2009 MASTER PLAN
ADDICKS AND BARKER RESERVOIRS
BUFFALO BAYOU AND TRIBUTARIES
FORT BEND AND HARRIS COUNTIES, TEXAS

U.S. ARMY CORPS OF ENGINEERS, GALVESTON DISTRICT
GALVESTON, TEXAS
AUGUST 2009

2009 Master Plan
Addicks and Barker Reservoirs
Buffalo Bayou and Tributaries
Fort Bend and Harris Counties, Texas

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

LIST OF APPENDICIES

1.0 INTRODUCTION

In December of 1935, a thunderstorm produced 16.5 inches of rainfall which caused major flooding along Buffalo Bayou through the City of Houston. The flooding resulted in eight deaths and an estimated $2.6 million in property damages. Power to all Houston Ship Channel industries was cut off as Buffalo Bayou rose 10 inches every hour for 24 hours, reaching 52 feet above sea level at Capitol Street Bridge, where normally the bayou ran at six feet above sea level.

In response to this catastrophe and to provide a measure of flood risk management for future events, Congress authorized the U.S. Army Corps of Engineers (USACE) to construct the Addicks and Barker Reservoirs as part of the Buffalo Bayou and Tributaries Project (BBTP), Texas. The BBTP was designed to reduce potential flood damages through a combination of reservoirs, channel improvements, and detention basins. Addicks and Barker Reservoirs serve as detention basins and were designed to collect excessive amounts of rainfall which would then be released into Buffalo Bayou at a controlled rate.

Addicks and Barker Reservoirs fulfill this purpose by impounding water during heavy rainfalls and flood events, but do not store water year-round as is typical of lake-forming reservoirs. This “dry” condition of the reservoirs provides the USACE with several management opportunities, primarily the management of natural and cultural resources and the development of recreational opportunities for the visiting public. The USACE is responsible for providing effective, long-term, sustainable management for both natural and cultural resources pursuant to ER-1130-2-540. In addition, Section 4 of the Flood Control Act of 1944 authorizes the USACE to construct, operate, and maintain public parks and recreational facilities in reservoirs.

The Addicks and Barker Reservoirs Master Plan was developed as a tool to aid the USACE Galveston District in integrating the authorized Flood Damage Reduction purpose of the reservoirs with the Galveston District’s responsibility as steward of the environmental and cultural resources located on the reservoir, while providing quality outdoor recreational opportunities to the public.

This Master Plan was developed in accordance with ER-1130-2-550 and with numerous other Acts, Regulations, Executive Orders, and Engineering Regulations and Pamphlets (refer to Appendix A). This Master Plan contains the following sections:

> Project Description: This section presents a brief history of the reservoirs and a general description of how the reservoirs function;
>
> Resource Objectives: This section discusses several resource management objectives which were formulated to provide general guidance and direction for the USACE Galveston District when making management decisions for Addicks and Barker Reservoirs;

Existing Conditions: This section presents a description of the existing environmental conditions and recreational development on both Addicks and Barker Reservoirs;

Recreation Analysis: This section provides an evaluation of recreational facilities on Addicks and Barker Reservoirs, consisting of an analysis of recreation use, a discussion of recreational needs identified for the region, and a discussion of similar recreational facilities located off the reservoirs;

Special Consideration: This section discusses specific resources that are rare, unique, of scientific, ecological, or cultural value, or of particular interest to the USACE Galveston District;

Land Classification: This section presents and describes the land use classifications developed for Addicks and Barker Reservoirs, consisting of: Recreation, Operations, Environmentally Sensitive Areas, Multiple Resource Use, and Proposed (Future) Recreation;

Resource Plan: This section presents specific action statements that will be incorporated into management decisions for Addicks and Barker Reservoirs.

1.1 PROJECT AUTHORIZATION AND LAND ALLOCATION

The Addicks and Barker Reservoirs were authorized as a part of the Buffalo Bayou and Tributaries Project (BBTP) by the Rivers and Harbors Act, approved June 30, 1938. The BBTP was subsequently modified by the Flood Control Acts of August 11, 1939, and September 3, 1954. The BBT provides for improvements to Buffalo Bayou and its principal tributaries, White Oak Bayou and Brays Bayou. The purpose of the project is to protect urban development in the downstream floodplain of Buffalo Bayou through the City of Houston.

All USACE reservoir lands are allocated based on the specific functions in accordance with the authorized purpose for which they were acquired. The authorized purposes can be classified as Operations, Recreation, Fish and Wildlife, or Mitigation. The sole authorized purpose of the Addicks and Barker Reservoirs is to reduce potential flood damages within the downstream floodplain of Buffalo Bayou; all lands acquired for Addicks and Barker Reservoirs are for this purpose. Accordingly, all project lands are allocated to Operations, meaning the safe and effective operation of the reservoirs take precedence over all other uses.

1.2 PURPOSE AND SCOPE OF THE MASTER PLAN

The purpose of the Addicks and Barker Reservoirs Master Plan is to provide guidance to the USACE Galveston District when making decisions on management actions on Addicks and Barker Reservoirs. This Master Plan is intended to be revised and updated as values, attitudes, needs, and knowledge regarding the resources on the reservoirs

change. The Galveston District shall review the efficiency and applicability of the Master Plan on an annual basis. This Master Plan, and all discussions contained, applies only to Addicks and Barker Reservoirs; nothing contained within this Master Plan shall be translated to other USACE Civil Works or Operations Projects.

2.0 PROJECT DESCRIPTION

Addicks and Barker Reservoirs are located in southeast Texas in the San Jacinto River basin approximately 17 miles west of downtown Houston (Figure 1). The reservoirs are strategically located above the confluence of Buffalo Bayou and South Mayde Creek. Beyond this confluence, Buffalo Bayou continues east through downtown Houston, where it joins with White Oak Bayou, and eventually becomes the Houston Ship Channel, which flows into San Jacinto Bay. The majority of both Addicks and Barker Reservoirs fall within Harris County; however, a small portion of Barker Reservoir crosses into Fort Bend County. Addicks Reservoir is situated on the north side of Interstate Highway 10 (I-10) with State Highway 6 (SH 6) bisecting the reservoir north to south. Barker Reservoir is situated on the south side of I-10, west of SH 6.

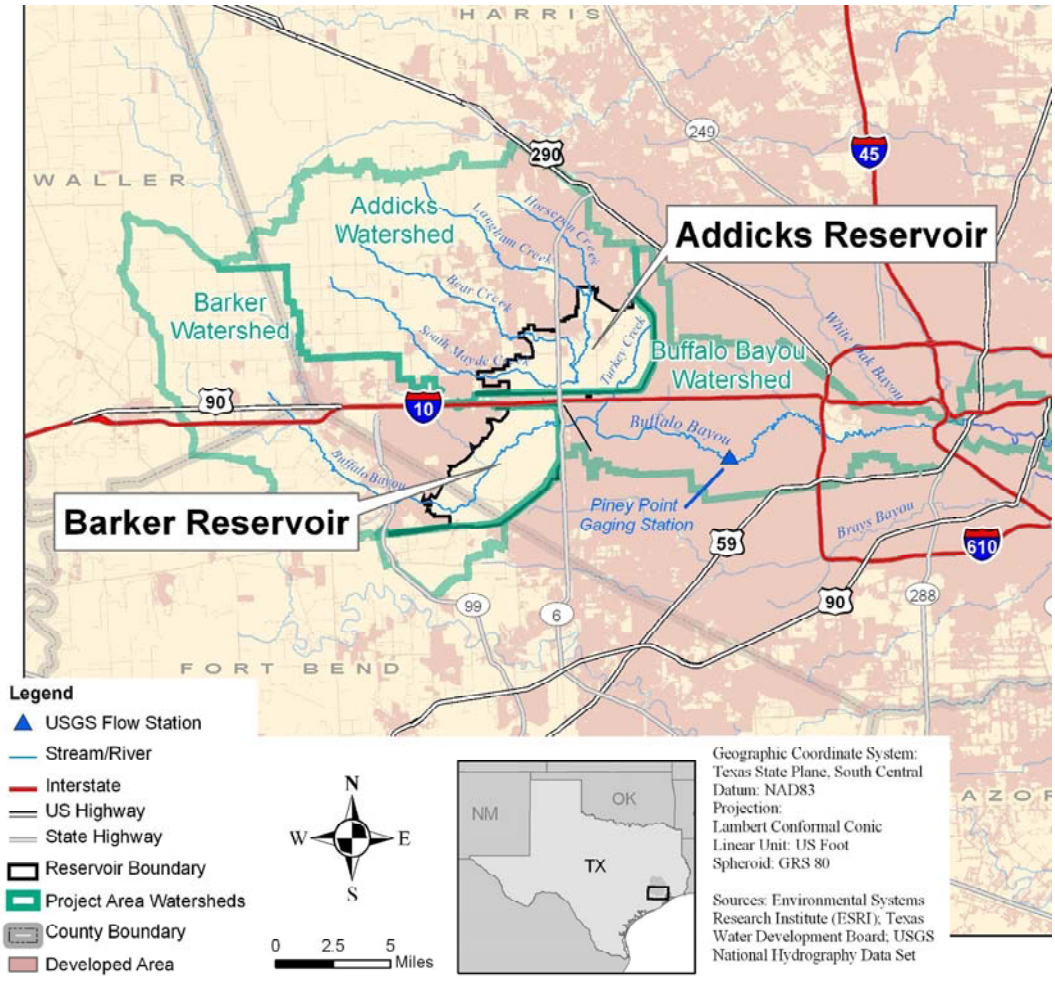

Figure 1. Addicks and Barker Reservoirs, Project Location Map

2.1 PAST LAND USE

The lands that eventually became Addicks and Barker Reservoirs were substantially modified both prior and subsequent to the acquisition of the land by the USACE and the construction of the reservoirs. The following section provides a brief description of the past land uses on the reservoirs.

Based on historic research, the majority of the property on Barker Reservoir was left unoccupied and unimproved until the late 1870s. Starting in the late 1870s and running through the early 1880s cattle ranching was the most common activity on Barker Reservoir. By 1877, the Texas Western Railroad ran east/west through project lands. During the late 1890s, there was a large shift from ranching to rice farming. However, by 1905, there was a shift back to ranching. Ranching generally remained the most common activity on Barker Reservoir until the land was acquired by the USACE (Fields et al. 1986).

Historic research has identified the earliest permanent settlements in Addicks Reservoir occurred in the 1850s. These settlements, referred to as the Bear Creek Community, were generally small farmsteads, with a diversified economic base, including: agriculture, ranching, dairies, and rice fields. Between the 1920s and 1940s, there were 40 separate residences located north of South Mayde Creek, along both sides of Bear and Langham Creeks. Many families also lived on both sides of Highway 6 as well. By that time, the community included a Methodist Church, a local school, entertainment centers, and a community cemetery (Fields et al. 1983).

The USACE began acquiring the lands that would become Addicks and Barker Reservoirs in the early 1940s. Acquisition of the lands in Barker Reservoir was completed in 1951 and in Addicks Reservoir in 1948. When the USACE acquired the lands that became Addicks and Barker Reservoir, many of the previous land owners were allowed to continue using the lands as they had been. Cattle ranching and farming (including rice farming) was allowed to continue on the reservoirs.

The construction of Barker Dam began in February 1942 and was completed in February 1945. The construction of Addicks Dam began in May 1946 and was completed in December 1948. Barker Dam consisted of an earthen embankment that measured 71,900 feet long and was approximately 36 feet above the stream bed at its highest point. The Addicks Reservoir dam consisted of an earthen embankment that measured 61,166 feet long and was approximately 48 feet above the streambed at the highest point. The dams were constructed from earth borrowed from areas adjacent to the dams.

As the City of Houston grew, eventually enveloping Addicks and Barker Reservoirs, the need for additional roads and utility corridors through the reservoirs increased. The USACE Galveston District has also issued numerous other types of outgrants, leases, and permits for developments and actions on the reservoirs (summarized in Table 1).

Table 1. Outgrants Summary (current as of 2006)				
Type	**Number**		**Total**	**Comments**
	Addicks	**Barker**		
Communication Outgrant	13	6	19	Phone lines, cell towers, relay stations, etc.
Electrical, distribution, Major	4	3	7	Major distribution lines crossing the projects
Electrical distribution, minor	1	5	6	Minor service lines to facilities within the project
Grazing leases	19	5	24	
Pipeline easements and consents	6	7	13	Pipelines range in size from 6” to 40” and carry a variety of products.
Pipeline related facilities	1	4	5	Meter stations, valve stations, pig stations, etc.
Recreational leases	4	4	8	Four major parks and 3 minor outgrants
Roadway easements, major	7	10	17	Public roadway over the dams or through the reservoirs
Roadway easements, minor	4	4	8	Minor roadways and support facilities including driveways, traffic lights, curving, straight, etc.
Sanitary Control outgrants	1	7	8	Sanitary control easements around water wells and waste water discharge pipes.
Stormwater drainage, major	7	14	21	Major drainage ditches discharging water into the reservoirs with ROW widths of up to 310’ wide
Stormwater drainage, minor	12	32	44	Stormwater discharge pipes primarily located along Barker Ditch and ditch ROWs of less than 50’ in width.
Waterline easements	3	2	5	Waterlines
Misc. Real Estate	5	9	14	Gas well, military training areas, water well, monitoring well, etc.

In addition, the northern portion of Barker Reservoir is currently leased as a training area facility to the 90th U.S. Army Reserve Command. This lease allows the use of approximately 1,370 acres within Barker Reservoir to operate and maintain a local training area facility; activity is limited to only “weekend” type training. The area is available to all branches of the military for training purposes and other approved uses.

2.2 PROJECT OPERATION

The operational objective of Addicks and Barker Reservoirs is to reduce flood damages to downstream interests along Buffalo Bayou resulting from storm events and above normal flows. Except for periods of heavy rainfall, Addicks and Barker Reservoirs do

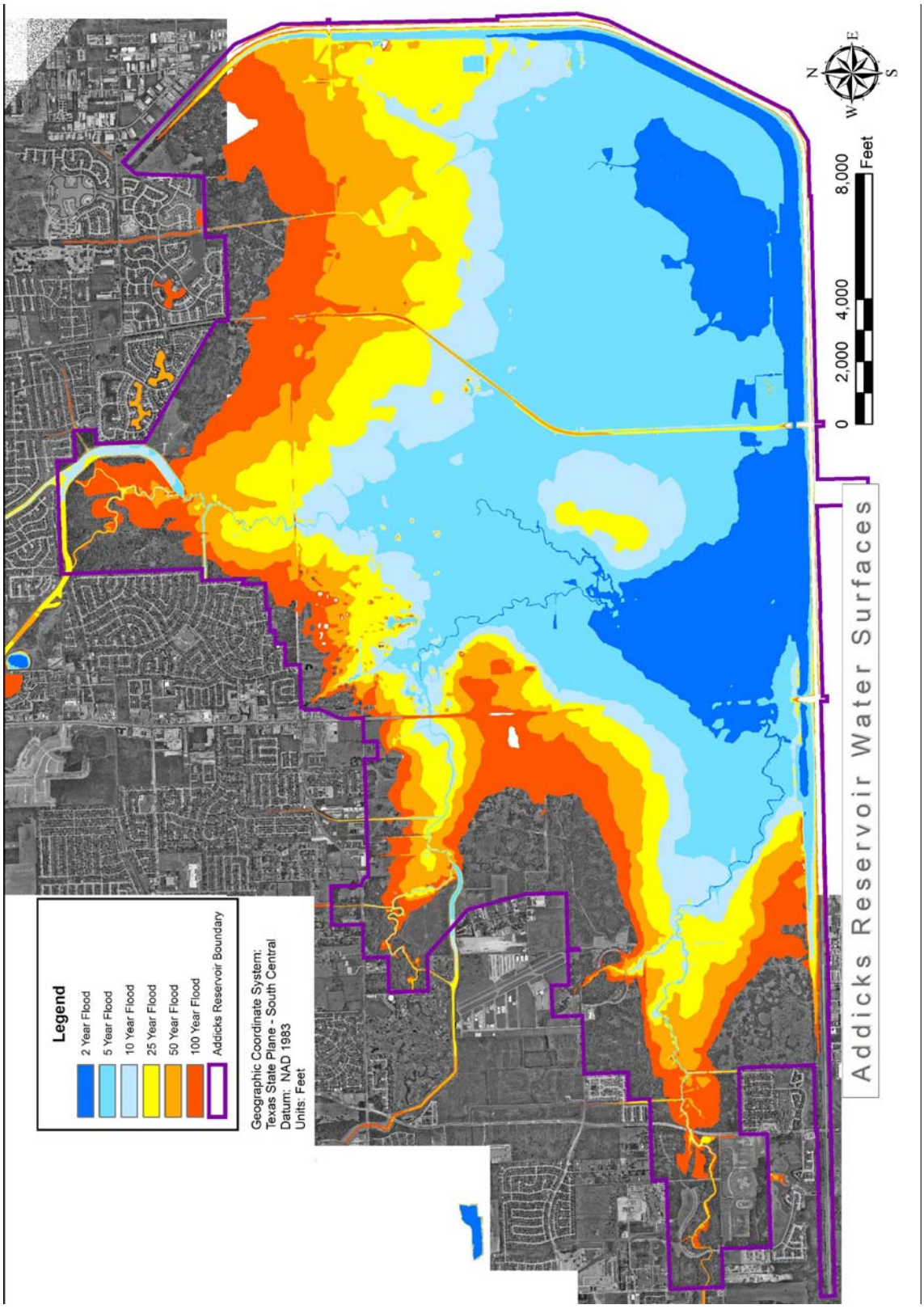

Figure 2. Approximate flood pools for Addicks Reservoir

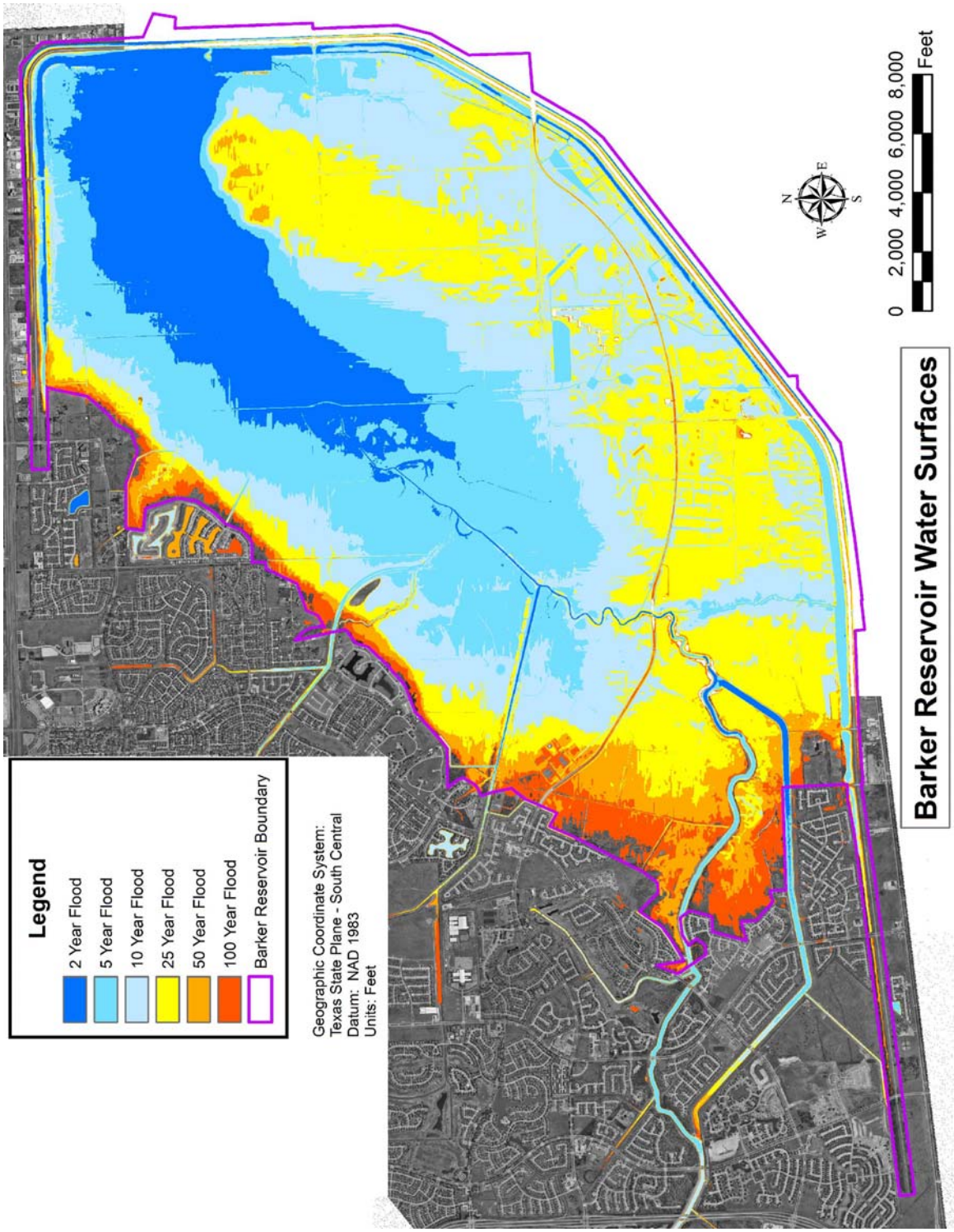

Figure 3. Approximate flood pools for Barker Reservoir

not normally impound water (see Appendix B: Past Flooding Events). This section presents a general description of how the reservoirs operate.

Under normal conditions, both dams have two conduits set to pass the normal flow of water. When the reservoirs are empty and one inch of rain falls below the dams, the gates are closed until it is safe to make releases. If releases are being made, the gates will be closed if 0.5 inch of rain falls below the reservoirs or flooding is predicted. Normal reservoir operations will resume when it is safe to make releases. The maximum allowable release from both reservoirs, combined with the uncontrolled runoff downstream, is 2,000 cubic feet per second (cfs) at the Piney Point Road gauging station, located 10.7 channel miles below Barker Dam.

Addicks and Barker Reservoirs each have five gated conduits serving as the outlet works. The original design concept for both dams provided for four of the five outlet conduits to be uncontrolled, permitting a combined uncontrolled discharge of approximately 15,700 cfs into Buffalo Bayou. In 1948, two of the four uncontrolled conduits were gated at each dam resulting in a reduced combined uncontrolled discharge of approximately 7,900 cfs, which was considered to be the channel capacity at that time.

The threat of flooding in the areas below the dams continued to rise with the increase in urban development throughout the 1940s and 1950s. In 1960, a study was prepared to consider the feasibility of gating the remaining uncontrolled conduits. As a result of that study, the remaining uncontrolled conduits on both reservoirs were gated by 1963. Normal regulating procedures specify that releases from the two reservoirs, in addition to the uncontrolled runoff downstream, should not exceed 2,000 cfs as measured at the Piney Point Road gauging station. Addicks Dam has a maximum discharge capacity of 7,852 cfs and Barker Dam 8,734 cfs.

Table 2 gives the estimated minimum time, in days, needed to discharge flood waters derived from six different flood frequencies (also refer to Figures 2 and 3). This estimate assumes there is a 1,000 cfs discharge from each reservoir, no additional rainfall and resultant runoff during the period of regulation and emptying the reservoirs. Figures 2 and 3 show the approximate flood pools for these same flood frequencies.

Table 2. Pertinent Data Summary

Flood Frequency	Addicks Reservoir		Barker Reservoir	
	Elevation Feet (NAVD)[1]	Pool Duration (days)	Elevation Feet (NAVD)[1]	Pool Duration (days)
2-yr flood event	93.1	18	88.9	13
5-yr flood event	95.9	28	91.7	25
10-yr flood event	96.7	31	92.7	30
25-yr flood event	97.7	36	93.4	34
50-yr flood event	98.6	40	93.9	37
100-yr flood event	100.5	49	95.5	45

1. Elevations are NAVD88, Epoch 2001

3.0 RESOURCE OBJECTIVES

The Galveston District recognizes that Addicks and Barker Reservoirs are important and valuable natural resources located in an area of ever-increasing population and development. Managed properly, the reservoirs will continue to provide opportunities for diverse public use without compromising their primary purpose of flood risk management, or their long-term environmental sustainability.

The resource objectives presented below were formulated to provide general guidance and direction to the overall management of Addicks and Barker Reservoirs. All requests for development or use of project lands will be evaluated against these objectives.

Ensure quality, consistent, and thorough management of all project lands, including all natural, cultural, and recreational resources.

Seek to continually increase efficiency, cost effectiveness, and innovation in project management without compromising the authorized purpose of the reservoirs.

Remain committed to providing responsible stewardship through the conservation, maintenance, and restoration of diverse habitat communities and the eradication or control of invasive species.

Maintain, protect, and restore wetlands.

Increase the quality of the public's experience by maintaining and developing recreation areas that meet the needs of the visitor while maintaining the integrity of the environment.

Provide quality recreation facilities that meet the needs of the visitors to the region, maintain, develop, and alter facilities in order to meet the changing and diverse use patterns of the visitors to the park.

Provide a safe and healthy environment for project visitors by monitoring, maintaining, and improving the environmental quality and natural aesthetics of the area.

Encourage outdoor recreational opportunities for the elderly, disabled, and other disadvantaged groups by providing barrier-free access.

Continue to expand upon the distribution of information concerning (1) the importance of ecosystem conservation and restoration, (2) applicable rules and regulations, and (3) the importance of public safety.

Decisions on how Addicks and Barker Reservoir lands will be used in the future will be guided by the policy statements found in ER 1130-2-550.2.2 and EP 1130-2-540.2-2. In addition, the following principles and introductory statement were developed by the Galveston District on December 5, 2006 to provide guidance to the public and

governmental entities interested in submitting requests for proposed development projects within the reservoirs.

Guiding Principles for Development

- The primary function of the reservoirs is flood risk management. No project will be approved that impacts this function.

- Proposed development must reflect broad-based community needs and not special or limited interests.

- The long-term environmental sustainability of the reservoirs will be maintained. Environmentally sensitive areas and resources are excluded from development. These areas include: riparian bottomland hardwoods, prairies, wetlands, endangered species habitats, and cultural resource sites.

- Proposed development must preserve or enhance the aesthetic integrity of the reservoirs. All proposed projects must address environmental sustainability and provide buffers between the proposed project and external residential or commercial development.

- The naming of park facilities or features will be approved by the Galveston District. Names should reflect regional or national historical figures or events, or unique environmental features, and will not be named in honor of a living person.

4.0 EXISTING ENVIRONMENTAL CONDITIONS

Addicks and Barker Reservoirs are located in the Upper Texas Coastal Prairie which contains an assemblage of grasslands, wooded stream bottoms and upland wooded areas (Diamond and Smeins 1984). Prior to European settlement and twentieth-century development, the region included woodlands of hackberry, pecan, elms, and live oaks interspersed with open prairies of native grasses dominated by little bluestem and other typical prairie species (Gould 1975; Diamond and Smeins 1984). Coastal forests of the Upper Texas Coast Ecoregion typically occur along rivers and bayous and on ridges, barrier islands, and delta splays (Barrow et al 2005).

As discussed in Section 2.1, numerous activities during the past 150 years have substantially altered the coastal prairie ecosystem that once existed on the reservoirs. The historic ranching, dairying, and agricultural activities would have altered vegetation and impacted the soils. As a part of the rice farming activities, numerous small, generally 1 to 2 feet high, levees were built on the reservoirs to retain water. These levees are still clearly visible today and continue to retain both rain and flood waters. In order to construct the dams, numerous borrow areas were created. These borrow areas are generally a few feet deep, ranging between 20 and 50 feet wide, and hundreds of feet long. Many of these borrow areas remain filled with water year round. The dams have affected the ecosystem by increasing the occurrence of flooding and retaining flood waters for longer durations. Woody vegetation became established with the decline of

agricultural and ranching practices after Federal acquisition, and with the continued suppression of a natural fire regime. Finally, the construction of roads and utility corridors has fragmented the ecosystem. Despite these extensive modern impacts, native vegetation assemblages are still identifiable in Addicks and Barker Reservoirs (Fields et al 1983; Fields et al 1986).

Based on a reconnaissance survey, the Existing Conditions for the reservoirs consist of: Degraded Coastal Prairie; Riparian Forest; Other Forested Areas, Infrastructure and Utility Corridors, and Developed Land (see Figures 4 and 5).

4.1 DEGRADED COASTAL PRAIRIE

Degraded Coastal Prairie, the most prevalent land cover, includes areas that were historically coastal prairie but now consist mostly of mixed prairie and old field habitat (mix of native and non-native plants). As discussed in Section 2.1, the ecosystem has been substantially altered by past activities.

Historically, the land surrounding and included in the reservoirs was coastal prairie. Coastal prairies are characterized by meandering bayous and sloughs, riparian forested areas adjacent to the water ways, and grassland areas. Since the modern settlement of this area, all that remains of the coastal prairie is less than 1% of the original 9 million acres. Conversion of the coastal prairie to crop lands and grazing practices have degraded and fragmented the coastal prairie to the point that almost none exists. Remnants of coastal prairies can be found in some of the few sites that have not been urbanized in Harris County, Texas. The U.S. Fish and Wildlife Service (USFWS) surveyed several locations in both Addicks and Barker Reservoirs and noted that many of the locations contained vegetation commonly found in a healthy coastal prairie ecosystem. However, the USFWS also noted many of these sites were succumbing to invasion by native and exotic woody and herbaceous plant species (USFWS 2008).

The most typical species identified by the USFWS consists of: broom-sedge bluestem (*Andropogon virginicus* var. *verginicus*), prairie Indian-plantian (*Arnoglossum plantagineum*), plains wild indigo (*Baptista bracteata* var. *leucophaea*), wine-cup (*Callirhos involucrata*), bush's caric-sedge (*Carex bushii*), flat-fruit caric-sedge (*Carex complanata*), bull thistle (*Cirsium horridulum*), needle leaf panic grass (*Dichanthelium aciculare*), panic grass (*Dichanthelium scoparium*), hairy fimbry (*Fimbristylis puberula*), gulf muhly (*Muhlenbergia capillaries*), prairie nuptunia (*Neptunia pubescens* var. *pubenscens*), brown-seed paspalum (*Paspalum plicatulum*), prairie-parsley (*Polytaenia nuttallii*), angle-stem beakrush (*Rhynchospora caduca*), globe beakrush (*Rhynchospora globularis*), macartney rose (*Rosa bracteata*), brown-eyed susan (*Rudbeckia hirta*), little bluestem (*Schizachyrium scoparium* var. *scoparium*), few-flowered nutrush (*Scleria pauciflora*), slender rosinweed (*Silphium gracile*), Texas vervain (*Verbena vervain*), tuber vervain (*Verbena rigida*), and Chinese tallow-tree (*Sapium sebiferum*).

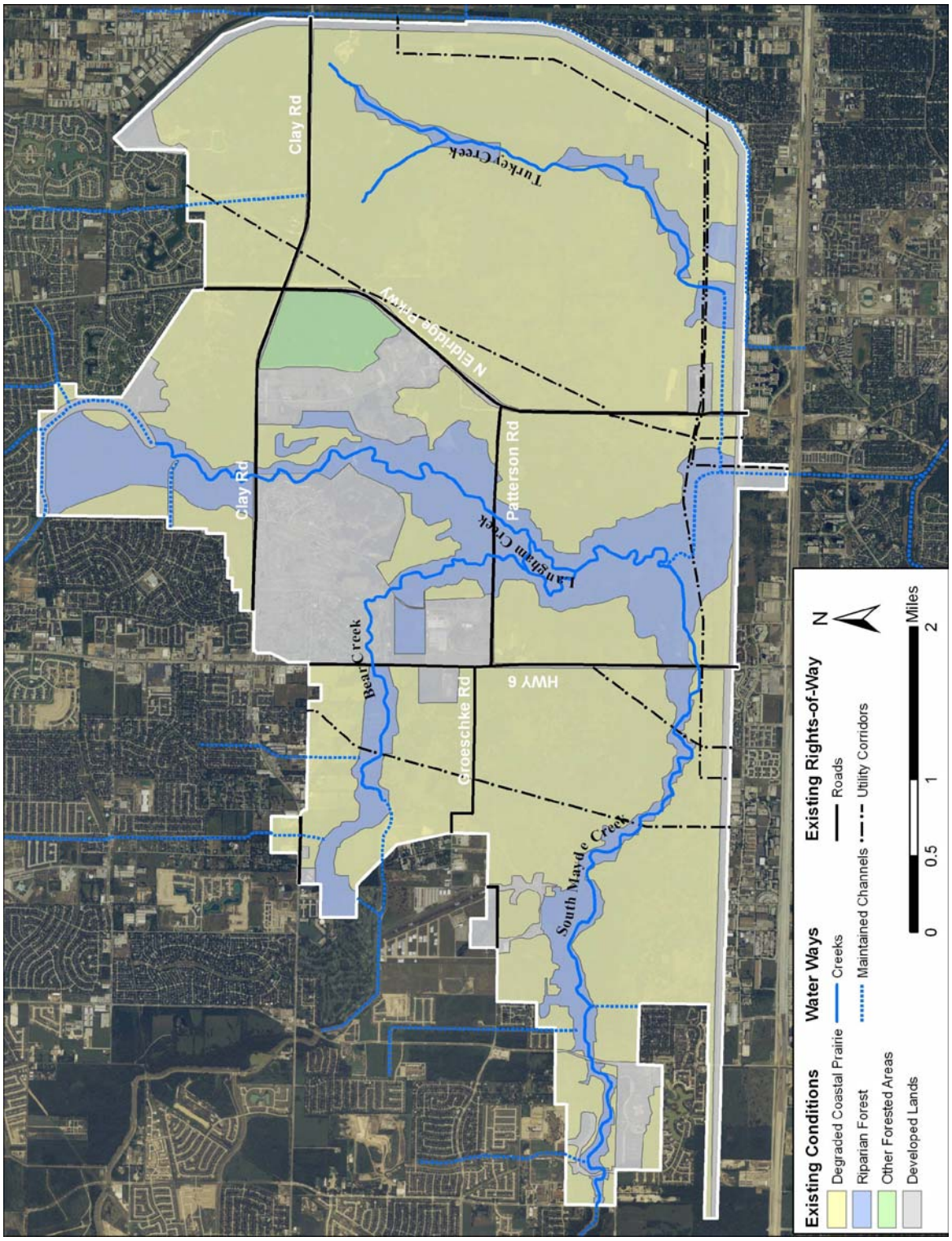

Figure 4. Existing Conditions, Addicks Reservoir

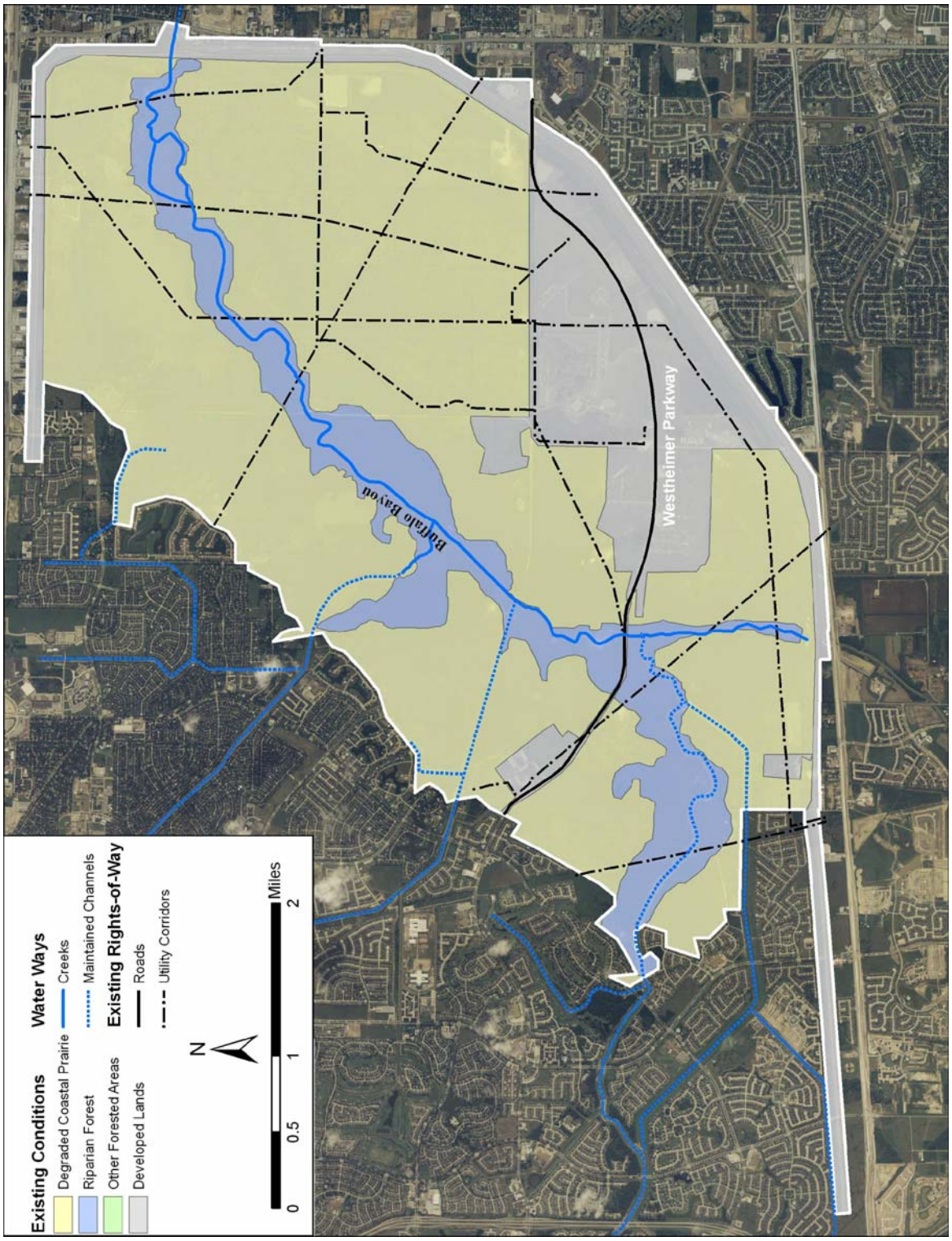

Figure 5. Existing Conditions, Barker Reservoir

4.2 RIPARIAN FOREST

Riparian Forest consists of the areas along the streams and bayous which have remnant forests not cleared for agricultural use and areas of regenerating forest. Riparian forests perform numerous ecological functions including aquifer recharge, filtering and slowing runoff, and providing important habitat for a number of animals (Guilfoyle 2001). The restoration and preservation of riparian forest is of particular importance at Addicks and Barker Reservoirs, as urbanization and agriculture have reduced the amount and quality of riparian and bottomland forests in the region. The reservoirs are located just east of the Columbia Bottomlands (Austin's Woods) which, at the beginning of the last century covered approximately 700,000 acres along the flood plains of the Brazos, San Bernard, and Colorado Rivers, but now exists only as scattered patches totaling approximately 175,000 acres (USFWS 2008).

Typical species found within riparian forests of the Upper Texas Coast include oaks (*Quercus* spp.), hickories (*Carya* spp.), American elm (*Ulmus americana*), winged elm (*Ulmus alata*), cedar elm (*Ulmus crassifolia*), green ash (*Fraxinus pennsylvanica*), yaupon (*Ilex vomitoria*), deciduous holly (*Ilex decidua*), box elder (*Acer negundo*), dwarf palmetto (*Sabal minor*), hackberry (*Celtis laevigata*), sweetgum (*Liquidambar styraciflua*), soapberry (*Sapindus drummondi*) (Barrow et al. 2005) and in wetter areas water tupelo (*Nyssa aquatica*) and bald cypress (*Taxodium distichum*).

4.3 OTHER FORESTED AREAS

This land class consists of forested and wooded areas outside of the Riparian Forests. The vegetation consists of a mix of evergreen-deciduous communities including Live Oak Woodland and Coastal Live Oak-Pecan. Typical species found in the Live Oak Woodland community include live oak (*Quercus virginiana*), water oak (*Quercus nigra*), loblolly pine (*Pinus taeda*), American elm (*Ulmus americana*), hackberry (*Celtis laevigata*), yaupon (*Ilex vomitoria*), sweetgum (*L. styraciflua*), green ash (*F. pennsylvanica*), and dwarf palmetto (*Sabal minor*) (Barrow et al. 2005). Typical species found in the Coastal Live Oak-Pecan (*Quercus virginiana-Carya illinoensis*) community include: live oak (*Q. virginiana*), post oak (*Q. stellata*), black jack oak (*Q. marilandica*), water or willow oak (*Q. phellos*), native pecan (*Carya illinoensis*), yaupon (*I. vomitoria*), and hawthorn (*Crataegus* spp.). These communities grade into or are intermixed with Live Oak-Post Oak communities or prairies. Other hardwood species include slippery elm (*Ulmus rubra*), white ash (*Fraxinus americana*), mulberry (*Morus*), and American sycamore (*Platanus occidentalis*). The shrub layer is composed chiefly of yaupon (*I. vomitoria*) and loblolly pine (*Pinus taeda*) saplings, southern arrow-wood (*Viburnum dentatum*), Drummond rattlebox (*Sesbania drummondii*), eastern baccharis (*Baccharis halimifolia*), American beautyberry, vines, rattan-vine (*Alabama supplejack*), grape, greenbriar, dewberry (*Rubus* sp.), honeysuckle (*Lonicera* sp.), peppervine, and McCartney rose.

4.4 DEVELOPED LANDS

The Developed Land classification consists of those lands where the ecosystem has been significantly and permanently altered. These areas include the Addicks Dam and the Barker Dam (described in Section 2.2), canals, existing borrow areas (described in Section 2.1), infrastructure and utility corridors (discussed in Section 4.5) and recreational developments (discussed below).

Bear Creek Pioneers Park, located in Addicks Reservoir, consists of approximately 1,350 acres of recreational development. This development includes: a Community Center with a greenhouse; three 18-hole golf courses; Farm and Ranch Club rodeo arena; 31 multi-sport soccer fields; 18 baseball fields; eight picnic pavilions; hundreds of picnic tables; more than five miles of designated equestrian and nature trails; paved and lighted jogging trails; restrooms; a war memorial; wildlife viewing enclosures with aviary; tennis courts, horseshoe pits, and paved parking (Figure 6).

Cullen Park, located in Addicks Reservoir, consists of approximately 350 acres. Developed facilities within the park include ball fields, picnic pavilions and tables, restrooms, hike and bike trails, and other day use facilities (Figure 6).

The Bayou Rifles Shooting Range, located in Addicks Reservoir, covers approximately 130 acres. The development consists of facilities for staging various target shooting activities.

George Bush Park, located in Barker Reservoir, consists of approximately 1,380 acres of recreational development. The development includes: soccer fields; baseball fields; playgrounds; picnic tables; hike, bike, and equestrian trials; a model airplane facility; shooting range; and paved parking (Figure 7).

The Cinco Ranch Park, YMCA is located in Barker Reservoir. This YMCA site provides area youths opportunity for camp-setting recreational activities. The YMCA is responsible for 200 acres, only approximately 30 acres are considered developed for recreation (Figure 7).

4.5 INFRASTRUCTURE AND UTILITY CORRIDORS

Infrastructure and utility corridors are subsets of the developed land class. Currently, there are six major roads that run through Addicks Reservoir and two major roads that runs through Barker Reservoir. All of these roads include adjacent rights-of-way set aside for maintenance and repair.

On Addicks Reservoir, there are three major north-south roads that run the length of the project: Highway 6, Barker-Cypress, and North Eldridge Parkway. The three major east-west roads located on the project are: Clay Road, which crosses the northern portion of the project, Groeschke Road, which runs from the west edge of the reservoir to Highway 6, and Patterson Road, which runs from Highway 6 to North Eldridge Road. In addition there are several smaller roads that run through Bear Creek Pioneers Park.

In Barker Reservoir, Westheimer Parkway runs east-west through the reservoir and South Barker-Cypress runs north-south from north of Westheimer Parkway to FM 1093, south of Barker Dam.

There are numerous pipelines, electrical utility lines (both major and minor), phone lines, and waterlines running throughout both reservoirs (Figures 4 and 5). The majority of these utility corridors include vegetation removal and many of them have access roads which are visible from aerial photographs. Many of the rights-of-way for the roads also have associated utility lines. All infrastructure and utility corridors are managed through consents, easements, leases, licenses, or permits. Additionally, most of the natural water ways, both upstream and downstream of the reservoirs have been channelized and are currently maintained. Most of this maintained channelization runs into the reservoirs as well. However, within the reservoirs the major creeks and bayous still follow a more natural course.

5.0 RECREATION ANALYSIS

There are three major recreational developments on the reservoirs: Bear Creek Pioneers Park and Cullen Park on Addicks Reservoir (Figure 6) and George Bush Park on Barker Reservoir (Figure 7). These recreational developments offer a wide variety of activities designed to accommodate local and regional needs through day use facilities. Park and recreation areas within the reservoirs include: sports fields, shooting ranges, model airplane fields, paved trails, playgrounds, community centers, golf courses, a community zoo, a war memorial, exercise circuits, numerous picnic facilities and pavilions, a farm and ranch club rodeo arena, equestrian trails, two dog parks, ponds, and a velodrome.

5.1 EXISTING RECREATIONAL FACILITIES

The three primary recreational areas on Addicks and Barker Reservoirs and the facilities associated with these parks are discussed in Section 4.4 and summarized in Table 3. Bear Creek Pioneer Park and George Bush Park are operated by Harris County Precinct No. 3. The park and recreation lease for Bear Creek Pioneer Park was issued in the 1960s and construction of the park began soon after. The park and recreation lease for George Bush Park was issued in the 1980s, quickly followed by development of the park. Cullen Park is operated by the City of Houston; the park and recreation lease was issued in the 1980s. Development of the park facilities began soon afterwards. After initial development of each of the parks, new facilities have continually been added to all of the parks.

The City of Houston Parks and Recreation Board (CHPRD) used a classification system for comparing parks and recreational facilities during the development of the “Parks and Recreation Master Plan Update Houston, Texas 2007” (CHPRD 2007). Using that same classification system, Bear Creek Pioneer Park, George Bush Park, and Cullen Park would most appropriately classified as Regional Parks.

Regional Parks are generally larger than 150 acres and provide services to an entire region. Typical developments in a regional park include: playgrounds, open spaces and reserves, natural habitats, sports complexes and concessions, multi-use courts, trails,

picnic areas, picnic pavilions, restroom facilities, various site furnishings, and plantings. In addition, golf courses, tennis centers, multi-use pavilions, mature areas, multi-purpose centers, senior centers, fishing access, horticultural centers, or other unique recreation activities are not uncommon in regional parks.

Table 3. Summary Recreational Development on Addicks and Barker Reservoirs

Recreation Area	Picnic Shelters/Pavilions	Picnic Sites	Visitor Center	Group Camp	Playground Areas	Baseball/Little League Fields	Soccer Fields	Jog, Hike, Bike, Trails (Miles)	Equestrian Trails (Miles)	Horseshoe Pits	Restrooms	Community Center	Golf Courses	Tennis Courts	Pond	Dog Park	Animal Exhibits
Addicks Reservoir																	
Bear Creek Pioneers Park	8	729	1	1	2	19	36	2.0	3.5	16	18	1	3	4		1	22
Cullen Park	7	390			7		8	3.5			12						
Subtotal	15	1,119	1	1	9	19	42	5.5	3.5	16	30	1	3	4		1	22
Barker Reservoir																	
George Bush Park	3	30			2	6	47	10.8	1		5				3	1	
Subtotal	3	30			2	6	47	10.8	1		5				3	1	
TOTALS	**18**	**1,149**	**1**	**1**	**11**	**25**	**89**	**16.2**	**4.5**	**16**	**35**	**1**	**3**	**4**	**3**	**2**	**22**

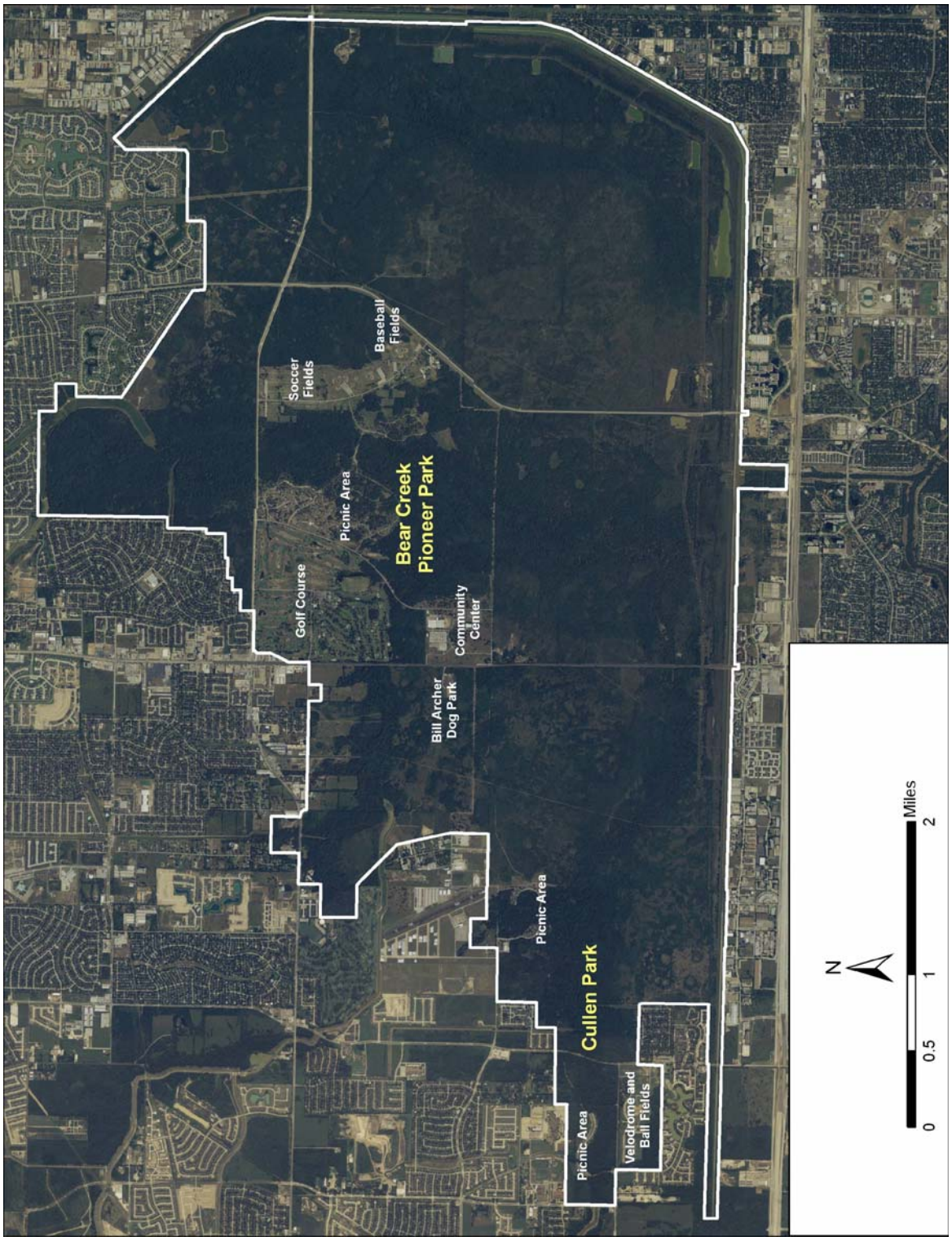

Figure 6. Recreational Areas, Addicks Reservoir

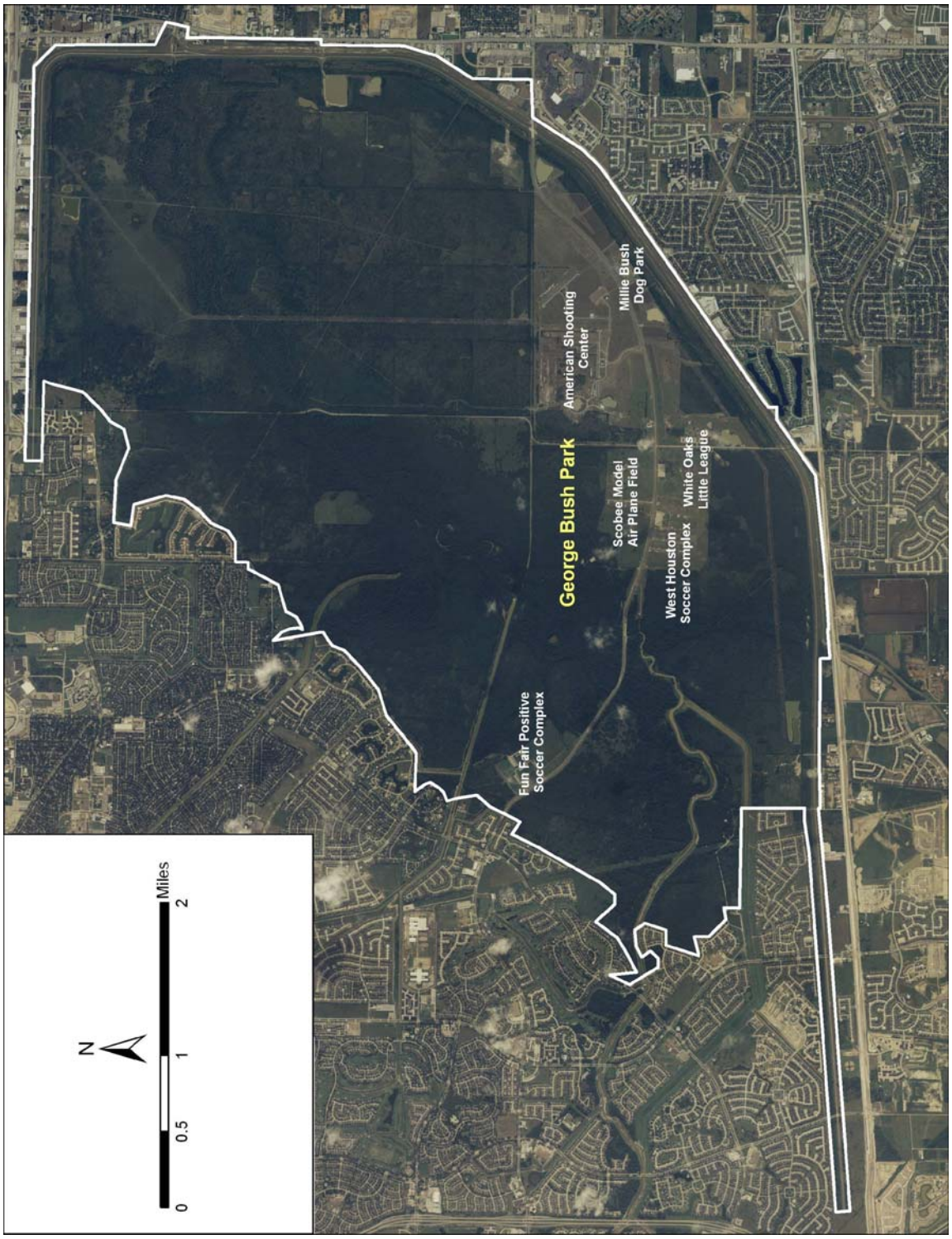

Figure 7. Recreational Areas, Barker Reservoir

5.2 VISITATION TO RECREATION FACILITIES ON THE RESERVOIRS

The visitation estimates presented here were made by the Galveston District and various county and municipal officials. Table 4 provides the total yearly reservoir visitation numbers and hours between 1988 and 2007 Estimates for visitation in 2006 from Harris County were derived from traffic counts at the park entrances and a group size multiplier of 1.5 (email correspondence from J. Langford, Precinct 3, Harris County Parks Administration to J. Splenda, The Louis Berger Group Inc., January 25, 2007).

Based on this information, the average number of park visits is approximately 3.2 million with an average of 8.9 million visitor hours. While there have been peaks and drops in visitation over the last 20 years, overall there hasn't been a dramatic increase or decrease in park visitation. However, the period between 2005 and 2007, does have an approximate average number of park visits of 4.4 million. This trend could be interpreted as reflecting an overall increase in park visitation. Regardless of this increase, the data does show that the parks have been, and continue to be, heavily used by the public.

Table 4. Addicks and Barker Reservoirs Recreation Totals

Year	Park Visits	Park Visitor Hours	Year	Park Visits	Park Visitor Hours
1988	3,112,106	8,586,300	1998	2,861,600	7,895,400
1989	3,137,767	8,657,100	1999	2,369,900	6,538,600
1990	4,371,983	12,062,300	2000	4,568,310	12,603,967
1991	unavailable	unavailable	2001	3,516,025	9,700,713
1992	2,377,238	6,558,800	2002	3,024,828	8,345,500
1993	2,651,323	7,315,000	2003	2,659,482	7,337,511
1994	2,764,625	7,627,600	2004	3,081,439	8,501,690
1995	1,368,902	3,776,800	2005	4,388,685	12,108,382
1996	3,390,047	9,353,140	2006	4,702,981	12,975,525
1997	2,791,970	7,703,045	2007	4,163,789	11,487,894
			2008	4,480,162	12,360,766

Table 5 shows the monthly estimates for Harris County Parks. These estimates are based on traffic count readings multiplied by a 1.5 group size. The information for Cullen Park is not available. Bear Creek Pioneers Park has an average of 194,000 visitors a month. The months with the lowest visitation are February, July, and December; May, June, and October have the highest amount of visitation. George Bush Park has an average of 77,000 visitors a month. The month with the lowest visitation is February; January and May have the highest visitation. Overall, the parks average 272,000 visitors a month. February, July, and December are the months with the lowest visitation, while May, June, and October have the highest amount of visitation.

Table 5. Monthly Visitation Estimates for Harris County Parks			
2006	**Bear Creek Pioneers**	**George Bush**	**Monthly Totals**
January	196,035	95,562	291,597
February	157,472	51,899	209,371
March	198,498	79,053	277,551
April	195,483	86,405	281,888
May	228,807	92,681	321,488
June	224,108	81,719	305,817
July	137,451	72,906	210,357
August	202,823	75,471	278,294
September	204,068	70,680	274,748
October	243,444	76,946	320,390
November	183,134	70,044	253,178
December	164,118	74,532	238,650

5.3 RECREATIONAL RESOURCES OUTSIDE THE RESERVOIRS

The Zone of Influence for a park refers to how far people are willing to travel to visit the park and is best defined by the parks classification. In this case, all three of the main recreational facilities on Addicks and Barker Reservoir (Bear Creek Pioneer Park, Cullen Park, and George Bush Park) are best classified as Regional Parks (refer to Section 5.1). Regional Parks are considered to have a regional zone of influence; for Addicks and Barker Reservoirs, the zone of influence is estimated to be a 25-mile radius surrounding the reservoirs.

Within the zone of influence, the City of Houston operates 15 other parks that are classified as Regional parks and an additional 9 Metro parks (see Table 6). Metro parks are almost identical to Regional parks. While the facilities at these parks vary, many offer facilities at a scale similar or identical to those found at Bear Creek Pioneers Park, Cullen Park, and George Bush Park.

Table 6. Regional and Metro Parks Operated by the City of Houston		
Alief Community Park	Glenbrook Park	Memorial Park
Blackhawk Park	Gus Wortham Park	Milby Park
Braeburn Glen Park	Hermann Park	Rodriguez Park
Brock Park	Keith-Weiss Park	Sharpstown Park
Brown (Herman) Park	Law Park	Sheldon Park
Cambridge Village Park	MacGregor Park	Stude Park
Cullinan/Oyster Creek Park	Mason Park	Sunnyside Park
Eisenhower Park	Melsore Park	Tidwell Park

In addition, the City of Houston operates over 307 parks varying from Regional parks to Neighborhood parks, including historical parks and nature areas. Harris County manages

an additional 37 parks in Precinct 3 while Fort Bend County manages eight parks. Amenities within these parks range from sports complexes with multiple ball fields to picnic pavilions to dedicated tree parks and trail corridor parks.

5.4 IDENTIFIED RECREATIONAL NEEDS IN THE REGION

As the gulf coast of Texas continues to experience strong growth, the demand for outdoor recreation increases. At the same time, conversion of open space to residential development reduces the amount of open space available. Increased demand for recreational facilities combined with a decreased availability of open space for recreation puts stress on the natural environment and associated natural resource conservation efforts.

In February 2000, TPWD, in coordination with Texas Tech University, conducted a study looking at conservation and outdoor recreation issues in Texas that could be used in the state's future planning efforts. As part of this study, a survey of Texas residents was conducted asking their opinion of the importance of natural areas in Texas to enjoy and experience nature, to which the vast majority of those polled (79 percent) stated that it was very important (TPWD 2005). After reviewing the data accumulated by researchers and the solutions and strategies called for by experts, the authors of the Texas Tech study compiled a list of key conservation and recreation recommendations for Texas. One of their recommendations emphasized the need for access to natural areas for outdoor recreation. Harris County (2000) reported that based on county resident survey responses, visitors are attracted by a park location and the presence of nature trails (17%). In Precinct 3 (the precinct that includes Addicks and Barker Reservoirs), the most frequently used park features are running tracks/nature trails followed by children's play areas and picnic areas (Harris County 2000).

Both short-term and long-term trends point to continued growth in outdoor recreation across all segments of the population with growth particularly strong in both viewing and learning activities. Participation in outdoor, land based recreation in Harris and Fort Bend Counties totaled over 89 participants per square mile, which is in the top 25 percent for counties in the nation (Cordell 1999). Nationally, participation in non-consumptive wildlife activities is expected to increase 61 percent through 2040 and should increase more rapidly than the population. The largest relative increase is expected to come in the southern region, including Texas (Cordell 1999). In addition to non-consumptive wildlife viewing, biking, horseback riding, and picnicking, participation rates will experience the greatest increase throughout the southern US, outpacing population growth. In anticipation of the growing demand, Harris County Precinct 3 administrators listed trails (natural and hardened surface) as the number one priority for new facilities in Precinct 3 (Harris County 2003).

Along with the increased demand for access to natural areas, demand for recreation associated with developed recreational areas such as multi-sport athletic fields (baseball, little league, soccer, etc.) has also increased. The demand for these recreational facilities is not typically captured in national or state recreation surveys, since the level of demand is usually dependent on the membership drives of sports leagues using the facilities and

the management and maintenance of the facilities is usually the responsibility of local governments. Harris County, Precinct 3 lists trails, playgrounds, soccer fields, and ball fields as the top 4 priorities for new parks within the Precinct. Eleven municipalities within Harris County have developed their own park master plans, and hike/bike trails were cited in the top two responses of every user survey asking for new amenities (Harris County 2003).

Another metric of measuring demand can be found in Harris County's ability to provide park space for the population. The Harris County Parks Master Plan (Phase Two) recognizes an existing shortage of park space to satisfy the population (Harris County 2003). Harris County (2003) reports that based on year 2000 population data for the Houston-Galveston Area Council, there are about 15 acres of park land for every 1,000 people, which is below the County objective to maintain 20 acres for every 1,000 people and well below the Urban Land Institute standard of 25.5 acres per 1,000 population. This illustrates a local need to acquire large tracts of land to be developed as parks or maintained as open space and/or conservation areas to achieve the County's park acreage goal (Harris County 2003).

6.0 RESOURCES REQUIRING SPECIAL CONSIDERATION

The Galveston District took into consideration numerous resources while developing the Land Use Classifications. During the development of the Land Use Classifications, certain resources were identified that require special consideration. These resources are: Invasive Species, Cultural Resources, Aesthetics, Threatened and Endangered Species, Remnant Prairie, Wetlands, Topographic Features, and Wildlife.

6.1 INVASIVE SPECIES

Invasive species are both native and non-native species of plants or animals that heavily colonize a particular habitat resulting in adverse effects to that habitat. Generally, invasive species are able to invade and begin to alter an ecosystem within a few decades because they have few natural pests or diseases in the ecosystem. Additionally, growth or reproductive characteristics enable them to outcompete other plants or animals in the ecosystem.

While a wide variety of invasive plant species have invaded both Addicks and Barker Reservoirs (Table 7), the most common invasive species found in the reservoirs consist of: Chinese tallow (*Triadica sebifera*), deep-rooted sedge (*Cyperus entrerianus*), salt cedar (*Tamarix* spp.) narrowleaf cattail (*Typha angustifolia*), alligator weed (*Alternanthera philoxeroides*), common reed (*Phragmities australis*), MacCartney rose (*Rosa bracteata*), and mesquite (*Prosopis glandulosa*).

The primary invasive animal species in the reservoirs are feral hogs. These animals were originally brought over from Europe in the 1600s as domesticated livestock and progressively left to roam free. Feral hogs are the most prolific large, wild mammal in North America, with populations capable of doubling in a four month time-span under optimal conditions. Large populations of feral hogs can cause extensive environmental

damage primarily through rooting and wallowing. Additionally, they compete with native wildlife for habitat, harbor diseases, and transmit parasites to domestic animals. Other non-native species of concern in the reservoirs include the channeled apple snail (*Pomacea canaliculata*), and feral dogs and cats; all of these species can have a substantial impact on native animal populations.

Table 7. Invasive Plant Species known to occur in Addicks and Barker Reservoirs

Grasses and Weeds		Woody Shrubs	
Vasey's grass	*Paspalum urvillei*	Japanese honeysuckle	*Lonicera japonica*
deep-rooted sedge	*Cyperus enrerianus*	Cherokee rose	*Rosa laevigata*
little barley	*Hordeum pusillum*	Chinese privet	*Ligustrum villosum*
Johnson grass	*Sorghum halepense*	Macartney rose	*Rosaceae*
Bermudgrass	*Cynodon dactylon*	waxyleaf private	*Ligustrum quihoui*
St. Augustine grass	*Stenolaphrum seciendatum*	Trees	
buffelgrass	*Pennisethum cillare*	Chinaberry	*Melia azedarach*
dallisgrass	*Paspalum dilatatum*	mock orange	*Poncirus trifoliate*
nutgrass	*Cyperus rotundus*	Chinese tallow	*Sapium sebiferum*
common chickweed	*Stellaria media*	mimosa	*Albizia julibrissin*
dandelion	*Taraxacum officinale*	paper mulberry	*Broussonetia papyrifera*
thistle	*Asteraceae*		

6.2 CULTURAL RESOURCES

Cultural resources are the remains of past human activities. Cultural resources on the reservoirs were created as early 4,600 years ago, with the possibility of some resources dating as early as 12,000 years ago. Many of the cultural resources on the reservoirs are the remains of early European settlements discussed in Section 2.1 and date between 1900s and 1940s.

Cultural resources are unique among the resources on the reservoirs since they are non-renewable; once damaged or destroyed, they cannot be restored. Currently, approximately 5,750 acres (40%) of Addicks Reservoir and 6,150 acres (47%) of Barker Reservoir has been inventoried for cultural resources sites. Overall, these inventories provide a strong representative sampling of the distribution and types of cultural resources located on both reservoirs.

A total of 179 cultural resource sites have been recorded in the reservoirs, 96 in Addicks and 83 in Barker. One hundred twenty-six of the cultural resources are prehistoric and 53 are historic. Ninety-nine of the prehistoric resources are identified as occurring on Mima ("pimple") mounds. The other 27 prehistoric resources appear to be primarily small lithic scatters with some tools present. Lithics, the most common artifact type, occur on most (111) of the prehistoric resources and ceramic sherds, the second most common artifact type, occur on only 39 of the prehistoric resources.

The historic resources primarily date between 1900 and 1930. The majority (23) of the resources are related to early 20th century home sites. There are also 12 historic trash

dumps/artifact scatters, 9 resources related to ranching and agriculture, 4 cemeteries, 2 historic bridges, 1 historic recreational facility, and 1 historic rail road feature.

6.3 AESTHETICS

Natural and cultural features that give the project area landscape its character include topographic features, existing structures, and vegetation. While aesthetics are most often thought of as a visual resource, the aesthetic integrity of an area is heavily influenced by both audible and olfactory impacts.

The natural aesthetic quality of the reservoirs serves as contrast to the visual character of the adjacent developed areas. Within the reservoirs, and especially along roads, the view of mixed forested and grassland areas is periodically interrupted by buildings, recreational developments, and ball fields. The reservoirs provide an aesthetic relief relative to the surrounding residential, commercial, industrial, and infrastructure developments by providing green space among dense suburban sprawl.

The areas of greatest concern for aesthetics are based on the amount of use and the type of use. Areas that are heavily used by the public (e.g. road ways, parks, and trails) or most highly visible (where the reservoirs are adjacent to private property) need to retain their aesthetically pleasing qualities. In addition, those areas that are more remote, where people go to enjoy an “outdoor” experience also need to retain their aesthetic qualities.

The aesthetic integrity of an area can be seriously compromised when there are sudden, abrupt, and unnatural changes. Examples of aesthetic impacts include, but are not limited to: pipelines, electrical utility lines, phone lines, cell towers, relay stations, roadways, waterlines, parking lots, oil and water wells, and buildings.

6.4 THREATENED AND ENDANGERED SPECIES

Federally listed threatened or endangered plant and wildlife species potentially occurring within the reservoirs consist of Texas prairie dawn-flower (*Hymenoxys texana*), the sharpnose shiner (*Notropis oxyrhynchus*), and whooping crane (*Haliaeetus leucocephalus*).

There are numerous populations of the Texas prairie dawn-flower (*Hymenoxys texana*) within the reservoirs. The Texas prairie dawn was Federally listed on 13 March 1986 (51 FR 8681). No critical habitat has been identified for this species. The Texas prairie dawn is an annual, usually under 12 inches in height, with several divergent branches arising from a rosette of basal leaves. Flower heads are usually few in number, small and yellow. The known *H. texana* sites occur only in Harris and Fort Bend Counties to the west of Houston, Texas and within the Gulf Coast Prairies and Marshes ecoregion. Texas prairie dawn is associated with poorly drained, sparsely vegetated areas ("slick spots") at the bases of Mima (pimple) mounds in open grassland or in almost barren areas. Soils are generally slightly saline, sticky when wet and powdery when dry. The plant is sometimes associated with other Texas Coastal Prairies and Marshes endemics such as Texas windmill-grass (*Chloris texensis*) and Houston machaeranthera (*Machaeranthera aurea*) (NatureServe, 2008). The plants do not grow on recently disturbed soils where the soil

horizon has been eliminated. The plants flower and produce fruit mid-March to mid-April during the moist months of early spring and are usually dead by the end of May. The most serious threat to the species is the destruction of habitat from urban and industrial development.

The sharpnose shiner (*Notropis oxyrhynchus*) is a small (two inches long), silvery minnow endemic to the Brazos River and its major tributaries in Texas. It occurs in stream habitats, primarily in fairly shallow water (less than three feet deep) in broad, open sandy channels with moderate to high current. The often saline and turbid waters of the Upper Brazos River are typical habitat for the shiner, which is adapted for finding and feeding on a variety of small aquatic invertebrates, as well as terrestrial arthropods entering the stream from the banks and riparian areas. Historically, it occurred throughout the main stem of the river and several of its major tributaries, including the Navasota River, and the Salt and Double Mountain Forks of the Brazos River (Upper Brazos Drainage). The sharpnose shiner has also been found in the Wichita River (within the Red River Basin) where it may have once naturally occurred but has since been extirpated. Major reservoir construction on the main stem Brazos River and throughout the drainage in the mid 1900s is thought to be the major cause of reduction in the distribution in the shiners. Currently, it is restricted to the Upper Brazos system and is thought to be extirpated from the river downstream of Possum Kingdom Reservoir. Current threats to the shiner include invasion of salt cedar, future water development projects (new reservoirs, reservoir enhancement, chloride control, etc.), wastewater and agricultural discharges, and excessive erosion/sedimentation resulting from surrounding land use. The sharpnose shiner does not occur within Addicks or Barker Reservoirs.

The whooping crane (*Grus Americana*) was Federally listed as endangered on 11 March 1967 (32 FR 4001). In Texas, the Aransas National Wildlife Refuge and surrounding portions of Aransas, Calhoun, and Refugio Counties are designated as critical habitat for the whooping crane (43 FR 36588). The whooping crane stands 5 feet tall and has a long, sinuous neck and long legs. Its snowy white body feathers are accented by jet-black wingtips, and it has a red and black head with a long, pointed, beak. The whooping crane's wings measure about 7 feet across. The whooping crane is named for its call, which has been described as a shrill, bugle-like trumpeting. Whooping cranes feed and roost in wetlands and upland grain fields where they associate with ducks, geese, and sandhill cranes. Whooping cranes nest in marshy areas among bulrushes, cattails, and sedges that provide protection from predators as well as food. They eat insects, minnows, crabs, clams, crayfish, frogs, rodents, small birds, and berries. Whooping cranes usually nest once each year, normally laying two eggs in late April to mid-May, with hatching occurring about one month later. Survival is usually limited to one nestling. Parents share incubation and rearing duties, but females take the primary role in feeding and caring for the young. It is highly unlikely that the Whooping Crane would be found on either Addicks or Barker Reservoirs, although they may pass through the area on their way to the coast.

6.5 REMNANT PRAIRIE

Historic farming and ranching activities drastically altered the prairie ecosystem of the area prior to the creation of Addicks and Barker Reservoirs. Of the approximately 9 million acres of the native coastal prairie grasslands once found in Texas, it is estimated that less than one percent remains in a relatively pristine state (Diamond and Smeins 1984; Grafe et al 1999). Based on a survey by the USFWS, there are several patches of remnant prairie on both Addicks and Barker Reservoirs (USFWS 2008). The characteristic prairie community species list is presented in Table 8.

Successional growth of native and non-native woody plants currently endangers patches of remnant prairie in the reservoirs. The encroaching woody vegetation includes sensitive briar (*Mimosa nuttallii*), rattle bush (*Sesbania drummondii*), McCartney rose (*Rosa bracteata*), yaupon (*Ilex vomitoria*), and Chinese tallow (*Sapium sebiferum*) (USACE, 1986). Historically, grazing and prairie fires prevented woody plants from establishing and overtaking prairie habitats. Fire suppression techniques have allowed both native and exotic species to invade the remaining patches of remnant prairie (Grafe et al, 1999).

Table 8. Characteristic Prairie Community and Species List - Upper Texas Coastal Prairie. (Adapted from Diamond and Smeins, 1985)

Graminoids (herbaceous flowering grasses, sedges and rushes)		Forbs (herbaceous flowering plants that are not grasses, sedges, or rushes)	
Andropogon gerardii	big bluestem	*Acacia hirta*	prairie acacia
Bouteloua curtipendula	sideoats grama	*Aster ericoides*	white aster
Carex microdonta	small-toothed caric sedge	*A. pratensis*	aster
Coelorachis cylindrica	cylinder jointtail grass	*Bifora americana*	prairie bishop
Dichanthelium oligosanthes	rosette grass	*Gnaphalium spp.*	cudweed
Fimbristylis puberula	hairy fimbry	*Hedyotis nigricans*	diamondflowers
Panicum virgatum	switchgrass	*Hymenopappus scabiosaeus*	Carolina woollywhite
Paspalum floridanum	Florida paspalum	*Liatris spp.*	blazing stars
Paspalum plicatulum	brownseed paspalum	*Linum medium*	stiff yellow flax
Paspalum setaceum	thin paspalum	*Neptunia lutea*	puff
Rhynchospora spp.	beakrush	*Physostegia intermedia*	slender false dragonhead
Schizachyrium scoparium	little bluestem	*Ratibida columnaris*	upright prairie coneflower
Scleria ciliate	fringed nutrush	*Rudbeckia hirta*	blackeyed Susan
Sorghastrum nutans,	Indiangrass	*R. nudiflora*	violet wild petunia
Sporobolus asper	scratchgrass	*Schrankia uncinata*	little leaf sensitive-briar
Stipa leucotricha,	Texas wintergrass,	*Sisyrinchium pruinosum*	roadside blue-eyed grass
Nassella leucotricha	Texas tussockgrass		

6.6 WETLANDS

The wetlands on Addicks and Barker Reservoirs are easily divided into two categories: riparian (riverine) or depressional (prairie potholes). Wetlands are continually subject to periodic inundation of water which saturates the soil and supports vegetation which can tolerate these soils. Wetlands like those found in the reservoirs and nearby Katy Prairie

provide vital habitat for aquatic species. Based on the USFWS National Wetland Inventory (NWI) data, Addicks and Barker Reservoirs contain approximately 3,400 acres and 4,100 acres of wetlands respectively.

Forested wetlands are perhaps the most rapidly disappearing wetland type in the United States. Most swamp and riparian forests underwent severe deforestation and over-harvesting in the late 19th and early 20th centuries. Since the mid-1950s, forested wetlands on the Texas coast have decreased in area by about 11 percent, a net loss of more than 96,000 acres (Moulton and Jacob 2000).

Prairie pothole and marsh wetlands are inundated by direct precipitation and runoff. They are often abandoned channels of the rivers that laid down the great floodplain and delta sediment deposits that make up most of the coastal plain. The Katy Prairie west of the project area is one of the more well known prairies with abundant pothole wetlands. Historically, agriculture was the greatest cause of the loss of prairie potholes and marshes. Urbanization is probably the greatest cause of loss today. Over the course of American history, more than 115 million acres of wetlands have disappeared, down from an original total of 221 million acres. In Texas, 600,000 acres of coastal wetlands and 52 percent of the total wetland acreage has been lost, with ongoing loss of prairie wetlands and coastal marshes (Tacha 1994). On the Texas Gulf Coastal plain, freshwater marshes have decreased by almost 30 percent since the mid-1950s, a net loss of more than 235,000 acres (Moulton and Jacob 2000).

In the water cycle, wetlands are crucial in restoring ground-water levels, by collecting runoff and precipitation, and allowing it to infiltrate slowly into the soil (Tacha, 1994). Wetlands assist with filtering suspended sediment, capturing bed load, aiding in floodplain development, and stabilizing banks against erosion. Water quality for the general project area is under study by the Buffalo & White Oak Bayous Indicator Bacteria Total Maximum Daily Load (TMDL) Stakeholders Group. Currently, all main segments and tributaries of Buffalo Bayou have been identified as impaired. Known sources of contamination are located upstream of the reservoirs.

6.7 TOPOGRAPHIC FEATURES

The topography within the reservoirs is generally flat with a slight decrease in elevation (about 30 feet) from west to east. Although the overall topography is flat, there are three micro-topographic features that contribute greatly to the ecosystem, prairie potholes, Mima (pimple) mounds, and gilgai. Prairie potholes are discussed in Section 6.6. Mima mounds and gilgai are discussed below.

The name Mima mounds originates from the Mima Prairie in Washington State, where hundreds of the grassy bumps are located. However, Mima mounds have also been located in Arkansas, California, Louisiana, Texas, Idaho, and Wyoming, and in other countries including Mexico, Canada, Argentina, China, and Kenya. Excavations made into the Washington mounds show that underneath a blanket of prairie grass lies a mixture of loose sand, fine gravel, and decayed plants. Bernard Hallet, a geologist at the University of Washington explains that this is unusual, as most land surfaces have a top

layer of organic material, dead plants and animals, no more than half a meter (1.6 ft) thick, while Mima mounds are made of organic-rich soil more than 2 meters thick. The exact origin of Mima mounds is still under debate, however two theories of their origin are: seismic activity (vibrations from violent earthquakes could have formed the Mima mounds) and pocket gophers (gophers tunneling into loose soil run into a gravel layer below, unable to burrow any farther, the gophers start building upward and outward).

Gilgai is a term referring to a series of microridges and associated microdepressions. Gilgais are commonly a few meters across and less than 30 cm deep. Gilgais form on clay soils due to the swelling of the clay when wet and subsequent shrinkage upon drying. This action causes the soil to crack when dry and loose soil material then fills these cracks. When the soil swells upon subsequent re-wetting the soil pressure cannot be dispersed into the now-full cracks and the soil is forced sideways causing a mound to form between cracks and a depression to form at the location of the crack. The process is then further exaggerated by the depressions holding water and thus becoming wetter and swelling more than the mounds, causing even greater shrinkage and cracking. In addition, the cracks channel water deeply into the soil causing even greater swelling and subsequent cracking of the depression areas. Each cycle of swelling, shrinkage and cracking becomes more exaggerated and the landscape eventually becomes covered by a repeated pattern of ridges and depressions.

6.8 WILDLIFE

Coastal prairies and riparian forests provide important wildlife habitat to a wide variety of species, and are especially important to avian species. Remnant coastal prairies still contain some of the highest numbers of red-tailed hawk (*Buteo jamaicensis*), northern harrier (*Circus cyaneus*), white ibis (*Eudocimus albus*), and white-faced ibis (*Plegadis chihi*) than any other region in the United States (Grafe et al 1999). Permanent residents include quail (*Coturnix* sp.), bluebirds (*Sialia sialis*) and a large variety of songbirds (National Audubon Society 2007).

Bottomland hardwood forests in the reservoirs provide important stopover habitat for migrating neotropical songbirds of the Central Flyway (Barrow et al 2005), as well as songbirds, wintering birds, and year-round residents. During spring and fall migration, neotropical migrants such as American redstarts (*Setophaga ruticilla*), Baltimore orioles (*Icterus galbula*), and black-throated green warblers (*Dendroica virens*) are likely to use the reservoirs. During winter, typical migrant species include ruby-crowned kinglet (*Regulus calendula*), yellow-rumped warbler (*Dendroica coronata*), white-throated sparrow (*Zonotrichia albicollis*), and yellow-bellied sapsucker (*Sphyrapicus varius*). Wintering waterfowl include wood duck (*Aix sponsa*) and mallard (*Anas platyrhynchos*) (Guilfoyle 2001). Year round residents of bottomland hardwood forest within the reservoirs include tufted titmouse (*Baeolophus bicolor*), Carolina wren (*Thryothorus ludovicianus*), Carolina chickadee (*Poecile carolinensis*), downy woodpecker (*Picoides pubescens*), cardinal (*Cardinalis cardinalis*), and red-bellied woodpecker (*Melanerpes carolinus*) (Guilfoyle 2001; National Audubon Society 2002). Wading birds such as the great egret (*Ardea alba*), great blue heron (*Ardea herodias*), and little blue heron (*Egretta*

caerula) also use the bottomland hardwood forests within the reservoirs (Guilfoyle 2001; National Audubon Society 2002).

Wetlands within the reservoirs provide habitat for waterfowl such as black-bellied whistling-duck (*Dendrocygna autumnalis*), northern shoveler (*Anas clypeata*), mallard (*Anas platyrhynchos*), pintail (*Anas acuta*), blue-winged teal (*Anas discors*), gadwall (*Anas strepera*), wigeon (*Anas americana*), and mottled duck (*Anas fulvigula*) and roseate spoonbill (*Platalea ajaja*).

The reservoirs afford extensive bird viewing opportunities and are included within the Great Texas Coastal Birding Trail. The reservoirs are located in the Central Flyway and provide habitat for a number of rare birds. Of the 48 species of Birds of Conservation Concern identified by USFWS as occurring within the Gulf Coastal Prairie region (USFWS 2002), and the 16 species of rare birds identified by TPWD as occurring within Harris and Fort Bend counties (TPWD 2007b), 15 have been observed in or near the reservoirs in the past ten years. The Buffalo Bayou Christmas Bird Count (National Audubon Society 2002) includes the reservoirs and has recorded winter bird populations for several decades. A rare visitor to the reservoirs, the bald eagle (*Haliaeetus leucocephalus*), was sited during the 2007 Christmas Bird Count. Additional bird surveys taken throughout the year at the Audubon Society's Edith Moore Nature Sanctuary near the reservoirs are also included in Table 9, below (National Audubon Society 2007).

Table 9. Rare Birds and Birds of Conservation Concern Observed in the Vicinity of Addicks and Barker Reservoirs

Common Name/*Scientific Name*	**Christmas Bird Count (1997-2007)**	**Edith Moore Nature Sanctuary (2004-2007)**
American bittern *(Botaurus lentiginosus)*	X	
White ibis (*Eudocimus albus*),	X	X
Northern harrier (*Circus cyaneus*)	X	
Peregrine falcon *(Falco peregrinus)*	X	
Red-headed woodpecker *(Melanerpes erythrocephalus)*	X	X
Loggerhead shrike *(Lanius ludovicianus)*	X	
Bewick's wren *(Thryomanes bewickii)*	X	
Sedge wren *(Cistothorus platensis)*	X	
Tropical parula *(Parula pitiayumi)*	X	
Swainson's warbler (*Limnothlypis swainsonii)*		X
Kentucky warbler (*Oporornis formosus)*		X
Grasshopper sparrow *(Ammodramus savannarum)*	X	
Henslow's sparrow *(Ammodramus henslowii)*	X	
LeConte's sparrow *(Ammodramus leconteii)*	X	
Painted bunting (*Passerina ciris)*		X

In addition to birds, the reservoirs provide habitat for numerous small to medium-sized mammals. These mammals include: raccoon (*Procyon lotor*), opossum (*Didelphis virginiana*), eastern fox squirrel (*Sciurus niger*), eastern gray squirrel (*Sciurus*

carolinensis), cottontail rabbit (*Sylvilagus* sp.), striped skunk (*Mephitis mephitis*), nine-banded armadillo (*Dasypus nobemcinctus*), and rodents including hispid cotton rat (*Sigmodon hispidus*), whitefooted mouse (*Peromyscus leucopus*), deer mouse (*Peromyscus* sp.), house mouse (*Mus musculus*), and whitefooted mouse (*Peromyscus leucopus*) (HCFCD, 2001). Typical large mammals include white-tailed deer (*Odocoileus virginianus*), coyote (*Canis latrans*), bobcat (*Lynx rufus*), beaver (*Castor canadensis*), feral hog (*Sus scrofa*), dog (*Canis lupus familiaris*), and cat (*Felis catus*), and river otter (*Lontra canadensis*).

Amphibians found in the reservoirs include green tree frogs (*Hyla cinerea*), leopard frogs (*Rana sphenocephala*), bullfrogs (*Lithobates catesbeianus*), and Gulf Coast toad (*Bufo valliceps*). Typical reptiles include snapping turtle (*Chelydra serpentina*), red-eared turtle (*Trachemys scripta*), three-toed box turtle (*Terrapene carolina*), ornate box turtle (*Terrapene ornata*), green anole lizard (*Anolis carolinensis*), five-lined skink (*Eumeces fasciatus*), and slender glass lizard (*Ophisaurus attenuatus*). The reservoirs also support a number of snake species such as prairie king snake (*Lampropeltis calligaster*), copperhead (*Agkistrodon*), cottonmouth moccasin (*Agkistrodon piscivorus*), and a number of water snakes (University of Texas 2000).

7.0 LAND USE CLASSIFICATIONS

Project lands have been further classified to provide guidance for proposed developments and natural and cultural resource management. The land classifications were developed to be consistent with the authorized purpose of the project and to meet the provisions of the National Environmental Policy Act (NEPA) and other Federal laws pursuant to the guidance found in ER 1130-2-550 and EP 1130-2-550; both dated November 15, 1996. The Land Classifications for Addicks and Barker Reservoirs are described below (and see Table 10 and Figures 8 and 9).

Table 10. Approximate Acreage for Each Land Use Class by Reservoir*

Land Use Class	Addicks	Barker	Total
Project Operations (OPS)	1,900	2,200	4,100
Recreation (REC)	1,700	1,400	3,100
Proposed Recreation (PRec)	110	340	450
Environmentally Sensitive Area (ESA)	4,300	2,900	7,200
Multiple Resource Management (MRM)	5,700	5,660	11,360
Total Acres			26,100

* Note that all acreages were generated by a geographic information system and have been rounded.

7.1 PROJECT OPERATIONS (OPS)

Project Operations (OPS) includes those lands required for the structure, operations center, office, maintenance compound, borrow areas, dams, gage houses, outlet structures, lands required for administrative and maintenance needs, and other areas that are used solely for project operations. The purpose of this category is to provide adequate

land for the safe and efficient operation and maintenance of the reservoirs for their authorized purpose of flood risk management.

Approximately 1,950 acres of land have been allocated to OPS on Addicks Reservoir. These lands consist primarily of the earthen dam, borrow areas adjacent to the dam, and lands adjacent to the dam most likely to be used for maintenance activities. Approximately 2,290 acres of land have been allocated to OPS on Barker Reservoir. This land consists primarily of the earthen dam, borrow areas adjacent to the dam, lands adjacent to the dam most likely to be used for maintenance activities, and the Addicks and Barker Administrative Compound.

7.2 RECREATION (REC) AND PROPOSED RECREATION (PREC)

Lands assigned to the Recreation (Rec) Land-Use Class, consist of those areas where the existing environment has been significantly altered for the purpose of recreational development. The purpose of this class is to identify the amount of lands that have been developed for activities not related to the authorized Flood Control purpose of the reservoirs.

There are approximately 1,640 acres of Rec lands in Addicks Reservoir. Rec lands in Addicks Reservoir consist primarily of the Bear Creek Park (including the Golf Course, Dog Park, and Sports Complex) and Cullen Park. There are approximately 1,385 acres of Rec lands in Barker Reservoir. This land consists primarily of George Bush Park.

The Galveston District has also identified three areas classified as Proposed Recreation (PRec). This Land-Use Class has been developed by the Galveston District specifically to identify areas that would be appropriate for future recreational development. The key criteria Galveston District used in identifying these areas were: (1) the area would otherwise be identified as Multiple Resource Management; (2) the area is adjacent to an existing road; and (3) there are no Environmentally Sensitive Areas within 100 feet. One area was identified in Addicks Reservoir that is approximately 110 acres and two areas were identified in Barker Reservoir that consists of approximately 340 acres.

7.3 ENVIRONMENTALLY SENSITIVE AREAS (ESA)

Environmentally Sensitive Areas (ESA) are areas where scientific, ecological, cultural, or aesthetic features have been identified that require special consideration and additional protection. Currently, ESAs consist of: wetlands, riparian bottomland hardwood forests, remnant prairies, cultural resources, and locations where *H. texana* has been identified.

Normally “limited” to “no” development for public use shall be contemplated on land in this classification. In addition, agricultural and grazing uses are generally not permitted in ESA.

Since there are a wide variety of resources that contribute to the establishment of the ESA, general statements about the types of activities or actions that would be allowed

within these areas cannot be made. Galveston District will make determinations on whether or not an action or activity is appropriate for the specific ESA.

There are approximately 4,360 acres of ESA within Addicks Reservoir. This area is mostly comprised of lands adjacent to Langham, Turkey, Bear, and South Mayde Creeks. There are approximately 2,940 acres of ESA within Barker Reservoir. This area is primarily comprised of the lands adjacent to Buffalo Bayou.

7.4 MULTIPLE RESOURCE MANAGEMENT (MRM)

Multiple Resource Management areas (MRM) are lands that are managed for the following activities, provided the activities do not interfere with the authorized purpose of the reservoirs - Flood Damage Reduction. Four management activities have been identified for Addicks and Barker Reservoirs: Low Impact Recreation, Wildlife Management, Vegetative Management, and Future Recreation. Currently, all lands classified as MRM on both Addicks and Barker Reservoirs are being managed for Low Impact Recreation, Vegetative Management, and Wildlife Management.

Low impact recreation offers the public opportunities for education, hiking and biking, wildlife viewing, sightseeing, photography, nature study, and other recreation activities which do not require substantial modifications of the existing environment. However, minor modifications may be appropriate, including, but not limited to, hike and bike trails, educational trails, and nature viewing platforms.

Vegetative management activities for these lands include protection and improvement of riparian forest, coastal prairie, and wetland habitats. These lands may be used for the limited activities listed above, as well as other approved activities, when deemed compatible by the Galveston District with vegetation management and habitat restoration goals. Lands being managed for vegetative habitats may include practices and techniques employed to enhance or restore vegetative resources such as eradication of invasive species, ecosystem restoration, or management of threatened and endangered species.

Wildlife management activities include management of areas for the benefit of specific wildlife species. Activities within these lands may also include protection and restoration of riparian forest, coastal prairie, and wetlands, with the intent to manage a habitat for a specific wildlife species or community.

While the Galveston District has identified three areas for PRec, other proposals for recreational development within the MRM areas may be considered and approved by the Galveston District. Therefore future recreation is also considered a management activity for the MRM areas. If recreational development is approved within a MRM area, then an equivalent number of acres will be removed from an appropriate PRec area or appropriate mitigation, as determined by the Galveston District, shall be required.

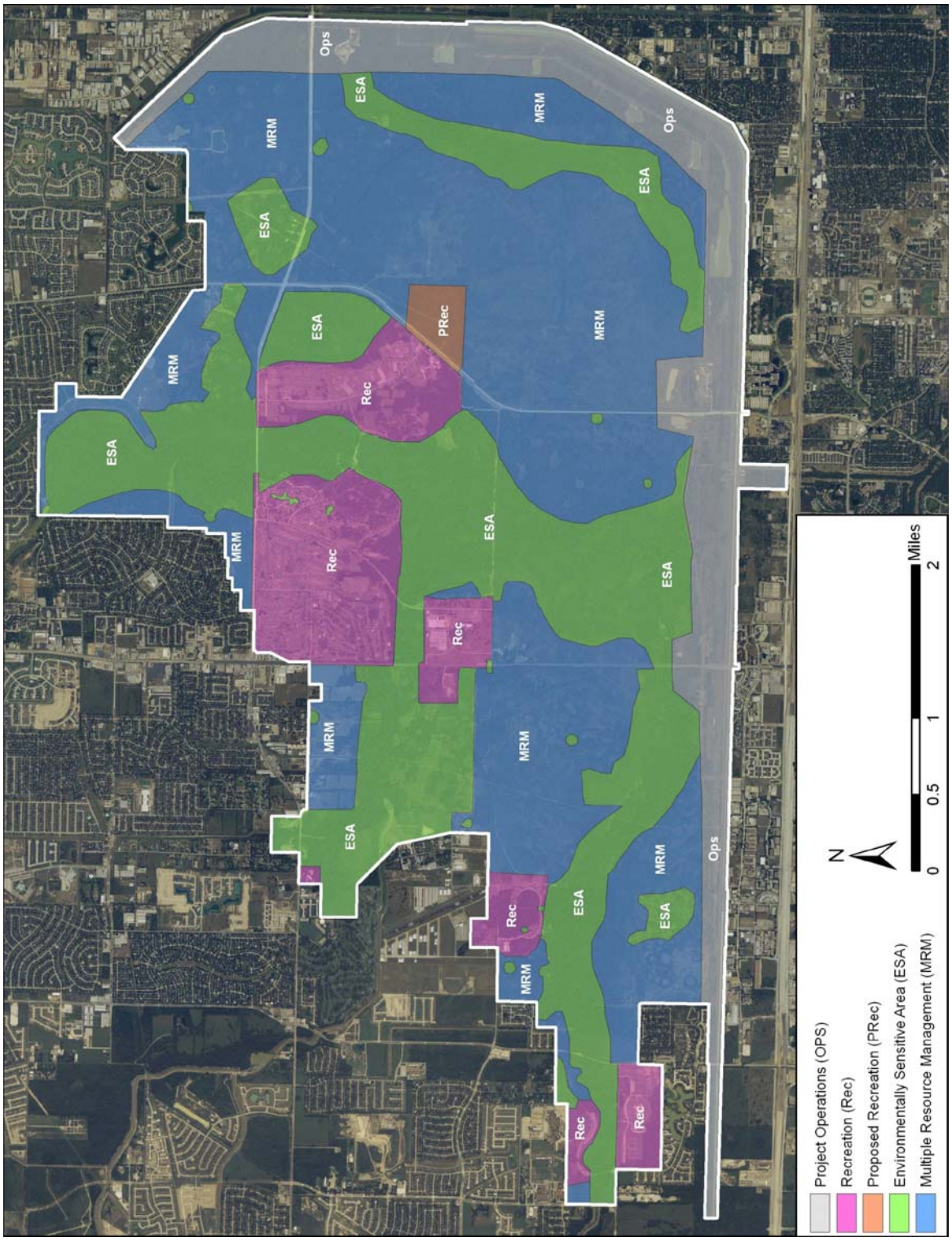

Figure 8. Land Use Classifications, Addicks Reservoir

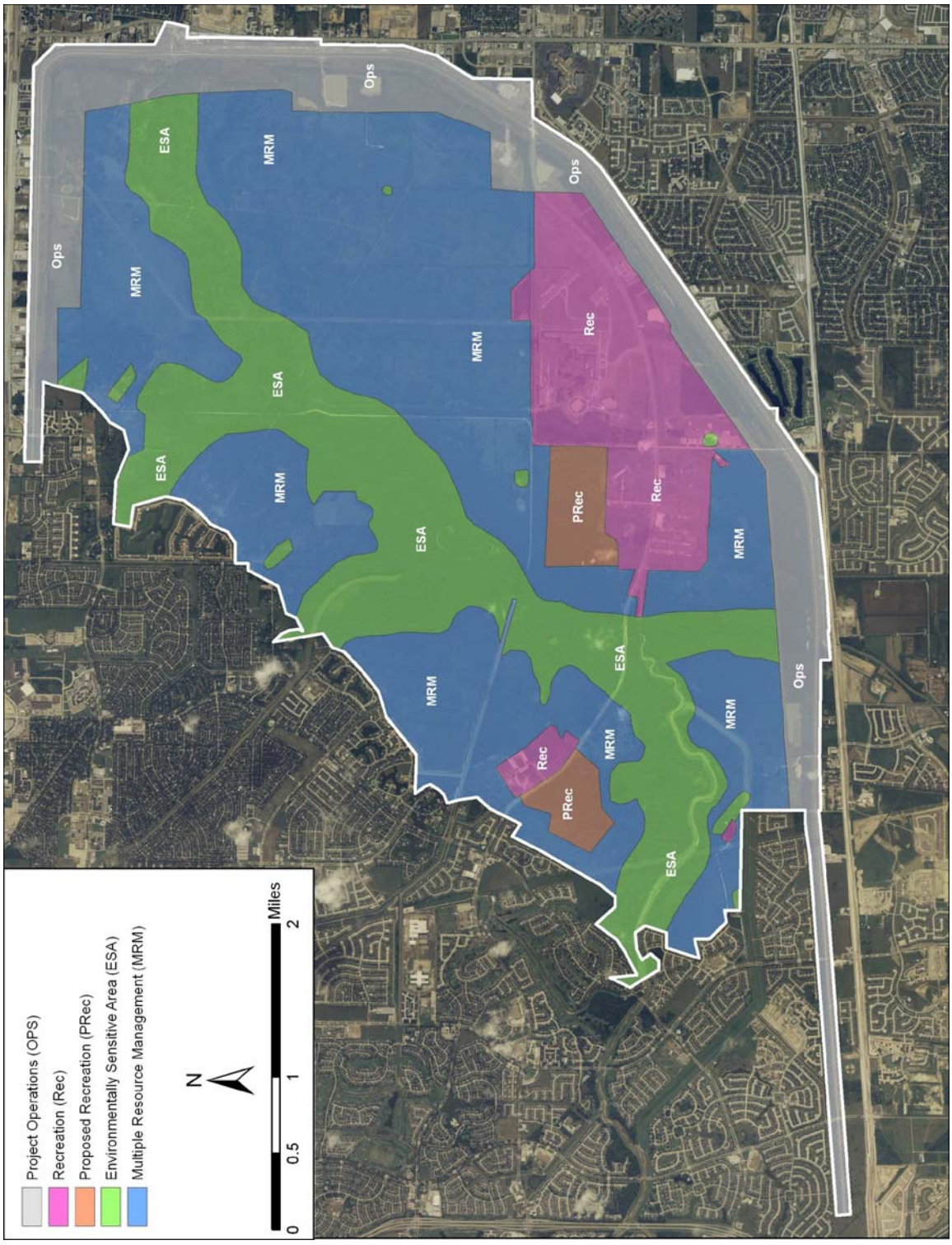

Figure 9. Land Use Classifications, Barker Reservoir

8.0 RESOURCE PLAN

The Galveston District has a well developed procedure for evaluating proposed actions on Addicks and Barker Reservoirs (see Appendix F). The following sub-sections provide action statements the Galveston District will use when evaluating proposed actions on Addicks and Barker Reservoirs.

8.1 MEETING RESOURCE OBJECTIVES

In Section 3.0, Galveston District identified nine resource objectives. Each of those objectives is presented again followed by an action statement describing how Galveston District intends to meet that objective.

> *Ensure quality, consistent, and thorough management of all project lands, including all natural, cultural, and recreational resources.*

Project administrative and management decisions/actions will adhere to all applicable laws, regulations, policies, and agreements. Galveston District will maintain consistent coordination, internally, and with other Federal, state, and local government agencies, private organizations, and individuals.

> *Seek to continually increase efficiency, cost effectiveness, and innovation in project management without compromising the authorized purpose of the reservoirs.*

The major concerns of management are maintaining the integrity of the operational structures (i.e. dams, water control structures, etc.), identification of facilities for rehabilitation or replacement, provision of efficient support facilities, public health and safety, and responsible stewardship of the environment.

> *Remain committed to providing responsible stewardship through the conservation, maintenance, and restoration of diverse habitat communities and the eradication or control of invasive species.*

Stewardship efforts will include monitoring and inventorying natural resources including status of native communities, invasive species, and identifying activities that are incompatible with land use classes. Stewardship includes taking action to correct situations when warranted. Refer to Section 8.2 below for more a more detailed discussion on Stewardship actions for Specific Resources.

> *Maintain, protect, and restore wetlands.*

Negative impacts will be avoided, minimized, or mitigated for a “no net loss” approach to management in accordance with Section 404 of the Clean Water Act and other Federal and state regulations. Galveston District will continue to identify and protect wetlands on the reservoirs. Additionally, Galveston District is in the process of developing an

Invasive Species and Ecosystem Restoration Management Plan with the U.S. Fish and Wildlife Service. This plan will include restoration efforts for wetlands.

> *Increase the quality of the public's experience by maintaining and developing recreation areas that meet the needs of the visitor while maintaining the integrity of the environment.*

The development of recreational facilities and opportunities by lessees shall incorporate environmental protection and enhancement techniques compatible with the USACE Natural Resources Management Mission and Galveston District's Guiding Principles for Development for Addicks and Barker Reservoirs. Site designs, impact deterrence, natural landscaping, and appropriate maintenance measures will be used to accomplish this goal. The USACE will not approve the construction of proposed facilities that are incompatible with the USACE's natural resources stewardship program mission and principles.

> *Provide quality recreation facilities that meet the needs of the visitors to the region, maintain, develop, and alter facilities in order to meet the changing and diverse use patterns of the visitors to the park.*

USACE policy is to provide outdoor recreation where there is an unfulfilled demand and a corresponding deficit of those facilities. This shortfall is fulfilled by either the Corps constructing the facilities or allowing other public (state and local), private sector, quasi-private entities or individuals to do so on project lands through an outgrant. The need for additional recreation facilities will be identified using professionally accepted methods prior to or along with a development application submittal to the USACE.

> *Provide a safe and healthy environment for project visitors by monitoring, maintaining, and improving the environmental quality and natural aesthetics of the area.*

Galveston District shall continue to monitor the natural, physical, cultural, and social resources on the reservoirs. Galveston District shall also continue to evaluate the effects proposed projects would have on these resources.

> *Encourage outdoor recreational opportunities for the elderly, disabled, and other disadvantaged groups by providing barrier-free access.*

Additional consideration shall be given to proposed outdoor recreation projects that include facilities and services for the elderly, disabled, or other disadvantaged groups.

> *Continue to expand upon the distribution of information concerning (1) the importance of ecosystem conservation and restoration, (2) applicable rules and regulations, and (3) the importance of public safety.*

Education is a key factor in increasing public knowledge and awareness of natural and cultural resources and in reducing impacts to those resources. Public knowledge is enhanced through programs both on and off site, news releases, internet websites,

informative handouts, posters, and various other public service announcements done on radio and television.

8.2 ADDRESSING RESOURCES IDENTIFIED FOR SPECIAL CONSIDERATION

In developing the 2009 Master Plan, Galveston District identified eight classes of resources that required special consideration. The following action statements describe, generally, how Galveston District shall address each of the resources in their management decisions.

Invasive Species: The invasion of native and non-native plants and animals is resulting in serious ecosystem degradation across the United States. Galveston District shall take into consideration the effects a proposed project would have on increasing the spread of invasive species both on and off the reservoirs. Submittals for proposed projects shall address the prevention and control of invasive species. Additionally, the Galveston District is in the process of developing an Invasive Species and Ecosystem Restoration Plan in coordination with the U.S. Fish and Wildlife Service.

Cultural Resources: Prior to the approval of any proposed project, Galveston District shall take into consideration the effects the project may have on Historic Properties, pursuant to the National Historic Preservation Act. All proposed projects (both internal and external) shall be reviewed by a Galveston District Staff Archeologist. If determined the proposed project has the potential to affect Historic Properties, the Galveston District, or project applicant, shall follow the steps described in 36 CFR 800.

Aesthetics: Prior to the approval of any proposed project, Galveston District shall take into account the visual, audible, and olfactory impacts of the project. While the aesthetic impacts to the reservoirs of any proposed project shall be considered, more stringent consideration shall apply to those areas most commonly viewed by the public and those areas most commonly used for an “outdoor” experience. Projects determined by Galveston District to have negative impacts to the aesthetic quality of reservoirs shall be required to avoid, minimize, and/or mitigate the negative impacts.

Threatened and Endangered Species: Currently, *H. texana* is the only threatened or endangered species located on the reservoirs. Galveston District shall continue to monitor known populations and conduct surveys for new populations. Galveston District shall not approve any proposed project that would adversely effect a population of *H. texana*. Galveston District is currently developing a *H. texana* Management Plan in coordination with the U.S. Fish and Wildlife Service.

Remnant Coastal Prairie: Galveston District shall continue to identify, maintain, and protect patches of remnant coastal prairie. The Galveston District is in the process of developing an Invasive Species and Ecosystem Restoration Plan in coordination with the U.S. Fish and Wildlife Service. Projects determined by Galveston District to impact remnant coastal prairie on the reservoirs shall be required to avoid, minimize, and/or mitigate the negative impacts.

Wetlands: Galveston District shall continue to identify, maintain, and protect wetlands located on the reservoirs. Galveston District shall continue to follow the "No Net Loss" policy. Additionally, the Galveston District is in the process of developing an Invasive Species and Ecosystem Restoration Plan in coordination with the U.S. Fish and Wildlife Service. Projects determined by Galveston District to impact wetlands on the reservoirs shall be required to avoid, minimize, and/or mitigate the negative impacts.

Topographic Features: Galveston District shall continue to identify, maintain, and protect the microtopographic features in the reservoirs (i.e. prairie potholes, Mima mounds, and gilgai). Proposed projects shall be evaluated for their effects to these features. Projects determined by Galveston District to have negative impacts to these microtopographic features in the reservoirs shall be required to avoid, minimize, and/or mitigate the negative impacts.

Wildlife: Prior to the approval of any proposed project, Galveston District shall take into account the effect the project would have on wildlife. Projects determined by Galveston District to have negative impacts to wildlife species on the reservoirs shall be required to avoid, minimize, and/or mitigate the negative impacts.

8.3 LAND USE CLASSIFICATION MANAGEMENT

Operations: Operations lands have been set aside to ensure adequate land exists for the safe and efficient operation and maintenance of the reservoirs for their authorized purpose of flood risk management. The operation and maintenance of the reservoirs takes precedence over all other concerns. Lands identified for Operations may serve a dual purpose (e.g. a recreation trail along the top of a dam), provided the secondary purpose is approved through the Galveston District review process. All operations and maintenance projects shall be reviewed by the Environmental Section of the Galveston District to ensure the project is in compliance with the National Environmental Policy Act.

Recreation: Lands assigned to the Recreation Land-Use Class, consist of those areas where the existing environment has been significantly altered for the purpose of recreational development. Any new recreational development within those areas will require review and approval through the Galveston District review process.

Proposed Recreation: Galveston District has also identified three areas classified as "Proposed Recreation." This Land-Use Class has been developed by the Galveston District specifically to identify areas that would be appropriate for future recreational development. Any proposed project in these areas will require review and approval of the project through the Galveston District review process.

Environmentally Sensitive Areas: Environmentally Sensitive Lands are areas where scientific, ecological, cultural, or aesthetic features have been identified that require special consideration and additional protection. Any proposed restoration efforts in these areas will be subject to review through the Galveston District review process and coordination with the appropriate Federal Agency.

Multiple Resource Management: These are lands that are managed for one or more of the following activities, provided those activities do not interfere with the authorized purpose of the reservoirs: Flood Damage Reduction. Four management activities have been identified for Addicks and Barker Reservoirs: Low Impact Recreation, Wildlife Management, Vegetative Management, and Future Recreation. Any proposed project or restoration efforts in these areas will be subject to review through the Galveston District review process and coordination with the appropriate Federal Agency.

9.0 SUMMARY REMARKS

In order to effectively operate the reservoirs, to act as responsible stewards of natural and cultural resources, and to provide recreational opportunities to the public, the USACE Galveston District has developed this Master Plan. In order to develop this Master Plan, Galveston District took into consideration how the reservoirs operate, and activities that have occurred on the reservoirs in the past. Galveston District then developed specific resource objectives to provide general guidance and direction for management decisions.

Galveston District then inventoried and mapped the existing conditions on the reservoirs. Five general classes of conditions currently exist on the reservoirs: Degraded Coastal Prairie, Riparian Forests, Other Forested Lands, Developed Lands, and Travelways and Utility Corridors. The District then conducted a recreational analysis, which consisted of identifying the recreational resources and facilities existing on the reservoirs, analyzing the visitation patterns of the public, identifying similar recreational areas off the reservoirs, and presenting identified recreational needs identified by local City and County Governments. Galveston District then identified resources that required special consideration. These resources consist of Invasive Species, Cultural Resources, Aesthetics, Threatened and Endangered Species, Remnant Coastal Prairie, Wetlands, Topographic Features, and Wildlife.

Based on this information, Galveston District then assigned specific land use classes to all parts of the reservoir. These land use classes include Project Operations (OPS), Recreation (Rec) and Proposed Recreation (PRec), Environmentally Sensitive Areas (ESA), and Multiple Resource Management Areas (MRM). Finally, Galveston District developed action statements to address how the resource objectives would be considered, how the special resources would be addressed, and the management actions that would occur within each of the land use classes.

This Master Plan will be reviewed by Galveston District on an annual basis. As the need arises as determined by the Galveston District, this Master Plan may be amended, updated, or revised to reflect current values, attitudes, needs, and knowledge concerning the resources on the reservoirs.

10.0 LITERATURE CITED

Barrow et al. 2005. Coastal Forests of the Gulf of Mexico: A Description and Some Thoughts on Their Conservation. USDA Forest Service Gen. Tech. Rep. PSW-GTR-191. 2005.

City of Houston 2007. Houston Parks Department website. Houston Parks Master Plan, Available online at: http://www.houstontx.gov/parks/masterplan/index.html; Accessed on November 10, 2007.

Cordell, K.H. 1999. Outdoor Recreation in American Life: A National Assessment of Demand and Supply Trends. Sagamore Publishing

Fields, R.C., M.D. Freeman, and S.M. Kotter. 1983. Inventory and Assessment of Cultural Resources at Addicks Reservoir, Harris County, Texas. Prewitt and Associates, Inc. Austin, Texas.

Fields, R.C., Godwin, M.F., Freeman, M.D. 1986. Inventory and Assessment of Cultural Resources at Barker Reservoir, Fort Bend and Harris Counties, Texas. Prewitt and Associates, Inc. Austin, Texas.

Gould. F.W. 1975. Texas Plants--Checklist and Ecological Summary. Texas Agricultural Experiment Station, Texas A&M University, College Station, Texas.

Grafe, V., L. Allain, M. Vidrine, C. Allen, and S. Johnson. 1999. Paradise Lost? The coastal prairie of Louisiania and Texas. U.S. Fish and Wildlife Service Pamphlet, Arlington, Virginia, USA.

Guilfoyle, M.P., 2001. "Management of bottomland hardwood forests for non-game bird communities on Corps of Engineers projects", EMRRP Technical Notes Collection (ERDC TN-EMRRP-SI-21), U.S. Army Engineer Research and Development Center, Vicksburg, MS. www.wes.army.mil/el/emrrp

Harris County 2000. Harris County Parks Awareness and Usage Study (on-line). Prepared by Gelb consulting Group, Inc. September 26, 2000. Study PowerPoint presentation accessed on the web November 20, 2007.

Harris County 2003. Harris County Master Plan for Parks, Recreation, and Open Space, Phase Two, Harris County Texas. May 20, 2003. Prepared by BCA Bricker and Cannady Architects. Available on the web at: http://www.eng.hctx.net/parkplan.htm. Accessed on November 20, 2007.

Moulton, D.W. and J.S. Jacob. 2000. Prairie Pothole and Marsh Wetlands, Addicks and Barker Reservoirs in Texas Coastal Wetlands Guidebook. Texas Sea Grant Publication TAMU-SG-00-605, p.14-17. Accessed on April 19, 2007. http://www.ruf.rice.edu/~scilinks/prairie_marsh.htm

National Audubon Society (2002). The Christmas Bird Count Historical Results [Online]. Accessed on November 16, 2007. http://www.audubon.org/bird/cbc

National Audubon Society, 2007. Edith Moore Nature Sanctuary Sightings Log 2004-2006. http://www.houstonaudubon.org/html/EdithMooreSightings.xls

NatureServe. 2008. NatureServe Explorer: An online encyclopedia of life [web application]. Version 6.1. NatureServe, Arlington, Virginia. Available http://www.natureserve.org/explorer. (Accessed: November 19, 2007).

TPWD. 2005. Land and Water Resources Conservation and Recreation Plan. January 2005.

TWPD, 2007. Texas Wildscapes Native Plant Tables. http://www.tpwd.state.tx.us/publications/pwdpubs/media/pwd_bk_w7000_0788_f-n.pdf Accessed November 19, 2007.

USACE. Galveston District. 2002. Existing Environmental Conditions of Buffalo Bayou, Houston, Texas, and Environmental Issues Relative to Master Plan Development. Prepared by: Turner Collie & Braden Inc. for the Harris County Public Infrastructure Department, Buffalo Bayou Partnership, and Harris County Flood Control District. March, 2002. 112 pp.

USFWS. 2008a. Columbia Bottomland Wetlands website http://www.fws.gov/southwest/clearlakees/wetlands_new.htm Accessed February 26, 2008

USFWS 2008b. Planning Aid Letter to the U.S. Army Corps of Engineers, Galveston District, Dated June 17, 2008

University of Texas, 2000. Herps of Texas website. http://www.zo.utexas.edu/research/txherps/ Accessed November 20, 2007.

Appendix A – Federal Laws and Regulations, Executive Orders, and Engineering Regulations Considered in the Development of the Addicks and Barker Master Plan

Fish and Wildlife Coordination Act, enacted March 10, 1934, as amended, August 14, 1946 (PL 79-732), 1958 (PL 85-624). This act provides authority for making project lands of value for wildlife purposes available for management by interested Federal and State wildlife agencies. It further provides for more effective integration of a fish and wildlife conservation program with Federal water resources developments.

National Environmental Policy Act (NEPA) of 1969, as amended (42 USC 4321 et seq.). This act establishes a national environmental policy and requires that all Federal agencies shall, to the fullest extent possible, use a systematic, interdisciplinary approach which integrates natural and social sciences and environmental design arts in planning and decision making.

Endangered Species Act of 1973 as amended (16 USC 1531 and 1536). This act requires that Federal agencies shall, in consultation with the U.S. Fish and Wildlife Service (USFWS) (or the National Marine Fisheries Service), use their authorities in furtherance of conserving endangered and threatened species and take such action as necessary to assure that their actions are not likely to jeopardize such species or destroy or modify their critical habitat.

Water Resource Development Act of 1986, Section 1135, provides for modifications in the structures or operations of a project, consistent with authorized project purposes to improve the quality of the environment, i.e. restoration of fish and wildlife habitat.

American Antiquities Act of 1906. The President of the United States is authorized to declare historic landmarks, historic and prehistoric structures, and other objects of historic or scientific interest that are situated upon the lands owned or controlled by the Government of the United States to be national monuments. That permits for the examination of ruins, the excavation of archeological sites, and the gathering of objects of antiquity upon the lands under their respective jurisdictions may be granted by the Secretaries of the Interior, Agriculture, and War.

National Historic Preservation Act of 1966 as amended (PL 96-515). This act establishes the basis for historic preservation in the U.S. The most relevant sections include: 106, which states that the head of any Federal agency must take into account the effect of an undertaking on any site that is included in or eligible for inclusion in the National Register; and 110, which states that all Federal agencies shall assume responsibility for the preservation of historic properties which are owned or controlled by said agency.

Archaeological and Historic Preservation Act as amended (PL 86-523). This act provides for the preservation of historic sites, buildings, objects, and antiquities of national significance by providing for the preservation of historical and archeological data which might otherwise be irreparably lost or destroyed as the result of any alteration of the terrain caused as a result of any Federal construction project or federally licensed activity or program.

Archeological Resources Protection Act of 1979 as amended (PL 69-95). This act prohibits unauthorized excavation on Federal and Indian lands, establishes standards for permissible excavation, and prescribes civil and criminal penalties for unlawful excavation or destruction of historic properties.

Native American Graves Protection and Repatriation Act as amended (PL101-601). This act requires that Native Americans cultural items be returned to their respective peoples if and when they have been excavated, and allows archeological teams a short time for analysis before the remains must be returned. "Cultural items" include human remains, funerary objects, sacred objects, and objects of cultural patrimony.

36 CFR 800 initiates the Section 106 process of the National Historic Preservation Act. It also provides methods to be used for the identification of historic properties, assessment of adverse effects, resolution of adverse effects, failure to resolve adverse effects, coordination with NEPA, Council review of Section 106 compliance, documentation standards, and post-review discoveries.

Section 4 of the Flood Control Act, approved December 22, 1944 (PL 534, 78th Congress), authorizes providing facilities for public use, including recreation, and conservation of fish and wildlife.

The River and Harbors Act, approved March 2, 1945 (PL 14, 79th Congress), specifies the rights and interests of the states in watershed development and water utilization and control, and the requirements for cooperation with state agencies in planning for flood control and navigation improvements.

Section 209 of the Flood Control Act of 1954 (PL 83-780), approved September 3, 1954, amended the Flood Control Act of 1944. It authorized the Secretary of the Army to grant leases to federal, state or governmental agencies without monetary considerations for use and occupation of land and water areas under the jurisdiction of the Department of the Army for park and recreation purposes when in the public interest.

The Land and Water Conservation Fund Act of 1965, approved September 1, 1964 (PL 578, 88th Congress, 78 Stat. 897), contains provisions by which the USACE may charge for admission and use of its recreation areas under prescribed conditions.

The Federal Water Project Recreation Act, approved July 9, 1965 (PL 72, 89th Congress, 79 Stat. 213) contains cost sharing provisions for acquisition of lands and development of recreation facilities for water resources projects authorized after 1965. It also provides for cost sharing development of new areas that were not part of initial project construction.

The Architectural Barriers Act of 1968 (PL 90-480), **Rehabilitation Act of 1973** (PL 93-112), **Rehabilitation Act Amendments of 1974** (PL 93-516), **Rehabilitation, Comprehensive Services, and Developmental Disabilities Amendments of 1978** (PL 95-602), and the **Americans with Disabilities Act of 1990** (PL 101-336) provide information and guidance regarding universal accessibility for persons with disabilities to USACE recreation facilities and programs.

The Omnibus Budget Act - Day Use Fees, approved August 10, 1993 (PL 103-66), contains provisions by which the USACE may collect fees for the use of developed recreation sites and facilities.

Title 10, United States Code, Section 2667, authorizes the lease of land at water resource projects for any commercial or private purpose not inconsistent with other authorized purposes, subject to specific restrictions thereupon, as set out in regulations, policy, and Delegations of Authority.

Title 16, United States Code, Section 460d, authorizes use of public lands for any public purpose, including fish and wildlife, if it is in the public interest. Such uses are also subject to regulations, policy and Delegations of Authority. The use of project lands for easements and licenses is authorized in various Congressional Acts and codified in Titles 10, 16, 30, 32 and 43 of the United States Code.

If needed, lands and rights-of-way will be acquired pursuant to provisions of the **Uniform Real Property Acquisition and Relocation Assistance Act of 1970**, P.L. 91-646, as amended.

Appendix B – Past Flooding Events

The reservoirs were built to protect downtown Houston from flooding. Harris County has been subjected to at least 14 major storm events since 1853 (USGS 2003). The following is a list of major storms impacting the Buffalo Bayou watershed and their associated damages:

1929 – Major flooding resulted from a Gulf storm causing 14 hours of rain and at least 10 inches of rainfall throughout the county resulting in seven deaths and over one million dollars in damages. All bayous were over their banks.

1935 - Major flooding following 16.5 inches of rainfall caused eight deaths and over $2.5 million in property damages.

1973 - A catastrophic storm produced 15 inches of rain and caused an estimated $50 million in damages.

1979 – Tropical Storm Claudette produced the highest recorded rainfall event recorded in U.S history in a 24-hour period, dropping 43 inches of rain on Alvin, Texas, located 50 miles southeast of the reservoirs. If this event had occurred over the Addicks and Barker watersheds, their reservoir capacities may have been exceeded.

1981 - A tropical depression caused about two to 10 inches of rain to fall in the Houston area.

1983 – Hurricane Alicia dropped 15 inches of rain in eastern Harris County over a four-day period. The death toll from Alicia was 11, with nearly $500 million in damages. Due to its passage through Galveston and not Freeport, the impacts to Addicks and Barker Reservoirs were less pronounced.

1992 – A rain event caused the flooding of I-10 and one death. The upper Buffalo Bayou watershed accumulated nine inches of rain in six hours. This event, along with considerable rainfall over the previous three months resulted in record pools levels at both Addicks and Barker Reservoirs.

1994 – As a result of the combination of residual atmospheric moisture from Hurricane Rosa and low-level moisture from the Gulf of Mexico, heavy rainfall caused severe flooding over a 38-county area including Harris and Fort Bend Counties. This event caused 22 flood-related deaths and damaged 15,775 homes. FEMA declared 29 of the 28 counties to be disaster areas and approved $54 million in disaster assistance.

1998 – In September, Tropical Storm Frances produced over 10 inches of rain that fell on Harris County. The total damage caused by Frances to Harris, Galveston, Brazoria, and Matagorda Counties totaled $286 million. Two months later, in November, another heavy rain event produced about eight inches of rain over the Houston area.

2001 - Tropical Storm Allison hit the southeastern coast of Texas in early June and dropped almost 36 inches of rain over a five-day period resulting in 22 deaths and $5 billion in damages. The center of this event was 50 miles northeast of the Addicks and

Barker watershed and could have potentially exceeded reservoir capacity had the storm event occurred directly over the reservoirs.

2002 – In late October strong thunderstorms caused five to eight inches of rain to fall in a short time in areas west and north of Houston.

2005 - Hurricane Rita caused $159.5 million in property and crop damage in southeastern Texas in September. In Harris County, sustained wind gusts of 60 mph caused widespread power outages.

Table B-1. Top-Ten Recorded Flood Pools* with Reference Pools - Addicks Reservoir

Event	**Elevation[1]**	**Surface Area (Acres)**	**Capacity in Acre-feet[2]**	**% Capacity Max. Pool[3]**	**% Capacity GOL[4]**
Max. Pool[5]	108.00	16,199	199,643	100.0	100.0
GOL[6]	103.20	13,108	130,203	65.0	100.0
100yr Flood[7]	100.5	11,534	96,793	48.0	74.0
March 6 1992	97.64	9,321	66,930	33.5	51.6
April 30,2009	97.08	8,913	61,825	31.0	47.7
November 7, 2002	96.63	8,544	57,896	29.0	44.6
St Hwy 6 (edge)	96.16	8,157	53,971	27.0	41.6
November 17, 1998	95.88	7,939	51,719	25.9	39.9
October 23, 1994	95.81	7,888	51,165	25.6	39.5
May 15, 1968	95.34[8]	***	***	***	***
November 25, 2004	95.06	7,354	45,450	22.8	35.0
July 8, 2007	95.00	7,312	45,010	22.5	34.7
September 4, 1981	94.43	6,979	40,937	20.5	31.6
September 17, 1998	94.13	6,807	38,869	19.5	30.0
Conduit invert	67.50	7	35	0	0

*As of July 2009
1. Elevation of water surface is in feet-NAVD, Epoch 2001.
2. One acre-foot of water is one acre of water, one foot deep.
3. Percent of capacity of maximum possible pool before water spills around end of dam.
4. Percent of capacity of maximum possible pool contained within the government owned land (GOL).
5. Maximum possible pool before water spills around the end of the dam.
6. Maximum possible pool contained within the government owned land.
7. Pool that would result from a 100 year storm event over the entire watershed.
8. Original elevations of 100.03 ft M.S.L. adjusted to reflect NAVD 1988.

Despite numerous major flood events in the Metropolitan Houston area since 1963 when the remaining two conduits at each dam were gated, Addicks and Barker Reservoirs have not exceeded the limits of government-owned land in any flood event (Tables B-1 and B-2). However, had some of these events been centered over Addicks and Barker Reservoirs or the Upper Buffalo Bayou Watershed, the combined rainfall and runoff

could have resulted in flood pools exceeding the limits of government owned land and possibly exceeding the capacity of Addicks and Barker Dams.

Flood Risk Management. Addicks and Barker Reservoirs fulfill their mission by reducing the damage to property downstream of the dams caused by flooding. The USACE is responsible for estimating the value of the reservoirs, and one way to do so is by estimating the monetary amount of flood damage avoided by the presence and operation of the reservoirs. Table B-3 shows estimated flood damage prevented by operation of Addicks and Barker Reservoirs.

Table B-2. Top-Ten Recorded Flood Pools* with Reference Pools - Barker Reservoir

Event	**Elevation[1]**	**Surface Area (Acres)**	**Capacity in Acre-feet[2]**	**% Capacity Max. Pool[3]**	**% Capacity GOL[4]**
Max. Pool[5]	104.00	16,543	209,600	100.0	100.0
GOL[6]	95.00	12,036	82,921	40.0	100.0
100yr Flood[7]	95.50	12,149	88,962	42.0	100.0
March 6, 1992	93.60	11,491	66,489	31.7	80.2
November 7, 2002	93.24	11,404	62,368	29.8	75.2
W. Pkwy (edge)	93.21	11,396	62,026	29.6	74.8
November 18, 1998	92.31	10,987	57,934	27.6	69.9
July 9, 2007	91.85	10,736	46,935	22.4	56.6
November 28, 2004	91.69	10,699	45,225	21.6	54.5
April 20, 1991	91.34	10,425	41,539	19.8	50.1
May 1, 2009	91.21	10,347	40,189	19.2	48.5
May 15, 1968	90.60[8]	***	***	***	***
May 31, 1997	90.58	9,495	33,890	16.2	40.9
October 22, 1994	90.54	9,427	33,512	16.0	40.4
Conduit invert	70.2	0	0	0	0

*As of July 2009
1. Elevation of water surface is in feet-NAVD 1988, 2001.
2. One acre-foot of water is one acre of water, one foot deep.
3. Percent of capacity of maximum possible pool before water spills around end of dam.
4. Percent of capacity of maximum possible pool contained within the government owned land (GOL).
5. Maximum possible pool before water spills around the end of the dam.
6. Maximum possible pool contained within the government owned land.
7. Pool that would result from a 100 year storm event over the entire watershed.
8. Original elevations of 94.60 MSL adjusted to reflect NAVD 1988.

Table B-3. Estimated Flood Damage Prevented			
Fiscal Year	**Annual Flood Damages Prevented**	**Cumulative Total**	**Notes/Storm Event**
47-'78		$31,428,000	1973 Storm/other events
1979	$5,300,000	$36,728,000	Tropical Storm Claudette
1980	$501,000	$37,229,000	
1981	$17,733,000	$54,962,000	Tropical Depression
1982	$11,700,000	$66,662,000	
1983	$16,000,000	$82,662,000	Hurricane Alicia
1984	$0	$82,662,000	
1985	$18,800,000	$101,462,000	
1986	$25,500,000	$126,962,000	
1987	$34,792,000	$161,754,000	
1988	$0	$161,754,000	
1989	$60,434,000	$222,188,000	
1990	$27,960,000	$250,148,000	
1991	$22,420,000	$278,108,000	
1992	$397,600,000	$675,708,000	March 1992 Flood
1993	$306,100,000	$981,808,000	Tropical Storm Arlene
1994	$289,700,000	$1,271,508,000	
1995	$340,000,000	$1,611,508,000	October 1994 Flood
1996	$260,000	$1,611,768,000	
1997	$285,000	$1,612,053,000	
1998	$478,000	$1,612,531,000	
1999	$445,000	$1,612,976,000	
2000	$415,000	$1,613,391,000	
2001	$24,000,000	$1,637,391,000	Tropical Storm Allison
2002	$23,300,000	$1,660,691,000	
2003	$385,000,000	$2,045,691,000	November 2002 Flood
2004	$194,060,000	$2,239,751,000	
2005	$371,953,000	$2,611,704,000	Hurricane Rita
2006	$387,200,000	$2,998,904,000	
2007	$801,000,000	$3,799,904,000	
2008	$834,200,000	$4,643,104,000	Hurricane Ike

Appendix C: *Hymenoxys texana* Management Plan

(not completed)

Appendix D: Invasive Species and Ecosystem Restoration Plan

(not completed)

Appendix E: Historic Properties Management Plan

(not completed)

Appendix F: Review Process for Requests for Availability for Addicks and Barker Reservoirs, Harris and Fort Bend Counties, Texas

CESWG-RE 9 March 2009

MEMORANDUM FOR CESWG-DE (District Commander David C. Weston)

SUBJECT: Review Process for Requests for Availability for Addicks and Barker Reservoirs, Harris and Fort Bend Counties, Texas

1. The following process is used to evaluate proposed public development in Addicks and Barker Reservoirs. This process is used to ensure that appropriate District elements have the opportunity to provide input on potential impacts or requirements prior to approving or denying a proposed project in the reservoirs, and operates in the following manner:

a. An applicant submits a request to SWG-RE for use of project lands. SWG-RE requests the Applicant submit as complete a request as possible. Applicants may also submit preliminary conceptual plans or information for informal review and discussion.

b. Upon receipt of a formal, written application with supporting plans or other documentation, SWG-RE prepares a Request for Availability, and sends the memo to SWG-OD, SWG-PE-RE, and SWG-PE-R. The Request for Availability is a checklist that ensures that all areas of compliance and review are considered for the proposed action. In addition, all District elements should review the application for compliance with the project Master Plan.

c. SWG-OD reviews the request to determine if it will impact the function of the reservoirs and to determine if the request is an appropriate use of the reservoir lands. SWG-OD requests comments from SWG-EC if the project could impact one of the dams.

d. SWG-PE-PR reviews the request to determine if it would result in impacts to recreational, natural, cultural, or aesthetic resources, if it is an appropriate use of reservoir lands in reference to the Master Plan, and if NEPA documentation or mitigation is required. Since preservation of natural resources is a primary management goal for Federal lands that is incorporated into the Master Plan, projects that require mitigation will not be viewed favorably and Applicants will be encouraged to revise their plans to avoid impacts.

e. SWG-PE-R reviews the request to determine if a Department of the Army (DA) permit is required. If so, the Applicant is required to also apply for a DA permit, and final SWG-RE approval is contingent upon permit issuance.

CESWG-RE
SUBJECT: Review Process for Requests for Availability for Addicks and Barker Reservoirs, Harris and Fort Bend Counties, Texas

f. Upon completion of District reviews, each reviewing office responds in writing to the SWG-RE Request for Availability memo, stating whether or not there are objections, special requirements or avoidances, or a DA permit required.

g. If there are no objections or DA permit required, then SWG-RE issues an outgrant to the Applicant.

h. If there are objections, then the District review team meets to discuss and resolve or concur on the objections. If a DA permit is required, SWG-PE-R also coordinates the permit action with the District following standard Regulatory procedures. If internal consensus cannot be reached by the review team, then the project is referred to the Commander for decision.

i. If the team reaches a consensus, then the Applicant is informed of the decision and any project revisions or special conditions required for project approval.

j. If the Applicant cannot or will not revise their request as recommended by the District team, conduct the necessary NEPA documentation, acquire a DA permit, or conduct required mitigation, or if the District team concurs that the request is not appropriate use of reservoir lands, then the request is denied in writing by SWG-RE. Any decision to deny a request will be briefed to the Chief-OPS, Chief-PE and DE prior to notifying the Applicant.

2. If the Applicant has issue with the denial that cannot be resolved through further coordination with the District team, then the Applicant may present his or her case to the Commander, who has final decision making authority. In this event, the team is available to brief the Commander on their concerns regarding the action, and their reasons for denial.

ORLANDO ROSAS
Chief, Real Estate Division