of longer duration in streams. The increased runoff rates and high channel velocities from inappropriately managed sites could result in excessive bank erosion or channel downcutting. Stream substrates and bottom-dwelling or benthic organisms can be scoured away by frequent high flows and velocities. Pollutants may concentrate during periods of lower flow. Extended periods of low flow may also result in higher in-stream temperatures during the summer, which could affect fish or other aquatic wildlife (USDA-NRCS and IEPA, 2002). However, these potential impacts can be mitigated by regulation and implementation of modern stormwater best management practices.

Detention would be provided to compensate for the increased stormwater runoff from the additional impervious area for existing alignments and disturbed area for new alignments associated with the Build Alternative. Future development also would have to provide detention, as required by state and local regulations. To minimize cumulative impacts, best management practices that integrate both water quantity and quality control would be considered, as practicable.

Many changes have been implemented and much progress has been achieved over the last several decades to improve water quality nationally and in the region. The Salt Creek Watershed, for example, is located in both Cook and DuPage Counties near the center of the project corridor. Rapid urbanization of the Salt Creek Watershed started around the 1950s. In the years that followed, human activities (e.g., land development/construction, land use) placed an overwhelming strain on the watershed. Several factors, such as increased impervious area, floodplain encroachment, loss of natural storage area, channel modification, and pollutant discharges resulted in increased stormwater runoff, flooding, and stream degradation (DuPage County, 2008).

Since the 1970s, various environmental regulations (at the federal, state, and local levels), flood control projects, public awareness, and activism have played a role in improving water quality and reducing flooding. Regulations, such as the federal CWA and the DuPage County Countywide Stormwater and Flood Plain Ordinance, are reducing the adverse effects of development upon water resources.[52] For waterways located close to the project corridor, a TMDL has been prepared for the Salt Creek Watershed[53] for chloride and DO, and for the West Branch DuPage River for chloride (CH2M HILL, 2004b). Additional TMDLs are in progress for impaired segments of Salt Creek, Addison Creek, and the West Branch

[52] The MWRDGC is preparing a countywide watershed management ordinance for Cook County.

[53] The Salt Creek TMDLs address segments of the following project corridor creeks: Salt Creek, Addison Creek, Spring Brook, and Meacham Creek (CH2M HILL, 2004a).

DuPage River to address fecal coliform.[54] A TMDL is also in progress to address chloride, DO, and fecal coliform for Higgins Creek (AECOM, 2010). TMDLs by themselves will not lessen future degradation, but with regulatory oversight, stakeholder initiatives, and implementation of best management practices, water quality in the local watersheds and the larger Des Plaines River drainage basin should improve, even with more development. The pollutant loading analysis for this project shows that water quality for TSS and metals (i.e., copper, lead, and zinc) has the potential of being improved with best management practice implementation in the majority of the watersheds that are tributary to the proposed Elgin O'Hare and West Bypass corridors.

Stormwater quality control would be accomplished through the NPDES Phase II General Permit No. ILR40, including incorporation of TMDLs to address impairments in affected watersheds. Water quality would be managed through a combination of stormwater runoff and drainage collection facilities and the implementation of other post-construction best management practices in accordance with state and federal water quality goals of restoring water quality of impaired or degraded streams.

In response to the TMDLs for Salt Creek and East and West Branches of the DuPage River, the DRSCW was formed. The DRSCW has set short-term and long-term goals to improve water quality. The DRSCW members work together and use data collection to help set priorities, make decisions, and provide recommendations to help achieve these goals. Through education and outreach the DRSCW has promoted water quality awareness throughout the Salt Creek and DuPage River watersheds. Implementation of practices and activities recommended by workgroups, such as the DRSCW, could help minimize indirect and cumulative impacts of this project and other projects in the Des Plaines River drainage basin.

Other workgroups are also active in the project corridor watersheds and have had a positive influence on the environment and protecting surface waters. With the assistance of Ecosystem Partnerships (i.e., UDPREP, LDPEP, and DRC), more than 700 acres of land and 10.8 miles of stream have been restored; more than 4,000 students have been educated; more than 6,000 volunteers have been enlisted; and more than 160 sites have been monitored. More than $2.5 million dollars in C2000 grants have been awarded. Local matching funds have leveraged approximately $4.9 million more. In total, this equals roughly $7.4 million dollars primarily for restoration and education projects in the respective watersheds of the Des Plaines River drainage basin (IDNR, 2011). The continued efforts of these organizations to meet their watershed goals, participate in the grant review process for restoration projects and/or land acquisition, and educate the community and other stakeholders can help to minimize the indirect and cumulative impacts that the proposed project could have on surface waters.

Of the major transportation projects proposed in the next 30 years in the vicinity of the project corridor, the EO-WB project is expected to break ground first. As such, it could be viewed as a model to develop practices that could be applied to other infrastructure projects in the larger Des Plaines River drainage basin or northeastern Illinois. As part of the EO-WB

[54] In addition to fecal coliform, TMDLs are being prepared for the following impairments associated with stream segments near the project corridor: pH (Salt Creek); DO, pH, manganese, and silver (West Branch DuPage River) (AECOM, 2009).

project, a Sustainability Working Group[55] was established. The working group prepared sustainability goals and recommendations to guide the planning, design, construction, and operation of the proposed EO-WB project. Sustainable practices potentially can reduce the environmental impact of a project and, at the same time, create financial and operational benefits, as well as social benefits for the community at large. Sustainable projects attempt to meet existing needs without jeopardizing the ability of others to meet future needs.

The sustainability goals and recommendations for this project include nine categories—planning, design, environment, energy reduction, water quality, materials and resources, construction practices, operations, and maintenance. The goals and recommendations can be used to supplement existing federal, state, or local regulatory requirements with additional best management practice environmental strategies and considerations.

Through the use of sustainable practices, the indirect and cumulative impact of this project can be minimized. To protect surface waters (by minimizing water pollution and practicing water conservation), the following recommendations (by the Sustainability Working Group) would be considered for this project and could be used for other projects, depending on project constraints, support, feasibility and available budget.

Construction practices that would be considered for this project include:

- Establish, implement, and maintain a Construction Waste Management Plan.
- Practice water efficiencies (e.g., use nonpotable water when possible and track its use).
- Provide preconstruction training for construction managers and contractors.
- Install signage highlighting environmentally sensitive areas (e.g., wetlands and stream corridors) to provide field reminders of sustainability objectives.
- Develop an incentive program, such as credit for future work for avoidance of environmental violations.

Water quality practices that would be considered for this project include:

- Determine the life-cycle costs and savings associated with low-impact development (LID)[56] stormwater best management practices.
- Specify drought-tolerant plant species.
- Consider opportunities for rainwater harvesting.
- Incorporate green roofs on associated roadway facilities.
- Incorporate grey-water flushing in toilet facilities (grey water refers to water from roof or road drainage).

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55 Illinois Governor Pat Quinn issued Executive Order10-13 on October 5, 2010, establishing the EO-WB Advisory Council. The Sustainability Working Group was established by the Advisory Council.

56 LID describes engineered controls, stormwater management facilities, and other best management practices that attempt to mimic pre-development hydrologic conditions, by emphasizing infiltration, evapotranspiration, or stormwater reuse for long-term flow control and runoff treatment.

- Work with the DRSCW to design a water quality monitoring program (designed for before, during, and after construction).
- Use the latest technology to track and quantify deicing material application rates, spreading techniques, weather data, pavement conditions, and all necessary items to make informed decisions to best manage a storm and minimize deicing material.
- Install vegetative swales and bioswales.
- Include permeable and porous pavement in mostly non- or low-traffic areas, such as parking areas, roadway shoulders, and maintenance roads.

More detail on the EO-WB project's sustainability goals and recommendations can be found in Appendix A. As practical, these sustainable practices would be applied to the future design and construction phases of the EO-WB project and could serve as a prototype for other transportation projects to minimize indirect and cumulative water quality impacts in the immediate area and to the downstream environment.

The surface waters crossed by the project corridor are largely impaired or degraded, but their water quality is anticipated to improve because of watershed studies, restoration projects, and regulatory action. Notably, the implementation of regulatory controls and the increasing consideration of sustainable policies have shown benefits to water quality. Overall, the potential indirect and cumulative water quality impacts of the proposed improvement and other major projects in the area can be minimized through agency oversight (at the local, state, and federal levels) and the implementation of best management practices.

# 3.11 Groundwater

## 3.11.1 Affected Environment

### 3.11.1.1 Aquifers

The project corridor contains groundwater resources and aquifers, within the surficial glacial deposits and bedrock; however, the main source of potable water in the vicinity of the project corridor is Lake Michigan water. In the surficial deposits, the accessible shallow aquifers can be found in the isolated lenses of sands and gravels of glacial till located within generally clayey soils. These aquifers are connected hydrologically and are recharged directly by surface water infiltration.

Within the bedrock, shallow Silurian dolomite produces water in varying quantities depending on the presence of water-bearing sands in the overlying drift. The shallow dolomite aquifer is separated from deeper aquifers by the shale of the Maquoketa Group. Below the shale is the Cambrian-Ordovician aquifer. The Cambrian-Ordovician aquifer is the most developed deep aquifer within the Chicago region and consists primarily of St. Peter Sandstone. Shallow aquifer wells supply low water-demand needs (e.g., single-family homes). Deep aquifer wells typically are used for large water-demand needs (e.g., community supply).

There are no sole-source aquifers, as designated under Section 1424(e) of the Safe Drinking Water Act, within the project corridor. The Illinois State Geological Survey (ISGS) published a map titled *Potential for Aquifer Recharge in Illinois* (Keefer and Berg, 1990). The map