



DEPARTMENT OF THE ARMY
ST. LOUIS DISTRICT, CORPS OF ENGINEERS
ROBERT A. YOUNG BUILDING - 1222 SPRUCE ST.
ST. LOUIS, MISSOURI 63103-2833

06 August 2018

Reply to:

U.S. Army Corps of Engineers
St. Louis District
Environmental Compliance Section (PD-C)
1222 Spruce Street
St. Louis, MO 63103-2833

Dear Sir or Madam:

The St. Louis District of the U.S. Army Corps of Engineers has prepared a Draft Environmental Assessment (EA) and unsigned Finding of No Significant Impact (FONSI) for proposed shoreline revetment and real estate acquisition at Carlyle Lake within Bond, Clinton, and Fayette Counties, Illinois. The EA and FONSI are available for public review. The electronic version of these documents are available online at:

<http://www.mvs.usace.army.mil/Portals/54/docs/pm/Reports/EA/CarlyleLakeShorelineErosionEA.pdf>

or you may request a copy of the draft EA and unsigned FONSI be mailed to you. The FONSI summarizes the anticipated effects of the project on the environment. The FONSI is unsigned and will be signed only after comments received as a result of this public review have been considered.

The St. Louis District of the U.S. Army Corps of Engineers is proposing to repair three erosion areas using revetment and acquire 17 other erosion areas around Carlyle Lake. Collectively, the shoreline revetment would total approximately 1,600 linear feet. Approximately 105.5 acres of real estate would be acquired as part of this proposed project. Areas acquired would be integrated into Carlyle Lakes' existing management activities.

Please provide any comments you may have regarding this project. For questions, comments, or to request a printed copy, please contact: Dr. Alison Anderson of the Environmental Compliance Section, **telephone** 314-331-8458 or **e-mail** at Alison.M.Anderson@usace.army.mil. Written comments may be sent to the address above, ATTN: Environmental and Planning Branch (PD-C, Anderson). Please respond by close of business on 05 September 2018.

Sincerely,

A handwritten signature in blue ink that reads "TC Allen".

Teri C. Allen, Ph.D.
Chief, Environmental Compliance Section

**Draft Environmental Assessment
with
Unsigned Finding of No Significant Impact (FONSI)**

**Carlyle Lake Shoreline Erosion
Kaskaskia River, River Mile 94.2
Bond, Clinton, and Fayette Counties, Illinois**



August 2018

**U.S. Army Corps of Engineers
St. Louis District
Regional Planning & Environmental Division North
1222 Spruce Street
St. Louis, Missouri 63103-2833
Telephone Number: (314) 331-8458**

1 INTRODUCTION

This Environmental Assessment (EA) has been prepared in accordance with the National Environmental Policy Act (NEPA) of 1969 and the Council on Environmental Quality's Regulations (40 Code of Federal Regulation §1500-1508, as reflected in the USACE Engineering Regulation 200-2-2. This EA evaluates the direct, indirect, and cumulative environmental, cultural, and social effects of the proposed shoreline erosion remediation efforts at Carlyle Lake, Bond, Clinton, and Fayette Counties, Illinois.

1.1 AUTHORITY

Carlyle Lake was authorized by Congress through the Flood Control Act of 28 June 1938 and modified by the Flood Control Act of 1958, House Document No. 232, Eighty-fifth Congress, 1st session. Carlyle Lake has other authorized purposes including:

Flood Risk Management. Authorized by Public Law (PL) 75-761, June 28, 1938, Flood Control Act of 1938 and PL 85-500, July 3, 1958, Flood Control Act of 1958 (Title II). The primary mission of Flood Risk Management is to save lives and reduce property damage associated with storms and floods.

Navigation. Authorized by PL 85-500, July 3, 1958, River and Harbor Act of 1958 (Title I). The primary mission of Navigation is to provide safe, reliable and efficient waterborne transportation systems for the movement of commerce, national security needs and recreation.

Water Supply. Authorized by PL 85-500, July 3, 1958, Water Supply Act of 1958 (Title III). The primary mission of water supply is to develop, control, maintain, and conserve the Nation's water resources.

Water Quality. Authorized by PL 78-534, December 22, 1944, Flood Control Act of 1944. The primary mission of water quality is silt control, soil erosion prevention, pollution abatement, improving water quality for municipal water supplies, recreation and fish and wildlife conservation.

Fish & Wildlife Conservation. Authorized by PL 85-500, July 3, 1958. The primary mission of fish & wildlife conservation is to manage and conserve natural resources, consistent with ecosystem management principles, while providing quality public outdoor recreation experiences to serve the needs of the present and future generations.

Recreation. Authorized by PL 78-534, December 2, 1944, Flood Control Act of 1944 and PL 85-500, July 3, 1958, River and Harbor Act, Title 1 The primary mission of recreation is to provide a sustainable level of high quality water oriented outdoor recreation opportunities within a safe and healthful environment that meets the needs of present and future generations.

1.2 PROJECT LOCATION

The Carlyle Lake watershed encompasses approximately 1,663 square miles, which includes all or portions of Bond, Clinton, Effingham, Fayette, Marin, Shelby, and Montgomery counties, Illinois. The watershed includes the Kaskaskia River between Carlyle Lake Dam and Lake Shelbyville Dam. Major tributaries of this watershed include: Big Creek, Richland Creek, Robinson Creek, and the East Fork

Kaskaskia River. Carlyle Lake is largely located in Clinton County, Illinois, with smaller portions of the lake within Bond and Fayette Counties (Figure 1). The dam site is located on the Kaskaskia River about 50 miles east of St. Louis, MO, at Kaskaskia River Mile 94.2. The lake is 12 miles long and is 1 to 3 miles wide and has approximately 26,000 acres of water surface at summer elevation. The lake shoreline is 88 miles and there are approximately 12,800 acres of public land managed primarily by the USACE, but the Illinois Department of Natural Resources (IDNR) also plays a significant role in management of public lands. The lake is a shallow reservoir susceptible to high winds and serves as a heavy recreational usage lake and supplies water to numerous communities. The land surrounding the lake is used predominately for agriculture.

1.3 PURPOSE AND NEED

The underlying need for action is to address the ongoing degradation of resources at Carlyle Lake. The purpose of the project is to provide long-term, minimal-maintenance stabilization that reduces erosion and prevents losses of resources. This EA evaluates the existing conditions and proposed alternatives to ultimately recommend an action to reduce erosion factors at Carlyle Lake. High erosional areas were identified for consideration under the Carlyle Lake Shoreline Erosion Study, Engineering Letter Report, 18 July 2017, approved by the Chief of the Engineering and Construction Division, St. Louis District.

Land acquisition for the Carlyle Lake project was initiated in 1958 and continued into the early 1960's utilizing the land acquisition policy referred to as the Eisenhower policy. This policy provided for a minimal amount of land acquisition around the shoreline of a multi-purpose reservoir such as Carlyle Lake. This policy minimized land acquisition costs initially. Shoreline erosion issues have existed at Carlyle Lake since at least the 1980's, and possibly dating back to the creation of the Lake extending the project waters onto private lands and resulting in requirement that this agency periodically revisit the project to acquire additional land from private interests. In January 1989, a letter report was approved which proposed a combination of land acquisition and revetment to solve the ongoing shoreline erosion issues at nine locations around the Lake. Following the approval of the 1989 letter report, revetment was placed and the efforts to acquire land began. Due to funding constraints and unwilling sellers, the land acquisition has proceeded very slowly since the report approval. Since this time, the erosion issues have continued to progress at some locations originally identified, including areas 2, 4, 7, and 8, as well as many new locations (Figure 1).

One contributing factor for the shoreline erosion issues at the Lake is the location fee lands and flowage easements elevations acquired when Carlyle Lake was created. The elevation of the summer guide curve elevation at the Lake is Elevation (EL) 445.00 ft. National Geodetic Vertical Datum of 1929 (NGVD), winter guide curve elevation is EL 443 ft. NGVD, while the top of the flood control pool is EL 462.5 ft. NGVD. During the construction of the lake, fee land was only acquired up to EL 450 ft. NGVD, with flowage easement acquired between EL 450 ft. and EL 462.5 ft. NGVD. As fee land was only acquired up to EL 450 ft NGVD, there is very little real estate between the normal Lake boundary and the fee land acquired. When frequent floods and high winds occur, the glacial clay till soil, which has limited resistance to wave action, erodes at an accelerated pace causing the shoreline to creep towards and encroach upon private property.

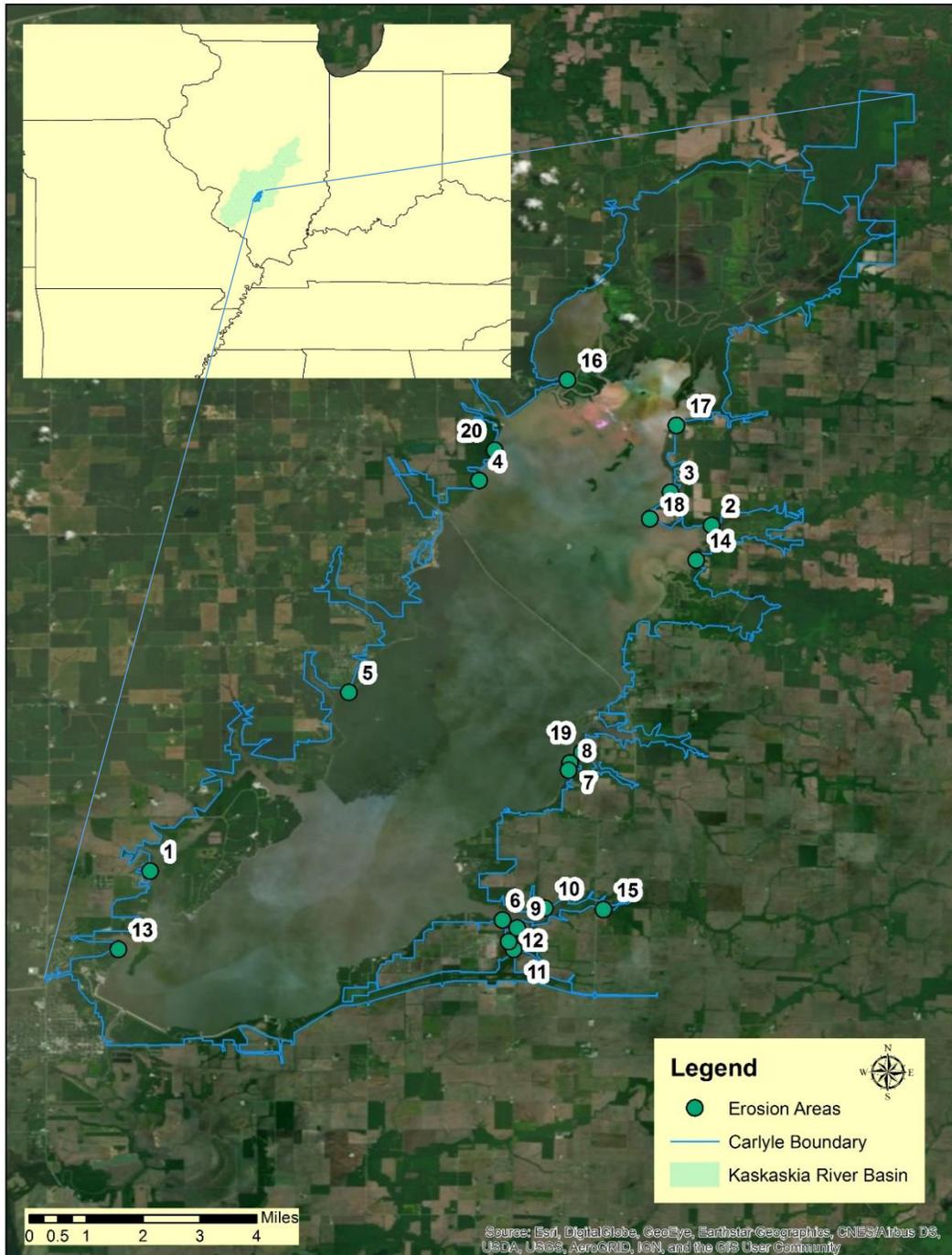


Figure 1. Carlyle Lake erosional areas identified in the Carlyle Lake Shoreline Erosion Study, Engineering Letter Report (July 2017).

2 ALTERNATIVES CONSIDERED

This section of the EA describes the alternatives considered and summarizes the alternatives in terms of their environmental impacts. Action alternatives were developed by identifying two measures to address shoreline erosion. The measures include real estate acquisition and shoreline revetment. Hydraulic models

were used to determine adequate height of the design wave and the resulting run-up on the slope of the shoreline which led to real estate boundaries needed. A no action alternative is also considered for all areas under consideration, as required by NEPA. All alternatives were evaluated for each erosion area and the most cost effective alternative was selected for each erosion area.

2.1 NO ACTION ALTERNATIVE

Under the no action alternative, no real estate would be acquired and no shoreline revetment would be placed at Carlyle Lake. Without actions to stabilize the shoreline along the lake, it would continue eroding at the current rate until a stable beach slope of 1V (vertical) on 15H (horizontal) is naturally reached. The Carlyle Lake Shoreline Erosion Study, Engineering Letter Report, 18 July 2017 estimated that the maximum top of the stable beach slope would occur at an elevation of 465.5 ft. NVGD. Once a stable beach slope is reached vegetation may repopulate the bank protecting it from further loss of materials. Within these erosion limits, possible losses could reach 112.5 total acres of land and 11 residential structures. See Table 1 for site specific possible losses.

Table 1. Possible land and residential structure losses anticipated if no action was taken to address on-going shoreline erosion.

Erosion Area	Possible Losses	Erosion Area	Possible losses
1	Three residential structures; 3.0 acres	11	2.9 acres
2	3.9 acres	12	1.9 acres
3	One residential structure; 7.5 acres	13	3.7 acres
4	12.0 acres	14	4.4 acres
5	0.9 acres	15	2.4 acres
6	9.6 acres	16	5.6 acres
7	Four residential structures; 2.4 acres	17	2.4 acres
8	Three residential structures; 1.6 acres	18	7.2 acres
9	14.2 acres	19	1.4 acres
10	11.4 acres	20	14.1 acres

2.2 REAL ESTATE ACQUISITION ALTERNATIVE

Under the real estate acquisition only alternative, a complete buy-out of the property needed to provide for the ultimate erosion limits (i.e., up to elevation 465.5 ft. NVGD) would be realized. This alternative would result in a buy-out costing over \$5.2 million, if acquisition was selected for all erosion areas. The lands acquired under this alternative would be managed by U.S. Army Corps of Engineers Carlyle Lake staff and follow the Carlyle Lake management plan. In addition, these areas would have no revetment placed and would continue to erode at the current rate until a stable natural beach slope is established as described in the No Action Alternative.

2.3 SHORELINE REVETMENT ALTERNATIVE

Under the shoreline revetment only alternative, revetment would be placed on the entire shoreline of each area for the ultimate shoreline protection. This alternative would result in over 20,700 linear feet of total revetment being placed for this proposed project, if selected for all erosion areas. A revetment solution could not be developed for Areas 5 and 10 due to the relatively flat ground surfaces in these areas. The

cost associated with this alternative includes the cost of the real estate acquisition required to place and maintain the revetment, if applicable.

This alternative would include revetment of the shoreline of areas to prevent further erosion. These areas require attention because of jeopardized facilities and properties. Repair areas are best repaired by reshaping the shoreline slope above the existing established beach slope, then placing a 12-inch layer of bedding stone followed by a 30-inch layer of 1000 pound riprap. Also, a permanent turf reinforcement mat would be placed above the top elevation where the riprap protection terminates. Any exposed soil remaining after the placement of revetment would be seeded with a native grass mixture. Where possible, riprap and bedding would be placed on grade without reshaping the slopes, however in some areas vegetation removal may be required. In some areas, bedding material would be placed to re-establish the shoreline slope. In other areas, excavation may be required to obtain the required thickness of riprap erosion protection. The upper limit of riprap protection is EL 460 ft. NVGD unless top of bank was lower; then elevations were adjusted based on the top of current erosion and slopes of the existing terrain. The lower limit of riprap is EL 443 ft. NVGD unless top of beach slope is higher. In some instances upper limits of protection were adjusted. This would minimize the amount of property acquisition required to place and maintain riprap protection, or to avoid large amount of riprap placed on gently sloping terrain.

2.4 TENTATIVELY SELECTED PLAN (TSP) BY EROSION AREA

For each erosion area with more than one feasible alternative, alternative plans were compared. Table 2 displays the 20 erosion areas and the feasible alternatives there were identified and considered.

Environmental and cultural impacts were considered for each erosion area. However, the cost of each alternative was ultimately the deciding factor in selecting one alternative over the other in order to address the shoreline erosion at Carlyle Lake.

The Tentatively Selected Plan (TSP) for each erosion area to address the shoreline erosion consists primarily of real estate acquisition. Of the 20 erosion areas, 17 of them would be acquired for a total of approximately 105.5 acres. However, three erosion areas (areas 1, 7, and 8) have several residential structures (Table 1) which would make it cost prohibitive to acquire real estate, therefore the revetment alternative was selected for those areas. For these areas, a total of approximately 1,600 LF of revetment would be needed to address the ongoing shoreline erosion.

Table 2. Alternatives considered and the Tentatively Selected Plan for each erosion area in order to address shoreline erosion at Carlyle Lake.

Erosion Area	Possible Erosion Control Measures			Considerations	Tentatively Selected Plan
	No Action	Acquisition	Revetment		
1	X	X	X	Three residential structures; Cost	Shoreline Revetment
2	X	X	X	Cost	Real Estate Acquisition
3	X	X	X	Cost	Real Estate Acquisition
4	X	X	X	Cost	Real Estate Acquisition
5	X	X		Not enough slope to place revetment	Real Estate Acquisition
6	X	X	X	Cost	Real Estate Acquisition
7	X	X	X	Four residential structures; Cost	Shoreline Revetment
8	X	X	X	Three residential structures; Cost	Shoreline Revetment
9	X	X	X	Cost	Real Estate Acquisition
10	X	X		Not enough slope to place revetment	Real Estate Acquisition
11	X	X	X	Cost	Real Estate Acquisition
12	X	X	X	Cost	Real Estate Acquisition
13	X	X	X	Cost	Real Estate Acquisition
14	X	X	X	Cost	Real Estate Acquisition
15	X	X	X	Cost	Real Estate Acquisition
16	X	X	X	Cost	Real Estate Acquisition
17	X	X	X	Cost	Real Estate Acquisition
18	X	X	X	Cost	Real Estate Acquisition
19	X	X	X	Cost	Real Estate Acquisition
20	X	X	X	Cost	Real Estate Acquisition

3 AFFECTED ENVIRONMENT

This section describes existing conditions in the proposed project area, which are referred to under the NEPA process as the Affected Environment. The resources described in this section are those recognized as significant by laws, executive orders, regulations, and other standards of national, state, or regional agencies and organizations; technical or scientific agencies, groups, or individuals; and the general public.

3.1 TOPOGRAPHY, GEOLOGY, AND LAND USE

The topography of the land around the lake is one of moderately low relief with gently rolling hills and alluvial valleys. The highest elevation in the area is about four miles southwest of Carlyle, Illinois and is approximately 580 ft. NGVD. More than seventy percent of the land in the area has a slope of less than 2 percent. Of the remainder, slightly less than 20 percent of the land is gently sloping and only about 10 percent has a slope of 5 percent or more. The normal summer pool (joint use pool) of the lake is 445.0 NGVD, which provides a water surface area of approximately 25,000 acres and 87 miles of shoreline. The lake extends upstream from the dam about 13 miles and is 1 to 3 miles wide.

Bedrock is seldom exposed in the Carlyle Lake area because it is buried by younger glacial age materials. The youngest bedrock is from the Pennsylvanian period, which is 320 to 286 million years ago. This is where major deposits of coal are found in this part of Illinois. Herrin #6 Coal is the major seam of coal found in this area and it is located about 500 feet below Carlyle Lake and the surrounding region. Deeper and older rock formations yield minor amounts of oil and natural gas.

The youngest materials found at the surface consist of glacial derived materials such as till and loess. During the Illinoisan period, about 191,000 to 130,000 years ago, the region was covered in ice, which eroded the upland and covered the area with glacial materials. This activity created the smooth plain and shallow valley topography we see within the region today. This glacial till can be seen along the wave-cut banks of the lake and is called Vandalia till. It is generally composed of silt with some small pebbles.

According to the National Land Cover Database (NLCD; Homer et al., 2015) the area surrounding Carlyle Lake is predominately cultivated crops and pasture lands. The land areas within the Carlyle Lake boundary are primarily made up of mixed and deciduous forests, forested and emergent wetlands, and small amounts of open space and low intensity development. Some of the areas of development consist of campgrounds, parking lots, and Carlyle Lake management facilities. The area of high intensity developed land that bisects Carlyle Lake is the Burlington and Northern Railroad crossing.

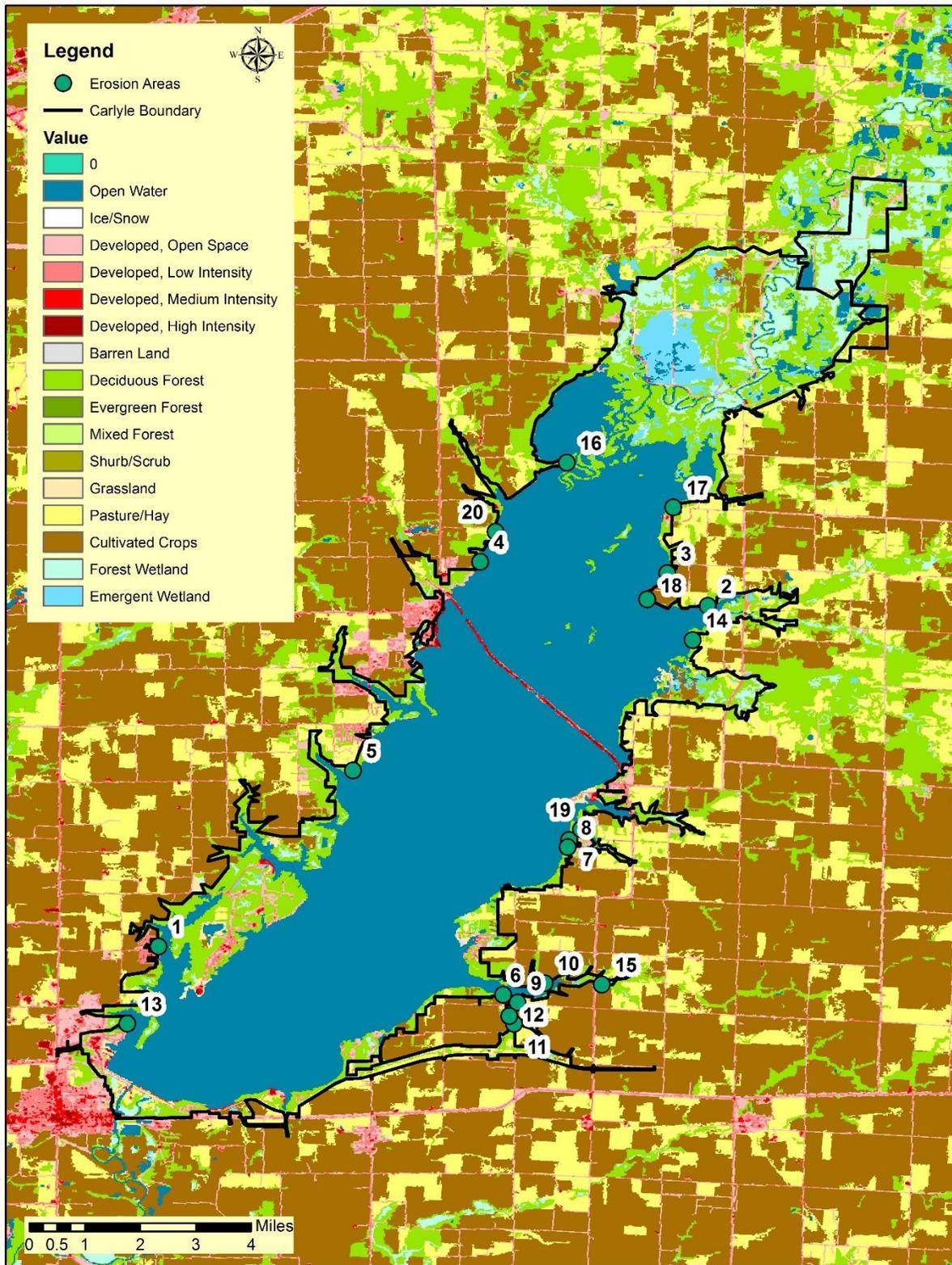


Figure 2. National Land Cover Database (Homer et al., 2015) for Carlyle Lake and the surrounding area.

3.2 HAZARDOUS, TOXIC, AND RADIOACTIVE WASTES

The U.S. Army Corps of Engineers, Engineer Regulations (ER 1165-2-132 and ER 200-2-3), and St. Louis District policy, requires procedures be established to facilitate early identification and appropriate consideration of potential hazardous, toxic, or radioactive water (HTRW) in reconnaissance, feasibility, preconstruction engineering and design, land acquisition, construction, operations and maintenance, repairs, replacement, and rehabilitation phases of water resource studies or projects by conducting HTRW Initial Hazard Assessments. USACE specifies that these assessments follow the process/standard practices for conducting Phase I Environmental Site Assessments published by the American Society for Testing and Materials (ASTM). The objective of the Phase I was to identify, to the extent feasible pursuant to the process described, recognized environmental conditions (RECs) in connection with a given property(s). This assessment is prepared using the following ASTM Standards:

- E1527-13: Standard Practice for Environmental Site Assessments – Phase I Environmental Site Assessment process
- E1528-06: Standard Practice for Limited Environmental Due Diligence: Transactions Screen Process (interview questionnaires)
- E2247-08: Standard Practice for Environmental Site Assessments: Phase I Environmental Site Assessment Process for Forestland or Rural Property

The purpose of this Phase I Environmental Site Assessment was to identify, to the extent feasible in the absence of sampling and analysis, the range of contaminants within the scope of the U.S. Environmental Protection Agency's (EPA) Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) and petroleum products. A Phase I Environmental Site Assessment was completed for the Carlyle Lake Shoreline Erosion Project on 05 April 2018 (USACE, 2018). The scope of the Phase I consisted of the following four components: 1) records review; 2) site reconnaissance; 3) interviews; and 4) report. The assessment revealed no RECs in connection with these properties. There are no records indicating any spills, pesticide/herbicide use, or HTRW contamination. Therefore, no Phase II assessment is necessary for the project areas.

3.3 HYDROLOGY AND HYDRAULICS

The normal summer pool (joint use pool) of the lake is 445.0 NGVD, which provides a water surface area of approximately 25,000 acres and 87 miles of shoreline (Table 3). The Lake extends upstream from the dam about 13 miles and is 1 to 3 miles wide. At the maximum pool elevation (flood control pool), the water surface area can reach approximately 58,500 acres and a depth of 58 ft. Carlyle Lake operations has the authority to operate within Inactive and Flood Control Pools depending on incoming flows, precipitation, and downstream river conditions as outlined in the Water Control Manual (USACE 2007).

Since the geology over much of the Kaskaskia River Watershed is unfavorable for the development of extensive groundwater systems, Carlyle Lake is primarily supplied water from surface streams. These streams include: Kaskaskia River, Hurricane Creek, East and North Forks of the Kaskaskia River, Hickory Creek, Brewster Creek, Coles Creek, Peppenhurst Branch, Allen Creek, and Gibbes Creek.

Table 3. Authorized pool elevations for Carlyle Lake and their corresponding surface areas and water depths.

Lake Pool	Elevation (ft)	Water Surface Area (acres)	Max. Water Depth (ft)
Inactive Pool (Minimum)	429.5	6,672	25
Joint-Use Pool (Normal)	445.0	24,710	40
Flood Control Pool (Maximum)	462.5	58,447	58

3.4 WATER QUALITY

The water quality in Carlyle Lake and the downstream river channel is generally good and is of suitable quality for uses, such as water supply, primary and secondary water contact recreation, and support of desirable biological communities. A routine water quality monitoring and investigation program is in place and managed by the USACE. Generally, the water collected at all sampling sites in the lake as part of the annual water quality monitoring at Carlyle Lake, tributaries and tailwater meet or exceed Illinois water quality standards for primary and secondary water contact recreation, which include swimming, boating, fishing and water skiing (USACE, 2015a). Even though phosphorous levels routinely exceed Illinois water quality standards, discharge from the lake generally has lower concentrations of phosphorous than the incoming tributary flows. Also on a few occasions, the tailwater has not met the minimum dissolved oxygen standards established by the State of Illinois.

According to the 2018 Illinois Integrated Water Quality Report 303(d) List, Carlyle Lake is listed as impaired due to Total Phosphorus, Total Suspended Solids, and Mercury. Therefore, the lake is not supporting the Designated Uses of fish consumption (Mercury), and impacts to Aesthetic Quality (Total Phosphorus causing eutrophication and Total Suspended Solids causing turbidity). The primary tool used to assess aesthetic quality for freshwater lakes is the Aesthetic Quality Index (AQI). The AQI represents the extent to which pleasure boating, canoeing, and aesthetic enjoyment are attained at a lake. Continued water quality monitoring would ensure the potential for water quality degradation is kept to a minimum.

Because the lake is very shallow and susceptible to high winds, it often prevents the lake from stratifying permanently during the summer months. Extended periods with little wind and high air temperatures, combined with elevated phosphorous levels, increase the likelihood of undesirable algae blooms. Upon subsequent algae die off, the dissolved oxygen in the lake as well as the downstream discharge can become severely depressed. This condition, combined with minimum downstream discharge, can cause minor fish kills in the lake as well as below the dam. When this occurs operational modifications such as changing the release source from the sluice gate to the spillway are implemented in order to improve downstream water quality. In addition, the minimum release is increased from 50 cubic feet per second (cfs) to 100 cfs. Using these management techniques helps to ensure that the lake continues to provide a suitable source for drinking water with the exception of potential taste and odor issues sometimes associated with algae blooms.

Section 404 of the Clean Water Act (33 U.S.C. 1344), Nationwide Permit (NWP) No. 13 permits bank stabilization activities necessary for erosion control and prevention. In the state of Illinois, this NWP includes a Section 401 of the Clean Water Act Certification as long as Regional Conditions are met. This Certification requires the use of Best Management Practices (BMPs) to protect water quality, preserve

natural hydrology, and minimize the overall impacts to aquatic resources during and after construction and the assessment of any potential impacts to State threatened and endangered species.

3.5 VEGETATION AND WETLANDS

Remnants of old forest can still be found along the stream channels that feed the upper reaches of the lake, around sub-impoundments, and below the main dam. This forest is dominated with pin oak, cottonwood, pignut hickory, and maple while the undergrowth largely consists of young pin oak. The upper portions of Carlyle Lake/Kaskaskia River consists primarily of oak-hickory forests with numerous old field sites. The old field sites are in various stages of succession which vary from pure stands of grasses and forbs to intermediate-aged oak-hickory forests. Forest and vegetative management practices vary from tree planting in recreational areas and maintaining old field clearings for wildlife to active restoration of wetland habitats. In addition, some areas are minimally managed in which natural ecological processes and succession are allowed to proceed.

Wetland habitat restoration has been a primary objective at the James Hawn Access, Boulder Flats, Steins Field, Grasher Creek Access, and Saddle Dam 3 areas (Figure 3). However, there are several areas around Carlyle Lake that have high concentrations of wetland habitats. According to the National Wetland Inventory (2016), there are approximately 3,000 acres of emergent wetland and 7,800 acres of forested wetland, along with numerous freshwater ponds, within the lake boundary (Figure 3). Some areas of Carlyle Lake have established semi-aquatic plants including smartweed, arrowhead, willow, buttonbush, reed grass, lotus, and cattails. However, water-level fluctuations, continued shoreline erosion, and deterioration of flooded timber stands has led to a decrease in existing vegetated habitats and has promoted the spread of invasive species.

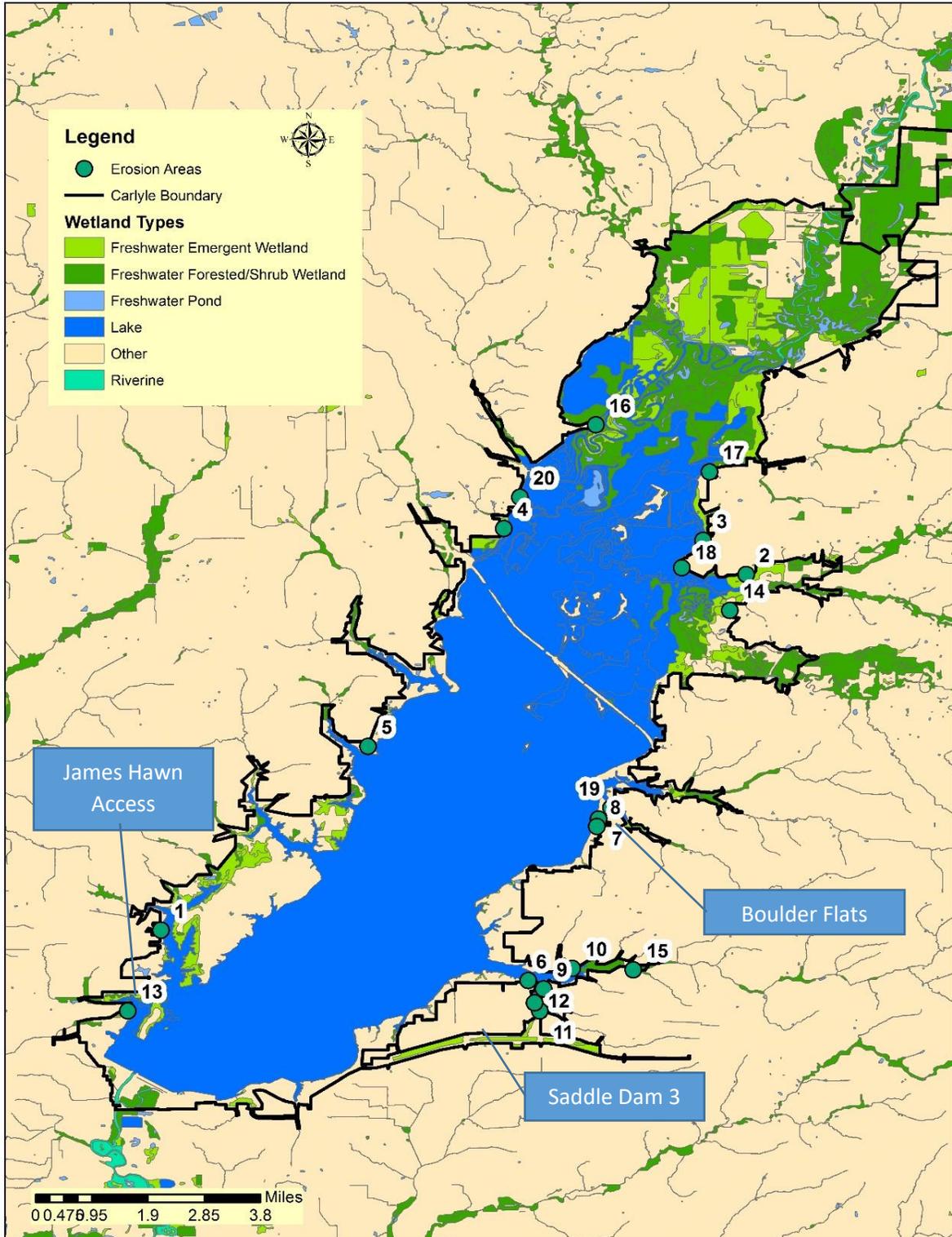


Figure 3. Various wetland types within the Carlyle Lake boundary (USGS, 2016) and the erosional areas being evaluated.

3.6 AQUATIC HABITATS

Carlyle Lake is the largest man-made lake in Illinois. It is approximately 12 miles long and 1 to 3 miles wide and has approximately 26,000 acres of water surface area at summer pool elevations. The lake shoreline is 88 miles and there are approximately 11,000 acres of public land managed primarily by the USACE, but the Illinois Department of Natural Resources (IDNR) also plays a significant role in management of public lands. The lake is a shallow reservoir susceptible to high winds. High winds can lead to increases in erosion and turbidity and prevent lake stratification during the summer months. High air temperatures during the summer months increase the likelihood of the development of undesirable algae blooms, which can lead to decreases in dissolved oxygen and subsequent fish kills.

The coves surrounding the lake are very shallow which prevents most access by motorized watercraft. These areas provide beneficial habitats for a variety of fish, birds, amphibians, and reptiles. Aquatic habitats in specific areas are enhanced by placing recycled Christmas trees in shallow areas every March in order to provide nesting habitat, cover, and food sources for fish and other aquatic organisms. The primary tributaries that flow into the lake include: Kaskaskia River, Hurricane Creek, East and North Forks of the Kaskaskia River, Hickory Creek, Brewster Creek, Coles Creek, Peppenhorst Branch, Allen Creek and Gibbes Creek.

3.7 FISH AND WILDLIFE

Carlyle Lake is home to approximately 50 different species of fish. Major recreational species include: white and black crappie; bluegill; green sunfish; red ear sunfish; long ear sunfish; largemouth bass; white bass; channel, blue, and flathead catfishes; gizzard shad; and a variety of other fish species. The U.S. Army Corps of Engineers in cooperation with the IDNR provide stocking and habitat improvement programs aimed at increasing fish populations and species diversity. Currently, there are eight fishing “hot spots” in which artificial habitats have been placed in the lake to attract fish. USACE and IDNR have supplemented the largemouth bass and white crappie populations by stocking fish from their local brood ponds. Sauger and walleye fingerlings and hybrid striped bass have also been stocked in the past.

Wildlife species occupying the area include birds, bats, small terrestrial mammals, and other species common to the region. Watching wildlife is a quickly growing outdoor recreational activity in the region. Carlyle Lake is a mid-migration resting area for waterfowl and other migratory birds, which provides visitors ample opportunities to view wildlife. Upland game management areas can be found around the lake which provides opportunities to visitors to see white-tailed deer, turkey, squirrels, bobwhite quail, rabbits, and mourning doves.

There are two state-managed wildlife areas at Carlyle Lake, which include Eldon Hazlet State Park and the State Fish and Wildlife Area. Eldon Hazlet State Park is located on the west side of Carlyle Lake and is leased by the IDNR from USACE. The park has more than 300 acres designated for public hunting. The State Fish and Wildlife Area is located at the northern end of Carlyle Lake. Within this area, there is approximately 2,000 acres of woodlands, 5,800 acres of open water and wetlands, 200 acres of grassland, and 1,500 acres of cropland planted for food and cover for wildlife. Other areas that are not utilized for high density recreation are managed for wildlife habitat, which includes: tree planting, wildlife food plots, successional control of grasslands, and nest box construction and placement.

3.8 THREATENED AND ENDANGERED SPECIES

3.8.1 State Listed Species

In accordance with the General Conditions outlined in Clean Water Act Section 404 NWP and the associated Section 401 Water Quality Certification from the State of Illinois, the proposed project should take into consideration impacts to state listed threatened and endangered species.

The Illinois Department of Natural Resource (IDNR) was contacted via the Ecological Compliance Assessment Tool (EcoCAT) website on 29 May 2018, for a list of Illinois State threatened and endangered species that could potentially be located in the project areas (IDNR project number: 1811379; Attachment 1). The Illinois Natural Heritage Database shows that eight species may be in the vicinity of the proposed project location. These species include: barn owl (*Tyto alba*), Indiana Bat (*Myotis sodalis*; see Section 3.8.2-Federally Listed Species), Least Bittern (*Ixobrychus exilis*), Eastern Massasauga (*Sistrurus catenatus*; see Section 3.8.2-Federally Listed Species), Ornate Box Turtle (*Terrapene ornata*), Osprey (*Pandion haliaetus*), and Spring Ladies' Tresses (*Spiranthes vernalis*).

Barn Owl. The barn owl is a cavity-nesting bird which relies on dead or hollow trees, old barns, or other unoccupied buildings for roosting and nest sites, and requires grasslands and other open areas for hunting. In Illinois, land use change from hay and pasture to row crops correlate with the decline of grassland birds, including the barn owl (Walk et al. 2010). The barn owl specializes in hunting small ground mammals including voles, field mice, and rats. Barn owls can quickly colonize areas of suitable habitat, readily adopt nest boxes, are tolerant of human presence, and are capable of high reproductive output and rapid population growth. Although barn owls are rare in Illinois, their populations are secure in Mississippi River Valley states south of Illinois, and populations in some Midwestern states, like Missouri and Ohio, appear to be expanding (Walk et al. 2010).

Least Bittern. The least bittern is an uncommon migrant and summer resident in Illinois. It is mostly seen near Lake Michigan in Cook and Lake Counties in cattail marshes. Spring migrants begin arriving in Illinois in April and typically leave in September. Their diet primarily consists of minnows, insects, frogs and small amphibians, crayfish, and even small mammals. The least bittern is threatened in Illinois mainly due to wetland destruction and human disturbance.

Ornate Box Turtle. The ornate box turtle is a terrestrial species that prefers sand and black soil prairies. It burrows in the ground to escape heat in the summer and cold in the winter. With 99 percent of Illinois' original prairies destroyed, the decline in ornate box turtle numbers is attributed to the loss of habitat, which resulted in this species being listed as an Illinois threatened species in 2009. Other threats to this species include habitat fragmentation, road mortality, and collection by turtle enthusiasts. Their diet primarily consists of insects, snails, earthworms, tadpoles, carrion, berries, and other plant materials.

Osprey. The osprey is a predatory bird that feeds almost entirely on fish. They are associated with aquatic habitats and use large trees for nesting and perching. The osprey is an uncommon migrant in Illinois. Historically, the osprey was a native summer (breeding season) resident. Pesticides, like DDT, are primarily responsible for the catastrophic declines in osprey population numbers. This decline resulted in the species being listed as an Illinois endangered species. The loss of nesting habitat has probably not had a great impact to osprey populations since they have adapted to nesting on man-made structures in many areas. Similar to the bald eagle, osprey population productivity has been improving and stabilizing with the ban of DDT.

Spring Ladies' Tresses. The Spring Ladies' Tresses, also known as Grass-leaved Ladies' Tresses, is a perennial plant in the Orchid family. This species is native to widely scattered area in the southern half of Illinois, which is the northern range limit of this species. Populations of this orchid in Illinois have been static or slowly declining. It can be found in open woodlands, grassy meadows, upland prairies, abandoned fields, and roadsides. The flowers of this plant are cross-pollinated by long-tongued bees and is vulnerable to snails, slugs, and white-tailed deer and other mammalian herbivores. The Spring Ladies' Tresses was sighted recently (2015 and 2018) in a prairie in Fayette County, Illinois. The loss of suitable habitat and reduction in pollinators have led to declines in this species at its' northern range which resulted in this species being listed as an Illinois endangered species.

3.8.2 Federally Listed Species

In accordance with Section 7(a)(2) of the Endangered Species Act (ESA) of 1973 (as amended), federally funded, constructed, permitted, or licensed projects must take into consideration impacts to federally listed and proposed threatened or endangered species.

The U.S. Fish and Wildlife Service (USFWS) was contacted via USFWS Information for Planning and Consultation (IPaC) website on 18 July 2018, for a list of Federal threatened, endangered and candidate species (Attachment 2) that could potentially be located in the project areas (Consultation Code: 03E18100-2018-SLI-0601 and Event Code: 03E18100-2018-E-01382).

Table 4. List of federally listed threatened and endangered species potentially occurring within the proposed project area.

Common Name	Scientific Name	Listing Status	Habitat
Indiana Bat	<i>Myotis sodalis</i>	Endangered	Caves and mines (hibernacula); small stream corridors with well-developed riparian woods, upland forests (foraging)
Northern Long-eared Bat	<i>Myotis septentrionalis</i>	Threatened	Caves and mines (hibernacula); small stream corridors with well-developed riparian woods, upland forests (foraging)
Piping Plover	<i>Charadrius meodus</i>	Endangered	Shorelines of the Great Lakes, shores of rivers and lakes in the Northern Great Plains, and along the Atlantic Coast
Eastern Massasauga	<i>Sistrurus catenatus</i>	Threatened	Wet prairies, marshes, and low areas along rivers and lakes
Rattlesnake-master Borer moth	<i>Papaipema eryngii</i>	Candidate	Undisturbed prairie and woodland openings that contain rattlesnake-master
Eastern Prairie Fringed Orchid	<i>Platanthera leucophaea</i>	Threatened	Old hardwood habitats with acidic soils
Lakeside Daisy	<i>Hymenoxys herbacea</i>	Threatened	Dry, rocky prairie grassland underlain by limestone along the Great Lakes
Prairie Bush-clover	<i>Lespedeza leptostachya</i>	Threatened	Tallgrass prairie region of Illinois, Iowa, Minnesota, and Wisconsin

Indiana Bat. Indiana Bats hibernate in caves, or mines, only during the winter months. In Missouri, hibernation season is from 1 October to 31 March. During the active season (1 April to 30 September), they roost in forest and woodland habitats. A wide variety of summer habitats are suitable for Indiana Bats such as forested/wooded habitat and non-forested habitats such as emergent wetlands, adjacent edges of agricultural fields, old fields, and pastures. Roosting habitats for this species include live and/or snags at least 5 inches diameter at breast height (DBH) and have exfoliating bark, cracks, crevices, and/or hollows. Tree species used as roosts often include, but are not limited to, shagbark hickory, white oak, cottonwood, and maple trees.

Northern Long-eared Bat. Northern Long-eared Bats hibernate in caves, or mines, only during the winter months. In Missouri, hibernation season is from 1 October to 31 March. During the active season (1 April to 30 September), they roost in forest and woodland habitats. A wide variety of summer habitats are suitable for Northern Long-eared Bats such as forested/wooded habitat and non-forested habitats such as emergent wetlands, adjacent edges of agricultural fields, old fields, and pastures. Roosting habitats for this species include live and/or snags at least 3 inches DBH and have exfoliating bark, cracks, crevices, and/or hollows. Tree species used as roosts often include, but are not limited to, shagbark hickory, white oak, cottonwood, and maple trees. Northern Long-eared Bats have also been observed roosting in human-made structures such as buildings, barns, bridges, and bat houses.

Piping Plover. The Piping Plover is a small, stocky shorebird with a sand-colored upper body, and a white underside with orange legs. They use wide, flat, open, sandy beaches with very little grass or other vegetation. Nesting territories often include small creeks or wetlands. In the spring and summer the Piping Plover migrates to the northern United States and Canada to breed. There are three locations where the Piping Plover is known to nest in North America: shorelines of the Great Lakes, shores of rivers and lakes in the Northern Great Plains, and along the Atlantic Coast. Their nesting range had become smaller around the Great Lakes area. In the fall, plovers migrate south and spend the winter along the Gulf Coast or other southern locations. The Great Lakes population of the Piping Plover was listed as an endangered species in 1986, and the Northern Great Plains and Atlantic Coast populations were listed as a threatened species in 1986 also.

Eastern Massasauga. The Eastern Massasauga rattlesnake is a small snake (~2ft long) with a thick body, heart-shaped head, and vertical pupils. They live in wet areas including wet prairies, marshes, and low areas along rivers and lakes. They also can use adjacent uplands during part of the year. They often hibernate in crayfish burrows but may also burrow under logs, tree roots, or use small mammal burrows. Massasaugas eat small rodents, frogs, and other snakes. They are also docile, secretive snakes that will try to escape rather than fight. There are only three or four populations remaining in Illinois. The one population at Carlyle Lake in Clinton County is thought to be the largest stronghold of this species. This population is actively being studied by natural resource agencies and habitat for this species is actively managed by USACE and IDNR.

Rattlesnake-master Borer Moth. Adult moth measures 1.4 – 1.9 inches and has a smooth head and a tufted body. The larvae develop in five instars, all of which have a yellowish head and are deep purplish-brown. Rattlesnake-master Borer Moth is univoltine (having a single flight per year) with adult emerging from mid-September to mid-October, and flying through mid- to late-October. They are a nocturnal species, which makes them hard to observe. Adults have underdeveloped mouth parts. The larvae feed exclusively on the rattlesnake-master plant. Rattlesnake-master Borer Moths are obligate residents of

undisturbed prairie and woodland openings that contain their only food plant, rattlesnake-master. The Rattlesnake-master Borer Moth has been recently (since 2002) observed in Effingham, Fayette, and Marion counties in Illinois.

Eastern Prairie Fringed Orchid. Also known as the prairie white fringed orchid, this species formerly occurred over much of north and central Illinois, but is now confined to the northeast corner of the state (Herkert 1991). This plant is found in mesic to wet prairies located on uplands and in river valleys. It may be present wherever prairie remnants are encountered. This orchid is a perennial herb that grows from an underground tuber. Flowering begins from late June to early July, and lasts only for 7 – 10 days. Night flying hawkmoths pollinate the nocturnal, fragrant flowers. Seed capsules mature over the growing season and are dispersed by the wind from late August through September. Current decline of this species is mainly due to the loss of habitat from the drainage and development of wetlands.

Lakeside Daisy. This plant is found in dry, rocky prairie grassland underlain by limestone. Although this plant grows in Great Lake states and along the Canadian shore of Lake Huron, it was once widespread in prairie habitats throughout the Midwestern United States. Fire suppression practices have eliminated the wildfires which once regularly cleared prairie grasslands of the encroaching woods. Because this plant needs full sun to survive, the expansion of shrubs and trees threaten the daisies survival. Collectors may also pose a threat since the daisy is found in just a handful of sites and is easily transplanted.

Prairie Bush-clover. This plant is a member of the pea family found only in the tallgrass prairie region of Illinois, Iowa, Minnesota, and Wisconsin. Prairie bush-clover is rare due to the conversion of native tallgrass prairie to cropland, overgrazing in areas where it still occurs, and urban expansion.

3.9 BALD AND GOLDEN EAGLE

Bald Eagles (*Haliaeetus leucocephalus*) winter along the major rivers of Illinois and Missouri, and at scattered locations some remain throughout the year to breed. Perching and feeding occurs along the edge of open water, from which eagles obtain fish. The bald eagle was removed from the List of Endangered and Threatened Species in August 2007 but it continues to be protected under the Bald and Golden Eagle Protection Act and by the Migratory Bird Treaty Act. Recommendations to minimize potential project impacts to the bird and nests are provided by the USFWS in the agency's National Bald Eagle Management Guidelines publication (USFWS, 2010). The guidelines recommend: (1) maintaining a specified distance between the activity and the nest (buffer area); (2) maintaining natural areas (preferably forested) between the activity and nest trees (landscape buffers); and (3) avoiding certain activities during the breeding season. Specifically, construction activity is prohibited within 660 feet of an active nest during the nesting season, which in the Midwest is generally from late January through late July. There are two known Bald Eagle nests in the State Fish and Wildlife Area located at the northern end of Carlyle Lake.

3.10 CULTURAL AND TRIBAL RESOURCES

Archaeological investigations in the area now managed as Carlyle Lake date to 1939 and have continued up until present. While pre-impoundment studies were generally excavations undertaken by universities and tied to academic research interests, post-impoundment investigations have been largely associated with the management of Carlyle Lake. Specifically, most post-impoundment studies have been conducted

through the authority of National Historic Preservation Act of 1966 (54 U.S.C. § 307103) (NHPA), specifically Sections 106 and 110.

To date, there have been more than 60 cultural resource surveys that have taken place at Carlyle Lake recording approximately 240 archaeological sites. These sites date from Late Paleo-Indian (10,000-8,000 BC) thru the early 20th century (1940's). In 1985 a Phase I and Phase II archaeological investigation was conducted for the St. Louis District, Corps of Engineers in conjunction with Shoreline Erosion study, Design Memorandum No. 14. At that time archaeological Phase II testing occurred at two of the parcels considered in this EA. Archaeological sites 11CT386 (Area 7) and site 11CT309 (Area 8) were tested to determine their eligibility for the National Register of Historic Places. Both sites were determined ineligible, and therefore require no further cultural investigations. In compliance for this project Phase I surveys of 10 parcels took place on 28 March, 23 April, and 24 April of 2018. The locations were pedestrian surveyed where visibility exceeded 25 percent and in areas with less visibility systematic shovel testing was performed. No cultural resources were identified in erosion areas 1, 2, 3, 11, and 13. Cultural resources were identified at five of the 10 parcels. These areas include:

- **Area 9.** This area is a partially wooded parcel with no previously recorded site. The 24 April 2018 survey of the area identified, on the surface of the plowed agricultural field, a rim fragment of a stoneware crock and a fragment of a white ware plate. No other artifacts were identified. A review of historic plat maps and aerial photographs do not identify any buildings within the vicinity. It is recommended that this small historic scatter does not represent an eligible resource.
- **Area 10.** This area is an agricultural field where site 11CT306, a large ineligible prehistoric scatter, was recorded in 1978. The 24 April 2018 survey of this area identified three unworked lithic flakes on the surface approximately 60 to 80 meters apart. These three flakes all fall within the site limits of site 11CT306. No other cultural materials was identified. It is recommended that site 11CT306 remain ineligible.
- **Area 14.** This area is a partially wooded parcel adjacent to a plowed field and pond that contains site 11CT67, an archaic campsite. A single isolated unworked lithic flake was identified during a shovel test. Additional shovel tests were placed at five meter intervals at the cardinal directions surrounding the positive test. None of the additional shovel tests produced any cultural material. It is recommended that this isolated find does not represent an eligible resource.
- **Area 18.** This area is located along the edge of an agricultural field, adjacent to where site 11FY37, a Middle Woodland to Mississippian site, was recorded by Fowler in 1960. The 23 April 2018 survey identified three non-diagnostic unworked lithic flakes on the surface approximately 150 – 300 meters apart. These three flakes fell outside of the site limits of site 11FY37. No other prehistoric material was found within this area. A review of the historic plat maps show a structure at this location in 1959, however no structure is present in any of the earlier plat maps and nothing is visible in the 1938 aerial photographs. It is recommended that these resources do not represent eligible resources.
- **Area 20.** This area is a wooded slope that is bordered to the west by agricultural fields. Archaic camp site 11B14 has been documented. The 28 March 2018 survey identified lithic material on the surface. These materials were modified and unmodified flakes and

fragments of a lithic biface tool. It is believed that site 11B14 falls outside of the proposed acquisition area.

3.11 RECREATION AND AESTHETICS

Carlyle Lake is the largest man-made lake in Illinois, with over 26,000 acres of water and 11,000 acres of public lands around the lake. The U.S. Army Corps of Engineers built Carlyle Dam across the Kaskaskia River, resulting in the filling of the reservoir to a mean elevation of 446 ft NVGD. There is little topographic relief in this region which makes Carlyle Lake shallow and oligotrophic, resulting in a high turbidity and several erosional areas. Many public and privately owned shorelines are in various stages of erosion and many have large amount of revetment to prevent further erosion. Overall, Carlyle Lake is generally considered to be aesthetically pleasing to many people.

There are a variety of recreational activities on and around Carlyle Lake. Public lands surround Carlyle Lake are managed by the USACE and IDNR. Carlyle Lake has seven Recreation Areas which are made up of Army Corps of Engineers managed lands, Illinois State Parks, and Illinois Fish and Wildlife areas. These areas provide a variety of facilities that intermingles camping and day-use activities including: swimming, fishing, bicycling, kayaking, hiking, wildlife viewing, and picnicking. Local businesses help support recreational opportunities at the lake with bicycle and kayak rentals, fishing supplies, and marinas that service boats and other watercrafts. Carlyle Lake is recognized as one of the nation's top-ten inland sailing lakes and is host to many races and regattas. Overall, Carlyle Lake has approximately 41 recreation areas that contain over 400 picnic sites, 700 campsites, 600 marina slips, 24 boat ramps, and approximately 25 miles of hiking trails. Watercraft based recreation differs between the northern and southern portions of the Lake. Approximately 8 miles upstream from the dam, the Lake is intersected by the Burlington and Northern Railroad crossing. Areas south of the railroad crossing are generally deep enough to accommodate most types of recreational watercraft use. However, north of the railroad crossing, the Lake is very shallow and only suitable for use by smaller recreational watercraft like those used for hunting and fishing.

3.12 SOCIOECONOMICS AND TRANSPORTATION

Easy access to Carlyle Lake is facilitated by a network of Interstate roadways, U.S. Highways, State Highways, and county roads. Specifically, Carlyle Lake is bordered on the north by Interstate 70, on the east by U.S. Highway 51, on the south by U.S. Highway 50 and Interstate 64, and on the west by State Highway 127. These major highways provide adequate and safe public access to all areas of the project. The proximity of these major highways also provides direct and quick access to Carlyle Lake from the St. Louis metropolitan area. County roads surrounding Carlyle Lake allow for reliable access to all of the recreation areas around the lake.

3.13 AIR QUALITY AND NOISE

The Clean Air Act of 1963 requires the U.S. Environmental Protection Agency (EPA) to designate National Ambient Air Quality Standards (NAAQS). The EPA has identified standards for six pollutants: lead, sulfur dioxide, carbon monoxide, nitrogen dioxide, ozone, particulate matter (less than 10 microns and less than 2.5 microns in diameter), along with some heavy metals, nitrates, sulfates, volatile organic

and toxic compounds (Table 5). Clinton County, IL currently is in attainment for all EPA air quality standards (USEPA, 2017).

Table 5. U.S. EPA air pollutants and their criteria levels for attainment.

Pollutant	Averaging time	Criteria	Form
Carbon monoxide	8 hours	9 ppm	Not to be exceeded more than once per year
	1 hour	35 ppm	
Lead	Rolling 3 month	0.15 µg/m ³	Not to be exceeded
Nitrogen dioxide	1 hour	100 ppb	98th percentile of 1-hour daily maximum concentrations, averaged over 3 years
	1 year	53 ppb	Annual Mean
Ozone	8 hours	0.070 ppm	Annual fourth-highest daily maximum 8-hour concentration, averaged over 3 years
Particle Pollution (PM_{2.5})	1 year	12.0 µg/m ³	Annual mean, averaged over 3 years
	24 hours	35 µg/m ³	98th percentile, averaged over 3 years
Sulfur dioxide	1 hour	75 ppb	99th percentile of 1-hour daily maximum concentrations, averaged over 3 years

The most significant producers of noise at Carlyle Lake are the various recreational activities. Common noises consist of recreational boat and watercraft motors, vehicle traffic, day use visitors, and maintenance equipment (e.g., lawn mowers). Noise levels around Carlyle Lake vary with location and season, with summer months having higher instances of noise related disturbances. Many areas within the Lake Project are undeveloped and heavily wooded with relatively minor noise disturbance. Noise levels for this type of area are typically around 20 to 30 decibels. Recreation areas and boating on Carlyle Lake can reach up to 70-80 decibels.

3.14 PRIME FARMLAND

The National Agricultural Land Study of 1980-81 found that millions of acres of farmland were being converted in the United States each year. In order to protect farmland from increasing urban sprawl, Congress passed the Agriculture and Food Act of 1981 (PL 97-98), which contained the Farmland Protection Policy Act. This Act is intended to minimize the impact Federal programs have on the unnecessary and irreversible conversion of farmland to nonagricultural uses. The Act also focuses on areas of prime farmland, which is identified by the United States Department of Agriculture Natural Resources Conservation Service (NRCS).

Prime farmland, as defined by NRCS, is land that has the best combination of physical and chemical characteristics for producing food, feed and forage, fiber, and oilseed crops, and is also available for these uses. Prime farmland has the soil quality, growing season, and moisture supply needed to produce economically sustained high yields of crops when treated and managed according to acceptable farming methods, including water management. Prime farmlands are not excessively erodible or saturated with water for a long period of time, and they either do not flood frequently or are protected from flooding.

The majority of the land surrounding Carlyle Lake has been classified as either prime farmland, farmland of statewide importance, or prime farmland if drained. Within the Carlyle Lake boundary, there are

approximately 1,700 acres of prime farmland and approximately 1,900 acres of farmland of statewide importance. Other land areas within Carlyle Lake would require water management for them to be considered prime farmland. This includes prime farmland if drained (~3,000 acres), prime farmland if drained and either protected from flooding or not frequently flooded (~2,200 acres), and prime farmland if protected from flooding or not frequently flooded (~30 acres). However, the majority of the surface area within the lake boundary is water, which is not considered prime farmland (Figure 4).

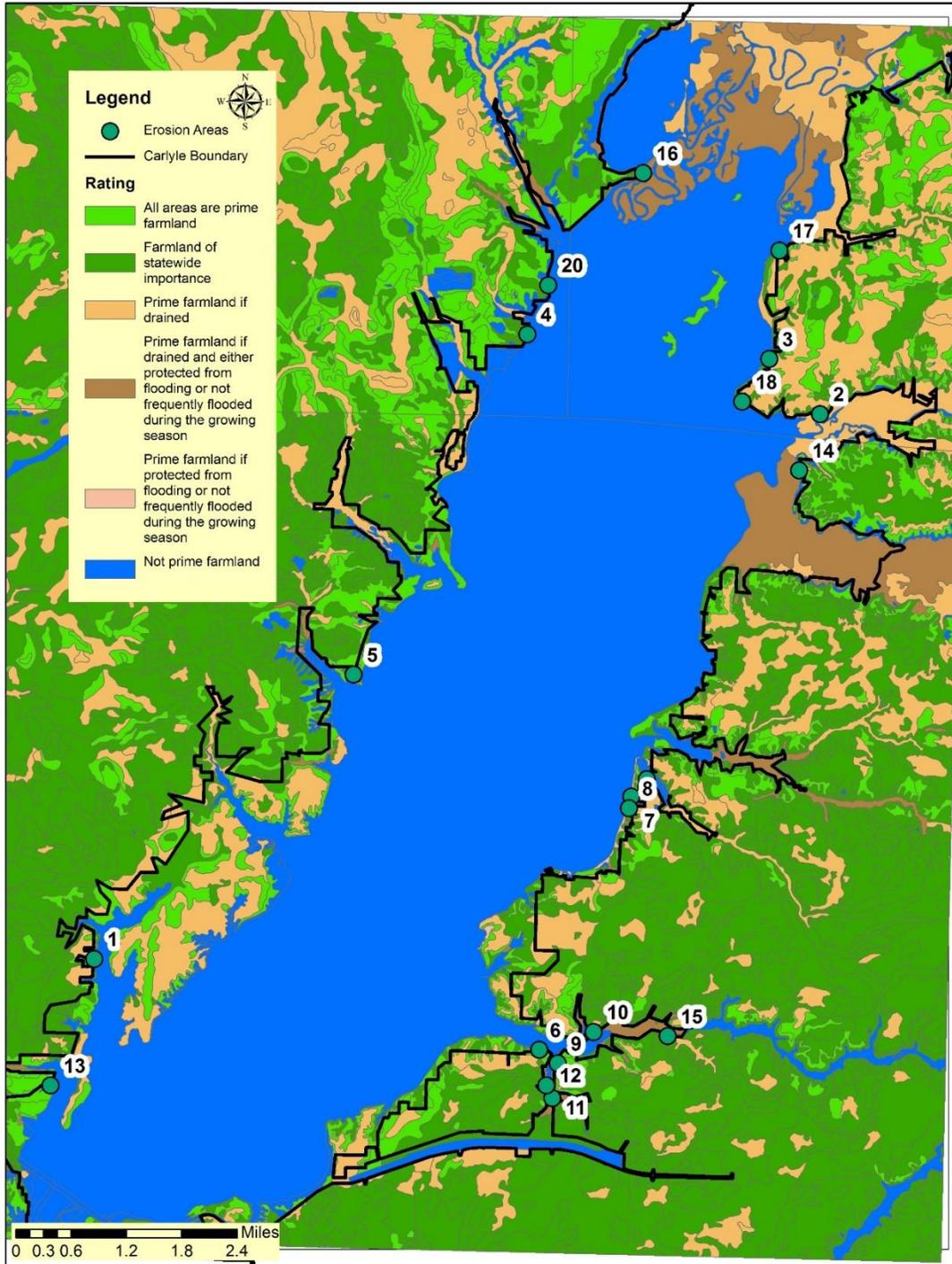


Figure 4. Farmland soil classification for the area surrounding Carlyle Lake.

4 ENVIRONMENTAL CONSEQUENCES

This chapter focuses on those resources specific to the proposed project areas that have the potential to be affected by activities connected with the bank stabilization and erosion control in and along Carlyle Lake.

An environmental effect, or impact, is defined as a modification in the existing environment brought about by the Corps' mission and support activities; these impacts are described as direct and indirect. The Council on Environmental Quality (CEQ) guideline 40 CFR 1508.8 describes direct impacts to be those which are caused by the action and occur at the same time and place. The CEQ regulations define indirect impacts as those that are caused by the action and are later in time or farther removed in distance, but are still reasonable foreseeable. Indirect impacts may include growth-inducing effects and other effects related to induced changes in the pattern of land use, population density or growth rate, and related effects on air and water and other natural systems, including ecosystems. Cumulative impacts are those that result from the incremental impacts of an action added to other past, present, and reasonably foreseeable actions, regardless of who is responsible for such actions.

4.1 TOPOGRAPHY, GEOLOGY, AND LAND USE

4.1.1 No Action Alternative

Under the No Action Alternative, it is anticipated that the shoreline topography in the erosion areas would ultimately change to a 1V to 15H slope. No changes to the overall geology would occur.

Land use in the erosion areas could be heavily altered if erosion persisted. Continued soil erosion could lead to the loss of agricultural lands (Table 6) such as cultivated crops (33.7 acres) and pasture (14.6 acres). Approximately 8.5 acres of developed land could be impacted, however these areas have some existing revetment. Continued soil erosion and more frequent inundation could also negatively impact approximately 55.6 acres of deciduous forest. Even though a stable beach slope would ultimately occur due to persistent erosion, the amount of woody and emergent vegetation in the area would determine the time needed for that slope to establish. Once it was established, successional riparian vegetative processes could continue and these areas could become vegetated depending on the frequency and duration of inundation. However, under this alternative, current land ownership and land management would not change.

Table 6. Land use according to the 2011 NLCD for erosion areas that may be lost due to continued erosion.

Erosion Area	Developed, Open Space	Developed, Low Intensity	Deciduous Forest	Pasture/Hay	Cultivated Crops	Total
1 ^R	2.00	1.00	-	-	-	3.00
2 ^A	-	-	3.90	-	-	3.90
3 ^A	-	-	2.20	5.30	-	7.50
4 ^A	-	-	1.00	0.00	11.00	12.00
5 ^A	-	-	0.45	0.45	-	0.90
6 ^A	-	-	2.60	0.00	7.00	9.60
7 ^R	1.78	0.40	0.22	-	-	2.40
8 ^R	1.30	-	0.30	-	-	1.60
9 ^A	1.00	1.00	4.60	4.60	3.00	14.20
10 ^A	-	-	4.40	-	7.00	11.40
11 ^A	-	-	1.70	1.20	-	2.90
12 ^A	-	-	1.90	-	-	1.90
13 ^A	-	-	3.70	-	-	3.70
14 ^A	-	-	1.30	3.10	-	4.40
15 ^A	-	-	1.60	-	0.80	2.40
16 ^A	-	-	5.60	-	-	5.60
17 ^A	-	-	2.40	-	-	2.40
18 ^A	-	-	2.30	-	4.90	7.20
19 ^A	-	-	1.40	-	-	1.40
20 ^A	-	-	14.10	-	-	14.10
Total	6.08	2.40	55.67	14.65	33.70	112.50

^A The TSP for these erosion areas is land acquisition

^R The TSP for these erosion areas is revetment

4.1.2 Real Estate Acquisition Alternative

Similar to the No Action Alternative, the Real Estate Acquisition Alternative is anticipated to impact the shoreline topography. Existing processes and activities at Carlyle Lake combined with a lack of revetment in the identified erosion areas may cause the shoreline to change to a 1V to 15H slope. No changes to the geology would occur. However, under this alternative, land ownership would be transferred to USACE and land management would become incorporated into the existing Carlyle Lake management plan.

Continued soil erosion could lead to the loss of agricultural lands (Table 5) such as cultivated crops (33.7 acres) and pasture (14.6 acres). Approximately 8.5 acres of developed land could be impacted, however these areas have some existing revetment. Continued soil erosion and more frequent inundation could also negatively impact approximately 55.6 acres of deciduous forest. Even though a stable beach slope would occur, the amount of woody and emergent vegetation in the area would determine the time needed for that slope to establish. Once it was established, successional riparian vegetative processes would continue and these areas could become vegetated depending on the frequency and duration of inundation.

4.1.3 Shoreline Revetment Alternative

Under the shoreline revetment alternative, revetment would be placed on the entire shoreline of each area for the ultimate shoreline protection. This alternative would result in over 20,700 linear feet of total

revetment being placed. A revetment solution could not be developed for Areas 5 and 10 due to the relatively flat ground surfaces in these areas. Areas 1, 7, & 8 are moderately developed areas with existing residential structures. These areas currently either have extensive revetment or are mostly grassland so the addition of new revetment at these locations would not significantly alter the existing land use. The remaining erosion areas (2, 3, 4, 6, 9, 11-20) are moderately forested along the bankline. If these areas require revetment then tree clearing would be needed.

4.2 HAZARDOUS, TOXIC, AND RADIOACTIVE MATERIALS

4.2.1 No Action Alternative

Under the No Action Alternative, all lands would remain in private ownership erosion would continue to occur until a stable beach slope was established. There would be a low probability that the continued shoreline erosion would expose any hazardous, toxic, or radioactive materials.

4.2.2 Real Estate Acquisition Alternative

Under the Real Estate Acquisition Alternative, no borrow material or excavation of sediments, or placement of material would take place. Based on the Phase I Environmental Assessment, there is a low probability that the continued shoreline erosion would expose any hazardous, toxic, or radioactive materials. If future development of the acquired properties indicate the presence of hazardous or toxic materials, USACE would be notified to perform a re-evaluation of the environmental conditions.

4.2.3 Shoreline Revetment Alternative

Rocks (riprap) utilized for the proposed shoreline repair would consist of quarry run limestone composed of newly quarried riprap. The materials would come from a USACE certified commercial stone quarry in the proposed project vicinity. The quarry must be able to produce stone which meets USACE specifications and would be free of organic and inorganic contaminants, in order to avoid adverse impacts to human health and the environment. Since no borrow material would be used on these sites, the likelihood of hazardous substances adversely affecting the project areas due to the proposed construction activities is very low. The St. Louis District Environmental Quality Section would be contacted immediately if suspected HTRW material was encountered at any point during construction.

4.3 HYDROLOGY AND HYDRAULICS

4.3.1 No Action Alternative

Under the No Action Alternative, hydrology and hydraulics of Carlyle Lake would remain the same as the existing conditions.

4.3.2 Real Estate Acquisition Alternative

Under the Real Estate Acquisition Alternative, hydrology and hydraulics of Carlyle Lake would remain the same as the existing conditions.

4.3.3 Shoreline Revetment Alternative

Dam operations would not be modified or changed as a result of this alternative. Effects on hydrology and hydraulics would be negligible because the proposed action would not result in alterations to the overall flow regime or water control management.

4.4 WATER QUALITY

4.4.1 No Action Alternative

Under the No Action Alternative, sedimentation and localized turbidity in the Lake is expected to increase with increased shoreline erosion. However, once a stable beach slope is reached, vegetation may repopulate the bank protecting it from further loss of materials.

4.4.2 Real Estate Acquisition Alternative

Under the Real Estate Acquisition Alternative, sedimentation and localized turbidity in the Lake is expected to increase with increased shoreline erosion. However, once a stable beach slope is reached, vegetation may repopulate the bank protecting it from further loss of materials.

4.4.3 Shoreline Revetment Alternative

There may be minor localized and short-term negative impacts from increases in turbidity caused by rock placement. To minimize these short-term impacts, appropriate Best Management Practices (BMP's) would be implemented. Rock would come from a commercial quarry capable of meeting USACE specifications and should be free of contaminants. Stabilization of the shoreline would reduce erosion which may improve water quality conditions resulting from turbidity and suspended sediments over the long-term. Constructing the project during low water conditions would also lessen turbidity by minimizing the amount of in-water work. Following completion of the proposed project, no impacts to water quality are anticipated.

Nationwide Permit (NWP) No. 13 permits bank stabilization activities necessary for erosion control and prevention. In the state of Illinois, this NWP includes a Section 401 of the Clean Water Act Certification as long as Regional Conditions are met. However, the Erosion Area tentatively selected for revetment placement totals 1,600 linear ft, which is greater than the 1,000 linear ft Regional Condition outlined in the Illinois EPA Water Quality Certification. However, individually the revetment at each erosion area would not be greater than 600 linear ft. In order to use the Section 401 of the Clean Water Act Certification, an exemption may need to be approved by the Illinois EPA prior to the placement of the proposed revetment.

4.5 VEGETATION AND WETLANDS

4.5.1 No Action Alternative

Under the No Action Alternative, soil erosion is expected to continue on to private property. Continued soil erosion and more frequent inundation could negatively impact bottomland hardwood forest, and forested and emergent wetlands. Even though a stable beach slope would eventually occur, the amount of woody and emergent vegetation in the area would determine the time needed for that slope to establish and the ultimate extent of the erosion. Once a stable slope was established, successional riparian vegetative processes would continue and these areas could become vegetated depending on the frequency and duration of inundation.

4.5.2 Real Estate Acquisition Alternative

Under this alternative, the USACE would acquire approximately 2.98 acres of various wetland types (Table 7). Since no construction would take place under this alternative, there would be no tree clearing

required. Continued soil erosion and more frequent inundation could negatively impact bottomland hardwood forest and forested and emergent wetlands. Even though a stable beach slope would eventually occur, the amount of woody and emergent vegetation in the area would determine the time needed for that slope to establish. Once it was established, successional riparian vegetative processes would continue and these areas could become vegetated depending on the frequency and duration of inundation. Land acquired would fall under the management of the Carlyle Lake Project and the Carlyle Lake Master Plan. This EA evaluates the acquisition of these lands only and any future Federal action would require additional environmental compliance.

Table 7. List of the erosion areas that contain wetland habitats according to the National Wetland Inventory that may be acquired under this alternative.

Erosion Area	Wetland Type	Acres
1 ^R	Lake	0.004
2 ^A	Emergent	0.615
9 ^A	Emergent	0.293
10 ^A	Lake	0.091
11 ^A	Forested	0.021
13 ^A	Emergent	0.844
15 ^A	Riverine	0.003
16 ^A	Forested	0.966
19 ^A	Lake	0.001
20 ^A	Lake	0.136
20 ^A	Emergent	0.012
Total Wetland		2.98

^A The TSP is land acquisition

^R The TSP is revetment

4.5.3 Shoreline Revetment Alternative

Any emergent vegetation in the immediate vicinity of the proposed project areas would be disturbed or removed during the construction process. In order to create a more stable bank, the angle of the slope would be lessened by placing material lakeward from the existing bank below the Ordinary High Water line. If all erosional areas were repaired using riprap, approximately 18 acres of shoreline would be covered, which includes 1.125 acres of emergent and forested wetlands. Area 7, which is tentatively selected for proposed revetment, currently has extensive revetment so the addition of new revetment at this location would not alter the existing wetland habitat. No tree clearing would be required for the placement of revetment or for accessing the construction area in Erosion Areas 1, 7, and 8, which are outlined in the Tentatively Selected Plan for revetment. Any exposed soil remaining after the placement of revetment would be seeded with a native grass mixture.

Table 8. Total area of potential wetland impacts if all erosion areas were selected for revetment placement.

Erosion Area	Wetland Type	Acres
2 ^A	Emergent	0.004
7 ^R	Forested	0.021
11 ^A	Forested	0.072
13 ^A	Emergent	0.35
14 ^A	Emergent	0.011
16 ^A	Forested	0.667
Total Wetland		1.125

^AThe TSP is land acquisition

^RThe TSP is revetment

4.6 AQUATIC HABITATS

4.6.1 No Action Alternative

Minimal long-term negative impacts concerning aquatic habitats may occur as a result of taking no action to address the continued erosion. Continued erosion would allow continued sediment inputs to the lake and lost vegetation from the shoreline, which could further degrade the existing aquatic habitats. As a stable beach slope is reached in these areas, aquatic vegetation could establish which could be suitable for fish spawning and nursery habitats.

4.6.2 Real Estate Acquisition Alternative

Minimal long-term negative impacts concerning aquatic habitats may occur as a result of taking no action to address the continued erosion. Continued erosion would allow continued sediment inputs to the lake and lost vegetation from the shoreline, which could further degrade the existing aquatic habitats. As a stable beach slope was reached in these areas, aquatic vegetation could establish which could be suitable for fish spawning and nursery habitats. No specific aquatic restoration or habitat enhancements are planned for these areas. However, the areas acquired under this alternative would be managed by the USACE. The incorporation of these parcels in the Carlyle Lake's fish and wildlife management would be a positive impact; however, the impacts would be minimal.

4.6.3 Shoreline Revetment Alternative

The placement of revetment along the shoreline below the Ordinary High Water would bury some existing aquatic habitats. Construction-related noise and localized turbidity may affect aquatic habitat in the project areas. However, these impacts would be temporary and not occur once construction was complete. Placement of the revetment could minimize impacts to aquatic organisms by timing construction to coincide with low-water periods, which would reduce construction activities in the water.

4.7 FISH AND WILDLIFE

4.7.1 No Action Alternative

Minimal long-term negative impacts concerning fish and wildlife may occur as a result of taking no action to address the continued erosion. Continued erosion would allow continued sediment inputs to the lake and lost vegetation from the shoreline. As a stable beach slope was reached in these areas, aquatic vegetation could establish which could be suitable for fish spawning and nursery habitats.

4.7.2 Real Estate Acquisition Alternative

Minimal long-term negative impacts concerning fish and wildlife may occur as a result of not repairing erosional areas. Continued erosion would allow additional sediment inputs to the lake and lost vegetation from the shoreline further increasing local turbidity. As a stable beach slope was reached in these areas, aquatic vegetation could establish increasing fish habitat in those areas. No specific restoration or habitat enhancements are planned for these areas. However, the areas acquired under this alternative would be managed by the USACE. The incorporation of these areas in the Carlyle Lake's fish and wildlife management plan would be a positive impact; however, the impacts would be minimal.

4.7.3 Shoreline Revetment Alternative

Short-term construction-related impacts to fish and wildlife may occur as part of the Shoreline Revetment Alternative. Construction-related noise and localized turbidity may affect fish in the project areas. However, these impacts would be temporary and not occur once construction was complete. Placement of the revetment could minimize impacts to fish by timing construction to coincide with low-water periods, which would reduce construction activities in the water. There would be temporary noise-related disturbances to any mammals and birds in the area as well. Permanent impacts to habitat would be limited since minimal tree loss is expected.

4.8 THREATENED AND ENDANGERED SPECIES

4.8.1 State Listed Species

In accordance with the General Conditions outlined in the Nationwide Permit No. 13 Clean Water Act Water Quality Certification from the State of Illinois, the proposed project should take into consideration impacts to state listed threatened and endangered species.

4.8.1.1 No Action Alternative

The status of state-listed threatened and endangered species that may occur within the project area is expected to remain the same, including their listing designations.

4.8.1.2 All Action Alternatives

Barn Owl. The barn owl is a cavity-nesting bird which relies on dead or hollow trees, old barns, or other unoccupied buildings for roosting and nest sites, and requires grasslands and other open areas for hunting. No tree clearing is anticipated under the proposed actions. No adverse effects to the barn owl are anticipated as a result of the proposed placement of revetment or land acquisition.

Least Bittern. The least bittern is an uncommon migrant and summer resident in Illinois. It is mostly seen near Lake Michigan in Cook and Lake Counties in cattail marshes. This species is not known to occur at Carlyle Lake, therefore no adverse effects to the least bittern are anticipated as a result of the proposed placement of revetment or land acquisition.

Ornate Box Turtle. The ornate box turtle is a terrestrial species that prefers sand and black soil prairies. Other threats to this species include habitat fragmentation, road mortality, and collection by turtle enthusiasts. During the proposed placement of revetment in erosion areas 1, 7, and 8, the contractor would be made aware of the potential to encounter wildlife on the roadways.

Osprey. The osprey is an uncommon migrant in Illinois. No tree clearing is anticipated under the proposed actions. No adverse effects to the osprey are anticipated as a result of the proposed placement of revetment or land acquisition.

Spring Ladies' Tresses. No open woodlands, grassy meadows, upland prairies, abandoned fields, or roadsides would be impacted as part of the proposed actions, therefore no adverse effects to the Spring Ladies' Tresses are anticipated.

4.8.2 Federally Listed Species

This section, along with Section 3.11, represents the St. Louis District's Biological Assessment of the project's effects on federally-listed species that may occur within the project area. This Biological Assessment is prepared in accordance with Section 7(c) of the Endangered Species Act of 1973, as amended.

4.8.2.1 No Action

Under the No Action Alternative, the erosion areas investigated as part of this project would continue to erode. The continued erosion of these areas could eventually lead to loss of potential bat and massasauga habitat. However, piping plovers may use the erosion areas as feeding locations during their migration. The biological impacts of the No Action Alternative are similar to the impacts of the Land Acquisition Alternative. The impacts of continued shoreline erosion on Federally-listed species are outlined in detail as part of the Tentatively Selected Plan (below).

4.8.2.2 Tentatively Selected Plan

Indiana Bat. Even though no tree clearing activity would take place during the placement of revetment, the continued erosion at acquired lands could eventually cause a loss of trees, and potential bat habitat. Therefore, the St. Louis District has determined that the proposed actions “*may affect, but not likely to adversely affect*” the Indiana Bat.

Northern Long-eared Bat. Even though no tree clearing activity would take place during the placement of revetment, the continued erosion at acquired lands could eventually cause a loss of trees, and potential bat habitat. Therefore, the St. Louis District has determined that the proposed actions “*may affect, but not likely to adversely affect*” the Northern Long-eared Bat.

Piping Plover. This species is known to occur in the vicinity of the Great Lakes. No populations of this species are known to occur in Carlyle Lake area. However, mudflats surround Carlyle Lake can provide feeding locations for migrants as they travel. Therefore, the St. Louis District has determined that the proposed action “*may affect, but not likely to adversely affect*” the Piping Plover.

Eastern Massasauga. Since 1991, the Eastern Massasauga rattlesnake locations have been monitored around Carlyle Lake. Based on monitoring efforts and increased awareness of the presence and status of the species, has led to increased reporting of the species presence by natural resource agencies and the public. This species has been reported near several of the erosion areas. Erosion areas 1, 7, and 8 have revetment proposed as the tentatively selected plan and are in close proximity to known massasauga occurrences. Since shoreline with and without revetment are considered undeveloped areas, actions must be followed to minimize and mitigate any potential negative impacts to the Eastern Massasauga due to construction activities. Rip-rapped shorelines are considered undeveloped areas because Eastern Massasauga may hibernate in crayfish burrows below the rip-rap. Construction activities would be limited

to periods while the Eastern Massasauga are in their hibernacula. For planning purposes, construction should be scheduled between 1 November and 28 February. Prior to beginning the proposed construction activities, a pre-construction survey of the revetment areas would be conducted. The Contractor would also be trained on the proper identification of the Eastern Massasauga and what to do if a snake is encountered, which would include the proper contact information and instructions not to handle or harass the snake. They would also be trained on the potential threat of illegal collection. Erosion areas proposed for acquisition may benefit this rattlesnake because these areas would fall under the management of the Carlyle Lake staff and follow the Eastern Massasauga management plan. However, the continued erosion may potentially impact suitable massasauga habitat. The St. Louis District has determined that if all of the above conditions are met, the proposed action “*may affect, but not likely to adversely affect*” the Eastern Massasauga.

Rattlesnake-master Borer Moth. The Rattlesnake-master Borer Moth is not currently known to occur at Carlyle Lake (IDNR 2018); however, extensive surveys for the species have not been conducted. Based on the best available information, the St. Louis District has determined that the proposed actions would have “*no effect*” on the Rattlesnake-master Borer Moth.

Eastern Prairie Fringed Orchid. There are no known wet-prairie remnants on the erosion areas proposed for revetment or for land acquisition. If any lands proposed for acquisition contain species, or potential habitat for this species, it would be protected from further development and would be managed by Carlyle Lake staff, which may benefit any threatened or endangered plant species. Therefore, the St. Louis District has determined that the proposed action would have “*no effect*” on the Eastern Prairie Fringed Orchid.

Lakeside Daisy. This species is known to occur in the vicinity of the Great Lakes. No individual from this species is known to occur in Carlyle Lake area. Therefore, the St. Louis District has determined that the proposed action would have “*no effect*” on the Lakeside Daisy.

Prairie Bush-clover. There are no known tallgrass prairie remnants on the erosion areas proposed for revetment or for land acquisition. If any lands proposed for acquisition contain species, or potential habitat for this species, it would be protected from further development and would be managed by Carlyle Lake staff, which may benefit any threatened or endangered plant species. Therefore, the St. Louis District has determined that the proposed action would have “*no effect*” on the Prairie Bush-clover.

4.9 BALD AND GOLDEN EAGLE

Since the proposed action is expected to take several years to complete, and there is the potential for conditions to change along the shoreline of Carlyle Lake over time with regard to nest trees, the District would continue to evaluate potential impacts to the bald eagle as design plans are developed, and would coordinate in this regard with the USFWS. There are currently no known Bald Eagle nests in the vicinity of the erosion areas proposed for revetment.

4.10 CULTURAL AND TRIBAL RESOURCES

Based on historic background research and the findings of the March and April pedestrian surveys, it is recommended that the acquisition and revetment alternatives for the 12 areas for which USACE had right-of-entry for the Carlyle Lake Erosion Study should have no adverse effect on historic properties.

The St. Louis District sent a letter dated 12 June, 2018 to the Illinois State Historic Preservation Office (SHPO), as well as representatives from 26 federally recognized tribes, requesting concurrence with the determination that no significant properties would be adversely affected by the proposed project. On 1 August, 2018 the District received verbal concurrence from the Illinois SHPO.

4.11 RECREATION AND AESTHETICS

4.11.1 No Action Alternative

Under the No Action, recreation in and around Carlyle Lake is anticipated to remain the same for most of the area. However, there may be areas where recreation decreases due to increases in erosional areas. As these areas erode, sediments get transported into the water column and then gets redeposited. These areas may become shallower and more expansive due to sediment deposition. Thus, recreation benefits in some areas may slightly decrease under the No Action Alternative.

Aesthetics of the erosional areas may decrease also. These areas are primarily made up of exposed soil and as erosion advances, vegetation in the immediate area may be lost which would further reduce the aesthetics of the lake.

4.11.2 Real Estate Acquisition Alternative

The Real Estate Acquisition alternative would be identical to the No Action Alternative. Erosion would continue to advance at all of the erosion areas, which would reduce both the recreational use and the aesthetics in those and nearby areas. However, the land acquisition would also increase public land surrounding Carlyle Lake which may benefit land-based recreation.

4.11.3 Shoreline Revetment Alternative

Some people may find construction related activities and rock to be aesthetically unpleasing. However, Erosion Areas 7 & 8 currently have existing revetment so the addition of new revetment at these locations would not decrease the aesthetics of the areas nor would it change the existing recreational uses.

4.12 SOCIOECONOMICS AND TRANSPORTATION

4.12.1 No Action Alternative

Under the No Action, transportation in and around Carlyle Lake is anticipated to remain the same for most of the area. The continued erosion of private land may impact landowners. For example, the erosion of existing farmland could lead to a loss of crop production and may impact the local economy.

4.12.2 Real Estate Acquisition Alternative

Under this alternative, transportation would remain consistent with exiting conditions. Economic losses to private landowners due to erosion would be eliminated. The lands acquired would be incorporated into the exiting Carlyle Lake management plan which may add to the recreation-based local economy.

4.12.3 Shoreline Revetment Alternative

Placing revetment along the eroding shoreline would reduce future loss of land and associated economic impacts to private landowners. However, during construction, dump trucks would use the local roads to

deliver materials to the revetment areas. Since only three areas have been tentatively selected for proposed revetment, this increase in traffic would be negligible and short term.

4.13 AIR QUALITY AND NOISE

4.13.1 No Action Alternative

There would be no change in noise levels under this alternative. Thus, no adverse impacts from noise levels are anticipated to occur under the No Action Alternative.

4.13.2 Real Estate Acquisition Alternative

There would be no change in noise levels or production carbon emissions under this alternative. Thus, no adverse impacts to noise levels or air quality are anticipated to occur under the Real Estate Acquisition Alternative.

4.13.3 Shoreline Revetment Alternative

During construction, there may be a temporary and localized reduction in air quality due to emissions from heavy machinery operating. However, once the proposed project is complete, no effects to air quality would occur. Since Clinton County, IL, is currently in attainment for all criteria pollutants, *de minimis* rates (e.g., ozone at 100 tons/year and carbon monoxide at 100 tons/year) are not applicable and a General Conformity analysis was not conducted (40 CFR §93.102). In addition, the proposed actions are considered as actions which would result in no emissions increases or an increase in emissions that is clearly *de minimis*.

Diesel emissions from project construction may pose a human health risk for construction workers and exposure to emissions should be minimized. The contractor may consult the *Construction Emission Control Checklist* to reduce exposure to diesel exhaust or the *Cleaner Diesels: Low Cost Ways to Reduce Emissions from Construction Equipment report* (USEPA 2007) to reduce the generation of emissions. Special management techniques would be implemented to control air pollution produced by the construction activities. Airborne particulates, including dust particles, from construction activities and processing and preparation of materials would be controlled at all times, including weekend, holidays, and hours when work is not in progress. The contractor would be required to maintain all excavations, and other work areas free from airborne dust. In addition, hydrocarbon and carbon monoxide emissions from equipment would be controlled to Federal and State allowable limits at all times. Therefore, effects of construction on air quality would be insignificant.

Noise would be generated as a result of revetment placement but it is not anticipated that nearby residents or park visitors would be adversely affected in the short- or long-term. Effects of the increased noise would be comparable to an increase in recreation on Carlyle Lake and therefore is not anticipated to impact the quality of life in the surrounding area. Post-placement noise levels would return to existing levels.

4.14 PRIME FARMLAND

4.14.1 No Action Alternative

Land use in the erosion areas could be heavily altered if erosion persisted. Continued soil erosion could lead to the loss of current agricultural lands (Table 5) such as cultivated crops (33.7 acres) and pasture (14.6 acres) according to the 2011 NLCD. A more detailed analysis of soil classifications (NRCS 2018) for the proposed impact areas could lead to the total loss of approximately 47 acres of farmland of statewide importance and 28 acres of prime farmland (Table 9). However, under the No Action Alternative, these lands would remain privately owned.

4.14.2 Real Estate Acquisition Alternative

Land use in the erosion areas could be heavily altered if erosion persisted. Continued soil erosion could lead to the loss of current agricultural lands (Table 5) such as cultivated crops (33.7 acres) and pasture (14.6 acres) according to the 2011 NLCD. A more detailed analysis of soil classifications (NRCS 2018) for the proposed acquisitions areas could lead to the total loss of approximately 47 acres of farmland of statewide importance and 28 acres of prime farmland (Table 9). However, under this Alternative, these lands would now be managed by the USACE Carlyle Lake office.

4.14.3 Shoreline Revetment Alternative

The placement of revetment along the shoreline of the proposed Erosion Areas would not have a negative impact on farmland. Revetment would help slow the rate of soil erosion, ultimately preserving existing land-use practices for areas tentatively selected for revetment.

Table 9. Farmland soil classification for all erosion areas, in acres, according to the NRCS soil survey.

Erosion Area	All areas are prime farmland	Farmland of statewide importance	Not prime farmland	Prime farmland if drained	Prime farmland if drained & protected from flooding or not frequently flooded during the growing season	Prime farmland if protected from flooding or not frequently flooded during the growing season
1 ^R		2.16	0.06	0.87		
2 ^A		3.04		0.84		
3 ^A		0.29		7.32		
4 ^A		7.59	4.47			
5 ^A	0.95		0.00			
6 ^A	3.77	5.11		0.70		
7 ^R		0.66		1.64		0.18
8 ^R		0.96		0.64		
9 ^A	10.09	3.54		0.59		
10 ^A		9.51	0.21	1.61	0.02	
11 ^A		2.57			0.45	
12 ^A		1.83			0.05	
13 ^A	3.70		0.11			
14 ^A	2.41	0.18	0.95	0.85		
15 ^A		1.85			0.63	
16 ^A	1.27	1.89	2.43		0.11	
17 ^A	1.17	0.88		0.36		
18 ^A	1.60	4.10	0.00	2.20		
19 ^A	0.40	0.08	0.92			
20 ^A	2.92	0.83	10.34	0.02		
Grand Total	28.26	47.07	19.49	17.63	1.24	0.18

^A The TSP is land acquisition

^R The TSP is revetment

5 ENVIRONMENTAL JUSTICE

Environmental justice refers to fair treatment of all races, cultures and income levels with respect to development, implementation and enforcement of environmental laws, policies and actions.

Environmental justice analysis was developed following the requirements of:

- Executive Order 12898 ("Federal Actions to Address Environmental Justice in Minority Population and Low-Income Populations," 1994)
- "Department of Defense's Strategy on Environmental Justice" (March 24, 1995)

Following the above directives, the methodology to accomplish this includes identifying minority and low-income populations within the study area by demographic analysis.

According to 2016 American Community Survey 5-Year Estimates for Bond, Clinton, and Fayette Counties, Illinois, racial composition is approximately 9.2 percent, 6.1 percent, and 6.5 percent non-white, respectively.

According to 2016 American Community Survey 5-Year Estimates, the percentage of families whose income in the past 12 months was below the poverty level in Bond, Clinton, and Fayette Counties, Illinois is approximately 10.6 percent, 6.7 percent, and 12.2 percent, respectively. These estimates of poverty do not reach the 20 percent threshold. Thus, the proposed actions would not disproportionately affect low income or minority populations.

6 CLIMATE CHANGE

The USACE, Institute of Water Resources (IWR) published a document titled "Recent US Climate Change and Hydrology Literature Applicable to the U.S. Army Corps of Engineers Missions of the Upper Mississippi Region 07 in 2015". The synopsis included in that document generally describes territory within the St. Paul, Chicago, Rock Island, and St. Louis USACE districts. The synopsis evaluated, observed and projected trends in temperature, precipitation, and stream flow as well as the general consensus in the literature reviewed of the trending parameters.

The USACE IWR (USACE 2015b) found a general consensus for a moderate to large upward trend in observed average temperature, minimum temperatures, average precipitation, extreme precipitation, and streamflow in the Upper Mississippi Region. There is a reasonable consensus that maximum air temperatures have decreased slightly in the recent past in the region. However, projected extreme precipitation is expected to have only a small increase with moderate consensus in the literature reviewed and forecasts of future hydrology and stream-flow are anticipated to be variable, with low overall consensus in the literature reviewed. Therefore, it was presumed that these watersheds are not anticipated to incur significant precipitation changes due to climate change within the anticipated 50 year period of analysis.

7 CUMULATIVE IMPACTS AND ADVERSE IMPACTS

The Carlyle Lake Master Plan provides guidance for the orderly development, use and management of Carlyle Lake Project resources. Resource planning takes into consideration: 1) authorized project purposes, 2) public input and interests, and 3) regional needs, opportunities, and constraints. The Master Plan describes many future park development and construction O&M Actions within the Carlyle Lake Project area. These Actions include such things as campsite renovation, sewer and water maintenance, renovation of vault toilets, renovation of shower facilities, boat ramp repair, etc. It should be noted that many of these are proposed Actions that do not have funding in place or justification to complete at this time, such as large scale renovation of day-use areas, construction of new shelter houses, or parking lot expansion. For example, overnight accommodations at the IDNR Eldon Hazlet State Park and the USACE Dam West Recreation Area are currently not used at peak capacity during any given year. Proposed expansion of these accommodations mentioned in the Master Plan is not likely unless there is a considerable increase in demand or need for these types of accommodations in the future. Further, any proposed actions will require funding through the USACE budget formulation process and may require additional coordination with stakeholders and partners upon implementation.

Although there is considerable land management ongoing at Carlyle Lake Project for fish and wildlife and flood control purposes, the impacts of the proposed land transfer are considered to be minor and would have no adverse impacts that could be considered additive to existing management practices. The incorporation of these parcels in Carlyle Lake's fish and wildlife management would be a positive impact; however, the impacts would be minimal. In summary, this action would not have any major cumulative impacts when the parcels are included in existing management practices. All erosional areas involved in this proposed real estate acquisition would be federally owned and future actions on these areas would be subject to subsequent environmental compliance and would fall under existing management practices conducted by the Carlyle Lake Project.

8 COORDINATION

Notification of the Draft Environmental Assessment and unsigned Finding of No Significant Impact was sent to officials, agencies, organizations, and individuals for public review and comment (Table 10).

Additionally, an electronic copy is available during the public review period (07 August – 06 September 2018) on the USACE St. Louis District's website at:

<http://www.mvs.usace.army.mil/Portals/54/docs/pm/Reports/EA/CarlyleLakeShorelineErosionEA.pdf>

Please note that the Finding of No Significant Impact is unsigned in the draft version of the EA and will only be signed into effect after careful consideration of the comments received as a result of the public review. In addition, to ensure compliance with the National Environmental Policy Act, Endangered Species Act, and other applicable environmental laws and regulations, coordination with these entities and individuals will continue, as required, throughout the execution of the project.

Table 10. A letter regarding the availability of a draft Environmental Assessment and unsigned FONSI for the proposed project was sent to the following entities:

<p>Matt Mangan Acting Field Supervisor U.S. Fish and Wildlife Service Marion Illinois Suboffice 8588 Route 148 Marion, IL 62959</p>	<p>Adam Rawe Resource Planner Impact Assessment Section Illinois Department of Natural Resources 1 Natural Resources Way Springfield, IL 62702</p>
<p>Sierra Club Illinois Chapter 70 E Lake Street, Suite 1500 Chicago, IL 60601</p>	<p>The Nature Conservancy Chicago Office 8 South Michigan Avenue Suite 900 Chicago, Illinois 60603</p>
<p>Traci McCauley Natural Resources Illinois Department of Agriculture 801 Sangamon Ave. P.O. Box 19281 Ag Bldg – FL 001 Springfield, IL 62794</p>	<p>Jeff Kruchten Illinois State Historic Preservation Office Illinois Department of Natural Resources 1 Natural Resources Way Springfield, IL 62702</p>
<p>The Honorable Richard Durbin U.S. Senator IL 711 Hart Senate Building Washington, D.C. 20510</p>	<p>The Honorable Tammy Duckworth U.S. Senator IL 524 Hart Senate Office Building Washington, D.C. 20510</p>
<p>The Honorable John Shimkus U.S. House of Representatives 15th Congressional District of Illinois 2217 Rayburn House Office Building Washington, DC 20515</p>	<p>Ivan Dozier State Conservationist NRCS Illinois State Office 2118 W. Park Court Champaign, IL 61821</p>
<p>Ronald Moore Izaak Walton League of America-Illinois Division 55 Ridgecrest Drive Decatur, IL 62521-5425</p>	<p>Heartlands Conservancy 406 East Main Mascoutah, Illinois 62258</p>
<p>Kenneth Westlake Office of Enforcement and Compliance Assurance U.S. EPA-Region 5 77 W. Jackson Blvd. Chicago, IL 60604</p>	<p>Illinois Environmental Protection Agency 1021 N Grand Ave E Springfield, IL 62702</p>

9 ENVIRONMENTAL COMPLIANCE

Guidance	Degree of Compliance
Federal Statutes	
Archaeological and Historic Preservation Act, as Amended, 16 U.S.C. 469, et seq.	PC ¹
<u>Bald and Golden Eagle Protection Act, 42 USC 4151-4157</u>	FC
Clean Air Act, as Amended, 42 U.S.C. 7401-7542	FC
Clean Water Act, as Amended 33 U.S.C. 1251-1375	PC ²
Comprehensive Environmental Response, Compensation, and Liability Act, 42 USC 9601-9675	FC
Endangered Species Act, as Amended, 16 U.S.C. 1531-1543	FC
Farmland Protection Policy Act, 7 U.S.C. 4201-4208	FC
Federal Water Project Recreation Act, as Amended. 16 U.S.C. 4601, et seq.	FC
Fish and Wildlife Coordination Act, as Amended, 16 U.S.C. 661-666c	FC
Land and Water Conservation Fund Act, as Amended, 16 U.S.C. 4601, et seq.	FC
National Environmental Policy Act, as Amended, 42 U.S.C. 4321- 4347	PC ³
National Historic Preservation Act, as Amended, 54 U.S.C 300101, et seq.	PC ¹
Noise Control Act, 42 USC 4901, et seq.	FC
Migratory Bird Treaty Act of 1918, 16 USC 703, et seq.	FC
Resource Conservation and Recovery Act, 42 USC 6901-6987	FC
Executive Orders	
Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations (EO 12898)	FC
Floodplain Management, E.O. 11988 as amended by E.O. 12148	FC
Protection of Wetlands, E.O 11990 as amended by E.O. 12608	FC
Protection and Enhancement of the Cultural Environment, E.O. 11593	PC ¹
Consultation and Coordination with Indian Tribal Governments, 06 Nov 2000, E.O. 13175	PC ¹
Protection of Migratory Birds (EO 13186)	FC

FC = Full Compliance, PC = Partial Compliance.

1. Full compliance will be attained after all required archaeological investigations, reports and coordination have been completed.
2. Full compliance will be attained upon completion of any permitting requirements or coordination with other agencies.
3. Full compliance will be attained upon signing of the NEPA decision document.

Applicable permits:

Nationwide Permit No. 13 – Bank Stabilization. This NWP authorizes bank stabilization activities necessary for erosion control or prevention provided the activity meets specific criteria. However, in the State of Illinois, the Illinois EPA has established General and Regional Criteria in order to obtain the Section 401 of the Clean Water Act Water Quality Certification. The General Criteria include the

evaluation of State-listed threatened or endangered species, the use of Best Management Practices, and the acquisition of an individual 401 water quality certificate. This Environmental Assessment incorporates the General Criteria evaluation. The project complies with the Regional Criteria with the exception of the 1,000 linear ft of stabilization limit. In total, the tentatively selected plan uses approximately 1,600 linear ft of revetment to address erosion along the Carlyle Lake shoreline. A one-time exemption to this limit, or an individual Water Quality Certificate, would need to be submitted to Illinois EPA for approval prior to the placement of the proposed revetment.

10 LIST OF PREPARERS

- Alison Anderson, Ph.D. – Environmental Coordinator
- Brendan Willig – Project Manager, Realty Specialist
- Lara Anderson – Cultural and Tribal Coordinator
- Richard Archeski – Hazardous, Toxic, and Radioactive Materials Specialist

11 WORKS CITED

- Homer, C.G., Dewitz, J.A., Yang, L., Jin, S., Danielson, P., Xian, G., Coulston, J., Herold, N.D., Wickham, J.D., and Megown, K.. 2015. Completion of the 2011 National Land Cover Database for the conterminous United States-Representing a decade of land cover change information. *Photogrammetric Engineering and Remote Sensing*, v. 81, no. 5, p. 345-354.
- Illinois Department of Natural Resources (IDNR). 2018. Rattlesnake-master Borer Moth. Biotics 5 Natural Heritage Database. <https://bioticsil.natureserve.org>. Accessed 20 September 2018.
- Illinois Environmental Protection Agency (IEPA). 2018. Illinois Integrated Water Quality Report and Section 303(d) List. Water Resources Assessment Information and List of Impaired Waters Volume I: Surface Waters. July 2018.
- Natural Resources Conservation Service, United States Department of Agriculture. Web Soil Survey. Available online at <https://websoilsurvey.nrcs.usda.gov/>. Accessed July 2018.
- United State Army Corps of Engineers (USACE). 2007. Carlyle Lake Water Control Manual. Appendix to Master Reservoir Regulation Manual. April 20, 2007.
- United State Army Corps of Engineers (USACE). 2015a. Carlyle Lake Water Quality Report. USACE, St. Louis District, Environmental Quality Section, St. Louis, MO.
- United State Army Corps of Engineers (USACE). 2015b. Recent US Climate Change and Hydrology Literature Applicable to US Army Corps of Engineers Missions – Water Resources Region 07, Upper Mississippi. Civil Works Technical Report, CWTS-2015-13, USACE, Washington, DC. https://www.usace.army.mil/corpsclimate/Recent_CC_HydrologyLit_Applicable_USACE_Missions/
- United State Army Corps of Engineers (USACE). 2018. Draft Eastern Massasauga Management Plan – Carlyle Lake, Illinois.

- United State Army Corps of Engineers (USACE). 2018. Phase I Environmental Site Assessment for Carlyle Lake Shoreline Erosion. April 5, 2018. St. Louis District, St. Louis, MO.
- United State Census Bureau. 2016. 2012 – 2016 American Community Survey 5-Year Estimates.
- United States Environmental Protection Agency (USEPA). 2007. Cleaner Diesels: Low Cost Ways to Reduce Emissions from Construction Equipment. National Center for Environmental Innovation. March 2007.
- United States Environmental Protection Agency (USEPA). 2018. Nonattainment Areas for Criteria Pollutants (Green Book). Data current as of 28 February 2018. <https://www.epa.gov/green-book>
- U.S. Fish and Wildlife Service (USFWS). 2010. National Bald Eagle Management Guidelines. <http://www.fws.gov/migratorybirds/CurrentBirdIssues/Management/BaldEagle/NationalBaldEagleManagementGuidelines.pdf>.
- U.S. Fish and Wildlife Service (USFWS). 2017. National Wetlands Inventory. Available at: <https://www.fws.gov/wetlands/index.html>.
- Walk, J.W., Mankowski, A., Esker, T.K., Cole, M., and Alessi, M.G. 2010. The Illinois Barn Owl Recovery Plan. State Wildlife Grant Program T-35-P-1.

FINDING OF NO SIGNIFICANT IMPACT

Carlyle Lake Shoreline Erosion Kaskaskia River, River Mile 94.2 Bond, Clinton, and Fayette Counties, Illinois

1. In accordance with the National Environmental Policy Act, I have reviewed and evaluated the documents relevant to the shoreline erosion located at the Carlyle Lake Project. The work involves either the acquisition of land or the placement of revetment at 20 areas around Carlyle Lake.
2. As part of this evaluation, I have considered the following project alternatives at each Erosion Area:
 - a. Land Acquisition - USACE would acquire land up to future erosion limits at identified erosion areas up to elevation 465.5 ft. NVGD.
 - b. Shoreline Revetment – USACE would place rip-rap revetment along approximately 1,600 linear ft at identified erosion areas.
 - c. No Action Alternative- Under this alternative, no federal action would take place and no land acquisition or revetment would occur.
3. The possible consequences of the three alternatives have been studied for physical, environmental, cultural, social, economic, aesthetic, and recreational effects. Significant factors evaluated as part of my review include:
 - a. No adverse impacts to socioeconomic, transportation, and recreation resources would occur as a result of the project.
 - b. No adverse impacts to federally threatened or endangered species are anticipated.
 - c. The proposed shoreline revetment and land acquisition would have no adverse impact upon archaeological remains or historic properties.
 - d. No significant impacts to natural resources are anticipated, including fish and wildlife resources and wetlands. The proposed actions would have no adverse impacts to the physical environment (e.g., noise, air and water quality) nor would the project adversely impact low-income or minority populations.
 - e. The shoreline revetment would require the placement of fill material below ordinary high water which is permitted under Nationwide Permit No. 13 for bank stabilization.
 - f. The “No Action” alternative was evaluated and would be unacceptable to recommend as it does not meet the project purpose.
4. Compliance with Clean Water Act Section 404, and Rivers and Harbors Act Section 10 is achieved under Nationwide Permit 13 for Bank Stabilization. Compliance with Section 106 of the

National Historic Preservation Act (NHPA) was achieved through coordination with the Illinois State Historic Preservation Office. The Fish and Wildlife Service reviewed the document during public review to ensure compliance with the Endangered Species Act and Fish and Wildlife Coordination Act. Compliance with the National Environmental Policy Act will be achieved with the signing of this document. The project is in compliance with all other applicable laws and regulations as documented in the Environmental Assessment.

5. Based on my analysis and evaluation of the alternative courses of action presented in the Environmental Assessment, I have determined that the implementation of the Tentatively Selected Plan would not have significant effects on the quality of the environment. Therefore, an Environmental Impact Statement will not be prepared prior to proceeding with this action.

(Date)

Bryan K. Sizemore
Colonel, U.S. Army
District Commander