



Grayson Lake Project Master Plan

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prepared for:



**US Army Corps
of Engineers**®
Huntington District

Huntington, West Virginia 25701

prepared by:

URS

Project No. W91237-08-D-0023
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Project Design Memoranda

Number	Title	Date
1	Site Selection	March 1963
2	General Design Memorandum	May 1963
2 Supplement	Monumentation of Reservation Boundary Line	June 1966
3A	Preliminary Master Plan	January 1964
3B	Master Plan Recreation Site Plan Appendix A – Project Resource Management Plan Appendix B – Forest Management Plan Appendix C – Fire Protection Plan	September 1965 August 1963 June 1976 August 1967
3C	Master Plan Update	November 1975
3D	Master Plan Update Supplement No. 1 Supplement No. 3 Supplement No. 5	April 1987 July 1987 July 1987 July 1987
4	Reservoir Lands, Part I: Dam Site and Construction Area	July 1963
5	Geology and Soils	October 1963
6	Dam, Spillway, and Outlet Works	October 1963
7	Concrete Aggregate	October 1963
8	Reservoir Lands, Part II	June 1964
8 Supplement	Reservoir Lands, Part II-Isolated Lands, Frazier Flats	June 1965
9	Relocation-Pipelines, Power and Telephone	July 1964
10	Reservoir Lands, Part III	January 1965
11	Reservoir Clearing	March 1965
12	Reservoir Lands Part IV–Remaining Real Estate	September 1965
13	Sediment Range Layout	February 1976

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1.0 INTRODUCTION AND BACKGROUND

This updated Master Plan provides guidance for the management and development of natural and manmade resources at the Grayson Lake Project in eastern Kentucky. Grayson Lake was impounded by the U.S. Army Corps of Engineers (USACE) in 1969. The USACE manages 16,930 acres including the lake. The lake is used incidentally for recreation and wildlife management. The Grayson Lake Project is referred to as the Project in this document.

This Master Plan is intended to provide a guide for achieving the goals of managing, conserving, and enhancing natural resources while providing the public with quality opportunities for outdoor recreation. The Master Plan was developed in response to regional and local needs, resource capabilities and suitability, and expressed public interests consistent with authorized Project purposes and relevant legislation and regulations.

The Master Plan provides a summary of the purposes and history of the Project; the applicable Federal laws and directives that govern its use; resource objectives; and a detailed analysis of existing natural resources, recreational resources, and land uses. The Master Plan includes projections of future demands for recreational use of the Project and a resource use plan to help ensure that the Project will continue to meet the goals of promoting awareness of the natural environment, adhering to sound environmental stewardship principles, and providing outdoor recreational opportunities for current and future generations in an efficient and effective manner.

The Master Plan also contains proposed actions for modifying recreational facilities and wildlife management approaches for consistency with USACE's established purposes. A Programmatic Environmental Assessment has been prepared to address the potential impacts of proposed actions.

To facilitate reading this document, a list of acronyms and abbreviations is included as Appendix A. Appendix B contains a bibliography.

1.1 Project Authorization

Construction of the Grayson Lake Project was authorized by the Flood Control Act of 1960 (Public Law [PL] 86-645), which was passed by the 86th Congress on 14 July 1960. The Grayson Lake Project was designated as part of the larger Comprehensive Flood Control Plan for the Ohio River Basin.

1.2 Authorized Project Purposes

The Grayson Lake dam was constructed on the Little Sandy River to serve several purposes. The primary purpose is flood risk management, and the secondary purposes are recreation and water quality improvement (USACE, 1994).

1.2.1 Flood Risk Management

The Flood Control Act of 1936 (PL 74-738) states that flood risk management is “a proper activity for the Federal Government in cooperation with states, their political subdivisions, and localities thereof.” Congress gave responsibility for Federal flood risk management projects to the USACE. One year later, in 1937, one of the most damaging floods along the Ohio River occurred. Part of Cincinnati was under water for more than 2 weeks, and damage exceeded \$20 million (Ohio Historical Society, 2010).

In the years after passage of the Flood Control Act of 1936, the USACE built approximately 400 reservoirs nationwide, pursuant to congressional authorization and appropriation, with the primary purpose of flood risk management. The reservoirs are estimated to have prevented more than \$19 billion in flood damage in the Ohio River Basin since the 1930s (USACE, 2009a). Subsequent act, including the Flood Control Act of 1965, authorized additional reservoirs, including Grayson Lake.

1.2.2 Recreation

Section 4 of the Flood Control Act of 1944 (PL 78-534) authorized the Chief of Engineers “... to construct, maintain, and operate public parks and recreational facilities in reservoir areas under the control of (the Secretary of the Army), and to permit the construction, maintenance, and operation of such facilities.” The Flood Control Act of 1962 (PL 87-874) broadened the 1944 authority to include all water resources projects. The USACE has since recognized long-term recreational development as a purpose that is equal to the other established purposes of water resources development.

One of the USACE’s policies is to encourage non-Federal participation in the administration of recreational opportunities at USACE projects. Since 1944, the USACE has entered into leases that permit State and local development and administration of recreational areas at Civil Works projects such as Grayson Lake. This policy was reaffirmed by Congress through the passage of the Federal Water Project Recreation Act of 1965 (PL 89-72). This act states that “in investigating and planning any Federal navigation, flood control, reclamation, hydroelectric, or

multipurpose water resource project, full consideration shall be given to the opportunities, if any, which the project affords for outdoor recreation.” The act also defines the basis for sharing the financial responsibilities in joint Federal/non-Federal development, enhancement, and management of recreational and fish and wildlife resources of Federal water projects.

A substantial number of recreational areas were developed before the cost-sharing principles of PL 89-72 were implemented, and these areas continue to be operated directly by the USACE. Non-consumptive recreational opportunities offered at the Project through leases with the State and county include camping, boating, and hiking. The Project also provides opportunities for consumptive recreation including fishing and hunting. Recreational areas vary from undeveloped forested land to well-developed and extensively used campgrounds.

1.2.3 Water Quality Control

The Federal Water Pollution Control Act of 1948 (PL 80-845) authorized the Surgeon General of the Public Health Service, in cooperation with other Federal and State and local entities, to develop comprehensive programs for eliminating or reducing the pollution of interstate waters and tributaries and improving the sanitary condition of surface and underground waters. During the development of the programs, consideration was to be given to improvements necessary to conserve waters for public water supplies, propagate fish and other aquatic life, provide for recreational purposes, and provide for agricultural and industrial uses.

The Federal Water Pollution Control Act Amendments of 1961 (PL 87-88) amended the Federal Water Pollution Control Act of 1948 to provide for a more effective program of water pollution control and to fulfill other purposes. Section 2 of PL 87-88 mandated consideration of water storage to include consideration of water storage in Federal projects for water quality control, except that such storage should not be a substitute for adequate treatment or control at the source. This directive was amended by Section 102(b) of the Federal Water Pollution Act Amendments of 1972 (PL 92-500).

The water quality control system at Grayson Lake was designed with the understanding that the lake would be stratified during the summer with warm, oxygenated water on the surface and cold, unoxygenated water at the bottom; therefore, a system of selective withdrawal inlets at various water depths was installed in the intake structures. The system allows simultaneous withdrawal of water from any combination of inlets, and choices over a considerable range of outflow rates and water parameters are therefore available.

The water quality control objectives for Grayson Lake consist of two facets: low-flow control and downstream flow augmentation. A downstream water quality control pool elevation of 645 feet National Geodetic Vertical Datum (NGVD) is maintained for fish and wildlife preservation and recreational enhancement.

1.2.4 Fish and Wildlife Management

The Fish and Wildlife Coordination Act of 1958 (PL 85-624) authorizes the USACE to modify projects to conserve fish and wildlife resources. The Endangered Species Act of 1973 (PL 93-205) provides additional authority for operating projects to protect threatened or endangered fish and wildlife. The Federal Water Project Recreation Act (PL 89-72) requires consideration of opportunities for fish and wildlife enhancement in planning water resources projects. Non-Federal bodies are encouraged to operate and maintain the project fish and wildlife enhancement facilities. If non-Federal bodies agree in writing to administer the facilities at their expense, the fish and wildlife benefits are included in the project benefits and project cost allocated to fish and wildlife. Fees may be charged by the non-Federal bodies to repay their costs. If non-Federal bodies do not so agree, no facilities for fish and wildlife may be provided. Fish and wildlife management at Grayson Lake is provided by the Kentucky Department of Fish and Wildlife Resources (KYDFWR), which has a license to manage almost 14,777 acres of the Project.

1.3 Prior Master Plans

The first Grayson Lake Project Master Plan was developed and approved in 1964 (USACE, 1964) and updated in 1975 and 1987 (USACE, 1975; USACE 1987). This document is an update of the 1987 plan.

1.4 Application of Public Laws

Development and management of Federal reservoirs are regulated by a number of statutes and Executive Orders (EOs), and guided by USACE documents. The following sections provide a summary of relevant Federal statutes and EOs.

1.4.1 Recreation

The public laws and policy listed below address development and management of recreational facilities on public lands and are pertinent to USACE project lands in eastern Kentucky.

- PL-78-53, Flood Control Act of 1936 (22 June 1936), authorizes the construction of civil engineering projects such as dams, levees, dikes, and other flood risk management measures through the USACE.
- PL 78-534, Flood Control Act of 1944 (22 December 1944), authorizes the Chief of Engineers to provide facilities in reservoir areas for public use, including recreation and conservation of fish and wildlife.
- PL 79-526, Flood Control Act of 1946 (24 July 1946), amends PL 78-534 to include authority to grant leases to nonprofit organizations at recreational facilities in reservoir areas at reduced or nominal charges.
- PL 83-780, Flood Control Act of 1954 (3 September 1954), further amends PL 78-534 and authorizes the Secretary of the Army to grant leases to Federal, State, or governmental agencies without monetary considerations for use and occupation of land and water areas under the jurisdiction of the Department of the Army for park and recreational purposes when in the public interest.
- Joint Land Acquisition Policy for Reservoir Projects (*Federal Register* [Volume 27, 22 February 1962]) allows the Department of the Army to acquire additional lands necessary for the realization of potential outdoor recreational resources of a reservoir.
- PL 88-578, Land and Water Conservation Fund Act of 1965 (1 September 1964), prescribes conditions under which USACE may charge for admission and use of its recreation areas.
- PL 89-72, Federal Water Project Recreation Act of 1965 (9 July 1965), requires sharing of financial responsibilities in joint Federal and non-Federal recreational and fish and wildlife resources with no more than half of the cost borne by the Federal Government.
- PL 90-480, Architectural Barriers Act of 1968 (12 August 1968), requires access for persons with disabilities to facilities designed, built, altered, or leased with Federal funds.
- PL 101-336, Americans with Disabilities Act of 1990 (ADA) (26 July 1990), as amended by the ADA Amendments Act of 2008 (PL 110-325), prohibits discrimination based on disabilities in, among others, the area of public accommodations and requires “reasonable accommodation” to persons with disabilities.

- PL 102-580, Water Resources Development Act of 1992 (31 October 1992), authorizes the USACE to accept contributions of funds, materials, and services from non-Federal public and private entities to be used in managing recreational facilities and natural resources.
- PL 103-66, Omnibus Budget Reconciliation Act–Day Use Fees (10 August 1993), contains provisions by which USACE may collect fees for the use of developed recreational sites and facilities, including campsites, swimming beaches, and boat ramps.
- PL 104-333, Omnibus Parks and Public Lands Management Act of 1996 (12 November 1996), creates a nine-member advisory commission to review the current and anticipated demand for recreational opportunities at lakes and reservoirs managed by the Federal Government, and to develop alternatives to enhance the opportunities for such use by the public.

1.4.2 Water Resource Protection and Flood Risk Management

A number of public laws address water resources protection and flood risk management and the integration of these goals with other Project purposes such as recreation. The following are pertinent to USACE project lands in eastern Kentucky:

- PL 74-738, Flood Control Act of 1936 (22 June 1936), declares flood risk management to be a proper Federal activity.
- PL 78-534, Flood Control Act of 1944 (22 December 1944), specifies the rights and interests of the states in water resources development and requires cooperation and consultation with State agencies in planning for flood risk management.
- PL 85-500, Water Supply Act of 1958 (3 July 1958), authorizes the USACE to include municipal and industrial water supply storage in multi-purpose reservoir projects.
- PL 87-88, Federal Water Pollution Control Act Amendments of 1961 (20 July 1961), requires Federal agencies to address the potential for pollution of interstate or navigable waters when planning a reservoir project.
- PL 89-80, Water Resources Planning Act of 1965 (22 July 1965), provides for the optimum development of the Nation’s natural resources through coordinated planning of water and related land resources. It provides authority for the establishment of a water resources council and river basin commission.

- PL 89-298, Flood Control Act of 1965 (27 October 1965), authorizes the Secretary of the Army to design and construct navigation, flood risk management, and shore protection projects if the cost of any single project does not exceed \$10 million.
- PL 95-217, Clean Water Act of 1977 (15 December 1977), amends PL 87-88 and requires the Environmental Protection Agency (EPA) to enter into written agreements with the Secretaries of Agriculture, the Army, and the Interior to provide maximum use of the laws and programs to maintain water quality.
- PL 99-662, Water Resource Development Act of 1986 (17 November 1986), establishes cost sharing formulas for the construction of harbors, inland waterway transportation, and flood risk management projects.

1.4.3 Fish and Wildlife Resources

A number of public laws address protection and maintenance of fish and wildlife resources. The following are pertinent to USACE project lands in eastern Kentucky:

- PL 79-732, Fish and Wildlife Coordination Act (10 March 1934), provides authority for making project lands available for management by interested State agencies for wildlife purposes.
- 16 U.S.C. §§ 668-668a-d, Bald and Golden Eagle Protection Act of 1940 (8 June 1940) as amended, prohibits anyone, without a permit issued by the Secretary of the Interior, from taking bald eagles (*Haliaeetus leucocephalus*), including their nests or eggs.
- PL 85-624, Fish and Wildlife Coordination Act (12 August 1958), states that fish and wildlife conservation will receive equal consideration with other project purposes and be coordinated with other features of water resources development programs.
- PL 91-190, National Environmental Policy Act of 1969 (NEPA) (1 January 1970), establishes a broad Federal policy on environmental quality stating that the Federal government will "... assure for all Americans safe, healthful, productive, and aesthetically and culturally pleasing surroundings ... preserve important historic, cultural, and natural aspects of our national heritage, and maintain, wherever possible, an environment which supports diversity and variety ..."
- PL 93-205, Conservation, Protection, and Propagation of Endangered Species (28 December 1973), requires that Federal agencies will, in consultation with the U.S. Fish and Wildlife Service (USFWS), further conservation of endangered and threatened species and ensure that

their actions are not likely to jeopardize such species or destroy or modify their critical habitat.

- PL 95-632, Endangered Species Act Amendments of 1978 (10 November 1978), specifies a consultation process between Federal agencies and the Secretaries of the Interior, Commerce, or Agriculture for carrying out programs for the conservation of endangered and threatened species.
- PL 101-233, North American Wetland Conservation Act (13 December 1989), directs the conservation of North America wetland ecosystems and requires agencies to manage their lands for wetland/waterfowl purposes to the extent consistent with missions.
- PL 106-147, Neo-tropical Migratory Bird Conservation Act (20 July 2000) promotes the conservation of habitat for neo-tropical migratory birds.

1.4.4 Forest Resources

The following law pertains to management of forested lands and is pertinent to USACE project lands in eastern Kentucky:

- PL 86-717, Protection and Improvement of Natural Resources (6 September 1960), provides for the protection of forest cover in reservoir areas and specifies that reservoir areas of projects developed for flood risk management or other purposes that are owned in fee and under the jurisdiction of the Secretary of the Army and the Chief of Engineers will be developed and maintained so as to encourage, promote, and ensure fully adequate and dependable future resources of readily available timber. Timber production can be implemented through sustained yield programs, reforestation, and accepted conservation practices.

1.4.5 Cultural Resources

A number of public laws mandate the protection of cultural resources on public lands. The following are pertinent to USACE project lands in eastern Kentucky:

- PL 59-209, Antiquities Act of 1906 (8 June 1906), applies to the appropriation or destruction of antiquities on federally owned or controlled lands and has served as the precedent for subsequent legislation.
- PL 74-292, Historic Sites Act of 1935 (21 August 1935), declares that it is a national policy to preserve for public use historic sites, buildings, and objects of national significance for the inspiration and benefit of the people of the United States.

- PL 86-523, Reservoir Salvage Act of 1960 (27 June 1960), provides for the preservation of historical and archaeological data that might otherwise be lost as the result of the construction of a dam and attendant facilities and activities.
- PL 89-665, National Historic Preservation Act of 1966 (NHPA) (15 October 1966), establishes a national policy of preserving, restoring, and maintaining cultural resources. It requires Federal agencies to take into account the effect an action may have on sites that may be eligible for inclusion on the National Register of Historic Places.
- PL 93-291, Archaeological and Historic Preservation Act of 1974 (24 May 1974), amends PL 86-523 and provides for the Secretary of Interior to coordinate all Federal survey and recovery activities authorized under this expansion of the *Reservoir Salvage Act of 1960*. The Federal construction agency may expend up to 1 percent of project funds on cultural resource surveys.
- PL 96-95, Archaeological Resources Protection Act of 1979 (31 October 1979), updates PL 59-209 and protects archaeological resources and sites on public lands and fosters increased cooperation and exchange of information among governmental authorities, the professional archaeological community, and private individuals.
- PL 101-601, Native American Graves Protection and Repatriation Act (16 November 1990), requires Federal agencies to return Native American human remains and cultural items, including funerary objects and sacred objects, to their respective peoples.

1.4.6 Leases, Easements, and Rights-of-Way

A number of laws and regulations govern the granting of leases, easements, and rights-of-way on Federal lands. The following are pertinent to USACE project lands in eastern Kentucky:

- Title 10 U.S. Code (U.S.C.) § 2667, Leases: Non-excess Property of Military Departments and Defense Agencies (10 August 1956), authorizes the lease of land at water resources projects for any commercial or private purpose not inconsistent with other authorized project purposes.
- U.S.C. Titles 10, 16, 30, 32, and 43 address easements and licenses for project lands. 16 U.S.C. § 460d authorizes the use of public lands for any public purpose, including fish and wildlife, if in the public interest.
- 16 U.S.C. § 470h-3, Lease or exchange of historic property (15 October 1966), for historic properties.

- 16 U.S.C. § 663, Impoundment or Diversion of Waters (10 March 1934), wildlife resources management in accordance with the approved general plan.
- 30 U.S.C. §§ 181–263, Mineral Leasing Act of 1920 (25 February 1920), promotes the mining of coal, oil, and gas on the public domain and specifies conditions of leasing agreements.
- 30 U.S.C. §§ 351–359, Mineral Leasing Act for Acquired Lands of 1947 (7 August 1947), provides that minerals subject to the Mineral Leasing Act of 1920 that are located on acquired Federal lands are subject to the Federal mineral leasing system.
- PL 91-631, Mining and Minerals Policy Act of 1970 (28 April 1971), specifies the Federal policy for economically sound development of domestic mining.
- PL 91-646, Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970 (2 January 1971), establishes a uniform policy for fair and equitable treatment of persons displaced as a result of Federal or federally assisted programs.
- PL 94-579, Federal Land Policy and Management Act of 1976 (21 October 1976), establishes a policy that the Federal Government receive fair market value for the use of the public lands and their resources unless otherwise provided for by statute. Provides for the inventory of public land and land use planning. Establishes the extent to which the executive branch may withdraw lands without legislative action.
- PL 95-87, Surface Mining Control and Reclamation Act (3 August 1977), regulates surfacing mining and requires permits and inspections.

1.4.7 Executive Orders

As head of the executive branch, the President can issue legally binding orders known as Executive Orders (EOs). These orders are generally issued to direct Federal agencies and officials in their execution of relevant laws and policies. The following EOs are pertinent to USACE project lands in eastern Kentucky:

- EO 11514, Protection and Enhancement of Environmental Quality (5 March 1970), outlines the responsibilities of Federal agencies in consonance with NEPA. EO 11514 was amended by EO 11991 in 1977, Relating to Protection and Enhancement of Environmental Quality, in 1977.

- EO 11593, Protection and Enhancement of Cultural Environment (13 May 1971), outlines the responsibilities of Federal agencies in consonance with the NHPA, NEPA, the Historic Sites Act, and the Antiquities Act.
- EO 11644, Use of Off-Road Vehicles on Public Lands (8 February 1972), establishes a uniform Federal policy regarding the use of off-road vehicles such as trail bikes, snowmobiles, and dune buggies on public lands.
- EO 11988, Flood Plain Management (24 May 1977), requires Federal agencies to avoid both long- and short-term adverse impacts associated with the occupancy and modification of floodplains and avoid development of floodplains when practicable alternatives exist.
- EO 11989, Off-Road Vehicles on Public Lands (24 May 1977), amends EO 11644 and authorizes Federal agencies to close areas or trails to off-road vehicles that cause adverse effects to soil, vegetation, wildlife, wildlife habitat, and cultural or historical resources.
- EO 11990, Protection of Wetlands (24 May 1977), restricts Federal agencies from taking actions that would destroy or modify wetlands when there is a practicable alternative.
- EO 11991, Relating to Protection and Enhancement of Environmental Quality (24 May 1977), amends EO 11514 by directing the Council of Environmental Quality to issue guidance to Federal agencies for implementing procedural provisions of NEPA.
- EO 12088, Federal Compliance with Pollution Control Standards (12 October 1978), requires all Federal agencies to be in compliance with environmental laws and fully cooperate with the EPA and State, interstate, and local agencies to prevent, control, and abate environmental pollution.
- EO 12962, Recreational Fisheries (7 June 1995), directs Federal agencies to improve the quantity, function, sustainable productivity, and distribution of U.S. aquatic resources for increased recreational fishing opportunities. EO 12962 was amended by EO 13474 in 2008.
- EO 13112, Invasive Species (3 February 1999), directs each Federal agency to prevent the introduction of invasive species, to detect and respond rapidly to and control populations of invasive species in a cost-effective and environmentally sound manner, to monitor invasive species populations accurately and reliably, and to provide for restoration of native species and habitat conditions in ecosystems that have been invaded.
- EO 13186, Responsibilities of Federal Agencies to Protect Migratory Birds (10 January 2001), directs Federal agencies, pursuant to a Memorandum of Understanding with the USFWS, to support the conservation intent of migratory bird conventions by integrating bird

conservation principles, measures, and practices into agency activities and by avoiding or minimizing, to the greatest extent practicable, adverse impacts on migratory bird resources.

- EO 13327, Federal Real Property Asset Management (4 February 2004), promotes the efficient and economical use of Federal real property resources in accordance with their value as national assets and in the best interest of the Nation. EO 13327 was amended by EO 13423, Strengthening Federal Environmental, Energy, and Transportation Management, in 2007.
- EO 13423, Strengthening Federal Environmental, Energy, and Transportation Management (24 January 2007), instructs Federal agencies to conduct their environmental, transportation, and energy-related activities under the law in support of their respective missions in an environmentally, economically and fiscally sound, integrated, continuously improving, efficient, and sustainable manner.
- EO 13514, Federal Leadership in Environmental, Energy, and Economic Performance (5 October 2009) expands on the energy reduction and environmental performance requirements for Federal agencies identified in EO 13423 and requires Federal agencies to make reductions in greenhouse gas emissions.

1.5 Purpose of the Master Plan

The purpose of this Master Plan is to provide guidance for the preservation, conservation, restoration, maintenance, management, and development of Project lands, waters, and associated resources. The Master Plan is intended to aid responsible stewardship of Project resources for the benefit of present and future generations.

The Master Plan contains an evaluation of the present use and potential uses of Project resources and recommendations for the future management and development of Project resources. This Master Plan is conceptual, and as such, identifies conceptual activities rather than designs and exact locations.

The Master Plan is based on responses to regional and local needs, resource capabilities and suitability, and expressed public interests that are consistent with authorized Project purposes and pertinent legislation and regulations. Actions by the USACE and by the agencies and individuals granted leases or licenses for use of Project lands must be consistent with the Master Plan. The Master Plan is distinct from the project-level implementation emphasis of the Operational Management Plan (OMP). Policies in the Master Plan are guidelines that will be implemented through provisions of the OMP, specific Design Memoranda, and other planning mechanisms.

The broad intent of this Master Plan is to:

- Determine appropriate uses and levels of development for Project resources
- Provide a framework within which the OMP and other planning mechanisms can be developed and implemented
- Establish a basis on which outgrants and recreational development proposals can be evaluated

1.6 Scope of the Master Plan

This Master Plan includes guidance for appropriate uses, development, enhancement, protection, and conservation of the natural, cultural, and built resources of the Project. The Master Plan has eight sections and three appendices:

- Section 1.0 – Introduction and Background
- Section 2.0 – Public Involvement, Coordination and Partnerships
- Section 3.0 – Resource Analysis
- Section 4.0 – Recreation Program Analysis
- Section 5.0 – Resource Objectives
- Section 6.0 – Land Allocation and Classification
- Section 7.0 – Resource Use Plan
- Section 8.0 – Special Programs
- Appendices
 - Appendix A: Acronyms and Abbreviations
 - Appendix B: Bibliography
 - Appendix C: Summary of Public Scoping Meetings

1.7 Project Description

The description of the Project includes location, history, water quality issues, land acquisition, Federal areas and recreational facilities, outgrants, Project data and lake operations, lake regulation, and visitation data.

1.7.1 Location

Grayson Lake is located on the Little Sandy River in Carter and Elliott Counties, KY, 37 miles upstream from the confluence with the Ohio River at Greenup, KY.

Interstate 64 (I-64) laterally transects the middle of Carter County and is approximately 8 miles north of the northern border of the Project. I-64 intersects State Route (SR) 7, which is the main north-south road through the Grayson Lake area. SR 7 is on the western side of the Project in Carter County and crosses to the eastern side of Grayson Lake just to the north of Elliott County. Just north of the dam, SR 7 intersects with State Highway 1496, which provides access to the northeastern portion of Grayson Lake Project Wildlife Management Area (WMA). Figure 1-1 shows the location of the Project in the Commonwealth of Kentucky and the major highways in the Project area.

Communities within less than a 1-hour drive of Grayson Lake include Grayson, Ashland, and Morehead, KY; and Huntington, WV. The Project is about 1.5 hours from Charleston, WV, and 2 hours from Lexington, KY.

1.7.2 History of the Project

Heavy rains or a combination of melting snow and heavy rains caused severe flooding in eastern Kentucky and on the Ohio River in February 1862, January 1918, January 1937, and February 1939. In letters to Congress in 1950 and 1951, Kentucky Governor Lawrence Wetherby described the excessive stream flooding throughout Kentucky that had recently devastated crop lands. The governor appealed to Congress to conduct surveys as the first step in developing and implementing flood risk management programs for the Kentucky watersheds (Wetherby, 1950).

During the 1950s, the local Soil Conservation District also appealed to Congress for an assessment of the feasibility of flood control on the Little Sandy River. In 1956, the USACE was authorized to appraise flood control development and report findings to Congress. The USACE report was completed in 1959 and concluded that flood control measures were necessary and economically feasible. As a result, Grayson Lake was authorized by the 1960 Flood Control Act. Final planning monies were provided in 1963, and a site selection report was completed. Construction of the dam began in June 1964, and the Project became operational in August 1969.

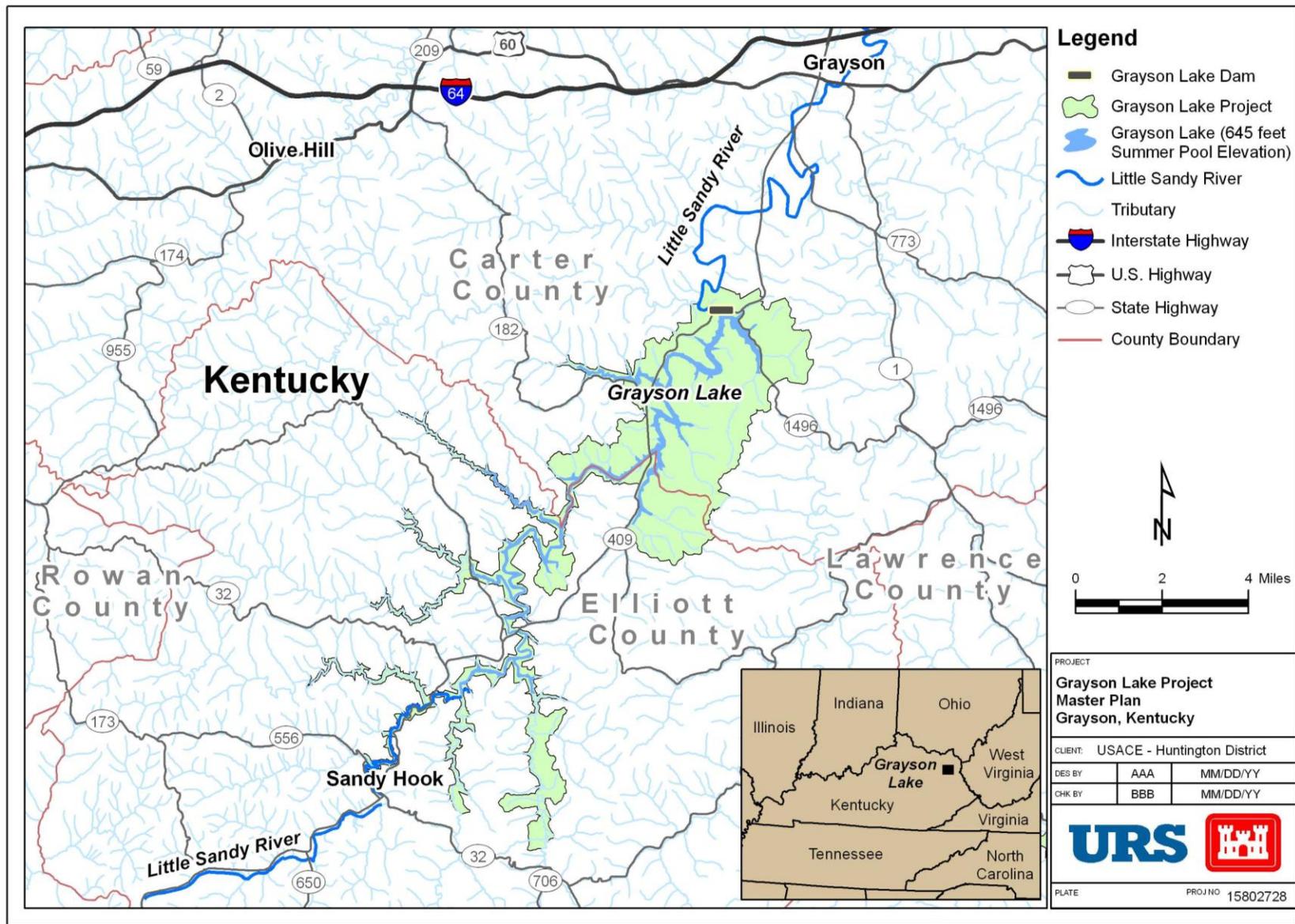


Figure 1-1: Location of Grayson Lake Project

1.7.3 Water Quality Issues

Cavernous limestone and abandoned clay mines that could lead to reservoir leakage were observed in what would be the rim of the initially proposed location of the Grayson Lake dam reservoir, and as a result, the dam site was relocated per the recommendations in Design Memorandum 1 (1963).

Based on testing of the lake by the USACE, specific conductance, alkalinity, and hardness of the water are relatively low. Water is classified as soft with low concentrations of dissolved materials. The lake is generally susceptible to suspended solid and pH problems.

1.7.4 Land Acquisition History

The Federal Government purchased the land for the Project site and fully funded construction of the Project. Property acquisitions are discussed in detail in USACE Design Memoranda 4 (1963), 8 (1964), 10 (1965), and 12 (1965), and the overall plan for the Project is discussed in USACE General Design Memorandum 2 (1963). Design Memorandum 4 designated approximately 1,150 acres for the dam site, construction work areas, access routes to the construction site, and borrow areas. Design Memorandum 8 detailed acquisition of about 9,000 acres in the lower portions of the reservoir along the Little Sandy River. Design Memorandum Supplement 8 (1965) recommended acquisition of 1,300 acres of land in the headwaters of Greenbriar Branch, Bills Branch, Birchfield Creek, and the Frazier Flats areas. Design Memorandum 10 recommended acquisition of the middle one-third of the reservoir land (approximately 2,600 acres). Design Memorandum 12 recommended acquisition of approximately 2,565 acres for the upper one-third of the Project. Land acquired for the Project totaled 16,938 acres. Eight acres were subsequently disposed, bringing the current acreage to 16,930.

1.7.5 Federal Areas and Recreational Facilities

The USACE manages the Dam Site Area, which has approximately 640 acres. The area includes the dam, Project office, Information Center, parking, picnic areas, shelters, restrooms, hiking trails, and a boat ramp. The other areas of the Project are managed through outgrants.

1.7.6 Outgrants

An outgrant is the written interest granted to an entity or individual that allows the entity or individual to make use of government property through lease, easement, or permit. Outgrants typically establish a time frame, conditions, and restrictions on the use of the property.

The outgrant areas are Grayson Lake State Park, Laurel Gorge Cultural Heritage Center, Elliott County Shrine Club Park, and Grayson Lake Marina.

Table 1-1 lists the outgrants areas at the Project. The locations of the Federal recreational and outgrant areas are shown on Figure 1-2. General descriptions of the outgrant areas are provided in Section 4.1.

Table 1-1: Outgrant Areas and Managing Agencies

Area	Acreage	Managing Agency
Dam Site Area	642	USACE
Grayson Lake State Park (includes Rolling Hills Campground, Hidden Cove Golf Course, and Bruin Recreation Area)	1,512	Kentucky Department of Parks
Wildlife Management Area, including Camp Webb	14,777	KYDFWR
Laurel Gorge Cultural Heritage Center	27	Elliott County
Elliott County Shrine Club Park	13	Elliott County
Grayson Lake Marina	10.3	VCV Inc.

KYDFWR = Kentucky Department of Fish and Wildlife Resources

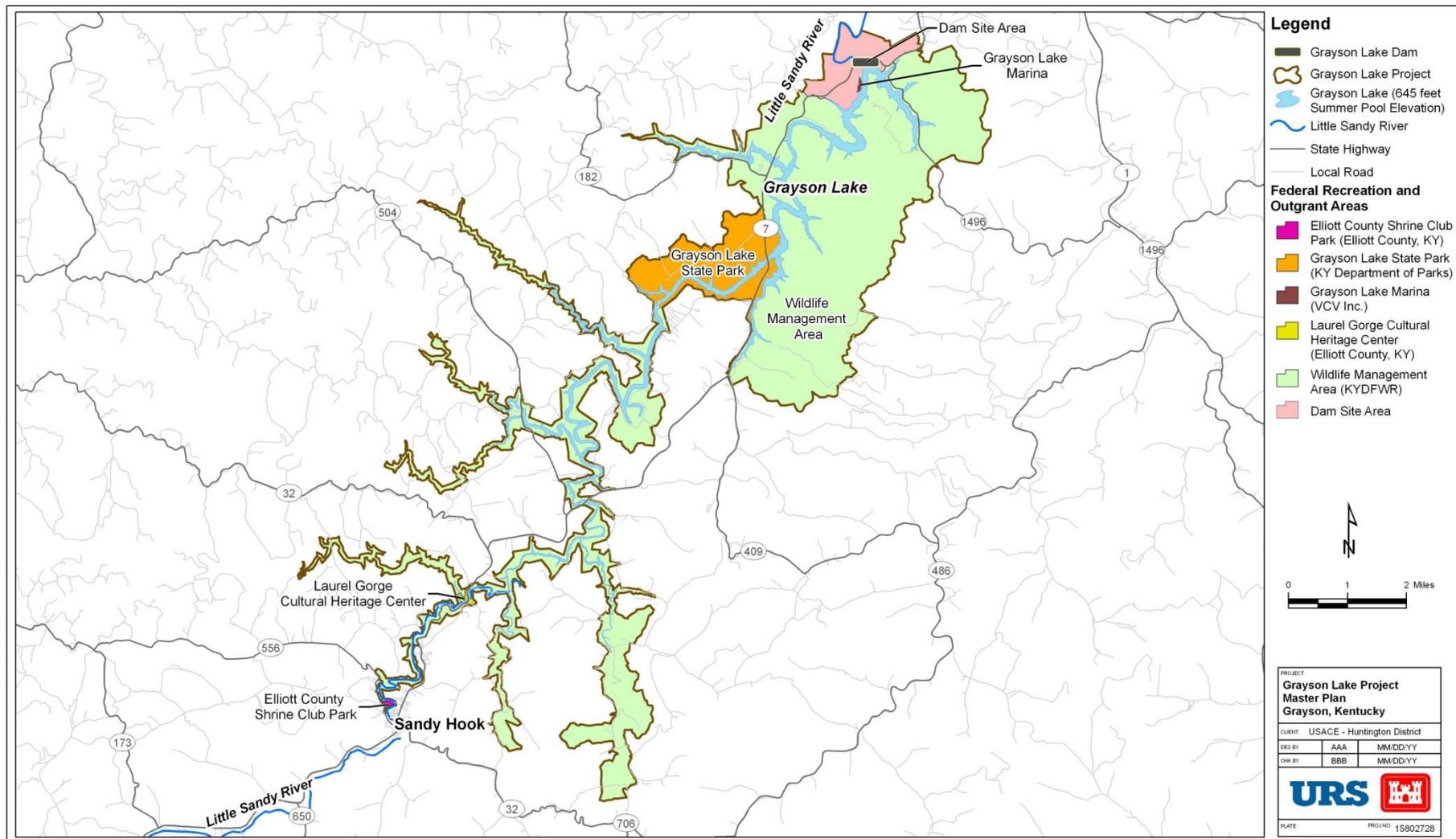


Figure 1-2: Recreational Areas

1.7.7 Project Data and Lake Operation

The Grayson Lake dam is an earth and rockfill structure with a central impervious core founded on rock (see Photograph 1-1). The stream bed elevation at the dam is 585 feet NGVD. The top elevation of the dam is 710 feet NGVD, and the crest length is 1,460 feet. The spillway is broad-crested and uncontrolled, with a crest width of 210 feet at a flood control pool elevation of 681 feet NGVD. See Table 1-2.



Photograph 1-1: Grayson Lake Dam

The outlet works are in the left dam abutment and include a 14-foot-diameter reinforced concrete tunnel. The dam is controlled by three 5-foot, 8-inch x 10-foot hydraulic sluiceways, with a bypass sluice for low-flow discharges.

Table 1-2: Project Structures

Facility	Category	Description
Dam	Type	Earth and rockfill structure with a central impervious core
	Crest length	1,460 feet
	Stream bed elevation	585 feet NGVD
	Top elevation	710 feet NGVD
Spillway	Type	Uncontrolled, excavated channel
	Crest elevation	681 feet NGVD
	Width	210 feet

NGVD = National Geodetic Vertical Datum

1.7.8 Lake Regulation

Table 1-3 shows how the surface area and shoreline (perimeter) of the lake change as surface elevations change. During periods of flooding, the elevation of the lake may be as high as 681 feet NGVD and have a surface area as much as 3,630 acres.

Table 1-3: Grayson Lake Elevation, Surface Area, and Shoreline

Lake Surface Level	Elevation (feet NGVD)	Surface Area (acres)	Shoreline (miles)
Winter Pool (December – March)	637	1,160	74
Summer Pool (April – November)	645	1,510	103
Maximum Flood Control Pool	681	3,630	180

NGVD = National Geodetic Vertical Datum

1.7.9 Visitation Data

USACE uses the Visitor Estimation Reporting System (VERS) for the annual number of visits to recreational areas in the Project. The VERS is based on accepted research guidelines and procedures adopted by USACE. The VERS system combines the type of recreational activity and season of the year along with traffic measurements to yield data. Five counters are used to count visitor vehicles—two around the USACE Project office and one each at the entrance to Laurel Gorge Cultural Heritage Center, the Grayson State Park entrance, and Camp Webb.

Table 1-4 contains the estimated number of visitors to the Project from 2000 to 2010. One visit is defined as the entry of one person into a recreational area. As shown in Table 1-4, visitation to the Project was highest in 2010 with an estimated 1,262,443 visitors. The average number of visitors per year between 2000 and 2010 is approximately 1,051,000. Because the estimated number of visitors has been fairly stable, the average number of visitors per year was used as the baseline to project future visitation data.

Table 1-4: Visitation Data, FY 2000 – 2010

Fiscal Year*	Estimated Number of Visitors
FY 2000	701,122
FY 2001	612,805
FY 2002	1,044,710
FY 2003	1,211,774
FY 2004	983,304
FY 2005	1,168,008
FY 2006	1,256,785
FY 2007	1,177,449
FY 2008	1,091,059
FY 2009	1,051,473
FY 2010	1,262,443

*October 1st to September 30th

2.0 SCOPING PROCESS AND PUBLIC INVOLVEMENT

The White House Council on Environmental Quality defines scoping as "... an early and open process for determining the scope of issues to be addressed and for identifying the significant issues related to a proposed action" (Title 40 Code of Federal Regulations [CFR] § 1501.7). The scoping process for the Master Plan was used to invite public participation, identify key issues, and obtain public comment on the Master Plan formulation process.

Public involvement is an important component of developing a successful Master Plan. The public involvement effort related to developing this Master Plan occurred in August 2009, providing the public, stakeholders, and public agencies opportunities to participate in defining the key issues and resource objectives.

2.1 Public Meeting

A public meeting was held on 18 August 2009 during the scoping phase of the Master Plan. The meeting, which was conducted at the Carter Caves State Park (344 Caveland Drive, Olive Hill, KY), contributed to and understanding of key Project issues and needs and the formulating of the resource objectives (see Section 6).

Two stakeholder meetings were held on 18 August 2009 at the Carter Caves State Park.

See Appendix C for a summary of the results of the scoping meetings.

2.2 Identified Key Issues

The following is a summary of the key issues that were identified for consideration in the Master Planning process based on the scoping process, including the public meeting and two stakeholder meetings.

- Improved fishing experience
- Improved access to the lake for swimming
- Expansion or enhancement of various trail systems
- Additional camping opportunities
- Management of the hemlock wooly adelgid (*Adelges tsugae*), which is threatening trees on Project land
- Increased parking around shelters

- Installation of additional recreational facilities, including boat docks and cottages

2.3 Consistency of Goals with Relevant Planning Documents

The goals and objectives for recreation at the Grayson Lake Project are consistent with those of other agencies that provide or plan for recreation in the area based on a review of existing planning documents prepared by the Commonwealth of Kentucky and all Federal agencies, as follows:

- *Statewide Comprehensive Outdoor Recreation Plan*, developed by the Kentucky Department of Local Government (Commonwealth of Kentucky, 2008)
- *Eastern Kentucky Comprehensive Adventure Tourism Plan*, developed by the Kentucky Department of Tourism (Commonwealth of Kentucky, 2007)
- *Comprehensive Wildlife Action Plan* (KYDFWR, 2003)
- *Wildlife Conservation Strategy* (KYDFWR, 2005)
- *Recreational Fishery Resources Conservation Plan Agency Action Plan* (EPA, 1996)
- *Conservation Education Strategic Plan to Advance Environmental Literacy* (USFS, 2007a)
- *2000 RAP [Renewable Resources Planning Act] Assessment of Forest and Range Lands* (USFS, 2000)
- *Rivers,wh Trails and Conservation Assistance Program: Strategic Plan* (NPS, n.d.)

According to the Association of Fish and Wildlife Agencies (2005), the goals that are common to these plans include:

- Provision of high-quality opportunities for recreation
- Good stewardship of the land
- Restoration of ecological corridors
- Natural habitats for conservation of wildlife
- Preservation of cultural, natural, and historic resources

Shared goals also include approaches for achieving desired ends, including: monitoring outcomes or programs, encouraging public involvement, coordination among government entities, and developing partnerships with public, private, and nonprofit entities to develop, manage, and maintain resources. Given the commonalities in goals established by State and Federal agencies, the USACE will continue to work with State and Federal agencies,

stakeholders, local government, the public, and other interested parties to enhance recreational opportunities and to support wildlife management and protection goals.

Table 2-1 lists some of the goals in plans that have been developed by other agencies and that are consistent with the Project purposes.

Table 2-1: Shared Recreational and Environmental Conservation Goals

Plan	Goal				
	Enhancement of Recreational Opportunities	Stewardship of the Land	Restoration of Ecological Corridors	Restoration of Habitats	Preservation of Natural, Historical, and Cultural Resources
Kentucky Statewide Comprehensive Outdoor Recreation Plan	✓				✓
Eastern Kentucky Comprehensive Adventure Tourism Plan	✓	✓			✓
Kentucky Comprehensive Wildlife Action Plan			✓	✓	
Kentucky Wildlife Conservation Strategy		✓	✓	✓	
EPA Recreational Fishery Resources Conservation Plan Agency Action Plan		✓		✓	✓
USFS Conservation Education Strategic Plan to Advance Environmental Literacy	✓				✓
USFS 2000 Renewable Resources Planning Act Assessment of Forest and Range Lands		✓			✓
NPS Rivers, Trails and Conservation Assistance Program Strategic Plan					✓

EPA = Environmental Protection Agency

NPS = National Park Service

USFS = U.S. Forest Service

2.4 Agency Coordination and Partnerships

Because the goals of the KYDFWR, the Kentucky Division of Forestry, the Kentucky Department of Parks, and Elliott and Carter Counties overlap with the goals of the USACE, these organizations work in partnership with the USACE at the Project.

The KYDFWR Southeastern Region has an office inside the Project; the KYDFWR works to enhance wildlife habitat through management of the Project's WMA and activities at Camp Robert C. Webb. The goal of sustainable management of forestry resources is shared by the KYDFWR and the Kentucky Division of Forestry.

The Kentucky Division of Forestry manages timber resources within the WMA. The Kentucky Division of Forestry also has the goal of wildfire prevention. The USACE and the Kentucky Division of Forestry established a Memorandum of Understanding for preventing and suppressing forest fires at the Project. The OMP contains detailed information concerning forest fire control responsibilities and operating procedures.

Other agencies that work in partnership with USACE are the Kentucky Department of Parks, which oversees the activities at the Grayson Lake State Park, and Elliott County, which manages activities at the Laurel Gorge Cultural Heritage Center.

Federal, State, and local government agencies share the goal of public safety. Depending on the type of threat to public safety, Project staff may contact the Carter and Elliott County Sheriff's Departments, Kentucky State Police, or KYDFWR Conservation Officers.

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3.0 NATURAL RESOURCE ANALYSIS

This section contains the results of an analysis of the existing conditions of the natural resources in the physical and biological environments at the Project. The information is provided to facilitate an understanding of natural resource capabilities, suitability, and constraints relative to future Project development and natural resource-related management activities. This section also provides key information for the development of resource objectives and land classification decisions.

3.1 Physical Environment

The physical environment includes the following natural resources:

- Surface water
- Wetlands
- Groundwater
- Physiography and topography
- Geology, soils, and minerals
- Historic and prehistoric resources
- Scenic elements

These natural resources are discussed in the subsections below. The existing conditions are presented followed by a brief discussion of the suitability of the resource for Project development.

3.1.1 Surface Water

Surface water pertains to water that is available at the ground surface and includes streams, Grayson Lake, and the tailwater at the Project.

3.1.1.1 Existing Conditions

Streams

Grayson Lake is located in Elliott and Carter Counties on the Little Sandy River. Grayson Lake is approximately 37 miles upstream from the confluence of the Little Sandy River and the Ohio River. The Little Sandy River watershed encompasses 724 square miles. Eight sub-watersheds drain surface water within the Project boundary.

The 230-square-mile subwatershed formed upstream of the Grayson Lake Dam includes a network of stream tributaries that carry surface water to the Little Sandy (Figure 3-1). The network covers approximately 659 stream miles. Figure 3-1 shows the Grayson Lake and Little Sandy River watershed boundaries, and Figure 3-2 shows the surface waters and tributaries within the Project.

Upstream land use, such as coal mining, logging, agriculture, and land development, have caused erosion, and the eroded sediment has been transported into surface water. Sediment is considered a pollutant and has diminished the clarity of streams and degraded surface water quality in the Little Sandy River watershed.

According to the *Draft 2010 Integrated Report to Congress on the Condition of Water Resources in Kentucky* (Kentucky Division of Water, 2010), the Little Sandy River and Grayson Lake are considered impaired for water quality under Section 303(d) of the Clean Water Act (33 U.S.C. § 1313). An impaired water body has chronic or recurring monitored violations of State water quality regulations and is a priority for water quality enhancement. Grayson Lake is listed as impaired for fish consumption due to methyl mercury contamination of fish. A segment of the Little Sandy River (river miles 71.8 to 74.7) upstream of Grayson Lake in Elliott County only partially supports warm water aquatic habitat because of sedimentation/siltation pollution.

Grayson Lake

The surface of Grayson Lake covers 1,510 acres and is approximately 20 miles long during the normal summer pool elevation of 645 feet NGVD (Photograph 3-1). The summer pool (April through November) is typically the highest water level during the year. The maximum depth of the lake at the deepest point near the dam is about 25 feet. The lake is long and relatively narrow with many coves at junctions with tributaries; these features result in a shoreline that is approximately 74 miles long during the summer. The shoreline generally consists of rolling hills that are well vegetated above the summer pool elevation. Above Bruin Creek, the lake shoreline changes from rolling hills to cliffs that are from 30 to 200 feet high.

Approximately 570 acres of the lake are designated for unrestricted boat use and approximately 936 acres are restricted as controlled speed or no wake zones (Figure 3-3).

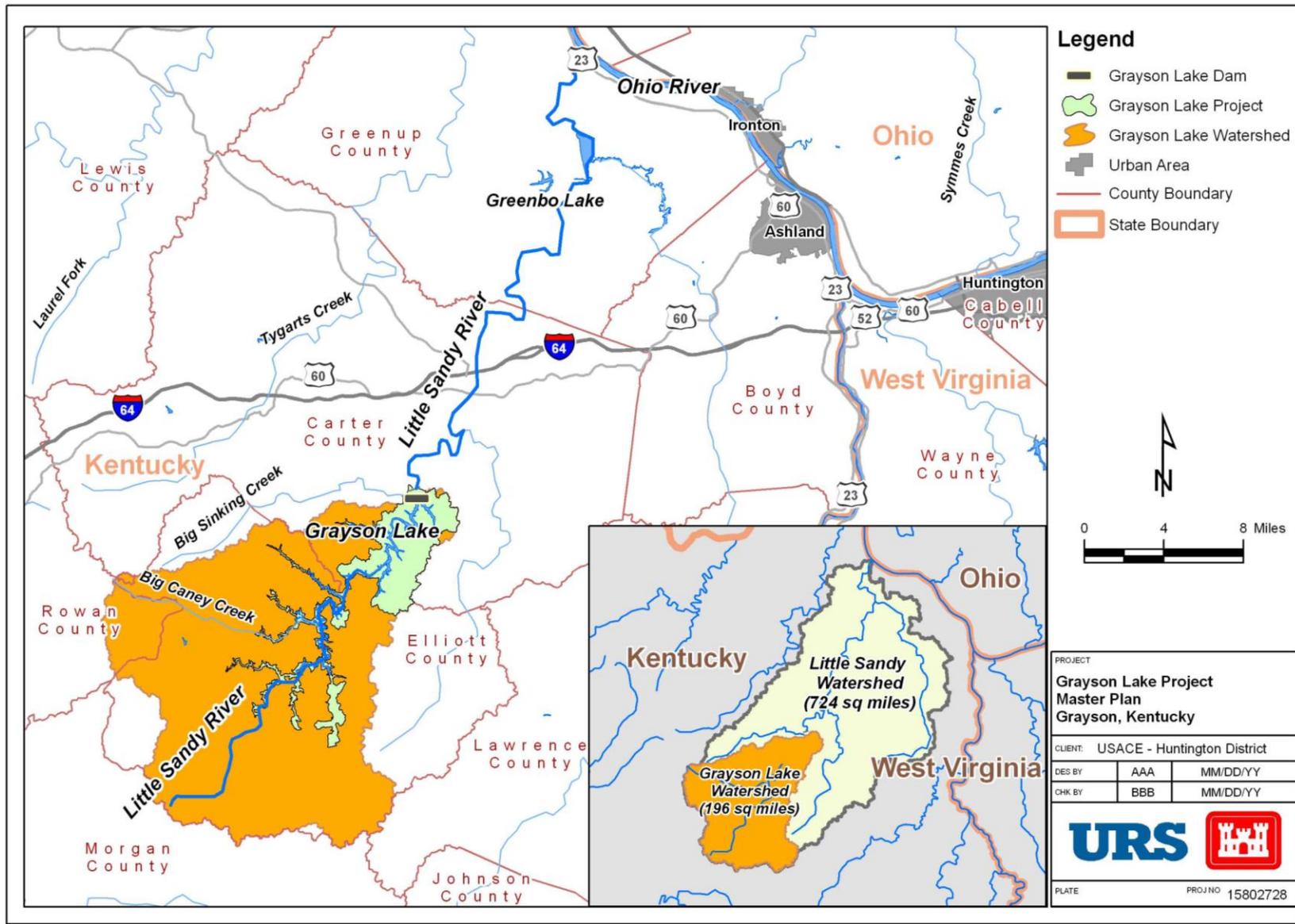


Figure 3-1: Grayson Lake Project Watershed

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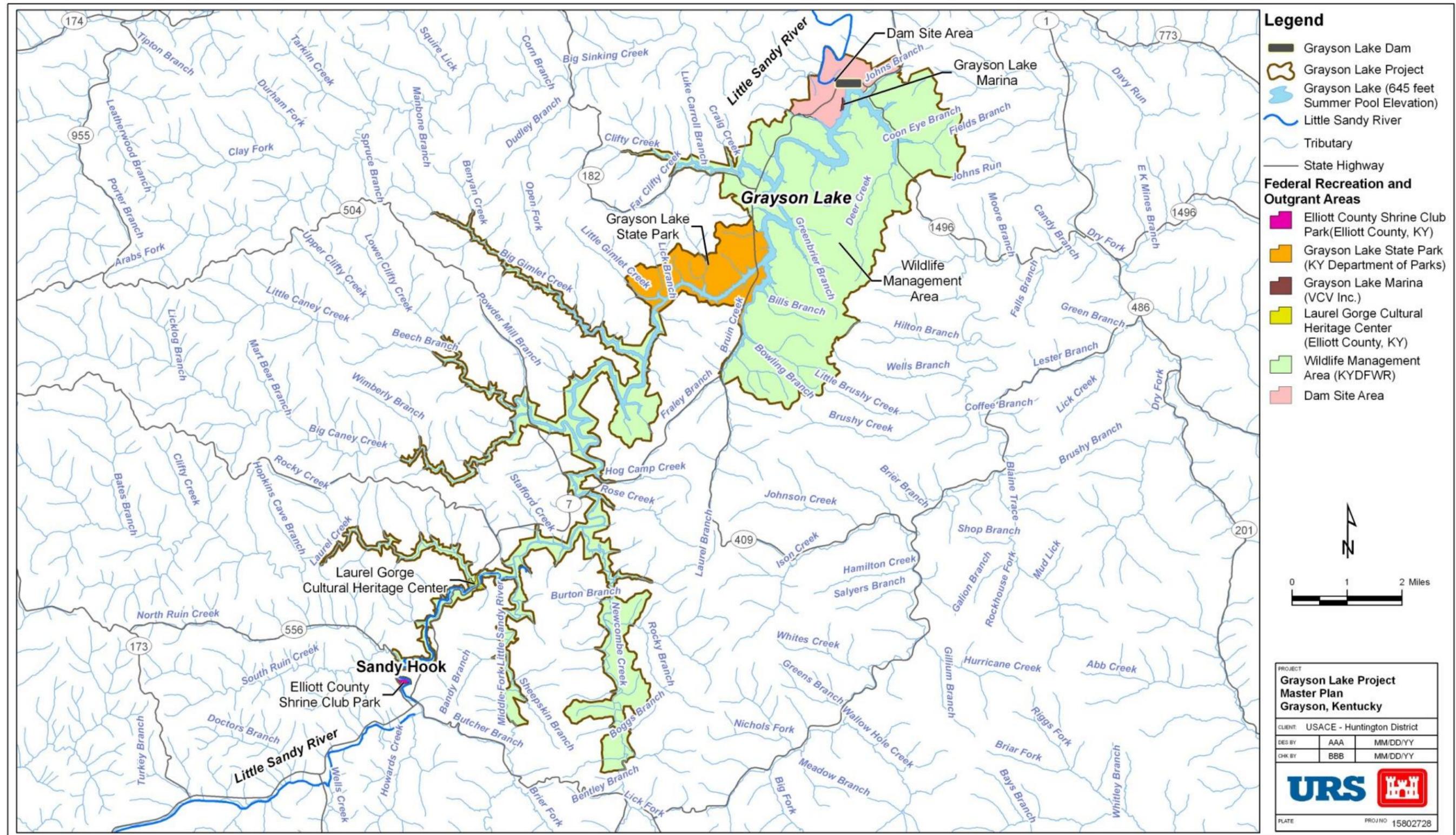


Figure 3-2: Surface Waters in the Project Area

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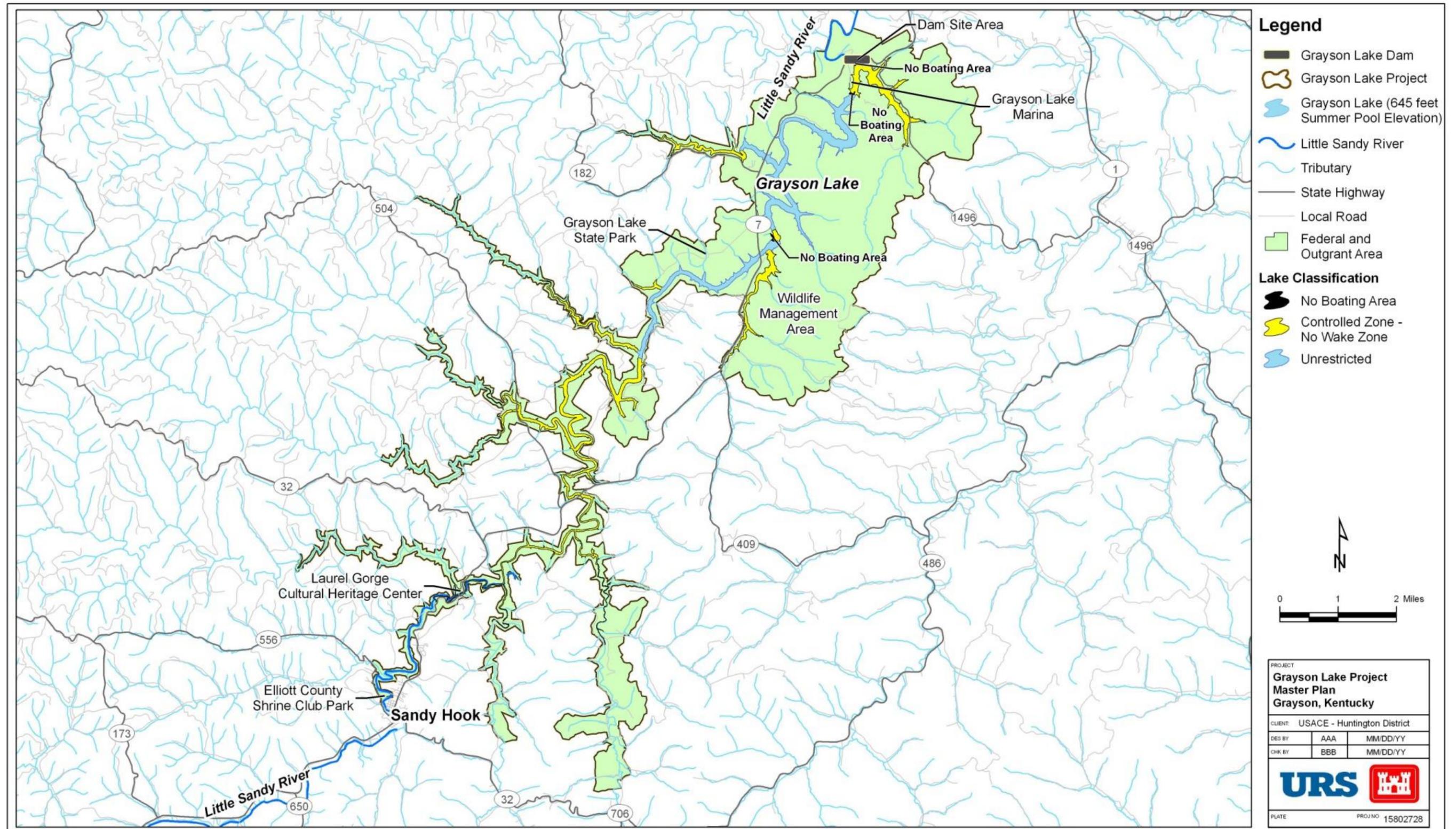


Figure 3-3: Water Surface Zoning

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The USACE regularly samples the water of Grayson Lake at different depths for temperature, dissolved oxygen, acidity (or pH), and conductivity. KYDFWR uses these data to assess the quality of the water for fish habitat. The lake is stratified during the summer with warm, oxygenated water on the surface and cold unoxygenated water levels at the bottom.



Photograph 3-1: Grayson Lake

Tailwater

The tailwater is immediately downstream of the dam where the outflow from the lake is discharged. Water is released from the lake through an intake structure and passes through a tunnel to emerge as outflow. This system allows withdrawal from various water depths and offers choices over a considerable range of outflow rates and water parameters, including temperature. In April, May, and November, the KYDFWR stocks the tailwater with rainbow trout (*Oncorhynchus mykiss*) to increase recreational fishing opportunities at the Project.

3.1.1.2 Implications of Surface Water Resources for Project Development

Grayson Lake is well suited for boating and other types of water recreation, such as water skiing, because of its surface area, depth, and water quality. The wider expanses of the lake are suitable for motorized boats, while coves and narrower reaches of the lake lend themselves to non-motorized boating. A relatively consistent summer pool elevation is maintained that is suitable and conducive to recreational boating and marina operations.

Despite Grayson Lake being 303(d) listed as impaired for consumption of fish, samples show that water quality in the lake is suitable to maintain fish populations and safe for recreation including swimming. The 303(d) listing does not affect human health from direct contact with the water. However, the steep and densely vegetated slopes limit access from the shore and can be a constraint for swimming. The beach at the Bruin Recreation Area is the only designated public beach, but it is closed, and the date of reopening has not been determined. Many lake users access the lake for swimming from watercraft.

The lake and tailwater support a diverse population of aquatic life because of the lake's water quality, surface area, and depth; the more than 100 miles of shoreline during normal summer pool elevation; and the numerous coves and supporting tributaries. The lake can support a moderate level of recreational fishing pressure.

Because the primary authorized purpose of the Project is flood risk management, the lake is designed to store floodwaters to reduce flood risk downstream. The normal summer pool elevation of 645 feet NGVD can be increased to the maximum flood control pool elevation of 681 feet NGVD during a severe flood event.

Figure 3-4 shows the areas that would be inundated at an elevation of 681 feet NGVD compared to the normal summer pool elevation of 645 feet NGVD. The potential fluctuation in elevation may constrain development adjacent to the lake. As illustrated on Figure 3-4, some sections of the Project would not be significantly affected by inundation, which is a result of the steep slopes and cliffs along the shoreline. According to Section 2.2.1 of EM 1110-1-400, *Engineering and Design Recreation Facility and Customer Services Standards* (USACE, 2004), a general guideline for planning purposes is to construct lakeside development above the 20 percent chance (5-year) flood event.

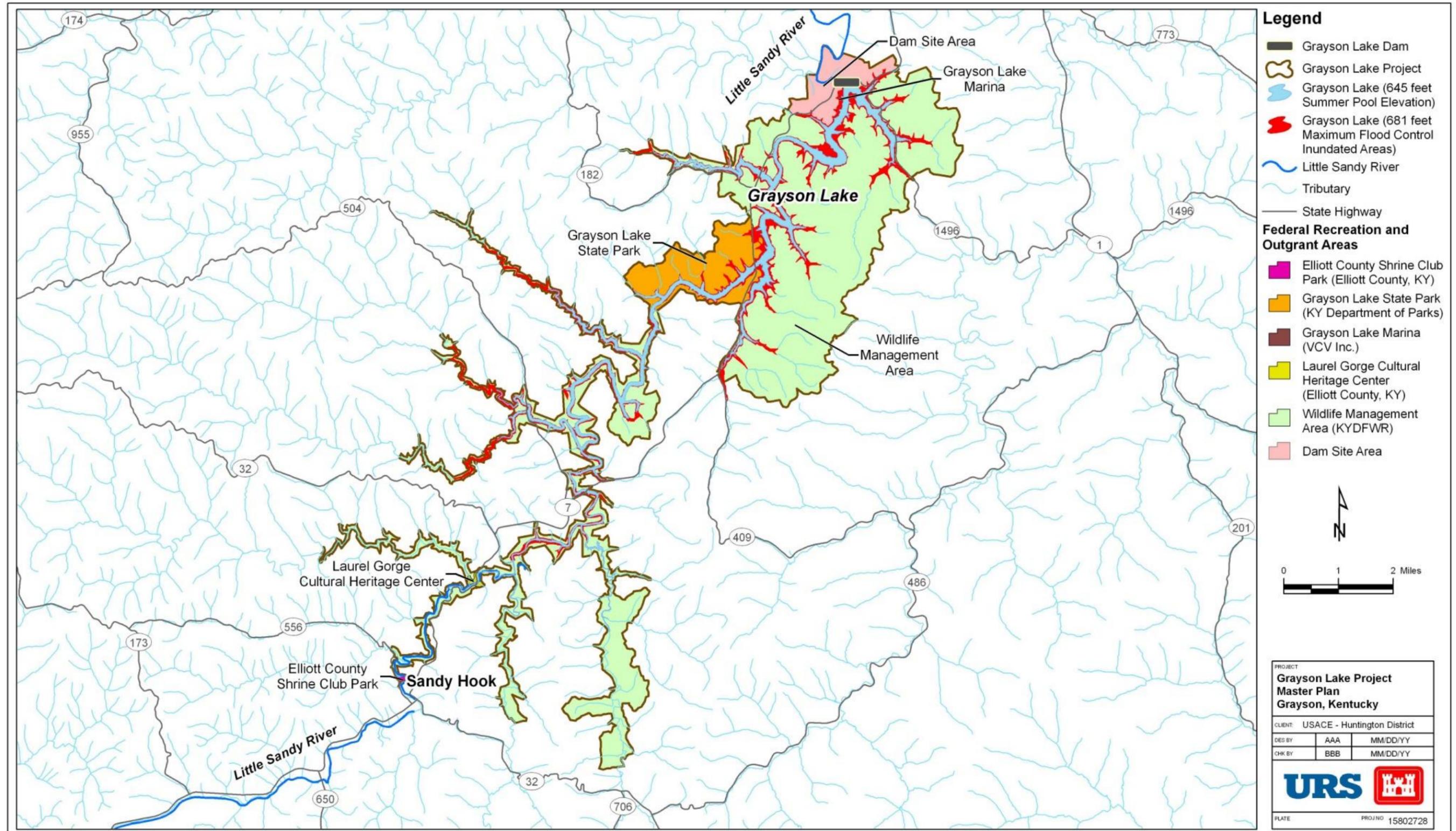


Figure 3-4: Inundation Area between Summer Pool and Flood Control Pool Elevations

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3.1.2 Wetlands

In Section 404 of the Clean Water Act (33 U.S.C. § 1344), wetlands are defined as “... those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas.”

Wetlands typically attract diverse vegetation because that attracts a variety of wildlife species, especially when standing water is present. Various wildlife species are attracted to wetlands because of standing water and diverse vegetation. Some wildlife species are dependent on wetland ecology for food, water, and shelter and cannot survive in other environments. The wildlife attracts predators, including hunters. Because of the link between upland and aquatic systems, wetlands attract and support many species from adjacent ecosystems.

Wetlands are important in part because they hold and slowly release floodwater and snow melt. Wetlands also filter impurities out of surface water, recycle nutrients, and trap sediment. Wetlands provide recreational opportunities for bird watching, hunting, wildlife observation, and possibly fishing, canoeing, kayaking.

3.1.2.1 Existing Conditions

The National Wetland Inventory (NWI) maps from the USFWS are generalized maps that give approximate locations of wetland areas based on surveys. According to the NWI maps 7 wetland types cover a total of approximately 85 acres (Figure 3-5). The wetlands tend to occur mainly in relation to streams and are scattered, consisting of relatively small areas of less than 3 acres (USFWS, 2010).

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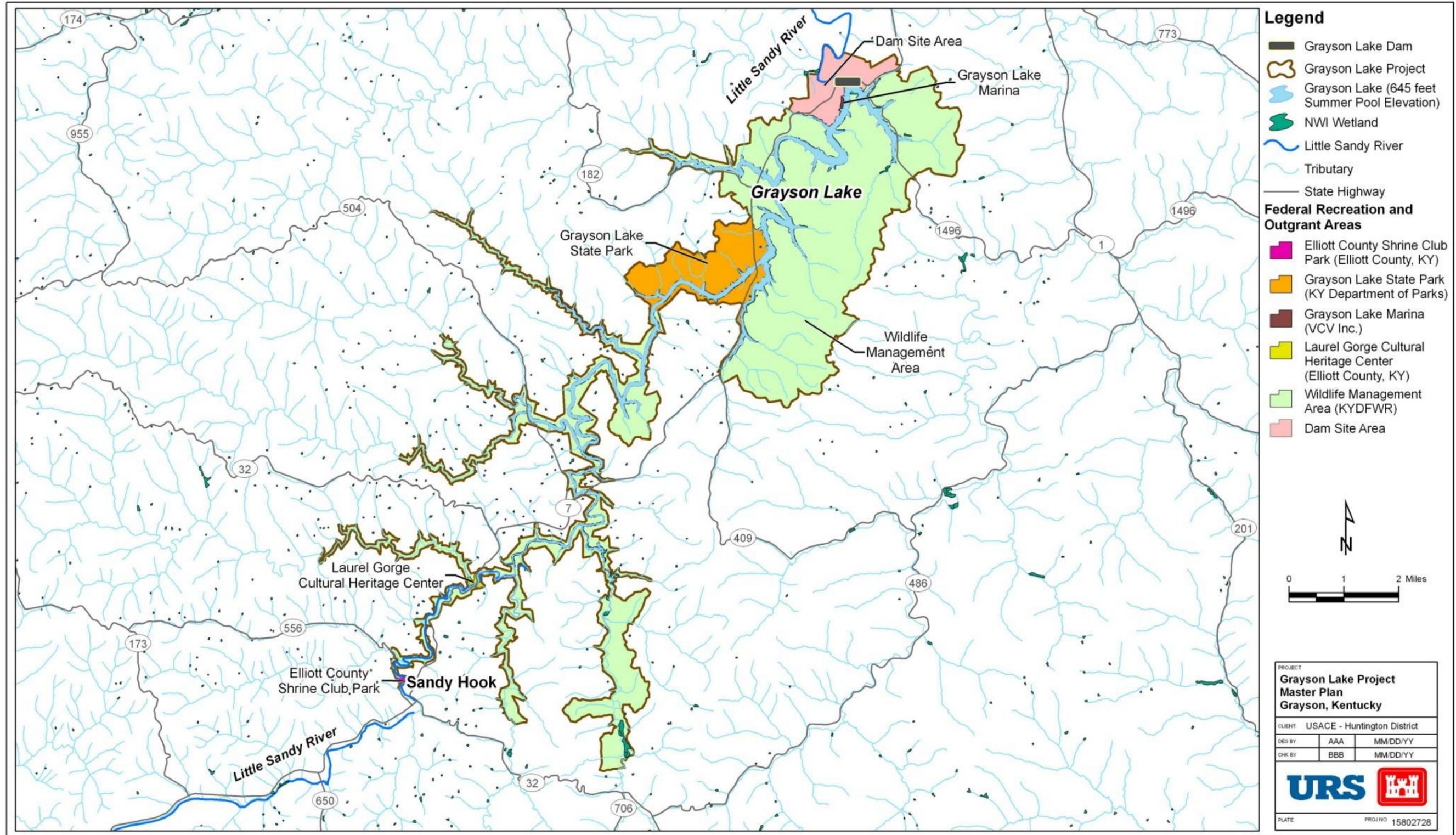


Figure 3-5: NWI Wetlands

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3.1.2.2 Implications of Wetland Resources for Project Development

Wetlands provide specialized habitat for select flora and fauna that would otherwise not thrive at the Project. Under EO 11990, Protection of Wetlands, Federal agencies are tasked with the responsibility to preserve and enhance wetland resources. Wetlands can be considered both a constraint and an opportunity for Project development. They are a constraint because they are a sensitive environmental resource that should be preserved, thus limiting development opportunities for high intensity/density recreational activities. They also provide recreational opportunities as a result of their diverse habitat and wildlife, such as wildlife viewing, bird watching, and interpretive and educational activities. Prior to the implementation of any proposed actions, such as recreational development of an area, wetland delineations would need to be conducted, the potential impacts on any wetlands would need to be evaluated, and water quality certification would need to be obtained, if necessary.

3.1.3 Groundwater

Groundwater is subsurface water in geologic units called aquifers, which are recharged by precipitation and infiltration of surface waters. Groundwater supplies wells and springs and is generally pumped by wells for public and private use. Groundwater is a vital, natural resource that is susceptible to contamination from a variety of activities. Contaminated groundwater can be difficult to remediate.

3.1.3.1 Existing Conditions

Three aquifers in the Project area contain groundwater (Alluvium, the Breathitt Group, and the Grundy Formation). Five groundwater wells (one of which is public) have been installed in the Project area (Figure 3-6), but the condition of the wells is unknown (Kentucky Geological Survey, 2002). Camp Webb and the KYDWFR Wildlife Division building (near Camp Webb) both have groundwater wells, but only the Camp Webb well is used for potable water. Potable water supply for the remaining Project area is provided from the Rattlesnake Ridge Water District. No natural springs have been identified in the Project area.

In Carter and Elliott Counties, the groundwater contains noticeable amounts of iron (Fe) and is considered moderately to extremely hard. Other naturally occurring constituents that may be present in objectionable amounts are sulfate (SO₄), sodium chloride (NaCl), and manganese (Mn) (Kentucky Geological Survey, 2011). Salty water commonly occurs at depths of 300 feet or more below the ground surface and may be encountered at more shallow levels. No groundwater contamination has been identified in the Project area.

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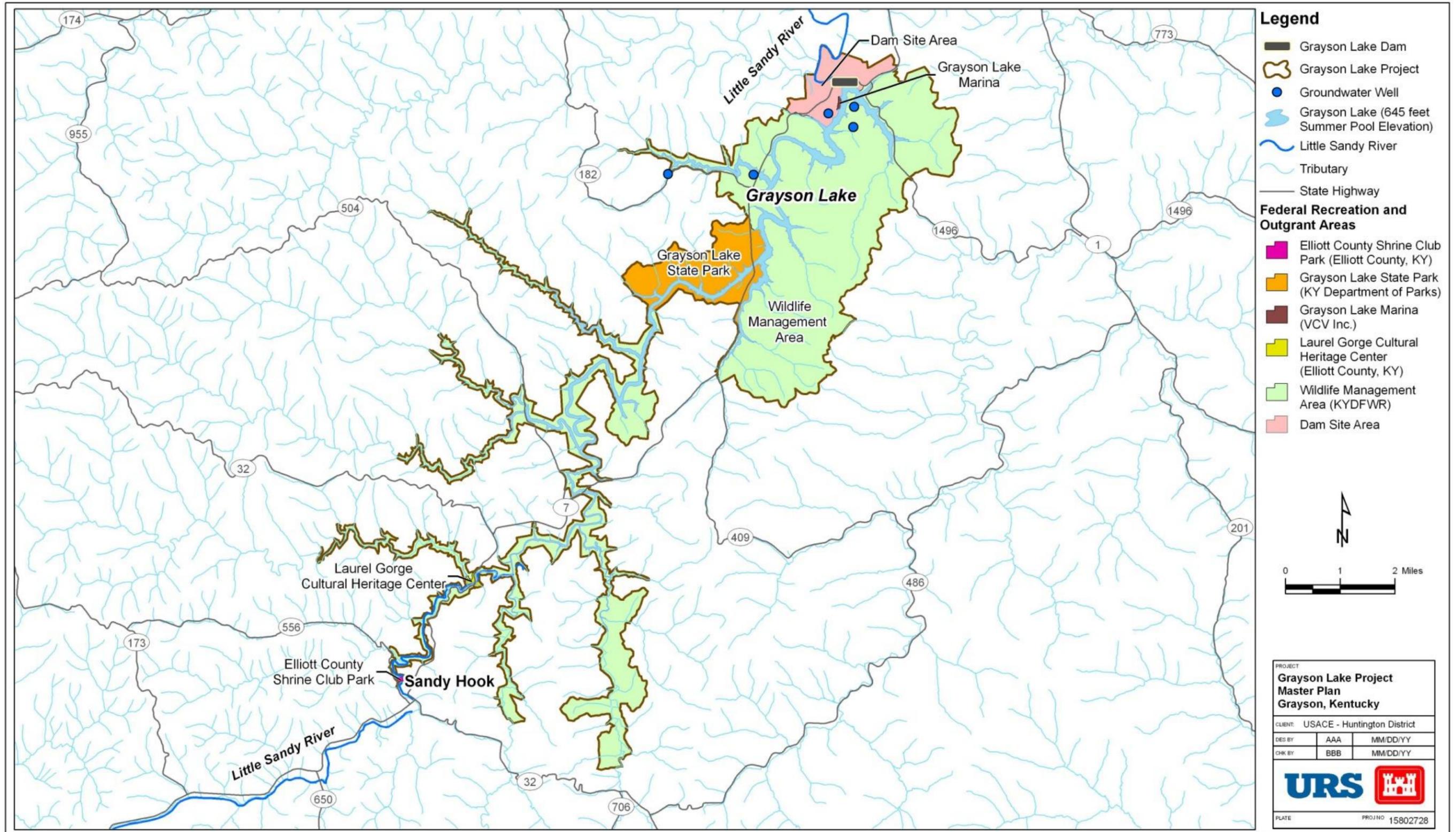


Figure 3-6: Groundwater Well Locations

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3.1.3.2 Implications of Groundwater Resources for Project Development

No constraints were identified that would limit the use or quantity of groundwater for development opportunities. Groundwater is a potential source of water for enhancing or developing additional wetlands, for irrigating maintained landscape areas such as the Hidden Cove Golf Course, or providing potable water for Project development in remote areas.

3.1.4 Physiography / Topography

The physical features of the earth's surface are described in terms of physiography (landforms) and topography (elevation, slope, and orientation).

3.1.4.1 Existing Conditions

The Project is located in the Kanawha Section of the Appalachian Plateau. The topography of the Project area is hilly and mountainous terrain with coves and valleys. Flat areas are uncommon, except along the valley bottoms. Elevations in the Project area range from approximately 560 feet to 1,300 feet NGVD. Approximately 60 percent of the Project area consists of steep slopes in excess of 30 percent. See Photograph 3-2.



Photograph 3-2: Typical Project Topography

3.1.4.2 Implications of Physiography/Topography Resources for Project Development

The topography at the Project provides significant scenic quality that enhances many of the recreational experiences, but it also poses development constraints. Areas with slopes of less than 15 percent have the highest development potential in terms of topography and provide opportunities for higher density recreational development. Slopes between 15 percent and 30 percent have more limited project development potential but can provide interesting and challenging opportunities for hiking, mountain biking, hunting, and wildlife and scenic viewing. Areas with slopes in excess of 30 percent typically have very limited development potential but provide wildlife habitat and visual buffers and add scenic quality.

As illustrated in Figure 3-7, the central portion of the Project has the best potential to support development. The southern portions of the Project are least suitable for higher intensity recreational use because of the significant amount of terrain with slopes over 30 percent including many sections with sheer cliffs at the shoreline. The portions of the Project that have the greatest potential for development based on topography may be limited by periodic inundation from the lake and its tributaries (Figure 3-4).

3.1.5 Geology, Soils, and Minerals

This section describes the geologic setting, soil characteristics, and mineral resources in the Project area.

3.1.5.1 Existing Geology Conditions

The geology of the Project area is characterized by Lower to Middle Pennsylvanian-aged rock that is approximately 305 to 320 million years old. Three primary geologic units occur within the Project area (Kentucky Geological Survey, 2009): (1) alluvium, which is found along valley bottoms and consists of stream deposits of sediments (gravels, sands, silts, clay) up to approximately 30 feet thick, (2) the Corbin Sandstone Member of the Lee Formation, which is found primarily at the bottom of mountain side slopes and consists of coarse sand and gravel (the Lee Formation forms the cliffs of Laurel Gorge), and (3) the Breathitt Formation, which is typically the first unit encountered upward from the valley floor, and consists of alternating layers of siltstone, sandstone, shale, coal, underclay, flint clay and limestone.

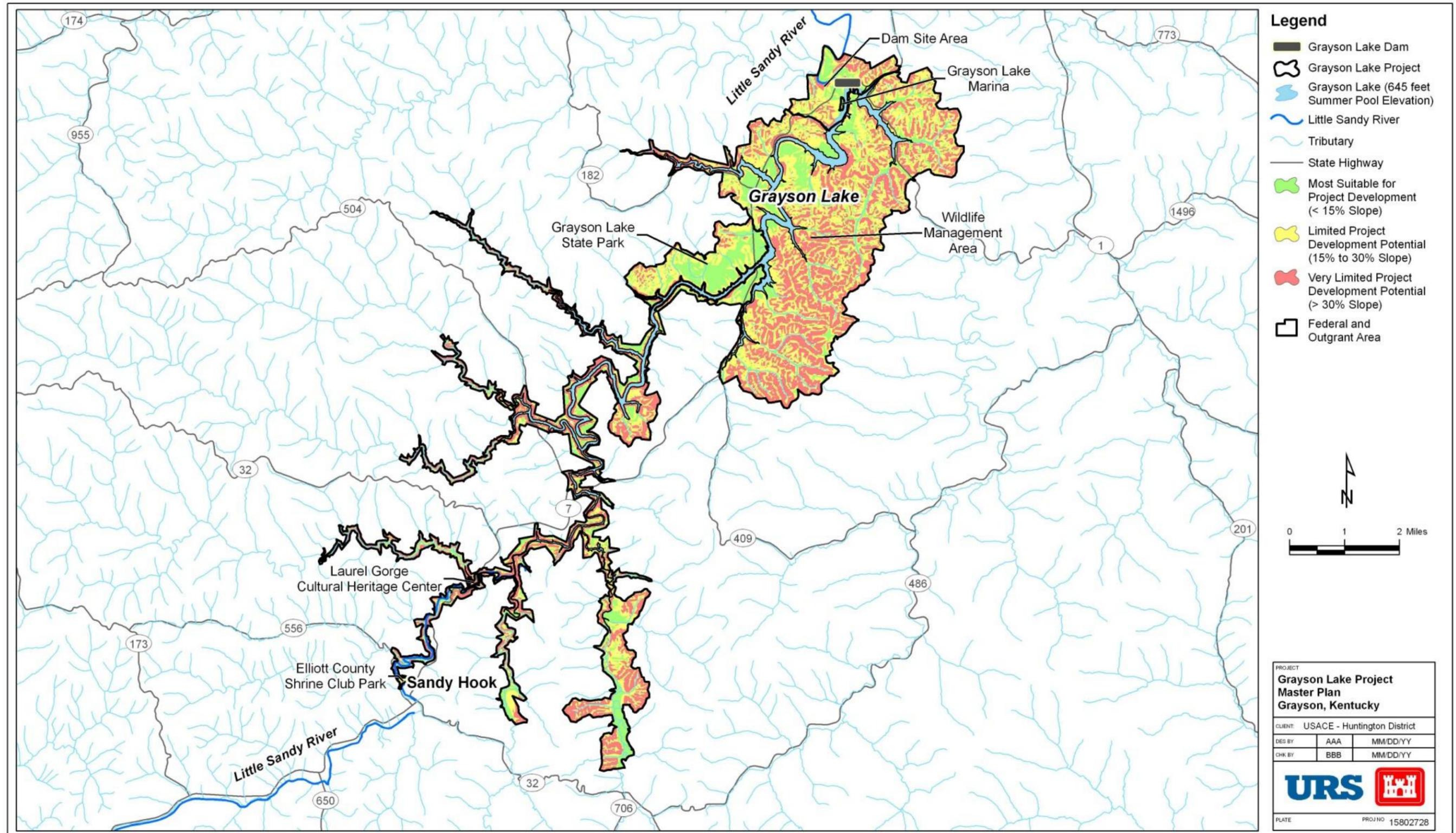


Figure 3-7: Topography Suitability for Project Development

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The geology of the Project area has resulted in formation of steep slopes, rock outcrops, and cliffs that provide scenic views. Although shales underlying sandstone cliffs may erode to form rock overhangs and possibly caves, no caves have been identified in the Project area.

3.1.5.2 Existing Soils Conditions

The soil types that occur in the Project area are primarily the result of variability in the geologic parent material and positions on the landscape. The various soil types are grouped based on associations across the landscape. According to the *1983 Soil Survey of Carter County, Kentucky* (USDA, 1983) and the *1965 Soil Survey of Elliott County, Kentucky* (USDA, 1965), 36 groups (referred to as soil map units in Table 3-1) occur at the Project area, 19 of which occupy less than 1 percent of the area. Because of the limited presence of the 19 soil map units, they are excluded from further discussion. The remaining 17 soil map units are listed in Table 3-1 and categorized as the following based on their suitability and limitations for recreational development: (1) most suitable for development, (2) limited development potential, and (3) least suitable for development. Figure 3-8 shows the soil types in the Project area.

The Farmland Protection Policy Act of 1981 (7 U.S.C. §§ 4201–4209) designates soils that are suitable to farming as prime or unique farmlands and is intended to minimize irreversible conversion of farmland to nonagricultural uses. Prime farmland soils cover approximately 5 percent of the Project area, generally occurring in valley bottoms along streams. These soils are not currently planted or managed for forage or wildlife habitat. An additional 5 percent of the soils in the Project area are classified as farmland of statewide importance.

Table 3-1: Soils in the Project Area in Order of Predominance

Soil Map Unit Symbol	Soil Type	Typical Slope	Suitability for Project Development Based on Slope and Soil Type
Carter County			
LTF	Latham-Shelocta association, steep	30–50%	Least Suitable. Poorly suited for camp areas, picnic areas, playgrounds, paths and trails, golf fairways, roads and streets, shallow excavations, and lawns and landscaping because of the potential for erosion and slow soil percolation.

Soil Map Unit Symbol	Soil Type	Typical Slope	Suitability for Project Development Based on Slope and Soil Type
LsE	Latham-Shelocta silt loams	20–30%	Least Suitable. Poorly suited for camp areas, picnic areas, playgrounds, paths and trails, golf fairways, roads and streets, shallow excavations, and lawns and landscaping because of the potential for erosion and slow soil percolation.
RSF	Rigley-Rock outcrop association, steep	30–60%	Least Suitable. Poorly suited for camp areas, picnic areas, playgrounds, paths and trails, golf fairways, roads and streets, shallow excavations, and lawns and landscaping because of the potential for erosion and slow soil percolation.
LaD	Latham silt loam	12–20%	Least Suitable. Poorly suited for camp areas, picnic areas, playgrounds, paths and trails, golf fairways, roads and streets, shallow excavations, and lawns and landscaping because of the potential for erosion and slow soil percolation.
MoB	Monongahela loam	2–6%	Limited Development Potential. Poorly suited for shallow excavations because of wetness. Moderately suited for camp areas, picnic areas, playgrounds, paths and trails, golf fairways, roads and streets, lawns and landscaping.
AIC	Allegheny loam	6–12%	Most Suitable. Moderately suited for camp areas, picnic areas, golf fairways, roads and streets, shallow excavations, and lawns and landscaping because of slope. Poorly suited to playgrounds. Slight limitation for paths and trails.
LaC	Latham silt loam, 6 to 12 percent slopes	6–12%	Least Suitable. Poorly suited for camp areas, picnic areas, playgrounds, paths and trails, roads and streets, and shallow excavations because of slope. Moderately suited to golf fairways and lawns and landscaping.
LyD	Lily fine sandy loam, 6 to 20 percent slopes	6–20%	Limited Development Potential. Poorly suited for camp areas, picnic areas, playgrounds, golf fairways, and shallow excavations because of slope. Moderately suited to paths and trails, and roads and streets, and lawns and landscaping.

Soil Map Unit Symbol	Soil Type	Typical Slope	Suitability for Project Development Based on Slope and Soil Type
Elliott County			
GsE	Gilpin-Shelocta complex	25–45%	Least Suitable. Very limited for golf fairways, lawns and landscaping, roads and streets, shallow excavations, camp areas, paths and trails, picnic areas, and playgrounds.
RgF	Rigley-Rock outcrop complex	30–70%	Least Suitable. Very limited for golf fairways, lawns and landscaping, roads and streets, shallow excavations, camp areas, paths and trails, picnic areas, and playgrounds.
GrD	Gilpin-Ramsey complex	6–25%	Least Suitable. Very limited for golf fairways, lawns and landscaping, roads and streets, shallow excavations, paths and trails, picnic areas, and playgrounds. Not limited for camp areas.
GeB	Gilpin-Ezel-Cotaco complex	0–6%	Most Suitable. Very limited for shallow excavation. Somewhat limited for golf fairways, lawns and landscaping, roads and streets, and playgrounds. Not limited for camp areas, paths and trails, and picnic areas.
SrF	Shelocta-Handshoe-Feds creek complex, stony	30–60%	Least Suitable. Very limited for golf fairways, lawns and landscaping, roads and streets, shallow excavations, camp areas, paths and trails, picnic areas, and playgrounds.
GtD	Gilpin-Steinsburg-Blairton complex	12–25%	Least Suitable. Very limited for golf fairways, lawns and landscaping, roads and streets, shallow excavations, camp areas, picnic areas, and playgrounds. Somewhat limited for paths and trails.
BID	Blairton-Cruze-Marrowbone complex	12–25%	Least Suitable. Very limited for golf fairways, lawns and landscaping, roads and streets, shallow excavations, camp areas, paths and trails, picnic areas, and playgrounds.
GbC	Gilpin-Blairton-Ramsey complex	2–12%	Most Suitable. Very limited for shallow excavation and playgrounds. Somewhat limited for golf fairways, lawns and landscaping, roads and streets. Not limited for camp areas, paths and trails, and picnic areas.

Soil Map Unit Symbol	Soil Type	Typical Slope	Suitability for Project Development Based on Slope and Soil Type
SoC	Shelocta-Grigsby-Orrville complex	2–15%	Least Suitable. Very limited for golf fairways, lawns and landscaping, roads and streets, camp areas, and playgrounds. Somewhat limited for shallow excavations and picnic areas. Not limited for paths and trails.

Sources: USDA (1983); USDA (1965)

3.1.5.3 Existing Minerals Conditions

The Project area is located in the Appalachian Mountains and is part of a region that contains coal deposits and oil and gas reserves. Coal mining and oil and gas extraction in Carter and Elliott Counties are ongoing activities that have occurred for many decades.

One active coal mining site is located just outside the Project area in Elliott County. Currently, there is no extraction of minerals in the Project boundaries. According to the Kentucky Division of Oil and Gas Conservation (2010), 19 oil and/or gas wells exist in the Project boundaries (Figure 3-9), but none of them are active. These well sites are appropriately maintained and do not adversely affect recreation at the Project or any other authorized Project purposes. Some of the subsurface mineral rights at the Project are owned by the government; however, large areas occur where the mineral rights are not owned by the government (Figure 3-9).

3.1.5.4 Implications of Geology, Soils, and Mineral Resources for Project Development

Geology and Soils

Many of the soils in the Project area, along with the steep sloping terrain on which they are found, are generally prone to severe erosion and have limited development potential for construction of roadways, trails, or small buildings or for the development of camping, picnicking, playground areas, or lawns. Some soils categorized as having limited development potential may be suitable for lower intensity recreational use such as hiking trails, wildlife observation, and hunting and even higher intensity recreational use where slopes are less than 15 percent. As shown on Figure 3-8, the soil types most suited to recreational development are relatively sparse within the Project area, with the largest concentrations occurring relatively close to the lake.

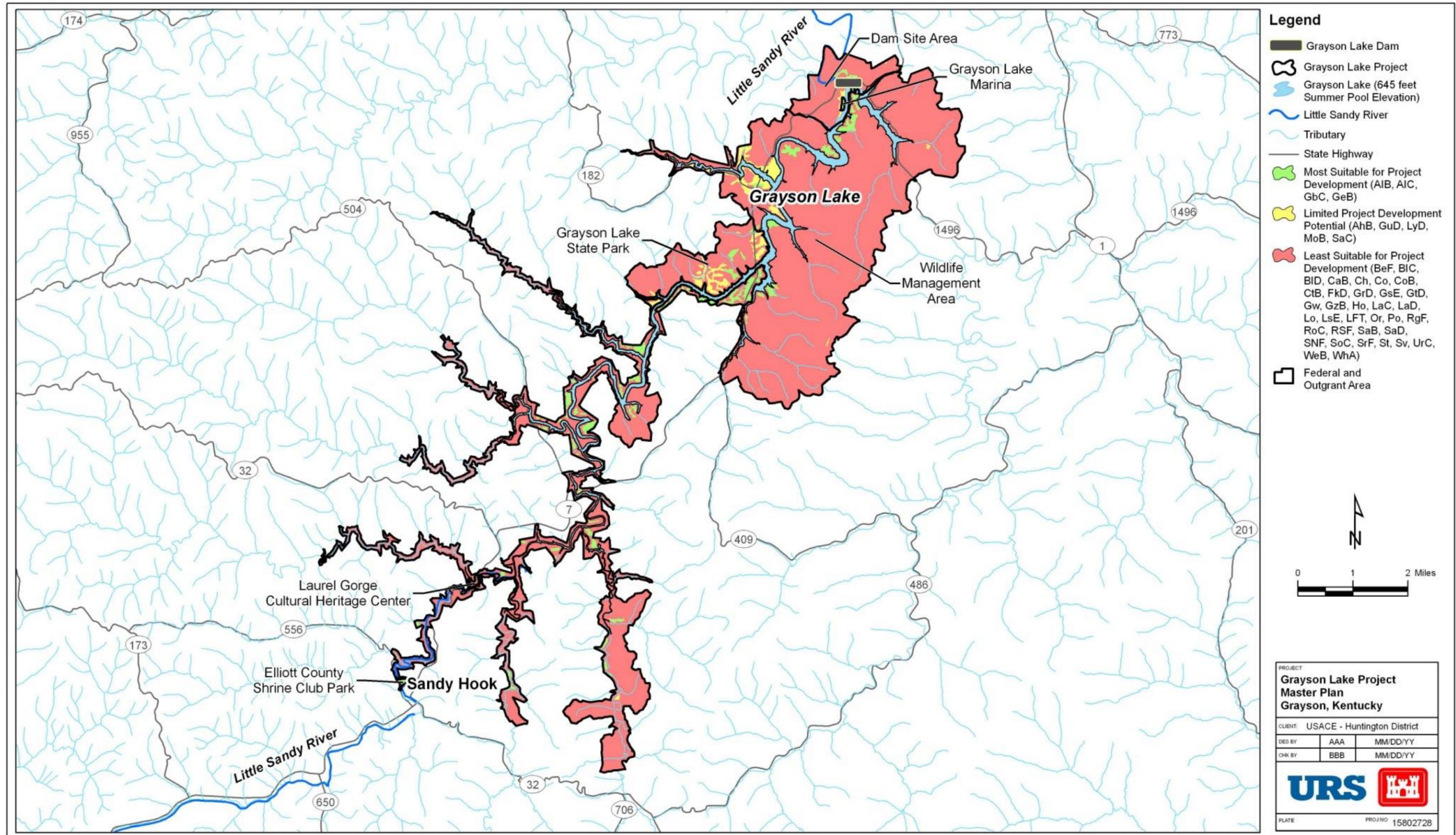


Figure 3-8: Soil Suitability for Project Development

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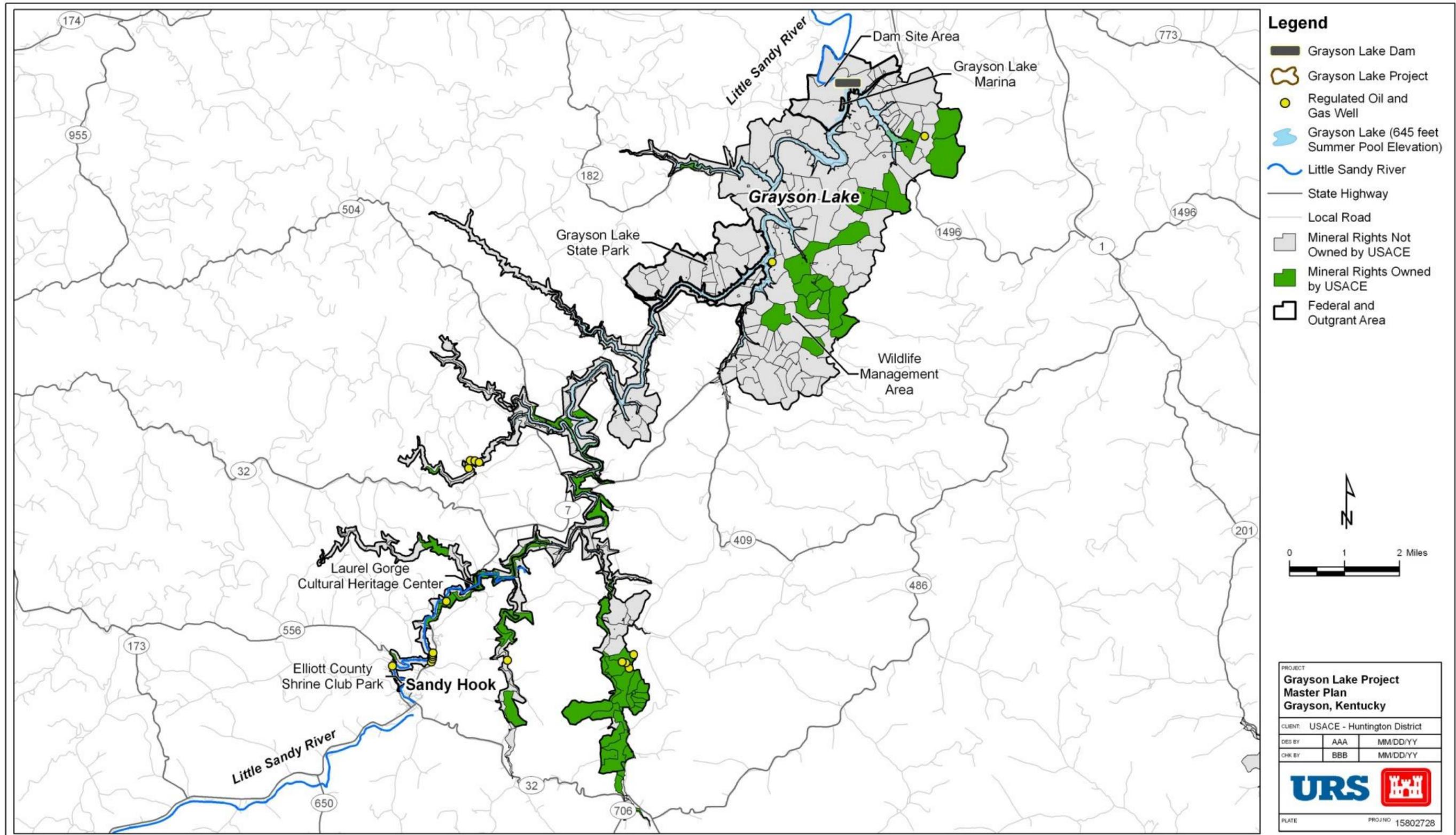


Figure 3-9: Mineral Rights and Oil and/or Gas Well Locations

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Minerals

Because the demand for coal, oil, and gas is anticipated to continue, there is potential for new extraction operations for minerals in the Project area. Coal, oil, and gas are leasable minerals governed by the Mineral Leasing Act of 1920 (30 U.S.C. §§ 181-263) and the Mineral Materials Act of 1947 (30 U.S.C. §§ 351 et seq.).

For Project lands where the government owns all subsurface mineral rights, any future resource extraction would proceed through the Bureau of Land Management (BLM). The BLM would coordinate any new leases with the USACE to avoid or minimize impacts to recreational, natural, or sensitive resources associated with access road and extraction site development. For Project lands where the government does not own the subsurface mineral rights, the owner of the mineral rights would apply to the Kentucky Division of Mine Permits for approval and permitting of the extraction process and amounts. Because mineral extraction can cause disturbances, the USACE would be allowed to review and comment on the application.

Potential impacts of mineral extraction activities include the footprint of the extraction site and construction and operation of access roads. Mineral extraction within the Project boundary could infringe on general recreational areas or on fish and wildlife-related recreation, either directly or from pollutants that are a result of extraction operations.

3.1.6 Cultural Resources

As defined by the Advisory Council on Historic Preservation, a historic property is a prehistoric or historic district, site, building, structure, or object included in or eligible for inclusion in the National Register of Historic Places (NRHP). A historic property includes artifacts, records, and remains that are related to and located in National Register properties.

3.1.6.1 Existing Conditions

A Historic Properties Management Plan (HPMP) was completed for the Project area in the spring of 2006 (Cultural Resource Analysts, Inc., 2006). The HPMP contains a summary of the 87 archeological sites that were identified in the Project area and recorded from the 1960s to 2006. The sites were primarily prehistoric (79) dating from the Early Archaic (8000–6000 B.C.) through Late Prehistoric (1000–1750 A.D.) temporal periods. Only 8 sites had a historic Euro-American affiliation. The majority (63) were identified as part of a pedestrian shoreline survey conducted in 2002. The shoreline survey is one of the 12 surveys that have been conducted completely or partially in the Project area as of the 2006 HPMP.

In the HPMP, the Project area was divided into three zones based on inundation by the lake:

- Conservation pool: below 634 feet above mean sea level (AMSL); permanently inundated
- Littoral zone: 634 to 645 feet AMSL; affected by seasonal fluctuations between the winter and summer pools
- Upland zone: above 645 feet AMSL; includes all remaining land in the Project area

Five of the archeological sites are in the conservation pool, 46 are in the littoral zone, and 36 are in the upland zone. Forty-nine of the 87 sites listed in the HPMP have been determined ineligible for the NRHP and no further cultural resources review or examination is required.

The only cultural resource in the Project area that is listed on the NRHP is the Horton-Kitchen House, which was listed in 1974 under criteria A and B (architecture/engineering and event). Two sites (15Cr12 and 15E12) were assessed for NRHP eligibility in the mid-1960s. Both were determined to be ineligible for the NRHP, but the 2006 HPMP recommends that the sites be reassessed. The HPMP recommends further evaluation of the following 19 sites in Carter County: 15Cr6, 15Cr7, 15Cr8, 15Cr9, 15Cr54, 15Cr55, 15Cr190, 15Cr191, 15Cr193, 15Cr199, 15Cr201, 15Cr205, 15Cr206, 15Cr208, 15Cr210, 15Cr212, 15Cr216, 15Cr218, and 15Cr219. The HPMP also recommends further evaluation of the following 19 sites in Elliott County: 15E11, 15E13, 15E134, 15E135, 15E136, 15E137, 15E139, 15E140, 15E142, 15E144, 15E146, 15E150, 15E153, 15E154, 15E157, 15E162, 15E163, 15E164, and 15E165. Of the 40 sites recommended for further assessment, 5 are in the conversation pool, 15 are in the littoral zone, and 20 are in the upland zone (which includes the two sites assessed in the 1960s). Of these 40 sites, 37 are prehistoric, consisting mainly of open air habitations without mounds and rock shelters, and 3 are historic farms/residences.

In 2011, an additional systematic survey was completed in the Project area. This survey was limited to shovel testing around the dam site and did not identify any new sites (ASC Group, Inc., 2011).

3.1.6.2 Implications of Cultural Resources for Project Development

Cultural resources in the conservation pool were originally situated in open field environments that were subject to deforestation, plowing, and clearing for the reservoir. These cultural resources have been continuously inundated since 1966. The effect if the inundation of these resources is unknown, but if the sites were not eroded prior to the establishment of silt caps, the inundation may have preserved them.

Cultural resources in the littoral zone were also originally situated in open field environments that were subject to deforestation and plowing. These sites are difficult to relocate because of the silting that occurs when the sites are submerged during normal summer pool and exposed during winter pool. If large enough silt caps are formed, the sites may have been preserved, but the alternating wet-dry cycle of the littoral zone increases decay rates for organic materials in the sites. If these sites are exposed during the winter pool, there is potential for looting.

Cultural resources in the upland zone are susceptible to mechanical and biochemical processes and human activities that are not associated with inundation. The sites in the upland zone constitute most of the recorded sites and are commonly affected by erosion, development, agricultural practices, and looting.

Site distribution tendencies in the Project area are based on the distribution of recorded sites in the Project area. Distributions have an inherent bias since most of the studies have been confined to the modern shoreline and bluffs as opposed to the adjacent ridge tops and hillsides. Alluvial landforms have a high potential to contain buried sites. The colluvial apron is also considered a potential location for deeply buried sites.

Proposed development actions should take into account previously identified sites and their treatment recommendations. Sites that are eligible or potentially eligible for the NRHP should be avoided or subjected to further analysis prior to any undertaking that has the potential to affect those sites. Avoidance measures and/or further analysis would be coordinated with the District archeologist. Actions proposed for areas not previously surveyed would require coordination with the District archeologist to determine whether a cultural resource survey is required.

Once inventories of real estate actions have been cleared, these smaller projects need to be catalogued and mapped using Geographical Information Systems (GIS) to ensure that areas are not subject to repeated surveys. In the absence of mapping, coordination with the District archeologist would ensure that real estate actions are not subject to unnecessary resurveying. Cultural resource research, evaluation, and reporting must comply with all applicable Federal and State laws and regulations.

Priorities for cultural resources at the Project are as follows:

1. Surveys of the littoral and upland zones during winter pool, when the majority of the littoral zone is accessible

2. Stabilizing and evaluating recorded sites that have been previously listed as potentially eligible or needing further evaluation for their NRHP eligibility.
3. Defining management goals for the Horton-Kitchen House.
4. Assessing the dam and associated structures for their NRHP eligibility.
5. Accessing artifact collections recovered from the Project according to the guidelines established in 36 CFR Part 79.
6. Improving consultation and education efforts including outreach to Native American tribes, coordination with the Kentucky Heritage Council, training of project personnel, and site interpretation.
7. Updating the HPMP to include the GIS georeferenced boundary delineations and metadata for all surveyed areas and identified resources in the Project.
8. Producing GIS boundary delineations for previously evaluated as well as all future real estate actions.

3.1.7 Scenic Qualities

Scenic qualities refer to the quality of the environment as perceived through visual senses.

3.1.7.1 Existing Conditions

As described previously, the topography of the Project area is characterized by hilly and mountainous terrain dissected by valleys and cliffs in the upper reaches of the lake. This terrain, in combination with the lake and forested landscape, creates an overall scenic environment with opportunities for scenic vistas and viewsheds. View distances range from relatively confined views to panoramic views that fade out of sight. The forests have a combination of older growth trees and understory trees (such as redbud and dogwood), creating a visually appealing environment. The vegetation of the Project offers changes in color, texture, and size that vary by topography, vegetation type, and season. River birch, willow, and sycamore trees flourish in lowlands adjacent to streams and the lake, providing an attractive contrast in color to that of the vegetation on adjacent slopes, ridges, and ravines such as post oak, Virginia pine, red oak, hemlock, and birch trees. See Photograph 3-3.



Photograph 3-3: Scenic View of Lake

3.1.7.2 Implications of Scenic Qualities for Project Development

The Project area has significant scenic qualities and provides numerous opportunities for scenic vistas. However, enjoyment of the scenic qualities can be limited because of accessibility to the sites and obstruction of the views by vegetation. Constraints to developing additional viewsheds include topography, soil conditions, and vegetation—all of which must be evaluated prior to creating opportunities for additional scenic vistas.

3.1.8 Hazardous, Toxic and Radioactive Waste

Hazardous wastes, as defined by the Resource Conservation and Recovery Act (RCRA), are “a solid waste, or combination of solid wastes, which because of its quantity, concentration, or physical, chemical, or infectious characteristics may: (1) cause, or significantly contribute to, an increase in mortality or an increase in serious irreversible or incapacitating reversible illness; or (2) pose a substantial present or potential hazard to human health or the environment when improperly treated, stored, transported or disposed of or otherwise managed.”

3.1.8.1 Existing Conditions

No HTRW issues were identified within the Project.

3.1.8.2 Implications of HTRW for Project Development

It is not anticipated that HTRW concerns will impact any Project development initiatives.

3.2 Biological Environment

The biological environment section provides a summary of the biological features of the Project area and planning constraints. The biological environment includes vegetation, terrestrial wildlife, aquatic resources, threatened and endangered species that may inhabit the Project, and critical and sensitive wildlife habitat.

3.2.1 Vegetation

The types of plants and the percentage of coverage in the Project area are discussed.

3.2.1.1 Existing Conditions

Most of the land cover at the Project is forested (82 percent) and is broken by small, scattered open areas and grasslands, pasture/hay, and developed open space (Figure 3-10) (Homer et al., 2004). Table 3-2 lists the land cover types in the Project area and the percentage of area they cover.

Table 3-2: Land Cover Types in the Project Area

Land Cover	Percent of Project Area
Allegheny-Cumberland Dry Oak Forest and Pine Woodlands	44%
Southern Ridge and Valley Dry Calcareous Forest	15%
South-Central Interior Mesophytic Forest	13%
Appalachian Hemlock-Hardwood Forest	10%
Open Water	8%
Developed Open Space	4%
Pasture/Hay	2%
Successional Grassland/Herbaceous	2%
Other (developed) includes low, medium- and high-intensity developed land	1.5%
Other (natural) includes herbaceous, successional shrub/scrub, and interior small stream/riparian categories, row crop, southern interior acid cliff, and evergreen plantations	0.5%

Source: Homer et al. (2004)

Allegheny-Cumberland Dry Oak Forests and Pine Woodlands are typically dominated by white oak (*Quercus alba*), southern red oak (*Quercus falcata*), chestnut oak (*Quercus prinus*), and scarlet oak (*Quercus coccinea*), with lesser amounts of red maple (*Acer rubrum*), pignut hickory

(*Carya glabra*), and mockernut hickory (*Carya alba*). Small stands of shortleaf pine (*Pinus echinata*) or Virginia pine (*Pinus virginiana*) may occur, particularly adjacent to escarpments or following fire. In the absence of fire, eastern white pine (*Pinus strobus*) may be prominent, occurring in a variety of situations, including on nutrient-poor or acidic soils (NatureServe, 2007).

South-Central Interior Mesophytic Forests are highly diverse and predominantly deciduous. They occur on deep and enriched soils enhanced by the presence of limestone or related base-rich geology, in non-mountainous settings, and usually in somewhat protected landscape positions such as coves or lower slopes. Dominant species include sugar maple (*Acer saccharum*), American beech (*Fagus grandifolia*), yellow poplar (*Liriodendron tulipifera*), American basswood (*Tilia americana*), red oak (*Quercus rubra*), cucumber tree (*Magnolia acuminata*), and black walnut (*Juglans nigra*). Eastern hemlock (*Tsuga canadensis*) may be present in some stands. Trees may grow very large in undisturbed areas, and many examples of this type of forest are bisected by small streams (NatureServe, 2007).

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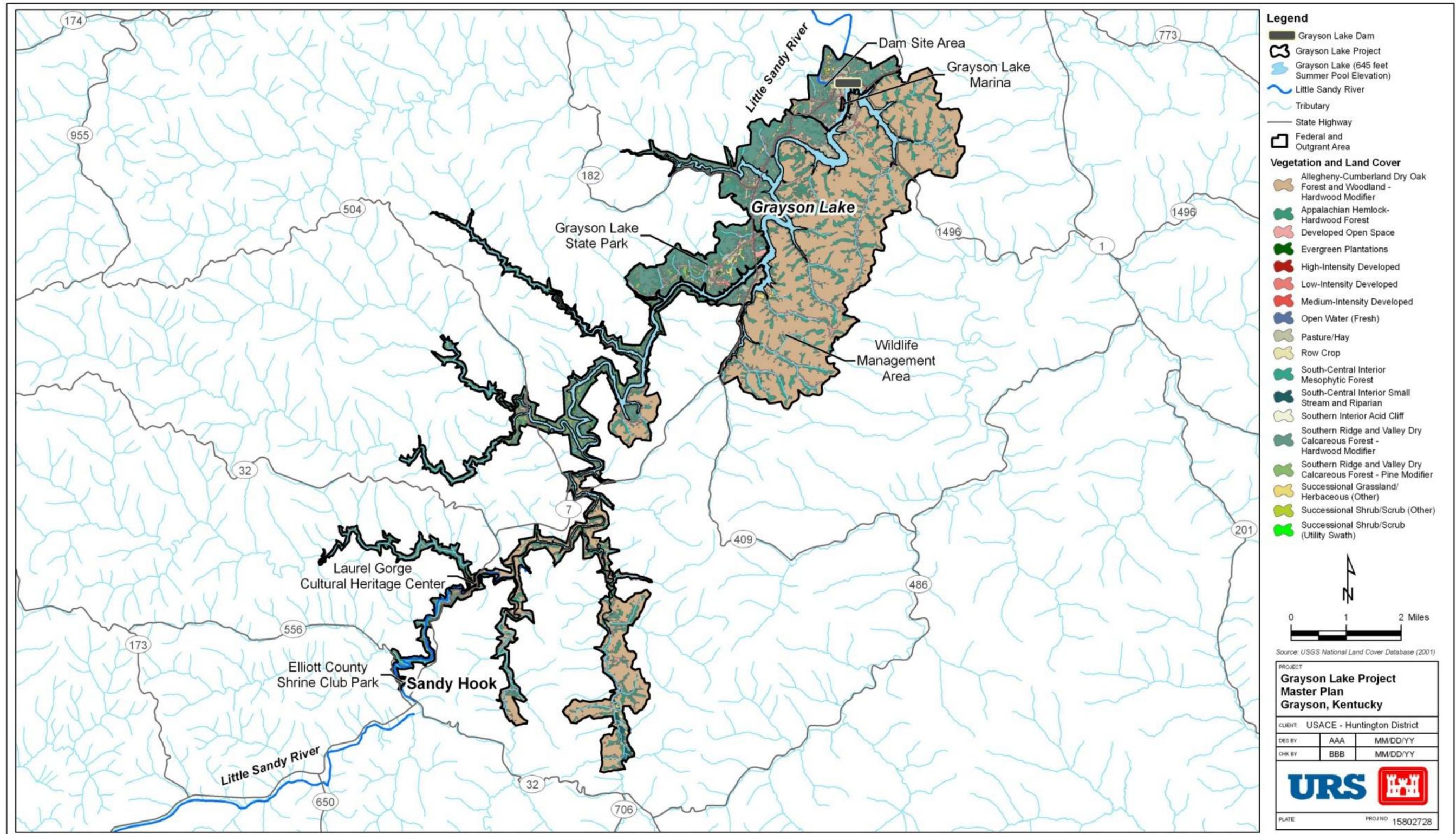


Figure 3-10: Vegetation and Land Cover

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Southern ridge and valley dry calcareous forests occur on a variety of topographic and landscape positions including ridge tops and upper and midslopes. Fire frequency and intensity are factors determining the relative mixture of deciduous hardwood versus evergreen trees in this system. High-quality and historic examples are typically dominated by combinations of oak and hickory species, sometimes with pine species and/or red cedar (*Juniperus virginiana*) as a significant component. They typically grow in limestone and shale-based soils.

Appalachian Hemlock-Hardwood Forests are characterized by northern hardwoods such as sugar maple, yellow birch (*Betula alleghaniensis*), and American beech, either forming a deciduous canopy or mixed with eastern hemlock or eastern white pine. Other common and sometimes dominant trees include oaks (most red oak), yellow poplar, black cherry (*Prunus serotina*), and sweet birch (*Betula lenta*) (NatureServe, 2007).

The primary tree species within the Project are oaks (*Quercus* spp.), maples (*Acer* spp.), and hickories (*Carya* spp.), with small stands of pine (*Pinus* spp.). Other less dominant species include American beech (*Fagus grandifolia*), yellow poplar (*Liriodendron tulipifera*), yellow birch (*Betula alleghaniensis*), American basswood (*Tilia americana*), cucumber tree (*Magnolia acuminata*), black walnut (*Juglans nigra*), Eastern hemlock (*Tsuga canadensis*), black cherry (*Prunus serotina*), and sweet birch (*Betula lenta*) (NatureServe, 2007).

Eastern hemlocks provide unique ecology to the Project because they are an evergreen species primarily found in riparian areas, providing significant canopy along streams year-round. Eastern hemlocks are currently threatened across most of its range by the hemlock woolly adelgid (*Adelges tsugae*). Because Eastern hemlocks are rapidly declining in Kentucky, special care is given by KYDFWR and USACE to prevent adverse impacts on the 211 acres (approximately 1 percent of the Project's land area) of existing stands.

There is a unique stand of 9 acres of Virginia pine that has many trees over 100-foot-tall and approximately 80 to 90 years old. The large size of the trees in this stand along with their exceptional form is atypical for the normally short, limby, poorly formed Virginia pine that typically occurs in the region.

A primary goal of the KYDFWR and USACE's comprehensive forestry management approach is to manage the forest to yield a healthy, sustainable forest. A key issue is controlling invasive species. Invasive species are problematic because they compete with native flora and fauna for the same resources. An invasive species is a species that is foreign to a particular region that outcompetes native species for the same resources. At the Project, bush honeysuckle (*Lonicera*

spp.), which is common to Kentucky, is an invasive species. Four species of bush honeysuckle are found in Kentucky. This species is a prolific seeder and is typically found near forest edges or in transition zones where sunlight is abundant. Because it grows rapidly and seeds prolifically, it out-competes the native vegetation that requires the same growing conditions. Autumn olive (*Elaeagnus umbellata*) is another invasive species at the Project. Bush honeysuckle and autumn olive were both introduced to North America in the 19th century. Bush honeysuckle was introduced for ornamental purposes, while kudzu was introduced for erosion control of severely disturbed areas such as strip mines (USDA Forest Service, 2010a; 2010b). If these species are not monitored and managed, they can affect the native ecology. Both species can be managed chemically, mechanically, or physically.

A third invasive plant in the Project area is hydrilla (*Hydrilla verticillata*), an aquatic plant that was introduced to the United States for ornamental purposes in the early 1960s. If conditions are favorable, such as a long and warm summer, this plant spreads rapidly. It grows to the surface of the water and forms dense mats that interfere with recreational uses, water sports, and fishing. When the plant dies, the plant sinks and decomposes in the water column or on the bottom, and an over-abundance of decomposing plant material can affect the water quality. If uncontrolled, this plant can grow unabated in its growing season and ultimately affect the water chemistry and water quality. The plant can be controlled chemically, mechanically, or physically.

A fourth invasive plant in the Project area is the Tree-of-Heaven (*Ailanthus altissima*). This plant is a rapidly growing deciduous tree that was introduced to the United States in the 1700s (USDA, 2010c). The trees are problematic because they crowd out native species, emit an offensive odor, and can damage pavement and foundations of buildings with their vigorous root system. The trees can be managed chemically, mechanically, or physically.

Additionally, multiflora rose (*Rosa multiflora*), is an invasive species that occurs in the Project. It is particularly dense in the Birchfield Branch area. In 2009, a targeted effort to control it in the Birchfield Branch area occurred. It was introduced to the United States in the 1860s (NISIC, 2011). Multiflora rose is a deciduous shrub that crowds out native species. It can be controlled chemically, mechanically, or physically. A combination of chemical control with mechanical or physical control is often recommended.

Vegetation management in the Project also includes prescribed burning to maintain grasslands. Management on open lands by KYDFWR includes limited burning and cutting for maintenance of meadow habitats, which are valuable habitat for birds and other wildlife, to encourage a more

desirable mix of wildlife-friendly vegetation and to reduce the fuel layer found naturally in the ecosystem.

In addition, the KYDFWR occasionally seeds open areas with native grass seed to augment or supplement the naturally occurring vegetation and provide benefit to small mammals, deer, turkeys, and birds by providing nesting areas, bedding areas for deer, and habitat for insects. In the 1990s, native grass/forb mixes were planted in Frazier Flats, West Clifty, Walker Point, and Deer Creek (Richard Mauro, Northeast Region Public Lands Wildlife Biologist, written communication, 5 December 2010).

3.2.1.2 Implications of Vegetative Resources for Project Development

Vegetative resources enhance and support development and recreational opportunities at the Project by providing an aesthetically pleasing natural setting and landscape buffer. The forest and associated open fields provide habitat for a variety of wildlife, affording opportunities for wildlife viewing. The forest also provides suitable habitat for target game species including deer and wild turkey. Vegetation and tree roots slow stormwater runoff, providing erosion control capabilities, especially in areas with steep slopes surrounding the lake and tributaries.

The Project contains many areas that are unique and/or environmentally sensitive, including the bottomland hardwood habitats, which are becoming scarcer and consequently more valuable; and Eastern hemlocks, which provide a unique ecology, but are rapidly declining in Kentucky. These areas are critical to the healthy ecology that supports the recreational activities at the Project and provides opportunities for future activities. Areas of the forest where the canopy is dense and unbroken provide a rapidly diminishing resource that attracts a number of neo-tropical birds, some of which are in decline. A good example is the cerulean warbler (*Dendroica cerulea*), which requires this specific ecology.

Properly managed, vegetative resources will continue to provide recreational opportunities at the Project, and the resource could support many opportunities for development activities. Protecting environmentally sensitive or unique vegetative resources can be a constraint when planning for future development activities—special consideration should be given to avoid or protect these areas.

3.2.2 Terrestrial Wildlife

Terrestrial wildlife is defined as the animals that are found on land and in the air and includes amphibians, birds, mammals, and reptiles.

3.2.2.1 Existing Conditions

According to the KYDFWR, the Project area supports at least 29 amphibian species, 140 bird species, 35 mammal species, and 20 reptile species (KYDFWR, 2011a). The scientific and common names of some of the species commonly found at the Project are listed in Table 3-3.

Table 3-3: Animals Commonly Found at Grayson Lake Project

Taxonomic Group	Scientific name	Common name
Amphibians	<i>Bufo fowleri</i>	Fowler's toad
	<i>Desmognathus fuscus fuscus</i>	northern dusky salamander
	<i>Desmognathus monticola</i>	seal salamander
	<i>Eurycea cirrigera</i>	southern two-lined salamander
	<i>Plethodon glutinosus</i>	slimy salamander
	<i>Pseudacris brachyphona</i>	mountain chorus frog
	<i>Rana clamitans melanota</i>	green frog
Birds	<i>Branta canadensis</i>	Canada goose
	<i>Meleagris gallopavo</i>	wild turkey
	<i>Coccyzus americanus</i>	yellow-billed cuckoo
	<i>Melanerpes spp.</i>	woodpecker
	<i>Colaptes auratus</i>	northern flicker
	<i>Contopus virens</i>	eastern wood-pewee
	<i>Empidonax vireescens</i>	Acadian flycatcher
	<i>Vireo spp.</i>	vireo
	<i>Cyanocitta cristata</i>	blue jay
	<i>Corvus brachyrhynchos</i>	American crow
	<i>Baeolophus bicolor</i>	tufted titmouse
	<i>Sitta carolinensis</i>	white-breasted nuthatch
	<i>Thryothorus ludovicianus</i>	Carolina wren
	<i>Hylocichla mustelina</i>	wood thrush
	<i>Dendroica spp.</i>	warbler
	<i>Piranga olivacea</i>	scarlet tanager
	<i>Cardinalis cardinalis</i>	northern cardinal
	<i>Molothrus ater</i>	brown-headed cowbird
Mammals	<i>Blarina brevicauda</i>	northern short-tailed shrew
	<i>Marmota monax</i>	woodchuck
	<i>Sorex fumeus</i>	smoky shrew

Taxonomic Group	Scientific name	Common name
	<i>Sorex hoyi</i>	pygmy shrew
	<i>Synaptomys cooperi</i>	southern bog lemming
Reptiles	<i>Terrapene carolina carolina</i>	eastern box turtle

Sources: KYDFWR (2011)

The KYDFWR implemented wildlife restoration within the WMA when, in the 1970s and early 1980s, white-tailed deer (*Odocoileus virginianus*) and wild turkey (*Meleagris gallopavo*) were relocated from other areas of Kentucky and other states. The KYDFWR conducts regular surveys to measure wildlife populations and collects reports from hunters regarding numbers and types of animals harvested to estimate the numbers of game species. The restoration efforts have yielded healthy, self-supporting populations of these two popular game species (Richard Mauro, Northeast Region Public Lands Wildlife Biologist, written communication, 5 December 2010).

Migratory waterfowl can generally be found at the western end of the WMA. Species using the Project for at least part of the year include mallard (*Anas platyrhynchos*), wood duck (*Aix sponsa*), American black duck (*Anas rubripes*), bufflehead (*Bucephala albeola*), green-winged teal (*Anas crecca*), green heron (*Butorides virescens*), blue heron (*Ardea herodias*), and belted kingfisher (*Megaceryle alcyon*).

Limited hunting occurs in a 550-acre area around Camp Webb. Several events per year are allowed: a two-day deer hunt in October for disabled individuals, a 2-day deer hunt for youth only in October, November, and January, and a one-day dove hunt in September for youth (Richard Mauro, Northeast Region Public Lands Wildlife Biologist, written communication, 5 December 2010; Dave Reiger, USACE, written communication 14 June 2011). Seasonal hunting for turkey and small game and an archery season for deer also occurs.

The KYDFWR maintains a dove management area at Frazier Flats. This area was established to focus on management techniques that are specific to the habitat needs of mourning doves (*Zenaida macroura* [Linnaeus]), such as planting millet and wheat to provide forage areas.

The KYDFWR has implemented various habitat development measures within the WMA. Construction of 30 small wildlife waterholes of less than 0.1 acre have been constructed at scattered locations on forested ridges in the WMA to provide habitat for a variety of upland species of frogs and salamanders and a standing water source for birds and mammals. Thirty acres of forest management and continued construction of waterholes are planned for 2011

(Richard Mauro, Northeast Region Public Lands Wildlife Biologist, written communication, 5 December 2010).

Although none of the main North American flyways cross the Project area, many neo-tropical migrants can be found in eastern Kentucky. Neotropical birds breed in North America and spend the non-breeding season in Mexico, the Caribbean, and Central and South America. The annual migration of neo-tropical migrants brings species such as cerulean warblers, indigo buntings (*Passerina cyanea*), scarlet tanagers (*Piranga olivacea*), Baltimore orioles (*Icterus galbula*), and wood thrushes (*Hylocichla mustelina*) into Kentucky to nest and breed while others pass through on their way to and from their breeding habitat north of Kentucky. During the non-breeding season, the neo-tropical species return south (KSNPC, 2007).

3.2.2.2 Implications of Terrestrial Wildlife for Project Development

Terrestrial wildlife resources support both consumptive and non-consumptive recreational activities at the Project. White-tailed deer and wild turkey are the most popular game species, but dove, woodcock, waterfowl, and various small game species also provide opportunities for hunters at the Project. Non-consumptive recreational activities supported by terrestrial wildlife at the Project include wildlife viewing and birding (neotropicals and year-round species).

Wildlife management provides opportunities for stewardship, support for species that are in decline, and preservation of habitat. The concept of stewardship, described in the *Environmental Stewardship and Maintenance Guidance and Procedures* pamphlet (USACE, 1996a), is a natural resources management tool that aims to ensure the conservation, preservation, or protection of resources for present and future generations by focusing on sustaining of ecosystems.

Properly managed, terrestrial wildlife will continue to provide recreational opportunities at the Project and the resource could support many opportunities for development. No significant issues related to terrestrial wildlife were identified that would constrain development activities.

3.2.3 Aquatic Resources

Aquatic resources refer to the animal life in surface waters including streams, wetlands, and the lake.

3.2.3.1 Existing Conditions

Grayson Lake sustains a diverse composition of aquatic species. Some of the fish species found in the lake are listed in Table 3-4.

Table 3-4: Some of the Fish Species in Grayson Lake

Common Name	Scientific Name
largemouth bass	<i>Micropterus salmoides</i>
smallmouth bass	<i>Micropterus dolomieu</i>
spotted bass	<i>Micropterus punctulatus</i>
black crappie	<i>Promoxis nigro-maculatus</i>
white crappie	<i>Promoxis annularis</i>
channel catfish	<i>Ctalurur punctatus</i>
flathead catfish	<i>Pylodictis olivaris</i>
blue catfish	<i>Ictalurus furcatus</i>
bluegill	<i>Lepomis macrochirus</i>
green sunfish	<i>Lepomis cyanellus</i>
longear sunfish	<i>Lepomis megalotis</i>
redbreast sunfish	<i>Lepomis auritus</i>
redecor sunfish	<i>Lepomis microlophus</i>
rock bass	<i>Ambloplites rupestris</i>
warmouth	<i>Lepomis gulosus</i>
white bass	<i>Morone chrysops</i>
yellow bass	<i>Morone mississippiensis</i>
yellow perch	<i>Perca flavescens</i>

Kentucky Fishing (2010)

Existing structure like rocky bottoms, sandy bottoms, pooling areas, rock outcrops, and grassy areas all work together to provide habitat for a variety of aquatic life. Semi-aquatic species include amphibians (see Table 3-3). Amphibians are referred to as semi-aquatic because they spend half their life cycle in aquatic ecosystems and half in terrestrial ecosystems. The Project area supports amphibians such as the Fowler's toad, salamanders, mountain chorus frog, and green frog. These animals are good indicators of the health and stability of an aquatic ecosystem (USACE, 2001).

The lake provides habitat for many warm water fish species (see Table 3-4); however, due to the rocky nature of the lake sides and bottom, the habit does not naturally provide high quality spawning and cover for fish (Fred Howes, fisheries biologist, the KYDFWR, personal communication, 26 May 2011). In development of the lake, timber was left in many of the cove

areas so that it would be below the summer pool elevation to provide underwater habitat to benefit fisheries. Additionally, the KYDFWR annually creates 3 fish-attractor sites in the lake that provide habitat for spawning and cover. These sites typically consist of securing artificial brush piles or discarded Christmas trees to the lake bottom. The adjacent wetlands and shallow water areas provide additional spawning areas as well as hunting areas for predator birds and other wildlife.

Because of the lack of high quality habitat and the nutrient-poor waters, the lake is considered a fair fishery. To improve the fishing experience at Grayson Lake, the KYDFWR has stocked the lake with smallmouth bass in previous years, but their populations have not been very successful. Currently, the KYDFWR stocks the lake with largemouth bass based on the success of the previous year's spawn along with hybrid striped bass (*Morone* sp.).

The tailwater below the dam is stocked regularly by the KYDFWR with rainbow trout (KYDFWR, 2010b). Laurel Creek, which feeds into Grayson Lake, is stocked with rainbow trout and brown trout (*Salmo trutta*) between April and June.

Although all waters in the Commonwealth are under a statewide advisory for women of childbearing age and children 6 years and younger to eat no more than one meal per week of freshwater fish, no fish consumption advisories or guidelines have been developed specifically for Grayson Lake (KYDFWR, 2011b).

3.2.3.2 Implications of Aquatic Resources for Project Development

Aquatic resources in both the lake and the tailwater support recreational fishing at the Project including multiple fishing tournaments each year. Although there is a statewide advisory for consumption of fish, the presence of methylmercury in the lake does not adversely affect fish populations. As such, the aquatic resources are not considered a constraint, but an opportunity when planning for development activities.

3.2.4 Threatened and Endangered and Species of Special Concern

Threatened, endangered, and species of special concern are sensitive and protected biological resources, including plant and animals that are listed for protection by the USFWS or the Commonwealth of Kentucky. Under the Federal Endangered Species Act of 1973 (16 U.S.C. §§ 1531–1544), an “endangered species” is defined as any species in danger of extinction throughout all or a significant portion of its range. A “threatened species” is defined as any species likely to become an endangered species in the foreseeable future.

3.2.4.1 Existing Conditions

Threatened or endangered species that may occur at the Project are shown in Table 3-5 along with their State and Federal status.

In February 2009, the Kentucky State Nature Preserves Commission (KSNPC) listed 11 species for Elliott County and 30 species for Carter County as endangered or threatened (KSNPC, 2009). Three species are federally listed in Carter County (fanshell freshwater mussel [*Cyprogenia stegaria*], Indiana bat [*Myotis sodalis*], gray bat [*Myotis grisescens*]), and two species (Indiana bat and gray bat) are federally listed in Elliott County.

Table 3-5: Listed Threatened and Endangered Species in Carter and Elliott Counties, KY

Taxonomic Group	Scientific Name	Common Name	Federal Status	State Status	County
Birds	<i>Haliaeetus leucocephalus</i>	bald eagle	Delisted	T	Carter/Elliott
	<i>Pooecetes gramineus</i>	Vesper sparrow	—	E	Carter
Mosses	<i>Cirriphyllum piliferum</i>	cirriphyllum moss	—	T	Elliott
	<i>Polytrichum pallidisetum</i>	A hair cap moss	—	T	Elliott
Vascular Plants	<i>Acer spicatum</i>	mountain maple	—	E	Carter/Elliott
	<i>Calopogon tuberosus</i>	grass pink	—	E	Carter
	<i>Carex tonsa</i> var. <i>rugosperma</i>	umbel-like sedge	—	T	Carter
	<i>Castilleja coccinea</i>	scarlet Indian paintbrush	—	E	Carter
	<i>Cypripedium kentuckiense</i>	Kentucky lady's Slipper	MC	E	Carter
	<i>Cypripedium parviflorum</i>	small yellow lady's slipper	—	T	Carter/Elliott
	<i>Hydrocotyle Americana</i>	American water-pennywort	—	E	Elliott
	<i>Lathyrus palustris</i>	vetchling peavine	—	T	Carter
	<i>Lilium philadelphicum</i>	wood lily	—	T	Carter
	<i>Lonicera dioica</i> var. <i>orientalis</i>	wild honeysuckle	—	E	Carter
	<i>Maianthemum stellatum</i>	starflower false solomon's-seal	—	E	Carter
	<i>Paxistima canbyi</i>	Canby's mountain-lover	MC	T	Carter
	<i>Spiranthes ochroleuca</i>	yellow nodding ladies' tresses	—	T	Carter
	<i>Taxus canadensis</i>	Canadian yew	—	T	Carter
<i>Thaspium pinnatifidum</i>	cutleaf meadow-parsnip	MC	T	Carter	
<i>Toxicodendron vernix</i>	poison sumac	—	E	Carter	

Taxonomic Group	Scientific Name	Common Name	Federal Status	State Status	County
Vascular Plants (cont.)	<i>Viburnum rafinesquianum</i> var. <i>rafinesquianum</i>	downy arrowwood	—	T	Carter
	<i>Viola walteri</i>	Walter's violet	—	T	Carter
	<i>Scutellaria saxatilis</i>	rock Skullcap	—	T	Elliott
Freshwater Mussel	<i>Cyprogenia stegaria</i>	fanshell	E	E	Carter
	<i>Epioblasma triquetra</i>	snuffbox	MC	E	Carter
	<i>Lasmigona compressa</i>	creek heelsplitter	—	E	Carter/Elliott
	<i>Simpsonaias ambigua</i>	salamander mussel	MC	T	Carter
	<i>Alasmidonta marginata</i>	elktoe	MC	T	Elliott
Insects	<i>Calopteryx dimidiata</i>	sparkling jewelwing	—	E	Carter
	<i>Ophiogomphus howei</i>	Pygmy Snaketail	MC	T	Carter
Invertebrates	<i>Macrocheles stygius</i>	A cave obligate mite	—	T	Carter
Fish	<i>Ichthyomyzon fossor</i>	northern brook lamprey	—	T	Carter/Elliott
	<i>Lampetra appendix</i>	American brook lamprey	—	T	Carter
Mammals	<i>Myotis grisescens</i>	gray bat	E	T	Carter/Elliott
	<i>Myotis leibii</i>	eastern small-footed myotis	MC	T	Carter
	<i>Myotis sodalis</i>	Indiana bat	E	E	Carter/Elliott

Source: KSNPC (2009b)

— = None

E = endangered

MC = species of management concern

T = threatened

The gray bat (*myotis grisescens*) has been extirpated from Elliott County (KSNPC, 2009). Two species—American water-pennywort (*Hydrocotyle Americana*) and creek heelsplitter (*Lasmigona compressa*)—have not been seen in Elliott County for at least 20 years. The other species listed in Table 3-5 for Elliott County are thought to be present in the county.

In Carter County, the following eight species have not been seen for at least 20 years (KSNPC, 2009): grass pink (*Calopogon tuberosus*), Kentucky lady's slipper (*Cypripedium kentuckiense*), yellow nodding ladies' tresses (*Spiranthes ochroleuca*), fanshell, salamander mussel (*Simpsonaias ambigua*), A cave obligate mite (*Macrocheles stygius*), American brook lamprey (*Lampetra appendix*), and Vesper sparrow (*Pooecetes gramineus*). The rest of the species listed in Table 3-5 for Carter County are thought to be present in the county.

3.2.4.2 Implications of Threatened and Endangered Species and Species of Special Concern on Project Development

Because no federally listed threatened or endangered species have been identified as living or hibernating within the Project area, threatened or endangered species should not limit development of recreational activities at the Project. Nevertheless, habitat for these species should be preserved. When activities in the Project are proposed, a biologist would evaluate whether the action has a potential to affect habitat for any of the State or federally listed species. If a species or their habitat could be affected, the USACE would consult with the USFWS under Section 7 of the ESA and the State as necessary.

Recognition and preservation of sensitive or critical habitat in the Project area for bald eagles may result in constraints, as well as opportunities, when planning for development activities. The *National Bald Eagle Management Guidelines* (USFWS, 2007b) notes that depending on the type of structure and visibility from the nest, new construction should be restricted within 330 to 660 feet from a nest. Timber operators (e.g., clear cutting, removal of overstory trees) should be avoided within 330 feet of a nest at any time and avoided within 660 feet of the nest during breeding season. For the following activities, no buffer is necessary around nests outside the breeding season and should be avoided within 330 feet of the nest during breeding season: (1) use of off-road vehicles, (2) use of motorized watercraft (including jet skis and personal watercraft), and (3) non-motorized recreation and human entry (e.g., hiking, camping, fishing, hunting). Loud, intermittent noises such as blasting should be avoided within 0.5 mile of active nests. The USFWS would be consulted for any activity that has the potential to adversely affect bald eagles occurring within one mile of a nest.

3.2.5 Critical Habitat

In Section 7 of the Endangered Species Act (16 U.S.C. § 1536), critical habitat is defined as an area that is essential to the conservation of a species, although the area need not actually be occupied by the species when it is designated.

3.2.5.1 Existing Conditions

The loss of critical habitat is one of the most common problems facing threatened and endangered species.

There is no designated critical habitat under Section 7 of the Endangered Species Act present within the Project area. The KSNPC has not identified any State Nature Preserves or State Natural Areas within the Project area (KSNPC, 2010).

3.2.6 Environmentally Sensitive Areas

Environmentally sensitive areas are typically areas that are designated as special status or protected by Federal or State statutes or legislation. Extremely rare or unique natural resource features may also be considered as potentially environmentally sensitive areas.

3.2.6.1 Existing Conditions

Examples of environmentally sensitive areas include the 9-acre stand of exceptional Virginia pine, stands of Eastern hemlocks, areas of forest dense and unbroken forest canopy, riparian areas, threatened and endangered species, wetlands, and National Register-eligible cultural resources.

3.2.6.2 Implications of Environmentally Sensitive Areas for Project Development

Preservation of environmentally sensitive areas may result in restrictions or constraints for resource development but may provide interpretative, educational, or eco-tourism opportunities.

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4.0 RECREATION PROGRAM ANALYSIS

This section contains the results of an analysis of the recreational program at the Project. The intent of the analysis was to identify the current and future recreational demands that may affect the resources at the Project. Changes in population, preferences, and alternative recreational facilities may change the demand for the recreational activities in the region.

This section begins with the information that was used as a baseline for the analysis. Section 4.1 is an overview of the Project areas, Section 4.2 is a summary of the recreational activities currently available to visitors and the number of visitors, Section 4.3 defines the recreational area of influence, and Section 4.4 describes comparable activities that occur in the area of influence

The results of the analysis are presented in the remainder of Section 4. The results consist of recreational trends (Section 4.5), potential recreational activities at the Project (Section 4.6), projected demand for recreational activities at the Project (Section 4.7), and the implications of the projected demand (Section 4.8).

4.1 Overview of the Project Areas

The Project comprises several areas that are managed by Federal, State, county, and private entities (see Figure 4-1). This section describes the primary areas, subareas, and existing amenities. The primary areas and managing entities are listed in Table 4-1. Table 1-1 lists the acreages of each area and the major facilities and activities (not including Grayson Lake), and Section 7.0 contains figures showing the features of the areas.

Table 4-1: Primary Areas of the Project and the Managing Entities

Primary Area	Managing Entity
Dam Site Area	USACE
Grayson Lake State Park (includes Rolling Hills Campground, Hidden Cove Golf Course, and Bruin Recreation Area)	Kentucky Department of Parks
Wildlife Management Area	KDFWR
Laurel Gorge Cultural Heritage Center	Elliott County
Elliott County Shrine Club Park	Elliott County
Grayson Lake Marina	VCV Inc.
Grayson Lake	USACE

KDFWR = Kentucky Department of Fish and Wildlife Resources

USACE = U.S. Army Corps of Engineers

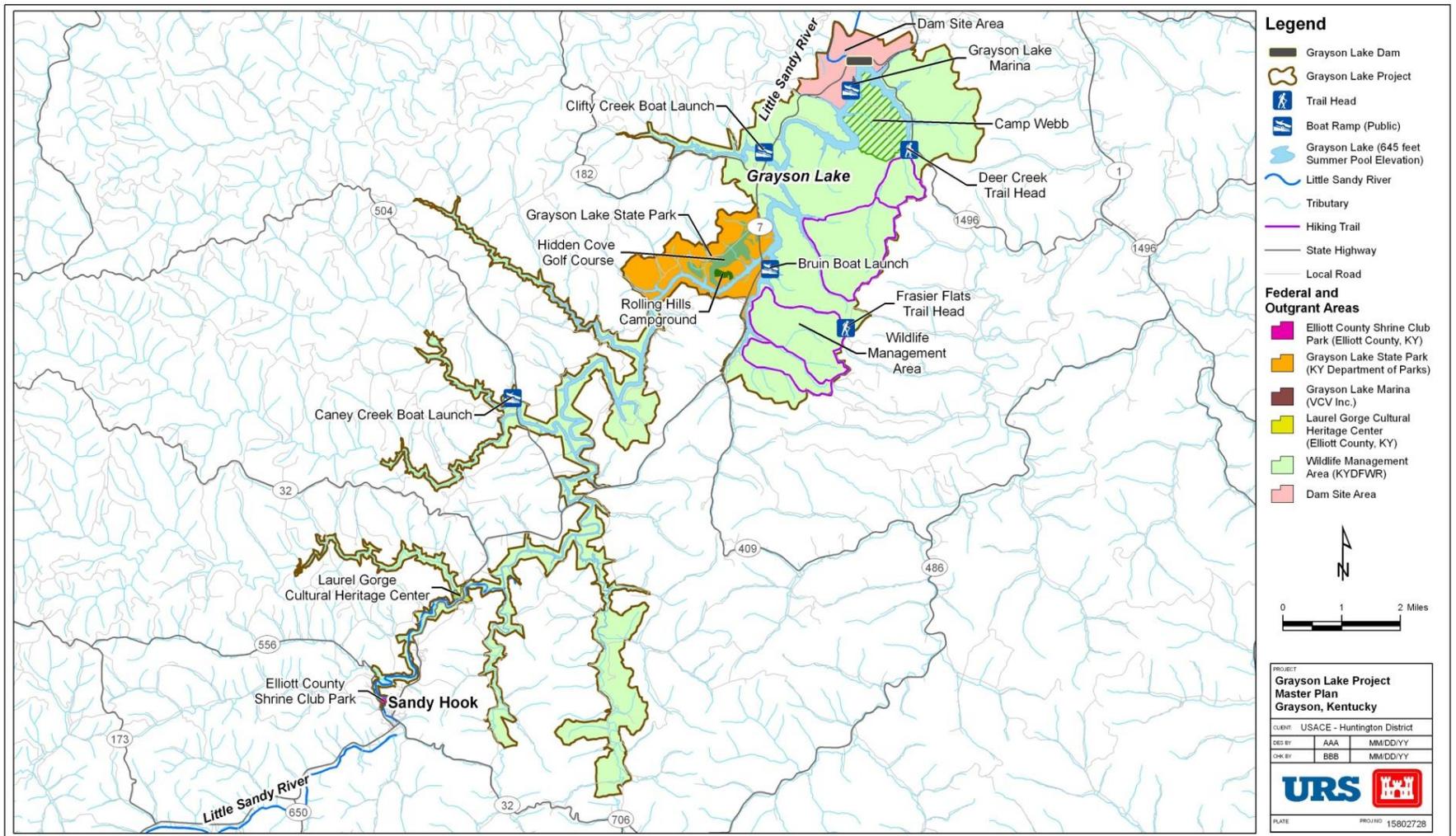


Figure 4-1: Existing Recreational Areas and Major Facilities

4.1.1 Dam Site Area

The Dam Site Area, which is operated by the USACE, consists of the Project office, Information Center, several picnic areas, fishing pier, playground equipment, boat ramp, and trails. The site is divided into the upper and lower Dam Site Areas. This site experiences congestions problems associated with mixed uses. The current picnic shelter users and the marina visitors share a parking area which causes congestion on weekends. Additionally, a portion of the parking area is being used by the concessionaire for long term trailer storage which further congests the area.

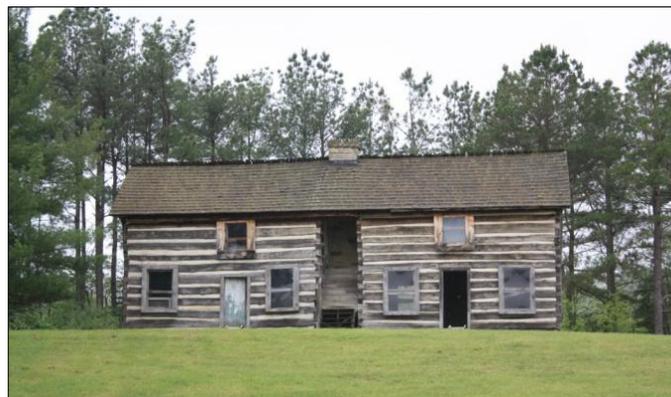
The upper Dam Site Area has the following facilities:

- Dam Site Area office and Information Center (see Photograph 4-1). The Information Center offers brochures on surrounding attractions, maps, boating safety, hunting and fishing guides, history of the area, and other topics. The Information Center also has men's and women's restrooms and eight parking spaces for visitors.



Photograph 4-1: Information Center

- Horton-Kitchen House, a historic structure that is listed on the NRHP. The structure is a Saddlebag design home —two adjacent cabins with a shared chimney (see Photograph 4-2). The Horton-Kitchen House is not open to the public.



Photograph 4-2: The Horton-Kitchen House

- Three picnic areas with shelters (Shelter #1, Shelter #2, and Shelter #3).

- Shelter #1 is adjacent to the Information Center. The shelter is wood with a metal roof and is in excellent condition. This shelter has a set of horse shoe pits with back stops, large grill, and two small grills. There are also four 6-foot-long picnic tables, three 12-foot-long picnic tables, trash receptacles, hot coals bin, water spigot, and two electrical receptacles. A gravel parking lot adjacent to the shelter has space for 7 vehicles. Across from this parking lot is a split-face-block restroom facility with two chemical toilets.

There are two open picnic areas near Shelter #1. The first open area has three 6-foot-long wooden benches with metal frames that offer views of the lake, four 6-foot-long wooden picnic tables with metal frames, two vinyl-coated metal picnic tables on concrete pads, playground equipment (monkey bar structures, slide, swing sets, four-seat carousel, spring-mounted ride, and two play structures), and trash receptacles. The second open picnic area is north of Shelter #1 and has five wooden picnic tables with metal frames, a small grill, and trash receptacles. A gravel parking lot adjacent to the second open picnic area can accommodate 32 vehicles.

- Shelter #2 is wood with a metal roof and is south of the Information Center. The shelter has two 12-foot-long wooden picnic tables with metal frames, water spigot, large grill, small grill, recycling bin, two 120-volt electrical receptacles, and a hot coals bin. The area adjacent to the shelter has a set of horse shoe pits, seven 6-foot-long wooden picnic tables on a metal base, three 8-foot long vinyl-coated metal picnic tables, five charcoal grills, and trash receptacles. Restroom facilities in the area include men's and women's restrooms with a water spigot and trash receptacles.
- Shelter #3 is a wooden structure with a metal roof. The shelter has six 12-foot-long wooden picnic tables on metal frames, large grill, small grill, water spigot, and two 120-volt electrical receptacles. The adjacent parking lot is 198 feet x 60 feet and can accommodate approximately 44 vehicles. The area around the shelter has a mix of open and canopied picnic and recreational sites. The area has a large play structure, swing set with five swings, ten 6-foot-long benches, and two 8-foot-long vinyl-coated picnic tables in small wooden shelters with metal roofs, trash receptacles, recycle bin, five small grills, large grill, and two hot coals bins. The restroom has two chemical toilets.

The shelters are in high demand and are reserved most weekends during spring, summer, and fall.

- Fishing pier. The pier is an all-metal structure with six dedicated fishing positions (see Photograph 4-3). The fishing pier has a dedicated gravel parking lot that can accommodate approximately 13 vehicles.



Photograph 4-3: Fishing Pier

- Four-lane boat ramp and 10-foot by 40-foot courtesy loading dock that provides boaters and anglers access to the lake. The boat ramp is heavily used by recreational boaters and fishing tournament participants. High use has led to congestion at the ramp and constraints on parking, especially when tournaments are in progress.
- A 60-vehicle paved parking lot that is shared by visitors using the picnic shelter, boat ramp, and marina.
- Emergency spillway for overflow parking. The area is a mixture of grass and gravel and can accommodate approximately 220 vehicles. This area has a concrete basketball court.

The lower Dam Site Area has the following facilities:

- Picnic area with a picnic shelter, restrooms, and playground equipment.
 - The picnic shelter has nine 12-foot-long wooden picnic tables on metal bases, trash receptacles, large grill, and a small grill. Restroom facilities are a concrete block building with a metal roof. Outside the restroom facility is a water spigot.
 - Playground equipment.
 - Horse-shoe pits.
 - Open picnic area includes two six-foot-long wooden benches on metal frames, two eight-foot-long vinyl-coated metal picnic tables, a wooden picnic table on a metal frame, an all-wood bench surrounding a tree, two small grills, and trash receptacle.
- Three hiking trails. The trails are well used by visitors, but crowding is not an issue.
 - The 1.75-mile-long Grayson Lake Nature Trail, a National Registered Trail that primarily follows the Grayson Lake and has varying terrain.
 - A 2.25-mile-long trail that covers varied terrain.

- An approximately 0.5-mile-long trail that surrounds the environmental nature study field. The trail is paved and provides opportunities for bird watching and wildlife viewing, and has a place for a launching a canoe.
- Two parking lots, as follows:
 - A gravel parking area at the terminus of the road that can accommodate approximately 22 vehicles.
 - A parking area that can accommodate approximately 18 vehicles.

The tailwater of the dam provides opportunities for fishing and boating. The tailwater is regularly stocked with rainbow trout by the KYDFWR. The area is also popular for visitors using small boats such as canoes and kayaks.

4.1.2 Grayson Lake State Park

Grayson Lake State Park, which is operated by the Kentucky Department of Parks, comprises Rolling Hills Campground, Hidden Cove Golf Course, and Bruin Recreation Area.

4.1.2.1 Rolling Hills Campground

The Rolling Hills Campground offers opportunities for multiple recreational experiences, including camping, hiking, picnicking, and play equipment. See Photograph 4-4. The campground has 71 campsites that are either open or canopied sites. Most of the campsites are equipped with 20 amperes, 30 amperes and 50 amperes power. The other sites have 30 amperes and 50 amperes power. Because of the terrain, nine of the campsites are not appropriate for recreational vehicles (RVs).



Photograph 4-4: Rolling Hills Campground

All of the campsites have an asphalt parking pad, fire ring/grill, water spigot contained in a concrete ring, and a picnic table. Most of the picnic tables are 6-foot-long wooden tables on metal frames. The sites are well spaced and offer a certain degree of privacy. One sanitary dump station serves the campground. The campground is popular—sites are typically 100 percent full on the weekends from May through October, with a 50 percent occupancy rate during the week.

The campsites are served by two bathhouses. Each bathhouse has men's and women's showers and restrooms, laundry facility, dumpster, and parking area. One bath house is close to the entry to the campground and has laundry facilities and a vending machine for detergent. Outside this facility is a vinyl-coated metal bench and trash receptacle.

The other bathhouse is centrally located with respect to all of the campsites and has the following amenities: restrooms, washer, dryer, pay phone, trash receptacles, soda vending machine, electrical outlets, electric hand dryers, water spigot, and dumpster. A small parking area with four vehicle spaces is provided.

The two hiking trails are relatively easy trails of varying lengths, with the trailheads near the entrance to the campground. The Beech-Hemlock Trail is a 0.8-mile-long, one-way trail that goes from one end of the campground to the other via a wooded trail that stays close to the lake. The 3-mile Lick Falls Loop Trail follows the lake for approximately half of the trail and has a scenic overlook at the mid-point. The remainder of the trail goes through the woods and returns to the starting point. Both trails are well maintained, easy to follow, and have moderate use.

The picnic area, which is near the entrance to the campground, has a nice wooded setting. Picnic facilities include four six-foot-long wooden picnic tables with metal frames, two 120-volt electrical receptacles, horse shoe pits, and trash receptacles. A basketball court and sand volleyball court are nearby.

The picnic area has one picnic shelter that is in good condition. The shelter has 17 six-foot-long wooden picnic tables on metal frames, 120-volt electrical receptacle, overhead lights, trash receptacles, water spigot, yard hydrant, two small grills, and horse shoe pits with backstops. The playground associated with the shelter contains a climbing structure, swing set, and a four-chute basketball goal. A 21-space parking lot supports the shelter and picnic area.

A second playground area is located in the center of the campsites. The equipment in this area includes a large play structure and a swing set. A water spigot is located nearby. The campground also has an amphitheater, but it is rarely used.

4.1.2.2 Hidden Cove Golf Course

Hidden Cove Golf Course consists of a year-round 18-hole golf course, driving range, putting green, practice sand traps, clubhouse, picnic area, and cart barn. The well-maintained course can accommodate all levels of players, with long tees that play at 7,200 yards and shorts tees that play at 6,500 yards. The concrete cart paths are also provided. See Photograph 4-5.



Photograph 4-5: Hidden Cove Golf Course

The golf course has a small clubhouse/pro shop that equipment for sale. See Photograph 4-6. The clubhouse also offers drinks and a limited food selection. One locker room for men and one for women contain showers, lockers, and restrooms. The cart barn can accommodate 61 carts.



Photograph 4-6: Clubhouse at Hidden Cove Golf Course

The golf course has one picnic shelter that is used by the golf course for outings and is not available for reservations. The shelter has nineteen 16-foot-long wooden picnic tables on metal frames, lights, trash receptacles, and 120-volt electrical receptacles.

The golf course has an asphalt parking lot with 89 spaces. Restrooms are portable chemical toilets. Water is provided by the Rattlesnake Ridge Water District.

4.1.2.3 Bruin Recreation Area

The Bruin Recreation Area offers a mix of day-use recreational facilities, including a boat ramp, picnic facilities, and playground equipment. See Photograph 4-7. The boat ramp has four lanes and a courtesy dock.



Photograph 4-7: Picnic and Playground Area

The Bruin Recreation Area is large and provides ample room for open recreation. A picnic shelter has sixteen 6-foot-long wooden picnic tables on metal bases, trash

receptacles, lights, electrical receptacles, and a water spigot. Adjacent to the picnic shelter is a play structure and swing set. The open area has one 6-foot-long wooden picnic table on a metal base, two small grills, and trash receptacles.

The Bruin Recreation Area has a designated swimming beach, but the beach area is closed. Access to the beach is steep. The grade drops quickly in the water so there is not much wading area at this location.

The restrooms at Bruin are on a septic system.

The primary parking area can accommodate 83 vehicles with trailers and 64 passenger-vehicles. Immediately adjacent to the boat ramp are two vehicle with trailer parking spaces.

4.1.3 Wildlife Management Area

The Wildlife Management Area (WMA) is operated by the KYDFWR. The habitat is managed to support a wide variety of wildlife species. The WMA includes Camp Webb, which is designed for conservation education.

The WMA is well used for hunting, with approximately 14,000 acres open for hunting a variety of game. The peak hunting times are in the spring for turkeys and in the fall for white-tailed deer. The only gun hunting permitted for deer are youth hunts, which typically last 2 days each and occur in October, November, and December. An area has been designated for dove hunting, and some waterfowl hunting is provided on portions of Grayson Lake. Hunting and harvests are managed according to area regulations.

The Api-su-ahts Trails consist of hiking trails, bridle trails, and fire roads for the area. The trail system is more than 22 miles, 9 miles of which are available for horseback riding. The trail system has two trailheads, one at Deer Creek and one at Frazier Flats. The Deer Creek trailhead has a 2.9-mile loop and a 7.8-mile loop. Two parking areas accommodate the trailhead at Deer Creek. One area is a grass field that can accommodate 5 to 10 vehicles with horse trailers, and the other is a small gravel lot that can accommodate 6 vehicles. The Frazier Flats trailhead has a 5.9-mile loop and a 6.5-mile loop. The Frazier Flats trailhead has a gravel parking lot that can accommodate 8 vehicles.

Two public boat ramps in the WMA provide access to the lake. The Caney Creek boat ramp has a one-lane boat ramp and parking area and is surrounded by scenic views and woods. The boat ramp is concrete, short, and has a shallow angle with an asphalt approach. The asphalt parking lot has 11 spaces for vehicles with trailers. Overflow parking can be accommodated in an adjacent dirt lot. The Clifty Creek boat ramp has a one-lane boat ramp and parking area. The ramp is concrete and the approach is asphalt. The parking area has space for 13 vehicles with trailers and 6 vehicles. The two boat ramps experience moderate use.

The Walker Point and Clifty parking areas provide additional access to the wildlife management area. Each area has a parking area that can accommodate at least 10 vehicles and a short walking path to the lake. Parking is also permitted along the roads in the WMA for access to the lake or for hunting. There are no restrooms in the WMA. Camping is not permitted in the WMA.

Approximately 600 acres of the WMA is designated as Camp Robert C. Webb. The primary purpose of Camp Webb is to provide conservation education at summer camps for children, but users range from Boy Scouts to conservation officers. See Photographs 4-8 and 4-9. Although Camp Webb is operated by the KDFWR, it is not available to the public.

Activities at the camp focus on intensive and basic instruction in outdoor activities and skills that are related to or dependent on natural resources, including nature education, archery, boating, outdoor survival, firearm safety, fishing/casting, and swimming. The camp has a swimming area, boat docks, gun and archery ranges, a basketball court, and a volleyball court. A short nature trail provides educational opportunities.



Photograph 4-8: Cabins at Camp Webb



Photograph 4-9: Boat Dock Area at Camp Webb

The boat dock area at Camp Webb has a storage building, dock with five slips, and a small boat ramp. Eight boats and 10 canoes are available for boating instruction and safety/rescues. The swimming area has a small beach and dock that can be used for swimming and fishing. The two shooting facilities are wood structures. The larger facility has six shooting positions, two instructor positions, and bleachers for spectators or classes. The smaller shooting facility has two shooting positions and seating for spectators.

Lodging facilities at Camp Webb consist of nine cabins, cafeteria, wildlife building, office, and a small bathhouse. A larger bathhouse is planned for construction in 2012. A permanent residence is available for the camp director. The camp has an office that is used by resource managers for the camp and the WMA. All of the water at the camp is well water, which is piped throughout the camp.

4.1.4 Laurel Gorge Cultural Heritage Center

The Laurel Gorge Cultural Heritage Center, which is managed by Elliott County, is an interpretive nature center with information and exhibits about the history of the people in the area and the local natural environment. The building has a classroom for educational programs, wildlife viewing room with a one-way glass, and a deck with tables and chairs for viewing or picnicking. A parking lot has space for approximately 20 vehicles.



**Photograph 4-10: Hiking Trail
at Laurel Gorge Cultural Heritage
Center**

The area around the center contains five trails that are part of the Laurel Gorge Hiking Trail System: main trail (1 mile), Cliff Line Trail (0.5 mile), Homestead Trail (0.33 mile), Creekside Trail Loop (0.5 mile), and boardwalk trail (0.2 mile). The trails offer views of the cliff line and the Little Sandy River and have interpretive signs to help identify native trees and animals in the area. A hiking and bicycling trail is being developed that runs adjacent to SR 7. A 1-mile trail is expected to complete by 2012.

One picnic shelter has eight 6-foot-long wood picnic tables and three small charcoal grills. Restrooms adjacent to the picnic shelter are planned for completion in 2012. A gravel parking lot, which is expected to be completed in 2011, will provide space for 25 to 30 vehicles.

4.1.5 Elliott County Shrine Club Park

The Elliott County Shrine Club Park is managed by the Elliott County Shrine Club through a sublease from the Elliott County Fiscal Court and is used primarily for horse shows. The park has approximately 13 acres and electricity but no potable water, restrooms, or designated parking areas.

4.1.6 Grayson Lake Marina

Grayson Lake Marina, which is operated by a private concessionaire (VCV Inc.), has a small store that offers gas, oil, and snacks; boat rentals; and slip rentals. See Photograph 4-11. The

marina has 185 boat slips. The marina offers rental of 57-foot slips (32), 45-foot slips (32), and 22-foot slips (122). The marina also offers 76 bank tie locations for rental, with an extra 17 bank tie locations if needed. Although the slips at the marina are full, there is no waiting list, and capacity does not appear to be an issue. The marina has 21 pontoon boats for rent, which is an adequate number most of the time. Sanitary services for houseboats are provided by the USACE. The waste pump station consists of a floating dock for single boat docking and pumping.

The marina has limited parking available in a gravel lot adjacent to the marina maintenance building. Marina visitors often park in the parking lot adjacent to the boat ramp in the Dam Site Area. An overflow parking area is located close to the marina.

4.1.7 Grayson Lake

Grayson Lake is long and narrow, and most of the shoreline is composed of steep cliffs. The lake is used for boating, fishing, and swimming. Views of the lake are good, both on and off the lake (see Photograph 4-12).

The summer pool of the lake is approximately 1,500 acres, but it drops to approximately 1,200 acres during the winter. With many winding channels, the lake is a popular boating destination. The lake is used primarily by motorized boats, but number of non-motorized boats is increasing. Approximately 930 acres of the lake during the summer are designated as no wake zones. Public boat access to the lake is provided by four boat ramps: Dam Site Area, Bruin Recreation Area, Clifty Creek, and Caney Creek. Traffic at the Bruin Recreation Area, Clifty Creek, and Caney Creek boat ramps is moderate, with little reported congestion. The use of the boat ramp at the Dam Site



Photograph 4-11: Grayson Lake Marina



Photograph 4-12: Grayson Lake

Area is high with congestion at the ramp and parking area. The Grayson Lake Marina supports boating activities with rental boats, slips, fuel, and supplies.

Although Grayson Lake is considered a fair recreational fishery, it supports 7 to 12 fishing tournaments per week during the summer. The fishery is limited by the lack of aquatic habitat and the fertility of the water. Plans are being developed by the KYDFWR that will increase the habitat for fish. The KYDFWR regularly stocks Grayson Lake with fish. Fishing on the lake takes place from boats and shore, including the fishing pier. Waterfowl hunting also occurs on the lake, although a portion of the lake near the dam is designated as a waterfowl resting area in which no hunting is allowed.

Grayson Lake has one designated swimming area at Bruin Recreation area, however the beach is closed. Swimming also takes place from the shore and from watercraft.

4.2 Current Outdoor Recreational Activities and Visitation

This section contains a discussion of the recreational activities that are currently available and the number of visitors who participate in these activities.

4.2.1 Outdoor Recreational Activities

The Project provides the opportunity to enjoy a wide range of recreational activities. Table 4-2 lists the major recreational activities that are available, locations, and facilities. Figure 4-1 shows the locations of the recreational areas.

Table 4-2: Facilities for Outdoor Recreational Activities at the Project

Activity	Location	Facilities
Boating	Dam Site Area	<ul style="list-style-type: none"> • Four-lane boat ramp • Courtesy loading dock • Parking area for vehicles.
	Bruin Recreation Area	<ul style="list-style-type: none"> • Four-lane boat ramp • Courtesy loading dock • Parking for vehicles with trailers
	Wildlife Management Area	<ul style="list-style-type: none"> • 2 one-lane boat ramps (Caney Creek and Clifty Creek) • Parking for vehicles with trailers • Small boat ramp (Camp Webb) • 5 boat slips (Camp Webb) • Boats and canoes for instructional use (Camp Webb)

Activity	Location	Facilities
	Grayson Lake Marina	<ul style="list-style-type: none"> • 185 boat slips • 76 bank tie locations • Boat rental • Parking area for vehicles. • General store • Fuel facilities • Sanitary dump pump station
	Grayson Lake	<ul style="list-style-type: none"> • Approximately 1,500 acres (summer) and 1,200 acres (winter) for boating
Camping	Rolling Hills Campground	<ul style="list-style-type: none"> • 71 campsites with electricity and water • 2 bathhouses with laundry facilities • Sanitary dump station
	Wildlife Management Area	<ul style="list-style-type: none"> • 9 cabins (Camp Webb)¹ • Cafeteria (Camp Webb) • Bathhouse (Camp Webb)
Fishing	Dam Site Area	<ul style="list-style-type: none"> • Fishing pier • Tailwater area
	Wildlife Management Area	<ul style="list-style-type: none"> • Bank fishing
	Grayson Lake	<ul style="list-style-type: none"> • Bank fishing and fishing from docks and boats • Fishing tournaments
Hunting	Wildlife Management Area	<ul style="list-style-type: none"> • Designated 14,000-acre hunting area for variety of game • Dove hunting area
	Grayson Lake	<ul style="list-style-type: none"> • Waterfowl hunting
Other activities (e.g., hiking, horseback riding, golf)	Dam Site Area	<ul style="list-style-type: none"> • 3 hiking trails totaling 4.5 miles • 2 playgrounds • Historic structure
	Rolling Hills Campground	<ul style="list-style-type: none"> • 2 hiking trails totaling 3.8 miles • Horse shoe pits • Basketball court • Sand volleyball court • 2 playgrounds • Amphitheater
	Hidden Cove Golf	<ul style="list-style-type: none"> • Year-round 18-hole course

¹ Facilities at Camp Webb are not open to the public.

Activity	Location	Facilities
	Course	<ul style="list-style-type: none"> • Driving range • Putting green • Practice sand traps • Pro shop • Clubhouse
	Bruin Recreation Area	<ul style="list-style-type: none"> • Playgrounds • Open area for recreation
	Wildlife Management Area	<ul style="list-style-type: none"> • Hiking trails totaling more than 22 miles • Volleyball court (Camp Webb) • Basketball court (Camp Webb) • Gun and archery ranges (Camp Webb) • Nature trail (Camp Webb) • Educational activities (Camp Webb)
	Laurel Gorge Cultural Heritage Center	<ul style="list-style-type: none"> • Interpretive nature center • 5 hiking trails totaling approximately 2.5 miles • Educational programs
	Elliott County Shrine Club Park	<ul style="list-style-type: none"> • Open area used for horse shows
Picnicking	Dam Site Area	<ul style="list-style-type: none"> • 4 picnic shelters with tables and facilities • Multiple picnic tables throughout area
	Rolling Hills Campground	<ul style="list-style-type: none"> • Picnic shelter with tables and facilities • Picnic area with multiple tables
	Hidden Cove Golf Course	<ul style="list-style-type: none"> • Picnic shelter with tables and facilities
	Bruin Recreation Area	<ul style="list-style-type: none"> • Picnic shelter with tables and facilities
	Laurel Gorge Cultural Heritage Center	<ul style="list-style-type: none"> • Picnic shelter with tables and facilities
Sightseeing	Dam Site Area	<ul style="list-style-type: none"> • Views of the lake and the dam
	Wildlife Management Area	<ul style="list-style-type: none"> • Multiple and diverse scenic views from roads and trails
Swimming	Bruin Recreation Area	<ul style="list-style-type: none"> • Designated swimming area (closed)
	Wildlife Management Area	<ul style="list-style-type: none"> • Designated swimming area (Camp Webb)
	Grayson Lake	<ul style="list-style-type: none"> • Swimming from the shore and boats
Water Skiing	Grayson Lake	<ul style="list-style-type: none"> • Lake is open for water skiing

4.2.2 Visitation by Recreational Area

The Project reports visitation data through the Visitor Estimation Reporting System (VERS) (see Section 1.7.9). Visits are a “head count” of visitors based on a count of vehicles and a statistical analysis of the number of people in a vehicle. A visit represents the entry of one person into a recreational area or site to participate in one or more recreational activities.

Project visitation data reflect estimates of the number of visits to each primary recreational area. Table 4-3 shows the baseline number of visits made to the recreational areas. The “Dispersed Area” category includes use that occurs outside developed recreational areas such as the WMA.

Table 4-3: Baseline Distribution of Visits by Primary Recreational Area

Area	Number of Visits	Percent
Dam Site Area	369,000	35%
Rolling Hills Campground	177,000	17%
Bruin Area	50,000	5%
Dispersed Areas (e.g., WMA)	236,000	22%
Camp Webb	25,000	2%
Caney Creek Boat Ramp	20,000	2%
Clifty Creek Boat Ramp	30,000	3%
Laurel Gorge Cultural Heritage Center	70,000	7%
Grayson Lake	74,000	7%
Total	1,051,000	100%

Sources: VERS and resource managers

4.2.3 Activity Distribution

Table 4-4 shows the baseline number of participants by recreational activity. Because visitors to the Project participate in various activities, the number of visitors (Table 4-3) to the Project may not be the same as the number of participants.

Table 4-4: Baseline Number of Participants for Recreational Activities

Activity	Number of Participants
Boating	69,700
Camping	12,000
Fishing	127,800

Activity	Number of Participants
Hunting	14,300
Other Activities	130,700
Picnicking	78,900
Sightseeing	584,100
Swimming	18,300
Water Skiing	5,700
Total	1,041,500

Source: VERS and resource managers

4.3 Area of Influence

The area of influence is defined as the area where the majority of the people who visit the Project live. Determining the area of influence and evaluating the demographic characteristics of the area is an important part of projecting the future demand for recreational facilities at the Project.

4.3.1 Identifying the Area of Influence

Based on the nature of the recreational activities provided at the Project, the vast majority of the visitors to the Project will reside within a 2-hour driving distance (see Figure 4-2). Therefore, this distance was used to define the area of influence.

For planning purposes, the area of influence was divided into three subareas:

- **Primary** – within a 30-minute drive of the Project. Because of their proximity to the Project, residents in the primary area of influence are expected to make the Project a destination for all of the recreational opportunities that are available.
- **Secondary** – between a 30- and 60-minute drive of the Project. Residents in the secondary area of influence are expected to visit the Project for specific reasons (e.g., golf) but are not expected to make the Project a destination solely for general day-use activities, such as picnicking, that are also available in their local area.
- **Tertiary** – between a 1- and 2-hour drive of the Project. Residents in the tertiary area of influence are expected to make the Project a destination for activities that are unique, provide a high-quality recreational experience, or are significantly different from those available in their local area (e.g., boating, fishing) or for overnight activities (e.g., camping).

The primary subarea of influence is located in Kentucky. The secondary subarea of influence includes portions of Kentucky (80 percent), West Virginia (10 percent), and Ohio (9 percent). The tertiary subarea of influence includes portions of Kentucky (53 percent), West Virginia (24 percent), and Ohio (22 percent).

4.3.2 Demographic Characteristics in the Area of Influence

Demographic data (population, age, and income) were compiled from data from the U.S. Census Bureau and regional and State data centers. These data were analyzed to determine the population within the area of influence and how the population is projected to change by 2020. Population data were collected for each census block group within the area of influence. The populations were summed to determine the total population. The percent change in population from 2000 to 2010 at the county level was assumed to apply to the block group level (e.g., a 3 percent increase in population at the county level would result in a 3 percent increase in population at the block group level).

The population for 2020 for each subarea was projected based on growth rates between the 2010 population and 2020 county level projections provided by the U.S. Census Bureau. The populations of the counties in the area of influence are projected to increase at different rates.

The projected growth rate was determined for the three subareas of influence based on the change in the estimated population in each county.

Similar to the population data, changes in age at the county level were assumed to apply to the block group. The population in each age group was estimated based on the block group level. Changes in the percentage of the population in each age group in the block group were based on projected changes at the county level. The analysis used estimates of the percent change in each age group for the three subareas of influence.

Median incomes were calculated by taking a weighted average of the median incomes of the counties in areas of influence. Median incomes of the counties were compiled from 2008 U.S. Census Bureau data. The median income of each county in the three subareas of influence was multiplied by the percentage of the region's population that resides in each county to calculate a weighted median income for each county. The weighted median incomes were then summed to find the weighted median income.

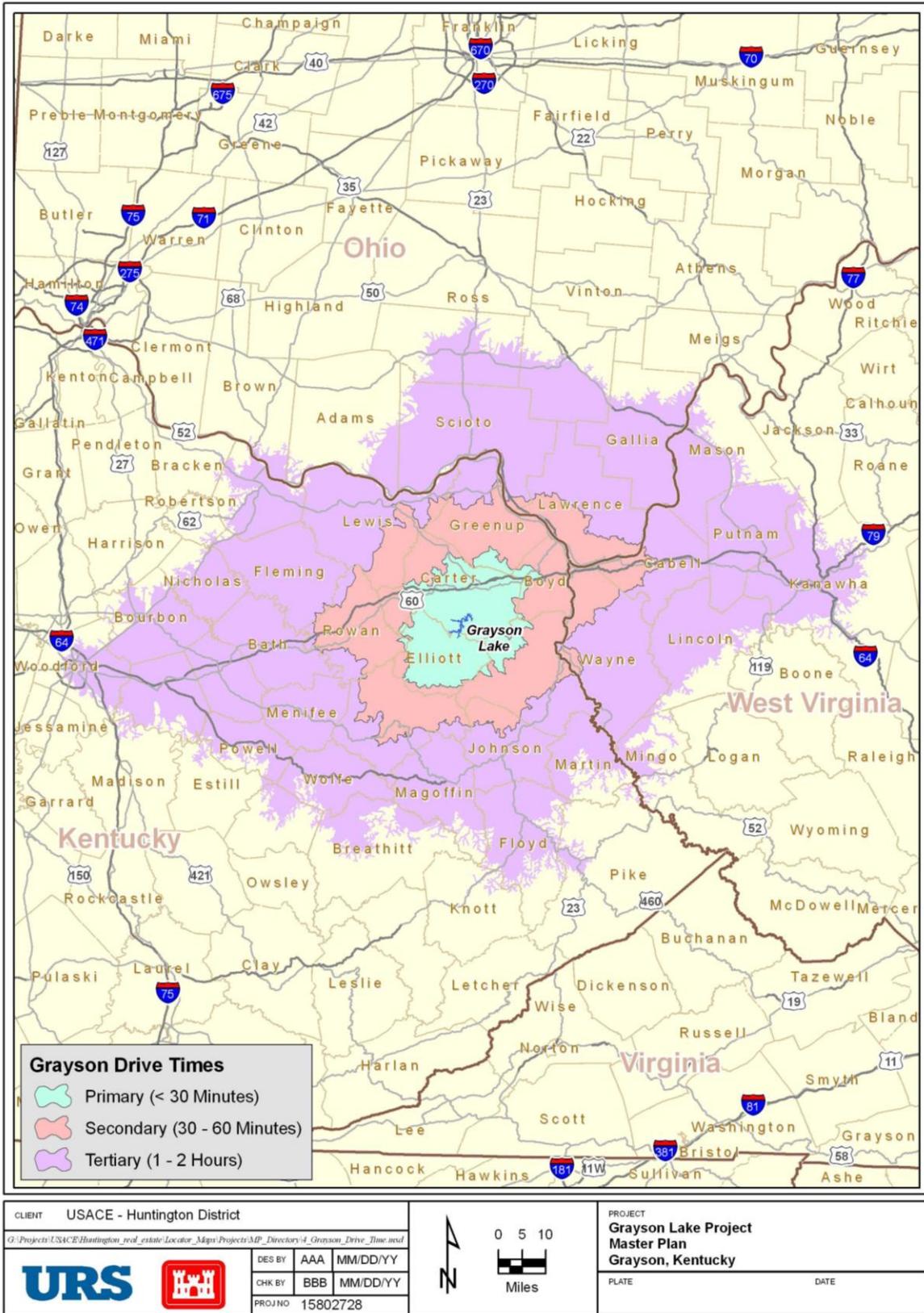


Figure 4-2: Area of Influence

4.3.2.1 Primary Subarea of Influence

The primary subarea of influence includes portions of eight counties, all located in Kentucky. The estimated populations for the primary subarea of influence are shown in Table 4-5. The population in the primary subarea of influence is projected to increase by 4.7 percent from 2010 to 2020.

Table 4-5: Population in the Subareas of Influence

Subarea	2010 Population	2020 Population (Projected)	Population Growth 2010–2020
Primary	32,945	34,504	4.7%
Secondary	278,669	278,134	-0.2%
Tertiary	922,465	951,095	3.1%

Projected changes in the age of the population in the primary subarea of influence were calculated (see Table 4-6). The results of the analysis are that the percentage of people 17 years old and under will decrease from 24 percent in 2000 to 22 percent by 2020. The population over 50 years old is projected to increase from 30 percent in 2000 to 38 percent by 2020. Age distribution across other age groups is projected to remain fairly constant.

Table 4-6: Age Distribution of Population in the Subareas of Influence

Age	Primary			Secondary			Tertiary		
	2000	2010	2020	2000	2010	2020	2000	2010	2020
<5	6%	6%	6%	6%	6%	6%	6%	6%	6%
5-17	18%	17%	16%	17%	16%	16%	17%	16%	16%
18-21	5%	5%	5%	7%	6%	5%	6%	5%	5%
22-29	10%	10%	10%	11%	11%	11%	11%	11%	11%
30-39	15%	14%	13%	14%	12%	13%	15%	13%	13%
40-49	15%	14%	13%	15%	13%	12%	15%	14%	13%
50-64	17%	20%	20%	17%	20%	19%	16%	20%	19%
>=65	13%	14%	18%	14%	15%	18%	13%	14%	17%

Source: Developed from data obtained from the U.S. Census Bureau

The median incomes of the households in the primary subarea of influence were estimated using a weighted average of the average 2008 median incomes² of the counties in the area. The

² 2010 Census data on median household income was not available at the time of this report.

weighted median income of the primary subarea of influence is \$32,400 (See Table 4-7). The incomes in the primary subarea of influence were lower compared to the median household income of approximately \$41,000 for the Commonwealth of Kentucky.

Table 4-7: Median Household Income in the Subareas of Influence

Subarea	Median Income (2008)
Primary	\$32,400
Secondary	\$35,200
Tertiary	\$40,100

Source: Developed from data obtained from the U.S. Census Bureau.

4.3.2.2 Secondary Subarea of Influence

The secondary subarea of influence includes portions of 16 counties (12 in Kentucky, 2 in West Virginia, and 2 in Ohio). The estimated populations for the secondary subarea of influence are shown in Table 4-5. The population in the secondary subarea of influence is projected to decrease by 0.2 percent by 2020.

Changes in the age of the population in the secondary subarea of influence were calculated (see Table 4-6). The results of the analysis are that the percentage of people 21 years old or under will decrease from 30 percent in 2000 to 27 percent by 2020. The percentage of people over 65 years old is projected to increase from 14 percent in 2000 to 18 percent by 2020. The percentage of people between 50 and 64 years is projected to increase by 2 percent by 2020. A slight decrease in population is projected in the other age groups.

The weighted median income of the secondary subarea of influence is \$35,200 (See Table 4-7). Most of the counties in the secondary subarea of influence are in Kentucky; the incomes in the secondary subarea of influence were lower compared to the median household income of approximately \$41,000 for the Commonwealth of Kentucky. Counties in West Virginia and Ohio also exhibited lower household incomes compared to incomes reported within their respective States, which were \$37,989 for the State of West Virginia and \$60,061 for the State of Ohio.

4.3.2.3 Tertiary Subarea of Influence

The tertiary subarea of influence includes portions of 52 counties in three States (33 in Kentucky, 10 in West Virginia, and 9 in Ohio). The estimated populations for the tertiary subarea of influence are displayed in Table 4-5. The population in the tertiary subarea of influence is projected to increase by 3.1 percent by 2020.

Changes in the age of the population within the tertiary subarea of influence were calculated (Table 4-6). The results of the analysis are that the percentage of people 21 years old or under will decrease from 29 percent in 2000 to 27 percent by 2020. The percentage of people older than 50 years of age is projected to increase from 29 percent in 2000 to 36 percent by 2020. A slight decrease in population is expected in the other age groups.

The weighted median income of the tertiary subarea of influence is \$40,100 (see Table 4-7).

4.4 Outdoor Recreational Opportunities at Comparable Facilities

Recreational opportunities provided at comparable facilities within a 2-hour drive of the Project were identified and reviewed to understand the recreational opportunities available to people living within the area of influence. A total of 17 facilities were identified (4 in the secondary subarea of influence and 13 in the tertiary subarea of influence). No recreational facilities providing similar opportunities were identified within the primary subarea of influence.

Table 4-8 lists the facilities, the operating agency, and the approximate size (acres). Figure 4-3 shows the locations of the facilities.

Table 4-8: Comparable Recreational Facilities

Subarea	Name	State	Operating Agency	Approximate Size (acres)
Secondary	Carter Caves State Resort Park	KY	Kentucky Department of Parks	1,600
	Tygart's State Forest	KY	Kentucky Department of Parks	900
	Greenbo Lake State Resort Park	KY	Kentucky Department of Parks	3,300
	Yatesville Lake	KY	USACE	13,200
Tertiary	Beech Fork Lake	WV	USACE	7,500
	Blue Licks Battlefield State Park	KY	Kentucky Department of Parks	150
	Booker T. Washington State	WV	WVDNR	400

Subarea	Name	State	Operating Agency	Approximate Size (acres)
	Park			
	Cabwaylingo State Forest	WV	WVDNR	8,100
	Cave Run Lake	KY	USACE	8,300
	Daniel Boone National Forest	KY	USFS	707,000
	Dewey Lake	KY	USACE	9,200
	East Lynn Lake	WV	USACE	24,800
	Fort Boonesborough State Park	KY	Kentucky Department of Parks	1,200
	Jackson Lake State Park	OH	ODNR	100
	Natural Bridge State Resort Park	KY	Kentucky Department of Parks	2,200
	Paintsville Lake State Park	KY	USACE	13,100
	Shawnee State Park	OH	ODNR	1,100

ODNR = Ohio Department of Natural Resources
USACE = U.S. Army Corps of Engineers
USFS = U.S. Forest Service
WVDNR = West Virginia Division of Natural Resources

These 17 facilities support a variety of recreational activities similar to those offered at the Project. Table 4-9 lists the recreational activities at the 17 facilities. The information is based on the *Statewide Comprehensive Outdoor Recreation Plan (Commonwealth of Kentucky, 2008)*, which is referred to as SCORP.³ Several amenities were also reviewed and are listed in Table 4-9. Amenities are services or features that can increase the enjoyment of visitors. The reviewed amenities are:

- High-speed Internet access
- Lodge and/or cabins
- Marina
- Onsite restaurant
- Outdoor theater

³ The SCORP contains the estimated participation in recreational activities among residents of Kentucky (Commonwealth of Kentucky, 2008). Estimates are based on a scientific survey and the median number of times in a year a household participates in an activity.

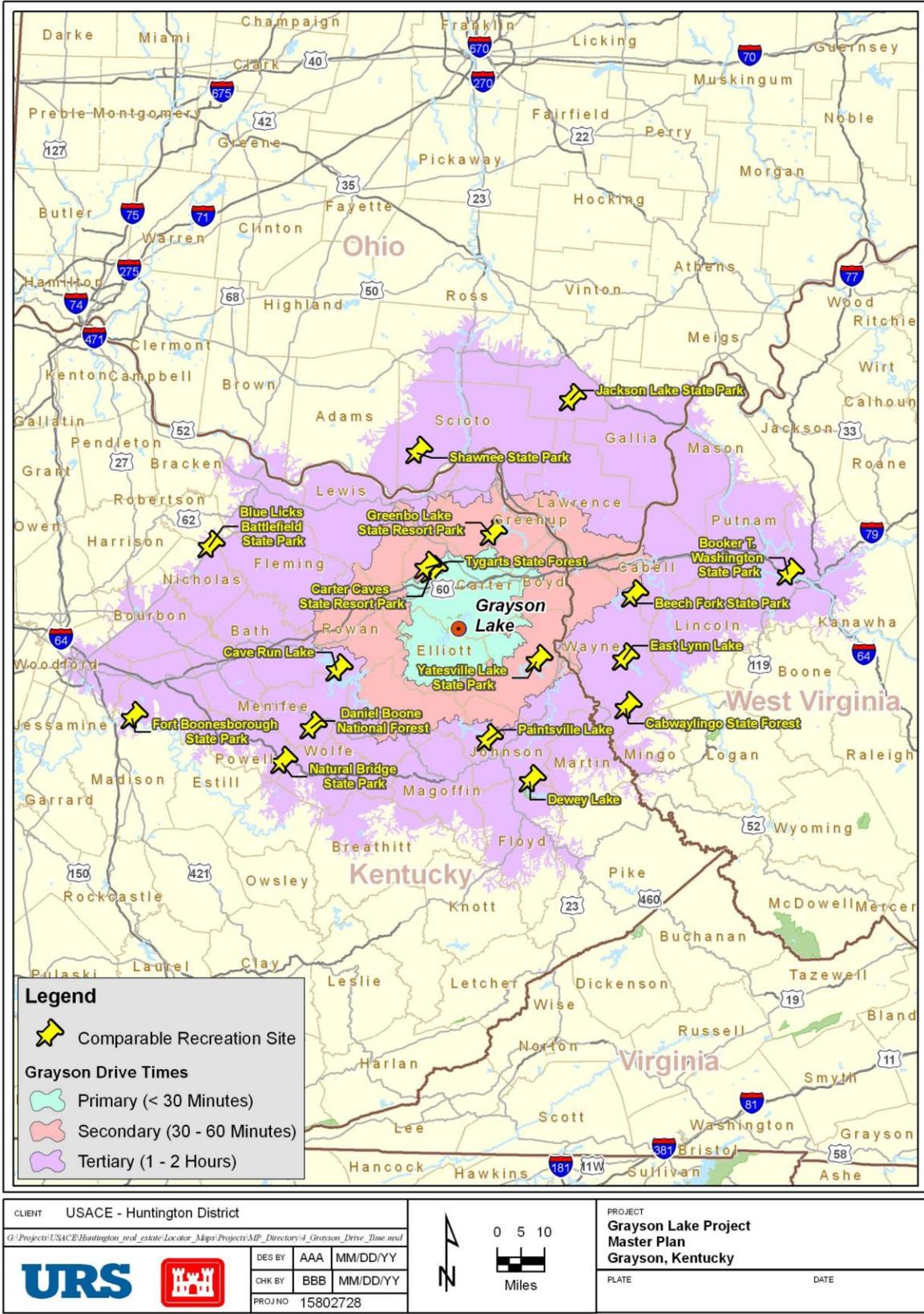


Figure 4-3: Comparable Recreational Facilities

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Table 4-9: Recreational Activities at the Grayson Lake Project and Comparable Facilities

Area of Influence/ Activities/Amenities	Grayson Lake Project	Carter Caves State Resort Park	Beech Fork Lake	Blue Licks Battlefield State Park	Booker T. Washington State Park	Cabwaylingo State Forest	Cave Run Lake	Daniel Boone National Forest	Dewey Lake	East Lynn Lake	Fort Boonesborough State Park	Greenbo Lake State Resort Park	Jackson Lake State Park	Natural Bridge State Resort Park	Paintsville Lake State Park	Shawnee State Park	Tygart's State Forest	Yatesville Lake
Area of influence	N/A	S	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T
Activities	ATV trails							✓										
	Boating	✓		✓		✓		✓	✓	✓	✓	✓	✓		✓	✓	✓	✓
	Birdwatching/wildlife viewing/sightseeing	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Bicycling on bike trail	✓	✓			✓		✓	✓	✓		✓	✓		✓	✓		✓
	Camping	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓
	Court activities	✓	✓		✓	✓	✓	✓	✓			✓	✓	✓	✓	✓		✓
	Fishing	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Golfing	✓	✓					✓						✓		✓		✓
	Hiking	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Horseback riding	✓	✓					✓	✓	✓	✓	✓			✓	✓	✓	✓
	Hunting	✓		✓		✓	✓	✓	✓	✓			✓		✓	✓	✓	✓
	Miniature golf		✓		✓							✓	✓	✓		✓		✓
	Nature preserve/ trail/historic site	✓		✓	✓			✓		✓	✓	✓	✓	✓	✓	✓		✓
	Off-road 4-wheel driving								✓				✓					
	Open field events	✓	✓			✓	✓	✓	✓			✓			✓	✓		✓
	Picnicking	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Playground	✓	✓	✓	✓	✓	✓			✓	✓	✓		✓	✓	✓		✓
	Rock climbing		✓						✓									
	Summer camps/daily rec events	✓	✓			✓			✓			✓	✓	✓				
	Swimming	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	
Target shooting	✓							✓									✓	
Winter activities													✓		✓			
Amenities	High-speed Internet access		✓		✓							✓						
	Lodges and/or cabins		✓		✓		✓					✓		✓		✓		✓
	Marina	✓		✓			✓	✓		✓		✓	✓		✓	✓		✓
	Onsite restaurant		✓		✓							✓		✓	✓	✓		
	Outdoor theatre	✓										✓	✓					✓

Definitions

- Area of influence S = secondary, T = tertiary
- ATV trails/riding All-terrain vehicle
- Boating Includes boat ramps, boating activities, and/or waterskiing
- Birdwatching/wildlife Activities that involve observing or photographing wildlife, nature, or historic areas located within a site, whether walking or driving viewing/sightseeing
- Camping Backpack camping, camping at a campsite without electricity or water, and camping with electricity and water (recreational vehicle)
- Court activities Activities that require a court setup, including but not limited to basketball, tennis, and volleyball
- Golfing Golf courses and/or driving ranges
- Hiking Hiking, walking, and exercising on a fitness trail
- Horseback riding Horseback riding on trails or in designated areas; horses may or may not be provided
- Nature preserve/..... Nature preserves, historic sites, visitor centers with educational tools/presentations trail/historic site
- Open field events Activities that can be performed on an open field, including but not limited to softball, soccer, lacrosse, cornhole/corn toss, football, disc golf, flying a kite, track and field events, and horseshoes
- Summer camps/daily..... Summer camps, horseback riding camps, events/presentations offered on a regular basis recreational events
- Swimming Designated swimming area (e.g., beach, pool)
- Winter activities Activities performed in winter, such as outdoor ice skating, snow sledding/snowshoeing, ice fishing, skiing, snowboarding, and snowmobiling
- Lodges and/or cabins Areas for overnight stay that provide more than basic shelter, such as electricity, plumbing, and furnishings
- Outdoor theatre Amphitheaters, areas for outdoor festivals/concerts/reenactments, and outdoor stages

As shown in Table 4-9, the comparable facilities offer similar recreational activities and amenities as the Project. The comparison is particularly relevant when reviewing the activities and amenities in at Carter Caves State Resort Park, which would have the greatest impact of the three subareas on visitation at the Project because of its closer proximity. Several of the comparable facilities in the tertiary subarea of influence offer more activities and/or amenities than the Project, but because these facilities are quite far from the Project, they have only a minor effect on the recreational patterns of the residents within the primary subarea of influence. The only significant difference in recreational activities offered by the facilities in the secondary and tertiary subareas of influence compared to the Project is that many of them offer summer camps and daily recreational events that tend to be day-use activities that draw visitors from the immediate area around the facility. Several of the comparable facilities in the secondary and tertiary subareas of influence offer high-speed Internet access and an onsite restaurant. These types of amenities increase the enjoyment of visitors at the facilities, but they are not expected to cause a significant shift in visitation patterns.

A review of the planned changes to the recreational activity opportunities at the comparable facilities in the area of influence indicated that no significant changes are anticipated for the near future, such as the addition or removal of an existing recreational activity or the construction of a new facility. Minor changes may occur at the comparable facilities, but none were identified that are expected to affect current visitation patterns.

In addition to the recreational activities provided at the Project and the comparable facilities, the area of influence has a number of national and State trail systems. These trail systems are on lands typically owned and managed by Federal, State and private entities and provide access to day-use recreational activities such as hiking, ATV riding, and mountain biking. Although these systems provide access to outdoor recreational activities, they do not provide the same recreational experience (e.g., boating, fishing, swimming) as the comparable facilities and are not expected to affect the number of visitors at the Project. The significant trail systems in the area of influence are:

- Mary Ingles Trail System
- Sheltowee Trace

4.5 Trends in Outdoor Recreational Activities

There has been much speculation in recreational literature that participation in all nature-based activities is declining because of a decrease in free time and increased technology in people's

everyday lives. However, a study by Cordell (2008) on trends in outdoor recreation indicated that while the national interest in nature and outdoor activities has changed over the last 60 years, overall it has not declined.

The discussion of participation trends in this section focuses on changing preferences for recreational activities. Changing preferences were identified by reviewing literature on trends in Kentucky and across the country. Changing preferences for a specific activity at the Project were identified through discussions with resource managers.

4.5.1 Age

Age can influence the preference for recreational activities. For example, as the population ages, there is a greater demand for RV camping and lodging and less demand for tent camping. In addition, older populations transition from active sports to less strenuous activities such as walking (Virginia Department of Conservation and Recreation, 2007).

4.5.2 Fishing and Hunting

According to Recreational Boating and Fishing Foundation (2010), age does not affect participation in recreational fishing. Despite these findings, there is evidence that across all age categories, participation in both fishing and hunting is decreasing. The SCORP indicates a decrease of 7 percent in the rate of participation in fishing and hunting since 2000 (Commonwealth of Kentucky, 2008). Similarly, the USFWS found that nationwide participation in fishing decreased by about 16 percent and hunting decreased by about 11 percent between 1991 and 2006 (USFWS, 2006).

The decrease in fishing and hunting is further supported by a U.S. Forest Service (USFS) study, *Outdoor Recreation in American Life: An Assessment of Demand and Supply Trends* (Cordell et al., 1999). The study contains projections of outdoor recreation participation through the year 2050 and accounts for increases in participation due to population growth. The study projects fishing visits will increase by 36 percent through 2050, but this is marginally less than the projected population growth of 44 percent. Therefore, the overall participation rate is actually projected to decrease over the next 40 years. Similarly, the study projects that participation in hunting will decrease by 11 percent.

4.5.3 Summer Activities

According to the SCORP, the participation rate for horseback riding and trail hiking is increasing, but the rate of increase is not specified (Commonwealth of Kentucky, 2008). The USFS projects that participation in both hiking and horseback riding will increase marginally faster than the population (Cordell et al., 1999).

The rate of participation in picnicking, swimming, camping, boating, water skiing, and sightseeing has been found to be steady (Bowker et al., 1999). While the participation rate for camping in general is steady, there is an increase in camping in an RV with electricity and water, as opposed to camping in tents. The USFS is projecting that primitive camping will increase at a slower rate than population growth and will therefore have a decrease in the rate of participation. However, developed camping is projected to increase at a greater rate than population growth (Cordell et al., 1999).

Observing nature has been increasing and is expected to continue to increase. The USFS projects that participation in non-consumptive wildlife activities, including bird watching, photography, and other forms of wildlife viewing will increase through 2050 (Cordell et al., 1999). The number of participants is anticipated to increase more rapidly than the population for these activities. Similar to non-consumptive wildlife activities, sightseeing and visiting historic places are projected to be two of the fastest growing outdoor recreational activities.

4.6 Identifying Potential Recreational Activity Opportunities

Identifying potential recreational activity opportunities at the Project is important to development planning and future investment. This section examines the recreational activities that are available at the Project, activities that may be a viable option in the future, and activities that cannot be considered because they are inconsistent with policy (USACE, 1996a) and environmental conservation goals.

The rate of participation in a particular activity may not correlate with the value people place on the activity. For example, people may place great value on camping, but it requires a large time commitment and typically people can only participate a few weekends a year. Camping can be considered as having high value but a low participation rate. Alternatively, people may play tennis more often because it requires much less time per event and can be enjoyed in the local neighborhood. Tennis can be considered as having a lower value, but a high participation rate. Therefore, although ranking the activities by rate of participation provides a general guide to the

value people place on certain activities, the activities need to be evaluated carefully when planning for current and future recreational activities at the Project.

The resources available at the Project provide the opportunity for visitors to participate in many of the activities identified in the SCORP. However, some of the activities may not be consistent with resource capabilities or water and outdoor resource based recreational policy. Therefore, the activities in the SCORP are categorized as follows for planning purposes:

- **Available** – Resources and supporting facilities for these activities are currently available at the Project.
- **Potential** – Facilities for these activities are not currently available at the Project, but they are consistent with planning goals and may be considered as potential future activities. Facilities for these activities may be cost shared by the USACE or constructed wholly by a non-Federal entity.
- **Inconsistent** – Facilities for these activities are not currently available at the Project and conflict with policy and environmental conservation goals.

Table 4-10 lists the activities identified in the SCORP (in decreasing order of participation) and identifies whether an activity is currently available at the Project, has potential as a future activity, or is inconsistent with policy and environmental conservation goals.

Table 4-10: Recreational Activities at the Project

Activity	Available	Potential	Inconsistent
Bird watching/wildlife viewing	✓		
Walking	✓		
Gardening		✓	
Driving (sightseeing)	✓		
Fishing from shore, pier, or boat	✓		
Golfing	✓		
Hiking on a trail	✓		
Hunting with firearms or bows	✓		
Exercising on fitness trail		✓	
Playing basketball	✓		
Playing soccer		✓	

Activity	Available	Potential	Inconsistent
Playing tennis		✓	
ATV riding			✓
Off road 4-wheel driving			✓
Track and field events		✓	
Camping with electricity and water (for RV use)	✓		
Cross-country skiing	✓		
Driving range/practice range	✓		
Horseback riding on trail	✓		
Motor boating/jet skiing/waterskiing	✓		
Orienteering or geo-caching	✓		
Picnicking	✓		
Sightseeing or photography	✓		
Swimming in a lake/river/stream	✓		
Target shooting with firearms or bow	✓		
Bicycling on bike trail		✓	
Corn toss/corn hole	✓		
Playing at a playground	✓		
Playing baseball or softball		✓	
Playing football		✓	
Playing volleyball	✓		
Skateboarding/BMX Bicycling		✓	
Swimming at a public/club pool		✓	
Visiting a dog park		✓	
Berry/mushroom picking			✓
Rock climbing		✓	
Visiting historic site	✓		
Attending a summer camp/horseback riding camp	✓		
Backpack camping		✓	

Activity	Available	Potential	Inconsistent
Camping at a campsite without electricity or water		✓	
Camping in a cabin		✓	
Ice skating outdoors		✓	
In line/roller skating	✓		
Mountain biking		✓	
Playing disc golf	✓		
Picnicking at a shelter	✓		
Sailing, canoeing, kayaking, river rafting	✓		
Snow sledding/snowshoeing	✓		
Visiting a nature preserve	✓		
Visiting a nature aquarium/zoo			✓
Flying a kite	✓		
Playing horseshoes	✓		
Playing lacrosse		✓	
Downhill skiing/snowboarding		✓	
Playing in a wave pool/lazy river/spray park		✓	
Paragliding/sky diving			✓
Playing miniature golf		✓	
Playing paintball			✓
Attending outdoor festivals/concerts/reenactments	✓		
Attending outdoor racing events			✓
Snowmobiling			✓

As shown in Table 4-10, the Project provides opportunities for more than half of the activities listed in the SCORP, including 8 of the top10 recreational activities that are the most popular in terms of participation rate (i.e., number of times in a year that a household participates in an activity) among residents of Kentucky.

The activities listed as potential are consistent with policy and environmental conservation goals and could be provided at the Project, although a large number identified as potential can currently be enjoyed in a non-organized or family event setting using the existing resources, such as playing soccer in open field areas. The potential activities could be formally developed by a local sponsor, but a determination on the suitability of the activity would be done on an individual basis.

4.7 Recreational Demand Analysis

The recreational demand analysis included a review of several factors that can change the demand for recreational activities. Changes in the following factors could result in a shift in demand for recreational activities at the Project or affect the number of visitors:

- Change in the opportunities available to participants, such as the development of new *comparable facilities* near the Project
- Change in preferences for activities, such as *national and State participation trends* showing a decrease in hunting
- Change in the *demographic characteristics* in the area of influence including a change in population and in the median age of the population; such changes can affect the preferred activities (e.g., older visitors may prefer RV camping to tent camping)

4.7.1 Impact of Comparable Facilities

The Project and the comparable facilities in the area of influence have been open and operating for many years. This, and a fairly stable visitation to the Project over the last few years, is an indication that the demand for particular activities offered at the Project is in a mature state (i.e., demand has reached an equilibrium). As noted earlier, no significant planned changes are anticipated at the comparable facilities, and no new comparable facilities are anticipated. Therefore, the effect of the comparable facilities is not expected to change the existing demand for recreational activities at the Project.

4.7.2 Impact of Trends in Participation Rates in Recreational Activities

Trends in recreation were reviewed to identify potential changes in demand for recreational activities at the Project. In general, the rate of participation in consumptive resource uses, such as hunting and fishing, has been declining and is anticipated to continue declining. However, the rate of participation for non-consumptive resources uses, such as nature trails and sightseeing,

has been increasing. Based on these trends, the following assumptions were used to forecast future activities and participation:

- The participation rate for “other” recreational activities, including hiking, horseback riding, and golf, will increase 5 percent between 2010 and 2020.
- The participation rate for fishing and hunting will decrease 7 percent between 2010 and 2020
- Although the participation rate for camping is anticipated to remain stable, there will be an increased preference for camping in an RV as opposed to a tent.
- As a population ages, there will be a shift to less physical activities, such as walking.
- The participation rate for sightseeing, including observing nature and visiting historic places, will increase 5 percent between 2010 and 2020.

4.7.3 Impact of Demographic Changes

The population change in the area of influence over the next decade is projected to be small—an overall increase of 2.4 percent. In addition to population growth, the age of the population is projected to increase. Based on the projected population, change in the demographics, and observations at the Project, the following assumptions were used to forecast future activities and participation:

- The population in the primary subarea of influence is projected to grow by 4.7 percent between 2010 and 2020.
- The population in the secondary subarea of influence is projected to decrease by 0.2 percent between 2010 and 2020.
- The population in the tertiary subarea of influence is projected to grow by 3.1 percent between 2010 and 2020.
- The demand for RV accessible campsites will increase because of preferences for RV camping as opposed to tent camping among older campers.
- The shift to an older population will create a demand for shorter walking and hiking trails with smooth surfaces and minimal slopes that are easy to traverse.

4.7.4 Projected Participation by Activity

A multi-step approach was used to project the participation in each recreational activity at the Project. The approach accounts for anticipated changes in the rate of participation in specific activities and the estimated change in population in each subarea of influence. In the first step,

the rate of participation for the current visitors engaged in the activities (see Table 4-3) was adjusted to estimate the impacts of preference changes on the current users.

In the second step, the estimated number of participants was adjusted to account for projected population changes within each subarea of influence. The rate of participation of the current population was assumed to be representative of the rate of the participation for new people to the area (e.g., if 15 percent of the current population participates in camping, it is assumed that 15 percent of the new people to the area would participate in camping). The current population engaged in the activities was divided among the three subareas of influence based on the assumption that 50 percent of visitors live in the primary subarea of influence;⁴ 40 percent live in the secondary subarea of influence; and 10 percent live in the tertiary subarea of influence. The current rate of participation in each activity was applied to the change in the population to estimate the number of visitors who would participate in an activity in 2020. The estimated number of people for each activity was also adjusted based on projected preference changes.

The estimated number of participants in each activity in 2020 (based on changes in preferences) was added to the estimated new entrants (or decline) from a change in population. Table 4-11 shows the baseline and projected number of visitors for each of the primary activities, sorted by subarea of influence.

⁴ The distribution of the population for each subarea of influence is based on observations by resources managers. These observations, listed below, are consistent with the demographic characteristics of the area and the location of comparable facilities:

- The primary subarea of influence has a number of small towns, whose residents visit the Project.
- Comparable facilities have a greater impact on the recreational destination to those living farther from the Project, such as in the tertiary subarea of influence.
- People may be unwilling to cross State lines for recreational purposes, especially for hunting and fishing, which would require the purchase of a nonresident license.

Table 4-11: Baseline and Projected Visitors by Recreational Activity and Subarea of Influence

Activity	Subarea of Influence	Baseline Participation*	Projected Participation for 2020*	Change
Boating	Primary	34,860	36,490	1,630
	Secondary	27,880	27,830	-50
	Tertiary	6,970	7,190	220
	Subtotal	69,710	71,510	1,800
Camping	Primary	5,980	6,260	280
	Secondary	4,790	4,780	-10
	Tertiary	1,200	1,230	30
	Subtotal	11,970	12,270	300
Fishing	Primary	64,610	62,910	-1,700
	Secondary	51,680	47,970	-3,710
	Tertiary	12,920	12,390	-530
	Subtotal	129,200	123,270	-5,930
Hunting	Primary	7,170	6,980	-190
	Secondary	5,730	5,320	-410
	Tertiary	1,430	1,370	-60
	Subtotal	14,330	13,670	-660
Other	Primary	66,050	72,610	6,560
	Secondary	52,840	55,370	2,530
	Tertiary	13,210	14,300	1,090
	Subtotal	132,100	142,280	10,180
Picnicking	Primary	39,890	41,760	1,870
	Secondary	31,910	31,850	-60
	Tertiary	7,980	8,220	240
	Subtotal	79,780	81,830	2,050
Sightseeing	Primary	295,220	324,550	29,330
	Secondary	236,180	247,490	11,310
	Tertiary	59,040	63,920	4,880

Activity	Subarea of Influence	Baseline Participation*	Projected Participation for 2020*	Change
	Subtotal	590,440	635,960	45,520
Swimming	Primary	9,130	9,550	420
	Secondary	7,300	7,290	-10
	Tertiary	1,830	1,880	50
	Subtotal	18,260	18,720	460
Water Skiing	Primary	2,840	2,980	140
	Secondary	2,270	2,270	0
	Tertiary	570	590	20
	Subtotal	5,680	5,840	160
	Total	1,051,470	1,105,350	53,880

*Values are rounded

As indicated in Table 4-11, overall participation is expected to increase by 53,880 visits (approximately 5.1 percent) by 2020 and the activities undertaken by the visitors are anticipated to change. Hunting and fishing visits are anticipated to decrease even when accounting for the projected population increase in the area of influence. The largest increases in participation are anticipated to be in the “Other” category (which includes hiking, horseback riding, and golf) and in sightseeing.

4.7.5 Lake Carrying Capacity

Although it is projected that the number of people participating in fishing could decrease by 5 percent, boating is expected to increase by 3.1 percent by year 2020. The increase in boating could lead to an overall increase in the number of boats using Grayson Lake as a result of the shift from recreational fishing to recreational boating. Therefore, the carrying capacity of Grayson Lake for boating was analyzed to determine whether the lake capacity is adequate for current and future demand. Carrying capacity refers to the number of boats that might use the lake at one time. If the number of boats exceeded the carrying capacity of the lake, boaters would not experience a reasonable level of satisfaction in the boating experience or a reasonable level of safety.

Because of shallow water, narrow portions of the lake, docks, and other constraints, 4 percent of Grayson Lake is estimated to be unsuitable for boating. Although some of the unsuitable area can be used safely by non-motorized boats or motorboats fishing close to shore, the area was removed from the lake carrying capacity analysis. The summer pool lake is 1,510 acres; therefore, the estimated number of acres available for boating in the summer months is:

$$\text{Acres available for boating during summer} = 1,510 - (0.04) * 1,510 = 1,450 \text{ acres}$$

Non-motorized boats (e.g., canoes, rowboats) require less lake space than motorboats for safety, and motorboats require more space than non-motorized boats for boating enjoyment. Based on observations by resource managers, it is estimated that the distribution of boats on the lake at any one time is 15 percent non-motorized boats and 85 percent motor boats.

The carrying capacity of Grayson Lake was estimated for three scenarios: high, medium, and low density of boats (Table 4-12), which is consistent with carrying capacity analyses conducted for the Lucky Peak Master Plan in Walla Walla, Washington (USACE, 2006).

Table 4-12: Space Assumptions for Safe and Enjoyable Boating

Type of Boat	Low-Density Requirement Per Boat	Medium-Density Requirement Per Boat	High-Density Requirement Per Boat
Non-motorized	2.5 acres	1.3 acres	0.5 acres
Motorboat	20 acres	10 acres	5 acres

Based on these assumptions, the number of boats that might comfortably be accommodated on Grayson Lake at any one time for each scenario is estimated as follows.

For each scenario:

$$L + M = T$$

Where:

$$L = \text{number of non-motorized boats} = 0.15 * T$$

$$M = \text{number of motorboats} = 0.85 * T$$

$$T = \text{total number of boats}$$

$$\text{Low-density scenario: } (L * 2.5 \text{ acres/boat}) + (M * 20 \text{ acres/boat}) = 1,450 \text{ acres}$$

$$\text{Medium-density scenario: } (L * 1.3 \text{ acres/boat}) + (M * 10 \text{ acres/boat}) = 1,450 \text{ acres}$$

$$\text{High-density scenario: } (L * 0.5 \text{ acre/boat}) + (M * 5 \text{ acres/boat}) = 1,450 \text{ acres}$$

Table 4-13 displays the number of boats that could use Grayson Lake at any one time for each density scenario.

Table 4-13: Numbers of Boats at Different Densities

Type of Boat	Number of Boats		
	Low Density	Medium Density	High Density
Non-motorized	12	25	50
Motorboats	71	142	285
Total Boats	83	167	335

The numbers of boats that could fit comfortably on the lake in the low-, medium-, and high-density scenarios were compared to the estimated number of boats (based on the estimated number of boaters) that use the lake on a weekend day during peak season. Weekend days during peak season were targeted in order to estimate the number of boaters on Grayson Lake during periods of highest volume.

An analysis was performed to evaluate the effect of the number of boats on the lake’s carrying capacity. The number of boats was derived based on the following assumptions, which are based on observations from resource managers:

- Peak boating season is 6 months long
- 80 percent of the total boaters for the season use the lake during peak season
- Three boaters per boat
- 65 percent of boating activities occur on a summer weekend
- 8 weekend days per month
- Duration of each boat trip is 6 hours or half of a summer day

Table 4-14 shows the projected number of boats on the lake at any one time on a summer weekend day based on these assumptions. As shown on the table, a total of 158 boats are projected to use the lake at any one time on a summer weekend day, which reflects medium-density usage with the capacity to accommodate additional boats.

**Table 4-14: Estimated Number of Boats and Boaters
During Peak Season, Baseline and 2020 Projection**

Peak Season	Boaters per Month	Boats per Month	Boats on Weekend Day	Boats at One Time on Weekend Day
Baseline	11,618	3,873	315	158
2020 Projection	11,925	3,975	323	162

The total number of boats on the lake at any one time was also examined for a summer weekend day in 2020. Based on the assumptions presented above and a projected 11,925 boaters per month during peak season, it is estimated there will be a total of 162 boats at any one time during a summer weekend day. The projected number of boats is similar to the baseline number of boats estimated to use Grayson Lake on a weekend day, indicating that overcrowding is not anticipated to be an issue in the future.

4.8 Implications of Projected Demand on Recreational Activities

Based on previously discussed trends and changing demographics, demand for recreational activities at the Project are expected to change over the next 10 years. This section describes the implications of the trend and demand analysis on recreational activities at the Project.

4.8.1 Boating

Boating is a popular activity at the Project. The number of boaters is anticipated to increase as the population in the area grows. The analysis of the carrying capacity of Grayson Lake indicates that the current use falls between the low- and moderate-density scenarios. Even with the additional boaters expected by 2020, the density scenario is anticipated to remain in the moderate range.

Although the overall capacity of the lake can accommodate the current and future boaters, some facilities that support boaters are insufficient. The boat ramp capacity is sufficient to serve the estimated number of boats that use the lake; however, because the ramps are located on the eastern half of the lake, the southwestern portion is not easy to access by boat.

The Dam Site Area boat ramp and parking area are often congested during peak periods of activity. Providing an additional courtesy dock at the boat ramp would help reduce congestion by moving boats away from the ramp while other activities are ongoing (such as parking the vehicle). Additional parking at the boat ramp, which also serves as parking for the picnic shelter and marina visitors, would also help reduce congestion.

Grayson Lake Marina also has limited vehicle parking. The only dedicated vehicle parking for the marina is a poorly defined gravel lot adjacent to the marina maintenance building. Marina visitors often use the parking area at the Dam Site Area boat ramp.

4.8.2 Camping

The Rolling Hills Campground has 71 campsites, which are typically full on the weekends from May through August. Occupancy during the week is usually at 50 percent. Although there is unmet demand on the weekends during the summer, the campground is operating at 50 percent or less the remainder of the time, indicating that while the demand is high, it is not overcapacity. Projections show only a small increase in camping activity. However, visitors frequently request cabins. Constructing 6 to 8 cabins is estimated to meet the demand.

4.8.3 Fishing

Fishing is a popular activity at the Project. Projections indicate a decrease in fishing visits at the Project, even when accounting for an increase in population. Fishing occurs on Grayson Lake from boat and shore, including the fishing pier. Although Grayson Lake is considered a fair fishery, it is able to support a large number of fishing tournaments throughout the fishing season. The lake is regularly stocked by the KYDFWR. The tailwater of the dam is also stocked and provides opportunities to fish for trout and other species.

The facilities that support fishing activities are sufficient, but congestion is a concern at the Dam Site Area boat ramp, particularly when fishing tournaments are underway. Access to Grayson Lake for shore fishing is available from multiple trails leading from roads in the outgrant areas and the WMA. No concerns were identified regarding the availability of appropriate shore fishing.

4.8.4 Hunting

Hunting is popular at the Project, especially for deer, dove, and turkey. However, projections indicate a decrease in visits for hunting activities at the Project, even when accounting for an increase in population. Because the WMA adequately addresses the current demand (no areas of congestion or conflict were identified), the current facilities are adequate to meet future demand.

4.8.5 Other Activities

Visitors engage in many activities that are included in the “Other” category, such as walking, hiking, golf, and horseback riding. The rate of participation in this category is expected to grow, leading to an increased number of participants engaged in these activities at the Project.

Facilities that support the current participation level in these activities appear to be appropriate for the current needs—the trails are well used but not congested. Additional hiking and biking trails are being developed at the Laurel Gorge Cultural Heritage Center. Changing demographics and preferences are anticipated to shift the activities that visitors participate in to less strenuous forms of activities, indicating a further increase in demand for walking and nature trails that are shorter in length and easier to traverse. Scenic views, wildlife viewing opportunities, and interpretive signage should be considered when developing and managing walking and nature trails.

4.8.6 Picnicking

Picnicking is a popular activity at the Project, and demand is anticipated to increase slightly by 2020 as the population increases. Picnicking is associated primarily with shelters, which are typically fully reserved on weekends during spring, summer, and fall. Meeting the demand is estimated to require adding another picnic shelter. Parking at the shelters is generally not a concern. Although restrooms are available, some are in need of updating to flush type.

4.8.7 Sightseeing

Sightseeing, including wildlife viewing, is the most popular recreational activity at the Project. There are a number of areas along roads and trails that provide scenic views to visitors. By 2020, the number of sightseers is expected to increase because of changes in trends and population increases. This demand could be met by providing additional access to viewsheds.

4.8.8 Swimming

There are two designated swimming beaches available at the Project, but one of them is closed and the other is not open to the general public. Most visitors who swim do so in Grayson Lake from the shore or while boating. The current situation is insufficient to meet the demand for swimming, and there are frequent requests for additional facilities (e.g., another swim beach or pool). This demand is anticipated to increase slightly as the population in the area of influence increases. Participation in swimming would be expected to increase if additional designated swimming areas were available.

4.8.9 Water Skiing

Water skiing takes place on Grayson Lake during the summer months, but it is not a significant recreational activity compared to other activities. Wakeboarding and tubing appear to be more popular than water skiing. The lake is able to handle the current and anticipated demand for water-based sports (waterskiing, tubing, and wakeboarding).

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5.0 Resource Use Objectives

The objectives for the use of Project resources, both manmade and natural, are presented in this section. The objectives are used to guide development in the Project area and also guide resource management to obtain the greatest possible benefit through meeting the needs of the public and protecting and enhancing the environment. In the development of the objectives, the following were considered: authorized Project purposes, applicable Federal laws and directives, regional needs, resource capabilities, and expressed public desires. The information in Sections 2.0, 3.0, and 4.0 form much of the basis for the resource use objectives.

While implementing the following objectives, opportunities should be sought to increase efficiencies, cost effectiveness, and innovation at the Project. Consistent with EO 13514, specific measures to pursue include energy efficiencies, reduction of water consumption, reduction of carbon emissions and reduction of operations and maintenance costs.

5.1 Resource Use Objective 1

Enhance the recreational use of Grayson Lake and increase opportunities for recreational boating and fishing opportunities.

5.1.1 Measures to Achieve Objective

1. Improve boat ramp facilities through adding or enhancing courtesy docks and meeting all applicable boat launch safety standards..
2. Increase the number of access points for boats.
3. Provide mooring locations for boats.

5.1.2 Justification

Boating is one of the popular activities on the lake. Results of the public scoping meeting indicate an interest in updating facilities at the boat ramps, such as paving the parking areas, installing lighting, and increasing security. The carrying capacity of Grayson Lake indicates that additional recreational boating activities can be supported.

5.2 Resource Use Objective 2

Enhance quality and diversity of overnight visitation opportunities.

5.2.1 Measures to Achieve Objective

1. Provide cabins as an additional lodging facility.
2. Increase amenities at campground, such as wireless Internet.

5.2.2 Justification

The recreational program analysis results show a projected increase in participation in camping. The demand for campsites within the Rolling Hills Campground is high, but the current number of campsites is sufficient for demand. There are frequent requests for cabins, which are not available at the project.

5.3 Resource Use Objective 3

Enhance recreational day use activities.

5.3.1 Measures to Achieve Objective

1. Provide additional picnic facilities, such as shelters, to meet current and future demand.
2. Improve swimming opportunities.
3. Enhance walking and hiking opportunities.

5.3.2 Justification

The Project is host to interesting topography, scenic resources, and abundant wildlife that provide a quality environment for trail hiking, sightseeing, and associated eco-tourism activities. Walking and hiking are popular activities in Kentucky, with trends showing an increase in participation in these activities.

Demand for picnic shelters is high, with shelters typically reserved every weekend during the recreation season.

Public comments indicate an interest in re-opening the swimming beach at the Bruin Recreation Area. The lake water quality is appropriate for swimming, but shoreline topography limits swimming access.

5.4 Resource Use Objective 4

Support unique, environmentally sensitive, and culturally sensitive areas.

5.4.1 Measures to Achieve Objective

1. Manage habitat to support a selected number of regionally important neotropical migrant species.
2. Identify and delineate the location, size, and type of wetlands.
3. Enhance existing wetlands or/and create new wetlands.
4. Protect and interpret environmentally unique ecosystems including the old growth Virginia pine, the Hemlock gorge, the state record Sycamore, and the ox-bow.
5. Prevent introduction of invasive species and, where present, control and monitor.
6. Restore native species and habitat conditions in ecosystems that have been invaded by non-native species.

5.4.2 Justification

In addition to supporting the laws and EOs described in Section 1.0 that require the conservation of wildlife and plant species and prohibit the destruction of wetlands, there are opportunities at the Project to provide support for environmentally sensitive areas. A comprehensive delineation of the wetlands at the Project has not been completed since the construction of the Grayson Lake dam. Conservation of the natural habitat within the Project would maintain the rich ecological diversity of the area and also attract visitors to the Project.

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6.0 Land Allocation and Land Classification

The land allocation and land classification information presented in this section provides for the orderly development, use, and management of Project lands and waters. Land allocation and classification categories are established for projects and are based on ER 1130-2-550, *Recreation Operations and Maintenance Policies* (USACE, 1996b).

6.1 Land Allocation

Land allocations identify the authorized purposes for which project lands were acquired. The entire Project has a land allocation of Operations. Operations lands are lands that are acquired to provide safe, efficient operation of the Project for its authorized purposes. The Project purposes are flood risk management, recreation, water quality control, and fish and wildlife management. No separable lands for recreation, fish and wildlife, or mitigation were acquired for the Project.

6.2 Land Classification

Allocated Project lands are further classified to provide for development and resource management consistent with the authorized Project purposes and the provisions of NEPA and other Federal laws. The classification process refines the land allocation to fully use Project lands and considers public desires, legislative authority, regional and Project-specific resource requirements, and suitability. General land classification categories as defined in ER 1130-2-550 (USACE, 1996b) include:

1. Project Operations
2. Recreation
3. Mitigation
4. Environmentally Sensitive Areas
5. Multiple Resource Management
 - (a) Recreation – Low Density
 - (b) Wildlife Management General
 - (c) Vegetative Management
 - (d) Inactive and/or Future Recreational Areas
6. Easement Lands

Table 6-1 identifies land classifications per ER 1130-2-550, and the Project areas included in the classifications and the associated acreages. The land classifications are discussed below, and the land classifications in the Project area are shown in Figure 6-1.

Table 6-1: Land Classifications and Project Areas

Land Classification		Project Area	Acreage
1	Project Operations	Dam Site Area	34
		Grayson Lake State Park	30
		Total	64
2	Recreation – Intensive Use	Grayson Lake Marina	10.3
		Grayson Lake State Park	270
		Laurel Gorge Cultural Center	27
		Dam Site Area	65
		Total	372.3
3	Mitigation	No applicable lands	0
4	Environmentally Sensitive Areas	Environmentally Sensitive Areas occur intermittently throughout the Project, but they are not identified as a separate land classification.	0
5	Multiple Resource Management		
	(a) Recreation – Low Density	Elliott County Shrine Club Park	13
		Grayson Lake State Park	1,212
		Dam Site Area	589
	(b) Wildlife Management General	Wildlife Management Area	14,777
	(c) Vegetative Management	No applicable lands	0
	(d) Inactive and/or Future Recreational Areas	No applicable lands	0
Total		16,591	
6	Easement Lands	Easement Lands	156
		Total	156

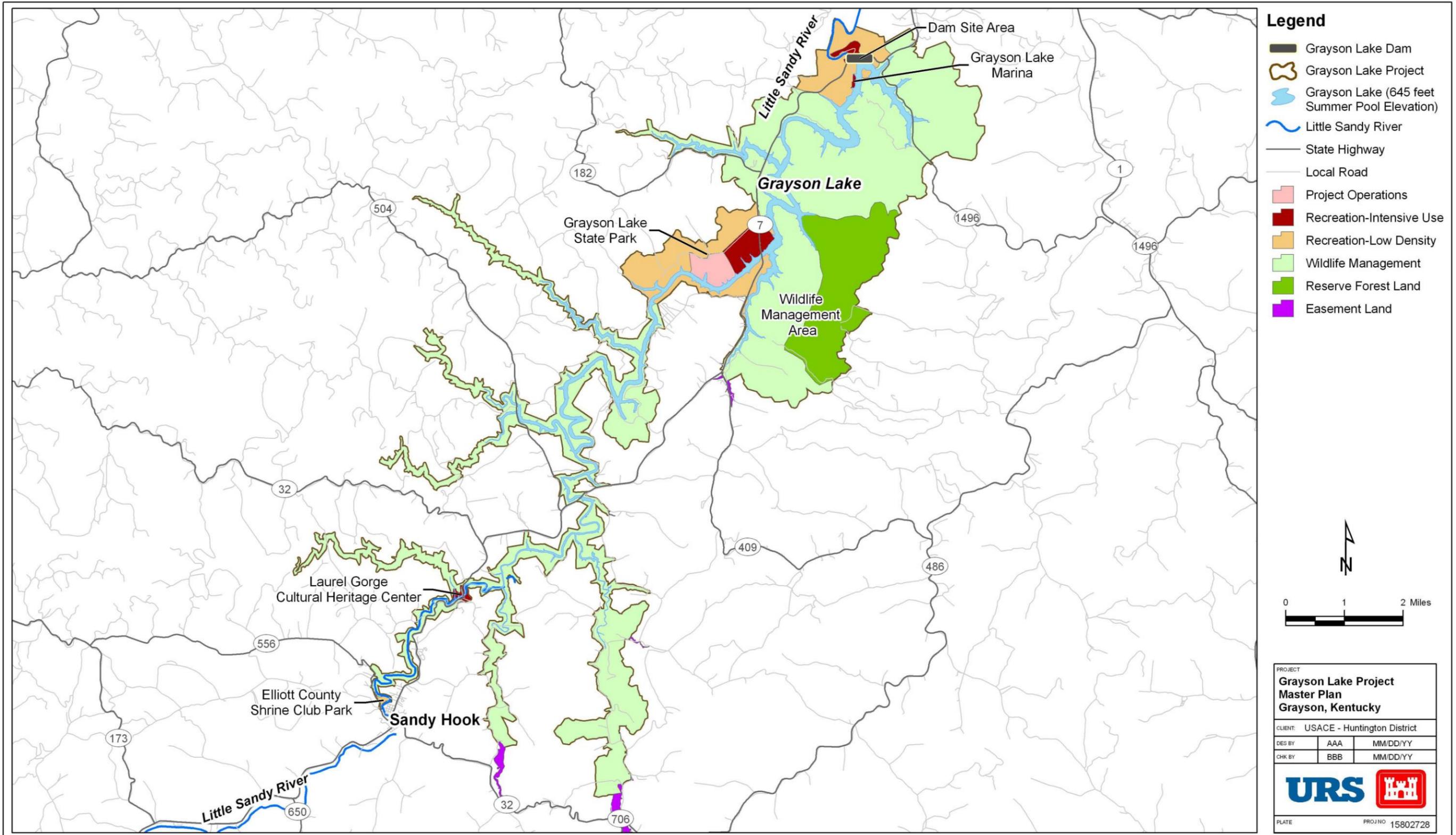


Figure 6-1: Land Use Classifications

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6.2.1 Project Operations

The Project Operations 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 the Project. When compatible with operational requirements, Project Operations lands may be used for wildlife habitat management, recreational use, or agricultural activities. Licenses, permits, easements, or other outgrants are issued only for uses that do not conflict with operational requirements.

6.2.2 Recreation – Intensive Use

The Recreation – Intensive Use classification includes lands that are designated for intensive levels of recreational use to accommodate and support the recreational needs and desires of visitors. These lands include lands on which existing or planned major recreational facilities are located and allow for developed public recreational facilities, concession development, and high-density or high-impact recreational use.

In general, no uses of these lands are allowed that would interfere with public enjoyment of recreational opportunities. Low-density recreation and wildlife management activities compatible with intensive recreational 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 noncompatible manmade intrusions such as pipelines, overhead transmission lines, or non-Project roads, except when warranted by the public interest

6.2.3 Mitigation

The Mitigation classification includes land acquired or designated specifically for mitigation. No mitigation lands exist at the Project.

6.2.4 Environmentally Sensitive Areas

The Environmentally Sensitive Area classification includes areas where scientific, ecological, cultural, or aesthetic features have been identified. Public use is normally limited or prohibited to ensure that the sensitive areas are not adversely affected. Agricultural and grazing uses are not permitted. Environmental Sensitive Areas are located intermittently throughout the Project within other land classification areas.

6.2.5 Multiple Resource Management

The Multiple Resource Management classification includes lands that are managed for one or more of the following subcategories: (a) low-density recreation, (b) wildlife management, (c) vegetative management, and (d) inactive and/or future recreation. However, management is not limited to these activities to the extent they are compatible with the primary allocation(s).

6.2.5.1 Recreation – Low Density

The Recreation – Low Density subclassification includes lands that are designated for dispersed and/or low-impact recreational use. Development of facilities on these lands is limited. Emphasis is on providing opportunities for non-motorized activities such as walking, fishing, hunting, or nature study. Site-specific, low-impact activities such as primitive 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.

Manmade intrusions, including powerlines, 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. When not in conflict with the safety of visitors and project personnel, hunting and fishing are allowed pursuant to tribal or State fish and wildlife management regulations.

6.2.5.2 Wildlife Management General

The Wildlife Management General subclassification includes lands that are designated for wildlife management. These lands contain valuable wildlife habitat components that are maintained to yield habitat suitable for a designated wildlife species or group of species. These lands may be administered by other public agencies under a lease, license, permit, or other formal agreement.

Private use of wildlife lands is prohibited except for agricultural activities undertaken to improve wildlife habitat. Licenses, permits, and easements are not allowed for manmade intrusions such as pumping plants, pipelines, cables, transmission lines, or non-project roads. Exceptions are allowed when necessary for the public interest. Wildlife lands are available for sightseeing, wildlife viewing, nature study, and hiking. Consumptive uses of wildlife, including hunting, fishing, and trapping, are allowed when compatible with the wildlife objectives for a given area and with Federal and State fish and wildlife management regulations.

At the Project, the KYDFWR has primary jurisdiction for wildlife management activities, and the USACE supports these activities.

6.2.5.3 Vegetative Management

The Vegetative Management subclassification includes lands that are designated for vegetative management. Management activities focus on the protection and development of forest resources and vegetative cover.

The Project has no project lands in this subcategory, but all Project lands are managed to protect and develop vegetative cover in conjunction with other lands.

6.2.5.4 Inactive and/or Future Recreational Areas

The Inactive and/or Future Recreational Areas subclassification includes lands that are designated recreational areas that are planned or that contain existing recreational areas that have been closed temporarily.

The Project has no project lands in this subcategory.

6.2.6 Easement Lands

The Easement Lands classification includes all lands for which USACE holds an easement interest but no fee title. Planned use and management of easement lands will be in strict accordance with the terms and conditions of the easement estate acquired for the Project.

Flowage easements have been acquired beyond the Project area and are shown in Figure 6-1.

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7.0 Resource Plan

This section presents the plan for resource use and development at the Grayson Lake Project. The plan includes identified issues and the recommended actions or strategies to address each issue. The issues and recommendation are presented in Table 7-1. Table 7-1 contains the following information for each Project area:

- **Land Classification** – Land use classification. See Section 6.0 for more information on land classifications.
- **Management Agency** – Agency or agencies directly responsible for managing a Project area.
- **Issues** – Identified issues, which are based on input from the public and interested agencies. Each issue relates to the resource use objective (RUO) listed in Section 5.0.
- **Recommendations** – Proposed actions or strategies to address the identified key issues. Recommendations are conceptual in nature and will be translated into operational terms in the Operational Management Plans. Prior to the implementation of any development activity, additional environmental studies and economic analysis may be conducted if necessary. The recommendations relate to the Project-specific measures that are intended to achieve the objective listed in Section 5.0.

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Table 7-1: Resource Plan for the Grayson Lake Project

Project Area	Land Classification	Management Agency	Issue	Recommendations
Dam Site Area	Project Operations and Recreation	USACE	Current boat ramp facilities do not meet needs. There is congestion at the boat ramp during the summer season including weekends, holidays, and fishing tournaments. (RUO 1)	<ul style="list-style-type: none"> • Provide procedural signage at boat ramp area to increase launch efficiency. • Provide an additional courtesy dock at the boat ramp. The courtesy dock should be similar in design to the existing dock and located on the opposite side of the boat ramp. An additional dock would allow more boats to be docked while boaters are attending to other tasks. See Figure 7-1.
			Recreational facilities do not meet the needs and demands of visitors. Shelters are reserved throughout the recreation season. (RUO 3)	<ul style="list-style-type: none"> • Construct one additional picnic shelter to meet demand. Potential area for new shelter is the lower dam site area. Develop the site with picnic tables, charcoal grills, and trash receptacles. Construct restroom facility to accommodate shelter visitors. Road access is currently available, but a parking lot with 15 spaces would be needed. See Figure 7-1. • Relocate an existing shelter within the dam site area. Develop the sites with picnic tables, charcoal grills, and trash receptacles. Construct restroom facility to accommodate shelter visitors. See Figure 7-1
Grayson Lake State Park (Rolling Hills Campground, Hidden Cove Golf Course, and Bruin Recreation Area)	Project Operations and Recreation	Kentucky Department of Parks	Current boat ramp facilities do not meet needs. The existing courtesy dock is not usable during periods of high water. (RUO 1)	<ul style="list-style-type: none"> • Replace existing courtesy dock with floating courtesy dock at the Bruin Recreation Area. The courtesy dock should be able to accommodate changes in water levels.
			Current camping facilities do not meet demand and needs. There are frequent requests for cabins. (RUO 2)	<ul style="list-style-type: none"> • Provide 8 cabins to meet demand. Potential area for the cabins is southwest of the existing campground. See Figure 7-2. • Provide wireless Internet service throughout the campground. Wireless Internet is an amenity that is becoming more popular and would be used by a wide variety of visitors.
			Recreational facilities do not meet the needs and demands of visitors. Complaints are received regarding current chemical toilets. (RUO 3)	<ul style="list-style-type: none"> • Replace existing restroom facility near the Hidden Valley Golf Course with flush toilets.
			The water costs for Hidden Valley Golf Course are high. Irrigating with treated water is not necessary and costly. (RUO 5)	<ul style="list-style-type: none"> • Provide an alternative water supply for irrigation by constructing a pipeline and pump to draw water from the lake. See Figure 7-2.
Wildlife Management Area	Multiple Resource Management, Wildlife Management General	KYDFWR	Boat access to Grayson Lake is limited. Boat ramps are located on the eastern portion of the lake, but the southwestern portion of the lake is not easy to access by boat. (RUO 1)	<ul style="list-style-type: none"> • Develop a one-lane boat ramp in southwestern portion of lake that can be used for small motorized boats and for launching non-motorized boats (e.g., canoes, kayaks). A parking lot should be able to accommodate 10 vehicles with trailers and 10 passenger vehicles. Potential location for the ramp is at the confluence of Little Sandy River and Laurel Creek.
			The locations and extent of the various ecosystems are not well known, which hinders the ability to provide effective management. (RUO 4)	<ul style="list-style-type: none"> • Identify and delineate the location, size, and extent of ecosystems. Enhance management activities to conserve and protect wildlife and surrounding habitat.
			The Project area includes unique habitats such as wetlands, habitat that supports neotropical migratory birds, and bottomland hardwood.	<ul style="list-style-type: none"> • Conduct baseline study that identifies habitats throughout the Project (e.g., wetland delineation) and develop monitoring program. The amount and range of the habitats would allow losses or gains to be tracked.
Laurel Gorge Cultural Heritage Center	Recreation (Low Density)	Elliott County	Recreational facilities do not meet the demands of visitors. Hiking and biking trails are in high demand, and facilities at the shelter are limited. (RUO 3)	<ul style="list-style-type: none"> • Develop additional hiking and biking trails. The trail should be easy to traverse to accommodate a wide range of users and include interpretive signage. • Construct a restroom adjacent to the picnic shelter for use by visitors to the shelter and trail system.
Elliott County Shrine Club Park	Recreation (Low Density)	Elliott County	Project area not regularly used and no needs were identified by stakeholders.	<ul style="list-style-type: none"> • No additional development is recommended.

Table 7-1: Resource Plan for the Grayson Lake Project

Project Area	Land Classification	Management Agency	Issue	Recommendations
Grayson Lake Marina	Recreation (Intensive Use)	VCV Inc.	Facilities do not meet the needs of visitors. Available parking is limited. (RUO 1)	<ul style="list-style-type: none"> • Construct an asphalt parking lot for visitors to replace the existing undefined gravel lot. Striping of the lot should maximize spaces for passenger vehicles. • Construct maintenance storage yard for trailers and equipment not being used or worked on to provide vehicle parking space near marina. Figure 7-1.
Grayson Lake	Project Operations	USACE	Opportunities for mooring boats for day and overnight use are limited. (RUO 1)	<ul style="list-style-type: none"> • Provide mooring buoys at different locations around the lake for day and overnight use. The buoys should be large enough to accommodate houseboats.

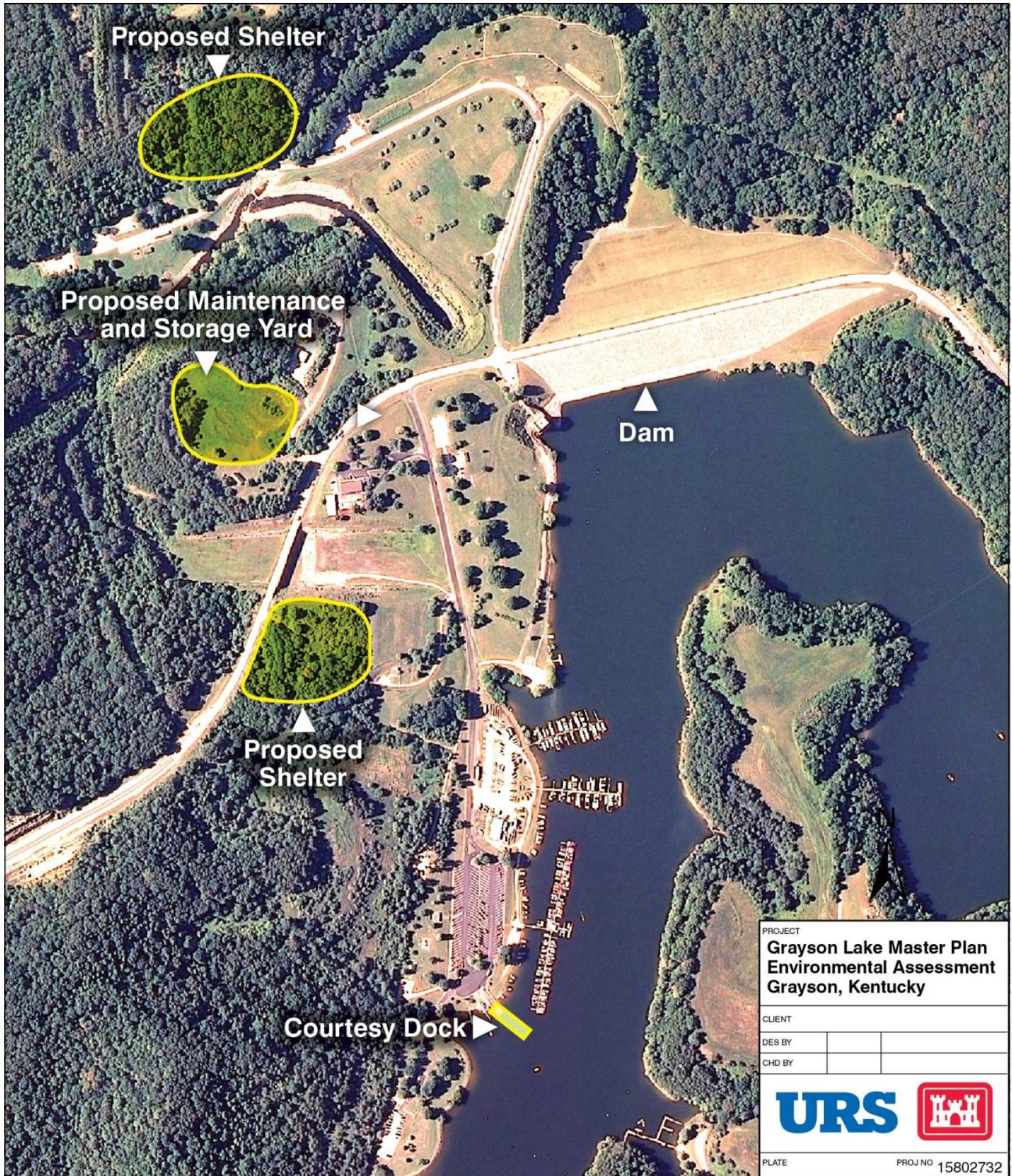


Figure 7-1: Recommendations for Dam Site Area

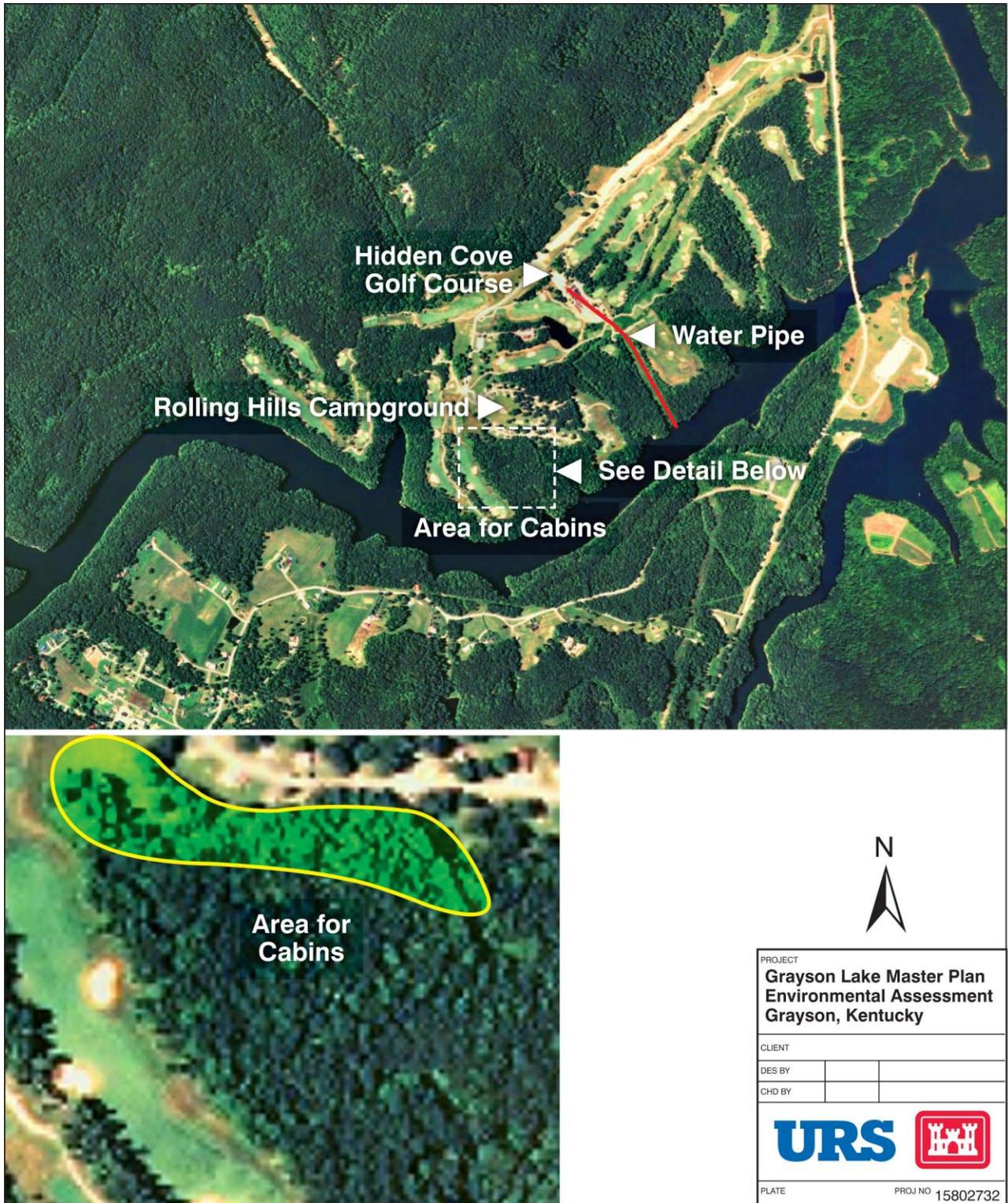


Figure 7-2: Recommendations for Grayson Lake State Park

8.0 Special Programs

According to EP 1130-2-550, *Recreation Operations and Maintenance Guidance and Procedures* (USACE, 1996b), special programs are programs or situations that should be identified and discussed in a Master Plan but are not covered in the other sections of the plan. Future development of utility corridors at the Project was identified for consideration as a special program.

The Energy Policy Act of 2005 (PL 109-58) directed the Secretaries of Agriculture, Commerce, Defense, Energy, and Interior to identify corridors for oil, gas, and hydrogen pipelines and electricity transmission and distribution facilities on Federal lands and to schedule prompt action to identify, designate, and incorporate the corridors into the applicable land use plans. In 2009, the USACE issued a Non-Recreational Outgrant Policy (USACE, 2009b), which states that the primary rationale for authorizing any future non-recreational outgrant request for use on USACE lands or waters will be (1) there is no viable alternative to the activity or structure being located on Civil Works land or waters or (2) it will directly benefit the Federal Government. Public utilities including power lines and gas and fuel pipelines are examples of outgrant requests that have been received by the USACE. Although no proposal has been made for either a major underground or aboveground utility line through the Project, such proposals may be issued in the future.

Developing a utility corridor for a major electrical transmission line or pipeline is a complex undertaking and must take into account numerous engineering and environmental issues as well as acquisition of rights-of-way and easements. The evaluations of many of these issues are guided by criteria developed by regulating agencies, including Federal, State, and municipal entities.

The focus of this section is to present factors that should be considered if a proposal for a utility is presented. The factors identified do not replace or take precedence over criteria that are used by regulating agencies, but provide a guide to reducing the recreational and environmental impacts to the Project. The following key factors should be reviewed and assessed to identify potential locations that would cause the least disruption to the recreational and environmental goals of the Project:

1. Existing utility corridors
2. Intensive-use recreation areas
3. Environmentally or culturally sensitive areas

4. Existing roadways
5. Footprint on Project lands

Existing Utility Corridors

The use of existing utility corridors should be evaluated to determine if the proposed utilities can be placed along the same corridor. Although no existing corridors were identified within the Project, the use of an existing corridor would cause less disruption to Project lands than constructing a new corridor. Future utilities should be grouped into the same corridor to reduce the recreational and environmental impacts.

Intensive-Use Recreation Areas

One of the primary objectives of the Project is recreational use. The presence of a utility corridor would disrupt the use and enjoyment of the Project by visitors. Therefore, Project areas listed as intensive-use (Figure 8-1, see Table 6-1) should be avoided to cause the least disruption to the recreational use of the Project by visitors.

In addition to direct impacts on recreational use, utility corridors may affect the natural beauty of the Project lands. Even if a utility corridor does not cross an intensive-use recreation area, it may impact visitors using the intensive-use areas. For example, an overhead transmission line crossing the lake may impair the view shed of visitors. Therefore, the visual impacts in areas that have intensive recreational use should be evaluated.

Although Grayson Lake is not listed as a recreation area, the lake receives significant use from boaters and fisherman. Locating certain types of utilities, such as an overhead transmission line, would cause considerable disruption and loss of aesthetic value to the users. If the lake must be crossed by the utilities, the narrow portions of the lake should be promoted.

Environmentally or Culturally Sensitive Areas

There are a number of environmentally and culturally sensitive areas located throughout the Project (Figure 8-1). These areas are unique and should be maintained; therefore, potential utility corridors should avoid these areas.

Existing Roadways

Roadways are present throughout the Project to provide access to the Project and to allow residents to pass through the area (Figure 8-1). These roadways represent areas that have already been removed from recreational use and have encountered environmental impacts. Placing utility

corridors adjacent to existing roadways would decrease the recreational and environmental impacts to the Project.

Footprint on Project Lands

The width of the Project varies throughout the Project area (Figure 8-1). If a utility corridor must pass through the Project, the option that presents the smallest footprint on Project lands should be selected.

Once a formal proposal is received, an evaluation should be conducted using the factors above to identify potential impacts. Recommendations for alternative utility corridor locations should be based on the evaluation.

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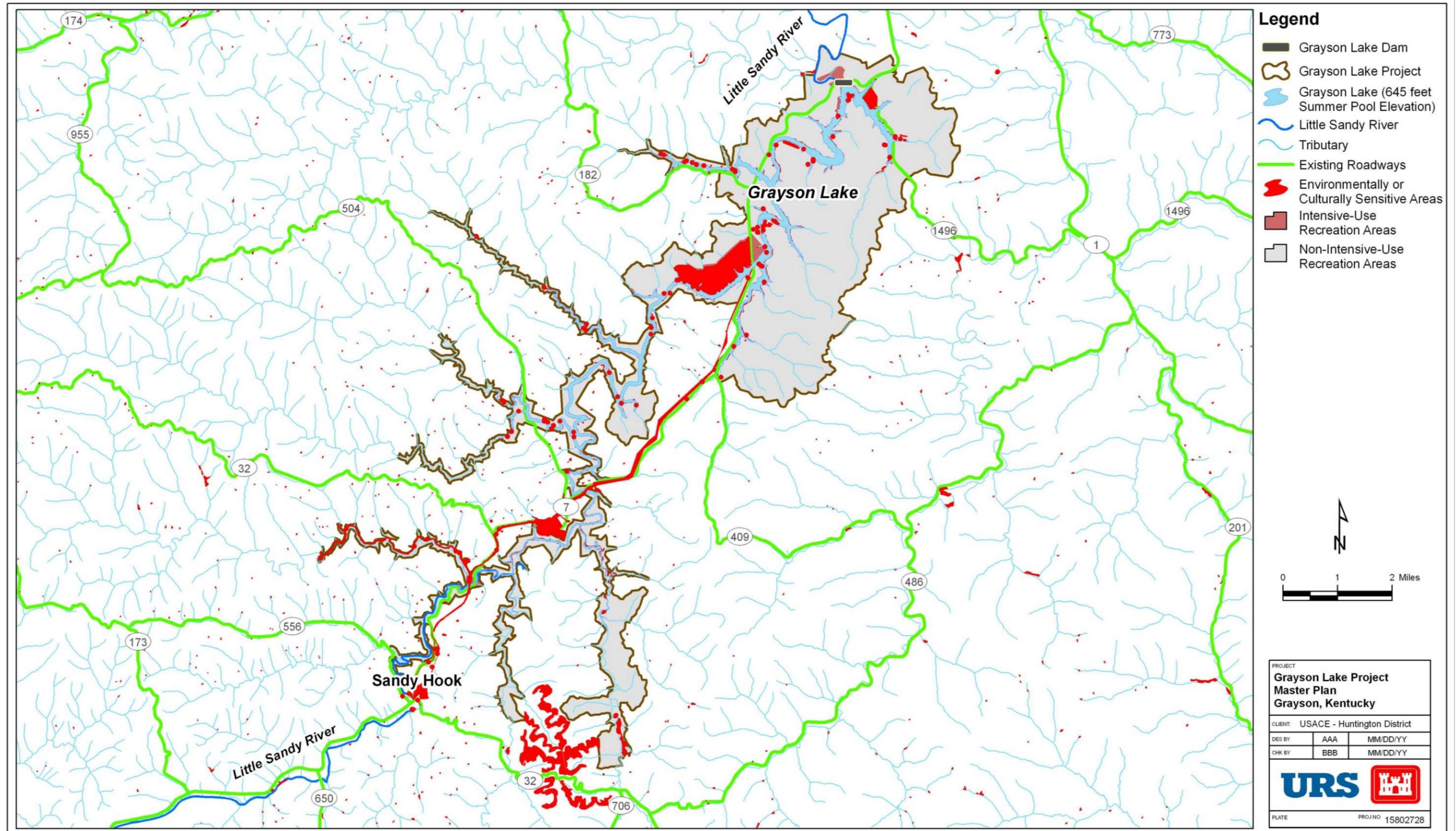


Figure 8-1: Locations of Evaluation Factors

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**Appendix A:
Acronyms and Abbreviations**

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ADA	Americans with Disabilities Act
AMSL	above mean sea level
ATV	all-terrain vehicle
BLM	Bureau of Land Management
BMP	best management practice
Camp Webb	Camp Robert C. Webb
CFR	Code of Federal Regulations
Commonwealth	Commonwealth of Kentucky
EO	Executive Order
EPA	U.S. Environmental Protection Agency
FY	fiscal year
GIS	Geographical Information System
HPMP	Historic Properties Management Plan
KSNPC	Kentucky State Nature Preserves Commission
KYDFWR	Kentucky Department of Fish and Wildlife Resources
n.d.	no date
NEPA	National Environmental Policy Act
NGVD	National Geodetic Vertical Datum
NHPA	National Historic Preservation Act
NPS	National Park Service
NRHP	National Register of Historic Places
NWI	National Wetland Inventory
OMP	Operational Management Plan
PL	Public Law
Project	Grayson Lake Project
RUO	resource use objective
RV	recreational vehicle
SCORP	<i>Statewide Comprehensive Outdoor Recreation Plan</i> (Commonwealth of Kentucky, 2008)
spp.	species pluralis (multiple species)
SR	State Route
U.S.C.	U.S. Code
USACE	U.S. Army Corps of Engineers

USDA	U.S. Department of Agriculture
USFS	U.S. Forest Service
USFWS	U.S. Fish and Wildlife Service
VERS	Visitor Estimation Reporting System
WMA	Wildlife Management Area

**Appendix B:
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Appendix C:
Summary of Public Scoping Meetings

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SCOPING MEETING NOTES

Grayson Lake Public Meeting Minutes

Tuesday, August 18, 2009

Attendees:

Dan Bock, U.S. Army Corps of Engineers, Huntington District
Kim Barnett, U.S. Army Corps of Engineers, Huntington District
Kelley Poff, U.S. Army Corps of Engineers, Huntington District
Bernice McCloud, Army Corps of Engineers, Huntington District
Frank Jeffery, U.S. Army Corps of Engineers, Huntington District, Grayson Lake
Sylvia Chelf, Army Corps of Engineers, Huntington District, Grayson Lake
Richard Mauro, Kentucky Department of Fish and Wildlife
Kelly Stoll, URS
Jagadish Prakash, URS
Jack Bunja, URS

COMMENTS/ISSUES

Recreation (14 comments)

- Everyone who parks at marina should pay fees - 2
- More security at the parking lots - 2
- More hiking trails - 1
- No more launch fees - 1
- More lights at the boat ramp - 1
- Update the boat ramp and floating dock - 1
- Blacktop picnic parking lot - 1
- Dock near campground - 1
- Add more parking at Shelter 3 - 1
- Relieve traffic congestion in recreation areas - 1
- Enforcement of abandoned property 1
- ATV trail 1

Fish & Wildlife (7 comments)

- Concerned about declining numbers black/small mouth bass - 3
- Stock more shad - 1
- Additional structures for fish - 1
- Better fishery - 1
- Preserve Oxbow area near the dam- 1

Other (3 comments)

- Increase in lake sediment, dredge to reduce - 1
- Don't allow KY DOH to straighten Route 7 - 1
- Leave Route 7 as a "green zone" and do not permit structures near the road - 1

Flood Damage Control (0 comments)

Water Quality (0 comments)

Key Issues

- Route 7 should not be straightened and keep as a green zone
- Additional lights and security near the boat ramp and parking lot
- Parking at the marina – all visitors should pay \$3 fee
- Increase parking near Shelters 2 and 3
- Add additional walking trails
- Pave gravel areas to accommodate older visitors
- More robust stocking program
- Closed state beach
- Replace floating dock – will be installed by May 2010

Grayson Lake Stakeholder Meeting Minutes

Tuesday, August 18, 2009, AM Meeting

Attendees:

Mike Swatzyna, Kentucky State Parks Department

Alex Thor, Kentucky State Parks Department

Beverly Faulkner, Grayson Lake State Park

Dan Bock, U.S. Army Corps of Engineers, Huntington District

Kim Barnett, U.S. Army Corps of Engineers, Huntington District

Kelley Poff, U.S. Army Corps of Engineers, Huntington District

Bernice McCloud, U.S. Army Corps of Engineers, Huntington District

Frank Jeffery, U.S. Army Corps of Engineers, Huntington District, Grayson Lake

Sylvia Chelf, U.S. Army Corps of Engineers, Huntington District, Grayson Lake

Kelly Stoll, URS

Jagadish Prakash, URS

Jack Bunja, URS

KEY POINTS:

Project purpose of Grayson Lake as authorized:

- Flood Damage Reduction
- Water Quality
- General Recreation
- Fish and Wildlife Conservation

The Grayson Lake Master Plan looks at 3 key items:

- Regional Need
- Resource Management
- Local Input

COMMENTS/ISSUES

Kentucky State Parks Department

- Develop cottages at the golf course
- For purposes of the Master Plan, there may be development of additional accommodations

- Campground facilities are up to date

QUESTIONS/DISCUSSIONS

- The state's GIS mapping effort will include boundaries, utilities and horticultural locations
 - Golf course complete
 - Will share data with the Corps
 - Has talked with counterpart at the Huntington District
 - All state agencies are working to update data and centralize
- Some state cabins are on historic property
 - These cabins must be restored with historic materials
 - Cannot replace, must restore the cabin
 - Recommends putting "accommodations" in the Master Plan
- Typically golfers do not utilize the camp sites
 - The state runs a program, Tees and Zzzs – most golfers stay at Carter Caves and drive to Grayson's course
 - The course has a \$1 million budget, 16,000 rounds played from August 2008 to August 2009
- The marina is run by a private concessionaire – the state had no plans to take over
- The state would like to expand the marina and the camping facilities, but there is no budget at this time
- Restrooms were in the original golf course plan – may be added in the future
- The state close the beach area this summer
 - It is unclear when it will reopen
 - There is no permanent structure closing the access to the beach – only caution tape
 - No permanent signs are posted

KEY ISSUES

- Cliff diving
- State operated beach is closed
- Historic cabin

Grayson Lake Stakeholder Meeting Minutes

Tuesday, August 18, 2009, PM Meeting

Attendees:

Richard Mauro, Kentucky Department of Fish and Wildlife
 Fred Howes, Kentucky Department of Fish and Wildlife
 Tom Timmermann, Kentucky Department of Fish and Wildlife
 Nathan Hall, Kentucky Division of Forestry
 Floyd Willis, Kentucky Division of Forestry
 Dan Bock, U.S. Army Corps of Engineers, Huntington District

Kim Barnett, U.S. Army Corps of Engineers, Huntington District
Kelley Poff, U.S. Army Corps of Engineers, Huntington District
Bernice McCloud, Army Corps of Engineers, Huntington District
Frank Jeffery, U.S. Army Corps of Engineers, Huntington District, Grayson Lake
Sylvia Chelf, Army Corps of Engineers, Huntington District, Grayson Lake
Kelly Stoll, URS
Jagadish Prakash, URS
Jack Bunja, URS

KEY POINTS:

Project purpose of Grayson Lake as authorized:

- Flood Damage Reduction
- Water Quality
- General Recreation
- Fish and Wildlife Conservation

The Grayson Lake Master Plan looks at 3 key items:

- Regional Need
- Resource Management
- Local Input

COMMENTS/ISSUES

Kentucky Department of Fish and Wildlife

- There is a five year plan to develop GIS maps – *wildlife management*
- They plan to add more fish attractors in the fall - *fisheries*
- The fertility of Grayson Lake is low and underwater topography is not conducive for some fish

Kentucky Division of Forestry

- Division is closely monitoring all local timbering operations
- The hemlock wooly adelgid is threatening trees on Grayson Lake
- The American chestnut restoration is going well

QUESTIONS/DISCUSSIONS

- The department does wildlife surveys on Grayson
 - Much of the work is overland management
 - Hiking trails, horse trails, and hunting on Grayson Lake
 - The state's GIS mapping effort will include boundaries, utilities and horticultural locations
 - Wildlife management would like to mark the boundaries in the southern portion of Grayson Lake
- The fisheries department finds Grayson Lake difficult to manage
 - There is an active restocking program
 - From 1976 through 2004, their department stocked 213,000 bass

- In the last 10 years, small mouth bass were stocked, but habitats limit the number of fish in the lake
- GIS mapping of fish attractors
- GPS locations of larger bass
- Would like to do a vegetation survey
- The forestry department primarily deals with public land
 - Use a fire detection plane for monitoring
 - Before coming on to Corps property, they will notify the Corps and ask permission
 - Permission will be made on a case-by-case basis with the local Corps resource manager
 - Prescribed burning only on Fish and Wildlife area of Grayson
- Trees in eastern Kentucky are under attack by the hemlock wooly adelgid
 - The trees can be inoculated but it is expensive and difficult
 - Not at Grayson, but it is spreading
 - Most of Laurel Creek area is under protection
 - Private citizens can inoculate their trees, but it is costly and there is not a cost-share program at this point
 - Ash trees are being attacked by the ash borer, no proven way to stop

KEY ISSUES

- Cliff diving
- State operated beach is closed
- Historic cabin
- Horse riders using non-horse trails

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