

United States Army Corps of Engineers
Louisville District

Brookville Lake Master Plan

2020



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CHAPTER 1 - INTRODUCTION

1.1 PROJECT AUTHORIZATION

Brookville Lake was authorized as a unit in the general comprehensive flood control plan for the Ohio River Basin adopted by the Flood Control Act approved 28 June 1938, Public Law 761, 75th Congress, 3rd Session. Under provision of the Water Supply Act of 1958, the State of Indiana executed a contract for water supply storage, agreeing to pay 22.54 percent of the project cost. This amount represents the construction costs allocated to the water supply features of the reservoir, plus capitalized pre-payment of operational, maintenance, and major replacement costs. This contract was approved by the Secretary of the Army in August 1965.

Recreation as a project purpose was included in the formulation studies made in connection with the advanced engineering and design planning efforts in accordance with the provisions of Section 4 of the Flood Control Act approved 24 December 1946 (Public Law 526, 79th Congress, 2nd Session, R.R. 6597) and Senate Document No. 47. Water storage was added as a project purpose at the request of the State of Indiana under the Water Supply Act of 1958.

1.2 PROJECT PURPOSE

Brookville Lake is a unit in the comprehensive plan for flood control and allied purposes in the Ohio River Basin. Operation of the reservoir will reduce flooding through the City of Brookville, Indiana, on the East Fork along the Whitewater River, and contribute to reduction in flooding along the short section of the Miami River before its entrance into the Ohio River. It also is a source of water supply. In addition, the lake provides general fish and wildlife recreation. Lastly, outflows are regulated in the interest of water quality control.

1.3 PURPOSE AND SCOPE OF MASTER PLAN

In accordance with Engineering Regulation (ER) 1130-2-550 Change 07, dated 30 January 2013 and Engineering Pamphlet (EP) 1130-2-550 Change 05, dated 30 January 2013, master plans are required for most USACE water resources development projects having a federally owned land base.

The U.S. Army Corps of Engineers (USACE) produces and operates under master plans to guide the responsible stewardship of USACE-administered lands and resources. A master plan presents an inventory and analysis of land resources, resource management objectives, land use classifications, resource use plans for each land use classification, current and projected facility needs, an analysis of existing and anticipated resource use, and anticipated influences on overall project operation and management. USACE land use classifications provide for development and resource management consistent with authorized purposes and other Federal laws.

This revision of the Brookville Lake Master Plan is intended to bring the Master Plan up to date to reflect current ecological, socio-demographic, and outdoor recreation trends that are affecting the lake. It is a vital tool for responsible stewardship and sustainability of the facility's resources for the benefit of present and future generations. This Master Plan guides and articulates USACE

responsibilities pursuant to federal laws to preserve, conserve, restore, maintain, manage, and develop the land, water, and associated resources. It is dynamic and flexible based on changing conditions. This revision of the Brookville Lake Master Plan is intended to not only bring the Master Plan up-to-date, but also to guide the comprehensive management, development, and use for recreation, natural resources, and cultural resources.

The master plan is distinct from the project-level implementation emphasis of the Operations Management Plan (OMP). Policies in the master plan are guidelines that will be implemented through provisions of the OMP or any other planning mechanisms.

The broad objectives of this Master Plan are to:

1. Determine appropriate uses and intensities of development for project resources;
2. Provide a framework within which the OMP or other planning mechanisms can be updated and implemented; and
3. Establish a basis on which outgrants and recreational development proposals can be evaluated.
4. Update previous land classification to make consistent with current policies and regulations.

The Master Plan also does not address details of design, management and administration, and implementation. These are specifically addressed in the Brookville Lake OMP. In addition, the Master Plan does not address the specifics of regional water quality or shoreline management with respect to private actions conducted by adjoining landowners such as vegetation modification. The operation and maintenance of primary project operations facilities, including but not limited to the dam, spillway, and gate-controlled outlet, are also not included in this Master Plan.

1.4 GENERAL WATERSHED DESCRIPTION

The Whitewater River originates in Darke County, Ohio, and Wayne and Randolph Counties, Indiana. The East Fork and mainstem flow south through farming and grazing country to join at Brookville. From Brookville, the Whitewater flows southeast to join the Great Miami River about five (5) miles from its confluence with the Ohio River. The total Whitewater River basin drainage area is 1,473 square miles, of which the East Fork composes 379 square miles.

The watershed of the East Fork is relatively long compared with its width, and lies in a north-south direction (Figure 1). The upland areas are relatively flat and the valleys begin as narrow grooves cut in this relatively flak plain. Progression downward, the valleys deepen and the stream entrenchments are more pronounced. In the vicinity of the damsite, the top lands range upward to about elevation 1,000-foot mean seal level (msl) while the bed of the stream is below elevation 650-foot msl, which gives a valley depth in excess of 350 feet. At the upstream end of the reservoir (Brookville Lake), the top lands are slightly higher than the lower part, and the stream bed ranges upward toward elevation 780-feel msl indicating that the stream valley is slightly steeper in slope than the adjacent top lands.

Beginning at the damsite has been glaciated, which accounts for the relatively flat slopes in the upland areas.

1.5 PROJECT ACCESS

Brookville Lake is located in southeastern Indiana on the East Fork of the Whitewater River in Franklin and Union Counties, Indiana. The Town of Brookville lies 1.2 miles south of the dam. Cincinnati, Ohio is 36 miles to the southeast. Immediate access to the project is provided by State Route 101 which parallels the east site for the project and S.R. 44 which crosses the lake near the upper reaches. Regional access is provided by Interstate 74 to the south and Interstate 70 to the north. Two causeways which cross the lake make all parts of the project accessible without requiring circumventing the lake.

The two east-west interstate highways pass near the projects area, I-70 on the north and I-74 to the south. I-74, US 52, and US 27 provide access from the Cincinnati area. US 27 is also a connection from I-70 to the project. The principal local access is via S.R. 101 which runs parallel to the east side of the lake. This is a two-lane road which is frequently congested on weekends and holiday by the large number of users (see Appendix C for transportation map). Two causeways, one at Fairfield and the other at Dunlapsville, aid in east-west distributing making all sites accessible from any direction. See Figure 2 for travel distance related to Brookville Lake.

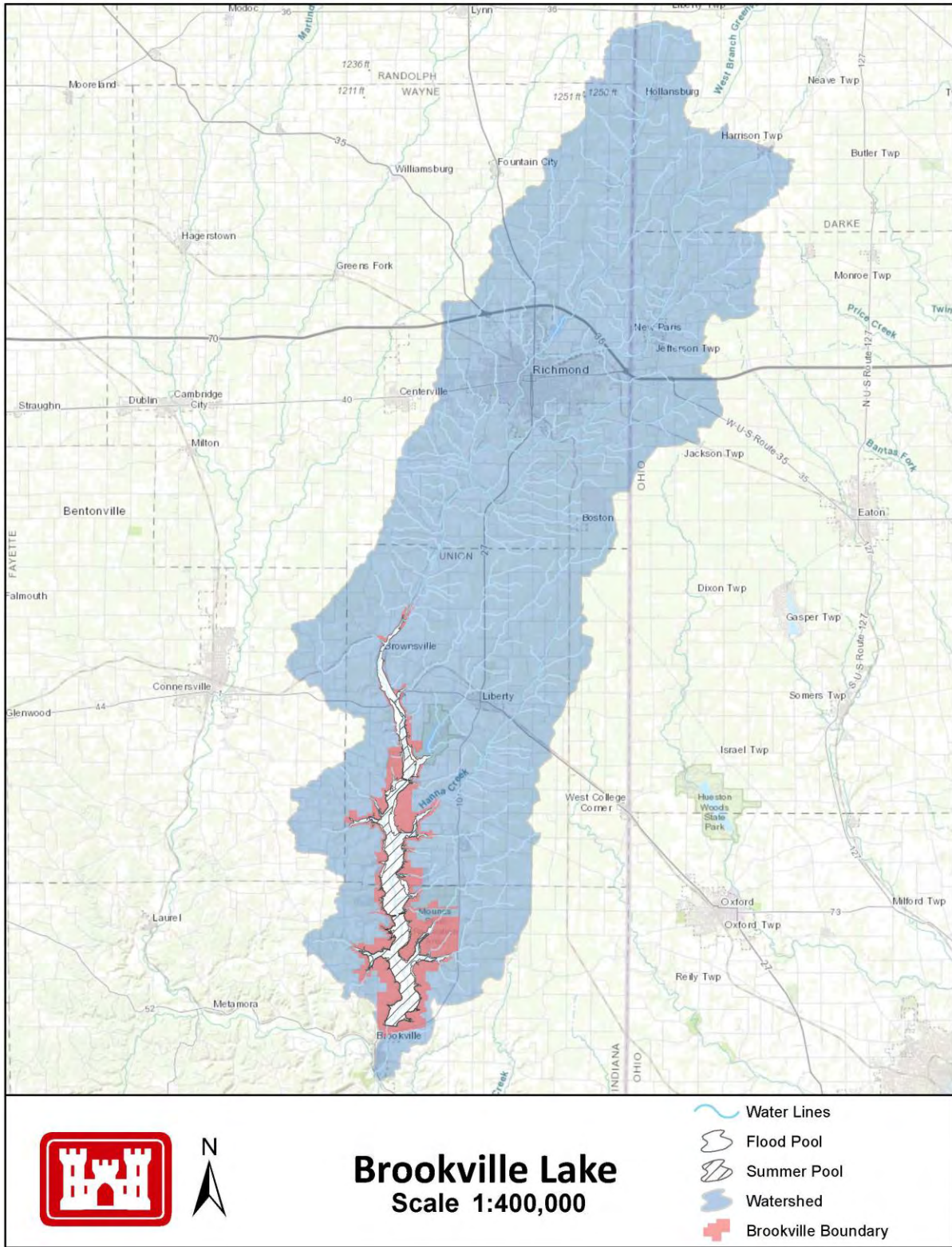


Figure 1: Brookville Lake Watershed.

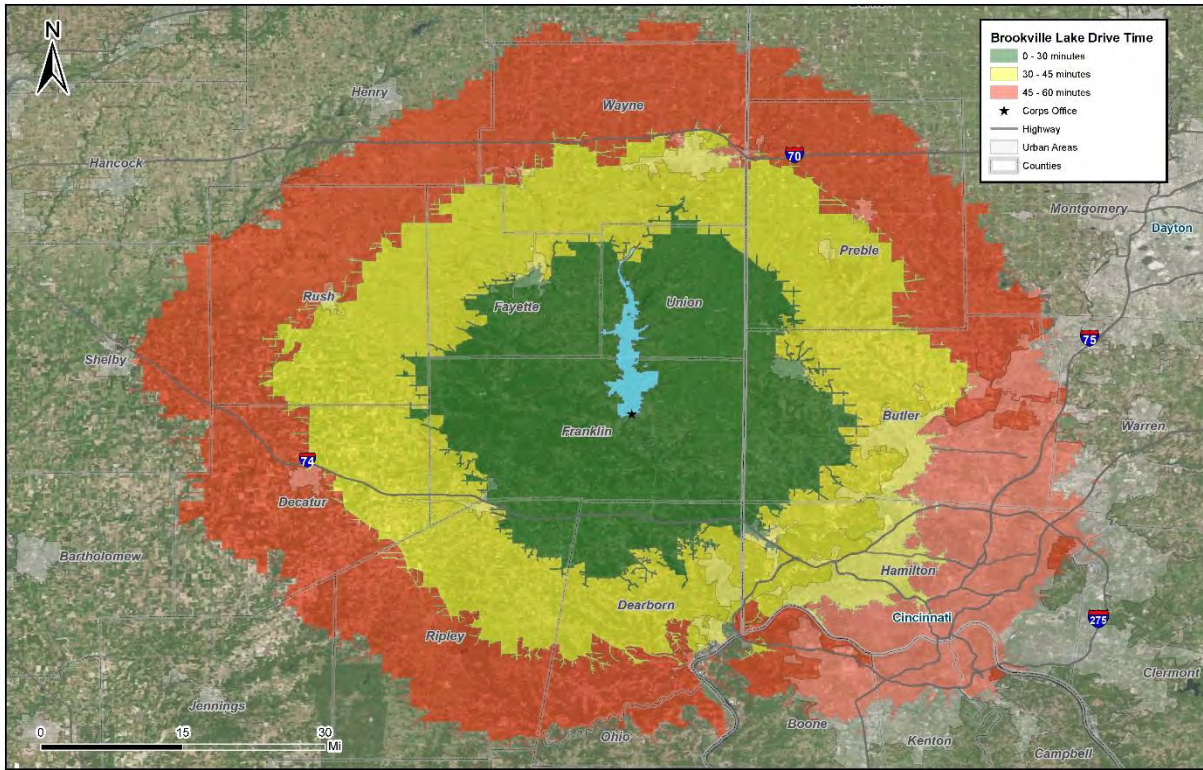


Figure 2: Area of Influence Map for Brookville Lake

1.6 LISTING OF PRIOR DESIGN MEMORANDUMS

Design memorandums previously prepared (between 1964 and 1980) for this Brookville Lake include the general design memorandum and date on the development of the general project plan. The general design details and controlling criteria have been set up in these memoranda which were utilized as a basis for the dam’s construction. Furthermore, these design memorandums were prepared for all aspects of the project including the prime flood risk management facilities, real estate acquisition, road and utility relocations, reservoir clearing, and the master plan for recreation development and land management. A partial list of the Design Memorandums for Brookville Lake are in Table 1.

Table 1: Previous Design Memorandum.

Previously Issued Design Memoranda	
Design Memorandum No.	Title
1	Reservoir and Spillway Capacities
2	General Design Memorandum
3	Concrete Aggregate and Riprap
4	Dam and Spillway
5	Outlet Works

6	Land Requirement Plan - Public Use
7	Real Estate for Construction Area
8	Relocation of State Highways
9	Real Estate in Town of Fairfield
10	Relocation of County Roads
11	Relocation of Utilities
12	Real Estate for Segments 1-10 and Indiana Highway 101
12A	Real Estate for Segments 12-30 and Roads
12B	Real Estate for Remaining Fee and Easements
13	Public Use Plan- Site Plan Portion
14	Lake Clearing
15	Master Plan (5 March 1979)

1.7 LISTING OF PERTINENT PROJECT INFORMATION

Brookville Dam is a 2,870-foot long earth and rock fill-type dam with a maximum height of 181 feet. The top width is 30 feet at elevation 809 feet msl; with an access that crosses the dam. The sides have slopes of one (1) vertical on three (3) horizontal (1:3 ratio) from the top elevation to 700 feet msl. Below the 700-foot msl line, the upstream face continues with the 1:3 ratio whereas the downstream face has a 1:4 ratio. The upstream face of the dam is armored with riprap approximately 2-feet thick; the downstream slope is grassy vegetation. A series of relief wells installed along the front of the dam catches groundwater seeping beneath the dam from the reservoir.

The emergency spillway is an uncontrolled open cut around the right abutment with crest elevation at 775 feet msl. It measures approximately 70 feet wide and is concrete lined. The downstream end of the spillway is approximately 1200 feet from the toe of the dam.

The outlet works consist of a control tower (dry type) with two hydraulically-operated 5.25 feet by 12 feet vertical lift sluice gates (inverse elevation 630 feet msl), one 30-inch, low-flow bypass pipe; one 16-inch, low-flow, bypass pipe, and six 4-feet by 4-feet multilevel inlets, discharging to a 12-foot diameter circular concrete conduit, and leading to the stilling basin. The outlet works has a main gate discharge capacity of 7,900 cubic feet per second (cfs) at flood pool (elevation 775 feet msl). Operation of the outlets works has shown that releasing through both conduit gates simultaneously is more efficient due to the reduction in gate chatter and turbulence.

The Project Office/visitor's center has been constructed near the overlook on the east end of the dam. A visitor's pavilion and overlook (known as the Edward D. Lewis Overlook Pavilion), picnic shelter, playground, and restroom are also located in this area. Recreation connected structures include two beach houses, picnic shelters, washhouses, comfort stations, entrance control stations, and marina offices. Structures connected with water supply and sewage disposal are located where

such utilities are available. Four houses and appurtenant outbuildings located on project lands which were acquired during the initial land acquisition and located on land leased to Indiana are being used by them as residences for park management personnel. Table 2 lists pertinent information about Brookville Lake Dam.

Table 2: Brookville Lake Dam Description.

BROOKVILLE LAKE DAM	
Type	Earth fill
Maximum height	181 feet
Length	2,870 feet
Drainage area above dam	379 square miles
Total Project Acreage	17,337 Acres

CHAPTER 2 - PROJECT SETTING AND FACTORS INFLUENCING MANAGEMENT AND DEVELOPMENT

2.1 DESCRIPTION OF RESERVOIR

Brookville Lake has a drainage area of 379 square miles above the dam. It has a recreational (summer) pool of 5,260, acres at elevation 748-feet msl and a winter (water supply) pool of 4510 acres at elevation 740-feet msl (Table 3).

The pool is gradually raised starting mid-March through the end of April. The summer pool was originally designed to be maintained until mid-September, but it has since been updated to extend the seasonal pool into mid-October. The summer pool is then uniformly reduced to the winter pool by December 1. The gaging station at Cincinnati Ohio is used as the Ohio River Control for Brookville Lake. Maximum release table was based on Whitewater River flows at Alpine Gage, taking into account time of travel of flood flows and runoff from the intermediate area.

During flood storage, a minimum release of 100 cfs and an allowable release of 6,300 cfs are implemented. Water fluctuation for the execution of project flood control purposes has a detrimental effect upon the recreation potential of Brookville Lake. For instance, there is a minimum controlled release of 40 cfs when pool elevations exceed 748-feet msl. The USACE operates the lake under the approved water control plan as required by 33 C.F.R § 222.5 and Engineering Regulation (ER) 1110-2-240.

A series of relief wells installed along the front of the dam catches groundwater seeping beneath the dam from the reservoir. This constant seepage makes up about 16 percent of the minimum flow.

Table 3: Brookville Lake Summary Data

Pool	Elevation (Feet)	Storage Capacity		Area (Acres)
		(Acre-feet)	(Inches-runoff)	
Silt	692	20,100	0.99	1,130
Minimum	713	55,650	2.75	2,250
Water supply	740	144,900	7.17	4,510
Summer	748	184,000	9.10	5,260
Flood	775	359,600	17.79	7,790
Flood Storage	740-775	214,700	10.62	-

Discharges from Brookville Lake are controlled to meet flood control, low flow augmentation, water supply, fish and wildlife and recreation requirements. The Project is designed to reduce flooding on the Whitewater River Below the dam, the Miami River, and to a lesser extent on the Ohio and Mississippi River.

Seasonal Pool is maintained from May 1 until mid-October, thereby enhancing fish and wildlife and recreation activities. The seasonal pool is then lowered to increase overall flood storage capacity during the winter and spring months when flood risk is high. Complete details of operations are included in the General Design Memorandum, D.M. No. 2.

2.2 HYDROLOGY (SURFACE WATER, GROUNDWATER)

Brookville Lake has a seasonal pool of 5,260 acres at elevation 748.0 feet msl until mid-October, and a winter pool of 4,510 acres at 740.0 feet msl the remainder of the year. At various times of the year, water fluctuation of two feet for the execution of project flood control purposes has a detrimental effect upon recreational uses of the project. Fluctuation of water levels has the potential to cause erosion, affect the opening or closing of beach facilities, create safety problems, and have the potential kill trees if high water is allowed to stand for a prolonged period of time.

Water quality management objectives consist of frequent monitoring of the project's waters to provide a safe habitat for fishes, a safe water supply for humans and wildlife, plus provide a safe recreational facility for the visiting public. Table 1 above summarizes the pool capacities of Brookville Lake.

One bedrock and one unconsolidated aquifer system is found within the Brookville Lake project boundary. The Maquoketa Group Aquifer System is located in Franklin and Union counties. This bedrock aquifer includes mostly shale with some limestone with bedrock surface ranges of 3 to 117 feet (IDNR 2009). This aquifer is overlain by thick clay deposits which are, in general, considered low risk for contamination from agricultural runoff or other contaminants. The Maquoketa Group is considered a limited groundwater resource with total well depths ranging from 2 – 100 feet (typically 35 – 90 ft). Well yields vary widely from 1 to 60 gallons per minute (gpm).

The Dissected Till and Residuum/Till Veneer Aquifer system is an unconsolidated aquifer which is found throughout much of Franklin and Union counties including the entire Brookville Lake project boundary. Wells constructed in this aquifer are typically dug to depths of 30 to 45 feet with capacities of 5 gpm or less (IDNR 2009). Water wells are in use at Hanna Creek boat ramp, Quakertown Beach, and Dunlapville.

2.3 SEDIMENTATION AND SHORELINE EROSION

Sedimentation and erosion has occurred around sections of the lake due to fluctuating water levels, soil types, and lack of vegetation along sections of the shoreline. Approximately 10,000 seedlings per year are planted at Brookville Lake in an effort to limit erosion (and improve wildlife habitat). Planted species include white Pine, dogwood, red pine, and lespedeza.

2.4 WATER QUALITY

The water quality management authority of USACE is founded on the Federal Water Pollution Control Act (FWPCA) of 1948 and its amendments including the Clean Water Act of 1977 and the Water Quality Act of 1987. Executive Order 12088, Federal Compliance with Pollution

Control Standards (1978), requires Federal facilities to comply with applicable pollution control standards in the same manner as any non-Federal entity. ER 1110-2-8154 stipulates that it is Corps policy to develop and implement a holistic, environmentally sound water quality management strategy for all projects. Furthermore, it is USACE's goal to responsibly manage our projects to maximize environmental stewardship. USACE is also mandated to comply with native State regulations and standards including the Indiana Administrative Code Title 327, Article 2 – Water Quality Standards

Water quality at Brookville Lake varies greatly depending on seasons, runoff volume, pollution sources, and lake capacity. Sources of impairment at Brookville Lake includes possible point and nonpoint pollution sources. Point sources are discernible, confined and discrete conveyances such as pipes, ditches, channels, tunnels or conduits by which pollution is transported to a water body. Potential point sources affecting Brookville Lake water quality include illicitly connected straight pipe systems, cropland and livestock runoff, sanitary sewer overflows (which may contain sediments, *E. coli* and nutrients), and regulated stormwater sources. Nonpoint source pollution is generally from land or stormwater runoff, drainage, seepage or hydrologic modification. Potential nonpoint pollution sources which effect overall project water quality include stream bank erosion; onsite wastewater treatment systems (septic systems); and urban stormwater runoff. Best Management Practices (BMPs) to improve pollution sources may include:

- Inspection and maintenance of wastewater treatment plants, industrial facilities, and onsite wastewater treatment systems
- Replacement of illicitly connected straight pipe and onsite wastewater treatment systems
- Creation of riparian forested or herbaceous buffers to protect against agricultural and urban runoff as well as stream bank erosion
- Regional implementation of stormwater management and planning
- Implementation of stream bank and shoreline protection practices

Additional water quality monitoring at the lake is performed by USACE, and is done in coordination with the state of Indiana. USACE Project personnel also conduct water quality monitoring in coordination with Indiana Department of Environmental Management (IDEM) in which biweekly measurements are collected from spring to fall during lake stratification to monitor temperature and dissolved oxygen levels. Data collected via the Louisville District Water Quality Program (LRL-WQ) is assessed annually. This program is responsible for monitoring and evaluating physical, chemical, and biological parameters of water quality in the 20 reservoirs and 542 river miles of the Ohio River with the Louisville District. Water quality in the tailwater is also assessed by analyzing data for exceedances of water quality (WQ) standards and criteria established by the IDEM. Data is compared and if any exceedances of established water quality criteria occur, the (LRL-WQ) reports this to IDEM.

Benthic macroinvertebrates and fish surveys are often used as water quality indicators to assess short- and long-term trends (USACE 2020b). In 2017, biological samples were collected by IDEM personnel at ten of the primary inflows and the tailwater of Brookville Lake. Macroinvertebrates were collected using IDEM's multi-habitat collection method and fish were collected using IDEM's backpack electrofishing method. Habitat was assessed using IDEM's Qualitative Habitat Evaluation Index (QHEI) and measured separately for macroinvertebrate and fish reaches. The

IDEM uses this data to calculate the Macroinvertebrate Index of Biotic Integrity (mIBI) and fish community data to calculate the Index of Biotic Integrity (IBI), which are developed specifically for Indiana streams. Some of the metrics used in calculating mIBI and/or IBI include: taxa richness; EPT richness –number of pollution intolerant taxa from the orders Ephemeroptera (mayflies), Plecoptera (stoneflies), and Trichoptera (caddisflies); sensitive species richness –number of species that are sensitive to poor water quality; and % tolerant –percentage of the total number of fish species tolerant of poor water quality. In general, good water quality is associated with higher values in mIBI and IBI (IDEM 2017). The high proportion of mIBI and IBI ratings designated as *Fair* suggest the watershed has some level of impact from human disturbance but still has fair stream health. The Brookville Lake tailwater received the lowest mIBI and IBI scores and was the only location with two Poor ratings. However, it is possible that discharge events occurring current to sampling may have impacted the macroinvertebrate and fish communities there.

Annual water quality monitoring suggests that Brookville Lake is eutrophic in nature and is susceptible to periodic algal blooms due to high nutrient load. Freshwater harmful algal blooms (HABs) are significant and excessive growths of blue-green algae, also known as cyanobacteria. All freshwater lakes are inhabited by native cyanobacteria species that are capable of producing HABs. Several of these species have the capability to produce toxins (called cyanotoxins) that are harmful to the nervous system (neurotoxins), liver (hepatotoxins), and skin (dermatotoxins) of humans and other animals (USACE 2020b). In addition to cyanotoxins, HABs can be harmful to lake ecosystems via the depletion of oxygen levels which can result in large fish kills. One of the most influential factors of HAB growth is the concentration of nutrients such as nitrogen and phosphorus. Most nitrogen and phosphorus pollution (i.e., eutrophication) comes from the runoff of agricultural fertilizer, lawn fertilizer, untreated human sewage (storm overflows), and animal sewage from concentrated animal feeding operations (USACE 2020b).

The USACE began monitoring Brookville Lake for HABs in 2012. Since this time, the USACE's Louisville District (LRL) Water Quality Program has coordinated with Indiana state agencies to develop a HAB Response Sampling Plan that protects the public while recognizing the state agencies as the water quality authority per the authority designated to them by the Environmental Protection Agency (EPA) via the Clean Water Act. USACE's primary function in the Indiana HAB Response Sampling Plan is to provide support for Indiana state agencies through data collection at the lakes managed by USACE. The LRL-WQ has also created Harmful Algal Blooms (HAB) Response Manuals for each reservoir to serve as reference information on HAB response.

There are six established HAB sampling sites at Brookville Lake. Samples at each site are collected by the IDEM staff and shipped overnight to an analytical laboratory that has been secured by the LRL-WQ. Based on the sampling results, the IDEM issues cautions or advisories. In August 2019, a High Cell Count Recreation Advisory was given for Brookville Lake due to high HAB cell counts in samples collected at Quakertown SRA and Mounds SRA.

In Indiana, HABs are addressed by the Indiana Department of Natural Resources (IDNR) and the IDEM in the IDNR HAB Response Standard Operating Procedure. The Louisville District WQ Program supports the state agencies efforts by reporting visual HAB indicators via the Indiana State Department of Health Algal Bloom Notification Form. IDEM samples for blue-green algae and analyzes those samples for the type and quantity of blue-green algae present and for the

following toxins which may be produced by certain types of blue-green algae: microcystin, cylindrospermopsin (only done if species that produce it are present), anatoxin-a, and saxitoxin. For protection of human health from exposure to the algae and any of the toxins, cyanobacteria will be compared to the World Health Organization (WHO) and the United States Environmental Protection Agency (EPA) guidelines. WHO guidelines recommend using an action level of 100,000 cells/ml of cyanobacteria to post recreational advisory signs.

Water quality in the tailwater of Brookville Lake is assessed by analyzing exceedances of WQ criteria established by IDEM. In 2017, Brookville Lake exceeded the USEPA's recommended criteria for total phosphorus (Criteria: 76.25 ug/L; Measurement: 209.0 ug/L), total nitrogen (Criteria: 2.18 mg/L; Measurements: 2.34, 2.48, and 3.26 mg/L), and turbidity (Criteria: 6.36 FTU; Measurement: 853 NTU). Brookville Lake was also identified as impaired (Clean Water Act Section 303d) as a result of mercury and polychlorinated biphenyl (PCB) accumulation in fish tissue samples in 2012 and exceeded PCB limits again in 2014 and 2018 (IN.gov 2020).

See Appendix A: Environmental Assessment for more detailed information on Water Quality.

2.5 CLIMATE

The climate of the Whitewater Basin, which includes Brookville Lake, is temperate continental with warm, humid summers and moderately cold, relatively dry winters. This area often exhibits erratic changes of temperature within and between seasons. Average temperatures of this area range of 20.4F in January to 75.3F in July. There is an average frost-free period of 155 days from 3 May to 5 October. On the uplands, the frost-free period generally begins about a week earlier than on the lowlands and ends a week or more later. The mean annual precipitation is 39.5 inches including an average of 13.8 inches of snowfall occurring mostly from December through March (USACE 2019).

2.6 TOPOGRAPHY AND GEOLOGY

The project area is located in the Dearborn Upland Section of Indiana within the Till Plains section of the Central Lowland Physiographic Province. The land surface is that of a glaciated plain broken by entrenched river valleys. Upland elevations exceed 1,000 feet while the valley bottom slopes from about 900 feet elevation near Richmond to less than 650 feet near the dam site. Local relief within the uplands or the valley is generally slight (less than 50 feet), but along valley sides, the relief ranges from 100 feet or so in the northern part of the project area to more than 350 feet near the south end of the basin. Tributary streams on the upland are relatively smooth and gentle in their head areas, but increasingly dissect the glacial surface as they near the main stream. Along the valley sides, the streams are steep and irregular and generally flow on bedrock. Over in the valley bottoms, the tributaries flatten out again as they flow upon terrace and floodplain materials (USACE 2011).

The geology of the area includes material of different types. Surface sediments have been deposited during recent ice age periods. Bedrock is exposed along steep slopes and some stream beds. Brookville Lake is near the crest of the Cincinnati Arch, a major geological structure in the central United States. The Arch is responsible for bringing relatively old rocks to the surface, and

causes all bedrock formations to gradually dip westward. Bedrock in the area is almost all Ordovician in age and consists of fossiliferous shale with numerous thin limestone layers. The dominant rocks are the Dillsboro and Kope formations of the Manquoketa Group. Silurian bedrock occurs in small areas in the Whitewater River Basin, but windblown silt, courtesy of the Wisconsin Glacial Period, is also present. Valley areas consist of alternating till and outwash deposits over a series of terraces which descend to the present stream level. Post-glacial stream development has cut into old deposits and developed an alluvial floodplain (USACE 2011).

2.7 SOILS

Soils in the vicinity of the Brookville Lake project are closely related to geologic parent material and topographic characteristics. Active floodplains are characterized by loamy soils of the Benessee-Shoals-Eel catena. Soil properties vary considerably over a short distance with Genessee soils occurring on the most level, best drained sites. Terrace areas are characterized by loamy soils of the Fox-Ninevah-Ockley catena with Fox soils dominant on low terraces (5-15' above the floodplain) where sand and gravel is at the surface, and Ockley soils dominant on the silt covered high terraces (20-35' above floodplain). Soils on the higher terraces tend to be much siltier and thicker than those on the low terraces. Rodman soils are commonly found on terrace scarps (USACE 2011).

Valley side slopes are characterized by shallow, clayey Fairmont and Switzerland soils with some areas of talus (sloping rock debris) or exposed bedrock. Similar shallow soils occur on some of the valley terraces where in fact the terrace is a rock bench with a thin veneer of sand and gravel (USACE 2011).

Upland soils are mostly in the Fincastle-Ragsdale-Brookston, or Miami-Russell-Fincastle catenas. The silty Fincastle soil occurs on the level and poorly drained wind-blown silt and glacial tills (ground moraine), while loamy Miami is typical of sloping well drained tills (especially end moraine). Russell soils occur most often in wind-blown silts on ground moraine. In the upland areas of the basin, the wind-blown silt cover is thick and continuous so that soils are very silty with clay rich lower horizons. Nearer the Whitewater in the sloping uplands, erosion has removed most or all of the silt and the soils are developed in till or even on bedrock with some profiles being less than a foot thick (USACE 2011).

Most soils in the area are moderately acidic. Upland soils tend to be limited in natural fertility due to lack of plant nutrients or in some locations to poor drainage and soil wetness. Alluvial soils, where well drained, are quite fertile (USACE 2011).

See Appendix C for soil maps at Brookville Lake.

2.8 RESOURCE ANALYSIS

2.8.1 Fish and Wildlife Resources

The IDNR Division of Fish and Wildlife stock fish annually according to the needs of the IDNR fisheries program. Fish habitat and cover is also actively maintained and created by the IDNR.

Fish species stocked include, but not limited, channel catfish, striped bass, muskellunge, walleye, largemouth bass, white bass, black crappie, bluegill, redear, rock bass, and smallmouth bass in Brookville Lake, and rainbow and brown trout are annually stocked in the tailwater. Other species found in the lake and headwaters that were present prior to stocking include carp, gizzard shad, white sucker, and various species of minnows and darters.

The stated objective of the wildlife program at Brookville Lake is to professionally manage, restore, create, and conserve the fish, forest, and wildlife resources (IDNR 2017). Management is primarily concerned with the improvement of wildlife habitat within the context of multi-use recreation. Primary game species include rabbit, quail, deer, squirrel, raccoon, dove, and various waterfowl species.

Brookville Lake offers trapping opportunities through a sealed bid process for specific trapping units. Details for these opportunities are available by IDNR in the late summer. . Special waterfowl hunts are conducted on Elly's Creek Marsh and Water Resting Area on a limited number of days designated by INDNR. Figure 3 shows designated hunting areas on the Brookville Lake Project.

2.8.2 Vegetative Resources

Habitats of the Brookville Lake project area are delineated and categorized using the National Land Cover Database (NLCD). The NLCD provides nationwide data on land cover categories at a 30m resolution with a 16-class legend based on a modified Anderson Level II classification system. Fifteen NLCD habitat categories are found at Brookville Lake, and of them, nine consist of regularly disturbed areas, including developed lands, shrub/scrub, cultivated crops, and barren areas (See Appendix C for NCLD maps). These regularly disturbed areas may include vegetative communities at various stages of ecological succession and are home to edge and urban adaptive species. Typical animal species found in these habitats include songbirds, coyotes, foxes, deer, raptors, mice, squirrels, raccoons and rabbits.

Forested Habitats

Forested habitats are classified using the NLCD system and include mixed, evergreen, and deciduous forest habitat types. These habitat classifications are broad categories that can be further refined into known forest community associations that are greatly affected by local and regional geologic and climate variables. In general, the larger tracts of forest habitat are located on steeper slopes that are often associated with water courses and are found in areas managed for wildlife or recreation. These forest habitats are often a mosaic of mixed community types occurring at different successional stages. Ongoing silvicultural practices (e.g., group selection, selective timber harvesting, and clear cutting methodologies) employed by land managers affect the forest composition and age structure and are conducted to improve forest health, achieve a desired forest composition or age structure (e.g., early successional stages), and to create or maintain wildlife habitat(s).

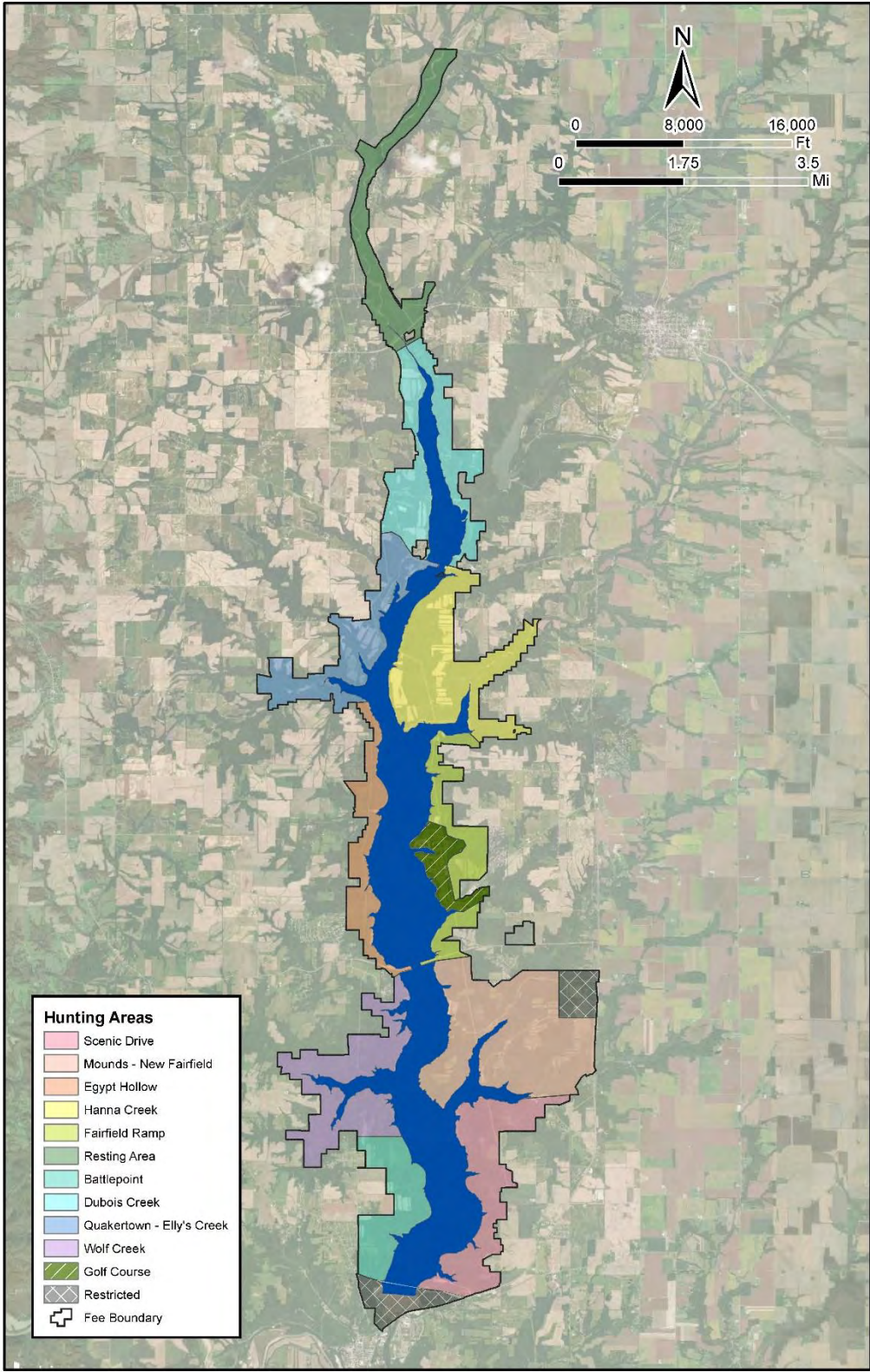


Figure 3: Brookville Lake hunting map

Generally found on flat or rolling uplands to steep slopes, the beech-maple forest is a dominant forest community found at Brookville Lake. Beech-maple forest covered much of the area during pre-colonial times, until subsequent agricultural, urbanization, and residential development converted much of this habitat to other uses. The community remains dominant in many areas and thrives in loam soils over glacial till. Sugar maple and American beech dominate the canopy with other members of the forest canopy including white ash, blue ash, sugar maple, white oak, chinquapin oak, red oak, shagbark hickory, tulip tree, Ohio buckeye, and black walnut. Common subcanopy and understory species include red oak, basswood, and tulip tree. The herbaceous layer is diverse and includes spring ephemerals, such as white trillium, Jack-in-the-Pulpit, spring beauty and Solomon's seal (Homoya et al. 1985, NatureServe 2020).

A typical mixed-mesophytic community predominately found on lower slopes, in coves, and in other protected landscape areas south of the glacial boundary is the south-central interior mesophytic forest type. This habitat contains a rich herb layer often comprised of abundant spring ephemerals such as spring beauty and Dutchman's breeches and often has small streams bisecting this community. Other herbs include white trillium, black baneberry and great Indian plantain. Dominant canopy species are sugar maple and American beech with maples, black walnut and sassafras (Homoya et al. 1985, NatureServe 2020b).

Many of the early successional habitats found on lands designated as wildlife management areas are fields in various stages of succession with many sections being colonized by trees and shrubs of various species. Pioneer tree species encroaching on open fields include honey and black locust, black cherry, red or sugar maple, white ash, sumac, dogwood, hackberry, elm, box elder, sassafras, and hawthorn. Some walnut, shagbark, bitternut and pignut hickories, white, red, and black oak, red bud, flowering dogwood, and beech exist in more advanced sere stages. In some of the open sloping areas with thin soils and limestone outcroppings, red cedar may be present as codominants (USACE 2016).

Mammals and birds common to forest habitats at Brookville Lake include white-tailed deer, gray squirrels, fox squirrels, raccoons, foxes, many passerine songbirds, woodpeckers, and owls.

Hay Fields/Pasture/Food Plots

Old fields are successional habitats characterized by grasses, shrubs, and trees. These habitats are typically maintained for hay productions, left as fallow fields, or transitioning from grasslands to early successional scrub/shrub/forest communities. In general, early successional habitats of the project area are characterized by the following plant species: blackberry, raspberry, switchgrass, big bluestem, and little bluestem among other grasses, forbs and shrubs. Food plots are created and maintained at Brookville Lake that range in size from 1 acre to 20 acres. The plots are corn, sunflowers or millet and are placed in areas where it is not feasible to have a crop lease field. Food plots might be created for a special project such as dove or waterfowl management. Wildlife species may include cottontail rabbit, white-tailed deer, turkey, wrens, sparrows, grouse, coyotes, foxes and other various songbirds and furbearers.

See Appendix A: Environmental Assessment for more detailed information on Vegetative Resources.

2.8.3 Threatened & Endangered Species

Lists of threatened, endangered and species of special concern are maintained by the U.S. Fish and Wildlife Service (USFWS) and the state of Indiana. Under the Endangered Species Act (ESA) of 1973 (16 U.S.C. §§ 1531-1544), endangered species are generally defined as any species in danger of extinction throughout all or a significant portion of its range. A threatened species is any species likely to become endangered in the foreseeable future. The ESA defines critical habitat of the above species as a geographic area that contains the physical or biological features that are essential to the conservation of a particular species and that may need special management or protection. The ESA also covers birds protected by the Migratory Bird Treaty Act (MBTA) of 1918 (16 U.S.C §§ 703-712) as birds of conservation concern.

An official species list from the USFWS, dated 5 March 2020 for the Brookville Lake Project Area (Consultation Code #03E12000-2020-SLI-0999) includes the Federally endangered Indiana bat (*Myotis sodalis*) and the Federally threatened northern long-eared bat (*M. septentrionalis*). Both species occur over a large geographical area, including the entire state of Indiana and the species in known from the Brookville Lake Project area (USFWS 2019).

In the spring, Indiana bats emerge from hibernation and migrate to summer roost sites, often over long distances. During the summer months, female Indiana bats establish maternity colonies of up to 100+ individuals under the loose bark of trees and in tree cavities. Habitat loss and fragmentation of forest habitat are among the major threats to Indiana bat populations. Additional threats include white-nose syndrome, disturbance (of hibernating bats) at hibernacula, and environmental contaminants (USFWS 2007).

The northern long-eared bat was listed as a threatened species in 2015 due to declines mostly associated with white-nose syndrome. The bats spend winter hibernating in caves and mines. During the summer, the bats roost singly or in colonies underneath bark and in cavities or in crevices of both live trees and snags. Males and non-reproductive females may also roost in cooler places like caves and mines. Threats to the species include habitat loss and fragmentation of forest habitat, environmental contaminants and pesticides, and disturbance of hibernating bats a hibernacula (USFWS 2015).

Bald eagles (*Haliaeetus leucocephalus*) are known to nest on the lake. While this species was formally removed from the endangered species list in 2007, these birds are protected under the MBTA and the Bald and Golden Eagle Protection Act (16 U.S.C. §§ 668-668c). Osprey (*Pandion haliaetus*) are also known to nest on Brookville Lake and are protected by the MBTA.

There are no critical habitats of listed species known in the Project area (USFWS 2020).

Section 7 of the ESA requires all federal agencies to conserve threatened and endangered species and to further the purpose of the act. The Environmental Assessment in Appendix A provides more information on sensitive species found in the vicinity of the lake, as well as implications for development.

Timber management at Brookville Lake is seasonally restricted due to the potential presence of the Indiana bat. The harvest of trees over five inches in diameter at breast height (dbh) are restricted within five miles of known Indiana bat locations from March 31 through November 15. Other management guidelines include retention of snags, shagbark hickory, large trees, and riparian habitat (USFWS 2007). The restrictions are imposed by the state of Indiana in accordance with the USFWS Midwest Region Bloomington Field Office.

Development near active bald eagle nests is limited by the Bald and Golden Eagle Act. Under the act, steps must be followed to prevent the take of an eagle. The Midwest Region of the USFWS maintains a guidance document that helps project developers to determine if their project will result in the “take” of an eagle. To take, as defined by the Act, also includes to pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, molest or disturb and includes their parts, nests, or eggs, and the molesting or disturbing the bird. In an effort to limit potential disturbance of nesting Bald Eagles, no tree trees will be cleared within 200 feet of an active or inactive nest; and that work within line of sight of the nests be restricted during the egg-laying period (January 15 through July 31). The USFWS should be consulted for guidance on impacts to threatened and/or endangered species, migratory birds and high-quality habitats if any new development is planned.

See Appendix A: Environmental Assessment for more detailed information on Threatened and Endangered Species.

2.8.4 Invasive Species

USFWS (2012) defines invasive species as one that is “not native to an ecosystem and which causes or is likely to cause economic or environmental harm or harm to human health.” Invasive species out-compete native plants and wildlife, degrading, changing or replacing native habitats (USFWS 2012). The IDNR maintains a list of invasive species found in Indiana on their website. Table 4 below lists invasive species that have been identified by land managers as present at Brookville Lake. This list does not include all invasive species present at the lake. The IDNR and USACE actively manage for invasive species including several invasive plants found in the management units throughout the project.

Table 4: Invasive species and relative amount of impacted acres at Brookville Lake.

Common Name	Species	# of Acres Impacted
Asian long-horned beetle	<i>Anoplophora glabripennis</i>	2
Autumn Olive	<i>Elaeagnus umbellata</i>	250
Canada thistle	<i>Cirsium arvense</i>	20
Common Reed	<i>Phragmites australis</i>	1
Emeral ash borer	<i>Agrilus planipennis</i>	12000
Eurasian watermilfoil	<i>Myriophyllum spicatum</i>	1
Garlic mustard	<i>Alliaria petiolata</i>	1000
Hydrilla	<i>Hydrilla verticillata</i>	1

Japanese chaff flower	<i>Achyranthus japonica</i>	1
Japanese honeysuckle	<i>Lonicera japonica</i>	25
Johnson grass	<i>Sorghum halepense</i>	100
Kudzu	<i>Pueraria montana</i>	1
Multiflora rose	<i>Rosa multiflora</i>	100
Oriental bittersweet	<i>Celastrus orbiculata</i>	1
Purple loosestrife	<i>Lythrum salicaria</i>	1
Japanese honeysuckle	<i>Lonicera japonica</i>	25
Tree-of-heaven	<i>Ailanthis altissima</i>	10
Zebra mussel	<i>Dreissena polymorpha</i>	5260
	Total=	18799

Invasive species are commonly introduced or spread through periodic disturbance of an area, either by humans or other migratory species. Awareness of current and local emerging invasive species and their potential impacts can help address and limit their spread. Invasive species have the potential to devastate forests throughout Indiana, including those at Brookville Lake, and could influence future management decisions. This devastation could be through the complete replacement of native species, or by the desolation of native species (i.e. the effects of the Emerald Ash Borer on Ash stands). Future development and maintenance projects conducted by land managers should attempt to limit the spread of invasive species found at the project. Additionally, interpretive signs and educational programs can be used to inform the public on the ecological problems associated with invasive species and increase their involvement in eradication programs.

2.8.5 Ecological Setting

The biology of the Brookville Lake area may be generally interpreted as a very rich representation of mid-western flora and fauna generated by various current factors. This diversity generally has been impacted by habitat changes from development around the lake and impoundment of the lake. Since construction of the dam, plant and animal species which have a low tolerance for slack water situations have either disappeared, or persist as a remnant or peripheral populations. There are various stages of vegetative succession present around the project, however, mature deciduous forest is the dominant stage. This abundance of forested land provides habitat for numerous species of plants and animals.

2.8.6 Wetlands

There are a number of wetlands located on the Brookville Lake Project (see Appendix C for wetland maps). Wetlands are located in floodplains and other low-lying areas surrounding the Brookville Lake and tailwater. In general, wetlands were identified using the National Wetland Inventory (NWI). Typical wetland flora may include various sedges, cattail, spikerush, smartweed, knotweed, arrowhead, pickerelweed, pondweed, naiad, watermilfoil, bladderwort, duckweed, and waterlily. Trees such as willow, cottonwood, sycamore, maple, ash, and oak may also be found in Brookville Lake wetlands. Wetlands provide habitat for many animals, including red-winged blackbird, muskrats, mink, beaver, reptiles and amphibians, as well as a wide range of waterfowl.

2.9 MINERAL AND TIMBER RESOURCES

Approximately 3,000 forested acres across different management units are intensively managed for wildlife and timber resources. A total of 120 acres are harvested once every three years using a combination of individual tree selection, small group selection, and regeneration (clear cut) harvest methods. These silvacultural activities will help establish needed or lost habitat types, the regeneration of the oak-hickory component, and increase the overall health of the forest. The intent of the 20-acre regeneration cuts is to create early successional stands adjoining open fields. Timber sales occur every three years with earned revenues typically from \$50,000 to \$100,000 per sale. Revenue generated from the sale of timber is returned to the IDNR for future management. All forest management activities will be coordinated through the IDNR Division of Forestry (DOF) for compliance with Indiana's Bat Management Practices.

2.10 CULTURAL RESOURCES

2.10.1 Cultural and Historic Overview

Researchers have developed a general chronology for the state of Indiana and Whitewater River Valley that provides a useful framework for organizing and describing the cultural resources at Brookville Lake (Swartz 1981, Kellar 1983, Hicks 1992, Stafford 1997, Jones and Johnson 2003). These schemes agree on a sequence of human occupation beginning after the Wisconsin glacial maximum, approximately 25,000 to 21,000 years ago, and continuing into the present day.

The prehistoric cultural sequence is generally divided into the following chronological periods: Paleo-Indian (14,000-10,000 B.C.), Early Archaic (10,000-8,000 B.C.), Middle Archaic (8,000-5,000 B.C.), Late Archaic (5,000-3,000 B.C.), Early Woodland (3,000-200 B.C.), Middle Woodland (200 B.C.-A.D. 500), Late Woodland (A.D. 500-900), and Late Prehistoric (Fort. Ancient and Mississippian, roughly A.D. 900-1600). This sequence reflects a general trend toward increasing socio-cultural and technological complexity beginning with small mobile bands that later developed into more sedentary, complex societies. The subsistence activities of the earliest cultures focused on hunting and gathering wild plant and animal foods. By late prehistoric times, however, agricultural economies based on three major tropical cultigens – corn, beans and squash – were characteristic of many societies in the eastern United States. Increases in the size and density of the human population and a trend toward increasing sedentism were also evident and reached their highest levels during the late prehistoric times.

In all, these prehistoric cultural trends are marked by stylistic differences in artifacts and correspond to major technological innovations or important shifts in adaptational patterns. However, there is considerable regional variation in the timing and extent to which these trends were expressed. For example, in many parts of Indiana, the hunting and foraging adaptation continued until European contact while in other parts cultures were adapted to a more focused economy based on corn horticulture.

The historic cultural sequence in Indiana and Whitewater River Valley is generally subdivided into four periods (Seiber & Munson 1992:7): (1) Cultures in Transition: Native American (A.D. 1600-

1800), (2) Transplanted Cultures: Pioneer Settlement (A.D. 1800-1850), (3) Regional Distinctiveness: Tradition and Change (A.D. 1850-1915), and (4) Twentieth Century Changes (A.D. 1915-1975). These subdivisions bracket the changes in settlement from European contact through the end of the Vietnam War. This sequence is just under 400 years in length, but represents a radical change in human culture and technology compressed into such a short time frame.

European contact with Native American peoples along the Whitewater River valley did not occur prior to 1674. It was not until French expeditions into the region in 1739 and 1749 that written accounts and mapping were produced. The early accounts document Shawnee and displaced peoples from Pennsylvania and New York including Iroquois, Delaware and others.

The period between 1750 and the early 1800s is one of extreme disruption for Native American peoples. This resulted from European settlement and expansion into the interior of North America, as well as from the impacts of European diseases. Initial contact with Native American peoples along the Whitewater River Valley did not occur prior to 1674. Early European accounts document the relocation of the Shawnee, Iroquois, Delaware and others from Pennsylvania and New York to Indiana and areas west. The path traveled by these groups, in part, followed an Indian trail documented by Moravian missionary accounts (McCord 2002). The trail is recorded from below Brookville near Cedar Grove and follows the valley of the East Fork of the Whitewater River past Conner's trading post in Fayette County before diverting across country to the upper reaches of the East Fork White River near New Castle (Setzler 1930).

Between 1763 and 1779 the area that include the State of Indiana was under British rule. At the end of the American Revolutionary War (1776-1883), England ceded the area north of the Ohio River and west of the Appalachians to the newly formed United States of America. The Whitewater River Valley was part of the Northwest Territory, which was established by the Ordinance of 1787.

A defining moment in the early history of Indiana and the Whitewater River Valley was the signing of the Treaty of Greenville, also called Treaty of Fort Greenville, on August 3, 1795. The treaty concluded hostilities between the recently formed United States of America and a Native American confederation headed by Miami chief Little Turtle. Territory encompassing most of the future state of Ohio and significant portions of what would become the states of Indiana, Illinois, and Michigan were ceded at this time. The southeastern boundary of this treaty traverses Brookville Lake and is recognizable even today. Franklin County was formed in 1811, before Indiana became a state, from lands acquired once held by the Miami Tribe. Brookville, its county seat, developed as a thriving community at the junction of the 2 forks of the Whitewater River.

The Indiana Territory was created in 1800 and became a state in 1816 with the town of Vincennes as its capital. The primary industry of Indiana during its early years, and even today, was agriculture. Initially, water transportation was the most cost effective method of shipping these goods to and from the region. However, river transport had a variety of hazards, whether moving down or up river. To facilitate transportation of people and goods across Indiana, 3 canals were proposed: (1) the Wabash and Erie Canal; (2) the Central Canal; and (3) the White Water Canal.

The White Water Valley Canal Company was chartered in 1826 with plans to construct a 76 mile system from Hagerstown to Brookville comprising of 56 locks, 7 dams, and 12 aqueducts to cross

10 creeks and the Whitewater River and a fall of 491 feet. The canal operated until 1865. Remnants of these facilities are preserved at the Whitewater Canal State Historic Site in Metamora, Indiana, and located south of Brookville Lake.

2.10.2 Existing Cultural Resources and Previous Investigations

The earliest published reference to cultural resources along the Whitewater River Valley is a drawing of the Fudge site in Ancient Monuments in the Ohio Valley (Squier and Davis 1848). The majority of the early published research appears in the Indiana Geologic Reports which included drawings of major sites and descriptions (Haymond 1869; MacPherson 1879; Cox 1879; Phinney 1882, 1883, 1886; Brown 1884). Franklin County, which has the highest recorded number of mounds and earthworks of the counties along the Whitewater River Valley, was of particular interest to the early researchers (Quick 1880 and 1885, Stoops n.d.a and n.d.b, Butler n.d.a and n.d.b, and Homsher 1884a). The excavation of Glidewell Mound, in Franklin County, was the first to be published in detail (Homsher 1884b). County histories, such as Helm (1881) and Walker (1892) also provided information on the archaeological sites within the county. Much of this early work was summarized by Thomas (1891).

Currently no historic properties listed on the National Register of Historic Places (NRHP) are recorded at Brookville Lake. Two historic bridges were delisted from the NRHP in 1974 - the Brownsville and Dunlapsville Covered Bridges - due to their removal for the lake's impoundment in 1970. The Dunlapsville Covered Bridge was subsequently destroyed through arson in 1971. The Brownsville Covered Bridge was relocated to Eagle Creek Park in Indianapolis, Indiana in 1974, and then moved to the Mill Race Park in Columbus, Indiana in 1994 (Indiana Historic Site and Structure Inventory Forms taken from the Indiana State Historic Architectural and Archaeological Research Database (SHAARD) dated April 21, 2020).

A majority of the cultural resources inventoried at Brookville Lake are archaeological sites (n=246). These sites were identified by amateur and professional investigators both before and after the creation of the lake (see Squier and Davis 1848; Haymond 1869; Quick 1880, 1885; Setzler 1930, Kellar 1967; Koleszar 1972; Kolbe 1992a, 1992b; McCord and Cochran 1996, 2000).

Franklin and Union counties, which have the highest recorded number of mounds and earthworks along the Whitewater River Valley, are of particular interest to investigators and are still present at Brookville Lake. Other site types represented in this inventory include prehistoric burials, villages, field camps, resource extraction location and limited activity sites dating from early Archaic period (10,000-8,000 B.C) to the Late Prehistoric period (roughly A.D. 900-1600), and historic cemeteries, farmsteads/homesteads, refuse heaps and/or dumps dating from the mid 1800's to the present. A majority of these archaeological sites have not been evaluated for their eligibility to the NRHP, but some have been determined eligible through consensus and/or evaluation under Section 106 of the National Historic Preservation Act (NRHP).

Two individual historic structures at Brookville Lake were identified and assessed for listing to the NRHP by the Historic Landmarks Foundation of Indiana as part of comprehensive survey of standing historic structures in Franklin and Union counties (Historic Landmarks Foundation of Indiana 1978). The first is an unnamed house located at 2295 S. Hubble Road. It is evaluated as a "Contributing" structure that is ineligible for listing to the NRHP but may contribute as part of a

historic district (Historic Landmarks Foundation of Indiana 1978). The second is the Joseph Coffman House at 383 S. Treaty Line Road (IHSSI Survey Number 161-357-10038) and is evaluated as a “Notable” structure requiring additional research to determine its eligibility to the NRHP (Historic Landmarks Foundation of Indiana 1978).

A historic family plot cemetery, known as the Hughes Cemetery (CR-24-152), is located at Brookville Lake in Franklin County, Indiana. The cemetery possesses approximately 12 burial locations with unmarked grave stones on a narrow upland ridge overlooking Wolf Creek. The cemetery has not been evaluated for its eligibility for listing the NRHP.

2.11 DEMOGRAPHICS

The area immediately surrounding Brookville Lake is rural in character and the towns within close proximity are agriculturally oriented. A change in the character of land use around the lake perimeter is evidence by the tourist-related business located along S.R. 101. Table 5 displays the relative proportion of county, state, and national population living under the poverty level at the median household incomes in Franklin and Union counties, the State of Indiana, and the United States. Both counties, as well as the State of Indiana, have lower median incomes than the national average. The relative proportion of minority populations of Franklin and Union counties and the state are lower than the national average. In addition to recreational development of the area, economic development of the surrounding areas is on-going with hotels and permanent homes...

Table 5: Comparison between Franklin and Union Counties against the State and National poverty levels.

Area of Influence	Proportion of Population in Poverty (2020)	Income (2018)	Proportion of Pop. as a Minority (2018)
Franklin County	8.6	\$46,629	3.8
Union County	10.7	\$38,998	5.2
Indiana	13.0	\$47,124	22.0
United States	13.1	\$54,526	39.1

Source: STATSIndiana and US Census Bureau, 2020.

2.12 ECONOMICS

USACE recognizes the importance of Brookville Lake and the activities on USACE lands and waters as being an important part of the local economy. Besides the economic savings through flood risk management and development advantages through water supply, businesses can see investment opportunities, and people are drawn to the natural areas surrounding USACE lakes, as is evidenced by the growing number of residents adjacent to USACE properties. Nationally, USACE lakes attract about 350 million recreation visits every year, with direct economic

benefits on local economies within a 30 mile radius. Table 6 outlines the estimated economic benefits of Brookville Lake and surrounding communities from 2016 and 2019.

Table 6: Economic benefits from Brookville Lake from FY16 and FY19

Economic Benefits	
Economic Data in FY 16	Economic Data in FY 19
<ul style="list-style-type: none"> · \$31,715,748 in visitor spending within 30 miles of Brookville Lake. · \$18,552,635 in sales within 30 miles of the Brookville Lake. · 286 jobs within 30 miles of the Brookville Lake. · \$7,874,401 in labor income within 30 miles of the Brookville Lake. · \$10,189,857 in value added within 30 miles of the Brookville Lake. · \$7,706,856 in National Economic Development Benefits. 	<ul style="list-style-type: none"> · \$39,666,475 in visitor spending within 30 miles of Brookville Lake. · \$21,910,783 in sales within 30 miles of the Brookville Lake. · 314 jobs within 30 miles of the Brookville Lake. · \$9,630,731 in labor income within 30 miles of the Brookville Lake. · \$12,830,791 in value added within 30 miles of the Brookville Lake. · \$9,627,686 in National Economic Development Benefits.
<p>With multiplier effects, visitor trip spending resulted in:</p> <ul style="list-style-type: none"> · \$32,758,127 in total sales. · 377 jobs. · \$12,716,539 in labor income. · \$18,801,324 in value added (wages & salaries, payroll benefits, profits, rents, and indirect business taxes). 	<p>With multiplier effects, visitor trip spending resulted in:</p> <ul style="list-style-type: none"> · \$38,618,113 in total sales. · 421 jobs. · \$15,406,942 in labor income. · \$23,013,096 in value added (wages & salaries, payroll benefits, profits, rents, and indirect business taxes).
Benefits in Perspective	
<p>The money spent by visitors at Brookville Lakes on trip expenses adds to the local and national economies by supporting jobs and generating income. Visitor spending represents a sizable component of the economy in many communities around Brookville Lakes.</p> <p>https://www.iwr.usace.army.mil/Missions/Value-to-the-Nation/</p>	

2.13 RECREATION FACILITIES, ACTIVITIES AND NEEDS

Brookville Lake offers a wide variety of facilities including campgrounds, day use and picnic areas, boat ramps, information center, hunting and multi-use trails provided by USACE and partners. The lake provides facilities for water-based recreation, such as boating, sailing, and kayaking; and multi-use trail use for cyclists and hikers.

2.13.1 Visitation Profile

The majority of visitors to Brookville Lake are within a 60 minute drive. These visitors are a diverse group of people with a wide variety of interests. Examples of visitors include campers who utilize the campgrounds around the lake—as well as in the county and federally operated parks; adjacent residents; hunters and anglers who utilize hunting grounds and participate in fishing tournaments; marina customers who utilize the marinas on the reservoir; and day users who picnic, hike, bird watch, bicycle and ride horses. Brookville Lake is the primary location for water-related recreation, providing the public with a location for boating, sailing, canoeing/kayaking, paddle boarding, and swimming in the area. Periodically, USACE estimates visitation to Brookville Lake by activity. Table 7 presents counts from 2016 and 2019 with well over three-quarters of a million visitors estimated from 2016 and over a million visitors from 2019.

Table 7: Social Benefits of Brookville Lake from FY16 and FY19

Social Benefits	
Facilities in FY2016	Facilities in FY2016
<ul style="list-style-type: none"> • 19 Recreation areas • 219 picnic sites • 485 camping sites • 9 playgrounds • 3 swimming areas <ul style="list-style-type: none"> • 20 trails • 45 trail miles • 2 fishing docks • 11 boat ramps • 671 marina slips 	<ul style="list-style-type: none"> • 19 Recreation areas • 86 picnic sites • 467 camping sites • 6 playgrounds • 2 swimming areas <ul style="list-style-type: none"> • 7 trails • 10 trail miles • 2 fishing docks • 11 boat ramps • 152 marina slips
Visits (person-trips) in FY 2016	Visits (person-trips) in FY 2019
<ul style="list-style-type: none"> • 831,562 in total • 33,841 picnickers • 34,763 campers • 116,082 swimmers • 68,549 water skiers • 294,549 boaters • 347,721 sightseers • 103,251 anglers • 18,816 hunters • 38,503 others 	<ul style="list-style-type: none"> • 1,027,699 in total • 199,071 picnickers • 196,355 campers/overnight visitors <ul style="list-style-type: none"> • 268,266 swimmers • 147,075 walkers/hikers/joggers <ul style="list-style-type: none"> • 208,394 boaters • 216,313 sightseers • 138,778 anglers • 42,131 special event attendees <ul style="list-style-type: none"> • 53,067 others
Public outreach in FY 2016	Public outreach in FY 2019
<ul style="list-style-type: none"> • 2,545 public outreach contacts 	<ul style="list-style-type: none"> • 5,487 public outreach contacts
Benefits in Perspective	

By providing opportunities for active recreation, Brookville Lake helps combat one of the most significant national health problems: lack of physical activity.

Recreational programs and activities at Brookville Lake also help strengthen family ties, and friendships; provide opportunities for children to develop personal skills, social values, and self-esteem; and increase water safety.

2.13.2 Area of Influence

Nearly all the visitation to Brookville Lake comes from within 60 road miles of the project. USACE defines the primary area of influence (AOI) as counties within 30 minutes of travel from the project and the secondary AOI as counties within 60 minutes of travel from the project. This area of influence (AOI) includes 16 counties in Indiana and eight in Ohio (see Figure 2 above) and was determined using ArcGIS software and the ESRI drive time analysis tool. Urban areas in the AOI include Muncie and Richmond, Indiana, and Cincinnati and Dayton in Ohio. Table 7 lists the estimated current and future populations of the major urban areas within Brookville Lake’s AOI.

Table 8: Population estimates for the ZOI for Brookville Lake.

Area of Influence				
County	Distance from Lake (miles)	Population Estimates		
		2020	2030	2040
Franklin (IN)	5	22,863	23,722	23,540
Union (IN)	5	6,974	6,896	6,573
Fayette (IN)	14	22,570	21,192	19,532
Wayne (IN)	20	65,349	63,583	61,494
Dearborn (IN)	28	49,589	51,753	51,989
Rush (IN)	28	16,252	15,548	14,293
Ohio (IN)	37	5,905	5,985	5,792
Decatur (IN)	42	27,006	27,785	27,766
Henry (IN)	43	48,041	45,591	42,614
Randolph (IN)	43	24,249	22,885	21,295
Ripley (IN)	44	28,904	30,412	30,921
Shelby (IN)	47	44,600	45,039	44,244
Hancock (IN)	53	76,353	85,043	91,845
Switzerland (IN)	57	10,703	11,458	12,056
Delaware (IN)	60	114,142	111,634	109,620
Jay (IN)	60	21,149	20,975	20,512
Preble (OH)	23	40,420	37,540	34,140

Butler (OH)	26	390,110	410,960	430,360
Hamilton (OH))	32	790,600	785,900	786,090
Clermont (OH)	37	208,330	214,090	216,190
Montgomery (OH)	45	513,830	496,650	489,390
Warren (OH)	47	225,770	235,640	239,060
Darke (OH)	49	51,270	48,280	46,280
Greene (OH)	60	164,940	165,780	163,300
TOTAL		2,753,709	2,770,281	2,779,316

In addition to Brookville Lake, there are several other recreational facilities located within the ZOI. Table 6 lists the other parks and recreational areas within the Brookville Lake ZOI.

Table 9: Recreational Areas surrounding Brookville Lake.

Public Use Sites, Brookville Lake Area		
Name	Location	Distance from Brookville Lake
Whitewater Memorial State Park	Union County, Indiana	Adjacent
Whitewater Canal State Memorial	Franklin County, Indiana	10 miles
Hueston Woods State Park	Preble County, Ohio	14 miles
Martindale State Fishing Area	Wayne County, Indiana	22 miles
East Fork Lake	Clermont County, Ohio	40 miles
Greensburg Res. State Fishing Area	Decatur County, Indiana	42 miles
Versailles State Park	Ripley County, Indiana	45 miles
Stonelick State Park	Clermont County, Ohio	57 miles
Caesar Creek Lake	Warren County, Ohio	58 miles

2.13.3 Recreation Areas and Facilities

Brookville Lake has 19 designated recreation areas. These areas are listed and described below. See Appendix C for additional recreation maps for Brookville Lake.

1. Bonwell Hill Boat Ramp
 - a. Managed by: Indiana Department of Natural Resources
 - b. Total area (acres): 50
 - c. Total recreational area (acres): 50

- d. Description: The Bonwell Boat ramp, located near the Corps of Engineers main office at Brookville Lake, provides one of the lake's three seven-lane boat ramp. Amenities include two restrooms, a parking lot, and two separate boat launch/loading docks at the boat ramp.
2. Brookville Lake Dam
 - a. Managed by: USACE
 - b. Total area (acres): 65
 - c. Total Recreation area (acres): 5
 - d. Description: The Brookville Dam site or Dam vista is a Corps of Engineers managed area with controlled access. Primarily serving as the main route for staff to enter the control tower, guests are allowed foot access to the dam road and below the dam for fishing. Amenities include a parking lot, the dam vista walking path, and the fishing access trail.
 3. Dunlapville Boat Ramp
 - a. Managed by: Indiana Department of Natural Resources
 - b. Total area (acres): 10
 - c. Total recreational area (acres): 10
 - d. Description: The Dunlapville area is a State-managed water access point within the boundaries of Brookville Lake's watershed. The Dunlapville Boat Ramp allows up to two boats to launch at once. Amenities include a restroom, parking lot, boat ramp, and a boat launch/loading dock.
 4. Egypt Hollow Boat Ramp
 - a. Managed by: Indiana Department of Natural Resources
 - b. Total area (acres): 80
 - c. Total recreational area (acres): 15
 - d. Description: The Egypt Hollow Boat Ramp is a State-managed area within Brookville Lake's watershed. The ramp allows access for two boats to launch at once. Amenities include a restroom, boat ramp, and boat launch/loading dock
 5. Fairfield Beach (aka Mounds Beach)
 - a. Managed by: Indiana Department of Natural Resources
 - b. Total area (acres): 550
 - c. Total recreational area (acres): 100
 - d. Description: Fairfield beach, or better known as Mounds Beach, is one of Brookville Lake's two beach areas. An entrance fee is charged. Amenities include five restrooms, parking lot, accessible fishing pier, playground, showerhouse, volleyball court, summertime concessions, and the designated swimming beach.
 6. Fairfield Marina
 - a. Managed by: Indiana Department of Natural Resources
 - b. Total area (acres): 20
 - c. Total recreational area (acres): 20

- d. Description: The Fairfield Marina is a State-managed area within the Brookville Lake watershed, one of four marinas on the lake. Amenities include restrooms, parking lot, boat slips, and buoys with season shuttle service. The Marina sells ice and gas.
7. Fairfield Boat Ramp
- a. Managed by: Indiana Department of Natural Resources
 - b. Total area (acres): 360
 - c. Total recreational area (acres): 200
 - d. Description: The Fairfield Boat Ramp is a State-Managed area within the Brookville Lake watershed. This ramp is one of three on the lake that allows up to seven boats to launch at one time, and also one of three that allows for launching at winter pool elevations. Amenities include a restroom, three parking lots, boat ramp, and two boat loading/launching docks. Nearby is the Sagamore Resort, Ainsley’s Café, Harbor Links 18-hole golf course, and Kent’s Harbor Marina.
8. Garr Hill Boat Ramp
- a. Managed by: Indiana Department of Natural Resources
 - b. Total area (acres): 18
 - c. Total recreational area (acres): 18
 - d. Description: Garr Hill Boat Ramp is a State-managed area within the Brookville Lake watershed. Amenities include two restrooms, three parking lots, boat ramp, and boat loading/launch dock.
9. Hanna Creek Boat Ramp and Sail Boat Marina
- a. Managed by: Indiana Department of Natural Resources
 - b. Total area (acres): 40
 - c. Total recreational area (acres): 40
 - d. Description: The Hanna Creek Boat Ramp and Sail Boat Marina is a State-managed area within the Brookville Lake watershed. Amenities in this designated sailboat launching area include two restrooms, three parking lots, two boat ramps, sail boat slips, a sailboat hoist, and three boat loading/launching docks.
10. Mounds Area (Campground)
- a. Managed by: Indiana Department of Natural Resources
 - b. Total area (acres): 2063
 - c. Total recreational area (acres): 2000
 - d. Description: The Mounds State Recreation Area Campground is a State-managed area within the Brookville Lake watershed. This is an entrance fee area. Amenities include nine restrooms, shower houses, designated parking areas, camp store, modern campgrounds with full hook-ups, year-round camping, hiking trails, picnic areas, a fish cleaning station, and a boat pump out station.
11. Overlook
- a. Managed by: USACE

- b. Total area (acres): 35
- c. Total recreational area (acres): 10
- d. Description: The Overlook is a Corps managed area within Brookville Lake watershed. Amenities include a restroom, parking lot, reservable picnic shelter, Edwards D. Lewis Overlook Pavilion, hiking trail, and a playground. The site overlooks the Dam, Brookville Lake, and the City of Brookville, Indiana.

12. Quakertown Beach

- a. Managed by: Indiana Department of Natural Resources
- b. Total area (acres): 40
- c. Total recreational area (acres): 30
- d. Description: Quakertown Beach is one of two beaches at Brookville Lake and is a State-managed area within the Brookville Lake watershed. This is an entrance fee area. Amenities include a shower/change house, restroom, three parking lots, fishing pier, designated swimming beach, and playground. Quakertown Beach is part of the Quakertown State Recreational Area.

13. Quakertown Campground

- a. Managed by: Indiana Department of Natural Resources
- b. Total area (acres): 10
- c. Total recreational area (acres): 10
- d. Description: Quakertown Campground is one of two campground choices at Brookville Lake. This State-managed area's amenities include three restrooms, shower house, designated parking spaces, and a three section campground. Quakertown Campground is part of the Quakertown State Recreation Area.

14. Quakertown Boat Ramp

- a. Managed by: Indiana Department of Natural Resources
- b. Total area (acres): 45
- c. Total recreational area (acres): 45
- d. Description: Quakertown Boat Ramp is a State-managed area within the Brookville Lake watershed, and one of three ramps on the lake that allow up to seven boats to launch at once. Amenities include a restroom, three parking lots, picnic shelter, boat slips, boat ramp, and boat launch/loading dock. Nearby is the Quakertown Marina concessionaire. Quakertown ramp is within the Quakertown State Recreation Area.

15. Scenic Drive

- a. Managed by: Indiana Department of Natural Resources
- b. Total area (acres): 105
- c. Total recreational area (acres): 105
- d. Description: Scenic Drive is a State-managed area within the Brookville Lake watershed that provides a common trailhead starting point for the three-mile Eagle Trail. Amenities include a parking lot and picnic areas. The main part of Scenic Drive is a 3.5 mile road which is closed to vehicle traffic.

16. Silver Creek Boat Ramp

- a. Managed by: Indiana Department of Natural Resources
- b. Total area (acres): 50
- c. Total recreational area (acres): 30
- d. Description: Silver Creek Boat Ramp is a State-managed area within the Brookville Lake Watershed. This is a fee entrance area and part of Whitewater Memorial State Park's entry point. Amenities include a restroom, three parking lots, picnic shelter, boat ramp, boat launch/loading dock, and playground. Visitors to Whitewater Memorial Park can enjoy Brookville Lake through this boat ramp, or visit Whitewater Memorial State Park's lake.

17. Tailwater Area

- a. Managed by: USACE
- b. Total area (acres): 50
- c. Total recreational area (acres): 30
- d. Description: The Tailwater Area is a Corps managed area within the Brookville Lake watershed. Amenities include a restroom, two parking lots, one general access picnic shelter, two reservable picnic shelters, a volleyball court, playground, and two universally accessible fishing piers.

18. Templeton Creek Boat Ramp

- a. Managed by: Indiana Department of Natural Resources:
- b. Total area (acres): 25
- c. Total recreational area (acres): 25
- d. Description: Templeton Creek Boat Ramp is a State-managed area within the Brookville Lake watershed. Amenities in this fee entrance area include a restroom, three parking lots, picnic shelter, boat ramp, and five single boat launch/loading docks. Templeton Creek Boat Ramp is a boat ramp designed for customers of the Mounds Campground and is part of the Mounds State Recreation Area.

19. Treaty Line Boat Ramp

- a. Managed by: Indiana Department of Natural Resources
- b. Total area (acres): 20
- c. Total recreational area (acres): 20
- d. Description: Treaty Line Boat Ramp is a State-managed area within the Brookville Lake watershed. Amenities include a restroom, one large parking lot, boat ramp, and a boat launch/loading dock.

2.13.4 Recreation Analysis

The 2016 -2020 Indiana Statewide Comprehensive Outdoor Recreation Plan (SCORP) presents a summary and analysis of the state's outdoor recreation resources with four stated goals:

- Qualify Indiana for National Park Service Land and Water Conservation Fund (LWCF) state-side grants

- Set statewide priorities for funding of grants through LWCF, the Recreational Trails Program (RTP), and any other applicable funds available at state or federal levels
- Provide a quantitative analysis of outdoor recreation supply and demand statewide
- Improve the provision of outdoor recreation to all users

Surveys are a critical piece in the development of the Indiana SCORP, which includes results from the following three surveys:

- Outdoor Recreation Participation Survey (recreation preferences);
- Local Park and Recreation Provider Study (challenges, issues and solutions faced by professional and non-profit outdoor recreation providers); and
- Trail User Survey (how the public uses Indiana trails).

The Outdoor Recreation Participation Survey identified the following outdoor recreation activities that Indiana residents currently participate in more than once a week. These are listed below in order of most popular to least popular.

1. Walking, hiking, jogging, running
2. Gardening / Landscaping
3. Relaxation / Spiritual Renewal
4. Bicycle Touring
5. Outdoor Pool Swimming or Water Sport

The Outdoor Recreation Participation Survey also captured the top five outdoor recreational activities that survey respondents would like to do in the future. Walking, Hiking, Jogging and Running remained at the top of the list and this activity has remained as the top activity since the 1995 survey.

1. Walking, hiking, jogging, running (pedestrian activities)
2. Camping
3. Fishing
4. Swimming
5. Canoeing, kayaking, tubing

The Outdoor Recreation Participation Survey reports how Indiana residents spend outdoor recreation. Seventy-three percent of respondents indicated that they would spend more than \$100 per year to participate in their favorite outdoor recreation activity. Overall, expenditures of less than \$100 was the most popular response at twenty-eight percent. The survey also indicates that Indiana residents currently prefer to engage in outdoor recreation activities closer to their home. Respondents to the Local Park and Recreation Provider Survey indicated that they look beyond tax revenues for funding, staffing and program needs. Local parks and non-profit outdoor recreation providers indicated they predominately used non-tax-based funding strategies to pay for their park systems: sixty-seven percent applied for grants, eighty percent received donations, fifty-three percent pursued a community foundation, thirty-two percent levied taxes and fourteen percent said they closed facilities (an increase from five percent in the 2010 survey).

2.13.5 Recreational Carrying Capacity

Recreational carrying capacity is considered by USACE to ensure that visitors have a high quality and safe recreational experience, and that natural resources are not irreparably damaged. An example of a carrying capacity consideration at Brookville Lake is the management of public hunting on USACE lands wherein hunting activity may be restricted by species or by area, depending on population and/or habitat conditions.

The plan formulated herein proposes to provide a variety of activities and to encourage optimal use of present public use areas, where possible, based on the carrying capability of the land. The carrying capability of the land is determined primarily by the distinct characteristics of the site. These characteristics, both natural and manmade, are development constraints that often determine the type of facilities that should be provided.

Having facilities that offer a wide variety of recreational activities will encourage a wide variety of visitors to enjoy the lake as well. Presently, USACE manage recreation areas using historic visitation data combined with best professional judgment to address recreation areas considered to be overcrowded, overused, underused, or well balanced.

USACE will continue to identify possible causes and effects of overcrowding and overuse and apply appropriate best management practices including: site management, regulating visitor behavior, and modifying visitor behavior.

2.14 REAL ESTATE AND ACQUISITION POLICY

The Brookville Lake Reservoir is a part of the flood protection plan for the Whitewater, Miami and Ohio River valleys, adopted by the Flood Control Act approved 28 June 1938 (Public Law 761, 75th Congress, Chapter 795, 3rd Session (H.R. 10618)). The guide elevation for acquisition was determined to be 780 feet msl.

Current fee acreage totals 16,950.46 acres consisting of 9,283 acres in Franklin County, Indiana and 7,655 acres in Union County, Indiana.

2.14.1. Easement Lands

Perpetual easements were also acquired to support project requirements. There are currently 241.68 acres of easement lands at Brookville Lake comprising 166.13 acres located in Union County, Indiana and 75.55 acres in Franklin County, Indiana. These easements were acquired for different purposes including road, flood protection levee, and occasional and permanent flowage easements.

Roadway Easement

Generally, roadway easements allow the government to construct, operate and maintain roads to access Corps-managed lands. There are 75.55 acres of roadway easements in Franklin County, Indiana at Brookville Lake.

Flowage Easement

Flowage easements grant the Government the right to occasionally or permanently flood private land in conjunction with operation of the project. The easement also prohibits the construction of habitable structures. There are 83.83 acres of occasional flowage easement and 81.41 acres of permanent flowage easement in Union County, Indiana at Brookville Lake.

Flood Protection Levee Easement

These easements grant the Government the right to construct, maintain, repair, operate, patrol, and replace a flood protection levee on private land. There are 0.89 acres of flood protection levee easements in Union County, Indiana at Brookville Lake.

2.14.2 Licensed Lands

Twelve licenses were also acquired to support construction and operation of the project. Eight licenses are located in Franklin County, Indiana and 4 licenses are located in Union County, Indiana. These licenses were acquired for different purposes including construction, alteration, repair, maintenance, and removal of outlet and inlet ditches, entranceways, and vehicle turn-around areas.

2.14.3 Disposals

The following real property interests have been disposed.

- 5.45 acres, fee (portion of Tract 1006) conveyed to the Trustees of the Sims Cemetery Association by Quitclaim Deed dated February 17, 1971. This disposal was in accordance with Cemetery Relocation Plan No. 1, approved August 15, 1969.
- 2.63 acres, fee (portion of Tract 1006) conveyed to the Trustees of the Brier Cemetery Association by Quitclaim Deed dated February 17, 1971. This disposal was in accordance with Cemetery Relocation Plan No. 1, approved August 15, 1969.
- 2.08 acres, fee (portion of Tract 1006) conveyed to the Trustees of the Brier Cemetery Association by Quitclaim Deed dated February 17, 1971. This disposal was in accordance with Cemetery Relocation Plan No. 1, approved August 15, 1969.
- 6.84 acres, fee (Tract 2600) conveyed to the Town of Liberty, Indiana by Quitclaim Deed dated October 21, 1976. This disposal was in accordance with Relocation Contract No. DACW27-73-C-0016. The United States reserved an occasional flowage easement over 6.84 acres (Tract 2616E).
- 55.03 acres, fee (portions of Tracts 115, 117, 118, 126C) conveyed to East Fork Enterprises, Inc. by Quitclaim Deed dated January 7, 1987. The United States reserved a road easement over 14.80 acres (Tract 132E).

- 13.32 acres, easement (Tracts 2113E, 2340E, 2703E-2, 2712E) conveyed to Union County, Indiana by Transfer and Assignment dated 22 November 1994. This disposal was in accordance with Relocation Contract No. DACW27-71-C-0075.
- 147 acres, easement (Tracts 127E, 128E, 132E, 200E, 215E, 216E, 217E, 218E, 218E-2, 218E-3, 219E, 220E, 221E, 709E, 1007E, 1008E, 2500E, 2611E, 2612E 2708E-1, 2708E-2, 3101E, 3102E, 3103E, 3104E, 3107E, 3108E, 3109E, 3110E, 3111E, 3112E, 3113E, 3114E, 3116E, 3117E) conveyed to the State of Indiana by Transfer and Assignment dated 2 December 1994. This disposal was in accordance with Relocation Contract No. DA15-029-CIVENG-66-53.

2.14.4 OUTGRANTS

Leases

Lease outgrants typically provide additional recreational opportunities to the general public. The USACE leases 16,445 fee acres at Brookville Lake to the State of Indiana under Lease No. DACW27-1-74-077 for a public park and recreational purposes and fish and wildlife management purposes. The term of the lease was originally forty (40) years, beginning January 1, 1974 but was later extended an additional 25 years and is now valid until December 31, 2038. The State of Indiana offers the following services either directly or through third party agreements: 18-hole golf course, 2 beaches (Mounds, Quakertown), seasonal camping (Quakertown), extended stay camping (Mounds), BEP Sagamore Waterfront Resort lodge, 20 rental cabins (Whitewater Memorial State Park), 11 boat ramps, 4 marinas, amphitheater (Mounds), campground store (Mounds), shooting range, and a dog training area.

The State of Indiana subleases to the following third parties:

- Quakertown Marina, Inc. for commercial marina purposes for a term beginning January 1, 2014 and ending December 31, 2033.
- Brookville Enhancement Partners – Kent’s Harbor Marina for commercial marina purposes, resort, and restaurant for a term beginning December 20, 1988 and ending December 19, 2038.
- Family Time Adventures for paddleboard rentals for a term beginning January 1, 2019 and ending December 31, 2020.

The USACE also leases 19.08 fee acres to the Treaty Pioneer Village, Inc. for overflow parking purposes on Tracts 2109, 2209, and 2210. The term of the lease is twenty-five (25) years, beginning January 1, 1998 and ending December 31, 2023.

Easements

Numerous easement outgrants are issued to various entities for the construction, operation, and maintenance of water, sewer, electric, telephone, and cable lines. Other easements grant various entities the right to construct, operate and maintain roads and bridges.

Table 10: List of Easements at Brookville Lake.

Outgrant Number	Grantee	Purpose	Term
DACW27-2-69-268	Gulf Refining Company	8" gas pipeline	perpetual
DACW27-2-71-130	American Telephone and Telegraph Company (AT&T)	buried coaxial communication cable	5/12/1971 – 5/11/2021
DACW27-2-74-043	Indiana and Michigan Electric Company	electric lines	perpetual
DACW27-2-75-017	Hoosier Energy Division Indiana Statewide Rural Electric Cooperative, Inc.	substation/ electric lines	perpetual
DACW27-2-75-153	General Telephone Company of Indiana, Inc.	buried telephone cable	5/21/1975 – 5/20/2025
DACW27-2-78-032	Brookville Lake Regional Waste District	sewage lift station/ponding lagoon	1/11/1978 – 1/10/2028
DACW27-2-78-121	Brookville Lake Regional Waste District	sewer lines	7/26/1978 – 7/25/2028
DACW27-2-80-015	Union County, State of Indiana	Bossert Road	perpetual
DACW27-2-80-056	Public Service Company of Indiana, Inc.	electric lines	perpetual
DACW27-2-80-098	Fayette-Union County Rural Electric Membership Corporation	electric lines	perpetual
DACW27-2-86-122	Union County Board of Commissioners Liberty, Indiana	road/bridge No.23 (over East Fork Whitewater River)	perpetual
DACW27-2-89-204	The GTE North, Inc. – Indiana Operations	buried telephone cable	10/31/1989 – 10/30/2019*
DACW27-2-90-158	Union County Board of Commissioners Liberty, Indiana	water line	8/13/1990 – 8/12/2040
DACW27-2-91-025	Union County Board of Commissioners Liberty, Indiana	sewer line	2/4/1991 – 2/3/2041
DACW27-2-91-059	State of Indiana, Department of Transportation	road / bridge over East Fork Whitewater River	perpetual
DACW27-2-93-087	Union County Board of Commissioners	road	perpetual
DACW27-2-94-034	Brook Hill Golf Club, Inc.	electric, water lines	4/22/1994 – 4/21/2024

DACW27-2-96-040	Union County Board of Commissioners	road / bridge (Elly's Creek)	perpetual
DACW27-2-98-022	Brookville Lake Regional Waste District	sewer line	3/1/1998 – 12/31/2023
DACW27-2-99-042	Town of Liberty, Indiana	water line	7/5/1999 – 7/4/2049
DACW27-2-99-047	Mark W. and Robin K. Vance	road	8/2/1999 – 8/1/2029
DACW27-2-00-013	Williams Communications, Inc	fiber optic cable	2/1/2000 – 1/31/2050
DACW27-2-03-016	Indiana Department of Natural Resources	waterline along State Road 101	1/15/2003 – 1//14/2053
DACW27-2-03-043	Union County Board of Commissioners Liberty, Indiana	road	perpetual
DACW27-2-18-068	Whitewater Valley Rural Electric Membership Corporation	electric lines	perpetual

*Easement renewal is currently being processed.

Consent to Easements

The following is a consent to easements located on a Government-owned easement.

Table 11: List of Consent to Easement for Brookville Lake

Contract Number	Grantee	Purpose	Term
DACW27-3-82-008	Countrytime Lebanon	water well	perpetual
DACW27-9-98-028	Brookville Lake Regional Waste District	sewer line	perpetual
DACW27-9-06-501	Countrytime Lebanon	access road	perpetual
DACW27-9-08-063	Dewey and Nancy Powell	driveway	perpetual

2.15 PERTINENT PUBLIC LAWS

Numerous public laws apply directly or indirectly to the management of Federal land at Brookville Lake. Listed below are several key public laws that are most frequently referenced in planning and operational documents.

- a. National Historic Preservation Act of 1966, approved 15 October 1966 (PL 665 89th Congress, as amended by PL 515 96th Congress), 54 USC § 300101, et seq.,

as amended, states a policy of preserving, restoring and maintaining cultural resources and requires that federal agencies take into account the effect any undertaking may have on sites that may be eligible for inclusion on the National Register of Historic Places.

- b. Archaeological and Historic Preservation Act of 1974, approved 24 May 1974 (PL 291 93rd Congress, amending Reservoir Salvage Act, Public Law 532 86th Congress, 27 June 1960, as amended), 54 USC § 312501, et seq., as amended, provides for the preservation of historical and archaeological data that might otherwise be lost or destroyed as the result of flooding or any alteration of the terrain caused as a result of any federal construction projects.
- c. Archeological Resources Protection Act of 1979, approved October 31, 1979 (PL 95 96th Congress), 16 USC § 470aa, et seq., as amended. This law protects archaeological resources and sites that are on public lands and Indian lands, and fosters increased cooperation and exchange of information between governmental authorities, the professional community, and private individuals.
- d. American Indian Religious Freedom Act, approved 11 August 1978 (PL 341 95th Congress), 42 USC § 1996, as amended. As stated in the implementing guidance, Chapter 6 of ER and EP 1130-2-540, the Commander shall consult with affected tribes, groups or individuals regarding appropriate action for project effect upon sacred sites, important to the practice of Native American religion.
- e. Secretary of the Interior's Standards and Guidelines for Archeology and Historic Preservation, 1983, 48 FR 44716-44742 are intended to provide technical advice about archeological and historic preservation activities and methods. These standards and guidelines are not regulatory and do not set or interpret agency policy.
- f. Native American Graves Protection and Repatriation Act, approved 16 November 1990 (PL 601 101st Congress), 25 USC § 3001, et seq., as amended, requires federal agencies and museums to inventory human remains and associated funerary objects and to provide culturally affiliated tribes with the inventory of collection. The Act requires repatriation, on request, to the culturally affiliated tribes and establishes a grant program within the Department of the Interior to assist tribes in repatriation and to assist museums in preparing the inventories and collections summaries.
- g. Curation of Federally-Owned and Administered Archeological Collections, 1990 (36 CFR Part 79), governs the Federal Archeology Program that establishes definitions, standards, procedures and guidelines to be followed by Federal agencies to preserve collections of prehistoric and historic material remains, and associated records, recovered under the authority of the Antiquities Act (54 USC § 320301, et seq.), the Archaeological and Historic Preservation Act (54 USC § 312501, et seq., amending the Reservoir Salvage Act previously codified as 16

U.S.C. 469-469c), a section of the National Historic Preservation Act (54 USC § 300101, et seq.), or the Archaeological Resources Protection Act (16 USC § 470aa, et seq.).

- h. Religious Freedom Restoration Act of 1993, approved 16 November 1993 (PL141 103rd Congress), 42 USC § 2000bb, et seq., as amended, guarantees application of the compelling interest test in all cases where free exercise of religion is substantially burdened and provides a claim or defense to persons whose religious exercise is substantially burdened by government. The compelling interest test, as set forth in prior Federal court rulings is a workable test for striking sensible balances between religious liberty and competing prior governmental interests.
- i. Indian Sacred Sites, Executive Order 13007 of May 24, 1996 (61 FR 26771-26772) orders Executive branch agencies to the extent practicable, permitted by law, and not clearly inconsistent with essential agency functions, to accommodate access to and ceremonial use of Indian sacred sites by Indian religious practitioners and avoid adversely affecting the physical integrity of such sacred sites. Where appropriate the agency shall maintain the confidentiality of sacred sites.
- j. The Water Resources Development Act of 2000, approved 11 December 2000 (PL 541 106th Congress) Section 208, authorizes the army to rebury Native American human remains that were discovered on Civil Works project lands and have been rightfully claimed by a tribe on those lands.
- k. Preserve America, Executive Order 13287, of 4 March 2003 states it is the policy of the Federal Government to provide leadership in preserving America's heritage by actively advancing the protection, enhancement, and contemporary use of historic properties owned by the Federal Government, and by promoting intergovernmental cooperation and partnerships for the preservation and use of historic properties.
- l. Public Law 78-534, Flood Control Act of 1944 (16 USC § 460d, et seq., and various sections of Titles 33 and 43 USC) - Section 4 of the act as last amended in 1962 by Section 207 of Public Law 87-874 authorizes USACE to construct, maintain, and operate public parks and recreational facilities in reservoir areas and to grant leases and licenses for lands, including facilities, preferably to Federal, State, or local governmental agencies.
- m. Public Law 85-624, Fish and Wildlife Coordination Act 1958 (16 USC § 661, et seq.) - This act as amended in 1965 sets down the general policy that fish and wildlife conservation shall receive equal consideration with other Project purposes and be coordinated with other features of water resource development programs. Opportunities for improving fish and wildlife resources and adverse effects on these resources shall be examined along with other purposes which might be served by water resources development.

- n. Public Law 86-717, Forest Conservation (16 USC §§ 580m-580n) - This act provides for the protection of forest and other vegetative cover for reservoir areas under this jurisdiction of the Secretary of the Army and the Chief of Engineers.
- o. Public Law 89-72, Federal Water Project Recreation Act of 1965 (16 USC §§ 4601-12 - 4601-21)- This act requires that not less than one-half the separable costs of developing recreational facilities and all operation and maintenance costs at Federal reservoir projects shall be borne by a non-Federal public body. A HQUSACE/OMB implementation policy made these provisions applicable to projects completed prior to 1965.
- p. Public Law 91-190, National Environmental Policy Act of 1969 (NEPA) (42 U.S.C. § 4321, et seq.; 40 CFR Parts 1500 through 1508) – NEPA declared it a national policy to encourage productive and enjoyable harmony between man and his environment, and for other purposes. Specifically, it declared a “continuing policy of the Federal Government... to use all practicable means and measures...to foster and promote the general welfare, to create conditions under which man and nature can exist in productive harmony, and fulfill the social, economic, and other requirements of present and future generations of Americans.” Section 102 authorized and directed that, to the fullest extent possible, the policies, regulations, and public law of the United States shall be interpreted and administered in accordance with the policies of the Act. It is Section 102 that requires consideration of environmental impacts associated with Federal actions. Section 101 of NEPA requires the federal government to use all practicable means to create and maintain conditions under which man and nature can exist in productive harmony. Specifically, Section 101 of the National Environmental Policy Act declares:
- Fulfill the responsibilities of each generation as trustee of the environment for succeeding generations;
 - Assure for all Americans safe, healthful, productive, and aesthetically and culturally pleasing surroundings;
 - Attain the widest range of beneficial uses of the environment without degradation risk to health or safety or other undesirable and unintended consequences;
 - Preserve important historic, cultural, and natural aspects of our national heritage and maintain wherever possible an environment which supports diversity and variety of individual choice;
 - Achieve a balance between population and resource use which will permit high standards of living and a wide sharing of life's amenities; and
 - Enhance the quality of renewable resources and approach the maximum attainable recycling of depletable resources.

CHAPTER 3 - RESOURCE OBJECTIVES

3.1 MASTER PLAN VISION

The Corps' vision for the on-going management of the land, water and recreational resources of Brookville Lake is to protect and improve the assets that currently draw users to the lake, conserve the lake's natural and cultural resources and create more sustainable practices throughout the lake operations.

This chapter sets forth goals and objectives necessary to achieve the Corps vision for the future of Brookville Lake. In the context of this Master Plan, "goals" express the overall desired end state of the Master Plan whereas resource "objectives" are specific task-oriented actions necessary to achieve the overall Master Plan goals. The Master Plan resource objective will be used as the basis for a future update of the OMP. Which is the Master Plan strategic implementation plan.

3.1.1 Resource Goals

The following statements, paraphrased from EP 1130-2-550, Chapter 3, express the goals for the Brookville Lake Master Plan:

- A.** Provide the best management practices to respond to regional needs, resource capabilities and capacities, and expressed public interests consistent with authorized project purposes.
- B.** Protect and manage project natural and cultural resources through sustainable environmental stewardship programs.
- C.** Provide public outdoor recreation opportunities that support project purposes and public interests while sustaining project natural resources.
- D.** Recognize the unique qualities, characteristics, and potentials of the project.
- E.** Provide consistency and compatibility with national objectives and other State and regional goals and programs.

3.1.2 USACE Environmental Operating Principles

The Corps' Environmental Operating Principles (EOPs) were developed to ensure that Corps missions included totally integrated sustainable environmental practices. The EOPs provided corporate direction to ensure the workforce recognize the Corps' role in, and responsibility for, sustainable use, stewardship, and restoration of natural resources across the Nation and, through the international reach of its support missions.

Since the EOPs were introduced in 2002 they have instilled environmental stewardship across business practices from recycling and reduced energy use at Corps and customer facilities to a

fuller consideration of the environmental impacts of Corps actions and meaningful collaboration within the larger environmental community.

The re-energized EOPs are:

- Foster sustainability as a way of life throughout the organization.
- Proactively consider environmental consequences of all Corps activities and act accordingly.
- Create mutually supporting economic and environmentally sustainable solutions.
- Continue to meet our corporate responsibility and accountability under the law for activities undertaken by the Corps, which may impact human and natural environments.
- Consider the environment and employing risk management and systems approach throughout the life cycles of projects and programs.
- Leverage scientific, economic, and social knowledge to understand the environmental context and effects of Corps actions in a collaborative manner.
- Employ an open, transparent process that respects views of individuals and groups interested in Corps activities.

3.1.3 Resource Objectives

Resource objectives are clearly written statements that respond to identified issues and that specify measurable and attainable activities for resource development and/or management of the lands and waters under the jurisdiction of the Louisville District, Brookville Lake Project Office. The objectives stated in this Master Plan support the goals of the Master Plan, USACE EOPs, and applicable national performance measures. They are consistent with authorized Project purposes, Federal laws and directives, regional needs, resource capabilities, and they consider public input. Recreational and natural resource carrying capacities are also accounted for during development of the objectives found in this Master Plan. Regional and State planning documents including 2018 Indiana SCORP were also considered when developing objectives.

The objectives in this Master Plan provide Project benefits, meet public needs, and foster environmental sustainability for Brookville Lake to the greatest extent possible. They include recreational objectives; natural resource management objectives; visitor information; education and outreach objectives; general management objectives; and cultural resource management objectives.

1. Objective 1: Increase access to the existing recreational facilities that exist within the Brookville recreational area.
 - a. Action 1: Integrate USACE Visitor Center/Operations Area with the local community by continuing to participate in regional initiatives (i.e. bike paths, multi-use rec trails, etc.)
2. Objective 2: Improve the quality of the recreational experience for all users.
 - a. Action 1: Update campgrounds with wi-fi, water, and sewer (if applicable).
 - b. Action 2: Continue to provide outdoor exercise equipment (fitness trail) to the regional bike path on USACE Operations Area

- c. Action 3: Redesign the trails to provide a better experience.
 - d. Action 4: Add bike maintenance stations along regional bike path.
 - e. Action 5: Add a mountain bike trail to facilities
 - f. Action 6: Improve water access for public
 - g. Action 7: Add interpretive signage throughout parks and trails
3. Objective 3: Control invasive species and assist in the growth of native species.
- a. Action 1: Engage volunteers to begin an invasive removal program and/or planting of native plants.
 - b. Action 2: Survey and remove dead trees that are considered potential safety hazards.
 - o Action 3: Flooding impacts-, shoreline erosion stabilization
 - o Action 4: Maintain existing woodlots and forest stands to minimize habitat fragmentation.
- Objective 4: Improve the experience of visitors to the visitor center and improve visibility of the amenities at Brookville Lake.
 - o Action 1: Increase size and public offerings at the Class B USACE Visitor Center
 - o Action 2: Provide educational opportunities that encourage the visitors to learn about the environment and the Corps of Engineers. Pursue continuous improvements in the public interpretive programs offered by USACE
 - o Action 3: Add additional attractions to the visitor's center.
 - o Action 4: Integrate USACE Visitor Center with the local community by increasing offerings of public interpretive programs (ie. create an interpretive education experience at the Prairie plots).
 - Objective 5: Maintain the existing cultural resources and improve the visibility of the cultural assets at Brookville.
 - o Action 1: Add interpretive signs for historic resources
 - Objective 6: Update existing facilities and amenities to increase the number of visitors and enhance the visitor experience.
 - o Action 1: Employ a temporary employment program for seasonal, part time employment.
 - o Action 2: Employ a capital improvement program to update facilities, particularly electric, throughout park.
 - o Action 3: Add additional water access to areas below dam.

CHAPTER 4 - LAND ALLOCATION, LAND CLASSIFICATION, WATER SURFACE AND PROJECT EASEMENT LANDS

The purpose of this Master Plan is to guide the comprehensive management and development of recreation, natural, and cultural resources at the Lakes and define the Corps' responsibilities pursuant to Federal laws to preserve, conserve, restore, maintain, manage, and develop lands, waters, and resources. An important aspect in managing these goals is properly defining the appropriate use for lands and water surface consistent with their congressionally authorized purpose.

4.1 LAND ALLOCATION

All lands at USACE water resource development projects are allocated by USACE into one of four categories in accordance with the congressionally authorized purpose for which the project lands were acquired. In accordance with Engineer Pamphlet (EP) 1130-2-550 land allocations identify the authorized purposes for which Corps lands were acquired. There are four possible categories of allocation identified in USACE regulations including Operations, Recreation, Fish and Wildlife, and Mitigation.

4.1.1 Operations

Operations: These are the lands acquired for the congressionally authorized purpose of constructing and operating the project. Approximately 13,100 acres of land were allocated as operations. This included 548 acres for Project Operations; 1,930 acres were allocated as Operations, Recreation-Intensive use; 1,900 acres were allocated as Operations, Recreation-Low Density; 1330 acres were allocated as Operations, Wildlife Management; and lastly, approximately 2,194 acres were allocated as Operations, Reserve Forest Land.

4.1.2 Recreation

Recreation: These lands were acquired specifically for the congressionally authorized purpose of recreation. These lands are referred to as separable recreation lands. Lands in this allocation can only be given a land classification of "Recreation." At Brookville Lake, approximately 3,850 acres of land were originally allocated as Recreation.

4.1.3 Fish and Wildlife

Fish and Wildlife: These lands were acquired specifically for the congressionally authorized purpose of fish and wildlife management. These lands are referred to as separable fish and wildlife lands. Lands in this allocation can only be given a land classification of "Wildlife Management." Brookville Lake did not originally allocate any lands with this classification.

4.1.4 Mitigation

Mitigation: These lands were acquired specifically for the congressionally authorized purpose of offsetting losses associated with development of the project. These lands are referred to as separable mitigation lands. Lands in this allocation can only be given a land classification of “Mitigation.” Brookville Lake did not originally allocate any lands with this classification.

4.2 LAND CLASSIFICATION

The guidance further defines land classifications to provide for development and resource management consistent with authorized purposes and other Federal laws. The previous Master Plan uses an obsolete classification scheme that has been rectified in this document to meet current standards. Currently, there are six categories of classification identified as:

- Project Operations
- High Density Recreation
- Mitigation
- Environmentally Sensitive Areas
- Multiple Resource Managed Lands
- Water Surface

The classification process refines the land allocations to fully utilize project lands and considers public desires, legislative authority, regional and project specific resource requirements, and suitability. Land classification indicates the primary use for which project lands are managed. The Lakes manage lands according to five of the above six classifications. There have been no changes to land management activities, however the system for classification has been realigned to meet current standards. See Table # for land classification acreages and Appendix C for the land classification maps for Brookville Lake.

Table 12: Updated land classifications for Brookville Lake

Classification	Acres
Project Operations	84.77
High Density Recreation	1,185.95
Mitigation	0
Environmentally Sensitive Areas	1,389.59
Multiple Resource Management Lands: Low Density Recreation	4565.04
Multiple Resource Management Lands: Wildlife Management	4640.36
Multiple Resource Management Lands: Vegetative Management	0
Multiple Resource Management Lands: Future/Inactive Recreation	0

Water Surface: Restricted	10.67
Water Surface: Designated No-Wake	468.66
Water Surface: Fish and Wildlife Sanctuary	468.66
Water Surface: Open Recreation	4641.88

4.3 CURRENT LAND AND WATER CLASSIFICATIONS

4.3.1 Project Operations

This classification includes lands required for the dam and associated structures, operations center, administrative offices, maintenance compounds, and other areas that are used to operate and maintain Brookville Lake. Where compatible with operational requirements, Project Operations lands may be used for wildlife habitat management and recreational use. Licenses, permits, easements, or other outgrants are issued only for uses that do not conflict with operational requirements.

4.3.2 High Density Recreation

These lands are designated for intensive levels of recreational use to accommodate and support the recreational needs and desires of visitors. They include lands on which existing or planned major recreational facilities are located and allow for developed public recreation facilities, concession development, and high-density or high-impact recreational use. In general, any uses of these lands that interfere with public enjoyment of recreation opportunities are prohibited. Low-density recreation and wildlife management activities compatible with intensive recreation use are acceptable, especially on an interim basis. No agricultural uses are permitted on those lands except on an interim basis for maintenance of scenic or open space values. Permits, licenses, and easements are not issued for non-compatible manmade intrusions such as pipelines; overhead transmission lines; and non-project roads, except where warranted by the public interest and where no viable alternative area or route is available. See Appendix C for recreation features at Brookville Lake.

4.3.3 Mitigation

This classification is used only for lands allocated for mitigation for the purpose of offsetting losses associated with the development of the project. There are no lands at Brookville Lake with this classification.

4.3.4 Environmentally Sensitive Areas

Environmentally Sensitive Areas are areas where scientific, ecological, cultural, and aesthetic features have been identified. At Brookville Lake several distinct areas have been classified as Environmentally Sensitive Areas (ESA), primarily for the protection of sensitive habitats or cultural resources. Development of public use on lands within this classification is normally prohibited to ensure that these sensitive areas are not adversely impacted. Agricultural uses are not

permitted on lands with this classification. Each of these areas is discussed in Chapter 5 of this Master Plan and illustrated on the maps in Appendix C.

4.3.5 Multiple Resource Management Lands

This classification includes lands managed for one or more of the following activities:

- Low-Density Recreations;
- Wildlife Management;
- Vegetative Management;
- Future or Inactive Recreation Areas; and
- Water Surface.

4.3.5.1 Low Density Recreation

These lands are designated for dispersed and/or low- impact recreation use. Development of facilities on these lands is limited. The emphasis is on providing opportunities for non-motorized activities such as walking, fishing, hunting, or nature study. Site-specific, low-impact activities such as camping and picnicking are allowed. Facilities may include boat ramps, boat docks, trails, parking areas and vehicle controls, vault toilets, picnic tables, and fire rings. This classification may be appropriate when a conflict exists between public use and wildlife habitat.

Manmade intrusions, including power lines, non-project roads, and water and sewer pipelines, may be permitted under conditions that minimize adverse effects on the natural environment. Vegetation management, including agricultural activities that do not greatly alter the natural character of the environment, are permitted for a variety of purposes, including erosion control, retention and improvement of scenic qualities, and wildlife management. Hunting and fishing are allowed pursuant to tribal or state fish and wildlife management regulations where these activities are not in conflict with the safety of visitors and project personnel.

4.3.5.2 Wildlife Management

This land classification applies to those lands managed primarily for the conservation of fish and wildlife habitat. These lands generally include comparatively large contiguous parcels, most of which are located within the flood pool of the lake. Passive recreation uses such as natural surface trails, fishing, hunting, and wildlife observation are compatible with this classification unless restrictions are necessary to protect sensitive species or to promote public safety. There are 4,640.36 acres of land included in this classification at Brookville Lake.

4.3.5.3 Vegetative Management

These are lands designated for stewardship of forest, prairie, and other native vegetative cover. Passive recreation activities previously described may be allowed in these areas. There are no lands with this classification at Brookville Lake.

4.3.5.4 Future or Inactive Recreation Areas

These are lands with site characteristics compatible with High Density Recreation development. These are areas with site characteristics compatible with potential future recreational development and recreational areas that are currently closed. They are managed for multiple resources until there is an opportunity to develop or reopen them. These areas are typically closed to vehicular traffic and will be managed as multiple resource management lands until development takes place. There are no lands with this classification at Brookville Lake.

4.3.6 Water Surface

USACE regulations specify four possible sub-categories of water surface classification. These classifications are intended to promote public safety, protect resources, or protect project operational features such as the dam and spillway. These areas are typically marked by USACE or lessees with navigational or informational buoys or signs, or are denoted on public maps and brochures. The Water Surface Classification map can be found in Appendix C of this Plan. The four sub-categories of water surface classification are:

- Restricted;
- Designated No-Wake;
- Fish and Wildlife Sanctuary; and
- Open Recreation.

4.3.6.1 Restricted

Restricted water surface includes those areas where recreational boating is prohibited or restricted for project operations, safety, and security purposes. The areas include the water surface upstream and downstream of the Brookville Lake Dam, around the water intake structures, as well as around the swim beaches. There are 10.67 acres of restricted water surface at Brookville Lake.

4.3.6.2 Designated No-Wake

Designated No-Wake areas are intended to protect environmentally sensitive shorelines and improve boating safety near key recreational water access areas such as boat ramps. No wake zones are located in the embayments, nears the Fairfield Causeway, in the area from Hanna Creek Ramp to the north, and in the wildlife management area at times when boating is permitted. These areas are marked with buoys across the lake.

4.3.6.3 Fish and Wildlife Sanctuary

This water surface classification applies to areas with annual or seasonal restrictions to protect fish and wildlife species during periods of migration, resting, feeding, nesting, and/or spawning. Brookville Lake has 468.66 water surface areas designated as a Fish and Wildlife Sanctuary.

4.3.6.4 Open Recreation

Open Recreation includes all water surface areas available for year-round or seasonal water-based recreational use. This classification encompasses the majority of the lake water surface and is open to general recreational boating. Boaters are advised through maps and brochures, or signs at boat ramps and marinas, that navigational hazards may be present at any time and at any location in these areas. Operation of a boat in these areas is at the owner's risk. Specific navigational hazards may or may not be marked with a buoy. There are 4,641.88 acres of open recreation water surface at Brookville Lake.

CHAPTER 5 - RESOURCE PLAN

The resource plan describes, in broad terms, how project lands will be managed according to the established land classifications. Each classification is discussed in terms of anticipated public use and resource stewardship needs.

5.1 MANAGEMENT BY CLASSIFICATION

This chapter describes the management plans for each land use classification within the Master Plan. The classifications that exist at Brookville Lake are Project Operations, High Density Recreation, Environmentally Sensitive Areas, and Multiple Resource Management Lands, which consist of Low Density Recreation and Wildlife Management. The Water Surface is divided into classifications of Restricted (Fish and Wildlife Sanctuary), No-Wake, and Open Recreation. The Resource Plan describes how areas under these various classifications will be managed in broad terms. There are also nineteen distinct recreation areas identified at Brookville Lake, which extend across multiple land classifications.

Further details for managing these lands will be included in the Operational Management Plan (OMP) for Brookville Lake, as revised. Management tasks described in the OMP will support the resource objectives, land classifications, and resource plan set forth in this Master Plan. While the following sections address broad plans for the land classifications listed above, at all project lands the Corps will strive to meet universal project goals which include taking proactive measures to enhance universal access to lands and facilities, improvement of safety for visitors, and identification and elimination of encroachments and trespassing. In addition, USACE will seek to identify important “unofficial” recreation activities and sites such as undeveloped shoreline fishing areas, swimming areas outside of developed beaches, or other preferred areas used by recreationists into the future. As development occurs in the future, USACE will seek to protect these areas and may require mitigation for development actions that would negatively impact these sites. As these sites are identified, they will be included in future updates to the Master Plan and may also be included in OMP.

5.2 PROJECT OPERATIONS

This category includes those lands required for operation of the dam, spillway, and outlet works at the Lake. The management plan for these areas is to continue providing physical security necessary to insure continued operations of the dam and related facilities. Public access to these areas is often restricted. Mooring private vessels and / or modification of land and vegetation within this area is prohibited without explicit permission. These areas may at times be used for compatible recreation activities and wildlife management as long as the proposed activities do not negatively impact project operations. Requests for a permit for a compatible use within an area designated for project operations will be evaluated on a case-by-case basis and a decision will be made as to whether or not the proposed activity will be permitted based on the potential impacts to operations.

Sufficient facilities have been developed in the Operations area which includes the Dam, Spillway, Visitor Center, Tailwater, and the Overlook area to provide for public use. There are 84.77 acres of land with this classification.

5.3 HIGH DENSITY RECREATION

Brookville Lake has 1,185.95 acres classified as High Density Recreation. These lands are developed for intensive recreational activities for the visiting public including day use and campgrounds. National USACE policy set forth in ER 1130-2-550, Chapter 16, states the primary rationale for any future recreation development must be dependent on the project's natural or other resource. This dependency is typically reflected in facilities that accommodate or support water-based activities, overnight use, and day use such as marinas, campgrounds, picnic areas, trails, swimming beaches, boat launching ramps, and comprehensive resort facilities. Examples of activities that are not dependent on a project's natural resources include, theme parks or ride-type attractions, sports or concert stadiums, and stand-alone facilities such as restaurants, bars, motels, hotels, and golf courses.

Support facilities are allowed under the policy, so long as they enhance the recreation experience, are dependent on the resource-based facilities, are secondary to the original intent of the recreation development, and the land base occupied by the outgrant.

USACE manages one area designated as High Density Recreation and IDNR manages sixteen areas under this land classification. In recreation areas, which are leased to other organizations for operation and management, USACE does not provide any maintenance within any of these locations but there are times when USACE provides support to the managing agency. USACE has to provide review of requests and ensure accordance with applicable laws and regulations for proposed activities within high density recreation zoning areas. The goal is to work with USACE partners to assure recreation areas are being managed in accordance with resource objectives identified in Chapter 3.

5.4 MITIGATION

This classification is used for lands that were acquired specifically for the purpose of offsetting losses associated with development of the project. There are no lands at Brookville Lake under this classification.

5.5 ENVIRONMENTALLY SENSITIVE AREAS

Defining sensitive areas as part of the master plan process assists in the protection of valuable resources. Many factors contribute to identifying sensitive areas. These sites are mapped and managed by the Corps. Data includes locations of threatened and endangered species and cultural sites not available to the public. Many species of greatest conservation need are found on Corps lands and are identified in various conservation plans by IDNR and other partners. Degree of sensitivity varies by location and by contributing factors to sensitivity. An area may be available to construct a properly designed hiking trail, or may be actively managed by forest practices like timber stand improvement without negatively impacting the site's sensitivity. Other sites can be

very sensitive to human disturbance and need adequate protection from development. Examples of this degree of sensitivity would involve eagle nests, osprey nests and heron rookeries. These animals are threatened by human activities especially during active breeding seasons.

Many wildlife species that are identified as having significant conservation need are often associated with large, contiguous blocks of habitat. Fragmentation of these habitats is a primary threat to sensitive species. Large block habitats at Brookville Lake have been classified as ESAs in an effort to minimize habitat fragmentation. Construction of utility corridors, roads, or other fragmenting disturbance is prohibited in ESAs.

The following occurrences on the landscape can contribute to areas being classified as sensitive. Oftentimes, multiple contributors to sensitivity exist on one area.

- Known or discovered cultural sites
- Reforestations
- Remnant prairies
- Larger planted prairies
- Wetlands
- Lands possessing unique wildlife value by diversity or conservative species
- Aesthetic quality or aesthetic views (scenic)
- Corridors between habitats that protect connectivity

Areas designated as sensitive can change over time and continued monitoring through programs like Multiple Species Inventory and Monitoring program (MSIM) provide valuable information to keep identified sensitive areas current. Through the use of Geographic Information System (GIS) databases maintained with separated layers, the dynamic nature of sensitivity can be managed in an up-to-date program. Some areas may be highly sensitive to change; other areas need prescribed management to remain viable. Management practices include invasive species control, prescribed fire or plantings.

The goal of sensitive area management is to protect and preserve known areas that contribute to the diversity and health of Brookville Lake. The program should be beneficial to plants, animals and the people that enjoy the resource. There are 1,389.59 acres of ESA lands at Brookville Lake.

5.6 MULTIPLE RESOURCE MANAGEMENT LANDS

This classification allows for the designation of a predominant use with the understanding that other compatible uses may also occur on these lands. The Multiple Resource Management Lands classification is divided into four sub-classifications. The land classifications below reflect the predominant sub-classification and describe other compatible uses that may occur on these lands.

5.6.1 Low Density Recreation

Low density recreation refers to lands with minimal development or infrastructure that support passive public recreational use (e.g. primitive camping, fishing, hunting, trails, wildlife viewing, etc.). Natural conditions preclude intensive public use development because extensive alteration

of natural systems would be required. Difficult access also is a factor indicating low-density use as most appropriate for these lands.

Private or long-term exclusive group use of these lands will not be permitted. Management practices leading to habitat improvements for the benefit of wildlife are encouraged. As such, other sub classifications tend to be compatible with this classification as well (i.e. vegetative management and wildlife management). No licenses, permits, or easements will be issued for non-compatible manmade intrusion, such as underground or exposed pipelines, cables, overhead transmission lines, or non-project roads. Exceptions to this restriction may be made where necessary to serve a demonstrated public need only in those instances where no reasonable alternative is available. Hunting uses are permitted under this land classification. There are 4,565.04 acres of land with this classification at Brookville Lake.

5.6.2 Wildlife Management

These are lands designated for the stewardship of fish and wildlife resources and are managed by USACE. There are currently 4,640.36 acres of land under this classification at Brookville Lake, however, areas of low density recreation, and ESA's all support wildlife and activities authorized in these area are compatible with other multiple resource management activities (i.e. hunting, hiking, bird watching, etc.). Management efforts focus on producing native wildlife food and habitat.

The broad objective of fish and wildlife management is to conserve, maintain and improve the fish and wildlife habitat to produce the greatest dividend for the benefit of the general public. Implementation of a fish and wildlife management plan is the first step toward achieving the goals of the Fish and Wildlife Coordination Act (Public Law 85-624). IDNR shares responsibility with USACE for managing fish and wildlife, primarily through enforcement of laws and regulations and establishing seasons and bag limits for game species. Future management plans for wildlife areas include continued cooperation with partners and managing and improving wildlife management areas under this land classification.

Priority in all lands under this classification will be provided to special status species including those federally and state listed, those identified as species of concern, and those afforded special protections in other federal regulations such as the Bald and Golden Eagle Act and the Migratory Bird Act.

Wildlife activities conducted by IDNR in these areas include maintenance and upgrading of existing facilities, improving wildlife habitat, and providing recreational opportunities. Approximately 10% of the crop is left un-harvested in the field for wildlife.

Techniques such as prescription burning, planting native grasses and forbs beneficial to pollinators, and artificial nest boxes to encourage continued use by raptors, including osprey and bald eagles, will also be utilized. Such lands are available to the public for sightseeing, nature study, hiking, hunting and other activities that enhance environmental awareness and promote environmental stewardship.

5.6.3 Vegetative Management

These lands are designated for stewardship of forest, prairie, and other native vegetative cover. The vegetation at Brookville Lake is a result of the geologic history of the area as well as human activity. A majority of the climax forest lands, including oak-hickory, beech-maple and northern flood plain forest, have been transformed into subclimax forest by human habitation. The Corps objectives concerning vegetation and forest management are to apply wise resource management principles that provide for habitat diversity and demonstrate good stewardship in the management of these resources. The management of woodlands is focused on the establishment and maintenance of the natural diversity of native plant species. Management of forest resources focuses on the establishment and maintenance of riparian zones and connection of fragmented upland woodlots. Efforts have been made by the USACE to restore and expand wetland and prairie habitat. These activities should continue with identification of opportunities to expand these habitat types.

Invasive species pose a significant threat to the Brookville Lake landscape. Vegetative threats include reed canary grass, *Sericea lespedeza*, emerald crown vetch, garlic mustard, and honeysuckle. All of these species have the ability to significantly alter native ecosystems. Trees are also very susceptible to invasive species, as evidenced by the emerald ash borer. Diligent monitoring and swift reaction are key to successful invasive species management. Eradication is rarely attainable, but control is critical to managing invasive species.

Currently, there are no lands classified as vegetative management at Brookville Lake.

5.6.4 Future / Inactive Recreation Areas

These areas have site characteristics compatible either with future recreational development or recreation areas that are closed. Until there is an opportunity to develop or reopen these areas, they will be managed for multiple resources. There are no locations at Brookville Lake that match this description.

5.7 WATER SURFACE

There are three Water Surface classifications at Brookville Lake: Open Recreation (unrestricted), Fish and Wildlife Sanctuary (no boating between October 1 and April 30), no wake zone and Restricted (No Boating). As part of managing the water surface areas at the project, the Corps will seek to maintain and, if possible, improve water quality and fisheries habitat structure to support a productive sport fishery and maintain healthy populations of native fish species. Water quality monitoring at established stations should continue throughout the Lakes' property and watershed, as the data gathered aids in conservation of the projects aquatic resources. A related issue is sedimentation within the reservoir. The Corps will evaluate all plans and proposals to ensure that planned or permitted activities are not contributing to the sedimentation problem and ensure that Best Management Practices are adhered to in order to prevent excessive erosion. In the future, sustainable reservoir sediment management plans should be developed to address long-term efforts to address sedimentation.

This section is in reference to water surface management needs, which Brookville Lake utilizes to ensure efficient operations as well ample space of public recreation. . Table 8 provides the area for each water surface classification.

Table 13: Brookville Lake Water Classifications

Water Surface Classification	Acres
Unrestricted (Open Recreation)	4641.88
Fish and Wildlife Sanctuary: No Boating 1 Oct to 30 Apr*	468.66
Restricted (No Boating)	10.67

NOTE 1: "" This area is also considered a no-wake zone outside these dates.*

5.7.1 Restricted – No Boating

There is approximately 10.67 acres of restricted boating at Brookville Lake. This area is located at the southern end of the lake in the vicinity of the intake tower.

5.7.2 Fish and Wildlife Sanctuary

There is approximately 468.66 acres of lake surface acre that is off-limits to boating between October 1 and April 30. This area is located at the northern most point of the lake and is restricted due to the area being used as a waterfowl sanctuary.

5.7.3 Open Recreation

The majority of water surface are for Brookville Lake is unrestricted year-round. This classification measures approximately 4641.88 acres in total.

5.7.4 No Wake Zones

Designated no-wake zones are marked with buoys to protect environmentally sensitive shorelines areas, recreational areas (such as boat ramps and docks), and for public safety. Boats are required to slow down in these areas to prevent waves from impacting these areas. The Fish and Wildlife sanctuary area is classified as a no wake zone when boating is permitted. IDNR or other lessees may reserve the right to designate waters as no wake zones.

There is approximately 468.66 acres of lake surface acre that is designated no wake by the Corps outside the dates between October 1 and April 30.

CHAPTER 6 - SPECIAL TOPICS / ISSUES / CONSIDERATIONS

6.1 HANNA CREEK SAILBOAT MARINA

The Hanna Creek Sailboat Marina has been severely impacted by siltation and overall degradation of facilities. During the public review meeting and comment period (July 24, 2019 through August 30, 2019), many local citizens commented on Hannah Creek and the current and future threats to this resource. Many commented on the siltation and suggested some level of dredging may be necessary to resolve these issues. The Hannah Creek Sailboat Marina is a regional recreational element specific to Brookville Lake.

6.2 WATER QUALITY

There is a potential for harmful algal blooms due to warm temperatures in the spring and summer. Water-based recreation can be negatively impacted by water quality concerns. Blue green algal blooms and elevated levels of E. coli (from goose feces) levels can be serious water quality issues that hinder recreational use of the lake. Other water quality impacts stem from the occasional flooding and high water at Clarence J. Brown Lake. These events contribute to sedimentation through shoreline erosion. The Corps and all lease holders should monitor and manage water quality. Shoreline erosion should be monitored and managed through maintaining or improving signage for no-wake zones.

6.3 WILDLIFE AND VEGETATIVE MANAGEMENT

The Corps, as well as all lease holders, should make all reasonable attempts to manage the wildlife and vegetative resources to promote native species. This should include management practices that attempt to remove or inhibit the spread of invasive species. Existing woodlots, wetlands, and other specific landscapes should be managed to promote healthy stands and to minimize fragmentation of forested parcels.

CHAPTER 7 - PUBLIC AND AGENCY COORDINATION

7.1 PUBLIC AND AGENCY COORDINATION OVERVIEW

The USACE is dedicated to serving the public interests in support of the overall development of land uses related to land management for cultural, natural, and recreational resources of Brookville Lake. An integral part of this effort is gathering public comment and engaging stakeholders in the process of planning. USACE policy guidance in ER 1130-2-550 and EP 1130-2-550 requires thorough public involvement and agency coordination throughout the Master Plan revision process including any associated Nation Environmental Protection Act (NEPA) process. Public involvement is especially important at Brookville Lake to ensure that future management actions are both environmentally sustainable and responsive to public outdoor recreation needs in the region, which is experiencing rapid population growth. The following milestones provide a brief look at the overall process of revising the Brookville Lake Master Plan.

The USACE began planning to revise the Brookville Lake Master Plan in July 2019. The objectives for the Master Plan revision were to (1) update land classifications to reflect changes in USACE land management policies since 1991 and (2) update the Master Plan to reflect new agency requirements for Master Plan documents in accordance with ER 1130-2-550, Change 7, January 30, 2013 and EP 1130-2-550, Change 5, January 30, 2013.

7.2 INITIAL STAKEHOLDER AND PUBLIC MEETINGS

The first action was a scheduled public scoping meeting providing an avenue for public and agency stakeholders to ask questions and provide comments. The public scoping meeting was held on July 31, 2019 at the Brookville Public Library. The Louisville District placed advertisements on the USACE webpage, social media and print publications two weeks prior to the public scoping meeting.

USACE employees hosted the workshop, which was conducted in an open format. Participants were asked to sign in at a table where staff provided the participants with information regarding the structure of the scoping meeting and comment forms. After signing in, participants were directed to be seated in for a presentation by USACE for the Master Plan Revision Project Delivery Team (PDT) to convey information about the following topics:

- Public involvement process;
- Project overview;
- Overview of the NEPA process;
- Master Plan and current land classifications; and
- How to submit comments.

At the conclusion of the presentation USACE representatives were available to answer questions and receive written comments at information tables. Interested persons had the opportunity to comment about the project using a variety of methods, including the following:

- Filling out a comment form at the open house;
- Taking a comment form home to be returned at a later date;
- Submitting a comment using electronic mail; and

- Submitting a comment and mailing it in on letterhead or choice of paper.

7.3 PUBLIC AND AGENCY REVIEW OF DRAFT MP, EA AND FONSI

The final draft Master Plan and Environmental Assessment was made available for public and agency review on DATE. The process of announcing the availability of the draft final Master Plan and the requirements for submitting comments was identical to the process described above for the initial public scoping workshops held in 2019. Public and agency comments for the draft final Master Plan were accepted through DATE. A total of # individuals submitted comments. At the end of the comment period a total of # written comments were received, # from the general public and # from agency or organization. A summary of comments received and the USACE response to the comments is provided below (Table TBD) Copies of letters received from governmental entities are included in the EA (Appendix B). Upon incorporation of public comment into the draft Master Plan, and EA and FONSI, final versions will be prepared and signed by the District Engineer for implementation. The final version will be posted on the District website.

CHAPTER 8 - SUMMARY OF RECOMMENDATIONS

8.1 SUMMARY OVERVIEW

The preparation of the Brookville Lake Master Plan followed the new USACE Master Planning guidance in ER 1130-2-550 and EP 1130-2-550, both dated 13 January 2013. Three major requirements set forth in the new guidance include (1) preparation of contemporary Resource Objectives, (2) Classification of project lands using the newly approved classification standards, and (3) preparation of a Resource Plan describing in broad terms how the land in each of the land classifications will be managed into the foreseeable future.

Additional important requirements include rigorous public involvement throughout the process, and consideration of regional recreation and natural resource management priorities identified by other federal, state, and municipal authorities. The study team endeavored to follow this guidance to prepare a Master Plan that will provide for enhanced recreational opportunities for the public, improve environmental quality, and foster a management philosophy conducive to existing and projected staff levels at Brookville Lake. Factors considered in the Plan were identified through public involvement and review of statewide planning documents including the 2018 Indiana SCORP. This Master Plan will ensure the long-term sustainability of the USACE managed recreation program and natural resources associated with Brookville Lake.

8.2 LAND CLASSIFICATION PROPOSALS

A key component in preparing this Master Plan was examining prior land classifications and addressing the needed transition to the new land classification standards. During the public involvement process USACE sought public input into whether, besides the simple change in nomenclature, a shift in land classification was desired (for example, should lands with a recreation classification be reclassified to a wildlife classification or vice versa.). Chapter 7 of the Plan describes the public input process.

The land classifications presented in the Plan were formulated based on these public comments and the USACE Brookville Lake Project staff, Operations Division Staff and IDNR to the Master Plan PDT based on first-hand experience, professional training, and best management practices.

There were 16,986.92 acres reclassified or updated to the new land classification name. All changes reflect historic and projected public use and new guidance from ER 1130-2-550 and EP 1130-2-550. A summary of acreage changes from prior land classifications to the current classifications is provided in Table 12.

Table 14: Summary of Land Classification changes for Brookville Lake.

Classification	2020 Master Plan	1979 Master Plan
	Acres	Acres
Project Operations	84.77	548
Operations, Recreation-Intensive Use*		1,930
Operations, Recreation- Low Density*		1,900
Operations, Wildlife Management*		1,300
Operations, Reserve Forest Land*		2,194
Recreation*		3,850
High Density Recreation	1,185. 95	
Mitigation	0	
Environmentally Sensitive Areas	1,389.59	
Multiple Resource Management Lands*		
Multiple Resource Management Lands: Low Density Recreation	4,565.04	
Multiple Resource Management Lands: Wildlife Management	4,640.36	
Multiple Resource Management Lands: Vegetative Management	0	
Multiple Resource Management Lands: Future/Inactive Recreation	0	
Water Surface: Restricted**	10.67	
Water Surface: Designated No-Wake**	468.66***	
Water Surface: Fish and Wildlife Sanctuary**	468.66	
Water Surface: Open Recreation**	4641.88	
*Classifications identified in 1979 Master Plan (now obsolete based ER 1130-2-550 and EP 1130-2 550).		
**Water zoning was established in 1979 Master Plan, but acreages were not calculated.		
***Fish and Wildlife Sanctuary is considered a no-wake zone for the open part of the year.		

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