Grayson Lake Project Master Plan

Draft Programmatic Environmental Assessment

August 2011

prepared for:

US Army Corps of Engineers ®
Huntington District

Huntington, West Virginia 25701

prepared by:

URS

Project No. W91237-08-D-0023
Task Order 0018

This page intentionally left blank.

Table of Contents

Acronyms and Abbreviations ..... **v**

1.0 Introduction **1-1**

1.1 Scope of the Programmatic Environmental Assessment 1-1

1.2 Grayson Lake Project Background 1-1

1.3 Grayson Lake Project Authority 1-4

1.4 Purpose and Need 1-4

2.0 No Action and Proposed Action Alternatives **2-1**

2.1 No Action Alternative 2-1

2.2 Proposed Action 2-1

3.0 Environmental Setting **3-1**

3.1 Physical Environment 3-1

3.1.1 Topography 3-1

3.1.2 Geology 3-1

3.1.3 Soils 3-5

3.1.4 Water Resources 3-11

3.1.5 Floodplains 3-21

3.1.6 Air Quality 3-21

3.1.7 Climate 3-21

3.1.8 Noise 3-21

3.2 Biological Environment 3-25

3.2.1 Vegetation 3-25

3.2.2 Wetlands 3-31

3.2.3 Terrestrial Wildlife 3-31

3.2.4 Aquatic Life 3-36

3.2.5 Threatened and Endangered Species 3-38

3.3 Socioeconomic Environment 3-43

3.3.1 Population and Employment 3-43

3.3.2 Environmental Justice 3-46

3.3.3 Transportation and Traffic 3-47

3.3.4 Recreation 3-47

3.4 Cultural Resources 3-51
3.4.1 Aesthetics 3-53
3.5 Land Use 3-53

4.0 Environmental Impacts of Alternatives 4-1
4.1 Physical Environment 4-1
4.1.1 Topography, Geology, and Soils 4-1
4.1.2 Water Resources 4-2
4.1.3 Floodplains 4-4
4.1.4 Air Quality 4-5
4.1.5 Noise 4-6
4.2 Biological Environment 4-6
4.2.1 Vegetation 4-6
4.2.2 Wetlands 4-8
4.2.3 Terrestrial Wildlife 4-8
4.2.4 Aquatic Life 4-9
4.2.5 Threatened and Endangered Species 4-11
4.3 Socioeconomic Environment 4-12
4.3.1 Population and Employment 4-12
4.3.2 Environmental Justice 4-12
4.3.3 Transportation/Traffic 4-13
4.3.4 Recreation 4-14
4.3.5 Cultural Resources 4-14
4.3.6 Aesthetics 4-16
4.4 Land Use 4-17
4.5 Cumulative Impacts 4-18
4.5.1 Past and Present Actions 4-18
4.5.2 Reasonably Foreseeable Future Actions 4-18
4.5.3 Impacts 4-18
4.6 Summary of Mitigation Measures and Agency Consultation Requirements 4-19

5.0 References 5-1

Appendices

Appendix A Grayson Lake Project Master Plan (2011)

Appendix B Distribution List for Draft Programmatic Environmental Assessment

List of Figures

Figure 1-1: Grayson Lake Project Location 1-3

Figure 3-1: Topography Suitability for Project Development 3-3

Figure 3-2: Grayson Lake Project Soils 3-9

Figure 3-3: Grayson Lake Watershed 3-13

Figure 3-4: Surface Waters in the Project Area 3-15

Figure 3-5: Groundwater Wells 3-19

Figure 3-6: Inundation Areas of Summer Pool and Maximum Flood Control Elevations 3-23

Figure 3-7: Vegetation and Land Cover in the Project Area 3-27

Figure 3-8: Wetlands in the Project Area 3-33

Figure 3-9: Recreational Areas in the Grayson Lake Project 3-49

Figure 3-10: Project Lands with Mineral Rights and Oil and/or Gas Wells 3-55

List of Tables

Table 1-1: Federal and Outgrant Recreational Areas 1-2

Table 2-1: Grayson Lake Project Master Plan Recommended Measures and Actions 2-2

Table 3-1: Soils Covering Greater Than 1 Percent of the Project Area in Order of Predominance 3-6

Table 3-2: Land Cover Types in the Project Area 3-25

Table 3-3: Animals Commonly Found in the Grayson Lake Project Area 3-35

Table 3-4: Common Fish Species in Grayson Lake 3-37

Table 3-5: Listed Threatened and Endangered Species in Carter and Elliott Counties 3-40

Table 3-6: Population in the Area of Influence 3-44

Table 3-7: Median Household Income in the Subareas of Influence 3-44

Table 3-8: Number of Visitors to the Grayson Lake Project, Fiscal Years 2000–2010 3-45

Photographs

Photograph 3-1: Grayson Lake 3-17
Photograph 3-2: Scenic View from Grayson Lake 3-53

Acronyms and Abbreviations

AMSL	above mean sea level
BMP	best management practice
CFR	Code of Federal Regulations
CO	carbon monoxide
Commonwealth	Commonwealth of Kentucky
CWA	Clean Water Act
dB	decibel
DNL	Day-Night Average Sound Level
EO	Executive Order
EPA	U.S. Environmental Protection Agency
ESA	Endangered Species Act of 1973
FERC	Federal Energy Regulatory Commission
FY	fiscal year
GIS	Geographic Information System
HPMP	Historic Properties Management Plan
I	Interstate
KPDES	Kentucky Pollutant Discharge Elimination System
KSNPC	Kentucky State Nature Preserves Commission
KYDFWR	Kentucky Department of Fish and Wildlife Resources
NEPA	National Environmental Policy Act
NGVD	National Geodetic Vertical Datum
NHPA	National Historic Preservation Act
NHRP	National Register of Historic Places
NPDES	National Pollutant Discharge Elimination System
NO_2	nitrogen dioxide
NOAA	National Oceanic and Atmospheric Administration
NWI	National Wetland Inventory
O_3	ozone
PEA	Programmatic Environmental Assessment
Project	Grayson Lake Project
spp.	*species pluralis* (multiple species)

SR	State Route
State Park	Grayson Lake State Park
U.S.C.	U.S. Code
USACE	U.S. Army Corps of Engineers
USDA	U.S. Department of Agriculture
USFWS	U.S. Fish and Wildlife Service
var.	variety
WMA	Wildlife Management Area

1.0 INTRODUCTION

The 1987 Grayson Lake Project Master Plan (USACE, 1987) (1987 Master Plan) was updated in 2011. The U.S. Army Corps of Engineers (USACE) proposes to implement the measures and actions that are recommended in the updated Master Plan (USACE, 2011) to achieve five resource use objectives. The environmental impacts of these measures have been evaluated, and the results of the evaluation are presented in this document. The measures are referred to collectively as the Proposed Action.

This draft Programmatic Environmental Assessment (PEA) has been prepared in part to fulfill the requirements of the National Environmental Policy Act (NEPA) of 1969 (42 U.S.C. §§ 4321–4327). The PEA identifies and assesses the potential environmental impacts of the Proposed Action. As required under NEPA, the draft PEA contains an assessment of the No Action Alternative in which the Proposed Action would not be implemented. The PEA is being prepared in coordination with Federal and State agencies and will support USACE decision-making regarding implementation of the measures recommended in the updated Master Plan.

1.1 Scope of the Programmatic Environmental Assessment

NEPA documents are allowed to cover broad actions, such as agency programs and related or similar actions, under the Council on Environmental Quality's NEPA implementing regulations (40 CFR § 1502.4). These NEPA documents are referred to as "Programmatic," are often broad in scope, and may be followed by supplemental NEPA documentation that incorporates the programmatic documents by reference. Supplemental NEPA documentation addresses specific actions.

Because the designs, specifications, footprints, and implementation schedules of the Proposed Action have not been finalized, this draft PEA contains a general evaluation of potential environmental impacts of the Proposed Action. Supplemental NEPA documents, which may include Categorical Exclusions or Environmental Assessments, may be required for implementation of individual measures or actions. The USACE would determine the appropriate level of NEPA documentation and whether incorporation of this PEA by reference into the supplemental NEPA documentation is appropriate for each action/measure.

1.2 Grayson Lake Project Background

The USACE manages 16,930 acres in Carter and Elliott Counties, Kentucky, which includes the Grayson Lake dam, Grayson Lake, and adjacent lands (Figure 1-1). The Grayson Lake Project

(Project) is 7 miles south of Grayson, Kentucky, on State Route (SR) 7. Table 1-1 lists the acreages of the Federal recreational and outgrant areas along with the managing agencies and major facilities and activities.

Table 1-1: Federal and Outgrant Recreational Areas

Area	Acreage	Managing Agency	Major Facilities/Activities
Dam Site Area	642	USACE	Boat ramp Dam Hiking trails Picnic shelters Information Center
Grayson Lake State Park (includes Rolling Hills Campground, Hidden Cove Golf Course, and Bruin Recreation Area)	1,512	Kentucky Department of Parks	18-hole golf course Boat ramp Sports facilities Campsites Clubhouse/pro shop Picnic shelters Playground Swimming beach (closed) Hiking/walking trails
Wildlife Management Area, including Camp Webb	14,777	KYDFWR	Boat ramps Hunting Multi-use trails Wildlife conservation Swimming beach
Laurel Gorge Cultural Heritage Center	27	Elliott County	Hiking trails Interpretive trail Outdoor classroom Picnic shelter Interpretive nature center
Elliott County Shrine Club Park	13	Elliott County	Open area used primarily for horse shows
Grayson Lake Marina	10.3	VCV Inc.	Boat slips Pontoon boat rentals Small store

KYDFWR = Kentucky Department of Fish and Wildlife Resources
USACE = U.S. Army Corps of Engineers

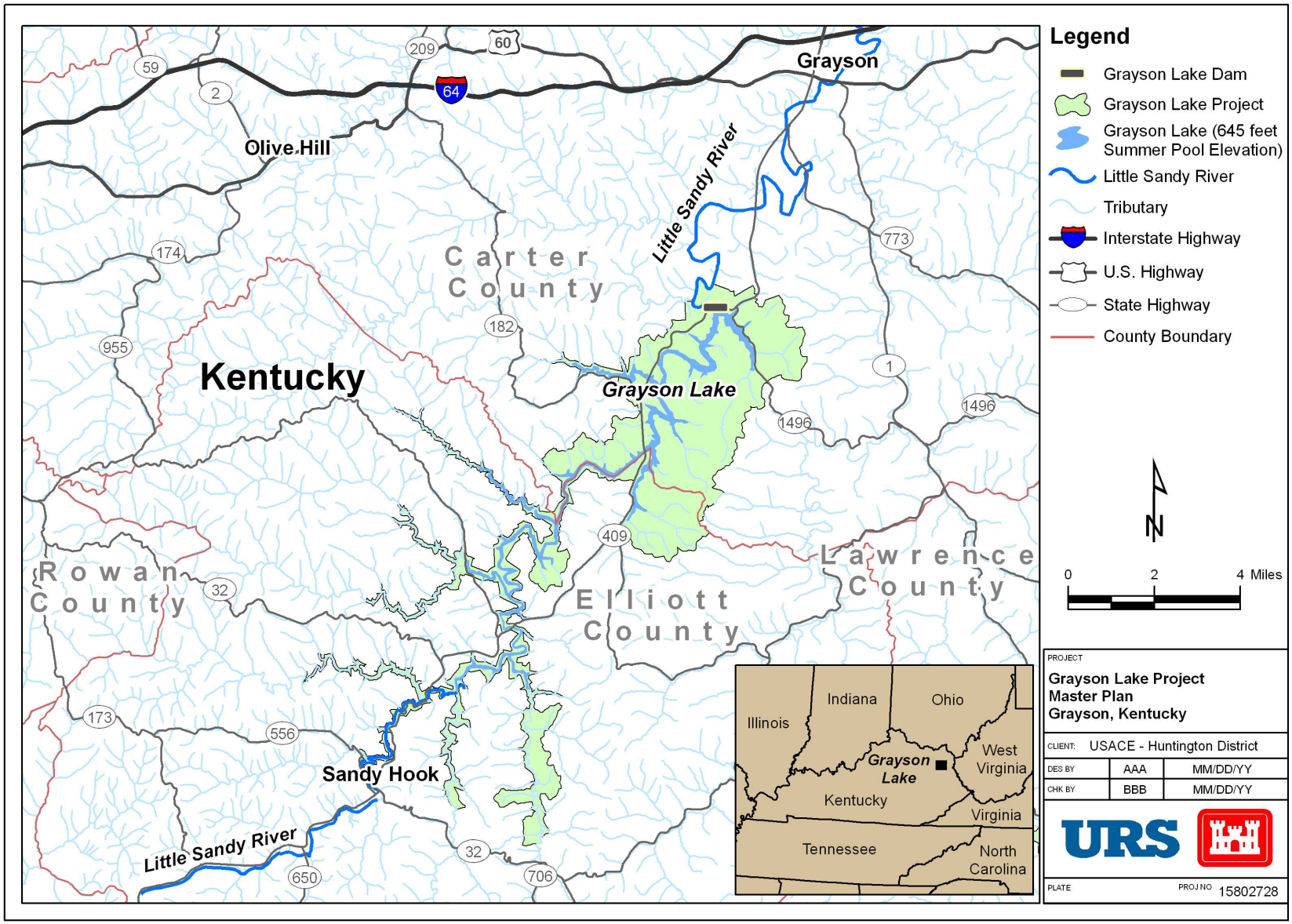

Figure 1-1: Grayson Lake Project Location

1.3 Grayson Lake Project Authority

The Grayson Lake Project was authorized by the Flood Control Act of 1960 (Public Law 86-645). Dam construction was completed in 1968. The primary authorized purpose of the Grayson Lake Project is flood risk management, and the secondary purposes are recreation and water quality improvement (USACE, 1994).

1.4 Purpose and Need

This PEA contains an evaluation of the environmental impacts of the measures and actions that are recommended in the 2011 Grayson Lake Master Plan (USACE, 2011) (Master Plan Update). Master plans are updated periodically to maintain focus on regional and ecosystem needs, project resource capabilities and sustainability, and expressed public interests and desires. An updated master plan is essential in fostering efficient and cost-effective projects for natural and cultural resources management and recreational programs by ensuring that current environmental mandates and considerations are incorporated (USACE, 1996). The Master Plan Update also includes recommendations for accommodating increased or new demands that may affect project resources.

The Master Plan Update addresses the resources in the Project area, which include but are not limited to water; geology; soils; vegetation; wildlife; and aquatic, cultural, aesthetic, recreational, and mineral resources. Through the implementation of the Master Plan Update, Project managers can provide responsible and timely protection, conservation, and enhancement of Project resources. The PEA is needed to assist USACE in its decision-making process regarding implementation of the Master Plan Update's recommended measures and actions to comply with NEPA.

2.0 NO ACTION AND PROPOSED ACTION ALTERNATIVES

This section provides a description of the two alternatives considered in this PEA—the No Action Alternative and the Proposed Action.

2.1 No Action Alternative

Under the No Action Alternative, the measures described in the Master Plan Update would not be implemented. Operation and management of the Project would continue as described in the 1987 Master Plan. Existing facility maintenance, wildlife and vegetation enhancement, trail development, erosion control, flood risk management, and management of recreational areas and activities would continue. New facilities and/or activities not identified in the 1987 Master Plan could be constructed or implemented on a case-by-case basis.

2.2 Proposed Action

Under the Proposed Action, the measures and actions described in the Master Plan Update would be implemented fully. The measures are divided into three categories: (1) modifying resource management based on updated resource status and guidance, (2) facility development based on resource capability, regional demand, and public desires, and (3) designating utility corridors.

Implementation of the Master Plan Update would allow an update of the Grayson Lake Project lands and waters that reflects environmental stewardship and conservation while meeting current and future public, social, and economic demands.

The Proposed Action consists of the measures and actions that are listed in Table 2-1. The Proposed Action would address the projected demands that are identified in the Master Plan Update. More information about the Proposed Action is provided in Sections 7.0 and 8.0 of the Master Plan Update, which is provided as Appendix A of this document.

Major utility corridors such as cross-country utilities and pipelines that would cross the Project may be considered. Utility corridor alignments would be determined based on impacts to environmentally sensitive areas, recreation uses, and land use such as mining.

Table 2-1: Grayson Lake Project Master Plan Recommended Measures and Actions

Measures and Actions	Description
Increase signage; may include updating visitor displays and installing instructional/ informational and interpretive signage	• Dam Site Area (at boat ramp area) • Proposed hiking and biking trails at Laurel Gorge Cultural Heritage Center
Construct trails	• Hiking and biking trails to accommodate a wide range of users at Laurel Gorge Cultural Heritage Center
Construct recreational facilities	• 1 picnic shelter, picnic tables, and restroom at the Dam Site Area • Relocate 1 existing picnic shelter at Dam Site Area • Restroom near picnic shelter (for trail and shelter users) at Laurel Gorge Cultural Heritage Center • Replace existing restroom near Hidden Valley Golf Course in State Park
Expand parking	• 15 spaces near proposed picnic shelter and picnic tables at Dam Site Area • 10 vehicles with trailers and 10 passenger vehicles in the WMA to accommodate new one-lane boat ramp at southwest portion of lake • Asphalt parking lot at Grayson Lake Marina
Construct courtesy boat dock	• 8-foot x 40-foot dock at the Dam Site Area • Replacement of the existing courtesy dock with a floating courtesy dock at Bruin Recreation Area
Construct cabins	• 8 cabins in the State Park
Provide water supply for irrigation of the golf course via a pipeline from the lake	• Hidden Valley Golf Course
Identify and delineate location, size, and extent of ecosystems; enhance management to conserve and protect wildlife and habitat	• WMA
Construct maintenance storage yard	• Grayson Lake Marina
Utility corridors	• Utilities or pipelines across the central portion of the Project

State Park = Grayson Lake State Park
WMA = Wildlife Management Area

3.0 ENVIRONMENTAL SETTING

This section describes the current (baseline) condition of the environment that could be affected by the No Action or the Proposed Action Alternatives.

3.1 Physical Environment

This section contains a description of the topography, geology, and soils in the Project area.

3.1.1 Topography

The topography of the Project area is hilly and mountainous and characterized by deep coves and valleys that have been eroded through thick, flat-lying, or gently folded sedimentary rocks. Flat areas are uncommon except along the valley bottoms. Elevations in the Project area range from approximately 560 feet to 1,300 feet National Geodetic Vertical Datum (NGVD) (McGrain and Currens, 1978). Approximately 40 percent of the Project area consists of steep slopes in excess of 30 percent (USGS, 2009). Figure 3-1 shows the topography in the Project area and how the topography relates to suitability of the Project area for development.

3.1.2 Geology

The Project area is in the Eastern Coalfields Physiographic Region of the Cumberland Plateau. The geology of the Project area is characterized by Lower to Upper Pennsylvanian-aged rock that is approximately 305 to 320 million years old. The three primary geologic units in the Project area are (1) alluvium, which is 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 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 (Kentucky Geological Survey, 2009).

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

This page intentionally left blank.

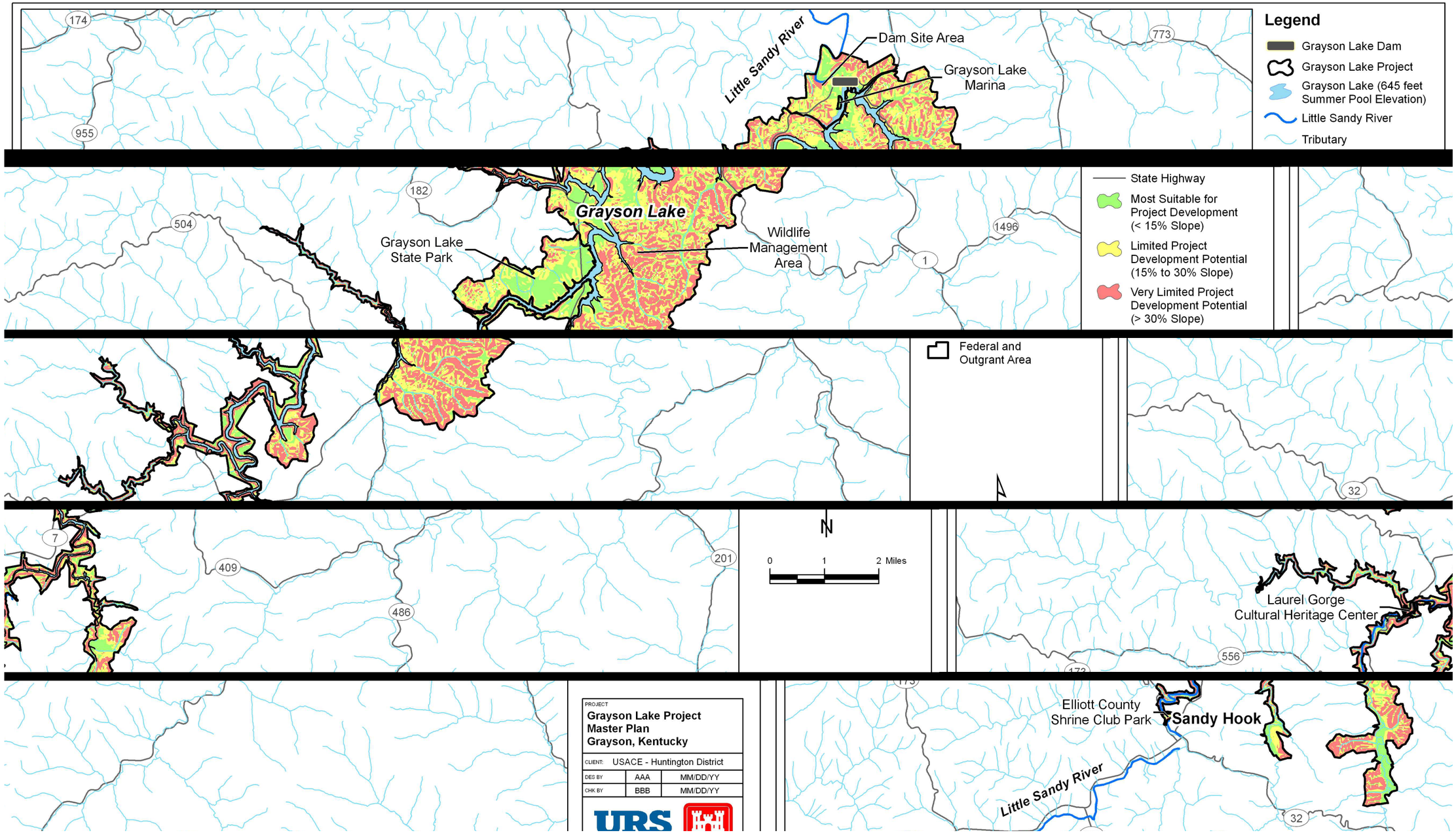

Figure 3-1: Topography Suitability for Project Development

This page intentionally left blank.

3.1.3 Soils

The soil types in the Project area are primarily the result of variability in the geologic parent material and positions on the landscape. Soils in the Project area were formed primarily from weathered sandstone, siltstone, shale, or from sediments deposited by running water. The soils on steep mountainside slopes are typically characterized by rock fragments throughout the soil.

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 together at the Project area, 19 of which occupy less than 1 percent of the area. Because of the limited presence of these 19 soil map units, they are excluded from further discussion. The remaining 17 soil map units are listed in Table 3-1 and are 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 3-2 shows soil types in the Project.

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 and are generally in valley bottoms along streams. These soils are not currently planted or managed for forage or wildlife habitat by USACE or the KYDFWR. An additional 5 percent of the soils in the Project area is classified as farmland of statewide importance.

Table 3-1: Soils Covering Greater Than 1 Percent of 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.
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.
AlC	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	6–12%	**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	6–20%	**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-Fedscreek 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.
BlD	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.
SoC	Shelocta-Grigsby-Orrville complex	2–15%	**Most 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 (1965); USDA (1983)

This page intentionally left blank.

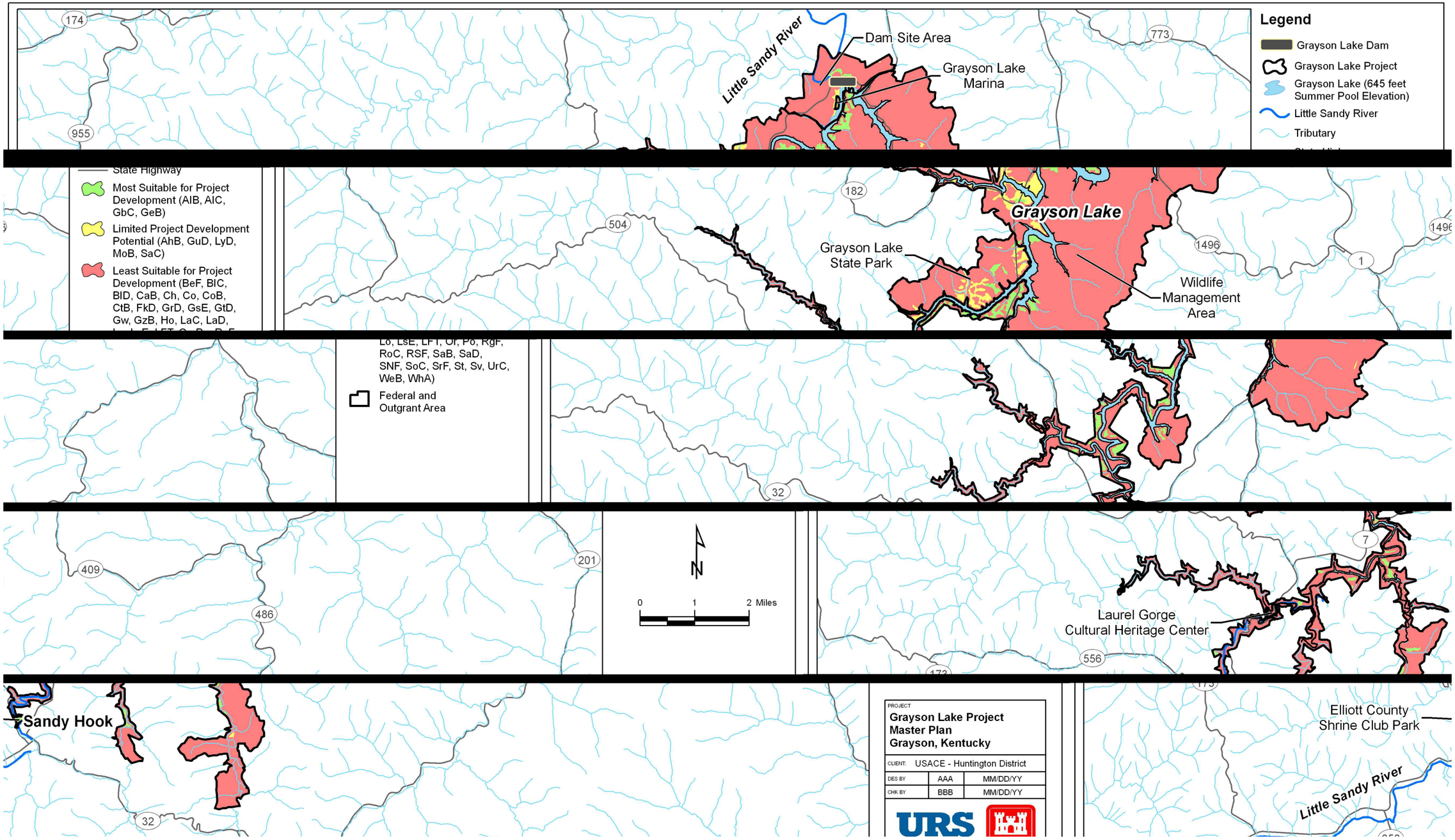

Figure 3-2: Grayson Lake Project Soils

This page intentionally left blank.

3.1.4 Water Resources

This section contains a discussion of surface water and groundwater in the Project area.

3.1.4.1 Surface Water

Surface water in the Project area includes rivers and streams, Grayson Lake, and the tailwater.

Rivers and Streams

Grayson Lake is 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 subwatersheds drain surface water within the Project boundary.

The 230-square-mile subwatershed upstream of the Grayson Lake Dam includes a network of stream tributaries that carry surface water to the Little Sandy River. The network covers approximately 659 stream miles. Figure 3-3 shows the Project area and Little Sandy River watershed boundaries and Figure 3-4 shows the surface waters and tributaries in the Project area.

Upstream land use such as coal mining, logging, agriculture, and development have caused soil erosion and the transport of sediment into surface waters. Sediment is considered a pollutant and has diminished the clarity of streams 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 of 1977 (CWA) (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 methylmercury contamination. 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.

The Commonwealth of Kentucky (Commonwealth) regulates and preserves its most pristine rivers through the Wild Rivers Program. The program was established by the Kentucky Wild Rivers Act of 1972 and is administered by the Kentucky Division of Water. None of the streams or rivers designated as wild and scenic under this program or designated under the National Wild and Scenic Rivers Act of 1968 (16 U.S.C. §§ 1271 et seq.) are within the Project area boundaries.

This page intentionally left blank.

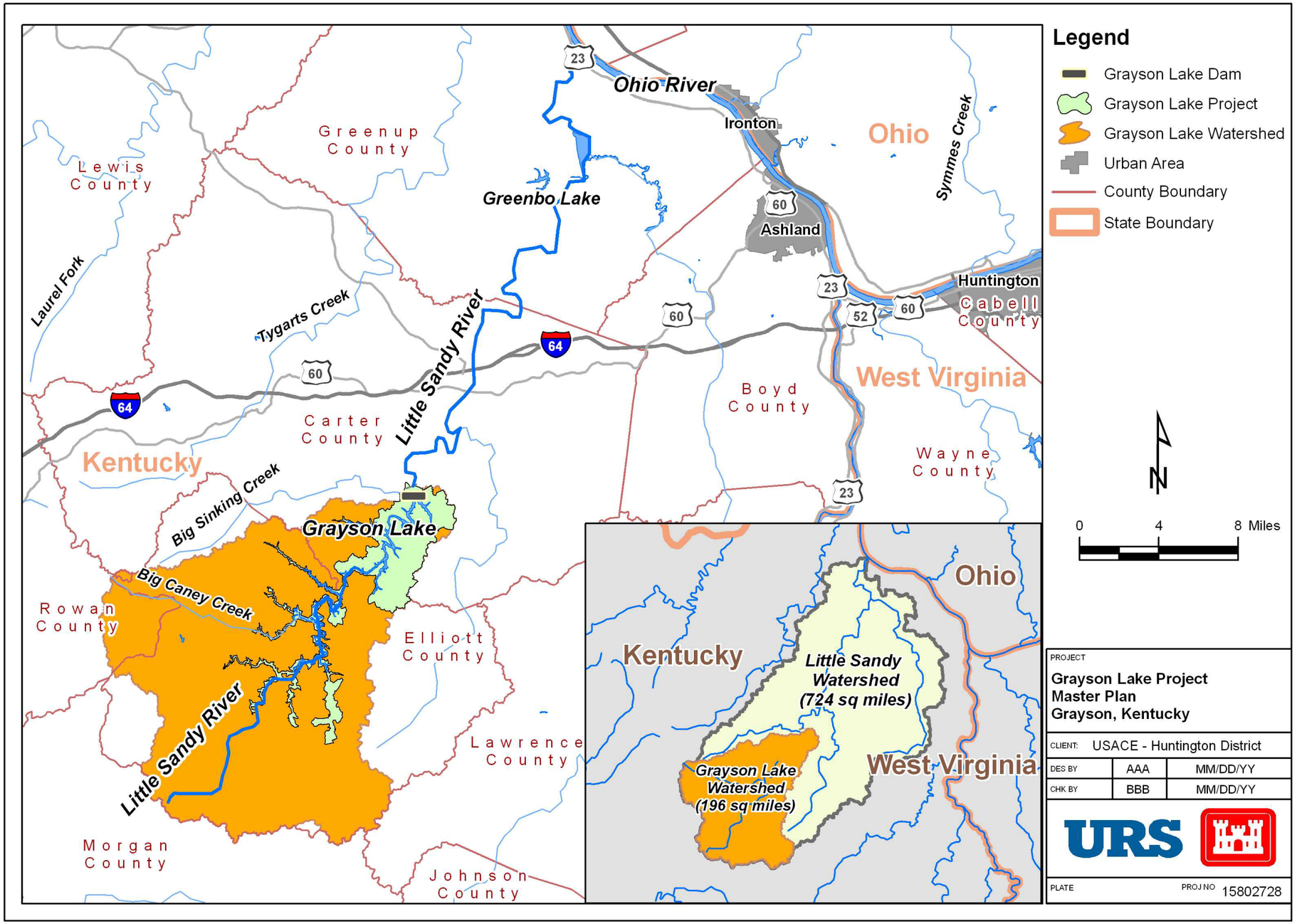

Figure 3-3: Grayson Lake Watershed

This page intentionally left blank.

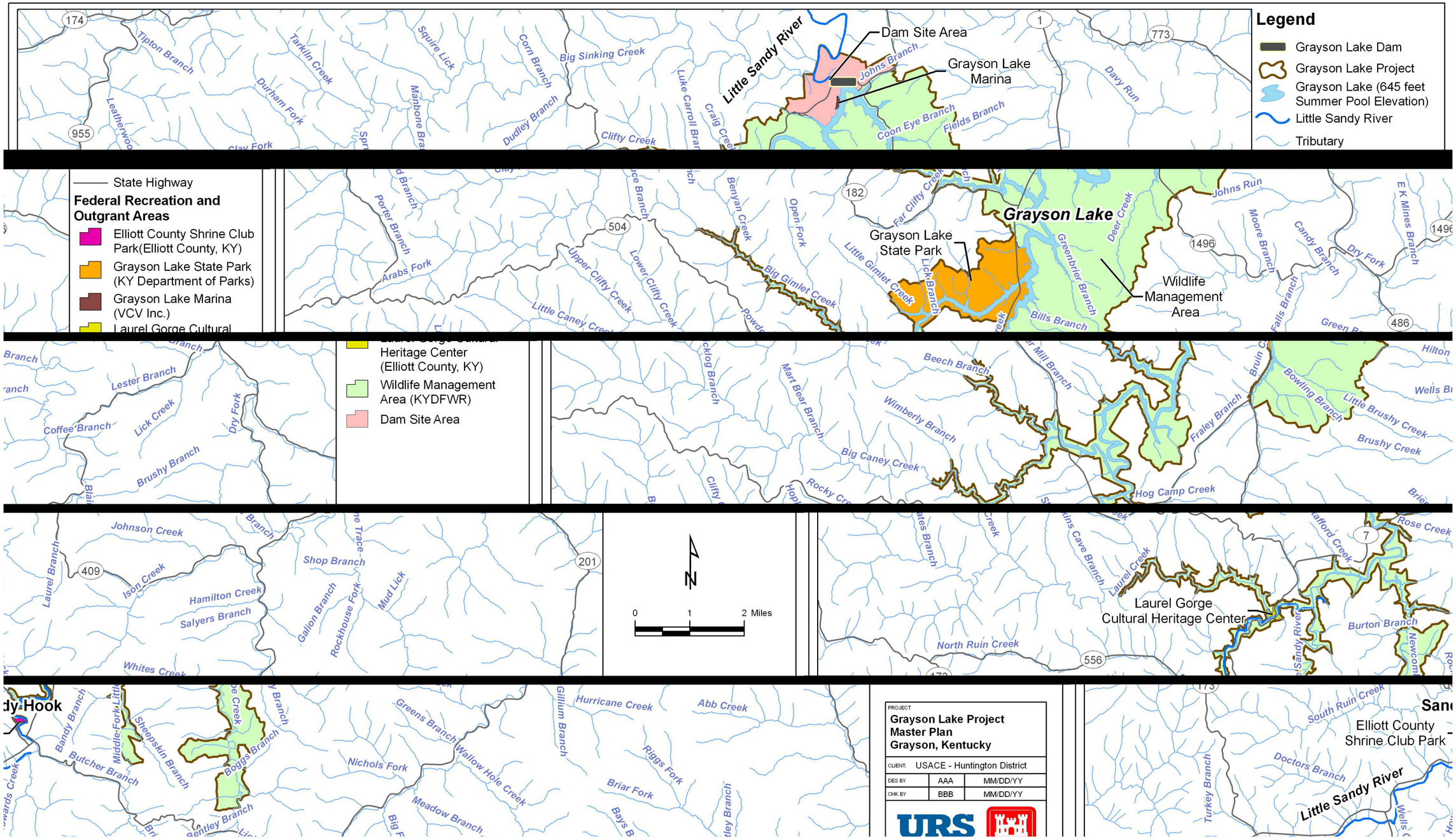

Figure 3-4: Surface Waters in the Project Area

This page intentionally left blank.

The CWA (33 U.S.C. §§ 1251 et seq.) established the basic framework for regulating discharges of pollutants into the waters of the United States. The CWA National Pollutant Discharge Elimination System (NPDES) (33 U.S.C. § 1342) requires permits for stormwater discharges associated with construction. The Kentucky Division of Water is authorized to carry out NPDES permitting under the Kentucky Pollutant Discharge Elimination System (KPDES). Construction projects that disturb more than 1 acre of land require coverage under the General Permit for Stormwater Discharges Associated with Construction Activities. Coverage under this permit requires development of construction site erosion control and storm water management plans.

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 above the lake. 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.

Photograph 3-1: Grayson Lake

The USACE regularly samples the water of Grayson Lake at different depths for temperature, dissolved oxygen, pH, and conductivity. The 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 water with low or depleted oxygen levels at the bottom.

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. Additionally, there is an environmentally sensitive area downstream of the dam referred to as the "ox-bow."

3.1.4.2 Groundwater

There are three aquifers in the Project area: the Alluvium, the Breathitt Group, and the Grundy Formation. Five groundwater wells (3 domestic, 1 public, and 1 unknown) have been installed in the Project area (Figure 3-5), 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 (Richard Mauro, wildlife biologist, Northeast Region Public Lands, written communication, 5 December 2010). Potable water supply for the remaining Project area is provided by the Rattlesnake Ridge Water Management District. No natural springs have been identified in the Project area.

In Carter and Elliott Counties, the groundwater contains noticeable amounts of iron and is considered moderately to extremely hard. Other naturally occurring constituents that may be present in objectionable amounts are sulfate, sodium chloride, and manganese (Kentucky Geological Survey, 2011a). 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.

Groundwater is a vital, natural resource that is susceptible to contamination from a variety of activities. Contaminated groundwater can be difficult to remediate. The Kentucky Department for Environmental Protection assesses how easily and quickly a contaminant can move into and within a groundwater system (Ray et al., 1994) on a scale from 1 (low) to 5 (high). The sensitivity of the groundwater system in the Project area is rated between 3 (moderate) and 4 (moderate-high) (Kentucky Geological Survey, 2011a).

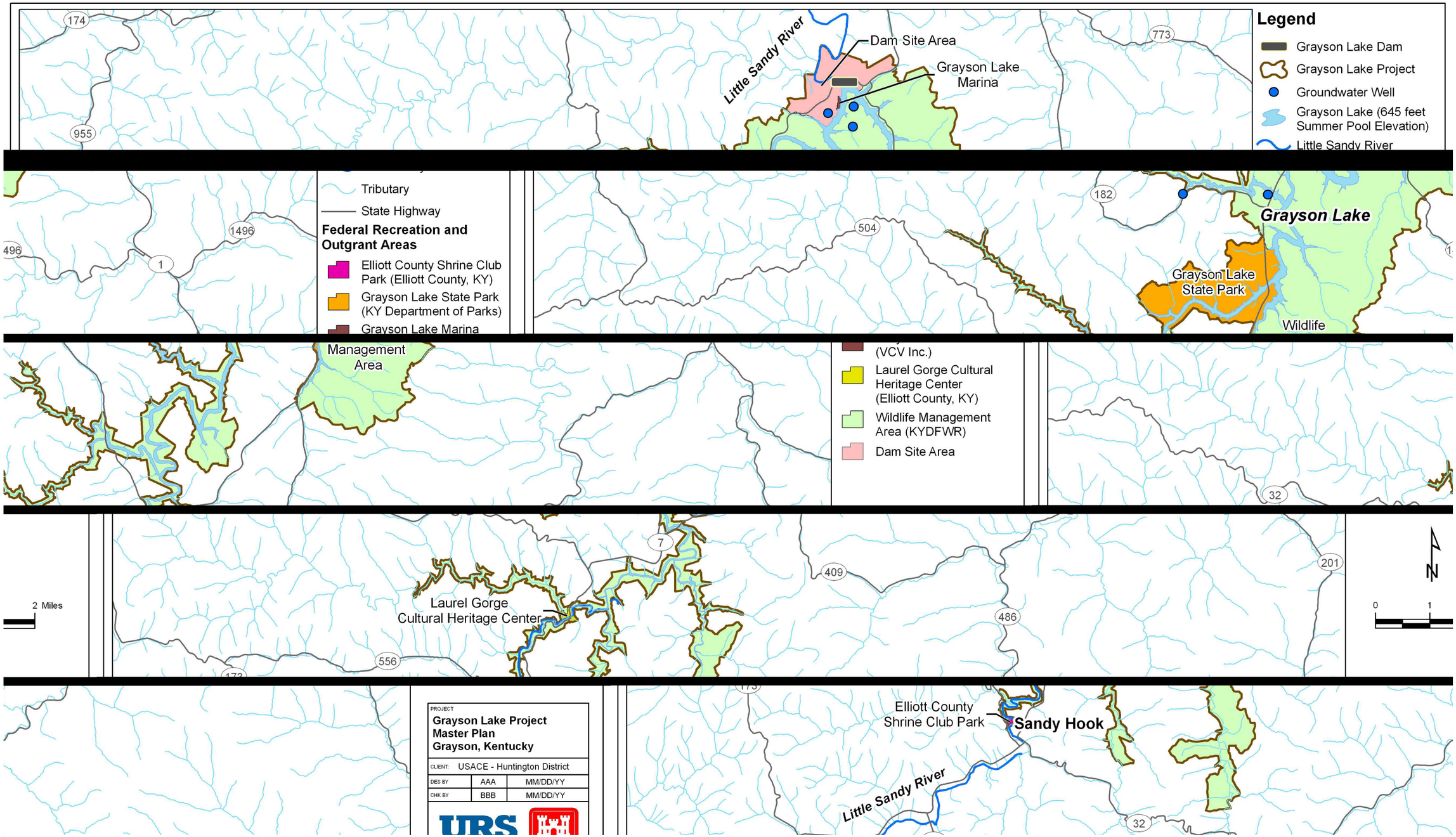

Figure 3-5: Groundwater Wells

This page intentionally left blank.

3.1.5 Floodplains

One of the primary authorized purposes of the Project is flood risk management. The Project area around the lake is designed to store floodwaters to reduce flood risk downstream. Consequently, inundation by flooding is largely artificially controlled. Figure 3-6 shows inundation areas between the summer pool elevation of 645 feet NGVD and the maximum flood control pool elevation 681 feet NGVD. Flooding of the land above the recreational summer pool elevation does occur, but the majority of flooding instances occur during the winter and spring months. Based on Figure 3-6, the majority of the recreation areas are subject to inundation.

3.1.6 Air Quality

The U.S. Environmental Protection Agency (EPA) has set national air quality standards for six principal pollutants (also referred to as "criteria" pollutants): carbon monoxide (CO), lead (Pb), nitrogen dioxide (NO_2), ozone (O_3), particulate matter, and sulfur dioxide (SO_2) (EPA, 2010). Ambient air quality in the Grayson Lake area is in attainment for all criteria pollutants (Kentucky Division of Air Quality, 2010).

3.1.7 Climate

The Project area has a temperate climate and experiences the four seasons with average temperatures ranging from approximately 34 degrees Fahrenheit in January to 75 degrees Fahrenheit in July. Since 1972, the region has received an average rainfall of between 2.85 and 4.76 inches per month, with an annual average of 43.42 inches (NOAA, 2006). There are striking variations in the severity of summer and winter from year to year.

3.1.8 Noise

EPA's Noise Control Act of 1972 (42 U.S.C. §§ 4901–4918), as amended by the Quiet Communities Act of 1978, states that the policy of the United States is to promote an environment for all Americans that is free from noise that jeopardizes health or welfare.

Noise is generally defined as loud or undesirable sound. Sound is most commonly measured in decibels (dB), with the Day-Night Average Sound Level (DNL) used as an average measure of sound in dB. The DNL descriptor is accepted by Federal agencies as a standard for estimating sound impacts and establishing guidelines for compatible land uses. EPA guidelines, and those of many other Federal agencies, state that outdoor sound levels in excess of 55 dB DNL are "normally unacceptable" for "outdoors in residential areas and farms and other outdoor areas

This page intentionally left blank.

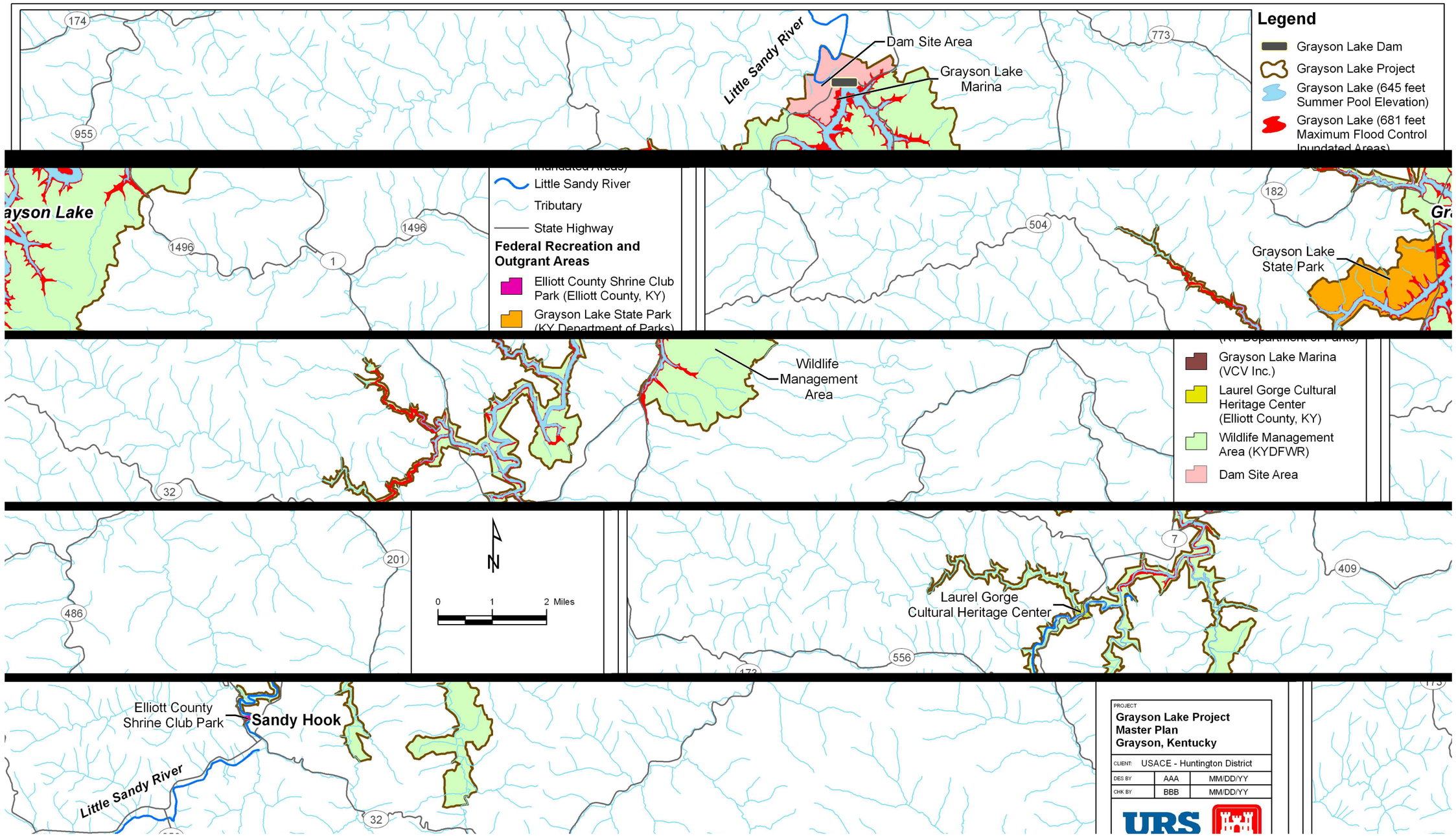

Figure 3-6: Inundation Areas of Summer Pool and Maximum Flood Control Elevations

This page intentionally left blank.

where people spend widely varying amounts of time …," which would include the Project area (EPA, 1974). Although temporary/transient noises occur in the Project area (e.g., from vehicles or boats), no notable sources of noise pollution are known to be present.

3.2 Biological Environment

The biological environment includes vegetation, wetlands, terrestrial wildlife, and aquatic life. Threatened and endangered species in the Project area are also discussed in this section.

3.2.1 Vegetation

Most of the land cover at the Project is forested (82 percent) with small, scattered open areas and grasslands, pasture/hay, and developed open space (Homer et al., 2004). See Figure 3-7. Table 3-2 lists the land cover types in the Project area and the percentage of the 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)

The primary tree species in the Project area are oaks (*Quercus* spp.*),* maples (*Acer* spp.*)*, and hickories *(Carya* spp.*)*, with small stands of pine (*Pinus* spp.*)*. Less dominant species include American beech *(Fagus grandifolia),* yellow poplar *(Liriodendron tulipifera),* yellow birch (*Betula alleghaniensis*), American basswood *(Tilia americana),* cucumber tree *(Magnolia*

This page intentionally left blank.

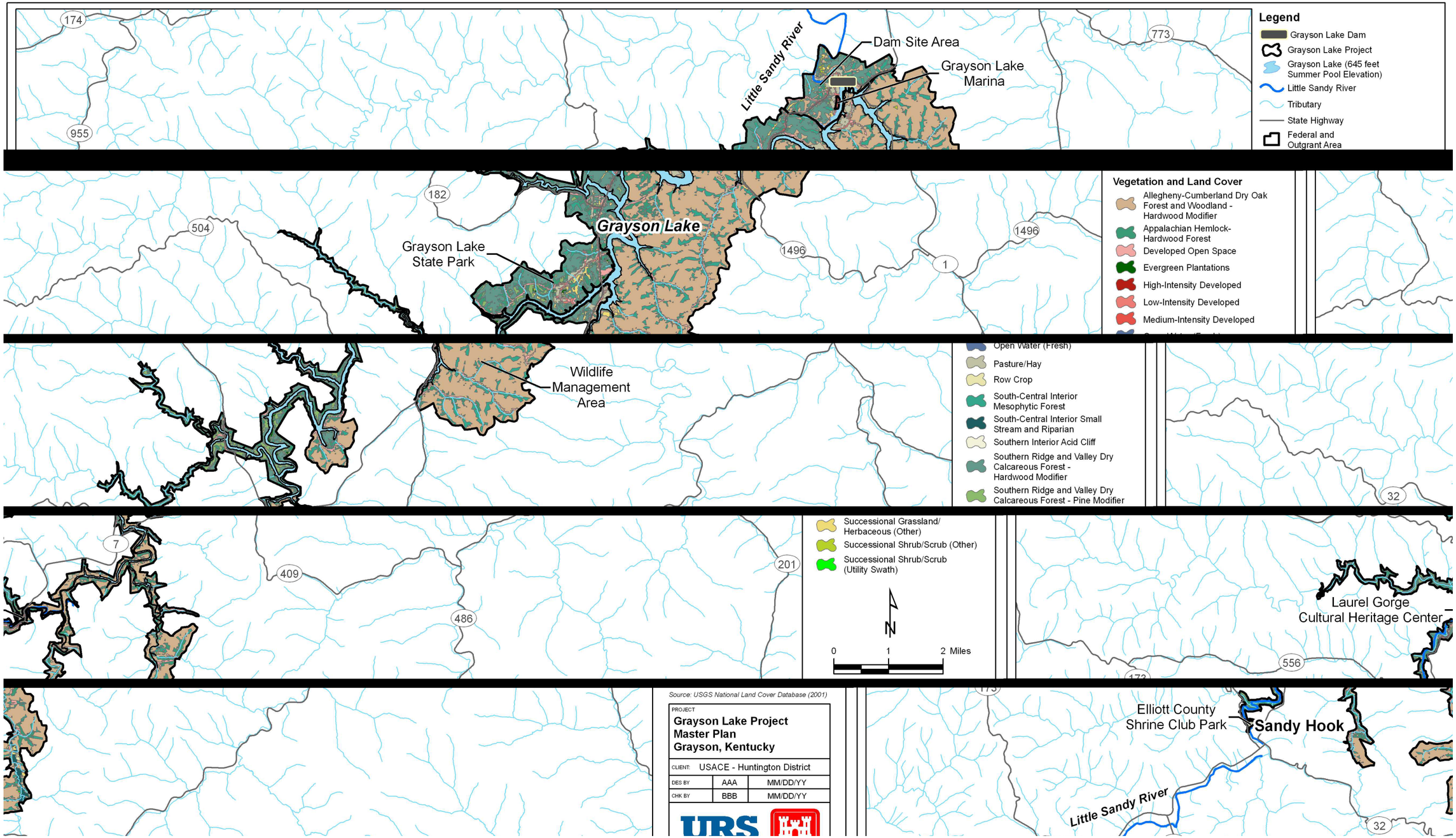

Figure 3-7: Vegetation and Land Cover in the Project Area

This page intentionally left blank.

acuminata), black walnut (*Juglans nigra)*, eastern hemlock (*Tsuga canadensis)*, black cherry (*Prunus serotina)*, and sweet birch (*Betula lenta*) (NatureServe, 2007).

The four primary forest communities are as follows:

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 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*,* yellow poplar*,* American basswood*,* red oak (*Quercus rubra*)*,* cucumber tree, and black walnut. eastern hemlock may be present in some stands. Trees may grow to be large in undisturbed areas. Many examples of this type of forest are bisected by small streams (NatureServe, 2007).
- **Southern Ridge and Valley Dry Calcareous Forests** occur on a variety of topographic and landscape positions including ridgetops and upper- and midslopes. Fire frequency and intensity help determine the relative mixture of deciduous hardwood versus evergreen trees in this system. High-quality and historical 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, 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 (mostly red oak), yellow poplar, black cherry, and sweet birch (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 (eastern hemlocks are not listed separately in Table 3-2).

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. Additionally, a sycamore tree that was once a state record for size is located below the dam.

3.2.1.1 Vegetation Management

The KYDFWR does limited cutting of overstocked areas to remove undesirable tree species in favor of native hardwoods, such as oak and hickory trees. A 30-acre harvest of yellow poplar is planned for 2011.

The Project area has some areas of grassland that are composed of native warm season grasses such as prairie cordgrass (*Spartina pectinata*), eastern gamagrass (*Tripsacum dactyloides*), switchgrass (*Panicum virgatum*), big bluestem (*Andropogon gerardii*), little bluestem (*Schizachyrium scoparium*), Indian grass (*Sorghastrum nutans*), and side-oats grama (*Bouteloua curtipendula*) (KYDFWR, 2008). In scattered locations, the KYDFWR has seeded open areas with native grass seed to augment or supplement the naturally occurring vegetation and to benefit 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). Other vegetation management activities in grasslands include limited prescribed burning and cutting for maintenance of meadow habitats that are valuable habitat for birds and other wildlife to encourage a more desirable mix of wildlife-friendly vegetation and reduce the natural fuel layer in the ecosystem.

An invasive species is a species that is foreign to a particular region and out-competes native species for the same resources. Prominent invasive species in the Project area are bush honeysuckle (*Lonicera* spp.), autumn olive (*Elaeagnus umbellata*), hydrilla (*Hydrilla verticillata*), multiflora rose (*Rosa multiflora*), and Tree-of-Heaven (*Ailanthus altissima*). Invasive species are monitored and managed at the Project to ensure that they do not affect native ecology; management includes chemical applications and physical removal.

3.2.2 Wetlands

The USACE regulates the discharge of dredged or fill material into waters of the United States, including wetlands, pursuant to Section 404 of the CWA (33 U.S.C. § 1344). Additionally, Executive Order (EO) 11990 (Protection of Wetlands) requires Federal agencies to avoid, to the extent possible, adverse impacts to wetlands. Wetlands provide a number of benefits to the environment, including water quality improvement, floodwater storage, fish and wildlife habitat, aesthetics, and biological productivity.

The National Wetland Inventory (NWI) maps from the USFWS are generalized maps that give approximate locations of wetlands based on surveys. According to the NWI maps, 7 wetland types cover approximately 85 acres combined. The wetlands tend to occur mainly in relation to streams and are scattered, consisting of relatively small areas of less than 3 acres (USFWS, 2010a). Figure 3-8 shows the NWI-mapped wetlands in the Project area.

3.2.3 Terrestrial Wildlife

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 in the Project area are listed in Table 3-3.

Migratory waterfowl 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*).

Although none of the main North American flyways cross the Project area, many neotropical 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 neotropical 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 neotropical species return south (KSNPC, 2005).

This page intentionally left blank.

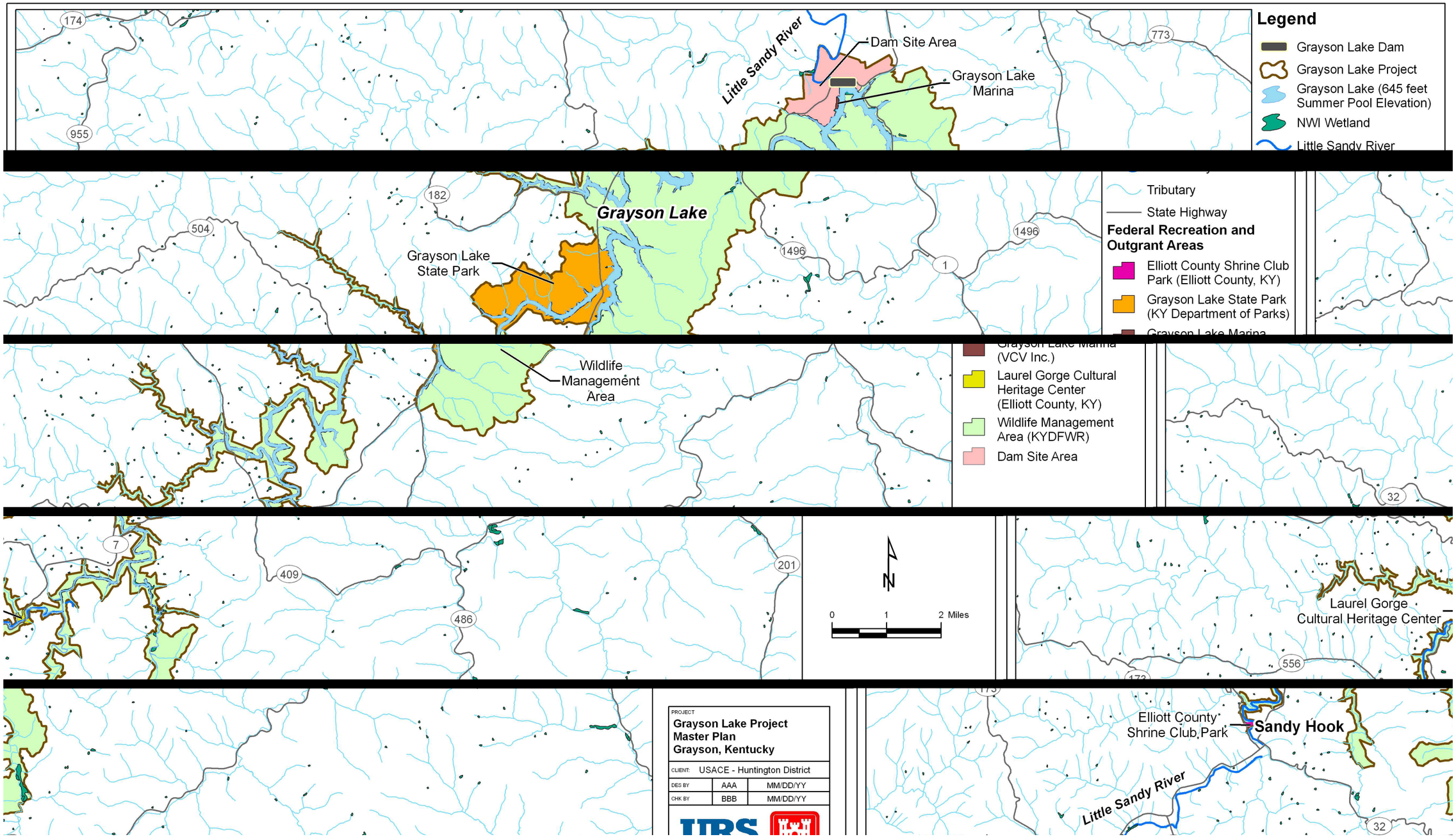

Figure 3-8: Wetlands in the Project Area

This page intentionally left blank.

Table 3-3: Animals Commonly Found in the Grayson Lake Project Area

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

Source: KYDFWR (2011a)

3.2.3.1 Wildlife Management

The WMA, which is managed by the KYDFWR, occupies 87 percent of the Project area (14,777 acres). See Figure 3-4. In the 1970s and early 1980s, the KYDFWR implemented wildlife restoration within the WMA when 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, wildlife biologist, Northeast Region Public Lands, written communication, 14 December 2010).

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 in the WMA. Small wildlife waterholes of less than 0.1 acre have been constructed at various 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 additional waterholes are planned for 2011 (Richard Mauro, wildlife biologist, Northeast Region Public Lands, written communication, 14 December 2010).

3.2.4 Aquatic Life

Grayson Lake sustains a diverse composition of aquatic species. Some of the fish species found in the lake are listed in Table 3-4. Additionally, there are semi-aquatic species such as amphibians that spend half their life cycle in aquatic ecosystems and half in terrestrial ecosystems. The Project area supports at least 29 species of amphibians, including Fowler's toad, salamanders, mountain chorus frog, and green frog. These animals are good indicators of the health and stability of an aquatic ecosystem.

Table 3-4: Common Fish Species in Grayson Lake

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

Kentucky Fishing (2010)

The lake provides habitat for many fish species; 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, 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 in April, May, and November and in some years it is also stocked in June and October (KYDFWR, 2010). Laurel Creek, which feeds into Grayson Lake, is stocked with rainbow trout and brown trout (*Salmo trutta*) between April and June. Aquatic resources in both the lake and the tailwater support recreational fishing at the Project including multiple fishing tournaments each year.

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 (KYDFWR, 2011b). No fish consumption advisories or guidelines have been developed specifically for Grayson Lake.

3.2.5 Threatened and Endangered Species

Threatened, endangered, and species of special concern are defined in this PEA as sensitive and protected biological resources, including plant and animals, that are listed for protection by the USFWS or the Commonwealth. Under the Endangered Species Act of 1973 (ESA) (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.

Threatened and endangered species and species of special concern that may occur in Elliott and Carter Counties are listed in Table 3-5, along with their Federal and State status.

3.2.5.1 Federally Listed Species

Three species are federally listed in Carter County: fanshell freshwater mussel (*Cyprogenia stegaria*), Indiana bat (*Myotis sodalis)*, Gray bat (*Myotis grisescens*) (KSNPC, 2011a). Two species are federally listed in Elliott County: Indiana bat and gray bat (KSNPC, 2011a). No designated critical habitat under Section 7 of the ESA (16 U.S.C. § 1536) occurs in the Project area.

Fanshell Mussel

The fanshell mussel is found in medium to large streams and rivers with moderate to strong currents in coarse sand and gravel with shallow to deep depths. The fanshell mussel is round with numerous pustules, elevated growth lines, and broken green rays (NatureServe, 2009a). This species was historically considered endemic to the eastern highlands east of the Mississippi River. It was historically widely distributed in the Tennessee, Cumberland, and Ohio River systems but is currently very rare (NatureServe, 2009a). The species has been found in the Green River in Kentucky but has not been confirmed in the Project area.

Indiana Bat

The Indiana bat has a wide range in the eastern United States, with a distribution from eastern Oklahoma to New Hampshire and from southern New England to the Florida panhandle (USACE, 2006). Most of the population hibernates in relatively few caves, which makes the species exceptionally vulnerable to disturbance to local habitat (NatureServe, 2009b). Census data from 1995 to 1997 indicate an acute decline of about 60 percent since population surveys began in the 1960s; the most severe declines occurred in Kentucky and Missouri, where the decline totals are 430,000 individuals over the past few decades (NatureServe, 2009b).

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

Taxonomic Group	Scientific Name	Common Name	Federal Status	State Status	County
Birds	*Haliaeetus leucocephalus*	bald eagle	Delisted[1]	T	Carter/Elliott
	Pooecetes gramineus	Vesper sparrow	—	E	Carter
Mosses	*Cirriphyllum piliferum*	Cirriphyllum moss	—	T	Elliott
	Polytrichum pallidisetum	A hair cap moss	—	T	Elliott
Vascular Plants	*Acer spicatum*	mountain maple	—	E	Carter/Elliott
	Calopogon tuberosus	grass pink	—	E	Carter
	Carex tonsa var. *rugosperma*	umbel-like sedge	—	T	Carter
	Castilleja coccinea	scarlet indian paintbrush	—	E	Carter
	Cypripedium kentuckiense	Kentucky Lady's Slipper	MC	E	Carter
	Cypripedium parviflorum	small yellow lady's slipper	—	T	Carter/Elliott
	Hydrocotyle Americana	American water-pennywort	—	E	Elliott
	Lathyrus palustris	vetchling peavine	—	T	Carter
	Lilium philadelphicum	wood lily	—	T	Carter
	Lonicera dioica var. *orientalis*	wild honeysuckle	—	E	Carter
	Maianthemum stellatum	starflower false solomon's-seal	—	E	Carter
	Paxistima canbyi	Canby's mountain-lover	MC	T	Carter
	Spiranthes ochroleuca	yellow nodding ladies' tresses	—	T	Carter
	Taxus canadensis	Canadian yew	—	T	Carter
	Thaspium pinnatifidum	cutleaf meadow-parsnip	MC	T	Carter
	Toxicodendron vernix	poison sumac	—	E	Carter

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

Source: KSNPC (2011)
— = None
E = endangered
MC = species of management concern
T = threatened
[1]Still protected under the Bald and Golden Eagle Protection Act

Northern populations migrate south to Alabama, Tennessee, Kentucky, Indiana, Missouri, and West Virginia for the winter. In the winter, populations are apparently absent from Michigan, Ohio, and northern Indiana where suitable caves and mines are unknown. The most important hibernating caves include the Bat, Hundred Dome, and Dixon caves in Kentucky (NatureServe, 2009b), but none of these caves are near Grayson Lake. However, the habitat in the Project area is potentially suitable for the Indiana bat.

In response to Section 7 of the ESA coordination conducted in connection with a 2006 PEA by the Federal Energy Regulatory Commission (FERC) in similar habitats in the region, the USFWS recommended that tree clearing be restricted from April 1 to November 15 to avoid affecting summer roosting of Indiana bats (FERC, 2006). With implementation of this mitigation, the FERC determined that the project may affect but is not likely to adversely affect Indiana bats.

Gray Bat

The gray bat occupies a limited geographic range in limestone karst areas of the southeastern United States (USFWS, 2010b). The species occurs mainly in Alabama, northern Arkansas, Kentucky, Missouri, and Tennessee. The species almost exclusively lives in caves, hibernating during the winter and roosting in caves along rivers during the summer where aquatic and terrestrial insects can be found. The gray bat is extremely vulnerable to disturbance because approximately 95 percent of individuals inhabit eight or nine caves in Kentucky (Kentucky Bat Working Group, 2011). Gray bats are seasonally migratory, often traveling hundreds of miles. Females precede males in migration, leaving the winter caves in late March and early April. Males follow in late April or early May (NatureServe, 2009c). Gray bat decline has been attributed to several factors, including human disturbance, natural and man-induced flooding of caves, and pesticides. The gray bat has been extirpated from Elliott County (KSNPC, 2009).

3.2.5.2 State-Listed Species

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, 2011a).

Two species, the American water-pennywort (*Hydrocotyle americana*), which is an aquatic plant, and the creek heelsplitter (*Lasmigona compressa),* which is a freshwater mussel, have not been documented 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, 2011a): 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 other species listed in Table 3-5 for Carter County are thought to be present in the county.

The KSNPC has not identified any State Nature Preserves or State Natural Areas in the Grayson Lake Project area (KSNPC, 2011b).

3.3 Socioeconomic Environment

The socioeconomic environment includes population and employment, environmental justice, transportation and traffic, recreation, cultural resources, and aesthetics.

3.3.1 Population and Employment

An area of influence comprising counties in Kentucky, West Virginia, and Ohio was identified as the area from which most visitors would be attracted to the Project. The area of influence was divided into primary, secondary, and tertiary subareas. The primary subarea of influence is within a 30-minute drive of the Project, the secondary subarea is between a 30- and 60-minute drive of the Project, and the tertiary subarea is between a 1-and 3-hour drive of the Project. The primary subarea is in Kentucky. The secondary area of influence includes portions of 16 counties (12 in Kentucky, 2 in West Virginia, and 2 in Ohio). The tertiary subarea of influence includes a larger geographical region comprising portions of 52 counties in three states (33 in Kentucky, 10 in West Virginia, and 9 in Ohio).

3.3.1.1 Population

Demographic data (population and age) were compiled from U.S. Census Bureau data and regional and State data centers. The data were analyzed to determine the population in the subareas of influence and the projected change by 2020. Table 3-6 shows the population in the subareas of influence in 2007 and the population estimates in 2010 and 2020.

Table 3-6: Population in the Area of Influence

Subarea of Influence	2007 Population	2010 Population	2020 Projection	Projected Growth 2010–2020
Primary	30,921	32,945	34,504	4.7%
Secondary	272,327	278,669	278,134	–0.2%
Tertiary	858,472	922,465	951,095	3.1%

Source: U.S. Census Bureau (2008, 2010)

Based on available population estimates, the rate of population growth in the primary subarea is expected to surpass the rate of growth in the other subareas between 2010 and 2020. In age distribution, the percentage of persons below the age of 21 across all three subareas is expected to decrease from approximately 24 percent in 2000 to 22 percent of the total population by 2020. The percentage of persons above the age of 65 is expected to increase in all three subareas from around 30 percent in 2000 to 38 percent by 2020. The population of the three subareas of influence will have a higher percentage of senior citizens than the percentage of persons of all other ages.

The tertiary subarea of influence had the highest median income in 2008 compared to the two other subareas (U.S. Census Bureau, 2008). See Table 3-7. Wealthy counties in Ohio led to the higher median incomes in the primary subarea. Median incomes were calculated by taking a weighted average of the median incomes of the counties in areas of influence. 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. In 2008, the weighted median income in the primary subarea of influence was $32,400 (Table 3-7), which was lower than the median household income of approximately $41,000 in Kentucky.

Table 3-7: Median Household Income in the Subareas of Influence

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

Source: U.S. Census Bureau (2008)

Most of the counties in the secondary subarea of influence are in Kentucky; in 2008, the median income in the secondary subarea of influence, $35,200, was lower than the median household income of approximately $41,000 in Kentucky. Counties in West Virginia and Ohio also exhibited lower household incomes compared to incomes reported within their respective states ($37,989 in West Virginia and $60,061 in Ohio). Kentucky and West Virginia counties in the tertiary subarea of influence reported lower median incomes than their respective states. Ohio counties in the tertiary subarea of influence had higher median household incomes than the counties in Kentucky and West Virginia but lower than the Ohio.

Table 3-8 lists the estimated number of visits to the Project area from 2000 to 2010. A visit represents the entry of one person into a recreational area. As shown in Table 3-8, visitation increased from fiscal year (FY) 2000 to FY 2003 and dropped during FY 2004 and FY 2005. The second highest number of visitations occurred in FY 2006 and dropped again in FY 2007 through FY 2009. The highest number of visitations since FY 2000 occurred in FY 2010.

Table 3-8: Number of Visitors to the Grayson Lake Project, Fiscal Years 2000–2010

Fiscal Year (10/1 to 9/30)	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

Visitation is expected to increase beyond 2010 based on population growth estimates. Overall participation is expected to increase by 53,880 visits (approximately 5.1 percent) by 2020, and the activities undertaken by 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 visits are anticipated to be in the "Other" category (which includes hiking, horseback riding, and golf) and in sightseeing.

3.3.1.2 Employment

Grayson Lake is located in the eastern portion of the State. An analysis of employment in the counties in the region identified key employment sectors and the anticipated change in employment opportunities. The small projected increase in population in the region over the next decade is consistent with the lack of anticipated significant new employment opportunities in the region.

Coomes and Kornstein (2010) indicate that areas along the north-south interstate corridor in Kentucky will continue to experience growth, while areas in the eastern and western portions of the Commonwealth will experience a decrease in employment opportunities. The government, including education and social services, is the primary employer in nearly 50 percent of the counties in the eastern portion of the State. Other key employers are retail, service, manufacturing, and healthcare.

The largest employment sectors in the West Virginia counties in the Project region are services and manufacturing, especially in Mason and Putnam Counties. Healthcare is a key employment sector in Wayne, Cabell, and Mason Counties. The Veterans Administration Hospital in Wayne County and the private healthcare facilities in Cabell and Kanawha Counties employ a sizeable percentage of the workforce. Employment with the Board of Education and County Commissions is reported to be high in both Wayne and Lincoln Counties.

For the Ohio counties in the Project region, the services sector was reported to be the largest sector as of 2007. This sector includes trade, transportation and utilities, information, financial, professional and business, education, and health and hospitality services. Forecasts are that employment in this sector will increase slightly (Coomes and Kornstein, 2010).

3.3.2 Environmental Justice

Executive Order (EO) 12898, Federal Action to Address Environmental Justice in Minority Populations and Low Income Populations, and the February 11, 1994, Presidential Memorandum providing guidance for this EO require Federal agencies to develop strategies for protecting minority and low-income populations from disproportionate and adverse effects of Federal programs and activities. The EO is "intended to promote non-discrimination in Federal programs substantially affecting human health and the environment." An environmental justice evaluation

is performed to evaluate the impact of a proposed project on the population and to ascertain whether target populations would be affected more adversely than other residents.

The 2010 U.S census data were reviewed to determine the racial composition of the population in Carter County and Elliott County. Carter and Elliott Counties reported a total population of 27,720 persons and 7,852 persons in 2010, respectively. Minority persons accounted for 2.8 percent (776 persons) and 4.8 percent (377 persons) of the total population in Carter and Elliott Counties, respectively. The U.S 2010 data regarding income and poverty is not available at the block group level. However based on 2009 estimates, the levels of poverty within Carter and Elliott Counties are higher than those exhibited within the state. Based on the above statistics there is some probability of minority and low-income persons residing in areas surrounding the project.

3.3.3 Transportation and Traffic

Carter County is one of 32 counties in Kentucky with interstate or parkway access. Interstate 64 (I-64) transects the county and is approximately 8 miles north of the Dam Site Area. I-64 gives egress to SR 7, which is the main north-south road corridor through the Project. SR 7 crosses the dam and continues south before entering Elliott County. Congestion often occurs along the recreational areas of SR 7. Several State secondary roads provide connectivity to the Project. These include SR 182 from the west and SR 1496 along the northeastern portion of the Project. SR 504 and SR 32 provide connectivity to some of the middle portions of the Project. SR 556 links the area around Sandy Hook to the southern portions of the Project. During fishing tournaments, increase in visitation at the Project has led to congestion on local roads and parking areas.

3.3.4 Recreation

The Project has six distinct recreational areas. Table 1-1 lists the recreational areas, the entities that manage them, and the approximate size of each area. Figure 3-9 shows the locations of the recreational areas.

3.3.4.1 Dam Site Area

The USACE manages the Dam Site Area, which has approximately 640 acres. The area includes the dam, an Information Center, parking, picnic area, shelters, restrooms, hiking trails, and a boat ramp. The Grayson Lake Marina is operated by a private concessionaire (VCV Inc.) and offers gas, oil, snacks, ice, boat rentals, and slip rentals. The marina has approximately 10 acres and 185 boat slips.

3.3.4.2 Grayson Lake State Park

Grayson Lake State Park is managed by the Kentucky Department of Parks and includes the Rolling Hills Campground, Hidden Cove Golf Course, and Bruin Recreation Area. The park has approximately 1,500 acres. Rolling Hills Campground has 71 campsites and is open from mid-March through mid-November. It also has an amphitheater, playground, basketball court, and two walking trails. Hidden Cove Golf is adjacent to the campground. The 18-hole golf course has a small clubhouse/pro shop. There is one picnic shelter. Bruin Recreation Area offers a mix of day-use recreational facilities, including a playground, picnic shelter, picnic tables, and swimming beach. The swimming beach is closed. The area also has a four-lane boat ramp and courtesy dock.

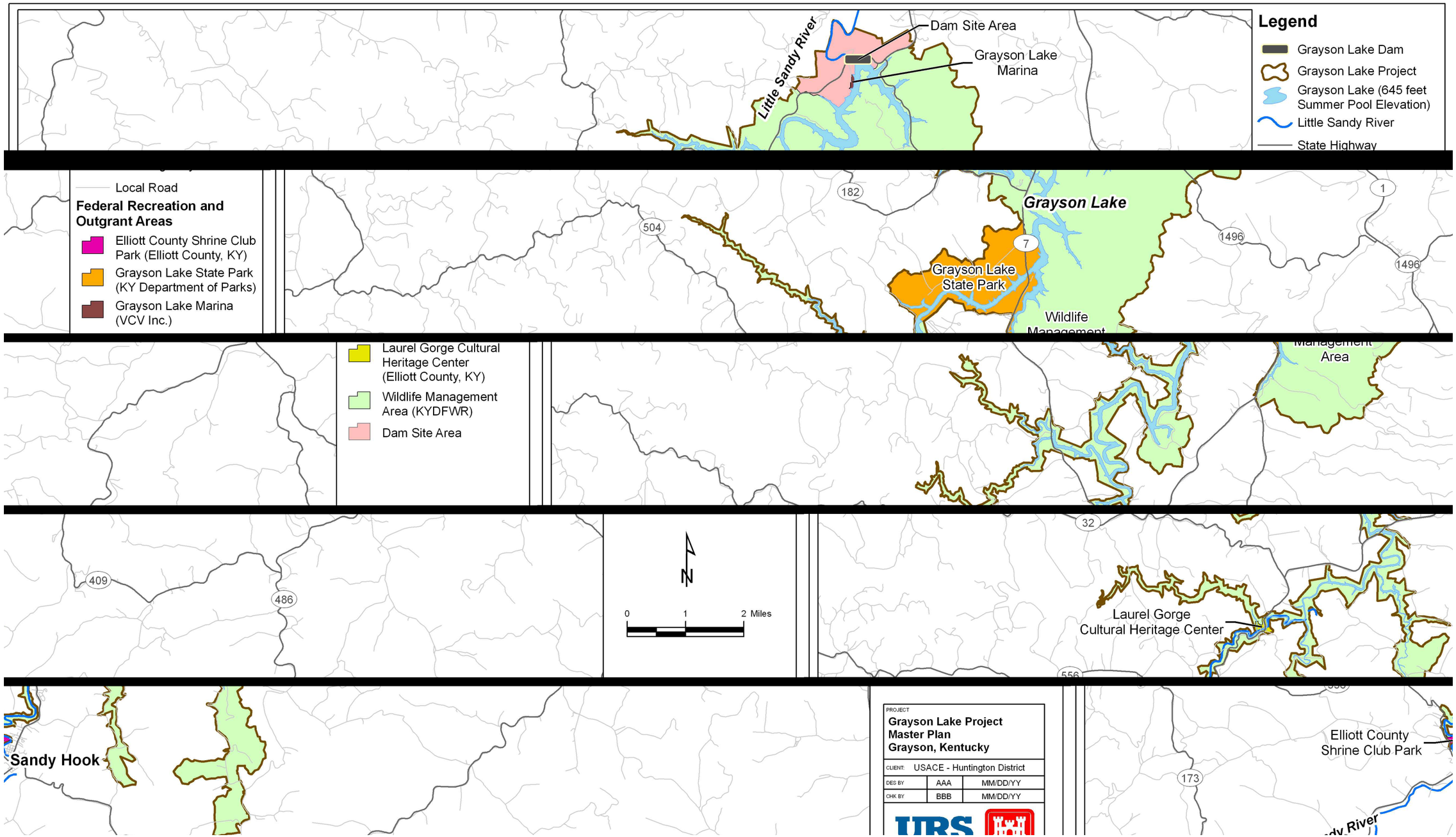

Figure 3-9: Recreational Areas in the Grayson Lake Project

This page intentionally left blank.

3.3.4.3 Wildlife Management Area

The KYDFWR manages the WMA, which covers approximately 15,000 acres. These lands are managed to create, enhance, and sustain permanent wildlife habitats and populations. Two boat ramps provide access to Grayson Lake. The WMA includes Camp Robert C. Webb (Camp Webb), which operates primarily as a conservation camp for students.

3.3.4.4 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 27-acre area includes hiking trails, an interpretive trail, a picnic shelter, an outdoor classroom area, and an interpretive nature center.

3.3.4.5 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. The park has approximately 13 acres and is used primarily for horse shows.

3.4 Cultural Resources

The National Historic Preservation Act (NHPA) of 1966 (16 U.S.C. §§ 470 et seq.) outlines Federal policy to protect historic properties and promote historic preservation in cooperation with states, tribal governments, local governments, and other consulting parties. The NHPA established the National Register of Historic Places (NRHP) and designated the State Historic Preservation Office as the entity responsible for administering State-level programs. Section 106 of the NHPA and its implementing regulations (36 CFR Part 800) outline the procedures for Federal agencies to follow to take into account the effect of their actions on historic properties. The Section 106 process applies to any Federal undertaking that has the potential to affect historic properties, defined in the NHPA as properties that are listed in or eligible for listing in the NRHP. As defined by the Advisory Council on Historic Preservation, a historic property is defined as a prehistoric or historic district, site, building, structure, or object included in or eligible for inclusion in the NRHP. A historic property includes artifacts, records, and remains that are related to and located within NRHP properties.

A Historic Properties Management Plan (HPMP) was completed for the Project area in the spring of 2006 (Cultural Resources 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 of the sites had a historical Euro-American affiliation. The majority (63) were identified as part of a pedestrian shoreline survey conducted for the USACE in 2002. The shoreline survey is one of the 12 surveys (3 of which were conducted for the USACE) that have been conducted 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 15El2) 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: 15El1, 15El3, 15El34, 15El35, 15El36, 15El37, 15El39, 15El40, 15El42, 15El44, 15El46, 15El50, 15El53, 15El54, 15El57, 15El62, 15El63, 15El64, and 15El65. 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 the 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).

3.4.1 Aesthetics

The topography of the Project area is characterized by hilly and mountainous terrain dissected by steep 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 the vegetation on adjacent slopes, ridges, and ravines such as post oak, Virginia pine, red oak, hemlock, and birch trees. Photograph 3-2 shows a scenic view from Grayson Lake.

Photograph 3-2: Scenic View from Grayson Lake

3.5 Land Use

Land use in the Project area is primarily recreational or focused on wildlife management areas. As discussed in Section 3.3.4, the Project area has six distinct recreational areas. Although the Project area is surrounded by rural land use such as forestry and agriculture, no agriculture occurs within the Project boundary. No industrial sites occur within the site boundary. The industrial sites closest to the Project site are Mullins Pallets, S&S Ready Mix, Inc., and Willard Miling, Inc., which are more than 1 mile away from the Project's eastern boundary. The City of Grayson is more than 4 miles north of the Project's northern boundary. Industrial sites in

Grayson are Grayson Journal-Enquirer; Printworks Unlimited, Inc.; Davis Lumber, Inc.; and Smithfield Foods, Inc. (Kentucky Cabinet for Economic Development, 2008).

The Project is 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 have been ongoing for many decades. One active coal mining site is located just outside the Project area in Elliott County (Kentucky Geological Survey, 2011b).

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; however, none of these are active (Figure 3-10). Fourteen are abandoned oil wells, 3 are oil wells of unknown status, 1 is an oil or gas well of unknown status, and 1 is an oil or gas well that is plugged and abandoned. Some of the subsurface mineral rights at the Project are owned by the federal government; however, large areas occur where the mineral rights are not owned by the federal government (Figure 3-10).

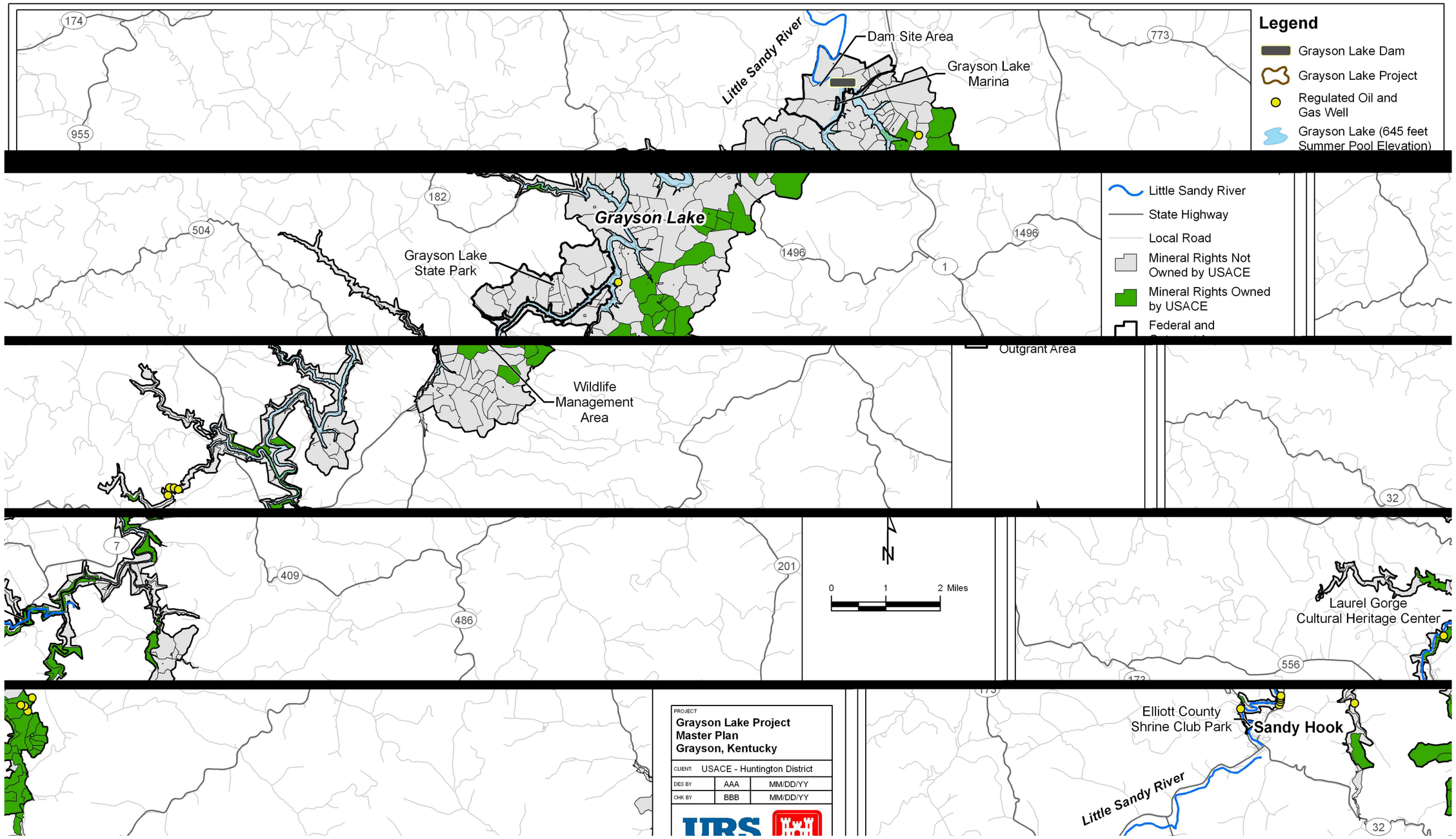

Figure 3-10: Project Lands with Mineral Rights and Oil and/or Gas Wells

This page intentionally left blank.

4.0 ENVIRONMENTAL IMPACTS OF ALTERNATIVES

This section identifies and assesses the potential environmental impacts from the No Action and Proposed Action Alternatives.

4.1 Physical Environment

4.1.1 Topography, Geology, and Soils

4.1.1.1 No Action

Under the No Action Alternative, no new proposed facilities or measures recommended in the Master Plan Update would be implemented. With the anticipated increase in visitation, the USACE and other resource agencies responsible for outgrants would monitor areas that are susceptible to erosion from increased usage and people trying to access less congested areas (potentially resulting from the development of social trails, trampling of vegetation on the edges of existing campgrounds, or overuse of existing trails), therefore minimizing the potential for increased erosion. To minimize potential adverse impacts on soils, the USACE and other resource agencies responsible for outgrants would implement protective measures such as closing off eroded areas and using erosion controls as needed. No impacts on topography or geology would occur.

Best management practices (BMPs) to minimize erosion during construction of new facilities would be implemented. For construction that would disturb more than 1 acre, the agency responsible for the action would obtain coverage under the KPDES by applying for a General Permit for Stormwater Discharges Associated with Construction Activities from the Kentucky Division of Water and would develop construction site erosion control and stormwater management plans as required.

4.1.1.2 Proposed Action

Under the Proposed Action, no impacts on topography would occur. Geotechnical evaluations would be performed to determine the risk of construction in areas of geologic concern such as highly erodible or unstable slopes.

Soils in the Project area on steep sloping terrain are generally prone to severe erosion and therefore have limited development potential for roadways, trails, small buildings, camping, and picnicking. Maintaining steep slopes (i.e., greater than 15 percent slope) in a forested condition would minimize erosion potential. Areas with slopes of less than 15 percent have less potential

for erosion than steeper areas and are more suitable for recreational use. The areas proposed for the construction of facilities (e.g., cabins, picnic shelters, camping sites) would occur primarily on slopes of less than 15 percent and close to existing development.

Implementation of temporary erosion and sediment control BMPs during construction (e.g., mulching bare areas, installing silt fences) along with permanent BMPs post-construction (e.g., managing the flow of stormwater runoff from impervious areas such as buildings and parking lots, establishing permanent vegetation) would occur for all proposed activities that would disturb the ground surface. For construction that would disturb more than 1 acre, the USACE would obtain coverage under the KPDES by applying for a General Permit for Stormwater Discharges Associated with Construction Activities from the Kentucky Division of Water and would develop construction site erosion control and stormwater management plans as required.

To more thoroughly evaluate impacts, the USACE would consider soil suitability, slope, and potential for geologic instability during site-specific project planning. Site-specific mitigation measures would be determined prior to construction and implemented as needed.

4.1.2 Water Resources

4.1.2.1 No Action

Under the No Action Alternative, the measures recommended in the Master Plan Update would not be implemented. With the anticipated increase in visitation, the USACE would monitor areas that are susceptible to erosion from increased usage and people trying to access new or less congested areas (potentially resulting in the development of social trails, trampling of vegetation on the edges of existing campgrounds, or overuse of existing trails), therefore minimizing the potential for increased sedimentation of the lake. The USACE would mitigate any adverse impacts by closing off eroded areas and implementing erosion and sediment controls as needed. Additionally, to minimize adverse impacts on water quality, the USACE would implement measures to account for any trash and debris left behind from increased visitor use of facilities by providing adequate trash receptacles and implementing temporary and permanent stormwater runoff BMPs in the construction of new facilities.

4.1.2.2 Proposed Action

Under the Proposed Action, an increase in impervious surface area would occur from new development such as parking areas, facilities, and new trails and would result in concentrated and increased stormwater runoff from these areas. BMPs to minimize the stormwater runoff from

impervious surfaces would be required, and runoff would be directed away from nearby surface waters, minimizing the risk of water pollution from spilled or water-transported materials.

Adverse short-term impacts on surface water quality could occur from sedimentation that is the result of ground disturbances during construction, especially in construction areas close to the shoreline or water bodies. With multiple areas being considered for new or updated facilities, there is increased potential for this additional nonpoint source pollution. Implementing erosion and sediment control BMPs during construction and implementing permanent stormwater runoff controls would minimize potential adverse impacts. For example, disturbed or bare areas remaining after construction would be vegetated to reduce the potential for erosion.

Adverse short- and long-term impacts on water quality may result in adverse impacts on other resources such as recreation (fishing and swimming), water treatment systems, aquatic biological resources and wildlife. Impacts on water quality may occur from trash/debris entering water bodies, from sewage, and from spills and leaks of contaminants from both land- and water-based vehicles. Stormwater runoff from additional impervious surfaces such as parking areas could carry additional pollutants into Grayson Lake. Mitigation such as setting limits for boating carrying capacity, providing adequately sized parking areas designed to appropriately handle stormwater runoff, providing adequate trash and sewage facilities for the amount of use, and including stormwater runoff measures during the design of redeveloped or new facilities would minimize adverse impacts. These measures would potentially result in an increase in water quality compared to existing conditions.

Temporary and localized turbidity in the nearshore lake environment would increase during the construction of new courtesy docks in three locations and the placement of footings or a buried cable in the lake for a utility corridor. Turbidity impacts during construction would be related directly to the amount of silt and clay on the lake bottom. Impacts would be short-term and limited to the vicinity of the work, especially with implementation of mitigation measures to minimize turbidity. These measures may include installation methods using techniques that minimize disturbance to submerged vegetation, limiting the construction equipment to the banks of the shore to the extent practicable, using a sediment/silt curtain if warranted, and implementing spill prevention and control measures for vehicles operating in the water. Other mitigation measures may include limiting the types of wood preservatives that are used. Wood preservatives such as creosote, pentachlorophenols, and chromated-copper-arsenate treated materials may result in pollutants leaching into the water. The USACE would obtain a CWA Section 401 permit from the Kentucky Division of Water for construction in the nearshore environment. Because the USACE would not be constructing the utility corridor projects, CWA

permits (Section 401 and Section 404) for utility corridor construction would be obtained by the utility corridor project owners and the projects overseen by FERC.

Groundwater resources are a potential source of water for enhancing or developing additional wetlands, for irrigating the golf course or other significant maintained landscape areas, or for providing potable water for Project development in remote areas. Because any new groundwater wells would be dispersed throughout the Project area, their effect on the local water table is expected to be negligible, but the amount of water proposed for withdrawal from new wells would be evaluated for impacts on the groundwater supply, and permits would be obtained from the Kentucky Division of Water if necessary. New potable water wells would be drilled and installed according to State and Federal regulations, effectively minimizing any risk of groundwater contamination.

4.1.3 Floodplains

4.1.3.1 No Action

Under the No Action Alternative, new construction could occur within areas subject to inundation from fluctuation in lake levels. The USACE would follow existing guidance regarding development in a floodplain. USACE (2004), Sections 2.2.1 and 5.2.2, state that seasonal fluctuations in water levels shall be taken into consideration when designing and developing lake and riverside facilities to avoid the placement of facilities in hazardous or high maintenance areas, and that the 5-year flood frequency is a good general guideline when planning lakeside development.

4.1.3.2 Proposed Action

Because flat areas are conducive to development, existing facilities are located in stream valleys and adjacent to the lake shoreline, and new facilities are primarily proposed for the same areas, although some may occur on bluffs or hilltops. Additionally, many recreational activities require direct access to the lake. Therefore, most of the recommended measures in the Proposed Action would take place within areas subject to inundation from fluctuation in lake levels. Because of topography constraints and the nature of water-based activities such as swimming and boating, no practicable alternative locations exist. The USACE would follow existing agency guidance described under the No Action Alternative regarding development within areas subject to inundation.

The functionality of the floodplain would not be reduced by Project activities. The USACE would ensure that its actions complied with USACE's guidance on development in a floodplain (USACE, 2004), EO 11988 (Floodplain Management), and USACE's guidance on implementation of EO 11988 (USACE, 1984), and would implement BMPs such as secondary containment and/or elevation of hazardous materials above base flood elevations to the maximum extent possible. Additionally, USACE and the State would ensure the safety of visitors by monitoring flood levels at areas and facilities used by the public and taking actions such as closing facilities as necessary. The USACE would ensure that actions would be in compliance EO 11988.

4.1.4 Air Quality

4.1.4.1 No Action

Under the No Action Alternative, new construction could result in short-term impacts on air quality from fugitive dust and construction vehicle emissions. To reduce temporary impacts on air quality from fugitive dust, the construction areas would be watered down when necessary to minimize particulate matter and dust. Emissions from fuel-burning internal combustion engines (e.g., heavy equipment, earthmoving machinery) could temporarily increase the levels of some of the criteria pollutants, including CO, NO_2, O_3, particulate matter 10 microns or greater in diameter, and non-criteria pollutants such as volatile organic compounds. To reduce the emission of criteria pollutants, running times of fuel-burning equipment would be minimized, and engines would be properly maintained. An increase in vehicles traveling in the Project area could cause limited, local air quality impacts, but impacts would be temporary and negligible compared to existing conditions.

Prescribed burning for wildlife management could result in short-term localized impacts on air quality. The size and timing of burning would be coordinated with local stakeholders and conducted in accordance with local, State, and Federal regulations. The public would be notified of prescribed burning well in advance of the burning, areas would be closed from public access, and signs would be posted to inform the public as needed.

4.1.4.2 Proposed Action

Impacts on air quality and mitigation measures to reduce potential impacts would be the same as described under the No Action Alternative. However, there would likely be more temporary construction-related emissions compared to the No Action Alternative because more construction is likely to occur under the Proposed Action.

4.1.5 Noise

4.1.5.1 No Action

Construction noise from capital improvements such as campground construction, vegetation management, and other development activities could have a moderate and temporary impact on visitors, employees, and wildlife. To reduce noise impacts, construction would occur during normal business hours, would not occur on Sundays or Federal holidays to the extent possible, and would be scheduled during the off season to the extent possible. Equipment and machinery on construction sites would meet all local, state, and Federal noise regulations.

Increased visitation at the Project would create additional noise above existing conditions. Seasonal noise from boats on the lake could have a negative impact on wildlife, day users, and lakeside campers. However, with the exception of boat ramps and marinas where boating noise is concentrated, boating-related noise is not expected to be loud or of long duration and would therefore have a minor impact on wildlife and visitors.

4.1.5.2 Proposed Action

Noise and mitigation measures to reduce potential noise impacts would be the same as described under the No Action Alternative except that temporary construction-related noise would be greater because more construction is likely under the Proposed Action.

4.2 Biological Environment

4.2.1 Vegetation

4.2.1.1 No Action

Under the No Action Alternative, the KYDFWR and the USACE would continue to monitor, manage, and protect grassland and forestland in the Grayson Lake Project area. Activities would include limited cutting of overstocked areas, native seeding and planting, and monitoring and removal of invasive species. Littering and trampling of vegetation could occur from informal use areas and social trails, especially with the anticipated increase in visitor usage. The USACE would monitor for impacts on vegetation and implement restrictions or restoration as needed.

4.2.1.2 Proposed Action

Under the Proposed Action, minor adverse impacts on vegetation would occur as a result of the expansion of parking areas, construction of recreational facilities and trails, development of scenic overlooks, and creation of utility corridors. Other impacts on vegetation could occur from

foot traffic on social trails, informal use of picnic or camping areas, littering, or the collection of woody material for fuel. Park ranger supervision would help mitigate these impacts.

Construction-related impacts, which would involve primarily removing vegetation prior to construction, would range from minimal impacts, such as clearing and leveling camping sites at a campground, to larger impacts related to the construction of parking areas and infrastructure. Many of the areas that would be affected by construction are adjacent to areas that have been developed or disturbed. Construction BMPs, such as revegetating disturbed areas and mitigating permanently lost vegetation by planting in other areas or restoring equivalent habitats, would be implemented as appropriate.

Some elements of the Proposed Action would result in long-term beneficial impacts on vegetation by consolidating activities to more central areas, allowing the recovery of discontinued areas, or reducing the number of social trails by constructing new trails. Hazardous trees in campgrounds, along roadways, and in day-use areas would be removed as appropriate and replaced with indigenous plant species as possible.

Because of the regional decline and unique ecology of eastern hemlocks and the uniqueness of the 9-acre stand of Virginia pine, these trees and their habitat may be identified, preserved, and managed to ensure that the species remains in its current form. Proactive management of open areas, such as meadows and clearings, and more densely vegetated areas would be initiated to achieve the optimal balance for wildlife and recreational use. Finally, a more aggressive approach to managing invasive species would occur in order to encourage the viability of native species.

Bottomland hardwood habitats are becoming scarcer and consequently more valuable. Loss of this valuable habitat continues because of changes in land use and increases in development. Because bottomland hardwood habitats support a variety of plant and animal species that can adapt to both flood conditions and dry periods and also support wildlife that does not thrive in other environments, this habitat would be protected and any impacts mitigated to the extent practicable. Management of these areas would yield a high-quality habitat for wildlife that would also be beneficial for many recreational activities, including hunting and wildlife viewing. Systematic harvesting of timber, which would result in long-term beneficial impacts on the ecosystem, would be considered in some areas to yield a more balanced forest in terms of desirable habitat to support target game and non-game species, as well as a diversity of wildlife and recreational use.

4.2.2 Wetlands

4.2.2.1 No Action

Under the No Action Alternative, the USACE and the KYDFWR would continue to preserve and enhance wetland resources within the Grayson Lake Project area as outlined in EO 11990 and the 1987 Master Plan.

4.2.2.2 Proposed Action

Under the Proposed Action, updated wetland delineations in focused areas of the Project and regular monitoring of wetlands for changes in size and health would be considered. Wetlands would be designated as environmentally sensitive resources. Restrictions on the development of wetlands would be incorporated into any plans for construction or recreational activities.

Wetlands would be both a constraint and an opportunity in the development of recreational facilities and activities. Development opportunities for high-intensity recreational facilities and activities (e.g., cabins, lodge, restaurant, campsites, picnic sites) would be limited or not allowed in wetlands. However, the wetlands would also provide recreational opportunities such as wildlife viewing, bird watching, and interpretive and educational activities. Wetlands would also support target game species and waterfowl, thereby supporting consumptive recreational uses.

The USACE would obtain all appropriate permits as required by Section 401 of the CWA for construction that would impact any waters of the US or Commonwealth of Kentucky. The USACE would require other agencies and developers to obtain CWA Section 404 permits prior to implementation of projects that would result in impacts on wetlands.

4.2.3 Terrestrial Wildlife

4.2.3.1 No Action

Under the No Action Alternative, impacts on wildlife resources would reflect the impacts of anticipated increased visitor use. Use of the shoreline and areas not designated for recreational purposes could result in increased habitat degradation, especially in more heavily used areas. The KYDFWR and the USACE would continue to monitor and manage wildlife in the same manner as outlined in the 1987 Master Plan. Wildlife viewing, birding, and opportunities to hunt game in portions of the Project area would continue. Impacts on vegetation from construction (e.g. removal of vegetation) would be avoided or minimized to the extent possible.

4.2.3.2 Proposed Action

Under the Proposed Action, maximizing the diversity of habitats in the Project area, including grasslands, meadows, forest, wetlands, and open areas, to support a wide variety of wildlife species is a key objective of the KYDFWR and the USACE. Other key objectives are to identify and delineate the location, size, and extent of ecosystems and enhance management to conserve and protect wildlife and habitat. Terrestrial wildlife resources that support both recreational activities (e.g., white-tailed deer, wild turkey, doves, waterfowl, various small game species) would be managed to allow hunting while maintaining population viability. The USACE and the KYDFWR would consider preserving particular areas of forest that attract neotropical migratory birds such as the cerulean warbler, which requires a dense and unbroken canopy, to provide habitat for declining species and also to attract birdwatchers. Wildlife management would also provide opportunities for stewardship, support for species that are in decline, and preservation of habitat in accordance with the USACE's *Environmental Stewardship and Maintenance Guidance and Procedures* (USACE, 1996).

Adverse impacts on wildlife could occur from construction- and human-related noise, loss of habitat, increased number of people in existing recreational areas, or new development in previously undisturbed areas. The increase in campsites and recreational facilities would increase visitation and potential visitor damage to wildlife habitat. However, user impacts would be mitigated by expanding and upgrading various day-use facilities and trails. Littering, trampling of vegetation, vandalism, and other problems associated with visitor use could occur. Park ranger supervision would help mitigate these impacts. Mitigation such as timing of construction to avoid sensitive periods to some populations (i.e., nesting season) and consideration of wildlife corridors and impacts on species prior to development would minimize impacts.

The potential increase in trash could attract additional wildlife, which could then become a nuisance and necessitate removal. Proper waste removal would reduce the potential for this to occur. However, because the majority of new disturbance would occur in areas that have been previously developed and have a relatively low habitat value compared to most of the undeveloped Project area, adverse impacts would be minimal.

4.2.4 Aquatic Life

4.2.4.1 No Action

Under the No Action Alternative, the KYDFWR and the USACE would continue to monitor and manage aquatic resources in the same manner as described in the 1987 Master Plan and under

current programs and management goals. The KYDFWR would continue to stock the Tailwater Area and lake and would continue the practice of adding fish attractors to the lake bottom to provide fish habitat.

Excess deposition of sediment as a result of stormwater runoff during land-based construction could adversely affect aquatic life, including the food chain, spawning and rearing habitat, in-stream cover, water temperature extremes, and other structural and functional components. Sedimentation from construction in areas adjacent to water bodies would be minimized by implementing erosion and sediment control measures, and any sedimentation increases would therefore be minor, short-term, and localized. Implementation of construction BMPs such as erosion and sediment controls and permanent stormwater runoff BMPs would minimize adverse impacts.

The effect of the No Action Alternative on fish populations would be a continuation of the existing conditions. Over time, visitation and demands on fish populations are expected to increase. To maintain the current quality and makeup of fish communities, current fishery management practices may need to be modified (e.g., stocking, catch limits).

4.2.4.2 Proposed Action

Construction in the water (e.g., new courtesy docks and footings or cable burial for a utility corridor) could result in short-term adverse impacts on the aquatic environment. Additionally, excess deposition of sediment as a result of stormwater runoff during land-based construction could adversely affect aquatic life, including the food chain, spawning and rearing habitat, in-stream cover, water temperature extremes, and other structural and functional components. Sedimentation from construction in areas adjacent to water bodies would be minimized by implementing erosion and sediment control measures, and any sedimentation increases would therefore be minor, short-term, and localized.

As impervious surfaces increase, the amount of runoff increases and the quality of stormwater runoff may be reduced from sediment, oils, and other pollutants. Impacts would be concentrated adjacent to the shoreline because this area has the largest number of visitors and most of the development. With designated land uses and development corridors, potential water quality impacts would be minimized. Implementation of construction BMPs such as erosion and sediment controls and permanent stormwater runoff BMPs would minimize adverse impacts.

Growth in visitation could increase fishing pressure, which could lead to increased harvests that would adversely affect some species populations; existing fishing pressure has already resulted

in increased stocking of some species. Increased recreational use could also result in indirect impacts from increased boating (noise disturbances and potential for spills and/or leaks of pollutants), trash or sewage entering water bodies, and stream bank or lakeside habitat destruction from overuse of some areas that could result in sedimentation of water or loss of riparian habitat. Protection or conservation of the riparian area around the lake would have positive impacts on aquatic resources by providing canopy cover, thereby reducing temperatures around the water's edge and providing a source of detritus, and by having tree roots that would maintain the banks. In addition, a wider riparian corridor with mature trees would filter runoff before reaching the lake.

4.2.5 Threatened and Endangered Species

4.2.5.1 No Action

KYDWFR and the USACE would continue to implement practices to avoid potential adverse impacts on the federally listed Indiana bat as appropriate, including restricting tree clearing from April 1 to November 15 in areas of potential habitat. In addition, the current practice of restricting tree cutting from October 15 to March 31 in the WMA would be continued in order to protect State-listed species.

The USACE would continue following bald eagle habitat management practices from the *National Bald Eagle Management Guidelines* (USFWS, 2007) to minimize disturbances and comply with the Bald and Golden Eagle Protection Act. These guidelines include restricting new construction to 330 to 660 feet from a nest, depending on the type of structure and visibility from the nest. Timber operators (e.g., personnel who clear cut or remove overstory trees) would maintain a minimum of 330 feet from a nest at any time and 660 feet during breeding season. For the following activities, no buffer would be necessary around nests outside the breeding season and should be avoided within 330 feet of the nest during breeding season: (1) off-road vehicles, (2) motorized watercraft (including jet skis and personal watercraft), (3) non-motorized recreation and human entry (e.g., hiking, camping, fishing, hunting). Loud, intermittent noises such as blasting would be avoided within 0.5 mile of active nests. The resource manager would be tasked with creating an inventory and monitoring all identified bald eagle nests.

4.2.5.2 Proposed Action

Surveys for federally listed species would be conducted if potential habitat for a federally listed species is identified during a pre-construction review of a Proposed Action area. Although no federally listed species or designated critical habitat in the Project area has been confirmed, the

USACE would coordinate with the USFWS under Section 7 of the ESA prior to implementation of any element of the Proposed Action. The USACE would follow mitigation measures required by USWFS for federally protected species. KYDWFR and the USACE would continue to implement practices to avoid potential adverse impacts on federally listed bats as appropriate, including restricting tree clearing from April 1 to November 15 in areas of potential habitat for the Indiana bat. In addition, the current practice of restricting tree cutting from October 15 to March 31 in the WMA would be continued in order to protect State-listed species. The USACE would follow bald eagle habitat management practices as described under the No Action Alternative.

4.3 Socioeconomic Environment

4.3.1 Population and Employment

4.3.1.1 No Action

Existing programs, operation and maintenance activities that would continue under the No Action Alternative and construction could result in short-term beneficial impacts on the local economy by increasing employment opportunities for local construction workers and increasing the number of workers in the Grayson Lake area during business hours. No impacts on population are anticipated.

4.3.1.2 Proposed Action

Short-term beneficial impacts from construction and long-term beneficial impacts from an anticipated increase in visitors to the Project would be the same as described under the No Action Alternative. No impacts on population are anticipated.

4.3.2 Environmental Justice

4.3.2.1 No Action

Existing programs and operation and maintenance activities that would continue under the No Action Alternative would be implemented within the boundaries of the project and at a distance from local population centers. As a result, any environmental justice populations that may reside around the project would not be directly impacted by these actions and no disproportionately high or adverse impacts on low-income or minority would occur under the No Action Alternative. Construction would provide greater employment opportunities for all local residents.

4.3.2.2 Proposed Action

As discussed in section 3.3.2, there is some probability of minority and low-income persons residing in areas surrounding the project. For purposes of this programmatic environmental assessment, generalizations about potential environmental justice populations using available data are acceptable, but more specific evaluations that will be required as part of any future supplementary project-specific NEPA documentation should be based on the more accurate data from the 2010 Census. At the time that specific actions are planned for implementation and it is determined that additional NEPA documentation will be needed for these actions, 2010 Census block group and block data should be available for use in determining whether minority and low income populations may be disproportionately impacted by the proposed actions.

The locations within the Project where Resource Plan recommendations would be implemented are generally far removed from populated areas. As a result, local residents would be unlikely to experience direct impacts from implementing these recommendations, whether disproportionate or otherwise. The direct and indirect impacts resulting from the proposed Resource Plan recommendations on local communities are not expected to be substantial, and it is unlikely that such impacts could likely be considered as disproportionate if environmental justice populations were determined to exist in any affected community. Final determination will be made when the impacts of individual recommendations planned for implementation are analyzed as part of any supplementary NEPA evaluations that may be required for these actions.

4.3.3 Transportation/Traffic

4.3.3.1 No Action

As visitor use increases, the ability of the existing facilities to handle the increase in traffic would decline. Some areas of the Project are already congested, such as recreational areas along SR 7, especially during holidays. The USACE would consider additional parking areas to reduce adverse impacts on traffic congestion.

4.3.3.2 Proposed Action

Increased traffic from construction and worker vehicles during construction could result in minor temporary impacts on traffic and transportation, but in most areas, the impact would likely be negligible. The expansion of parking areas would have long-term beneficial impacts on vehicular traffic, and the addition of courtesy docks would have long-term beneficial impacts on boat traffic. The USACE would continue to consider additional parking areas to reduce potential impacts on traffic congestion as visitation increases.

4.3.4 Recreation

4.3.4.1 No Action

The provision of recreational facilities and services would continue under the No Action Alternative, but the 1987 Master Plan, which the resource manager and staff operate under, would not accurately reflect the current status of Project facilities. In addition, there would be limited new measures such as trail corridors and additional land use designations to better accommodate recreational needs while protecting natural resources.

4.3.4.2 Proposed Action

Needs related to recreational activities such as reduced congestion and better traffic flow at facilities would be better accommodated by implementing the Proposed Action. The Proposed Action is based on a review of the existing facilities, resource suitability, and discussions with stakeholders. There are many beneficial impacts on recreation from increasing the intimacy of the visitor's experience with nature through new interpretive trails, signage, and support facilities. These activities would combine with existing facilities and vegetative management to facilitate outdoor educational activities. Expanding the camping experience with modern facilities would also complement the existing campsites, and the expansion of parking would accommodate additional people. A potential utility corridor could disrupt recreational areas or facilities, but the USACE would avoid or minimize adverse impacts prior to consent of utility corridor construction.

Implementing the Proposed Action would require that proposals consider potential impacts on existing recreational facilities from construction and include avoidance and minimization measures and mitigation as necessary. Trails would be located to accommodate visitor experience and education while protecting and conserving the natural resources and limiting possible environmental impacts. In addition, hunting would be enhanced by inventory and management of wildlife habitats. Trail designs would accommodate various uses and avoid conflicts, such as with horseback riders and hikers.

4.3.5 Cultural Resources

4.3.5.1 No Action

Recreational activities and construction could be implemented individually under the No Action Alternative. The process for identifying sites prior to project implementation and the required consultations under Section 106 of the NHPA would be the same as under the Proposed Action.

4.3.5.2 Proposed Action

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 mitigated prior to any undertaking that has the potential to affect those sites. Avoidance measures and/or mitigation would be coordinated by the USACE Huntington District archeologist (District archaeologist). Actions proposed for areas not previously surveyed would require coordination with the District archeologist to determine whether a cultural resource survey is required.

Once the USACE inventories real estate actions that have been cleared internally, 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.

Prior to development/construction, the USACE would evaluate the potential for the Proposed Action to adversely affect cultural resources and would consult with the Kentucky State Historic Preservation Officer under Section 106 of the NHPA before implementing any actions that have a potential to affect the sites that are eligible or potentially eligible for the NRHP. Actions that are proposed in areas that have not been surveyed require coordination with the USACE archeologist to determine whether a cultural resources survey is required.

4.3.6 Aesthetics

4.3.6.1 No Action

Under the No Action Alternative, there would be a potential for increased adverse impacts on the aesthetics of the Project area. The storage area at the marina would continue to be visually displeasing. Outgrants would continue to be requested. If the outgrants are not concentrated in a designated area, there is additional likelihood of land disturbance, which could negatively affect aesthetic qualities. An increased number of visitors could result in littering, trash, trampled

vegetation, and congestion that would adversely affect the aesthetics of the Project area. The USACE would monitor Project areas and implement measures such as additional trash receptacles, restoration of affected areas, or restrictions as needed to avoid or minimize impacts.

4.3.6.2 Proposed Action

With continuous requests for outgrants of Project lands, implementing the Proposed Action would reduce the potential impacts to the aesthetics in the Project area by concentrating development in designated areas. Additionally, moving the storage area at the marina to a screened location would result in beneficial impacts on aesthetics that area. However, aboveground utility lines from implementation of a new utility corridor could affect the viewshed. By developing corridors for activities such as trails, greenways, and utility lines, activities would be concentrated, and there would be less potential for land disturbance, which often reduces the aesthetic quality of natural areas. In addition, an updated inventory and resource analysis would more accurately identify the areas that provide high-quality aesthetics. Development of scenic overlooks would result in long-term beneficial impacts on the public's ability to enjoy the views at the Project.

An increased number of visitors could result in littering, trash, trampled vegetation, and congestion that would adversely affect the aesthetics of the Project area. The USACE would monitor Project areas and implement measures such as additional trash receptacles, restoration of affected areas, or restrictions as needed to avoid or minimize impacts.

4.4 Land Use

4.4.1.1 No Action

No changes in existing land use would occur under the No Action Alternative. Under existing conditions, the public and private uses of Grayson Lake do not affect industrial areas or local industry.

4.4.1.2 Proposed Action

For Project lands where the federal government owns all subsurface mineral rights, any future resource extraction would proceed through the Bureau of Land Management. The Bureau of Land Management 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 federal 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 federal government would be allowed to review and comment on the application. The Proposed Action would not affect industrial areas or local industry.

4.5 Cumulative Impacts

Cumulative impacts would result from the incremental impact of the Proposed Action added to impacts from other past, present, or reasonably foreseeable future actions in the local area.

Geographical boundaries for this discussion of cumulative impacts are the Grayson Lake Project area and Elliott and Carter Counties. Temporal boundaries are the reservoir impoundment (1968) to 50 years after the Master Plan Update (2041).

4.5.1 Past and Present Actions

The Little Sandy River was impounded for the creation of Grayson Lake, which occurred in 1968. Authorized purposes for construction were flood risk management, recreation, and water quality improvement. Recreation and associated natural resource management are the focus of the Master Plan Update.

Grayson Lake contributes to the local economy through visitor spending and by providing local jobs. Recreational facilities are associated with the high volume of visitation. Some areas reach and sometimes exceed capacities for parking, camping, and picnicking facilities. Boat traffic on the lake is often heavy.

4.5.2 Reasonably Foreseeable Future Actions

Visitation in the Project is expected to increase as the population increases. Pressure on the lake's resources is therefore expected to continue. Requests for outgrants and encroachments on public lands are also expected to continue. Specifically, the Kentucky Department of Transportation is planning upgrades to SR 7 in the Project area including widening of the road and providing turning lanes into the recreation areas, and a new trail that would go through the Project and connect Greenup to the Jenny Wiley State Park is proposed.

4.5.3 Impacts

As the area around Grayson Lake experiences increased development, terrestrial resources surrounding the lake will become even more limited. With the loss of vegetated land outside USACE boundaries, wildlife is likely to be concentrated in the remaining forested lands. In

addition, more pressure will be placed on the public lands for the facilities and activities that are provided.

Land development and stormwater runoff from developed, agricultural, logging, and mining areas are the primary sources of water quality pollution in the lake. With urban development and loss of pervious surfaces (vegetated areas where water can infiltrate) upstream in Elliott and Carter Counties, there is increased potential for stormwater runoff and a reduction in water quality draining into the lake.

Because visitation to the Grayson Lake Project is expected to increase, demands for recreational facilities will also continue to increase. Facilities will need continual repair and upgrade to meet visitor expectations. In addition, there may be conflicting demands for recreational opportunities on the lake and Project lands. Although the continued request for uses of Project lands by various interests will also add more demands on the limited Project lands and waters, the USACE would not allow development to exceed the carrying capacity of the Project's environmental resources; development would be limited to a sustainable level.

Implementation of the Proposed Action (implementation of the Master Plan Update) would provide a tool for the resource staff of Grayson Lake to ensure that natural resources and Project facilities are being used to the greatest extent possible without degrading resources. Designating areas for existing and future outgrants of Project lands would limit locality and severity of potential impacts while expediting evaluation period for requests.

4.6 Summary of Mitigation Measures and Agency Consultation Requirements

The following measures would be implemented as appropriate to avoid or minimize adverse impacts on resources:

- Implementing erosion and sediment control BMPs for all projects and obtaining an NPDES General Permit for Stormwater Discharges Associated with Construction Activities from the Kentucky Division of Water for any project that would disturb more than 1 acre of ground
- Obtaining Section 401 Water Quality Certification from the Kentucky Division of Water for work in waters of the United States, including the nearshore environment of the lake and wetlands
- Avoiding lakeside development in areas subject to the 5-year flood frequency

- Coordination with the USFWS under Section 7 of the ESA where there is a potential to adversely affect Federally listed threatened and endangered species
- Avoiding tree removal between October 15 and March 31 in the WMA to protect some State-listed species, avoiding activities that would result in disturbances to federally listed bats under Section 7 of the ESA between April 1 to November 15, and following bald eagle habitat management practices
- Compliance with Section 106 of the NHPA prior to construction

In addition, the USACE would consult with the following agencies prior to implementation of the Proposed Action:

- USFWS under Section 7 of the ESA and Bald and Golden Eagle Protection Act
- Kentucky State Historic Preservation Officer under Section 106 of the NHPA and other Consulting Parties including Native American tribes as appropriate

5.0 REFERENCES

ASC Group, Inc. 2011. *Archaeological Survey of Shoreline, Dam Areas, and Recreation Areas for the US Army Corps of Engineers, Huntington District Lakes in Kentucky, Ohio, Virginia, and West Virginia (Draft).* Contract W912P9-09-D-0536.

Coomes, P. and B. Kornstein. 2010. "Recent Economic Performance of Regions Around Kentucky." *Kentucky Annual Economic Report 2010.*

Cultural Resource Analysts, Inc. 2006. *Historic Properties Management Plan for the Grayson Lake Reservoir, Carter and Elliott Counties, Kentucky*. Contract DACW69-03-D-0005.

EPA (U.S. Environmental Protection Agency). 1974. *Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety.*

EPA (U.S. Environmental Protection Agency). 2010. *National Ambient Air Quality Standards (NAAQS)*. Available at http://www.epa.gov/ttn/naaqs. Accessed 19 March 2010.

FERC (Federal Energy Regulatory Commission). 2006. *Environmental Assessment for the Proposed Big Sandy Pipeline Project*. Prepared in cooperation with the USACE.

Homer, C., C. Huang, L. Yang, B. Wylie, and M. Coan. 2004. *Development of a 2001 National Landcover Database for the United States.* Photogrammetric Engineering and Remote Sensing, Vol. 70, No. 7, July 2004, pp. 829-840.

Kentucky Bat Working Group. 2011.Gray Bat Web site. Available at http://www.biology.eku.edu/bats/graybat.htm. Accessed 28 April 2011.

Kentucky Cabinet for Economic Development. 2008. *Existing Industry in Kentucky*. Geographical Information Systems geospatial data. Frankfort, KY. February.

Kentucky Division of Air Quality. 2010. *Fiscal Year 2010 Annual Report.* Available at http://air.ky.gov/Division%20Reports/DAQ%202010%20Annual%20Report.pdf. Accessed 19 April 2011.

Kentucky Division of Oil and Gas Conservation. 2010. Online Oil and Gas Records Database. Available at http://kgs.uky.edu/kgsweb/DataSearching/OilGas/OGSearch.asp. Accessed March 10, 2011.

Kentucky Division of Water. 2010. *Draft 2010 Integrated Report to Congress on the Condition of Water Resources in Kentucky*.

Kentucky Geological Survey. 2002. State Hydrology Series Web site Hydrologic and Watershed Coverages. Water Wells Geographical Information System files: data from the Kentucky Ground Water Data Repository. Available at http://www.uky.edu/KGS/gis/hydro.htm. March. Accessed 10 February 2010.

Kentucky Geological Survey. 2009. Kentucky Geologic Map Information Service Interactive On-line Mapper. Available at http://kgs.uky.edu/kgsmap/KGSGeology/viewer.asp#. Accessed 10 February 2010.

Kentucky Geological Survey. 2011a. *Groundwater Atlas for Lawrence County*. Available at http://www.uky.edu/KGS/water/library/gwatlas/Elliott/Waterquality.htm and http://www.uky.edu/KGS/water/library/gwatlas/Carter/Waterquality.htm. Accessed 2 February 2011.

Kentucky Geological Survey. 2011b. Kentucky Geologic Map Service Interactive On-line Mapper Kentucky Surface Mining Information for Elliott and Carter Counties. Available at http://eppcmaps.ky.gov/website/smis/viewer.htm?startLeft=5679961.63644444&startBottom=3854206.63&startRight=5891955.56355556&startTop=4003264.86&XY=5785958.6:3928735.745&QueryZoom=Yes. Accessed 20 April 2011.

KSNPC (Kentucky State Nature Preserves Commission). 2005. *Across the Americas: Kentucky's Ecological Link to Latin America*: in Naturally Kentucky Spring 2005 Number 46. Available at http://www.e-archives.ky.gov/pubs/NaturePreserves/Natky46_Spring2005.pdf. Accessed 29 April 2011.

KSNPC (Kentucky State Nature Preserves Commission). 2011a. *County Report of Endangered, Threatened, and Special concern Plants, Animals and Natural Communities of Kentucky.* Available at http://naturepreserves.ky.gov/pubs/publications/KSNPC_countylist.pdf. Accessed 12 August 2011.

KSNPC (Kentucky State Nature Preserves Commission). 2011b. *State Nature Preserves and State Natural Areas*. Available at http://naturepreserves.ky.gov/naturepreserves/Pages/preserves.aspx. Accessed 29 April 2011.

KYDFWR (Kentucky Department of Fish and Wildlife Resources). 2008. Native Warm Season Grasses. Available at http://fw.ky.gov/native.asp. Accessed 12 February 2010.

KYDFWR (Kentucky Department of Fish and Wildlife Resources). 2010. *Grayson Lake State Park.* Available at http://parks.ky.gov/findparks/recparks/gl/. Accessed 18 February 2010.

KYDFWR (Kentucky Department of Fish and Wildlife Resources). 2011b. *Kentucky Fishing and Boating Guide*. March 2011 – February 2012. Available at http://fw.ky.gov/navigation.aspx?cid=800. Accessed 25 May 2011.

KYDFWR (Kentucky Department of Fish and Wildlife Resources). 2011a. Kentucky's Species Information for Public Hunting Area Grayson Lake WMA. Available at http://fw.ky.gov/kfwis/arcims/WmaSpecies.asp?strID=225. Accessed August 12, 2011.

McGrain, P. and J.C. Currens. 1978. *Topography of Kentucky: Kentucky Geological Survey*, ser. 11, Special Publication 25.

NatureServe. 2007. International Ecological Classification Standard: Terrestrial Ecological Classifications. NatureServe Central Databases. Arlington, VA.

NatureServe. 2009a. *Cyprogenia stegaria*. NatureServe Explorer. Available at http://www.natureserve.org/explorer/servlet/NatureServe?searchName=Cyprogenia+stegaria+. Accessed 18 February 2010.

NatureServe. 2009b. *Myotis sodalis*. NatureServe Explorer. Available at http://www.natureserve.org/explorer/servlet/NatureServe?searchName=Myotis+sodalis. Accessed 18 February 2010.

NatureServe. 2009c. *Myotis sodalis*. NatureServe Explorer. Available at http://www.natureserve.org/explorer/servlet/NatureServe?searchName=Myotis+grisescens. Accessed 18 February 2010.

NOAA (National Oceanic and Atmospheric Administration). 2006. *The Climate of Kentucky*. Available at http://cdo.ncdc.noaa.gov/climatenormals/ clim60/states/Clim_KY_01.pdf. Accessed 12 February 2010.

Ray, J.A., J.S. Webb, and P.W. O'Dell. 1994. *Groundwater Sensitivity Regions of Kentucky.* Kentucky Department for Environmental Protection, Division of Water, Groundwater Branch. Frankfort, Kentucky.

USACE (U.S. Army Corps of Engineers). 1984. Publication Number ER 1165-2-26, Water Resources Policies and Authorities - Implementation of Executive Order 11988 on Flood Plain Management. March 30. Available at http://140.194.76.129/publications/eng-regs/er1165-2-26/toc.htm. Accessed 20 May 2011.

USACE (U.S. Army Corps of Engineers). 1987. *Grayson Lake Project Master Plan.*

USACE (U.S. Army Corps of Engineers). 1994. *Authorized and Operating Purposes of Corps of Engineers Reservoirs*.

USACE (U.S. Army Corps of Engineers). 1996. EP 1130-2-550, *Recreation Operations and Maintenance Policies*. Chapter 3: Project Master Plans and Operational Management Plans. Washington, DC.

USACE (U.S. Army Corps of Engineers). 2004. Publication Number EM 1110-1-400, Engineering and Design - Recreation Facility and Customer Services Standards. November 1. Available online at http://140.194.76.129/publications/eng-manuals/em1110-1-400/toc.htm. Accessed 20 May 2011.

USACE (U.S. Army Corps of Engineers). 2006. *Big Sandy Pipeline Project: Draft Environmental Assessment*.

USACE (U.S. Army Corps of Engineers). 2011. *Draft Grayson Lake Project Master Plan.*

U.S. Census Bureau. 2008. State and County Quickfacts Web site: Median Income Statistics for Kentucky. U S. Department of Commerce, Bureau of Census. Available at http://quickfacts.census.gov/qfd/states/21000.html. Accessed August 12, 2011.

U.S. Census Bureau. 2010. Population Estimates. U S. Department of Commerce, Bureau of Census. Available at http://www.census.gov/popest/cities/. Accessed 29 April 2011.

USDA (U.S. Department of Agriculture). 1965. Soil Conservation Service *Soil Survey of Elliott County, Kentucky*. Natural Resources Conservation Service Soil Data Mart. Available at http://soildatamart.nrcs.usda.gov/. Accessed 10 February 2010.

USDA (U.S. Department of Agriculture). 1983. Soil Conservation Service *Soil Survey of Carter County, Kentucky*. Natural Resources Conservation Service Soil Data Mart. Available at http://soildatamart.nrcs.usda.gov/. Accessed 10 February 2010.

USFWS (U.S. Fish and Wildlife Service). 2007. *National Bald Eagle Management Guidelines.*

USFWS (U.S. Fish and Wildlife Service). 2010a. National Wetland Inventory (NWI) map data Available at http://www.fws.gov/wetlands/Data/Mapper.html. Accessed 8 February 2010.

USFWS (U.S. Fish and Wildlife Service). 2010b. Gray Bat Fact Sheet. Available at http://www.fws.gov/midwest/Endangered/mammals/grbat_fc.html. Accessed April 29, 2011.

USGS (U.S. Geological Survey). 2009. USGS Digital Elevation Model Geographical Information System file, 1/3-Arc Second National Elevation Dataset. Available at http://nationalmap.gov. Accessed 10 October 2010.

Appendix A
Grayson Lake Project Master Plan (2011)

This page intentionally left blank

Appendix B
Distribution List for the
Draft Programmatic Environmental Assessment

This page intentionally left blank.

List of persons invited to review the Draft PEA	
Name	***Affiliation***
Ms. Beverly Faulkner	Grayson Lake State Park
Ms. Gwenda Atkins	Laurel Gorge Cultural Center
Mr. Chris Garland	Kentucky Department of Fish and Wildlife Resources
Ms. Monica Conrad	Kentucky Tourism, Arts & Heritage Cabinet
Mr. Richard Mauro	Kentucky Department of Fish and Wildlife Resources
Mr. Charles Wallace	Carter County Judge/Executive
Mr. David Blair	Elliott County Judge/Executive

Note: The SEA was also submitted to the Kentucky State Clearinghouse for interagency review and comment.

This page intentionally left blank.