- 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 indicates that the project corridor has a relatively low potential for aquifer recharge into either aquifer. Consequently, there is a low potential for groundwater contamination except in the Salt Creek and West Branch DuPage River corridors, where larger resources of sand and gravel are present.

The project corridor contains no Class III special resource groundwaters, which are found by the Illinois Pollution Control Board to be demonstrably unique or irreplaceable sources of groundwater and are suitable for application of a water quality standard more stringent than Class I groundwater. Class III groundwaters are considered vital contributors for particularly sensitive ecological systems and/or dedicated nature preserves. There are no dedicated nature preserves in the project corridor.

3.11.1.2 Water Supply Wells

The Illinois Groundwater Protection Act (IGPA) established a program for protection of groundwater. The minimum setback zone established by the IGPA prohibits locating new potential primary or secondary sources and potential routes of groundwater pollution (e.g., abandoned or improperly plugged wells) within 200 or 400 feet of a wellhead. The second level of protection is the maximum setback zone. The maximum zone prohibits locating new potential primary sources of groundwater pollution within 1,000 feet of the wellhead. This project does not pose a potential primary or secondary source, or a potential route, for pollution as defined in the Illinois Environmental Protection Act, and the project corridor does not contain any wellhead protection areas. The nearest wellhead protection area is located in west-central Illinois.

Within the project corridor, nearly all potable water supply needs are met using Lake Michigan water. Nonetheless, 83 water supply wells are within 200 feet of the project corridor, according to the ISGS Water and Related Wells Database and the IEPA Source Water Assessment Program. According to the IEPA Source Water Assessment Program, six of those wells are classified as Community Water Supply (CWS) wells, and 77 wells are classified as non-CWS wells (IEPA, 2008). Six CWS wells are within 400 feet of the project corridor, and 20 CWS wells are within 1,000 feet of the project corridor.

The wells vary in depth from less than 100 feet to more than 2,200 feet. Of the 83 water supply wells within 200 feet of the project corridor, 72 wells are in the shallow aquifer (less than 500 feet deep), averaging about 200 feet deep, and 11 wells are in the deep aquifer (500 to 2,200 feet deep). Of the six CWS wells within 200 and 400 feet of the project corridor, three are shallow aquifer and three are deep aquifer wells. Of the 20 CWS wells within 1,000 feet of the project corridor, 12 are shallow aquifer wells, and eight are deep aquifer wells.

Every incorporated community within the project corridor receives its main water supply from Lake Michigan, supplied by either the City of Chicago or the City of Evanston. Municipal wells provide water for irrigation and serve as backup for Lake Michigan supplies. In DuPage County, unincorporated areas without public water supply typically rely on shallow wells to supply their water needs. The Oasis, Des Plaines, and Touhy mobile home parks are located within 200 feet of the project corridor, and use CWS wells to meet their needs.

3.11.1.3 Groundwater Quality

The IEPA monitors groundwater quality from CWS wells in the state. This information is summarized in IEPA's *Integrated Water Quality Report and Section 303(d) List* (IEPA/BOW, 2012). This report assesses water quality throughout the state and categorizes it into three levels. The groundwater use assessments are based primarily upon CWS chemical monitoring analyses of the Class I potable resource groundwater standards. A fixed-station probabilistic network of CWS wells is used to predict the likelihood of attaining full use support in the major aquifers in Illinois. The attainment of use support is described as Full Support and Nonsupport. CWS wells were identified to have Full Support (good) water quality on the northwest side of O'Hare Airport in the vicinity of the project corridor. CWS wells were identified as having Nonsupport (fair and poor) water quality from west of O'Hare Airport to the western terminus of the project corridor.

In northeastern Illinois, including parts of Cook and DuPage Counties, the primary groundwater quality issues concerning deep bedrock aquifers include high levels of naturally occurring barium, radium, and total dissolved solids (TDS). Public water systems treat these groundwater contaminants as necessary (e.g., by ion-exchange softening, lime softening, etc.) to make groundwater potable. In general, the groundwater quality of deep bedrock aquifers is less susceptible to chemical contamination by vertical migration from the land surface than shallow aquifers, although groundwater in deep bedrock aquifers tends to have higher mineral concentrations than groundwater in shallow aquifers (this varies by location).

Shallow aquifers can be affected by surface contamination. Road runoff, underground storage tanks (USTs), landfills, septic fields, industrial discharges, wastewater treatment plants, and atmospheric deposition are common sources of pollutants. Potential contaminants include chloride, TDS, heavy metals, and petroleum compounds. During the last 20 years in northeastern Illinois, contaminants, such as TDS and chloride, have been increasing in many shallow wells. Chloride can be used as an indicator of surface aquifer contamination. Chloride concentrations have been increasing in shallow aquifers throughout the Chicago metropolitan area, especially in the outer counties (DuPage, Kane, McHenry, Will). The smallest change in chloride concentrations have been recorded in Cook and Lake Counties, where 80 percent of samples were greater than 10 mg/L, almost 50 percent were greater than 40 mg/L, and only 16 percent were greater than 100 mg/L. None of the sampled values were greater than the maximum level of acceptability of 250 mg/L. The increase in chloride concentrations in shallow aquifers may be attributed primarily to road salt runoff and septic field discharge (Illinois Department of Public Health, 2011; Illinois State Water Survey [ISWS], 2008a; ISWS, 2008b; Kelly and Wilson, 2008).

3.11.1.4 Karst Topography

Karst topography is a landscape characterized by sinkholes, depressions, caves, and underground drainage, generally underlain by soluble rocks (e.g., limestone, dolomite). Most karst topography in Illinois is restricted to the northwestern counties (Carroll and Jo Daviess Counties), western counties (Adams, Calhoun, and Pike Counties), and southwestern counties (Madison, Monroe, Randolph, and St. Clair Counties). Karst topographic regions are highly vulnerable to groundwater contamination. The project corridor is not located within an area identified to have karst topography. Consequently, there is no potential for an impact to this resource.

3.11.1.5 Seeps

In this region, seeps are generally associated with steep valley walls and usually are associated with wetland areas. No seeps have been identified as part of the wetland assessments completed for this project, and no impacts to seeps are anticipated.

3.11.2 Environmental Consequences

This analysis focuses on potential impacts of the Build Alternative on community and private water supplies. All of the communities located near the Build Alternative receive their drinking water supply from Lake Michigan; therefore, impacts to their drinking water supply are not anticipated. However, wells mapped within the project corridor are being considered. This evaluation is based on available well location data provided by IEPA and ISGS.

Every community near the Build Alternative has municipal wells. The active wells are used for irrigation and for water supply at parks or other facilities that do not have a Lake Michigan water supply. Most of the wells are remnants from pre–Lake Michigan water supply and are kept operational in case the Lake Michigan water supply is compromised. Similarly, private wells are used for various purposes. Not every owner is supplied by Lake Michigan water; therefore, wells may be used to provide potable water.

Although roadways and other supporting transportation improvements are not considered a source for groundwater contamination because the project corridor has a low potential for groundwater recharge, the following information is provided as documentation of consideration of the setback requirements. The IGPA (Chapter 415 ILCS Section 55) establishes setback zones for the location of potential sources of pollution, such as USTs, dry wells, borrow pits, and facilities for storage of deicing salt. The minimum setback zone around a private well is 200 feet for protection of groundwater. For a CWS well the minimum setback zone is 400 feet. Up to a 1,000-foot setback for CWS wells is required if technical data support a wider zone. The Build Alternative is not located within a regulated recharge area established by the Illinois Pollution Control Board. The nearest regulated recharge area is west of Peru, Illinois.

Non-CWS wells, private water wells, and CWS wells near the project corridor have a potential risk for contamination from roadway runoff, especially if the wells are shallow or improperly cased. Potential sources of contamination associated with roadway construction include sedimentation, siltation, and hydrocarbon runoff. During operation and maintenance of the project roadway, potential sources of contamination include road oils, chlorides, pesticides and fertilizers. Operations and maintenance activities involving chlorides, pesticides, or fertilizer-handling should be implemented carefully to avoid potential impacts.

The potential for contaminating groundwater supply wells depends on well construction, proximity to pollutant sources, and geological conditions. It is anticipated that potential well impacts near the Build Alternative would be minimal because of the generally clayey soils with low permeability above the aquifers, controlled roadway drainage patterns (e.g., stormwater conveyed and captured by curb and gutter, storm sewer, and open ditches), and the dilution of runoff associated with proposed stormwater management facilities.

There are 77 private water supply wells within 200 feet of the project corridor and six community water supply wells within 400 feet of the project corridor. Additionally, 24 wells are identified to be within the project corridor that are likely remnant records of wells that no longer exist because they are mapped as being within existing pavement areas of the Elgin-O'Hare Expressway or other past improvements. Wells that are identified as being functional within the construction limits of the Build Alternative would be abandoned in accordance with state regulations.

The project would not create any new potential "routes" for groundwater pollution or any new potential "sources" of groundwater pollution as defined in the Illinois Environmental Protection Act (415 ILCS 5/3, et seq.). Accordingly, the project is not subject to compliance with the minimum setback requirements for CWS wells or other potable water supply wells as set forth in 415 ILCS 5/14, et seq. This project does not pose a potential primary or secondary source, or a potential route, for pollution as defined in the Illinois Environmental Protection Act.

No measurable change in available groundwater supply is expected due to the Build Alternative. The additional impervious area associated with the project would represent a small reduction in potential recharge area that would be offset by construction of the stormwater management facilities and other stormwater best management practices.

3.11.3 Measures to Minimize Harm and Mitigation

To minimize potential changes in groundwater quality, a comprehensive soil erosion and sediment control plan will be implemented by IDOT and/or the Illinois Tollway during construction, which would minimize degradation of surface waters. Additionally, post-construction best management practices, such as bioswales, infiltration basins, native vegetation, filter strips, and stormwater management facilities, would be installed where practical and feasible to collect, detain, and filter stormwater runoff to minimize potential surface and groundwater degradation (see subsection 3.10). The post-construction best management practices would be installed with all stormwater management facilities and surface drainageways. The best management practices would focus on capturing and retaining potential contaminants to prevent them from exiting the project corridor as surface or groundwater flow. In particular, at the three locations where shallow aquifer wells are used for potable water, the types of best management practices to be implemented will be carefully considered to minimize infiltration while maximizing the filtering of runoff (see Appendix E). The potential for groundwater infiltration is limited due to the clayey soils; therefore, it is expected that the potential for groundwater migration of contaminants will be minimal.

3.12 Floodplains

3.12.1 Affected Environment

Floodplains within the project corridor typically consist of open areas but may also contain roadways or developments. Floodplains are extensions of waterways where water rises and expands into additional storage areas. Within vegetated areas, floodplains provide an opportunity for infiltration and water quality treatment through filtering of nutrients, sediment, and impurities.