ENVIRONMENTAL ASSESSMENT

DEERFIELD ROAD (FAU 1257)

IL 21/US 45 to SAUNDERS/RIVERWOODS ROAD

LAKE COUNTY, ILLINOIS

MARCH 2021

LakeCounty
Division of Transportation

DEERFIELD ROAD (CH 11, FAU 1257)
US 45/ IL 21 (Milwaukee Avenue) to Saunders/Riverwood Road
Sec. No. 15-00038-07-WR

LAKE COUNTY, ILLINOIS

ENVIRONMENTAL ASSESSMENT

Submitted Pursuant to 42 USC 4332 (2)(c)
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For FHWA

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Abstract

This Environmental Assessment (EA) documents the impacts with the proposed action to reconstruct a two-mile section along Deerfield Road from US 45/ IL 21 (Milwaukee Avenue) to Saunders/Riverwoods Road within Lake County. The purpose of the project is to address capacity, safety, mobility, non-motorized and operational deficiencies. The existing roadway is one lane in each direction with open drainage ditches. The proposed action includes a third lane (flush median), curb and gutter, drainage improvements, Des Plaines River bridge widening/rehabilitation, multi-use path, utility relocations, auxiliary lane additions at two signalized intersections and through lane/auxiliary lane additions at one intersection.

Construction of the proposed action will require the acquisition of approximately 3.02 acres of right-of-way, 6.56 acres of permanent easement and 4.44 acres of temporary construction easements from 78 parcels. There will be no residential or building relocations, but there are 35 permanent parking stall impacts to commercial properties. There is no permanent acquisition from adjacent Forest Preserves, Nature Preserve, and Nature Preserve Buffers. There will be a small permanent impact to an Illinois Natural Areas Inventory (INAI) site (341 SF). A 0.32 acre temporary easement is proposed at the Cahokia Flatwoods Forest Preserve to access the Deerfield Road bridge abutment and piers.

Impacts to wetlands and unvegetated waters of the U.S. total 0.65 acres and 0.02 acres respectively. Replacement is proposed to be provided within the Des Plaines River watershed. The Preferred Alternative meets the requirements of the U.S. Army Corps of Engineers Regional Permit Program (RPP). The cumulative wetland/waters of the U.S. impact does not exceed 1.0 acre.

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Introduction

This Environmental Assessment describes the environmental consequences for the proposed improvements to Deerfield Road from US 45/IL 21 to Saunders/Riverwoods Road in Lake County, Illinois to address existing and future capacity, safety, mobility, non-motorized and operational deficiencies. The project is located in the Village of Riverwoods, Village of Buffalo Grove and Village of Deerfield.

Deerfield Road as well as Saunders/Riverwoods Road are minor arterial roadways under the jurisdiction of Lake County Division of Transportation (LCDOT). US 45 / IL 21 (Milwaukee Avenue), at the west terminus, is a principal arterial roadway under the jurisdiction of the Illinois Department of Transportation (IDOT). Deerfield Road serves as a vital east-west regional route and has a partial interchange with I-94 adjacent to the project study area. Portwine Road is a north-south collector roadway under the jurisdiction of the Village of Riverwoods.

The project development process incorporated a Context Sensitive Solutions (CSS) project development approach. Through development of a Stakeholder Involvement Plan (SIP) for the project, stakeholders were provided a range of opportunities to be informed and provide input to the Project Study Group that was comprised of LCDOT, IDOT and the Federal Highway Administration (FHWA). These stakeholder involvement opportunities included two public meetings, one public hearing (scheduled for spring 2021), a Stakeholder Involvement Group (SIG), and multiple individual meetings with communities, agencies, organizations, business owners, property owners, and homeowners associations as discussed within this document.

For the purposes of alternative development, the Deerfield Road corridor was separated into two distinct sections that each have unique needs. Section A includes intersection improvements at Milwaukee Avenue and corridor improvements to Deerfield Road from Milwaukee Avenue to the Des Plaines River. Section B includes intersection improvements at Portwine Road and Saunders/Riverwoods Road, and corridor improvements to Deerfield Road from the Des Plaines River to Saunders/Riverwoods Road intersection. A range of eleven (11) alternatives were developed for Section A and five (5) alternatives for Section B. Through a robust alternatives development and evaluation process, along with stakeholder outreach, a preliminary preferred alternative for each section was identified, and was presented at Public Information Meeting #2. The proposed action includes reconstruction of approximately 2 miles of Deerfield Road to meet the established project purpose and need. This includes a flush center turn lane at twelve feet wide, one eleven foot lane in each direction with three foot bike-friendly shoulder, curb and gutter and eight foot multi-use path, and closed drainage system. Intersection improvements are being made at three signalized intersections.

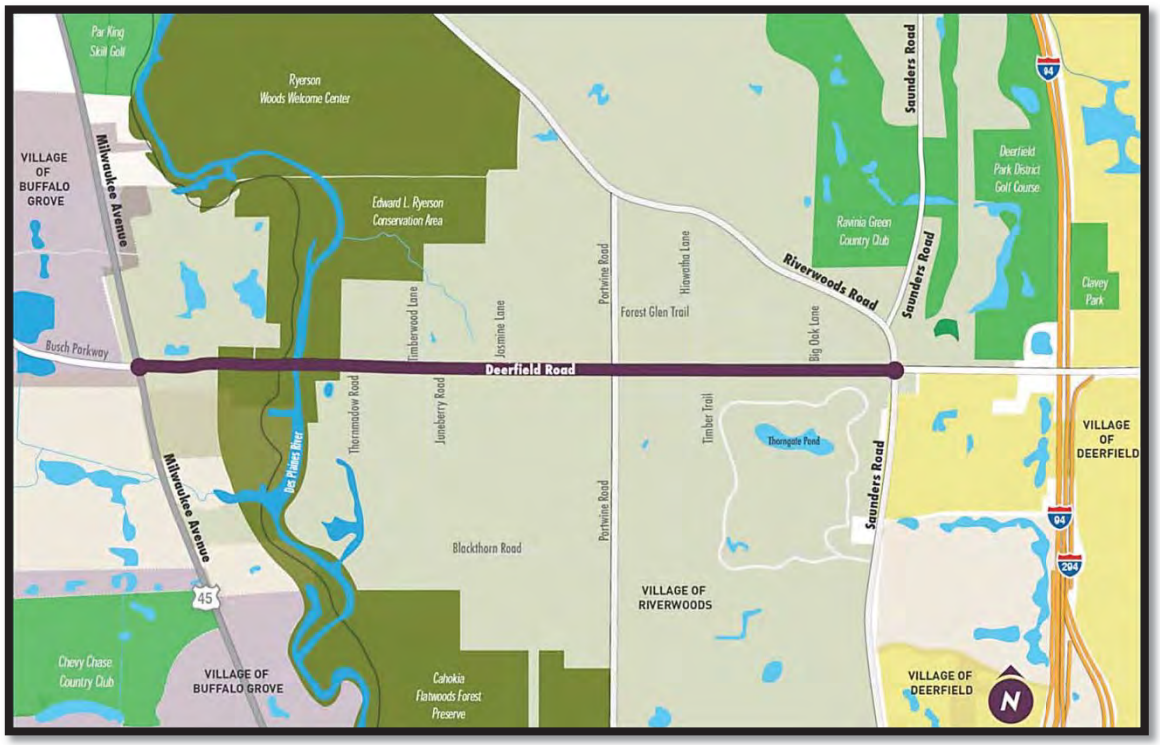
During development of the preferred alternative, a new regional traffic model was approved for the Chicago Metropolitan area for the design year 2050. The new traffic projections were utilized for development of air quality and traffic noise analysis and 2040 projections were maintained for traffic analysis evaluations.

1.0 Purpose and Need

1.1 Where is the Project Located?

Deerfield Road is County Highway 11 (CH 11) from IL 83 to Wilmot Road, a distance of approximately 5.7 miles. The project location is along Deerfield Road with a western terminus at Milwaukee Avenue (US 45/IL 21) and an eastern terminus at Saunders/ Riverwoods Road, a distance of approximately 2.0 miles. There is a partial interchange with I-94 (to/from south only) on Deerfield Road located east of Saunders/ Riverwood Road. Deerfield Road lies within the municipal boundaries of the Village of Riverwoods through a majority of the corridor from Milwaukee Avenue to Saunders/ Riverwoods Road. West of Milwaukee Avenue, Deerfield Road is within the municipal boundaries of Village of Buffalo Grove. East of Saunders/ Riverwoods Road, Deerfield Road is within the Village of Deerfield (see Figure 1-1 below). Refer to Appendix A (Section 1.1, page 1-3) for a detailed description of the project location.

Figure 1-1: Location Map



1.2 What is the Project's Background?

Deerfield Road is a 2-lane roadway within the study area and a 5-lane roadway section east and west of the study area. Improvements to this section of Deerfield Road are being studied due to steady increases in travel demand and congestion during peak AM and PM travel times resulting from growth in population and employment in the area.

LCDOT has identified Deerfield Road from Milwaukee Avenue to Saunders/ Riverwood Road in their 2040 Transportation Plan as a route widening and is included in the Federal Fiscal Year (FFY) 2019-2024 Transportation Improvement Program (TIP No. 10-03-0005) endorsed by the Policy Committee of the Chicago Metropolitan Agency for Planning (CMAP), the Metropolitan Planning Organization (MPO) for the region in which the project is located.

Deerfield Road is one of a few crossings of the Des Plaines River in southern Lake County, with the other crossings being Half Day Road (IL 22) 2.3 miles to the north and Lake Cook Road 1.0 mile to the south. Half Day Road and Lake Cook Road were previously widened in 2003 and 1994, respectively, and there are no plans to further widen either roadway across the Des Plaines River. Refer to Appendix A (Section 1.2, page 1-6) for a detailed description of the project's background.

1.3 What is the Need for the Proposed Project?

The needs for the project include capacity, safety, mobility, non-motorized and transit connections, and operational deficiencies.

- Capacity – Intersection and roadway sections experience unacceptable delays particularly during the evening peak hours. For example, Milwaukee Avenue Intersection with Deerfield Road experiences over two minutes of delay per vehicle in the evening peak hour. Over half of the project's roadway length requires 22 minutes to travel 1.3 miles in the evening peak hour, compared to less than 3 minutes to travel the same distance in the morning peak hour.
- Safety – Over a five-year period (2014-2018), there were 353 crashes and the predominant crash types were rear-end (47%) and left turning (26%).
- Mobility – There are 52 access points off Deerfield Road within the two (2) mile stretch from Milwaukee Avenue to Saunders/ Riverwoods Road. The access points consist of eleven (11) local streets, nine (9) commercial access drives and thirty-two (32) residential driveways. The large number of access points along the 2-lane stretch of roadway, in conjunction with the high travel demand, contributes to excessive wait times to and from side streets and entrances along Deerfield Road.
- Non-motorized and transit connections – Within the study area, Deerfield Road represents a gap in the Lake County regional trail network. Deerfield Road is one of the few Des Plaines River crossings that bicyclists can utilize since Half Day Road (IL 22) is approximately 2.3 miles north of the crossing and Lake Cook Road is approximately 1.0 mile south of the crossing. Pace bus routes and private shuttles operate along Deerfield Road and experience delays due to the capacity issues.
- Operational deficiencies – The underlying pavement was constructed in the 1960s and has signs of advanced deterioration with more frequent cycles of maintenance required. The existing roadway cross section on Deerfield Road from Milwaukee Avenue to Saunders/ Riverwoods Road is one through lane in

each direction with narrow shoulders and nearby potential roadside hazards (trees, berms, ditches, brick mailboxes, power line poles, steep side slopes, and culvert head walls) just off the shoulders on both sides of Deerfield Road and also multiple side streets.

Refer to Appendix A (Section 1.3, page 1-13) for a detailed description of the need for the proposed improvement.

1.4 What is the Purpose of the Proposed Project?

The purpose of the project is to provide an improved transportation system to address capacity, safety, mobility, and operational deficiencies along Deerfield Road and improve non-motorized accommodations from Milwaukee Avenue (US 45/ IL 21) to Saunders/ Riverwoods Road in Lake County, Illinois.

The project purpose and need received concurrence at the National Environmental Policy Act (NEPA)/404 coordination meeting on June 19, 2017.

2.0 Alternatives

This section describes the alternatives considered for Deerfield Road from Milwaukee Avenue to Saunders/Riverwoods Road. As discussed below, reasonable alternatives were evaluated based on their ability to satisfy the purpose and need for the project. Alternatives that did not satisfy the purpose and need for the project, or that would have unacceptable impacts in comparison to other alternatives were dismissed from further consideration as part of an alternatives development and evaluation process based on engineering evaluation and stakeholder input. The alternatives development and evaluation process was coordinated through the NEPA/404 Merger process. Refer to Appendix E for summaries of the NEPA/404 Merger meetings related to the alternatives development and evaluation process described below. A detailed description of the alternatives evaluation process can be found in Appendix B.

2.1 What Alternatives were considered?

Alternatives that were considered are summarized below and described in more detail within Appendix B (Section 2.1, page 1).

- 2040 No-Build: includes committed projects in the CMAP Transportation Improvement Program (TIP) and lane additions required for a private development recently constructed (2019) at the northwest corner of Milwaukee Avenue and Deerfield Road. This alternative was determined to not satisfy the purpose and need for the project.
- Transportation System Management (TSM) Consideration: The provisions of 23 Code of Federal Regulations (CFR) 450.320(a) and (b) places restrictions on the use of federal funds for projects in Transportation Management Areas (TMAs) designated as non-attainment for carbon monoxide and/or ozone. In these areas, federal funds may not be programmed for any project that will increase capacity for single occupancy vehicles (SOV) unless the project is addressed through a Congestion Management Process (CMP). For this project, it has been determined that stand-alone CMP alternatives will not satisfy the project purpose and need and, therefore, this undertaking is a warranted project for adding SOV capacity. As documented in the above information, this project results from the CMP for Northeastern Illinois as a warranted project for adding SOV capacity and all reasonable congestion management strategies have been incorporated into the project to sustain its effectiveness.
- Build Alternatives: Through the evaluation process, it became evident that Deerfield Road has two distinct "sections" within the corridor. Section A is composed of improvements related to the Milwaukee Avenue intersection within the west portion of the corridor. Section A is mostly commercial with high volume access driveways. Section B is the east portion of the corridor; from the Des Plaines River to and inclusive of the Saunders/Riverwoods Road intersection. Section B consists of large lot residential with many low volume

access driveways and streets. Due to the differing adjacent land use of Section A and Section B, each have unique transportation demands and needs, and therefore alternative concepts and a range of alternatives were developed for each.

- Section A: Section A alternatives are focused around the alternatives considered at the Milwaukee Avenue intersection. A range of 12 alternatives were developed and evaluated for Section A.
- Section B: Section B alternatives are focused around the corridor of Deerfield Road from the Des Plaines River to Saunders/Riverwoods Road, including the Portwine Road and Saunders/Riverwoods Road intersections. A range of 6 alternatives were developed and evaluated for Section B.

2.2 What Alternatives were Eliminated and Why?

Alternatives for the two distinct sections within the Deerfield Road corridor, Section A and Section B, were evaluated through a comparative evaluation process, which is summarized below and described further within Appendix B (Section 2.2, page 7).

2.2.1 Section A Alternatives Comparative Evaluation

Based on traffic volumes and delays, a large intersection improvement is anticipated at the Deerfield Road and Milwaukee Avenue intersection. Specifically, on the east leg of Milwaukee Avenue intersection nearly 2,000 feet is needed for lane shifts, advanced warning distance, and lane drops related to added lanes at the intersection. Therefore, Section A alternatives are focused around the alternatives considered at the Milwaukee Avenue intersection.

Based on the alternative evaluation, which evaluated transportation performance, socio economic impacts and cost, the preferred intersection configuration is Alternative A1D: add a westbound right turn lane, extend the northbound right turn lane, add a third westbound thru lane, and add dual left turn lanes on both Deerfield Road approaches. The resulting recommendations are discussed in Appendix B (Section 2.2.1, page 7).

2.2.2 Section B Alternatives Comparative Evaluation

The Range of Alternatives for Section B was developed from the initial screening process and was conceptually developed and comparatively evaluated with respect to transportation performance, mobility, safety, environmental and socio-economic impacts, and cost. The range of alternatives consists of six alternatives. Each alternative was conceptually developed based on the typical roadway cross sections, based on applicable LCDOT and IDOT roadway design criteria.

Based on the range of alternative evaluation results, a clear preferred alternative arose. The alternatives to be carried forward included Alternative 3: 3-Lane Roadway Section with Curb and Gutter (the preferred alternative) and 2040 No-Build for more detailed development and comparative evaluation. Appendix B (Section 2.2.2, page 13) presents a

summary of the range of alternatives and key considerations of the evaluation results to arrive at a preferred alternative for the project.

2.3 What are the Alternatives to Be Carried Forward?

The alternatives to be carried forward include the No-Build and the combination of Alternative A1D from Section A and Alternative 3 from Section B (Preferred Alternative). The No-Build alternative consists of no additional geometric or capacity improvements to the project corridor and intersections within the 2040 planning horizon, and does not address the transportation performance, safety, mobility and operational deficiencies. The No-Build is carried forward as a baseline for comparison of impacts and benefits.

A comparative analysis of the No-Build and Preferred Alternative was performed with respect to transportation performance, mobility, safety, environmental resource impacts, socio-economic impacts, and design/cost considerations. The resulting Impact Evaluation is provided in Appendix B (Section 2.3, page 23).

2.4 What is the Preferred Alternative?

The preferred alternative is compared against the No-Build in Appendix B (Section 2.4, page 30). Notable benefits of the preferred alternative over the No-Build include:

- Improving capacity and congestion by decreasing the Deerfield Road at Milwaukee Avenue intersection delay by almost 70% (222 seconds/vehicle to 72 seconds/ vehicle), and
- Decreasing Deerfield Road westbound total travel time through the corridor in the PM by 80% (36 minutes to 7 minutes).
- Improving mobility and accessibility as measured by side street access to Deerfield Road from zero to over 30 acceptable gaps for the PM peak hour.
- Improving safety by decreasing the injury crashes/year by over fifty percent.
- Improving non-motorized connections by implementing the off-road multi-use path along Deerfield Road with the project.
- Correcting operational deficiencies by reconstructing Deerfield Road to meet current standards.

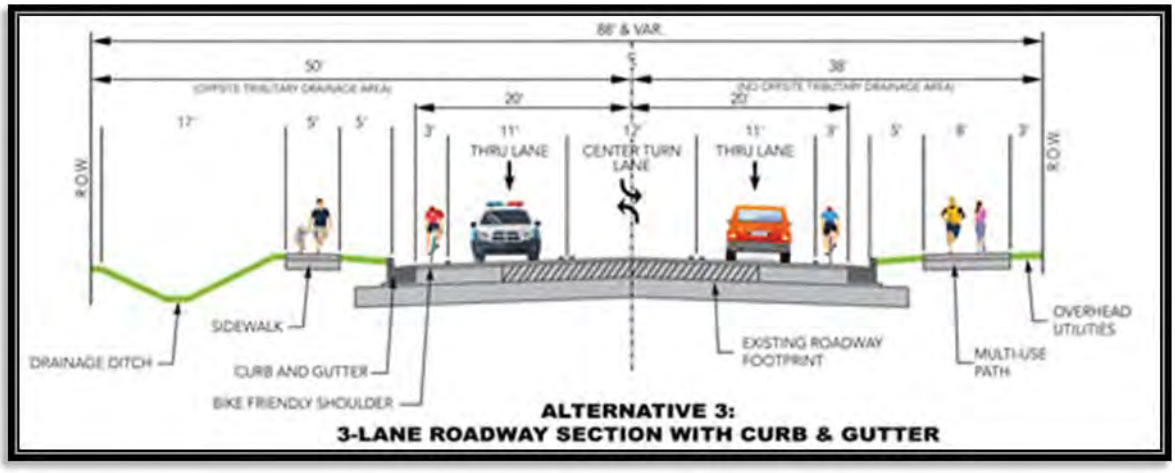
On the above basis, the preferred alternative meets the purpose and need for the project better than the No-Build. The Preferred Alternative is shown in Appendix C Figure C-1 and includes:

- An intersection improvement at Milwaukee Avenue, including two thru lanes, dual left turn lanes, and an exclusive right turn lane on the northbound, southbound, and eastbound approaches and three thru lanes, dual left turn lanes, and an exclusive right turn lane on the westbound approach.

- An intersection improvement at Portwine Road, including an exclusive left turn lane on the northbound and southbound approaches.
- An intersection improvement at Saunders/Riverwoods Road, including a right turn lane on the northbound approach.
- The typical roadway section from Milwaukee Avenue to Saunders/ Riverwoods Road includes two 11 feet wide travel lanes in each direction separated by a 12 feet wide two-way left turn lane and 3 feet wide bike friendly shoulders bounded by barrier curb and gutter. Figure 2-1 below shows the proposed typical section along Deerfield Road.
- A separate 8-foot wide multi-use path along the south side of the roadway from Milwaukee to Portwine Road and along the north side of the roadway from Portwine Road to Saunders/ Riverwoods Road. The multi-use path will be a part of the regional Lake County Trail network.
- A 5-foot wide sidewalk along the north side of Deerfield Road from Milwaukee Avenue to Chicory Lane, west side of Portwine Road from Deerfield Road south to Arrowwood Trail, and west side of Saunders Road from Deerfield Road to Thorngate HOA Park.
- A new closed drainage system.
- A new pavement structure.
- Widening and re-decking of the Deerfield Road bridge structure over the Des Plaines River.

The Alternatives Carried Forward and Preferred Alternative received concurrence at the NEPA/404 coordination meeting on June 21, 2018. The environmental resources, impacts, and mitigation associated with the Preferred Alternative are discussed in detail within Chapter 3.

Figure 2-1: Deerfield Road Proposed Typical Section



3.0 Environmental Setting, Impacts, and Mitigation

The project study area was inventoried for environmental resources. Figure C-2: Environmental Resources Map in Appendix C identifies the sensitive cultural, natural, physical, and socio-economic resources in the project study area. Resources potentially impacted by the proposed action or that require discussion pursuant to applicable laws and regulations are addressed in this chapter.

3.1 Social and Economic Factors

3.1.1 What community(ies) exist within the project study area?

Communities and demographic boundaries in the project study area are the Villages of Deerfield, Riverwoods, and Buffalo Grove. Deerfield and Riverwoods are located entirely within Lake County, Illinois. Buffalo Grove is located partially within Lake County and partially within Cook County, Illinois. The study area is within Block Groups 1, 2, and 4 of Census Tract 864505, Block Group 2 of Census Tract 864522, and Block Group 1 of Census Tract 864802 (see Figure C-3 in Appendix C).

Table 3-1 provides the populations of the project study area communities for Census years 2000, 2010 and 2018. Although Lake County has experienced population growth over the last decade, the Village of Riverwoods and Village of Buffalo Grove have experienced a population decline.

Table 3-1: Population Data

Demographic Boundary	2000	2010	2018 Estimate	Percent Change
Lake County	644,599	703,462	703,619	+9.2%
Village of Deerfield	18,420	18,225	18,930	+2.7%
Village of Riverwoods	3,843	3,660	3,562	-7.3%
Village of Buffalo Grove	42,909	41,496	40,494	-5.6%

Source: U.S. Census Bureau, 2010 Census Summary File; 2018: ACS 5-Year Estimates Data Profiles

The cohesion of the communities is not anticipated to change during or after the construction of the preferred alternative. No neighborhoods would be bisected or isolated, and access to local businesses, public facilities, and services and transportation modes would not be restricted. The Riverwoods Police Department and the Lincolnshire-Riverwoods Fire Protection District Station 52 are located on Saunders Road at the east end of the project. Neither will be impacted by the project.

3.1.2 Will the project impact Title VI, minority, or low-income populations?

The project's potential for impacts to ethnic, racial, or religious minorities was considered in accordance with Title VI of the Civil Rights Act of 1964. Based on the 2010 Census, the largest racial minority populations in the project study area are Asian and Hispanic or Latino in Block Group 4 of Census Tract 864505 (see Table 3-2 and Figure C-3 in Appendix C). All other block groups in the project study area are predominately white (more than 80 percent). Information is not available regarding the religious status of local populations. The census data also indicate that Riverwoods has a higher population of elderly (persons greater than 64) than the other communities in the project study area (see Table 3-3). An environmental justice population of concern was not identified because the affected community is not more than 50 percent minority of low-income; and, the environmental justice population in the affected areas is not meaningfully greater than the minority or low-income population in Lake County.

No groups of individuals have been, or will be, excluded from participation in public involvement activities, denied the benefit of the project, or subjected to discrimination in any way on the basis of race, color, age, sex, national origin, disability, or religion.

Table 3-2: Racial and Ethnic Composition (Percent of Population) [1]

Demographic Boundary	White Alone [1]	Black or African American Alone [1]	Some Other Race Alone [2]	Hispanic or Latino [3]
Lake County	81.5%	7.5%	9.0%	21.9%
Village of Deerfield	94.3%	0.6%	4.2%	2.8%
Block Group 2, Census Tract 864505	85.0%	0.9%	12.2%	3.7%
Block Group 4, Census Tract 864505	75.1%	1.3%	20.5%	6.2%
Village of Riverwoods	93.2%	0.7%	5.4%	2.8%
Block Group 1, Census Tract 864505	91.6%	1.0%	4.6%	3.7%
Block Group 2, Census Tract 864522	94.3%	0.4%	4.2%	1.8%
Village of Buffalo Grove	72.8%	2.0%	20.9%	5.5%
Block Group 1, Census Tract 864802	93.4%	0.5%	5.3%	2.5%

Source: U.S. Census Bureau, 2010 Census Summary File

1. "Alone" following these racial categories signifies respondents who self-identify with one race. The remaining percentage of each demographic boundary include respondents who self-identify with more than one race.
2. "Some Other Race Alone" is American Indian and Alaska Native alone, Asian alone, Native Hawaiian and Other Pacific Islander alone, or Some Other Race Alone.
3. "Hispanic or Latino" refers to a person of Cuban, Mexican, Puerto Rican, South or Central American, or other Spanish culture or origin regardless of race. Hispanic or Latino is an ethnic identifier, not racial. People who identify their origin as Hispanic or Latino may be any race.

Table 3-3: Age Characteristics

Demographic Boundary	Under 18 (percent)	18-64 (percent)	Over 64 (percent)	Median Age (years)
Lake County	24.4%	61.9%	13.7%	36.7
Village of Deerfield	28.2%	55.9%	15.9%	41.9
Block Group 2, Census Tract 864505 [1]			9.7%	40.2
Block Group 4, Census Tract 864505 [1]			13.2%	38.7
Village of Riverwoods	25.9%	57.0%	17.1%	47.4
Block Group 1, Census Tract 864505 [1]			13.8%	45.6
Block Group 2, Census Tract 864522 [1]			15.3%	48.3
Village of Buffalo Grove	22.5%	63.4%	14.1%	41.4
Block Group 1, Census Tract 864802[1]			14.0%	43.3

Source: U.S. Census Bureau, 2010 Census Summary File

1. Age data for census tracts are provided in 5-year increments, including a 14-19-year-old age range. Therefore, the percentage of people specifically under 18 years old is unavailable for block groups, as this is within the 14-19-year-old age range.

The project study area was also evaluated in accordance with Executive Order 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations, to determine if there is a potential for disproportionate and adverse impacts to low-income or minority populations. In addition to the racial and ethnic composition information above, census data was reviewed for income characteristics to identify potential low-income areas in the project study area (see Table 3-4), as well as disability population data (see Table 3-5). The Health and Human Services 2019 Poverty Guidelines indicate that the poverty level for a family of four is $25,750, and the 2018 Census Poverty Threshold for a family of four is $25,465. In accordance with Executive Order 12898, the proposed improvements will not have disproportionately high or adverse human health and environmental effects on minority and low-income populations.

The existing parking lot of the Brentwood North Health and Rehabilitation Center is located directly adjacent to the south side of the Deerfield Road right-of-way near the Des Plaines River crossing. Brentwood North Health and Rehabilitation Center provides short- and long-term rehabilitation care services to senior citizens. As a result of the proposed improvement and associated roadway widening, the front row of parking will be impacted along Deerfield Road. All impacted parking spaces will be replaced as part of this project with a different parking lot configuration.

Table 3-4: Income Characteristics

Demographic Boundary	Median Household Income ($)	Percent Persons Below Poverty Level	Unemployment Rate
Lake County	$86,244	8.3%	3.7%
Village of Deerfield	$144,229	2.7%	2.0%
Village of Riverwoods	$209,825	6.7%	4.2%
Village of Buffalo Grove	$111,435	4.4%	3.0%

Source: U.S. Census Bureau, 2018: ACS 5-Year Estimates Data

Table 3-5: Disability Data

Demographic Boundary	Percentage of Population with a Disability
Lake County	8.9%
Village of Deerfield	7.0%
Village of Riverwoods	3.9%
Village of Buffalo Grove	7.6%

Source: U.S. Census Bureau, 2018: ACS 5-Year Estimates Data

3.1.3 Will the project have any change in travel patterns?

The preferred alternative will include a two-way left turn lane that spans the entirety of the project corridor. Drivers will utilize this lane for left turns onto any street or driveway along Deerfield Road. Travel times will decrease because drivers will not have to wait for left-turning vehicles in front of them to move before proceeding. The project will better accommodate increased projected traffic on Deerfield Road (see Table 3-6). This will also lead to fewer rear-end crashes. The decreased travel time will influence travel patterns by causing a greater number of drivers anticipated to use Deerfield Road.

Table 3-6: Deerfield Road Traffic Volumes & Level of Service (LOS)

Location	2016 ADT (Average Daily Traffic)	LOS		2040 No-Build ADT	LOS	
		AM	PM		AM	PM
Deerfield Road at Milwaukee Avenue						
North Leg (Milwaukee Ave.)	39,800	D	D	40,000	D	F
South Leg (Milwaukee Ave.)	38,200	F	F	39,000	F	F
West Leg (Deerfield Rd.)	15,700	F	C	16,300	D	E
East Leg (Deerfield Rd.)	19,550	C	F	20,200	F	F
Deerfield Road at Portwine Road						
North Leg (Portwine Rd.)	1,950	C	D	2,000	C	D
South Leg (Portwine Rd.)	2,150	E	F	2,200	E	F
West Leg (Deerfield Rd.)	19,450	B	A	20,200	C	B
East Leg (Deerfield Rd.)	19,450	A	B	20,200	B	D
Deerfield Road at Saunders/ Riverwoods Road						
North Leg (Saunders/ Riverwoods Rd.)	11,150	E	C	12,600	E	D
South Leg (Saunders/ Riverwoods Rd.)	15,450	C	D	16,500	C	E
West Leg (Deerfield Rd.)	19,450	B	C	20,200	C	C
East Leg (Deerfield Rd.)	25,150	A	D	26,100	B	B

Additional auxiliary lanes have been added to the intersections at Milwaukee Avenue, Portwine Road, and Saunders Road, which will reduce congestion and travel times. Dual-left turn lanes have been added to the east and west legs of the intersection of Deerfield Road and Milwaukee Avenue. A dedicated right turn lane has been added to the south and east legs. An additional through lane has been added to the east leg.

A dedicated left turn lane has been added to the north and south legs of the intersection of Deerfield Road and Portwine Road.

A dedicated right turn lane has been added to the south leg of the intersection of Deerfield Road and Saunders Road.

During construction of Deerfield Road, disruptions to traffic patterns will occur, however, two-way traffic is proposed to be maintained throughout construction. No detours are proposed during construction. The fire and police departments are coordinating with the project through the Stakeholder Involvement Group (SIG) to ensure that emergency vehicles will be accommodated.

3.1.4 Will the project change or impact any pedestrian, bicycle, or transit facilities?

On the south side of Deerfield Road, there is an existing bike path extending from the Des Plaines River Trail (DPRT) to Thornmeadow Road. On the north side of Deerfield Road, there is an existing multi-use path extending from Portwine Road to Saunders Road, which continues beyond the project limits. There will be temporary impacts to these facilities during construction.

The preferred alternative will improve pedestrian and bicycle facilities along the project corridor. A new 8-foot multi-use path will be constructed on the south side of Deerfield Road, from Milwaukee Avenue to the DPRT and from an existing multi-use path at Thornmeadow Road to Portwine Road. East of Portwine Road, a new 8-foot multi-use path will be constructed on the north side of Deerfield Road from Portwine Road to Saunders/Riverwoods Road. This will fill in existing gaps in the regional path network and increase accessibility to the DPRT. A 3-foot bike friendly shoulder is being provided along Deerfield Road to accommodate experienced cyclists, which utilize this corridor.

Several sections of sidewalk will be included, which requires participation by the local agency, the Village of Riverwoods. Sidewalk will be provided along the north side of Deerfield Road from Milwaukee Avenue to Chicory Lane, along the west side of Portwine Road from Deerfield Road to Arrowwood Trail, and along the west side of Saunders Road from Deerfield Road to Thorngate Park.

New crosswalks will be added on all legs of the intersection of Deerfield Road and Milwaukee Avenue. New crosswalks will be added on the south and east legs of the intersection of Deerfield Road and Portwine Road. New crosswalks will be added on all legs of the intersection of Deerfield Road and Saunders Road. Two new mid-block crossings of Deerfield Road will be added at Timberwood Land and Hoffman Lane.

Pace Bus Routes 234 and 272 go along Milwaukee Avenue past Deerfield Road. The project will not interfere with either route. There are also school bus routes along the corridor.

3.1.5 Will the project require any residential or business relocations?

This project has no residential or commercial relocations.

3.1.6 Will this project affect land use?

The existing and proposed land use will remain consistent. The land use around the project corridor is residential with commercial at the termini intersections, and this project will continue to support those land uses.

3.1.7 Will the project cause any economic impacts, economic growth, or economic development?

There are several businesses on the northeast quadrant of the intersection at Deerfield Road and Milwaukee Avenue, as well as a large grocery store on the northwest quadrant. There is construction on the southwest quadrant, and the land on the southeast quadrant is undeveloped.

A barrier median is proposed along the westbound dual left turn lanes on Deerfield Road. Access to the businesses in the northeast quadrant will be impacted and modified to right-in/right-out onto Deerfield Road due to the barrier median. Economic impacts to local businesses are not anticipated, as the right-in/right-out will be maintained on Milwaukee Avenue. The increased traffic that could travel down Deerfield Road as a result of the project could lead to economic development along the corridor.

There will be a total of 35 parking stalls impacted with the proposed improvement, 4 from the Shops of Buffalo Grove, 6 from Riverwoods Medical Center, and 25 from Colonial Court commercial property. The front row of parking along the Brentwood North Medical Center, 56 parking stalls, will be impacted and replaced as part of the project (i.e., no net loss of parking). These impacts are associated with the proposed improvement at the Milwaukee Avenue intersection.

3.2 Agricultural Resources

There are no agricultural resources (i.e., farmland) within the project study area. Based on a review of aerial photography, the closest farmland tracts were identified approximately 1.4 miles northwest of the Deerfield Road/Milwaukee Avenue intersection. The project is not anticipated to impact agricultural resources or interrupt local farming operations.

3.3 Cultural Resources

Historic properties are any properties that are on or eligible for listing in the National Register of Historic Places (NRHP), and include below ground resources, like archaeological sites, and above ground resources, such as buildings and bridges. These resources are protected by Section 106 of the National Historic Preservation Act (NHPA).

What is the National Register of Historic Places?

The National Register of Historic Places (NRHP) is the official list of historic resources in the U.S. worthy of preservation. Listed places can include districts, sites, buildings, structures, and objects. For a place or property to be eligible for the NRHP, it must be significant for at least one of four main eligibility criteria related to an event, a person, distinctive characteristics of a method of construction (or the work of a master), or the property has yielded (or may be likely to yield) important historical information.

What is Section 106 of the NHPA?

Section 106 of the National Historic Preservation Act (NHPA) of 1966 requires federal agencies to consider the effects of federally-funded projects on historic properties.

3.3.1 How were historic properties identified in the project study area?

Historic districts and buildings were identified using field reviews and historical record searches of previously documented historic sites located within the Area of Potential Effect (APE). The APE for this project was defined as the parcels bordering the proposed improvements. Potentially historic buildings were identified by compiling a photo log of all structures 40 years or older within the APE. The photo log was reviewed by IDOT's cultural resources staff to determine if any structures could be considered eligible for the NRHP.

3.3.2 Do archaeological properties exist within the APE?

Based on a survey by the Illinois State Archaeological Survey, no archaeological sites were identified within the APE. One previously recorded site may fall within the APE, but the site has been impacted by development and could not be located. No impacts to archaeological properties are anticipated (see Appendix D-1).

3.3.3 Do historic architectural properties (buildings, bridges, or structures) exist within the APE?

According to IDOT's Historic Bridges of Illinois list (http://historic-bridges.isas.illinois.edu/bridgelist.htm) there are no historic bridges identified within the project study area.

Figure 3-1: Smith River Cabin at the Edward L. Ryerson Area Historic District located approximately one-half mile north of Deerfield Road – not visible from the project corridor

Photograph by CBBEL, March 2019

Based on a memo from the IDOT Cultural Resources Unit, dated August 24, 2017, there is one architectural property located in the APE that is listed on the NRHP: Edward L. Ryerson Area Historic District at 21950 N. Riverwoods Road, Deerfield, Illinois. The 471-acre historic district is located north of Deerfield Road and adjacent to the Des Plaines River, entirely within the boundaries of the Edward L. Ryerson Conservation Area, which is owned by the Lake County Forest Preserve District (LCFPD) (see Figure C-2 in Appendix C and Appendix D-1). The Edward L. Ryerson Area Historic District was listed on the NRHP in 1996. There are ten buildings, one open space site, one corn crib structure, and three objects (i.e., a gate, a pump, and a sculpture) within the property that contribute to its historic listing (see Figure 3-1).

The property is significant due to its social history and architecture. Applicable NRHP criteria include: (1) the property is associated with events that have made a significant contribution to the broad patterns of our history; and (2) the property embodies the distinctive characteristics of a type, period, or method of construction or represents the work of a master, or possesses high artistic values, or represents a significant and distinguishable entity whose components lack individual distinction.

The memo from the IDOT Cultural Resources Unit also identified nine architectural resources within or immediately adjacent to the APE that warrant consideration for listing on the NRHP (see Figure C-2 in Appendix C and Appendix D-1).

3.3.4 Will the project impact historic architectural properties?

No historic bridges were identified within the project study area. The project will not impact historic bridges. Historic architectural properties were located within the APE. However, based on preliminary design, the proposed project will have no adverse effect on the Edward L. Ryerson Area Historic District (listed on the NRHP) or the nine architectural properties that warrant consideration for listing on the NRHP.

To avoid impacts (including the acquisition of temporary and permanent easements) to the historic district and to the properties that warrant consideration for NRHP listing, the preliminary roadway design incorporates minimum lane widths (i.e., 11-feet wide in lieu of 12-feet wide) with curb and gutter, minimum lane addition (i.e., a two-way left turn lane instead of also adding a second through lane in each direction) through a majority of the residential portion of the Deerfield Road corridor, a slight southern alignment shift, retaining walls, minimum slope embankment (3H:1V), and a longitudinal box culvert located within existing Deerfield Road right-of-way between Hoffman Lane and Thorngate Creek in lieu of a larger conveyance ditch.

A review of the proposed improvements adjacent to historic architectural properties was completed by IDOT's Cultural Resources Unit. IDOT, in coordination with FHWA, has made a finding of "No Adverse Effect" for the proposed improvements. IDOT requested concurrence from the Illinois State Historic Preservation Officer (SHPO) that the proposed improvements would not adversely affect historic properties subject to protection under Section 106 of the NHPA. On August 28, 2020, the SHPO concurred with the "No Adverse Effect" finding (see Appendix D-1).

3.4 Air Quality

Air quality is protected by the Clean Air Act and air quality standards established by the U.S. Environmental Protection Agency (USEPA). Air quality was evaluated as part of this Phase I Study, including the following:

- Will carbon monoxide build-up from vehicles waiting at signalized intersections in the project study area be a health hazard?
- Does the project study area meet current air quality standards set by the USEPA?
- Will an increase in diesel emissions be an air quality concern as a result of this project?
- Will the project result in an increase of hazardous air pollutants or Mobile Source Air Toxics?
- How will construction activities affect air quality?

Appendix D-2 summarizes the air quality assessment that was completed for this project. Based on the assessment that was completed, this project will not cause new air quality violations, worsen existing violations, or delay timely attainment of the relevant National Ambient Air Quality Standards. Potential air quality impacts are anticipated to be minimal or of short duration (e.g., during construction).

3.5 Noise

Sound is produced when pressure waves generated by a vibrating source travel through the air and are of sufficient strength to be capable of causing an auditory response in the human ear and brain. Sound is composed of a wide range of frequencies. However, the human ear is not uniformly sensitive to all frequencies. Therefore, the "A" weighted decibel scale was devised to correspond with the ear's sensitivity. The resulting unit of measurement is the dB(A).

Noise is unwanted sound that can adversely affect normal activities. The criteria used to evaluate noise impacts are contained in 23 CFR 772, *Procedures for Abatement of Highway Traffic Noise and Construction Noise*, and the IDOT *Highway Traffic Noise Assessment Manual* (2017 edition). This project is using federal funding for preliminary engineering and environmental studies. Federal funding is also anticipated to be used for subsequent phases of project development and construction. To be eligible for federal funds, traffic noise was analyzed for this project in accordance with IDOT *Departmental Policy D&E-06: Highway Traffic Noise Assessment Manual* (effective March 29, 2017). This project is considered a Type I noise project since the proposed improvements include roadway reconstruction with the addition of through traffic lanes at Milwaukee Avenue.

3.5.1 How is noise assessed for roadway projects?

Roadway noise depends on four main factors:

- The number of vehicles present;
- Traffic speed;
- The number of large trucks present; and
- How far the listener is from the roadway.

Traffic noise is predicted for Existing, future No-Build, and future Build conditions. Data and findings from traffic noise reporting are used to determine if traffic noise impacts will occur due to the proposed project, then methods to reduce noise for the listener (called noise abatement) are considered.

There are four steps in highway traffic noise analysis:

1) Identify places with similar noise and land use. This is done by determining Common Noise Environments (CNEs), which are a group of receptors with similar noise exposure, topography, traffic characteristics, and land use. CNEs are grouped by noise sensitivity based on FHWA Activity Categories (i.e., residential, parks, hotels, etc.). Assign one representative receptor per CNE, as the worst-case noise location in the CNE. A receptor is a location analyzed for noise impacts and is typically an exterior area of frequent human use (e.g., bench, patio).

2) Conduct noise modeling for each receptor. Existing, future No-Build, and future Build conditions are modeled using FHWA Traffic Noise Model 2.5 (TNM 2.5) for each representative receptor, using comparative field monitoring to ensure the model accurately represents the area's noise characteristics.

3) Analyze representative receptors (one per CNE) for noise impacts. If the representative receptor is impacted, the entire CNE is considered to have a noise impact. There are two ways to identify noise impacts:

   a) Compare modeled future Build noise levels to the FHWA Noise Abatement Criteria (NAC) to determine if noise impacts will occur (see Table 3-7 below). The NAC does the following:

      - Classifies where noise levels interfere with human speech;
      - Differs by land use; and
      - Establishes noise levels at which noise barriers need to be studied.

      The CNE has a noise impact if future Build noise at the representative receptor is within one decibel, meets, or exceeds the NAC.

   b) For each representative receptor, the CNE has a noise impact if future Build noise is predicted to increase by 15 dB(A) or more at a representative receptor(s).

Table 3-7: Noise Abatement Criteria (NAC) Categories and Noise Levels Where Impact Occurs

Example Land Uses	FHWA Noise Abatement Category	FHWA NAC – Noise Level Where Impact Occurs (dB(A))
Residential	B	67
Recreation areas, cemeteries, hospitals, medical facilities, parks, places of worship, schools, trails	C	67
Hotels, motels, restaurants, bars, offices	E	72
Agriculture, airports, emergency services, industrial, manufacturing, retail facilities, utilities, warehousing	F	None
Undeveloped lands that are not permitted for development	G	None

4) Determine if noise abatement is feasible and reasonable for each impacted CNE. Noise abatement are measures taken to reduce traffic noise impacts (i.e., construction of berms or noise walls, shifting roadway alignment, etc.). For each CNE determined to be impacted by noise, noise abatement is assessed. Noise abatement must:

    - Be feasible to construct;
    - Effectively reduce noise;
    - Be cost-effective; and
    - Have a majority of those benefited by each abatement measure support its construction. This is called viewpoints solicitation, and depending on the project's characteristics, is completed in either preliminary engineering or after the final design has been approved.

3.5.2 Are there any noise sensitive areas within the project study area?

The project study area was reviewed, and potential noise-sensitive receptors were grouped into CNEs. Fifteen CNEs were identified along the project corridor. Each CNE was represented by one receptor. The 15 noise-sensitive receptors included a mixture of residential, restaurant, medical office, medical facility, and park/recreational uses. The approximate location of noise-sensitive receptors and CNEs are depicted at Figure C-4 in Appendix C.

3.5.3 Are there any noise impacts in the project study area?

FHWA TNM 2.5 was used to predict the Existing, future No-Build, and future Build traffic noise levels for representative receptors (see Table 3-8 and Figure C-4 in Appendix C).

Table 3-8: Traffic Noise Modeling Summary

Receptor Number	Receptor Description	FHWA NAC (db(A))	Existing Noise Level (2016) (db(A))	Future No-Build Noise Level (2050) (db(A))	Future Build Noise Level (2050) (db(A))	Noise Level Change (Build minus Existing) (db(A))	Impacted?
R1	Restaurant	72	62	63	63	1	No
R2	Residential	67	57	58	58	1	No
R3	Restaurant	72	62	63	63	1	No
R4	Restaurant and Medical Office	72	65	66	69	4	No
R5	Medical Facility	67	61	63	64	3	No
R6	Residential	67	59	61	63	4	No
R7	Residential	67	65	66	67	2	Yes
R8	Residential	67	64	66	66	2	Yes
R9	Residential	67	63	64	65	2	No
R10-3	Residential	67	58	59	60	2	No
R11	Residential	67	66	68	69	3	Yes
R12	Residential	67	62	64	65	3	No
R13	Restaurant	72	60	60	62	2	No
R14	Park	67	62	62	64	2	No
R15	Residential	67	59	60	61	2	No

Based on TNM, the predicted existing noise levels range from 57 dB(A) at R2 to 66 dB(A) at R11. The projected 2050 No-Build traffic noise levels range from 58 dB(A) at R2 to 68 dB(A) at R11. Generally, receptor noise levels increase an average of 1 dB(A) from the existing scenario to the No-Build scenario due to an increase in traffic volumes.

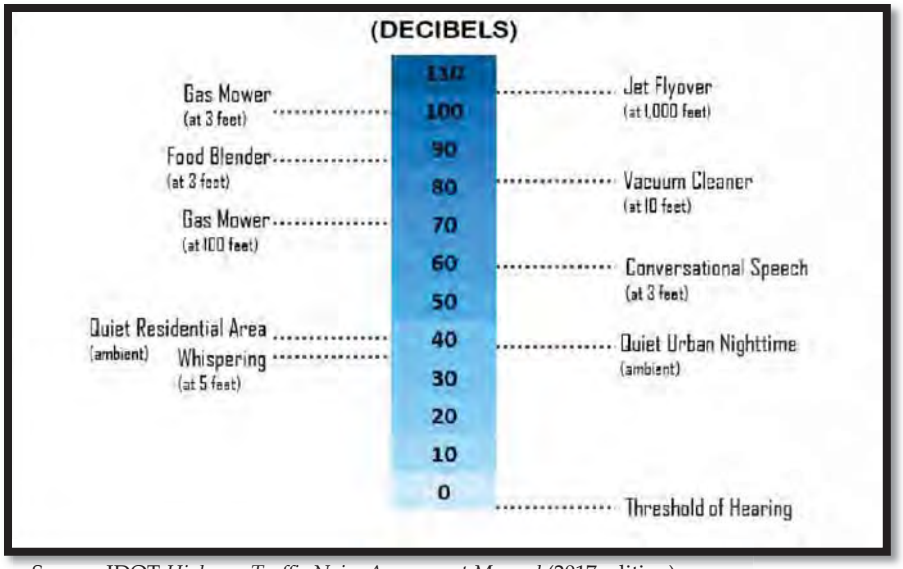
What is a perceptible change in sound?

- A **3 dB(A)** change is barely perceptible by the human ear.
- A **5 dB(A)** change is readily perceptible by the human ear.
- A **10 dB(A)** change is heard by the human ear as a doubling in sound.

The projected 2050 Build traffic noise levels range from 58 dB(A) at R2 to 69 dB(A) at R4 and R11. Generally, receptor noise levels increase an average of 2 dB(A) from the existing scenario due to an increase in traffic volumes and construction of additional traffic lanes. Three residential receptor locations (i.e., R7, R8, and R11) approach, meet, or exceed the FHWA NAC, and therefore warrant a noise abatement analysis. For residential receptors, the NAC are approached at a sound level of 66 dB(A), which is comparable to conversational speech at a distance of three feet (see Figure 3-2). The most feasible noise barrier for this project would be in the form of a noise abatement wall.

None of the receptors had a substantial increase in noise (i.e., an increase of 15 dB(A) or more from Existing to 2050 Build conditions).

Figure 3-2: Common Sound Levels



Source: IDOT *Highway Traffic Noise Assessment Manual* (2017 edition)

3.5.4 Would a noise barrier be feasible and reasonable?

The IDOT *Highway Traffic Noise Assessment Manual* (2017 edition) identifies general criteria that must be met before a noise barrier is recommended for implementation. These include the following:

- Noise barriers shall be evaluated to address the identified traffic noise impacts;
- Noise barriers shall be feasible (can be built and can achieve the traffic noise reduction feasibility criterion of at least 5 dB(A) for at least two impacted receptors);
- Noise barriers shall achieve the Noise Reduction Design Goal (NRDG) of at least 8 dB(A) for at least one benefited receptor (Reasonableness Criterion 1);
- Noise barriers shall be cost effective (i.e., may not exceed the allowable noise abatement cost) (Reasonableness Criterion 2); and
- Noise barriers shall be deemed desired by the benefited receptors (Reasonableness Criterion 3).

Noise abatement was considered at the three impacted receptors: R7, R8, and R11 (see Table 3-8).

Noise abatement was not considered feasible at R7 and R8 because under the 2050 Build condition, only one receptor was impacted in each respective CNE. Therefore, the traffic noise reduction feasibility criterion of at least 5dB(A) for at least two impacted receptors was not achieved within the CNE.

Noise abatement was considered feasible at R11 since a 5dB(A) traffic noise reduction was achieved for at least two impacted receptors. The location of the potential noise wall that was evaluated is shown at Figure C-5 in Appendix C. The R11 Barrier was considered reasonable with respect to the traffic NRDG of at least 8dB(A) for at least one benefited receptor and was also considered cost effective (see Table 3-9).

Table 3-9: Barrier R11 Summary

Benefited Receptors	Barrier Length (ft)	Average Barrier Height (ft)	Estimated Total Noise Wall Cost	Does the Barrier meet NRDG? [1]	Estimated Cost per Benefited Receptor	Average Allowable Cost per Benefited Receptor [2]	Will the Barrier Likely be Implemented?
37	1,927	14.7	$992,400	Yes	$26,822	$30,000	Yes

1. There must be at least one benefited receptor that has noise levels reduced at least 8 dB(A) to meet the NRDG.
2. The allowable cost is calculated based on the IDOT *Highway Traffic Noise Assessment Manual* (2017 edition).

The feasible and cost-effective noise wall being considered for CNE 11 was presented to the benefited receptors at a noise forum (i.e., public meeting summarizing the potential noise barrier to be voted on) on September 19, 2019 (see Appendix E). Viewpoints solicitation packages were provided to all benefited receptors via certified mail. Almost 90 percent of the vote responses were in favor of the potential noise wall (see Figure C-5 in Appendix C).

Based on the traffic noise analysis and noise abatement evaluation conducted, highway traffic noise abatement measures are likely to be implemented based on preliminary design. The noise barrier was determined to meet the feasibility and reasonableness criteria. If the project's final design characteristics are different from the preliminary design, LCDOT (in coordination with IDOT) will determine if revisions to the traffic noise analysis are necessary. A final decision on noise abatement will not be made until the project's final design is approved and the public involvement process is complete.

3.5.5 How will construction activities affect noise levels?

Trucks and machinery used for construction produce noise which may affect some land uses and activities during the construction period. Residents along the alignment will, at some time, experience perceptible construction noise from implementation of the project. To minimize or eliminate the effect of construction noise on these receptors, mitigation measures have been incorporated into IDOT's *Standard Specifications for Road and Bridge Construction* as Article 107.35.

Construction methods to be used for proposed improvements are considered and determined in the final engineering design with the preparation of contract drawings and specifications. Depending on the construction methods and potential for construction noise impacts, there are several potential abatement options that might be considered if they are warranted.

Construction Staging
Options for minimizing noise impacts during construction could include installation of temporary barriers, such as temporary noise walls, temporary material stockpiles, or equipment enclosures for noisy equipment (e.g., shields or heavy curtains); routing construction equipment away from identified sensitive receptors; or operating equipment as far from any identified sensitive receptors as is practical and feasible.

Sequence of Operations
Options for minimizing noise impacts could include scheduling and conducting louder construction operations during the day (and not during the night, when people are much more sensitive to noise), or conducting multiple loud operations at one time. The total noise level from multiple activities would not substantially increase the overall noise level. Its effect is that it would reduce the total duration of that noise level in the defined area.

Alternative Construction Methods
Options for minimizing noise impacts include the evaluation of alternative pile driving methods as this is a major noise contributor and can generate vibration complaints. The project could also consider quieter demolition methods or pavement removal methods, such as using special muffler systems, shields (e.g., structural barriers), or enclosing equipment (e.g., portable curtains).

3.6 Natural Resources

3.6.1 Upland Plant Communities

Existing land use along the project study area consists primarily of residential, commercial, and open space. Land use along Milwaukee Avenue is almost exclusively commercial while areas on the north side of Deerfield Road are low density residential and higher density residential on the south side of Deerfield Road between Saunders Road and Timber Trail. A relatively large area of forested open space is located within forest preserve property to the north and south of Deerfield Road near the Des Plaines River crossing and at private property located between Hoffman Lane and Portwine Road on the north side of Deerfield Road. An additional open space parcel (owned by the Village of Riverwoods) is located to the northeast of the Riverwoods Road/Deerfield Road intersection. This open space area has a small pavilion, rain garden and mature woodland that appears to be actively managed. Table 3-10 summarizes the mapped land cover within the project study area as identified by the U.S. Geological Survey (USGS).

Table 3-10: Land Cover Mapped in the Project Study Area

Cover Type	Acreage [1]	Percent of Total within Project Study Area
Open Space		
Forest & Woodland	15.55	11.87
Introduced & Semi-Natural Vegetation	0.85	0.65
Shrub & Herb Vegetation	1.16	0.89
Open Water	3.02	2.31
Total	*20.58*	*15.72*
Urban and Built-up Land		
Developed Land	109.90	83.93
Recently Disturbed	0.47	0.36
Total	*110.37*	*84.28*
Grand Total	**130.95**	**100.0**

1. Acreages are based on data from the USGS National Gap Analysis Program *Land Cover Data Viewer Map*.

3.6.1.1 What type of upland plant communities occur within the project study area?

The Village of Riverwoods and the Riverwoods Preservation Council (RPC) have characterized the existing natural plant communities within the Village of Riverwoods (https://villageofriverwoods.com/woodland-ecology) as follows along the project study area:

What is the Riverwoods Preservation Council?

The Riverwoods Preservation Council (RPC) is a non-profit group of resident volunteers that is dedicated to preserving the natural character of the community.

- Wet and wet-mesic floodplain forests: Wooded wetland communities in low-lying areas where flooding is frequent and prolonged during the growing season (see Figure 3-3).
- Northern flatwoods: Wooded wetland communities subject to extended seasonal inundation and ponding due to soil formation over an impervious clay layer which traps water and slows proper drainage.

Figure 3-3: Wet to Wet-Mesic Floodplain Forest

Photograph from INHS Botanical Survey Report, August 2018

- Mesic woodlands: Wooded areas with a well-balanced supply of moisture without ponding and extended periods of inundation where the soil is often moderately well-drained, and shading creates cooler landscape conditions.
- Dry-mesic woodlands: Wooded areas in higher landscape elevations with well-drained soils and not subject to repeated inundation or prolonged soil saturation.
- Mesic savannas: Well drained natural area communities with few trees (typically oaks) and little canopy cover leading to high sunlight, sporadic shading, and the dominance of an understory of prairie plants.

A botanical survey of the project study area was performed by the Illinois Natural History Survey (INHS) in July 2017, and May through August 2018. The botanical survey included a search for threatened and endangered species and an assessment of natural vegetation communities. Threatened and endangered species are discussed below in Section 3.6.3. In general, similar woodland community types were identified along the project study area by INHS and the Village of Riverwoods/RPC, with the exception of mesic savanna, which no longer exists within the project study area. INHS did not observe any prairie or savanna communities within the project study area. Per INHS, the majority of the project study area consists of maintained roadside ditches and lawns (including woodland lawns), or wooded roadsides densely populated with common buckthorn (*Rhamnus cathartica*) and other shrubs, including many planted ornamentals.

Figure 3-4: Deerfield Road wooded corridor looking east near Timberwood Lane

Photograph by CBBEL, March 2019

Many of the woodland lawns are associated with single family residential lots containing wooded frontage along Deerfield Road (see Figure 3-4). These wooded lots are primarily comprised of relatively large to moderately sized individual trees, shrub understory, and herbaceous ground cover containing either grasses and forbs or lawn grass. Immediately adjacent to Deerfield Road, woodland degradation has occurred due to urbanization and the encroachment and dominance of invasive weedy species such as black cherry (*Prunus serotina*), box elder (*Acer negundo*), common buckthorn, and honeysuckle (*Lonicera* spp.). The project study area also has a large number of dead standing trees that appear to be diseased green ash (*Fraxinus pennsylvanica*). The current dominance of these tree species and the repeated tree trimming under the power lines, have reduced the quality of the wooded areas immediately adjacent to Deerfield Road.

Landscape trees are found primarily at the commercial properties on the west side of the project study area and at some of the residential lots on the east side. In general, the

landscaped areas consist of primarily smaller trees that appear to have been planted for aesthetic purposes surrounded by manicured lawn grasses and ornamental vegetation. The landscape tree composition is dominated by evergreens and ornamentals, including: various spruce (*Picea* spp.), white cedar (*Thuja occidentalis*), crabapple (*Malus* spp.), and hawthorn (*Crataegus* spp.).

The Edward L. Ryerson Nature Preserve and the Herrmann Wildflower Farm Addition Nature Preserve Buffer are located along the project study area (see Section 3.12). Per INHS, the nature preserve and buffer contain high quality natural communities including dry-mesic upland forest, mesic upland forest, mesic floodplain forest, and northern flatwoods. Based on the INHS botanical survey, these high-quality natural communities do not extend into the project study area. However, the southern portion of the dry-mesic upland forest at the nature preserve buffer is near the project study area. Three additional wooded areas within the project study area are notable for containing natural communities whose structure and composition have remained fairly intact despite past disturbances and encroachment by woody invasive species. The wooded natural communities of notable quality are depicted at Figure C-6 in Appendix C.

Three forested blocks of 20 acres or more in size were identified along the project study area (see Figure C-6 in Appendix C). All three forested blocks extend beyond the project study area and include wooded natural communities of notable quality per INHS.

- Forested Block Area 1 is located at the Edward L. Ryerson Conservation Area/ Nature Preserve (LCFPD) to the north of Deerfield Road. It includes mesic to wet floodplain forest along Deerfield Road. The majority of this wooded community was evaluated by INHS to the south of Deerfield Road and is described below at Forested Block Area 2.
- Forested Block Area 2 is located at the Cahokia Flatwoods Forest Preserve (LCFPD) to the south of Deerfield Road. It includes mesic to wet floodplain forest and dry-mesic to mesic upland forest. The dry-mesic to mesic upland forest is dominated mainly by red oak (*Quercus rubra*) with basswood (*Tilia americana*), white oak (*Quercus alba*), sugar maple (*Acer saccharum*), and black cherry in the subcanopy.

  The wetter portions of Areas 1 and 2 along the banks of the Des Plaines River are dominated by silver maple (*Acer saccharinum*) and eastern cottonwood (*Populus deltoides*), with box elder. Areas slightly higher in elevation also include common hackberry (*Celtis occidentalis*), swamp white oak (*Quercus bicolor*), basswood, American elm (*Ulmus americana*), and Siberian elm (*Ulmus pumila*). Several standing dead green ash are also present. The shrub layer is generally sparse, but a dense understory of common buckthorn occurs along the western banks of the Des Plaines River in Area 2. The mesic portions of the floodplain are dominated in the canopy by sugar maple, common hackberry, and basswood with bitternut hickory (*Carya cordiformis*), bur oak (*Quercus macrocarpa*), American elm, black

walnut (*Juglans nigra*), black cherry, and green ash. Sugar maple dominated the understory.

- Forested Block Area 3 is located on the north side of Deerfield Road between Hoffman Lane and Portwine Road within the privately-owned Herrmann Wildflower Farm Addition Nature Preserve Buffer and adjacent natural area. It includes a mosaic of northern flatwoods and dry-mesic upland forest (See Figure 3-5). Swamp white oak is the dominant species in the wetter northern flatwoods joined by eastern cottonwood, bur oak, pin oak (*Quercus palustris*), basswood, and slippery elm (*Ulmus rubra*). Numerous standing dead black ash (*Fraxinus nigra*) are also present. The canopy of the dry-mesic upland forest is mainly dominated by white oak with red oak, shagbark hickory (*Carya ovata*), basswood, and bur oak. Both communities are dominated by common buckthorn, glossy buckthorn (*Frangula alnus*), and black ash in the shrub and sapling layers.

Figure 3-5: Dry-mesic upland forest

Photograph from INHS Botanical Survey Report, August 2018

In October 2018 and January 2019, CBBEL completed a tree survey of the project study area. During the tree survey, data was collected including: tree species, condition (health), form (shape), and general comments (see Table C-7 and Figure C-8 in Appendix C). The tree survey data was shared with the Village of Riverwoods/RPC and the LCFPD.

Most of the trees identified within the project study area have typical condition and typical to above-average form with the exception of the trees identified under the power lines. In general, the closed woodland areas associated with the forest preserves and the wooded residential lots are of moderate quality and dominated by large and moderately sized stems, with most of the stems ranging in size from 10-24 inches in diameter at breast height (DBH). These areas also contain a number of trees located sporadically throughout the project study area with a DBH greater than 25 inches and higher quality condition and form.

3.6.1.2 Will the project impact any upland plant communities?

The project will not impact prairie or savanna communities. However, woodland impacts are unavoidable due to the proximity of the proposed improvements. Woodland impacts will be either direct or indirect.

- Direct woodland impacts include vegetation removal that would result from roadway construction, pavement widening, grading for drainage and the construction of stormwater management facilities.

- Indirect impacts could result from root zone encroachment due to adjacent construction activities, soil compaction, change in hydrology, and increased edge effect for remaining woodland.

Trees that are anticipated to be removed because of the proposed project are summarized in Table 3-11 and Table 3-12:

Table 3-11: Summary of Anticipated Tree Removals (not including LCFPD property)

Anticipated Number of Tree Removals [1]							
Village of Riverwoods Classification [2]	Within Existing Right-of-Way	Within Proposed Right-of-Way	Within Proposed Temporary Easement	Within Proposed Permanent Easement	Total Removal by Species	Quantity with DBH ≥12-inches	Percent of Grand Total Removed (by Species)
Desirable Tree Species [2]	183	92	72	23	370	215	36.3%
Other Tree Species	274	121	115	138	648	276	63.7%
Total	457	213	187	161	1,018	491	100%

1. Includes trees with a DBH of 6-inches or greater not located on LCFPD property. Anticipated tree removals were based on tree location within existing or proposed right-of-way and proposed easement areas. See Table C-9 in Appendix C for a summary of anticipated tree removals by species.

2. Includes a list of "desirable protected trees" and "highly desirable protected trees" based on Section 9-6-5 of the Village of Riverwoods *Tree and Woodland Protection Ordinance*.

Table 3-12: Anticipated Tree Removals on LCFPD Property

Common Name	Scientific Name	DBH (inches) [1]	Approximate Location
Siberian elm	*Ulmus pumila*	11	Proposed Temporary Easement at Cahokia Flatwoods Forest Preserve
Siberian elm	*Ulmus pumila*	13	Proposed Temporary Easement at Cahokia Flatwoods Forest Preserve

1. Includes trees with a DBH of 1-inch or greater on LCFPD property.

A summary of anticipated tree removals by species is provided at Table C-9 in Appendix C. The tree species with the greatest number of anticipated removals are American elm (12.8%), red oak (10.8%), and dead stems of various species (10.3%), including diseased green ash. The removal and disposition of ash trees (*Fraxinus* spp.) will comply with U.S. Department of Agriculture (USDA)/ Illinois Department of Agriculture (IDOA) quarantine restrictions.

A more detailed tree impact evaluation is anticipated to occur during the design process.

3.6.1.3 How were impacts to upland plant communities avoided or minimized?

The Lake County Division of Transportation (LCDOT) recognizes the important function and value that trees and upland vegetation contribute to the roadside environment such as: aesthetic/wildlife values, screening, windbreaks for open rural areas, shading for urban heat reduction, and air quality enhancement.

The preferred alternative will update Deerfield Road to current roadway design standards. To maintain the existing Deerfield Road aesthetics and avoid/minimize direct and indirect woodland impacts to the extent practicable, the preliminary design incorporates minimum lane widths (i.e., 11-feet wide in lieu of 12-feet wide) with curb and gutter, minimum lane addition (i.e., a two-way left turn lane instead of also adding a second through lane in each direction) through a majority of the Deerfield Road corridor, a slight southern alignment shift, retaining walls, minimum slope embankment (3H:1V), and a longitudinal box culvert located within existing Deerfield Road right-of-way between Hoffman Lane and Thorngate Creek in lieu of a larger conveyance ditch. Higher quality upland plant communities at the nature preserve and nature preserve buffer will be avoided in their entirety. No forested blocks greater than 20 acres in size are being bisected or fragmented because of this project. However, there are a number of trees that will need to be removed that are located within or adjacent to the existing right-of-way, due to the close proximity of the trees to the existing edge of pavement, engineering constraints, detention and compensatory storage needs, and the need to maintain proper site drainage and treat stormwater runoff as part of the proposed improvements.

The vast majority of tree impacts would include removals at the edge of woodlands or wooded residential lots that extend offsite. In general, the woodland edges that would be impacted by the proposed project are degraded and appear to have been adversely affected by adjacent land uses and urbanization in the existing condition. Woodland edge does provide some wildlife habitat, windbreaks, shading, and air quality benefits. Existing vegetation not being removed will be protected and pruned for safety and equipment clearance during the construction phase, as necessary. Due to the adaptability and hardiness of tree species typically occurring at the woodland edge, remaining trees not directly impacted by the proposed project are likely to survive and continue to provide woodland functions in the post-construction condition. Avoidance and minimization measures will continue to be evaluated during final design. As practical and feasible, special effort will be made to preserve large diameter (greater than 10-inches DBH) trees, desirable tree species, trees with higher quality condition and form, and trees that function as screening.

What is a "desirable" tree species?

Section 9-6-5 of the Village of Riverwoods Tree and Woodland Protection Ordinance includes a list of "desirable protected trees" and "highly desirable protected trees". Examples of these desirable tree species per the Village Ordinance, include (but are not limited to): black walnut, common hackberry, hawthorn species, hickories, and oaks.

3.6.1.4 How will the loss of trees be mitigated?

Roadside trees will be protected and preserved to the extent possible consistent with standards of highway safety. During the design phase of the project, additional tree impact evaluation will be completed as necessary to avoid/minimize impacts, and a tree mitigation plan will be developed. Tree mitigation will be guided by IDOT *Departmental Policy D&E-18: Preservation and Replacement of Trees*, where practicable and feasible. However, there is limited planting space within the proposed right-of-way and easement areas.

LCDOT has discussed potential tree mitigation with the RPC and LCFPD and will continue coordination with these organizations during final design of the project. The tree mitigation plan will consider the comments provided by these organizations and information in the RPC publication, *In Our Own Backyard,* and the Village of Riverwoods/RPC *Natural Plant Communities Map*. Where possible, at compensatory floodplain storage areas or other appropriate low-lying areas subject to inundation, trees suitable for establishment in wet-mesic floodplain forest or northern flatwoods will be utilized; at upland backslopes or well drained, upland open spaces and appropriate parkway locations, trees suitable for establishment in mesic woodland and dry-mesic woodland will be utilized.

The post-construction condition provides an opportunity to plant higher quality native replacement trees and increase tree diversity. Due to the presence of the emerald ash borer (*Agrilus planipennis*) in Illinois, including Lake County, no varieties of ash trees will be planted as replacement trees.

3.6.1.5 Are invasive plant species present in the project study area?

Noxious weeds and invasive species are plants that are not native to the project study area. Based on the USDA – NRCS *Noxious Weeds List for Illinois*, there are nine noxious weeds listed for Illinois. These include plants found within the project study area, including: Canada thistle (*Cirsium arvense*), common ragweed (*Ambrosia artemisiifolia*), giant ragweed (*Ambrosia trifida*), and sowthistle (*Sonchus arvensis*). Additional invasive plant species dominate plant communities in the project study area, such as common buckthorn, honeysuckle, and multiflora rose (*Rosa multiflora*) in upland habitats and reed canary grass (*Phalaris arundinacea*), common reed grass (*Phragmites australis*), purple loosestrife (*Lythrum salicaria*), and narrow-leaved cattail (*Typha angustifolia*) in the wetlands.

Approximately 36 percent of the deciduous tree species identified during the tree survey are considered invasive, weedy, or aggressive. This is in addition to evergreen trees such as red cedar (*Juniperus virginiana*), pines (*Pinus* spp.), spruces, and white cedar that are scattered throughout the wooded residential lots. The most common invasive trees were black locust (*Robinia pseudoacacia*) and Norway maple (*Acer platanoides*).

To the extent practicable, earthwork, erosion control, and landscaping will follow applicable sections of the IDOT *Standard Specifications for Road and Bridge Construction* and Chapter 59 of the *Bureau of Design and Environment Manual* (*Landscape Design*). See Section 3.12.5 for Best Management Practices (BMPs) to be followed during construction activities adjacent to natural area(s). Seed mixes will be required to meet purity/noxious weed seed requirements. Herbicides and/or other weed control methods will be used to control invasive and noxious plant species within the rights-of-way during operation of the facility.

3.6.2 Wildlife Resources

Wildlife resources refer to terrestrial insects, amphibians, reptiles, birds, mammals, and their habitats. Available wildlife lists were obtained from the LCFPD for preserves located immediately adjacent to the project study area. The RPC publication, *In Our Own Backyard*, was also reviewed.

Based on these resources, 200 species of birds, 24 species of mammals, 12 species of reptiles, and nine species of amphibians have been observed in the vicinity of the project study area.[1] Of the recorded species, 39 birds, one mammal (muskrat [*Ondontra zibethicus*]), and three amphibians (blue-spotted salamander [*Ambystoma laterale*], spotted salamander [*Ambystoma maculatum*], and wood frog [*Lithobates sylvatica*]) are listed as "Species in Greatest Need of Conservation for Illinois."[2] Of the 200 bird species, 154 are considered neotropical migrants.[3] These include species such as the eastern bluebird (*Sialia sialis*), scarlet tanager (*Piranga olivacea*), wood thrush (*Hylocichla mustelina*), and several warbler species (genus names vary). The majority of the species recorded in the vicinity of the project study area are woodland or wetland species, but wildlife typically observed near urban/suburban areas are also included, such as: common garter snake (*Thamnophis sirtalis*), gray squirrel (*Sciurus carolinensis*), mourning dove (*Zenaida macroura*), striped skunk (*Mephitis mephitis*), and white-tailed deer (*Odocoileus virginianus*).

What are neotropical migrant birds?

Neotropical migrant birds nest in the U.S. and Canada and spend the winter months in tropical Mexico, Central and South America, and the Caribbean.

3.6.2.1 What type of wildlife habitat occurs within the project study area?

Various woodland community types, woody riparian habitat, wetlands, and open waters comprise the most important wildlife habitat within the project study area. The woodland habitat includes three forested blocks that are 20 acres or larger in size. Wildlife may use

[1] Terrestrial insects were not included in the LCFPD lists. *In Our Own Backyard* primarily discussed insects in general terms and listed insects that the IDNR considered to be beneficial – these are not summarized here.
[2] Based on Appendix I of *The Illinois Comprehensive Wildlife Conservation Plan & Strategy* (Illinois Wildlife Action Plan) (IDNR, 2005).
[3] Based on a list of neotropical migrants from the Neotropical Migratory Bird Conservation Act https://www.fws.gov/birdhabitat/grants/NMBCA/BirdList.shtm#t1

the large forested blocks and woody riparian habitat as corridors to move between habitat patches. Under existing conditions, there is a bridge at Deerfield Road that crosses over the Des Plaines River and adjacent trail. This bridge allows wildlife passage under the roadway between two of the large forested blocks and allows access to other important habitat types.

What is woody riparian habitat?

Woody riparian habitat is an area predominantly covered by trees or shrubs located adjacent to and up-gradient from streams and lakes. It provides cover for fish and other wildlife, keeps streams cool, slows erosion and stream flow, and adds organic material to the aquatic food chain.

3.6.2.2 Will the project impact wildlife habitat?

The existing Deerfield Road has caused some habitat fragmentation between the large forested blocks, within woody riparian habitat, and other wooded parcels located adjacent to the project study area. Due to this human influence, the wildlife species that use the edge habitat adjacent to the existing roadway are expected to be adapted to more urban conditions.

During the proposed roadway construction activities, there will be minor short-term direct negative impacts to wildlife associated with the disturbance of habitat for contractor access, demolition, clearing, and grading activities, as well as general construction-related noise. A relatively small loss of habitat due to the proposed project will displace wildlife from the project study area forcing relocation to suitable habitat. Many wildlife species would avoid harm due to construction operations, but some mortality is possible, especially to less mobile wildlife species that may be present in construction areas. Due to the relatively small amount of habitat being removed for this project compared to the acreage of adjacent available habitat, impacts to the overall wildlife resources in the area are expected to be minimal.

The Migratory Bird Treaty Act (16 USC 703-712) affords protection to migratory bird species native to the U.S. or its territories. Neotropical migrant birds may use the habitats found in (and adjacent to) the project study area (e.g., wetlands and woodlands) for breeding (see Figure 3-6). There would be some loss of bird nesting and foraging areas as a result of this project due to the loss of habitat within the roadway footprint. Large forested blocks are located adjacent to the project study area at forest preserves, nature preserves, and other natural areas (e.g., Illinois Natural Areas Inventory [INAI] sites). The nature preserves are being avoided in their entirety. Only minor

Figure 3-6: Scarlet Tanager – A neotropical migrant that uses forested habitat

Photograph from USFWS, undated

impacts are anticipated near the edge of one forest preserve property and at one natural area – these impacts have been coordinated with the LCFPD and the Illinois Department of Natural Resources (IDNR), as required, and are discussed in more detail in Section 3.12 and Section 3.13. Forest edge does not provide quality nesting habitat for neotropical migrant birds, compared to forest interior habitat. The minor impacts at the edge of these large forested blocks are not anticipated to negatively affect the overall quality of the adjacent woods or neotropical migrant birds.

Roads can act as a barrier to wildlife and may pose a threat because of traffic volumes, vehicle speed, and the width of the roadway corridor. Traffic crash reports from 2014-2018 were reviewed to determine the number of reported deer-vehicle collisions along the project study area. During that time-period, 10 deer-vehicle collisions were recorded by local police. The collisions were relatively spread out along the project study area, with about three-fifths of the crashes occurring on Deerfield Road west of Portwine Road. The majority of the collisions occurred between November and January, and mainly in the late afternoon through evening when deer are more active and driver visibility is hindered. A relatively small number of deer-vehicle collisions occur within the project study area in the existing condition (i.e., less than 3 percent of the total crashes from 2014-2018); these types of collisions are anticipated to remain a safety concern in the proposed condition – albeit relatively small. Deer are relatively mobile, and their mobility exposes them to collisions with vehicles as the deer attempt to cross roadways. Deer are common in the vicinity of the project, and no negative impact to the overall deer population is expected.

Roadways do not pose barriers to all forms of wildlife equally. Small, terrestrial wildlife are more likely to be affected by barriers than birds and larger mammals (which tend to be more mobile). Most reptiles and amphibians identified in the vicinity of the project area are less mobile and rely on their immediate habitat. Reptiles and amphibians most likely would be affected by road improvements during breeding, nesting, and seasonal movements.

The proposed culvert at the Thorngate Creek crossing has been oversized/modified to accommodate the movement of small to medium sized terrestrial wildlife along the riparian corridor. At the request of the LCFPD, a potential culvert is also being evaluated within the riparian corridor on the east side of the Des Plaines River to provide a crossing under Deerfield Road for small to medium sized terrestrial wildlife and a connection between Wetland #1 (at Edward L. Ryerson Nature Preserve) and Wetland #15 (at Cahokia Flatwoods Forest Preserve). Additional coordination and a final decision regarding this culvert will occur during final design and permitting. There is an existing bridge over the Des Plaines River and adjacent trail and this crossing will remain in the proposed condition. Although impacts may occur, a negative net effect on the overall reptile, amphibian, or small mammal population in the area is not anticipated as a result of the proposed project.

3.6.3 Threatened and Endangered Species

The Federal Endangered Species Act (ESA) (16 USC 1531-1544) protects species of plants and animals that are threatened or endangered within the U.S. The Illinois Endangered Species Protection Act (520 ILCS 10) protects species of plants and animals that are listed under the federal act plus additional plants and animals. Both acts provide for the conservation of threatened and endangered species and the ecosystems upon which they depend.

What is the Endangered Species Act (ESA) of 1973?	What is the Illinois Endangered Species Protection Act?
This is a federal law that protects threatened and endangered species from extinction. "Endangered species" are in danger of extinction within the foreseeable future throughout all or a significant portion of their range. "Threatened species" are likely to become endangered. The law prohibits a "taking" of a listed species and destruction of critical habitat. This law applies to projects that involve funding or approval from a federal agency.	This is a state law that protects species that are listed by the Illinois Endangered Species Protection Board as threatened or endangered. Consultation with the IDNR occurs for any federal, state, or local agency action that might affect a listed species.

3.6.3.1 What federally threatened or endangered species potentially exist in the project study area?

Federally threatened or endangered species listed by the U.S. Fish and Wildlife Service (USFWS) for Lake County, Illinois, are included in Table 3-13.

Table 3-13: Federally Threatened or Endangered Species for Lake County, Illinois [1]

Common Name	Species	Group	Status
Eastern massasauga [2]	*Sistrurus catenatus*	Reptile	Threatened
Eastern prairie fringed orchid	*Platanthera leucophaea*	Flowering plant	Threatened
Karner blue butterfly	*Lycaeides melissa samuelis*	Insect	Endangered
Northern long-eared bat	*Myotis septentrionalis*	Mammal	Threatened
Piping plover	*Charadrius melodus*	Bird	Endangered; Critical Habitat
Pitcher's thistle	*Cirsium pitcheri*	Flowering plant	Threatened
Rufa red knot	*Calidris canutus rufa*	Bird	Threatened
Rusty patched bumble bee	*Bombus affinis*	Insect	Endangered

1. From https://www.fws.gov/midwest/endangered/lists/illinois-cty.html (last revised May 9, 2017) – see Appendix D-3. Appendix D-3 also includes an "official" list of threatened and endangered species that may occur in the project study area, and/or that may be affected by the proposed project (from USFWS, dated November 2, 2020).

2. The eastern massasauga was not included in the USFWS list for Lake County, Illinois (last revised May 9, 2017). However, it was included in this table because there are known records of the eastern massasauga within the vicinity of the project study area.

3.6.3.2 Will the project affect federally threatened or endangered species?

Based on a review of the project study area and the suitable habitat of each federally threatened or endangered species, an effect determination is provided below:

Figure 3-7: Eastern Prairie Fringed Orchid

Photograph by M. Redmer, USFWS, undated

- Eastern massasauga: See discussion below regarding state-listed species. This project will have no effect on the eastern massasauga.
- Eastern prairie fringed orchid: The eastern prairie fringed orchid (see Figure 3-7) can be found in moderate to high quality wetlands, sedge meadow, marsh, and mesic to wet prairie. The 2017 and 2018 INHS botanical surveys did not find any eastern prairie fringed orchid. This project will have no effect on the eastern prairie fringed orchid.
- Karner blue butterfly: Suitable habitat for the Karner blue butterfly includes pine barrens and oak savannas on sandy soils and containing wild lupine (*Lupinus perennis*), the only known food plant of the Karner blue butterfly larvae. The 2017 and 2018 INHS botanical surveys did not find wild lupine, pine barrens, or oak savannas on sandy soils in the project study area. The project will have no effect on the Karner blue butterfly.
- Northern long-eared bat: See discussion below regarding state-listed species. The proposed improvements are consistent with the activities analyzed in the USFWS Programmatic Biological Opinion, dated January 5, 2016. This project may affect the northern long-eared bat. However, any take that may occur as a result of the project is not prohibited under the ESA Section 4(d) rule adopted for this species at 50 CFR §17.40(o) (see Appendix D-3).
- Piping plover and critical habitat: Suitable habitat for the piping plover includes wide, open, sandy beaches with very little grass or other vegetation, which are not present within the project study area. The project will have no effect on the piping plover.
- Pitcher's thistle: Suitable habitat for the Pitcher's thistle is lakeshore dunes, which are not present in the project study area. The project will have no effect on the Pitcher's thistle.
- Rufa red knot: The USFWS has determined that only actions that occur along coastal areas or large wetland complexes during the migratory window of May 1 through September 30 would potentially impact the rufa red knot. Coastal areas and large wetland complexes are not present within the project study area. The project will have no effect on the rufa red knot.
- Rusty patched bumble bee: This project was evaluated using the USFWS guidance, dated March 21, 2017, titled "The Rusty Patched Bumble Bee (*Bombus affinis*), Interagency Cooperation under Section 7(a)(2) of the Endangered Species

Act, Voluntary Implementation Guidance." According to the guidance, if a project is outside of a "high potential zone" for the rusty patched bumble bee, then the USFWS advises that a no effect determination is appropriate. USFWS shapefiles were reviewed on November 2, 2020. This project is located outside of the "high potential zone". Therefore, the project will have no effect on the rusty patched bumble bee.

3.6.3.3 What state threatened or endangered species have a recorded presence in the vicinity of the project study area?

The Illinois Endangered Species Protection Act requires IDNR consultation for state-listed threatened or endangered species (17 IAC 1075). Consultation for the project was initiated with the IDNR through the Ecological Compliance Assessment Tool (EcoCAT) on September 11, 2018 and was updated on January 8, 2020. Based on the consultation and a review of the Illinois Natural Heritage Database (INHD), the following state-listed threatened or endangered species were reported within the vicinity of the project study area (see Table 3-14):

Table 3-14: State Threatened or Endangered Species with a Recorded Presence in the Vicinity of the Project Study Area

Common Name	Species	Group	Status
Awnless graceful sedge	*Carex formosa*	Flowering plant	Endangered
Blackchin shiner	*Notropis heterodon*	Fish	Threatened
Black-crowned night heron	*Nycticorax*	Bird	Endangered
Bulrush	*Scirpus hattorianus*	Flowering plant	Endangered
Dwarf raspberry	*Rubus pubescens*	Flowering plant	Threatened
Eastern massasauga	*Sistrurus catenatus*	Reptile	Endangered
Grove bluegrass	*Poa alsodes*	Flowering plant	Endangered
Hairy white violet	*Viola blanda*	Flowering plant	Endangered
Iowa darter	*Etheostoma exile*	Fish	Threatened [1]
Marsh speedwell	*Veronica scutellata*	Flowering plant	Threatened
Mountain blue-eyed grass	*Sisyrinchium montanum*	Flowering plant	Endangered
Northern cranesbill	*Geranium bicknellii*	Flowering plant	Endangered
Northern long-eared bat	*Myotis septentrionalis*	Mammal	Threatened
Purple fringed orchid	*Platanthera psycodes*	Flowering plant	Endangered
Tubercled orchid	*Platanthera flava*	Flowering plant	Threatened
Tuckerman's sedge	*Carex tuckermanii*	Flowering plant	Endangered

1. Consultation with IDNR was initiated in 2018. The Iowa darter has since been removed from the Illinois List of Endangered and Threatened Species (Illinois Endangered Species Protection Board, effective May 28, 2020).

3.6.3.4 Will the project affect state threatened or endangered species?

Based on coordination with the IDNR, state threatened or endangered species impacts are unlikely for this project, except for the blackchin shiner. Additional information regarding specific species is provided below:

- Blackchin shiner: The blackchin shiner lives in glacial lakes that have many aquatic plants and in the streams that enter and leave these lakes. Based on coordination with the IDNR, the blackchin shiner was identified in the Des Plaines River at the Deerfield Road bridge in July 2018.

  The proposed improvements will require in-stream construction to widen the existing Deerfield Road bridge to the south by extending two existing piers. It is anticipated that temporary causeways and cofferdams may be necessary during the in-stream construction, and streambank vegetation may be removed during construction activities, including access. The construction activities could potentially affect the blackchin shiner. LCDOT has committed to obtain an Incidental Take Authorization (ITA) from the IDNR for potential impacts to the blackchin shiner prior to the project going to Letting.

When may an ITA be issued?

An ITA may be issued when a "take" of a state-listed animal species is likely to occur, but is not the intention of the action. A "take" of an animal is defined as harm, hunt, shoot, pursue, lure, wound, kill, destroy, harass, gig, spear, ensnare, trap, capture, collect, or attempt to engage in such conduct.

- Black-crowned night heron: A black-crowned night heron record of occurrence is located approximately 0.7-mile northeast of the project study area. The black-crowned night heron nests in trees that surround wetlands. Per the INHS, there does not appear to be breeding habitat within the limits of the proposed improvements. Per the IDNR, potential impacts to the black-crowned night heron are unlikely as a result of the proposed improvements.

- Eastern massasauga: Based on the INHD, there are two records of the eastern massasauga (see Figure 3-8) within the vicinity of the project study area from 2009. These are the most recent records of occurrence near the project study area. Per INHS, the two eastern massasauga that were encountered in 2009 were relocated to the Lincoln Park Zoo for a captive propagation project.

Figure 3-8: Eastern Massasauga

Photograph by A.R. Kuhns, INHS Aquatic Survey Report, 2018

Suitable habitat for eastern massasauga includes graminoid dominated plant communities (i.e., fens, sedge meadows, peatlands, wet prairies, open woodlands, and shrublands). On May 15, 2018, the INHS visited the project study area to determine if suitable eastern massasauga habitat is present and to search for the snake and crayfish/hibernation burrows. At the request of the IDNR, the INHS visited the project study area a second time on December 17, 2018, to search for crayfish/hibernation burrows. No eastern massasauga, crayfish/hibernation burrows, or their preferred habitat were documented during the INHS field surveys. Based on the results of the surveys, IDNR concurred that the eastern massasauga is unlikely to be present in the project study area and IDNR considers impacts to the eastern massasauga to be unlikely for this project.

- Iowa darter: The Iowa darter lives in clear lakes, sloughs, and creeks that have many aquatic plants. There is a record of the Iowa darter from a tributary to the Des Plaines River in the vicinity of the study area. However, per IDNR the proposed project is unlikely to have an impact on the species due to the distance between the proposed improvements and record of occurrence.

  Consultation with IDNR was initiated in 2018. The Iowa darter has since been removed from the Illinois List of Endangered and Threatened Species (Illinois Endangered Species Protection Board, effective May 28, 2020).

- Northern long-eared bat: The northern long-eared bat (see Figure 3-9) hibernates in caves and mines - swarming in surrounding wooded areas in autumn. It roosts and forages in upland forests and woods. During the summer, northern long-eared bats roost singly or in colonies underneath bark, in cavities or in crevices of both live trees and snags (dead trees). A northern long-eared bat maternity colony was recorded in the vicinity of the project study area in 2006. To minimize potential impacts to the northern long-eared bat, tree clearing will be restricted between the dates of April 1 and September 30. The IDNR concurred that this commitment would be sufficient to reduce the likelihood of impacts to the northern long-eared bat.

Figure 3-9: Northern Long-Eared Bat

Photograph by A. Hicks, New York Department of Environmental Conservation, undated

- Plant species: The INHS completed botanical surveys in July 2017 and May through August 2018. None of the plant species listed in Table 3-14 were observed by INHS in the project study area nor were any additional threatened

or endangered plant species observed by INHS during the botanical surveys. Per the IDNR, potential impacts to threatened or endangered plant species are unlikely as a result of the proposed improvements – assuming that all soil erosion and sediment control BMPs are followed and right-of-way limits are respected.

In a letter dated January 22, 2020, IDNR terminated consultation with respect to state threatened and endangered species (see Appendix D-3).

3.7 Surface Water Resources

Surface water resources include wetlands, streams, rivers, lakes, and ponds. Wetlands are discussed in Section 3.10. Surface water resources are protected by the Clean Water Act (CWA) (33 USC 1251).

3.7.1 What waterbodies exist in the project study area?

On July 25 and July 28, 2016, May 25, 2017, and September 26, 2018, Christopher B. Burke Engineering, Ltd (CBBEL) completed wetland and waters of the U.S. (WOUS) field investigations of the project study area. Twenty-four wetlands and WOUS, 12 detention areas, three roadside drainage ditches, and one man-made rain garden were identified. Their locations are depicted at Figure C-2 in Appendix C.

A preliminary jurisdictional determination (PJD) and boundary verification (BV) were completed by the Lake County Stormwater Management Commission (LCSMC) to determine which of the delineated wetlands and surface water resources appear to be jurisdictional under Section 404 of the CWA, isolated waters of Lake County (IWLC), or excluded under the Lake County Watershed Development Ordinance (WDO) (e.g., permitted excavations/impoundments and roadside ditches) (see Appendix D-4). The U.S. Army Corps of Engineers (USACE) accompanied LCSMC on the PJD field review. Based on the results of the PJD, the surface water resources, except wetlands, that appear to be jurisdictional are discussed below. Delineated surface water resources, except wetlands, that were found to be exempt from regulation are not discussed further. Wetlands are discussed in Section 3.10.

The surface water resources that appear to be USACE jurisdictional include: the Des Plaines River, Aptakisic Creek, Thorngate Creek, three detention areas, and two roadside ditches. The two roadside ditches are tributary to USACE jurisdictional WOUS/ wetlands. The three detention areas are located at the west end of the project study area along the north and south sides of Deerfield Road and are either on-line with Aptakisic Creek or have a clearly discernable hydrologic connection. Two additional open water detention areas located east of the Deerfield Road/Portwine Road intersection were determined to be IWLC (i.e., subject to regulation under the WDO) and not USACE jurisdictional.

Over the past few decades, numerous organizations have monitored/sampled the water resources in the northern portion of the Des Plaines River watershed (including southern Kenosha County, Wisconsin; central Lake County, Illinois; and northern Cook County, Illinois). The Des Plaines River Watershed-Based Plan provides a summary of these monitoring/sampling efforts (see http://www.lakecountyil.gov/2437/Watershed-Management-Plans), including a recent study by the Des Plaines River Watershed Workgroup (DRWW).

A summary of the delineated streams, including information from the DRWW study, is provided below.

Des Plaines River

The Des Plaines River (see Figure 3-10) is a perennial stream that originates in southeast Wisconsin. It flows south for approximately 133 miles until its confluence with the Kankakee River where it forms the Illinois River. The Des Plaines River crosses under Deerfield Road approximately 2,200 feet east of Milwaukee Avenue near the west end of the project study area. The existing crossing structure at Deerfield Road is a 3-span bridge with two piers that are parallel to the flow of the river. Immediately adjacent and parallel to the south side of Des Plaines River bridge is a separate LCDOT shared use path bridge. The total drainage area at the Deerfield Road crossing is approximately 310 square miles.

Figure 3-10: Des Plaines River looking downstream of Deerfield Road

Photograph by CBBEL, July 2016

Based on data collected in 2016 during the DRWW study, habitat quality at the Deerfield Road sampling site was excellent (Qualitative Habitat Evaluation Index [QHEI] = 80.5). The macroinvertebrate assemblage quality was good, and the fish community was indicative of poor conditions (see Table C-10-1 in Appendix C).

What is a Qualitative Habitat Evaluation Index (QHEI)?

The QHEI is a composite of six habitat metrics: substrate, in-stream cover, channel morphology, riparian zone and bank erosion, pool/glide and riffle/run quality, and stream gradient. Scores range from 0-100. A higher score represents more diverse and better quality habitat.

Aptakisic Creek

Near the project study area, Aptakisic Creek is a perennial stream that flows from northwest to southeast and is tributary to the Des Plaines River. Aptakisic Creek crosses under Milwaukee Avenue through a bridge located approximately 1,700 feet south of Deerfield Road. The total drainage area at the crossing is approximately 7.4 square miles.

Based on data collected in 2016 during the DRWW study, habitat quality from two sampling sites located between Deerfield Parkway and Milwaukee Avenue was fair

(QHEI = 46.0 and 52.0). The macroinvertebrate assemblage quality was fair, and the fish community was indicative of fair conditions (see Table C-10-1 in Appendix C).

Thorngate Creek

Thorngate Creek flows from southeast to northwest and is tributary to the Des Plaines River. Thorngate Creek crosses under Deerfield Road through a culvert located approximately 770 feet west of Hoffman Lane. The existing crossing structure is a single circular 48-inch reinforced concrete pipe (RCP) culvert with grated flared end sections. The total drainage area at the crossing is approximately 0.80 square miles (511 acres). Based on USGS mapping, Thorngate Creek is intermittent upstream of Deerfield Road and perennial downstream of the crossing.

Based on data collected in 2016 during the DRWW study, habitat quality north of Deerfield Road (downstream of the project study area) near Timberwood Lane was fair (QHEI = 59.0). The macroinvertebrate assemblage quality was fair, and the fish community was indicative of fair conditions (see Table C-10-1 in Appendix C).

3.7.2 Are there any waterbodies that the Illinois Environmental Protection Agency (IEPA) lists as impaired or fully supporting for a designated use?

The IEPA *Illinois Integrated Water Quality Report and Section 303(d) List* (CWA Sections 303[d], 305[b], and 314) (DRAFT November 14, 2018) was reviewed to determine the "Use Support" of each of the assessed surface water resources that are located within the project study area. At the Deerfield Road crossing, the Des Plaines River (i.e., Waterbody Segment IL_G-36) is listed as impaired and as non-supportive of aquatic life, fish consumption, and primary contact recreation (e.g., swimming). Aesthetic quality was not assessed. Potential causes of impairment include:

- aquatic algae;
- fecal coliform;
- mercury;
- other flow regime alterations;
- polychlorinated biphenyls (PCBs);
- total phosphorus

Potential sources of impairment include:

- atmospheric deposition – toxics;
- dam or impoundment;
- impacts from hydrostructure flow;
- municipal point source discharges;
- urban runoff/storm sewers;
- unknown sources

The other surface water resources that were identified within the project study area are not included in the IEPA *Illinois Integrated Water Quality Report and Section 303(d) List*. However, at the northeast quadrant of the Milwaukee Avenue and Deerfield Road intersection, two off-site lakes (i.e., Meadow Lake East [IL_WGL] and Meadow Lake West [IL_WGF]) have been assessed by IEPA and are listed as impaired (see Figure C-11 in Appendix C). Both of these lakes fully support aquatic life but are non-supportive of aesthetic quality. Fish consumption and primary contact recreation uses were not assessed. Potential causes of impairment include total phosphorus and total suspended

solids (TSS). Potential sources of impairment include runoff from forest/grassland/parkland, rural (residential areas), and urban runoff/storm sewers. Runoff from the proposed Deerfield Road improvements will not outlet into these lakes.

Similar to IEPA, a 2016 study by the DRWW also concluded that the Des Plaines River was impaired. The DRWW study also sampled Aptakisic Creek and Thorngate Creek and determined that these streams were impaired. Causes of impairment varied per stream, but included: bank erosion, channelization, chlorides, no riparian zone, organic enrichment, nutrients, and siltation. Impairment sources included: habitat and hydrologic alterations, urban runoff, and wastewater treatment plant effluent. Heavy siltation associated with habitat alterations and altered hydrology from urban and suburban runoff was the most prevalent stressor in the watershed (see Table C-10-2 in Appendix C for DRWW chemical data).

The project study area is primarily located in the Willow Creek - Des Plaines River Watershed (Hydrologic Unit Code [HUC] 0712000405) (see Figure C-11 in Appendix C). Within this watershed, Total Maximum Daily Loads (TMDLs) have been approved by USEPA for fecal coliform, total phosphorus, ammonia, carbonaceous biochemical oxygen demand, and chloride. The Des Plaines River mainstem was not addressed through these TMDLs and the surface water resources identified in the project study area were not targeted for TMDL development. The proposed improvements are not located within the subwatershed of any of the waterbodies that were targeted for TMDL development. Therefore, this TMDL will not be discussed further.

What is a Total Maximum Daily Load (TMDL)?

A TMDL is the greatest amount of a given pollutant that a waterbody can receive without violating water quality standards and designated uses.

TMDLs set pollution reduction goals that are necessary to improve the quality of impaired waters. A TMDL takes a watershed approach. It includes the effects of seasonal variation and also takes into account a margin of safety, which reflects scientific uncertainty and future growth.

A small portion of the project study area at the far east end is located in the North Branch Chicago River - Sanitary and Ship Canal Watershed (HUC 0712000301) (see Figure C-11 in Appendix C). A TMDL has been prepared for the northern portion of this watershed (DRAFT for Public Review, dated September 2018). However, as part of this project, no improvements are proposed in this watershed. Therefore, this TMDL will not be discussed further.

3.7.3 Are there any streams in the project study area that have a special designation?

Within the project study area, none of the identified surface waters are listed as navigable WOUS under Section 10 of the River and Harbors Act of 1899; none of the surface waters have been designated by the Illinois Pollution Control Board (IPCB) as Outstanding Resource Waters; and none of the surface waters have been designated as Wild and Scenic Rivers under the Wild and Scenic Rivers Act (Public Law 90-542; 16 USC 1271 et seq.).

The segment of the Des Plaines River that crosses through the project study area is listed on the Nationwide Rivers Inventory (NRI) for its Outstandingly Remarkable Values (ORVs), including: "Scenery" and "Recreation." Thorngate Creek and Aptakisic Creek are not listed on the NRI. The NRI describes this segment of the Des Plaines River as an "interesting stream generally maintaining a wilderness character due to many parks, forest preserves and areas along its course. Heavily used for many recreational purposes."

What is the Nationwide Rivers Inventory (NRI)?

The NRI is a compilation of free-flowing rivers and river segments that appear to have one or more ORVs that could qualify them for inclusion in the National Wild and Scenic Rivers System. ORVs include criteria such as scenery, recreation, geology, fish/wildlife value, and historic/cultural significance. The NRI is managed by the National Park Service Rivers, Trails, and Conservation Assistance Program.

This segment of the Des Plaines River is used for canoeing and is part of the regional Des Plaines River Water Trail. The Des Plaines River is not included as part of the National Water Trails System, administered by the National Park Service (NPS). Canoe access is available upstream at Wright Woods (LCFPD) near Illinois Route 60 (Townline Road) and downstream at Allison Woods (Forest Preserve District of Cook County) south of Palatine Road. Approximately 12 miles separates the two canoe launches. This distance can be shortened by using alternate take-out points along the canoe route.

The proposed improvements include widening the existing Des Plaines River bridge to the south approximately seven feet. In-stream construction is anticipated. Flow will be maintained during construction so that recreational activities (e.g., canoeing) are not prohibited. The water trail is anticipated to remain open during construction activities so that canoeing is not disrupted. Temporary impacts to scenery may be experienced. These impacts will be short-term and no permanent adverse effect to the Des Plaines River ORVs are anticipated because of the proposed improvement.

North of Deerfield Road, the Des Plaines River, Thorngate Creek, and adjacent wetland areas are mapped as Advanced Identification (ADID) Site 176. Based on the ADID summary sheets, the basis for the high functional value determination included biological values (i.e., presence of State threatened or endangered plant species, designation as an INAI site, and high-quality plant community) and water quality/hydrology values (i.e., shoreline/bank stabilization and sediment/toxicant retention). The Des Plaines River and Thorngate Creek also flow through the Edward L. Ryerson Nature Preserve. The portion of the Des Plaines River that is mapped as ADID is located approximately 60 feet upstream of the proposed improvements. The portion of Thorngate Creek that is mapped as ADID is located approximately 1,200 feet downstream of the proposed improvements. BMPs (as discussed later in this section) will be implemented to protect

What is an Advanced Identification (ADID) site?

An ADID site is a mapped high-quality aquatic resource (e.g., wetland) identified by the USEPA and USACE based on biological, hydrological, and water quality functions. The ADID study was completed in 1992 to identify high quality sites in advance of specific permit requests.

the streams during construction, operation, and maintenance of Deerfield Road and no impacts are anticipated at the ADID portion of these streams.

At the project study area, none of the stream segments are listed as a Biologically Significant Streams in the IDNR Biological Stream Rating Report, "*Integrating Multiple Taxa in a Biological Stream Rating System*" (2008). The segment of the Des Plaines River that passes through the project study area has a "D" rating for diversity and a "D" rating for integrity. Aptakisic Creek and Thorngate Creek have not been rated by IDNR. 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.

3.7.4 How will water resources be impacted during construction of the project?

Roadway construction, including: demolition, vegetation removal, grading and other soil disturbance, drainage structure and utility installation/relocation, pavement installation, and other activities can have an impact on water resources. These impacts can be temporary or permanent.

The proposed Deerfield Road improvements would take place within an existing transportation corridor. As such, the permanent impacts to water resources would predominantly be associated with the installation or modification of drainage structures and the widening or lengthening of existing stream crossing structures. Temporary impacts could result from in-stream construction and construction-related erosion or sedimentation. Temporary impacts could vary based on the construction method used and will be coordinated with applicable regulatory agencies. Potential impacts would be minimized through the implementation of a Storm Water Pollution Prevention Plan (SWPPP), including soil erosion and sediment controls, good housekeeping practices, and other BMPs.

Anticipated impacts to unvegetated WOUS are summarized in Table 3-15.

Table 3-15: WOUS Impact Summary

WOUS Site	Existing Crossing	Permanent Impact (acre) [1, 2]	Temporary Fill (acre)	Description of Impact	Sheet Number [3]
Des Plaines River – WOUS #W1	3-span bridge	0.001	0.09	• Vegetation removal at the stream bank associated with construction activities, including access; • In-stream construction to widen the existing Deerfield Road bridge to the south (extend two existing piers); • Temporary fill for potential temporary causeways and cofferdams	8
Thorngate Creek – WOUS #W17	48-inch RCP culvert	0.01	0.01	• Vegetation removal at the stream bank associated with construction activities for widening of Deerfield Road, multi-use trail, and floodplain compensatory storage area adjacent to east bank of creek;	10, 11

WOUS Site	Existing Crossing	Permanent Impact (acre) [1, 2]	Temporary Fill (acre)	Description of Impact	Sheet Number [3]
				• In-stream construction associated with culvert replacement (i.e., an embedded box culvert) and installation of outlet protection; • Temporary fill for potential cofferdam	
Roadside Ditch – WOUS #WR1	N/A	0.01	0.00	• Ditch to be filled to widen Deerfield Road and construct potential noise wall	18
	Total =	**0.02**	**0.10**		

1. Impacts ≤0.005 acre were rounded to the nearest thousandth of an acre.
2. Impacts (0.003 acre) are anticipated at Detention Area #24. Detention Area #24 appears to be an IWLC and not a USACE regulated WOUS. Therefore, impacts are not included with the WOUS above.
3. See the Wetland Impact Evaluation Exhibits (Figure C-13 in Appendix C).

Efforts will be made to avoid and minimize impacts to water resources. When permanent impacts are unavoidable, waterway crossings would be bridged, enclosed in an embedded box culvert, or otherwise designed to prevent the restriction of expected high water flows; allow movement of aquatic biota; and not impede low water flows in order to minimize negative effects to the aquatic ecosystem.

In-stream construction may be required to replace the culvert at Thorngate Creek and to widen the existing bridge at the Des Plaines River. No improvements are anticipated at Aptakisic Creek. In-stream construction would follow standard practice (see IDOT *Standard Specification for Road and Bridge Construction*), including isolating the work area, as necessary. All required permits and approvals (see Section 3.7.8) would be obtained prior to any in-stream construction or other WOUS impacts (e.g., USACE regulated roadside ditch). Additional details regarding construction methodology would be provided during CWA and floodway construction permitting, as requested by permitting agencies. Flow would be maintained during construction by using dam and pumping, fluming, culverts, or other techniques, as necessary. Cofferdams, if necessary, would be constructed of non-erodible materials; earthen embankments or dikes would not be used as cofferdams. If dewatering is required to perform "work in the dry", the dewatering would be only 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, where possible, to original contours and installation of erosion control as soon as practicable in accordance with permit requirements.

The means and methods to widen the two existing Deerfield Road bridge piers at the Des Plaines River have yet to be determined. Based on the methods of construction used for the adjacent existing LCDOT shared use path bridge completed in 2010, it is anticipated that building a temporary causeway from the closest riverbank may be necessary to access each pier. Construction methods and further minimization of temporary fill will be evaluated in more detail in Phase II, as part of final design and permitting (e.g., Section 404 of the CWA).

3.7.5 Will construction impacts to water resources be mitigated?

The preferred method of mitigation for the 0.02 acre of permanent WOUS impact is to purchase credits at a USACE approved mitigation bank located offsite, but within the same basin as the project (i.e., the Des Plaines River drainage basin). Banking will be the first method of mitigation considered during final design and permitting.

What is a Mitigation Bank?

A mitigation bank is a site(s) where resources (e.g., wetlands, streams, riparian areas) are restored, established, enhanced, and/or preserved to provide compensatory mitigation for regulatory impacts. In general, a mitigation bank sells mitigation credits to permittees whose obligation to provide compensatory mitigation is then transferred to the mitigation bank sponsor.

3.7.6 Will water resources be impacted during operation of the proposed project?

Operational impacts associated with roadways include the accumulation of pollutants on roadway surfaces and rights-of-way as a result of roadway use, natural contributions, and deposition of air pollution. These pollutants include solids, heavy metals (lead, zinc, copper), oil and grease, and nutrients. The concentrations of these pollutants are highly variable by site and are affected by numerous factors, such as traffic characteristics, climate, maintenance activities, and adjacent land use.

Potential water quality impacts may include short-term, localized acute loadings with few to no chronic effects.

The proposed project will add additional turn lanes at Milwaukee Avenue. The north leg of the Milwaukee Avenue/Deerfield Road intersection has an existing (2016) ADT of 39,800 vehicles per day (vpd). The projected traffic for the 2050 No-Build and 2050 Build alternative are both 42,000 vpd – an increase in 2,200 vpd. Because the No-Build and Build traffic volumes are the same, the increase in traffic along the north leg of Milwaukee Avenue is not directly attributed to the proposed improvements. The existing ADT along the south leg of the Milwaukee Avenue/Deerfield Road intersection decreases by 3,200 vpd from 38,200 vpd to 35,000 vpd under the 2050 Build alternative. When comparing existing ADT to the 2050 Build ADT, a net increase in traffic volume along Milwaukee Avenue in the vicinity of Deerfield Road is not anticipated. Milwaukee Avenue will not be discussed further with respect to water quality.

As part of the project, existing drainage patterns will be maintained. Currently, stormwater runoff along the proposed improvements is conveyed via sheet flow and roadside ditch. In the proposed condition, stormwater runoff will drain to curb and gutter and will be conveyed through storm sewer. Stormwater runoff will be routed through BMPs prior to discharge to wetlands or WOUS, to the extent practicable. These BMPs will slow stormwater velocity and allow settling and filtering of particulates. Vegetation on the right-of-way will further remove pollutants through biological processes. No stormwater discharge outfalls are proposed at the adjacent Edward L. Ryerson Nature Preserve or the Herrmann Wildflower Farm Addition Nature Preserve

Buffer located adjacent to the north side of Deerfield Road. The LCFPD, Illinois Nature Preserves Commission, and LCSMC are represented on the project SIG. Individual coordination has also occurred. Adverse impacts to the receiving waters are not anticipated during operation of Deerfield Road as a result of the proposed improvements.

3.7.7 Will water resources be impacted during maintenance of the proposed project?

BMPs will be used to protect water resources during winter maintenance activities after the proposed improvements are constructed. Deicing salt (sodium chloride) applied with blended liquids (e.g., salt brine, calcium chloride) and plowing are the main tools used during winter to control ice and snow on roadway surfaces (see Figure 3-11). Deicing salt helps to maintain traffic flow and safe roadways in the winter.

Figure 3-11: Roadway Winter Maintenance

Photograph by LCDOT, undated

Road salt moves through the environment as runoff, splash, and spray. The salt is carried by melt water runoff to the roadway drainage swales, ditches, or storm sewers to a receiving stream or other water body. Salt is also transported by splash or spray generated by moving vehicles coming in contact with brine, slush, or dried residue. The amount of salt entering the environment depends on the number of snow storms per season, salting events per storm, and management practices implemented by the jurisdiction performing the roadway maintenance activities.

LCDOT follows a Snow and Ice Control Plan for roadways within its jurisdiction and emphasizes sensible salting in an effort to ensure that the proper amount of chemicals is used for each unique snow and ice event. Practices, such as pre-wetting, anti-icing, applying road salt, and plowing will be used as necessary in an efficient manner along Deerfield Road to provide the motoring public with safe roadways and the least amount of impact to the environment as possible.

In 2018, Lake County received the "Excellence in Snow and Ice Control Award" from the American Public Works Association (APWA). LCDOT accepted this award of national recognition for its innovative, safe, and environmentally friendly Snow and Ice Control Program, which includes, but is not limited to the following initiatives:

- LCDOT's in-house liquid blending system allows for the adjustment of salt brine and beet juice ratios to meet various road conditions. This helps reduce the amount of salt used and allows the salt to be used more effectively.

- In partnership with the LCSMC and the Lake County Health Department, Lake County hosts Annual Deicing Workshops to educate other public and private entities in the region on best practices.
- The Lake County Health Department partners with LCDOT to provide real-time river monitoring of chloride levels downstream from the LCDOT maintenance yard.
- Through the use of technology, LCDOT optimizes operations through real-time tracking of vehicle locations, deicing application rates, and reporting.
- LCDOT keeps the public informed through a comprehensive public outreach effort using social media (Facebook and Twitter) and Lake County PASSAGE.
- 380 cameras in the Lake County PASSAGE System are also available to LCDOT snow and ice control management staff to aid in their decision-making processes and in managing snow and ice event(s).
- LCDOT subscribes to DTN, a weather service that provides 24-hour weather forecasts in Lake County and offers LCDOT 24-hour phone access to speak with a meteorologist to discuss the forecast and/or local storm system.

In Lake County, snow season officially runs from November 15 to April 15, but planning and preparation starts well before. The LCDOT maintenance staff spends several weeks testing and preparing the equipment, training drivers, and planning the snow removal response effort so that everything is ready when winter arrives. Outside of active snow season, the entire operation is evaluated and updated to respond to changing conditions, advancements in technology, and to better protect the environment.

3.7.8 What water-related permits will the project require?

Prior to construction, all necessary water related permits and certifications will be obtained, including but not limited to the following:

- Section 404 CWA Permit: Project that require the discharge of dredge or fill materials into jurisdictional WOUS (including wetlands) are subject to the requirements of Section 404 of the CWA and are reviewed by the USACE. Projects in northeastern Illinois that will have minimal individual and cumulative impacts on aquatic resources may be eligible for the Regional Permit Program. The proposed improvements meet the requirements of the USACE Regional Permit Program. A pre-application meeting will be scheduled with the USACE during Phase II to discuss the proposed improvements and confirm permit processing.

- Section 401 CWA Water Quality Certification: States are granted authority to review activities in WOUS (including wetlands) and to issue Section 401 CWA Water Quality Certification that the activity is not likely to violate state water quality standards. In Illinois, IEPA issues Section 401 CWA Water Quality

Certification. IEPA has granted Section 401 CWA Water Quality Certification for projects that qualify for the USACE Regional Permit Program.

- National Pollutant Discharge Elimination System (NPDES) Construction Permit (Section 402 CWA): It is anticipated this project will result in the disturbance of one or more acres of land. As a result, a NPDES permit for stormwater discharges from the construction site is required. Permit coverage for the project will be obtained either under the IEPA General Permit for Stormwater Discharges from Construction Site Activities (NPDES Permit No. ILR10) or under an individual NPDES permit. Requirements applicable to such a permit will be followed, including the preparation of a SWPPP. Such a plan shall identify potential sources of pollution which may reasonably be expected to affect the quality of stormwater discharges from the construction site and shall describe and ensure the implementation of practices which will be used to reduce the pollutants in discharges associated with construction site activity and to assure compliance with the terms of the permit.

- Floodway Construction Permit: IDNR-Office of Water Resources (IDNR-OWR) issues construction permits for work within regulatory floodways and for the encroachment of regulatory floodplains serving a tributary area of 640 acres or more in an urban area and a tributary area of 6400 acres or more in a rural area. The proposed improvements involve work within the regulatory floodway of the Des Plaines River (see Section 3.9).

- Lake County Watershed Development Permit (WDP): A Lake County WDP is required for any regulated development (e.g., project located in a regulatory floodplain, a project that proposes to impact WOUS or IWLC), including a public road development, in Lake County, Illinois. The WDP application, including a soil erosion and sediment control plan and proposed BMPs, would be reviewed by LCSMC.

3.8 Groundwater

The project study area contains groundwater resources and aquifers within the surficial glacial deposits (unconsolidated system) and within the shallow and deep bedrock systems. Within the surficial deposits, the accessible shallow aquifers can be found in the lenses of sands and gravels of the glacial till.

The glacial drift deposits in Lake County vary in thickness from about 75 feet in the southeastern part of the county to more than 300 feet along the west-central portion of the county. Within the project study area, the bedrock is mapped as being 200 to 300 feet deep. Sand and gravel deposits are present in the glacial drift. Where these deposits are sufficiently thick, they offer potential for developing moderate to large quantities of water (100 to 1000 gallons per minute) from individual wells. Shallow outwash deposits are present along the Des Plaines River in the eastern part of the county. The buried sand and gravel deposits are present at most sites in the county.

Beneath the glacial deposits, the upper bedrock formations consist principally of beds of Silurian dolomite and shale, which dip easterly at about 10 to 15 feet per mile. The rock formations in Lake County range in age from Silurian to Precambrian.

3.8.1 Are any aquifer recharge areas, wellhead protection zones, or private and public water supply wells located in the project study area?

According to the IEPA Source Water Assessment and Protection Program, there are no identified Class III Special Resource Groundwater protection areas within or near the project study area.

Based on available well data, of the 60 total non-community water supply wells within 400 feet of the right-of-way, there are 54 wells, that are more than 100 feet deep that are finished in bedrock, and one more than 100 feet deep finished in sand and gravel and one in clay. There are four wells under 100 feet deep finished in sand and gravel; of these four wells, one appears to have been abandoned. Based on the IEPA Source Water Assessment and Protection Program, 34 non-community water wells were identified within 200 feet of the study limits. Three of which are finished at less than 100 feet deep; of these three wells, one appears to have been abandoned.

There are three Community Water Supply Wells that have groundwater protection zones of 200 feet that are located within 200 feet of the project limits. These wells are located northeast of the Deerfield Road and Milwaukee Avenue intersection. Two of the three wells are identified as "inactive" on the IEPA Source Water Assessment and Protection Program website. One of the wells is owned by the Village of Riverwoods and is identified as an "emergency" well.

3.8.2 Will there be any impacts to any aquifer recharge areas, wellhead protection zones, or private and public water supply wells?

According to the IEPA Source Water Assessment and Protection Program and Potential for Contamination of Shallow Aquifers in Illinois (Berg, 1984), there is a "Very High Potential" for shallow aquifer contamination within 20 feet of the ground surface to the west of Jasmine Lane associated with the Des Plaines River and associated floodplain. From just west of Jasmine Lane heading east there is a "Moderately High to Moderate" potential for recharge due to sand, silt and gravel deposits at the surface. However, in most instances, this shallow surface layer is not suitable to provide adequate water for operation of a well. No water supply wells within the project study area are finished within the upper 20 feet. Two wells are finished less than 100 feet deep at the southwest corner of Milwaukee Avenue and Deerfield Road. These wells were installed in 1929 and 1978, respectively. The property the wells is located on has been recently redeveloped and the wells have most likely been abandoned.

Based on the available well data, no "active" Community Water Supply Wells or non-community water supply wells will be directly impacted by the proposed project. One "inactive" Community Water Supply Well for the Village of Riverwoods is mapped within the project footprint at the Federal Life Insurance Company property located

northeast of the Deerfield Road and Milwaukee Avenue intersection. The Village of Riverwoods has confirmed that the well within the project footprint at this location has been sealed and is "inactive".

This project will not create any new potential "routes" (i.e., dry wells, borrow pits) for groundwater pollution or any new potential "sources" (i.e., bulk road oil or deicing salt storage facilities) 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 Community Water Supply Wells or other potable water supply wells, as set forth in 415 ILCS 5/14, et seq. Since no LCDOT or IDOT facilities exist or are planned for this project, there should be no impact on the 200/400 foot setback zones around these wells as determined by the IEPA Division of Public Water Supplies.

Potential non-point source pollution as a result of this project is anticipated to be negligible. As part of this project, stormwater BMPs are proposed to minimize the potential impact of the proposed improvements on wetlands and other water resources. Additionally, direct impacts to WOUS, including wetlands, have been avoided or minimized to the extent practicable. Additional information regarding the treatment of stormwater runoff and protection of surface water resources can be found in Section 3.7.

There are expected to be minimal potential indirect impacts to groundwater because the project footprint has been minimized, stormwater storage and filtration will occur and no new routes, or Potential Routes (as defined by IDOT) for groundwater contamination are occurring as part of this project. Additionally, there are no Potential Secondary Sources (as defined by IDOT) for groundwater contamination that will be created due to this project.

3.8.3 Will the project impact karst topography?

Karst topography is characterized by numerous caves, sinkholes, fissures, and underground streams. Karst topography usually forms in regions of plentiful rainfall where bedrock consists of carbonate-rich rock (i.e., limestone, gypsum, or dolomite) that is easily dissolved. The project study area is not located within karst topography according to the IEPA Source Water Assessment and Protection Program. The nearest karst topography in Illinois is located along the Mississippi River in northwest and southwest Illinois, and at scattered locations between Dixon and Byron. No impact to karst topography is anticipated as a result of the proposed improvements.

3.8.4 Will the project impact the Mahomet Sole Source Aquifer?

The Mahomet Sole Source Aquifer is located in central Illinois. There are no Sole Source Aquifers, as designated under Section 1424(e) of the Safe Drinking Water Act, within the project study area.

3.8.5 Will the project impact seeps?

No seeps were identified during the wetland delineations completed for this project (see Section 3.10.1). No impact to seeps are anticipated as a result of the proposed improvements.

3.9 Floodplains

Floodplains are flat areas along streams and other water bodies that hold excess water after a storm. Executive Order 11988 states that impacts to floodplains should be avoided when possible.

3.9.1 How were floodplains identified in the project study area?

Based on the Flood Insurance Rate Maps (FIRM) of Lake County and Incorporated Areas (Panels 266 and 267, effective date: September 18, 2013), 100-year floodplains and a regulatory floodway are located within the project study area as shown on Figure C-2 in Appendix C. This includes the Des Plaines River floodplain covering the west end of the project with a regulatory floodway and the extension of the Des Plaines River floodplain up the Thorngate Creek waterway located between Juneberry Road and Jasmine Lane. Thorngate Creek flows south to north under Deerfield Road and then west to feed into the Des Plaines River just north of the Deerfield Road bridge. The Des Plaines River flows north to south under Deerfield Road.

3.9.2 Will the project impact any floodplains in the project study area?

Widening the Deerfield Road bridge and approaches is considered a transverse encroachment of the Des Plaines River floodplain, meaning an action within a floodplain that is perpendicular to the direction of river flow. The project would involve placing fill in the 100-year floodplain and regulatory floodway through the widening of piers and the approach roadway embankment. Impacts to the Des Plaines River 100-year floodplain and regulatory floodway are unavoidable to meet project roadway and bridge design standards.

Widening Deerfield Road and replacing the Thorngate Creek culvert is considered a transverse encroachment of the Des Plaines River floodplain at Thorngate Creek. The project would involve placing fill in the 100-year floodplain by replacing the guardrail and drop off with a traversable sloped embankment and longer culvert. The roadway profile is being raised at Thorngate Creek to accommodate a larger embedded culvert for wildlife crossing. Impacts to the Des Plaines River floodplain at Thorngate Creek are unavoidable to widen Deerfield Road, mitigate the roadside safety hazard, and provide a larger culvert opening.

3.9.3 How were impacts to floodplains minimized and mitigated?

Per IDNR-OWR requirements, fill within the Des Plaines River regulatory floodway must be compensated at a 1:1 ratio. This will be accomplished by bank excavation between the Deerfield Road and separated bike path bridges.

100-year floodplain fill will be mitigated at a 1.2:1 ratio per LCSMC requirements. There are two options for compensatory storage basins for fill within the Des Plaines River 100-year floodplain at the west end of the project. The first option is expanding the combined compensatory storage/detention basin located on the Federal Life Companies property along the north side of Deerfield Road just east of Milwaukee Avenue. The second option is expanding the storage capacity on the currently vacant property owned by the Village of Riverwoods located at the southeast corner of Deerfield Road and Milwaukee Avenue. Both properties are large enough to satisfy the compensatory storage/detention requirements, are hydraulically connected and equivalent, and have been discussed with the affected property owners. A final decision will be made during the land acquisition process depending on property owner negotiations. Either property will be maximized to provide additional detention volume within the basin for roadway improvements or potential future development.

There is one option for a compensatory storage basin for fill within the Des Plaines River 100-year floodplain near the middle of the project at the Thorngate Creek crossing. A proposed compensatory storage basin is located on the northeast (downstream) side of the Thorngate Creek crossing and has been discussed with the property owner to minimize property, tree, and wetland impacts. The provided 100-year floodplain and regulatory floodway mitigation is summarized in Table 3-16.

Table 3-16: 100-Year Floodplain and Regulatory Floodway Mitigation Summary

	Incremental Flood Stages	Fill (CY)	Required Compensatory Storage (CY) [1]	Provided Compensatory Storage (CY)
Des Plaines River Floodplain	Normal Water Level to 10-year	1,348	1,618	3,369 [2,3]
	10-year to 100-year	3,892	4,670	5,683 [2,3]
Des Plaines River Floodway	Normal Water Level to 10-year	135	135	135
	10-year to 100-year	1,201	1,201	1,201
Des Plaines River Floodplain at Thorngate Creek	Normal Water Level to 10-year	127	152	1,641
	10-year to 100-year	350	420	435

1. Required compensatory storage volumes listed at 1.2:1 ratio for floodplain, 1:1 ratio for floodway.
2. Excavation provided more than requirement to be reserved for future detention.
3. This table lists the compensatory storage volumes to be provided at the Federal Life Companies property (first option mentioned above). Compensatory storage volumes available at the Village-owned property (second option mentioned above) are slightly larger.

This project will not cause significant encroachment because there is no potential for interruption of the facility, there is no significant risk, and there are no significant adverse impacts on natural and beneficial floodplain values.

Wetlands are transitional areas between aquatic and terrestrial habitats where water occurs at or near the soil surface during the growing season. All wetlands are protected by the Illinois Interagency Wetlands Policy Act (IWPA) and some wetlands are protected by the CWA.

What is a wetland?

A wetland is an area of land that exhibits the following three criteria:

1) hydric soil;
2) prevalence of hydrophytic vegetation; and,
3) inundation/saturation by surface or groundwater long enough to support hydrophytic vegetation.

Wetlands are a critical part of our natural environment. They reduce the impacts of floods, absorb pollutants, and improve water quality.

What is hydrophytic vegetation?

Hydrophytic vegetation includes plants that grow in water or that are adapted for life in saturated soil conditions.

3.10.1 What wetlands were identified in the project study area?

CBBEL completed wetland field investigations on July 25 and July 28, 2016, May 25, 2017, and September 26, 2018 to determine the boundary, type, quality, and function of each identified wetland within the project study area. Wetland boundaries were delineated using the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Midwest Region* (August 2010). Twenty-four wetland and WOUS areas, twelve detention areas, three roadside drainage ditches, one man-made rain garden were identified (see Figure C-2 in Appendix C). A PJD and BV were completed by LCSMC to determine which of the delineated wetlands and WOUS appear to be jurisdictional under Section 404 of the CWA, IWLC, or excluded under the WDO (e.g., permitted excavations/ impoundments and wetlands created incidental to construction grading) (see Appendix D-4). The USACE accompanied LCSMC on the PJD field review.

Wetlands with a Floristic Quality Index (FQI) of 20 or more or a native mean C-value of 3.5 (USACE)/4.0 (IWPA) or greater suggests that a site has evidence of native character and are considered High Quality Aquatic Resources (HQAR). Wetlands that are mapped as ADID sites or located within an INAI site are also considered HQAR by the USACE or IWPA, respectively. The five wetlands described below are considered HQAR.[4] The majority of the remaining identified wetlands were determined to have low to fair natural area quality.

- Wetland #1 has a native FQI of 29.1 and a native mean C-value of 3.4. This wetland site is located within LCFPD property, nature preserve, INAI site, and overlaps with mapped ADID wetland. Wetland #1 is located immediately adjacent to the Des Plaines River. It also contains a forested depression on the north side of Deerfield Road that is connected by a small drainage swale to the

[4] Wetland #30 is a man-made rain garden with a native mean C-value of 3.8. During the PJD, it was determined to be an IWLC (not regulated by the USACE) and excluded under the WDO. Therefore, Wetland #30 was not discussed with the HQAR below.

Des Plaines River and adjacent overbank wetland. The wetland is dominated by a mixture of moderate quality, woody and herbaceous wetland plant species.

- Wetland #15 has a native FQI of 22.7 and a native mean C-value of 3.4. This wetland is located south of Deerfield Road within LCFPD property and consists of a large forested wetland depression. The wetland area was dominated by primarily trees in the overstory and a sparse coverage of shrubs in the mid-canopy.

- Wetland #17 has a native FQI of 19.5 and a native mean C-value of 2.9. This wetland site is located in the central portion of the project study area and to the west of Hoffman Lane. The northern portion of the delineated area is located within an INAI site. Wetland #17 is located adjacent to Thorngate Creek. The slopes of the creek contain a sparse mixture of lowland, hydrophytic, woody and herbaceous vegetation.

- Wetland #33 has a native FQI of 32.6 and a native mean C-value of 3.6. This wetland is located within an INAI site at the northeast corner of the Deerfield Road and Hoffman Lane intersection. The wetland site is characterized as a forested flatwoods wetland (see Figure 3-12). At the time of the field visit, the wetland was dominated by somewhat common woodland species, but also contained higher quality species.

Figure 3-12: Flatwoods with dense shrub layer of common buckthorn and black ash

Photograph from INHS Botanical Survey Report, August 2018

- Wetland #34 has a native FQI of 11.5 and a native mean C-value of 2.4. This wetland is located within an INAI site on the north side of Deerfield Road, between Hoffman Lane and Portwine Road (immediately east of Wetland #33). At the time of the field visit, the wetland consisted of a small forested depression and was being invaded by aggressive weed species. In general, the vegetative composition of this wetland was low.

What is a forested flatwoods wetland?

Flatwoods are a somewhat rare woodland, wetland community type that has formed in nearly level and gently undulating topography with a claypan layer underneath the topsoil which tends to prevent water from percolating downward. The soils are slowly permeable and poorly drained.

3.10.2 Will the project impact wetlands?

The proposed improvements will impact 11 wetlands totaling 0.65 acre (see Table C-12 and Figure C-13 at Appendix C). The majority of the wetland impacts affect forested wetlands. The forested wetlands within the project study area provide functions, such as: flood storage and conveyance, groundwater recharge, erosion and sediment control, pollution control, and wildlife habitat.

This project has been discussed at NEPA/404 Merger meetings with various federal and state regulatory/review agencies, including, but not limited to the USACE, USEPA, USFWS, IDNR, and IDNR-SHPO. Refer to Appendix E for meeting summaries. The USACE also participated in the PJD field review for this project.

Prior to construction, all necessary wetland permits and approvals will be obtained. The preferred alternative meets the requirements of the USACE Regional Permit Program. The proposed improvements are anticipated to have minimal individual and cumulative impacts on the aquatic environment. The cumulative wetland and WOUS impact does not exceed 1.0 acre. Except for the HQAR, the wetland impacts are based on the project's proposed right-of-way and easements and represent a worst-case scenario. Wetland impacts at HQAR were based on anticipated construction limits. Avoidance and minimization measures for wetlands throughout the project corridor will continue during the design and permitting process. It is anticipated that the impacts to federally regulated wetlands that are under USACE jurisdiction will be processed under Regional Permit #3 for Transportation Projects. A pre-application meeting will be scheduled with the USACE during Phase II to discuss the proposed improvements and confirm permit processing.

In Illinois, state activities (or activities accomplished with state funds) that impact wetlands require approval under the IWPA. Mitigation is required for all wetland impacts so that there is no overall net loss of the state's existing wetland acres or their functional value. This project qualifies to be processed as a Programmatic Review Action under IDOT's Wetlands Action Plan since the project is on existing and contiguous alignment. IDOT has reviewed the potential wetland impacts based on the preliminary design. For additional information see Appendix D-4.

Because LCDOT is the lead agency for this project, a Lake County WDP will also be obtained from LCSMC prior to any wetland impacts. LCSMC has a representative on the project's SIG and there have also been separate meetings with LCSMC to discuss the project. Refer to Appendix E for meeting summaries. LCSMC also completed the PJD and BV for this project.

3.10.3 How were wetland impacts avoided and minimized?

Reasonable alternatives were discussed with regulatory/review agencies at NEPA/404 Merger meetings and with other project stakeholders and were evaluated based on their ability to satisfy the purpose and need for the project. Alternatives that did not satisfy the purpose and need for the project, or that would have unacceptable impacts in

comparison to other alternatives, were dismissed from further consideration as part the alternatives development and evaluation process.

The preferred alternative will update Deerfield Road to current design standards. To maintain the existing Deerfield Road aesthetics and avoid/minimize impacts to wetlands and other environmental resources to the extent practicable, the preliminary design incorporates a minimum lane width (i.e., 11-feet wide in lieu of standard 12-feet wide) with curb and gutter, minimum lane addition by adding a two-way left turn lane along Deerfield Road instead of also adding a second through lane in each direction, minimum bike path width of 8-feet instead of a standard 12-feet, minimum 5-feet separation between the bike path and roadway edge of pavement, a southern alignment shift in several locations, retaining walls in several locations, minimum slope embankment (3H:1V), and a longitudinal box culvert located within existing Deerfield Road right-of-way between Hoffman Lane and Thorngate Creek in lieu of a larger conveyance ditch. Several of the wetlands that were delineated along the project corridor are being avoided in their entirety. However, there are a number of delineated wetlands (including the HQAR) located within the existing right-of-way. The proposed improvements would take place along the existing Deerfield Road alignment. Due to the close proximity of the wetlands to the existing edge of pavement, the adjacent land use, engineering constraints, detention and compensatory storage needs, and the need to maintain proper site drainage and treat stormwater runoff, all wetland impacts could not be avoided.

Executive Order No. 11990 (EO 11990) states that the agency "...shall provide leadership and shall take action to minimize the destruction, loss, or degradation of wetlands, and to preserve and enhance the natural and beneficial values of wetlands in carrying out the agency's responsibilities." Additionally, pursuant to EO 11990, new construction should not take place in wetlands when there is a practicable alternative and all practicable measures to minimize harm should be taken.

Based upon the above considerations, it is determined that there is no practicable alternative to the proposed construction in wetlands and that the proposed action includes all practicable measures to minimize harm to wetlands that may result from such use.

3.10.4 How will mitigation for wetland loss be accomplished?

The preferred method of mitigation for the 0.65 acre of wetland impact at a 1.5:1 replacement ratio (or a 5.5:1 replacement ratio for impacts to wetlands with an FQI of 20 or more, or presence of an INAI site – see Table C-12 in Appendix C) is to purchase up to 1.74 acres of credit at a USACE, IDNR, and LCSMC

When does the IWPA require a mitigation ratio of 5.5:1?

The IWPA requires a mitigation ratio of 5.5:1 for impacts to wetlands with at least one of the following situations present:

- Presence of a state or federally listed threatened or endangered species;
- Presence of essential habitat of a state or federally listed threatened or endangered species;
- Presence of an INAI site; or
- Wetlands with a native FQI of 20 or more or a native mean C-value of 4.0 or greater.

approved wetland mitigation bank located offsite, but within the same basin as the project (i.e., the Des Plaines River drainage basin). The proposal that will be presented to the regulatory agencies during permitting is to provide the necessary wetland mitigation credit at the Buffalo Creek Forest Preserve Wetland Mitigation Bank in Long Grove, Illinois. Wetland banking will be the first method of mitigation considered during final design and permitting. For additional information see Appendix D-4.

3.11 Special Waste

In accordance with Section 20-12 (*Special Waste Procedures*) of the *Bureau of Local Roads and Streets Manual*, CBBEL completed a special waste screen for the project study area on September 22, 2016. As a result of the special waste screen, it was determined that a Preliminary Environmental Site Assessment (PESA) would be required for the project. IDOT is responsible for the PESA prepared for the state road portion of the project, and the local public agency (LPA) is responsible for the PESA prepared for the non-state road portion of the project. Two PESAs were prepared for the project study area. Under the direction of IDOT, one PESA was prepared by the Illinois State Geological Survey (ISGS) for the Milwaukee Avenue portion of the project study area, dated February 27, 2018. Milwaukee Avenue is under state jurisdiction and this portion of the project study area affects state right-of-way. A second PESA, dated July 24, 2017, was prepared by CBBEL (on behalf of the LPA) for the remainder of the project study area. The cover memo for each PESA is included in Appendix D-5.

3.11.1 Will the project involve any sites affected by special waste?

The PESA prepared by ISGS lists thirteen sites that were determined to contain Recognized Environmental Conditions (RECs) along the Milwaukee Avenue portion of the project study area (see Figure C-2 in Appendix C). These sites include gas stations and other commercial properties, medical buildings, storage facilities, vacant land, a creek, and office buildings (see Figure 3-13).

What is a Recognized Environmental Condition?

A Recognized Environmental Condition (REC) indicates the presence or likely presence of any hazardous substances or petroleum products in, on, or at a property under conditions that indicate an existing release, a past release, or a material threat of a future release into structures on the property or into the environment.

The thirteen sites with RECs identified by ISGS included the following conditions:

- evidence of chemical use (or former use) (at 6 REC sites);
- potential chemical use (or former use) (at 5 REC sites);
- potential drums (at 2 REC sites);
- former dumping (at 1 REC site);
- unknown fill (at 2 REC sites);
- Highway Authority Agreement (HAA) (at 1 REC site);

- presence on the IEPA Bureau of Land (BOL) list (at 1 REC site);
- potential or former monitoring wells (at 6 REC sites);
- impacted soil and/or groundwater (at 6 REC sites);
- spills (at 2 REC sites);
- impacted surface water (at 1 REC site);
- former or potential underground storage tanks (USTs) (at 3 REC sites);
- USTs with documented releases (at 1 REC site);
- volatile organic compounds (VOCs) (at 1 REC site); and,
- VOCs, semi-volatile organic compounds (SVOCs), and metals (at 2 REC sites).

Figure 3-13: REC site located at southeast corner of Milwaukee Avenue / Deerfield Road

Photograph by CBBEL, July 2016

The most common conditions included REC sites with evidence of chemical use (or former use); potential or former monitoring wells; and impacted soil and/or groundwater.

The PESA prepared by CBBEL for the local roads portion of the project study area identified five sites with RECs and/or regulatory database information, including the following conditions (see Figure C-2 in Appendix C):

- previous hazardous materials incident(s) (at 3 REC sites);
- record of leaking underground storage tank (LUST) (at 3 REC sites); and,
- the recorded presence of a UST (at 4 REC sites).

The most common condition included REC sites with the recorded presence of a UST.

Construction of the proposed improvements will require right-of-way acquisition and easements. No building demolition is expected. Further studies, including a Preliminary Site Investigation (PSI) will be performed if the project requires land acquisition, easements, or excavation (including subsurface utility relocation) on or adjacent to a property with RECs. A PSI is performed to determine the nature and extent of contamination. It is the responsibility of Phase II to determine if any of the sites with RECs or right-of-way adjacent to the sites with RECs will be impacted with the proposed work and/or if any right-of-way will be required at any of the REC locations.

Special waste issues that may arise in the construction phase of the project will be managed in accordance with the IDOT *"Standard Specifications for Road and Bridge Construction"* and *"Supplemental Specifications and Recurring Special Provisions."*

3.12 Special Lands

"Special lands" include state designated lands and properties that were acquired or developed with the assistance of IDNR administered grant funds. Types of special lands are discussed in more detail below.

What grants are administered by the IDNR?

A list of grants administered by the IDNR can be found at: https://www.dnr.illinois.gov/grants/Documents/IDNRGrantOpportunitiesListing.pdf

3.12.1 Will the proposed improvements involve Section 6(f) properties?

Section 6(f) of the Land and Water Conservation (LAWCON) Fund Act requires that any property acquired or developed with the assistance of LAWCON funding be used for public outdoor recreation unless otherwise approved by the NPS. In Illinois, LAWCON funding is administered by the IDNR. Based on coordination with IDNR and the LCFPD, LAWCON funding has not been used for the acquisition or development of any land within the project corridor. However, a portion of the Des Plaines River Trail (DPRT) near its northern terminus used LAWCON funds.

The DPRT crosses under Deerfield Road near the western end of the project (see Figure 3-14 and Figure C-2 in Appendix C). The DPRT originates near Russel Road in Wadsworth, Illinois, and follows the Des Plaines River south for nearly the entire length of Lake County (i.e., 31.4 miles) to Lake Cook Road where it connects to the Cook County Forest Preserve Trail system and continues south for another 20 plus miles.

Figure 3-14: DPRT looking north at the Deerfield Road crossing

Photograph by CBBEL, November 2018

As part of the proposed project, periodic temporary daytime closures of the DPRT within the south right-of-way of Deerfield Road will be required for construction access and drainage improvements (see Section 3.13). At this location, the DPRT is managed by the LCFPD. The segment of the DPRT that crosses the project corridor was not acquired or developed using LAWCON funds. The proposed improvements will not result in a conversion of land to a non-recreational use. Improvements are being coordinated with the LCFPD. No impacts to Section 6(f) lands are anticipated as part of proposed improvements.

3.12.2 Will the proposed improvements involve Open Space Lands Acquisition and Development (OSLAD) properties or other properties that have received IDNR administered grant funds?

Open Space Lands Acquisition and Development (OSLAD) is a State-funded grant program with essentially the same compliance procedures as required for the LAWCON Section 6(f) grant program. However, because the OSLAD program is State-funded, concurrence of the NPS is not required for proposed conversion of OSLAD-assisted lands to other than public outdoor recreational use. Based on coordination with IDNR and LCFPD, there have been numerous grants over the years for the development of the DPRT, including, but not limited to OSLAD and the Illinois Bicycle Path Grant. However, the segment of the DPRT that crosses under Deerfield Road at the project corridor was not acquired or developed using OSLAD or other IDNR administered grant funds. No OSLAD or other IDNR administered grant funded parcels are known to be located within the project corridor or will be impacted by the proposed improvements.

3.12.3 Are there any state designated lands in the project study area?

State designated lands include INAI sites, Land and Water Reserves, Natural Heritage Landmarks, and Nature Preserves. The Illinois Natural Areas Preservation Act sets the criteria for these land designations to help protect Illinois' sensitive natural resources. The following state designated lands are located within one mile of the project study area: the Buffalo Grove Prairie INAI site, the Edward L. Ryerson Conservation Area INAI site, the Edward L. Ryerson Nature Preserve, the Herrmann Wildflower Farm Addition Nature Preserve Buffer, and the Herrmann's Woods INAI site. Of these five state designated land sites, four of them are located immediately adjacent to the north side of the proposed Deerfield Road improvements (see Figure C-2 in Appendix C). The Edward L. Ryerson Nature Preserve and INAI site are located adjacent to the Des Plaines River crossing at Deerfield Road. Separately located further east, at the northwest corner of Deerfield Road and Portwine Road, is the Herrmann Wildflower Farm Addition Nature Preserve Buffer and INAI site. Under Illinois law, a dedicated nature preserve buffer has similar status and protection as a nature preserve. The Illinois Natural Heritage Database does not include any records of Land and Water Reserves or Natural Heritage Landmarks within one mile of project study area.

Table 3-17 below provides a summary of the state designated lands located adjacent to the project study area.

Table 3-17: State Designated Land Summary

Site Name	Size (acres)	Ownership (Public or Private)	Basis for Significance
Edward L. Ryerson Nature Preserve (#NP040)	278.9	Public	See INAI #1007 below
Edward L. Ryerson Conservation Area INAI (#1007)	378.0	Public and Private	High-quality natural communities, including mesic floodplain forest, mesic and dry-mesic forest, and northern flatwoods; Recorded presence of a number of state-listed threatened and endangered species; State-dedicated nature preserve
Herrmann Wildflower Farm Addition Nature Preserve Buffer	9.4	Private	See INAI #0664 below
Herrmann's Woods INAI (#0664)	22.2	Private	High-quality natural communities; State-dedicated nature preserve buffer

3.12.4 Will the project affect any state designated lands?

Based on preliminary engineering, impacts to the Buffalo Grove Prairie INAI site, the Edward L. Ryerson Conservation Area INAI site, the Edward L. Ryerson Nature Preserve, and the Herrmann Wildflower Farm Addition Nature Preserve Buffer will be avoided (i.e., proposed improvements are limited to existing right-of-way areas adjacent the state designated lands). A small impact within a privately-owned portion of the Herrmann's Woods INAI site located at the northeast corner of the Deerfield Road and Hoffman Lane intersection will be necessary to complete drainage improvements. At the street corner, a temporary easement of 141 square feet is required for culvert installation/ construction activities and to re-establish existing drainage patterns. A permanent easement of 200 square feet is necessary for future anticipated culvert maintenance. At the intersection, the existing narrow right-of-way and the location of the existing culverts prohibits INAI site avoidance (see Figure 3-15). The distance from the existing edge of pavement to the existing right-of-way varies, but it gets as close as approximately 5 feet and one of the existing culverts is located immediately adjacent to the perimeter of the INAI site. Any drainage improvements (including removal of the existing culvert) at this intersection as part of the proposed improvements would impact the INAI site.

Figure 3-15: INAI site at the northeast corner of Deerfield Road and Hoffman Lane – showing limited right-of-way

Photograph by CBBEL, November 2018

Herrmann's Woods (INAI# 0664) is a Category I (high quality natural community) and III (associated with a state-dedicated Nature Preserve) INAI site. Based on the INHS botanical surveys completed for this project, the high-quality natural community does not extend into the project study area.

3.12.5 How were state designated lands avoided or impacts minimized?

Consultation for the project with respect to state designated lands was initiated with the IDNR through EcoCAT on September 11, 2018 and was updated on January 8, 2020. This project was also coordinated with the Illinois Nature Preserves Commission, LCFPD, and various other stakeholders (see Chapter 4.0 and Appendix E). Avoidance and minimization of impacts to state designated lands located immediately adjacent to the proposed improvements was achieved through the alternatives development process (Chapter 2.0 and Appendix B) and through the use of retaining walls, minimizing lane widths to 11-feet instead of a standard 12-feet, minimizing additional pavement area by adding a two-way left turn lane only instead of also adding a second travel lane in each direction through a majority of the Deerfield Road corridor, and a slight southern alignment shift.

In a letter dated January 22, 2020, the IDNR determined that impacts to the Buffalo Grove Prairie INAI site are unlikely. IDNR also provided the following recommendations to avoid or minimize impacts to the state designated lands located adjacent to the proposed improvements:

Edward L. Ryerson Nature Preserve and Edward L. Ryerson Conservation Area INAI

- Install fencing and signage to clearly delineate the boundaries of the Edward L. Ryerson Nature Preserve to ensure no disturbances occur within the Nature Preserve.
- Avoid parking and staging in areas adjacent to the Nature Preserve.
- Wash equipment before entering the work site next to the Edward L. Ryerson Nature Preserve and INAI site to prevent the transfer of non-native and invasive species into the Nature Preserve.
- Implement and properly maintain soil erosion and sediment control BMPs as required by the NPDES Permit No. ILR10 SWPPP.
- To the extent practicable, avoid temporary and permanent lighting near the boundary of the Edward L. Ryerson Nature Preserve to minimize adverse effects to nocturnal wildlife and to help preserve the integrity of the Nature Preserve. If temporary or permanent lighting is required, implement the following:
    - All lighting should be fully shielded fixtures that emit no light upward.
    - Only "warm-white" or filtered LEDs (CCT <3,000 K; S/P ratio <1.2)[5] should be used to minimize blue emission.
    - Only light the exact space with the amount (lumens) needed to meet highway safety requirements.

[5] LED = Light-Emitting Diode; CCT = Correlated Color Temperature; K = degrees Kelvin; S/P ratio = scotopic/photopic ratio

- If LEDs are to be used, avoid over-lighting based on the higher luminous efficiency of LEDs.

Herrmann's Woods INAI

- Clean all equipment (including, but not limited to: heavy machinery, hand tools, and boots) of all soil and debris prior to entering the INAI site.
- Treat any remaining stump/root complexes of any invasive species that are cleared (e.g., black locust, honeysuckle species, buckthorn, autumn olive) with appropriate herbicide(s) to avoid re-sprouting.
- Upon completion of construction disturbance to the INAI site, re-plant disturbed soil areas only with vegetation native to Lake County, Illinois.

Note: The above practices will be required to promote the integrity of the INAI site and to minimize the establishment of new invasive species in the area.

These recommendations have been incorporated into the project commitments at Section 3.16. In a letter dated January 22, 2020, IDNR closed consultation for this project (see Appendix D-3).

3.13 Section 4(f)

Section 4(f) of the U.S. Department of Transportation (USDOT) Act of 1966 (23 CFR 774) protects historic sites and publicly owned parks, recreational areas, and wildlife and waterfowl refuges.

3.13.1 Are there any Section 4(f) properties located in the project study area?

Within the project study area there are a number of Section 4(f) resources, including: Edward L. Ryerson Conservation Area and NRHP Historic District (LCFPD), Cahokia Flatwoods Forest Preserve (LCFPD), DPRT (LCFPD), the Des Plaines River Water Trail, Woodland Preserve (Village of Riverwoods), and Deerfield Golf Club and Learning Center (Deerfield Park District) (see Figure C-2 in Appendix C). In addition, nine architectural resources within or immediately adjacent to the project study area warrant consideration for listing on the NRHP (see Section 3.3).

3.13.2 Will any land from the Section 4(f) properties be needed for the project (either temporarily or permanently)?

Based on preliminary design, property acquisition (including temporary and permanent easements) from the Section 4(f) properties will not be needed for the project, except as described below.

The proposed project will require a temporary easement of 0.32 acre at the Cahokia Flatwoods Forest Preserve located adjacent to the south side of Deerfield Road to complete the following activities (see Appendix D-6):

- Construction access to widen the existing Deerfield Road bridge over the Des Plaines River - The construction access would take place at an existing LCFPD driveway and access road to minimize tree/brush removal and other potential impacts to forest preserve property (see Figure 3-16). The existing driveway connects the DPRT with the existing LCDOT shared use path (located parallel to the south side of Deerfield Road). The existing driveway would be replaced as part of the proposed improvements.

Figure 3-16: Access road at Cahokia Flatwoods Forest Preserve looking southeast towards the DPRT

Photograph by CBBEL, November 2018

- In-stream construction to widen the existing Deerfield Road bridge over the Des Plaines River - Two existing piers located in the Des Plaines River would be extended to the south to accommodate the bridge widening. The bridge widening will take place within existing Deerfield Road right-of-way. Approximately 0.09 acre of temporary fill is anticipated to complete the in-stream construction. The Des Plaines River Water Trail and in-stream construction methods are discussed in more detail in Section 3.7.

- Access and replace/upgrade two existing 15-inch corrugated metal pipes that convey stormwater runoff under the DPRT - The two existing metal pipes are located within the existing LCDOT right-of-way.

No permanent adverse physical impacts to the Section 4(f) resources are anticipated. The proposed Deerfield Road improvements will not interfere with the activities, features, or attributes of the adjacent Section 4(f) resources. Cahokia Flatwoods Forest Preserve is predominantly undeveloped. The temporary easement will be located along an existing access route at the north end of the preserve.

An existing access driveway is located at the northwest corner of Cahokia Flatwoods Forest Preserve. The access driveway will be accessible to connect with the existing LCDOT shared-use path (located on the south side of Deerfield Road) and the DPRT with periodic closures during construction. Detours will be posted for users during the anticipated short-term temporary closures of the DPRT for culvert replacement and other construction activities. The anticipated temporary closure of the DPRT would be located within the existing Deerfield Road right-of-way at approximately the same location as the temporary closure that took place during construction of the LCDOT shared-use path bridge. Construction of the LCDOT shared-use path and shared-use

path bridge was completed in 2010 and was designed with consideration of the future Deerfield Road improvements.

It is anticipated that causeways and cofferdams will likely be needed within the Des Plaines River to complete the Deerfield Road bridge widening. Flow within the Des Plaines River will be maintained during in-stream construction so that recreational activities (e.g., canoeing) are not prohibited. The water trail is anticipated to remain open during construction activities so that canoeing is not disrupted.

Temporary impact areas at the Cahokia Flatwoods Forest Preserve, the DPRT, and the Des Plaines River will be fully restored. Restoration of forest preserve property will be coordinated with the LCFPD. Disturbed areas within the temporary easement will be returned to existing contours and stabilized with vegetation approved by the LCFPD. The Des Plaines River is jurisdictional under Section 404 of the CWA. A Section 404 CWA Permit will be obtained from the USACE during Phase II for the bridge widening and in-stream construction. Restoration of the Des Plaines River will be completed in accordance with Section 404 CWA Permit requirements.

Based on coordination with FHWA and IDOT Central Bureau of Local Roads and Streets (CBLRS), the proposed Deerfield Road improvements are being considered a temporary occupancy of a Section 4(f) resource and is "so minimal as to not constitute a *use* within the meaning of Section 4(f)." The Section 4(f) Temporary Occupancy Evaluation (per 23 CFR 774.13(d)) completed for the Deerfield Road improvements is included in Appendix D-6.

What is meant by a "use" of a Section 4(f) property?

Generally speaking, a "use" of a Section 4(f) property occurs when:

- Land is permanently incorporated into a transportation facility;
- A temporary occupancy of land is adverse in terms of preservation; or,
- There is a constructive use of the property.

A "constructive use" occurs when the transportation project does not incorporate land from a Section 4(f) property, but the project's proximity impacts are so severe that the protected activities, features, or attributes that qualify the property for protection under Section 4(f) are substantially impaired.

The LCFPD is the Official with Jurisdiction over the Section 4(f) resources adjacent to the proposed Deerfield Road improvements. The LCFPD has a representative on the project's SIG and there have also been three separate meetings with the LCFPD to gather their input on the project (see Chapter 4.0 and Appendix E).

LCDOT has coordinated with the LCFPD regarding the temporary occupancy of the Section 4(f) resources and has provided the LCFPD with the opportunity to review the Section 4(f) Temporary Occupancy Evaluation document prepared for the proposed improvements. Following the public hearing, LCDOT will seek concurrence from the LCFPD that the conditions of 23 CFR 774.13(d) have been met and that the temporary occupancy of the Section 4(f) resources by LCDOT is so minimal as to not constitute a "use" within the meaning of Section 4(f).

3.14 Indirect and Cumulative Impacts

The sections above primarily consider the direct impacts of the proposed improvements. Direct impacts are caused by the construction of the project. However, impacts not directly related to the construction of the project, such as indirect and cumulative impacts, may also occur.

3.14.1 Will the proposed improvements result in indirect impacts?

Indirect impacts are caused by a project, but they occur later in time or in an area that is farther away from the project. Indirect impacts are "reasonably foreseeable," or highly likely to occur after the project is built.

Based on existing traffic data, westbound Deerfield Road is extremely congested near the Milwaukee Avenue intersection in the afternoon. This congestion likely causes many drivers to avoid the roadway. The proposed improvements should relieve congestion and likely increase the use of Deerfield Road. In turn, this could increase the value of businesses near the Milwaukee Avenue intersection. However, the additional free flow traffic in the afternoon hours could also potentially result in deer-vehicle collisions (especially during October through December). Enforcement of the posted speed limit and driver vigilance would minimize the risk.

The majority of the property located in the vicinity of the proposed improvements is built-out or includes preserved open space. There is relatively little undeveloped land located near the project corridor. The existing land use is predominantly single family residential from the Des Plaines River to Saunders/Riverwoods Road with some open space, including forest preserves. West of the Des Plaines River and east of Saunders/Riverwoods Road, the land use is predominately retail/commercial and office/research parks with some open space. There are a few vacant parcels near the east and west project limits.

Over time, it is likely that nearby vacant parcels will be developed, and existing properties will be re-developed. Based on a review of local zoning maps and comprehensive plans, future land use near the project is anticipated to generally remain the same. However, retail/commercial is anticipated to expand along Milwaukee Avenue and additional office/research park development is anticipated along Saunders Road.

3.14.2 Will the proposed improvements result in cumulative impacts?

Cumulative socio-economic or environmental impacts can occur when the impacts from one project are added to the impacts from other past, present, and likely-to-occur projects. When added together, minor impacts from a number of individual and relatively small projects could result in a greater impact to the community and natural resources.

The proposed Deerfield Road improvements and development potentially induced by this project will be subject to applicable ordinance requirements, such as the Lake County WDO and municipal ordinances. The WDO requires that the developer incorporate BMPs into their site design to minimize increases in runoff rates, volumes, and pollutant loads. Preservation of natural resource features (e.g., wetlands, floodplains, and woodlands) on each development site must also be considered during project design. In accordance with these ordinances, potential cumulative impacts to natural resources are anticipated to be minimal.

LCSMC has taken the lead to prepare a Des Plaines River Watershed-Based Plan (dated June 2018/adopted November 2018). LCDOT contributed to the development of the watershed-based plan. This "umbrella" plan updates or completes watershed-based planning for several sub watersheds within the larger Des Plaines River basin, including the subwatershed where the proposed Deerfield Road improvements would occur. The purpose of this effort was to develop a plan to minimize water pollution and flood damage; restore lakes, streams, and wetlands in the watershed to a healthy condition; and provide opportunities for watershed stakeholders to have a role in the process. The watershed-based plan identifies a strategy and guides local stakeholders to implement water quality BMPs that are both cost effective and focused on treating surface water runoff and stormwater. Implementation of the watershed-based plan is anticipated to reduce potential cumulative environmental impacts.

3.15 Irretrievable and Irreplaceable Resources

Implementation of the proposed action involves a commitment of a range of natural, physical, human, and fiscal resources. Land used in the construction of the proposed facility is considered an irreversible commitment during the time that the land is used for a highway facility. However, if a greater need arises for use of the land or if the highway facility is no longer needed, the land can be converted to another use. At present, there is no reason to believe such a conversion will be necessary or desirable.

Considerable amounts of fossil fuels, labor, and highway construction materials such as cement, aggregate, and bituminous material are expended. Additionally, large amounts of labor and natural resources are used in the fabrication and preparation of construction materials. These materials are generally not retrievable. However, they are not in short supply and their use will not have an adverse effect upon continued availability of these resources. Any construction will also require a substantial one-time expenditure of both state and federal funds which are not retrievable.

The commitment of these resources is based on the concept that residents in the immediate area, state, and region will benefit by the improved quality of the transportation system. These benefits will consist of improved accessibility and safety, savings in time, and greater availability of quality services which are anticipated to outweigh the commitment of these resources.

3.16 Environmental Commitments

The following mitigation measures and commitments will be implemented during future phases of the project to minimize environmental impacts associated with the proposed improvements (See Table 3-18):

Table 3-18: Mitigation Measures and Commitments

Description	Responsible Party	Commitment To
Noise abatement measures are likely to be implemented at the southwest corner of the Deerfield Road and Saunders Road intersection. A final decision on noise abatement will not be made until the project's final design is approved and the public involvement process is complete.	LCDOT	IDOT
During the design phase of the project, additional tree impact evaluation will be completed as necessary to avoid/minimize impacts, and a tree mitigation plan will be developed. Impacted trees will be replaced where practicable and feasible. No varieties of ash trees will be planted as replacement trees.	LCDOT	Village of Riverwoods
An ITA shall be obtained from the IDNR for potential impacts to the blackchin shiner prior to the project going to Letting.	LCDOT	IDNR
No tree clearing shall occur between April 1 and September 30 to avoid impacts to the northern long-eared bat.	LCDOT	IDNR and USFWS
Accommodations for the movement of small to medium size terrestrial wildlife will be provided at the Thorngate Creek and Des Plaines River crossings, including the evaluation of a potential wildlife crossing between Wetland #1 and Wetland #15. The design, coordination, and final decision regarding wildlife crossings will continue during Phase II with final engineering and permitting.	LCDOT	Village of Riverwoods and LCFPD
Compensatory storage volume for fill placed in the regulatory floodway and 100-year floodplain of the Des Plaines River will be provided in proposed compensatory storage basins located west of the river and east of Milwaukee Avenue. Compensatory storage volume for fill placed in the 100-year floodplain of Thorngate Creek will be provided in a proposed compensatory storage basin located on the northeast (downstream) side of the Thorngate Creek crossing at Deerfield Road.	LCDOT	IDNR-OWR, IDOT, and LCSMC
Compensation for Wetland/WOUS impacts will be provided in accordance with Section 404 of the CWA, IWPA, and the Lake County WDP. The preferred method of wetland/WOUS mitigation is to purchase credits at a USACE, IDNR, and LCSMC approved wetland mitigation bank located in the Des Plaines River basin. Impact minimization measures will continue during the design and permitting process.	LCDOT	USACE, IDNR, and LCSMC
During Phase II (contract plan preparation and land acquisition) it will be determined if any of the REC sites or right-of-way adjacent to the REC sites will be impacted with the proposed work and/or if any right-of-way will be required at any of these locations. A PSI will be completed, if necessary.	LCDOT	IDOT

Description	Responsible Party	Commitment To
To avoid/minimize impacts to the Edward L. Ryerson Nature Preserve and the Edward L. Ryerson Conservation Area INAI site: • Install fencing and signage to clearly delineate the boundaries of the Edward L. Ryerson Nature Preserve to ensure no disturbances occur within the Nature Preserve. • Avoid parking and staging in areas adjacent to the Nature Preserve. • Wash equipment before entering the work site next to the Edward L. Ryerson Nature Preserve and INAI site to prevent the transfer of non-native and invasive species into the Nature Preserve. • Implement and properly maintain soil erosion and sediment control BMPs as required by the NPDES Permit No. ILR10 SWPPP. • To the extent practicable, avoid temporary and permanent lighting near the boundary of the Edward L. Ryerson Nature Preserve to minimize adverse effects to nocturnal wildlife and to help preserve the integrity of the Nature Preserve. If temporary or permanent lighting is required, implement the following: o All lighting should be fully shielded fixtures that emit no light upward. o Only "warm-white" or filtered LEDs (CCT <3,000 K; S/P ratio <1.2) should be used to minimize blue emission. o Only light the exact space with the amount (lumens) needed to meet highway safety requirements. o If LEDs are to be used, avoid over-lighting based on the higher luminous efficiency of LEDs.	LCDOT	IDNR
To promote the integrity of the Herrmann's Woods INAI site and minimize the establishment of new invasive species in the area: • The Contractor will be required to clean all equipment (including, but not limited to: heavy machinery, hand tools, and boots) of all soil and debris prior to entering the INAI site. • The Contractor will be required to treat any remaining stump/root complexes of any invasive species that are cleared (e.g., black locust, honeysuckle species, buckthorn, autumn olive) with appropriate herbicide(s) to avoid re-sprouting. • Upon completion of construction disturbance to the INAI site, the area will be re-planted only with vegetation native to Lake County, Illinois.	LCDOT	IDNR
Section 4(f) resources affected by the temporary occupancy (i.e., the Cahokia Flatwoods Forest Preserve, the DPRT, and the Des Plaines River) will be fully restored. Restoration of forest preserve property will be coordinated with the LCFPD. Restoration of the Des Plaines River will be completed in accordance with Section 404 CWA Permit requirements.	LCDOT	LCFPD and USACE

3.17 Permits/Certifications Required

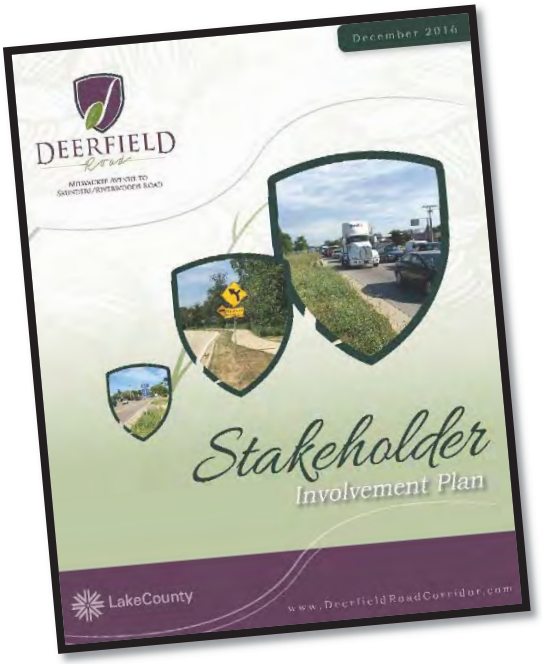
The following permits and certifications will be required from the identified resource/regulatory agencies for this project:

- ITA from IDNR (see Section 3.6.3.4)
- Section 401 CWA Water Quality Certification from IEPA (see Section 3.7.8)
- Section 402 CWA NPDES Construction Permit from IEPA (see Section 3.7.8)
- Section 404 CWA Permit from the USACE (see Sections 3.7.8 & 3.10.2)
- Floodway Construction Permit from IDNR-OWR (see Sections 3.7.8 & 3.9.3)
- IWPA approval from IDOT/IDNR (see Section 3.10.2)
- Lake County WDP from LCSMC (see Sections 3.7.8 & 3.10.2)

Additional information on these permits/certifications and affected resources can be found in Sections 3.6, 3.7, 3.9, and 3.10.

4.0 Comments and Coordination

LCDOT and IDOT provided regular opportunities for project stakeholders from the project area, local government officials, as well as state and federal agencies to participate in the Deerfield Road project through a structured coordination and communication program. The opportunity for participation was open with no persons excluded because of income, race, color, religion, national origin, sex, age, or handicap. This chapter summarizes the agency coordination and public involvement activities that occurred during project development, including the early coordination process, coordination activities with resource agency officials, and meetings with area officials, interested groups, and the public.



A Stakeholder Involvement Plan (SIP) was prepared which provided for a range of public involvement opportunities for this project. The SIP was used as a "blueprint" for defining methods and tools to educate project stakeholders and provide opportunities for stakeholder input as part of the project decision-making process. The SIP also established the Project Study Team that was made up of representatives from LCDOT and the project consultants. The Project Study Team was responsible for the ultimate project decisions made at each project development milestone based on stakeholder input as well as other factors such as transportation performance, design considerations, and environmental impacts. A copy of the SIP is available on the project website (*www.DeerfieldRoadCorridor.com*).

A detailed summary of coordination efforts, key issues, comments, and pertinent information obtained through the agency coordination and public involvement process is provided Appendix E.

5.0 Next Steps

Following the release of the Environmental Assessment (EA) for public review and comment, a public hearing will be held during the public comment period. The EA review and comment period will be a minimum of 30 days. The project team will then address comments and make any necessary changes to the proposed improvement and EA. To document the changes following the EA review, comment period and the public hearing, an Errata to the EA document will be prepared. Specifically, the EA Errata will:

- Reflect changes to the proposed improvement or mitigation measures resulting from comments received on the EA or at the public hearing, if one is held, and the effect of the changes;
- Include any necessary findings, agreements, or determinations for compliance with wetland requirements (see Section 3.10), historic/cultural regulations (Section 106 of the NHPA; see Section 3.3), and public lands/resources (Section 4(f)) regulations (see Section 3.13);
- Incorporate pertinent comments received on the EA and the responses to those comments;
- Include public hearing summary.

After the public comment period concludes, LCDOT and IDOT may recommend to the FHWA that a Finding of No Significant Impact (FONSI) be issued for the project. The FHWA will review the EA, comments submitted on the EA (in writing or at a public hearing or meeting), and other supporting documentation, as appropriate. If the FHWA agrees with the LCDOT and IDOT's recommendations, it will issue a separate written FONSI incorporating by reference the EA and any other appropriate environmental documents. If FHWA determines the project will have a significant impact on the environment, then an Environmental Impact Statement will be required.