Howard Bend Floodplain
Draft Environmental Impact Statement for Purposes of Section 10 of the Rivers and Harbors Act of 1899 and Section 404 of the Clean Water Act

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Executive Summary

ES.1 Project Description

This Draft Environmental Impact Statement (DEIS) has been prepared in consideration of past, present and reasonably foreseeable future actions that may occur within the Howard Bend floodplain area of St. Louis County, Missouri. The DEIS outlines how actions within the study area that pertain to Section 404 of the Clean Water Act (CWA) will be administered by the U.S. Army Corps of Engineers (USACE). The study area is located within the floodplain of the Missouri River and comprises approximately 8,624 acres of land and encompasses lands from the low bank of the Missouri River to the base of the surrounding bluff line. The study area begins at approximately Missouri River Mile (RM) 38.4 at the mouth of Bonhomme Creek and runs upstream to the Interstate 70 Blanchette Memorial Bridge at approximately RM 29. The boundaries fall within the city limits of the City of Maryland Heights with a small portion of the study area located in the City of Chesterfield. Most of the land use is agricultural; however, major developed features within the Howard Bend floodplain study area include:

- Interstate 70;
- Riverport Mixed Use Development;
- Harrah's Casino complex;
- City of Maryland Heights Expressway;
- Page Avenue Extension;
- Howard Bend Levee;
- The Missouri River Wastewater Treatment Plant;
- The Missouri American Water Treatment Plant;
- The City of St. Louis Water Treatment Plant; and
- Creve Coeur Airport.

Prominent natural features within the study area include the following:

- The Missouri River;
- Creve Coeur Lake Memorial Park (CCLMP);
- 1,852 acres of undeveloped open lands; and
- Fee Fee and Creve Coeur creeks.

ES.2 Purpose and Need

The Howard Bend EIS was promulgated by a series of regulatory and legal mandates related to Section 404 of the CWA and Section 10 of the Rivers and Harbors Act of 1899. The USACE has regulatory authority to administer permits that pertain to waters of the United States. This agency has issued permits on a project-by-project basis within the Howard Bend floodplain study area since 1984. This has resulted in 31 separate permit actions and a series of incremental, mitigative measures.

Legal Mandates

The preparation of this document was also undertaken to fulfill several legal mandates that require the preparation of an EIS. Each of these mandates and the needs they represent are described below.

Need: Assess Secondary and Cumulative Impacts. By mutual agreement between the USACE (St. Louis District), Missouri Department of Transportation (MoDOT), Federal Highway Administration (FHWA), and the City of Maryland Heights, this DEIS is being prepared pursuant to Subpart "r" of the Section 404 permit issued for the Page Avenue Extension in 1993.

However, this EIS will not reevaluate previously approved projects including the Page Avenue Extension project, the Riverport or Harrah's Casino levees, or any other previously approved or USACE-permitted projects located in or in proximity to the study area such as the Monarch-Chesterfield Levee project.

Potential Future Need: Provide Additional Flood Control. It is recognized that the ongoing construction of the 500-year +3 feet levee by the Howard Bend Levee District (HBLD) is a non-Federal activity that, to date, has not required the issuance of any Federal permit. Construction of the primary 500-year levee by the HBLD is an action anticipated to be completed in 2004. The presence of this levee, therefore, must be assumed as a base condition of the affected environment, and not part of the proposed action. However, as is discussed in Section 2.2.1, future phases of levee construction are being considered that may entail the construction of flank levees along Fee Fee and Creve Coeur creeks and would likely require the issuance of a Section 404 permit from the USACE. At this time, the construction of flank levees is an action that is a "reasonably foreseeable future" action and as such, will be evaluated in detail in this EIS. Therefore, in anticipation of this potential future action, this EIS will effectively meet the legal need for an EIS as stated in Paragraph 5.a. of the Riverport Consent Decree

Consequently, alternatives to these levee improvements, their varying degrees of interior flood protection, and their resultant effects will be given consideration in this EIS in a manner that is consistent with the NEPA process.

Area of Study

In consideration of the aforementioned issues and needs, the scope of this EIS will focus on the section of Missouri River floodplain between the Monarch-Chesterfield Levee (RM 38.4, Bonhomme Creek) north to I-70 at the Blanchette Memorial Bridge (RM 29.6) and will encompass Riverport and Harrah's Casino complex (Figure 1-2). Because the floodplain is the primary resource affected by the alternatives under study, the study area shall furthermore be limited to that area from the St. Louis County bank of the Missouri River to the base of the bluffs. The study area will include the Creve Coeur Creek valley to the intersection of Olive Boulevard with the proposed relocated Route 141 (Woods Mill Road), and Creve Coeur Mill Road. Although some agencies have commented that the USACE (St. Louis District) should extend the reach of this study to encompass a much larger region, the USACE believes that the study area, as defined, adequately gives consideration to cumulative impacts in a manner consistent with the intent of the regulatory and legal mandates presented.

ES.3 Alternatives

Based upon the legal mandates as set forth by the Page Avenue Extension 404 permit, the Riverport Consent Decree, and regulatory authority granted to the USACE to administer Section 404 of the CWA and Section 10 of the Rivers and Harbors Act of 1899, alternatives are being considered in this DEIS to the proposed action. The alternatives are (1) No Action (Alternative 1) or (2) the Special Area Management Plan (SAMP) (Alternative 2). The two alternatives are considered primary actions.

The No Action Alternative (Alternative 1), for purposes of this action, will be considered for permits under Section 10 of the Rivers and Harbors Act of 1899 and Section 404 under the CWA of 1977 as exists currently under the constraints of the USACE Regulatory Program. The No Action Alternative would entail continuing the current regulatory policy of reviewing permit applications on an individual, case-by-case basis under the current individual permit practices for permitting.

The SAMP (Alternative 2) would provide for the issuance of permits in accordance with a plan specifically developed to address the long-range resource protection of the Howard Bend

floodplain. The SAMP would provide guidance and regulatory administrative requirements for managing wetland and surface water resources in the Howard Bend floodplain. This would provide a more cohesive approach with respect to the conversion of waters of the United States as well as the mitigation of unavoidable adverse impacts. Permitting for projects that could potentially impact these resources will be covered under the provisions of a General Permit in a manner consistent with the SAMP. The SAMP will allow developers to plan with a higher level of predictability and assure resource agencies and other interested parties that individual and cumulative environmental impacts will be analyzed in the context of ecosystem needs. The lead agency responsible for the SAMP development for the Howard Bend floodplain is the USACE St. Louis District. The overall goal of the SAMP is to minimize impacts of future projects to aquatic resources in the Howard Bend floodplain and to develop a General Permit for specified types of permit actions that will streamline the permitting process. In addition to resource protection, the SAMP will incorporate the proposed goals and objectives of (1) the Future Land Use Plan as adopted by the City of Maryland Heights for the Howard Bend floodplain, (2) wetland protection and preservation, and (3) wetland mitigation.

Regulatory alternatives considered in this DEIS, therefore, meet a need to assert a more comprehensive and cohesive approach toward the regulation of waters of the United States within the Howard Bend study area, thereby avoiding the inadvertent effects of a case-by-case regulatory approach.

Other Reasonably Foreseeable Actions

A number of proposed improvements are planned within the Howard Bend floodplain study area. These improvements include:

- Future land use development;
- Future roadway development; and
- Stormwater management improvements and other miscellaneous improvements to the existing water and sewer treatment plants and Creve Coeur Lake Memorial Park.

This DEIS defines reasonably foreseeable future actions as those items either planned or formally adopted by the City of Maryland Heights or the City of Chesterfield through building or grading permits, zoning, comprehensive land use planning, or planned improvements by respective utility agencies. An overview of these major reasonably foreseeable actions is provided in Table ES-1.

Table ES-1. Reasonably Foreseeable Future Actions in the Howard Bend Floodplain

Description of Action	Purpose
Flank Levee systems for Creve Coeur and Fee Fee creeks	Enhance stormwater management control
Maryland Heights Expressway (MHE) Extension from Page Avenue to Olive Boulevard (four lanes expandable to six lanes)	Improve roadway linkage
Baxter Road Extension (I-64 to MHE)	Improve roadway linkage
Hog Hollow Road Relocation	Improve security at Missouri American Water Plant
MSD Plant Expansion	Expand treatment capacity at waste treatment plant to meet future needs of entire serviceable watershed
Build-out of City of Maryland Heights Future Land Use Plan for the Howard Bend Floodplain	Provide guidance for future development land use and economic development characteristics
Terra Vista Estates (City of Chesterfield)	Provide 32-unit residential subdivision
Mill Ridge Villas (City of Chesterfield)	Provide 46-unit residential town home development
Dredging of Creve Coeur Lake	Improve recreational value and flood storage of lake and compliance with Page Avenue 404 permit

The analysis of impacts from these reasonably foreseeable future actions, coupled with the impacts of past and present actions, provides a means to assess the cumulative effect of all actions on the natural and human environment of the Howard Bend floodplain study area.

ES.4 Environmental Setting

The Affected Environment section of this DEIS describes the existing environmental setting and constitutes the base line for which the impact of potential future actions will be assessed. The Howard Bend study area comprises approximately 8,624 acres. The study area is comprised of a variety of land uses, socioeconomic characteristics, and cultural, ecological, and water resources.

Existing Land Use

Predominant land use within the Howard Bend study area is comprised of dedicated green space, recreation areas, agricultural lands, offices, warehouses, and various other industrial uses. An overview of existing land use within the study area is provided on Table ES-2.

Table ES-2. Distribution of Existing Land Uses, 2002

Land Use	Acres	Percent
Agriculture	3,906.85	45.3
Parks and Recreation	1,960.13	22.73
Vacant	845.36	9.8
Utility and Public Service	609.65	7.07
Commercial	569.3	6.6
Transportation	542.01	6.29
Arts and Entertainment	116.73	1.35
Residential	39.44	0.46
Industrial	28.78	0.33
Accommodation/Hospitality	5.52	0.06
Total	8,623.77	100.0

Source: City of Maryland Heights Land Use and City of Chesterfield Zoning Map modified to reflect existing land use.

Of the 8,624 acres in the Howard Bend study area, 1,852 acres are located riverside of the levee. Residential use within the study area is comprised of approximately 22 detached residences and 282 apartment units. Most of these units are located in the extreme southern portion of the study area along Creve Coeur Mill Road. The total appraised value of property within the study area is $300,241,320, generating an estimated $8,477,550 in taxes annually. The preponderance of the property value and tax generation is attributed to the Riverport Development and the Harrah's Casino complex.

Cultural Resources

A total of 18 archaeological investigations have been conducted in the Howard Bend study area. Of these resource investigations, 16 sites were identified within the study area that were determined to be ineligible for inclusion on the National Register of Historic Places (NRHP) or were not formally evaluated for eligibility (Figure 3-4).

A survey of potential historic architectural resources was conducted as part of this study. Twelve locations were identified as containing buildings that appear to be at least 50 years of age. The preponderance of these architectural resources was old farmsteads. However, other resources could include the industrial building and structure associated with the Missouri American Water

Company Treatment Plant and would most likely include the City of St. Louis Howard Bend Water Plant.

Ecological Resources

The ecological resources constitute a variety of land cover types, mammals, birds and fish typically found within the Missouri River floodplain environs of east central Missouri. Many of these floodplains contain large expanses of open land dedicated predominantly to agricultural use and protected by levees, which provide various levels of flood protection. Additionally, large deciduous stands of trees and various wetland communities are found on the river side of these levee systems. The Howard Bend floodplain typifies this type of environment but also contains large expanses of non-agricultural and recreational open space as well as areas of existing office, warehouse, and industrial development. A summary of cover types by area for the entire Howard Bend study area is provided in Table ES-3.

Table ES-3. Summary of Land Cover

Land Cover Type	Acres	Percent
Cultivated Field	3,182	36.9
Developed Lands	1,284	14.9
Grassland	1,178	13.7
Deciduous Forest	934	10.8
Old Field	817	9.5
Wetlands	708	8.2
Water	516	6
Mud/Sand	4	<0.1
Total	8,623	100.0

Source: MACTEC, 2003.

Wetlands

This DEIS addresses the existence of wetland communities throughout the study area, defines their functional classification, and provides an in-depth view of the various resources and techniques utilized to inventory the wetland types within the Howard Bend study area. A total of approximately 708 acres of wetlands were identified within the Howard Bend study area and are presented in Table ES-4.

Table ES-4. Wetlands within the Howard Bend Study Area

Wetland Type	Acres	Percent
Palustrine Forested (PFO)	461.3	65.2
Farmed Wetland (FW)	95.2	13.4
Palustrine Emergent (PEM)	57.3	8.1
Palustrine Emergent/Scrub Shrub Complex (PEM/PSS)	39.2	5.5
Palustrine Scrub Shrub (PSS)	27.8	3.9
Palustrine Scrub Shrub/Forested Complex (PSS/PFO)	24	3.4
PEM/PSS/PFO	3.2	0.5
Total	**708.0**	**100**

Water Resources

Surface water resources within the study area consist of both flowing water systems (i.e., streams and rivers) and non-flowing systems (i.e. lakes and ponds). The dominant surface water resources within the Howard Bend floodplain include the Missouri River, Bonhomme,

Creve Coeur, Fee Fee and Louiselle creeks, (and their associated floodplains) and Creve Coeur Lake. Additional surface water resources include a 64-acre siltation basin, the lakes associated with the Crystal Springs Quarry Golf Course, and borrow areas for the construction of the 500-year levee that subsequently filled with water.

The predominant groundwater resource in the study area is the Missouri River alluvial aquifer, which is a widely used water source in the area. The alluvial aquifer is directly connected to the Missouri River in some areas.

Agricultural Resources

Detailed agricultural statistics were not readily available for use in characterizing the agricultural resources within the study area; however, agricultural land constitutes the predominant land use within the study area. Approximately 3,907 acres (or 45 percent) of land in the study area is used for agricultural purposes.

Prime farmland within the study area was quantified using soil types and slopes specified as prime by the USDA and NRCS. Prime farmland occurred within cropland, forested areas, old field areas, and pastures. Total prime farmland within the study area is estimated to be 3,303 acres.

ES.5 Summary of Environmental Impacts

The Howard Bend study area is an expansive area of the Missouri River floodplain that at one time provided a rich mosaic of bottomland forest, wetland, and open water habitats. As a result of a long-term trend analysis, it was determined that a long history of agricultural use has resulted in significant and long lasting effects on the function and value of the study area for wildlife (due to land cover alteration) and for flood storage (due to agricultural levee construction in the 1940s). In recent years (i.e., since 1985), the Howard Bend floodplain has demonstrated a notable and increasing shift in character as a result of the construction of large-scale developments (e.g., Riverport and Harrah's) and a significant expansion of the transportation infrastructure (e.g., Page Avenue and MHE). These improvements, coupled with a significant increase in flood protection due to the construction of the 500-year primary levee and the adoption of a Future Land Use Plan for the area by the City of Maryland Heights, and the stated intentions of the HBLD to construct an interior flank levee system, have set the floodplain on a course that will entail a continued alteration of its character to that of developed uses. In total, approximately 2,100 acres of additional lands may be subject to future development. Altered environmental conditions as a result of these actions will create a future study area that will be characterized by increased traffic, altered visual landscapes, and increased noise.

In spite of this prevailing trend toward future land development, the Howard Bend study area also entails the integration of planned land areas dedicated to open space, wildlife habitat, and recreation. CCLMP, coupled with the open lands of the Missouri Riverfront (i.e., lands outside the 500-year levee), account for approximately 4,200 acres that will remain undeveloped wildlife habitat or that will be available for recreational uses. These areas will provide for sustained recreational use, the maintenance of wildlife habitat, and continued wetland support functions. Due to the proximity of these areas to existing and future transportation facilities, these areas will, however, be subject to on-going visual and noise impacts.

Evaluation of the Regulatory Action Alternatives

A synopsis of the relative effects (consequences, including benefits) of each regulatory alternative under consideration are summarized in Table ES-5. In summary, the regulatory

actions under consideration represent differences in the policy and process by which potential projects affecting waters of the United States are evaluated for issuance of CWA Section 404 permits (see Section 2.0). Additionally, because the very intent and purpose of Section 404 of the CWA is to regulate waters of the United States, the resources that may be most affected by a change in the program are expectedly those that have some relationship to wetlands, aquatic ecosystems, or water quality.

Table ES-5. Summary of Impacts of the Regulatory Alternatives

Resource Area	Category	
	Case by Case Permitting (No Action)	Special Area Management Plan (SAMP)
Social/Economic Characteristics	No Impact*	No Impact
Land Use	No Impact	• Increased degree of habitat preservation • Requires dedication of land for wetland bank creation • Need for vegetative buffers
4(f)/6(f) Lands	No Impact	No Impact
Cultural Resources	Requires coordination with SHPO for compliance with Section 106 NHPA	Requires coordination with SHPO for compliance with Section 106 NHPA
Air Quality	No Impact	No Impact
Noise	No Impact	No Impact
Mineral Resources/Soils	Requirements for erosion control to be issued as conditions of permit	• Requirements for erosion control to be issued as conditions of permit • More comprehensive BMPs for erosion control can be utilized • More extensive buffer requirements will increase protection of receiving waters
Land Cover	• Management of remaining natural resources within CCLMP only; limited or little management of other areas • Mitigation for project impacts may be in small isolated areas and out of study area.	• Comprehensive management of remaining natural resources using buffers, tree mitigation and wetland mitigation policies • Mitigation (wetland, tree) will be required to occur within the study area
Wildlife	Management of remaining natural resources within CCLMP only; limited or little management of other areas	• Comprehensive management of remaining natural resources using buffers, tree mitigation and wetland mitigation policies • Ensures greater habitat availability and connectivity in the future
Sensitive Species	Management of remaining natural resources within CCLMP only; limited or little management of other areas	• Comprehensive management of remaining natural resources using buffers, tree mitigation and wetland mitigation policies • Ensures greater habitat availability and connectivity in the future
Wetlands	• Protection of 153 acres of wetlands in CCLMP • Isolated project-specific wetland mitigation • Potential loss from the Howard Bend ecosystem	• Protection of 483 acres of wetlands in CCLMP • Comprehensive and consolidated approach to wetland mitigation • Wetland mitigation to occur within the Howard Bend ecosystem

Table ES-5. Summary of Impacts of the Regulatory Alternatives

Resource Area	Category	
	Case by Case Permitting (No Action)	Special Area Management Plan (SAMP)
Surface Water Resources	• Isolated project-specific stream mitigation • Potential loss from the Howard Bend ecosystem	• Comprehensive and consolidated approach to stream mitigation • Stream mitigation to occur within the Howard Bend ecosystem
Ground Water Resources	No Impact	Greater degree of protection of groundwater recharge areas (wetlands)
Floodplains	No Impact	No Impact
Agricultural Resources	No Impact	No Impact
Special Waste	No Impact	No Impact
Visual Environment	Incremental degradation of visual environment due to reduced need for buffers, reduced level of comprehensive land planning	• Improved visual environment due to the use of landscape buffers around sensitive natural resources including protected wetlands, mitigation acres, agricultural fields, and golf courses. • Greater opportunity for comprehensive land planning in environmentally sensitive resources.
* "No impact" relates to the effects of the regulatory alternative rather than other non-Federal actions that may occur in the study area. Such actions in the study area may have an effect on the environment in such a way as to impact or alter the listed resources.		

Primary differences in the consequences of each of the regulatory alternatives include the following:

- **Wetland Preservation** – The SAMP alternative expands on the preservation of existing wetlands over that which exists currently. At present, a total of 153 acres of wetlands are preserved with CCLMP and other mitigation lands as compared to a total of 483 acres of wetlands that would be preserved under the SAMP alternative.
- **Comprehensive and Consolidated Mitigation** – Potential unavoidable adverse impacts to waters of the United States will be mitigated under each alternative. However, the SAMP alternative will ensure a more cohesive approach that will ensure that mitigation will take place within the study area (Case-by-Case Permitting has resulted in historical net losses within the study area). Additionally, the establishment of a wetland and stream bank(s) will ensure that the mitigation wetlands and streams are functional and well managed.
- **Water Quality Protection and Enhancement** – The SAMP alternative provides features that further ensure the protection and enhancement of water quality. These measures include the mitigative measures discussed above as well as added requirements for the establishment of vegetative buffers that will reduce erosion and pollutant loading to (or within) receiving waters.

  Additionally, the preservation of wetland habitats (under each alternative, but expanded upon by the SAMP) will also provide benefits related to the protection of groundwater resources (filtering function of recharge zones).
- **Wildlife Habitat Enhancement and Preservation** – The preservation and creation of wetland habitats and vegetative buffers in conjunction with the SAMP will provide added benefit to the wildlife and sensitive species within the study area via a more comprehensive approach to threatened and endangered species coordination, and by increasing available habitats and improving habitat connectivity.

ES.6 Areas of Controversy

There are currently no known areas of public controversy with respect to the proposed project.

ES.7 Issues to be Resolved

There are no known unresolved issues that would affect this project.

ES.8 Other Federal and State Actions (Permits)

The nature of the proposed action is one that relates to the policy and procedures of the USACE's Regulatory Program within the Howard Bend study area. As such, no specific permits are required to implement the selected alternative. Future actions taken within the limits of the study area shall be required to follow all appropriate procedures to obtain applicable permits from Federal, state, and local agencies including the USACE, MDNR, St. Louis County, the City of Maryland Heights, and the City of Chesterfield.

In most cases, potential unavoidable adverse impacts to waters of the United States will qualify for authorization under the provisions of the General Permit issued for the SAMP area.

Potential actions with impacts that exceed the limits prescribed under the General Permit shall require processing as an Individual Permit and shall require Public Notice Review.

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List of Abbreviations and Acronyms

AADT	average annual daily traffic
ACHP	Advisory Council of Historic Places
AIRS	Aerometric Information Retrieval System
APCD	Air Pollution Control Department
AQL	Protection of Warm Water Aquatic Life and Human Health – Fish Consumption
ARG	American Resource Group
AST	aboveground storage tank
ASTM	American Society of Testing Materials
BMPs	best management practices
BTG	Boating and Canoeing
Ca	calcium
CAAA	Clean Air Act and Amendments
CBB	Crawford Bunte Brammeier
CCLMP	Creve Coeur Lake Memorial Park
CEQ	Council on Environmental Quality
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CERCLIS	Comprehensive Environmental Response, Compensation, and Liability Information System
CERC/NFRAP	CERCLIS No Further Remedial Action Planned
CFR	Code of Federal Regulations
cfs	cubic feet per second
CLOMR	Conditional Letter of Map Revision
CO	carbon monoxide
CWA	Clean Water Act
cy	cubic yard
dB	decibel
dBA	decibels, time weighted average
dbh	diameter at breast height
DOH	Department of Health
DWS	Drinking Water Supply
EIS	Environmental Impact Statement
EWGCC	East-West Gateway Coordinating Council
FDA	Food and Drug Administration
FEMA	Federal Emergency Management Agency
FHWA	Federal Highway Administration
FIRMs	Flood Insurance Rate Maps
FPPA	Farmland Protection Policy Act
FTA	Federal Transit Administration
FTTS	FIFRA (Federal Insecticide, Fungicide, & Rodenticide Act)/TSCA (Toxic Substances Control Act) Tracking System
FW	forested wetland
GIS	Geographic Information System
gpm	gallons per minute
HBLD	Howard Bend Levee District
HEL	highly erodible lands
I-64	Interstate 64
IMOP	Inventory of Mines, Occurrences, and Prospects (MDNR)
IND	Industrial
IP	individual permit
IRR	Irrigation
LOMR	Letter of Map Revision
LUST	leaking underground storage tank
LWCF	Land and Water Conservation Fund
LWW	Livestock and Wildlife Watering
MASS	Missouri Agriculture Statistic Service
MCLD	Monarch-Chesterfield Levee District
MDC	Missouri Department of Conservation
MDNR	Missouri Department of Natural Resources
Mg	manganese
mgd	million gallons per day
mg/kg	milligrams per kilogram
mg/L	milligrams per liter
$\mu g/m^3$	micrograms per square meter
MHE	City of Maryland Heights Expressway
MOBIL6	USEPA Air Quality Model
MoDOT	Missouri Department of Transportation
MOP	Mines, Occurrences, and Prospects
MPO	Metropolitan Planning Organization
MSD	Metropolitan St. Louis Sewer District
msl	mean sea level
MWQS	Missouri Water Quality Standards
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act of 1969
NI	Not Inventoried
NPS	National Park Service
NO_2	nitrogen dioxide
NO_x	nitrogen oxides
NRCS	Natural Resources Conservation Service
NRHP	National Register of Historic Properties
NW	Non-Wetland
NWI	National Wetland Inventory
O3	ozone
PAH	polynuclear aromatic hydrocarbon
Pb	lead
PC	prior converted wetland
PCB	polychlorinated biphenyl
PCS	Permit Compliance System
PEM	palustrine emergent wetland
PFO	palustrine forested wetland

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PHEL	potential highly erodible lands
$PM_{2.5}$	particulate matter less than or equal to 2 microns in diameter
PM_{10}	particulate matter less than or equal to 10 microns in diameter
ppm	parts per million
PSS	palustrine scrub shrub wetland
RCRA	Resource Conservation and Recovery Act
RCRIS-SQG	Resource Conservation and Recovery Index System-Small Quantity Generator
RGL	Regulatory Guidance Letter
RGP	Regional General Permit
RM	River Mile
SAMP	Special Area Management Plan
SCS	Soil Conservation Service (now NRCS)
SCORP	Statewide Comprehensive Outdoor Recreation Plan
SHPO	State Historic Preservation Officer
SIP	State Implementation Plan
SO_2	sulfur dioxide
SQG	small quantity generator
SR	State Route
TAZ	Transportation Analysis Zone
TDS	total dissolved solids
TIP	Transportation Improvement Plan
TPH	total petroleum hydrocarbons
USACE	United States Army Corps of Engineers
USC	United States Code
USDA	United States Department of Agriculture
USDOI	United States Department of the Interior
USEPA	United States Environmental Protection Agency
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
UST	underground storage tank
VOC	volatile organic compound
WW	wooded wetland

1.0 Purpose of and Need for Proposed Action

1.1 Project Authority

The United States Army Corps of Engineers (USACE) in compliance with Section 10 of the Rivers and Harbors Act of 1899 and Section 404 of the Clean Water Act (CWA) is responsible for the regulation and protection of the Nation's aquatic resources. Authority to issue permits and regulate the discharge of dredge or fill material into waters of the United States applies to all waters of the United States, including navigable waters and wetlands.

Pursuant to Section 404 of the CWA [33 United States Code (USC) 1344], the Secretary of the Army, acting through the Chief of Engineers, has the authority to issue permits, after notice and opportunity for public hearing, for the discharge of dredged or fill material into the waters of the United States at specified disposal sites [see 33 Code of Federal Regulations (CFR) Part 323]. The selection and use of disposal sites will be in accordance with guidelines developed by the Administrator of United States Environmental Protection Agency (USEPA) in conjunction with the Secretary of the Army as published in 40 CFR Part 230. Jurisdictional limits of Section 404 encompasses the Howard Bend study area and applies to all waters of the United States including such features as Creve Coeur Lake, the Missouri River, and Fee Fee, Creve Coeur, Louiselle, and Bonhomme creeks, their tributaries, and floodplain wetlands.

Pursuant to Section 10, the USACE has the authority to regulate any work in, over, or under navigable waters that could affect the course, location, condition, or capacity of those waters. Examples of such regulated activities include piers, bulkheads, aids to navigation, and electric transmission lines. In the context of the area that is the subject of this study (i.e., the Howard Bend study area) limits of Section 10 authority extend from the channel of the Missouri River to the ordinary high water mark and end at the outlet of closure structures (e.g., flap gates, etc.) installed within the Howard Bend Levee. It does not extend to any waters of the United States inside either the Riverport or Howard Bend levees.

This project is also being undertaken in compliance with the National Environmental Policy Act of 1969 (NEPA, 42 USC 4321-4347). Specifically, Section 102 of that Act directs Federal agencies to prepare a detailed statement using a systematic, interdisciplinary process that assesses the effects of proposed actions by a Federal agency on the environment.

1.2 Project Background

1.2.1 Regional Development Background

The Missouri River floodplain is a valued resource that provides important flood storage and fish and wildlife habitat throughout much of its length. Use of the floodplain is varied, consisting of cultivated fields bounded by levees offering varying degrees of flood protection, open lands offering valuable fish and wildlife habitat, and relatively flat lands ideally suited to development. During the last 25 years, the Missouri River floodplain between approximate Missouri River Mile (RM) 27.0 (Earth City) and RM 47.0 (Chesterfield) in St. Louis County, Missouri, has been subjected to extensive levee construction and development for agricultural, industrial, and

commercial purposes. Examples of development activities occurring within this region of the Missouri River floodplain have included the following (Figure 1-1):

- **Earth City Development**. The development of Earth City began in 1972 with the construction of a 500-year levee and has entailed the construction of associated infrastructure (central four-lane roadway, secondary roadways, and drainage and utilities), and mixed uses including hotels, office buildings, and warehousing and distribution facilities.
- **Riverport/Harrah's Casino.** The Riverport and Harrah's Planned Development District is a mixed use development complex that consists of various opportunities for entertainment (Harrah's Casino and UMB Pavilion), offices, and hotels. Riverport is protected by a 500-year levee that was constructed in 1988, whereas the construction of the Harrah's Casino complex was accomplished with the construction of a 100-year levee in 1996.
- **Chesterfield Valley.** The Chesterfield Valley is a 4,700-acre area that has been characterized by extensive development over the last 25 years. This development has included a significant expansion of Spirit of St. Louis Airport, the construction of the St. Louis County Correctional Institution, and extensive commercial and industrial development that includes more than 250 businesses and over 3 million square feet of development. The Great Flood of 1993 breached the existing 100-year levee system and resulted in the evacuation of businesses and homes, the closure of Interstate 64 (I-64) for a 3-week period, the closure of Spirit of St. Louis Airport for 3 months, and the evacuation and relocation of inmates of the correctional facility. Economic damages attributable to the flood have been estimated at $200 million. In response, the Monarch-Chesterfield Levee District (MCLD) began construction of the 500-year Monarch-Chesterfield Levee.
- **Howard Bend Levee.** Flood protection of the Howard Bend study area was initiated in response to the 1993 flood with the repair and improvement of an existing earthen berm (agricultural levee) which provided varying levels of flood protection (approximate 20- to 40-year flood recurrence). Planning was initiated subsequent to the 1993 flood to develop a levee that provides 500-year flood protection. This project is being financed and constructed by local property owners through the Howard Bend Levee District (HBLD) without any Federal funding. The project is being undertaken in two phases: Part One and Part Two as follows:

  Part One of the overall flood protection program consists of a 500-year levee, which is nearing completion. When completed, this levee will extend from the City of St. Louis Waterworks in Howard Bend to the Riverport Levee. An application for a Conditional Letter of Map Revision (CLOMR) to the Federal Emergency Management Agency (FEMA) was submitted in December of 2000; a CLOMR was issued in June 2002. This CLOMR represents an interim condition for defining the 100-year floodplain until additional stormwater management and flood control improvements are implemented for Fee Fee and Creve Coeur creeks. This application requested a revision to the current floodplain mapping within the Howard Bend study area based on the flood protection provided by the 500-year levee. Part One would also include the construction of a 100-year plus 3-foot flood protection for the Howard Bend Levee in proximity to Harrah's Casino complex and is scheduled to be completed in 2004. A floodwall in conjunction with the levee at the Harrah's Casino complex is planned to be constructed in 2004.

  Part Two of the HBLD's flood control program will consist of the construction of interim flank levees along Fee Fee and Creve Coeur creeks as well as other ancillary stormwater management projects and is currently under design study. No funding is currently provided for Part Two.

1.2.2 Regulatory Background

Prior to February 1995, the regulatory responsibility for Section 404 permits in the Missouri River floodplain in St. Louis County, Missouri resided with the Kansas City District, USACE (Kansas City District). As of February 1, 1995, this responsibility was transferred to the St. Louis District, USACE (St. Louis District).

Kansas City District recognized the piecemeal development of the levee-protected areas within the Monarch-Chesterfield floodplain and placed a moratorium on individual developments, requiring the preparation of an environmental analysis. The St. Louis District continued this moratorium on development in the protected areas within the Monarch-Chesterfield floodplain until late 1996 and late 1997, at which time the St. Louis District issued Section 404 permits for the remaining wetlands within the levee-protected area based upon two consolidated permit applications and an accompanying environmental assessment. Large–scale mitigation was required as a condition of these permit actions. In 1997, the St. Louis District initiated an integrated feasibility study and Environmental Impact Statement (EIS) to evaluate the feasibility and impact of raising the Monarch-Chesterfield Levee. A Final EIS was released in 2002.

Other recently completed EISs within the Howard Bend study area have included the completion of an EIS for the Page Avenue Extension Project (Booker, 1992) for the Federal Highway Administration (FHWA) and Missouri Department of Transportation (MoDOT) and a Supplemental EIS for the Page Avenue Extension Project [National Park Service (NPS), 1995a]. The Kansas City District issued an accompanying Section 404 permit for the construction of Page Avenue Extension in 1995. Tables 1-1 through 1-3 present a summary of this and other permits issued by the USACE within the Howard Bend study area from 1984 to the present.

The issuance of the permit for the Riverport Levee and Page Avenue Extension projects involved legal challenges, which resulted in certain limitations and special conditions for future USACE's permit actions (see Section 1.3.2).

1.3 Project Purpose and Need

The alternatives considered in this EIS have been developed to meet several identified needs. Indeed, the needs within the study area are multi-faceted, including the USACE's need to assert its regulatory authority and the need to respond to various legal mandates. The basic purposes associated with each of these needs are provided in subsequent sections.

1.3.1 Regulation of Fill Activities within Waters of the United States (Regulatory Action Alternatives)

Past regulation of fill activities within the Howard Bend study area has been conducted on a case-by-case basis. This has been conducted in a manner consistent with that which is practiced by other USACE districts across the nation. However, this invariably has necessitated a project-by-project consideration of actions affecting waters of the United States and has resulted in a disjointed analysis of natural resource impacts in relation to Section 404 of the CWA (see Table 1-1). Difficulties associated with this include the following:

- *Incremental loss of wetland acreage and functional value.* The result of this narrow, focused approach is that wetland function and value are incrementally lost to the system, with little ability to assess impacts and preserve resources on a regional scale (i.e., within the Howard Bend area as a whole).

Table 1-1. Permits Issued within the Howard Bend Study Area (1984 to Present)

Applicant	Project Feature	Year Permit Issued	Type of Permit*	Impacts to Wetlands and Waters of the United States	Mitigation Requirements	Mitigation Status
Metropolitan St. Louis Sewer District (MSD)	Replace outfall to Creve Coeur Creek	1984	NW7	None	None	--
	MSD Treatment Plant Expansion	1985	IP	Hydraulically dredge 500,000 cubic yards (cy), fill 19 acres of adjacent wetland	Preservation: 2.7 acres existing forested and 3.3 acres existing emergent Enhancement/creation: 17.5 acres existing wetlands	Not complete
	New outfall structure and repair of scour hole	1995	IP	0.4 acre forested 0.5 acre emergent	0.9 acre natural revegetation	Complete
	34,000-foot force main	1997	NW12	0.03 acre palustrine emergent wetland (north of Missouri American Water Plant)	None	--
	Fee Fee Creek sanitary relief 2,700 feet	1999	NW12 NW13	0.03 acre	None	--
	Fee Fee sanitary relief 9,200-foot force main	1999	NW12	0.69 acre emergent wetlands impacted	None	--
Riverport	Discharge 53,600 cubic yards to construct levee, 17 cubic yards stilling basin and outfall structure, minor grading in wetland	1983	IP	4.92 acres (calculated)	Create 10 acres of wetlands. Incorporate 28 acres of wetland as retention	Complete
	Temporary haul road, widen Earth City Expressway	1987	Mod. to IP	1 acre, plus 0.5 acre temporary	Create additional 3 acres	Complete
Missouri American Water Company (formerly St. Louis County Water Company)	Lagoon construction	1988	IP	1.5 acres emergent wetland	1.5 acres	Complete (Note: mitigation area impacted by 2000 permit)
	Water treatment components within ownership boundary to meet USEPA standards	2000	IP	2.9 acres at four locations (1.9 acres farmed wetland, 1.0 acres emergent)	3.9 acres emergent wetlands	Completed Off-Site on Bonhomme Island

Table 1-1. Permits Issued within the Howard Bend Study Area (1984 to Present)

Applicant	Project Feature	Year Permit Issued	Type of Permit*	Impacts to Wetlands and Waters of the United States	Mitigation Requirements	Mitigation Status
Howard Bend Levee District (HBLD)	Creve Coeur Creek bank stabilization	1986	IP	200 feet, left descending bank	None	--
	Creve Coeur Creek bank stabilization	1987	IP	200 feet, right descending bank	None	--
	Creve Coeur Creek bank stabilization	1990	NW 13†	875 feet, four locations	None	--
	Levee maintenance (base widening/shaping)	1991	IP	3 acres emergent and forested wetland	3 acres natural revegetation	Unknown
	Creve Coeur Creek bank stabilization	1992	NW 13†	875 feet, four locations	None	--
	Levee repairs after 1993 flood	1994	GP	0.32 acre farmed wetland	0.32 acre (same site as 1991 permit)	Unknown
	Creve Coeur Creek bank stabilization	1994	NW 13†	875 feet, four locations	None	--
	Creve Coeur Creek bank stabilization	1996	NW 13†	875 feet, four locations	None	--
	Louiselle Creek ditch maintenance	1997	NW3	5,200 feet	None	--
Harrah's Casino Complex	Inland harbor with channel impacts for floating casino	1994	IP**	2.84 acres wetland 2.79 riparian trees	9.99 wetland 4.40 acres riparian trees	
	Relocate casino to 1,000 feet from river	1995	Mod. to IP**	4.80 acres wetland 0.74 acres riparian trees	13.99 wetland 4.02 riparian trees	
	Construct casino and move groundwater wells	1996	Mod. to IP	3.15 acres 1.65 acres (temporary) 0.74 acres riparian trees	11.93 wetland 4.02 riparian trees	Complete

Table 1-1. Permits Issued within the Howard Bend Study Area (1984 to Present)

Applicant	Project Feature	Year Permit Issued	Type of Permit*	Impacts to Wetlands and Waters of the United States	Mitigation Requirements	Mitigation Status
Missouri Department of Transportation (MoDOT)	Page Avenue Extension	1995	IP	2.90 acres scrub shrub, 8.40 acres emergent, 3.99 acres forested	8.99 acres scrub shrub, 27.30 acres emergent, 20.19 acres forested [to be incorporated with Little Creve Coeur Lake 6(f) mitigation]. Monitor for 20 years	Not complete, in progress
	Creve Coeur Creek siltation basin (64-acre excavation)	1998	Mod. to IP	None	Part of mitigation for Page Avenue Extension (located in mitigation land. Incorporate into Creve Coeur Lake Memorial Park (CCLMP).	Complete
Tree Court Golf	Golf course	1995	NW 14‡	None	None	--
Sportport	Bridge crossing	1998	NW 14	0.33 acre emergent wetland	None	--
AmerenUE Power Line	Linear project, 11.2 miles	1999	NW 12	Minor impacts	None	--
Creve Coeur Airport	Access road, tree clearing	1998	NW 14	0.1 acre emergent	None	--
City of Maryland Heights	Relocate existing Creve Coeur Mill Road	1999	NW 14	0.001 acre 0.04 acre (temporary)	None	--
St. Louis Rowing Club	Phase 2 Dredge Creve Coeur Lake	2002	NW 42	275 feet	None	--

* NW = nationwide; IP = individual permit; Mod. = modification.
† Creve Coeur Creek bank stabilization is at the same four locations.
** Permit issued, superceded by subsequent modification.
‡ Permit issued, but project never built.

Source: USACE, St. Louis District, Permit Files.

Table 1-2. Section 404 Permitting Summary in the Howard Bend Study Area

Type of Permit	Number	Total Impact
Individual Permit	14*	Wetlands: 53.81 acres Riparian habitat: 0.74 acre Stream channel: 400 feet
Nationwide	16†	Wetlands: 1.22 acres Stream channel: 8,975 feet
General Permit	1	Wetlands: 0.32 acre
Total	31	Wetlands: 55.35 Riparian habitat: 0.74 acre Stream channel: 9,375 feet

* Includes modifications to IPs.
† Includes all issued NW permits

Table 1-3. Mitigation Summary in the Howard Bend Study Area

Type of Mitigation	Applicant	Mitigation Acreage Requirement	Completed Mitigation	Unfulfilled Mitigation Commitment
Wetlands				
Preservation	MoDOT	None	NA	NA
	All Others	34.00	28.00	**6.0**
Enhancement and Creation	MoDOT	56.48	56.48 (in progress)	0
	All Others	52.05	31.23	**20.82**
Riparian Habitats				
	All Others	4.02	4.02	0
Total		**146.55**	**119.73**	**26.82**

- *Small, unconsolidated mitigation.* The mitigation of wetland impacts suffered a similar fate as direct wetland impact, as mitigation for many projects has been piecemeal and in some cases, ineffective. On a landscape scale, this results in a loss of functional value for the ecosystem. Additionally, in some cases, mitigation has not been implemented in a timely fashion. For example, a permit granted to the Metropolitan St. Louis Sewer District (MSD) for a proposed plant expansion contained a required condition to develop and preserve a wetland mitigation site. At present, the commitment to establish this mitigation area remains unfulfilled. This proposed mitigation site may also be subject to future impacts in conjunction with the need to further expand treatment plant capacity.
- *Inconsistent ownership and management of mitigation wetlands.* Independent mitigation of wetlands has typically been done on lands owned by differing landowners who have often taken a minimalist approach with regard to management of mitigation sites. This has, in most cases, resulted in wetland mitigation sites of poor quality that are reduced in their functional opportunity and effectiveness.

Regulatory alternatives considered in this EIS, therefore, meet a need to assert a more comprehensive and cohesive approach toward the regulation of waters of the United States within the Howard Bend study area, thereby avoiding the inadvertent effects of a case-by-case regulatory approach.

1.3.2 Legal Mandates

The preparation of this document is also being undertaken to fulfill several legal mandates that require the preparation of an EIS. Each of these mandates and the needs they represent are described below.

Need: Assess Secondary and Cumulative Impacts. By mutual agreement between the St. Louis District, MoDOT, FHWA, and the City of Maryland Heights, this EIS is being prepared pursuant to Subpart "r" of the Section 404 permit issued for the Page Avenue Extension. Specifically Subpart "r" states the following:

> *"In the event an extension of the new Earth City Expressway/Highway 141 is proposed that would tie into the Page Avenue Extension, you must prepare an EIS or assure that an EIS is prepared to assess the potential significant impacts to the Missouri River floodplain in St. Louis County that may occur if a road equivalent to Earth City Expressway or Highway 141 were connected to the Page Avenue Extension in the vicinity of River Valley Drive interchange."*

Of particular concern to the Kansas City District, as the Page Avenue permit was written, was the potential for induced development within the floodplain resulting from an increase in the roadway capacity of the City of Maryland Heights Expressway (MHE) connection with Page Avenue. Expansion of the through capacity of this intersection to four-lanes could conceivably result in greater development within the floodplain and, therefore, potentially greater impact to wetlands and other waters of the United States. Condition "r" was written as part of the USACE permit with the intent to address potential secondary and cumulative impacts to the Howard Bend floodplain resulting from increased access. The USACE interprets and enforces this condition as requiring assessment of the impacts to the Missouri River floodplain only within the Howard Bend floodplain in St. Louis County. Consequently, a central focus of this EIS, prepared in response to this requirement, is to assess potential secondary and cumulative impacts associated with induced development within the floodplain.

However, this EIS will not reevaluate previously approved projects including the Page Avenue Extension project, the Riverport or Harrah's Casino levees, or any other previously approved or USACE-permitted projects located in or in proximity to the study area such as the Monarch-Chesterfield Levee project.

Potential Future Need: Provide Additional Flood Control. It is recognized that the on-going construction of the 500-year +3 feet levee by the HBLD is a non-Federal activity, that to date, has not required the issuance of any Federal permit. Construction of the primary 500-year levee by the HBLD is an action anticipated to be complete in 2004. The presence of this levee, therefore, must be assumed as a base condition of the affected environment, and not part of the proposed action. However, as discussed in Section 2.2.1, future phases of levee construction are being considered that may entail the construction of flank levees along Fee Fee and Creve Coeur creeks and would likely require the issuance of a Section 404 permit from the USACE. Needs for the additional levee construction along these creeks arise from a desire to control interior flooding and promote economic development within the floodplain. At this time, the construction of flank levees is an action that is a "reasonably foreseeable future" action and as such will be evaluated in detail in this EIS. Therefore, in anticipation of this potential future action, this EIS effectively will meet the legal need for an EIS as stated in Paragraph 5.a. of the Riverport Consent Decree, which reads as follows:

> *"Should any person or entity apply for a USACE permit for, or initiate construction to build, an approximately 5-mile long levee extending from Riverport to Howard Bend and substantially along the alignment as indicated on Lahay Deposition Exhibit One or the functional equivalent thereof, invoking the Corp's jurisdiction under Section 404 of the CWA or Section 10 of the Rivers and Harbors Act of 1899, the USACE shall prepare an EIS regarding same if no other Federal agency with jurisdiction prepares an EIS."*

Consequently, alternatives to these levee improvements, their varying degrees of interior flood protection, and their resultant effects will be given consideration in this EIS as per the NEPA process.

1.3.3 Area of Study

The Missouri River and its floodplain have been subjected to extensive modification due to man's alterations. Most of the Missouri River floodplain has been extensively cleared and put into agricultural production. Extensive levee systems have also isolated much of the floodplain and wetlands from naturally occurring flooding cycles. The river itself has been extensively modified, beginning as early as 1884, when the Federal government (first under the Missouri River Commission and later under the USACE) was mandated to maintain a navigation channel by removing snags, deepening and straightening the river, and building flood control structures such as levees and reservoirs. The Missouri River Bank Stabilization and Navigation Project, constructed and maintained by the USACE has resulted in the reduction of surface water area of the Missouri River by as much as 50 percent between Rulo, Nebraska and St. Louis, Missouri (Missouri River Bank Stabilization and Navigation Project, Final Feasibility Report and Final Environmental Impact Statement, May 1981). In-channel islands have been nearly eliminated, chutes and sloughs have been closed off, and the connectivity of the river and floodplain has been drastically reduced. The upstream dams have reduced the natural flows of the river for purposes of navigation, and stabilization structures have provided a controlled navigable channel. However, these stabilization structures have also caused a major accretion of soil along the river, between dikes, and within river chutes and side channels (Missouri River Bank Stabilization and Navigation Project, Final Feasibility Report and Final Environmental Impact

Statement, May 1981). These conditions have led to an increase in agricultural land use within the floodplain, and in some locations, may increase the interest in floodplain urban development by providing local citizens with a sense of security that the river will not meander within the floodplain as it once did. The lower Missouri River floodplain, especially in St. Louis County, Missouri, from approximate river mile 27 to 47 has been affected by public and private levees.

This EIS is evaluating the impacts of the floodplain development in this particular section of the Missouri River floodplain. The primary focus of this EIS and, therefore, the Proposed Action, is to select the project alternative that provides the USACE the best means by which to fulfill its regulatory function under the Clean Water Act within the Howard Bend floodplain area. The focus of this analysis is accordingly, directed to the human and natural environment of the floodplain and the potential impacts of future development on those resources. The scope of this EIS will, therefore, focus on the section of the Missouri River floodplain between the Monarch-Chesterfield Levee (RM 38.4, Bonhomme Creek) north to I-70 at the Blanchette Memorial Bridge (RM 29.6) and will encompass Riverport and the Harrah's Casino complex (Figure 1-2). Because the floodplain is the primary resource affected by the alternatives under study, it shall furthermore be limited to that area from the St. Louis County bank of the Missouri River to the base of the bluffs. It shall, however, extend up the Creve Coeur Creek valley to the intersection of Olive Boulevard, the proposed relocated Route 141 (Woods Mill Road), and Creve Coeur Mill Road.

The USACE recognized that some actions considered in the cumulative impact analysis of this document may have effects on Missouri River flood elevations and consequently, may result in impacts to areas outside the designated study area. While these potential consequences are recognized in this document, they are appropriately not analyzed in detail, as these actions may not be subject to USACE authority or control, and are not associated with the resources of the immediate project area (i.e., that area that is the subject of the Federal action). The legal mandates outlined above, the fact that the Howard Bend Levee already exists, and the need to evaluate an area that is environmentally sensitive and under strong developmental pressures dictates a limited study area. The collaborative planning effort within this geographic area of special sensitivity has very limited impacts to the Missouri River outside of the identified study area.

Although some agencies have commented that the St. Louis District should extend the reach of this study to encompass a much larger region, the USACE believes that the project area, as defined, adequately gives consideration to cumulative impacts in a manner consistent with the intent of the regulatory and legal mandates presented. The USACE would be interested in participating with other resource agencies in a comprehensive study of the lower Missouri River as suggested by these agencies. That comprehensive study would be a daunting task, and it would be well beyond the authority and scope of this study. A task such as this could possibly be completed under a program similar to the Upper Mississippi River Environmental Management Program or like the Kansas City Districts Missouri River Fish and Wildlife Mitigation Project. If authorized by Congress, a comprehensive study of the lower Missouri River could be conducted. The Kansas City District is also modifying the Missouri River Master Manual for management of flows on the Missouri River for commercial and environmental purposes. The USFWS, under the Big Muddy Refuge, is also purchasing and developing up to 60,000 acres of Missouri River floodplain for fish and wildlife purposes. Programs with the U.S. Department of Agriculture through their Conservation Reserve Program and Wetland Reserve Program, and the MDC land acquisition and wetlands programs along the Missouri River are also providing needed habitat and floodplain wetlands.

U.S. Army Corps of Engineers
St. Louis District

Howard Bend Floodplain EIS

Legend

- Howard Bend
- Earth City
- Chesterfield Valley
- Riverport/Harrah's Casino Complex
- Municipal Boundary
- Major Expressway

- Study Area
- Interstate Hwy
- US Hwy
- State Hwy
- Railroad
- Road
- Water
- County Line

1:125000

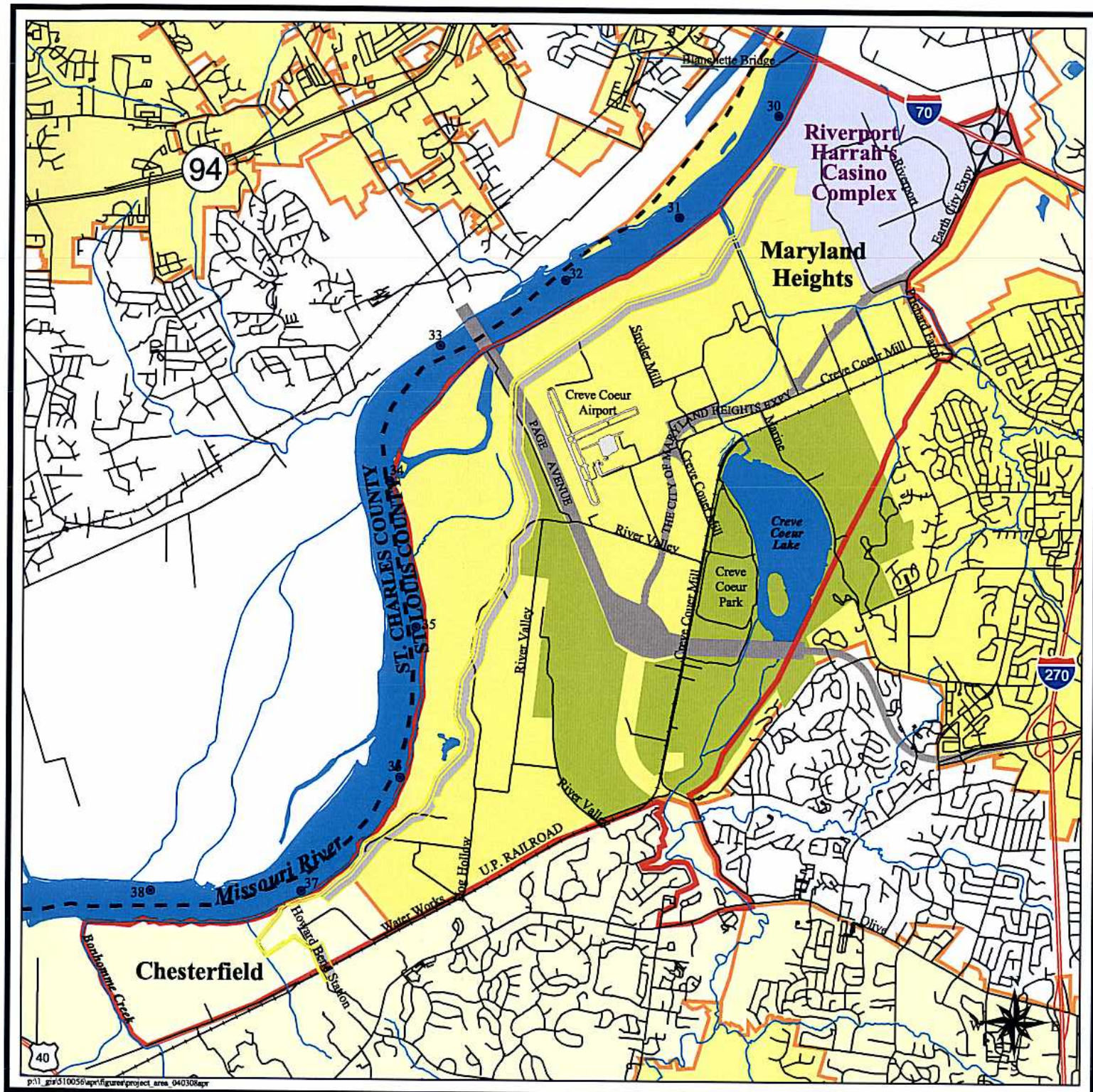
1 0 1 2 Miles

February 26, 2004

Figure 1-1
Regional Project
Setting

MACTEC, Inc.

p:\1_gis\510056\apr\figures\regional_setting_040226.apr



U.S. Army Corps of Engineers
St. Louis District

Howard Bend Floodplain EIS

Legend

- Riverport/Harrah's Casino Complex
- 500-Year Levee
- Newly Constructed Roadways
- Creve Coeur Park
- Municipal Boundary
- Study Area
- Interstate Hwy
- US Hwy
- River Mile
- Road
- Railroad
- Stream
- Water
- County Line

1:60000

0.5 0 0.5 1 Miles

March 8, 2004

Figure 1-2
Project Study Area

MACTEC, Inc.

2.0 Project Alternatives

The complexity of this project with respect to the project purpose and need, and the strong emphasis on cumulative impact analysis, necessitated a multi-tiered approach to formulate study alternatives. Two study alternatives were formulated to meet the regulatory mandate of the USACE, pursuant to its authority under Section 10 of the Rivers and Harbors Act of 1899 and Section 404 of the CWA. Such alternatives are considered to be "primary" alternatives that are being considered by the USACE as the lead Federal agency responsible for compliance under NEPA. In contrast, "secondary" actions are those considered by other parties (public or private) that are formulated to address the past, present or reasonably foreseeable future actions that respond to the local need for flood control, future economic growth and land use development, and future roadway improvements. Secondary actions are presented and described in this section and are in conjunction with the primary alternatives assessed in the Environmental Consequences (Section 4.0) of this document.

2.1 Primary Alternatives – Regulatory Alternatives of the Lead Agency

2.1.1 Alternative 1 – No Action (Maintain Existing Permitting Program)

This alternative consists of the No Action alternative under which permitting will be considered within the constraints of the existing USACE Regulatory Program. For this alternative, issuance of nationwide and individual permits will be consistent with current USACE policies and procedures as set forth in 33 CFR Parts 320-331.

The USACE has the responsibility to administer a permit program to regulate structures in navigable waters and the placement of dredged and fill material into waters and wetlands of the United States. Authority is given to the USACE under Section 10 of the Rivers and Harbors Act of 1899 and Section 404 under the CWA of 1977. Currently permit applications are processed on a case-by-case basis and are evaluated individually. As permit applications are received, each application is logged in and assigned to the appropriate USACE geographic project manager. In the case of proposed projects within the Howard Bend floodplain, permit applications go to the Missouri Team and are assigned to the project manager working south of the Missouri River. Such applications are queued in with all the other applications south of the Missouri River and evaluated in order, unless otherwise directed by USACE management. The USACE will review the project, determine if a permit is necessary, and determine the type of permit that can be used for the proposed action.

Projects having minor impacts to waters of the United States can be permitted by using existing nationwide permits. Projects qualifying for an existing nationwide permit, by meeting certain thresholds, must request authorization and verification from the USACE. Nationwide permit authorization can be issued in 30 to 60 days from receipt of the application. By comparison, activities that do not qualify for permitting under the nationwide program require that applicants follow the individual permit process. Application review requires the issuance of a public notice and a public interest review. The individual permit process is very time intensive and on average, will take 3 to 6 months.

Under the No Action alternative, the USACE will continue to operate the regulatory program using its normal procedure and will evaluate each permit application in the Howard Bend

floodplain on a case-by-case basis. Typical characteristics of the current regulatory program are presented in Table 2-1.

Table 2-1. Characteristics of Primary Alternatives

Primary Alternative	Public Interest Review	Evaluation Time (Days)	Capacity for Comprehensive Planning	Capacity for Consideration of Cumulative Impacts	Potential for Fragmented Mitigation	Management Responsibility for Mitigation Site
Case-By-Case Permitting						
Nationwide Permit	NO*	30-60	LOW	LOW	HIGH	LOW
Individual Permit	YES	90-180	LOW	LOW	HIGH	MEDIUM
Special Areas Management Plan (see Section 2.1.2)						
SAMP	YES*	30-60	HIGH	HIGH	LOW	HIGH

* The Public Interest Review is already complete in the development of the General Permit.

Under case-by-case permit evaluation, impacts will be examined individually for a given project apart from any long range aquatic protection plan and development plan. Each applicant has the right to submit permit applications independently, and there is no control as to when applications are submitted to the USACE. Consequently, the USACE assumes that the applicant has land ownership and can build the project and therefore, begins each evaluation in the order in which the applications are received. This process has, in some areas, resulted in a fragmentation of the wetland resource and incremental loss of wetland acreage and functional value. Small isolated tracts of mitigated wetlands are often created with no central management responsibility to establish and monitor the success of the mitigation. Mitigation is also often not timely, being constructed subsequent to wetland and stream impacts, and has often times been ineffective. Cumulative impacts are very difficult to assess for individual projects. Under this alternative, the City of Maryland Heights would also lack any control or approval authority for impacts to wetlands and waters of the United States within the Howard Bend study area.

2.1.2 Alternative 2 – Special Area Management Plan

Alternative 2 consists of the issuance of permits in accordance with the requirements and procedures of a Special Area Management Plan (SAMP). The intent of the SAMP will be to control and manage wetland and surface water resources in the Howard Bend floodplain and provide for a more cohesive approach to the conversion of waters of the United States, as well as the mitigation of unavoidable adverse impacts. Permitting of projects potentially impacting these resources shall be covered under the provisions of a General Permit and in a manner consistent with the SAMP.

The 1980 Amendments to the Coastal Zone Management Act define the SAMP process as

> *"A comprehensive plan to provide for natural resource protection and reasonable coastal-dependent economic growth containing a detailed and comprehensive statement of policies, standards and criteria to guide public and private uses of lands and waters; and mechanisms for timely implementation in specific geographic areas within the coastal zone."*

This process of collaborative interagency planning within a geographic area of special sensitivity is just as applicable in non-coastal areas. The USACE has developed a Regulatory Guidance Letter (RGL) 86-10 with a time extension in RGL 92-03 to address SAMPs. The USACE guidance indicates that a SAMP designed to reduce the incremental loss of wetland acreage and functional value will reduce the creation of small unconsolidated mitigation areas, and reduce inconsistent ownership and management of mitigation lands associated with case-by-case project review. The SAMP will also allow developers to plan with predictability and assure regulatory and conservation agencies and other interested parties that individual and cumulative environmental impacts will be analyzed in the context of the ecosystem needs. An ideal SAMP should also conclude in an end product that facilitates an abbreviated permit processing procedure that identifies restrictions for undesirable activities in the SAMP area.

The St. Louis District is the lead agency responsible for the Howard Bend floodplain SAMP development. Under this alternative, the intent is to establish an area-wide plan to minimize individual and cumulative impacts of future projects in the Creve Coeur and Fee Fee creeks watersheds located within the Missouri River floodplain known as the Howard Bend Bottoms. The goals are to provide natural resource protection, provide a practical and predictable process for development, and promote consolidated regional land use and environmental planning. The SAMP will reflect the City of Maryland Heights' goals of quality land use planning that incorporates environmental resources planning with flood protection and open space; stormwater management; traffic planning; sewer and water infrastructure planning; and parks, recreation and tourism planning. Similarly, the SAMP will also reflect the goals and objectives of the City of Chesterfield (as per their Comprehensive Plan) and St. Louis County Parks Department (CCLMP Master Plan).

SAMP Plan Features

- **Land Use Plan** – The SAMP shall incorporate the Future Land Use Plan recently adopted by the City of Maryland Heights. Rather than make parcel-specific land use recommendations, the Plan identifies a range of potential land uses allowable in each of five districts (see Section 2.2.5). The Future Land Use Plan also identifies developmental restrictions (zoning codes, development regulation, and building codes) to ensure quality, compatible relationships to other development, adequacy of public facilities, and environmental protection.

- **Wetland Protection and Preservation** – The SAMP alternative identifies lands that are to be provided an additional level of protection or restricted from development. The protected areas include lands located riverside of the 500-year levee, wetlands and creeks within the Creve Coeur Lake complex, and wetlands within the Little Creve Coeur Lake area (Figure 2-1). Wetlands within these areas may be limited from any future development and shall be subject to any pre-existing requirements for monitoring and maintenance (e.g., MoDOT mitigation lands). For wetlands outside of these areas, that cannot be avoided by development, the applicant will be required to mitigate by purchasing credits at one or more mitigation sites or mitigation banks. All unavoidable impacts to wetlands shall be subject to mitigation.

- **Wetland Mitigation** – For those wetlands that are not protected and are subject to potential impact, the SAMP will establish mitigation formulas based upon the functional assessment of the impacted wetlands or waters of the United States and the potential for mitigation at the mitigation sites or banks. On December 24, 2002, the USACE and USEPA published Mitigation RGL-02-02. This RGL is intended to improve the success of compensatory

mitigation and meet the nation's goal of "No Net Loss" with regards to wetlands. The new RGL clarifies the USACE position on a number of points including the following:

- increased use of functional assessment tools,
- improved performance standards, and
- a stronger emphasis on monitoring of wetland mitigation.

The new RGL encourages a watershed-based approach to aquatic resource protection, and fits in well with the SAMP proposal. The USACE has traditionally used "acres" as the standard measure for determining impacts and required mitigation for wetlands and other aquatic resources, primarily because useful functional assessment methods were not available. The USACE will now actively increase their reliance on functional assessment methods. USACE districts will determine, on a case-by-case basis, whether to use a functional assessment or acreage surrogates for determining mitigation and for describing authorized impacts. Districts will use the same approach to determine losses (debits) and gains (credits) in terms of amounts, types, and location(s) for describing both impacts and compensatory mitigation.

The St. Louis District will develop a functional assessment method for mitigation planning for the SAMP study area. The objective will be to provide, at a minimum, one-to-one functional replacement (i.e., no net loss of functions). Focusing on the replacement of functions provided by a wetland, rather than only calculation of acreage impacted or restored, in most cases will provide a more accurate and effective way to achieve the environmental performance objectives of the "No Net Loss" policy. In some cases, replacing the functions performed by one wetland can be achieved by another, smaller wetland; in other cases, a larger replacement wetland may be needed to replace the functions of the wetland impacted by development. Consequently, on an acreage basis, the ratio should be greater than one-to-one where the impacted functions are demonstrably high and the replacement wetlands are predicted to have a lower function. Conversely, the ratio may be less than one-to-one where the functions associated with the area being impacted are demonstrably low and the replacement wetlands provide higher function. However, in the absence of more definitive information on the functions of a specific wetland site, a minimum one-to-one acreage replacement may be used as a reasonable surrogate for no net loss of functions. These ratios can be higher based upon the wetland being impacted. Specific amounts and types of required mitigation will be identified, and rationale provided for acreage replacement and the factors considered when the required mitigation differs from the one-to-one acreage surrogate. If an acreage surrogate is used, the following minimum wetland mitigation ratios have been established within the St. Louis District:

Wetland Type	Replacement Ratio
Farmed Wetland	1:1
Emergent Wetland	1.5:1
Scrub shrub Wetland	1.5:1
Forested Wetland	1.5:1
Open Water	1:1

The SAMP will establish one or more mitigation sites or banks in accordance with RGL 02-2, other regulations or guidance, and the Federal Guidance for the Establishment, Use and Operation of Mitigation Banks (Federal Register, November 28, 1995). Compensatory mitigation for impacts will be required to occur at one of these pre-approved sites within the study area. The SAMP will identify a public or private entity who will administer the mitigation site or bank. Each mitigation site or bank will have a mitigation plan or banking prospectus to create a banking instrument as required in the Federal Guidance and will be created on

non-jurisdictional wetland sites, on hydric soils and supported by sufficient wetland hydrology. The SAMP will establish all appropriate specifications and requirements for mitigation site or bank construction, operation (i.e., debiting and crediting), management, and maintenance. It is anticipated that the mitigation sites or banks will be designed to establish a site having a mosaic of open water, emergent, scrub shrub, and forested community types to provide maximum wetland function and value. Acceptable trees include river birch, pin oak, white oak, swamp white oak, green ash, pecan, red oak, hackberry, and hawthorn. Within the Howard Bend floodplain, possible mitigation sites or bank locations are within the lower Creve Coeur Creek flank levee system, the north portion of Little Creve Coeur Lake, HBLD borrow area along Water Works Road, and HBLD borrow area riverside of the main stem levee. The potential service area for the mitigation sites or banks is the entire Creve Coeur Creek and Fee Fee Creek upland and floodplain watersheds in St. Louis and St. Charles counties that are adjacent to the Missouri River in the floodplain landscape. The mitigation sites or banks will be protected by a deed restriction, covenant of restriction, or conservation easement to allow uses and protect them in perpetuity.

- **Tree Replacement** – Tree mitigation will be provided for in accordance with the City of Maryland Heights' Landscaping Design Regulations (City of Maryland Heights, 2002). Tree preservation and replacement shall be in accordance with the provisions of Section 25-19.5 of Ordinance 2002-2120. Trees considered under this policy are those that exceed 6 inches caliper. Accordingly, tree replacement shall be on the basis of caliper (two for one, and one for one) depending on the location and size of the tree impacted. Trees shall be planted in accordance with an approved planting plan. Replacement species shall be native trees found in the region.

- **Cultural Resources Protection** – Cultural resource protection under the SAMP shall be in accordance with the provisions of Section 106 of the National Historic Preservation Act and Appendix C of the USACE Regulatory Program (33 CFR Part 325) to protect cultural resources. Recorded sites known to be eligible for listing on the National Register of Historic Places (NRHP) include both historic archaeological sites and architectural sites (see Section 3.2). Any Federally funded project or non-Federally funded project requiring the issuance of a Federal permit must comply with the provisions of Section 106 and shall entail a review of recorded information and a Phase I pedestrian survey of the potentially affected property. Potential impacts to any known or newly discovered NRHP-eligible sites shall be in accordance with the requirements of the State Historic Preservation Office of the Missouri Department of Natural Resources (MDNR) and the Advisory Council of Historic Places (ACHP).

- **Sensitive Species** – A sensitive species review shall be performed to identify any threatened and endangered species and critical habitat in the proposed study area. Coordination will include U.S. Fish and Wildlife Service (USFWS) and Missouri Department of Conservation (MDC) records and file review and will result in appropriate avoidance and mitigative measures should a listed species be found to utilize the site.

- **Vegetated Buffers** – Vegetative buffers are recognized as providing valuable function in terms of both water quality enhancement and wildlife habitat. In order to provide for these functions within the area covered by the SAMP, natural habitats or grass planted buffer strips shall be established according to the guidance in Table 2-2.

Table 2-2. SAMP Buffer Recommendations

Element	Buffer Requirement	Additional Controls
Underseepage Berm	Buildings – 50-foot setback Ditches – 100-foot setback	Grass buffer
SAMP Wetlands	100 feet	No mowing, buffer to consist of native plant species.
Mitigation Areas	100 feet	No mowing, buffer to consist of native plant species.
Golf Courses	50 feet	Grass buffer
Agricultural Field	50 feet	Grass buffer
Streams/Lakes	50 feet	No mowing, buffer to consist of native plant species.

- **Water Quality Protection** – Erosion control methods will be implemented during construction and permanent stabilization measures to minimize erosion, detain excess stormwater runoff, and prevent offsite sedimentation. Construction should be timed or phased to minimize exposed grading work. Protection measures can include fabric, stone, temporary or final seeding, straw bales or perimeter silt fences. All conditions of the MDNR water quality certification (included in the General Permit) must be met to ensure that the project has no adverse affects on water quality.

Permit Process – General Permit

The USACE will seek to develop a General Permit through the public interest review process by obtaining input from the resource agencies and all concerned groups and individuals. The General Permit will attempt to identify (through the SAMP, and avoidance and minimization) the wetlands or other aquatic resources that can be impacted and mitigated on a watershed basis within the SAMP study area. The General Permit will be signed by the USACE' District Engineer and will remain in effect for a period of 5 years and encompass the SAMP jurisdictional area. Upon expiration, the permit may be extended for another 5 years or if warranted, modified through a new public interest review. The General Permit will be coordinated with MDNR and incorporate any water quality certification for the proposed activities.

The USACE will issue the General Permit as part of the SAMP along with the City (Maryland Heights or Chesterfield) zoning/construction permits. Each development zoning/construction permit would be issued by the City on a project-by-project basis after a public notice announcement and a public interest review, and in accordance with the General Permit and SAMP.

Specific requirements of each permit application under the SAMP and zoning/construction permit shall be formulated in detail during the permit development process but are expected to include the following:

- Detailed site plan (showing site development, plan views, and cross sections);
- Wetland delineation map;
- Tabulation of acreage and type of wetlands impacted;
- Tree inventory and replacement plan;
- Stormwater management and interior drainage plan (construction plan approved by MDNR and MSD);
- FEMA floodplain compliance;
- Onsite cultural survey or letter from the State Historic Preservation Officer (SHPO) clearing the site;

- Onsite threatened and endangered species survey;
- Demonstration of compliance with buffer requirements;
- Water quality protection plan (erosion control plan);
- Infrastructure connections;
- Traffic analysis; and
- Statement of compliance with other local, state and Federal regulations.

The permit application review process will be performed by the USACE and the Cities of Maryland Heights or Chesterfield (as appropriate) and will include the following steps:

1. Complete Section 404 permit application sent to the USACE to determine if the proposed project fits the General Permit or would need to be evaluated under a special individual permit review.
2. Complete application sent to the appropriate City Planner, who would then review the completed application and recommend approval or denial to Planning Commission.
3. Department of Community Development issues a 30-day public notice to solicit comments regarding the proposed project.
4. After public hearing and the evaluation of comments, City Planning Commission makes final decision on zoning/construction development permit consistent with the General Permit and SAMP.

The SAMP permit instrument is a USACE Regional General Permit (RGP) that will be administered by the USACE with input and approval of zoning/construction permits issued by the City of Maryland Heights and/or the City of Chesterfield. The RGP permit will include any 401 water quality certification from MDNR. The permit package will authorize a construction period of 5 years and allow a permit extension not-to-exceed 5 years. The permit is transferable with property title transfer.

Upon project implementation, the developer will provide the USACE and the appropriate City as-builts drawings and monitoring reports (as necessary). These data shall be in a format that can be incorporated in the USACE and City of Maryland Heights' Geographical Information System (GIS). In the event of the denial of a given permit application, the developer has the right to appeal. A joint review by the USACE, City, and MDNR will be conducted.

2.2 Cumulative Impact Analysis (Secondary Actions)

In accordance with 40 CFR 1508.7, the assessment of potential secondary and cumulative impacts shall consider all appropriate "past, present, and reasonably foreseeable future actions" that may impact the environmental resources within the Howard Bend floodplain. With respect to reasonably foreseeable future actions, those considered are limited to projects that have been identified for the study area and those that have demonstrated some level of commitment by the project proponent (e.g., approved plan, commitments to mitigative measures, financial commitments to the project, expenditure of effort for preliminary designs, etc.). This assessment is provided in detail in Section 4.0 of this document. Past, present, and reasonably foreseeable future actions that will be considered in the assessment of cumulative impacts within the Howard Bend study area are summarized in Table 2-3. Past and present actions are illustrated in Figures 2-2 and 2-3.

Table 2-3. Summary of Past, Present, and Reasonably Foreseeable Future Actions Included in the Cumulative Impact Analysis

Timeframe	Description of Action
Past	❑ Page Avenue Extension ❑ Expansion of Creve Coeur Airport ❑ Riverport Development ❑ Harrah's Casino Complex ❑ Sportport ❑ Expansion of Missouri American Water Company Plant ❑ Expansion of the MSD Plant
Present	❑ Howard Bend 500+3 Levee (construction stage) ❑ MHE Extension to River Valley Drive (construction stage) ❑ Expansion of functional capacity of Page Interchange with MHE to accommodate four through lane capacity (construction stage)
Reasonably Foreseeable Future	❑ Howard Bend flank levee system for Creve Coeur, Fee Fee and Louiselle creeks ❑ MHE Extension south to Olive Boulevard ❑ Baxter Road Extension (Chesterfield Valley Spur) Connection ❑ Hog Hollow Road Relocation ❑ MSD Plant expansion ❑ Build Out of City of Maryland Heights Draft Land Use Plan ❑ Terra Vista Estates ❑ Mill Ridge Villas ❑ Dredging of Creve Coeur Lake

Alternatives have previously been considered and evaluated [either pursuant to NEPA, or Section 404(b)(1) of the CWA, or both] for each of the past and present actions. One exception, however, is that of the on-going improvements to the Howard Bend Levee. This action, being undertaken by the HBLD is being privately funded and will not require the issuance of a Federal permit (and is therefore, not subject to Federal control). In spite of this, the design of the improvements to the levee to provide for 500-year (+3 feet) protection has considered a number of alternatives. Features of the primary levee include the following:

1. Throughout much of its length, the primary levee has been designed and constructed on the identical alignment of the existing levee system. The existing levee system provided variable degrees of flood protection, estimated to range from a 20- to 40-year recurrence interval.
2. In two separate areas, for a total distance of 13,100 lineal feet the design and subsequent construction of the levee resulted in the relocation of the existing levee out of the existing floodway. As a result, the entire levee is now outside the FEMA floodway.
3. For the entire length of the project, the construction of the primary levee has effectively avoided impacts to waters of the United States.

During the design process, the HBLD initially believed that a 100-year levee design would be adequate. However, after the 1993 flood, the HBLD determined that developers in the St. Louis real estate market were demanding greater level of flood protection. Consequently, it became clear that the desire to attract high quality development necessitated a superior (500-year) level of flood protection and that a 100-year level of protection would inhibit development and compromise the quality of development that would be attracted.

Since the decision to build was not subject to permit, the HBLD felt that the 500-year levee was very much worth the additional investment in flood protection in terms of flood security and cost/benefit ratio.

Several actions are considered in conjunction with the cumulative impact analysis that are within the "reasonably foreseeable" future timeframe. Each of these actions and their associated reasonable alternatives are described below.

2.2.1 Interior Flood Control and Drainage System

At present, the interior stormwater drainage and conveyance system within the Howard Bend floodplain consists of a series of channelized streams and minor man-made ditches. Within the area protected by the 500-year HBLD Levee, these features consist of Creve Coeur Creek, Fee Fee Creek, and Louiselle Creek.

Stormwater runoff from the intensely developed upland watersheds of each of these creeks is conveyed to the floodplain and ultimately to the Missouri River. Low levees (i.e., "flank levees") that were constructed in the 1940s and 1950s along these creeks provide overbank flood protection from an approximate 10- to 20-year storm event. However, larger storm events (i.e., 50- to 100-year recurrence interval) often result in extensive flooding of low-lying lands within the floodplain. In fact, in response to some high intensity storm events, runoff patterns can be quite unusual. Indeed, under such conditions runoff from the steeper Fee Fee Creek watershed reaches the confluence of Creve Coeur and Fee Fee creeks and flows upstream into lower Creve Coeur Creek and subsequently, into Creve Coeur Lake.

Primary areas that provide detention and storage of stormwater include Creve Coeur Lake, the Creve Coeur Lake sedimentation basin, depressional areas such as Little Creve Coeur Lake, and to a lesser extent, a variety of smaller, predominantly man-made ponds and basins. Creve Coeur Lake provides about 7.8 feet of temporary storage (2,340 acre-feet) above normal pool before park beaches, boat ramps, trails, and Marine Avenue are impacted.

Potential future improvements in interior drainage and flood control are being considered by the HBLD as part of its long-term planning process. These improvements (considered to be Phase III of HBLD's overall flood protection and stormwater control program) are intended to provide a centralized conveyance and detention system within the study area that will diminish interior flooding problems and support future development. Several alternatives are analyzed in this EIS to facilitate the cumulative impact analysis of this reasonably foreseeable future action:

1. No flank levee improvement (No Action);
2. Alternative A – Gated Discharge to Missouri River; and
3. Alternative B – Gated Discharge at Creve Coeur Creek/Fee Fee Creek Junction.

Characteristics of each of these alternatives are presented in Table 2-4 and are described in the following sections.

Table 2-4. Summary of Flank Levee Alternative Characteristics

	Existing Conditions	Plan A – Gated	Plan B – Open
Acreage within HBLD	6,470	6,470	6,470
Lands Dedicated to Flood Protection (acres)	530	640	570
Lands Subject to Flooding (acres)	2,370	1,810 – 1,900	1,830 – 1,920
Developable Property (acres)	1,030	590 – 650	660 – 730
Volume of Earth Cut (cubic yards)	0	1,744,370	418,000
Volume of Earth Filled (cubic yards)	0	156,510	159,230
Underseepage Berm (acres)	230	230	310
Estimated Cost	--	$25.9 M	$25.1 M

Source: Horner & Shifrin, 2003.

2.2.1.1 No Flank Levee Improvement

Improvements to the flank levee systems along Fee Fee and Creve Coeur creeks are a central feature of any effort to provide additional interior drainage and flood protection within the northern portion of the Howard Bend floodplain. Under this alternative, no such improvements would be made. The Howard Bend 500-year levee will provide protection from Missouri River flooding, but under flood conditions, the gated outlet structure of Creve Coeur Creek at the river will be closed, thereby retaining interior water for a longer duration.

Ponding will also continue to occur in the floodplain adjacent to the creeks, and under the conditions resulting from a 100-year storm, as much as 2,400 acres would remain flooded. Sources of this flood water would come from upland runoff and subsequent overbank flooding of the creeks, coupled with poor interior drainage. Additionally, in response to high-intensity rainfall events, stormwater carried by Fee Fee Creek would continue to back up into Creve Coeur Lake.

2.2.1.2 Flank Levee Alternative A – Gated Discharge at Missouri River

This alternative is characterized by improvements to the flank levees along Creve Coeur, Fee Fee and Louiselle creeks to provide 100-year interior flood protection with a gated outlet to the Missouri River. Primary elements of the improvements would include constructing flank levees along Creve Coeur and Fee Fee creeks to provide 100-year protection and to accommodate the required interior flood storage (Figure 2-4). Cross-sections of the flank levee systems would vary from 250 feet wide to 750 feet wide (outside to outside toe). Additional system features include increasing the capacity of the gated outlet structure and providing a pump station at the Missouri River to pump out interior water at times when the Missouri River is at flood stage and the gate structure is closed. Interior ponding areas outside the flank levee would be necessary to store local runoff until pumping could effectively remove it from the system. Depending upon stormwater conditions, it is estimated that the pumping capacity at this location would need to be up to 600 cubic feet per second (cfs). A variety of options for localized stormwater control and management will be implemented as a secondary drainage system in conjunction with specific site planning and land use development. A number of these options are identified in Section 2.2.1.4. The 100-year flank levees along Creve Coeur and Fee Fee creeks and the drainage channel would reduce the 100-year floodplain of these creeks and allow more areas to be developed.

Many final design details of the flank levee system have not yet been developed. However, according to discussions with the HBLD, the interior of the flank levee system will be constructed by excavation of areas adjacent to the existing creeks as is illustrated in Figure 2-4. Setback distances from the creek will vary, allowing for some preservation of the riparian corridor. Additionally, the existing channel would remain largely intact and would convey normal creek flow. Under Alternative A (gated discharge at the Missouri River), much of the lands within the flank levee system would be maintained in a condition that allows for attenuated conveyance of stormwater. However, because this flank levee alternative is primarily designed to accommodate flood storage (lower Creve Coeur Creek, Fee Fee Creek), some limited areas may also be allowed to redevelop wooded plant communities (e.g., scrub shrub and forested wetlands) in the areas between the levees with the understanding that the area cannot be allowed to accumulate silt resulting in significant displacement of stormwater storage

2.2.1.3 Flank Levee Alternative B – Gated Discharge at Creve Coeur Creek/Fee Fee Creek Junction

This alternative is characterized by the development of a flank levee system that provides 500-year flood protection with a permanently open discharge connection between the Missouri River and Creve Coeur Creek. The existing closure structure would be removed from the levee along the Missouri River, allowing free discharge that Missouri River flood water can enter lower Creve Coeur Creek and Fee Fee Creek during high river stages. Under this plan, flank levees along lower Creve Coeur Creek and Fee Fee Creek would be constructed such that protection from a 500-year flood frequency event would be provided (Figure 2-5). This 500-year flank levee system would extend from the Missouri River to the bluff line. Conveyance, not storage, would dictate the width of the lower Creve Coeur and Fee Fee creeks. The width of the proposed flank levee systems between the outside toes would vary from approximately 250 to 450 feet. A new gated structure would be constructed to control discharge from upper Creve Coeur Creek at its junction with lower Creve Coeur Creek (also Fee Fee Creek junction) to prevent flood water from backing up into the upper Creve Coeur Creek system. A pump station would also be required at this location to control interior drainage and to facilitate the discharge of interior Creve Coeur Creek water to the Missouri River. A smaller pump station with a capacity up to 500 cfs would be required to serve the Creve Coeur Creek watershed. As in Alternative A, a gated structure (flap gate) would also be utilized on Louiselle Creek near its confluence with Fee Fee Creek. There is an existing gated structure currently in place at the confluence of Louiselle and Fee Fee creeks.

Many final design details of the flank levee system have not yet been developed. However, according to discussions with the HBLD, the interior of the flank levee system will be constructed by excavation of areas adjacent to the existing creeks as is illustrated in Figure 2-5. Setback distances from the creek will vary, allowing for some preservation of the riparian corridor. Additionally, the existing channel will remain largely intact and convey normal creek flow. A new channel would be constructed within the interior of the flank system to convey normal creek flow. Under this alternative, most of the land within the flank levee system would be maintained in a condition that would sustain flood conveyance. Consequently, while herbaceous vegetation would be acceptable, woody vegetation would have to be managed to prevent blockage or significant impediment to stream flow.

2.2.1.4 Other Stormwater Improvement Options

Both flank levee alternatives may include a number of secondary improvements associated with stormwater conveyance to the primary systems of Creve Coeur and Fee Fee creeks. Specific hydraulic characteristics and geographic requirements of these improvements are presently undetermined due to the uncertainty of future land use improvements. These options are to implement minor, localized stormwater control associated with future development. Therefore, the requirements will be dictated by the type and character of future land use and site planning considerations, as well as overall stormwater management policies to be set forth in conjunction with the City of Maryland Heights, City of Chesterfield, HBLD, and MSD. These secondary options may include:

- Widening of Creve Coeur Creek from the outlet structure of Creve Coeur Lake to the junction of Fee Fee Creek to a total width of 50 feet between the inside toes of the flank levee banks. (The existing channel is approximately 33 feet in width.)
- Develop berms along Creve Coeur Mill Road on the west side of Creve Coeur Lake and along Marine Avenue east of Creve Coeur Lake to reduce flooding along Marine Avenue and adjacent ground and to increase storage volume of the lake.

- Develop a ditch system between Little Lake and Creve Coeur Creek. This is not likely to require a berm or a levee and may be accomplished with a large, flat bottom ditch.
- Raise the existing Louiselle Creek flank levees by up to 1 to 3 feet in specific locations. This improvement is contingent upon whether the existing culvert will remain in place or be redesigned and upgraded at Creve Coeur Mill Road.

2.2.2 MHE Extension South to Olive

Long-term transportation planning within the City of Maryland Heights has identified a need to improve the roadway connection between the newly constructed Page Avenue Extension and Olive Boulevard. At present, the City is undertaking the design and construction of the MHE, a four-lane roadway extending approximately 2.9 miles south from the Earth City Expressway at I-70 to River Valley Drive. This roadway facility is being constructed to a four-lane section but has sufficient right of way for its potential future expansion to six lanes. Currently, two through lanes with associated turn lanes are planned to be constructed from River Valley Drive south to the entry and exit ramps on the south side of Page Avenue. The new roadway has two bridges, a crossing of Fee Fee Creek south of the existing Casino Center Drive and a bridge over Creve Coeur Creek approximately 1,400 feet west of the intersection of Marine Avenue and the new MHE.

Concurrently, MoDOT has conducted preliminary studies (including the preparation of an Environmental Assessment) for the relocation of Route 141 from Ladue Road, north to Olive Boulevard and connecting to Creve Coeur Mill Road approximately 1,500 feet north of Olive Boulevard. The planned improvement for the relocated Route 141 is for a four-lane divided roadway with a single point diamond interchange at Route 141 and Olive Boulevard. Any future roadway improvements from the north would most likely connect to the planned future interchange of Route 141 and Olive Boulevard. In the absence of a four-lane connection between Olive Boulevard and Page Avenue within the Howard Bend floodplain, traffic from south and west St. Louis County that is destined for the Riverport/Harrah's area or I-70 is forced to use Creve Coeur Mill Road or existing I-270. This results in increased congestion on these existing roadways and deterioration in the level of service due to insufficient capacity during peak traffic periods.

In order to address this need, the City indicated that it proposes to design and construct a four-lane connector roadway (expandable to six lanes) from Olive Boulevard, extending parallel or along a portion of Creve Coeur Mill Road, to Page Avenue Extension (Figure 2-6). This action will also entail an expansion of the through capacity to four lanes up to River Valley Drive (currently being constructed with two through lanes and two turning lanes from River Valley Drive to Page Avenue). The intended timeframe for this proposed improvement is approximately between 2017 and 2022 given current funding forecasts. The typical cross section of such a roadway is illustrated in Figure 2-7. As is shown in Figure 2-6, the location is generally fixed in the vicinity of Page Avenue as it would connect at the existing interchange and would extend south along a 660-foot reserved transportation corridor through the Page Avenue mitigation lands. However, further south the precise location is presently undetermined as there are several conceptual options (Options 1 through 5) that extend up Creve Coeur Creek valley to Olive Boulevard. These five conceptual alignments share a number of common layout and design characteristics:

- Each alignment connects to the proposed single point interchange of Olive Boulevard and Route 141;
- Each alignment contains a bridge over the existing Union Pacific Railroad tracks and Creve Coeur Creek; and

- Each alignment contains a second crossing of Creve Coeur Creek approximately 1,200 feet north of Olive Boulevard.

However, each alignment is different in geometry, length, length of bridge, and length of roadway. Figure 2-6 provides a corridor area in which any of the five options may be developed. It is important to note that the conceptual corridor band varies in width from 155 feet to 900 feet. However, the actual roadway right of way required would only be a maximum of 200 feet.

Table 2-5 provides an overview of each conceptual alignment in terms of length of roadway, length of bridge structure, and estimated construction costs in 2003 dollars.

Table 2-5. Future MHE Extension – Page Avenue to Olive Boulevard

	Option 1	Option 2	Option 3	Option 4	Option 5
Project Length (feet)	8,687	8,793	8,898	9,212	8,746
Number of Lanes	6	6	6	6	6
Total Length of Bridge (feet)	3,740	3,860	2,540	2,252	3,514
Total Area of Bridge (square feet)	457,178	457,154	301,431	265,640	414,652
Bridge cost	$29,716,570	$29,715,010	$19,593,015	$17,266,600	$26,952,380
Total Length of Roadway (feet)	4,947	4,933	6,358	6,960	5,232
Total Roadway Cost	$10,046,617	$9,467,861	$11,097,461	$11,721,838	$10,987,200
Right of Way Cost	$882,000	$884,000	$1,260,000	$3,096,000	$832,000
Grand Total (2003)	$40,645,187	$40,066,871	$31,950,476	$32,084,438	$38,771,580
Grand Total (2010) at 4% Increase	$53,486,294	$52,725,269	$42,044,647	$42,220,932	$51,020,754
Grand Total (2018) at 4% Increase	$73,199,686	$72,158,172	$57,541,003	$57,782,261	$69,825,425

Single point interchange at Olive to be built by MoDOT.

Bridge structure lengths vary by alignment depending upon the extent of Creve Coeur Creek floodway to be traversed. One option would utilize a reserved corridor for a planned residential community approximately 1,200 feet north of Olive Boulevard. The City of Chesterfield requested that the proposed Terra Vista Estates development reserve a corridor in this area in anticipation of the future roadway improvement. This corridor was contingent upon zoning approval and has been recorded as a condition of the site development plan record of approval.

Detailed descriptions of the alignments are not provided at this time because of the anticipated long-term time horizon for this improvement. Changes in land use, ultimate final design of the Route 141/Olive Boulevard interchange, and natural resource systems associated with the Creve Coeur Creek system may well warrant a modification in design criteria and ultimately, the final constructed alignment. To select a final preferred alignment at this time would be premature and could potentially encumber property that may or may not be impacted until 2017 or beyond.

2.2.3 Other Roadway Improvements

2.2.3.1 Baxter Road Extension (Chesterfield Valley Spur) Connection

Long range transportation planning (i.e., year 2020) by the City of Chesterfield has identified the need to construct a new road to help address the future traffic need projected in the newly Proposed Conceptual Land Use Plan. This proposed improvement is currently under consideration by the City of Maryland Heights for adoption into its future transportation plan. The facility is proposed to be constructed in about 5 years and would connect the Chesterfield Valley to the Howard Bend study area via a two-lane roadway extending from the I-64/Baxter Road

intersection, to the proposed MHE between Page Avenue and Olive Boulevard (Figure 2-8). After bridging Bonhomme Creek, the proposed roadway would become aligned parallel to the Union Pacific Railroad and extend approximately 4.6 miles in total length along what is known as Waterworks Road.

Preliminary traffic studies and long range forecasts demonstrate that such a facility could carry between 12,000 and 15,000 vehicles per day (AADT—average annual daily traffic) if connected to the MHE. The road is planned as a minor arterial road which will augment the urban principal arterial system (I-64, Route 141–Woods Mill, Route 340–Clarkson-Olive Boulevard).

No engineering studies have been conducted for the Baxter Road Extension to determine alignments or right of way, but it is thought that it will be initially constructed as a two-lane facility (upgradeable to four lanes). The roadway would also likely be designed to incorporate pedestrian and bicycle facilities to connect Chesterfield Valley to the Katy Trail.

2.2.3.2 Hog Hollow Road Relocation

The relocation of Hog Hollow Road in the vicinity of the Missouri American Water Company (formerly St. Louis County Water Company) is a reasonable foreseeable future action in light of the current emphasis on Homeland Security. This action is viewed as needed to increase security logistics and control at the facility. A relocated Hog Hollow Road would also provide more direct access for motorists in the southwestern portion of the study area to Olive Boulevard. At present, Hog Hollow Road extends north to northeast from Olive Boulevard to River Valley Drive; as a result, it divides the property of the American Water Company facilities. The water plant treats Missouri River water and distributes the potable water to its customers in west St. Louis County. The plan would be to relocate an approximately 0.9-mile section of Hog Hollow Road which bisects the water plant operation and relocate it to the east of the water plant while maintaining the connection to River Valley Drive (see Figure 2-8).

2.2.4 Expansion of MSD Plant

MSD owns and operates the Missouri River wastewater treatment plant in the central portion of the study area north of Creve Coeur Mill Road at Marine Avenue (Figure 2-9). This plant serves approximately 150 square miles of Maryland Heights, Chesterfield, and parts of Creve Coeur, Hazelwood, Bridgeton, St. Ann, Ellisville, Ballwin, and unincorporated St Louis County.

This facility is designed to treat approximately 28 million gallons per day (mgd) of wastewater and is currently at capacity. During periods of peak demand, often correlating with significant rainfall events, the plant has treated up to 80 mgd. Currently, the capacity of the existing facility is a factor limiting further development.

MSD has conducted a preliminary study to increase plant capacity to 39 mgd. The funds necessary for this improvement, however, have not been secured. It is anticipated, however, that expansion of the plant will occur in the reasonably foreseeable future as this additional capacity will be a prerequisite to further development within the study area. Probable areas for plant expansion include a 44-acre area located immediately south of the existing plant (see Figure 2-9)

2.2.5 Build Out of City of Maryland Heights Final Draft Howard Bend Future Land Use Plan

In conjunction with its ongoing efforts to update its Community Comprehensive Plan, the City of Maryland Heights has adopted a Final Draft of the Future Land Use Plan for the Howard Bend

Planning Area (City of Maryland Heights, 2002, available on the City's web site). In the context of the assessment of cumulative impacts, this land use plan may be used to predict the potential nature and extent of future development within the Howard Bend area. The City of Maryland Heights' planning initiative responds to existing conditions as well as present and predicted market factors, and is intended to establish guidelines and strategies to direct overall infrastructure development and land use in the Howard Bend study area. In conjunction with this effort, the City has subdivided the Howard Bend Planning Area into five districts (Figure 2 10). Unconstrained lands within the study area that may be subject to future build out in accordance with the City of Maryland Heights' Future Land Use Plan are identified in Figure 2-11. Permissible land uses within each of these districts have also been established as indicated in Table 2-6.

Table 2-6. Permissible Land Uses within Each Howard Bend Planning District

Land Use	Planning District				
	Riverport/ Harrah's	CCLMP	Expressway Corridor	River Valley Corridor	Missouri River Front
Manufacturing	Prohibited	Prohibited	Prohibited	Prohibited	Prohibited
Light Industrial	Discouraged	Prohibited	Conditional	Conditional	Prohibited
Office Distribution	Conditional	Prohibited	Conditional	Encouraged	Prohibited
Warehousing	Discouraged	Prohibited	Discouraged	Conditional	Prohibited
Office	Encouraged	Prohibited	Encouraged	Encouraged	Prohibited
Retail	Discouraged	Prohibited	Discouraged	Discouraged	Prohibited
Restaurant	Encouraged	Conditional	Conditional	Discouraged	Prohibited
Motor Vehicle Oriented Businesses (MVOB)	Conditional	Prohibited	Conditional	Discouraged	Prohibited
Hotel	Encouraged	Prohibited	Encouraged	Discouraged	Prohibited
Residential	Prohibited	Prohibited	Prohibited	Prohibited	Prohibited
Recreational	Conditional	Encouraged	Conditional	Conditional	Conditional
Agricultural	Prohibited	Discouraged	Conditional	Conditional	Conditional

Source: City of Maryland Heights, 2002.

For the purposes of this EIS, two development scenarios were developed for analysis of cumulative impacts. Each of these two scenarios assume that approximately 2,100 acres of unconstrained lands may be affected by future development. However, each scenario differs in the potential density of development that would likely occur on lands impacted by flooding of Creve Coeur and Fee Fee creeks.

- **Scenario 1 – Interim Condition**. This scenario assumes an eventual 100 percent buildout of all the unconstrained lands identified in Figure 2-11 in the absence of a flank levee system. Under this scenario, each site development project would be required to detain and accommodate local stormwater as there would not be a centralized stormwater conveyance system in place. The 100-year floodplain as represented by the CLOMR (see Figure 3-8) would be a constraint to future development that would slow, but not totally deter development. Developers proposing to construct facilities within such areas would be required to dedicate a greater portion of their total site to stormwater conveyance (ditches, etc.) and storage (wet/dry detention basins, etc.).

- **Scenario 2 – Ultimate Condition**. Under Scenario 2, development within unconstrained lands would be supported by further reductions in designated 100-year floodplain (see Section 2.2.1) and the presence of a centralized stormwater conveyance system. As predominantly defined by a well developed flank levee system for Creve Coeur and Fee Fee creeks, potential future development projects would not be as constrained by the need to accommodate as much stormwater. Consequently, the unconstrained lands identified on Figure 2-11 will be expected to develop more rapidly and at a somewhat higher density.

The following provides an overview of the goals and development guidelines for each of the five planning districts as it is presented in the City of Maryland Heights' Future Land Use Plan (City of Maryland Heights, 2002).

Riverport/Harrah's

The principal elements of this planning district are the Riverport Business Park and Harrah's Hotel and Casino. While still under development, the character and pattern of uses in the district are already established by these planned developments. The remainder of the district is M-2 Heavy Industrial District, and is characterized by the Fred Weber quarry and landfill. The district makes up about 11 percent of the Howard Bend Planning Area.

Vision – The vision for the Riverport/Harrah's District is to complete build-out according to the Planned Development plans approved by the City of Maryland Heights. High development intensity is desirable within this district. However, providing opportunities for pedestrian linkage, the creation of public spaces, and amenities within each project site are essential components to the character and quality of the district.

Development Policies – It is the policy and intent of the City of Maryland Heights to continue the build-out of the approved Planned Development District with the specifically defined uses and performance standards already in effect. Interior stormwater management within the district is the responsibility of each developer.

Creve Coeur Lake

The Creve Coeur Lake District is unique in the Howard Bend Planning Area in that it is owned and managed almost in its entirety by the St. Louis County Parks Department. This planning district encompasses nearly 20 percent of the Howard Bend Planning Area and supports both active and passive recreation uses. Creve Coeur Lake Memorial Park (CCLMP) dominates the district north of Page Avenue, whereas the Page Avenue mitigation lands represent the remainder of the district south of Page Avenue. Comprehensive planning for these lands is currently being undertaken by the County as part of a master planning process.

Vision – The City envisions that the Creve Coeur Lake District will continue as a major regional destination for a variety of active and passive recreation uses, some of which are unique to the region, and all of which are supportive of the City of Maryland Heights' hospitality industry. A planned development park district is intended to be created as a mechanism to establish a partnership with the County to facilitate the future use and management of County park lands.

Development Policies – Future development within this district will consist of both active and unique sports structures and facilities such as a velodrome, horse arena, exercise track, skateboard park, and other recreation facilities. Selected hospitality services such as restaurants that are integral to these facilities will also be permitted. Parking facilities to support these uses will be encouraged to incorporate designs that have a low environmental and storm water impact (e.g., pervious parking surfaces).

Expressway Corridor

The Expressway Corridor has the highest long-term potential for commercial development. It is the largest planning district in the Howard Bend Planning Area, containing 27 percent of the land area. Moreover, the district incorporates as its spine the region's future outer-belt arterial highway – the Earth City/MHE. The Expressway will provide regional access to the Planning Area, and to this district in particular. The district will include four at-grade intersections along the Expressway – at Prichard Farm, Marine, River Valley, and Sportport roads.

Vision – This district is envisioned as a premier business center in the St. Louis region, containing a lively area with office, hospitality, and other compatible land uses.

Development Policies – The Expressway Corridor and the edges near CCLMP should include first class office space and accessory commercial uses. Offices should occupy approximately 75 percent of the land in the district, with the remainder consisting of business service center uses including motor vehicle oriented businesses and hospitality related uses. This corridor could develop along lines similar to the area along the I-64 corridor in west St. Louis County. In the airport and northwest area, business service centers and service and distribution centers are envisioned to be the dominant component, occupying approximately 75 percent of the land area, with office uses occupying approximately 25 percent of the area. An urban design plan to be developed in the future will address building massing, orientation and materials; relationship of buildings to the public right of way; mix of uses; street level activity; integration of trails and open space; creation and protection of viewsheds; vehicular parking, access and circulation; and others. Retail uses will be permitted only when they are integrated into the first floor of the business park use, and the use of first floor space for this purpose will be encouraged. The development of freestanding retail centers is discouraged. Additionally, "Big Box" retail is not consistent with this Plan, as it would be out of scale with the pedestrian orientation desired for the area. Interior stormwater management will be the responsibility of the developer and should incorporate non-structural techniques to the maximum extent feasible. Office development within this district is intended to include public spaces integrated with the overall development. Additionally, the integration of architecture and design with open space, water features, public amenities, and stormwater management will be required. The MHE is intended to be developed as a "parkway," with linear green areas, landscaping, and other streetscape elements such as lighting, being incorporated as an integral part of the design of the Expressway. Where the Expressway intersects with the stormwater conveyance system, efforts will be made to incorporate water features within view of the Expressway. A trail may also be developed adjacent to the main levee and on the under seepage berm that could be as much as 4.3 miles in length.

River Valley

The River Valley District is located at the southern end of the Howard Bend Planning Area, furthest from the highway system. At present, the area consists exclusively of agricultural land uses. The district makes up just over 20 percent of the Howard Bend Planning Area.

Vision – This district will consist of high quality, but lower intensity office distribution and business service centers with integrated architectural and site design.

Development Policies – The City of Maryland Heights recognizes that this district will likely be the last area to develop with high quality business uses due to the need to phase improvements that improve accessibility to the area. The City will explore and facilitate access to the regional transportation system from this district, although the MHE Extension is not anticipated to be completed until some time between 2017 and 2022. Recreation related land uses, such as a

golf course are appropriate for this southernmost area. Sound access management principles will be followed, pursuant to an overall Traffic Management Plan for the area.

Missouri Riverfront

The Missouri Riverfront is the only planning district that will be outside the 500-year levee. The land area between the levee and the Missouri River is either in a natural state or is used for agriculture. It comprises 23 percent of the Howard Bend Planning Area. Covering nearly 2,000 acres, the district is located entirely within either the regulated floodway or the floodplain. As a result, the lands that are actively farmed are often flooded. It is rich in wildlife habitat, and is often used for local hunting activities. It is also the location of borrow pits for the construction of the 500-year levee.

Vision – The character of this area is not envisioned to change substantially. It will remain as open space, and will be incorporated into the evolving regional network of open spaces. To the extent that changes are encouraged, they will be in the direction of expanding the natural character of the area, not in the direction of expanded active agricultural uses. Important viewsheds will be preserved. Low impact access to the area will be provided to the public in such a way that the environmental integrity of the area is maintained and private property rights are respected.

Development Policies – Existing agricultural uses within this district are recognized as a legitimate form of land use. However, the further loss of natural habitats will be discouraged. Additionally, sound wildlife management techniques and principles will also be encouraged within this district along with environmental mitigation and low impact walkways to facilitate passive recreation. The viewshed of the Missouri River from Page Avenue will also be maintained in a natural condition within this district.

2.2.6 Terra Vista Estates Development

The Terra Vista Estates development is a planned subdivision by the Levinson Corporation consisting of 32 homes located in the floodplain of Creve Coeur Creek north of Olive Boulevard. The project as proposed is platted as a subdivision by the City of Chesterfield and entails the construction of an access road connecting to Creve Coeur Mill Road and placement of fill areas within the floodplain and floodway of Creve Coeur Creek (see Figure 2-9). This proposed development has been approved by the City of Chesterfield and is currently going through the re-zoning process.

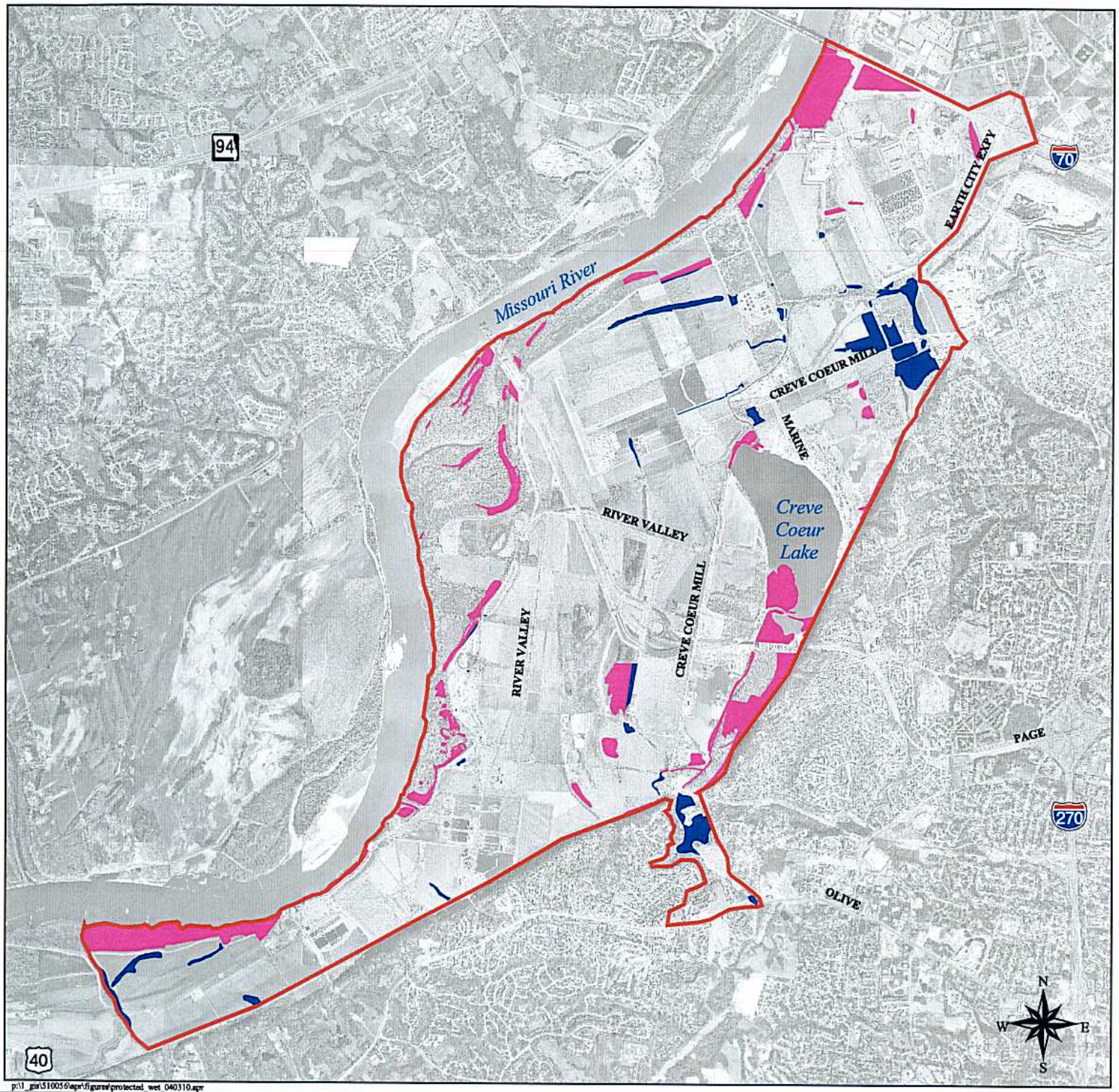
2.2.7 Mill Ridge Villas Development

The Mill Ridge Villas development is a subdivision proposed by the Jones Company consisting of 46 townhomes located in the floodplain of Creve Coeur Creek north of Olive Boulevard. The project as proposed would be located within the limits of the City of Chesterfield and would entail the construction of an access road (Amiot Drive) connecting to Creve Coeur Mill Road (see Figure 2-9). A preliminary plat of this proposed development is currently being reviewed by the City of Chesterfield.

2.2.8 Dredging of Creve Coeur Lake

As a result of the mitigation commitments made in conjunction with the Page Avenue Extension project, MoDOT is obligated to improve the overall depth of Creve Coeur Lake by dredging of the open water area. This action will entail the removal of approximately 2 million cubic yards of material which will be placed in each of two designed upland disposal facilities (see Figure 2-9). Total area of the two disposal facilities is approximately 95.7 acres. As proposed, the dredging will be performed using a hydraulic dredge which will convey a slurry of material to the facilities.

The perimeter of each facility will consist of a berm that will effectively contain the slurry. Water carried in the slurry will be decanted off and returned to the lake, allowing the dredged material to dry and settle out. In time (approximately 15 to 20 years), the spoil material will be sufficiently dried out as to be suitable for additional recreational development by MoDOT.



U.S. Army Corps of Engineers
St. Louis District

Howard Bend Floodplain EIS

Legend

- Protected Wetland
- Un-Protected Wetland

- Study Area
- Interstate Hwy
- US Hwy
- State Hwy

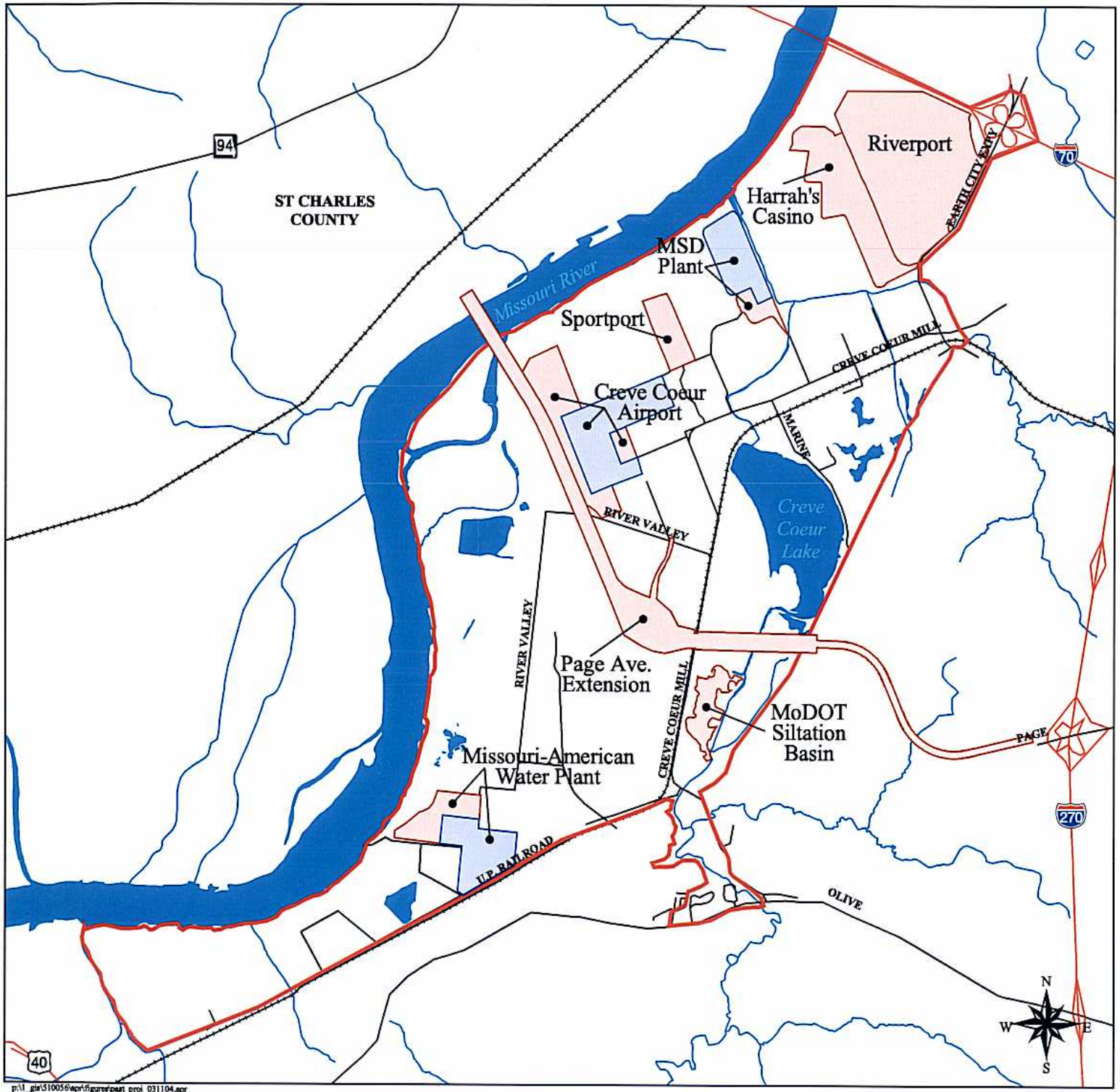
1:60000

0.5 0 0.5 1 Miles

March 10, 2004

Figure 2-1
Wetland Areas
Protected by the SAMP

MACTEC, Inc.



U.S. Army Corps of Engineers
St. Louis District

Howard Bend Floodplain EIS

Legend

- Past Project
- Existing Facility
- Study Area
- Interstate Hwy
- US Hwy
- State Hwy
- Road
- Railroad
- Stream
- Water

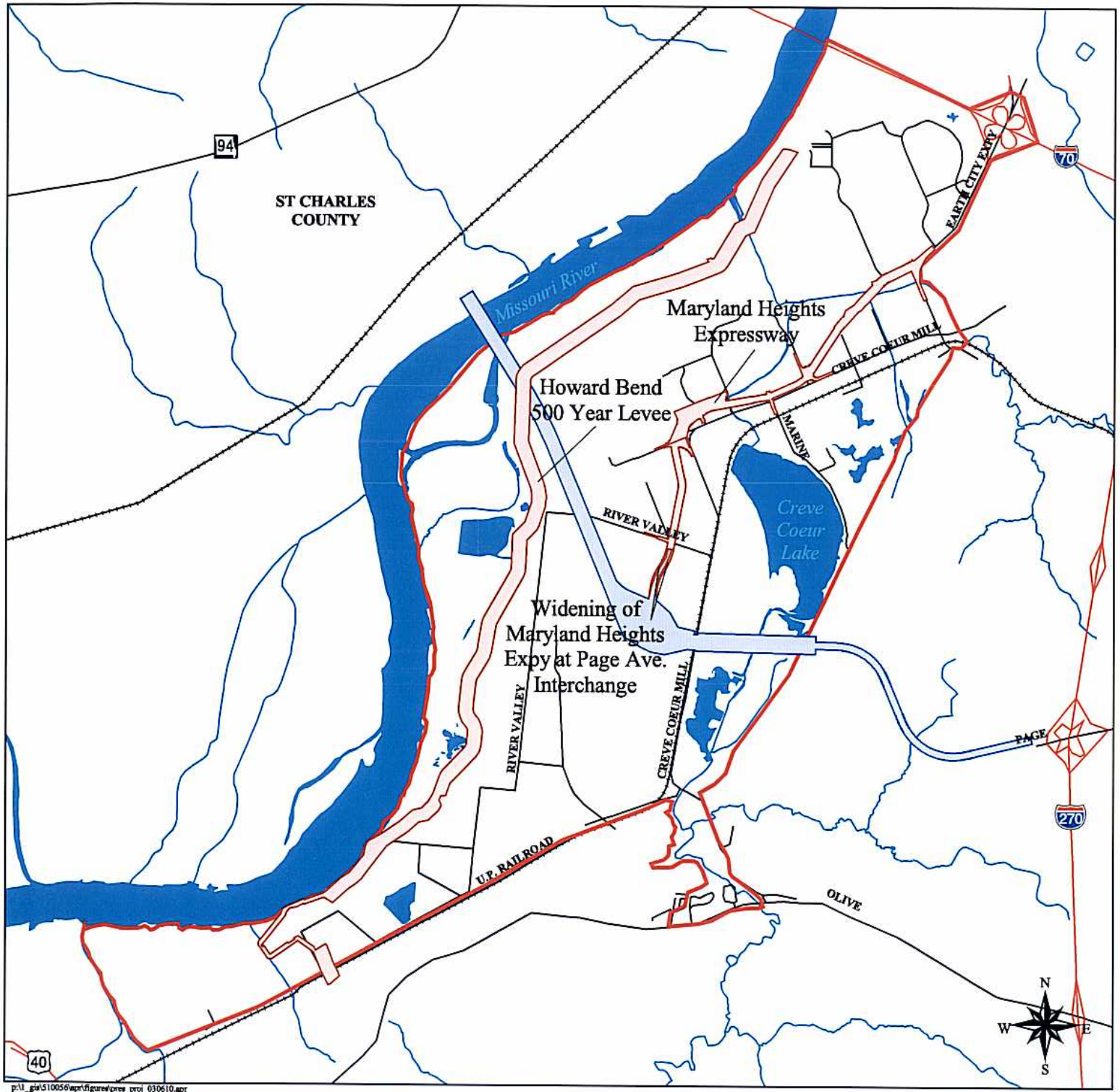
1:60000

0.5 0 0.5 1 Miles

June 12, 2003

Figure 2-2
Past Projects within
the Howard Bend Area

MACTEC, Inc.



U.S. Army Corps of Engineers
St. Louis District

Howard Bend Floodplain EIS

Legend

- Present Project
- Page Avenue Extension

- Study Area
- Interstate Hwy
- US Hwy
- State Hwy
- Road
- Railroad
- Stream
- Water

1:60000

0.5 0 0.5 1 Miles

June 12, 2003

Figure 2-3
Present Projects within the Howard Bend Area

MACTEC, Inc.

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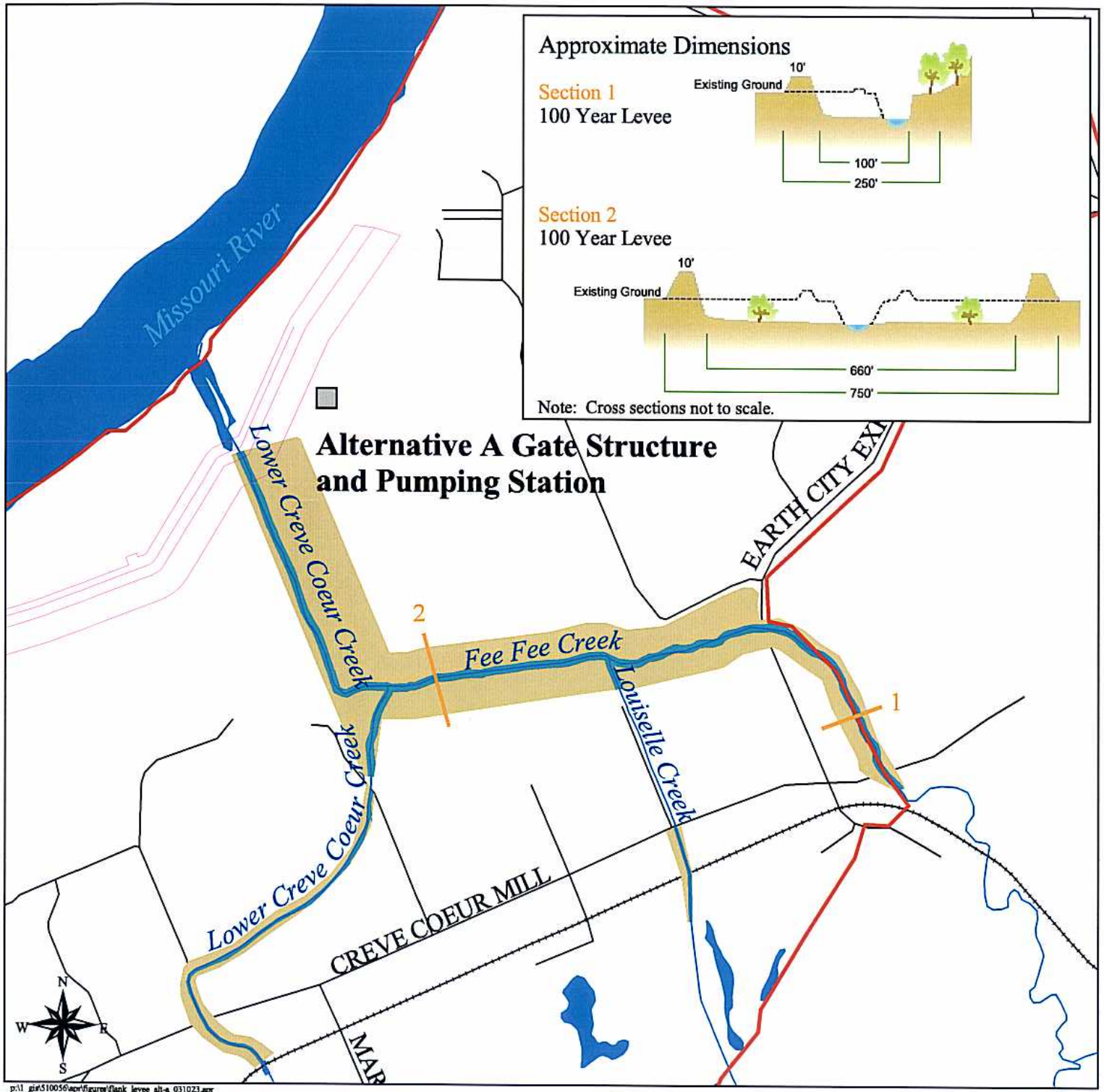


U.S. Army Corps of Engineers
St. Louis District

Howard Bend Floodplain EIS

Legend

- Cross Sections
- New 500 Year Levee
- Conveyance/Flood Storage Area
- Flank Levee
- Alternative A Gate Structure and Pumping Station
- Study Area
- Road
- Railroad
- Stream
- Water

1:20000

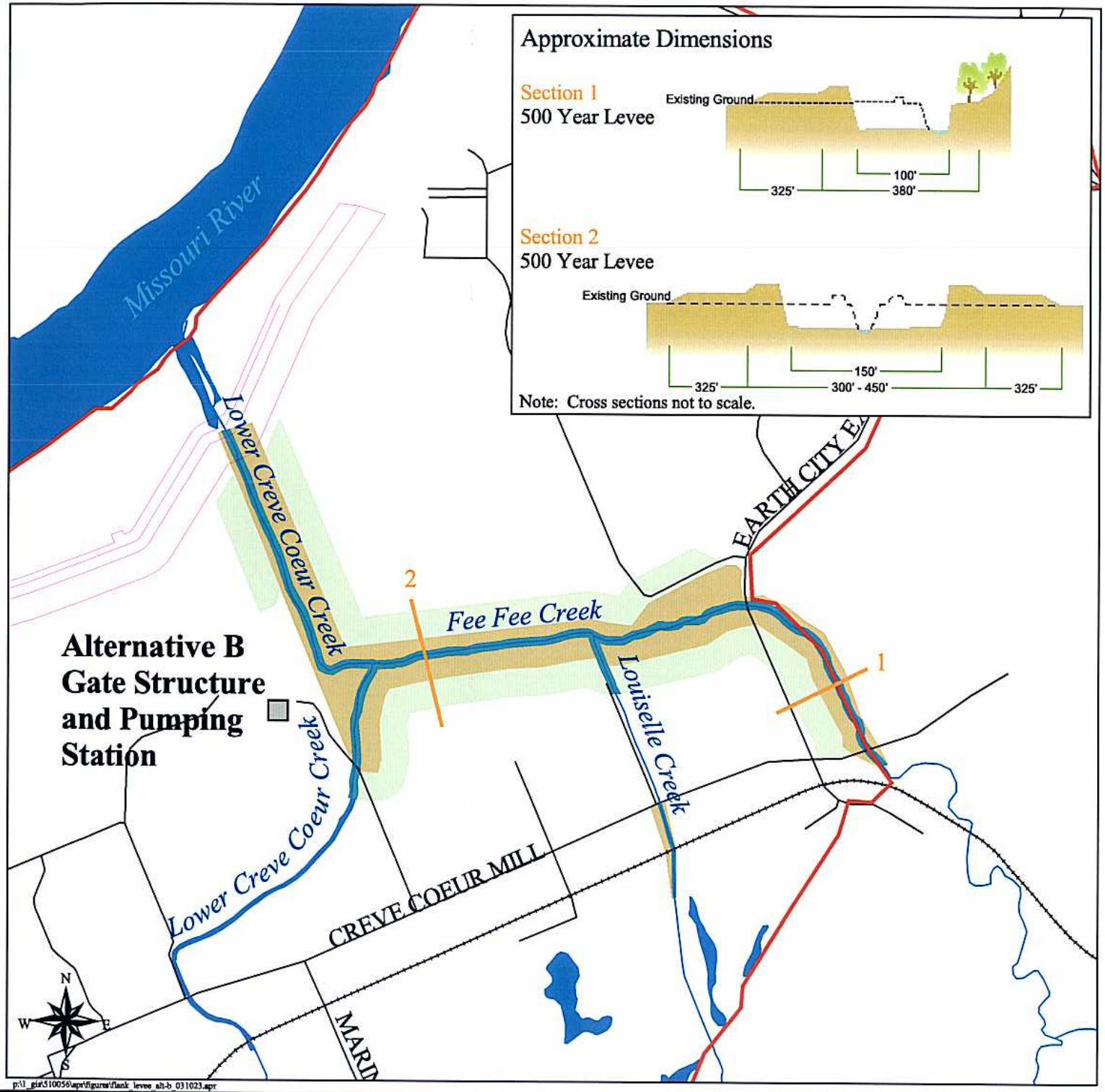
1000 0 1000 2000 Feet

October 23, 2003

Figure 2-4
Future Flank Levee Alternative A:
Gated Discharge at
Missouri River

MACTEC, Inc.

p:\1_gis\510056\apr\figures\flank_levee_alt-a_031023.apr



U.S. Army Corps of Engineers
St. Louis District

Howard Bend Floodplain EIS

Legend

- Cross Sections
- New 500 Year Levee
- Conveyance/Flood Storage Area
- Flank Levee
- Underseepage Berm
- Alternative B Gate Structure and Pumping Station
- Study Area
- Road
- Railroad
- Stream
- Water

1:20000

1000 0 1000 2000 Feet

October 23, 2003

Figure 2-5
Future Flank Levee Alternative B: Gated Discharge at Creve Coeur / Fee Fee Creek Confluence

MACTEC, Inc.

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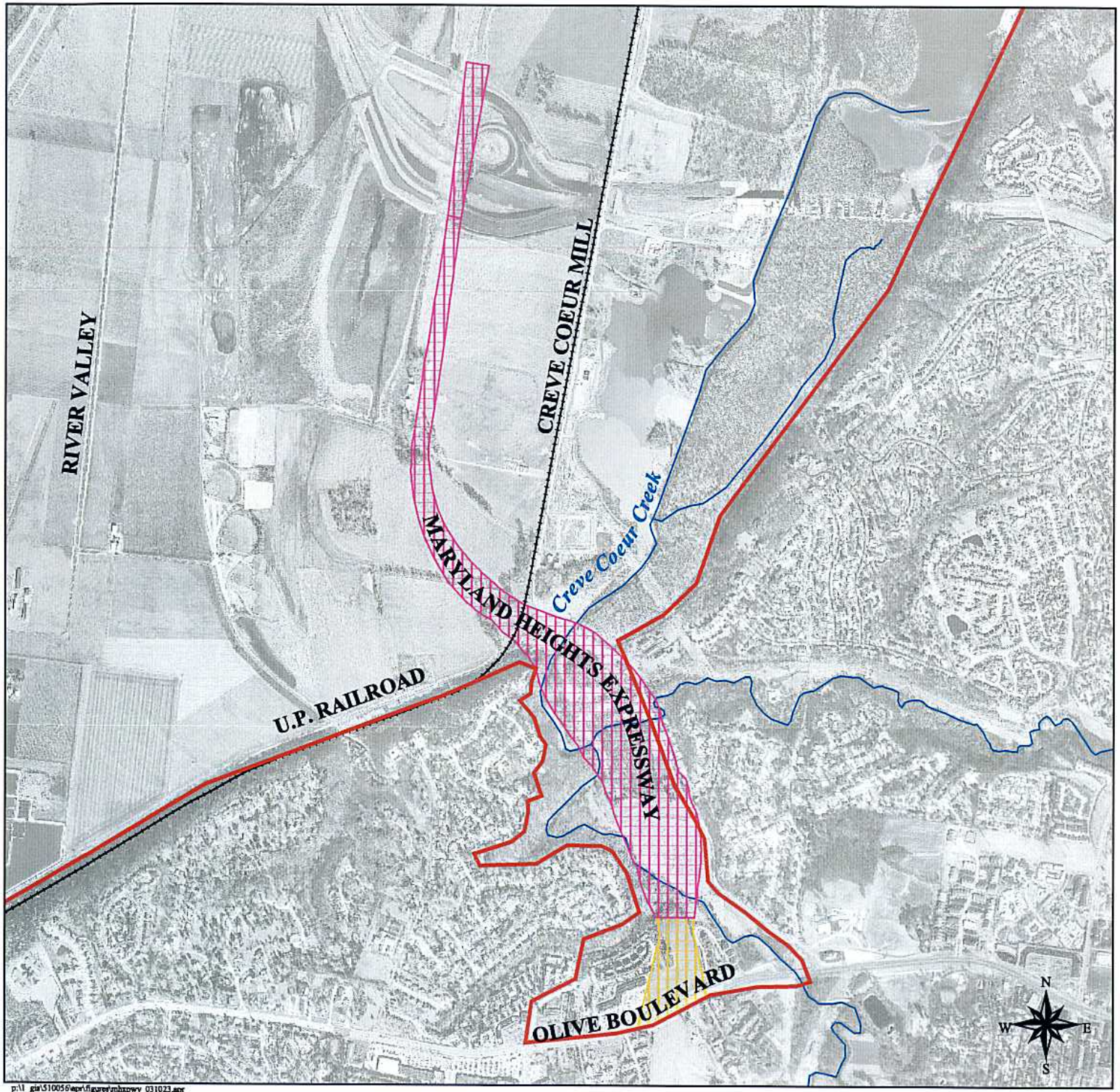


U.S. Army Corps of Engineers
St. Louis District

Howard Bend Floodplain EIS

Legend

- Maryland Heights Expressway Extension Range of Alternates
- To Be Constructed By MoDOT (Rt. 141 Relocation Not Included)
- Study Area
- Railroad
- Stream

1:20000

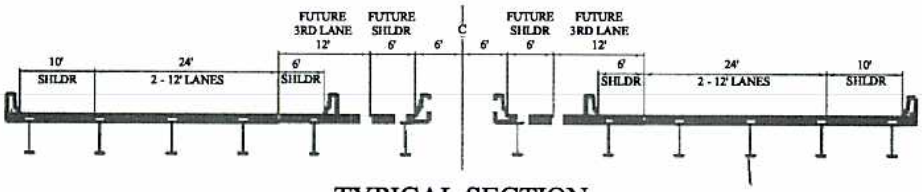
0.25 0 0.25 Miles

October 23, 2003

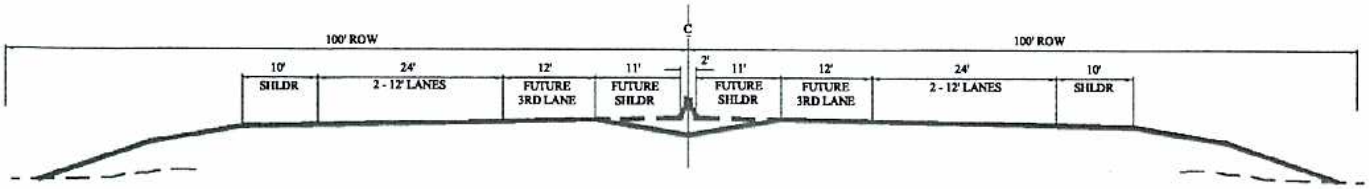
Figure 2-6
Future MHE Extenstion
to Olive Boulevard

MACTEC, Inc.

p:\l_gis\510056\apr\figures\mhxpwy_031023.apr



TYPICAL SECTION
ON STURUCTURE



TYPICAL SECTION
RIVER VALLEY TO OLIVE BLVD.

U.S. Army Corps of Engineers
St. Louis District

Howard Bend Floodplain EIS

June 4, 2003

Figure 2-7
Typical Bridge and Roadway Sections for the MHE Extension

MACTEC, Inc.

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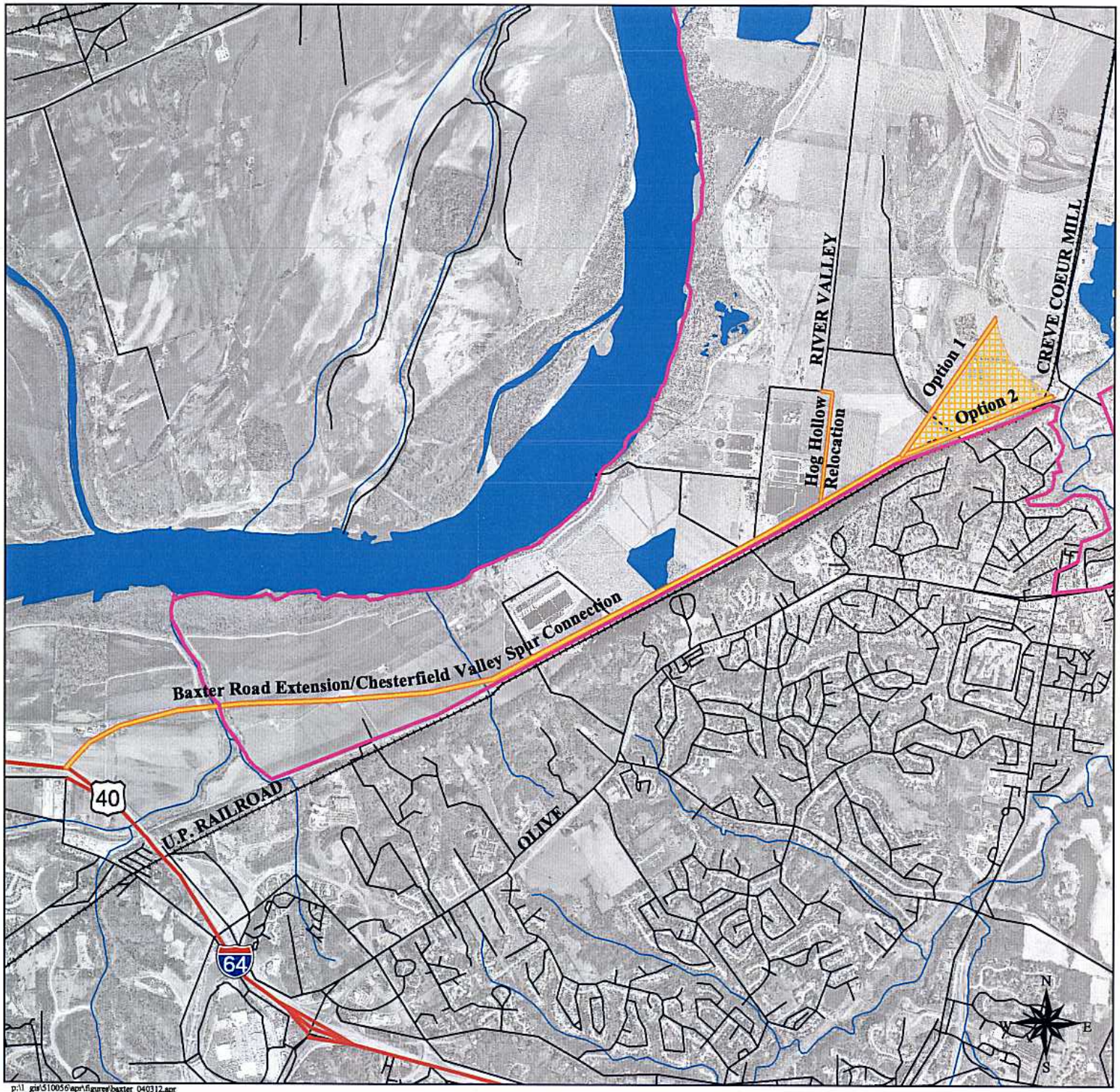


U.S. Army Corps of Engineers
St. Louis District

Howard Bend Floodplain EIS

Legend

- Baxter Road Extension/Chesterfield Valley Spur Connection and Hog Hollow Relocation
- Potential Range of Alternatives for Eastern Terminus

- Study Area
- Interstate Hwy
- US Hwy
- Road
- Railroad
- Stream
- Water

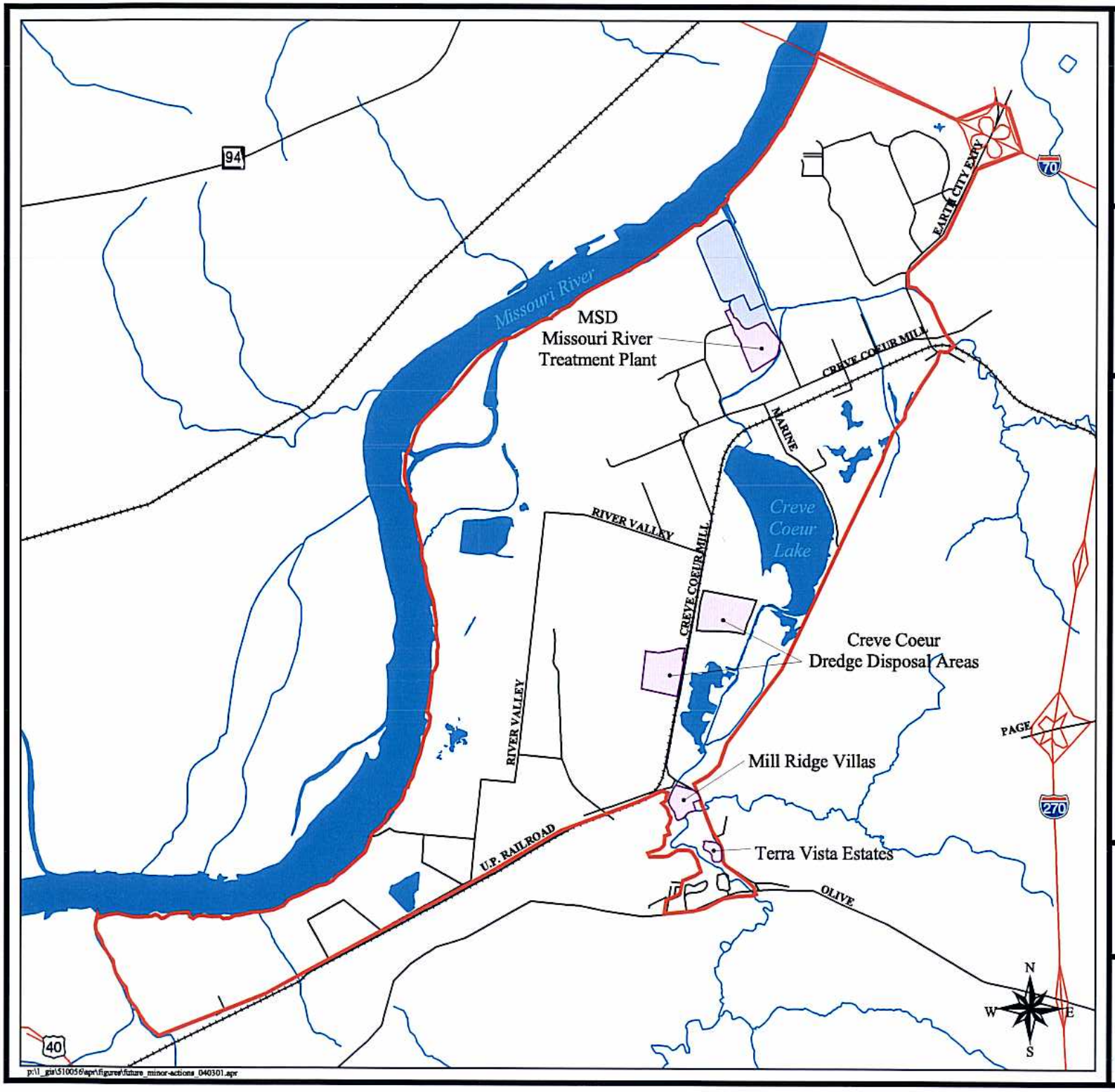
1:40000

0.5 0 0.5 Miles

March 12, 2004

Figure 2-8
Baxter Road Extension (Chesterfield Valley Spur) Connection and Hog Hollow Relocation

MACTEC, Inc.



U.S. Army Corps of Engineers
St. Louis District

Howard Bend Floodplain EIS

Legend

- Future Project
- Existing Facility

- Study Area
- Interstate Hwy
- US Hwy
- State Hwy
- Road
- Railroad
- Stream
- Water

1:60000

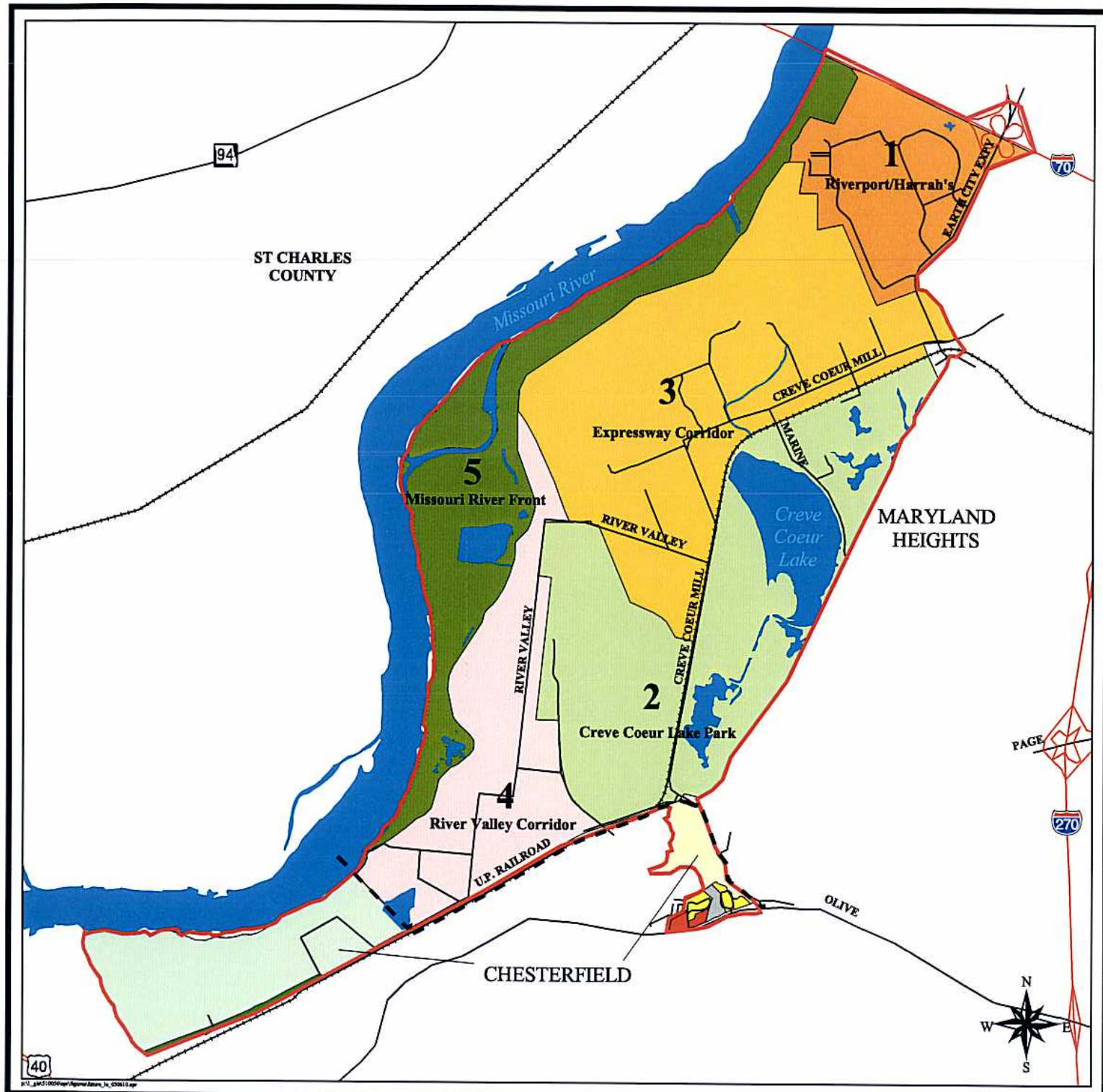
0.5 0 0.5 1 Miles

March 1, 2004

Figure 2-9
Future Minor Actions within
the Howard Bend Area

MACTEC, Inc.

p:\1_gis\510056\apr\figures\future_minor-actions_040301.apr



U.S. Army Corps of Engineers
St. Louis District

Howard Bend Floodplain EIS

Legend

Maryland Heights Planning Districts	Chesterfield Conceptual Plan
1 Riverport/Harrah's	Agricultural
2 Creve Coeur Lake Park	141 Corridor
3 Expressway Corridor	Multi-Family Residential
4 River Valley Corridor	Single Family Residential
5 Missouri River Front	Office Park
	Retail
	Park/Recreation

Sources: Cities of Maryland Heights and Chesterfield

Study Area	Road
Interstate Hwy	Railroad
US Hwy	Stream
Road	Water

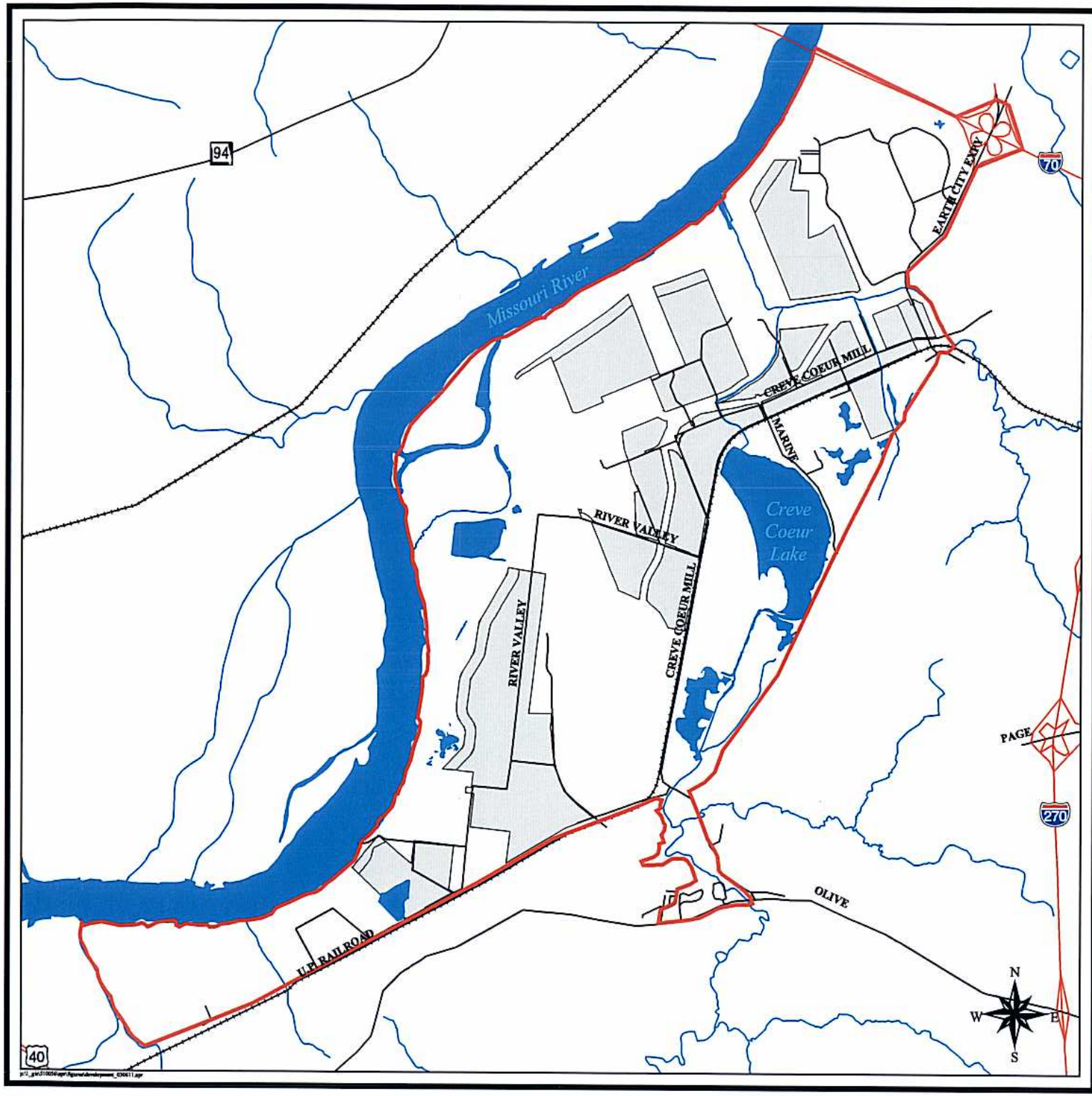
1:60000

0.5 0 0.5 1 Miles

June 12, 2003

Figure 2-10
Future Land Use

MACTEC, Inc.



U.S. Army Corps of Engineers
St. Louis District

Howard Bend Floodplain EIS

Legend

Zones of Permissable Development

Study Area	Road
Interstate Hwy	Railroad
US Hwy	Stream
State Hwy	Water

1:60000

0.5 0 0.5 1 Miles

June 12, 2003

Figrue 2-11
Zones of
Permissable Development

MACTEC, Inc.

3.0 Affected Environment

This section describes the existing environmental resources that would be affected by implementation of the proposed action.

3.1 Social/Economic Characteristics and Land Use

3.1.1 Demographic Characteristics

3.1.1.1 Regional Population Trends

As a basis for characterizing the affected environment, demographic information was compiled for the City of Maryland Heights, the City of Chesterfield, St. Louis County, and the State of Missouri. The vast majority of the study area (90 percent) is located in the City of Maryland Heights and the remaining 10 percent of the study area is located in the City of Chesterfield.

The population contained within the Howard Bend study area is very low due to a history of flooding coupled with widespread agricultural and recreational use beginning in the early 1900s. Persons most likely to utilize the recreational facilities within the study area, in most cases, reside in the City of Maryland Heights or within the St. Louis metropolitan area. The population statistics presented below characterize these populations.

Table 3-1 illustrates population trends in the City of Maryland Heights, the City of Chesterfield, St. Louis County, and the State of Missouri from 1980 until 2000. Although there was an increase in population in the state, each city and the county, the increase in population in the City of Chesterfield (23.2 percent) was disproportionately higher than that in Maryland Heights, the County or the State (1.2 percent, 2.3 percent and 9.3 percent respectively).

As is detailed in Table 3-2, the median age of persons living in the City of Maryland Heights in 2000 (34.2) is somewhat lower than the median age of persons living in St. Louis County (37.5) or in the State of Missouri (36.1). The median age of persons has increased slightly in all three locations since 1990. In the City of Maryland Heights, the population of persons 18 and under as well as those 65 and older both increased from 1990 to the year 2000. This general trend was also present in St. Louis County, although the increase was smaller (Table 3-2).

Table 3-1. Population Trends

Demographic Area	1980	1990	2000	% Change 1990-2000
City of Maryland Heights*	NA	25,402	25,756	1.2%
City of Chesterfield*	NA	37,991	46,802	23.2%
St. Louis County	973,896	993,529	1,016,315	2.3%
State of Missouri	4,916,686	5,117,073	5,595,211	9.3%

* 1980 census data was not available for the Cities of Maryland Heights or Chesterfield as these cities were incorporated in 1985 and 1988, respectively.

Source: Missouri State Census Data Center and the United States Census Bureau.

Table 3-2. Age Characteristics

Demographic Area	Year	Median Age	18 and Under	65 and Older
City of Maryland Heights	1990	31.4	20.0%	7%
	2000	34.2	21.5%	9.5%
City of Chesterfield	1990	37.1	27.1%	9.2%
	2000	41.8	24.6%	14.7%
St. Louis County	2000	34.7	24.5%	13.1%
	2000	37.5	25.2%	14.1%
State of Missouri	1990	33.6	25.7%	14.0%
	2000	36.1	25.5%	13.5%

Source: Missouri Census Data Center and the United States Census Bureau.

In terms of racial characteristics in 2000, those who are white accounted for approximately 85 percent of the demographic in both the City of Maryland Heights and the State of Missouri. That percentage was lower in St. Louis County, at approximately 77 percent (Table 3-3). The percentage of black residents was highest in St. Louis County, at 19 percent, followed by the State of Missouri at approximately 11 percent. The City of Maryland Heights, comparatively, had a lower percentage of black residents at around 6 percent. In contrast, the percentage of residents of other races was comparatively higher in the City of Maryland Heights, at 8 percent, whereas the percentage of residents of other races in both St. Louis County and the State of Missouri was 2.4 percent.

Table 3-3. Racial Characteristics, 2000

Demographic Area	Race		
	White	Black	Other
City of Maryland Heights	85.4%	5.6%	8.0%
City of Chesterfield	91.3%	1.9%	6.8%
St. Louis County	76.8%	19.0%	2.7%
State of Missouri	84.9%	11.2%	2.4%

Source: The United States Census Bureau.

3.1.1.2 Housing

In the year 2000, both the City of Maryland Heights and St. Louis County had a high rate of owner occupied housing units (approximately 95 percent) when compared with the State of Missouri, at around 90 percent (Table 3-4). The median housing unit value in the State of Missouri ($89,900) was substantially lower than that in either the City of Maryland Heights or St. Louis County ($107,900 and $116,600 respectively).

As discussed above, the residential base of the study area is extremely low. An inventory of the study area was conducted which resulted in the identification of 22 houses and 282 apartment units located within the study area. In addition, 19 houses are located along the east side of Creve Coeur Mill Road (just north of Olive Boulevard) immediately adjacent to the study area boundary.

Table 3-4. Housing Characteristics, 2000.

Demographic Area	Housing Units	Occupied Housing Units	Vacancy Rate	Average Household Size	Median Housing Unit Value
City of Maryland Heights	11,846	11,302	4.6%	2.25	$107,900
City of Chesterfield	18,738	18,060	3.6%	2.59	$238,300
St. Louis County	423,749	404,312	4.6%	2.47	$116,600
State of Missouri	2,442,017	2,194,594	10.1%	2.48	$89,900

Source: The United States Census Bureau.

3.1.2 Economic Characteristics

3.1.2.1 Income

There was an increase in income from 1990 to the year 2000 in the City of Maryland Heights, the City of Chesterfield, St. Louis County, and the State of Missouri (Table 3-5). The average per capita income in the City of Maryland Heights increased from $17,785 in 1990 to $24,918 in the year 2000. Likewise, the average per capita income in Chesterfield increased from $28,019 to $43,288 during the same 10-year period. The same trend was evident in St. Louis County and the State of Missouri in which the average per capita income increased from $18,625 and $12,989 in 1990 to $27,595 and $19,936 in the year 2000, respectively.

Table 3-5. Economic Characteristics, 1990 and 2000

Demographic Area	Per Capita Income		Median Household Income		Percentage of Persons Below Poverty Level	
	1990	2000	1990	2000	1990	2000
City of Maryland Heights	$17,785	$24,918	$43,920	$48,689	3.6%	5.3%
City of Chesterfield	$28,019	$43,288	$66,930	$83,802	2.1%	2.6%
St. Louis County	$18,625	$27,595	$45,214	$50,532	5.6%	6.9%
State of Missouri	$12,989	$19,936	$26,362	$37,934	13.3%	11.7%

Source: Missouri State Census Data Center and the United States Census Bureau.

Likewise, the median household income increased in the City of Maryland Heights from $43,920 in 1990 to $48,689 in the year 2000. This trend also occurred in St. Louis County, in which the median household income was $45,214 in 1990 and increased to $50,532 in the year 2000. In the State of Missouri, the median household income also increased from $26,362 in 1990 to $37,934 in the year 2000. By comparison, the median income in Chesterfield was higher in both 1990 and 2000 as compared to the other demographic areas examined ($66,930 and $83,802, respectively.

The percentage of persons below the poverty level remained roughly the same in Chesterfield but increased slightly in the City of Maryland Heights from 3.6 percent in 1990 to 5.3 percent in the year 2000. Likewise, the percentage of persons below the poverty level increased in St. Louis County from 5.6 percent in 1990 to 6.9 percent in the year 2000. The percentage of persons below the poverty level decreased in the State of Missouri from 13.3 percent in 1990 to 11.7 percent in the year 2000. Despite a decreasing trend in the State of Missouri, the percentage of persons below the poverty level was higher in the State than in the City or the County in both census years.

3.1.2.2 Labor Force Characteristics

There was a dramatic decline in unemployment in St. Louis County and in the State of Missouri from 1980 to the year 2000 (Table 3-6). In 1980, the unemployment rate was lower in St. Louis County (5.4 percent) than in the State of Missouri. In 1990 and 2000, the unemployment rate was the lowest in the City of Chesterfield (2.3 and 1.6 percent) followed by the City of Maryland Heights (2.7 and 2.0 percent). In comparison, the unemployment rate was somewhat higher in St. Louis County for both years (4.5 and 3.1 percent, respectively). In all three census years, 1980, 1990 and 2000, the unemployment rate was higher in the State of Missouri (6.9, 6.2 and 3.4 percent, respectively) than in the Cities or the County.

Table 3-6. Unemployment Rate

Demographic Area	1980	1990	2000
City of Maryland Heights*	NA	2.7%	2.0%
City of Chesterfield*	NA	2.3%	1.6%
St. Louis County	5.4%	4.5%	3.1%
State of Missouri	6.9%	6.2%	3.4%

* 1980 census data was not available for the Cities of Maryland Heights or Chesterfield as these cities were incorporated in 1985 and 1988, respectively.

Source: Missouri State Census Data Center and the United States Census Bureau.

Table 3-7 presents a distribution of the labor force within each demographic area by employment category. In the year 2000, the highest percentage of workers were in the field of educational, health and social services for the City of Maryland Heights, St. Louis County and the State of Missouri with percentages of 17.1 percent, 21.7 percent, and 20.4 percent respectively. For the City of Maryland Heights, the next highest percentage of workers were in professional, scientific, management, administrative and waste management services; followed by manufacturing; retail trade; and finance, insurance and real estate. For St. Louis County and the State of Missouri, the next highest percentage of workers were in manufacturing, then retail trade. Despite the prevalence of widespread agricultural land use, the actual labor force involved with agricultural production is rather low.

Employment data are available for the Harrah's Casino complex and the Riverport mixed use development. It is currently estimated that these two development areas contain approximately 11,500 full-time jobs. Of these 11,500 jobs, the major employers include the following:

Employers	Number of Employees
Harrah's Casino complex	2,800
Express Scripts Inc.	1,700
Magellan Health Services	1,050
United Healthcare	850
Unigraphics	450
Lambert Field Construction Office	200
University of Phoenix	100
Midwest Casualty	110

For the City of Chesterfield, the highest percentage of workers were in the areas of educational, health and social services followed by manufacturing; professional, scientific, management, administrative and waste management services; finance, insurance, and real estate; and retail trade. These employment sectors accounted for 22.8, 14.2, 13.9, 12.3, and 10.9 percent,

respectively. These five categories account for approximately 75 percent of employed persons living in Chesterfield in the year 2000.

3.1.2.3 Tax Base

Tax information for the Howard Bend study area are presented in Table 3-8. The assessed total is a percentage of the appraised total and this percentage differs depending upon land usage. The estimated tax generated in the study area is $8,477,550.11 per year.

Table 3-7. Labor Force Characteristics by Job Type

Land Use Category	City of Maryland Heights		City of Chesterfield		St. Louis County		State of Missouri	
	Employed Persons (#)	Employed Persons (%)	Employed Persons (#)	Employed Persons (%)	Employed Persons (#)	Employed Persons (%)	Employed Persons (#)	Employed Persons (%)
Agriculture, Forestry, Fisheries	50	0.3	82	0.3	1,146	0.2	58,415	2.2
Construction	806	5.3	579	2.5	24,817	4.9	182,858	6.9
Manufacturing	2,041	13.5	3,346	14.2	64,212	12.7	393,440	14.8
Transportation, Warehousing and Utilities	775	5.1	702	3.0	27,141	5.4	150,641	5.7
Wholesale Trade	711	4.7	1,240	5.3	21,290	4.2	97,021	3.7
Retail Trade	1,797	11.9	2,573	10.9	57,061	11.3	315,872	11.9
Information	582	3.9	853	3.6	19,021	3.8	80,623	3.0
Finance, Insurance and Real Estate	1,656	11.0	2,913	12.3	45,603	9.0	177,651	6.7
Professional, Scientific, Management, Administrative and Waste Management Services	2,110	14.0	3,270	13.9	56,101	11.1	198,547	7.5
Educational, Health and Social Services	2,590	17.1	5,383	22.8	109,440	21.7	541,715	20.4
Arts, Entertainment, Recreation, Accommodation and Food Services	1,107	7.3	1,471	6.2	38,345	7.6	206,295	7.8
Other Services	511	3.4	787	3.3	24,398	4.8	132,940	5.0
Public Administration	367	2.4	407	1.7	16,675	3.3	121,906	4.6
Total	15,103	100	23,606	100	505,250	100	2,657,924	100

Source: United States Census Bureau, 2000.

Table 3-8. Tax Base for the Howard Bend Study Area

Acres	Approximate Appraised Total	Assessed Total	Estimated Tax
6,834.87*	$300,241,320*	$94,254,910*	$8,477,550.11*

* Values do not include a small number of parcels for which no information was available from the database.

Source: St. Louis County Department of Revenue.

3.1.3 Land Use

3.1.3.1 Existing Land Use and Zoning

Existing Land Use

The Howard Bend study area consists of an approximately 8,624-acre area. Predominant land use is dedicated green space, agricultural lands, office, warehouse and various other industrial uses. Of this total, approximately 1,852 acres are located riverside of the levee. Agricultural lands, consisting of cultivated fields used for row crop production and nurseries (Lucky Girl Nursery, Thies Farm, Schmittel's Nursery, and Baxter Farm and Nursery) account for over 45 percent of existing land use, which is the highest percentage of land use in the Howard Bend study area (Table 3-9).

Table 3-9. Distribution of Existing Land Uses, 2002

Land Use	Acres	Percent
Agriculture	3,906.85	45.30
Parks and Recreation	1,960.13	22.73
Vacant	845.36	9.80
Utility and Public Service	609.65	7.07
Commercial	569.30	6.60
Transportation	542.01	6.29
Arts and Entertainment	116.73	1.35
Residential	39.44	0.46
Industrial	28.78	0.33
Accommodation/Hospitality	5.52	0.06
Total	8,623.77	100.0

Source: City of Maryland Heights Land Use and City of Chesterfield Zoning Map modified to reflect existing land use.

Parks and recreational areas and dedicated green space also account for a substantial percentage of land use within the Howard Bend study area (nearly 23 percent). Recreational facilities include CCLMP located in the eastern portion of the study area, Crystal Springs Quarry Golf Course, Creve Coeur Baseball Athletic Association, Seeger West County Golf Driving Range, and Sportport Soccer complex (Figure 3-1, see Section 3.1.4.1).

Utilities and public services (which account for 7 percent of the land) include MSD Missouri River Wastewater Treatment Plant, the Missouri American Water Company, and the City of St. Louis Water Treatment Plant, which are located within the study area. These utilities provide infrastructure to service the floodplain area and surrounding West St. Louis County area.

Commercial uses account for approximately 7 percent of the land in the study area. Dominant uses include the Riverport business center, Harrah's Casino complex, and Creve Coeur Airport. Harrah's Casino complex, located in the extreme northwestern portion of the study area, contains two casinos as well as a hotel with 291 guest rooms. Riverport business center is located just east of Harrah's. This consolidated business district, which contains a variety of businesses, is owned and managed primarily by Duke Realty. Businesses located in Riverport include the UMB Bank Pavilion (a large amphitheater complex), Express Scripts, Magellan Behavioral Health, Citi Mortgage and EDS, among others. A trust was formed and a Board of

Trustees oversees development within Riverport in order to maintain building standards that meet the agreed-upon guidelines for development.

Vacant land accounts for approximately 10 percent of the land use in the Howard Bend study area. Transportation-related land accounts for 6 percent.

There is very little land in the study area that is designated for residential land use (only 0.46 percent of the study area). The small number of residences within the floodplain consist of isolated single farm houses (not all of which are inhabited), and the densest concentration of houses is located in the southeastern portion of the study area along Creve Coeur Mill Road (just north of Olive Boulevard). Accommodation/hospitality (i.e., primarily hotels) and industrial land use account for just 0.06 and 0.33 percent, respectively.

Other miscellaneous uses within the study area include such industrial facilities as Smith Brothers Auto Salvage, Southard Construction, and West Continental Auto Parts and Salvage which collectively account for less than 1 percent of the overall land use.

As previously noted, the majority of the study area (90 percent) is located within the City of Maryland Heights. All areas could be subject to future land use alteration but predominantly include areas that are currently used for agriculture as well as open space (i.e., those areas that have not yet been developed). Agriculture represents the most prominent land use in the study area (45 percent) that accounts for approximately 3,907 acres that would be available for future development.

The two areas that are located in the City of Chesterfield are located in the most southeastern portion of the study area (just north of Olive Boulevard) and the most southwestern portion of the study area just east of Bonhomme Creek. The former area (north of Olive Boulevard) currently consists of single-family residential, multi-family residential, vacant/agricultural lands, and commercial and industrial/utility areas. The area just east of Bonhomme Creek is comprised of vacant/agricultural uses as well as industrial/utility uses.

Existing Zoning

With the exception of some planned industrial areas (i.e., Riverport and Harrah's complex) much of the lands within the study area that are located within the City of Maryland Heights have been zoned as non-urban (Figure 3-2). Development within these lands is subject to approval by the City as reviewed by the City of Maryland Heights' Planning Commission and approved by City Council. Future development shall occur in accordance with the permissible uses identified by the City of Maryland Heights' zoning code (Table 3-10)(City of Maryland Heights, 1989), and as guided by the City of Maryland Heights' Future Land Use Plan (City of Maryland Heights, 2002).

Existing Zoning in the City of Chesterfield

Existing zoning in the City of Chesterfield consists primarily of residential, floodplain, planned commercial and a shopping district in the southeastern portion of the study area (north of Olive Boulevard abutting Creve Coeur Mill Road) (see Figure 3-2).

The extreme southwestern portion of the study area that falls within the City of Chesterfield (east of Bonhomme Creek) is zoned as floodplain non-urban (see Figure 3-2). Permissible uses are detailed in the City of Chesterfield's zoning code (available from the City of Chesterfield).

3.1.3.2 Future Land Use

City of Maryland Heights

In conjunction with an ongoing effort to update its Community Comprehensive Plan, the City of Maryland Heights has adopted a Future Land Use Plan for the Howard Bend Planning Area (City of Maryland Heights, 2002). In the context of the assessment of cumulative impacts, this Future Land Use Plan may be used to predict the potential land use type and extent of future development within the Howard Bend study area. The City of Maryland Heights' planning initiative takes into account existing conditions as well as present and predicted market factors, and is intended to establish guidelines and strategies to direct overall infrastructure development and land use in the Howard Bend study area. In conjunction with this effort, the City has subdivided the Howard Bend Planning Area into five districts (see Figure 2-10) and established permissible land uses within each of these districts as indicated in Table 2-6. The five districts are discussed in detail in Section 2.2.5. Areas will be developed in accordance with the designated land use as well as the zoning ordinances as established by the City of Maryland Heights and defined in its zoning codes (1989).

Table 3-10. Land Uses Permitted in Non-Urban Zoned Areas within the City of Maryland Heights

Land Use Category	Land Use Description	Use*
Agriculture	Crop Farming	P
	Nursery and Tree Production	P
	Composting Plants	C
	Agricultural Related Activities	P
	Riding Stables	C
Residential Uses	Dwelling, Single Family Attached	P
	Adult Retirement Housing	C
Utilities		C
Retail Trade	Nursery and Garden Centers	C
	Fruits and Vegetable Markets	C
Transportation Services		C
Professional	Veterinary Services	C
Arts and Recreation	Fairgrounds	C
Museums and Parks	Privately-Owned Parks	C
	Publicly-Owned Parks and Recreational Facilities	P
Recreation	Commercial Amusement and Recreation Facilities	C
	Golf Courses and Country Clubs	C
	Golf Instruction Centers	C
	Miniature Golf Centers	C
	Golf Driving Ranges	C
	Municipal Amusement and Recreation Facilities	P
Personal Services	Cemeteries and Crematories	C
	Animal Kennels	C
	Parking Lots and Garages	C
Public Administration	Fire Protection	C

* Permitted (P) or Conditional (C).

Source: City of Maryland Heights Zoning Code, 1989.

City of Chesterfield

The total area contained within the City of Chesterfield accounts for approximately 10 percent of the study area. The two areas that are located in the City of Chesterfield are in the most southeastern portion of the study area (just north of Olive Boulevard) and the most southwestern portion of the study area just east of Bonhomme Creek. Future land use within these areas is expected to be limited by floodplain and floodway constraints. Some of the lands in association with Creve Coeur Creek are development-limited by floodplains, floodway, and wetlands. However, as discussed in Sections 2.2.6 and 2.2.7, two residential developments have been recently proposed in this area (Terra Vista Estates, Mill Ridge Villas). Lands east of Bonhomme Creek lack a 100-year levee system and are, therefore, unprotected by flooding from the Missouri River.

3.1.4 Public Services and Community Facilities

3.1.4.1 Recreational Facilities

Recreational land uses are the second most prominent land use, after agricultural use. CCLMP is centrally located within the study area and is administered by the St. Louis County Parks Department (Figure 3-3). The park contains 2,242 acres (1,937 acres within the study area) that surround a 300-acre lake. The park provides various recreational opportunities such as picnicking, walking, sightseeing, bird watching, rollerblading, bicycling, and fishing in a heavily wooded area that contains a mixture of woodland and wetland habitats. This is one of the few remaining natural areas in the St. Louis metropolitan area.

The St. Louis County Parks Department currently manages 1,937 acres of park land in the study area. In order to guide future land use within CCLMP, St. Louis County Parks Department is in the process of developing a Master Plan to include areas in the park dedicated to both active and passive recreational use. The majority of recreational land within the park district is comprised of land designated for passive recreational use (see Figure 3-3), 4(f) and 6(f) land, and MoDOT wetland mitigation land. The northern two-thirds of the park is primarily used for active recreation such as archery, softball, tennis, sailing, rowing, golf, disc golf, and jogging. Special events such as power boat racing occasionally take place at various times throughout the summer months. Swimming is prohibited in Creve Coeur Lake. A 44-acre parcel of land, located directly southwest of the lake is used for polo, field hockey, lacrosse, and other field games.

The St. Louis County Parks is preparing a Creve Coeur Park Master Plan in recognition of the dramatic impacts to the park both from a land acquisition and development perspective (Creve Coeur Park Master Plan Pre-Final, April 16, 2003). As a result of the Page Avenue Extension mitigation, the Park has doubled in size from 1,140 acres to 2,242 acres. The long-term vision for the improvements and new developments encompasses a 20-year planning period with an implementation focus over the next 7 years until 2010.

The Master Plan identifies eight planning areas: the Bluffs, Greensfelder, Fisherman's Wharf, the Fairgrounds, Sailboat Cove, the Meadows, Mallard Lake (Siltation Basin), and Little Creve Coeur Lake. Each planning area is being evaluated for improvements to such things as vehicle/pedestrian access, parking, day use structures (picnic tables and grills, shelters, restrooms), historic structures, playgrounds, ball fields, lake use, trails, and trail links. In addition, each planning area will provide unique recreation experiences by the nature of the

natural resource development within the park. Following are some key features that have been identified as objectives of the Master Plan:

- Improve/construct boat launch, piers, docks, and concession facilities to maximize the use of lake surfaces for active recreation boating.
- Construct walking/bike trails around the lake, with connection to surrounding neighborhoods and to the Katy Trail across the Missouri River.
- Develop a natural area use component utilizing existing natural and created wetland park areas that focus on wildlife habitat restoration, interpretive and educational activities, and restoration of the floodplain.
- Improve existing traditional day-use recreation facilities and infrastructure to accommodate special events.
- Preserve and restore historic buildings and structures within the Park such as the Trolley Station, Greensfelder Memorial Pavilion, stone fire pits, Ice House Building, and the Dripping Springs site.

Sportport is a 64-acre recreational facility located northwest of Creve Coeur Lake. This facility is comprised of 12 full-size soccer fields and one stadium field with accompanying locker rooms, concession stand, benches, bleachers, and parking areas. There are year-round organized events such as a soccer academy, tournaments, and a summer sports camp. In addition to soccer, this facility is also utilized for playing lacrosse, rugby, and field hockey. This facility is owned and operated by the City of Maryland Heights Parks and Recreation Department.

Other recreational facilities in the study area include Golfport which includes a driving range and a recreational complex, Creve Coeur Athletic Association's baseball fields, Crystal Springs Quarry Golf Course, and the Seeger West County Driving Range.

3.1.4.2 Churches

Only one church is located within the study area. The First Baptist Church of Creve Coeur is located at 1553 Creve Coeur Mill Road (north of Olive Boulevard) in Chesterfield.

3.1.4.3 Cemeteries

There are no cemeteries located in the study area.

3.1.4.4 Schools

There are no schools located in the study area; however there is one daycare located in Riverport near the Earth City Expressway. Schools within the vicinity of the study area include Rose Acres Elementary and Pattonville High School which are located just outside the study area (northeast of Crystal Springs Quarry Golf Club), at 2905 Rose Acres Lane and 2497 Creve Coeur Mill Road, respectively.

3.1.4.5 Hospitals and Nursing Homes

While there are no hospitals or nursing homes located in the study area, two hospitals are located in close proximity and are equipped to provide both emergency and extended care medical treatment. Barnes-Jewish West County Hospital is located at 12634 Olive Boulevard in Creve Coeur (1 mile west of I-270). DePaul Health Center is located just northeast of the intersection of I-270 and I-70 at 12303 DePaul Drive in Bridgeton.

3.1.4.6 Emergency Services

Emergency services provided to the study area include fire departments, ambulance services, and police departments. Fire protection in St. Louis County is provided by 23 fire protection districts and 20 municipal fire departments. The Howard Bend study area falls within four different fire districts: Creve Coeur, Chesterfield, Pattonville, and Maryland Heights. Each department has numerous engine houses located within their various fire protection districts. These four districts function as a team, and vehicles that respond to a fire may come from a variety of districts, depending upon the location and extent of the fire. Additional districts from nearby areas may also respond to a fire, if needed. Each fire department has its own ambulance that is available to respond to an emergency. Districts coordinate with each other and, if an ambulance from one district is being utilized, an ambulance from a nearby district will be dispatched to provide assistance during an emergency.

Many municipalities in St. Louis have their own police department that respond to calls within their areas. The Cities of Maryland Heights and Chesterfield have jurisdiction within the Howard Bend study area. In addition, the St. Louis County Police Department, which is divided into six districts, is also available to provide additional support to unincorporated areas or to municipalities, as needed. Law enforcement in CCLMP is provided by the St. Louis County Park Police and is supplemented by the police department of the City of Maryland Heights.

3.1.4.7 Libraries and Museums

There are no libraries or museums located in the study area. However, there are two branches of the St. Louis County Library located just outside of the study area. The Bridgeton Trails branch is located northeast of the study area at 3455 McKelvey Road. The Thornhill Branch is located just east of the southeastern most point of the study area at 12863 Willowyck Drive (off Fee Fee Road, 1-mile north of Olive Boulevard).

3.1.4.8 Water and Wastewater Treatment

Sanitary Sewer Treatment Capacity

MSD owns and operates the Missouri River Treatment Plant located in the central portion of the study area north of Creve Coeur Mill Road at Marine Avenue. This plant serves a watershed of approximately 150 square miles, and includes the Cities of Maryland Heights, Chesterfield, and parts of Creve Coeur, Hazelwood, Bridgeton, St. Ann, Ellisville, Ballwin, and unincorporated St. Louis County.

This facility is designed to treat approximately 28 mgd of wastewater and is currently at capacity. During periods of peak demand, often correlating with significant rainfall events, the plant has treated up to 80 mgd by storing excess stormwater and subsequently treating it during off-peak periods. MSD has conducted a preliminary study to increase plant capacity to 39 mgd. The funds necessary for this improvement, however, have not been secured.

Water Supply

The water supply for the Howard Bend area is provided by the Missouri American Water Company's Central Plant, located on Hog Hollow Road. This facility currently has the capacity to treat and pump 217 mgd and has an agreement with the City of St. Louis to purchase an additional 30 mgd, if needed for peak demand. Normal demand is between 120 and 140 mgd. The City of St. Louis Water Division, located in the Howard Bend study area, does not supply water to this area with the exception of additional supply during peak demand via the Missouri American water system.

3.1.5 4(f)/6(f) Lands

CCLMP is a part of the St. Louis County Park system that has received Federal financial assistance from the Land and Water Conservation Fund (LWCF) Act grant-in-aid program (NPS, 1995b). As such, the CCLMP is a land that is subject to protection under Section 6(f)(3) of the LWCF Act. Any request to convert such lands must be in accord with the Statewide Comprehensive Outdoor Recreation Plan (SCORP) and subject to such conditions as are necessary to assure the substitution of other recreation properties of at least equal fair market value and reasonably equivalent usefulness and location. Development and management of these substitution properties must be for outdoor recreation purposes and in accord with the explicit purpose for which the properties are acquired (NPS, 1995b). Additionally, Section 4(f) of the Department of Transportation Act of 1966 provides protection for parks, wildlife refuges, and historic sites.

The original portion of CCLMP totaled 1,140 acres. However, as a result of impacts associated with the Page Avenue Extension, a total of 1,102 acres were added to park land as mitigation pursuant to the requirements of Section 4(f) (209 acres) and Section 6(f) (893 acres). The actual distribution and extent of each of these lands are presented in Figure 3-3.

CCLMP, administered by the St. Louis County Parks and Recreation Department, is a 2,242-acre park mostly located on the Missouri River's Howard Bend floodplain (see Figure 3-3). The park includes a 300-acre lake and provides outdoor recreation activities for the residents of St. Louis County, St. Charles County, and visitors to metropolitan St. Louis. CCLMP provides numerous outdoor recreation opportunities for both active and passive pursuits. Opportunities exist for activities such as picnicking, walking, sunbathing, sightseeing, bird watching, and fishing. The northern portion of the park is primarily used for active recreation. Active recreation in this area includes such activities as archery, softball, tennis, sailing, rowing, sail-boarding, ice skating, disc golf, and jogging. Special events such as power boat racing take place at occasional times throughout the year. Swimming is not allowed in the lake. In contrast, the southern portion of the park, including the Page Avenue mitigation lands is used for passive forms of recreation including bird watching and walking. This area is being used for the development of outdoor recreational areas which includes the development of wetland and wildlife habitats. St. Louis County Parks Department is currently developing the master plan for the park to guide its future development and use.

3.2 Cultural Resources

3.2.1 Prehistoric and Historic Summary

The Howard Bend study area has been inhabited for thousands of years. The long sequence of human interaction with the natural environment can be characterized by an increase in cultural complexity, beginning with small egalitarian hunting and hunting/foraging societies culminating many years (and cultures) later with socially stratified, agriculturally-based societies. Prehistoric subsistence practices in eastern North America have traditionally revolved around the collection of native plant foods as an adjunct to hunting and fishing. Evidence from both archaeological and ethnological investigations indicate that prior to the European settlement, Native Americans had developed uses for many plant species (Yarnell, 1976). Table 3-11 illustrates the primary characteristics of the early inhabitants of the study area.

The History of Creve Coeur Lake

Creve Coeur Lake was one of the region's most popular recreational attractions around the turn of the century and after. The lake was the site of the St. Louis County Fair in the late 1800s, and has over the years been the site of such activities as carnivals, fireworks, boat and motorcycle races, and picnicking. In 1910, approximately 15,000 people crowded the shores of the lake for a boat regatta. The Missouri Pacific Railroad and the Creve Coeur Lake streetcar line provided transportation from St. Louis to the lake. Citizens from St. Louis would drive to the lake via horse-drawn wagons and carriages over distances of up to 20 miles (Citizens Historical Committee, 1968; Thomas, 1911).

In the early twentieth century, such attractions as Hickory and Dripping Springs, Studt's Park, Electric Park, Eldorado, the Hellrung and Grimm Outing Club, and the Creve Coeur Yacht Company's clubhouse could be enjoyed around the lake area. During the prohibition period of the 1920s, gangsters and racketeers frequented the clubs and resorts around the lake. By the late 1930s, however, the lake's popularity declined, perhaps because of economic hardships or the availability of the automobile which could take the traveler to new, more distant vacation areas. In 1950, the last streetcar made its way from St. Louis to Creve Coeur Lake, and by then, silt in the lake had reduced its depth to a few inches. Since then, the county has dredged the lake and razed what was left of the old buildings around its shore (Citizens Historical Committee, 1968; Hannon, 1986; Thomas, 1911).

Table 3-11. Summary of Prehistoric Occupation Periods

Period	Dates	Description
Paleo-Indian Period	ca. 15,000-8000 B.C.	Big-game hunters who subsisted on both present-day animal and plant foods. Nomadic camps of low population densities were located on ridges or slopes overlooking reliable sources of water. The environment was undergoing changes as a result of retreating glaciers.
Dalton	ca. 8600-7000 B.C.	This period is characterized by a shift from forest to prairie communities in the Midwest; settlement shift from nomadic hunter to semi-nomadic hunter/forager.
Archaic	ca. 8000-1000 B.C.	Shift in diet from large game to small game, fish, nuts, and wild vegetables. Settlement shift from nomadic to sedentary; smaller territories were exploited for food resources.
Woodland	1000 B.C.-A.D. 900	The appearance of pottery and an agricultural society that was congregated in smaller, more permanent settlements.
Mississippian	A.D. 900-ca. A.D. 1600	Increased reliance upon agriculture as a subsistence base and increased social complexity. Settlement patterns are less nomadic and were characterized by large regional population centers surrounded by a radiating network of agricultural and special purpose sites.

Source: American Resource Group (ARG), 2002.

3.2.2 Archaeological Resources

A total of 18 investigations of archaeological resources in the Howard Bend study area have been conducted and have been summarized by ARG (2002). As a result of these previous investigations, 16 sites were identified within the study area (Figure 3-4, Table 3-12). Each of these sites was either determined to be ineligible for inclusion on the NRHP or was not formally evaluated as to its NRHP eligibility. In some instances, recommendations were made to avoid the site or to conduct further testing on the site prior to conducting any activities that would impact the site.

Table 3-12. Previously Recorded Archaeological Sites Located within the Study Area

Site ID No.	Description	NRHP Status	Further Recommendations
23SL376	Prehistoric (indeterminate age) and historic materials (1910)	Ineligible	Completely destroyed by the construction of Riverport.
23SL428	Prehistoric site	Ineligible	Site was destroyed.
23SL734	Prehistoric special function camp/historic residence/farmstead	Not evaluated	Further work needs to be conducted at the site prior to any activities that would adversely impact potential subsurface features.
23SL736	Special function camp with nondiagnostic prehistoric debris	Not evaluated	The site was destroyed by recent construction; no further recommendations.
23SL737	Historic recreation facility	Not evaluated	Highly probable that subsurface features are present; further testing needs to be conducted prior to any activities that would impact the site.
23SL738	Historic farmstead	Ineligible	Buried beneath a layer of sediment after the flood of 1993.
23SL739	Historic farmstead	Not evaluated	The structure has been razed; although it is possible that subsurface features are present; no recommendations for further work were made.
23SL740	Historic recreational facility	Not evaluated	As of 1989 the associated buildings were still in use; no recommendations for further work were made.
23SL741	Historic dwelling	Not evaluated	Highly probable that subsurface features are present; further testing needs to be conducted prior to any activities that would impact the site.
23SL742	Historic limestone quarry	Not evaluated	The site did not appear to have been disturbed since it was last utilized; no recommendations for further work.
23SL746	Historic residence	Not evaluated	Site was destroyed; no further recommendations.
23SL768	Prehistoric campsite or habitation area	Not evaluated	The site has been heavily impacted by clearing and agricultural activities.
23SL776	Historic midden	Not evaluated	Site is in poor condition and artifacts present are limited to the plow zone.
23SL883	Historic farmstead (turn of the twentieth century)	Ineligible	Destroyed during the razing of surface structures and by flooding.
23SL884	Historic farmstead (turn of the twentieth century)	Ineligible	Destroyed during the razing of surface structures and by flooding.
23SL885	Historic farmstead (turn of the twentieth century)	Ineligible	Destroyed during the razing of surface structures and by flooding.

Source: ARG, 2003.

Shipwrecks

Previously recorded shipwrecks are a common feature along the lower Missouri River and its floodplain. A total of seven shipwreck sites are recorded to have occurred within the Missouri River channel in the vicinity of the study area (see Figure 3-4). Additionally, one shipwreck is recorded to have occurred within the present Howard Bend study area (The USACE's *Abandoned Shipwrecks on Missouri River Channel Maps of 1879 and 1954)*. The shipwreck of the Carrier was recorded in two locations in the same year (1858). As a result, its exact location is difficult to ascertain. Neither the site of the Carrier wreck nor other reported shipwreck

locations have been formally investigated to confirm their location and characteristics (i.e., NRHP eligibility).

3.2.3 Historic Architectural Resources

A windshield survey of extant architectural resources was conducted during January and February 2001 (ARG, 2002). The architectural resources of the Howard Bend study area include a mixture of farmsteads, landscape product suppliers, recreational facilities, airport installations (both active and abandoned), and public water treatment facilities.

Twelve locations were identified as containing buildings that appear to be at least 50 years of age (Figure 3-4). Most of the architectural resources on the farmsteads are of wood-frame construction. The farmsteads include houses, barns, machine sheds, steel grain silos and miscellaneous outbuildings. They date from the late 1800s to the late 1900s and are described in summary form in Table 3-13.

Table 3-13. Historic Architectural Sites Located within or Adjacent to the Study Area

Site No.	Site Name	Date	NRHP Status
1	Dussault Farm	1920	NRHP Eligible
2	Dauster Farm (Thies Farm Products)	1940	Farmstead buildings in fair to poor condition. Property has minor local significance, although probably not NRHP eligible
3	Knobbe Farmstead	1940	Not likely to be NRHP eligible
4	Seeger West County Golf Range	1930s	Potentially NRHP eligible
5	Armina Lodge Cemetery*	1885	Not known
6	John Prestien Farmstead*	1930s	Not likely to be NRHP eligible (buildings may have local historical significance because of their association with early farming activities in the county; however, buildings are abandoned and in poor condition)
7	Abandoned House	Not known	House and garage are in poor condition; unlikely to be eligible for the NRHP
8	Timber Country Mulch/Cordell Quethem Farmstead	1880s	Site may have local significance and may be potentially NRHP eligible
9	St. Louis County Waterworks/ Missouri American Water Company's Central Plant	1929/ 1933-1938	It is likely that these buildings are architecturally significant and would be potentially eligible for the NRHP
10	City of St. Louis Howard Bend Water Plant	ca. 1926-1927	The water intake plant complex is architecturally significant and would likely be considered NRHP eligible
11	Burkhardt Tenant Farmstead	Not known	The buildings are of standard design and construction; not likely to be NRHP eligible
12	Marie Burkhardt Farmstead	ca. 1940	The buildings are of standard design and construction; not likely to be NRHP eligible

* Located outside the study area near Olive Boulevard.

Source: ARG, 2002.

The following sites are located in the Howard Bend study area. Although not formally evaluated for NRHP eligibility, they were deemed potentially significant historically based upon a site visit and/or an initial review.

Dussault Farm (ca. 1920)
This site consists of a house and a garage, and is potentially NRHP eligible (ARG, 2002). The house may have been built for Maud Smith by Mr. Quatum, a successful farmer in the bottoms around 1920. The property may be considered locally significant because of its association with recreation and prohibition historic themes in the early development of the river bottoms. Additionally, the bricks used in its construction may have been made in the City of St. Louis. The exterior of both the house and the garage have been restored, and are in very good condition.

Seeger West County Golf Range (ca. 1930s)
The Seeger West County Golf Range site is comprised of a practice range and one structure, a golf pro shop. The estimated construction date of this structure is ca. 1930s. The exterior of the building has been modified somewhat by an addition to the rear of the building, the installation of vinyl siding, and enclosure of the porch. The building and the site may be historically significant because of the association with the recreational and prohibition activities of the period from the 1920s to the 1930s.

Timber Country Mulch/Cordell Quethem Farmstead (ca. 1880s)
This site is comprised of a house, two barns, a machine shed, a pump house, a garage, corrugated metal silos, and a sales shed. Nothing is known of the history or background of this property. Based on the apparent age of the house (ca. 1880s), it is possible that the site may have local significance and may potentially be NRHP eligible.

The City of St. Louis Howard Bend Water Plant (ca. 1926-1927)
The City of St. Louis Howard Bend Water Plant is comprised of a complex of four major buildings and several smaller ones. They are all built of small rock-faced stones laid in broken courses. The trim is made of ashlar stone. The buildings were designed in 1926 and 1927 by the staff of the St. Louis City Water Division, with the assistance of the Board of Public Service. The water intake plant complex is architecturally significant and would likely be considered eligible for listing on the NRHP.

St. Louis Water Company's St. Louis County Waterworks (1929)/Missouri American Water Company's Central Plant (ca. 1933-1938)
The St. Louis Water Company's St. Louis County Waterworks is currently located south of the study area along Waterworks Road (see Figure 3-4). The plant was constructed in 1929 to provide a potable water supply to the expanding development in St. Louis County. Subsequent expansions were made in 1931 and 1954-55 (Schworm, 1968).

The Missouri American Water Company's Central Plant is a complex of buildings in mostly a matching style of yellow brick with stone or cast concrete trim. The dates of construction of these buildings are estimated to be ca. 1933-1938 (ARG, 2002). It is likely that this complex of buildings would be considered architecturally significant and would be potentially eligible for the NRHP.

3.3 Traffic and Transportation

3.3.1 Roadway Network

The Howard Bend study area is located within a complex and often congested urban transportation network. The major components of the regional transportation system in proximity to the study area include major interstate freeways, urban arterial, collector, and local roads, railroad facilities, and a general aviation airport. Additionally, a well developed hike and bike trail system associated with CCLMP is in place and utilized by park users.

The study area is situated in the northwestern portion of the St. Louis metropolitan area. I-70 forms the northern boundary of the study area and is an important part of the region's interstate transportation network. I-270 is circumferential roadway system around St. Louis that is located approximately 1 mile to the west of the study area and is a major circumferential interstate for the St. Louis region. In proximity to the study area, I-270 functions as a major north/south arterial connecting I-64, the Page Avenue Extension, and I-70. Each of these interstate highways are fully access controlled freeways. Access to these facilities is provided via grade separation and interchanges with high volume arterials.

Primary access to the study area from I-70 is via the Earth City Expressway South interchange. I-70 crosses the Missouri River at the Blanchette Memorial Bridge into St. Charles County which abuts the northwest corner of the study area. I-70 is characterized by ten lanes in this location and is a major corridor for St. Charles County residents and residents of other surrounding counties commuting to St. Louis County and St. Louis City. Additionally, because I-70 is a major national east-west interstate corridor, it receives significant through traffic passing through the St. Louis region.

MoDOT has recently completed the construction of the Page Avenue Extension. This new facility extends from its existing terminus west of I-270, then crosses CCLMP and the Howard Bend floodplain, the Missouri River, and then extends into St. Charles County. Page Avenue Extension is a divided 10-lane facility providing access to the study area via an interchange just south of River Valley Drive.

North-south movements within the study area are currently served primarily by the Earth City Expressway and Creve Coeur Mill Road. The Earth City Expressway is a primary arterial serving the northern portion of the study area and the Earth City Industrial Park north of I-70 (north of the study area). Access to Earth City Expressway from I-70 is via a partial cloverleaf interchange. Access to the Earth City Expressway is typically achieved via signalized intersections with other larger volume roadways. The Earth City Expressway currently extends from State Route (SR) 370, north of Earth City, across I-70 and south to Prichard Farm Road. It consists of two through lanes in each direction in this segment with associated turn lanes into Riverport and Harrah's Casino complex.

Creve Coeur Mill Road is a north-south roadway in the study area. The roadway is classified as a minor arterial for the segment extending from Prichard Farm Road to Olive Boulevard and is one lane in each direction in this segment. Because of its low topographic position within the floodplain, Creve Coeur Mill Road is often subject to localized flooding and becomes impassable. Prichard Farm Road, located in the vicinity of Harrah's Casino and Riverport is a north-south connector roadway that links Creve Coeur Mill Road with the Earth City Expressway. Prichard Farm Road is also classified as a primary arterial.

The MHE is a project that extends a four-lane expressway facility from the terminus of the Earth City Expressway at Pritchard Farm Road, south to River Valley Drive. This 2.9-mile facility is an important central arterial facility within the Howard Bend study area that effectively provides service to local traffic within the area as well as more regional movements. The roadway has also been constructed at an elevation that will be above the 100-year flood elevation of the Fee Fee Creek and Creve Coeur Creek systems. Consequently, north-south traffic movement within the study area will not be interrupted during conditions of localized flooding. The roadway is currently open for traffic but is still undergoing final construction.

An additional secondary arterial within the planning area is Marine Avenue that provides a link between the central portion of the study area and the upper, urbanized portion of the City of Maryland Heights and is the primary access road to CCLMP.

River Valley Drive is a two-lane primary collector road providing the principal access to the Hog Hollow Road and Waterworks Road in the southwestern portion of the planning area. Roadways of this classification are designed to collect and distribute traffic between specified areas and the arterial roadways and expressways. River Valley Drive connects at Creve Coeur Mill Road and proceeds west to a grade separated overpass with Page Avenue Extension. It then proceeds south toward the Missouri American Water Company where it turns to the southeast and proceeds up the river bluff through a residential area to Olive Boulevard. River Valley Drive from Page Avenue Extension south to Hog Hollow Road is on a recently completed new alignment constructed in 2000-2001. The previous alignment was parallel to the old levee system, and the road was relocated after the levee was reconstructed further to the east.

Hog Hollow Road is a two-lane facility which provides access from its connection with River Valley Drive through the existing plant operations of the Missouri American Water Company and then proceeds south up the bluff and connects with Olive Boulevard.

Other existing road systems within the study area consist of major and minor arterials and local roads. Pritchard Farm connects to the MHE at Casino Drive and serves as an arterial for vehicles accessing the northern areas of Maryland Heights and Bridgeton via McKelvey Road. It provides access to residential areas of Bridgeton and Maryland Heights, Pattonville High School, Fred Weber, Inc. construction services operations, and a variety of light industrial uses in the northeast sections of the study area.

Casino Drive is a four-lane access road that serves Harrah's Casino and Hotel complex. This elevated roadway is built on a flood protection berm and terminates in the Harrah's Casino complex.

Riverport Drive serves as the only connection to the Riverport development from Earth City Expressway. This loop road has two signalized access points with Earth City Expressway. Riverport Drive serves as a collector/distributor road to the numerous office buildings and business service centers within the Riverport development and the UMB entertainment complex.

Waterworks Road is segmented and exists in two locations. The southeast segment provides access from Creve Coeur Mill Road along the southern boundary of the study area to River Valley. The southwestern section of Waterworks Road provides access to the City of St. Louis Missouri River Water Plant. The two segments of Waterworks Road are connected via a platted and unconstructed right of way (Paper Street) which parallels the Union Pacific Railroad single track line and the base of the Missouri River bluffs which form the southern boundary of the study area.

Other roadways within the study area include a number of local roads that provide access to various developments from the existing collector and arterial system. These include roads within the Riverport Development, minor streets serving the light industrial uses within the northern study area, and Airport Road which serves the Creve Coeur Airport users and operations.

Other transportation components within the study area include the Union Pacific Railroad, Creve Coeur Airport, and a trail system. The Union Pacific is a single track facility which traverses the entire study area. It enters the study area in the most southwestern corner and proceeds east along the base of the Missouri River bluff. At its intersection with Creve Coeur Mill Road, the Union Pacific parallels along the east side of Creve Coeur Mill Road in a north-south direction through the study area. The Union Pacific Railroad averages two trains per day.

Creve Coeur Airport is a privately owned public use airport with services and facilities for general aviation aircraft of single and twin engine piston aircraft. The Creve Coeur airport has been designated by the East-West Gateway Coordinating Council (EWGCC) in 1991 as a regional reliever airport. *"A reliever airport provides facilities and services for attracting and diverting general aviation activity from major air carrier airports."* The airport is located on 160 acres in the central part of the study area and has approximately 250 aircraft based at the facility. The airport serves predominantly privately owned aircraft and is served by two existing runways. The current runways are planned for improvements of the primary runway to a 4,500-foot length and the extension of the crosswind runway to 2,800 feet. These improvements will require the purchase of an additional 145 acres of land and 13 acres of land for aviation clearances, respectively. The proposed long range improvement plan for the airport includes expanded parking, lighting of runways, expanded taxiways, and various air navigational devices. Facilities include hangers, tie downs, and service and fueling operations (Crawford, Murphy & Tilly, Inc, 1996).

The CCLMP bicycle and trail system that exists within the study area is generally confined within the limits of the park and the Page Avenue Extension mitigation lands. These various trails are approximately 4.5 miles in length.

3.3.2 Existing Traffic Volumes

Existing traffic volumes on the principal arterials are based upon AADT and consists of average number of vehicles that travel these roadways on an average day throughout the year. The AADT accounts for vehicles traveling in both directions on a given roadway. For many of the roadways, AADT was determined by actual traffic counts on specific locations of the roadways. A summary of known traffic volumes within the study area in year 2000 is provided on Table 3-14.

Table 3-14. Existing AADT

Roadway and Segment	AADT (2000)
Creve Coeur Mill Road (north of Olive)	12,200
Creve Coeur Mill Road (north of River Valley)	9,000
Marine Avenue (south of Creve Coeur Mill Road)	6,700
Earth City Expressway (north of Pritchard Farm)	27,900

Source: CBB, 2001.

3.4 Air Quality

3.4.1 Air Quality Standards

Air quality is regulated by the USEPA. The USEPA delegates authority to the MDNR for monitoring and enforcing air quality regulations in Missouri. The MDNR then delegates some authority to local municipalities having air quality control agencies. In Maryland Heights, this agency is the City of St. Louis Air Pollution Control Department (APCD).

Air quality in Missouri is defined with respect to conformity with the National Ambient Air Quality Standards (NAAQSs). These standards were developed and promulgated by the USEPA (Table 3-15). The six priority air pollutants constituting the NAAQSs are ozone (O_3), carbon monoxide (CO), sulfur dioxide (SO_2), nitrogen dioxide (NO_2, often reported as part of nitrogen oxides, NO_x), particulate matter less than 10 microns in aerodynamic diameter (PM_{10}), and lead (Pb).

MDNR has adopted the standards for the criteria pollutants listed in Table 3-15 in its air quality program. The USEPA and MDNR classify geographic regions of Missouri as having air quality better or equal to (attainment) or worse than (non-attainment) these standards.

Table 3-15. USEPA Criteria Pollutant Emission Standards

Pollutant	Averaging Period	Primary	Secondary
CO	1 hour	35 ppm	35 ppm
	8 hour	9 ppm	None
Pb	3 month	1.5 μg/m^3	1.5 μg/m^3
NO_2	1 year	0.053 ppm	0.053 ppm
O_3	1 hour	0.12 ppm	0.12 ppm
	8 hour	0.08 ppm	0.08 ppm
SO_2	24 hour	0.14 ppm	None
	1 hour	0.03 ppm	None
	3 hour	None	0.5 ppm
PM_{10}	1 year	50 μg/m^3	50 μg/m^3
	24 hour	150 μg/m^3	150 μg/m^3
$PM_{2.5}$	1 year	15.0 μg/m^3	15.0 μg/m^3
	24 hour	65 μg/m^3	65 μg/m^3

μg/m^3 = micrograms per square meter.
ppm = parts per million.
Source: Missouri Department of Natural Resources.

The USEPA and MDNR have classified St. Louis County as being in attainment with all the criteria pollutant NAAQS, except that of ozone. Ozone levels in St. Louis County are designated as being in non-attainment with the ozone NAAQS. Tropospheric ozone is a secondary pollutant that forms when ultraviolet radiation catalyzes a reaction between volatile organic compounds and oxides of nitrogen.

The Clean Air Act and Amendments (CAAA) of 1990 requires states with areas that are not in compliance with any NAAQS to develop state implementation plans (SIPs). The CAAA classifies the areas by magnitude of noncompliance for the Ozone Non-Attainment areas in five

categories (marginal, moderate, serious, severe, and extreme). The St. Louis ozone non-attainment area has been classified as a bi-state moderate non-attainment area. Section 181 of the CAAA requires states with moderate non-attainment areas to achieve attainment by 1996. Currently the attainment date for the 1-hour ozone standard in the St. Louis area is established as November 15, 2004.

3.4.2 Air Quality Conditions

There are 11 air monitoring stations within the St. Louis, Missouri area which are operated by MDNR. Among these the Orchard Farm, Weidman-Queeny Park, and Ladue monitoring sites are representative of the study area and can be used to describe existing air quality of the area. Table 3-16 presents the air quality measurement for ozone for each of these locations. Ozone monitoring data shows that in general, violations are no longer occurring within the St. Louis region (see Table 3-16). The St. Louis metropolitan area has recorded 3 years of complete, quality assured ambient air quality monitoring data (2000-2002), demonstrating attainment with the 1-hour ozone standard. Based on emission trends, it is expected that the air quality will continue to meet the 1-hour ozone NAAQS throughout the maintenance period (2014).

Table 3-16. 2002 One-Hour Ozone Emissions from Selected Monitoring Stations in the St. Louis Area

Monitoring Site	1-Hour Highs (ppm)			
	1st	2nd	3rd	4th
Orchard Farm	**0.145***	**0.125***	0.117	0.114
Weidman-Queeny Park	0.114	0.113	0.110	0.108
Ladue	0.114	0.111	0.111	0.109

* Exceeds air quality standard.

Source: Missouri Department of Natural Resources.

The MDNR developed a transportation emission budget as required in the maintenance plan for conformity determinations. The budget establishes a cap on emissions that cannot be exceeded by predicted highway and transit vehicle emissions. Emissions expected from implementation of highway plans and programs should be consistent with estimates of emissions from motor vehicles and necessary reduction contained in the applicable SIP. The St. Louis area meets the five criteria as outlined in Section 107 (d)(3)(E) of the CAAA for redesignation status.

For the maintenance plan, the USEPA Air Quality Model, MOBIL6, transportation emission model was used to predict emissions and develop the budget. The mobile source budget is defined as the motor vehicle related portion of the project emission inventory that is used to demonstrate reasonable further progress milestones, attainment or maintenance for a particular year specified in the SIP. The mobile source budget establishes a limit on emissions that cannot be exceeded by predicted highway and transit vehicle emissions.

3.4.3 Emission Sources

Three basic types of sources of NO_x and volatile organic compound (VOC) emissions exist in the area: mobile sources, area sources (which consist of light industrial sources such as asphalt plants) and major point sources in the area. Total emissions in the St. Louis area are made up of approximately 60 percent from mobile sources, with the remainder area and major point sources. Table 3-17 presents the estimated amount of pollutants emitted in the St. Louis region in tons per day of the types of sources.

Table 3-17. St. Louis Area VOC and NO_x Emissions, 2000 (Tons of Ozone Per Season Weekday)*

Source Category	VOC	NO_x
Point Sources	46.59	165.96
Area Sources	57.38	32.27
On-Road Mobile Sources	103.79 / 84.56†	181.75 / 134.45†
Off-Road Mobile Sources	40.59	73.16
Total	248.35 / 229.12	453.14 / 405.84

* The ozone season is from April 1st through October 31st.
† Mobile 5.b.

3.5 Noise

Existing noise conditions within the study area were investigated in detail by MoDOT as part of the Page Avenue Extension EIS (TCT-St. Louis, Inc, 1992). Noise levels are measured using equipment that expresses the noise energy of the environment in units of L_{eq} on an A-weighted scale (measured in decibels-dB). The L_{eq} is the steady-state sound level which, in a given period of time, contains the same acoustic energy as the time-varying sound level during the same period. The A-weighted scale (dBA) emphasizes frequencies that approximate the response of the human ear.

Baseline conditions were established by measuring noise levels at each of 17 locations along the proposed route. A total of seven monitoring locations were located along various alternatives within the Howard Bend floodplain. Results of this baseline noise monitoring are presented in Table 3-18. Common sources of noise within the study area include that from ground transportation, occasional aircraft noise emissions, and the operation of agricultural equipment. These latter sources of noise, however, are generally more intermittent in their occurrence and therefore do not contribute significantly to the noise environment of the study area. Other common sources of noise are natural sounds such as wind, insects (crickets, etc.), birds, and calling amphibians. Automobile and truck traffic on roadways of the study area represent the primary sources of noise as the noise emission from such facilities is generally constant during daytime hours.

Table 3-18. Page Avenue Extension Noise Measurement Locations

Location Identification	Description	Noise Level (dBA)
Q	Open field, east of Creve Coeur Mill Road, south of Page Avenue Extension	65.8
QG	Creve Coeur Mill Road south of River Valley Drive	66.9
QH	CCLMP, near beach area at northern end of Creve Coeur Lake	63.6
QI	CCLMP, along Creve Coeur Creek south of Page Avenue Extension	47.8
QK	Creve Coeur Mill Road at Waterworks Road	67.4
QJ	CCLMP, along east side of Creve Coeur Lake along Page Avenue Extension	53.0
5	Residence along River Valley Drive, west of Creve Coeur Airport	46.6

Source: TCT-St. Louis, Inc. 1992.

In general, noise levels within the study area vary in their intensity in accordance to the nature of the surrounding land use and the relative distance from roadways. Areas that are characterized by high activities and close proximity to established roadways have been recorded to have baseline noise levels of over 60 dBA. In contrast, other areas more distant from arterial roadways exhibit baseline noise levels in the range of 45 to 50 dBA.

In addition to the above monitoring locations, MoDOT performed baseline noise monitoring at 25 locations in the vicinity of CCLMP to document the noise environment of the park. Results of this monitoring effort documented baseline noise levels of approximately 62 dBA in the vicinity of Creve Coeur Mill Road along the west side of the park and approximately 53 dBA along the protected east end of the park near the bluffs.

In general, the relationship between noise levels and land use are expected to be similarly applicable to other portions of the study area. High intensity use areas within the northern portion of the study area (i.e., Riverport, Harrah's, Earth City Expressway) are expected to have existing noise levels in the mid to upper 60s (dBA). In contrast, lower activity areas such as that of cultivated fields along River Valley Drive, Waterworks Road, and the undeveloped lands along the Missouri River, are expected to be characterized by noise levels ranging from 45 to 55 dBA.

3.6 Natural Resources

3.6.1 Geologic Setting

3.6.1.1 Geology and Topography

Geology

The Howard Bend study area geology consists of a thick sequence (approximately 100 feet) of alluvial sediments, which is underlain by limestone and shale (Rockaway and Lutzen, 1970; Lutzen and Rockaway, 1971; Miller et. al., 1974; Miller and Vandike, 1997; Brill, 1991; USACE, 2000; and Booker Associates, 1992). The alluvial sediments consist of sand, silt, clay, and gravel. The sediment from the glaciers was deposited within the river valley, and along with more recent deposits from the Missouri River, combined to form the alluvial sediments that exist today.

Typically the percent of fine-grained material (clay and silt) is higher in the upper part of the sediments, with coarser material (sand/gravel) dominating in the lower part of the sequence. The Missouri River alluvium forms an important and widely used water source as is discussed in Section 3.8.2.

Alluvial sediments within the study area are noted as having some limitations for development. For example, low-lying sediments associated with swamps and backwaters contain a high organic content and frequent flooding that renders them unsuitable for certain kinds of development such as waste disposal (landfills, sewage lagoons, etc.) and construction (foundations, roads, etc.). Other alluvial sediments with a higher percentage of sand, gravel, silt and clay, are better suited to development, particularly when flood risk is reduced (Rockaway and Lutzen, 1970 and Lutzen and Rockaway, 1971).

Geologic formations of the adjacent uplands consist primarily of limestone with minor amounts of shale and other lithologies. Dominant formations within the surrounding bluffs include the following:

- Ste. Genevieve Limestone;
- St. Louis Limestone;
- Salem Formation (limestone);
- Warsaw Formation (shale and limestone); and
- Cherokee Group (shale, clay, limestone, coal, sandstone).

The most significant seismically active feature in the region is the New Madrid Fault, located in the southeast Missouri boot heel. Minor tremors are relatively common in this area. The potential effect zones of a large earthquake (8.6 Richter magnitude) in the New Madrid seismic zones were developed by Thenhaus (1990). These effect zones are classified in the terms of a Modified Mercalli Intensity Scale, which generally decreases with distance from the New Madrid Fault. The subsurface geology is (in part) also considered, resulting in irregular shapes for the intensity zones. According to that scale, the most severe effects would be associated with zone XI and the lowest effects would be associated with zone VII. The study area is located in a moderate effect zone (VIII).

The potential earthquake effects (liquefaction/amplification, landslide, and collapse) depend on the subsurface geology. Liquefaction potential is mapped based on thick cohesionless soils (mostly sand) with a high water table (river valleys). Soil amplification potential, which causes increased ground shaking, is based on thick, soft, cohesive soils (mostly clay) combined with a high moisture content (river valleys). Landslide potential is mapped based on significant stretches of high local relief (river bluffs). Collapse potential is mapped based on karst features (sinkholes, caves, etc.) and /or shallow mine openings (MDNR, 1993). Due to the high sand and clay content, and high water table in the Missouri River floodplain within the study area, the potential for liquefaction/amplification is considered severe (MDNR, 1993 and 1995). The Missouri River bluffs surrounding the study area are (in part) identified as having landslide potential. Due to the lack of karst features, no collapse potential is identified in the study area.

Topography

The topography of the study area is characteristic of the Missouri River floodplain and is relatively flat, with surface elevations typically at about 440 to 450 feet mean sea level (msl). Agricultural use coupled with the construction of levees and drainage ditches have resulted in an alteration of the surface topography. The normal pool elevation of Creve Coeur Lake is 442.2 feet msl, whereas the elevation of many of the drainage ditches and small streams in the study area floodplain is approximately 435 to 440 feet msl.

Uplands to the east and south of the study area have a terrain that is more variable and dissected. Typical elevations of the bluffs range from 550 to 600 feet msl. Elevations of the numerous streams and ravines that dissect the uplands range from about 450 to 500 feet msl.

3.6.1.2 Mineral Resources

The mineral resources (sand/gravel and limestone) within the study area are limited, with no known mines or quarries located within the study area [MDNR-Inventory of Mines, Occurrences, and Prospects (IMOP) Database, 2002].

The Weber Quarry (approximately 80 acres in size) extracts limestone from the St. Louis and Salem Formations; however, it is located just outside (northeast) of the study area boundary (Weber Quarry personal communication, 2002).

Sand and gravel is periodically extracted from the Missouri River during dredging operations. The location and extent of these operations vary and are permitted by the USACE. St. Charles Sand Company operates regularly within the Missouri River in the vicinity of the study area.

3.6.2 Soils

The soils within the study area were formed in recently deposited alluvium and consist of mixtures of silt, clay, and sand. The study area soils were deposited by a meandering river and have been altered by erosion (in conjunction with periodic flood events) and anthropogenic sources (i.e., farming, construction, etc.). Therefore, soil profiles encountered in the field may not match the "typical" profiles listed by the Soil Conservation Service (SCS, 1982, now NRCS). The following soils have been mapped in the study area [U.S. Department of Agriculture (USDA), 1982]:

- *Wilbur Silt Loam* -- The Wilbur series consists of deep, moderately well drained, moderately permeable soils on floodplains. The typical Wilbur soil profile consists of 0 to 6 inches of layered dark grayish brown and brown silt loam, and 6 to 50 inches of layered brown silt loam.
- *Eudora Silt Loam* -- The Eudora series consists of deep, well drained, moderately permeable soils on floodplains. The typical Eudora soil profile consists of 0 to 12 inches of very dark grayish brown silt loam, 12 to 23 inches of brown and dark grayish brown silt loam, and 23 to 37 inches of brown very fine sandy loam.
- *Booker Clay* -- The Booker series consists of deep, very poorly drained, very slowly permeable soils on floodplains. The typical Booker profile consists of 0 to 37 inches of dark gray clay.
- *Blake Silty Clay Loam* -- The Blake series consists of deep, somewhat poorly drained, moderately permeable soils on floodplains. The typical Blake profile consists of 0 to 9 inches of very dark grayish brown silty clay loam, and 9 to 23 inches of layered dark grayish brown silty clay loam and brown very fine sandy loam.
- *Waldron Silty Clay* -- The Waldron series consists of deep, somewhat poorly drained, slowly permeable soils on floodplains. The typical Waldron profile consists of 0 to 23 inches of dark grayish brown silty clay and 23 to 39 inches of layered dark grayish brown silty clay and grayish brown silt loam.
- *Sarpy Loamy Fine Sand, rarely flooded (#44) and Sarpy Loamy Fine Sand, frequently flooded* -- The Sarpy series consists of deep, excessively drained, rapidly permeable soils on floodplains. The typical Sarpy profile consists of 0 to 31 inches of loamy fine sand.
- *Blake to Eudora to Waldron Complex* -- This complex consists of mixtures of these three soils (described above) that were not separated in the field mapping.

Due to the potential for flooding, wetness and shrink-swell, the mapped soils within the study area have moderate to severe limitations for most building site developments (e.g., dwellings with or without basements, small commercial buildings, and roads) (USDA, 1982).

Only two of the study area soils are currently listed by the NRCS as hydric soils: the Booker Clay and the Sarpy Loamy Fine Sand, frequently flooded. Inclusions of hydric soils have been observed in most of the other mapped soils. As an example, the Wilbur Silt Loam is a listed non-hydric soil but was observed to have inclusions that meet the hydric soil criteria in proximity to Creve Coeur Lake.

3.6.3 Ecological Resources

3.6.3.1 Land Cover

Vegetative land cover within the Howard Bend study area was identified using a combination of photo-interpretation of 2001 aerial photography coupled with field reconnaissance. Results of this effort are presented in Figure 3-5 and Table 3-19.

Table 3-19. Summary of Land Cover

Land Cover Type	Acres	Percent
Cultivated Field	3,182	36.9
Developed Lands	1,284	14.9
Grassland	1,178	13.7
Deciduous Forest	934	10.8
Old Field	817	9.5
Wetlands	708	8.2
Water	516	6.0
Mud/Sand	4	<0.1
Total	8,623	100.0

Source: MACTEC, 2003.

Cultivated Field

Cultivated fields accounted for 3,182 acres and represent the predominant cover type within the area. The predominance of this cover type reflects a long history of agricultural use within the study area dating back to the early 1800s. Vegetative communities associated with this cover type are generally low in quality and are dominated by cultivated crops (corn, soybeans, specialty crops), and weedy species such as foxtail (*Setaria* sp.), ragweed (*Ambrosia* spp.), amaranth (*Amaranthus* sp.), and velvetleaf (*Abutilon* sp.), among others.

Grasslands

Grasslands are the second-most abundant land cover type, accounting for 1,178 acres (13.7 percent). Lands included in this cover type consist of recreational areas (e.g., soccer fields, golf course, driving ranges, etc.), airport grassed runway and clear zones, levees, and maintained open space around industrial facilities such as the Missouri American Water Company and the MSD plant. In general these areas are low-quality habitats that are dominated by species such as fescue (*Festuca elatior*), bluegrass (*Poa pratensis*), foxtail (*Setaria* spp.), and other ornamental grass species. Areas within the vicinity of Little Creve Coeur Lake, however, are grasslands that are more valuable for wildlife. These areas represent lands that have recently been removed from cultivation and are being developed as mitigation areas and passive recreational areas by MoDOT and St. Louis County Parks Department.

Wetlands

Wetlands represent approximately 8.2 percent of the study area and encompass a total of 708 acres. Wetland types vary in vegetative form and water permanence and are generally associated with lands along the Missouri River, in the upper regions of Creve Coeur Lake, and at various other locations within the study area. A detailed discussion of wetland types, representative vegetation, and function is provided in Section 3.7.

Deciduous Forests

Deciduous forests cover approximately 934 acres within the study area. Given the study area's location on the Missouri River floodplain, all of the forests are considered bottomland forests, as compared to the upland forests located on the adjacent hills and bluffs. Natural bottomland forest communities are characterized by the presence of alluvial soils (sand/silt/clay) and frequent flooding or ponding water (Nelson, 1985). The vegetative composition and structure of this community type varies with local topography, hydrology, soils, and level of disturbance.

In general, the forests in the study area can be classified as mesic to wet-mesic bottomland forests (Nelson, 1985). The mesic bottomland forests are located on level to gently sloping natural levees or higher elevations on the floodplain. The soil is moderately well drained, with the soil profile generally moist for most of the year, but wet for only a short time (usually spring) of the year. The wet-mesic forests are located on level to gently sloping bottomlands, at slightly lower elevations than the mesic forests. The soils are somewhat poorly drained and are seasonally or intermittently wet for significant periods. The water table is usually near the surface for part of the year. The vegetation in the wet-mesic forests typically meets the wetland vegetation criteria (USACE, 1987), but may not meet the hydrology or soils criteria. These forests are typically interspersed with, or grade into wetlands.

The principle areas of mesic and wet-mesic forests within the study area occur as a relativity narrow strip along the Missouri River (river side of the levee), Jane Downing Island and associated areas, and at the southern end of CCLMP (see Figure 3-5). Smaller isolated tracts are located throughout the study area.

The mesic and wet-mesic communities within the study area have a tree canopy that is characterized by cottonwood (*Populous deltoides*), sycamore (*Platanus occidentalis*), silver maple (*Acer saccharinum*), box elder (*A. negundo*), hackberry (*Celtis occidentalis*), slippery elm (*Ulmus rubra*), green ash (*Fraxinus pennsylvanica*), and persimmon (*Diospyros virginiana*). Common shrub and vine species include deciduous holly (*Ilex decidua*), dogwood (*Cornus* spp.), poison ivy (*Toxicodendron radicans*), trumpet creeper (*Campsis radicans*), moonseed (*Menispermum canadense*), grape (*Vitis* spp.), green briar (*Smiliax* spp.), Virginia creeper (*Parthenocissus quinquefolia*), and Japanese honeysuckle (*Lonicera japonica*). Stinging nettle (*Urtica dioica*), false nettle (*Boehmerica cylindrica*), pokeweed (*Phytolacca americana*), sedges (*Carex* spp.), white snake root (*Ageratina altissima*), giant ragweed (*Ambrosia trifida*), white avens (*Geum canadense*), spotted touch-me-not (*Impatiens capensis*), and wood sage (*Teucrium canadense*) are representative of the herbaceous layer.

Old Field

Old fields consist of fallow farm fields or abandoned developed areas. Approximately 817 acres of old field were identified in the study area. Typical old field plant species include goldenrod (*Solidago* spp.), ragweed (*Ambrosia* spp.), grape (*Vitis* spp.), Queen Anne's lace (*Daucus carota*), Johnson grass (*Sorghum halepense*) and various tree saplings (cottonwood, box elder, etc.). Primary areas mapped as old field include areas outside of the 500-year levee in the vicinity of Jane Downing Island, vacant lands in the vicinity of the MSD plant, and various parcels scattered in Riverport and other locations. Old field habitats can provide wildlife functions, such as cover and forage.

Developed Lands

Developed lands within the study area include areas that are either under construction or exist as established residential, commercial and industrial uses, roadways, and parking lots. In general, these areas consist of landscape and drainage features that are peripheral to developed, impervious land surfaces. Approximately 1,284 acres of developed lands were

identified in the study area. In general, this cover type offers little in the way of habitat value, although peripheral areas may be used intermittently by songbirds, waterfowl and other fauna that are tolerant to high levels of human activity.

3.6.3.2 Wildlife

Wildlife occurring within the study area has been documented by a number of previous studies:

- Page Avenue Extension Wintering Bald Eagle Study (Dunstan, 1989);
- Page Avenue Extension Biological Survey and Reconnaissance of Vertebrate Species (Dunstan and LaCross, 1989);
- Little Creve Coeur Lake Bird Atlas for 1999 (St. Louis County Parks, unpublished data); and
- Indiana Bat Habitat Survey, Howard Bend Levee District Proposed Borrow Site, Maryland Heights, Missouri (Burns & McDonnell, 2000a).

In general, the results of these inventories revealed wildlife communities that correspond to the quality and distribution of cover types within the study area. As discussed in Section 3.6.3.1, general cover types within the study area included cultivated fields, grassland, wetlands, deciduous forest, old field, developed lands, and open water.

Birds

A total of 152 bird species were documented from all habitats within the study area (St. Louis County Parks and Recreation, 1999). Historical bird use within the study area and adjacent bluff area is relatively high as reported by Dunstan and LaCross (1989). In addition to field studies performed as part of the Page Avenue Extension project, they compiled a list of birds identified from the area by field biologists and birders from 1974 to 1989. In total, 212 bird species were included on their list. The largest number of bird species was documented from woodland and wetland habitats. Lesser numbers of species occurred in cropland, old field, and urban areas.

Representative birds identified within forested habitats included blue jay (*Cyanocitta cristata*), black-capped chickadee (*Parus atricapillus*), tufted titmouse (*Parus bicolor*), common crow (*Corvus brachyrhynchos*), and American robin (*Turdus migratorius*). In contrast, water-dependant species such as wood duck (*Aix sponsa*), killdeer (*Charadrius vociferous*), great blue heron (*Ardea herodias*), and red-winged blackbird (*Agelaius phoeniceus*) were frequently observed within emergent wetlands, the open water areas of Creve Coeur Lake, and Little Creve Coeur Lake. Species that were more commonly associated with cropland and pasture included barn swallow (*Hirundo rustica*), purple finch (*Carpodacus purpureus*), mourning dove (*Zenaida macroura*), chimney swift (*Chaetura pelagica*), and northern mockingbird (*Mimus polyglottos*). Notable or uncommon bird species observed within the study area included American bittern (*Botaurus lentiginosus*), northern harrier (*Circus cyaneus*), white pelican (*Pelecanus erythrorhynchos*), ruddy duck (*Oxyura jamaicensis rubida*), and black-necked stilt (*Himantopus mexicanus*).

Nineteen bird species identified from the study area are currently assigned a state status or rank by the MDC (see Section 3.6.3.3, Sensitive Species).

Mammals

A total of 16 mammal species were documented from all habitats within the study area. A proportionate number of species were documented in both wetland and nonwetland cover types. Woodland and wetland habitats were highly utilized. Representative species included white-tailed deer (*Odocoileus virginianus*), opossum (*Didelphis marsupialis*), raccoon (*Procyon lotor*), muskrat (*Ondatra zibethica*), and eastern gray and eastern fox squirrels (*Sciurus*

carolinensis and *S. niger*). Cropland and old field habitats were utilized to a lesser extent, but a larger proportion of small mammal species occurred in these habitats including eastern mole (*Scalopus aquaticus*), meadow vole (*Microtus pennylvanicus*), and eastern cottontail rabbit (*Sylvilagus floridanus*).

Reptiles and Amphibians

Previous studies conducted for the Page Avenue Extension also evaluated the study area for the presence of reptile and amphibian (herpetile) species. A total of 10 species were documented from all habitats within the study area. With the exception of the eastern box turtle (*Terrapene carolina*), all herpetile species were documented in pond, river, creek, ditch and wetland habitats, and adjacent riparian areas. Woodland, streambed, and old field habitats contained fewer herpetile species than wetland and aquatic cover types. Commonly found amphibian species included bullfrog (*Rana catesbeiana*), green frog (*R. clamitans*), cricket frog (*Acris crepitans*), northern leopard frog (*R. pipiens*), Fowler's toad (*Bufo woodhousii fowleri*), and southern leopard frog (*R. sphenocephala*). Frequently encountered turtles included eastern box turtle and false map turtle (*Graptemys pseudogeographica*). No snake species were inventoried during the survey. Based upon the kinds of cover types represented within the study area, it is likely that typical snake species may include eastern garter snake (*Thamnophis sirtalis sirtalis)*, black rat snake (*Elaphe obsoleta*), northern water snake (*Nerodia sipedon sipedon*), and western ribbon snake (*Thamnophis proximus proximus).*

3.6.3.3 Sensitive Species

The Endangered Species Act of 1973 (16 USC 1531-1543) provides for the protection of threatened and endangered species, and the conservation of designated critical habitat. The potential occurrence of Federal and state listed species in the vicinity of the study area was determined through literature review, field observation, and agency consultation with USFWS and MDC. As is summarized in Table 3-20, MDC identified 11 sensitive species that have the potential to occur in the study area (see Appendix A, MDC agency letter dated September 6, 2002). No response was received from the USFWS. Several of these species have been observed to occur within the study area (e.g., many of the bird species, several plants). However, other species have a distribution that may encompass the study area, but have not been reported from the study area. The following discussion is limited to those Federal or state listed species that have been reported to occur within the study area.

No species of conservation concern, including state and Federal listed threatened and endangered species, were observed during field reconnaissance of the study area. There is no designated critical habitat within the study area.

Federal and State Listed Species

Indiana bat (*Myotis sodalis*)

The Indiana bat is a Federal and state listed endangered species that utilizes summer habitats within mature floodplain, riparian, and adjacent upland forests. Indiana bats roost and establish maternity colonies primarily beneath the loose bark of dead, dying or live hickory, oak and other trees. Foraging areas of Indiana bats are primarily tree canopies of floodplain, riparian, and upland forests. Indiana bat winter habitat consists exclusively of caves and mines with specific temperature and humidity ranges (USFWS, 1999).

Table 3-20. Federal and State Listed Species and Species of Conservation Concern within the Howard Bend Study Area

Common Name	Scientific Name	Status*		Reported in Study Area	Status in Study Area*
		Federal	State		
Birds					
Bald eagle	*Haliaeetus leucocephalus*	T	E, S2	N (1)	I
American bittern	*Botaurus lentiginosus*		E,S1	Y (2)	I
Snowy egret	*Egretta thula thula*		E, S1	Y (3)	I
Northern harrier	*Circus cyaneus*		E, S1S2	Y (3)	I
King rail	*Rallus elegans*		E, S1	Y (3)	I
Peregrine falcon	*Falco peregrinus tundrius*		E, S1	Y (3)	I
Loggerhead shrike	*Lanius ludovicianus*		S1S2	Y (3)	I
Pied-billed grebe	*Podilymbus podiceps*		S2	Y (3)	I
Least bittern	*Ixobrychus exilis*		S2	Y (3,4)	O
Little blue heron	*Egretta caerulea*		S2	Y (3)	O
Black-crowned night heron	*Nycticorax hoactli*		S2	Y (3)	I
Sora rail	*Porzana carolina*		S2	Y (3)	O
Common gallinule	*Gallinula chloropus*		S2	Y (3)	I
Marsh wren	*Cistothorus palustris*		S2	Y (3)	O
Henslow's sparrow	*Ammodramus henslowii*		S2	Y (3)	I
Virginia rail	*Rallus limicola*		S2?	Y (3)	I
Great egret	*Ardea alba*		S3	Y (3)	O
Cooper's hawk	*Accipiter cooperii*		S3	Y (3)	I
Yellow-headed blackbird	*Xanthocephalus xanthocephalus*		S3	Y (3)	I
Black tern	*Chlidonias niger*		SX	Y (3)	I
Interior least tern	*Sterna antillarum athalasus*	E	S1	N	Along Missouri River
Piping plover	*Charadrius melodus*	T	--	N	Along Missouri River
Mammals					
Indiana bat	*Myotis sodalis*	E	E	N (5)	†
Fishes					
Pallid sturgeon	*Scaphirhynchus albus*	E	E	N	Present in the Missouri River
Sicklefin chub	*Macrhybopsis meeki*		S3	N	
Sturgeon chub	*Macrhybopsis gelida*		S3	N	
Silver chub	*Macrhybopsis storeriana*		S3	N	
Plains minnow	*Hybognathus placitus*		S2	N	
Ghost shiner	*Notropis buchanani*		S2	N	
Plants					
Dwarf burhead	*Echinodorus tennellus*		S1	Y (2)	Present in CCLMP Lands
Yellow-flowered leafcup**	*Smallanthus uvedalius*		S4	Y (2)	
Large-seeded mercury‡	*Acalypha deamii*		SH	Y (2)	

* E – Endangered
S1 – Critically imperiled in the state
S1S2 – Rank of the species is between S1 and S2
S2 – Imperiled in the state
S3 – Rare and uncommon in the state
S4 – Rare and uncommon in the state
SH – Occurred historically in the state
SX – Element is believed extirpated from the state
? – Denotes inexact or uncertain ranks

Status in Study Area:
I – Infrequently observed
O – Occasionally observed

† Potential habitat along Missouri River and CCLMP.
** Last observed in 1881 (Smith, personal communication).
‡ Last observed in 1930 (Smith, personal communication).

Sources: (1) Dunstan and Lacrosse, 1989. (2) MDC, 2002. (3) St. Louis County Parks, 1999. (4) St. Louis County Parks, 2002. (5) Burns & McDonnell, 2000a.

A previous survey was conducted within the study area to assess the presence and quality of potential summer Indiana bat habitat. This survey was performed on a 275-acre parcel (the former Chesterfield Golf Course) that was proposed for use as a borrow site (Burns & McDonnell, 2000a). Potential habitat suitability was assessed by examining vegetative composition and structure within the area. As a result of this analysis, the site was determined to have a low suitability for roosting and foraging. No maternity roosting sites were observed (Burns & McDonnell, 2000a).

Suitable summer roosting and foraging habitat for the Indiana bat may, however, occur within the study area along the riparian corridors along the Missouri River, Fee Fee Creek, and Creve Coeur Lake. These riparian corridors also contain varying amounts of snags, cavities, and trees with exfoliating bark that may be used by Indiana bat as summer roost sites. There is no suitable winter habitat for Indiana bats within the study area.

Bald Eagle (*Haliaeetus leucocephalus*)
Bald eagle is a Federally listed threatened species and is listed by the state of Missouri as an endangered species. Previous surveys in the study area were conducted in conjunction with the Page Avenue Extension project from November 19, 1988 through March 8, 1989 to evaluate winter use of the area by bald eagle (Dunstan, 1989). Two sightings of adult bald eagles occurred during the study. One bald eagle was observed foraging near Missouri RM 36.3 on December 20, 1998 (St. Louis County) and a second individual was observed flying over Green's Bottom and Catfish Island in St. Charles County on February 24, 1989. Suitable bald eagle habitat within the study area was determined to be sparse due to the lack of mature trees clumped or located in places likely to be used for foraging, eating, resting or night roosting.

An analysis of habitat within the vicinity of the Page Avenue Extension indicated that a minimum amount of adequate perch tree habitat was available for bald eagle foraging, eating, resting, and night roosting. No adequate abundant food sources in the form of fish or waterfowl were identified. However, areas that were determined to be suitable to bald eagle winter use (feeding, roosting, etc.) were the habitats in association with Creve Coeur Lake and along the Missouri River at Jane Downing Island (RM 33.5, see Figure 3-6). It is likely that other areas containing sufficient forested composition and suitable perching/roosting trees are also located along the Missouri River within the Howard Bend study area.

Pallid Sturgeon (*Scaphirhynchus albus*)
The pallid sturgeon is a Federally endangered species that inhabits the Missouri and Mississippi rivers. The pallid sturgeon is a benthic (bottom-dwelling) fish that prefers turbid, swift-flowing water of various depths. Earlier studies indicated that the pallid sturgeon does not have a restricted home range and may move long distances (USFWS, 1993). Side channels, wing dams, and other channel training structures provide important habitat diversity under conditions of normal and high river stage, including over-wintering and nursery areas for benthic invertebrates, and riverine fish species including the pallid sturgeon (Atwood, 2000; Pitlo, 1998; USACE, 1999; Dunn and Johnson, 2000; Jacobson and Laustrup, 2000). Dike systems contribute to habitat diversity because they are comprised of a mosaic of steep bank, sandbar, deep channel habitat types, and a variety of microhabitats (USACE, 1999). Both dike fields and side channels occur in the vicinity of Jane Downing Island (see Figure 3-6) and may be suitable to pallid sturgeon use.

Interior Least Tern (*Sterna antillarum*)
The interior least tern is a small bird listed by the USFWS as endangered. Formerly well distributed in the Mississippi basin, the interior tern has been eliminated from most stretches of

the Mississippi River and its tributaries. It nests on barren or sparsely vegetated alluvial islands or sandbars maintained by periodic inundation from large rivers. Little is known about the interior tern's specific food preferences, but small fish such as minnows constitute its prey. While there is no documentation of occurrence, there is potential for periodic occurrence of the interior least tern along exposed sand bars of the Missouri River or Creve Coeur Lake in the study area.

Piping Plover (*Charadrius melodus*)
The piping plover is a Federally endangered bird species in the Great Lakes Region, and is listed as Federally threatened elsewhere in the U.S. Breeding sites are generally found on islands, lake shores, coastal shorelines, and river margins, with preferred substrates including open sand, gravel, or cobble. Piping plovers winter in coastal areas where they spend the majority of their time foraging. Primary prey for wintering plovers includes polychaete marine worms, various crustaceans, insects, and occasionally bivalve mollusks. Foraging usually takes place on moist or wet sand, mud, or fine shell. Piping plovers are not known to occur in the study area, but there is a potential for the small birds to periodically use the shorelines (e.g., Missouri River, Creve Coeur Lake) within the study area.

American Bittern (*Botaurus lentiginosus*)
This bird species is listed by the state of Missouri as endangered and primarily inhabits wet prairies, and a variety of nonforested wetlands including marsh, fen, and swamp habitats. Additional habitats include remnant basins, sloughs, and unfarmed, temporary wetlands in the Missouri River floodplain (MDC, 2002). Emergent wetland vegetation including cattail, bulrush, sedge, and rush species are vital habitat components for the foraging and breeding requirements of this species. Foraging strategies consist of stalking, hovering over, and plunging into water for small fish and frogs. Additional prey items include small reptiles, mollusks, and insects. The American bittern is documented to occasionally occur west of Creve Coeur Lake within the study area.

Snowy Egret (*Egretta thula*)
The snowy egret inhabits marshes, swamps, and lowland forests vegetated with shrubs and dense emergent vegetation including buttonbush, willow, and bulrush. This state listed endangered species forages in shallow water by stalking aquatic insects, small fish, and amphibians. This species has been reported infrequently as foraging within the study area. Nesting frequently occurs in vegetation measuring a height of approximately 13 feet and 7 centimeters at diameter breast height (dbh).

Northern Harrier (*Circus cyaneus*)
The northern harrier is listed by the state of Missouri as endangered and is reported to nest and hunt in a variety of habitats including grassland, old field, cropland, prairie, and non-forested wetlands with dense herbaceous vegetation measuring about 10 inches high. In contrast to other birds of prey, this species perches and hunts low to the ground (10 to 30 feet high) for prey items including small mammals, birds, reptiles, and amphibians.

King Rail (*Rallus elegans*)
The king rail is listed by the state of Missouri as endangered that is reported to occasionally utilize the habitats of the study area. This species inhabits wetlands dominated by emergent vegetation, preferably associated with riverine floodplain systems. Nesting and feeding activities occur in stands of emergent vegetation including cattails, rushes, smartweed, sedges, burreed, and cutgrass. Prey items include terrestrial and aquatic insects, crustaceans, and fruits and seeds depending on seasonal availability. King rails may occur where muskrats have created pathways through dense emergent vegetation.

Peregrine Falcon (*Falco peregrinus*)
The peregrine falcon was de-listed by the USFWS in 1994, but remains listed as a state endangered species in Missouri. Perching and nesting sites include cliffs, ledges, buildings, and smokestacks. Small mammals and birds are hunted over open habitat types including woodland and grassland. This species is usually observed in areas of shorebird and waterfowl concentrations in Missouri during spring and fall migrations to prey on geese, ducks, and swans. Limestone outcroppings within the bluffs immediately east of the Howard Bend floodplain are in the form of cliffs and ledges in some areas that may be suitable for use by peregrine falcon. Individuals of this species have been occasionally observed in the vicinity of Little Creve Coeur Lake.

3.6.3.4 Species of Special Concern

Animals of Special Concern

A number of birds listed as species of special concern are known to occasionally occur within the study area (see Table 3-20). Many of these species are water-dependent species that have been observed in the vicinity of Little Creve Coeur Lake and other wetland habitats. For example, herons, egrets, rails, terns, grebes, yellow-headed blackbirds, and marsh wrens are water-dependent species that utilize wetland and shallow water habitats for feeding, cover, and nesting.

The following is a description of other animal species of special concern that have previously been observed to occur within the study area.

The loggerhead shrike inhabits open areas with scattered trees and shrubs. Preferred foraging habitat includes old field, crop field, and hayfield. Perching and nesting is provided by a patchy distribution of thorny trees and shrubs within foraging areas, or fencerows and hedgerows adjacent to foraging areas comprised of honey locust, Osage orange, eastern red cedar, and multiflora rose. Prey items include large insects (beetles, dragonflies, butterflies), small mammals, birds, and reptiles. This species has been observed at Little Creve Coeur Lake within the study area.

Henslow's sparrow is a S2 ranked species of special concern that occurs in grasslands, old fields and cropland dominated by herbaceous vegetation 1 to 2 feet tall. This species prefers cool season grasses and forbs such as tall fescue, orchard grass, clover, and sedges with dense litter coverage for nesting and foraging for insects and seeds. Although Henslow's sparrow prefers damp conditions, it may inhabit dry upland fields. This species has been documented within the study area at Little Creve Coeur Lake.

Cooper's hawk is associated with terrestrial habitats and usually inhabits pine and oak-hickory forests. Snags, stumps, and logs are used as perches for spotting prey. Cooper's hawk feeds on a variety of insects, small mammals, birds, and amphibians and reptiles as a juvenile. Adult food habits primarily include birds such as thrushes, starlings, sparrows, and others which are found at the edges of woodlands, fields, and grasslands. This species is state-ranked S3, and has been documented within the study area at Little Creve Coeur Lake.

Four fish species are listed as species of special concern and have been reported to occur within the vicinity of the study area. They include the sicklefin chub (S3), sturgeon chub (S3), silver chub (S3), plains minnow (S2), and ghost shiner (S2). These species do not occur within the interior of the study area. Rather, they are restricted to the Missouri River, and its tributaries and side channels, outside the Howard Bend Levee system.

Plants of Special Concern

Dwarf burhead is an emergent aquatic species that colonizes the receding, sandy or rocky shorelines of artificial and natural sinkhole ponds (Yatskievych, 1999). This species is reported to exist in only St. Louis, Howell, and Scott counties in Missouri and is considered critically imperiled in Missouri (S1). Dwarf burhead has recently been documented within the mitigation lands of CCLMP in 2000.

According to the USDA-NRCS Plants Database, yellow-flowered leaf cup is synonymous with *Polymnia uvedalia* var. *densipilis*. This species inhabits low woods, wooded valleys, alluvial and upland thickets, and the base of bluffs (Steyermark, 1963). The historic distribution of this species primarily included the southern one-third of Missouri, and counties located south of the Missouri River and bordering the Mississippi River. Yellow-flowered leaf cup was last observed in 1881 and was observed within the CCLMP lands (Smith, personal communication) but may no longer be extant in the study area.

Large-seeded mercury occurs in wet or dry woodlands with tree canopy openings, moist alluvial soils, and gravel bars along streams, and prairies. This species may also occur in fallow and cultivated fields, thickets, waste ground, roadsides, and along railroads (Steyermark, 1963). Extant sites are located in Greene, Pike, and St. Louis counties. Historical records of this species are from Clay, Jackson, Pulaski, and St. Louis (Valley Park and Pacific) counties (Tim Smith, MDC, personal communication). This species was historically reported from CCLMP in 1930 (Smith, personal communication) but may no longer be extant in the study area.

3.7 Wetlands

3.7.1 Mapping of Study Area Wetlands

The USACE and the USEPA jointly define wetlands as *"those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions."* The accurate mapping of the wetland resource of the Howard Bend study area entailed a varied approach that included the review and integration of existing data from a number of sources, agency file review, and field reconnaissance as described in the following narrative.

3.7.1.1 Review of Existing Mapping

Existing sources of mapping were used as a basis for the preliminary identification of study area wetlands. This review included the following:

- National Wetland Inventory (NWI) maps;
- U.S. Geological Survey (USGS) topographic mapping;
- FEMA Flood Insurance Rate Maps (FIRMs);
- 2001 black and white aerial photography;
- City of Maryland Heights 2-foot topographic mapping;
- NRCS current and historic hydric soil maps; and
- NRCS certified wetland maps.

NWI maps developed by the USFWS are available in a GIS data base and were used as an initial base map of the wetlands in the Howard Bend study area. The classification system used by the NWI (Cowardin et al., 1979) is based on vegetative type (i.e., emergent, scrub shrub, forested, unconsolidated bottom) and water regime. Wetlands identified by NWI are generally

considered as a useful planning tool but are generally recognized as being an inadequate predictor of wetland and waters of the United States that may be subject to USACE jurisdiction.

3.7.1.2 Previous USACE Jurisdictional Wetland Determinations

The results of all previous wetland delineations were reviewed and incorporated into the project base map. Numerous wetland delineations have been performed using USACE's 1987 Wetland Delineation Manual in support of both past and present projects within the area. Data from jurisdictional wetland determinations and permits issued since 1984 were obtained from the St. Louis District (in the form of previously prepared project reports and permit file data) and were integrated into the wetland base map. Information obtained from these records was used to identify jurisdictional wetland limits, previous wetland impacts, and mitigation requirements as summarized in Table 1-1 (see Section 1.0).

Projects for which existing documentation was available for incorporation into the wetland map included the following:

- Riverport development (USACE Regulatory Branch file data);
- Harrah's Casino Complex (USACE Regulatory Branch file data);
- Page Avenue Extension (TCT-St. Louis, Inc. 1991; Booker Associates, Inc., 1992; National Park Service 1995a, 1995b);
- Howard Bend 500+ Year Levee, (McKinney Associates and D.G. Purdy and Associates, 1994; Burns & McDonnell, Inc., 1999a, 1999b, 2000b, 2000c, 2001);
- MSD Howard Bend Plant Expansion (USACE Regulatory Branch file data);
- Missouri American Water Company expansion (USACE Regulatory Branch file data);
- Creve Coeur Mill Reliever Road (QST Environmental, 1998);
- Creve Coeur Airport Expansion (Crawford, Murphy & Tilly, Inc., 1996); and
- Sportport Development (USACE Regulatory Branch file data).

3.7.1.3 Incorporation of 15-Day Flood Elevation Data

The primary source of riverside wetland hydrology is flooding from the Missouri River. Consequently, hydrologic data from the USACE was utilized to plot the 15-day elevation of continuous inundation throughout the riverside portion of the study area. Hydrologic data demonstrated that the 15-day flood elevation followed a gradient (1-foot vertical drop per river mile) from Missouri RM 39 to 29. Two-foot contour mapping was used in conjunction with hydrologic data to identify wetlands riverside of the levee. These contours were further correlated to known elevations of delineated wetlands to aid in identifying riverside wetlands. These elevations were used as a guide and field checked in the vicinity of Jane Downing Island and the Missouri American Water Company areas (see Figure 3-6).

3.7.1.4 NRCS Certified Wetlands/NRCS Slide Review

In accordance with an interagency Memorandum of Agreement (dated January 6, 1994) between USEPA, USACE, United States Department of the Interior (USDOI), and USDA-NRCS, the NRCS has been given the authority to map wetlands in agricultural lands. Accordingly, wetlands in agricultural areas were incorporated from NRCS map data for certified farm tracts. Wetlands identified by NRCS are classified into one of the following categories: farmed wetland (FW), prior converted wetland (PC), non-wetland (NW), wooded wetland (WW) or non-inventoried (NI). Because NRCS does not certify wetlands unless requested by the landowner, not all agricultural lands within the study area contained an NRCS-certified wetland determination. Consequently, a slide review of a 10-year period was conducted using NRCS methodology to identify areas within farm tracts that showed a consistent indication of wetlands

as reflected by observable inundation and crop stress. Slide interpretation was performed by a project team consisting of representatives from the USACE, NRCS, and MACTEC.

3.7.1.5 Field Reconnaissance

Areas in non-agricultural lands and not covered by previous studies were examined in the field by MACTEC personnel. A reconnaissance level effort was employed using USACE's 1987 Wetland Delineation Manual. Areas where field determinations were performed include wetlands near Louiselle Creek, along lower Creve Coeur Creek, near the Missouri American Water Company plant, and riverside of the levee on Jane Downing Island.

3.7.2 Study Area Wetlands

As a result of the aforementioned mapping effort, a total of approximately 708 acres of wetlands have been identified within the Howard Bend study area (Table 3-21 and Figure 3-6).

Table 3-21. Wetlands within the Howard Bend Study Area

Wetland Type	Acres	Percent
Palustrine Forested (PFO)	461.3	65.2
Farmed Wetland (FW)	95.2	13.4
Palustrine Emergent (PEM)	57.3	8.1
Palustrine Emergent/Scrub Shrub Complex (PEM/PSS)	39.2	5.5
Palustrine Scrub Shrub (PSS)	27.8	3.9
Palustrine Scrub Shrub/Forested Complex (PSS/PFO)	24.0	3.4
PEM/PSS/PFO	3.2	0.5
Total	**708.0**	**100**

Forested wetlands (PFO1-palustrine forested broadleaved deciduous) comprise approximately 461 acres (65.2 percent) and are the most abundant wetland type within the study area. These wetlands are primarily associated with the following three areas:

- Floodplain of Creve Coeur Creek upstream of the Creve Coeur Lake;
- Areas adjacent to Louiselle Creek, and
- Low-lying forested areas on the riverside of the 500-year levee.

Dominant tree species associated with these wetlands include black willow (*Salix nigra*), cottonwood (*Populus deltoides*), sycamore (*Platanus occidentalis*), slippery elm (*Ulmus rubra*), green ash (*Fraxinus pennsylvanica*), and silver maple (*Acer saccharinum*).

Farmed wetlands (FW) are emergent wetlands that are subject to regular disturbance from cultivation. These wetlands are located in agricultural fields throughout the study area, and are often characterized by reduced water permanence, low species richness, and a predominance of weedy plant species. Typical plant species of these wetlands include amaranth (*Amaranthus* sp.), curly leaved dock (*Rumex crispus*), panic grass (*Panicum dichotomiflorum*), barnyard grass (*Echinochloa crus gali*), and foxtail (*Setaria glauca*). Approximately 95 acres of farmed wetlands (13.4 percent) were identified in the study area.

Emergent wetlands (PEM, palustrine emergent) account for approximately 57 acres and are the third most well represented type (8.1 percent). Emergent wetland communities are located in smaller isolated areas, and are composed variously of smartweeds, spikerushes, nutsedge, false nettle, cattail, and sedges. In some deep marsh areas [e.g., Little Creve Coeur Lake and near the Page Avenue sedimentation basin (see Figure 3-6)], bulrushes, arrowhead, and floating-leaved species such as American lotus are also present.

Lesser-well represented wetland types within the study area include scrub shrub wetlands (PSS, palustrine scrub shrub) and various emergent, scrub shrub, and forested wetland complexes. Scrub shrub wetlands account for approximately 3.9 percent of the wetland resource (27.8 acres), whereas other complexes account for a similar or lesser amount of wetlands within the study area. In general, scrub shrub wetlands and other complexes are most commonly found in the vicinity of upper Creve Coeur Creek (upstream of Creve Coeur Lake), in the vicinity of Little Creve Coeur Lake, and at scattered locations on the riverside of the 500-year levee. Dominant species within scrub shrub wetlands include buttonbush (*Cephalanthus occidentalis*), rose mallow (*Hibuscus laevis*), and various tree species (e.g., willows).

3.7.3 Functional Characterization

The following presents a general functional characterization of the wetlands within the study area. For the purposes of discussion, wetlands are grouped according to overall landscape position and dominant hydrology source. Accordingly, wetlands of the study area have been divided into the following groups:

- Creve Coeur Lake complex,
- Little Creve Coeur Lake wetlands,
- Missouri Riverfront wetlands,
- Stream Corridor wetlands, and
- Miscellaneous interior wetlands.

3.7.3.1 Creve Coeur Lake Wetland Complex

As is described in Section 3.8.1.2, Creve Coeur Lake is an oxbow of the Missouri River. This is a relatively large open water area (approximately 300 acres) that is classified by NWI as a lacustrine deep water habitat. Creve Coeur Lake, coupled with fringing wetlands along its shoreline and wetlands within the floodplain of Creve Coeur Creek upstream of Creve Coeur Lake, form an open water/wetland complex totaling approximately 424 acres. Channel flow from Creve Coeur Creek provides the primary source of water to the lake and this complex of wetlands. However, as discussed in Section 3.8, locally intense storm events can result in circumstances in which backwater from Fee Fee Creek flows upstream into Creve Coeur Lake via Creve Coeur Creek.

The associated vegetated wetlands consist predominantly of forested wetlands, but also include minor areas of scrub shrub and emergent wetlands. Typical species in the Creve Coeur Lake forested wetlands include willow, silver maple, green ash, cottonwoods, and box elder. Only small areas of emergent and scrub shrub wetlands have been mapped in the Lake area. The emergent wetland vegetation includes cattails, smartweed, nut sedge, false nettle, and various sedges. The scrub shrub wetland vegetation includes buttonbush, rose mallow, and various tree saplings.

The close juxtaposition of open water zones (Creve Coeur Lake and the Page Avenue sedimentation basin, the channel of Creve Coeur Creek) with various classes of vegetated wetlands (emergent, scrub shrub, and forested) results in a complex that performs a number of valuable wetland functions. Notable functions performed by these wetlands include wildlife function support (cover for nesting, feeding/foraging habitat, etc.), flood storage, and water quality improvement (as a result of nutrient retention/removal and erosion and sedimentation control). This area also provides important flood control (large water storage volume) as it receives and stores runoff from upland areas subsequent to storm events. In addition, due to its landscape position (within the bottomland at the base of an upland stream) it also performs

important nutrient retention and removal functions in conjunction with other water quality improvement (sediment reduction) functions. However, channelization of Creve Coeur Creek within the floodplain reduces the extent of flooding within these wetlands and therefore limits the overall wetland extent.

3.7.3.2 Little Creve Coeur Lake Wetlands

The term “Little Lake” refers to a 275-acre depressional area located west of Creve Coeur Lake. Like Creve Coeur Lake, Little Lake was once an oxbow of the Missouri River. Currently, the wetlands of the Little Lake area are limited to approximately 30 acres of emergent and scrub shrub communities located on the south side of Page Avenue Extension. The typical plants observed in the emergent areas consist of spike rush (*Eleocharis* sp.), smartweed (*Polygonum lapathifolium* and *pennsylvanicum*), cattail (*Typha angustifolia*), arrowhead (*Sagittaria* sp.), and sedges (*Cyperus* sp.). Scrub shrub communities include tree saplings such as silver maple (*Acer saccharinum*), green ash (*Fraxinus pennsylvanica*), and cottonwood (*Populus deltoides*), as well as various sedges.

Historically wetlands of the Little Lake were supported by channel flow from Creve Coeur Creek coupled with runoff from overland flow/runoff from adjacent lands. However, sometime between 1930 and 1933, Creve Coeur Creek was diverted to entirely flow into Creve Coeur Lake. This diversion eliminated the dominant water supply to Little Lake and facilitated its conversion to farm land. However, due to its lower topographic position in the floodplain, Little Lake still collects storm water runoff from adjacent areas. As a closed depression, the only way water is removed from the area is through evaporation, transpiration, and the slow percolation to groundwater.

Little Lake provides both stormwater retention and water quality improvement functions. However, because it is located in a closed depression that has been isolated from channel flow from Creve Coeur Creek, these functions are somewhat limited. Cessation of agricultural uses within the Little Lake area is also increasing the area’s wildlife support functions as more natural habitats are developed.

3.7.3.3 Missouri Riverfront

The Missouri Riverfront represents a predominantly undeveloped flood-prone area located outside of the 500+ year primary levee. The area is at its widest point in the vicinity of Jane Downing Island and narrows along the Missouri River both upstream and downstream (see Figure 3-6). Wetlands associated with the Missouri Riverfront consist of approximately 330 acres and are characterized as having a hydrology that is dependant upon periodic flooding from the Missouri River. Ponding of direct precipitation and/or local runoff may also be important in some of the wetlands in this area.

The dominant cover type within this area is deciduous forest that is interspersed by forested, emergent, and scrub shrub wetlands. Riverine wetlands are also represented in association with the Missouri River side channel in the vicinity of Jane Downing Island. Wetlands within this area are typically developed in Missouri River overflow channels and shallow depressions. Several areas have been established as a result of the creation of depressional areas (i.e., borrow pits). The typical plant species in the forested wetlands include willows, silver maple, cottonwood, box elder, and green ash. Characteristic species within scrub shrub wetlands include buttonbush, rose mallow and various tree saplings; dominant species within emergent wetlands include smartweed, nut sedge, and false nettle. Plant species which colonize the channels during the dry season include sedges (e.g., *Cyperus strigousa*), cocklebur (*Xanthium strumarium*), fog-fruit (*Phyla lanceolata*), and purple ammannia (*Ammannia coccinea*).

The Missouri Riverfront area consists of a mosaic of wetland types that provide functional value through flood attenuation and storage, groundwater discharge/recharge, seasonal/temporary fish and wildlife values (forage/cover/spawning), and sediment retention and nutrient removal. However, such functions as fish and wildlife habitat, and sediment retention and nutrient removal, are reduced for those wetlands that have been converted to agricultural use. Riverine wetlands associated with the side channel along Jane Downing Island also offer seasonal open water habitat and snags/dead wood that may provide important fish spawning/nursery habitat and wildlife functions.

3.7.3.4 Stream Corridor Wetlands

Several wetland areas are associated along the riparian corridors (i.e., streams) within the interior of the floodplain. These areas are primarily found along Louiselle Creek, Fee Fee Creek, and upper Creve Coeur Creek, north of Olive Boulevard. Forested and emergent wetlands are the dominant community types along Louiselle and Fee Fee creeks, whereas scrub shrub and forested wetlands are more prevalent along upper Creve Coeur Creek. In the case of Louiselle Creek and Fee Fee Creek, the streams have been channelized and are currently bordered by low flank levees. As a result, hydrology of these wetlands is primarily driven by the ponding of interior drainage behind flank levees, coupled with periodic overbank flooding.

The plant communities in these forested, scrub shrub, and emergent wetlands were similar to those found along the Missouri River (e.g., cottonwood, green ash, silver maple, smartweed, sedges, etc.) but also included a greater abundance of pin oak (*Quercus palustris*) and deciduous holly, and a reduced frequency of willows.

Wetlands associated with these interior stream systems provide varying degrees of wetland function depending on the nature and extent of representative plant communities and the opportunity for and degree of flooding. Existing flank levees along Fee Fee Creek and Louiselle Creek reduce the incidence of overbank flooding and therefore, reduce the flood storage function. In contrast, flank levees do retard drainage of the land behind the levees and therefore, provide some limited storage of locally ponded rainfall. Wildlife habitat is another important function performed by the wetlands as they provide valuable habitat and cover (concealment, nesting, foraging, etc.) and may also be corridors for faunal movement between the Missouri River and natural habitats within the uplands.

3.7.3.5 Miscellaneous Interior Wetlands

The remaining wetlands within the study area consist of relatively isolated wetlands associated with small channel scars and closed depressions. Hydrology of these wetlands is predominantly the result of stormwater runoff from adjacent land areas and results in a perched water table over relatively impervious soil.

In many cases these wetlands are of low quality, as they are often relatively small, isolated, and, in the case of farmed wetlands, impacted by cultivation. Consequently, these wetlands are not expected to exhibit high functional value for commonly recognized wetland functions such as flood storage, wildlife habitat, nutrient retention and removal, groundwater recharge/discharge, or erosion control.

3.8 Water Resources

3.8.1 Surface Water and Water Quality

Surface water resources of the study area consist of both flowing water systems (streams and rivers) and non-flowing systems (lakes and ponds). The surface water resources within the Howard Bend floodplain are discussed in the following subsections.

3.8.1.1 Streams and Rivers

Missouri River

The Missouri River forms the western boundary of the study area and is the dominant flowing water feature in the region. It is a dynamic riverine system that is characterized by the main channel, main channel border areas, and side channels (e.g., those in the vicinity of Jane Downing Island, Figure 3-7) that are connected to the main river under high flow conditions. The Missouri River is the longest river in the United States (2,714 miles) with a watershed of approximately 580,000 square miles (Collier's Encyclopedia, 1969). The Missouri River meanders along the western edge of the Howard Bend study area from RM 29.6 to 38.4, a distance of 8.8 miles. This portion of the Missouri River near St. Louis is referred to as the lower Missouri River. It is characterized as a large river and is used variably for recreation, municipal water supply (e.g., Missouri American Water Company), navigation, commercial sand dredging, and commercial fishing.

The dominant physical features in the study area are the Missouri River bottomlands and the adjacent rolling hills. Because the Missouri River is a navigable river, activities that would entail construction in, over and under the river are regulated by Section 10 of the Rivers and Harbors Act of 1899. Additionally, such activities are also regulated under Section 401 of the CWA by the MDNR and under Section 404 of the CWA by the USACE. For all other surface water resources within the floodplain, activities impacting the waters below ordinary high water are only regulated by Sections 401 and 404 of the CWA.

The Missouri River is a turbid river characterized by a strong current, a shifting sand bottom, and rapidly fluctuating water levels. Past channelization of the river for navigation and flood control purposes has resulted in changes that have reduced its overall quality and productivity as a riverine ecosystem. The Missouri Water Quality Standards designate the Missouri River in the study area for the following uses: Irrigation (IRR), Livestock and Wildlife Watering (LWW), Protection of Warm Water Aquatic Life and Human Health – Fish Consumption (AQL), Boating and Canoeing (BTG), Drinking Water Supply (DWS), and Industrial (IND) (MDNR, 10 CSR 20-7, Stream Classifications and Use Designation).

Interior Creeks

Streams dissecting the hills adjacent to the Missouri River are generally high-gradient streams with steep, eroded banks. They are subject to extreme flow variation, with many being intermittent in flow. Those streams flowing through the bottomlands and the topographically gentler uplands are more meandering, are of lower gradient, and have broad streambeds with heavy bed-loads. These variations in morphometry, flow, and associated bed-load movement are the primary characteristics determining the existing water quality of the streams.

Bonhomme, Creve Coeur, Fee Fee and Louiselle creeks are the perennial creeks within the study area. Bonhomme Creek forms the southwestern edge of the study area and carries water from the Chesterfield Valley bluffs to the Missouri River. Creve Coeur Creek and Fee Fee Creek

are the two major upland watersheds that carry water into and through the Howard Bend floodplain to the Missouri River.

Creve Coeur Creek has a watershed area of approximately 15,000 acres and drains the predominantly developed uplands located southeast of the study area. Upper Creve Coeur Creek enters the study area as it crosses Olive Boulevard and is characterized by a meandering channel that is bordered by a relatively well established riparian zone. Within the floodplain, upper Creve Coeur Creek becomes a channelized stream as it conveys drainage from the uplands to the MoDOT sedimentation basin and ultimately to Creve Coeur Lake. Lower Creve Coeur Creek is formed by the outlet of Creve Coeur Lake. From this location it is generally flanked by a low levee system and has a deeply incised channel. Banks have been stabilized by riprap in some locations. In the vicinity of the MSD plant, Creve Coeur Creek is joined by Fee Fee Creek and flows approximately 3,000 feet before discharging to the Missouri River through a closure structure constructed in approximately 1963. When river stage is elevated, the structure is closed causing water within the creek system to back up within the interior of the floodplain. The Missouri Water Quality Standards (MWQS) designates the following uses for Creve Coeur Creek: LWW and AQL (MDNR, 10 CSR 20-7, Stream Classification and Use Designation).

Fee Fee Creek is a perennial stream located in the northern portion of the study area and has a total watershed area of approximately 9,350 acres. Like Creve Coeur Creek, Fee Fee Creek has a channel that is meandering within the dissected uplands but has been channelized within the study area. Prior to the development of I-70, the natural channels of Creve Coeur and Fee Fee creeks flowed north and discharged to the Missouri River in the area that is currently the Earth City development. Concurrent with the time at which I-70 was constructed, Fee Fee and Creve Coeur creeks were rerouted and channelized to discharge to the river at its current location. Low flank levees along its length within the floodplain provide temporary storage and conveyance of surface water during smaller (approximately 20-year frequency) storm events. In contrast to that of lower Creve Coeur Creek, the gradient of Fee Fee Creek within the uplands is very steep, resulting in a rapid delivery of runoff in response to localized storm events. At times when the river stage is elevated (resulting in the blockage of the outlet of lower Creve Coeur Creek), this rapid runoff from the Fee Fee Creek watershed results in an unusual flow pattern in which stormwater from Fee Fee Creek flows upstream within lower Creve Coeur Creek and subsequently, into Creve Coeur Lake. The MWQS designates the following uses for Fee Fee Creek: LWW and AQL (MDNR, 10 CSR 20-7, Stream Classification and Use Designation).

Louiselle Creek is a tributary of Fee Fee Creek that enters the floodplain from a watershed south of Fee Fee Creek. Like Creve Coeur and Fee Fee creeks, Louiselle Creek is a low quality channelized stream that is flanked by a low levee system. Overbank flooding occurs in response to intense localized storm events.

3.8.1.2 Lakes and Ponds

Creve Coeur Lake

Creve Coeur Lake (see Figure 3-7), located in CCLMP, is considered to be the “jewel” of the St. Louis County Parks and Recreation Department. The 300-acre lake located within the 2,242-acre park is administered by the St. Louis County Parks and Recreation Department. Historically, Creve Coeur Lake has been used for recreation, and in the late 1880s it was the site of the St. Louis County Fair. The lake is currently used recreationally for fishing, sail boating, and row boating (except by permit by the County parks system, no gasoline engines are allowed). Fish commonly harvested within allowable limits include largemouth bass, catfish, sunfish, and crappie. No swimming is allowed.

Creve Coeur Lake is a natural oxbow lake that was formed when the Missouri River's course was diverted. Through the years, the lake has trapped sediment eroded from the upper Creve Coeur Creek watershed and has required dredging. In the late 1970s several million cubic meters of accumulated sediment were dredged from the lake. Since that time, a large delta has formed at the south end of the lake. The lake is scheduled to be dredged again in 2004. Water depths currently average approximately 5 feet in areas that have a high amount of silt accumulation, but normally range from 5 to 10 feet. Recently excavated siltation basins on the upstream side of Creve Coeur Lake were created by MoDOT to intercept and trap sediment within Creve Coeur Creek prior to its deposition within Creve Coeur Lake. These siltation basins, totaling 64 acres, are designed to protect Creve Coeur Lake from future siltation thereby resulting in less frequent dredging.

The lake is also important in storing storm water. Approximately 2,340 acre-feet of storage is provided within the lake from elevation 442.2 (normal pool elevation) to elevation 450.0 msl (stage at which point Marine Avenue is inundated although several points along the road flood at lower elevations).

Creve Coeur Lake is designated for the following uses: LWW, AQL, and BTG (MDNR, 10 CSR 20-7, Stream Classification and Use Designation). The lake and creek south of Creve Coeur Lake are designated Metropolitan No-Discharge Streams. This means that "*no water contaminant except uncontaminated cooling water, permitted storm water discharges in compliance with permit conditions, and excess wet-weather bypass discharges not interfering with beneficial uses, shall be discharged to streams*."

Due to chlordane contamination, the Department of Health (DOH) issued an advisory for consuming fish from Creve Coeur Lake in 1985. The criteria for removing the advisory require that concentrations within sampled fish tissue be below the action level for two consecutive sample years. Based upon results of samples taken from carp in 1998 and 2000, the amount of chlordane was below the Federal Drug Administration (FDA)'s action level of 0.3 milligrams per kilogram (mg/kg or ppm) and the advisory was subsequently lifted from Creve Coeur Lake in 2001. Creve Coeur Lake was included on the 1998 list of waters designated under sections 303(d) of the Federal CWA due to chlordane contamination. The MDNR has proposed that Creve Coeur Lake be de-listed in the most recent 303(d) list which was submitted to the USEPA and has not yet been approved or finalized.

An analysis of sediment samples from Creve Coeur Lake was conducted in March 2000. Contaminants tested were pesticides/polychlorinated biphenyls (PCBs) and heavy metals with an emphasis on chlordane and mercury. Results indicated that there are no contaminants in the sediment over background levels. Further testing and disposal of dredge material will be in accordance with MDNR requirements and will be at the sites identified in Section 2.0.

Siltation Basin

The 64-acre siltation basin was excavated by MoDOT as part of the Page Avenue Extension mitigation to alleviate the chronic siltation problem of Creve Coeur Lake. The siltation basin is located on mitigation land that has been incorporated in CCLMP. Flow from Creve Coeur Creek passes through the sedimentation basin prior to its discharge to Creve Coeur Lake. The Parks Department owns and maintains the siltation basin. The siltation basin is designed to trap an average of two-thirds of the sediment that would otherwise be deposited in Creve Coeur Lake. This will, therefore, increase the life span of Creve Coeur Lake and keep it functioning as a recreation lake. The basin was constructed with a varying depth of 5 to 20 feet and will require dredging at 10-year intervals as it becomes filled with sediment.

Aquatic ecological communities within the siltation basin are likely to be similar to that of Creve Coeur Lake due to its open water connection to the lake and to Creve Coeur Creek. Likely fish species within the basin include largemouth bass, catfish, crappie, and sunfish.

Crystal Springs Quarry Golf Course Lakes

The Crystal Springs Quarry 9-hole golf course was constructed in 1996 and later expanded to 18 holes in 1999. The lakes were created to serve a dual function as water hazards for the golfer and to provide storm water retention. The lakes also receive localized runoff from the golf course and may, therefore, function as a water quality sink in capturing excess nutrients contained in golf course fertilizers and herbicides.

HBLD Borrow Areas

To obtain the necessary borrow material for the construction of the 500-year levee, the HBLD excavated several areas within the study area that have subsequently filled with water. These ponded areas include an 18-acre area located inside the levee system in the vicinity of the Missouri American Water Company plant (the Reising borrow site) and a 14-acre open water area associated with the Stolte borrow site (see Figure 3-7). Other open water areas are associated with the 60-acre area old golf course borrow site and the 60-acre Moore borrow site. With the exception of the Reising borrow site, each of these open water areas are located on the outside of the 500-year levee system and are, therefore, subject to periodic flooding by the Missouri River.

Adjacent lands around several of these ponds are actively cultivated. Extensive shallow areas are exposed under low water conditions along the shoreline of these waterbodies, resulting in the formation of mud flats that are used by shorebirds and many other migratory species. Fish communities of these surface water resources are believed to be relatively poor as they are recently formed. However, the pond on the Reising borrow site has been stocked and has shown evidence of fish communities.

3.8.2 Groundwater Resources

The groundwater resources within the study area can be divided into the (1) alluvial aquifer and (2) bedrock aquifer(s).

3.8.2.1 Alluvial Aquifer

The Missouri River alluvium within the study area forms an important and widely used water source (aquifer). Typically water well yields are higher in the deeper (greater than 50 feet) sand and gravel sediments. Groundwater levels in the alluvial aquifer typically range from 5 to 20 feet below the ground surface. As a result of the coarse alluvial sediments within the floodplain, the alluvial aquifer is directly interconnected with the Missouri River in some areas. Consequently, groundwater levels often rise and fall over a period of several days in response to the fluctuation of river stage. In contrast, there is typically a lower response of the alluvial aquifer to local rainfall events, as compared to the bedrock aquifers. During periods of flooding, the groundwater surface elevation can be high enough to allow alluvial wells to flow at the surface. When the Missouri River is under normal flow conditions, groundwater typically flows towards the river and in a generally downstream direction.

The Missouri River alluvium receives water recharge from several sources: infiltration from the Missouri River, direct precipitation, recharge from bedrock aquifers adjacent to the alluvium, and infiltration of stream or lake water.

The groundwater elevation is usually higher in the bedrock aquifers adjacent to the alluvial aquifer. Therefore, there is groundwater flow and recharge from the bedrock aquifers to the alluvial aquifer. The water recharge from streams and lakes depends, in part, on the nature of the sediments in proximity to these sources. In sandy, permeable soils the recharge is significant. In contrast, the recharge is less in clay soils with low permeability,

As stated above, the grain size of the alluvial sediments typically increase with depth, with finer grained materials directly near the surface, and sands/gravels at greater depth. Because these sediments were deposited over time by the meandering Missouri River channel (and associated side channels), there is no definitive sequence of deposition at any particular area. As a result, the recharge characteristics of the alluvium can vary significantly across the study area. In areas with a clay/silt cap, the alluvial aquifer may be under confined conditions, and in sandy areas the aquifer would be under unconfined (water table) conditions.

The Missouri River alluvial aquifer is used for potable water (in some areas), irrigation, and industrial uses. Both the City of St. Louis and St. Louis County withdraw surface water from the Missouri River to treat, store, and distribute to their customers. The City of St. Charles uses this aquifer as a potable water source; however, its well field is located in the alluvium on the west side of the Missouri River (outside of the study area).

In general, the alluvial aquifer water quality can be described as a moderately mineralized calcium (Ca)-magnesium (Mg)-bicarbonate type. The hardness (Ca, Mg, etc.) is typically high [300 to 500 milligrams per liter (mg/L)] and the total dissolved solids (TDS) typically range from 450 to 750 mg/L (Miller and Vandike, 1997). The iron (0.29 to 5.1 mg/L) and manganese (0.05 to 4.4 mg/L) levels generally exceed public drinking water standards (Miller and Vandike, 1997), and sulfate levels may be high (Miller et al., 1974). Minimum and maximum ranges for a variety of water quality parameters (nitrate, hardness, iron, pH, etc.) for the Missouri River alluvium are reported in Miller et al. (1974). Groundwater from the alluvial aquifer usually requires extensive treatment before it can be used to supply a public water system.

3.8.2.2 Bedrock Aquifers

Several of the groundwater wells in proximity to the study area produce from bedrock below the alluvial aquifer. These wells are completed in the following Mississippian Age formations: Ste. Genevieve Formation, St. Louis Limestone, Salem Formation, and Warsaw Formation. These formations consist predominantly of limestone. Typically, yields from these aquifers are significantly lower than the alluvial aquifer. Typical yields are in the 5 to 50 gpm range, but higher yields are reported locally (Miller and Vandike, 1997). Most bedrock wells are constructed with several aquifers open to the well, therefore, it is not feasible to determine yields or water quality from specific formations. The Ste. Genevieve, St. Louis, Salem, and Warsaw formations are included in what is called Group 1 aquifers (Miller et al., 1974). Groundwater from these formations varies from calcium-magnesium-bicarbonate type to a sodium-bicarbonate or a sodium-chloride type. The dissolved solids content ranges from 246 to 6,880 mg/L. The water is generally low in iron and very hard (Miller et al., 1974). The high levels of sulfate and dissolved solids may be due to the overlying Pennsylvanian age shales, sandstones, and siltstones.

3.8.2.3 Howard Bend Water Wells

A search for groundwater wells within (and in proximity to the study area) was conducted by contacting the MDNR Well Head Protection Department (Rolla, Missouri). The results provided by MDNR indicated several bedrock and alluvial wells within or in proximity to the study area. However, most of the wells had poor location information and could not be precisely located

within the study area. The latitude and longitude was available for eight groundwater wells in the vicinity of the study area, but only two of the wells are located within the study area boundary:

- Creve Coeur Airport Well, with a total depth of 42 feet; and
- Hale Irwin Golf Learning Center Well, with a total depth of 65 feet.

These wells are screened in the alluvial aquifer and are likely just used as non-potable water (watering lawn, etc.).

Several of the wells located just outside of the study area boundary, however, are screened in the bedrock aquifers (i.e., Salisbury Well, Henry Cook Well, and the Kellman and Sons Dairy Well, etc.). These wells are open to several bedrock formations (e.g., St. Louis and Salem Formations).

3.8.3 Floodplains

Flooding by the Missouri River has historically been a recurring characteristic of the Howard Bend floodplain. Recent major flood events resulted in flooding across the area to a depth of more than 10 feet in 1993 and approximately 2 feet in 1995. In response to a 1986 flood event, the HBLD was organized in 1987 as the successor to the Howard Bend Levee Association to reduce the risk of future flood loss and minimize the impact of floods on human safety, health and welfare. In 1997 the HBLD began work to raise the existing levee to a height that would provide 500-year flood protection. The completion of this work in 2004 will provide substantial protection of the study area from flooding by the Missouri River and has also resulted in a re-mapping of the 100-year floodplain. Figure 3-8 identifies 100-year floodplains within the study area as reflected by a CLOMR issued by the FEMA. The term “Conditional” reflects the incomplete status of several on-going projects within the study area. Subsequent to the completion of the Missouri River levee improvements currently under construction, the finalized Letter of Map Revision will be issued. For this EIS, the base condition identifies all these projects as essentially complete and therefore the 100-year floodplain is that as represented by the CLOMR in Figure 3-8.

As is evident in Figure 3-8, large land areas within the study area have been removed from the floodplain. However, the areas within the vicinity of Little Creve Coeur Lake, Fee Fee Creek, Louiselle Creek and lower Creve Coeur Creek retain their designation as 100-year floodplain due to localized flooding from these interior stream systems.

Creve Coeur Creek and Fee Fee Creek are the primary watersheds of the floodplain that drain largely urbanized areas. Watershed areas of Creve Coeur Creek and Fee Fee Creek are approximately 15,000 acres and 9,350 acres, respectively. Low flank levees along each of these creeks provide protection from an approximate 10- to 20-year flood frequency. In response to significant storm events, the increased storm water volumes exceed the storage capacity of the creeks and Creve Coeur Lake, resulting in localized flooding as is indicated in Figure 3-8. Roadways that are flooded under such conditions include all or a portion of River Valley Drive, Prichard Farm Road, Marine Avenue, and Creve Coeur Mill Road. This also results in a reduction or loss of access to and/or use of CCLMP, the MSD Missouri River Wastewater Treatment Plant, Sportport, and Creve Coeur Airport. Agricultural, transportation, and recreational uses are also restricted.

The Cities of Maryland Heights and Chesterfield are approved to administer the Federal flood insurance program per FEMA. As such, both municipalities have ordinances in place under which to review and administer any proposed development within the regulatory floodplain as defined by FEMA Flood Insurance Rate Maps. Specifically, floodplain permits and flood studies are required for any changes via the removal or filling of earth within the designated floodplain.

Development within the floodplain must demonstrate a no "net rise" to the stream or river floodway conveyance area, if applicable. All habitable structures must demonstrate a minimum 1-foot free board or elevation to their finished elevation above the 100-year flood levels.

3.9 Agricultural Resources

3.9.1 Agricultural Characteristics

According to the Missouri Agriculture Statistics Service (MASS), approximately 65 percent of the land in Missouri is used for agricultural purposes (MASS, 1997). The average farm size in Missouri is 275 acres. Dominant crops in Missouri are soybeans and corn (MASS, 2000).

Detailed agricultural statistics are not readily available for the study area but are available for both St. Louis County and the State of Missouri (Table 3-22). Both St. Louis County and statewide statistics demonstrate a declining trend in the number of farms, and in the case of St. Louis County, the total number of acres of cropland harvested. This clearly reflects the effects of expanding residential and commercial development within the region. Trends within both the county and the state reflect a general consolidation of farm operations into somewhat fewer but larger units. Economic value of the agricultural products and the value of farm land within the county and the state have generally increased in recent decades in parallel to general inflationary trends.

Table 3-22. 1997 Agricultural Statistics

Statistic	St. Louis County*		Missouri†	
	Number	Historical Trend (since 1970)	Number	Historical Trend (since 1970)
Number of Farms	291	Declining	109,000	Declining
Average Farm Size (acres)	155	Increasing	275	Increasing
Total Harvested Cropland (in 1,000 acres)	22	Declining	28,826	Stable
Percent Agricultural Lands	12	Not available	68	Not available
Market Value of Agricultural Products Sold ($ in millions)	21.3	Increasing	5,367.8	Increasing
Value of Land and Buildings per Acre ($/acre)	2,789	Increasing	1,069	Increasing
Prime Farmland (acres)	50,190	Not available	14,310,200	Not available

* MASS, 1997.
† MASS, 2000.

Agriculture represents the predominant land use within the study area (see Section 3.1.3). In total, approximately 3,907 acres of land are used for agriculture and includes cultivated fields used for the production of common crops such as corn and soybeans, specialty crops (cabbage, pumpkins, and squash), and growing fields for landscape nursery products.

3.9.2 Prime Farmland

The USDA defines prime farmland as soils that have the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops, and is available for these uses. In 1997, Missouri had a total of 14,310,200 acres of prime farmland within the state (National Resource Inventory, revised 2000).

Prime farmland within the study area was quantified using soil types and slopes specified as prime by the USDA NRCS. Prime farmland occurred within cropland, forested areas, old field, and pasture. Total prime farmland within the study area is estimated to be 3,303 acres. State and county information is summarized in Table 3-22.

3.10 Special Waste

3.10.1 Potential Site Identification

The USEPA and state databases on environmental problem sites and activities were consulted to identify potential sites.

Two operating automobile salvage yards were identified on Creve Coeur Mill Road: Smith Brothers Auto Sales and Salvage at 2079 Creve Coeur Mill Road; and West Continental Auto Parts and Salvage Company at 2050 Creve Coeur Mill Road. Although these sites were not listed on any databases, the activities and waste disposal practices on-site could impact the study area.

In order to assess the current environmental conditions within the Howard Bend study area, a third party database search was conducted for the study area by EDR, Inc. (formerly Environmental Data Resources). In addition, a drive-by survey was conducted to verify the location and identification of the sites identified within the database report and to identify any sites which are not found within the databases searched. The databases searched conform to the American Society for Testing and Materials (ASTM) Standard E 1527-00. However, it is likely that complete Phase I Environmental Assessments will be conducted by any prospective property buyer or developer. Table 3-23 summarizes the facilities that were identified as a result of the database search and the drive-by survey.

3.10.2 Potentially Contaminated Sites

As a result of the database search and subsequent field reconnaissance, several sites were identified that represent an on-going concern. These sites are described below and vary from those which are currently undergoing remedial action to those that remain suspect and warrant further investigation.

3.10.2.1 Howard Bend Water Treatment Plant

The City of St. Louis Water Department owns and operates this facility. A total of three underground storage tanks (USTs) were removed from this site. One of the USTs had leaked and is shown as being an active remediation site although the site cleanup began in 1993. Based on the database report, only soil was impacted.

3.10.2.2 Arrowhead Airport

Arrowhead Airport is a small decommissioned airport which has not been in operation since the flood of 1993. There are currently three storage buildings, one office area/repair building, and

one repair shed at this site. In addition, it appears that there are two USTs near the south end of the facility near the storage building and one UST at the northwest corner of the site adjacent to the office/repair structure. None of these USTs appear on the MDNR UST or leaking UST (LUST) databases.

Table 3-23. Results of Database Search and Drive-By Survey to Identify Potential Sites of Environmental Contamination Located within the Howard Bend Study Area

Site Identification	Site Location	Federal/State Program List*	Comments
Howard Bend Water Treatment Plant	14765-14769 Olive Boulevard	RCRIS-SQG UST LUST	Owned by City of St. Louis, listed as having had three USTs removed, one of which had leaked and impacted soils; currently in remediation phase.
Missouri-American Water Company (St. Louis County)	901 Hog Hollow	UST/LUST	LUST was removed in 1990, granted closure by MDNR. Two 10,000-gallon USTs (diesel) are still in use at the site.
Breezy Point Stable	Southwest corner of study area	CERC/NFRAP	Investigated for dioxin; none found.
CCLMP, St. Louis County Parks Department	Marine Avenue at Creve Coeur Mill Road	RCRA-SQG UST	St. Louis County Parks Department formerly had a small shed on-site for maintenance and storage. The shed was flooded but was not rebuilt; UST was subsequently removed.
Creve Coeur Airport	3127 Creve Coeur Mill Road	UST	The USTs at the airport have been removed. Fueling is now from secondarily contained ASTs.
MSD Missouri River Treatment Plant	3455 Creve Coeur Mill Road	AIRS PCS UST LUST AST	MSD has had two USTs removed and currently stores used oil in a UST which meets the 1998 USEPA requirements. MSD also utilizes an AST for the storage of gasoline. A previously discovered LUST has been removed and remediated. Closure was completed in June 1994.
MSD-Creve Coeur Mill Road Pump Station	2150 Creve Coeur Mill Road	UST	Pump station equipped with an emergency generator supplied by a 4,000-gallon diesel fuel UST.
Mobil Mart	13553 Riverport Road	UST	This Mobil station is an active station which lists three USTs in service. The tanks meet the USEPA tank regulations of 1998 for leak detection and overfill protection.
Sverdrup Investments	13736 Riverport Road	UST	550-gallon diesel tank.
Arrowhead Airport†	850 Hog Hollow Road	UST	At least three unregistered USTs are present at this site. Airport has not been in operation since 1993.
Southard Construction†	2133 Creve Coeur Mill Road	RCRA-SQG	Repair/storage yard for asphalt paving equipment.
West Continental Auto Parts and Salvage†	2050 Creve Coeur Mill Road	RCRA	Auto salvage yard containing typical metals, petroleum hydrocarbons, and antifreeze.
Former Smith Brothers Salvage Yard†	2079 Creve Coeur Mill Road	RCRA	Currently undergoing remediation and awaiting closure. Auto salvage yard containing typical metals, PAHs, petroleum hydrocarbons, and antifreeze.

* Notes:
AIRS – Aerometric Information Retrieval System
AST – aboveground storage tank
CERCLIS – Comprehensive Environmental Response, Compensation, and Liability Information System
CERC/NFRAP – CERCLIS No Further Remedial Action Planned
FTTS – FIFRA (Federal Insecticide, Fungicide, & Rodenticide Act)/TSCA (Toxic Substances Control Act) Tracking System
LUST – Leaking Underground Storage Tank
MDNR – Missouri Department of Natural Resources
PAHs – polynuclear aromatic hydrocarbons
PCS – Permit Compliance System
RCRIS-SQG – Resource Conservation and Recovery Index System-Small Quantity Generator
UST – underground storage tank

† These sites were not listed on the databases consulted but were identified by MACTEC as a result of drive-by survey. The Federal/State Program List classification represents the category this site would fall under.

3.10.2.3 Southard Construction, Inc.

Southard Construction does not appear on any of the databases searched under the ASTM standard for Phase I Environmental Assessments. However, the facility is utilized for the storage and repair of asphalt paving equipment and dump trucks and probably qualifies for listing as a Resource Conservation and Recovery Act (RCRA)-Small Quantity Generator (SQG) or a conditionally exempt SQG.

3.10.2.4 West Continental Auto Parts and Salvage

West Continental Auto Salvage yard is not registered in any of the ASTM databases. Based on a casual observation of the property from the entrance and on past experience with salvage yards, probable soil contaminants include metals; polynuclear aromatic hydrocarbons (PAHs); petroleum hydrocarbons (gasoline, motor oil, diesel fuel); and antifreeze. In addition, it is possible that groundwater has been impacted due to careless handling of motor oil, gasoline, and antifreeze. The presence of waste tires is also probable. Until further investigations are completed, the extent of any impacts to soil and groundwater cannot be determined.

3.10.2.5 Former Smith Brothers Salvage Yard

This former salvage yard was purchased as right of way for the new MHE. In order to achieve closure of the site due to impacts from past practices, approximately 3,000 cubic yards of soil have been removed, a 3-foot soil cap has been installed over a portion of the site, and a deed restriction has been placed on the property limiting future use. The contaminants that were above cleanup levels included benzo-a-pyrene, petroleum hydrocarbons, and minor amounts of PCBs and mercury.

3.10.2.6 Fred Weber Sanitary Landfill, Fred Weber North Quarry, and Fred Weber Service Facility

This site is not located within the study area but is located within the surrounding area and has the potential to impact groundwater in the study area. These three facilities are co-located at 2320 Creve Coeur Mill Road approximately 0.25-mile east of the intersection of Prichard Farm Road and Creve Coeur Mill Road. The sanitary landfill was permitted in 1993 and occupies approximately 70 acres. The north quarry is a registered LUST and UST facility with no active tanks listed on the MDNR database. The service facility is a registered UST site. Four tanks have been removed from the facility.

3.11 Visual Resources

The Howard Bend floodplain study area is located in its entirety within the Missouri River floodplain. This floodplain area can be generally characterized as relatively flat with little topographic relief, bounded by upland tree-lined bluffs or the large natural tree stands abutting the Missouri River.

With the exception of developed areas, many views are expansive across existing or previously existing agricultural fields delineated by tree lines that define creek systems, the CCLMP, or the forested areas abutting the bluffs and Missouri River.

For purposes of defining the visual character of the study area, the Howard Bend floodplain has been divided into distinct visual units or viewsheds. These units are generally unique in their visual character or visually contained by treelines or roadways. Figure 3-9 delineates the

various visual units as described for this analysis. The visual units can be characterized as follows:

- Riverport/Harrah's Casino complex development area including Earth City Expressway;
- Creve Coeur Airport/MSD Area;
- Creve Coeur Mill Road/MHE;
- Creve Coeur Lake Area;
- River Valley/Page Avenue Mitigation Lands Area;
- Upper Creve Coeur Creek Valley Area;
- Bonhomme Creek Area; and
- Missouri River Viewshed.

Table 3-24 provides a summary of each existing viewshed's major visual features.

Table 3-24. Visual Unit Summary

Viewshed/Visual Unit	General Visual Characteristics and Features
Riverport/Harrah's Casino Complex	Significantly developed with 1- to 12-story buildings; includes Riverport development, Harrah's Casino complex, and eight-lane Earth City Expressway.
Creve Coeur Airport/MSD Plant Area	Open and expansive areas of agriculture and airport; MSD plant lagoons and Creve Coeur Creek form northern limits; levee and new Missouri River Bridge visible to west; Page Avenue Extension forms southern limit; Sportport lighting very visible.
Creve Coeur Mill Road/MHE (North of Page)	Generally defined as long and narrow; sparse development of small one-story structures associated with businesses to north; includes Creve Coeur Mill Road and newly constructed MHE and associated bridges; southern limit at Page Avenue Extension.
Creve Coeur Lake Area (CCLMP)	Open expanses of water, very contained by tree masses on all sides; includes roadways, parking, trails, and golf course; portion of elevated Page Avenue Extension visible to south.
River Valley Drive/Page Avenue Mitigation Lands	Large open expanses of agricultural land; elevated Page Avenue Extension highly visible to north; includes Missouri American Water Company.
Upper Creve Coeur Creek Valley	Narrow corridor along Creve Coeur Creek and Creve Coeur Mill Road; defined by numerous residential and several small commercial structures.
Bonhomme Creek Area	Open agricultural fields; tree masses of Bonhomme Creek; Missouri River and upland bluffs define visual limits north, south, and west; City of St. Louis Water Treatment Plant defines eastern visual limits.
Missouri River Viewshed/Visual Corridor	Channel of Missouri River visible; major visual features include new Page Avenue Bridge and Blanchette Memorial Bridge over Missouri River. Large natural stands of trees dominate the landscape.

3.11.1 Riverport/Harrah's Casino Complex

The Riverport/Harrah's Casino complex visual unit is characterized by 1- to 12-story buildings with associated roadways, parking, and commercial landscapes. The eastern portion of this area is a six-lane expressway and visually terminates with a large earthen berm that buffers existing landfill and quarry operations. The northern boundary of this viewshed is characterized by an elevated freeway (I-70). The western limits are defined by forested undeveloped lands adjacent to Riverport and Harrah's at the Missouri River.

View of Riverport development from south.

View of Harrah's Casino complex from east.

Riverport development from Earth City Expressway at Prichard Farm Road and Casino Drive.

3.11.2 Creve Coeur Airport/MSD Drive

This viewshed is characterized by expansive views of the Creve Coeur Airport and agricultural fields. Smaller structures associated with the airport and/or local farms are visible. The northern boundary of the viewshed contains the MSD Treatment Plant operations and is characterized by berms surrounding the plant and its associated lagoons, and tree masses aligning lower Creve Coeur Creek. The southern limits of the viewshed are established by the elevated Page Avenue Extension and the new bridge over the Missouri River. The western limits are characterized by the new Howard Bend Levee and large deciduous tree stands abutting the Missouri River. Other visual features include Sportport and its associated lighting.

Page Avenue at south end of Creve Coeur Airport.

Creve Coeur Airport.

View of agricultural fields in proximity to Creve Coeur Airport.

View of MSD Treatment Plant.

3.11.3 Creve Coeur Mill Road/MHE Corridor (North of Page)

This roadway corridor is long and linear and extends from Prichard Farm Road south to the underpass with Page Avenue Extension. Generally the area is visually contained by tree lines associated with the CCLMP and the Fee Fee Creek and Creve Coeur Creek systems. Other visual features within this corridor include small one-story structures associated with businesses along Creve Coeur Mill Road, portions of the newly constructed MHE west of Creve Coeur Mill Road, and a parallel, slightly elevated railroad bed. The southern limit of the viewshed is defined by the Page Avenue Extension overpass of Creve Coeur Mill Road.

Creve Coeur Mill Road north of Page Avenue Extension.

Creve Coeur Mill Road under Page Avenue Extension.

MHE at Marine Avenue.

3.11.4 Creve Coeur Lake Area

The Creve Coeur Lake area is a very self-contained visual unit characterized by the open expanses of water bounded by natural but well defined tree masses of the Missouri River bluffs on the east. The southern limits are characterized by large natural tree masses and a portion of the elevated Page Avenue Extension. Other visual features of the lake area include a two-lane road system, pedestrian trails, parking areas associated with the CCLMP, and open grass areas with intermittent tree planting which includes a portion of the Crystal Springs Quarry Golf Club. The Creve Coeur Lake area is historically considered a highly sensitive visual resource given the extensive mitigation associated with the Page Avenue Extension.

Creve Coeur Lake – View to south toward Page Avenue Extension.

View of east shore of Creve Coeur Lake.

3.11.5 River Valley Drive/Page Avenue Mitigation Lands

This is the largest contiguous visual unit within the study area and is generally characterized by large open views of existing or previously existing agricultural lands. This viewshed's northern limits are defined by the elevated roadway and overpasses associated with the Page Avenue Extension. The western limits are established by the Howard Bend Levee and the large natural

tree stands abutting the Missouri River. The eastern and southern visual boundaries are generally associated with the abutting trees massed along the bluffs. Other visual elements within the viewshed include the Missouri American Water Company, River Valley Drive, Creve Coeur Mill Road, the interchange of Page Avenue Extension with MHE, and the elevated railroad bed of the Union Pacific Railroad.

View of River Valley Drive at Waterworks Road.

River Valley Drive at Page Avenue Extension

View of Page Avenue mitigation lands west of Creve Coeur Mill Road.

Page Avenue mitigation lands (south of Page Avenue Extension).

River Valley Drive near Missouri American Water Company treatment plant.

Relocated River Valley Drive (south of Page Avenue Extension).

View of levee from River Valley Drive.

3.11.6 Upper Creve Coeur Creek Valley

This area is located at the southern limits of the study area. It is characterized by large tree stands abutting Creve Coeur Creek, numerous one-story residential and/or commercial structures abutting the Creve Coeur Mill roadway, partial open areas of agricultural fields, and scrub shrub wetlands. Views within this area are generally more narrow and confined than other viewsheds within the study area.

View of Creve Coeur Mill Road.

Commercial use along Creve Coeur Mill Road.

View of Creve Coeur Creek.

3.11.7 Bonhomme Creek Viewshed

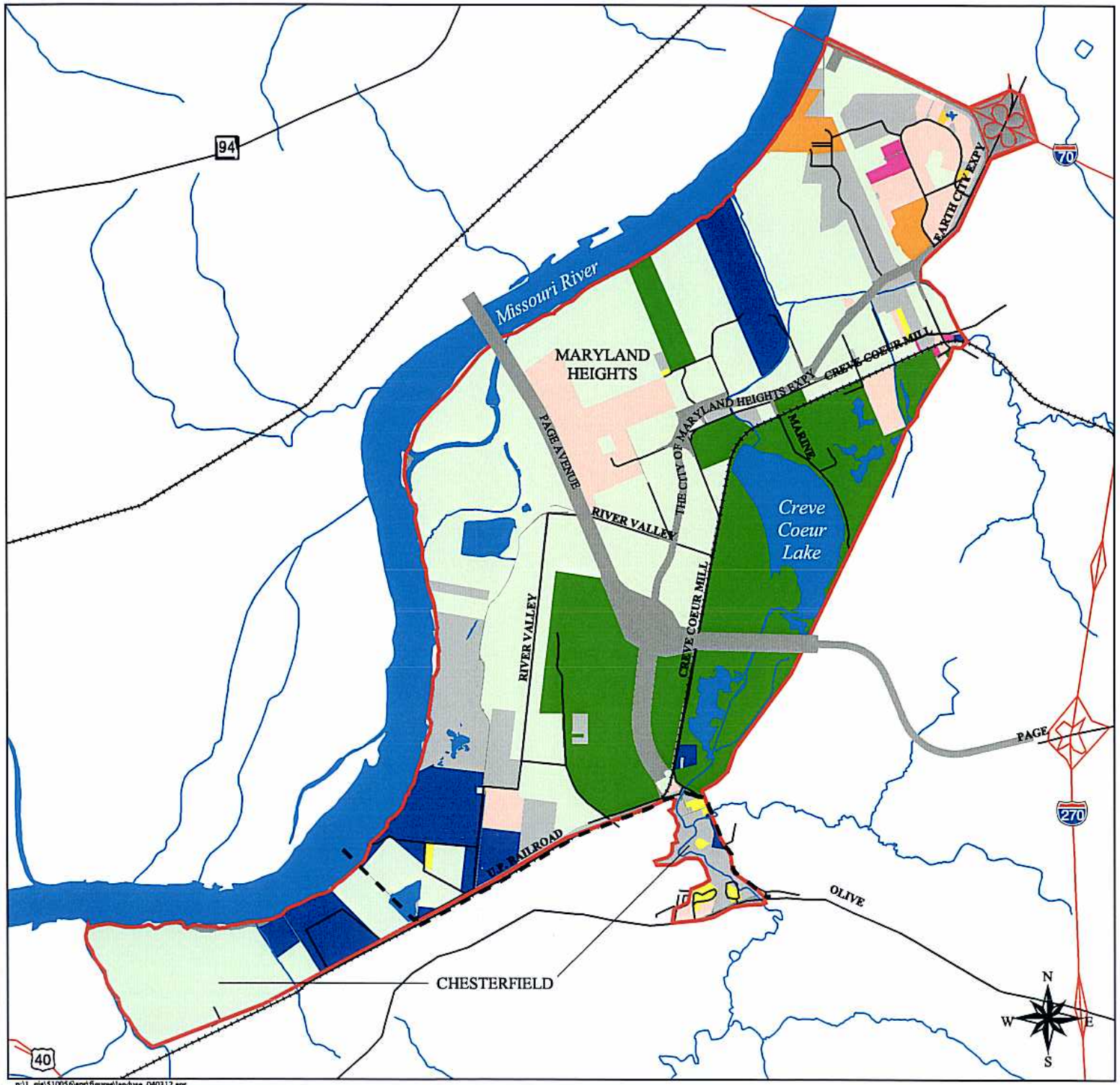
This viewshed can be described as open and is characterized by agricultural fields. The boundaries of this visual unit include the tree massed bluffs to the south, and the large tree masses associated with the Missouri River and Bonhomme Creek systems to the north and west. The eastern limits of this viewshed are defined by the one- to four-story buildings of the City of St. Louis Water Treatment Plant.

City of St. Louis Water Treatment Plant.

View of agricultural lands west of City of St. Louis Water Treatment Plant.

3.11.8 Missouri River Viewshed

This visual unit is characterized by the actual view to the Missouri River channel, large natural stands of trees between the Howard Bend Levee, and the river channel. The most predominant feature within this linear viewshed is the new bridge crossing of the Missouri River for the Page Avenue Extension and the I-70 Blanchette Memorial Bridge at the northern limits of the visual corridor. The Missouri River viewshed can be characterized as a highly sensitive visual resource by the large expanses of natural areas which abut the Missouri River channel. This viewshed forms the westernmost boundary of the study area.



U.S. Army Corps of Engineers
St. Louis District

Howard Bend Floodplain EIS

Legend

- Accomodation/ Hospitality
- Agricultural
- Arts & Entertainment
- Commercial
- Industrial
- Parks & Recreation
- Residential
- Utility & Public Services
- Vacant
- Transportation

Sources: Chesterfield Zoning, modified to reflect current land use and City of Maryland Heights Land Use.

- Study Area
- Interstate Hwy
- US Hwy
- State Hwy
- Road
- City Limit
- Railroad
- Stream
- Water

1:60000

0.5 0 0.5 1 Miles

March 12, 2004

Figure 3-1
Existing Land Use within the Howard Bend Area

MACTEC, Inc.

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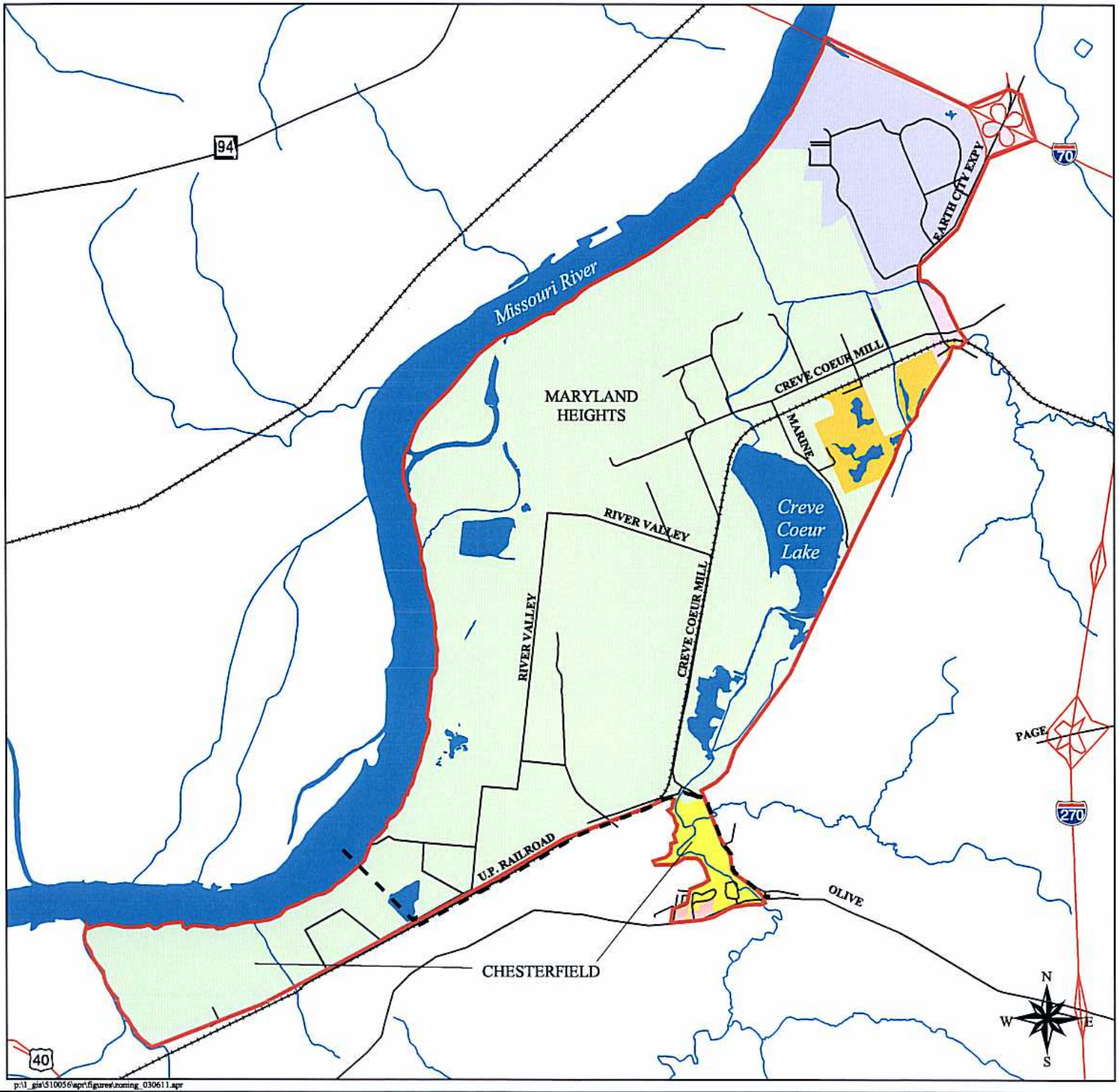


U.S. Army Corps of Engineers
St. Louis District

Howard Bend Floodplain EIS

Legend

- Non-Urban and Non-Urban Floodplain
- Commercial
- Manufacturing
- Residential
- Mixed Use
- Planned Development Manufacturing

Source: Cities of Maryland Heights and Chesterfield

- Study Area
- Interstate Hwy
- US Hwy
- State Hwy
- Road
- Railroad
- City Limit
- Stream
- Water

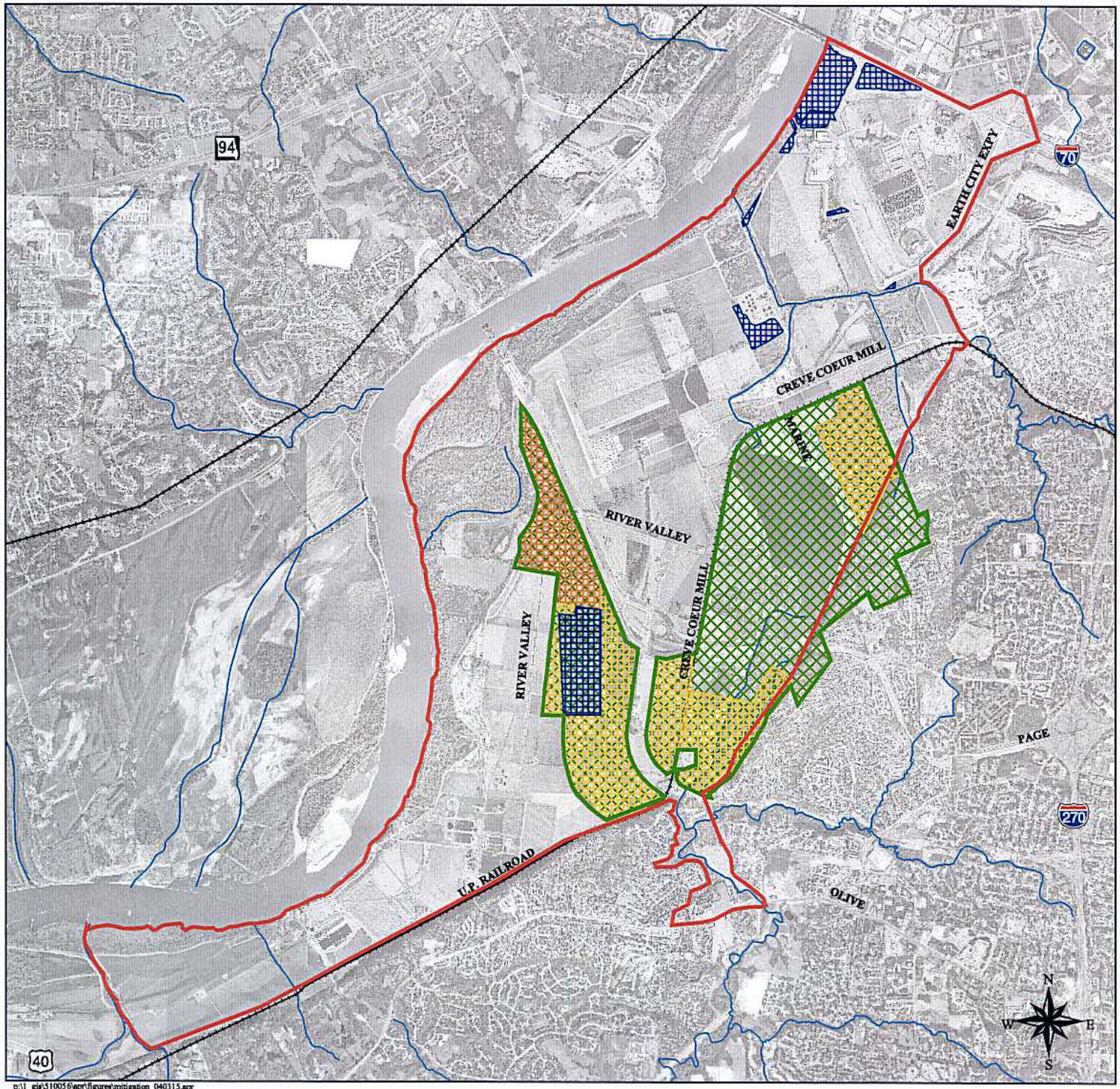
1:60000

0.5 0 0.5 1 Miles

June 12, 2003

Figure 3-2
Zoning Districts within the Howard Bend Area

MACTEC, Inc.



U.S. Army Corps of Engineers
St. Louis District

Howard Bend Floodplain EIS

Legend

- Wetland Mitigation Land
- 4(f) Mitigation Land From Page Ave.
- 6 (f) Mitigation Land from Page Ave.
- Creve Coeur Park

- Study Area
- Interstate Hwy
- US Hwy
- State Hwy
- Railroad
- Stream

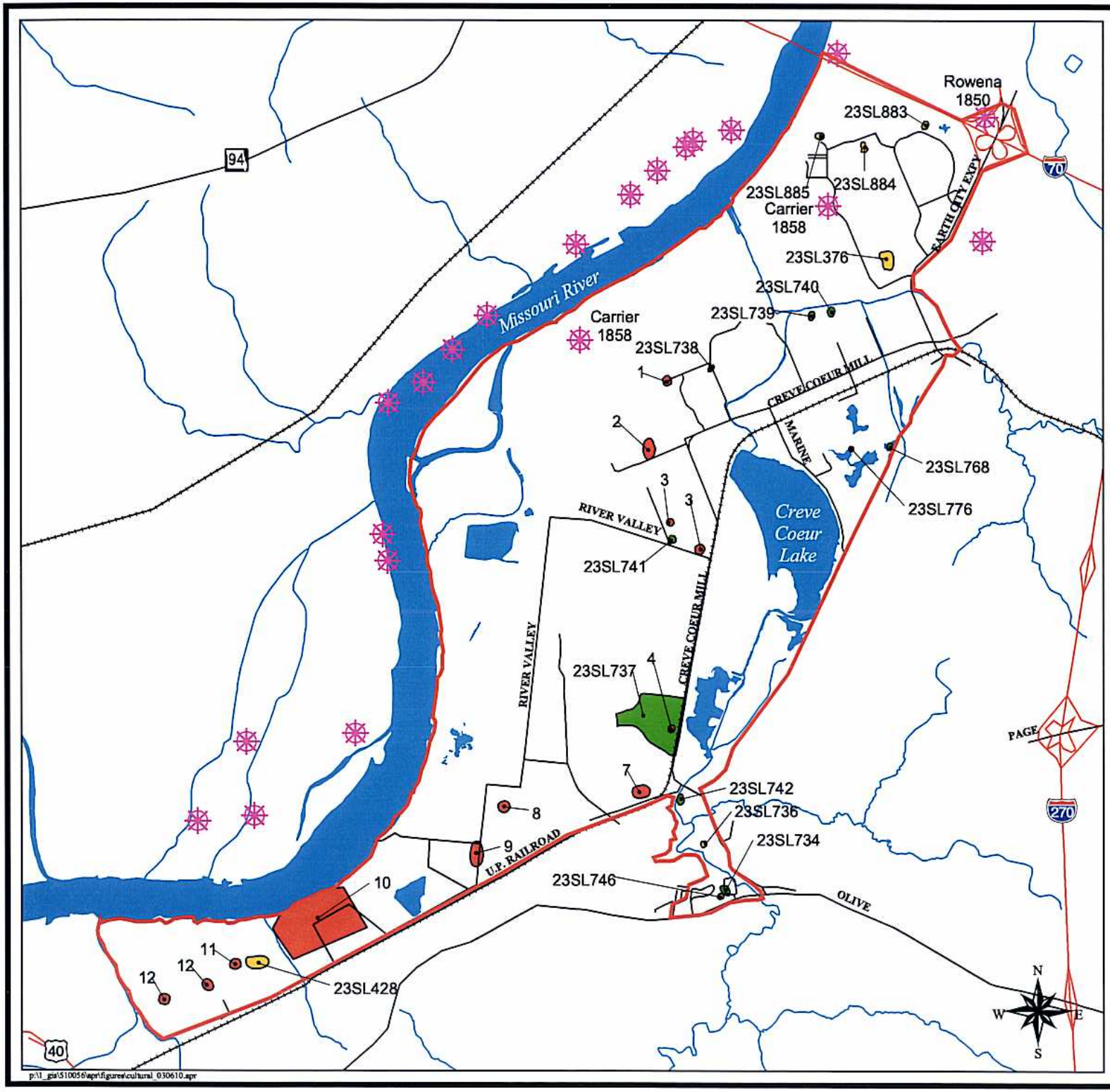
1:60000

0.5 0 0.5 1 Miles

March 15, 2004

Figure 3-3
Creve Coeur Lake Memorial Park and Mitigation Lands within the Howard Bend Area

MACTEC, Inc.



U.S. Army Corps of Engineers
St. Louis District

Howard Bend Floodplain EIS

Legend

- Shipwreck
- Previously Located Archeological Site
- Architectural Structure
- Archeological Site Impacted by a Past Project
- 23SL#### - Previously Recorded Site Number

- Study Area
- Interstate Hwy
- US Hwy
- State Hwy
- Road
- Railroad
- Stream
- Water

1:60000

0.5 0 0.5 1 Miles

June 12, 2003

Figure 3-4
Cultural Resources within the Howard Bend Area

MACTEC, Inc.

U.S. Army Corps of Engineers
St. Louis District

Howard Bend Floodplain EIS

Legend

- Study Area
- Active Farmfield
- Construction
- Deciduous Forest
- Grassland
- Mud/Sand
- Oldfield
- Farmed Wetland
- Emergent Wetland
- Scrub Shrub Wetland
- Forested Wetland
- Urban/Developed
- Water

1:60000

0.5 0 0.5 1 Miles

June 12, 2003

Figure 3-5
2001 Cover Types within
the Howard Bend Area

MACTEC, Inc.

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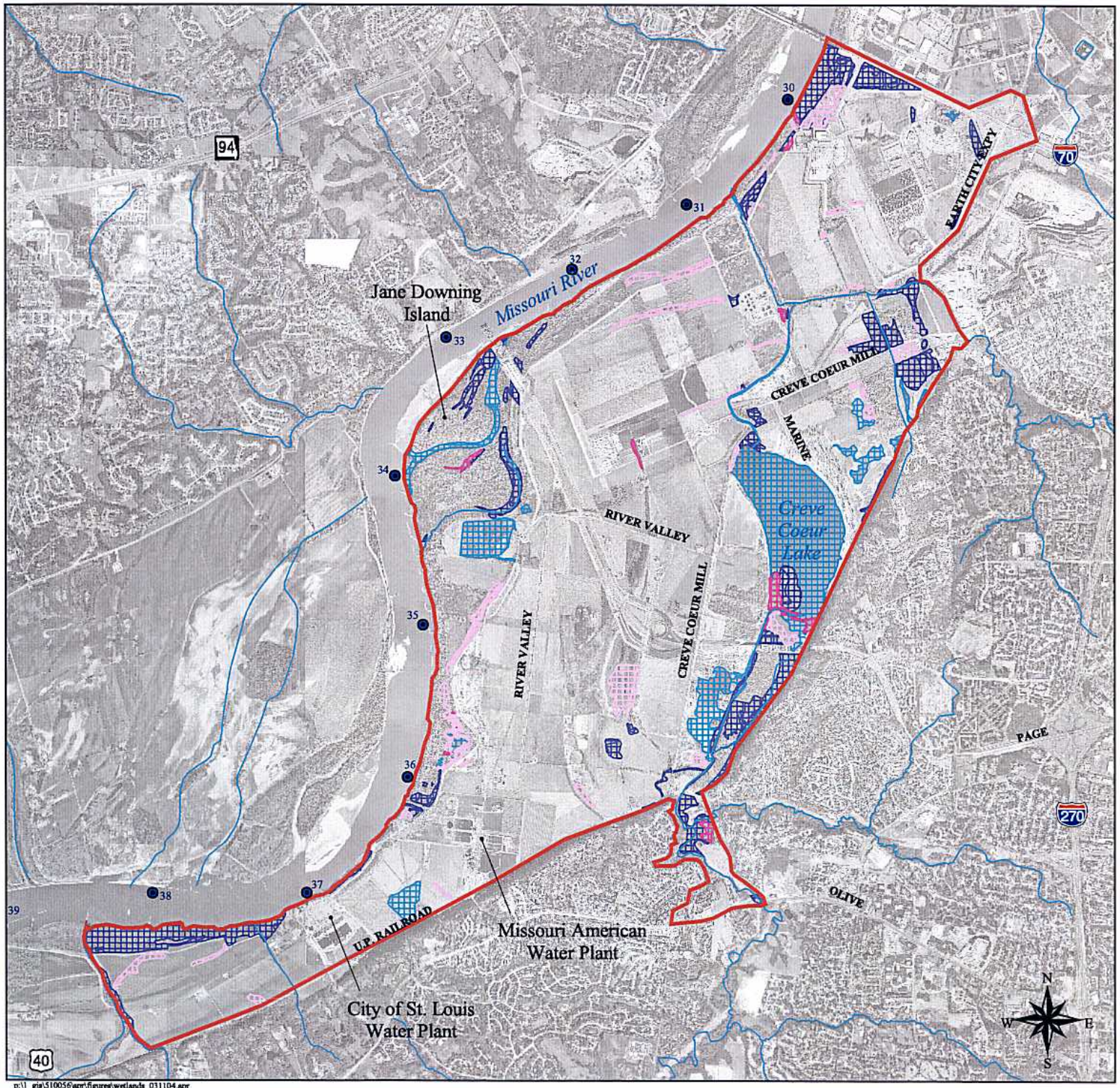

U.S. Army Corps of Engineers
St. Louis District

Howard Bend Floodplain EIS

Legend

- Emergent Wetland
- Scrub Shrub Wetland
- Forested Wetland
- Open Water
- River Mile
- Study Area
- Stream
- Interstate Hwy
- US Hwy
- State Hwy

1:60000

0.5 0 0.5 1 Miles

November 4, 2003

Figure 3-6
Wetland and Aquatic Resources within the Howard Bend Area

MACTEC, Inc.

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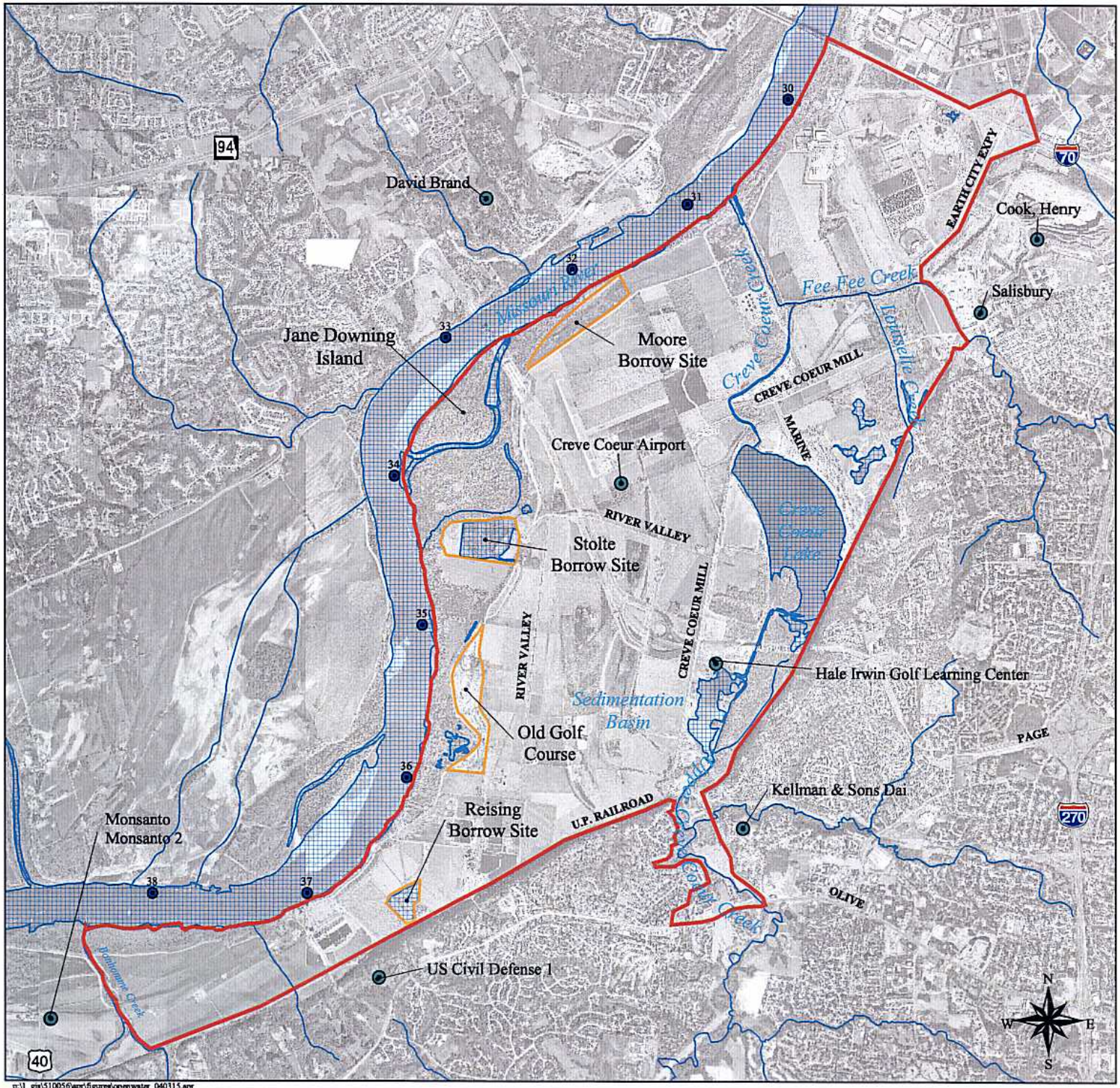


U.S. Army Corps of Engineers
St. Louis District

Howard Bend Floodplain EIS

Legend

- River Mile
- Well
- Stream/River
- Lake/Pond/River
- Borrow Site
- Study Area
- Interstate Hwy
- US Hwy
- State Hwy

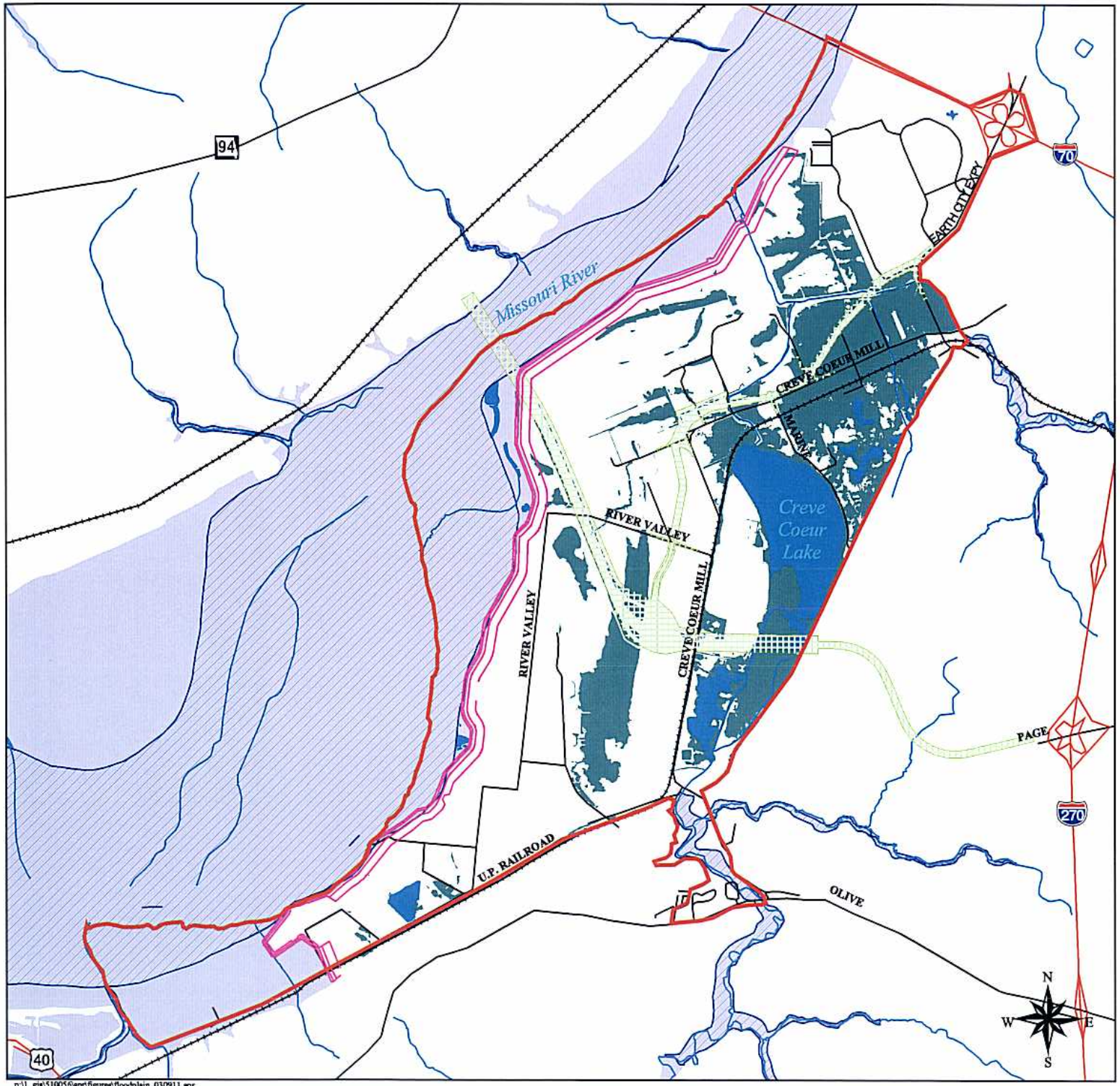
1:60000

0.5 0 0.5 1 Miles

March 15, 2004

Figure 3-7
Water Resources within the Howard Bend Area

MACTEC, Inc.



U.S. Army Corps of Engineers
St. Louis District

Howard Bend Floodplain EIS

Legend

- New 500 Year Levee
- Remaining FEMA Floodway
- CLOMR Floodplain
- Remaining FEMA Floodplain
- Existing ROW

- Study Area
- Interstate Hwy
- US Hwy
- State Hwy
- Road
- Railroad
- Stream
- Water

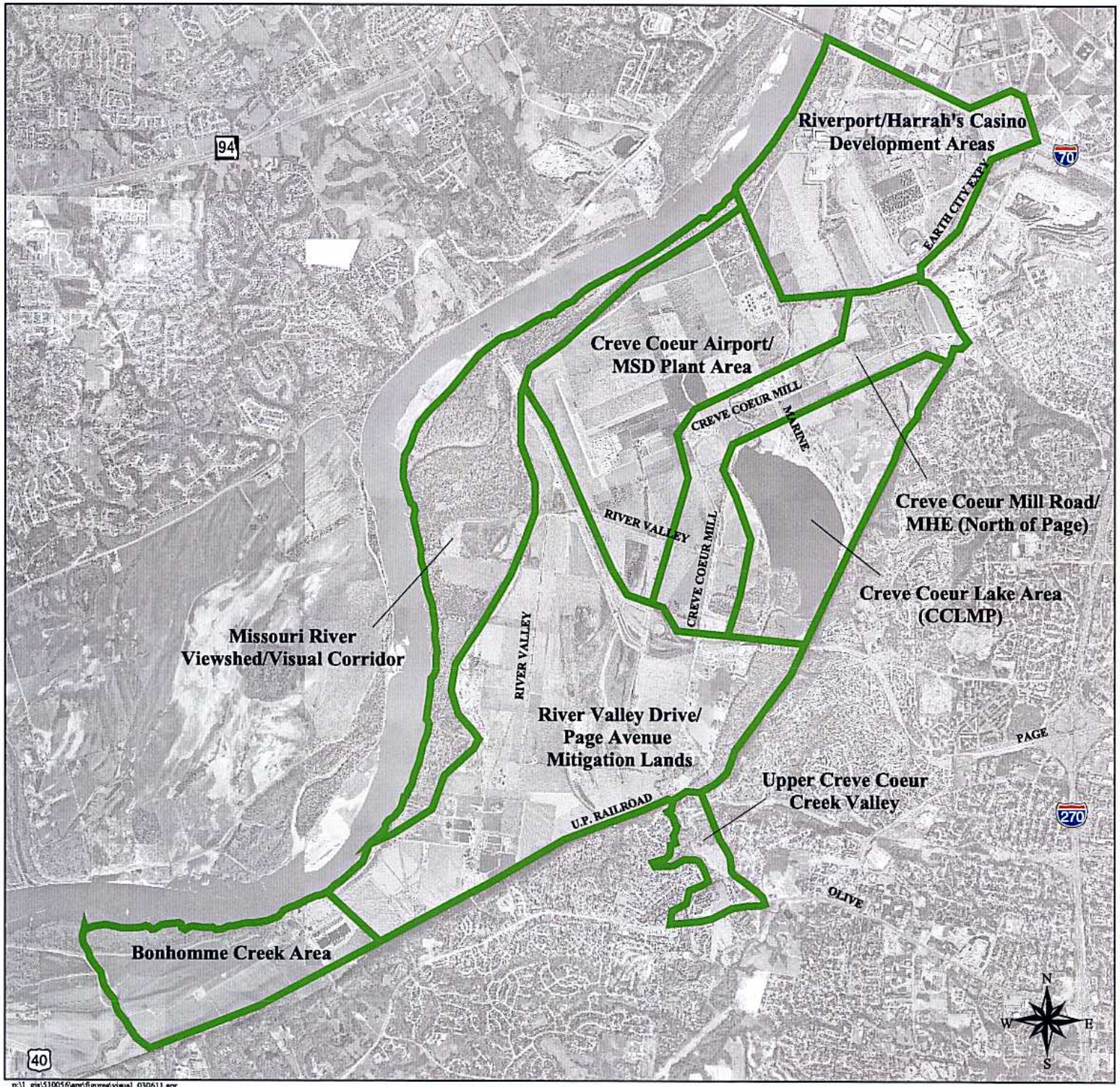
1:60000

0.5 0 0.5 1 Miles

September 12, 2003

Figure 3-8
Howard Bend Area
Floodplain/Floodway
with CLOMR Floodplain

MACTEC, Inc.



U.S. Army Corps of Engineers
St. Louis District

Howard Bend Floodplain EIS

Legend

Viewshed/Visual Unit

Interstate Hwy
US Hwy
State Hwy

1:60000
0.5 0 0.5 1 Miles

June 12, 2003

Figure 3-9
Visual Landscape Units
within the Howard Bend Area

MACTEC, Inc.

4.0 Environmental Consequences

This section presents an analysis of direct and indirect impacts of the regulatory alternatives under consideration. Direct impacts are those localized and immediate in their effect (e.g., sedimentation within surface water runoff). In contrast, indirect impacts are those that may affect those same resources, but would be evident somewhat later in time or somewhat removed in distance from the primary areas of operation, but are still reasonably foreseeable (e.g., the effect of a change in watershed on wetlands).

This section also integrates the assessment of cumulative impacts as required by 40 CFR 1508.7 and ER 200-2-2. A cumulative impact analysis must consider the potential impact on the environment that may result from the incremental impact of the project when added to other past, present, and reasonably foreseeable future actions. While the consideration of cumulative effects is normally presented in a separate section of an EIS, it is organizationally incorporated here into the assessment of the effects of the primary action. This approach will allow a more thorough and integrated analysis of environmental impacts of the primary action (which is procedural in nature) with those of specific development projects within the floodplain that may impact the resources subject to USACE regulatory authority.

The methodology for performing such analyses is set forth in “Considering Cumulative Effects Under the NEPA” [Council on Environmental Quality (CEQ), 1997] and includes the following:

1. Identification of the area in which effects of the project may be felt;
2. Assessment of the impacts that are expected in that area from the project;
3. Identification of other actions (past, present, and reasonably foreseeable) that have had or are expected to have impacts in the same area;
4. Assessment of the impacts or expected impacts from these other actions; and
5. Assessment of the overall impact that can be expected if the individual impacts are allowed to accumulate.

For this project, the geographic area of analysis for evaluation of cumulative impacts is the Howard Bend floodplain as discussed in Section 1.0. Other actions that will be considered as part of this analysis are presented and described in Section 2.0. In most cases, the consideration of other past actions and their associated impacts were limited to those occurring subsequent to 1985 (the time at which the current USACE regulatory program became effective). However, in the case of some natural resources (i.e., land cover, wetlands, surface water), the cumulative impact analysis entailed a more extensive historical analysis to establish the long-term trends of these resources within the study area (see Sections 4.6.2, 4.7, and 4.8.1, respectively). With respect to reasonably foreseeable future actions, those considered are limited to projects that have been identified for the study area and those that have demonstrated some level of commitment by the project proponent (e.g., approved plan, commitments to mitigative measures, financial commitments to the project, expenditure of effort for preliminary designs, etc.).

4.1 Social/Economic Characteristics and Land Use

4.1.1 Demographics

Changes in population characteristics for the study area are evaluated in terms of both direct and indirect effects (Table 4-1). Direct impacts to populations are those attributable to changes in residential population, as well as the influx of workers into the study area that may be

required to construct a given development project or facility. In contrast, indirect demographic impacts may be thought of as those associated with subsequent changes in the level of employment within the study area as a result of the operation of a given facility.

Table 4-1. Summary of Impacts to Demographic Characteristics Associated with Past, Present and Reasonably Foreseeable Future Actions

Action	Impact to Demographics
Primary Action	
Alternative 1: Case-by-Case (No Action)	No impacts
Alternative 2: SAMP	No impacts
Past Actions	Three residential displacements, and three commercial displacements due to Page Avenue Extension mitigation*
Present Actions	No impacts
Reasonably Foreseeable Future Actions:	
1. Flank Levee System	
Alternative A	No impacts
Alternative B	No impacts
2. MHE Extension (Alternatives 1-5)	Number of homes displaced: 1-14† Number of residents displaced: 2.5-35†
3. Baxter Road Extension	
Options 1-2	No impacts
4. Relocated Hog Hollow Road	No impacts
5. MSD Plant Expansion	No impacts
6. Land Use Plan Development	
Scenario 1: Interim Condition	12 residential displacements (assumes total build out)
Scenario 2: Ultimate Condition	12 residential displacements (assumes total build out)
7. Terra Vista Estates	Number of new residential units: 32 Approximate number of new residents: 80
8. Mill Ridge Villas	Number of homes displaced: 2 Number of new residential units: 46 Approximate number of new residents: 115
9. Creve Coeur Lake Dredging	No impacts
Subtotal	
Total	

* Booker, 1992.

† Numbers are preliminary and are based upon conceptual alternates only. Range of residents potentially displaced is based upon an average household size of 2.5 (Missouri Census Data Center, 2000).

4.1.1.1 Past and Present Actions

Past actions have had little direct impact on the demographic composition of the study area. Past actions considered in this cumulative impact analysis have resulted in three residential and three commercial displacements in conjunction with the Page Avenue Extension mitigation. No appreciable impact on population was observed as a result of these actions. These past actions have, however, had an effect on the transient, day (non-residential) population in that the development of Sportport, Riverport, and Harrah's Casino complex significantly increased the non-residential, day population.

As with past actions, present actions have not affected the demographic characteristics of the residential population in the study area. No residential displacements or additions have occurred

as a result of the present actions. The construction of the Howard Bend Levee will afford increased flood protection to persons who already live and work in the study area as well as those non-residents who utilize the services and facilities in the study area. Construction-phase activities for each of the present actions have resulted in an influx of workers using the area.

4.1.1.2 Future Actions

With the exception of the Terra Vista Estates subdivision and the Mill Ridge Villas development, none of the reasonably foreseeable actions will directly impact the demographic composition within the study area. If both of these developments are constructed, there will be an additional 78 homes in the study area north of Olive Boulevard which may result in a corresponding residential increase of approximately 195 persons [based upon an average household size in the City of Chesterfield of 2.5 (Missouri Census Data Center, 2000)]. The completion of the Mill Ridge Villas development will result in the displacement of two homes. This increase of 0.17 percent within the City of Chesterfield does not represent a significant change in the City of Chesterfield's population.

Although the construction of the Howard Bend flank levee system for Creve Coeur and Fee Fee creeks will not directly alter the demographic composition within the study area, it will result in improved stormwater management which will aid increased development in general. This improved stormwater management, in conjunction with the City of Maryland Heights' Future Land Use Plan and the expansion of the MSD plant, will likely result in an increase in the number of daytime persons who either work in the study area or utilize its services and facilities.

The extension of the MHE south to Olive Boulevard is an action that may have a minor adverse impact on local residential areas. Depending on the option that is selected, up to 14 existing residences may be displaced (approximately 35 existing residents). [Note: The MHE Extension has not yet been designed and the number of residential displacements is conceptual only.] This accounts for 0.07 percent of the population of the City of Chesterfield and does not represent a significant change in the local demographics.

Additionally, two planned residential developments are also located in the Creve Coeur Creek valley north of Olive Boulevard, and if constructed, could be adversely affected by one or more potential MHE extension alternatives. Depending on the extent to which these developments are constructed and the final alignment of the future MHE extension, additional residential units may be displaced.

4.1.1.3 Regulatory Action

Neither of the two regulatory alternatives (No Action and implementing a SAMP) would impact the demographic composition in the study area either directly or indirectly.

4.1.2 Environmental Justice

Potential disproportionate impacts to low income and minority populations were evaluated in accordance with Executive Order 12898. The City of Maryland Heights contains a population that is comprised of 85.4 percent white residents, 5.6 percent black residents, and 8 percent residents of other races (see Table 3-3). In addition, the residents of the City of Maryland Heights had a median household income in the year 2000 that was only 3.7 percent lower than the median household income in St. Louis County and was 22 percent higher than the median household income in the State of Missouri (see Table 3-5). No disproportionately high or adverse human health or environmental effects are expected to occur to low income or minority groups with either of the regulatory actions or any of the reasonably foreseeable future actions.

4.1.3 Economic Characteristics

No detailed analysis was made to quantify the economic impacts of the actions under consideration in this EIS. However, some generalizations can be made to acknowledge the effects of past, present, and reasonably foreseeable future actions on the economic characteristics of the study area. An assessment of the potential economic impacts from past, present, and future foreseeable projects will be most appropriately focused on both the direct and indirect effects of the particular project. Direct economic impacts include changes to the employment base and the increased personal income of workers during the construction and operational phases of each of the projects under consideration. Due to the greater proportion of the study area that falls within the City of Maryland Heights, the City of Maryland Heights' tax base will experience a much greater impact than the tax base in the City of Chesterfield.

4.1.3.1 Employment

Past actions have directly shifted the employment characteristics within the study area from primarily agricultural to commercial, hospitality, and service-related employment. Temporary employment is provided during the construction phase for all actions, whereas additional jobs are created in association with any developed facilities. For example, past and on-going development in the Riverport/Harrah's planning district has resulted in the creation of approximately 11,500 jobs. This shift is expected to continue with future actions in accordance with changes in developed land use. Other employers in the Howard Bend area are not accounted for in this number and would include water and wastewater treatment operations, the Creve Coeur Airport, and smaller employers located throughout the study area.

Among the reasonably foreseeable future actions, future land development in accordance with the City of Maryland Heights' Future Land Use Plan would result in a significant change in local employment. A precise estimate of additional employment is not possible, as future development will be market-driven. However, based on the permissible uses identified in the City of Maryland Heights' Future Land Use Plan, it is estimated that such development may support (upon complete build out) between 25,000 and 35,000 full time and part-time jobs in addition to the 11,500 identified at the Riverport/Harrah's district. The rate at which these changes may be expected to occur, however, can not be predicted, as future development within the study area will be market driven. For each action, the investment of capital (and the employment of workers) to develop and operate the facility (i.e., roadway, plant expansion, commercial development, entertainment venue) results in a multiplier effect within the local and regional economy. This effect, while not quantified, produces additional economic benefits due to multiplier effects that include increased sales revenues of supplies, increased employment, additional housing requirements, and expansion of the tax base (Regional Multipliers, 1992).

4.1.3.2 Tax Base

Past and present actions have had a variable effect on the local tax base. Actions taken by public or semi-public entities such as MoDOT, the Missouri American Water Company, and the City of Maryland Heights have required the acquisition of lands that had previously been taxable (predominantly agricultural land). The conversion of these lands to public ownership has resulted in some reduction in the tax base. In contrast, commercial and entertainment-based developments such as Riverport and Harrah's Casino complex have resulted in an increase in property value of lands contained within their levee (or flood protection berm). Similarly, these developments have provided a considerable expansion of the tax base (real estate taxes, casino revenue) over that assessed for agricultural uses.

The on-going construction of the 500-year primary levee has also had the effect of increasing property value. Improvements in stormwater management and improved traffic patterns within the study area will facilitate increased development within the study area (i.e., in accordance with the City of Maryland Heights' Future Land Use Plan). This increased development will result in increased tax revenues to the HBLD, St. Louis County, and the City of Maryland Heights. The Terra Vista Estates subdivision and Mill Ridge Villas, if constructed, would also generate additional tax revenue. The dredging of Creve Coeur Lake and the expansion of the MSD plant will not have an effect on the local tax base. Each action will be conducted entirely within publicly owned lands.

There will be no effect on economic characteristics from the adoption of a SAMP versus No Action with regard to regulatory oversight within the study area.

4.1.4 Land Use

4.1.4.1 Past and Present Actions

Prior to 1985, land use in the Howard Bend study area consisted primarily of agricultural areas (row crop production), open space, utility companies (MSD, St. Louis City and County Water), and recreational lands (CCLMP). Since 1985, changes in land use within the study area resulted from the development of Riverport, Harrah's Casino complex, and Sportport which converted primarily agricultural land to commercial, arts and entertainment, and parks and recreation, respectively. Additional changes in land use have occurred due to the development or expansion of existing transportation facilities (e.g., Page Avenue Extension, MHE, and trails around CCLMP, etc.) (see Section 3.1.3) or recreational facilities (e.g., Crystal Springs Quarry Golf Club). Additionally, the construction of a portion of the 500-year levee required the acquisition and displacement of the Chesterfield Golf Course for realignment of the levee out of the floodway and for the acquisition of fill material. However, as presented in Table 3-9, agricultural lands still represent, by far, the prominent land use (approximately 45 percent or 3,907 acres), followed by parks and recreation (approximately 23 percent or 1,960 acres).

4.1.4.2 Future Actions

Future development of unconstrained lands in accordance with the City of Maryland Heights' Future Land Use Plan will generally conform to the "Encouraged" and "Conditional" uses within each Planning District as discussed in Section 2.2.5. The specific nature and type of development within each Planning District cannot be known at this time as this future development will be market-driven. With few exceptions, future actions will have the greatest impact on agricultural lands (Table 4-2). Future development will impact approximately 1,658 acres of existing agricultural land. The same amount of land will be impacted under either the interim (Scenario 1) or the ultimate condition (Scenario 2); however, the rate at which the build-out occurs differs between the two conditions. Development of the flank levee system will impact between 132 and 166 acres of agricultural lands. Options 1 and 2 of the Baxter Road extension will impact between 21 and 23 acres of agricultural lands. Impacts from the MHE Extension to Olive Boulevard and the relocation of Hog Hollow Road are both nominal (i.e., less than 1 acre per project). In the case of the MHE, future extension of this roadway will occur within a corridor previously dedicated to transportation uses (see Figure 2-6). There will be no impacts to agricultural lands from any other reasonably foreseeable future actions. Collectively, all reasonably foreseeable future actions will impact between 1,812 and 1,848, or approximately 47 percent of existing agricultural land.

Table 4-2. Summary of Potential Impacts to Land Use Associated with Foreseeable Future Actions

Action	Category									
	Accommodation/ Hospitality	Agriculture	Arts and Entertainment	Commercial	Industrial	Parks and Recreation	Residential	Utility and Public Service	Vacant	Transportation
1. Flank Levee System										
Alternative A	0	131.7	0	2.7	0	0	0	4.1	26.3	3.0
Alternative B	0	166.0	0	4.8	0	0	0	12.9	38.5	6.4
2. MHE (Options 1-5)	0	0.7-0.7	0	0.8-1	0	0	0	0.2-2.1	8.5-13.6	18.1-20.1
3. Baxter Road Extension (Options 1-2)	0	20.7-23.1	0	0-0.3	0	2.5-5.4	0	11.4	7.1-10.1	0.4-3.5
4. Hog Hollow Road Relocation	0	0.7	0	1.2	0	0	0	1.1	1.07	0.1
5. MSD Plant Expansion	0	0	0	0	0	0	0	43.8	0	0
6. Land Use Plan Development										
Scenario 1: Interim Condition	0	1,657.9	0.00	100.6	0.8	66.7	13.1	9.8	208.5	38.5
Scenario 2: Ultimate Condition	0	1,657.9	0.00	100.6	0.8	66.7	13.1	9.8	208.5	38.5
7. Terra Vista Estates	0	0	0	0	0	0	0	0	7.3	0
8. Mill Ridge Villas	0	0	0	0	0	0	5.2	0	12.1	2.8
9. Creve Coeur Lake Dredging	0	0	0	0	0	95.7	0	0	0	0
Total	0	1,811.7-1,848.4	0.00	105.3-107.9	0.8	164.9-167.8	18.3	70.4-81.1	270.9-291.2	62.9-71.4

As discussed in Section 3.1.3, parks and recreation areas comprise the second largest percentage of land in the study area (approximately 23 percent). The planned dredging of Creve Coeur Lake will impact the largest portion of parks and recreation areas (approximately 96 acres for spoil disposal). The dredged material disposal site located south of Page Avenue and west of Creve Coeur Mill Road will directly affect 41 acres of dedicated 6(f) lands within CCLMP. Future land development will impact approximately 67 acres of park and recreation land. Future transportation projects will also impact park and recreation lands. The Baxter Road Extension will directly affect between 3 and 5 acres of dedicated 6(f) lands within CCLMP. Additionally, as discussed in Section 4.1.6, depending on the location of the final alignment, the Baxter Road Extension may also result in the creation of a 66-acre remnant of 6(f) lands to the south of Baxter Road. A total of between 151 and 154 acres (or approximately 8 percent) of park and recreation land will be impacted by reasonably foreseeable future actions.

The next highest range of impacts of future projects will be to vacant land, which comprises approximately 10 percent of the study area. As was the case with agricultural land, the greatest impact to vacant land will be as a result of future development of unconstrained lands (208 acres). Development of the flank levee system will impact between 26 and 38 acres of vacant land, and the three future transportation projects (the MHE Extension, the Baxter Road Extension, and the relocation of Hog Hollow Road) all impact less than 14 acres of vacant land per project (see Table 4-2). Terra Vista Estates and Mill Ridge Villas will convert between 7 and 12 acres of vacant land (respectively) to residential uses. In total the reasonably foreseeable future actions will impact between 271 and 291 acres of vacant land.

Land dedicated to commercial usage currently accounts for approximately 569 acres (or approximately 7 percent of the study area). Commercial areas are located in Riverport development, Creve Coeur Airport (which is considered a commercial-transportation facility) and in the southeastern portion of the study area (in Chesterfield just north of Olive Boulevard) (see Figure 3-1). The greatest impact to commercial land will be from the future development, which will impact approximately 101 acres. The flank levee system will impact between 2 to 5 acres.

Utility and public services consist of the MSD treatment plant and St. Louis City and County water plants (see Figure 3-1). Expansion of the MSD plant will have the greatest impact, as the plant is categorized as a utility facility. Approximately 44 acres will be impacted by the plant's expansion. The flank levee system will impact between 4 and 13 acres of utility and public service land. The Baxter Road Extension and the relocation of Hog Hollow Road will impact approximately 11 acres and 1 acre of utility and public service land, respectively. Potential future development may also impact approximately 10 acres of utility and public service land.

4.1.4.3 Regulatory Actions

Neither the No Action (Case-by-Case Permitting) nor the SAMP alternative will have a direct effect on land use alteration within the study area. Guidelines and restrictions on future development under the SAMP alternative will, however, contribute to the specific features of future development including the degree of preservation of natural habitats, mitigation requirements (including the establishment of one or more wetland banks within the study area) and the need for protective vegetated buffers.

4.1.5 Public Services and Facilities

4.1.5.1 Past Projects

Transportation improvements such as the Page Avenue Extension will result in improved access for emergency vehicles traveling in and around the study area, and will improve the level

of service provided to those living and working in the study area. (The expansion of Creve Coeur Airport had no significant effect on public services and facilities.) Developments such as Riverport, Harrah's Casino complex, and Sportport have increased the number of daytime non-residents who work in the study area or who use facilities or services within the study area. This increased daytime population results in a greater demand for public services and facilities. Revenue generated by Harrah's Casino complex is used in part, to provide improved public services and facilities within the study area. Indirectly, tax revenues from other developments within the study area are also used to provide public services. The expansion of the Missouri American Water Company's Central Plant provided an increased ability to meet the growing demand for potable water.

4.1.5.2 Present Projects

Improvements in the efficiency of the transportation infrastructure (i.e., the MHE Extension to River Valley Drive) will have the effect of increasing response times of emergency vehicles, and will improve access to recreational and entertainment facilities. The construction of the Howard Bend Levee has no direct effect upon public services and facilities. However, the improved protection provided by the 500-year levee will allow for the maintenance of services and continued access to facilities under flood conditions.

4.1.5.3 Reasonably Foreseeable Future Projects

As with past and present transportation improvements, the eventual extension of the MHE south to Olive Boulevard and completion of the Baxter Road Extension will generally not directly affect public facilities, but will result in improved emergency services' response time and will enhance access to recreational and entertainment facilities within the study area. Several of the potential alternatives to the future MHE extension, however, would result in the displacement of the First Baptist Church of Creve Coeur.

In contrast, future developments within the study area (i.e., Terra Vista Estates subdivision, Mill Ridge Villas, and development in accordance with the City of Maryland Heights' Future Land Use Plan) will result in an increase in the number of persons and employment centers in the study area, thus resulting in a greater demand upon public services and facilities. Construction of the Howard Bend flank levee system for Creve Coeur, Fee Fee and Louiselle creeks and the dredging of Creve Coeur Lake will have no direct affect on public services and facilities. The existing MSD plant which treats wastewater for the region is currently at capacity and is a factor that is limiting future development. The planned expansion of the MSD plant will result in an improvement in the capacity to provide wastewater treatment, but may facilitate future demands for such services by additional developments.

4.1.5.4 Regulatory Alternatives

Neither the SAMP nor the No Action (Case-by-Case Permitting) regulatory alternative will have a significant effect on public services and facilities.

4.1.6 4(f)/6(f) Lands

4.1.6.1 Past and Present Actions

Potential impacts of past and present actions on 4(f)/6(f) lands have consisted of the crossing of CCLMP by the Page Avenue Extension project. This project resulted in significant impacts on the park as it crossed the upper end of Creve Coeur Lake. As compensation for those impacts,

MoDOT purchased and donated a total of 1,102 acres of land to the CCLMP for future recreational uses (see Section 3.1.5).

4.1.6.2 Future Actions

With the exception of the Baxter Road Extension and the future extension of the MHE, none of the reasonably foreseeable future actions are expected to result in impacts to 4(f) or 6(f) lands. Baxter Road Extension, depending on its alignment, may result in both direct and indirect impacts to the dedicated 6(f) lands within CCLMP. The future extension of the roadway to a connection with the MHE Extension may require a more northerly alignment (see Figure 2-8) that would entail the direct conversion of approximately 5.4 acres of 6(f) lands. By comparison, a southerly alignment along Waterworks Road would encroach upon 2.5 acres of 6(f) lands. This southerly alignment, however, may not allow for an effective connection with the future MHE as the MHE will be on structure at this location. Indirect impacts, ranging up to 66 acres may also result from the severance of the 6(f) lands in association with a northerly alignment of this roadway. The resultant effect of this severance will be a reduced utility of the 66-acre 6(f) remnant and inefficient management of the area.

The future MHE Extension will extend through 6(f) lands along a reserved transportation corridor. The potential indirect impacts of this future corridor with regard to noise and visual impacts were, however, recognized by the NPS (NPS, 1995a). As a result, a corridor width was established at 660 feet to allow for the natural mitigation of noise over distance, and to allow for some reduction in the visual impact.

4.1.6.3 Regulatory Actions

Neither the No Action (Case-by-Case Permitting) nor the SAMP alternative will have an effect on 4(f) or 6(f) lands.

4.2 Cultural Resources

4.2.1 Past and Present Actions

Several previously recorded archaeological sites have been affected by past (i.e., since 1985) and present actions. These included one prehistoric site and three historic sites affected by the Riverport development. None of these sites, however, were either listed or determined to be eligible for listing to the NRHP. One historic site (farmstead) that had not been formally evaluated as to NRHP eligibility was impacted by the Page Avenue Extension and again by the MHE Extension to River Valley Drive. Consequently, none of the past or present actions have significantly affected cultural resources.

4.2.2 Future Actions

None of the foreseeable future actions identified will impact archaeological or architectural sites either listed or determined to be eligible for listing to the NRHP. Several sites, however, have been identified that have not been formally evaluated, but may be impacted by future actions. Specifically, each of the flank levee alternatives may affect two historic sites; the MHE may affect two historic sites and one prehistoric site; the Mill Ridge Villas development may affect a potentially historic limestone quarry (minor impact due to detention basin); and future land use development may affect one historic site (Table 4-3). Additionally, the ultimate future development of the floodplain may further impact the Dussault Farm, a site determined to be potentially NRHP eligible (ARG, 2002).

Table 4-3. Summary of Impacts to Cultural Resources Associated with Past, Present and Reasonably Foreseeable Future Actions

Action	Archaeological Resources	Architectural Resources
Primary Action		
Alternative 1: Case by Case Permitting (No Action)	No impacts	No impacts
Alternative 2: SAMP	No impacts	No impacts
Past Actions	One historic site not evaluated for NRHP eligibility (#23SL741)	
Present Actions	One historic site not evaluated for NRHP eligibility (#23SL741)	No Impacts
Reasonably Foreseeable Future Actions		
1. Flank Levee System		
Alternative A	Two historic sites not evaluated for NRHP eligibility (#23SL739, and #23SL740)	No impacts
Alternative B	Two historic sites not evaluated for NRHP eligibility (#23SL739, and #23SL740)	No impacts
2. MHE (Options 1-4)	Three sites not evaluated for NRHP eligibility: ▪ 1 prehistoric (#23SL734) ▪ 2 historic (#23SL737, #23SL742)	No impacts
3. Baxter Road Extension (Options 1-2)	No impacts	No impacts
4. Hog Hollow Road Relocation	No impacts	No impacts
5. MSD Plant Expansion	No impacts	No impacts
6. Land Use Plan Development		
Scenario 1: Interim Condition	Impacts to one site not evaluated for NRHP eligibility (23SL741)	Impacts to site # 1, Dussault Farm
Scenario 2: Ultimate Condition	Impacts to one site not evaluated for NRHP eligibility (23SL741)	Impacts to site # 1, Dussault Farm
7. Terra Vista Estates	No impacts	No impacts
8. Mill Ridge Villas	Encroachment on one historic site not evaluated for NRHP eligibility.	No impacts
9. Creve Coeur Lake Dredging	No impacts	No impacts

4.2.3 Regulatory Actions

There will be no direct impacts to archaeological resources as a result of regulatory actions under Case-by-Case Permitting or under the provisions of a SAMP. As is the current policy of the USACE, review of potential future actions requiring a Section 404 permit shall include a consideration of cultural resources. Coordination will be conducted with the Missouri State Historic Preservation Office of the MDNR in accordance with Section 106 of the National Historic Preservation Act.

4.3 Traffic and Transportation

Significant modifications in the traffic network and associated roadway system have occurred since 1985 in the northern sections of the study area, and major future changes in the roadway network are being constructed or planned. These improvements, both built or planned, are in response to new development, significant changes in the regional transportation network, and future planned development. In addition to the roadway improvements within the study area, past and future improvements are proposed for the Creve Coeur Airport facilities and runways and the trail system of CCLMP.

4.3.1 Past and Present Actions

Major roadway improvements in the study area since 1985 included improvements to Earth City Expressway from I-70 to Pritchard Farm Road, development of the Casino Drive access road to the Harrah's Casino complex, and major intersection improvements at both of the Riverport Drive intersections with Earth City Expressway.

With the initial development of the Riverport development in 1987, lane widening of Earth City Expressway south of I-70 took place in anticipation of the increased traffic to serve the development. To improve levels of service of the Riverport Drive intersections at Earth City Expressway, significant intersection improvements were conducted in 2002 and 2003 at both the north and south intersections with additional lane widening to Earth City Expressway.

The development of Harrah's Casino complex in 1996 required a major access road to the gaming facility and its associated parking and service drives. Casino Drive, approximately 1 mile in length, is an access road developed on top of a flood protection berm. Riverport and Harrah's Casino complex are restricted on the amount of build out that they will ultimately be permitted based upon the level of service that their intersecting roadways have with Earth City Expressway.

Present actions associated with the study area roadway network are significant and are in response to major improvements within the regional transportation system and anticipation of future development. The primary improvement is the construction of the Page Avenue Extension. This 10-lane facility connects St. Charles County and St. Louis County with a new crossing of the Missouri River. The Page Avenue Extension connects Route 94 in St. Charles County with I-270 in St. Louis County. In the Howard Bend study area, one access point to Page Avenue is available. This access point is south of River Valley Drive and will be accessed via a diamond interchange with MHE.

The new MHE improvement is a four-lane expressway facility expandable to six lanes from the intersection of Pritchard Farm Road with Earth City Expressway south to River Valley Drive. The improvement includes two bridges. The first bridge is 550 feet in length over Fee Fee Creek, and the second bridge is 100 feet in length over Creve Coeur Creek.

South of River Valley Drive, the MHE is constructed as two through lanes to the Page Avenue Extension interchange with associated left turn lanes to and from the ramps of Page Avenue Extension. Other ancillary improvements with the MHE include:

- Reconstruction of the intersection of Pritchard Farm Road and Casino Drive with MHE;
- Extension of Marine Avenue with intersection improvements with MHE;
- New intersection improvement of MSD Drive with the MHE;
- Closure of access from Creve Coeur Mill Road to River Valley Drive; and
- Improvements to Airport Road alignment and intersection with MHE.

These improvements are consequences of the MHE improvement and are designed to improve circulation and reduce intersection congestion and conflicts once the MHE and Page Avenue Extension are operational.

Traffic modeling and forecasting of these conditions were developed for 2003 in anticipation of these improvements becoming operational (Table 4-4). These forecasts for future AADT levels are based upon certain assumptions on how these improvements will react to the attractiveness of both regional and local trips to the new facilities in 2003.

Table 4-4. Forecasted AADT with MHE from Earth City Expressway to Page Avenue Extension (2003)

Roadway and Segment	AADT (2000)
Page Avenue Extension (at Missouri River)	30,000
MHE (north of Page, two-lane section)	7,500
MHE (north of River Valley, four-lane section)	6,000
MHE (north of Marine)	15,000
Earth City Expressway (north of Pritchard Farm)	28,500
Creve Coeur Mill Road (north of Page Avenue Extension	10,500
Marine Avenue (at Creve Coeur Mill Road)	6,500

* Forecast assumes four-lane connection of MHE from Earth City Expressway to River Valley Drive and two-lane connection from River Valley Drive to Page Avenue Extension.

Creve Coeur Airport

Approved actions for the Creve Coeur Airport include a 4,500-foot runway and a 2,500-foot crosswind runway. Other improvements include expanded parallel taxiways and new hangars and service facilities. These improved facilities are expected to increase the number of base aircraft at the facility to over 325 by 2012 and increase flight operations from 48,000 in 1997 to 76,000 by 2012. The planned improvements were approved by MoDOT in the Final Environmental Assessment Report for the Airport in 1996.

Bicycle and Pedestrian System

The CCLMP provides an interconnected system of bicycle and pedestrian trails which currently follow the Creve Coeur Lake area and the upper bluffs of the Park. Recent expansion of the trail system has included trails south to the Page Avenue Extension. The current primary trail system is a minimum 8-foot wide asphalt trail throughout the Park including a new trail facility parallel to Creve Coeur Mill Road. The current trail system comprises 4.5 miles.

The trail system for CCLMP is planned for expansion from 4.5 to 15 miles as part of the CCLMP Park Master Plan. This expanded trail system includes additional trails in and around the Page Avenue mitigation lands and a planned future connection to the Katy Trail system.

4.3.2 Future Actions

Significant future improvements are being planned for expansion of the roadway network within the study area. These improvements can be defined as reasonably foreseeable by their current review or inclusion into the long-range transportation plans for the City of Maryland Heights and/or City of Chesterfield.

These reasonably foreseeable actions include the following improvements (Figure 4-1):

1. Extension of MHE south of Page Avenue to Olive Boulevard (four-lane facility expandable to six lanes).
2. Baxter Road Extension (Chesterfield Valley Spur) with overpass of I-64 along the existing Waterworks Road right of way to the MHE Extension. This roadway is planned as a two-lane facility expandable to four lanes and would have both east bound on and off access to I-64 and westbound access via the frontage road at Boones Crossing.
3. Relocation of Hog Hollow Road to east from River Valley Drive at Missouri American Water Treatment Plant.

Additionally, a system of roadways and collectors would be expected to be constructed within future developed lands to provide access to the local network.

Traffic modeling, forecasting, and analysis of roadway volumes in the Howard Bend area are critical to understanding the impact of new roadway improvements and land use growth on the transportation network. The traffic analysis for this area is very complex given the major transportation improvements being constructed or planned within or in proximity of the study area coupled with future land use growth. Traffic modeling is not an exact science but provides a means to anticipate an order of magnitude of traffic growth under various scenarios, given roadway types and land use growth.

It is important to recognize that many of the existing arterials in the region currently operate at Level of Service E or F (conditions characterized by intermittent and significant stops and delays caused by congestion) during peak periods. These would include I-70 (both east and west of the Blanchette Memorial Bridge), I-270, I-64, and various segments of Olive Boulevard. As a result of this congestion, any major improvements in the region can be expected to attract motorists from throughout the area.

In order to identify the potential attractiveness of the facilities in the Howard Bend study area, a travel demand model was used to forecast future traffic volumes. These analyses are critical to understanding the impacts that new roadway improvements and/or land use growth will have throughout the transportation network. The traffic analyses are very complex given the major transportation improvements being constructed or planned within or around the study area, particularly when coupled with the potential for significant future land use growth. Though travel demand modeling is an inexact science, it represents a valuable tool for preparing order-of-magnitude forecasts for the various scenarios.

Various sources of information were used to generate long-range traffic forecasts for the study area, including the following:

1. The EWGCC's Regional Travel Demand Model;
2. The Chesterfield, Missouri City-Wide Transportation Study prepared by George Butler Associates;
3. The City of Maryland Heights Traffic Model developed by CBB; and
4. The Howard Bend Land Use Plan.

Land use growth was based upon a range of assumptions regarding the potential types and densities of development. The Howard Bend Land Use Plan provided the basis for these assumptions by estimating development potential within each Transportation Analysis Zone (TAZ) that was established for the study area (Figure 4-2). Projected land use changes in each zone were used to estimate traffic generation that was aggregated with the reassignment of "external" traffic to the proposed road system.

Forecasted traffic volumes for roadways in the study area are summarized in Table 4-5. These volumes reflect 20 years of growth (a "design year" condition). It should be noted that due to the number of variables involved, projected volumes on these roads could be expected to vary by ±10 to 20 percent. Specifically, there is considerable potential variability in the following:

- The type and density of land uses that may actually be developed within the study area;
- The eventual treatment of external network constraints, such as the interchanges of Page Avenue (Route D) with Route 94 and I-270, could have a pronounced impact on the level of traffic that travels through the study area;
- The development of the road system within the study area, including the extent to which internal capacity constraints would be addressed with the construction of the proposed transportation system improvements; and
- The potential connectivity of the various facilities located within the study area (i.e., the connection of MHE with Water Works Road has a pronounced impact on some of the forecasts for the secondary roads).

Table 4-5. Long Range Traffic Forecast with Land Use Growth

Roadway and Segment	AADT Range
Page Avenue Extension (at Missouri River)	115,000 to 145,000
MHE – North of River Valley	37,000 to 53,000
MHE – North of Page Avenue Extension	47,000 to 63,000
MHE – South of Page Avenue Extension	49,000 to 65,000
Creve Coeur Mill Road (at Page Avenue)	4,000 to 11,000
Marine Avenue (at MHE)	8,000 to 11,000
River Valley Drive (south of Page Avenue Extension)	1,500 to 10,000
Relocated Hog Hollow Road (north of Water Works Road)	5,000 to 15,000
Water Works Road (west of MHE)	1,500 to 17,000
Baxter Road Extension (Chesterfield Valley Spur)	11,000 to 20,000

Source: CBB, 2003.

4.3.3 Regulatory Action

Neither the No Action (Case-by-Case Permitting) nor the SAMP alternative will directly impact transportation needs within the study area. However, any future transportation improvement that will require a Section 404 permit will have to comply with the requirements of the USACE Regulatory Program as discussed in Section 2.1.

4.4 Air Quality

Potential air quality impacts may be appropriately evaluated for both the construction and operation phase of a given project. Potential impacts associated for each phase are discussed below.

4.4.1 Construction Related Air Impacts

Each of the past and present actions have had the potential to increase the emissions of engine exhaust and fugitive dust within the study area due to earth moving activities during the construction phase. In most cases, smaller projects have not resulted in noticeable effects. In contrast, large earth moving projects such as the construction of the Riverport and Harrah's developments (and their associated levees), the construction of Page Avenue Extension, the

construction of the MHE, and the construction of the 500-year levee have invariably resulted in varying amounts of dust from exposed lands (depending on soil and wind conditions).

As with the past actions, each of the future actions represents a potential for soil disturbance and consequently, fugitive exhaust and dust emissions. Such effects will vary in magnitude with the overall magnitude of the project, timing, condition of the soil, and wind conditions. Potential effects are expected to be localized. Mitigative measures may be put in place, however, to reduce the duration and intensity of such effects. These measures may include such actions as watering dry areas or other methods as necessary to comply with MDNR air regulations limiting the emission of fugitive dust.

4.4.2 Operational Air Impacts

Common concerns associated with operational phase air impacts center on projects that constitute a single emission source (e.g., smoke stack effluent) and those that consist of linear (mobile) emission sources. Since manufacturing and industrial uses are presently limited (and subject to future limitations as per the City's Future Land Use Plan) this analysis is focused on transportation improvements that represent linear air emission sources.

Pollutants of common concern in highway planning studies are CO, O_3, and NO_x. The Howard Bend floodplain is located in an area where the SIP contains transportation control measures. As the designated Metropolitan Planning Organization (MPO) for the eight-county St. Louis metropolitan area, the EWGCC is required to prepare and approve the Transportation Improvement Program (TIP), a 5-year schedule of transportation improvements planned for the area, in order for these projects to use Federal funds. The CAAA requires that the TIP conform to plans to improve air quality in the St. Louis metropolitan area.

The control requirements for a nonattainment area are more stringent than for attainment areas. The MPO is responsible for making the conformity determinations, which for Federally funded projects must additionally be approved by the FHWA, the Federal Transit Administration (FTA), and USEPA.

Past and present transportation actions that are expected to carry significant vehicular traffic are the Page Avenue Extension and the MHE (see Section 3.3 for AADT). Extensive modeling efforts were performed in conjunction with the Page Avenue Extension as it was a Federally funded transportation improvement subject to the conformity procedures of 23 CFR Part 770. As a result, it was determined that Page Avenue Extension was in conformity with the SIP.

The MHE is a locally funded roadway that was not subject to the conformity procedures of 23 CFR Part 770. Consequently, there was no requirement to evaluate this project for regional impacts to air quality. Similarly, the future extension of the MHE south to Olive Boulevard is anticipated to be constructed using local funding. No Federal funds are anticipated to be used for either land acquisition or construction at this time. The effect of this future transportation improvement, however, will be to increase traffic volumes on the MHE as it draws traffic from other congested roadways such as I-270 and I-64. While no detailed analysis of air quality impacts has been conducted for this future action, it is likely that it will effectively reduce congestion on these associated roadways, and thereby improve local air quality conditions. The analysis of air quality impacts from the relocated Route 141 substantiates this conclusion. In the Draft Environmental Assessment for the Route 141 project, MoDOT reported that the air quality conformity analysis on the project completed by EWGCC found that the proposed improvements to Route 141 between Olive Boulevard and Route 40 would not significantly affect the conformity finding and would meet the Federal requirements of all the conformity tests (FHWA and MoDOT, 2001).

4.4.3 Regulatory Actions

Each of the regulatory alternatives under consideration is procedural in nature and will have no effect on air quality. Potential air quality impacts of projects subject to a Section 404 permit, however, will be evaluated in accordance with the current scope and limit of USACE Regulatory Program authority. Future projects subject to the 404 permitting authority of the USACE will be reviewed for conformity applicability pursuant to regulations implementing Section 176(c) of the CAAA. Those proposed activities that will not exceed *de minimis* levels of direct emissions of a criteria pollutant or its precursors will be exempted by 40 CFR Part 93.153. Any later indirect emissions are generally not within the USACE's continuing program responsibility and generally not practically controlled by the USACE.

4.5 Noise

The assessment of noise impacts from past, present, and reasonably foreseeable future projects may best be evaluated by considering noise impacts related to construction phase activities as well as those attributable to project operation.

4.5.1 Construction Related Noise Impacts

Construction related noise impacts are those associated with the periodic operation of machinery required in site preparation and facility construction. Sources of noise during the construction phase include earthmoving equipment and trucks, bulldozers, air compressors, generators, pile drivers, and other related equipment. The duration of such impacts is also anticipated to be relatively short and limited to daylight hours and the period of time required constructing a given project.

Each of the past, present, and reasonably foreseeable future projects under consideration has or will result in construction phase noise emissions. Such impacts are of relatively short duration and have been mitigated for by the use of appropriate noise control measures (i.e., mufflers, limits to the time of operation, etc.).

4.5.2 Operational Noise Impacts

As discussed in Section 3.5, baseline noise emissions within the study area are demonstrably higher in the vicinity of existing arterial roadways. Vehicular traffic, therefore, represents the primary noise emission source within the study area and also corresponds to the primary mode of noise impacts for any project considered as part of a cumulative impact analysis.

4.5.2.1 Past Projects

Several actions subsequent to 1985 have entailed improvements and expansion of the roadway system of the study area and have therefore, had an effect on the noise environment. For example, the construction of the Earth City Expressway and Page Avenue Extension are past projects that have or will alter vehicular use in the study area. Although direct noise emission levels are not available for the Earth City Expressway, predicted noise levels have been calculated for Page Avenue Extension. This facility will represent a new source of noise within the project when it is completed in late 2003. Noise modeling of this new roadway was performed using FHWA's STAMINA 2.0/OPTIMA noise programs. STAMINA 2.0 is a predictive model that is used to estimate future noise levels based on changes in vehicular volume and mix. Results of this analysis are presented in Table 4-6 for the three monitoring locations within the study area.

Table 4-6. Summary of Page Avenue Extension Noise Impacts

Location ID	Description	Baseline Noise Level (dBA)	Projected Noise Level-2015 (dBA)
QG	Creve Coeur Mill Road south of River Valley Drive	66.9	66.9*
QJ	CCLMP, along east side of Creve Coeur Lake along Page Avenue Extension	53.0	58.7
QK (Green-Black Alignment)	*Creve Coeur Mill Road at Waterworks Road*	*67.4*	*67.4**
5	Residence along River Valley Drive, west of Creve Coeur Airport	46.6	59.3

* No increase projected when geometrics are considered.

Source: TCT-St. Louis, Inc. 1992.

As a result of this action, noise levels within the floodplain will increase (when the roadway is opened in late 2003) approximately 5 dBA in the vicinity of upper Creve Coeur Lake, and approximately 13 dBA in the vicinity of River Valley Drive.

4.5.2.2 Present Projects

Among the present projects identified within the study area, the construction of the MHE represents the only project that is a potential significant source of operational phase noise. This transportation facility is anticipated to carry a traffic volume of approximately 6,000 to 15,000 AADT in 2003 and will, therefore, be a source of noise. For much of its length, this facility is close to and generally parallels the existing Creve Coeur Mill Road. It will also act as a reliever to the existing roadway and many travelers within the study area will likely use the new roadway rather than the existing facility. Consequently, many of the sources of noise generation on Creve Coeur Mill Road will be shifted to the MHE. This will result in a corresponding shift in noise levels (i.e., noise contours) as the new facility is generally located in undeveloped areas to the north and west of the existing roadway. As documented by TCT-St. Louis, Inc. (1992), the existing noise levels along Creve Coeur Mill Road were recorded at approximately 62 dBA north of Page Avenue Extension. The proposed volume of traffic on the new MHE is likely to cause slightly higher noise levels along the proposed roadway in accordance with the higher projected traffic volume.

4.5.2.3 Reasonably Foreseeable Future Actions

Several future actions represent roadway improvements that if implemented, will change the distribution and flow of traffic within the Howard Bend floodplain.

The future expansion of the MHE will extend a four-lane facility from River Valley Drive, through Page Avenue Extension, through a reserved corridor within the CCLMP, and terminating at relocated Route 141 at Olive Boulevard. This proposed roadway, funded by the City of Maryland Heights and scheduled for design and construction in 15 to 20 years, is expected to be an important arterial roadway that is projected to carry up to 65,000 AADT (see Section 4.3). Traffic generated noise levels will also be expected to increase within lands adjacent to the roadway. Such increases are expected to result in noise levels in excess of 65 dBA in close proximity to the roadway (NPS, 1995a). In areas that are in close proximity to Creve Coeur Mill Road, this will represent a slight increase over the background levels of 67 dBA, based on projected noise

levels associated with the Green-Black alternative for Page Avenue (see Table 4-6). In contrast, areas more distant from existing roadways such as the open lands within CCLMP near Little Creve Coeur Lake, will likely have a greater increase in noise levels (10 to 15 dBA) over background levels. These noise impacts, however, previously have been taken into consideration in recognition of the 109-acre reserved corridor in the CCLMP. NPS concluded that the presence of the roadway would impact noise levels within CCLMP, but that the benefits of the park alternative under consideration would offset these impacts (NPS, 1995b).

The Baxter Road Extension is another planned future action that will alter the flow and distribution of traffic in the area. If constructed, this facility will provide a connection from the Chesterfield Bottoms to the Howard Bend floodplain via River Valley Drive (and possibly Creve Coeur Mill Road). As a result, it is anticipated that this roadway will carry an estimated traffic volume of 11,000 to 20,000 AADT (see Section 4.3). As a consequence of this improved access, it is likely that development will occur within the River Valley Planning District in accordance with the City of Maryland Heights' Future Land Use Plan. The effects of these developments will significantly increase noise levels in this portion of the floodplain. Baseline noise conditions within the southern area of the Howard Bend floodplain are likely to be approximately 46 dBA (see MoDOT Receptor #5, Section 3.5). In contrast, resultant noise levels are expected to be approximately 10 dBA higher (i.e., approximately 56 dBA).

Other future actions are also likely to have an effect on noise levels. While some of these may contribute minor amounts of noise due to their operation (e.g., MSD plant expansion—operational noise), most noise level increases are again, likely to be associated with increases in traffic in conjunction with the proposed development. Development of unconstrained lands within the study area in accordance with the City of Maryland Heights' Future Land Use Plan (including the proposed Terra Vista Estates and Mill Ridge Villas in Chesterfield) will undoubtedly provide expanded use of the study area as a center for hospitality, recreation, and commercial businesses (and their associated employment). This will effectively increase traffic on the MHE, River Valley Drive and other roadways, and will cause a resultant increase in noise levels in surrounding lands. Timing of these future developments and hence, the corresponding increases in noise levels can not be predicted with certainty at this time.

A consideration of past, present, and reasonably foreseeable future actions indicates that these actions will have significant cumulative effects on the noise environment of the study area (Table 4-7). Noise levels are expected to be greatest in close proximity to existing and proposed roadway arterials and lower elsewhere as noise attenuates naturally over distance. Significant increase in noise levels are anticipated along future roadways planned south of Page Avenue (MHE Extension, River Valley Drive, and Baxter Road Extension). In the case of the MHE, the reserved corridor has been established at a width of 660 feet as a mitigative measure to minimize noise levels. This width was established based upon the 65 dBA noise contour as modeled by NPS in conjunction with the CCLMP Supplemental EIS (NPS, 1995a). The 65 dBA noise level is also used by FHWA as the threshold for noise impacts. A preliminary analysis of noise impacts associated with the future MHE extension suggests that noise levels along the proposed roadway could increase from 67 dBA (existing conditions) by 5 to 15 dBA (depending on terrain and distance to receptors). Such an impact may be more significant for those future residential receptors within the Terra Vista Estates and Mill Ridge Villas developments which closely abut (or are bisected by) the proposed MHE extension. At present, however, none of the proposed future roadway improvements are scheduled for Federal funding by FHWA. Consequently, these improvements would not be subject to noise abatement measures.

Table 4-7. Summary of Noise Impacts Associated with Past, Present and Reasonably Foreseeable Future Actions

Action	Noise Impact	
	Construction Phase	Operational Phase
Primary Action		
Alternative 1: Case by Case (No Action)	No Impact	No Impact
Alternative 2: SAMP	No Impact	No Impact
Past Actions	Short-term noise emissions for all projects	Long-term increases in noise levels along major arterial roadways (Page Avenue Extension, Earth City Expressway, Creve Coeur Mill Road: increases of less than 5 dBA near existing roads, but 10 to 15 dBA in previously undeveloped areas
Present Actions	Short-term noise emissions for all projects	Long-term increases in noise levels along MHE
Reasonably Foreseeable Future Actions		
1. Flank Levee System		
Alternative A	Short term	No Impact
Alternative B	Short term	No Impact
2. MHE Extension		
Options 1-5	Short term	Minor (<5 dBA) increases in vicinity of Creve Coeur Mill Road Significant (>65 dBA) noise levels in open lands such as CCLMP and increase 5 to 15 dBA (depending on terrain and distance to receptors) for residential receptors along Creve Coeur Mill Road
3. Baxter Road Extension		
Options 1-2	Short term	Significant (>10-15 dBA) increases in open lands Lower noise increases near Creve Coeur Mill Road
4. Hog Hollow Road Relocation	Short term	Similar noise levels along relocated road as exists along existing alignment
5. MSD Plant Expansion	Short term	Minimal operational impacts
6. Land Use Plan Development		
Scenario 1: Interim Condition	Short term	Noise levels increase along arterial roadways and secondary streets serving developed uses
Scenario 2: Ultimate Condition	Short term	Greater noise level increases along arterial roadways and secondary streets serving developed uses
7. Terra Vista Estates	Short term	No Impact
8. Mill Ridge Villas	Short term	No Impact
9. Creve Coeur Lake Dredging	Short term	No Impact

< = less than.
> = greater than.

4.5.2.4 Regulatory Actions

Each of the regulatory alternatives under consideration is procedural in nature and will not cause any changes in the noise levels within the study area. Additionally, the policies and procedures established by these actions will not result in other actions that will increase or alter the noise conditions of the study area or the region.

4.6 Natural Resources

4.6.1 Mineral Resources and Soils

As stated in Section 3.6.1, no mineral resources were identified within the study area. Sand is extracted from the Missouri River in St Charles County, and limestone is quarried from the Weber Quarry, but these activities are not located within the study area. Therefore, the past, present, reasonably foreseeable, and regulatory actions will have no impacts to mineral resources.

The soils within the study area were described in Section 3.6.2. The principle soils that will be impacted by the past, present, and reasonably foreseeable actions consist of the following: Eudora Silt Loam (rarely flooded), Booker Clay, Blake Silty Clay Loam, Waldron Silty Clay, and the Sarpy Loamy Fine Sand (rarely flooded). None of the soils within the study area are considered by the NRCS as highly erodible lands (HEL) or potential highly erodible lands (PHEL) (USDA, 1994). The lowland surface slopes and generally high clay content typically prevents high erosion rates for these soils.

4.6.1.1 Past and Present Actions

Each of the past and present actions (i.e., since 1985) have had the potential to increase soil erosion within the study area due to runoff from exposed soils and due to the effects of wind erosion. In most cases, smaller projects have not resulted in noticeable soil erosion effects. In contrast, large earth moving projects such as the construction of Riverport and Harrah's developments (and their associated levees), the construction of Page Avenue extension, the construction of the MHE, and the construction of the 500-year levee have invariably resulted in varying amounts of dust from exposed lands (depending on soil and wind conditions).

The increase in impermeable surface areas (roads, buildings, parking lots, etc.) prevents the direct infiltration of rainwater and increases the quantity and (typically) the velocity of surface water runoff. If mitigation measures are not taken, these changes can increase soil erosion. In addition, there is an increased potential for soil erosion during construction due to exposed soil. It should be noted that most of the existing land within the study area is currently used for row crops, which typically has higher soil erosion rates as compared to forested land or grassland. In all cases, the impacts of this soil erosion have been temporary (i.e., limited to the construction phase) and localized to the construction site.

4.6.1.2 Future Actions

As with the past actions, each of the future actions represents a potential for soil disturbance and, consequently, soil erosion. Such effects will vary in magnitude with the overall magnitude of the project, timing, condition of the soil, water, and wind conditions. Potential effects are expected to be localized. Mitigative measures may be put in place, however, to reduce the duration and intensity of such effects, and may include such actions as silt fencing, straw bales, and detention basins to prevent soil laden surface water from reaching streams and lakes. The extent of surface water impacts during construction will depend on adherence to appropriate standard erosion control measures

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As part of each action, storm water control is typically required in the form of a project specific detention basin that temporarily stores and treats (removes sediment) from surface water runoff. This also assists in preventing erosion within existing streams by slowing the release (quantity) and velocity of surface water runoff reaching the receiving streams.

Additionally, as stated in Section 3.6.1, the study area is located in a “moderate effect” seismic zone, but is an area that has a severe potential for liquefaction and amplification. Any potential development projects would likely require appropriate engineering considerations to accommodate design in such a seismic setting.

4.6.1.3 Regulatory Action

Site-specific erosion control requirements are expected to be operative for both the No Action alternative (Case-by-Case Permitting) and the SAMP alternative. Consequently, each regulatory action will work to minimize potential impacts from erosion. However, requirements for vegetated buffers around receiving surface water resources will be minimal under the No Action alternative. Consequently, erosion from construction sites and subsequent deposition within receiving surface water systems may occur to a greater degree than that evident under the SAMP alternative. By comparison, the SAMP alternative will require a more extensive and comprehensive buffer system that will intercept eroded materials and diminish sedimentation within receiving waters.

4.6.2 Land Cover

The assessment of cumulative impacts on land cover was undertaken by performing an historical trend analysis of changes in land cover within the study area. Identification of land cover conditions prior to the initiation of flood control within the Howard Bend area required that this analysis extend over an approximately 70-year period from 1928 to 2001. Black and white aerial photos for the study area were obtained for 1928, 1945, 1965, 1986, and 2001 and were used to identify and map cover types. This analysis established a context of environmental conditions that were used as a basis for evaluating the significance of impacts of past and present projects, as well as those associated with future actions.

4.6.2.1 Historical Overview

Initial presettlement land cover within the study area is likely to have been similar to that of other big river floodplains. As such, it may have consisted of a mosaic of bottomlands forest, wet prairie, marsh, and open water habitats (Theiling, 1999). By 1928, however, European settlement of the area had resulted in large-scale land clearing as agricultural uses accounted for 52 percent of the land cover (Figures 4-3 and 4-4). Lands that retained their natural character were either represented by larger wetland and open water complexes that were too wet to farm, or smaller fragments of uncleared land scattered across the floodplain. Non-wetland and non-agricultural cover types generally were poorly represented, each accounting for 3 percent or less of the total area.

By 1945, the percentage of agricultural lands had increased to 56 percent, reflecting a trend of continued land clearing and drainage of wetland habitats (e.g., northern reaches of the study area, see Figure 4-3). At the same time, USACE river training structures (wing dams) resulted in the landward accretion of sediments within the Missouri Riverfront. These processes resulted in both a slight increase in the acreage of wetlands within the study area and a concurrent decrease in open water as the Missouri River became more constricted.

Land cover trends from 1945 to 1965 reflected both a continued expansion of agriculture and an incremental increase in developed lands, grasslands, and forested lands. Agricultural land cover reached its highest point (among the years considered) in 1965, at which time it accounted for 65 percent of the study area. Little Creve Coeur Lake was entirely cultivated at that time as a result of the cutoff of the water inlet from Creve Coeur Creek and the initiation of surface water pumping from depressional areas. As a result, wetland habitats were at their lowest extent of all years prior to 1986, accounting for approximately 16 percent of the study area. Developed

lands, deciduous forest, and grassland increased in 1965 to 8 percent, 3 percent, and 2 percent, respectively.

By 1986, however, wetlands had redeveloped within a portion of Little Creve Coeur Lake and within the vicinity of Louiselle and Fee Fee creeks, and collectively accounted for approximately 22 percent of the study area. Deciduous forest continued to increase incrementally to 4 percent. Similarly, the percentage of grassland cover increased to 5 percent, reflecting a greater extent of maintained (mowed) areas within CCLMP, Creve Coeur Airport, and the primary levee along the Missouri River.

In summary, natural habitats and cover types within the study area have had a long history of being impacted by agricultural use. By 1986 native wetland and floodplain communities had been severely impacted as a result of land clearing and drainage alteration and had been limited primarily to the vicinity of Creve Coeur Lake, Little Creve Coeur Lake, and the area outside the levee along the Missouri River.

4.6.2.2 Past and Present Actions

Land cover conditions in 1986 represent the baseline conditions against which past and present actions may be evaluated. Effects of past and present actions are presented in summary form in Table 4-8 and are graphically represented in Figures 4-3 and 4-4.

Relative changes in land cover from 1986 to 2001 reflect the impact of these past and present actions coupled with on-going changes in the natural community, and changes in the nature of wetland regulation. For example, deciduous forest cover increased from 4 percent in 1986 to 11 percent in 2001 due to the continued successional development of lands both outside the primary levee system and the development of forested lands within CCLMP.

Wetlands declined markedly over the period as a result of a number of factors including impact from past and present actions (total impact of approximately 59 acres, see Tables 1-1 and 1-2), changes in mapping technique (use of 1987 USACE methodology rather than photo interpretation/soils), changes in regulatory programs and authorities (i.e., USACE and NRCS jurisdictional division and mapping methods)(see Section 4.7), and on-going pumping of surface water in the Little Creve Coeur Lake area. In contrast, however, the construction of the Page Avenue Extension, while impacting wetlands and other cover types, has had the effect of greatly expanding CCLMP as a result of compensatory mitigation. Much of this expansion has been associated with the acquisition of lands in the vicinity of Little Creve Coeur Lake. Agricultural uses within these areas effectively ceased in 2001 and these lands are in the process of reverting to a mosaic of wetland and non-wetland natural habitats.

Construction and development within the study area due to past project activity has primarily included actions associated with commercial business expansion, public utility improvements, transportation improvements, and expansion of recreational areas (see Table 2-3). These activities have had the greatest effect on agricultural land cover types, followed by old field, grassland, wetlands, deciduous forest, developed land, and open water (see Table 4-8).

The cover types considered to provide high quality wildlife habitat primarily include wetlands, deciduous forest, and late successional old field. The majority of wildlife reported to occur in the study area, including herpetofauna and sensitive avian species, primarily utilize these habitats for feeding, nesting, and roosting. Grassland, active farm field, and developed areas within the study area are generally considered low quality wildlife habitats due to limited opportunities for cover, nesting, and feeding habitats.

Table 4-8. Summary of Impacts to Land Cover Associated with Past, Present and Reasonably Foreseeable Future Actions

Action	Category						
	Cultivated Field	Developed Lands	Wetland	Grassland	Old Field	Deciduous Forest	Water
Primary Action							
Alternative 1: Case by Case (No Action)	NA	NA	No comprehensive management of natural resources other than that performed by St. Louis County Parks				
Alternative 2: SAMP	NA	NA	Comprehensive management of remaining natural resources using buffers, tree mitigation, and wetland mitigation policies				
Past Actions	919.6	38.5	58.7	9.9	136.7	45.7	5.4
Present Actions	373.8	36.6	<0.0	72.7	1.0	34.7	18.4
Subtotal	1,293.4	75.1	58.7	82.6	137.7	80.4	23.8
Reasonably Foreseeable Future Actions							
1. Flank Levee System							
Alternative A*	53.9	4.1	12.9	9.6	37.3	48.8	0.6
Alternative B†	82.9	9.5	15.2	12.1	61.0	49.5	0.0
2. MHE Extension							
Options 1-5	9.8-9.9	5.8-8.0	0.7-4.7	8.2-8.8	3.6-4.3	0.9-2.5	0.0-0.0
3. Baxter Road Extension							
Options 1-2	26.0-32.5	9.8-15.6	0.4-0.7	4.8-4.9	0.0-0.6	0.1-0.4	0.1-0.1
4. Hog Hollow Road Relocation	3.2	0.5	0.0	0.5	0.0	0.0	0.0
5. MSD Plant Expansion	0.3	0.8	2.4	0.2	40.1	0.0	0.0
6. Land Use Plan Development**							
Scenario 1: Interim Condition	1,617.4	178.9	49.1	125.6	82.8	25.3	16.7
Scenario 2: Ultimate Condition	1,617.4	178.9	49.1	125.6	82.8	25.3	16.7
7. Terra Vista Estates	0.0	0.0	0.0	7.3	0.0	0.0	0.0
8. Mill Ridge Villas	0.0	0.8	0.1	0.0	16.9	2.3	0.0
9. Creve Coeur Lake Dredging	40.6	0.0	0.0	18.2	4.5	38.3	0.0
Subtotal	1,751.2-1,786.8	200.7-214.1	65.6-72.2	174.4-177.6	185.2-210.2	115.7-118.3	16.8-17.4
Total	3,044.6-3,080.2	275.8-289.2	124.3-130.9	257.0-300.2	322.9-347.9	196.1-198.7	40.6-41.2

* In low range total.
† In high range total.
** Only Scenario 1 was used in totals to avoid double counting impacts for land use plan development.

In contrast to past development projects, present actions are focused on providing increased access to, and protection of developed properties through road and levee construction (see Table 2-3). In general, these projects have predominantly affected low quality habitats including active farm fields, grasslands, and developed lands (see Table 4-8). The MHE extension to River Valley Drive has, with the exception of the crossing over Creve Coeur and Fee Fee creeks, been entirely within agricultural fields, grasslands, and previously developed areas. Similarly, the construction of the 500-year levee by the HBLD has essentially been on the same alignment as the previous levee except where alignment modifications were made to relocate the existing levee out of the regulatory floodway. Improvements to this levee have entailed an increase in the overall height of the levee and the construction of a system of underseepage berms, which accounts for much of the additional lands (primarily cultivated field—see Table 4-8) that have been impacted by this action. The construction of the primary levee has also entailed the construction of several borrow sites (see Figure 3-7) that may develop wetland characteristics. Such areas (including the future wetland area constructed in CCLMP north of Little Creve Coeur Lake) have not been accounted for in Table 4-8 as they are not currently recognized as functional wetlands.

4.6.2.3 Future Actions

Potential effects of reasonably foreseeable future actions on land cover within the study area are summarized in Table 4-8 and are discussed below for each action.

Flank Levee System

The flank levee system is a major action that will have a notable effect on land cover. Direct impacts to land cover will primarily occur in conjunction with the excavation of lands immediately adjacent to the streams and riparian corridors contained within the flank levee system (i.e., Fee Fee Creek and lower Creve Coeur Creek), and the placement of fill required for the flanking levees. These activities could potentially result in the excavation and/or filling of between 12.9 and 15.2 acres of wetlands (Alternatives A and B, respectively) and approximately 49 acres of non-wetland riparian forests and old field habitats. It is likely, however, that the actual wetland impact of the flank levee system will be somewhat lower as demonstrated by HBLD's past efforts to avoid and minimize wetland impacts in the construction of the primary levee.

In its constructed condition, much of the flank levee system will be maintained with grasses and herbaceous vegetation. Woody vegetation will be periodically removed in order to maintain hydraulic flow under Alternative B. By comparison, Alternative A may incorporate management measures that will allow for redevelopment of some natural habitats within the flank levee system. Over time, such areas may include emergent wetland and shrub/forested riparian habitats. However, the location and extent of such habitat redevelopment has not been designed and is dependant on the HBLD's need to maintain the area for adequate stormwater detention and conveyance.

Indirect impacts associated with the flank levee system are those attributable to the effects of improved flood protection and its related effects on increased land development. While such development has not been identified, it is likely to result in the alteration of each of the land cover types identified, depending on its location, type, and specific characteristics.

MHE Extension

The extension of the MHE from Page Avenue to Olive Boulevard is an action that is anticipated to occur between 15 and 20 years in the future. Such an action will occur within a reserved transportation corridor within the CCLMP, and will have the effect of altering cover types within the CCLMP and within the Creve Coeur Creek valley. Dominant natural cover types at this time include cultivated fields, grasslands, wetlands, and old field habitats. Within 15 years, however,

the agricultural fields within CCLMP will have developed to natural habitats consisting of late successional old field, which would also be impacted by the proposed improvement.

Baxter Road Extension/Hog Hollow Road Relocation
The Baxter Road Extension is an action that will primarily affect low quality cover types (agricultural field, grassland, developed areas (see Table 4-8). Its primary alignment is anticipated to be along Water Works Road at the base of the bluffs and as such, would limit its impact to natural cover types. Similarly, the relocation of Hog Hollow Road will impact predominantly agricultural areas. Between 0.4 and 0.7 acres of wetland would be impacted with the proposed Baxter Road Extension.

MSD Plant Expansion
The expansion of the MSD Missouri River Plant is anticipated to be to the south of the existing facility and would therefore, result in impacts to approximately 40 acres of old field and approximately 2.4 acres of emergent wetland.

4.6.2.4 Future Land Use Development

The build out of unconstrained lands in accordance with the City of Maryland Heights' Future Land Use Plan would collectively represent the action with the greatest potential impact on land cover. In total, approximately 2,100 acres of lands may be converted if the land use development is complete within these areas (see Table 4-8). Primary land cover types affected include agricultural lands, grasslands, old fields and previously developed areas. A total of approximately 25.3 acres of deciduous forest and 49 acres of wetlands may be affected by this collective action. The extent to which these habitats will be impacted, however, will depend on the particular type of development planned, its location, and specific site characteristics. Additionally, the presence or absence of a flank levee system will also affect the rate at which these lands are developed and the characteristics of the resultant cover type. For example, in the absence of the flank levee system, developers will be required to provide more on-site stormwater detention and storage and will, therefore, be required to have wider ditch systems and detention basins. In contrast, the presence of a flank levee system will provide a central stormwater conveyance and detention system that will reduce the amount of lands needed for storm water control.

Terra Vista Estates and Mill Ridge Villas Developments
The proposed Terra Vista Estates development will alter approximately 7.3 acres of land. Land cover within the area affected by this project consists primarily of grassland habitats. Similarly, the Mill Ridge Villas development will alter approximately 0.1 acre of wetlands, 16.9 acres of old field habitats, and 2.3 acres of deciduous forest.

Creve Coeur Lake Dredging
Dredging of Creve Coeur Lake is planned to be conducted by hydraulic dredging. Slurry carrying the dredged materials will be deposited in each of two basins designed to retain the sediments (see Figure 2-9). Land cover types that will be impacted by this action include approximately 27 acres of agricultural field, 12 acres of grassland, and 38 acres of deciduous forest.

4.6.2.5 Regulatory Action

No direct impacts on land cover within the study area will occur with either the No Action (Case-by-Case Permitting) or the SAMP alternative. Indirect impacts expected with the No Action alternative include continued incremental habitat conversion and the lack of a cohesive approach to mitigation and compensation. In contrast, indirect impacts under the SAMP

alternative include a more cohesive approach to the preservation of natural habitats. Establishment of policies controlling buffer zones between new developments and natural habitats (especially wetlands and surface water resources) will indirectly provide for expansion of natural habitats and enhanced quality of the protected (buffered) resource.

4.6.3 Wildlife

Historical land cover alteration has resulted in changes in the habitat types (see Section 4.6.2.1) and their associated wildlife communities within the study area. Remaining high quality habitat types consist of vegetated wetlands, deciduous forest, and late successional old fields. Such areas support a variety of species that utilize these habitats for nesting, feeding, and roosting. In contrast, agricultural lands, grasslands, and developed areas provide a considerably lower habitat value due to a greater degree of disturbance and reduced habitat complexity (i.e., vegetation type). Alteration of these habitats results in both the displacement of wildlife and the direct mortality of those wildlife that are incapable of escaping land clearing activities.

Potential cumulative impacts to wildlife may be evaluated by focusing on the extent to which relatively high quality cover types are directly altered by past, present and reasonably foreseeable future actions. Indirect cumulative impacts may also relate to the extent to which these habitats are fragmented as well as potential effects on the movement or distribution of wildlife species.

4.6.3.1 Past and Present Actions

Past and present actions since 1985 have collectively resulted in a loss of approximately 80 acres of deciduous forest, 59 acres of wetlands, and 138 acres of old field habitat (see Table 4-8). In total, approximately 277 acres of these relatively high quality wildlife habitats have been replaced by low quality developed areas and grasslands. Consequently, these actions have effectively reduced the overall carrying capacity of the study area for wildlife species associated with these habitats.

Several of these actions have fragmented existing habitats and isolated or limited the movements and dispersal patterns of wildlife populations. For example, transportation improvements such as the Page Avenue Extension and the MHE have bisected or reduced the contiguity of forested and riparian habitats. In the case of the MHE, these effects have been limited to the riparian corridor along Fee Fee Creek and the impacts to approximately 29 acres of deciduous forest along lower Creve Coeur Creek. In contrast, Page Avenue Extension resulted in significant impacts to the natural habitats within CCLMP, fragmentation of forested areas along the Missouri River, and the bisection of Little Creve Coeur Lake. (It should be noted that at the time, land cover in the Little Creve Coeur Lake area was predominantly low quality agricultural lands.) In recognition of the magnitude of these impacts however, MoDOT was compelled to provide significant compensation in the form of land acquisition, subsequent dedication of those lands to CCLMP, and wetland mitigation. With the cessation of agricultural practices in the Little Creve Coeur Lake area, the effect of this compensation has been to greatly expand the wildlife habitat and use of the study area. Indeed, as is discussed in Section 3.6.3.2, additional natural habitats within CCLMP (open water habitat of sedimentation basin and acres associated with Little Creve Coeur Lake) have undoubtedly contributed to the high species richness of bird use within the study area. In total, 1,102 acres of land were added to the CCLMP as part of the Page Avenue mitigation package. These areas are being managed by St. Louis County Parks Department as open, natural habitats for wildlife use and outdoor passive recreation. Additionally, an area totaling 113 acres (wetland and upland buffer) has been established by MoDOT for wetland mitigation (see Section 4.7). Again, despite the impacts

cited above for the Page Avenue Extension, the mitigation effort promises to provide important wildlife habitat in the future.

The construction of the 500-year levee by the HBLD has resulted in habitat alteration as discussed in Section 4.6.2.2. However, this action has also entailed the creation of open water (and future potential wetland) areas as a result of the need to obtain borrow material for the construction of the levee. These areas include several open water habitats as illustrated in Figure 3-7. Wildlife value of these water bodies is apparent, as they are used by waterfowl, wading birds, shorebirds, and other wildlife.

4.6.3.2 Future Actions

The majority of reasonably foreseeable projects that are planned to occur within the study area will entail the conversion of a variety of wildlife habitats to impermeable surfaces for the development of roads, commercial buildings and associated parking, housing, and utility expansion (see Table 2-3). The impacts to wildlife from each potential future action will vary with each action's corresponding effect on natural habitats, but will include the generalized mechanisms of wildlife impact discussed earlier in this section (i.e., displacement, direct mortality, reduced carrying capacity, etc.). Table 4-8 provides a summary of the potential impacts to valuable wildlife habitats with each future action. A discussion of some of the future actions having more significant implications for wildlife impacts are provided below.

Flank Levee System

The flank levee system proposed by the HBLD will have varying impacts on wildlife, depending on the option that is ultimately implemented. During the construction phase, each alternative will result in the loss of up to 65 acres of riparian habitats along lower Creve Coeur and Fee Fee creeks. The extent to which this impact will occur, however, is at present not known as detailed design plans have not yet been prepared. By comparison, the absence of a flank levee system that is assumed under land development Scenario 1 would not impact land cover along these creeks, see below. This clearing and excavation activity will result in localized direct mortality of less mobile faunal species and will displace more mobile species.

Once implemented, however, the effects of each alternative differ. In the case of Alternative A (gated discharge at the Missouri River), selected natural communities (emergent, scrub shrub, forested) may be allowed to become established within the interior of the levee system, thereby providing valuable wildlife habitat. Additionally, depending on the extent to which such plant communities are allowed to become reestablished, they may enhance the connection between the natural communities of the bluff area and the riparian habitats along the Missouri River. Under conditions in which the Missouri River is elevated, creek flow and stormwater runoff may be stored within the flank levee system, thereby providing value to fish and wildlife.

For Alternative B (gated discharge at the Creve Coeur Creek and Fee Fee Creek junction), the flank levee system will be open to the Missouri River, thereby allowing flood water to enter the system during periods of elevated river stage. As compared to Alternative A, this alternative entails a narrower channel and more dynamic water level fluctuations that would provide shorter durations of available open water habitat, decreased open water surface area, and less potential for the development of emergent wetlands. Additionally, woody vegetation establishment along channel margins would be limited with this alternative due to the potential for trees to impede the conveyance of creek flow and stormwater runoff to the Missouri River. A benefit to wildlife from open discharge design to the river may be the seasonal use of lower Creve Coeur Creek by various fish species and waterfowl. The value of this feature as fish habitat, however, is not clear, as final design and management procedures that would affect the degree and quality of open water habitat have not been developed.

MHE Extension

The extension of the MHE to Olive Boulevard will result in the displacement of wildlife during construction and the fragmentation of the habitats within the Creve Coeur Creek valley and Little Creve Coeur Lake portion of CCLMP. While these habitats are of relatively low quality today, it is expected that in 15 years they will take on a character equivalent to late successional old field and as such, may provide valuable wildlife habitat. Future roadway development will bisect these habitats causing isolation of faunal populations and an increased opportunity for roadkill. The construction of the roadway on structure in the Creve Coeur Creek valley will, however, result in a reduced incidence of roadkill along this segment of the MHE Extension.

4.6.3.3 Future Land Use Development

Potential development in accordance with the City of Maryland Heights' Future Land Use Plan will effectively displace wildlife associated with natural habitats of the unconstrained lands in the study area. Complete alteration of the habitats identified in Figure 2-11 is assumed with both development scenarios (i.e., with and without flank levees). What differs among the two scenarios is the rate at which habitats are modified and the extent of stormwater conveyance and detention that is required for each local site development (see Section 2.2). The effects of this development will be to eliminate isolated populations of species that are limited to small habitat "islands;" sustain and enhance the presence of fauna that are tolerant to developed uses and capable of feeding, hiding, and resting in such areas; and limit faunal use for many species to those habitats preserved within CCLMP, the Missouri Riverfront, and the riparian corridors along lower Creve Coeur and Fee Fee creeks.

Scenario 1 also differs from Scenario 2 with regard to the intrinsic level of impact to natural habitats along lower Creve Coeur, Fee Fee, and Louiselle creeks. In particular, Scenario 1 assumes the absence of a flank levee system which would eliminate or reduce land cover alteration along these creek systems.

Baxter Road Extension

This future action will comparatively result in relatively low impact to wildlife populations within the study area. Though it would cross the riparian corridor of Bonhomme Creek, it is expected to be constructed on a bridge at this location, thereby minimizing potential impacts to wildlife. Depending on the location alternative selected, however, this action may include an eastern terminus at Creve Coeur Mill Road (future MHE Extension) that will create a 66-acre remnant within the 6(f) lands of CCLMP (see Figure 2-8). Effects to wildlife associated with this action would be similar to the fragmentation impacts previously discussed above for the MHE Extension.

Creve Coeur Lake Dredging

Dredging of Creve Coeur Lake is a future action that was a condition of the permit for the Page Avenue Extension. This action will have detrimental impacts to wildlife in that it will require the construction of a sedimentation basin in a forested area of CCLMP that presently provides good wildlife habitat. Conversely, it will deepen Creve Coeur Lake and will improve its function and value as a fishery.

4.6.3.4 Regulatory Actions

As described in Section 2.1, the No Action regulatory alternative may result in the continued fragmentation and loss of wetland acreage and landscape functional value.

The intent of the SAMP is to implement long-term environmental planning to minimize resource impacts within the study area. With the exception of cultural resources protection, all SAMP functions provide direct benefits to wildlife. Wetland protection and preservation will designate wetlands and creeks for protection from development, thereby preserving the highest quality wildlife habitats and increasing habitat interconnectivity within the study area (see Figure 2-1).

In combination with the location of 4(f) and 6(f) mitigated lands within the new boundaries of CCLMP, the acreage and quality of protected land available for wildlife use will greatly increase (see Figure 3-3). Additional wildlife benefits will be gained by a refined mitigation process. The mitigation of unprotected wetlands will require functional assessments in addition to acreage quantifications to ensure no net loss of functional values. Mitigation banks may be designed to provide maximum functional values and will be protected in perpetuity.

In addition to wetland preservation and mitigation provisions, the SAMP will include provisions for tree mitigation, vegetated buffers and erosion control methods to enhance and protect water quality.

4.6.4 Sensitive Species

Significant habitat alteration that may have had the potential to adversely affect sensitive species had occurred historically, as a result of large-scale activities (extending well beyond the study area) that included land clearing and the installation of river training structures. Such historical activities have had pronounced landscape effects and have altered the distribution and quality of floodplain and riverine habitats. While it is not possible to be specific, the consequence of these previous actions has undoubtedly been to increase the rarity of species.

4.6.4.1 Past and Present Actions

Potential impacts to threatened and endangered species are given consideration as part of the USACE's permit review process. As a result, the effects of past and present actions (i.e., those subsequent to 1985) on sensitive species had previously been given consideration by USACE for actions requiring a Federal permit. No significant adverse impacts were reported to occur as a result of any of the previously permitted past or present actions.

Conversely, it may be important to note the positive effects of habitat preservation. Management and preservation of natural habitats in CCLMP (including 153 acres of wetlands) and the expansion of natural habitat preservation in the vicinity of Little Creve Coeur Lake as a result of the Page Avenue mitigation package have been beneficial to sensitive species. As is presented in Table 3-20, a large number of species of conservation concern have been reported within CCLMP in recent years. The presence of these species (many of which are water/wetland dependant) reflects the value of these preserved lands as predominantly foraging and resting habitats. As these habitats continue to develop (especially those in the Little Creve Coeur Lake area) they will likely provide more stable habitats that will also be suitable for nesting by some of these species.

4.6.4.2 Future Actions

Potential future actions within the study area are not expected to have a significant adverse impact on sensitive species. While the various actions under consideration in this EIS will have the effect of habitat alteration (see Section 4.6.2.2), potentially affected high quality natural habitats are generally limited in their distribution and overall suitability to support sensitive species.

4.6.4.3 Regulatory Actions

Previous USACE regulatory program actions resulted in the permitting of 31 actions within the study area since 1985 (see Table 1-1). As previously stated, none of these actions resulted in significant adverse effects on sensitive species. Similarly, it is not expected that future actions individually permitted by the USACE on a case-by-case basis will have a significant effect on sensitive species.

Future permitting under the SAMP alternative is also not expected to have any adverse impacts on sensitive species. However, a more cohesive approach to mitigation may further enhance the study area's capacity for support to sensitive species. The consolidation of mitigation requirements in a fewer number of mitigation areas, coupled with the long-term preservation of mitigation areas will likely expand and enhance habitat quality and interconnectivity the use of the study area by sensitive species.

4.7 Wetlands

Past and present actions have had a considerable effect on wetlands of the study area, but such effects are properly evaluated in the context of more long term use of the area. Consequently, the assessment of cumulative effects on wetlands was performed in conjunction with the trend analysis described in Section 4.6.2.1. Wetland distribution and extent were established historically for 1928, 1945, 1965, and 1986 by photo interpretation. Wetland extent for 2001 was established using the methodologies described in Section 3.7.

4.7.1 Historical Overview

Based on the distribution of hydric soils and the close association of the study area to the Missouri River, it is likely that a large portion of the pre-settlement study area was composed of wetlands. Settlement of the area in the 1800s led to clearing (and presumably drainage) of many wetlands as is reflected by the land cover map from 1928 (see Figure 4-3). Despite these wide-scale clearing activities, it is estimated that approximately 23 percent of the study area consisted of wetlands at that time (see Figure 4-3). Complexes of forested and scrub shrub wetland were well represented (see Figure 4-3) and existed in undrained oxbows and channel scars of the study area including Creve Coeur Lake, Little Creve Coeur Lake, and the northern reaches of the study area.

Over the subsequent intervening years, wetlands losses continued within the study area as more lands were converted to agricultural uses. Notable characteristics of the effects to wetlands within this time period include the following:

- Active pumping of surface water within Little Creve Coeur Lake area has been conducted since the 1970s;
- Levee construction beginning in the 1930s;
- Expansion of levee construction using mechanized equipment after World War II;
- Diversion of flow from Fee Fee Creek and lower Creve Coeur Creek from the north oxbow wetland complex in the northern reaches of the study area directly to the Missouri River;
- Wide scale development of watersheds of Creve Coeur and Fee Fee creeks, resulting in deposition of eroded materials in wetlands of the study area; and
- Expansion of actively cultivated lands to approximately 53 percent by 1986.

Effects of these various activities on wetlands of the study area were to remove wetland hydrology, clear and remove established wetland vegetation, displace wetland fauna, disrupt

wetland soils through cultivation, and increase sediment and pollutant transport to wetlands due to the effects of increased soil erosion.

Several historical actions, however, have resulted in the expansion of the wetland resource (albeit somewhat temporary). For example, placement of river training structures (wing dams) in the 1940s had the effect of expanding wetlands in the vicinity of Jane Downing Island. Continued accretion of sediments within this area has, however, reduced the extent of such wetlands in recent years (see Figure 4-3 versus Figure 3-5).

4.7.2 Past and Present Actions

The aggregate impact of past and present actions on wetlands is presented in Table 4-9 and is illustrated by type in Figure 4-5. In total, 55.3 acres of wetlands have been impacted since 1985. In most cases these impacts were subject to regulation by the USACE under Section 404 of the CWA. However, in at least one case, an additional 3.4-acre wetland was impacted using “clean excavation” techniques allowed under the Tulloch Rule. Many of these past permits had mitigation requirements as was presented in Table 1-1. However, past and present actions have not always been effective in mitigation (thus, replacing) for impacts to wetlands. Functional performance of these mitigation wetlands has not been assessed but is likely to be mixed as several of these mitigation sites are small, isolated, and poorly managed. As is presented in Table 1-3, there is a deficit of approximately 21 acres of wetland mitigation within the study area. Additionally, MoDOT has expressed concern about their ability to restore all the planned wetlands within its mitigation site due to inadequate hydrology. While MoDOT is seeking a solution to this problem, the USACE maintains its concern regarding the viability of the entirety of the mitigation site.

Past borrow pit construction for the 500-year levee (see Figure 3-7) has also resulted in the creation of several areas that may develop wetland characteristics. For example, the development of a borrow site within the CCLMP north of Little Creve Coeur Lake entailed the seeding of a 20-acre emergent wetland and the creation of a 14-acre shallow open water area. Other wetland areas may be expected to develop voluntarily in some of the other borrow sites.

4.7.3 Future Actions

Impacts of each of these actions may be evaluated in terms of direct wetland conversion due to the placement of fill (i.e., project “footprint”) and in terms of indirect effects. Indirect impact to wetlands common to most actions under consideration may result from alteration of wetland hydrology (changes in flow patterns, watershed area, etc.), and isolation or fragmentation of wetlands. Degradation of water quality may also occur due to the effects of erosion and sedimentation, increased nutrient loading, and reduced shading by riparian vegetation.

Potential direct impacts to wetlands have been assessed for each future action and are summarized in Table 4-9. Potential future actions that are anticipated to result in little or no wetland impacts include the Hog Hollow Road relocation, Terra Vista Estates and Mill Ridge Villas developments, and the dredging of Creve Coeur Lake. It is estimated that all other actions will result in unavoidable impact to wetlands as reflected in Table 4-9. It should be noted that values presented in Table 4-9 are based on current wetland mapping (see Figure 3-6) and do not reflect potential changes that may occur in the near future. Such changes are expected to include the USACE’s “capture” of wetlands formerly designated at Prior Converted (PC) by the NRCS. Such wetlands are known to occur in the vicinity of Little Creve Coeur Lake. The USACE intends to assert its authority over such lands if they demonstrate wetland characteristics 5 years after the cessation of agricultural activities.

Table 4-9. Summary of Impacts to Wetlands Associated with Past, Present and Reasonably Foreseeable Future Actions

Action	Wetland Type				
	Total	Farmed wetland	Emergent Wetland	Scrub Shrub Wetland	Forested Wetland
Primary Action					
Alternative 1: Case by Case (No Action)	NA	Preservation of wetlands in CCLMP, Riverside of HBLD levee			
Alternative 2: SAMP	NA	Preservation of wetlands in CCLMP, Riverside of HBLD levee, upper Creve Coeur Creek, Louiselle Creek			
Past Actions	58.7 (55.3 permitted, 3.4 acres due to "clean" excavation)				
Present Actions	<0.1				
Subtotal:	58.7				
Reasonably Foreseeable Future Actions					
1. Flank Levee System					
Alternative A	12.8	1.3	1.4	1.5	8.6
Alternative B	15.1	1.3	1.0	1.5	11.3
2. MHE Extension					
Options 1-5	0.7-5.0	0.0	0.0	0-1.3	0.7-3.7
3. Baxter Road Extension					
Options 1-2	0.4-0.7	0.1-0.1	0.0-0.3	0.0-0.0	0.3-0.3
4. Hog Hollow Relocation	0.0	0.0	0.0	0.0	0.0
5. MSD Plant Expansion	2.4	0.0	2.4	0.0	0.0
6. Land Use Plan Development					
Scenario 1: Interim Condition	49.1	17.2	10.5	0.1	21.3
Scenario 2: Ultimate Condition	49.1	17.2	10.5	0.1	21.3
7. Terra Vista Estates	0.0	0.0	0.0	0.0	0.0
8. Mill Ridge Villas	0.1	0.0	0.0	0.0	0.1
9. Creve Coeur Lake Dredging	0.0	0.0	0.0	0.0	0.0
Subtotal	65.5-72.4	18.6-18.6	14.3-14.2	1.6-2.9	31.0-36.7
Total (Grand)	186.9-201.1				
* Subject to revision as a result of a recent field determination.					

4.7.3.1 MHE Extension

The extension of the MHE from Page Avenue to Olive Boulevard is anticipated to impact from 0.7 to 5.0 acres of wetlands, depending on the final location and design of the roadway. The roadway is expected to be on fill through the reserved corridor from Page Avenue to near Creve Coeur Mill Road. Differences in potential impacts of options considered for this action are predominantly associated with the extent of bridging that is used in the construction of the facility.

4.7.3.2 MSD Plant Expansion

The anticipated expansion of MSD's Missouri River Plant is expected to impact approximately 2.4 acres of wetlands. It is expected that the expansion of the existing facility will occur to the south, which will result in impacts to a small emergent wetland.

4.7.3.3 Flank Levee System

The construction of the HBLD flank levee system will affect a number of small wetlands including those along lower Creve Coeur Creek, Fee Fee Creek, and Louiselle Creek. Construction of this stormwater control facility will entail excavation of a secondary channel adjacent to the existing stream system (i.e., inside the flank levees) to an elevation equivalent to the existing stream bed. This activity will result in impacts between 12.8 to 15.1 acres of wetland (Alternative A versus Alternative B) and several hundred feet of riparian corridors. [Note: Actual magnitude of impact based on final design not yet developed.] Differences in these alternatives are accounted for by differences in location of the levee and the need for an underseepage berm for Alternative B. These excavation and fill activities will result in impacts on the water quality of these streams as a result of the effects of erosion and sedimentation. Such impacts, however, are expected to be short term in their duration and minimized though the use of best management practices (BMP) including erosion and sedimentation control measures.

Subsequent to the construction phase, varying amounts of wetlands may be expected to redevelop within the flank levee system. Such wetland redevelopment may be greater with Alternative A as compared to Alternative B, as Alternative A will incorporate a wider flank levee interior and may allow for incorporation of such features in the final design. Additionally, Alternative A may also incorporate maintenance plans that allow for some redevelopment of riparian areas and scrub shrub and forested wetlands within a portion of the levee interior.

Each of the flank levee alternatives and ensuing localized drainage systems have the potential to cause significant indirect impacts on wetland hydrology. By controlling overbank flooding from local creeks, and by enhancing the removal of ponded water from lands outside the levee, the flank levees will reduce or remove hydrology from interior wetlands. This will effectively remove such areas as jurisdictional wetlands and make them more vulnerable to development.

By comparison, the absence of a flank levee system (see Scenario 1 under Future Land Use Development, below) would not result in impacts to wetlands along lower Creve Coeur, Fee Fee, and Louiselle creeks.

4.7.4 Future Land Use Development

Development of the study area in accordance with the City of Maryland Heights' Future Land Use Plan will also result in wetlands impacts. While this development may be expected to be somewhat different under each scenario, wetland losses within developable lands (see Figure 2-1) are assessed at 100 percent for both options. However, because Scenario 1 assumes that no flank levee will be constructed, it would result in between 12.9 to 15.2 acres of less wetland impact than Scenario 2. Under Scenario 1 (no future flank levee system) development is expected to occur at a slower pace, and will be required to incorporate more local flood storage and stormwater detention. Interior wetlands will, therefore, likely be converted to buildings, parking lots, and detention basins. By comparison, development of these lands under Scenario 2 (flank levee system in place) is expected to occur more rapidly and with less on-site storage and detention.

4.7.5 Regulatory Action

Wetland resources lie at the center of the primary action under consideration. While not resulting in direct and immediate effects to wetlands, each regulatory alternative being considered exerts an indirect impact on the wetland resource by virtue of its effect on the permitting policy and process. The relative effects of each of the alternatives under consideration may be assessed in terms of both wetland preservation and mitigation. Each of these characteristics are discussed below.

4.7.5.1 Preservation

For the SAMP alternative, several wetland areas have been identified for preservation and are, therefore, not subject to future development. As is indicated in Table 4-10, much of this area is currently in public ownership (e.g., CCLMP) and is, therefore, already subject to long-term preservation. In such cases, the effect of the SAMP, therefore, is to further reinforce the long-term preservation and management of wetlands within these areas. For the Missouri Riverfront Planning District, use of these lands is controlled by the City of Maryland Heights through their Future Land Use Plan. However, few lands on the riverside of the 500-year levee are in public ownership. Consequently, the effect of the SAMP in such areas will be to further constrain uses within these areas and to preclude wetland conversion and loss.

Table 4-10. Existing Wetland Areas to be Preserved Under the Regulatory Alternatives

Area Description	Controlling Authority	Acreage of Preserved Wetlands	
		SAMP Alternative	No Action Alternative
Creve Coeur Lake Area	St. Louis County Park	123.0	123.0
Little Creve Coeur Lake Area	St. Louis County Park	30.4	30.4
Riverside of 500-year Levee	City Land Use Controls	329.6	Limited
Total		**483**	**153.4**

Table 4-10 also identifies several additional areas that are afforded long-term wetland preservation. Wetlands within these areas are composed of a variety of community types (emergent, scrub shrub, forested—see Section 3.7) and were selected by the USACE for long-term preservation due to their overall functional value and their location with respect to other features within the study area. For example, scrub shrub and forested wetlands along upper Creve Coeur Creek are closely linked to the wetlands of Creve Coeur Lake.

By comparison, the No Action alternative would also result in wetland preservation. Wetlands presently located within CCLMP would be sustained in conjunction with the Park's goal to manage such areas as open natural habitats. Additionally, previously established wetland mitigation sites will be preserved in accordance with covenants and restrictions limiting the use of those parcels.

4.7.5.2 Mitigation

As discussed in Section 2.1.2, project applicants requesting a Section 404 permit must demonstrate that they have taken all appropriate measures to avoid and minimize effects to wetlands, prior to the USACE giving consideration to mitigation of impacts. Under both the No Action (Case-by-Case Permitting) and SAMP alternatives, mitigation of impacts to wetlands would be undertaken in response to the needs of each project being permitted. This would be prescribed by the USACE (and the MDNR through the Water Pollution Control Program-Section

401 Water Quality Certifications) in accordance with the following general national policy and agency guidance requirements:

- Presidential policy and USACE Headquarters' policy as to "no net loss" of wetlands.
- RGL-02-02, December 24, 2002, directing USACE mitigation policy to
    - Use functional assessment tools,
    - Improve mitigation performance standards, and
    - Impose stronger requirements for monitoring of wetland mitigation sites.
- MDNR Stream and Wetland Mitigation Guidelines.

These general policies and guidance requirements are effective for both the No Action and SAMP alternatives and provide an overall mitigation framework which ensures (1) that wetland impacts are actually mitigated, and (2) greater likelihood that such mitigation efforts will be functionally effective. These policies however, do not specify where such mitigation may occur, nor do they establish overall requirements for wetland management. In the case of the No Action alternative, wetland mitigation may be expected to occur in a piece-meal fashion in response to the needs of each individual project. This may result in small, isolated mitigation sites with low functional value and poor management. Additionally, the No Action alternative may result in an overall net loss regionally (i.e., within the study area) as such mitigation requirements may be fulfilled at an off-site location (e.g., a mitigation bank, see Section 2-1 and Table 1-1). In contrast, the SAMP alternative would require that mitigation be undertaken at one of several centralized locations within the study area. Such mitigation sites are likely to be in close association with other wetland and surface water resources and consequently, would be expected to exhibit greater overall functional value. Additionally, the wetland bank would be administered by a public or private entity and would consequently be precluded from future development and subject to an active and responsible management program.

4.8 Water Resources

4.8.1 Surface Water Resources

Surface water resources within the Howard Bend study area have undergone considerable alteration as a result of past uses. In order to establish the context within which the effects of past, present and reasonably foreseeable future actions may be evaluated, an historical trend analysis was conducted. The results of this analysis and the assessment of cumulative impacts are presented below.

4.8.1.1 Historical Overview

An assessment of historical changes in surface water resources and its related effects on water quality may be undertaken by measuring the degree to which streams and lakes of the study area have been altered by man's activities. This analysis was performed by integrating information from a number of sources including the following:

- Photointerpretation of black and white aerials from 1928, 1945, 1965, 1986, and 2001;
- Review of MDNR water quality data and 303d lists of impaired waters;
- Review of USACE 404 permits relating to channel improvements and streambank stabilization; and
- Incorporation of local oral history from long-time residents.

As discussed in Section 4.6.2.1, a long history of agricultural use has resulted in significant alteration of the Howard Bend floodplain. The changes in land cover discussed in this previous section were paralleled by the construction of a continuous agricultural levee from Bonhomme Creek north to the current location of I-70, the development of agricultural flank levees adjacent

to the Creve Coeur and Fee Fee creeks channels (20 to 40 year protection), and significant alterations to the streams and lakes of the study area. Notable changes during this "pre-regulatory" era (i.e., prior to USACE's Section 404 program) included extensive channelization of streams, alteration of surface water flow patterns, elimination of seasonal flooding of lands adjacent to the Missouri River, and drainage and pumping of surface water.

Channelization and diversion of streams has been progressive over the historical period. Maps from the late 1800s suggest that flow from Creve Coeur Creek once entered Little Creve Coeur Lake. Results of photo interpretation since 1928 have shown that more than 5.8 miles of streams within the study area have been channelized (Figures 4-6 and 4-7). Comparatively, only 2.2 miles of stream channel are present that retain predominantly the characteristics of a naturally meandering channel. Similarly, a significant alteration of the drainage pattern of Creve Coeur Creek occurred some time after 1945 when the cutoff channel (now lower Creve Coeur Creek) was constructed to carry flow from Creve Coeur Creek and Fee Fee Creek directly to the Missouri River (see Figure 4-6). Effects of these historical activities has been to increase flow velocities, increase channel scour, and increase erosion and turbidity levels of the creek systems. Primary areas in which channelization was evident from aerial photos (actual dates of channelization are not known) included lower Creve Coeur Creek (1965), upper Creve Coeur Creek (1965, 2001), Fee Fee Creek (1965), Louiselle Creek (1945), and Bonhomme Creek (1986). In many areas, riparian vegetation has become established along these modified streams. Width and composition of this zone varies with the nature of adjacent land uses and the degree of continued disturbance.

Efforts to improve navigability of the Missouri River were undertaken by the placement of river training structures (wing dams) by the USACE in the 1930s. These structures were effective navigation improvements, but had the effect of reducing the river's overall width and channel complexity, as is evident in Figure 4-3. The net local effect of this action has been to stimulate the accretion of sediments along the right descending shoreline, and thereby reduce the amount of available surface water within the study area.

Non-point source pollution including erosion and subsequent sedimentation has also been a source of surface water degradation. Sedimentation within Creve Coeur Lake and Little Creve Coeur Lake have reduced water depth and diminished water quality. Agricultural land uses were also observed to be historically conducted in close proximity to many surface water features (creeks, lakes and the Missouri River) with little or no adjacent buffer or riparian zone. The inevitable result of such practices would have been to increase runoff, increase pollutant and nutrient loading, and increase erosion. Significant development within the upland watershed of Creve Coeur Creek also had the effect of degrading the water quality of Creve Coeur Lake. As discussed in Section 3.8.1.2, Creve Coeur Lake was included on the 1998 list of waters designated under Section 303(d) of the Federal CWA due to chlordane contamination. Presumably, this chlordane had been carried to the lake by runoff from developed and agricultural areas within its watershed.

Surface water resources have also been affected by active pumping of surface water to accelerate the use of such areas for cultivation. This has particularly been the case within the Little Creve Coeur Lake area where local residents have indicated that pumping of surface water has occurred since the 1970s (Stemme, personal communication). As a result of the purchase and subsequent donation of many of these lands to CCLMP for use as outdoor recreational areas and wetland mitigation (MoDOT), the active pumping of surface water has been ceased.

4.8.1.2 Past and Present Actions

Few actions subsequent to 1985 have had a significant effect on surface water resources. This may in large part, be attributable to the effect of the USACE's regulatory program in requiring permit applicants to "avoid and minimize" impacts to surface water resources.

Projects that have affected surface water resources since 1985 include those associated with roadway construction, channel improvements, and levee construction. In the case of roadway construction, bridging of Creve Coeur Creek and the Missouri River by the Page Avenue Extension and bridging of Fee Fee Creek and lower Creve Coeur Creek by the MHE have resulted in only minor impacts, as these actions have spanned the creek channels. In the case of the Page Avenue Extension, however, some significant positive effects to water quality have been realized by the construction of a sedimentation basin to intercept and detain sediments carried by Creve Coeur Creek prior to their deposition in Creve Coeur Lake. This same action, however, also resulted in the rechannelization of a portion of Creve Coeur Creek upstream of Creve Coeur Lake (see 2001 inset in Figure 4-6).

Several channel improvement projects have also been conducted in an effort to improve bank stability and increase conveyance. This work, performed in accordance with a Section 404 permit from the USACE (see Table 1-1), resulted in impacts to 3,900 lineal feet (single shoreline) of lower Creve Coeur Creek on six separate occasions (1986, 1987, 1990, 1992, 1994, 1996), and 5,200 lineal feet of Louiselle Creek for channel maintenance in 1997.

Under normal conditions (i.e., non-flood), the 500-year levee has no interaction with the Missouri River as flows are generally confined to the area within the river banks. Consequently, under such conditions, the levee exerts no effects on river hydrology, water quality, or its biological resources.

The construction of the 500-year levee by the HBLD has had the primary effect of eliminating (or further reducing) the potential for Missouri River flooding of the study area. Under high flood conditions (20- to 40-year plus frequency), the prior levee has the effect of confining flood water to the main channel and unprotected floodplain areas north of the river. The effects of this has been to alter hydrologic parameters (velocity, flood stage), diminish the water quality improvement function of the Howard Bend floodplain (e.g., reduced turbidity due to the settling of materials within the floodplain), and in providing aquatic species habitat (e.g., fish foraging and spawning). It should be noted that flooding of the Howard Bend floodplain from Missouri high-water events has been limited – having occurred four times since the 1940s. While such events have been infrequent, the recent event in 1993 had the effect of inundating the entire floodplain.

Another effect of the construction of the 500-year levee consisted of the creation of several surface water bodies (see Section 3.8.1.2). For example as depicted in Figure 3-7, two large open water bodies (one near the Missouri American Water Company plant totaling 20.9 acres (Reising borrow site), and one outside of the levee near River Valley Drive totaling 49.0 acres (Moore site) were formed as a result of the development of borrow sites. Other borrow sites that exhibit open water under various river conditions include the old golf course site and the Stolte borrow site. These areas have been formed by infiltration of groundwater, runoff, river seepage and river flooding and vary in water depth.

4.8.1.3 Future Actions

Potential effects of reasonably foreseeable future actions on surface water resources within the study area are summarized in Table 4-11 and are discussed below for each action.

Table 4-11. Summary of Impacts to Surface Water Resources Associated with Past, Present and Reasonably Foreseeable Future Actions

Action	Summary of Impact
Primary Action	
Alternative 1: Case by Case (No Action)	Continued protection of surface waters through existing USACE Regulatory Program Potential for lower level of control of non-point source pollution due to minimal buffer requirements Potential for mitigation out of study area
Alternative 2: SAMP	Continued protection of surface waters through existing USACE Regulatory Program Increased protection of surface waters due to expanded buffer requirements Requirement for mitigation within the study area
Past Actions	3,900 lineal feet of streams improved through bank stabilization projects 5,200 lineal feet of Louiselle Creek affected by channel maintenance activities Roadway bridging of upper Creve Coeur Creek and Missouri River (Page Avenue Extension) Reduced turbidity and sedimentation in Creve Coeur Lake due to construction of Page Avenue sedimentation basin Channelization of upper Creve Coeur Creek to connect to sedimentation basin
Present Actions	Roadway bridging of lower Creve Coeur Creek and Fee Creek (MHE) Creation of open water bodies in two locations totaling 69.9 acres of new open water habitat
Reasonably Foreseeable Future Actions	
1. Flank Levee System	
Alternative A	Channel alternation of up to 12,000 feet along Lower Creve Coeur and Fee creeks
Alternative B	Channel alternation of up to 12,000 feet along Lower Creve Coeur and Fee Fee creeks. Portions of lower Creve Coeur and Fee Fee creeks subject to Missouri River flooding
2. MHE Extension	
Options 1-5	Roadway bridging of upper Creve Coeur Creek
3. Baxter Road Extension	
Options 1-2	Roadway bridging of Bonhomme Creek Culverted Crossing of Intermittent Creek
4. Hog Hollow Road Relocation	No impact
5. MSD Plant Expansion	No impact
6. Land Use Plan Development	
Scenario 1: Interim Condition	Potential for erosion and sedimentation within surface water resources during construction phase Potential for increased pollutant loading due to stormwater runoff from paved surfaces
Scenario 2: Ultimate Condition	Potential for erosion and sedimentation within surface water resources during construction phase Potential for increased pollutant loading due to stormwater runoff from paved surfaces
7. Terra Vista Estates	No Impact
8. Mill Ridge Villas	No Impact
9. Creve Coeur Lake Dredging	Increased water depth, improved water quality of Creve Coeur Lake

Flank Levee System

The flank levee system is a major action that will have a significant effect on surface water resources. Direct impacts to surface water resources will primarily occur in conjunction with the excavation of lands immediately adjacent to the streams contained within the flank levee system (i.e., Fee Fee Creek, lower Creve Coeur Creek, Louiselle Creek) and in conjunction with the construction of the pump station and gate structure. These activities will result in excavation and/or filling of streams for each flank levee alternative in order to construct appropriate overflow and diversion structures and suitable detention areas. In its constructed condition, the flank levee system under Alternative B will include a central channel surrounded by a maintained, vegetated area (i.e., grassed conveyance area). By comparison, Alternative A may incorporate management measures that will allow for redevelopment of some natural habitats within the flank levee system provided excess silt is not trapped. For both alternatives, the existing channel will be subject to a high degree of modification (up to 12,000 lineal feet of Lower Creve Coeur and Fee Fee creeks).

One notable characteristic of flank levee Alternative B (gated discharge at Creve Coeur/Fee Fee creeks junction) is that the stream system within the flank system may be more accessible to aquatic biota from the river. This will increase connectivity between the aquatic ecosystems of the river environment and those of upper Fee Fee Creek, thereby enhancing overall aquatic ecosystem function.

By comparison, the absence of a future flank levee system (see Scenario 1 under Future Land Use Development, below) would not result in impacts to the stream channel and riparian corridor along lower Creve Coeur and Fee Fee creeks.

MHE Extension

The extension of the MHE south to Olive Boulevard will entail one or more crossings of Creve Coeur Creek, depending on the alternative selected. Crossing of the creek in these locations, however, is anticipated to be accomplished by bridging, since Creve Coeur Creek has a designated floodway in this location. As a result, impacts to surface water resources are expected to be minimized, since bridging will likely entail little or no instream construction activities.

Baxter Road Extension/Hog Hollow Road Relocation

The Baxter Road Extension is an action that will necessitate the crossing of Bonhomme Creek and a small intermittent tributary. The crossing of Bonhomme Creek would likely be constructed by bridging, whereas the intermittent tributary would be crossed on fill using a culvert. Potential impacts to surface water resources with both crossings are expected to be minor and primarily related to the construction phase.

Future Land Use Development

The build out of unconstrained lands in accordance with the City of Maryland Heights' Future Land Use Plan would entail a large scale alteration of land cover within the study area as was discussed in Section 4.6.2.1. Potential short-term effects of this action include local site disturbance and an increased potential for erosion and sedimentation within receiving surface water resources. If all areas identified within Figure 2-11 are converted to developed areas, a total of 16.7 acres associated with the newly formed borrow lake near the Missouri American Water Company plant are vulnerable for future development. In all likelihood, however, this open water area is likely to be left intact and incorporated into a local stormwater detention system for individual site developments in this area. Increased development, however, will likely also result in an increase in runoff rates and increased pollutant loading (oil, grease, metals, etc.) associated with stormwater runoff from paved surfaces.

Land Development Scenarios 1 and 2 are quite different with regard to the intrinsic impact to surface water resources of lower Creve Coeur, Fee Fee, and Louiselle creeks. In particular, Scenario 1 assumes the absence of a flank levee system which would result in reduced impacts to creek channels and riparian corridors.

Creve Coeur Lake Dredging

Dredging of Creve Coeur Lake is planned to be conducted by hydraulic dredging. Slurry carrying the dredged materials will be deposited in each of two basins designed to retain the sediments (see Figure 2-9). The resultant effect of this dredging activity will be to remove accumulated sediments from Creve Coeur Lake, thereby increasing average depth within the lake. Increased water depth, coupled with the effects of the upstream sedimentation basin will likely improve water clarity as a result of increased light penetration, increase primary productivity, and improve the quality and productivity of the aquatic ecosystem.

4.8.1.4 Regulatory Action

The intent of the USACE's regulatory program is to protect surface water resources. With regard to the No Action alternative (Case-by-Case Permitting), projects will be permitted on an individual basis under the guidelines of the current regulatory program (see Section 2.1). As with the SAMP alternative, direct impacts to surface water under the No Action alternative will be mitigated under the current policies requiring in-kind replacement. However, requirements for vegetated buffers around receiving surface water resources will be minimal. Consequently, the increase in pollutant loading into surface water systems is likely to go unchecked. By comparison, the SAMP alternative will require stream mitigation to occur within the study area and a more extensive and comprehensive buffer system that will afford a greater degree of water quality protection than that provided by the No Action alternative.

4.8.2 Groundwater Resources

As stated in Section 3.8.2, groundwater is present within the study area in the alluvial (sand/gravel) and bedrock (limestone) aquifers. The bedrock aquifer is unlikely to be vulnerable to project effects due to its depth below the ground surface (typically exceeds 100 feet) and the fact that the primary source of groundwater recharge originates from upland areas. In contrast, the alluvial aquifer is considered more susceptible to impacts, due to its proximity to the surface (less than 10 feet in some areas and seasons) and higher permeability (ability to transport water).

4.8.2.1 Historical Overview

As stated in Section 4.6.2.1, the study area has historically been subject to large scale land clearing and draining for agricultural uses, urban development, and levee construction. The construction of wing dams has constricted the Missouri River and decreased the area of open water. In addition, the urban development of the surrounding uplands has increased the volume of surface water runoff that currently flows across the study area. In short, the surface water hydrology (water quantity and quality) within the study area has been significantly modified by man. One resultant effect of this historical change in use has been to increase the rate of surface water runoff (from agricultural lands) and decrease the degree of groundwater recharge (compared to pre-settlement conditions).

4.8.2.2 Past and Present Actions

The alluvial aquifer, however, typically receives a significant amount of recharge water from the Missouri River, along with lesser amounts of direct infiltration of rainwater and recharge from lakes and streams. As a result, the groundwater originating from the Missouri River has not been significantly impacted by either past or present actions. The frequency of interior flooding will decrease as a result of the construction of the 500-year levee. However, this will not significantly alter the typical (non-flood stage) alluvial aquifer groundwater conditions.

4.8.2.3 Future Actions

With respect to future actions, the completion of the flank levee system (either Alternative A or B) will reduce the extent of interior surface water flooding but, like the 500-year levee, is not expected to significantly alter the typical (non-flood stage) alluvial aquifer groundwater conditions. Other individual future actions such as the MHE Extension, Baxter Road Extension, MSD Plant Expansion, Terra Vista Estates, Mill Ridge Villas, Creve Coeur Lake Dredging, and Hog Hollow Road Relocation, are not expected to have a significant impact to the alluvial aquifer. Although, these actions will result in changes to groundwater recharge/discharge functions and groundwater flow patterns, these impacts are expected to be localized and not affect the overall utilization of the alluvial aquifer.

Development of unconstrained lands in accordance with the City of Maryland Heights' Future Land Use Plan could result in the conversion of about 2,100 acres of land (primarily agricultural, developed and grassland cover types). The extent to which these cover types will be impacted, however, will depend on the particular development (refer to Section 4.6.2.1). In general, however, this development will result in a significant increase in impervious surface area (buildings/parking lots, etc.), a corresponding increase in surface water runoff, and a decrease in groundwater recharge. Therefore, there may be some reduction in the quantity of available groundwater in the alluvial aquifer as a result of future development in the study area. The extent of these impacts will depend on the proximity to the Missouri River and the amount of local groundwater recharge.

4.8.2.4 Regulatory Action

Neither the No Action (Case-by-Case Permitting) nor SAMP alternatives will have a significant impact on groundwater resources. However, the SAMP alternative will provide a greater degree of wetland protection and will ensure that wetland mitigation will be conducted within the study area. As a result, the SAMP will provide a somewhat greater degree of protection of groundwater recharge areas (e.g., wetlands).

4.8.3 Floodplains

In accordance with Executive Order 11988, Floodplain Management, Federal agencies are required to assess affects of their actions on floodplains. Because of the very nature and setting of this project, floodplains and floodplain use are central issues. Consequently, it is important to establish an historical context of flooding and flood control within the Howard Bend study area.

4.8.3.1 Historical Overview

As is discussed in Section 4.6.2.1, the Howard Bend area has a long history of agricultural use. Aerial photos from 1928 reveal that vast areas of the floodplain had been cleared and were undergoing active cultivation (see Figure 4-3). The absence of flood control measures at this time left these lands vulnerable to frequent inundation by flood events from the Missouri River. In order to minimize losses from such events, the construction of earthen levees was initiated in 1935. Levees were expanded and strengthened in the years following World War II as mechanized equipment became more available. Major flood events that resulted in the failure or overtopping of these levees occurred in 1935, 1941, 1944, 1947, 1951, 1986, 1993, and 1995 (Stemme, personal communication). Flooding in 1951 and 1993 were the most severe, resulting in water depths of 8 to 10 feet across the floodplain. The HBLD was formed in response to the 1993 flood event and serves as a local agency that is responsible for interior drainage and flood control.

4.8.3.2 Past Actions

Impacts of past actions on floodplains have been primarily limited to the effects of the construction of the 500-year Riverport levee and the 100-year flood protection berm surrounding

the Harrah's Casino complex. Prior to the construction of these developments, the entire Howard Bend study area was mapped as 100-year floodplain (Zone A on FIRMs) by the FEMA. Collectively, these projects have resulted in the loss of approximately 638 acres of floodplain (Table 4-12). Other past actions have resulted in the placement of fill within the floodplain (e.g., Page Avenue Extension, Creve Coeur Airport expansion, Sportport) but these projects have been constructed at elevations below the 100-year flood level and have generally been required to provide compensatory on-site stormwater detention. In the case of the Page Avenue Extension, the selected alignment was to result in the placement of fill within an estimated 141 acres of floodplain (Booker Associates, 1992). However, as it was originally evaluated in the Final EIS, this encroachment resulted in the construction of the Page Avenue Extension above the 100-year flood level. As constructed, however, Page Avenue was completed at an elevation below the 100-year elevation (50-year flood level), resulting in a somewhat lower floodplain encroachment. This action, however has resulted in the placement of fill within approximately 210 acres of floodplain and has increased the accessibility of the study area. This increased access has resulted in further pressure (economic and political) to provide additional floodplain protection and additional land development.

Table 4-12. Summary of Impacts to Floodplains Associated with Past, Present and Reasonably Foreseeable Future Actions

Action	Acres Impact
Primary Action	
Alternative 1: Case by Case (No Action)	No impact
Alternative 2: SAMP	No impact
Past Actions	638 acres (direct and indirect); 210 acres of additional floodplain encroachment due to Page Avenue Extension fill placement
Present Actions*	4,168 of area designated as non-floodplain (indirect); 126 acres of additional floodplain encroachment due to MHE fill placement
Subtotal	4,806 acres removed from floodplain of Missouri River
Reasonably Foreseeable Future Actions	
1. Flank Levee System	
Alternative A	71.7 filled; 358.7 additional acres removed from floodplain designation (indirect)
Alternative B	116.2 filled; 360.4 additional acres removed from floodplain designation (indirect)
2. MHE Extension	
Options 1-5	2.4-6.6**
3. Baxter Road Extension	
Options 1-2	1.4-3.7
4. Hog Hollow Road Relocation	0.0
5. MSD Plant Expansion	6.6
6. Land Use Plan Development	
Scenario 1: Interim Condition	232.7†, slow rate of conversion
Scenario 2: Ultimate Condition	232.7†, more rapid rate of conversion
7. Terra Vista Estates	4.8**
8. Mill Ridge Villas	23.5 filled; increased flood storage**
9. Creve Coeur Lake Dredging	Increased flood storage within Creve Coeur Lake
Subtotal	343.1-394.1 (direct) 358.7-360.4 (indirect)
Total	5,507.8-5,560.5 (direct and indirect)

* Does not include the alignment of the 500-year levee itself.
† Rate and extent of conversion will be dependant upon the rate of development and will be constrained by additional requirements for on-site detention and stormwater control.
** Reflects FEMA FIRM mapping.

4.8.3.3 Present Actions

The increased flood protection by the 500-year HBLD primary levee has resulted in the issuance of a CLOMR that effectively revises the limits of the 100-year floodplain in the Howard Bend study area (see Section 3.8 and Figure 3-8). As is presented in Section 1.2, this action has entailed the design and construction of a levee substantially on the same alignment of the existing levee. Additionally, it has actually reduced floodway encroachment by relocating a segment of the pre-existing levee to an area outside the FEMA mapped floodway.

Direct impacts of this action have caused a significant change in the amount of FEMA floodplain within the study area including the re-designation of approximately 4,168 acres as non-floodplain. Other direct effects include alteration of hydrology, water quality, and aquatic biological functions of the river during extreme flood events (see Section 4.8.1.2). The 500-year primary levee provides for protection from flooding by the Missouri River, but does not alleviate interior flooding from streams in the study area in response to local storm events. Consequently, the 500-year levee does not remove the 100-year floodplain designation (Zone A) from the entire study area.

In general, the Missouri River floods from bluff to bluff during flood events greater than the 100-year frequency, except for the levee protected areas of Monarch-Chesterfield, Howard Bend, and Riverport. During the feasibility study for the Monarch-Chesterfield Levee Project (raise the existing levee to a 500-year levee), the USACE conducted a HEC-2 model that utilized hydraulic and hydrologic data from current or proposed projects in the study area. These other projects included the Page Avenue Extension, MHE, Howard Bend Levee raise to 500-year, St. Charles L-15 Levee, and the Hazelwood Levee raise. Using these current and future impacts to the floodplain, and updated hydrographic surveys, revised as-built bridge and road plans, and calibration to the 1993 and 1995 flood events, the HEC-2 data set showed that for the 100-year and 500-year project for the Monarch-Chesterfield Levee, the maximum increase in Missouri River water surface elevations at river mile 46.5 would be 0.2 and 0.8 feet, respectively.

Therefore, the cumulative impacts of increased levee encroachments in the Missouri River's floodplain for a 100-year return (1 percent chance) or higher would be 1 foot or less, in accordance with state guidelines. This analysis assumed that the State of Missouri and National Flood Insurance Program is being adhered to by the State of Missouri, and the communities along the Missouri River are adhering to the guidelines of the National Flood Insurance Program. All future structures, levees, buildings, roads, and bridges are assumed to follow the guidelines for floodplain development. The cumulative impacts for the 500-year flood (0.2 percent chance) are not defined by the National Flood Insurance Program.

Other present actions have required the placement of fill within floodplain areas. In particular, the MHE extension to River Valley Drive is being constructed at an elevation above the 100-year flood level of Creve Coeur and Fee Fee creeks. Compensatory storage to offset the effects of this action, however, are being provided by a series of expanded ditches along the length of the new roadway embankment.

Alteration of the floodplain of the Missouri River as reflected by the CLOMR will also have an effect on the mapped extent of the floodplain along upper Creve Coeur Creek, as this area had been influenced by backwater from the Missouri River. The actual nature and extent of the potential mapping changes are not known at this time, as this area was excluded from the area of analysis for the CLOMR. A revision of the FEMA FIRM would need to be made as a result of a Flood Study of upper Creve Coeur Creek. Therefore, for the purposes of this EIS, the current

FEMA 100-year floodplain was used to evaluate the potential effects of future actions on floodplains.

4.8.3.4 Future Actions

Table 4-12 summarizes the potential affects of each future action on the floodplains identified in Figure 3-8. In general, the effects of each of these individual actions are relatively minor. For example, the Baxter Road Extension will entail encroachment on up to 3.7 acres of floodplain of the Missouri River, Terra Vista Estates and Mill Ridge Villas will encroach upon 4.8 acres and 23.5 acres of the floodplain of Creve Coeur Creek, respectively; and the anticipated expansion of the MSD Missouri River Plant will encroach upon 6.6 acres of interior floodplain along lower Creve Coeur Creek. In the case of the MHE Extension, the potential for floodplain/floodway encroachment may be minimized by each of several alignment location alternatives, and by varying the length of bridge (see Section 2.2.2). In accordance with the requirements of FEMA and St. Louis County, local stormwater detention and/or conveyance will be required for each of these actions.

Several other future actions have the potential to result in significant floodplain encroachment and flood zone alteration. Each of theses actions are discussed below.

4.8.3.5 Future Land Use Development

Future development of the areas identified in Figure 2-11 will occur at a rate that is market driven, and in a manner that is consistent with the City of Maryland Heights' Future Land Use Plan. In total, approximately 233 acres of floodplain could be affected assuming the flank levee system is constructed (i.e., Land Use Scenario 2). Similarly, approximately 233 acres of floodplain could be affected if development is completed in the absence of a flank levee system. It should be noted that development may occur within the 100-year floodplain, but such actions would require FEMA approval and will involve greater effort by the developer to accommodate requirements for flood storage. Each individual project will be responsible for local accommodation of stormwater runoff and storage and conveyance methods, either by ditch or pumping. In the absence of comprehensive planning, the Howard Bend floodplain will be characterized by sporadic storage facilities, inconsistent design of runoff controls, and non-uniform conveyance systems.

Flank Levee System

The Creve Coeur Creek and Fee Fee Creek flank levees were initially constructed in the 1940s and originally had capacity to retain storm events. However, as a result of increased development within the uplands, the volume of runoff has dramatically increased and the storage capacity of these channels has subsequently been exceeded. Each of the flank levee alternatives being considered would have the effect of reducing the extent of the 100-year floodplain (Figures 4-8 and 4-9).

Impacts of each flank levee alternative are summarized in Table 4-12. In terms of actual encroachment, Alternative B results in greater direct impact, as it results in effects to approximately 116.2 acres of floodplain as compared to 71.7 acres with Alternative A. However, in terms of the resultant remaining floodplain extent within the interior of the Howard Bend floodplain, each alternative is nearly identical, resulting in the conversion of approximately 360 additional acres (see Table 4-12). Primary effects of each flank levee alternative are to reduce the extent of designated 100-year floodplain in the vicinity of lower Creve Coeur Creek, Fee Fee Creek, and Louiselle Creek (Figures 4-8 and 4-9). Flood storage within Creve Coeur Lake and Little Creve Coeur Lake is maintained under each alternative. Secondary impacts of each flank levee alternative are to support continued floodplain development and alteration. With the

completion of a flank levee system that includes a central conveyance artery, it is expected that additional isolated portions of floodplain will be converted as stormwater is drained away or pumped from development sites to the central conveyance system (see narrative above).

As the configuration of the interior drainage system becomes more certain, a subsequent CLOMR will be sought which will incorporate the features of interior drainage system. As with prior conditions, this CLOMR will become a LOMR after these features are completed and documented as such to FEMA.

4.8.3.6 Regulatory Actions

Under the Case-by-Case alternative, the floodplain will continue to be divided on a piece-meal basis as individual projects are submitted for Section 404 permitting. Project stormwater detention and conveyance will be provided on a project by project basis with limited advance planning. The USACE does not encourage floodplain development but does not regulate floodplain impacts. The USACE will request reviews and comments from Maryland Heights and FEMA to ensure that floodplain issues are resolved and that stormwater detention is adequate.

By comparison the SAMP is a comprehensive plan developed to provide natural resource protection, provide a practical and predictable process for development, and promote consolidated regional land use and environmental planning. As such the plan should provide a more cohesive policy regarding floodplains and the centralization of flood storage. Under the plan, the stakeholders, of which FEMA is a member, will have an opportunity to provide input into the plan specifics for comprehensive floodplain management. The group can address the concerns identified in Executive Order 11988 Floodplain Management.

4.9 Agricultural Resources

Coordination with the NRCS was conducted throughout the course of the environmental documentation and the project planning process for the purposes of identifying wetlands subject to NRCS jurisdiction. NRCS is also the primary agency responsible for coordination pursuant to the Farmland Protection Policy Act (FPPA). For Federally funded projects potentially affecting prime or unique farmlands, coordination with NRCS requires completion of the Farmland Conversion Impact Rating (Form AD-1006), which specifically evaluates the conversion of prime and unique farmland, and statewide and locally important farmland to nonagricultural uses.

4.9.1 Past, Present, and Reasonably Foreseeable Future Actions

Table 4-13 presents a cumulative impact summary of effects to prime and unique farmlands. Past and present actions have resulted in the permanent loss of approximately 1,485 acres of prime and unique farmlands due primarily to the expansion of the transportation infrastructure within the floodplain, the construction of Riverport and Harrah's Casino complex, and the construction of the 500-year levee by the HBLD.

Potential future projects may ultimately result in the conversion of approximately 2,300 acres of prime and unique farmland. Expanded flood protection with the construction of the flank levee system will likely account for the greatest impact of any single project (120 to 169 acres). Other projects will likely result in considerably less impact (4 to 90 acres per project). Additionally, future development within the study area in accordance with the City of Maryland Heights' Future Land Use Plan will also likely result in small-scale (i.e., less than 100-acres per development) impact to prime and unique farmland. Over an extended period of time, as driven by market forces, development of unconstrained lands within the City of Maryland Heights' various planning districts may result in a total prime and unique farmland conversion of up to

1,938 acres. In the case of the interim condition (i.e., land use Alternative 1), it is expected that somewhat less than 1,938 acres will be converted due to the absence of an interior flood control system.

Table 4-13. Summary of Impacts to Prime and Unique Farmland Associated with Past, Present and Reasonably Foreseeable Future Actions

Action	Acres Impacted
Primary Action	
Alternative 1: Case by Case (No Action)	NA
Alternative 2: SAMP	NA
Past Actions	1,059
Present Actions	426
Subtotal	1,485
Reasonably Foreseeable Future Actions	
1. Flank Levee System	
Alternative A	120.0
Alternative B	169.0
2. MHE Extension	
Options 1-5	17-18
3. Baxter Road Extension	
Options 1-2	30-36
4. Hog Hollow Road Relocation	4
5. MSD Plant Expansion	43
6. Land Use Plan Development	
Scenario 1: Interim Condition	Less than 1,937*
Scenario 2: Ultimate Condition	Up to 1,937
7. Terra Vista Estates	7
8. Mill Ridge Villas	10
9. Creve Coeur Lake Dredging	101.0
Subtotal	2,269-2,325
Total	3,754-3,810

* Rate and extent of conversion will be dependant upon the rate of development and will be constrained by additional requirements for on-site detention and stormwater control.

Prime and unique farmland will however, be preserved within several areas including the CCLMP, and in lands on the riverside of the 500-year levee. In total, approximately 2,348 acres of prime and unique farmland will be preserved within these areas.

4.9.2 Regulatory Action

No direct impact to prime and unique farmland will occur as a result of the selection of either the SAMP or the No Action (Case-by-Case Permitting) regulatory alternative. These policies will result in a permitting process that continues to evaluate prime and unique farmland as one of the many natural environmental and public interest factors subject to consideration in the NEPA decision-making process. Conversion of prime and unique farmland with either alternative will occur as a result of impacts from other parties (private or non-Federal public entities) and will in all likelihood, not be subject to FPPA compliance requirements.

4.10 Special Waste

Within the study area, the facilities which are most likely to have potential environmental liabilities are the Arrowhead Airport, Southard Construction, and West-Continental Auto Parts and Salvage Company. Arrowhead Airport appears to have three unregistered USTs on-site. The Southard Construction site may have contaminants on-site that were the result of asphalt paving materials. West-Continental is spread out over approximately 40 acres and may contain any or all of the constituents found during the investigation at Smith Brothers Auto Salvage. These contaminants include petroleum hydrocarbons, metals, polynuclear aromatic hydrocarbons, solvents, and antifreeze.

4.10.1 Past and Present Actions

Construction of the MHE Extension to River Valley Drive impacted the Smith Brothers Auto Salvage site. A site evaluation was conducted and contaminants [benzo(a)pyrene, benzene, total petroleum hydrocarbons (TPH), PCBs and pentachlorophenol] were present on-site at levels that exceeded action levels. The site was remediated and capped; it is currently awaiting closure status.

4.10.2 Future Actions

Construction of the flank levee system for Creve Coeur, Fee Fee and Louiselle Creeks will impact the Southard Construction Company as well as the West-Continental Auto Parts and Salvage Company. Additionally, the Arrowhead Airport site will be affected by the build-out of the City of Maryland Heights' Draft Land Use Plan.

Prior to construction, any potential developer of these sites will need to comply with all appropriate state and Federal requirements requiring site investigation, characterization of potentially hazardous constituents, and remediation to ensure proper health and safety.

4.10.3 Regulatory Action

There will be no effect on special waste from either the SAMP or the No Action (Case-by-Case Permitting) alternative. It is likely that a Phase I Site Assessment in accordance with ASTM Standards will be performed in advance of any proposed development within the study area. Prior to development of any contaminated site, remediation and compliance with all applicable state and Federal laws and regulations are necessary for the issuance of a Section 404 permit by the USACE.

4.11 Visual Resources

An assessment of the visual and aesthetic impacts are based upon the anticipated potential build out of land use in accordance with the City of Maryland Heights' Future Land Use Plan. The plan identifies all potential areas and types of development that may occur in accordance with the Future Land Use Plan. Additionally, the plan also identifies areas in which future development is limited. The analysis of visual impact also includes a consideration of future roadway improvements, storm water conveyance modifications associated with the flank levee systems, future CCLMP improvements, and the Missouri River Treatment Plant expansion. Improvements or modifications in land use in the portions of the study area associated with the City of Chesterfield are predominantly within the lower Creve Coeur Creek area.

Several areas are designated as visually sensitive resources and an assessment of both direct and indirect visual impacts must be presented.

The potential future land use and development build out that may occur and the planned roadway and storm water conveyance systems that will occur over time will significantly alter the visual character of the Howard Bend study area. Visual impacts will be presented for by past/present (1985 to present) as well as reasonably foreseeable future actions (i.e., those actions that are reasonably foreseeable given their adoption into the City of Maryland Heights or City of Chesterfield long range plans and/or their preliminary planning/engineering or commitment to funding).

The visual units were developed based upon general views associated with an area or the visual uniqueness of a specific area. Many of the units (viewsheds) overlap with the abutting unit, but for purpose of definition they have been divided by a significant landscape feature which may or may not create a complete visual barrier to the next area.

The visual units/viewsheds as defined for the study area are as follows:

- Riverport/Harrah's Casino complex development area including Earth City Expressway;
- Creve Coeur airport/MSD area;
- Creve Coeur Mill Road/MHE;
- Creve Coeur Lake area;
- River Valley/Page Avenue Mitigation lands area;
- Upper Creve Coeur Creek Valley area;
- Bonhomme Creek area; and
- Missouri River viewshed.

Table 4-14 summarizes visual impacts by past, present, and reasonably foreseeable actions. An assessment of visual impacts for each foreseeable action and its associated options is also provided for clarification and overall degree of potential impact.

Regulatory Action

There will be no significant effect of the No Action alternative. The SAMP alternative will, however, establish distinct buffers to sensitive natural areas which can reduce modifications of the visual landscape in certain specific areas.

4.12 Summary of Analysis of the Regulatory Alternatives

Each of the preceding sections have assessed the potential consequences of the regulatory alternatives under consideration, as well as the cumulative impacts of each of the past, present, and reasonably foreseeable future actions considered in this EIS. For each resource, this analysis consisted of the establishment of historical trends and the assessment of future impacts. Decisions about the future USACE Regulatory Program, however, must not be considered for each resource independently, but should be based on a fully integrated understanding of the future of the Howard Bend floodplain (in consideration of its existing condition and all reasonably foreseeable future projects). The purpose of this section is to present that integrated overview of the study area and evaluate the effectiveness of each of the regulatory alternatives in consideration of both the existing and future conditions.

Table 4-14. Summary of Impacts to Visual Resources Associated with Past, Present and Reasonably Foreseeable Future Actions

Action	Potentially Affected Viewsheds	Summary of Potential Impacts
Primary Action		
Alternative 1: Case by Case Permitting (No Action)		No distinguishable impact of alternative or visual environment.
Alternative 2: SAMP		SAMP provides buffers to sensitive natural resources which can reduce visual impact or preserve existing visual character of certain areas.
Past Actions	Riverport/Harrah's Casino complex including Earth City Expressway	Predominant visual impacts include conversion of open agricultural lands to commercial development supporting structures 1 to 12 stories in height, associated roadways, parking, levees, lighting, and commercial landscape. Earth City Expressway is widened, and Casino Drive elevated which dramatically changed/altered visual openness/expansiveness of the area including the ground line.
	Creve Coeur Airport/MSD	Minor visual impact included airport expansion of facilities and runways. Predominant visual impact was development of Page Avenue Extension and new Missouri River Bridge crossing of the Page Avenue Extension; significantly modified/severed viewshed to south. Ground line at Page significantly elevated. Sportport lighting highly visible.
	Creve Coeur Mill Road/MHE	Significant changes to visual resources at southern terminus with overpass of Page Avenue Extension.
	Creve Coeur Lake Area	Significant impacts to visual environment at elevated Page Avenue Extension on structure in south end of the lake. Significant mitigation required as part of Page Avenue Extension because of 4(f)/6(f) impacts to CCLMP.
	River Valley/Page Avenue Extension Mitigation lands	Significant visual impacts to north with development of Page Avenue Extension and new Missouri River crossing. Significant mitigation by MODOT of lands east of River Valley and south of CCLMP to offset visual impacts to park. Mitigation has changed visual character of area by creating large expanse of open water (sedimentation basins) and conversion of agricultural fields to old fields.
	Upper Creve Coeur Creek Valley	No significant impact.
	Bonhomme Creek Area	No significant impact.
	Missouri River Viewshed	No significant impact.
Present Actions	Riverport/Harrah's complex including Earth City Expressway	Connection of Howard Bend Levee to Harrah's flood protection berm will modify land form and creates distinct landscape feature south of area viewshed.
	Creve Coeur Airport/MSD Area	Changes in visual character include development of an elevated MHE which severed the open landscape, and new Howard Bend levee which provides a distinct visual line in the landscape and further visually separates open areas from river.
	Creve Coeur Mill Road/MHE	Significant change in visual landscape in four-lane divided and elevated roadway severs open view, changes ground line, and is a dominant landscape feature given its width of right of way, and expanse of concrete. Elevated bridges over Fee Fee and Creve Coeur creeks impact visual continuity of riparian landscape.
	Creve Coeur Lake Area	No direct impacts to lake area visual unit in present actions other than increased vehicular traffic in area via Marine connection to MHE.
	River Valley/Page Avenue Extension Mitigation lands	Impacts include modified height and width of opening for Page Avenue Extension interchange with MHE creating more dominant land form. Howard Bend Levee creates dominant land form and distinct line in landscape separating Missouri River area from open and expansive landscape.
	Missouri River Viewshed	Predominant visual impacts include Howard Bend Levee which creates a distinct ground line and visual demarcation from tree masses abutting river viewshed. Significant visual impact of new tied arch bridge over Missouri River alters overall character of viewshed.
	Other Viewsheds	No significant impact.

Table 4-14. Summary of Impacts to Visual Resources Associated with Past, Present and Reasonably Foreseeable Future Actions

Action	Potentially Affected Viewsheds	Summary of Potential Impacts
Reasonably Foreseeable Future Actions		
1. Flank Levee System		
Alternative A Alternative B	Riverport/Harrah's, Creve Coeur Airport/MSD, and Creve Coeur Mill Rd/MHE	Flank levee construction will create distinct modification to ground line and loss of tree masses abutting Fee Fee and lower Creve Coeur creeks with earthen berm. Flank levees create distinct geometric shape in landscape.
	Other Viewsheds	No significant impact.
2. MHE (Options 1-5)	River Valley/Page Avenue Mitigation Lands	MHE to be located in 660-foot reserved transportation corridor. MHE right of way and four lanes of concrete create distinct visual line and visually severs landscape. Roadway approach berms elevate/modify land form at south end of viewshed. Distinct changes in visual landscape.
	Upper Creve Coeur Creek Valley	Options 1-5 vary in visual impact. Overall significant changes in visual character include four-lane roadway elevated on concrete structure; potential loss of residential/commercial buildings in visual landscape.
	Other Viewsheds	No significant impact.
3. Baxter Road Extension (Options 1-2)	Bonhomme Creek River Valley/Page Mitigation	Visual impact to Bonhomme Creek area by elevated roadway. Creates distinct visual line in landscape. Option 2 extends to MHE corridor; moderate visual impact along base of bluff; utilizes previously impacted corridor (i.e., Paper Street). Potential impact to 4(f)/6(f) mitigation lands with the intersection with reserved corridor; modifies line and character of this area (see Figure 4-1, Transportation Network with Reasonably Foreseeable Actions).
	Other Viewsheds	No significant impact.
4. Hog Hollow Road Relocation	River Valley/Page Avenue Extension	Low visual impact of Hog Hollow Road east of Missouri American Water's Central Plant.
5. MSD Plant Expansion	Creve Coeur Airport/MSD	Additional structures, treatment expansion changes land form and visual character moderately.
	Creve Coeur Mill Road/MHE	Moderate indirect impact; portion of plant expansion visible to viewshed.
6. Land Use Plan Development		
Scenario 1: Interim Condition Scenario 2: Ultimate Condition	Riverport/Harrah's	Continued build out of Riverport/Harrah's will have moderate impact on visual character of area as remaining undeveloped ground is built. Visually denser condition; less space between existing structures.
	Creve Coeur Airport/MSD Creve Coeur Mill Road/MHE Creve Coeur Lake Area River Valley/Page Avenue Mitigation Lands Missouri River Viewshed	Sight lines reduced by buildings of varying height and density. Viewsheds convert from predominant open/expansive views to more urban characterized by vertical elements of structures, ground line modifications, texture and surface of landscape dramatically altered. Open agricultural landscape replaced by architectural features. Creve Coeur Airport/MSD and Creve Coeur Mill Road/MHE character modified by vertical architectural elements, interspersed with open space for stormwater management. Visual character of area is less dense than Option 2. Potential indirect impacts to Creve Coeur Lake area viewshed depending upon height of structures in surrounding environs. Moderate impact to Missouri River viewshed; predominant views to development areas buffered by tree masses and proximity to views from Missouri River.
	Upper Creve Coeur Creek Valley Bonhomme Creek Area	No significant impact.
7. Terra Vista Estates 8. Mill Ridge Villas	Upper Creve Coeur Creek Valley	Moderate visual impact to green space. Tree masses replaced by residential structures; streets, lighting, ground line significantly modified; views shortened.
9. Creve Coeur Lake Dredging	Creve Coeur Lake Area	Impacts associated with loss of existing tree mass.

4.12.1 Integrated Overview of the Howard Bend Study Area

The Howard Bend study area is an expansive area of the Missouri River floodplain that at one time provided a rich mosaic of bottomland forest, wetland, and open water habitats. A long history of agricultural use, however, has resulted in significant and long lasting effects on the function and value of the study area for wildlife (due to land cover alteration) and for flood storage (due to levee construction). In recent years (i.e., since 1985), the Howard Bend floodplain has demonstrated a notable and increasing shift in character as a result of the construction of large-scale developments (i.e., Riverport and Harrah's) and a significant expansion of the transportation infrastructure (e.g., Page Avenue and MHE). These improvements, coupled with a significant increase in flood protection due to the construction of the 500-year primary levee and the adoption of a Future Land Use Plan for the area by the City of Maryland Heights, and the stated intentions of the HBLD to construct an interior flank levee system, have set the floodplain on a course that will entail a continued alteration of its character to that of developed uses. In total, approximately 2,100 acres of additional lands may be subject to future development. Altered environmental conditions as a result of these actions will create a future study area that will be characterized by increased traffic, altered visual landscapes, and increased noise.

In spite of this prevailing trend towards future land development, the Howard Bend study area also entails the integration of land areas dedicated to open space, wildlife habitat, and recreation. CCLMP, coupled with the open lands of the Missouri Riverfront, account for approximately 4,200 acres that will remain as undeveloped wildlife habitat or that will be available for recreational uses. These areas will provide for sustained recreational use, the maintenance of wildlife habitat, and continued wetland support functions. Due to the proximity of these areas to existing and future transportation facilities, these areas will be subject to on-going visual and noise impacts.

4.12.2 Evaluation of the Regulatory Action Alternatives

A synopsis of the relative effects (consequences, including benefits) of each regulatory alternative under consideration are summarized in Table 4-15. In summary, the regulatory actions under consideration represent differences in the policy and process by which potential projects affecting waters of the United States are evaluated for issuance of CWA Section 404 permits (see Section 2.0). Additionally, because the very intent and purpose of Section 404 of the CWA is to regulate waters of the United States, the resources that may be most affected by a change in the program are expectedly those that have some relationship to wetlands, aquatic ecosystems, or water quality. As presented in Table 4-15, these resources include land use, soils, land cover, wildlife, sensitive species, wetlands, surface water resources, and groundwater resources. However, other laws with which the USACE must comply in the administration of its Regulatory Program include the Endangered Species Act, the National Historic Preservation Act, Fish and Wildlife Coordination Act, CAAA, Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), RCRA FPPA, Noise Control Act, and Bald Eagle Protection Act. As such, the USACE Regulatory Program will continue its required consideration of such issues as threatened and endangered species, cultural resources, air quality, noise, special wastes, and prime and unique farmlands. Primary differences in the consequences of each of the regulatory alternatives include the following:

- **Wetland Preservation** – The SAMP alternative expands on the preservation of existing wetlands over that which exists currently. At present, a total of 153 acres of wetlands are preserved with CCLMP and other mitigation lands as compared to a total of 483 acres of wetlands that would be preserved under the SAMP alternative.

- **Comprehensive and Consolidated Mitigation** – Potential unavoidable adverse impacts to waters of the United States will be mitigated under each alternative. However, the SAMP alternative will ensure a more cohesive approach that will ensure that mitigation will take place within the study area (Case-by-Case Permitting has resulted in historical net losses within the study area). Additionally, the establishment of a wetland and stream bank(s) will ensure that the mitigation wetlands and streams are functional and well managed.

- **Water Quality Protection and Enhancement** – The SAMP alternative provides features that further ensure the protection and enhancement of water quality. These measures include the mitigative measures discussed above as well as added requirements for the establishment of vegetation buffers that will reduce erosion and pollutant loading with receiving waters.

  Additionally, the preservation of wetland habitats (under each alternative, but expanded upon by the SAMP) will also provide benefits related to protection of groundwater resources (filtering function of recharge zones).

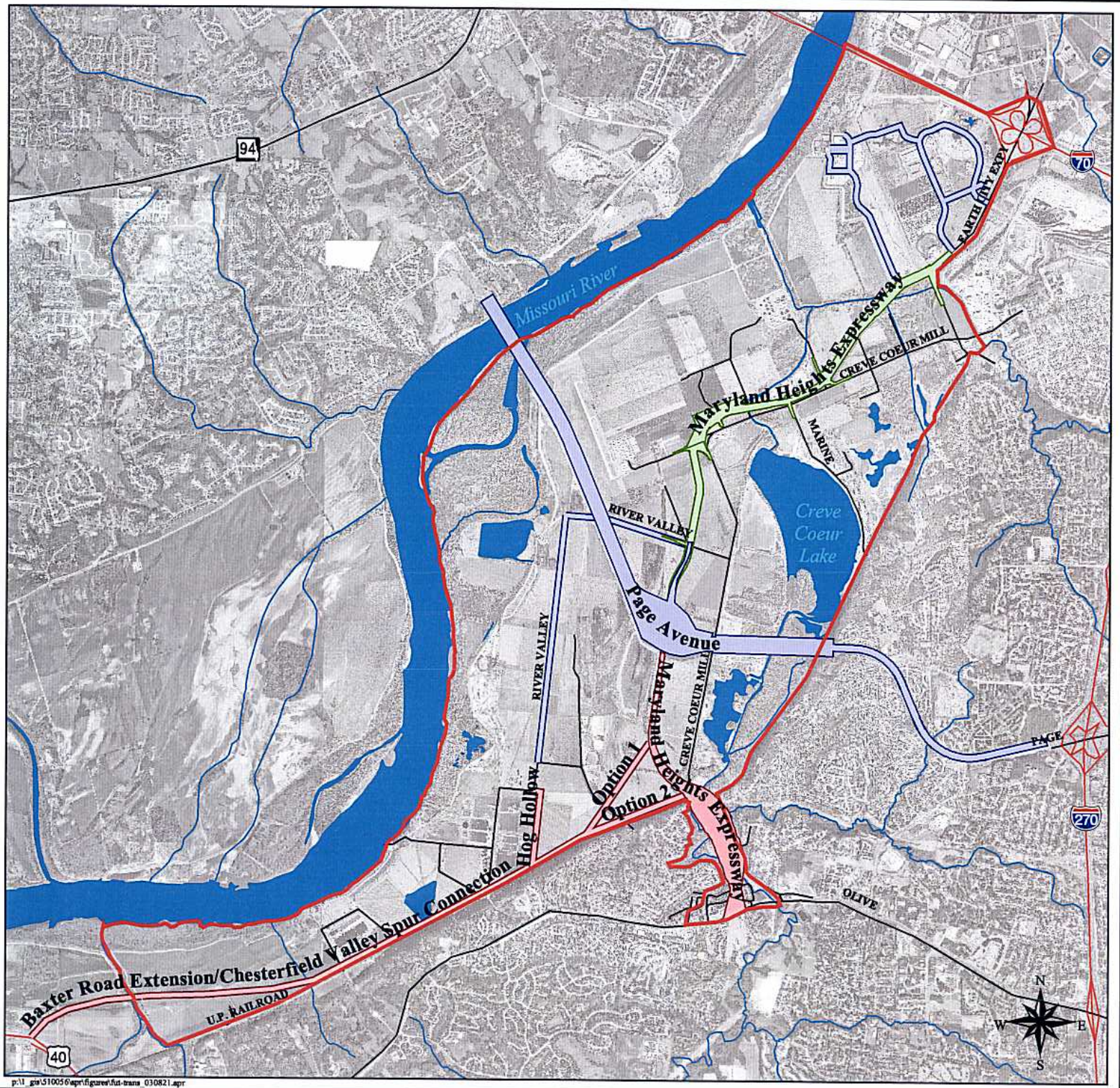
- **Wildlife Habitat Enhancement and Preservation** – The preservation and creation of wetland habitats and vegetative buffers in conjunction with the SAMP will provide added benefit to the wildlife and sensitive species within the study area by a more comprehensive approach to threatened and endangered species coordination, by increasing available habitats and improving habitat connectivity.

Table 4-15. Summary of Impacts of the Regulatory Alternatives

Resource Area	Category	
	Case by Case Permitting (No Action)	SAMP)
Social/Economic Characteristics	No Impact*	No Impact
Land Use	No Impact	Increased degree of habitat preservation Requires dedication of land for wetland bank creation Need for vegetative buffers
4(f)/6(f) Lands	No Impact	No Impact
Cultural Resources	Requires coordination with SHPO for compliance with Section 106 NHPA	Requires coordination with SHPO for compliance with Section 106 NHPA
Air Quality	No Impact	No Impact
Noise	No Impact	No Impact
Mineral Resources/Soils	Requirements for erosion control to be issued as conditions of permit	Requirements for erosion control to be issued as conditions of permit More comprehensive BMPs for erosion control can be utilized More extensive buffer requirements will increase protection of receiving waters

Table 4-15. Summary of Impacts of the Regulatory Alternatives

Resource Area	Category	
	Case by Case Permitting (No Action)	SAMP)
Land Cover	Management of remaining natural resources within CCLMP only; limited or little management of other areas Mitigation for project impacts may be in small isolated areas and out of study area.	Comprehensive management of remaining natural resources using buffers, tree mitigation and wetland mitigation policies Mitigation (wetland, tree) will be required to occur within the study area
Wildlife	Management of remaining natural resources within CCLMP only; limited or little management of other areas	Comprehensive management of remaining natural resources using buffers, tree mitigation and wetland mitigation policies Ensures greater habitat availability and connectivity in the future
Sensitive Species	Management of remaining natural resources within CCLMP only; limited or little management of other areas	Comprehensive management of remaining natural resources using buffers, tree mitigation, and wetland mitigation policies Ensures greater habitat availability and connectivity in the future
Wetlands	Protection of 153 acres of wetlands in CCLMP Isolated project-specific wetland mitigation Potential loss from the Howard Bend ecosystem	Protection of 483 acres of wetlands in CCLMP Comprehensive and consolidated approach to wetland mitigation Wetland mitigation to occur within the Howard Bend ecosystem
Surface Water Resources	Isolated project-specific stream mitigation Potential loss from the Howard Bend ecosystem	Comprehensive and consolidated approach to stream mitigation Stream mitigation to occur within the Howard Bend ecosystem
Ground Water Resources	No Impact	Greater degree of protection of groundwater recharge areas (wetlands)
Floodplains	No Impact	No Impact
Agricultural Resources	No Impact	No Impact
Special Waste	No Impact	No Impact
Visual Environment	Incremental degradation of visual environment due to reduced need for buffers, reduced level of comprehensive land planning.	Improved visual environment due to the use of landscape buffers around sensitive natural resources including protected wetlands, mitigation acres, agricultural fields, and golf courses. Greater opportunity for comprehensive land planning in environmentally sensitive resources.
* "No Effect" relates to the effects of the regulatory alternative rather than other non-Federal actions that may occur in the study area. Such actions in the study area may have an effect on the environment in such a way as to impact or alter the listed resources.		



U.S. Army Corps of Engineers
St. Louis District

Howard Bend Floodplain EIS

Legend

- Past Transportation Project
- Present Transportation Project
- Future Transportation Project

- Study Area
- Road
- Interstate Hwy
- US Hwy
- State Hwy

1:60000

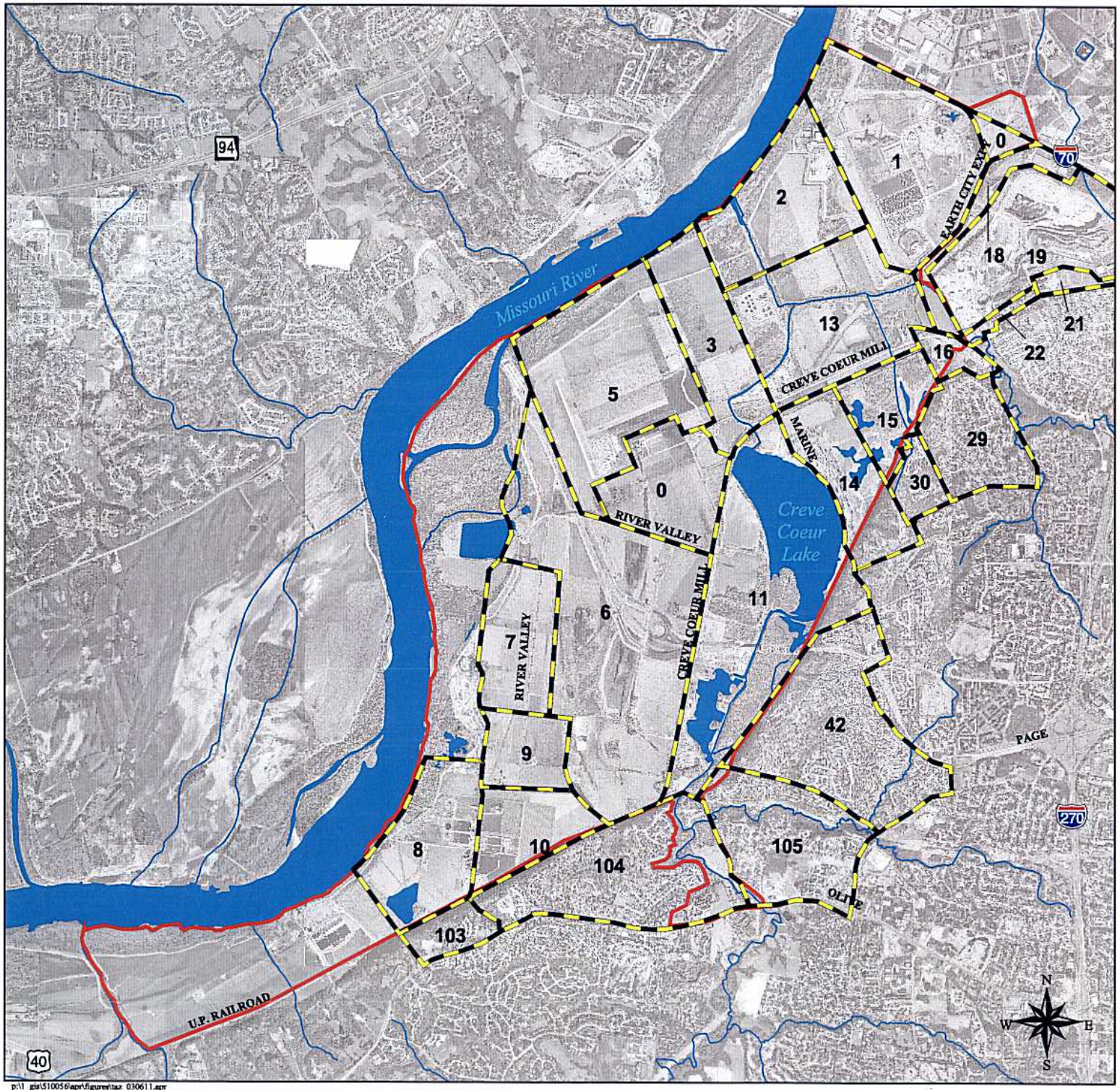
0.5 0 0.5 1 Miles

September 16, 2003

Figure 4-1
Transportation Network with Reasonably Foreseeable Actions

MACTEC, Inc.

p:\l_gis\510056\apr\figures\fut-trans_030821.apr



U.S. Army Corps of Engineers
St. Louis District

Howard Bend Floodplain EIS

Legend

Transportation Analysis Zone

Study Area
Interstate Hwy
US Hwy
State Hwy

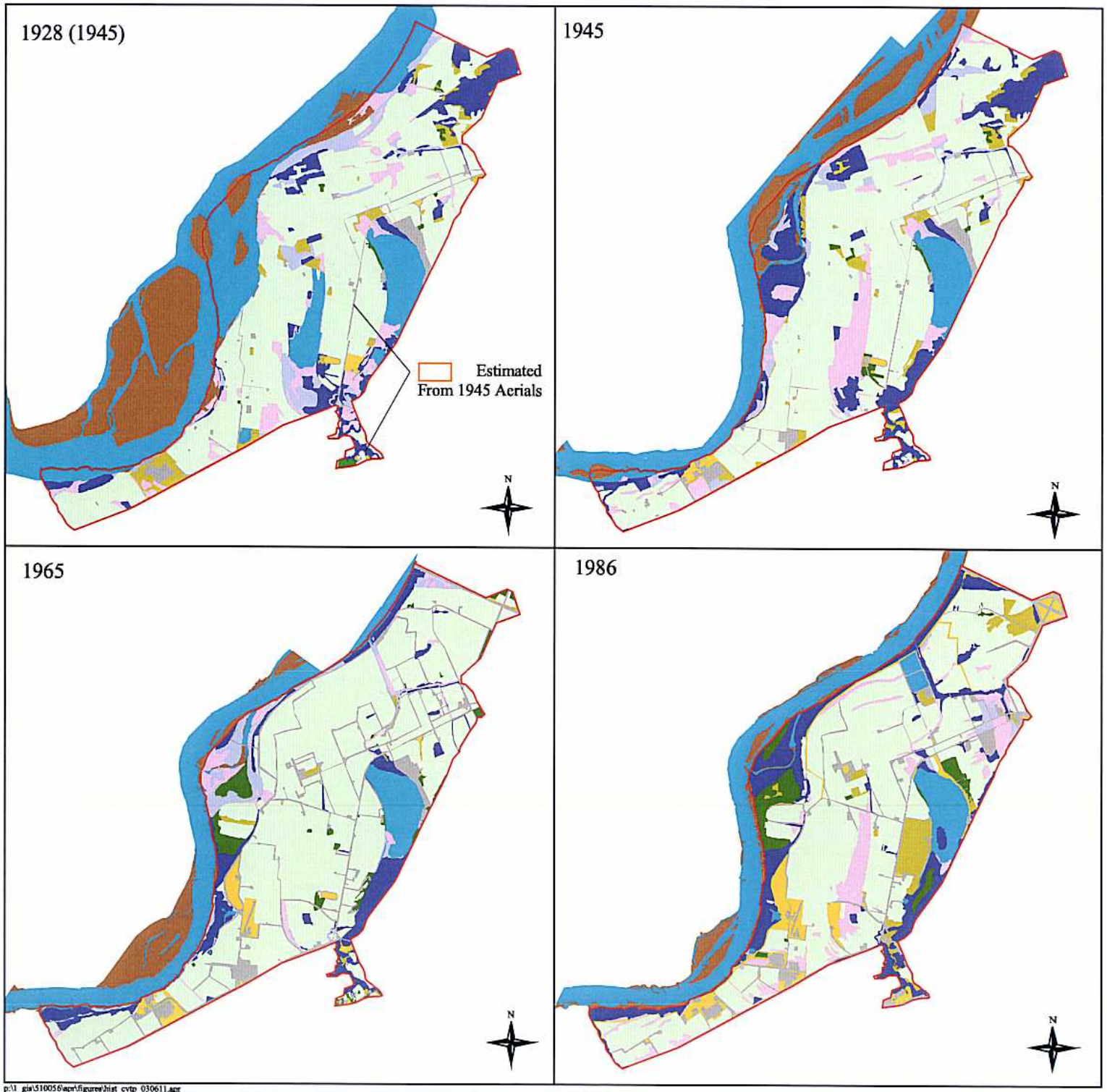
1:60000
0.5 0 0.5 1 Miles

June 11, 2003

Figure 4-2
Traffic Analysis Zones

MACTEC, Inc.

p:\1_gis\510056\aprr\figures\taz_030611.apr



U.S. Army Corps of Engineers
St. Louis District

Howard Bend Floodplain EIS

Legend

- Study Area

Cover-Types Within Study Area

- Active Farmfield
- Deciduous Forest
- Grassland
- Mud/Sand
- Oldfield
- Emergent Wetland
- Forested Wetland
- Scrub Shrub Wetland
- Tree Farm
- Urban/Developed
- Water

Cover-Types Outside Study Area

- Water
- Land

1:120000

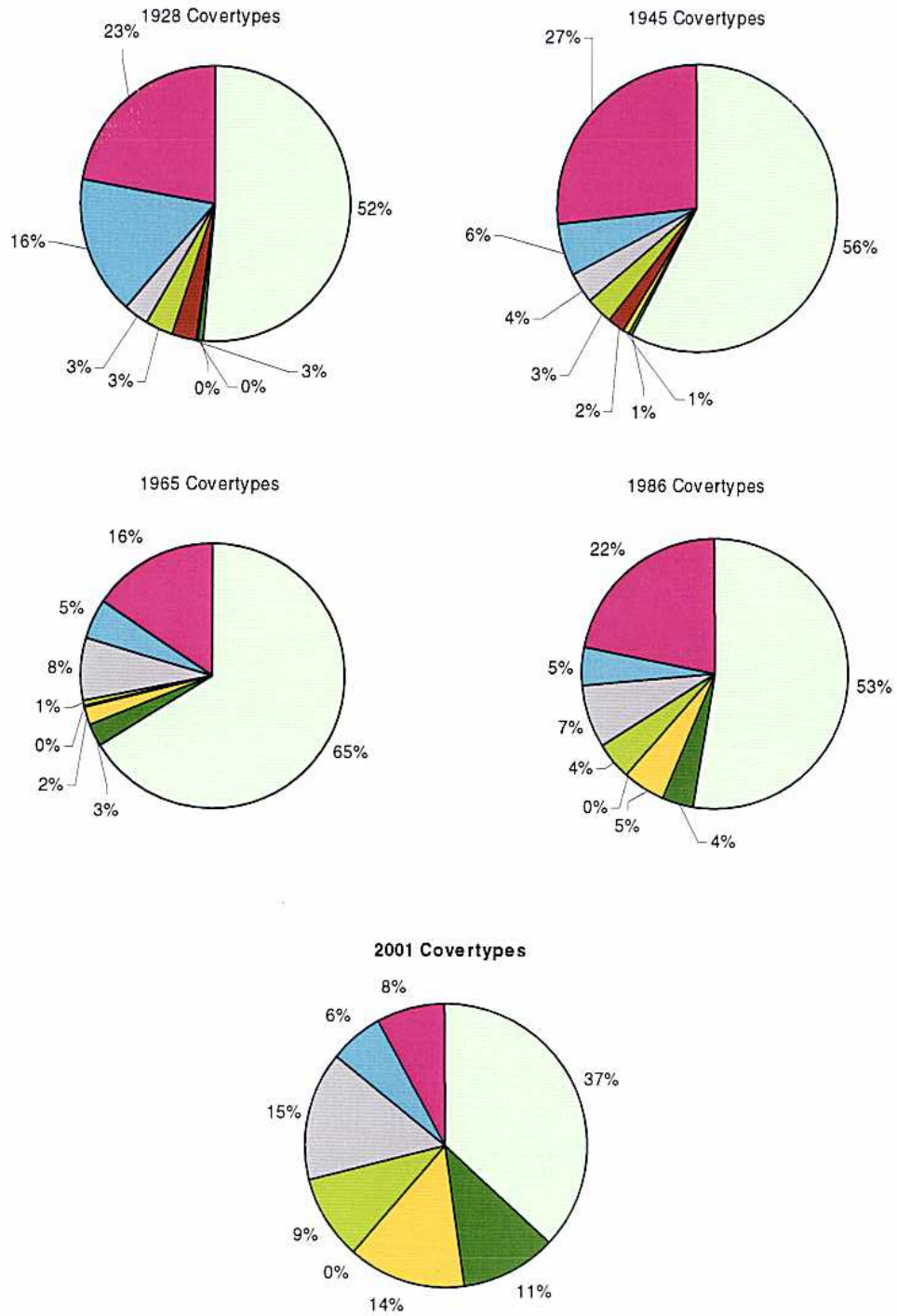
1 0 1 2 Miles

June 12, 2003

Figure 4-3
Historic Cover Types
within the
Howard Bend Area

MACTEC, Inc.

p:\1_gis\510056\apr\figures\hist_cvtp_030611.apr



U.S. Army Corps of Engineers
St. Louis District

Howard Bend Floodplain EIS

Legend

- Active Farmland
- Deciduous Forest
- Grassland
- Mud/Sand
- Oldfield
- Urban/Developed
- Water
- Wetland

June 12, 2003

Figure 4-4
Historic Land Cover

MACTEC, Inc.

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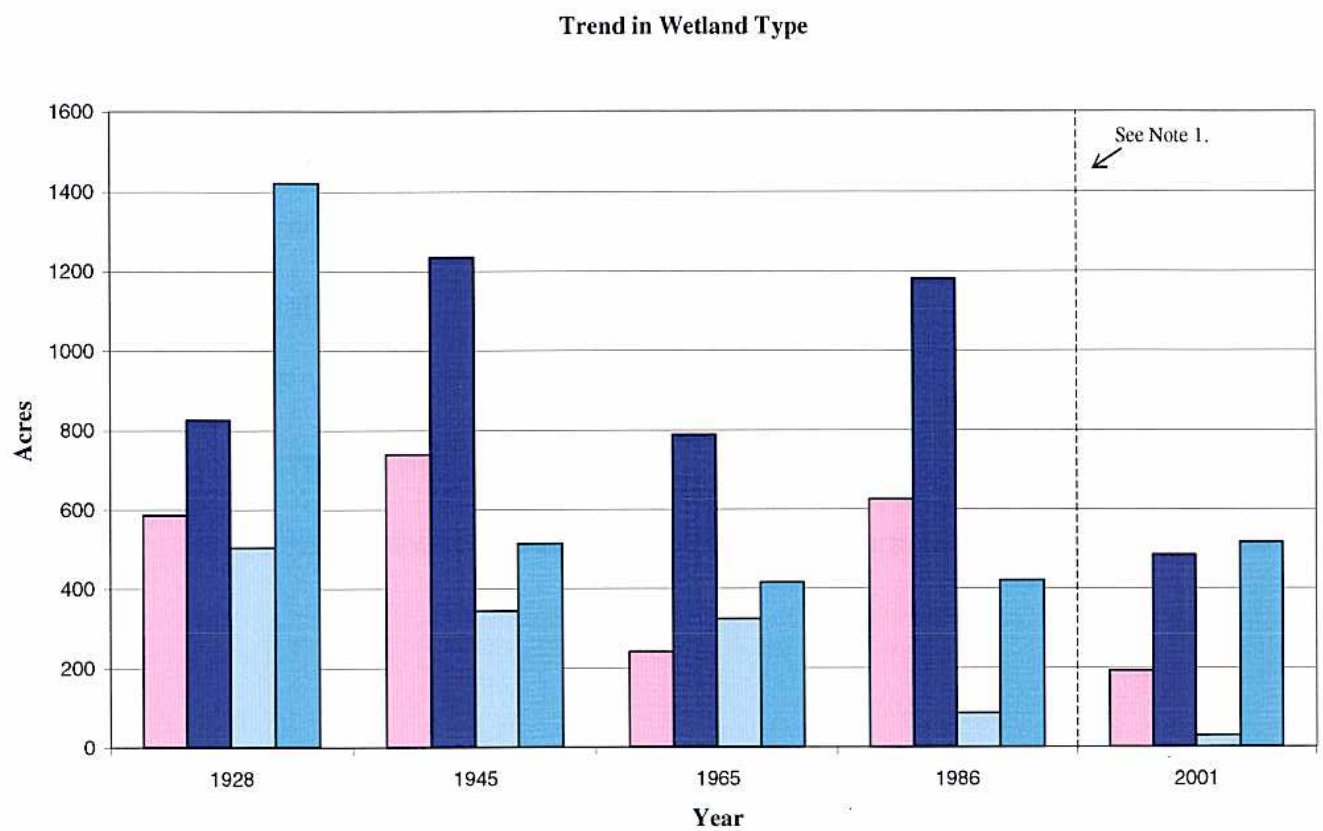

Note 1: Wetlands From 1928 - 1986 based on aerial photo interpretation. Wetlands from 2001 based on previously accepted wetland field delineations, NRCS certifications and NRCS slide review.
Note 2: Additional categories for 2001 were combined as follows: Emergent included PEM//PEM/PSS, PEM//PSS, PEM/PSS and Farmed Wetlands. Forested included PFO/PSS and WW. Scrub Shrub included PEM/PSS/PFO.

U.S. Army Corps of Engineers
St. Louis District

Howard Bend Floodplain EIS

Legend

Emergent
Forested
Scrub Shrub
Water

August 20, 2003

Figure 4-5
Trend in Wetland Type

MACTEC, Inc.

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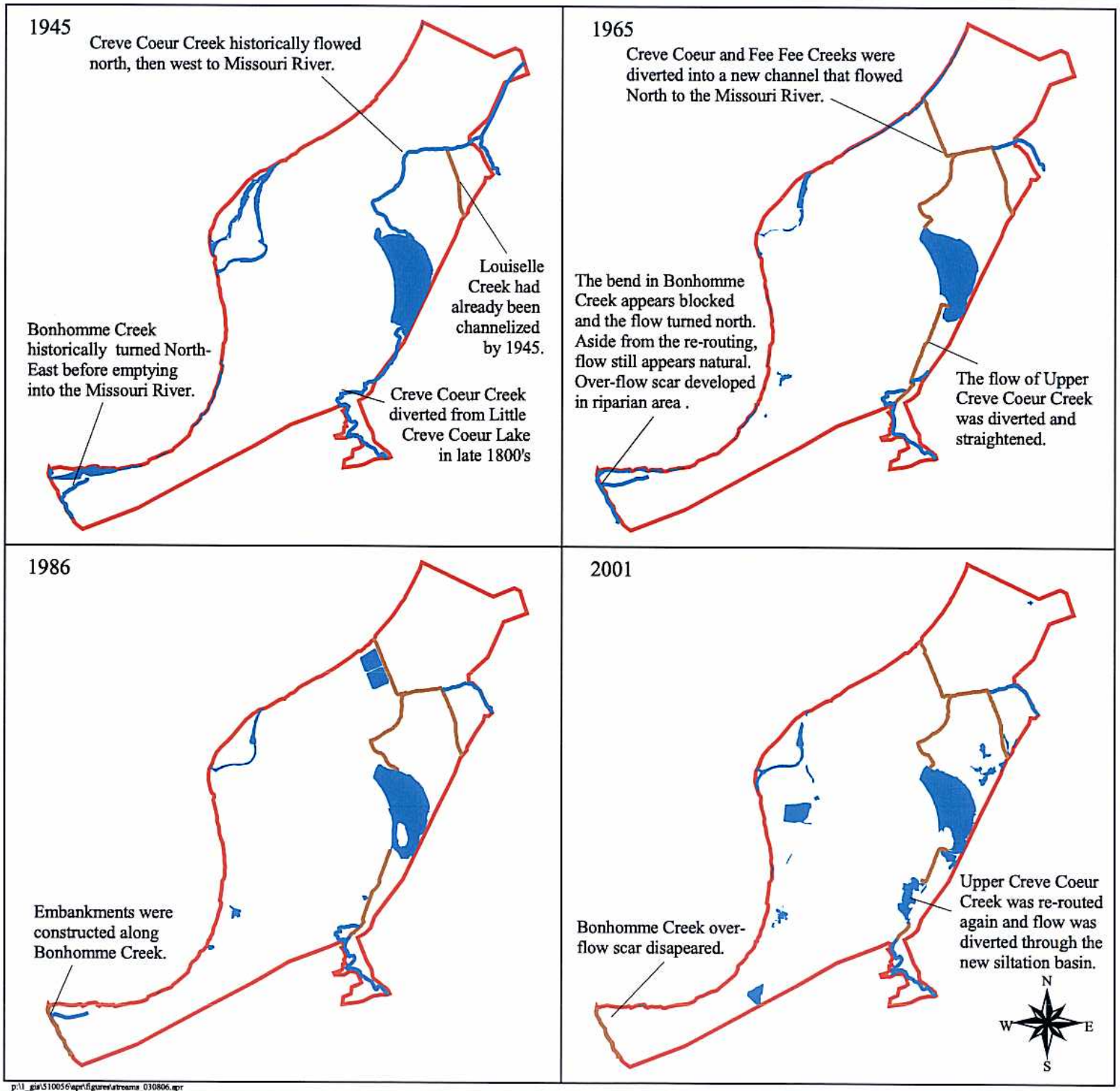

U.S. Army Corps of Engineers
St. Louis District

Howard Bend Floodplain EIS

Legend

- Natural Stream
- Channelized Stream
- Study Area
- Open Water

1:120000

1 0 1 2 Miles

September 11, 2003

Figure 4-6
Stream Channelization within the Howard Bend Area

MACTEC, Inc.

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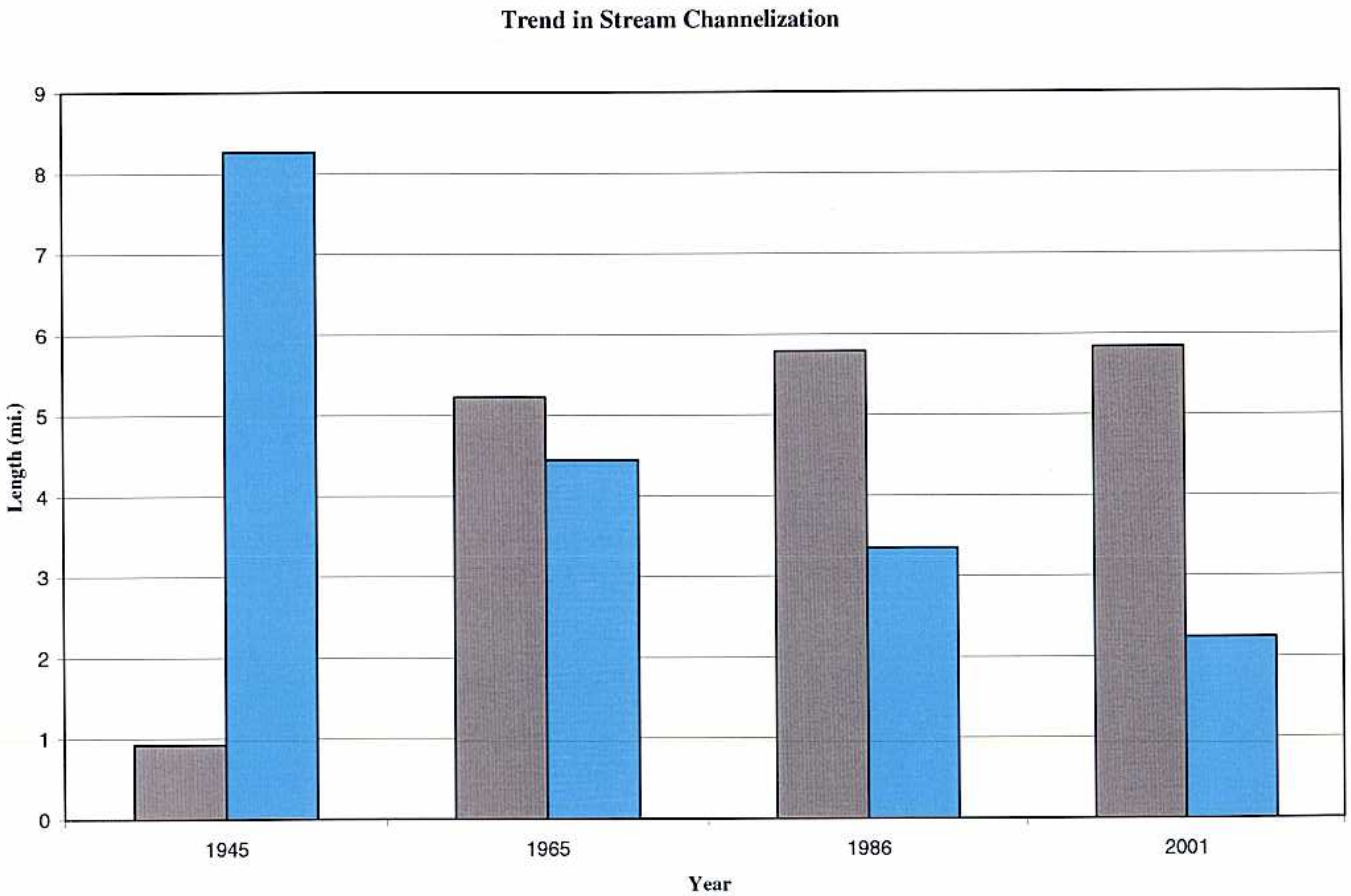


U.S. Army Corps of Engineers
St. Louis District

Howard Bend Floodplain EIS

Legend

Channel

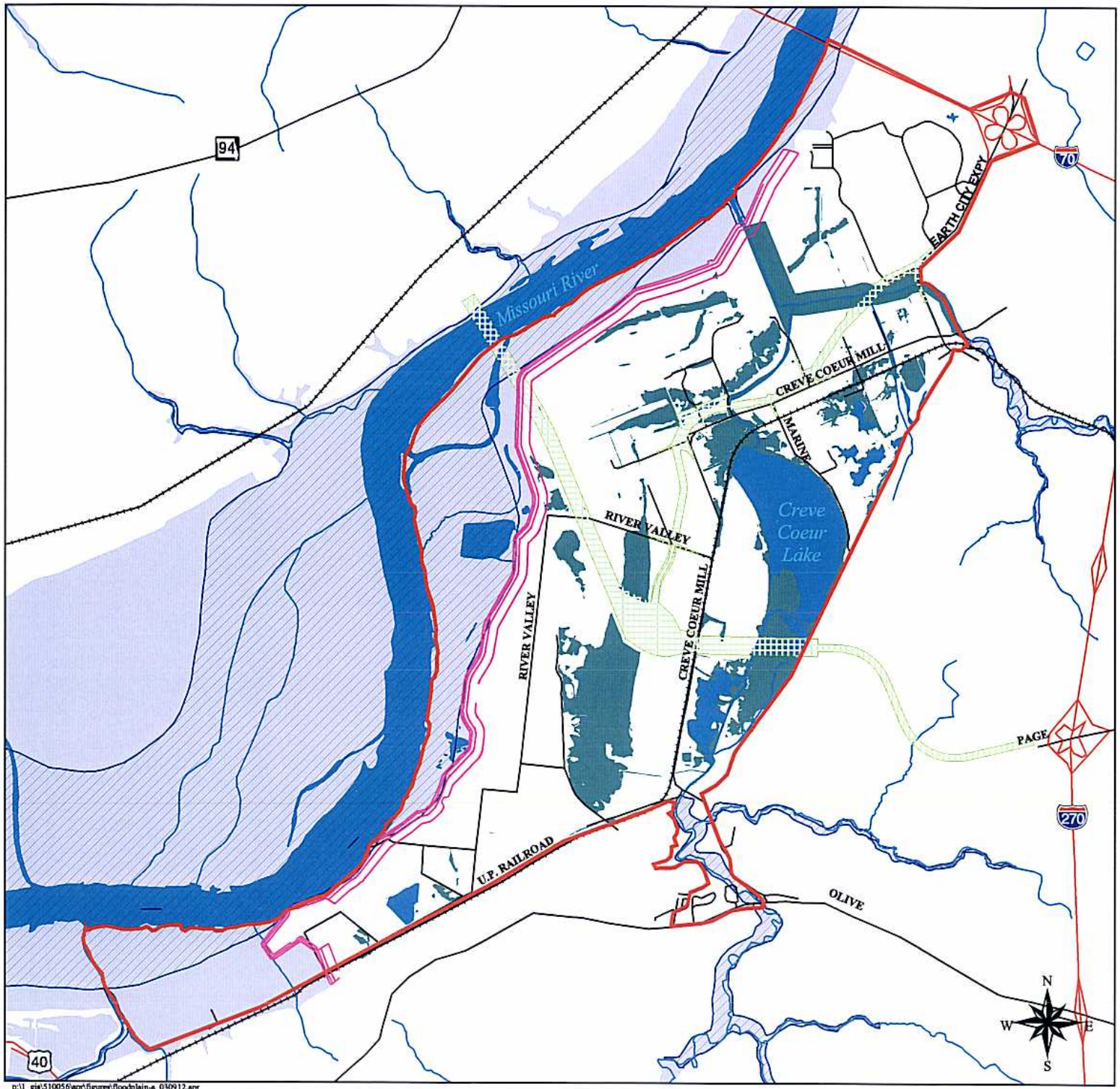
Natural

June 12, 2003

Figure 4-7
Trend in
Stream Channelization

MACTEC, Inc.

p:\1_gis\510056\apr\figures\stream_graph_030612.apr



U.S. Army Corps of Engineers
St. Louis District

Howard Bend Floodplain EIS

Legend

- New 500 Year Levee
- Remaining FEMA Floodway
- Flank Alt. A Resultant 1% Probability Floodplain
- Remaining FEMA 1% Probability Floodplain
- Existing ROW
- Study Area
- Interstate Hwy
- US Hwy
- State Hwy
- Road
- Railroad
- Stream
- Water

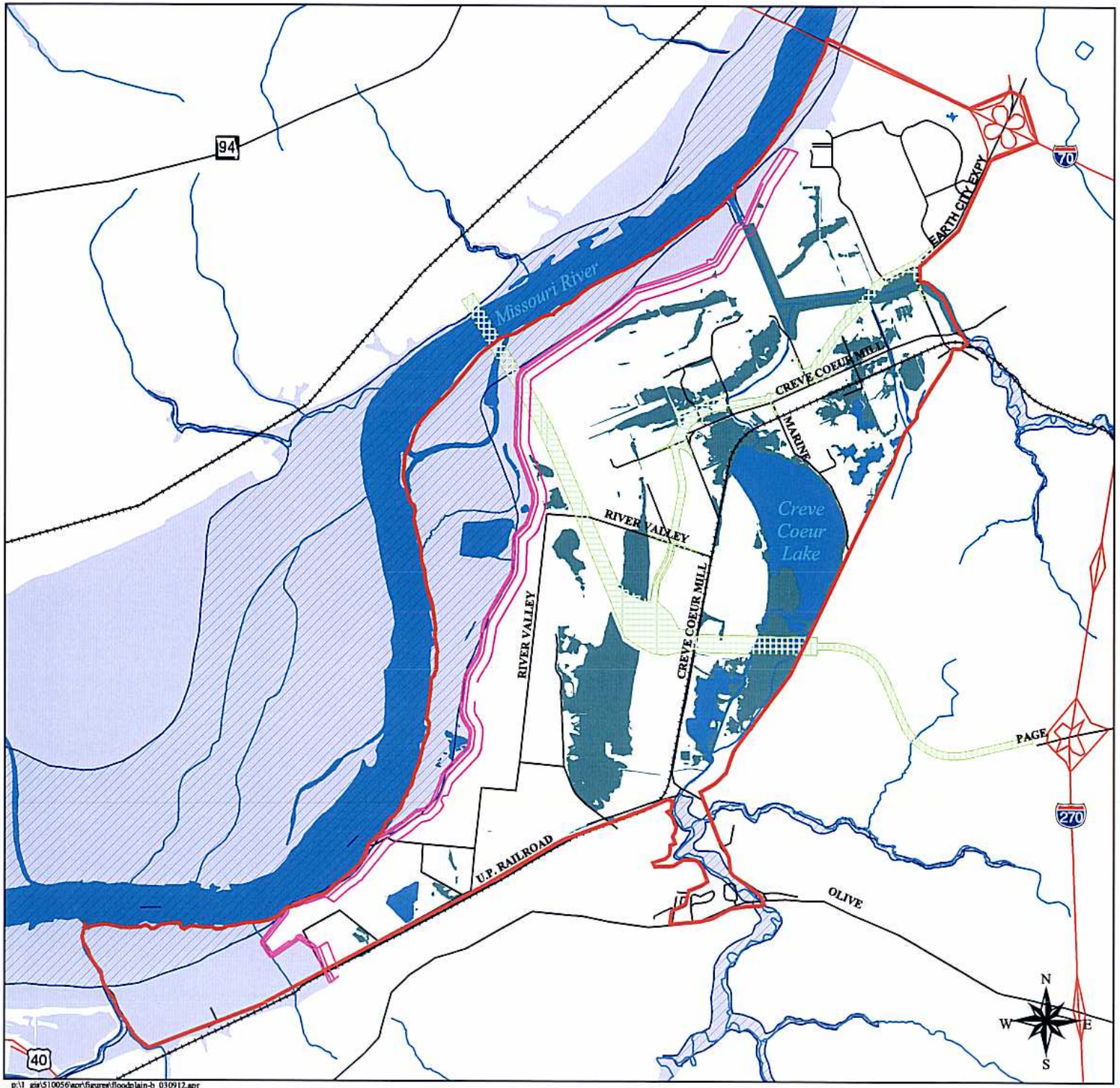
1:60000

0.5 0 0.5 1 Miles

September 12, 2003

Figure 4-8
Howard Bend Area
Floodplain/Floodway with
Future Flank Levee Alternative A

MACTEC, Inc.



U.S. Army Corps of Engineers
St. Louis District

Howard Bend Floodplain EIS

Legend

- New 500 Year Levee
- Remaining FEMA Floodway
- Flank Alt. B Resultant 1% Probability Floodplain
- Remaining FEMA 1% Probability Floodplain
- Existing ROW
- Study Area
- Interstate Hwy
- US Hwy
- State Hwy
- Road
- Railroad
- Stream
- Water

1:60000

0.5 0 0.5 1 Miles

September 12, 2003

Figure 4-9
Howard Bend Area
Floodplain/Floodway with
Future Flank Levee Alternative B

MACTEC, Inc.

5.0 Short-Term Impacts Versus Long-Term Productivity

The short- and long-term effects of the proposed action are to alter the process by which the USACE implements its Regulatory Program within the Howard Bend study area. This will result in certain changes and limitations in the manner in which a Section 404 permit is granted, the areas that are unavailable for future development (i.e., areas subject to preservation will be precluded to development under the SAMP), the need to incorporate certain vegetated buffers, and the need to mitigate for unavoidable adverse impacts (wetlands, streams, trees) at specifically designated sites within the study area (see Section 2.1.2).

Such changes in the regulation of natural resources within the study area are made in view of the maintenance and enhancement of the long-term productivity of the environment. Many lands within the study area are currently subject to long-term preservation as they are dedicated parts of CCLMP (including mitigation lands), and are subject to restricted permissible uses in accordance with the City of Maryland Heights' Future Land Use Plan (e.g., Missouri Riverfront area). The implementation of the SAMP alternative builds on this existing land preservation, increasing their protection, and ensuring that natural resources of value are protected and mitigated effectively in the future.

6.0 Irreversible and Irretrievable Commitments of Resources

The No Action alternative would result in a loss of planning related study dollar and time investments. The proposed action (SAMP) will require the expenditure of human and fiscal resources. Personnel and fiscal expenditures are considered an irreversible commitment, and will be required in conjunction with the need to develop and administer the SAMP and establish the needed mitigation bank(s) within the study area.

7.0 Permits

The nature of the proposed action is one that relates to the policy and procedures of the USACE Regulatory Program within the Howard Bend study area. As such, no specific permits are required to implement the selected alternative. Future actions taken within the limits of the study area shall be required to follow all appropriate procedures to obtain applicable permits from Federal, state, and local agencies including the USACE, MDNR, St. Louis County, the City of Maryland Heights, and the City of Chesterfield.

In most cases, potential unavoidable adverse impacts to waters of the United States will qualify for authorization under the provisions of the General Permit issued for the SAMP area.

Potential actions having impacts that exceed the limits prescribed under the General Permit shall require processing as an Individual Permit and shall require Public Notice Review.

8.0 List of Preparers

Preparers	Qualifications	Primary Responsibilities
U.S. Army Corps of Engineers, St. Louis District		
Danny McClendon	MS Biology; 17 years experience in regulatory compliance, project management, and environmental impact analysis.	Project Manager, Senior Review, Coordination
MACTEC Engineering and Consulting, Inc.		
Michael Brazier	MS Engineering, BS Engineering; 33 years of direct experience in regulatory compliance and environmental engineering design/management and project management.	Wetlands, Floodplains, Alternatives, Surface Water
William Elzinga	MS Biology, BS Biology; 19 years of experience in environmental impact assessment, terrestrial, and wetland ecology.	Environmental Lead
Scott George	BS Geology; 22 years of professional experience in environmental investigations including wetland delineation and geological assessments.	Wetlands, Water Quality and Geology
Linda Hart	BS Business/Biology; 17 years of professional experience as a manager with professional responsibility in technical writing, editing, and document production for environmental documents.	Technical Editor and Document Coordinator
Britton Marchese	MS Environmental Sciences; 5 years of experience as an Environmental Scientist and technical writer and editor.	Socioeconomics, Special Waste, Cultural Resources
Bruce McNitt	BLA Landscape Architecture; 25 years experience in project management of multidisciplinary efforts.	Project Manager, Visual Environment, Transportation, Document Review
Brian Mueller	BS Fisheries/Limnology; 15 years of professional experience in fisheries, GIS, and impact analysis.	GIS Coordinator
Richard Skinker	BS Fisheries and Wildlife; 7 years of professional experience in natural resource damage assessments, aquatic ecology, plant taxonomy, and wetland investigations.	Wetland Scientist, Wetlands, Threatened and Endangered Species
Chris Tedder	B.S. Geology; 14 years of professional experience in the geotechnical evaluation of surface and subsurface conditions and in conducting environmental sampling and site evaluations.	Special Waste
Eric Westhus	MS Biology, BS Biology; 2 years of professional experience in Ecology and GIS.	GIS Support

Preparers	Qualifications	Primary Responsibilities
Blane Wood	B.S. Operations Management; 12 years professional experience, specializing in compliance auditing, air quality permitting and the development and implementation of complex regulatory compliance sampling protocols.	Air Quality
Crawford, Bunte, Brammeier		
Doug Shatto	B.S. Civil Engineering; 17 years of professional experience in conducting traffic impact studies, transportation planning and travel demand modeling (computerized traffic forecasting), signal system optimization and parking studies.	Traffic Analysis
American Resources Group		
Cally Lence	BS History; 4 years of professional experience in identification, classification and investigation of cultural resources.	Historian-Survey and Report Preparation
Mike McNerney	M.A. Anthropology, B.S. Business Administration; 31 years of professional experience in identification, classification and investigation of cultural resources.	Principal Investigator
Steve Titus	MA Anthropology, BA Education; 16 years of professional experience in identification, classification and investigation of cultural resources.	Co-Principal Investigator, Supervising Archeologist
White and Borgognoni		
Gail White	MS Historic Architecture, BS Architecture; 28 years of professional experience in historic architectural surveys and evaluations, historic preservation, and rehabilitation planning.	Architectural Historian-Survey and Report Preparation
Independent Technical Review		
Dennis Stevens, Hydraulics USACE St. Louis District		Hydrology and hydraulics
David Vigh, Planning USACE Mississippi Valley Division		EIS Review
Eddie Brooks, Hydrology USACE Mississippi Valley Division		EIS Review

9.0 List of Agencies, Organizations, and Persons Receiving the DEIS

Federal

Mr. Charles Scott
Field Supervisor
U.S. Fish and Wildlife Service
608 East Cherry St., Room 200
Columbia, MO 65201

Mr. Victor Blackburn
Natural Resources Conservation Service
1215 Fern Ridge Parkway, Suite 212
St. Louis, MO 63141

U.S. Environmental Protection Agency
Attn: Office of Federal Activities
NEPA Compliance Div
EIS Filing Section
Areil Rios Building (South Oval Lobby)
Mail Code 2252-A, Room 7241
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Washington, DC 20044

Mr. Ken Sessa
Regional Environmental Specialist
Federal Emergency Management Agency, Region VII
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Mr. Raymond Homer
Environmental Coordinator
U.S. Department of Agriculture
Rural Development
601 Business Loop 70 West
Parkade Center, Suite 235
Columbia, MO 65203

Mr. Dennis Potter, Soil Scientist, Liaison
Natural Resources Conservation Service
Parkade Center, Suite 250
601 Business Loop 70 West
Columbia, MO 65203

Renee Cook
District Conservationist
NRCS
160 St. Peters Centre Boulevard
St. Peters, Missouri 63376

Mr. Joe Cothern, NEPA Program Manager
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U.S. Environmental Protection Agency
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Kansas City, KS 66101

Mr. Roger Wiebusch
U.S. Office of Homeland Security
U.S. Coast Guard
1222 Spruce Street
St. Louis, MO 63103

Ms. Sandy Freeman
Environmental Officer
U.S. Department of Housing and Urban Development
St. Louis Office, Region VII
1222 Spruce Street
St. Louis, MO 63103-2836

Mr. Mike Madrigal
U.S. Dept. of Housing and Urban Development
Kansas City Regional Office
400 State Avenue
Kansas City, KS 66101

Mr. Donald Neumann
U.S. Department of Transportation
Federal Highway Administration
209 Adams Street
Jefferson City, MO 65101

The Honorable Jim Talent
Three CityPlace Drive
Suite 1020
St. Louis, Missouri 63141

The Honorable Christopher S. Bond
Federal Building, Room 140
339 Broadway
Cape Girardeau, MO 63701

State

Mr. George Reidel, Floodplain Management Manager
State Emergency Management Agency
P.O. Box 116
Jefferson City, MO 65102

Mr. Dale Schmutzler
State Emergency Management Agency
P.O. Box 116
Jefferson City, MO 65102

Ms. Janet Sternberg
Mr. Joe Bachant
Missouri Department of Conservation
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2901 West Truman Boulevard
Jefferson City, MO 65101

Mr. Steve Mahfood, Director
Mr. Tom Lange
Ms. Jane Beetem
Missouri Department of Natural Resources
P.O. Box 176
Jefferson City, MO 65102

Ms. Gayle Unruh
Mr. Barry Bergman
Mr. Rob Meade
Missouri Department of Transportation
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Jefferson City, MO 65102

Mr. Brian Weiler
Administrator of Aviation
Missouri Department of Transportation
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Jefferson City, MO 65102

Mr. Richard Gross, Director
Missouri Housing and Development Commission
3770 Broadway
Kansas City, MO 64111

Governor Robert Holden
Missouri Capitol Building
Room 218
P.O. Box 720
Jefferson City, MO 65102-0270

The Honorable John Loudon
District 7
State Capitol Building
Room 332
Jefferson City, MO 65101

Representative Jane Cunningham
District 86
Missouri House of Representatives
201 West Capitol Avenue
Room 313-1
Jefferson City, MO 65101

Representative Albert Joseph Liese
District 79
Missouri House of Representatives
201 West Capitol Avenue
Room 135BC
Jefferson City, MO 65101

Congressman Todd Akin
District 2
301 Sovereign Court Suite 201
St. Louis, MO 63100

Local

Mr. Mike Geisel, Director of Public Works/City Engineer
City of Chesterfield
690 Chesterfield Parkway West
Chesterfield, MO 63017

Mr. J. Wayne Oldroyd
Director of Community Planning and Development
City of Maryland Heights
212 Millwell
Maryland Heights, MO 63043

Mr. Charlie A. Dooley
St. Louis County Executive Commissioner
41 South Central Avenue
Clayton, MO 63105

Mr. Herb Liu
Mr. Gary Schutz
Mr. Chris Ludwig
Mr. Paul Andrews
St. Louis County Parks Department
41 South Central
Clayton, MO 63105

Mr. Steve Lauer, Director
St. Charles County Planning Department
201 North Second Street
Suite 420
St. Charles, MO 63301-2874

Mr. Bob Innis
Transportation Corridor Improvement
East-West Gateway Coordinating Council
10 Stadium Plaza
St. Louis, MO 63102-1714

Mayor John Nations
8 Baxter Lane
Chesterfield, MO 63017

Mr. Mike Dulle
St. Louis County Department of Highways and Traffic
121 South Meramec Avenue
St. Louis, MO 63105

Mayor Mike Moeller
11923 Wooded Valley Court
Maryland Heights, MO 63043

Others

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Jacobs Civil Inc.
501 N. Broadway
St. Louis, MO 63102

Dr. John H. Mullen, Executive Director,
Howard Bend Levee District
Creve Coeur Airport
3127 Creve Coeur Mill Road
St. Louis, MO 63146

Mr. Daniel Human
Husch & Eppenberger, LLC
231 South Bemiston, 8th Floor
St. Louis, MO 63105-1914

Mr. Gene Rovack
Horner & Shifrin
5200 Oakland
St. Louis, Missouri 63146

St. Louis County Public Library
Bridgeton Trails Branch
3455 McKelvey Road
Bridgeton, Missouri 63044

St. Louis County Public Library
Thornhill Branch
12863 Willowyck Drive
St. Louis, Missouri 63141

10.0 Coordination

Coordination and communication has occurred with state and Federal agencies, the Cities of Chesterfield and Maryland Heights, USACE, HBLD, the St. Louis County Parks Department, interested citizens, and various interested parties and residents of the Howard Bend study area. A variety of means were utilized throughout the course of the EIS planning process to encourage and facilitate agency and public interaction and to receive input. These activities included public meetings, written correspondence, meetings with city officials, agency meetings, telephone conversations and field visits. In addition, an oral history was obtained from a long-time resident of the Howard Bend study area to provide additional background information as well as an historical overview.

10.1 Public Involvement

Public involvement for the Howard Bend EIS has occurred in a number of public forums throughout the EIS process. These forums have included a public meeting, two study area property owner meetings, and workshops in conjunction with the City of Maryland Heights' Howard Bend Future Land Use Plan planning process. In addition, presentations were made to the City of Maryland Heights' Planning Commission and periodic project updates were provided to elected officials in the City of Maryland Heights. The dates of public meetings are provided in Table 10-1.

Table 10-1. Howard Bend Public Meetings

Date	Forum
April 13, 2000	Public Scoping Meeting at the City of Maryland Heights Community Centre
January 17, 2001*	Howard Bend Property Owners Workshop
February 28, 2001*	Howard Bend Property Owners Workshop
April 11, 2001*	Howard Bend Property Owners Workshop
May 22, 2001	Planning and Zoning Commission Workshop
May 23, 2001*	Howard Bend Property Owners Workshop
July 25, 2001*	Howard Bend Property Owners Workshop

* Presentation of EIS features/methodologies held in conjunction with the City of Maryland Heights' Draft Land Use Plan.

The public informational meeting was held on April 13, 2000 at the Maryland Heights Community Centre from 4:00 p.m. until 8:00 p.m. The purpose of the meeting was to introduce the public to the project, discuss the purpose of the study and answer questions, and gather feedback. The meeting was advertised via a press release issued to local newspapers by the USACE as well as letters sent to the participating agencies and levee district members. The HBLD mailed meeting announcements to all of its members.

A concerted effort was made to thoroughly describe the requirements of the NEPA process and the purpose of this EIS. It was noted to the public and to agencies that this EIS will not reevaluate the Page Avenue Extension project, the Monarch-Chesterfield Levee project, the Riverport or Earth City Levees, or any other previously approved or permitted projects by the USACE located in the study area. However, it was conveyed that this EIS will take into account the cumulative and secondary impacts of past, present and reasonably foreseeable future

projects on the remaining natural resources within the study area. The study area was defined as the Missouri River floodplain between RMs 29.6 and 38.4 in St. Louis County (I-70 to the Monarch-Chesterfield Levee).

The primary action was defined as regulatory in nature. The No Action alternative would entail continuing to process Section 404 permit applications on a case-by-case basis. The second alternative would involve the development of a SAMP to address the cumulative and secondary impacts of future development in the area in an effort to protect or mitigate important aquatic resources due to permitted activities. Various past, present and reasonably foreseeable future actions and key environmental issues were also defined. Finally, the various phases of the EIS planning process were described.

Visual displays included environmental resource maps depicting the extent of the study area, detailed natural resources in the area and proposed future projects occurring within the study area. Given the complexity of this project, an effort was made to detail the various environmental issues that would be addressed. Specific information was provided regarding:

- 500-year levee construction;
- stormwater management;
- future development;
- proposed roadways;
- natural resource assessments;
- cultural resource assessments;
- floodplain; and
- floodway.

Additionally, the project team was introduced to the public, and the names and phone numbers were provided of team members to contact with additional information or concerns. Informational sheets and comment forms were distributed to meeting participants.

Approximately 65 people attended the meeting. Issues that were raised by the public included:

- Concern for flooding and backup of water when new roads are put into the Howard Bend area;
- The timing of construction of the various road projects; and
- Several land owners within the Howard Bend Levee District identified themselves as proponents of the proposed projects.

Various discussions were organized with Howard Bend property owners in conjunction with the formulation of the City of Maryland Heights' Land Use Plan. In addition, public meetings were held that included representatives from the City's Planning and Zoning Commission and interested citizens from the public. These meetings generally included an overview of the EIS process and how this process would interface with the Howard Bend Future Land Use Study. The dates of these meetings are provided in Table 10-1.

10.2 Public Hearing

A public hearing will be conducted in conjunction with the issuance of the Draft EIS. Advertising for the hearing will include public notices printed in local papers and a press release will be issued to inform the public of the hearing. The DEIS will be provided to public facilities including city halls, courthouses and libraries in and around the study area.

10.3 Agency Coordination

A variety of means were utilized throughout the course of the study to encourage and facilitate agency coordination. These included correspondence, phone conversations, and meetings. A number of formal meetings were held with agency representatives throughout the planning process in order to keep them apprised of the study progress and methodologies, and to solicit their formal input. Meetings were conducted in an interactive manner in order to encourage constructive comments and to obtain input regarding sensitive regulatory and natural resource issues.

The dates of various agency meetings conducted include the following:

- March 9, 2000 agency scoping meeting;
- June 8, 2000 agency meeting;
- May 20, 2002 USACE/agency field meeting;
- September 24, 2002 meeting with the USACE and the City of Maryland Heights;
- November 4, 2002 pre-agency meeting with the USACE and the City of Maryland Heights;
- November 6, 2002 agency meeting;
- December 18, 2002 meeting with the City of Chesterfield;
- February 10, 2003 meeting with St. Louis County Parks Department;
- February 25, 2003 meeting with St. Louis County Parks Department; and
- August 21, 2003 meeting with the City of Chesterfield.

Attendees varied slightly at each agency meeting. Below is a list of agencies in attendance at one or more of the agency meetings held:

- MDC;
- MDNR;
- MoDOT;
- USDA NRCS;
- USFWS;
- St. Louis County Parks Department;
- USACE; and
- State Emergency Management Agency.

Local representatives included:

- City of Chesterfield;
- City of Maryland Heights;
- St. Charles County;
- HBLD;
- The Missouri Coalition for the Environment; and
- The Webster Groves Nature Society.

The initial scoping meeting on March 9, 2000 was designed to encourage an exchange of information. Agencies were provided with an overview of the study area and the purpose of the EIS, the study methodologies utilized, and an outline of the project. Their feedback was requested regarding critical resource issues within the study area.

The USACE and various agencies held a field visit in May 2002. The purpose of this meeting was to discuss the use of Page Avenue Extension mitigation lands for borrow or sale to the HBLD as well as the use of mitigation land for conveyance or storage of stormwater and the

possible requirement of a Section 6(f) evaluation. Other issues discussed included MoDOT's expressed concern that borrow activities were affecting their efforts to establish mitigation wetlands.

A subsequent agency meeting in November 2002 provided information on the revised study area, which had been expanded in an effort to be consistent with the planning areas depicted in the Howard Bend Future Land Use Plan. In addition, a copy of the draft Purpose and Need, Project Alternatives, methodology for assessing cumulative impacts, and the status of inventorying and mapping resources was provided. The primary discussion topics included:

- Comments related to the affects of the 500-year levee on 100-year flood stage;
- The new USACE flood profiles;
- A request to expand the study area upstream;
- An overview of secondary and cumulative impact analyses;
- Permits and mitigation;
- CCLMP Master Plan process;
- Legal mandate for the project – condition "r" of the Page Avenue EIS;
- SAMP goals and features; and
- Cultural resources.

Following each agency meeting, the USACE received a number of comments from agency representatives. Issues raised via comments were addressed in subsequent meetings and/or were addressed in the EIS.

10.4 Other Coordination Meetings

Other coordination meetings were conducted throughout the process with the City of Chesterfield, St. Louis County Parks, HBLD, and various developers. The purpose of these meetings was to gather planning level information from these agencies and to provide an update of project activities. These meetings provided a forum whereby projects currently being proposed were incorporated into the planning process and were evaluated in the EIS. An example of this is the Baxter Road Extension, which was proposed by the City of Chesterfield subsequent to the planning stage of this EIS, but was added to the list of reasonably foreseeable future actions. Coordination with the Cities of Chesterfield and Maryland Heights regarding the transportation projects was vital to the development of alternatives.

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Appendix A

Correspondence
(in chronological order)

Appendix A

Correspondence
(in chronological order)

February 28, 2000

Regulatory Branch

Mr. Dave Christensen
Deputy Director of Public Works
City of Chesterfield
16052 Swingley Ridge Road
Chesterfield, Missouri 63017

Dear Mr. Christensen:

The purpose of this letter is to invite you to attend an Agency Scoping Meeting to be held on March 9, 2000, in Maryland Heights, Missouri. This Agency Scoping Meeting will kick-off the Environmental Impact Statement (EIS) being prepared for Missouri River Flood Plain Developments between Missouri River Miles 29.6 to 38.4, St. Louis County, Missouri. A Notice of Intent to prepare the draft EIS was published in the January 26, 2000 Federal Register. The St. Louis District, U.S. Army Corps of Engineers is the Federal sponsor for this EIS.

This Agency Scoping Meeting will be held from 10:00 a.m. to 2:00 p.m. at the Maryland Heights Community Centre, 2344 McKelvey Road, Maryland Heights, Missouri. This meeting will be the first opportunity for the various Federal, state, and local governmental and regulatory agencies to familiarize themselves with the scope of the EIS, the initial list of alternatives, time schedules, provide input, and to voice any concerns that should be addressed in the draft EIS.

Please contact Mr. Danny McClendon at (314) 331-8580 if you, or a representative from your agency, will be attending this meeting. It is important that you let Mr. McClendon know no later than March 6, 2000, if someone from your agency will be attending this meeting.

Sincerely,

Michael A. Brazier
Chief, Regulatory Branch

Michael A. Brazier
Chief, Regulatory Branch

February 28, 2000

Regulatory Branch

Mr. Steven Lauer
St. Charles County Planning Department
201 North 2nd Street, Room 420
St. Charles, Missouri 63301-2874

Dear Mr. Lauer:

The purpose of this letter is to invite you to attend an Agency Scoping Meeting to be held on March 9, 2000, in Maryland Heights, Missouri. This Agency Scoping Meeting will kick-off the Environmental Impact Statement (EIS) being prepared for Missouri River Flood Plain Developments between Missouri River Miles 29.6 to 38.4, St. Louis County, Missouri. A Notice of Intent to prepare the draft EIS was published in the January 26, 2000 Federal Register. The St. Louis District, U.S. Army Corps of Engineers is the Federal sponsor for this EIS.

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Sincerely,

Michael A. Brazier
Chief, Regulatory Branch

Michael A. Brazier
Chief, Regulatory Branch

February 28, 2000

Typical letter to cooperating

Regulatory Branch

Mr. Daniel L. Human
Ziercher & Hocker, P.C.
The Bemiston Tower
231 South Bemiston, 8th Floor
St. Louis, Missouri 63105-1914

Dear Mr. Human:

The purpose of this letter is to invite you to attend an Agency Scoping Meeting to be held on March 9, 2000, in Maryland Heights, Missouri. This Agency Scoping Meeting will kick-off the Environmental Impact Statement (EIS) being prepared for Missouri River Flood Plain Developments between Missouri River Miles 29.6 to 38.4, St. Louis County, Missouri. A Notice of Intent to prepare the draft EIS was published in the January 26, 2000 Federal Register. The St. Louis District, U.S. Army Corps of Engineers is the Federal sponsor for this EIS.

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Sincerely,

Michael A. Brazier
Chief, Regulatory Branch

Michael A. Brazier
Chief, Regulatory Branch

February 28, 2000

Regulatory Branch

Mr. Brian Weiler
Administrator of Aviation
Missouri Department of Transportation
Post Office Box 270
Jefferson City, Missouri 65102

Dear Mr. Weiler:

The purpose of this letter is to invite you to attend an Agency Scoping Meeting to be held on March 9, 2000, in Maryland Heights, Missouri. This Agency Scoping Meeting will kick-off the Environmental Impact Statement (EIS) being prepared for Missouri River Flood Plain Developments between Missouri River Miles 29.6 to 38.4, St. Louis County, Missouri. A Notice of Intent to prepare the draft EIS was published in the January 26, 2000 Federal Register. The St. Louis District, U.S. Army Corps of Engineers is the Federal sponsor for this EIS.

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Please contact Mr. Danny McClendon at (314) 331-8580 if you, or a representative from your agency, will be attending this meeting. It is important that you let Mr. McClendon know no later than March 6, 2000, if someone from your agency will be attending this meeting.

Sincerely,

Michael A. Brazier
Chief, Regulatory Branch

Michael A. Brazier
Chief, Regulatory Branch

February 28, 2000

Regulatory Branch

Mr. Victor Blackburn
Natural Resources Conservation Service
1215 Fern Ridge Parkway, Suite 212
St. Louis, Missouri 63141

Dear Mr. Blackburn:

The purpose of this letter is to invite you to attend an Agency Scoping Meeting to be held on March 9, 2000, in Maryland Heights, Missouri. This Agency Scoping Meeting will kick-off the Environmental Impact Statement (EIS) being prepared for Missouri River Flood Plain Developments between Missouri River Miles 29.6 to 38.4, St. Louis County, Missouri. A Notice of Intent to prepare the ft EIS was published in the January 26, 2000 Federal Register. The St. Louis District, U.S. Army Corps of Engineers is the Federal sponsor for this EIS.

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Sincerely,

Michael A. Brazier
Chief, Regulatory Branch

Michael A. Brazier
Chief, Regulatory Branch

February 28, 2000

Regulatory Branch

Mr. Bob Innis
Transportation Corridor Improvement
East-West Gateway Coordinating Council
10 Stadium Plaza
St. Louis, Missouri 63102-1714

Dear Mr. Innis:

The purpose of this letter is to invite you to attend an Agency Scoping Meeting to be held on March 9, 2000, in Maryland Heights, Missouri. This Agency Scoping Meeting will kick-off the Environmental Impact Statement (EIS) being prepared for Missouri River Flood Plain Developments between Missouri River Miles 29.6 to 38.4, St. Louis County, Missouri. A Notice of Intent to prepare the draft EIS was published in the January 26, 2000 Federal Register. The St. Louis District, U.S. Army Corps of Engineers is the Federal sponsor for this EIS.

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Sincerely,

Michael A. Brazier
Chief, Regulatory Branch

Michael A. Brazier
Chief, Regulatory Branch

February 28, 2000

Regulatory Branch

Mr. Herb Liu
Parks Planning and Development Specialist
Saint Louis County Department of Parks
and Recreation
41 South Central
Clayton, Missouri 63105

Dear Mr. Liu:

The purpose of this letter is to invite you to attend an Agency Scoping Meeting to be held on March 9, 2000, in Maryland Heights, Missouri. This Agency Scoping Meeting will kick-off the Environmental Impact Statement (EIS) being prepared for Missouri River Flood Plain Developments between Missouri River Miles 29.6 to 38.4, St. Louis County, Missouri. A Notice of Intent to prepare the draft EIS was published in the January 26, 2000 Federal Register. The St. Louis District, U.S. Army Corps of Engineers is the Federal sponsor for this EIS.

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Sincerely,

Michael A. Brazier
Chief, Regulatory Branch

Michael A. Brazier
Chief, Regulatory Branch

February 28, 2000

Regulatory Branch

Mr. Donald E. Spencer
Assistant Director
St. Louis County Department of Highways
and Traffic
121 South Meramec Avenue
St. Louis, Missouri 63105

Dear Mr. Spencer:

The purpose of this letter is to invite you to attend an Agency Scoping Meeting to be held on March 9, 2000, in Maryland Heights, Missouri. This Agency Scoping Meeting will kick-off the Environmental Impact Statement (EIS) being prepared for Missouri River Flood Plain Developments between Missouri River Miles 29.6 to 38.4, St. Louis County, Missouri. A Notice of Intent to prepare the draft EIS was published in the January 26, 2000 Federal Register. The St. Louis District, U.S. Army Corps of Engineers is the Federal sponsor for this EIS.

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Sincerely,

Michael A. Brazier
Chief, Regulatory Branch

Michael A. Brazier
Chief, Regulatory Branch

February 28, 2000

Regulatory Branch

Mr. George Riedel
State Coordinator
State Emergency Management Agency
Post Office Box 116
Jefferson City, Missouri 65102

Dear Mr. Riedel:

The purpose of this letter is to invite you to attend an Agency Scoping Meeting to be held on March 9, 2000, in Maryland Heights, Missouri. This Agency Scoping Meeting will kick-off the Environmental Impact Statement (EIS) being prepared for Missouri River Flood Plain Developments between Missouri River Miles 29.6 to 38.4, St. Louis County, Missouri. A Notice of Intent to prepare the draft EIS was published in the January 26, 2000 Federal Register. The St. Louis District, U.S. Army Corps of Engineers is the Federal sponsor for this EIS.

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Sincerely,

Michael A. Brazier
Chief, Regulatory Branch

Michael A. Brazier
Chief, Regulatory Branch

February 28, 2000

Regulatory Branch

Mr. Robert Bissell
Mitigation Division
Federal Emergency Management Agency
2323 Grand Boulevard, Suite 900
Kansas City, Missouri 64108

Dear Mr. Bissell:

The purpose of this letter is to invite you to attend an Agency Scoping Meeting to be held on March 9, 2000, in Maryland Heights, Missouri. This Agency Scoping Meeting will kick-off the Environmental Impact Statement (EIS) being prepared for Missouri River Flood Plain Developments between Missouri River Miles 29.6 to 38.4, St. Louis County, Missouri. A Notice of Intent to prepare the draft EIS was published in the January 26, 2000 Federal Register. The St. Louis District, U.S. Army Corps of Engineers is the Federal sponsor for this EIS.

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Sincerely,

Michael A. Brazier
Chief, Regulatory Branch

Michael A. Brazier
Chief, Regulatory Branch

February 28, 2000

Regulatory Branch

Mr. Robert Sfreddo
Assistant Chief Engineer-Design
Missouri Department of Transportation
Post Office Box 270
Jefferson City, Missouri 65102

Dear Mr. Sfreddo:

The purpose of this letter is to invite you to attend an Agency Scoping Meeting to be held on March 9, 2000, in Maryland Heights, Missouri. This Agency Scoping Meeting will kick-off the Environmental Impact Statement (EIS) being prepared for Missouri River Flood Plain Developments between Missouri River Miles 29.6 to 38.4, St. Louis County, Missouri. A Notice of Intent to prepare the draft EIS was published in the January 26, 2000 Federal Register. The St. Louis District, U.S. Army Corps of Engineers is the Federal sponsor for this EIS.

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Sincerely,

Michael A. Brazier
Chief, Regulatory Branch

Michael A. Brazier
Chief, Regulatory Branch

February 28, 2000

Regulatory Branch

Ms. Venessa Madden
U.S. Environmental Protection Agency
Region VII
901 North 5th Street
Kansas City, Kansas 66101

Dear Ms. Madden:

The purpose of this letter is to invite you to attend an Agency Scoping Meeting to be held on March 9, 2000, in Maryland Heights, Missouri. This Agency Scoping Meeting will kick-off the Environmental Impact Statement (EIS) being prepared for Missouri River Flood Plain Developments between Missouri River Miles 29.6 to 38.4, St. Louis County, Missouri. A Notice of Intent to prepare the draft EIS was published in the January 26, 2000 Federal Register. The St. Louis District, U.S. Army Corps of Engineers is the Federal sponsor for this EIS.

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Sincerely,

Michael A. Brazier
Chief, Regulatory Branch

Michael A. Brazier
Chief, Regulatory Branch

February 28, 2000

Regulatory Branch

Mr. Joe Cothern
U.S. Environmental Protection Agency
Region VII
NEPA Coordinator
901 North 5th Street
Kansas City, Kansas 66101

Dear Mr. Cothern:

The purpose of this letter is to invite you to attend an Agency Scoping Meeting to be held on March 9, 2000, in Maryland Heights, Missouri. This Agency Scoping Meeting will kick-off the Environmental Impact Statement (EIS) being prepared for Missouri River Flood Plain Developments between Missouri River Miles 29.6 to 38.4, St. Louis County, Missouri. A Notice of Intent to prepare the draft EIS was published in the January 26, 2000 Federal Register. The St. Louis District, U.S. Army Corps of Engineers is the Federal sponsor for this EIS.

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Sincerely,

Michael A. Brazier
Chief, Regulatory Branch

Michael A. Brazier
Chief, Regulatory Branch

February 28, 2000

Regulatory Branch

Mr. Dan Witter
Missouri Department of Conservation
Policy Coordination
Post Office Box 180
Jefferson City, Missouri 65102-0180

Dear Mr. Witter:

The purpose of this letter is to invite you to attend an Agency Scoping Meeting to be held on March 9, 2000, in Maryland Heights, Missouri. This Agency Scoping Meeting will kick-off the Environmental Impact Statement (EIS) being prepared for Missouri River Flood Plain Developments between Missouri River Miles 29.6 to 38.4, St. Louis County, Missouri. A Notice of Intent to prepare the draft EIS was published in the January 26, 2000 Federal Register. The St. Louis District, U.S. Army Corps of Engineers is the Federal sponsor for this EIS.

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Sincerely,

Michael A. Brazier
Chief, Regulatory Branch

Michael A. Brazier
Chief, Regulatory Branch

February 28, 2000

Regulatory Branch

Mr. John Madras
Missouri Department of Natural Resources
Water Pollution Control Program
Post Office Box 176
Jefferson City, Missouri 65102-0176

Dear Mr. Madras:

The purpose of this letter is to invite you to attend an Agency Scoping Meeting to be held on March 9, 2000, in Maryland Heights, Missouri. This Agency Scoping Meeting will kick-off the Environmental Impact Statement (EIS) being prepared for Missouri River Flood Plain Developments between Missouri River Miles 29.6 to 38.4, St. Louis County, Missouri. A Notice of Intent to prepare the draft EIS was published in the January 26, 2000 Federal Register. The St. Louis District, U.S. Army Corps of Engineers is the Federal sponsor for this EIS.

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Sincerely,

Michael A. Brazier
Chief, Regulatory Branch

Michael A. Brazier
Chief, Regulatory Branch

February 28, 2000

Regulatory Branch

Mr. Tom Lange
Missouri Department of Natural Resources
Post Office Box 176
Jefferson City, Missouri 65102-0176

Dear Mr. Lange:

The purpose of this letter is to invite you to attend an Agency Scoping Meeting to be held on March 9, 2000, in Maryland Heights, Missouri. This Agency Scoping Meeting will kick-off the Environmental Impact Statement (EIS) being prepared for Missouri River Flood Plain Developments between Missouri River Miles 29.6 to 38.4, St. Louis County, Missouri. A Notice of Intent to prepare the draft EIS was published in the January 26, 2000 Federal Register. The St. Louis District, U.S. Army Corps of Engineers is the Federal sponsor for this EIS.

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Sincerely,

Michael A. Brazier
Chief, Regulatory Branch

Michael A. Brazier
Chief, Regulatory Branch

February 28, 2000

Regulatory Branch

Mr. Donald Neumann
U.S. Department of Transportation
Federal Highway Administration
209 Adams Street
Jefferson City, Missouri 65101

Dear Mr. Neumann:

The purpose of this letter is to invite you to attend an Agency Scoping Meeting to be held on March 9, 2000, in Maryland Heights, Missouri. This Agency Scoping Meeting will kick-off the Environmental Impact Statement (EIS) being prepared for Missouri River Flood Plain Developments between Missouri River Miles 29.6 to 38.4, St. Louis County, Missouri. A Notice of Intent to prepare the draft EIS was published in the January 26, 2000 Federal Register. The St. Louis District, U.S. Army Corps of Engineers is the Federal sponsor for this EIS.

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Sincerely,

Michael A. Brazier
Chief, Regulatory Branch

Michael A. Brazier
Chief, Regulatory Branch

Mel Carnahan
Governor

STATE OF MISSOURI

EMERGENCY MANAGEMENT AGENCY

Jerry B. Uhlmann
Director

DEPARTMENT OF PUBLIC SAFETY
OFFICE OF THE ADJUTANT GENERAL

P.O. Box 116, Jefferson City, Missouri 65102
Phone: 573/526-9100 Fax: 573/634-7966
E-mail: mosema@mail.state.mo.us

March 13, 2000

U.S. Army Corps of Engineers,
St. Louis District
Attention: Danny D. McClendon
Regulatory Branch
1222 Spruce Street
St. Louis, Missouri 63103-2833

Re: Howard Bend Floodplain EIS

Dear Mr. McClendon:

We very much appreciate the opportunity to comment on the Howard Bend Levee Environmental Impact Statement. Please accept this letter as comments from the Missouri State Emergency Management Agency (SEMA) regarding this project.

The City of Maryland Heights is a participant in the National Flood Insurance Program (NFIP). Any development associated with this project located within a special flood hazard area as identified by the Federal Emergency Management Agency (FEMA) must meet the requirements of the community's floodplain management ordinance. This would require obtaining a floodplain development permit for this project. This permit must be obtained prior to the commencement of the construction/development activity. The permit would be obtained from the City of Maryland Heights.

If the proposed development activity is located within a regulatory floodway, a "no-rise" certificate and statement as to the effects of possible flooding is required before the development can be permitted. This analysis must be performed by a licensed engineer and to FEMA standards.

The Corps of Engineers currently has a study of the Upper Mississippi River and Lower Missouri River regarding new river profiles. New preliminary profiles should be available within the next year. The new river profiles may have some affect on the proposed levee increase and should be included in the EIS.

If you have any questions concerning our comments, please contact me a (573) 526-9141.

Sincerely,

George Riedel
Floodplain Management Manager

GR:psh

2000 MAR 17 AM 10: 16

cc: Kay Carder, Mitigation Specialist, FEMA Region VII
MoDOT File
Community File - City of Maryland Heights
Howard Bend Levee File

St. Charles County Government

Planning Department
Steven G. Lauer, Director

March 21, 2000

U.S. Army Corps of Engineers
St. Louis District
Attn: Regulatory Branch (McClendon)
1222 Spruce Street
St. Louis, Missouri 63103-2833

Dear Mr. McClendon:

I appreciated having the opportunity to discuss the Howard Bend Levee Floodplain Project with you at the Agency Scoping Meeting/Workshop on March 9, 2000. The maps that were displayed at the workshop were very helpful in determining the scope of the project.

As the March 9th workshop initiated the scoping meeting process for the Environmental Impact Statement (EIS), St. Charles County would, as per your suggestion, like to offer the following comments: The Greens Bottom area of St. Charles County would be most affected by this development. As Greens Bottom is only protected by an agricultural levee, we would like to express our concern for the impact of any rise in the base flood elevation. One of our primary concerns would be the Duckett Creek Sanitary District Sewage Treatment Plant located at 2950 Greens Bottom Road which came within inches of being inundated during the Great Flood of 1993. In our opinion the EIS needs to address the issue of increased flood heights for St. Charles County and what would be done to minimize any impacts for the Duckett Creek facility.

We appreciate having this opportunity to comment and would request that St. Charles County continue to be kept informed of the status of this project through the EIS review process. If you have any questions concerning this matter please feel free to contact me at your earliest convenience.

MAR 24 AM 10: 34

Sincerely,

Steven G. Lauer
Director of Planning

cc: Joe Ortwerth, County Executive
Ed Siegmund, Assistant Director of Planning

201 North Second Street • Suite 420 • St. Charles, MO 63301-2874
314 949 7335 • Fax 314 949 7336 • ctypnz@www.win.org

MISSOURI DEPARTMENT OF CONSERVATION

Headquarters

2901 West Truman Boulevard, P.O. Box 180, Jefferson City, Missouri 65102-0180
Telephone: 573/751-4115 ◆ Missouri Relay Center: 1-800-735-2966 (TDD)

JERRY M. CONLEY, Director

March 22, 2000

2000 MAR 24 AM 10: 33

Mr. Danny D. McClendon
Project Manager
St. Louis District Corps of Engineers
Regulatory Branch
1222 Spruce Street
St. Louis, MO 63103-2833

Re: Howard Bend Floodplain EIS

Dear Mr. McClendon:

This letter is in response to your request for comments in reference to the March 9, 2000 meeting held for familiarizing the agencies with the proposed project. We appreciate the opportunity to speak one on one with the study principals and sponsors; the District is to be commended for taking the initiative for this effort. Properly conducted, some balance of national objectives may yet be achieved.

Your March 9 letter specifically requested input into the proposed scope of analysis and alternatives, and to relay any concerns or issues that may have arisen during the March 9 meeting. The content of this letter is to be included in your upcoming Public Scoping Meeting presently slated for April 13, 2000.

We are pleased to comply with your wishes in the spirit of moving the dialog for this project forward. However, as we learned during your March 9 meeting, the issues surrounding this topic are more complex than first meets the eye, therefore we consider this letter as a "preliminary view" of a work in progress. Our initial views are as follows:

Proposed Scope of Analysis

The "Intent to Prepare" declaration published in the January 26, 2000 Federal Register gives notice that an EIS to address cumulative and future impacts to the Missouri River floodplain resulting from permitted actions pursuant to Section 404, CWA will be prepared. According to the Council on Environmental Quality's regulations for implementing NEPA (5CFR § 1508.7), an action may cause cumulative impacts on the environment if its impacts overlap in space or time with the impacts of other past, present, and reasonably foreseeable future actions. Given this guidance, we view your proposed

COMMISSION

ANITA B. GORMAN — Kansas City
RANDY HERZOG — St. Joseph
RONALD J. STITES — Plattsburg
HOWARD L. WOOD — Bonne Terre

study area of river mile 29.6 to 38.4 overly constraining to a true accounting of cumulative impacts attributable to the regulatory functions' program (action). Your proposal is a rebuttable presumption for three reasons: (1) the proposed study area provides an overly limited ability to assess fluvial geomorphologic and hydrolic impacts and (2) the natural resources listed in your notice of intent indicates the focus of the study is a river, or open environmental system. Frankly, 8.8 miles of study in such an environment will not yield reliable insights to the dynamics of the system under study. Catfish as a case in point have been found to migrate many miles within the Missouri River. Finally, (3) a narrow scope of study flies in the face of the "overlap" in space per CEQ guidance.

Conversely, we understand that there needs to be logical limits to the geographic scope of your analysis. Since one of our principal concerns focuses on the hydrology of past and future flood flows, one logical limit would be the area between the valley walls within the USGS's eight digit designation for the lower Missouri: Hermann to St. Louis. This would allow a more reasonable accounting of river and tributary hydrology and hydraulics, particularly related to flood frequency, location, peak discharge, bank and channel dynamics including such critical habitats as sand bars and chutes. Adoption of the USGS's designation would also facilitate collaboration with that agency.

Supplementary Information

Your Federal Register Notice of Intent correctly summarizes the sequence of events leading up to the present for St. Louis County from river mile 27.0 to 47.0. However, the dynamic nature of the Missouri River pays no heed to the arbitrary political or jurisdictional boundaries of the designated reach. Other activities by a wide array of entities both upstream from river mile 47 and downstream of river mile 27 on both banks have caused and will cause cumulative impacts to the resources of concern to the scope of your EIS. We do not recommend as comprehensive an accounting of these actions as those for the St. Louis County side, save to acknowledge they exist or may exist and will contribute to the District's actions under examination.

With reference to the activities listed for St. Louis County, your Supplementary Information notes the legal and administrative restrictions placed on many of these activities. Reference is also made to the complexity of existing mitigation arrangements. During your March 9, 2000 meeting, it became obvious that institutional knowledge of these arrangements is being lost or has been lost by the various entities present at the meeting.

The development of a comprehensive reference to these agreements in the EIS would first create a record of this public trust within your proposed study area, but our suggested study reach as well.

Secondly, such a compendium would allow an analysis of whether past actions have avoided adverse impacts to the ecosystem under study. Further, the analysis should determine if the scope of mitigation plans already in place truly offset irreversible loss of valuable aquatic resources per CEQ guidance.

Alternatives

The Corps proposes three "available" alternative courses of action: (1) no action or no future permits; (2) permits on a case-by-case basis; and (3) a Howard Bend Strategic Area Management Plan. We would advocate a fourth alternative: a Strategic "Reach" Management Plan based on river and ecosystem needs as predicated on the cumulative and secondary impacts disclosed by our suggested study reach.

Scoping and Public Involvement

Your Notice of Intent outlines several key areas to be analyzed in depth. Again, with CEQ guidance in mind and given that the federal action in question is the regulatory program of the Corps of Engineers, we recommend that the factors under study follow and otherwise comply with the 404(b)(1) guidelines required of the Corps' regulatory process. Such a study outline would first be more comprehensive and secondly be more in keeping with the tenants of a programmatic EIS.

We appreciate the opportunity to review and comment on your present study status. We look forward to working with the St. Louis District on this endeavor since it portends a unique opportunity to address the cumulative impacts to a unique and valuable ecosystem. The lower Missouri River is not only an important resource to the St. Louis metropolitan area but is the threshold to the entire Missouri River Basin. The lessons learned during the course of your study may well be applicable to many present and coming issues of similar nature upstream.

Sincerely,

Daniel J. Witter

DANIEL J. WITTER
POLICY COORDINATION CHIEF

DJW:sf

Federal Emergency Management Agency

Region VII
2323 Grand Blvd., Suite 900
Kansas City, MO 64108-2670

March 23, 2000

U.S. Army Corps of Engineers
St. Louis District, ATTN: Regulatory Branch (McClendon)
1222 Spruce Street
St. Louis, MO 63103-2833

Dear Mr. McClendon:

Thank you for the opportunity to attend the Agency Scoping Meeting/ Workshop for the Howard Bend Floodplain Environmental Impact Statement (EIS). We understand the EIS will consider the effects of raising the Howard Bend levee to a 500+ year level of protection. We have two comments concerning the scope of the EIS.

The City of Maryland Heights, Missouri participates in the National Flood Insurance Program. As a condition of participation, the community adopts and enforces a floodplain management ordinance that meets the minimum requirements of 44 CFR 60.3. The Maryland Heights floodplain management ordinance actually exceeds the minimum requirements. All proposed work must comply with the community's floodplain management ordinance. Also, since the proposed changes involve a levee, the requirements of 44 CFR 65.10 should be considered.

The U.S. Army Corps of Engineers currently has a study underway that will change the profiles along the Lower Missouri and Upper Mississippi Rivers. The modified profiles may result in revised Flood Insurance Rate Maps (FIRM) at a later date. While there is no regulatory requirement to use the revised profiles until they are shown on an effective FIRM, the revised profiles should be considered in the EIS along with any plans to construct or improve levees along the Missouri River.

If there are additional questions, please contact Mr. Bob Franke at (816) 283-7073 or bob.franke@fema.gov. I may be contacted at (816) 283-7004.

2000 MAR 28 AM 8:42

Sincerely,

Pamela K. Sayer

for Robert G. Bissell, Director
Mitigation Division

STATE OF MISSOURI
Mel Carnahan, Governor • Stephen M. Mahfood, Director
DEPARTMENT OF NATURAL RESOURCES
OFFICE OF THE DIRECTOR
P.O. Box 176 Jefferson City, MO 65102-0176

April 3, 2000

Mr. Danny D. McClendon
Project Manager
U. S. Army Corps of Engineers
St. Louis District
1222 Spruce Street
St. Louis, Missouri 63103-2833

Re: Howard Bend Floodplain EIS

Dear Mr. McClendon:

The Department of Natural Resources is submitting the following comments based on information provided at the March 9, 2000 agency scoping meeting on the Howard Bend Floodplain EIS. We commend the Corps of Engineers for undertaking a study involving cumulative impacts to environmental and cultural resources along the Missouri River.

Scope of Analysis and Alternatives

Your letter of March 9, 2000 requested comments on the proposed scope of analysis and alternatives. We understand that the City of Maryland Heights is funding this EIS, due to their interest in property along the right descending bank of the Missouri River. However, it would seem difficult, if not impossible, to fully assess "cumulative and future impacts to the Missouri River floodplain" without (at a minimum) studying impacts to both sides of the river. Overall impacts on flood heights and cumulative impacts on the floodway should be addressed in this EIS, if it is to meet its stated purpose.

We would like to see a backwater analysis accomplished that would assess the impacts during large flood events. The current scope of this EIS will not provide sufficient analysis of the potential impacts to resources on the opposite side of the river of raising the Howard Bend Levee (and the adjacent Monarch-Chesterfield Levee) to the 500+ year protection level. These resources include the Katy Trail State Park, First State Capitol State Historic Site and surrounding National Register of Historic Places Properties and Historic Districts in St. Charles County.

We hope that this study could be expanded to assess probable impacts to resources directly across as well as up and down river from the proposed study area. We also would prefer that this EIS be considered the first of a number of studies to assess cumulative impacts at critical areas along the Missouri River, especially areas where rapid development is anticipated.

RECYCLED PAPER

Overall Comments

The notice of intent states that the EIS will "address the impacts to the environment for several large projects forecast in the future that may require Section 404 permits." While the NOI points out several large projects, such as levees raised or under construction in the area, Page Avenue and a proposed north/south connector road, more information is needed on "resultant commercial and industrial development and agricultural conversions" anticipated in the area. Presumably, increased levee protection and major new roadways will result in new development which will have impacts on the floodplain. The existence of high power utility lines in the floodplain indicate possible industrial development, as has occurred in the Chesterfield area. At the agency scoping meeting, land use maps previously developed for Maryland Heights were displayed, but these were somewhat dated, and proposed land uses for the floodplain should be defined in the EIS.

This raises several other questions we would like to see addressed in the Howard Bend Floodplain EIS:

- If the result of this EIS is to develop a mitigation plan for future development, thereby eliminating the need for a separate EIS for future projects, what would be the impact of building on or paving a high percentage of the floodplain? What would be the storm water runoff and other drainage impacts from such development in the floodplain, and how should they be mitigated? What are the anticipated impacts to wetlands in the area?

- What wetlands in the study area have been used as mitigation for the various projects planned, underway or completed? In order to ensure protection of these lands in perpetuity, they must be clearly defined. What impact would future development have on existing and future mitigation areas or other public trust lands?

- Possible impacts to Creve Coeur Lake Memorial Park. These should include visual and noise impacts as well, and suggested mitigation for such impacts. The viability of Land and Water Conservation Fund Section 6(f) lands recently added to Creve Coeur Lake Memorial Park should also be assessed. Consideration of the Page Avenue mitigation lands is considered essential to the SAMP, as they were set aside to help maintain outdoor recreation activities as well as the environmental integrity of the floodplain.

Program Comments

Searches of databases within the department's Hazardous Waste Program identified a number of facilities or sites that should be assessed as a part of this EIS. The program's comments and reports are enclosed.

The department's Historic Preservation Program identified a number of concerns, as follow:

- Numerous steamboat wrecks occurred along this reach of the Missouri River, a few of which are indicated on the attached topographic map. Wrecks may be still in the channel, are deeply buried in the present floodplain.

- Historic and prehistoric archaeological sites have been recorded and the potential for additional sites is very high.

- The Lewis and Clark expedition followed the Missouri River, with both popular history and scholarly research indicating the presence of camp sites. Geological, geographical, and historic sites may still be present as described in the expeditions journals that could be significant.

- At least three (3) phases of HPF funded historic architectural survey was conducted in the Boone-Duden area of South St. Charles County. Individual properties, districts and rural cultural landscapes have been identified which may be eligible for inclusion in the National Register of Historic Places.

- City of St. Charles has several National Register listed properties and districts (see attached), included but not limited to the First Missouri State Capitol Buildings; Lindenwood Hall; Old City Hall; St. Charles Historic District and expansions; Frenchtown Historic District; and the St. Charles Odd Fellows Hall.

The department's Division of Geology and Land Survey expressed concerns regarding earthquake hazards in the floodplain. Floodplain sediments are the soil type most susceptible to liquification - the movement of the earthquake causes the sediments to act as a fluid. Floodplain sediments can literally flow out from underneath structures, causing the structures to collapse.

The Department of Natural Resources commends the Corps of Engineers for being proactive in promoting use of a Strategic Area Management Plan (SAMP). We hope that the SAMP would serve as a valuable resource for future environmental decision making in the project area, and an example that can be followed in similar areas.

Sincerely,

DEPARTMENT OF NATURAL RESOURCES

Stephen Mahfood
Director

SM:jbj

c: Jerry Conley, Director, Missouri Department of Conservation
Dennis Grams, Regional Administrator, U.S. EPA, Region VII
Mark Wilson, Field Supervisor, U.S. Fish and Wildlife Service

Public Notice

US ARMY CORPS
OF ENGINEERS
St. Louis District

Reply To:
U.S. Army Corps of Engineers
Attn: CEMVS-CO-F
1222 Spruce Street
St. Louis, MO 63103-2833

Public Notice No.
P-2216
Public Notice Date
April 4, 2000

Expiration Date
Postmaster Please Post Conspicuously Until: April 13, 2000

SPECIAL PUBLIC NOTICE
OPEN PUBLIC WORKSHOP

Interested parties are hereby notified that the U.S. Army Corps of Engineers, St. Louis District, Regulatory Branch and the City of Maryland Heights will be holding an open **Public Workshop on April 13, 2000**, to obtain comments and to receive feed-back from the public on a proposed Draft Environmental Impact Statement (DEIS). The St. Louis District, U.S. Army Corps of Engineers, Regulatory Branch has announced that a DEIS will be prepared to address cumulative and future impacts to the Missouri River flood plain, resulting from permitted actions evaluated under Section 404 of the Clean Water Act. The study area is from approximate Missouri River mile 29.6 to 38.4, along the right descending bank of the Missouri River in St. Louis County, Missouri. Most of this area of flood plain is currently protected by the Howard Bend Levee, which connects to the Riverport Levee. No pending regulatory permits are required at this time for proposed development projects within this area. However, it is the intent of the St. Louis District to prepare a DEIS to address the cumulative impacts that have occurred to the aquatic resources in this area from permitted activities, as well as to address the impacts to the environment for several large projects forecast in the future, that may require Section 404 permits. The public workshop will provide the public the opportunity to view the proposed study area, large-scale maps, ask questions about the study area, discuss potential alternatives, discuss wetlands, fish and wildlife resources and potential mitigation issues, and to provide comments on the proposed study. No formal presentations will be given at the public workshop. It will be an open workshop and will be held:

WHEN: April 13, 2000.

TIME: 4:00 p.m. until 8:00 p.m.

WHERE: City of Maryland Heights Community Centre
2344 McKelvey Road
Maryland Heights, Missouri

During the last 25 years, the Missouri River flood plain between approximate Missouri River miles 27.0 (Earth City Levee) and 47.0 (Monarch-Chesterfield Levee) in St. Louis County, Missouri, has been subjected to extensive levee construction and development for agricultural, industrial, and commercial purposes. These activities have impacted the aquatic environment and fish and wildlife resources in this reach of flood plain. Construction of the Earth City Levee to a 500-year level of protection in 1972, construction of the Riverport Levee to a 500-year level of protection in 1988, reconstruction and recertification of the Monarch-Chesterfield Levee to a 100-year level of protection in 1997 and current proposal to raise this levee to a 500+-year level of protection, reconstruction of a portion of the Howard Bend Levee to a 100-year level of protection in 1996 and current proposal to raise this levee to a 500+-year level of protection, current construction of the Page Avenue Extension Project, the proposal to construct the Earth City Expressway Extension, and resultant commercial and industrial development and agricultural conversions has resulted in a disjointed analysis of natural resource impacts in relation to Section 404 of the Clean Water Act. The St. Louis District, Corps of Engineers is currently preparing an EIS for the Monarch-Chesterfield Levee project. In addition, the Missouri Department of Transportation completed an EIS for the Page Avenue Extension Project in 1992, and the National Park Service completed a Supplemental EIS for the Page Avenue Extension Project in 1995. Therefore, the scope of this current DEIS will focus on the section of Missouri River flood plain between the Monarch-Chesterfield Levee and Interstate 70, and a north/south connector road corridor running through the Howard Bend flood plain, with a beginning point at Interstate 70 and a terminus at Olive Boulevard, between Route 141 (Woods Mill Road) and Creve Coeur Mill Road. This DEIS will not reevaluate the Page Avenue Extension Project, the Monarch-Chesterfield Levee Project, the Riverport or Earth City Levees, or any other previously approved or permitted projects by the Corps of Engineers located in the study area. However, the DEIS will take into account the cumulative and secondary impacts of these projects on the remaining aquatic resources within the study area, and address any special conditions or requirements of these previous projects.

The St. Louis District has identified 3 alternative courses of action available: 1. The "no action" alternative would be to not grant any future Section 404 permits within the study area; 2. Continue to process Section 404 permit applications on a case-by-case basis for future developments within the Howard Bend Flood Plain study area, without developing a Strategic Area Management Plan (SAMP); and 3. Evaluate the environmental effects of future developments within the Howard Bend Flood Plain study area leading to the development of a Strategic Area Management Plan (SAMP) to address the cumulative and secondary impacts of developments in this area , and develop a comprehensive plan to protect or mitigate important aquatic resources due to permitted activities.

Public involvement will be sought during scoping and conduct of the study in accordance with NEPA procedures. A public scoping process will help to clarify issues of major concern, identify any information sources that might be available to analyze and evaluate impacts, and obtain public input on the range and acceptability of alternatives. Comments on the scope of the proposed DEIS will be accepted for 30 days after the date of the public workshop. Interested parties are encouraged to attend this workshop at their leisure anytime during the workshop. No set or formal presentations will be held. Additional opportunities for comment will be available after the DEIS is released in the Fall of 2000. Comments and requests for additional information should be mailed to the U.S. Army Corps of Engineers, ATTN: CEMVS-CO-F (Danny McClendon), 1222 Spruce Street, St. Louis, Missouri 63103-2833.

Michael A. Brazier

MICHAEL A. BRAZIER
Chief, Regulatory Branch

3

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION VII
901 NORTH 5TH STREET
KANSAS CITY, KANSAS 66101

JUN 23 2000

2000 JUN 29 AM 9:12

Danny McClendon
Regulatory Project Manager
Army Corps Of Engineers
1222 Spruce Street
St. Louis, MO 63103-2833

Dear Mr. McClendon:

re: Howard Bend Floodplain Environmental Impact Statement

This letter is in response to your request for comments on the proposed St. Louis District (SLD) Army Corps of Engineers Howard Bend Floodplain EIS. The Environmental Protection Agency (EPA) has reviewed the project materials distributed at the March 9, 2000 Agency Scoping meeting and subsequent agency comment letters received by the SLD.

The Federal Register Notice of Intent (NOI), dated January 26, 2000, indicates the Corps wishes to conduct a study that will examine the cumulative and future impacts to the Missouri River Floodplain from Clean Water Act, Section 404 permitted actions. Furthermore, the NOI states the geographical scope will be limited to the Howard Bend Floodplain. While this is a compact and limited geographical area, considering the interactions and magnitude of environmental stresses in this region, EPA believes that useful scientific information may be attained from this EIS which may be used to assist the Corps in local, regulatory planning activities.

Clarification, however, is needed in several important aspects of this proposal in order to ensure a successful and beneficial EIS. Through the scoping process, a clear Purpose and Need for the EIS still needs to be identified. Objectives and goals need to be defined indicating what this study hopes to accomplish, how the information that is generated and compiled will be used, and what the limitations are of such a compact, cumulative study. For instance, it would be unrealistic to expect this EIS to solely satisfy the cumulative effects analysis requirements of future projects within, or affected by, the study area. Additionally, not all possible and reasonable future actions and their ensuing effects could be forecast at this point in time, in the proposed EIS.

RECYCLE

The No-Action Alternative is unclear. The Corps states that the no-action alternative will be to not grant any future Section 404 permits and a moratorium on all permit applications until a comprehensive Resource Management Plan is complete. From the information supplied, it would seem that this alternative would be an action alternative and that continuing to process Section 404 permits on a case by case basis would be the No-Action Alternative. If this is incorrect, please provide EPA with further explanation.

EPA supports the Missouri Department of Conservation (MDC) suggestion that a Strategic Reach Management Plan be considered as an additional alternative and that the Herman to St. Louis region is acceptable. EPA believes information generated by this EIS may initiate a more comprehensive research study into the anthropogenic stresses imposed upon the river basin and associated ecosystems which could further support a larger, Programmatic EIS. A Strategic Reach Management Plan alternative may be the catalyst for such a much needed study.

The SLD states that it will not re-open previous EIS's from the surrounding area, or previously approved or permitted projects in the study area. While the Corps may not be legally obligated to revise previous studies or re-consider previous projects because of this undertaking, EPA recommends and encourages that information from previous studies or EIS's be used where applicable in this EIS. The very nature of this cumulative effect study will most likely require information that has been generated from those prior studies and on-going studies, such as the Monarch-Chesterfield EIS.

EPA recommends that the environmental baseline be discussed among the agencies early on in the scoping process. The natural resources located within the study area require further definition and the methodologies that will be used to determine cumulative impacts to these resources need to be addressed. EPA also suggests that the EIS study account for "development-driven" secondary impacts to the resources in the immediate area and downstream areas. Ultimately, the value of this EIS lies with the validity of the scientific information generated and how that information will be used.

EPA commends the initial efforts undertaken by your office in the NEPA planning process and for seeking interagency coordination and participation. Should you have any questions about this letter, or need further assistance, please contact me at 913-551-7551.

Sincerely,

Royce B. Kemp

Royce B. Kemp
NEPA Team
Environmental Services Division

cc: Joe Bachant, MDC
John Madras, MDNR
Mark Wilson, USFWS

June 30, 2000

Ms. Teresa J. Price
Director of Planning
City of Chesterfield
16052 Swingley Ridge Road
Suite 100
Chesterfield, MO 63017-2080

Re: Petition Numbers 09-2000 & 10-2000
Levinson Building & Realty, Inc.

Dear Ms. Price:

This is to request that the City of Maryland Heights be given the opportunity to offer its comments on the above petition. As you are aware from the comments offered by the Missouri Department of Transportation, this development is within the corridor under consideration for the extension of Earth City Expressway from Olive Boulevard to Page Avenue. This area has also been identified as part of the Howard Bend Flood Plain Area, which is the subject of an Environmental Impact Statement sponsored by the Army Corps of Engineers and being funded by the City of Maryland Heights. We believe it is critical that the proposed re-zoning and associated development be considered within the context of the Howard Bend EIS.

Development within the flood plain and floodway corridor, such as the Levinson proposal, has potential for substantial environmental impacts. Accordingly, the project merits a detailed and thorough review to insure the public interests are protected. While I understand that your staff has considered these issues, the City of Maryland Heights may be in a stronger position to prepare this analysis as part of the Environmental Impact Statement.

Of course, our ability to offer this analysis of the proposal is severely constrained by the current schedule, as it is my understanding that the Plan Commission has the petition on its agenda for recommendation on July 10, 2000. Therefore, I would request that the matter be postponed until at least July 24th, so our staff and our environmental consultant, Environmental Science and Engineering, have sufficient time to review the proposal and prepare their

comments.

While I understand the need of any property owner and/or developer to have their petition processed in an expeditious manner, the City does not want to cause undue delay in this process. However, in light of the potential impact on the environmental resources of the site, as well as the future roadway improvements that will be beneficial to not only our respective cities, but the region as well, the additional time requested to insure good planning is certainly warrented.

Thank you for your consideration in this matter. Please advise either my self or J. Wayne Oldroyd, Director of Community Development of your decision on this request.

Sincerely,

Michael T. O'Brien
Mayor

CC – Mayor Nancy Greenwood

/jc

ENVIRONMENTAL SCIENCE & ENGINEERING, INC.
MEMORANDUM
ST. LOUIS, MISSOURI

TO: Wayne Oldroyd
Bryan Pearl
File 510056.3000

FROM: Bruce McNitt
DATE: October 25, 2000
SUBJECT: Route 141 Improvement Connection at Olive Road

The improvement study for Route 141 from Ladue Road north to Olive Road is currently being studied by the Missouri Department of Transportation (MoDOT). It is the Howard Bend study team's understanding that this study is in its final stages of alternative analysis. At a previous public informational meeting conducted by MoDOT, indications are that MoDOT's preliminary inclination is the upgrade of the existing alignment for Route 141. Environmental Science & Engineering, Inc. (ESE) also understands that an optional alignment for a relocated Route 141 east of the existing alignment is not considered favorable because of the potential environmental impacts to an existing creek system. ESE also understands that the U.S. Corps of Engineers (USCOE)-St. Louis have indicated a preference for the upgrade of the existing alignment.

The Howard Bend study team believes that a dialogue with MoDOT regarding the ultimate decision for improvement to Route 141 is critical at this time. The proposed use of the reserve corridor for the Earth City expansion appears to be the most sensitive and least intrusive impact for routing of the roadway south of Page Avenue to Olive Road. Should an upgrade of the existing alignment be selected south of Olive Road for Route 141, a cost-effective and efficient connection for the two new improved facilities (Route 141 north to Olive Road and Earth City Expressway Extension, south to Olive Road) would be difficult. Constraints within the corridor north of existing Olive Road at the Route 141 intersection include commercial development, existing established residential neighborhoods, and steep topography.

In addition, failure to join these two improved facilities with an efficient and well-conceived connection will severely impact the transportation efficiency of these two improvements. Our preliminary traffic analysis has determined that two major issues arise:

1) Reduced volumes for the Route 141 and Earth City Expressway Connection resulting in added volume to local neighborhood collector streets.
2) Significant reduction in the level of service on Olive Road between the intersection at existing Route 141 at Olive Road and the proposed intersection of Earth City Expressway and Olive Road, located 0.6 mile to the east.

It is our understanding that Olive Road would maintain a similar level of service and traffic volumes should a direct connection be made from Route 141 to the Earth City Expressway Extension.

ESE recognizes the environmental issues that a relocated Route 141 could spawn but also recognizes the importance of a well-conceived connection for the improvement at Olive Road. ESE would like to meet with MoDOT to discuss this connection and the transportation characteristics and environmental impacts that the various connections would have for the Earth City Expressway Connection in more detail.

Environmental Science & Engineering, Inc.
A MACTEC COMPANY

December 21, 2000
510056

Mr. John Pellet
President
Howard Bend Levee District
13126 Parkland Woods Court
Maryland Heights, Missouri 63043

RE: Capacity of Primary Conveyance Areas

Dear Mr. Pellet:

As part of the Howard Bend Study, Harding ESE, Inc. needs to ascertain the capacity of the primary stormwater conveyance areas to accommodate future development within the study area. It is our understanding that the conveyance areas have adequate capacity to carry upstream stormwater flows as well as future development stormwater.

Harding ESE is seeking assurance as well as guidance on the capacity of these primary conveyance areas to accommodate differential runoff from future impervious surfaces.

It is our understanding that the levee's stormwater consultant, Horner & Shifrin, has been planning for differential runoff in the primary conveyance areas. We would appreciate a written confirmation that this added capacity has been considered and the estimated acreage of pervious vs. impervious that has been calculated. This would be extremely helpful in our environmental impact analysis.

Mr. Pellet, thank you for you assistance on this matter.

Sincerely,

HARDING ESE, INC.

Bruce McNitt/rsl

Bruce C. McNitt
Vice President

pc: Wayne Oldroyd, City of Maryland Heights
Gene Rovak, Horner & Shifrin
Dan Human
Raymond Steege, Harding ESE

3199 Riverport Tech Center Drive, St. Louis, MO 63043
314.209.5900, Fax 314.209.5929, www.eseworld.com

Husch & Eppenberger, LLC
Attorneys and Counselors at Law

231 South Bemiston, 8th Floor
Clayton, MO 63105-1914
314.727.5822
314.727.2824 fax

January 19, 2001

Mr. Ray Steege
Environmental Science & Engineering, Inc.
3199 Riverport Tech Center Drive
Maryland Heights, MO 63043

Re: Howard Bend Levee District Wetland Delineation Reports

Dear Ray:

Enclosed are copies of three Wetland Delineation Reports which were prepared for the Howard Bend Levee District with respect to the property impacted by the levee construction.

I thought you would want to have a copy of this in connection with the Environmental Impact Statement preparation. We are proceeding with confirmation of these delineations through the NRCS.

Please let me know if you have any questions or comments regarding the enclosed. We would certainly authorize you to work with Frank Norman of Burns & McDonnell regarding the enclosed reports or other wetland matters within the District. His telephone number is 816-822-3484.

Sincerely yours,

HUSCH & EPPENBERGER, LLC

Daniel L. Human

DLH/df
Enclosures

COPY TO:

Mr. Leo Ebel
Horner & Shifrin, Inc.
5200 Oakland Avenue
St. Louis, MO 63110

Mr. John K. Pellet
13126 Parkland Woods Ct.
Maryland Heights, MO 63043

Mr. Wayne Oldroyd
City of Maryland Heights
212 Millwell Drive
Maryland Heights, MO 63043

City of Chesterfield

16052 Swingley Ridge Road • Suite 100 • Chesterfield, MO 63017-2080
Phone: 636-537-4000 • Fax: 636-537-4798 • www.chesterfield.mo.us

March 20, 2001

Mr. Bruce C. McNitt
Vice President
Harding ESE
3199 Riverport Tech Center Drive
St. Louis, Missouri 63043

RE: Howard Bend Levee/Route 141 EIS

Dear Mr. McNitt:

Enclosed, is the information you requested in our meeting held on March 15, 2001, regarding the above referenced subject. Please note that I did not include a copy of the zoning map for the area adjacent to the St. Louis City Waterworks. This entire area is zoned Floodplain Non-Urban (FPNU).

I hope this information assists you in the preparation of the EIS. If you have any questions, or need additional information, please advise.

Sincerely,

Brian McGownd, P.E.
Deputy Director of Public Works/Assistant City Engineer

cc: Mike Geisel, Director of Public Works/City Engineer
Teresa Price, Director of Planning

MISSOURI COALITION FOR THE ENVIRONMENT

6267 Delmar Blvd. 2-E • St.Louis MO 63130 • 314-727-0600 Fax: 314-727-1665 • moenviron@moenviron.org • www.moenviron.org

September 10, 2001

2001 SEP 12 PM 2:20

Danny McClendon
Regulatory Branch
U.S. Army Corps of Engineers
1222 Spruce Street
St. Louis, Missouri 63103-2833

Re: Howard Bend Levee

Dear Mr. McClendon:

The intent of this letter is to refine the issues for discussion at our meeting on September 19, 2001 at your office. In general, it appears to us that activities of the Howard Bend Levee District (HBLD) may be in violation of section 404 of the Clean Water Act and section 10 of the Rivers and Harbors Act of 1899, and have activated special conditions of the section 404 permit issued for the Page Avenue Extension (Permit No. 93-00264). We are also concerned that the cumulative effects of raising both the Monarch-Chesterfield levee and the Howard Bend levee will cause an increase in flood heights greater than that permitted by law.

Our specific concerns are:

1.) *Crossing of Creve Coeur Creek.* The Howard Bend levee currently crosses Creve Coeur Creek just to the east of the MSD plant. It is unclear to us how the new levee will cross the creek without triggering either section 404 or section 10. It seems beyond dispute that the area of the crossing contains waters subject to both the Clean Water Act and the Rivers and Harbors Act. Under the Earth City Consent Decree and other laws, the Corps is required to assert its section 10 jurisdiction up tributaries of the Missouri River to the extent of the ordinary high water mark. The current construction on the levee appears to be in violation of federal law due to HBLD's failure to secure a permit for the crossing of Creve Coeur Creek.

Moreover, the Corps has not yet provided us with any evidence that a permit was granted for the construction of the original earthen levee through the creek or for the construction of a concrete floodwall on top of the earthen levee after the 1993 flood. In what appears to be a blatant attempt to circumvent federal law, we understand that the HBLD constructed a short section of floodwall on top of the earthen levee through Creve Coeur Creek sometime after the 1993 flood. The floodwall has no independent utility without a similar increase in the height of the remainder of the levee. This would seem to be subject to section 10 and also a modification of the permit we assume was granted for the original construction through the creek. Moreover, it is clearly an integral part of current efforts to raise the entire levee.

The Corps' FOIA office has not yet produced any documents relating to the legality of the levee crossing Creve Coeur Creek without a permit. It would be most helpful if you could provide a response to our requests prior to the meeting on the 19th.

2.) *Jurisdictional Wetland Determinations*. We have tried for well over a year now to obtain documents from the Corps showing the jurisdictional wetland determinations for the plan to raise the Howard Bend levee. In response, your FOIA office has said the documents have either been lost or never existed. This response is very troubling and indicates the Corps may not be carrying out its regulatory oversight responsibilities. The National Wetland Inventory maps prepared by the Fish & Wildlife Service show a number of wetlands along the route of the new levee. It is unclear to us whether the Corps has reviewed these maps or otherwise checked the wetland determinations of the HBLD.

3.) *Page Avenue Extension Permit Conditions.* Special condition "s" in the Page Avenue section 404 permit requires that an EIS be prepared if any facility that increases flood protection is connected to the Page Avenue Extension. The proposed 500-year levee fits this criteria. Why isn't the construction of the levee a violation of this condition? The EIS that is apparently underway for development in the Howard Bend floodplain does not satisfy this condition because NEPA requires compliance with its terms *before* a project is begun, much less completed.

4.) *No-Rise Certification*. Part of the Howard Bend levee will be located in the regulatory floodway. Federal law prohibits construction in the floodway if it will cause more than a one-foot rise in the base flood elevation. Documents obtained by the Coalition show that the Corps has knowledge that the Howard Bend levee combined with the Monarch-Chesterfield levee will cause more than a one-foot rise in the base flood elevation. (copy enclosed). In light of this evidence, it is unclear: 1) why this project is permissible and 2) why FEMA accepted the levee district's "no-rise certification" that purportedly showed zero effect on flood elevations.

I hope that prior notification of these issues will allow you to provide answers at our meeting on the 19th or take other appropriate action. Please call if you have any questions.

Very truly yours,

Edward J. Heisel
Senior Law & Policy Coordinator

cc: David Asbed, USACE, Office of Counsel
Bob Franke, FEMA
George Riedel, SEMA

DRAFT
ENVIRONMENTAL SCIENCE & ENGINEERING, INC.
MEMORANDUM
ST. LOUIS, MISSOURI

TO: File 5100-056-1000

FROM: Bruce McNitt
DATE: June 21, 2000
SUBJECT: Howard Bend, June 8, 2000 Agency Meeting Minutes

Attendees:

Wayne Oldroyd	City of Maryland Heights	Vanessa Madden	USEPA
John Howland	MoDOT	Rick Hansen	USFWS
Danny McClendon	USCOE	Joe Bachant	MDC
Joe Hughes	USCOE, Kansas City	Tom Lange	MDNR
Bill Levins	USCOE	Bruce McNitt	ESE
Mike Brazier	USCOE		

pc: Raymond Steege
Kris Erickson

An agency coordination meeting was held on June 8, 2000 at the Runge Nature Center in Jefferson City, Missouri.

1) Danny McClendon stated that according to Dennis Stephens, who is modeling the new Missouri River profiles for the USCOE, a 1-foot rise would occur in the floodplain elevation when Monarch/Chesterfield and Howard Bend Levees are combined in the model. Mr. Stephens can provide more exact elevation differences for each action independently.

2) Introduction by Danny McClendon—Purpose of the meeting and review of past information with regards to agency comments.

3) Kathryn Erickson needs to compile public comments for Danny McClendon (Kathryn completed 6/19/00).

4) The new flood profiles should be included in the EIS, but are still 3 years away from final completion.

5) MDNR supported development of a SAMP.

6) Danny McClendon provided a brief overview of the letters received to date in response to the first agency meeting.

7) Jason Clark has left USEPA. Royce Kemp is taking over the project but he could not attend the meeting.

8) USFWS—Preparing coordination application for Monarch EIS. Rick Hansen wants consideration of larger geographic areas to include Howard Bend EIS.

9) Tom Lange asked if there is a cooperating agency? USCOE is in the process of getting FHWA on board as sponsoring agency.

10) Tom Lange asked, "Why FHWA?"—Our scope is looking at meeting 141 at Olive where MoDOT is studying Ladue to Olive.

11) Tom Lange did not see the need for FHWA as a cooperating agency.

12) Wayne Oldroyd provided an overview of the land planning endeavor and how this planning process would coordinate with the Howard Bend Stormwater Management Plan.

13) Rick Hansen of USFWS—How was Subpart "R" written into the Page Avenue EIS and who was responsible? Danny McClendon explained in detail and how USCOE was involved in the Page project and were the agency responsible for Subpart "R."

14) Rick Hansen—Believes Monarch/Chesterfield Levee and Howard Bend, etc. as connected actions.

15) FEMA/SEMA asked (Hansen) New Rules profiles - 2 to 3 years away.

16) USCOE believes flood profiles for Mississippi River will go down.

17) USCOE is not sure on Missouri River flood levels.

18) Howard Bend Levee is not going to be built in regulated floodway. No fill will occur in regulatory floodway.

19) If levee is built today before new profiles are in affect, levee would be grandfathered.

20) If a USCOE project causes increased rise in flood elevations, new guidance at USCOE states that USCOE must procure flood (flowage) easements.

21) How do you evaluate secondary and cumulative impacts? Danny McClendon reiterated secondary and cumulative are in a floodplain area behind the levee and not in the floodway.

22) Danny McClendon asked what the benefits of a comprehensive study from Herman to the confluence of the Mississippi River would be. How would this work? This EIS is not the catalyst to study the river comprehensibly. What are the agencies looking for? Who should be responsible for this type of initiative?

23) Danny McClendon presented the concept of removing Subpart "R" as a condition of the Page Avenue EIS.

24) MDC—It is a "crap shoot" to come out with an EIS (for City/USCOE) prior to the final flood profiles being developed.

25) CEQ cumulative impact assessment, procedures and protocol should be reviewed in detail (Ray and Kris need to discuss).

26) Royce Kemp at USEPA conveyed through Vanessa Madden that the geographic scope for EIS was adequate.

See attached handout provided at the meeting.

CITY OF MARYLAND HEIGHTS

212 MILLWELL DRIVE • MARYLAND HEIGHTS, MISSOURI 63043
TEL 314-291-6550 • FAX 314-291-7457 • WWW.MARYLANDHEIGHTS.COM

October 3, 2001

Bruce McNitt
Harding ESE
3199 Riverport Tech Center Drive
St. Louis, MO 63043

Re: Final Draft: Howard Bend Land Use Plan

Dear Mr. McNitt:

At their meeting on September 25, 2001, the Planning Commission voted to accept the Final Draft of the Howard Bend Land Use Plan as prepared by Horner & Shifrin, Inc. and McBride Dale Clarion, dated September 5, 2001 as the resource document for the amendment to the Comprehensive Plan. Staff will no prepare the Comprehensive Plan amendment for a public hearing on November 13, 2001. Therefore, you are directed to do the following:

1. Review the draft document (attached) to determine if it contains the information required for the Howard Bend Flood Plain EIS. Please furnish your comments in writing to staff by October 10, 2001.

2. Complete the analysis of secondary and cumulative impacts as related to future land use for inclusion in the EIS.

3. Attend the public hearing to record public comment related to the adoption of the Comprehensive Plan amendment.

4. Provide an updated schedule of the EIS process, including projections of public hearing dates.

If you have any questions regarding this matter, please contact me at your earliest convenience.

Sincerely,

J. Wayne Oldroyd, AICP
Director of Public Works

CC - Michael T. O'Brien, Mayor
Mark Levin, City Administrator
Howard Paperner, City Attorney
Bryan Pearl, Director of Public Works
Ray Steege, Harding ESE

City of Chesterfield

16052 Swingley Ridge Road • Suite 100 • Chesterfield, MO 63017-2080
Phone: 636-537-4000 • Fax: 636-537-4798 • www.chesterfield.mo.us

October 17, 2001

Mr. Patrick Worzer
Land Design Services, Inc.
11920 Westline Industrial Drive
St. Louis, Missouri 63146
PHN (314) 991-1818
FAX (314) 567-7442

Subject: Revised Flood Study Review Comments for Mill Valley Estates

Dear Mr. Worzer:

The City of Chesterfield Department of Public Works has reviewed your Revised Flood Study for the above referenced project and has the following comments:

1. As previously indicated, provide CORPs of Engineers' approval for the alterations of the floodway and to ensure that the rare wooded wetlands in the northern section and the wetlands on the southern section of the site are not adversely impacted. The City appreciates a copy of the November 25, 1998. Please show the approximate locations and area of these wetlands on the plan, as the wetlands in the northern section of the site are not well defined in the attachments.
2. As previously indicated, ensure that all provided calculations/output are legible (alphabetical and numerical characters must be greater than 0.08 inches).
3. As previously indicated, explain how the existing riverbanks will be modified to handle the additional velocities.
4. Provide contours (label existing contours periodically please) and improvements (structures, etc.) around the perimeter of the site. Provide this information 150' from the property line.
5. Provide approval from the Missouri Department of Transportation on the location of the corridor, the flood study and the size and configuration of the piers.
6. A site visit indicates that several of the revisions made between the duplicate effective model and the corrective effective model are questionable. Although it is stated that these revisions were made based off of MSD's orthotopo maps, it is debatable that these revisions accurately represent current conditions (example RS 32,440).
7. It is apparent that the cross-section at RS 28,865 is extremely optimistic. More cross-sections must be used to better model the turn the water must negotiate through this stretch of creek. The additional cross-sections must depict the existing home. The orientation of the cross-sections is very important throughout this area.

8. Please revisit the ineffective flow areas, from the cross-section at RS 30,160 through RS 29570. The area that conveys flow along the right bank is not an effective flow area. Please see the calculation booklet for clarification.
9. Provide additional cross-sections between RS 28,865 and 27,670. There is too large a gap between these cross-sections.
10. Method 5 was utilized for the encroachment for the floodway models. Method 5 is best suited for steep, fast moving, well defined, uniform streams. Since the target stream does not conform to all of these criteria, please explain why method 5 was chosen over method 4 to calculate the floodway models.

It appears as though a meeting between the City of Chesterfield and Land Design Services, Inc. may be advantageous. Please call the City of Chesterfield and schedule an appointment at your convenience. A site visit may be incorporated into the scheduled meeting.

For your use, the City is returning the calculations booklets and the plan with notes for ease in revisions. These marked-up booklets and plan must be returned to the City with the revised submittal. For future submittals please make sure that two copies of the calculations booklets and the plan are provided for review. It is important to note that the information requested above, once provided, may result in further comments and questions from the City of Chesterfield Department of Public Works.

Should a meeting to discuss these comments be deemed helpful, please feel free to contact me and schedule a meeting.

Sincerely,

Leslie Sawyer-Sagehorn, P.E.
Civil Engineer

Cc: Michael O. Geisel, Director of Public Works/City Engineer
Brian McGownd, Deputy Director of Public Works/Assistant City Engineer
Bonnie Hubert, Superintendent of Engineering
Ed Levinson, Levinson Building & Realty, Inc., P.O. Box 39, Chesterfield, Missouri 63005
Bryan Pearl & Wayne Oldroyd, City of Maryland Heights, 212 Millwell Drive, Maryland Heights, Missouri 63043
Danny McClendon, Regulatory Branch Manager, Army Corps of Engineers, 1222 Spruce Street, St. Louis, Missouri 63103-2833
Federal Emergency Management Agency, Mitigation Division, 2323 Grand Boulevard, Suite 900, Kansas City, Missouri 64108

CITY OF MARYLAND HEIGHTS

212 MILLWELL DRIVE • MARYLAND HEIGHTS, MISSOURI 63043
TEL 314-291-6550 • FAX 314-291-7457 • WWW.MARYLANDHEIGHTS.COM

November 28, 2001

NOV 30

Mr. Bruce McNitt
Harding ESE
3199 Riverport Tech Center Drive
Maryland Heights, MO 63043

Re: Wetland Conservation Determination (NRCS-CPA-026E)

Dear Mr. McNitt:

Enclosed is correspondence from the Natural Resource Conservation Service dated November 19, 2001 regarding a wetlands determination on the Sportport property. Please review and advise as to what action, if any, the City should take in this matter.

As the response time is limited to thirty (30) days, your prompt response is appreciated.

Sincerely,

J. Wayne Oldroyd, AICP
Director of Community Development

CC - Mark Levin
Bryan Peari
Howard Paperner

JWO/jc

USDA NRCS
Natural Resources Conservation Service
USDA Service Center
160 St. Peters Centre Blvd.
St. Peters, MO 63376
(636) 922-2833 ext. 3

RECEIVED
NOV 26 2001
PLANNING & ZONIN

CERTIFIED MAIL

November 19, 2001

City of Maryland Heights
212 Millwell Drive
Maryland Heights, MO 63043-2512

Dear City of Maryland Heights:

Enclosed is the Highly Erodible Land and Wetland Conservation Determination Form NRCS-CPA-026E (supersedes all others delivered) for the City of Maryland Heights farm in St. Louis County, F#1082, Tract 1226. The determinations are a result of the field visit that was completed Jamie Salvo, SWCD Resource Conservationist, and Allan Johnston, WETS/TL, on November 6, 2001. We have determined the areas noted on the enclosed form meet the current prior converted cropland criteria on cropland & farmed wetland criteria.

If you agree with the determinations, they will be considered final in 30 days and become part of your case file. The wetland determinations will serve as a reference in the development of a conservation plan, determining some program eligibility, etc.

If you disagree, you can request a field visit and/or mediation with me within the next 30 days while the determinations are still preliminary. If I have not received any notification from you within the next 30 days, I will change the determinations to final.

1. **Request a field visit** – A field visit with you would include a review of the data we gathered to make the wetland determination. Any questions you have concerning the determination would be answered. Also, if you can provide us with additional technical information, we will use it for possible changes.
2. **Request mediation** - Mediation is a process in which a trained, impartial person would help us look at mutual concerns, consider options, and determine if we can agree on a solution. The mediator has no decision making authority, but may be able to help us reach a mutually agreeable decision. We can provide you with a pamphlet from Lincoln University on Missouri's Agricultural Mediation Program.

If you do not wish to request a field visit or mediation, you can appeal to the County FSA Committee (COC) within 30 days after the determinations become final. Only final determinations can be appealed to the COC. If you want to appeal immediately, you may do so through a process called

United States Department of Agriculture

Natural Resources Conservation Service

NRCS-CPA-026E
9/2000

HIGHLY ERODIBLE LAND AND WETLAND CONSERVATION DETERMINATION

Name Address:	City of Maryland Heights	Request Date:	7/20/01	County:	St. Louis
Agency or Person Requesting Determination:	City of Maryland Heights	Tract No:	1082	FSA Farm No.:	1226

Section I - Highly Erodible Land

Is a soil survey now available for making a highly erodible land determination?	Yes
Are there highly erodible soil map units on this farm?	No

Fields in this section have undergone a determination of whether they are highly erodible land (HEL) or not; fields for which an HEL Determination has not been completed are not listed. In order to be eligible for USDA benefits, a person must be using an approved conservation system on all HEL.

Field(s)	HEL(Y/N)	Sodbust(Y/N)	Acres	Determination Date
1	N	N	12.4	12/21/87
2	N	N	15.3	12/21/87
	-	-		

The Highly Erodible Land determination was completed in the-Office

Section II - Wetlands

Are there hydric soils on this farm?	Yes

Fields in this section have had wetland determinations completed. See the Definition of Wetland Label Codes for additional information regarding allowable activities under the wetland conservation provisions of the Food Security Act and/or when wetland determinations are necessary to determine USDA program eligibility.

Field(s)	Wetland Label*	Occurrence Year (CW)**	Acres	Determination Date	Certification Date
1	PC/NW		5.7	11/6/01	11/6/01
1	FW		6.7	11/6/01	11/6/01
2	PC/NW		9.4	7/9/97	7/9/97
2	PC/NW		5.9	11/6/01	11/6//01
UN	NI		6.3	7/9/97	

The wetland determination was completed in the -Field It was -mailed to the person on 11/20/01.

Remarks: Supercedes all previous determinations delivered.

I certify that the above determinations are correct and were conducted in accordance with policies and procedures contained in the National Food Security Act Manual.

Signature Designated Conservationist	Date
Renee A. Cook	11/19/01

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, gender, religion, age, disability, political beliefs, sexual orientation, and marital or family status. (Not all prohibited bases apply to all programs.) Persons with disabilities who require alternative means for communication of program information (Braille, large print, audiotape, etc.) should contact USDA's TARGET Center at 202-720-2600 (voice and TDD).

To file a complaint of discrimination, write USDA, Director, Office of Civil Rights, Room 326W, Whitten Building, 14th and Independence

Buzz Westfall
County Executive

Saint Louis
COUNTY
PARKS

Genie Zakrzewski, CPRP
Director of Parks & Recreation

February, 2002

RECEIVED
FEB 13 2002

Mr. Eric Westis
Harding ESE, Inc.
3199 Riverport Tech Center Drive
St. Louis, MO. 63043

RE: Howard Bend Floodplain Environmental Impact Reply

Dear Mr. Westis,

As you may be aware St. Louis County owns about one-third of the floodplain property within the Howard Bend Levee District. This would constitute a rather large interest in what occurs around the 2229.59-acre Creve Coeur Memorial Park. The present master plan calls for half the park to be developed as active recreation (i.e. shelters, trails, athletic fields, restrooms, etc.) and the remaining half as passive (i.e. wetlands, outdoor education, etc.). Though the wetlands have only been in existence for a short period, they have already shown signs of providing environs unlike any other in the Metro area.

At present the park is surrounded by agrarian operations that we know will someday cease to exist based on present trends. The 500 plus year levee system being constructed will no doubt bring other use such as light industrial, retail, warehouse and office space. There is a keen interest on the part of St. Louis County Department of Parks and Recreation to protect its largest park.

Please inform me of any information that may assist you in the EIS. If you have any questions, please feel free to call me at (314) 615-0355.

Sincerely,

Christopher M. Ludwig
Parks Project Manager

CC Ben Knox

I:\Data\DESPLN\CENTRAL\CRCOEUR\Howard Bend Levee\Harding ESE Reply.doc

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION VII
901 NORTH 5TH STREET
KANSAS CITY, KANSAS 66101

RECEIVED
FEB 25 2002

FEB 21 2002

Richard A. Skinker
Senior Environmental Resource Specialist
Harding ESE, Inc.
3199 Riverport Tech Center Drive
St. Louis, MO 63043

RE: Howard Bend Floodplain Environmental Impact Statement (EIS)

Dear Mr. Skinker:

This letter is to inform you that the Environmental Protection Agency did, in fact, receive Harding ESE, Inc.'s letter dated May 8, 2001 regarding the project mentioned above. The EPA did not have any specific comments at that time to provide. In your renewed call for information, we would recommend taking a look at the Corps' Monarch-Chesterfield EIS. It appears that some of the environmental issues examined under that analysis could also apply to the Howard Bend project. A copy of EPA's review comments for the Monarch-Chesterfield EIS are provided as an enclosure.

We would appreciate any update that you might be able to provide on this project. I can be contacted at (913) 551-7805 or by e-mail at rocha.nick@epa.gov . Thank you for re-initiating communication on this project.

Sincerely,

Nicholas P. Rocha
NEPA Team
Environmental Services Division

RECYCLE
PAPER CONTAINS RECYCLED FIBERS

Mr. Gerald Barnes
Deputy District Engineer
Corps of Engineers
1222 Spruce Street
St. Louis, MO 63103-2833

Dear Mr. Barnes:

re: Review of the Chesterfield Valley Flood Control Study and Integrated Draft Environmental Impact Statement in St. Louis County, Missouri

The Environmental Protection Agency has reviewed the Chesterfield Valley Flood Control Study and Integrated Draft Environmental Impact Statement (DEIS). Our review is provided pursuant to the National Environmental Policy Act (NEPA) 42 U.S.C. 4231, Council on Environmental Quality (CEQ) regulations 40 C.F.R. Parts 1500-1508, and Section 309 of the Clean Air Act (CAA). The DEIS was assigned the Council on Environmental Quality (CEQ) number 000268.

The DEIS endeavors to analyze the need for flood damage reduction protection for Chesterfield Valley, Missouri. Structural flood control methods are evaluated which may significantly raise the existing levee height in this floodplain valley. Based on our limited review (the DEIS was addressed to the incorrect, Region 7 address, thereby reducing the amount of review days), and considering the level of detail that prompted each of our detailed comments (enclosed), we have assigned the DEIS a rating of EO-2 (Environmental Objections - Inadequate Information). A copy of EPA's rating system criteria is provided as an attachment to these comments.

EPA strongly encourages the Corps of Engineers to reevaluate the range of alternatives that are available to provide flood damage reduction which are in keeping with the intent of E.O. 11988 (Floodplain Management). I urge you to engage this Region's NEPA staff to discuss our objections and detailed comments for this DEIS.

Please send one copy of the Final EIS to this office at the same time it is officially filed with our Washington, D.C. office. If you have any questions, please contact Royce B. Kemp at (913)551-7551.

Sincerely,

Dennis Grams, P.E.
Regional Administrator

Enclosure(s) - 2

cc: Tom Lange, MDNR
Mark Wilson, USFWS

EPA's Comments on the Chesterfield Valley Flood Control Study and Integrated Draft Environmental Impact Statement in St. Louis County, Missouri

General DEIS Comments:

1. The Need portion (of the Purpose and Need) of the DEIS is deficient and unclear, providing no justification to increase the level of flood damage protection over the standard established by FEMA. Furthermore, the document does not contain analysis sufficient in detail to support Federal action in an increase in levee height above the 100 year level. A clearer need, which is presented in the narrative, would be to "bring the 100-year levee up to date to present federal standards."

2. The DEIS does not rigorously explore and objectively evaluate all reasonable alternatives. Reasonable alternatives that are not within the jurisdiction of the Corps are not included for analysis, and alternatives that are examined are not explained equally such that a reader may evaluate their comparative merits (40 CFR 1502.14).

3. The DEIS is flawed in that the document appears to *select* and rationalize the agency's preferred plan for implementation. The DEIS contains conclusions and other language that are normally found in a Record of Decision (ROD). In this same context, the DEIS rejects the No-Action alternative for consideration.

4. The document does not follow the NEPA format as recommended by 40 CFR 1502.10, furthermore, the Corps does not provide a compelling reason why the format is not followed. This deficiency causes the document to be extremely difficult to read, and to logically follow the issues and understand the consequences of the action being proposed.

5. This project would promote substantial development within the Missouri River Floodplain. Floodplain uses and values would be adversely affected by commercial and urban development that would promote increases in non-point source pollution, further wetland loss, and increased air pollution.

6. Cumulative effects of past, present and future incremental flood damage reduction projects are not adequately analyzed. "Flood control" cumulative actions promote commercial and urban development in the floodplain. The study does not provide adequate disclosure of the inherent risk involved in locating residences and businesses within the floodplain.

7. The net economic benefits, by which the recommended plan is selected, are not significantly greater than those for the existing levee. That is, the added flood damage reduction potential of the 500-year levee, considering average annual damage cost estimates and the associated benefit/cost ratio, when compared to the standard FEMA certified 100-year levee, is minimal and does not provide sufficient justification to increase the levee height above the federally recognized standard of 100-year flood protection. In fact, the benefit to cost ratio is highest for the 100-year levee plan. According to the *Principles and Guidelines for Water and Land Resources Implementation Studies (1983),* it is acceptable for the Corps to propose a plan other than the NED plan.

8. The estimated average annual damages appear to be artificially high for the 500-year levee raise because the economic analysis takes into account significant *anticipated* future development. This type of logic makes the net economic benefit greater for each successive level of levee height rasing (e.g., 100, 200, 500-year levels), while not taking into account (and equally and objectively comparing) the environmental values gained from restricting floodplain development.

9. This project would establish a precedent to increase other levees to the 500-year level with federal funding. No justifiable reason exists, nor is presented in the DEIS, to substantiate the need for this extreme and misleading level of flood damage reduction protection and the expenditure of federal funds to support it. Simply stated, the project proposal appears to be contrary to the intent of Executive Order 11988, Floodplain Management.

10. The project sponsor has elected on its own *desire* (not need) to initiate the construction of a 500-year levee, and has completed approximately 50% of that levee and plans to on completing the remainder of the 500-year levee with or without the assistance of the federal government. Although offered as an alternative in the DEIS, there is clearly no intention of constructing a 100-year levee.

Detailed DIES Comments:

1. Summary, page 6. The DEIS fails to disclose the project's Unresolved Issues as required by 40 CFR 1502.12.

2. Summary, page 11, Table 1. The section fails to explain the partial compliance (PC) with the Clean Water Act.

3. Main Report, page 20. This section describes specific planning steps used by the Corps in their planning process. However, the document does not appear to logically follow those steps, thereby creating a disconnect that makes it difficult to understand the actual planning process used for this project and to follow the issues throughout the document.

4. Main Report, page 23. EPA recommends that a map be included to supplement the description of the Floodplain Delineation.

5. Main Report, page 26. This section states that approximately 750 acres of farmland will remain agricultural land both in the future with/without project scenario. However, the DEIS provides no substantiation or reasoning for this statement.

6. Main Report, page 34. The amount stated for average annual inundation damages is not consistent with that of page 63, Table 8.

7. Main Report, page 37. This page seems to more fully capture the 'project need' in identifying that the Monarch-Chesterfield levee system lacks seepage controls, has an inadequate interior drainage system, and a costly maintenance program. EPA believes that non-levee raise alternatives exist that would best satisfy these needs for the project area, but have not been explored by the Corps.

8. Main Report, page 37. The Planning Objectives section fails to allow for any alternative other than a levee raise when other practicable alternatives may exist.

9. Main Report, page 39-40. This section eliminates reconnaissance measures from further consideration without adequately describing how the measure was cost prohibitive or otherwise insufficient to meet the projects' purpose, nor does it specifically explain why purchasing flood-prone structures would not be economically feasible for this project.

10. Main Report, page 57. Table 7 provides no quantifiable information for an informed decision making process, nor does it disclose effects that one could use in a rational, analytical evaluation of the alternatives.

11. Main Report, page 58. This section states that the induced flooding of the 500-year level flood cannot be accurately measured, yet elsewhere in the document there are specific, increased water stage trends (page 80).

Summary of EPA Rating Definitions

EPA's rating system was developed as a means to summarize EPA's level of concern with a proposed action. The ratings are a combination of alphabetical categories that signify EPA's evaluation of the environmental impacts of the proposal and numerical categories that signify an evaluation of the adequacy of the EIS.

Environmental Impact of the Action

"LO" (Lack of Objections)

The EPA review has not identified any potential environmental impacts requiring substantive changes to the proposal. The review may have disclosed opportunities for application of mitigation measures that could be accomplished with no more than minor changes to the proposal.

"EC" (Environmental Concerns)

The EPA review has identified environmental impacts that should be avoided in order to fully protect the environment. Corrective measures may require changes to the preferred alternative or application of mitigation measures that can reduce the environmental impact. EPA would like to work with the lead agency to reduce these impacts.

"EO" (Environmental Objections)

The EPA review has identified significant environmental impacts that must be avoided in order to provide adequate protection for the environment. Corrective measures may require substantial changes to the preferred alternative or consideration of some other project alternative (including the no action alternative or a new alternative. EPA intends to work with the lead agency to reduce these impacts.

"EU" (Environmentally Unsatisfactory)

The EPA review has identified adverse environmental impacts that are of sufficient magnitude that they are unsatisfactory from the standpoint of public health or welfare or environmental quality. EPA intends to work with the lead agency to reduce these impacts. If the potentially unsatisfactory impacts are not corrected at the final EIS stage, this proposal will be recommended for referral to the CEQ.

Summary of EPA Rating Definitions (*continued*)

Adequacy of the Impact Statement

"Category 1" (Adequate)

EPA believes the draft EIS adequately sets forth the environmental impact(s) of the preferred alternative and those of the alternatives reasonably available to the project or action. No further analysis or data collection is necessary, but the reviewer may suggest the addition of clarifying language or information.

"Category 2" (Insufficient Information)

The draft EIS does not contain sufficient information for EPA to fully assess environmental impacts that should be avoided in order to fully protect the environment, or the EPA reviewer has identified new reasonably available alternatives that are within the spectrum of alternatives analyzed in the draft EIS, which could reduce the environmental impacts of the action. The identified additional information, data, analyses, or discussion should be included in the final EIS.

"Category 3" (Inadequate)

EPA does not believe that the draft EIS adequately assesses potentially significant environmental impacts of the action, or the EPA reviewer has identified new, reasonably available alternatives that are outside of the spectrum of alternatives analyzed in the draft EIS, which should be analyzed in order to reduce the potentially significant environmental impacts. EPA believes that the identified additional information, data, analyses, or discussions are of such a magnitude that they should have full public review at a draft stage. EPA does not believe that the draft EIS is adequate for the purposes of the NEPA and/or Section 309 review, and thus should be formally revised and made available for public comment in a supplemental or revised draft EIS. On the basis of the potential significant impacts involved, this proposal could be a candidate for referral to the CEQ.

CITY OF MARYLAND HEIGHTS

212 MILLWELL DRIVE • MARYLAND HEIGHTS, MISSOURI 63043
TEL 314-291-6550 • FAX 314-291-7457 • WWW.MARYLANDHEIGHTS.COM

March 4, 2002

Bruce McNitt
Harding ESE
3199 Riverport Tech Center Drive
St. Louis, MO 63043

Re: Howard Bend Levee District permits

Dear Mr. McNitt:

Attached is a memorandum from Russ Todd, Building Commissioner/Flood Plain Manager, regarding the permits issued to the Howard Bend Levee District for the construction and improvement of the levee.

If you have further questions on this issue, please call.

Sincerely,

J. Wayne Oldroyd, AICP
Director of Community Development

JWO/jc

CITY OF MARYLAND HEIGHTS

212 MILLWELL DRIVE • MARYLAND HEIGHTS, MISSOURI 63043

BUILDING &

CODE
ENFORCEMENT

MEMO

To: Wayne Oldroyd, Community Development Director

From: Russell Todd, Building Commssioner RDT

Subject: Howard Bend Levee District Permits

Date: March 1, 2002

This memo addresses the above permits as they relate to the construction of the Howard Bend Levee District levee improvements.

Attached are copies of the grading permits and floodplain development permit issued to the Howard Bend Levee District. These permits were issued in accordance with city ordinances governing the moving of earthen fill and construction within the 100-year regulatory floodplain.

Only one floodplain development permit was issued for this project. The levee district was allowed to submit the plans in phases as they were designed and continue work on the levee.

You will also find attached a building permit for the concrete work adjacent to the Missouri-American Waterworks.

If you need any additional information, just ask.

CITY OF MARYLAND HEIGHTS
212 MILLWELL DRIVE MARYLAND HEIGHTS, MISSOURI 63043 TEL 314-291-6550 FAX 314-291-7457

APPLICATION FOR BUILDING PERMIT

Please type or PRINT clearly in ink.

HOG HOLLOW DATE: October 13, 2000

PROJECT ADDRESS: St. Louis County Water Co.-Central Plant ZONING DISTRICT: _____

PROPERTY OWNER NAME: HBLD - John Pellet TELEPHONE: 314-469-1305

ADDRESS: 13126 Parkland Woods Ct. Maryland Heights, MO 63043

TENANT NAME: NOT APPLICABLE TELEPHONE: _____

CURRENT ADDRESS: _____

CONTRACTOR NAME: Goodwin Bros. Construction Co. TELEPHONE: 636-931-6084

ADDRESS: 1766 Hwy. 61 South Crystal City, MO 63019

CONTACT PERSON FOR PICK-UP: Mr. Dan Nichols TELEPHONE: 636-931-6084 (Ext. 109)

ARCH/ENGR Horner & Shifrin, Inc. TELEPHONE NUMBER 314-531-4321 FAX NUMBER 314-531-6966

USE GROUP _____ CONST. TYPE Conc CURRENT SQ. FT. N.A. ADD'L SQ. FT. N.A. TOTAL SQ. FT. N.A.

DESCRIPTION OF WORK Construction of floodwalls to increase flood protection level

COST OF CONSTRUCTION (Bldg. Costs Only) $ 1.2 million

Charlie 1-636-448-5103

IS CONTRACTOR A TRANSIENT EMPLOYER Yes [ ] No [X]

IF YES, YOU MUST PROVIDE VALID TAX CLEARANCE ISSUED BY THE MISSOURI DEPARTMENT OF REVENUE OR CONTACT THE DEPARTMENT OF REVENUE AT (573) 751-3804 TO REQUEST PROPER REGISTRATION AND TAX CLEARANCE INFORMATION. THE BUILDING PERMIT WILL NOT BE ISSUED UNTIL THE CITY IS PROVIDED WITH THE TAX CLEARANCE.
(A "transient employer" is an employer making payment of wages taxable under the Missouri Income Tax Law, the Workers' Compensation Law and the Missouri Employment Security Law, who is not domiciled in Missouri and who temporarily transacts any business within the state.)

I hereby certify that the information contained in this application and accompanying drawings or plats is correct, and that I will conform with all applicable laws of the City of Maryland Heights.

Contractor

SIGNATURE OF APPLICANT: Leo A. Ehrl
Horner & Shifrin, Inc.

Please note: Two (2) sets of drawings are required. One (1) set will be returned. The Maryland Heights Fire Protection and Creve Coeur Fire District also require two (2) sets of drawings be submitted through the City. Other fire districts serving the City may have other requirements.

FOR OFFICE USE ONLY

APPROVALS		INSPECTION APPROVALS	
CITY PLANNER	DATE	FOOTING	DATE
PUBLIC WORKS	DATE	FOUNDATION	DATE
BUILDING COMMISSIONER ~~/PLANS EXAMINER~~	DATE 10/26/00	FRAMING	DATE
		Bryan Elmore BUILDING FINAL	DATE 6.14.01

PERMIT NO. 00-576 ISS. DATE 10/27/00 EXP. DATE 10/27/01 FEE $ 5188 RECEIPT NO. 9491

2235 X

CITY OF MARYLAND HEIGHTS

212 MILLWELL DRIVE • MARYLAND HEIGHTS, MISSOURI 63043

FLOODPLAIN DEVELOPMENT PERMIT/APPLICATION

PERMIT/APPLICATION NO. 99-10 **DATE:** October 22, 1999

1. Applicant Name: Howard Bend Levee Dist. Address: 13126 Parklands Wood Ct. Maryland Hgts, MO 63043 Phone: 469-1305
2. Address of Development Site: North of City of St. Louis Water Division's Howard Bent Treatment Plan 14769 Olive Boulevard; Chesterfield, MO 63017
3. Type of Development: Filling [X] Grading [X] Excavation [X] Routine Maint. [ ] Minor Improvement [ ] Substantial Improvement [X] New Construction [ ] (If Applicable) Pre-Improvement Values of Structure $_____ Cost of Improvement $ 2.3 million±
4. Description: Earthwork and concrete work involved in raising protection level of existing flood protection levee by approx. 3 ft.
5. Is property located in a designated Floodway? Yes [ ] No [X]

   IF YES, CERTIFICATION MUST BE PROVIDED PRIOR TO THE ISSUANCE OF A PERMIT TO DEVELOP, THAT THE PROPOSED DEVELOPMENT WILL RESULT IN NO INCREASE IN THE BASE FLOOD (100-YEAR) ELEVATION.
6. Is property located in a designated Floodway Fringe? Yes [X] No [ ]

   IF YES: Will project raise base flood elevation more than one foot? Yes [ ] No [X]

   a) Elevation of the Base (100-Year) Flood 462.5± MSL/~~NGVD~~

   b) Elevation/floodproofing requirement 472.0 MSL/~~NGVD~~

   c) Elevation of the proposed development site (if known) N.A. MSL/~~NGVD~~XX

   THIS PERMIT IS ISSUED WITH THE CONDITION THAT THE FIRST FLOOR (INCLUDING BASEMENT FLOOR) OF ANY NEW OR SUBSTANTIALLY IMPROVED RESIDENTIAL BUILDING WILL BE ELEVATED ABOVE THE BASE FLOOD ELEVATION. IF THIS IS A NON-RESIDENTIAL BUILDING, THIS PERMIT IS ISSUED WITH THE CONDITION THAT THE FIRST FLOOR (INCLUDING BASEMENT) OF A NEW OR SUBSTANTIALLY IMPROVED NON-RESIDENTIAL BUILDING WILL BE ELEVATED OR FLOODPROOFED ABOVE THE BASE FLOOD ELEVATION.
7. FIRM Panel number: 0145 H Source of Base Flood Elevation Data if not available on FIRM: _____
8. Other permits required? Corps of Engineers 404 Permit: Yes [ ] No [X] State Permit: Yes [ ] No [X]

ALL PROVISIONS OF THE CITY OF MARYLAND HEIGHTS, FLOOD DAMAGE PREVENTION ORDINANCE NO. 87-325 SHALL BE COMPLIED WITH.

THIS PERMIT IS ISSUED WITH THE CONDITION THAT THE DEVELOPER/OWNER WILL PROVIDE CERTIFICATION BY A REGISTERED ENGINEER, ARCHITECT, OR LAND SURVEYOR OF THE "AS-BUILT" LOWEST FLOOR (INCLUDING BASEMENT) ELEVATION OF ANY NEW OR SUBSTANTIALLY IMPROVED BUILDING COVERED BY THIS PERMIT.

Plans and Specifications approved this 5TH day of NOVEMBER, 1999.

NO BUILDINGS ARE INVOLVED IN THIS PROJEC

Signature of Developer/Owner

Russell Todd
Flood Plain Administrator

KS4/99

* CONTRACTOR TO OBTAIN GRADING & BUILDING PERMITS

GRADING PERMIT

Department of Streets and Engineering
City of Maryland Heights
212 Millwell Drive
Maryland Heights, MO 63043
291-6550

GRADING PERMIT NO. 6-0023-01

DATE: 10-30-01

Permit is hereby granted to: DAVE KOLB EXCAVATION
(Company Name)

to grade or excavate: LEVEE FROM RIVER VALLEY TO PAGE AVE.
(Locations)

for the purpose of: CONSTRUCTING LEVEE

NO PERMIT FEE !

J Allen
Director
Streets & Engineering

GRADING PERMIT

Department of Streets and Engineering
City of Maryland Heights
212 Millwell Drive
Maryland Heights, MO 63043
291-6550

GRADING PERMIT NO. G.0022.01

DATE: 10-30-01

Permit is hereby granted to: DAVE KOLB EXCAVATION
(Company Name)

to grade or excavate: LEVEE FROM PAGE TO DISCHARGE CANNEL
(Locations)

for the purpose of: CONSTRUCTING LEVEE

NO PERMIT FEE!

J. Allen
Director
Streets & Engineering

GRADING PERMIT

Department of Streets and Engineering
City of Maryland Heights
212 Millwell Drive
Maryland Heights, MO 63043
291-6550

GRADING PERMIT NO. G-0015-2000

DATE: 10/24/00

Permit is hereby granted to: GOODWITH BROTHERS CONSTRUCTION
(Company Name)

to grade or excavate: FOR HOWARD BEND LEVEE DISTRICT
(Locations)

for the purpose of: CONSTRUCTION OF FLOOD WALL

NO FEES FOR
PERMIT OR INSPECTIONS

JOHN ALLEN
~~Director~~
Streets & Engineering

GRADING PERMIT

Department of Streets and Engineering
City of Maryland Heights
212 Millwell Drive
Maryland Heights, MO 63043
291-6550

GRADING PERMIT NO. G-0016-2000

DATE: 10/24/2000

Permit is hereby granted to: UNNERSTALL CONSTRUCTION
(Company Name)

to grade or excavate: FOR HOWARD BEND LEVEE DISTRICT
(Locations)

for the purpose of: CONSTRUCT LEVEE

NO FEES FOR
PERMIT OR INSPECTIONS

JOHN ALLEN
~~Director~~
Streets & Engineering

DEPARTMENT OF THE ARMY
ST. LOUIS DISTRICT, CORPS OF ENGINEERS
1222 SPRUCE STREET
ST. LOUIS, MISSOURI 63103-2833

REPLY TO
ATTENTION OF:

March 4, 2002

Regulatory Branch

Mr. William Elzinga
Harding ESE
3199 Riverport Tech Center Drive
St. Louis, Missouri 63043

Dear Mr. Elzinga:

We have reviewed your February 28, 2002, Scope of Services for the Howard Bend Environmental Impact Statement (EIS). This scope of services is for work that still needs to be completed to get the subject EIS through the draft stage. This includes continued scoping, data gathering and analyses, formalization of the study area, alternatives, purpose and need, and writing and publication of the draft EIS. This would also include preparation for a formal public hearing on the draft EIS.

As you know, the original schedule for publication of the draft EIS has been delayed. This project has proven to be a very difficult and dynamic one. However, the current scope of services appears to get the project on track with the appropriate scope of analysis. We agree that a meeting with the resource agencies prior to publication of the draft EIS is needed. This will help to insure that the agencies are kept informed and potentially reduce comments on the draft EIS. After numerous meetings we have decided that the expanded study area is needed and should also help with agency coordination. We are currently working with you on developing the existing wetland database. We need to coordinate on working with the Natural Resources Conservation Service to do a slide review of areas not already determined for wetlands and determine the best methods to delineate the remaining forested areas. The current land use master plan being conducted by the City of Maryland Heights should adequately address the needs of future foreseeable actions for commercial and industrial development for the protected areas from the 500-year levee

construction of flank levees and the need for the Howard Bend Levee District to obtain a Section 404 permit. If this occurs we may have to do additional evaluation and impact analysis. We will need to coordinate closely with the levee district and City of Maryland Heights to determine the appropriate direction to take on this issue. We are discussing this issue with our counsel to determine the repercussions of the flank levees on the EIS. If you have any questions do not hesitate to contact me at (314) 331-8574.

Sincerely,

Danny D. McClendon

Danny D. McClendon
Chief, Regulatory Branch

STATE OF MISSOURI
Bob Holden, Governor • Stephen M. Mahfood, Director
DEPARTMENT OF NATURAL RESOURCES
OFFICE OF THE DIRECTOR
P.O. Box 176 Jefferson City, MO 65102-0176

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MAR 1 1 2002

March 5, 2002

Richard Skinker
Harding ESE
3199 Riverport Tech Center Drive
St. Louis 63043

Dear Mr. Skinker:

The Missouri Department of Natural Resources is writing to express concerns regarding floodplain development in Missouri. The U.S. Army Corps of Engineers' current study of future floodplain development impacts in the Howard Bend Bottoms area of St. Louis County provides an opportunity to address a variety of floodplain issues that may not be specific to a particular flood control or construction project.

Despite investment of over $38 billion on federal flood protection projects nationwide, the amount of flood damages incurred annually throughout the country has significantly increased. The approximately $3 billion spent annually on flood repairs has more than doubled since 1951 in terms of per-capita expenditures and dollar value. (Letter to the Honorable Pete Domenici by environmental organizations, 1995.) The reason for this increase, despite significant investment in flood control measures, is that flood control programs encourage communities and individuals to discount or underestimate the risks of development in the floodplain. The economic incentives for state and local governments, as well as individual investors, to make intelligent decisions regarding floodplain development have been eliminated by the federal government's increased assumption of responsibility for flood control as well as flood insurance programs. The federal government's programs to build and repair levees, subsidize the cost of flood insurance, and provide disaster relief to flood "victims" for repeated flood damage encourages the cycle of floodplain development, damage and redevelopment.

Changes in federal policy during the last century resulted in the burden of cost being shifted from the floodplain property owner to the federal taxpayer. By around 1950, the taxpayer had become responsible for the full cost of building and maintaining flood control projects, repairing public and private projects, and providing disaster relief. The National Flood Insurance Program (NFIP) now allows floodplain development to proceed with little or no risk to the floodplain property owner, state or local government.

A disproportional allocation of federal flood disaster relief goes toward the rebuilding of structures that have previously received damages. Only three states rank above Missouri in terms of repetitive losses. This trend of repetitive losses is likely to escalate in cost, as building in the floodplain continues. For example, the Flood of 1993 caused $570 million in damage in the Chesterfield Valley, according to a Post-Dispatch article from July 19, 2000. Rapid development of this area in the years since the Flood of 1993 has multiplied the amount of damage possible should the newly raised levee prove inadequate to flood protection in future flood events. Flood control measures such as levees reduce the frequency of flood damage in a floodplain, but cannot eliminate the inevitability of flood damage during future flood events. However, the public perception is that a floodplain protected by a levee is "safe," particularly if development is insured by the NFIP, and therefore rushes ahead with large-scale floodplain development.

RECYCLED PAPER

Such development is encouraged by local governments that reap the rewards of additional tax revenue generated by the development, without any risk of compensating for flood damages in the future.

Both state and federal officials have recognized the extreme risks of building in the floodplain. In federal Executive Order 11988 – Floodplain Management, 1977, the order states in part: "Each agency shall provide leadership and shall take action to reduce the risk of flood loss ...and to restore and preserve the natural and beneficial values served by floodplains in carrying out its responsibilities for (1) acquiring, managing, and disposing of Federal lands, and facilities; (2) providing Federally undertaken, financed, or assisted construction and improvements; and (3) conducting Federal activities and programs affecting land use, including but not limited to water and related land resources planning, regulating, and licensing activities." In recognition of ever-increasing expenditures on flood losses, Missouri's Executive Orders 97-08 and 97-09 address the need to "insure that future uses and development of the State's floodplains are analyzed and used in a manner to lessen the risk of flood losses..." During a 1999 St. Louis visit, James Lee Witt, head of FEMA, had this to say about levee protection of floodplains: "If its manmade, nature can wipe it out." FEMA's Bob Bissell, chief of the mitigation division in Kansas City, stated ".... as you saw in '93, that security literally washed away, and there was a lot of damage behind the levee. So even though our regulations allow that kind of development, we don't really support it. We support a more conservative flood-mitigation effort, which would be to simply not build there."

The floodplain should function as an area to store and slowly release water during high water events. Levees are designed to restrict the access of such water to the floodplain, squeezing rivers into deeper and narrower channels. Contained in this manner, water is unable to spread out over the floodplain, instead rushing downstream with greater velocity, resulting in higher flood crests and peaks. The public's reaction after observing the higher water level is to demand improved flood protection measures, resulting in a self-perpetuating cycle of wetland drainage and levee construction along the entire river system.

The gradual but continual loss of floodway conveyance capacity, combined with evidence that river stages are increasing during periods of flooding is a problem that needs to be addressed during this floodplain planning and management discussion. The loss of floodway conveyance and floodplain storage capacity is due to the cumulative effect of a number of factors, including: bank stabilization and navigation structures; accretion of land in and along the channel; construction of federal, agricultural and other private levees within the floodway; and construction of facilities in the floodway related to public, commercial or industrial development. Bank stabilization has contributed to reduction of the carrying capacity of the river channel and floodway, as the overall channel width has been progressively narrowed, and numerous secondary channels have been silted in or closed off. Bank stabilization and navigation structures have encouraged development along the Missouri River, without implementation of a comprehensive floodplain management plan. As a result of these programs, 100,300 acres of aquatic and 374,300 acres of terrestrial habitat have been lost in the floodplain located between Sioux City, Iowa and St. Louis, Missouri on the Missouri River. (Jerry L. Rasmussen and Jim Milligan, U.S. Fish & Wildlife Service, Columbia, MO, "The River Floodway Concept – A Reasonable and Common Sense Alternative for Flood Control.")

On the Mississippi River and its tributaries alone, more than 7,000 miles of levees separate these waterways from their natural floodplain. Both scientific literature and public policy have established the important role that wetlands play in maintaining water quality. Wetlands serve to protect drinking water supplies, water-related recreational activities and aquatic life by controlling and filtering run-off. One factor in the extent of massive flooding during 1993 in the Upper Mississippi River Basin was that more than 85% of the wetlands in most of the basin had previously been lost. The result was that water that would have remained in temporary lakes and lowlands prior to loss of wetlands, instead was rapidly diverted to already swollen rivers. It is estimated that 300 acres of wetlands have been lost since 1993 in the Chesterfield Valley alone. (Riverfront Times, "After the Deluge," citing U.S. Fish and Wildlife Service, 11/15/2000.) Future development in the area is a certainty. The level of environmental impacts that come with the shopping centers and suburban housing are of a substantial consequence to the future of streams, surface water quality, flood flows, sedimentation of streams and wetlands.

As evidenced by the state and federal Executive Orders, reducing the risk of flood losses is a goal of both levels of government. To reduce the risk of flood damage, residential property and facilities of high dollar value and high risk of damage by flood should be removed from the floodplain. This does not mean that land should remain fallow, rather the following uses that are compatible with inundation are recommended: farmland, open space, limited use recreational facilities, fish and wildlife habitat and wetlands. Repetitive flooding has resulted in the accumulated deposits of fertile soils in floodplain areas. Therefore construction on flood plains removes some of Missouri's most fertile agricultural land from crop production, reducing the agricultural capacity of the state. Agricultural lands and wildlife habitat could exist outside the protection of levees in urban areas. In rural areas, interior agricultural lands should be protected by levees constructed at the landowner's discretion and expense, not to exceed height sufficient to protect against a ten year flood elevation. The exception to this approach would be in areas where:

- Protecting existing densely concentrated development would make more economic sense than relocation;
- Levees can be constructed and maintained to provide adequate protection from flooding; and
- Such flood protection would not compound problems during high water (disrupting transportation networks or impeding the floodway).

Negative impacts to cultural resources are likely to occur during floodplain development. Archeologists had, until 1999, held the general opinion that buried or deeply buried archeological sites in the Missouri River floodplain had long ago been washed away by repeated flooding. However, that opinion was radically changed when investigations prior to a bridge replacement in Callaway County led to the discovery of the Callaway Farms site. A significant part of a pre-historic village was excavated, demonstrating that while the current floodplain may appear mostly level, a series of terraces existed prehistorically. These terraces have been covered by layers of alluvium over the centuries. Now that archeologists know to search for sites in the floodplain, more are likely to be discovered.

Shipwrecks are protected in Missouri by state law, and are another resource likely to be located in floodplains. This would include steamboats, ferries, barges, and other historic and pre-historic Native American watercraft. Historically, Missouri developed along the major rivers before inland areas were settled. Numerous small towns remain throughout the river valleys as a result of this settlement pattern. These towns are generally considered too small to justify an urban levee, but consideration should be given to their protection as levees are constructed upstream and downstream of their location.

Groundwater impacts are likely to result from development in floodplains. In general, the increase in the impermeable area caused by the addition of roadways and parking lots will affect the hydrology of the area. This effect will be to diminish the groundwater recharge in the area, in turn diminishing the base flow. The most severe effects will be realized in times of drought, when groundwater discharge is the only input into stream systems. Accordingly, there will be an increase in the peak flow, due to:

1. increases in the amount of impermeable surfaces;
2. reduction of stream channel lengths by use of culvert pipes;
3. reduction of interception of precipitation through continuous mowing/maintenance of grass along right-of-ways;
4. increases in velocity due to reduced roughness within culvert pipes/riprap areas; and shunting of runoff directly into streams through engineered ditches.

Air quality is likely to be negatively impacted as a result of intensive floodplain development. The amount of traffic congestion induced by large-scale floodplain developments will increase the amount of pollutants in the area. Since the floodplains have previously been undeveloped, there is no transit access, and little or no alternative to single occupant vehicles for travelers trying to reach the area. Since St. Louis County

is in the ozone non-attainment area, higher concentrations of pollutants could have consequences outside the floodplain.

We appreciate being provided the opportunity to comment on this proposed study of floodplains in Missouri. Please contact me if you have any questions about our comments at (573) 751-3195.

Thank you.

Sincerely,

DEPARTMENT OF NATURAL RESOURCES

Tom Lange

Tom Lange
NEPA Coordinator

United States Department of Agriculture

USDA

NRCS Natural Resources Conservation Service

160 St. Peters Centre Blvd., St. Peters, MO 63376-1695 Phone: 636-922-2833 ext. 3 Fax: 636-922-2840

March 20, 2002

Rich Skinker
Harding ESE
3199 Riverport Tech Center Dr.
Maryland Heights, MO 63043

Dear Mr. Skinker:

Enclosed are the tracts that have certified wetland delineations. I apologize for the delay in getting this back to you.

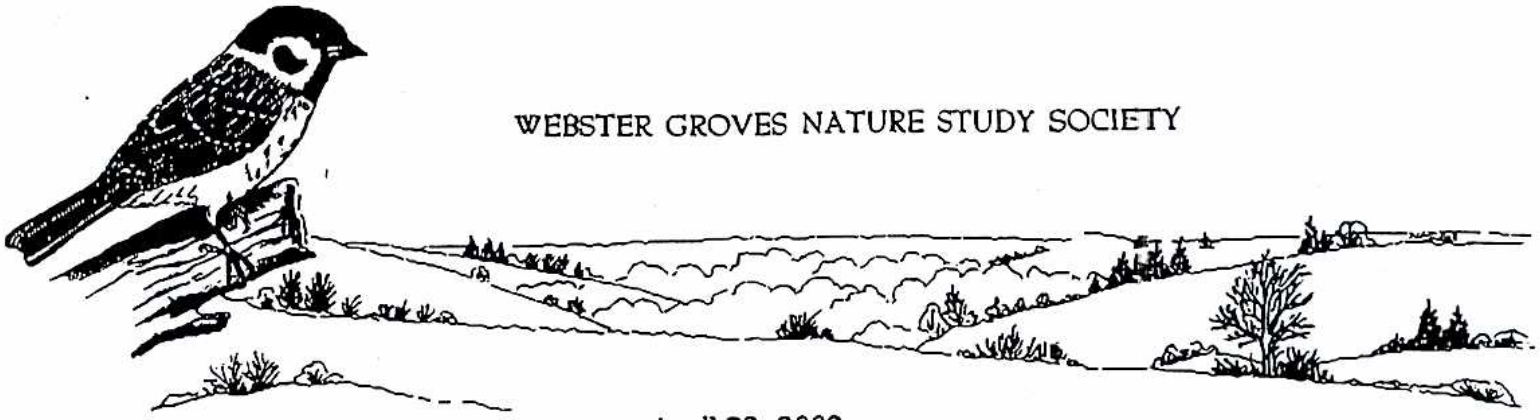
If you have any questions, don't hesitate to call me.

Sincerely,

Renee L. Cook (FC)

Renee L. Cook
District Conservationist

Enclosure



WEBSTER GROVES NATURE STUDY SOCIETY

April 23, 2002

By Fax to (314) 331-8741 and by Regular Mail

Mr. Danny McClendon
U.S. Army Corps of Engineers
1222 Spruce Street
St. Louis, MO 63103

By Fax to (913) 551-7863 and by Regular Mail

Ms. Kathy Mulder
U. S. Environmental Protection Agency
901 North Fifth Street
Kansas City, Kansas 66101

By Fax to (573) 526-3239 and by Regular Mail

Ms. Gayle Unruh
Mr. Robert Meade
Missouri Department of Transportation
P. O. Box 270
Jefferson City, MO 65102

By Fax to (402) 221-3372 and by Regular Mail

Mr. Robert Anderson
National Park Service
Omaha Regional Office
1709 Jackson Street
Omaha, Nebraska 68102

By Fax to (573) 751-7627

Mr. Stephen Mahfood, Director
Missouri Department of Natural Resources
P. O. Box 176
Jefferson City, MO 65102

By Fax to (573) 876-1914 and by Regular Mail

Mr. Rick Hansen
U.S. Fish and Wildlife Service
608 East Cherry Street, Room 200
Columbia, MO 65201

Dear Regulators:

St. Louis County has begun digging borrow pits in the Page Avenue mitigation area near Little Creve Coeur Lake. The Webster Groves Nature Society is concerned that such digging might impact the hydrology of the area and negatively affect Little Creve Coeur Lake, which is a natural wetlands. It is our understanding that St. Louis County has entered into a contract with the Howard Bend Levee District to sell dirt to the Levee District and that the only purpose of the borrow pits is to allow St. Louis County to meet its obligations under this commercial contract, for which it is receiving payment.

We would like your agencies to immediately take the following steps:

1) Ask St. Louis County to stop digging until a thorough assessment has been made of its activities.

2) Provide us with a copy of any report assessing the impact of St. Louis County"s dirt removal and creation of borrow pits. If no such assessment has been done, we would like to know why.

3) Provide us with a summary of what oversight responsibilities each of the above agencies has relating to this project.

4) Provide us with a copy of the Master Plan for this project. If such a plan does not exist, what agency or entity is responsible for preparing it?

We look forward to hearing from each of the above agencies concerning the four areas outlined above. We are also requesting a meeting of regulators, St. Louis County, and non-governmental stakeholders, such as WGNSS, Missouri Coalition for the Environment, and St. Louis Audubon Society, to discuss the impact of St. Louis County's actions on Little Creve Coeur Lake.

We look forward to your individual replies to this letter. Thank you in advance for your cooperation in helping us assess this matter.

Very truly yours,

Yvonne Homeyer

Yvonne Homeyer, Conservation Chairperson
and President-Elect
1508 Oriole Lane
St. Louis, MO 63144
(314) 863-3321 office
homeyer@earthlink.net

Copy to:

By Fax to (314) 615-4696 and by Regular Mail

Ms. Genie Zakrzewski, Director
St. Louis County Parks
41 S. Central Avenue
St. Louis (Clayton), MO 63105

MISSOURI COALITION FOR THE ENVIRONMENT

6267 Delmar Blvd. 2-E • St.Louis MO 63130 • 314-727-0600 Fax: 314-727-1665 • moenviron@moenviron.org • www.moenviron.org

April 25, 2002

RECEIVED
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2002 APR 29 AM 6: 40
OFFICE OF COUNSEL

VIA FAX AND U.S. MAIL

Danny McClendon
Regulatory Branch
U.S. Army Corps of Engineers
1222 Spruce Street
St. Louis, Missouri 63103-2833

Re: Howard Bend Levee

Dear Mr. McClendon:

I am writing this letter to request that the Army Corps of Engineers bring an immediate halt to activities underway on the Howard Bend levee. As you know, the Howard Bend Levee District (HBLD) has been in the process of raising its levee to a so-called 500-year level of protection for nearly a year now. It is undertaking these activities without a section 404 permit. All along, the Coalition has maintained that this activity is in violation of the federal Clean Water Act, National Environmental Policy Act and other federal laws. We have requested on numerous occasions that the Corps assert jurisdiction over the project to ensure compliance with federal laws. Nevertheless, the Corps has been dilatory in responding to our efforts to obtain relevant documents and flatly refused to acknowledge the serious legal issues regarding this project.

We now believe there is irrefutable evidence that the HBLD is illegally "piecemealing" this project in violation of the above referenced statutes. Instead of acknowledging the full scope of the project, which will require one or more section 404 permits, the HBLD is intentionally concealing the full extent of the project to delay the assertion of federal jurisdiction. Moreover, there seems little question that even the illegally piecemealed definition of the project requires a federal permit.

Enclosed are two recently obtained documents that, when combined with all of the other information we have discussed with you in the past, provide the irrefutable proof that the HBLD is engaged in an illegal effort to piecemeal the levee project.

- Attachment A is a page from the recently approved Howard Bend Future Land Use Plan prepared by the City of Maryland Heights. This document reveals the true plans of the HBLD with regard to the levee project. Not only does it include the levee along the Missouri River, but also includes extensive flank levees along Creve Coeur Creek, the installation of pumps in and along the Creek and the possible "widening" of Fee Fee Creek. There can be

no question that these activities are both part of the larger levee project and that they will require a section 404 permit. In fact, some of these activities – such as modifications to the outfall structure – will physically be part of the erroneously delimited "river levee." If you would like to see the complete document for context, it can be obtained on the City of Maryland Heights web site.

- Attachment B is a copy of a document obtained as a result of a FOIA request to the Corps. (It should be noted that the original FOIA request for these documents is nearly a year old, and these documents were only produced within the last two months). Page 1 of attachment B shows the document as originally viewed – with several "post-it" notes stuck to it. Two of the post-its were signed "M.F." and apply specifically to the current activities of the HBLD. As you can see, the top note recommends that the Corps should not issue any permits that would allow a 500-year levee to be constructed without an EIS because such activity would be a violation of the consent decree obtained by the Coalition in the Riverport litigation brought in the late 1980s. The note at the bottom of the page states that an HBLD representative (not named) stated that they would try to piecemeal the levee project. There is no date shown on the document or the notes.

There can be no question that the activities described in the Howard Bend Land Use Plan will require a section 404 permit. There can also be no question that these actions constitute an integral part of the project that has already begun through work on the river levee. As you know, NEPA absolutely requires that an environmental review be prepared *before* the issuance of a federal permit. It is therefore essential that the Corps bring an immediate halt to the ongoing activities on the Howard Bend levee to prevent any further transgressions of federal law. Moreover, the fact that the Corps has apparently long known about the intent of HBLD to "piecemeal" this project calls the integrity of your entire regulatory program into further question.

Finally, I will reiterate our contention that the existing structure across Creve Coeur Creek appears to have been built illegally. Despite numerous requests and months of waiting, the Corps has never provided us with documentation showing that either the original outfall structure or the concrete floodwall later built over the Creek was done with a valid permit. In fact, every indication is that the floodwall was built shortly after the 1993 flood in a blatant attempt to segment it from the entire levee raising project. In any event, both the original outfall structure and the more recently built floodwall must obtain a valid section 404 permit under the Clean Water Act and a Section 10 permit pursuant to the Rivers and Harbors Act of 1899 since they impact wetlands and waters below the "ordinary high water mark."

I am dismayed at the blind eye the Corps continues to turn toward the blatantly illegal endeavor underway in the Howard Bend floodplain. However, after witnessing a similar pattern on other projects, the Corps' complete disregard for federal law no longer surprises me. Please provide a response to this letter within 10 days letting me know whether the Corps intends to take action or that enforcement will once again be left up to interested members of the public.

Very truly yours,

Edward J. Heisel
Senior Law & Policy Coordinator

Encls.

cc: Larry Shepherd (*via fax*)
USEPA Region 7
901 N. 5th Street
Kansas City, KS 66101
(913) 551-7765 (fax)

Charles Scott, USFWS (*via fax*)
608 E. Cherry Street
Room 200
Columbia, MO 65201
(573) 876-1914 (fax)

Stephen Mahfood (*via U.S. Mail*)
Director, MDNR
P.O. Box 176
Jefferson City, MO 65102

David Asbed, USACE Office of Counsel (*via U.S. Mail*)
U.S. Army Corps of Engineers
1222 Spruce Street
St. Louis, Missouri 63103-2833

RESOURCE INVENTORY: STORMWATER MANAGEMENT

The second project is construction of an internal drainage conveyance and storage system. The Howard Bend Planning Area receives upland stormwater flow from two major watersheds, including Creve Coeur Creek and Fee Fee Creek. With these two watersheds, along with the land within the planning area itself, the Howard Bend Planning Area handles drainage conveyance for over 49 square miles. The long-term preservation of land to allow for this conveyance and storage is critical. The internal regional drainage system is also being designed and will ultimately be constructed by the Levee District. Depending on the final design, there will be substantial land that must be preserved for flood conveyance and storage, some of which is currently in private ownership. Care should be exercised in the design of conveyance channels, settlement ponds and other water features, to ensure that water flows continuously, that their banks are attractive and that they become scenic and recreational assets to the area.

In addition to the need to convey and store stormwater for the purpose of minimizing the risk of flooding, it is also possible and desirable to use stormwater conveyance systems as a community asset. Specifically, rather than simply engineering concrete channels, stormwater conveyance and storage can be designed to function as an open space amenity. First, certain areas can be maintained as environmentally sensitive open space areas that can provide scenic relief and open space in developed areas, while serving as conveyance channels during times of flooding. Secondly, stormwater conveyance channels have the potential to serve as an integrated backbone of a system of water features serving as amenities for development.

Given the constraints of topography, the regional stormwater system to collect, transport, store and pump stormwater will be large and complex. Depending on available funding, it may take that next ten years to develop and complete. The particular system that has been proposed by the Levee District would keep in place the existing configuration whereby the discharge from Creve Coeur Lake continues in Creve Coeur Creek, to a junction with Fee Fee Creek; from that point on, a common channel leads to a gated outlet structure which discharges through the levee to the Missouri River (the gates can be cloased to prevent Missouri floodwater from entering the protected area). Primary elements of improvement include widening portions of Fee Fee Creek and raising the flank levees to increase the available stormwater storage, increasing the capacity of the outlet structure, and accelerating the rate at which excess water may be stored in the "Little Lake" area. Pumping would be necessary to discharge during Missouri River Flood Events. This system has been incorporated into the current land use plan and the ongoing EIS.

An alternate drainnage plan being considered changes the primary configuration. The discharge structure would be removed from the Missouri River levee, allowing free discharge so that lower Fee Fee Creek could "float" at the level of the Missouri River during high stages. Under this plan, flank levees along Fee Fee Creek would be constructed to the level of the Missouri River flood protection, from the river to the bluff line. Conveyance, not storage, would dictate the width of the lower Fee Fee reach. A new gated structure would be constructed to control discharge from Creve Coeur Creek at its junction with Fee Fee Creek, to prevent river backup into the Creve Coeur Creek system.

ASSUMPTIONS

The Howard Bend Levee District will be responsible for the design, construction, and maintenance of the regional stormwater conveyance and storage system located within the Howard Bend area.

The location and rights-of-way of conveyance channels and storage areas as part of this regional stormwater storage and conveyance system will be established by the Howard Bend Levee District and will be sized to manage upland flow for 100-year joint frequency storm event.

Some land that is currently in private ownership will likely be identified for preservation as stormwater conveyance or storage areas; the location of these areas and addressing private property issues is the responsibility of the Levee District.

The flank levees should be designed to ensure that stagnant water does not result. The use of settlement ponds and various water features should be undertaken so that they become scenic assets, rather than merely stormwater control devices.

Local runoff for individual sites within the planning area will be detained on site.

Standards for impervious surface site coverage (structures and parking areas) need to be developed in order to accommodate detention of stormwater. These standards need to be developed based upon stormwater runoff and conveyance requirements.

Developers will be responsible for on-site drainage and conveyance to the regional stormwater system.

It is reasonable to require multiple use of the stormwater conveyance system for scenic and aesthetic purposes where feasible.

ATTACHMENT A (Page 16 OF PLAN)

Attachment B Page 1 45

Horner & Shifl
Engineers/Architects
Surveyors/Constructi
5200 Oakland Ave
St. Louis, Missouri
314-531-4321

MAKE SURE THAT WE DON'T ISSUE NWPS OR IP'S FOR HBLD STRUCTURES THAT WILL ALLOW A 500 YEAR LEVEE TO BE CONSTRUCTED WITHOUT EIS PER RIVERPORT CONSENT DECREE MF.

TO: Kansas City D.
U.S. Army Corps
700 Federal Bld.
601 E. 12th St. / K

ATTN: MR. JIM SCOTT

WE TRANSMIT:
(✓) herewith ( ) under separate cover via
in accordance with your request

FO

(✓) review & comment
( )

OHWM

TI

( ) Shop Drawing Prints
( ) Product Literature

Mo. River
Mile 30.75

439.9

DESCRIPTION

on for replacement of gated outlet
ps. 2pp form + 4 drawings
stim plan, structure plan, and sections

Looks like I.P. probably excessive generally for NWP.

for the levee district, in a draft
e we formally apply for the permit.
tion of 1' contour detailed topo from
give cut + fill yardage.
ne photos of the existing structure.)

P.S., HBLD SAID THEY WOULD TRY TO PIECEMEAL IT. MF.

COPIES TO:

BY: Gene Rovak
GENE ROVAK

H&S JOB NO. 9429

MISSOURI DEPARTMENT OF CONSERVATION

Headquarters
2901 West Truman Boulevard, P.O. Box 180, Jefferson City, Missouri 65102-0180
Telephone: 573/751-4115 ▲ Missouri Relay Center: 1-800-735-2966 (TDD)

JOHN D. HOSKINS, Director

RECEIVED
SEP 0 9 2002

September 6, 2002

Ms. Kathleen L. Conley
Harding ESE, Inc.
3199 Riverport Tech Center Dr.
St. Louis, MO 63043

Dear Ms Conley:

Re: Howard Bend Floodplain Environmental Impact Statement

Thank you for your letter of July 8, 2002, regarding species of conservation concern within the proposed project area. I also appreciate your accommodating our need for additional time to develop our comments. Whatever alternative is selected, we urge that adequate consideration be given to avoiding and minimizing impacts to the environmental resources within the project area. Balancing economic development, flood protection, and natural resource protection in this area is difficult, given the multiplicity of federal, state, local, and private interests in this issue, now and in the future.

A review of our records shows that public lands, sensitive species or communities are known to exist on or near the above referenced site. Details are provided in the enclosed Heritage Database report which reflects information we currently have in our database. Please be advised this is **not a site clearance letter**. Rather, this letter provides an indication of whether or not public lands and sensitive resources are known to be (or are likely to be) located close to the proposed project area.

Incorporating information from our Heritage Database into project plans is an important step that can help reduce unnecessary impacts to Missouri's sensitive natural resources. However, the Heritage Database is only one reference which should be used to evaluate potential adverse impacts. Other types of information, such as wetland and soils maps and on-site inspections or surveys, should be considered. Reviewing current landscape and habitat information and species biological characteristics would additionally ensure that species of conservation concern are appropriately identified and addressed.

COMMISSION

STEPHEN C. BRADFORD
Cape Girardeau

ANITA B. GORMAN
Kansas City

CYNTHIA METCALFE
St. Louis

HOWARD L. WOOD
Bonne Terre

Since 1971, the Conservation Commission and Department staff have been stating their concerns to the U.S. Army Corps of Engineers (USACOE) over land use and flooding issues in this region of the Missouri and Mississippi Rivers. The 1993 and 1995 floods provided dramatic examples of the staggering social and economic losses that result when these mighty rivers reclaim their floodplains; and these rivers will flood again—any bets to the contrary?

Coordination with private, local, state, and federal entities for non-structural (without levees) means of reducing flood damage and open space/wetland development may provide a means to achieve a balance between economic development and natural resource considerations. Depending upon which course of action proposed by the USACOE is adopted through the Environmental Impact Statement process, fish and wildlife resources within the Howard Bend Levee Floodplain could be adversely affected. Other recreational, aesthetic, and environmental resources and potentials in this region, lying so near a major metropolitan complex, might also suffer.

Thank you for the opportunity to review and comment. The Conservation Commission and Department staff would like to urge the USACOE not to make any decision for an alternative course of action until all feasible alternatives and facts are determined and carefully evaluated. The Department would welcome involvement in development of a Howard Bend Strategic Area Management Plan if that alternative proves to be the selected course of action.

Sincerely,

DANIEL J. WITTER
POLICY COORDINATION CHIEF

DJW:GG:dcl

Enclosure

c: John Smith, Gerald Ross, Michael Arduser, Richard Wehnes, Lynn Schrader, Joel Porath, Steve Spezia

HARDING ESE, INC.
3199 RIVERPORT TECH CENTER DRIVE
ST. LOUIS, MISSOURI 63043

HOWARD BEND FLOODPLAIN ENVIRONMENTAL IMPACT STATEMENT

The following species and/or natural communities are known to occur on or in the vicinity of the project site:

Scientific Name	Common Name	Federal Status	State Status	State Rank	Township/ Range	Sec.
BOTAURUS LENTIGINOSUS	AMERICAN BITTERN		E	S1	046N005E	19
MACRHYBOPSIS MEEKI	SICKLEFIN CHUB			S3	046N004E	25
ECHINODORUS TENELLUS VAR PARVULUS	DWARF BURHEAD			S1	046N004E	25
PHYSCOMITRELLA PATENS	A MOSS			S1S2	047N005E	32
HYBOGNATHUS PLACITUS	PLAINS MINNOW			S2	046N004E	25
MACRHYBOPSIS MEEKI	SICKLEFIN CHUB			S3	046N005E	07
PASPALUM SETACEUM VAR SETACEUM	SLENDER PASPALUM			S1	047N005E	32
SMALLANTHUS UVEDALIUS	YELLOW-FLOWERED LEAFCUP			S4	046N005E	19
MACRHYBOPSIS MEEKI	SICKLEFIN CHUB			S3	046N004E	12
ACALYPHA DEAMII	LARGE SEEDED MERCURY			SH	046N005E	29
MACRHYBOPSIS STORERIANA	SILVER CHUB			S3	046N004E	25
MACRHYBOPSIS GELIDA	STURGEON CHUB			S3	046N005E	07
NOTROPIS BUCHANANI	GHOST SHINER			S2	046N004E	12

Additional information for planning purposes:

Overwintering bald eagles (Federally threatened, State endangered) may occur in the project area, as they are common winter residents in big river habitats and major lakes where they feed on fish.

Pallid sturgeons (Federally endangered, State endangered) are big river fish that may range widely in the Mississippi River and Missouri River system. Because the preferred habitat and range of the species are unknown, any project that modifies big river habitat or impacts water quality should consider the possible impact to pallid sturgeon populations.

FEDERAL STATUS - The federal status is derived from the provisions of the federal Endangered Species Act, which is administered by the U.S. Fish and Wildlife Service. The Endangered Species Act provides federal protection for plants and animals listed as Endangered or Threatened. E = Endangered, T = Threatened, C = Candidate, PE = Proposed Endangered for Federal listing.

STATE STATUS (E) -The state status is determined by the Department of Conservation under constitutional authority. Rule 3CSR10-4.111Endangered Species of the *Wildlife Code of Missouri* and certain state statutes apply to state Endangered species.

STATE RANK - A numeric rank of relative endangerment based primarily on the number of occurrences of the species within the state of Missouri. S1 = Critically imperiled in the state, S2 = Imperiled in the state, S3 = Rare and uncommon in the state.

Eastern collared lizard populations, natural communities and geologic features are recognized as sensitive biological resources and may also appear on this report.

HARDING ESE, INC.

HOWARD BEND FLOODPLAIN ENVIRONMENTAL IMPACT STATEMENT

Additional Information (continued):

Species of stream fishes spawn (lay and fertilize their eggs) during specific times of the year. Fish eggs are extremely vulnerable to localized habitat destruction and activities that cause excessive sediment loads which can smother fish eggs. High levels of chemical and organic pollutants can also negatively affect the proper development of fertilized fish eggs. Human activities that change the physical structure of rivers and streams, such as building impoundments or channelization (straightening streams), could negatively affect fish movement and distribution. All activities that alter, destabilize or destroy stream bottoms or banks should be avoided to prevent disrupting the spawning activities of stream fishes. In addition, avoid all activities that introduce chemical or organic pollutants to streams.

Please note the following information regarding Indiana bats (Federally endangered, State endangered) which may occur in the project area. Indiana bats roost and raise young under the bark of trees in riparian forests and upland forests near perennial streams. Favored roosts are large diameter (>9" dbh; best are >21" dbh) dead oaks and hickories, and living shagbark hickory. Other tree species such as elm, cottonwood, ash, and maple, if they have exfoliating bark, also may be used as roosts. Indiana bats especially need snags standing in openings, at edges, or where tree canopy is sparse. Projects should avoid or minimize the removal of potential roost trees from riparian zones or from woodlots within 0.6 mile of perennial streams or permanent water. If removal of potential roost trees is unavoidable, it should be done when Indiana bats are not likely to be present, i.e., between 15 September and 1 April. During the course of development, if possible, leave snags standing. Indiana bats feed upon terrestrial and aquatic insects; they preferentially forage in and around the canopy of riparian and floodplain forest, but also along forest/field edges and fencerows. Therefore, mature forest canopy should be enhanced and stream quality not degraded.

Public land in the project area:

August G. Beckemeier Conservation Area	Missouri Department of Conservation	Chesterfield Quadrangle
Louis H. Bangert Memorial Wildlife Area	Missouri Department of Conservation	St. Charles Quadrangle
Riverwoods Conservation Area	Missouri Department of Conservation	St. Charles Quadrangle

AMERICAN
RESOURCES
GROUP, LTD.

127 North Washington
Carbondale, IL 62901
Phone 618/529-2741
Fax 618/457-5070
e-mail: arg@midwest.net

October 10, 2002

MACTEC Engineering & Consulting
Attn: Bill Elzinga
3199 Riverport Tech Center Drive
St. Louis, MO 63043

Re: Revision of Howard Bend Report to Include Historical Data and Maps of Recorded Steamboat Wrecks.

Dear Bill:

Enclosed please find two copies of the above referenced report. We had to transfer the steamboat wrecks to our original maps as the copies we got were very poor quality. Also, enclosed is our billing for this work.

If you have any questions, please contact me. Thank you for your support.

Sincerely,

Mike

Michael J. McNerney
President

cal
enclosures

U.S. Environmental Protection Agency Region 7
Howard Bend Scoping Comments
February 26, 2003

Project Scope

Geographic

The cited legal mandate "Subpart r " narrowly focuses assessment of cumulative impacts to road construction projects (e.g. Page Avenue Extension) within St. Louis County. EPA recommends departing from this constraint in the cumulative impacts analysis for an area that is impacted by more than just highway construction projects.

The EPA recommends that the study area encompass the entire Missouri River floodplain from Earth City to Chesterfield Valley in St. Louis County, Missouri. Further, the EPA would like to see the inclusion of the left descending bank of the river from Weldon Spring to St. Charles, since significant development has occurred in those areas during the last 25 years.

Temporal

EPA believes that it is important to establish a baseline condition or a point in time where man-made modifications within the floodplain were not *the* significant driver for subsequent modifications. Issues to be analyzed to establish the baseline condition include:

- Estimates for property loss/damage due to erosion or river stage increase induced by levee projects
- Discussion of induced development and potential for catastrophic loss due to levee failure.
- Levee height escalation (costs and consequences).
- The EIS should forecast storm water run-off during peak storm events for the watershed(s), utilizing HEC series or equivalent stormwater models.
- Point and non-point source(s) should be mapped to determine the potential impacts associated with the ponding behind the levee system during storm events (need for water evacuation systems, construction code limitations...).

Effective Use of Previous Studies

The EPA strongly encourages that information relating to cumulative and secondary impacts from these previous EIS's be used in the Howard Bend EIS. These past studies prove relevant because they are similar in nature to Howard Bend, and could be used as a baseline or as an example of

actual post-implementation consequences. Section 1506.4 of the Council on Environmental Quality (CEQ) regulations for implementing NEPA specifically cites utilization of other documents for efficiency:

1504.6 Combining documents.
Any environmental document in compliance with NEPA may be combined with any other agency document to reduce duplication and paperwork.

Environmental Justice

Environmental justice communities (minority and/or low income) are frequently located within floodplains. Incremental "flood control" projects, fill activities, or other development within the floodplain have the potential to raise river stages to the degree that a disproportionate impact may be imparted to EJ communities. EPA recommends that the USACE evaluate the existence of low income and/or minority populations at a scale that is finer than census block data.

THE JONES COMPANY
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May 2, 2003

RECEIVED
MAY - 5 2003
PLANNING & ZONING

Mr. J. Wayne Oldroyd
City of Maryland Heights
212 Millwell Drive
Maryland Heights, Missouri 63043

RE: Mill Ridge Villas

Dear Mr. Oldroyd:

Some months back we met concerning a tract of ground within the City of Chesterfield located on the west side of Creve Coeur Mill Road at Amiot Drive. At the time, we discussed the potential roadway corridor for the connection of the Earth City Expressway to Route 141 at Olive Boulevard.

Please find enclosed a preliminary development plan for the property which incorporates a corridor for the future potential roadway. I am forwarding the plan for your review and comment. A petition for zoning approval to allow the Mill Ridge Villas project has been submitted to the City of Chesterfield. No hearing date has been set for that petition.

Thank you for your consideration in this matter. Please feel free to contact me at 636-537-7128 or jduepner@centexhomes.com.

Sincerely,

Jerry Duepner
The Jones Company Homes, LLC

JD:sd
Enclosure

cc: Michael Doster, Doster Mickes James & Ullom
George Stock, Stock & Associates